European Aviation Safety Agency

NOTICE OF PROPOSED AMENDMENT

# NPA 2011-20 (A)

RMT.0136 (ADR.001 (a)) & RMT.0137 (ADR.001 (b))

RMT.0140 (ADR.002 (a)) & RMT.0141 (ADR.002 (b))

RMT.0144 (ADR.003 (a)) & RMT.0145 (ADR.003 (b))

# Authority, Organisation and Operations Requirements for Aerodromes

## NPA 2011-20 (A) — Explanatory Note

## EXECUTIVE SUMMARY

*Purpose*

The purpose of this Notice of Proposed Amendment (NPA) is to introduce rules applicable to aerodromes. Regulation (EC) No 216/2008 as amended by Regulation (EC) No 1108/2009 (hereafter referred to as the 'Basic Regulation') included aerodromes and ATM/ANS into the European aviation safety regulatory system. The Basic Regulation mandated EASA with the task to develop Implementing Rules (IRs) applicable to aerodromes within a defined timeframe for the field of aerodrome safety.

*Scope*

As defined by the Basic Regulation the rules, apply to aerodromes which are open to 'public use', which serve commercial air transport and where operations using instrument approach or departure procedures are provided and:

- which have a paved runway of 800 metres or above; or
- exclusively serve helicopters[1].

*Discussion*

To enable the task to be completed, EASA established three working groups, which included representatives of National Aviation Authorities, aerodrome operators associations and other aviation industry associations (including those that represented the pilot and Air Navigation Services community). The working groups were created to develop the safety rules containing the detailed requirements with which related oversight authorities, aerodrome operator organisations, aerodrome design and operations have to comply with. The working groups were given the task of developing draft IRs and were further directed to develop Acceptable Means of Compliance (AMCs), Certification Specifications (CSs) and, where appropriate, Guidance Material (GM).

The working groups developed the rules within certain parameters, primarily that they must be closely based on the Standards and Recommended Practices (SARPs) contained in ICAO Annex 14, Volume 1, Aerodromes. With the draft rules proposed by this NPA, EASA followed closely the advice established by the aforementioned working groups.

As a result of this task, the Aerodrome rules are structured into three parts: 'Part Authority Requirements (AR)', 'Part Organisation Requirements (OR)' and 'Part Operational Requirements (OPS)'.

- **Part-AR** contains the requirements to be fulfilled by the competent authority. The part contains three sections, covering General Requirements, Management and Oversight, Certification and Enforcement.
- **Part-OR** contains the requirements to be fulfilled by the aerodrome operator. The part contains five sections covering General Requirements, Certification — Declaration, Operator Responsibilities, Management and Manuals.
- **Part-OPS** contains the requirements to be fulfilled by the aerodrome operator. The part contains three sections, covering Aerodrome Data, Aerodrome Operational Services, Equipment and Installations and Aerodrome Maintenance.

In addition to and in support of the aforementioned draft rules, EASA has produced a 'Book 1' of CSs for aerodrome design that will be used to construct the certification basis

[1] Rules applicable to heliports are not covered in this NPA.

as part of the certification process. A further 'Book 2' of GM to further describe the intent of the CSs has also been produced. Those books are forming also part of this NPA.

Throughout the drafting process, EASA has been particularly mindful of the flexibility needed to implement the rules and, as directed by the Basic Regulation, has devised means to allow Member States and aerodrome operators to propose alternative compliance means.

Additionally, EASA has recognised and developed measures that allow Member States to seamlessly convert their existing aerodrome certificates/licences, which are based on national aviation rules, into an aerodrome certificate issued in accordance with the Basic Regulation and its IRs. This process includes the option of accepting deviations from the European aerodrome design certification specifications when these have been in existence before the entry into force of the European CSs. The introduction of the Deviations Acceptance & Action Document (DAAD), unique to aerodromes, will enable this process to be applied and managed.

*Impact*

Member States, as signatories to the Chicago Convention of 1944, are obliged to adopt the SARPs contained within the Annexes to that Convention. Member States, as signatories to the Chicago Convention, are obliged to certify and oversee their aerodromes based on national legislation implementing the ICAO requirements. Within the EASA region, Member States have transferred to the European Union the power to legislate in the area of safety of aerodromes.

Therefore, as from the entry into force of the IRs, Member States will continue to certify and oversee their aerodromes, but in accordance with the Basic Regulation, its IRs and CSs. The European rules will introduce standard processes for certification and oversight, managing and operating aerodromes based on the spirit of flexibility and of continuity of certificates as explained above.

The level of impact of these changes will vary depending on how Member States have chosen to adopt the ICAO SARPs so far, and how they will make future use of their discretion in the application of the individual aerodrome certification process. Case studies have taken place with selected Member States in order to assess and to visualise the potential impact of the European rules. Results of the case studies are included in the Regulatory Impact Assessment (RIA) attached to this NPA. A summary of the RIA is included in the introduction of the NPA.

*Conclusion*

EASA has been conscious throughout the development and drafting of the rules for aerodromes that Member States are able to easily transit to the future rules and that obligations placed on the Member States and on the industry are not greater than those currently required by the ICAO SARPs. Equally, EASA has endeavoured to ensure the rules are easily understood and applied. It is anticipated that the adoption of the rules will lead to improved safety without creating undue burden or other adverse effect such as discontinuation of established and well working mechanisms.

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# A. Explanatory Note

## I. Introduction

1. Amended Regulation (EC) No 216/2008 (hereafter referred to as the 'Basic Regulation'), extended the responsibilities of the European Aviation Safety Agency (hereafter referred to as the 'Agency') to the areas of ATM/ANS and aerodromes. This new responsibility mandated the Agency to prepare draft safety rules for aerodromes as well as common rules for certification and oversight by the National Aviation Authorities (NAAs) in support of the European Commission. Proposed Implementing Rules contain the conditions for the issuance of certificates, the obligations and privileges of certificate holders and sanctions in case of non-compliance. Furthermore, the Agency would provide rules and guidelines regarding aerodrome Safety Management Systems (SMSs).

## II. Process and scope

2. The Agency[2] developed this Notice of Proposed Amendment (NPA) in line with the Rulemaking Procedure[3].

3. This rulemaking activity is included in the Agency's Rulemaking Programme for 2012 in line with the Rulemaking Procedure. It implements the rulemaking tasks RMT.0136 (ADR.001 (a)) & RMT.0137 (ADR.001 (b)) 'Requirements for aerodrome operator organisations and competent authorities'; RMT.0140 (ADR.002 (a)) & RMT.0141 (ADR.002 (b)) 'Requirements for aerodrome operations'; and RMT.0144 (ADR.003 (a)) & RMT.0145 (ADR.003 (b)) 'Requirements for aerodrome design'.

   The scope of this rulemaking activity is defined in the Terms of Reference (ToR) ADR.001, ADR.002 and ADR.003 as published on the Agency's website.

4. To support this, one of the standard working methods employed by the Agency involves the formation of rulemaking groups, composed of experts who are selected on the basis of their professional expertise, from among the National Aviation Authorities, industry and professions who assist the Agency to draft rules for a defined area.

5. As required by the ToRs, the Agency established rulemaking groups to support it in drafting the NPA in order to establish the new regulatory system for aerodromes by 2013, and it identified three initial tasks that needed to be achieved:

   - ADR.001 — Requirements for aerodrome operator organisations and competent authorities,
   - ADR.002 — Requirements for aerodrome operations,
   - ADR.003 — Requirements for aerodrome design.

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2 The Agency is directly involved in the rulemaking process. It assists the Commission in its executive tasks by preparing draft regulations for the implementation of the Basic Regulation, and amendments thereof, which are adopted as 'Opinions' [Article 19(1)]. It also adopts Certification Specifications, Acceptable Means of Compliance and Guidance Material to be used in the certification process and to facilitate the implementation of the Basic Regulation and its Implementing Rules [Articles 18(c) and 19(2)].

3 The Agency is bound to follow a structured rulemaking process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as the 'Rulemaking Procedure'. See Management Board Decision concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material (Rulemaking Procedure), EASA MB 08 2007, 13.6.2007.

*Note 1: Requirements for the certification of aerodrome equipment, as well as for the oversight of designers and producers of safety-critical aerodrome equipment will follow at a later stage jointly with the work to be done for specific ATM systems and constituents.*

*Note 2: The Agency did not undertake the development of safety rules for apron management services but later on will initiate a joint group with ATM[4].*

6. The text of this NPA has been developed by the Agency, based on the input of the aforementioned Rulemaking Groups ADR.001, ADR.002 and ADR.003. It is submitted for consultation of all interested parties in accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

7. There were no pre-existing EU rules for the safety of aerodromes. Therefore, as per Article 8a.6(a) of the Basic Regulation, the proposed future common aerodrome design and operations rules were developed primarily based on Annex 14, Volume 1, Aerodromes, to the Chicago Convention.

8. The rulemaking working groups were initially given the task of developing draft 'hard law' Implementing Rules as required by the Basic Regulation for adoption by the Commission before the 31st of December 2013. However, the Agency further took the early decision to deliver, where possible, the accompanying 'soft law' Acceptable Means of Compliance (AMC), Certification Specifications (CS) and Guidance Material (GM) to accompany the aforementioned Implementing Rules to help the NAAs, aerodrome operator organisations and other interested parties to implement and understand the rationale and therefore the impact the new Implementing Rules will place on them.

9. This NPA therefore includes a proposal for Implementing Rules (IRs), Acceptable Means of Compliance (AMC) and Certification Specifications (CSs) applicable to aerodromes which are open to 'public use', which serve commercial air transport and where operations using instrument approach or departure procedures are provided and:

   - which have a paved runway of 800 metres or above; or
   - exclusively serve helicopters.

10. Implementing measures for heliports (Annex 14, Volume II, Heliports) both in terms of stand-alone Instrument Flight Rule (IFR) heliports as well as Visual Flight Rules (VFRs) heliports co-located at certified aerodromes will be undertaken at a later stage. Until these Implementing Rules are in place, the respective national regulations will be applicable as far as they do not conflict with applicable EU rules.

## III. Overview of the rules proposed in this NPA

### *Comparison with ICAO*

11. ICAO Annex 14, Volume 1, Aerodromes (Fifth edition, July 2009), has been used as the baseline, but not exclusively, for all future European rules. Consideration of other ICAO annexes containing material appropriate for aerodrome application and responsibility has been taken into account. In order to conduct effective, efficient, and consistent transposition of the ICAO regulatory material into European rules (EU law), it is essential that there is a clear understanding of the ICAO and EASA rulemaking structures as well as the synergies and variances between them.

12. In order to understand the process the working groups employed while developing the European rules, it is important to appreciate that the terms 'transpose(d)' and

[4] However, some procedural rules related to those services are included in the proposed rules under organisation and authority requirements; however, due to the lack of substantial requirements for the provision of these services, certain articles will come into effect when the remaining rules have been adopted in the future (see Article 11 of the draft Regulation).

'transposition' are intended to mean consideration of the ICAO provisions, and where considered essential to safety, subsequent adaptation into the European rule structure. These terms are not intended to mean only 'copy-paste' from the ICAO provisions into the European regulations.

13. The three working groups used different approaches to the development of the European rules:

- ADR.003: For producing Certification Specifications (CSs), the working group used Annex 14[5] as the primary reference and transposed a high percentage to the SARPs regarding aerodrome design as CSs.
- ADR.002: Given the task of developing operational rules (IRs & AMCs), the working group typically used the case-by-case approach but the task was complicated by the application of the rules to the aerodrome operator, whereas the SARPs are directed at the State, and had to transpose material from a number of sources. Therefore, their material was a blend of the SARPs, contained in a number of annexes, designed to enable the reader to easily follow the application of the new rules and meet the intent of the original SARPs.
- ADR.001: This working group had the challenging task of developing novel authority and organisation rules. Given the absence of ICAO SARPs in most of these areas, the working group partially relied on material already produced by the Agency for other domains (OPS & FCL), and developed material based on best practice within the Member States and partner countries.

14. A common element within all working groups was the requirement to provide evidence of conformity of the European rules against the ICAO SARPs. A list of this conformity, indicating any differences and the justification, is included in this NPA.

15. The ICAO regulatory material has been approved in the form of Standards and Recommended Practices (SARPs).

- 'Standards' are those specifications where uniform application is necessary for the safety or regularity of international air navigation and to which contracting States will conform in accordance with the ICAO Convention. A 'standard' contains a statement specifying an obligation through the use of the verb 'shall'.
- 'Recommended practices' are specifications for which uniform application is desirable in the interest of safety, regularity or efficiency of international air navigation, and to which contracting States will endeavour to conform in accordance with the ICAO Convention. 'Recommended practices' use the verb 'should'.

16. EASA rulemaking on the other hand is promulgated as Implementing Rules (IRs), Acceptable Means of Compliance (AMCs), or Certification Specifications (CSs).

- IRs are binding in their entirety and are used to specify high and uniform level of safety and uniform conformity and compliance without variation.
- AMCs are non-essential and non-binding. AMCs serve as a means by which the requirements contained in the IRs can be met, hereby offering the benefit of presumption of compliance. However, applicants may decide to show compliance with the requirements using other means and may propose an alternative means of compliance, based, or not, on those issued by the Agency. These alternative means of compliance (AltMoC) must only be used when it is demonstrated that the safety objective set out in the Implementing Rules is met. When the competent authority uses an alternative means of compliance, it must notify the Agency.

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[5] ICAO Annex 14, Volume I, Aerodrome design and operations, fifth edition, July 2009, including Amendment 10.

- CSs are non-binding technical standards adopted by the Agency to meet the Essential Requirements (ERs) of Annex Va to the Basic Regulation. CSs are used to establish the certification basis (CB) as described below. An aerodrome operator may propose an Equivalent Level of Safety (ELoS) for a given CS that demonstrates how it meets the intent of that CS and hereby complies with the ER. Additionally, the aerodrome operator may propose an alternative when they feel the CS is inadequate or inappropriate for use at their aerodrome. This may result in the competent authority introducing a Special Condition (SC). SCs are special detailed technical specifications determined by the NAA for an aerodrome if the Certification Specifications established by the Agency are not adequate or are inappropriate to ensure conformity of the aerodrome with the ERs of Annex Va to the Basic Regulation. Such inadequacy or inappropriateness may be due to:

  — the design features of the aerodrome; or

  — where experience in the operation of that or other aerodromes, having similar design features, has shown that safety may be compromised.

  SCs, like CSs, become binding on an individual basis to the applicant as part of an agreed CB.

17. It can be seen that it is likely to be a synergy between what is an ICAO Standard and what is required for an IR, as both should be used to ensure uniform conformity without variation. Therefore, it is expected that Standards would normally be transposed as IR material; this would also result in the complementary ICAO/IR use of the verb ‘shall’.

18. In considering transposition of Recommended Practices (RPs), the rulemaking working groups have found it necessary to use a case-by-case approach to determine whether the RP contains a safety objective, in which case an AMC or CS would be the appropriate transposition. This would also result in the complementary use of the verb ‘should’. Additionally, some Recommended Practices may be more appropriate as GM, particularly for those provisions for which compliance cannot be measured.

19. In reflection of the above, the following overall lines were established:
    - the majority of the SARPs related to design were transposed into a CS;
    - everything else that implies an obligation for the aerodrome operator was transposed as an IR or AMC; and
    - a review of State Letters was performed to access the possible need to include the proposed change to the annexes in the rules.

20. Some ICAO SARPs are composed of a standard, supplemented by a recommendation detailing a stricter, additional requirement. The structure of European rules, however, does not come with a tool exactly mirroring the character of an ICAO recommendation. Therefore, the most appropriate solution to those cases was to transpose both the standard and the recommendation into one CS, and to adjust the wording in order to reflect the spirit of the recommendation accordingly. This goes especially in the case of the technical requirements for the Runway End Safety Area (RESA), where the proposed CS reflects fully identically the set of requirements emerging from the ICAO SARPs without implying any change or additional element.

***Certification process including the establishment of the certification basis (CB)***

21. The single most discussed subject during the development of the new Agency rules has been the establishment of the aerodrome certification basis and how it fits in with the certification process. Therefore, it is worth examining how an application for an aerodrome certificate/licence is processed today under national rules against the way it will be processed under the Agency rules. This exercise will highlight the slight differences, and many similarities, that exist between them.

22. Currently, following ICAO Standards, an application for an aerodrome certificate/licence is made in writing to the appropriate NAA with a map showing the aerodrome location/boundaries and a copy of the aerodrome manual.

23. Before a certificate/licence is granted, the NAA will require to be satisfied that the physical conditions on the manoeuvring area, apron and in the surroundings of the aerodrome are acceptable, and that the scale of equipment and facilities provided are adequate for the flying activities which are expected to take place. The criteria which will be applied in making this assessment are described in the NAA transposition of ICAO Annex 14, Volume 1, Aerodromes. The NAA will also require to be satisfied that the applicant has an effective Safety Management System and, in those activities which are related to the safe operation of the aerodrome, provides staff who are competent and, where necessary, suitably qualified.

24. An element of the process described above will require the NAA to visit the aerodrome to determine the extent to which the aerodrome, its facilities, equipment and organisation meet the certification/licensing requirements.

25. The issued certificate/licence will normally remain in force until suspended or revoked, but may be issued for a limited period depending on the procedures employed by the NAA.

26. In the future, the issuance of an aerodrome certificate may be a two-stage process. The first stage is to establish the certification basis (CB) using:

- the applicable Certification Specifications (CSs);
- any Equivalent Level of Safety (ELoS) proposed by the applicant; and
- any Special Conditions (SCs) determined by the competent authority.

Once the first stage is established, the second stage involves assessing the aerodrome operator's ability to meet the requirements of the Basic Regulation [the Essential Requirements (ERs) and Implementing Rules (IRs)]. This is achieved by using a combination of discussion, aerodrome inspections and validation of the aerodrome manual.

The competent authority will issue the certificate(s) when:

- the applicant has shown that the aerodrome complies with the agreed CB;
- the aerodrome has no features or characteristics making it unsafe for operation;
- it has approved the aerodrome manual submitted by the operator; and
- the aerodrome operator has demonstrated, to the satisfaction of the competent authority, compliance with the applicable requirements of the ERs and IRs and any other applicable requirements that have been notified by the competent authority.

27. The certificate will be issued for an unlimited duration. The privileges and the scope of the activities that the aerodrome operator is approved to conduct will be specified in the terms of approval attached to the certificate.

28. Where the owner and operator of the aerodrome are the same entity, this process may be achieved under a single stage involving an iterative process between the aerodrome operator and the NAA throughout, leading to the issuance of the certificate.

29. According to the Basic Regulation, the European Parliament and the Council had anticipated that the process described above would be unsuitable for the assessment of existing certified aerodromes. They recognised that existing aerodromes have operated safely under their national rules based on ICAO Annex 14, in some cases, for a considerable number of years, and that appropriate measures will be needed to ensure adequate continuity for those aerodromes. Therefore, to reduce the impact the new EU rules may have on existing aerodromes, as directed by the European Commission, the Agency has developed conditions and measures described in the following section.

***Conversion and acceptance measures***

30. Article 8a(5)(g) of the Basic Regulation mandated the Agency to propose the conditions for the **acceptance** and for the **conversion** of aerodrome certificates issued by Member States, including measures which are already authorised by the Member State concerned on the basis of notified deviations from Annex 14 to the Chicago Convention before the entry into force of this Regulation.

31. Conversion: A period of 48 months is proposed to allow Member States to convert their existing aerodrome certificates/licences into aerodrome certificates considered to be issued under the Basic Regulation. It relates to the dimension of time only and not to the process involved in converting the old certificate to the new one.

32. Acceptance: The major change following the introduction of the measures is the ‘acceptance’ process involved in converting the existing certificate/licence. It gives the NAA the option to transfer the conditions of the existing certificate/licence to the new certificate subject to certain requirements. It is expected that existing deviations will be jointly reviewed during the acceptance procedure and compared with the new rules. The procedure may result in some items transferring to an ELoS, some to an SC, and those that remain may be included in a document, informally referred to as ‘Deviation Acceptance & Action Document’ (DAAD)[6]. This mechanism is described in Article 7 of the draft Regulation. This document will involve a safety assessment that supports the continued deviation and will be accompanied with a possible action plan that indicates the conditions appropriate to removing them and/or any possible mitigation measures while they remain on the list. Once agreed, the DAAD will be attached to the new certificate, possibly with caveats requiring review obligations. Unlike the conversion, the DAAD action plan is not time-bound. It should be noted that the Agency will take no part in the acceptance process; it is purely an action between the NAA and the aerodrome.

33. This mechanism is designed to keep the acceptance procedure simple and the use of the DAAD will avoid any undue burden on NAAs and aerodromes during the acceptance process and ensure continuity of the aerodrome operation.

34. As described above, the acceptance process is designed to allow aerodromes to easily convert their existing aerodrome certificates/licences to a new one based on the EU rules. The DAAD option has been developed to support this acceptance process only. It is not intended for the DAAD to be used in any other circumstances. It should be produced jointly by the NAA and the aerodrome to document those existing deviations and non-compliances that remain after reviewing them with the new aerodrome rules.

35. It is intended that the DAAD will be individual to each aerodrome.

36. Further to the procedures described above, consideration has also been given to defining the conditions that require an aerodrome operator to notify the NAA of changes once the certificate has been issued. The Agency has recognised that NAA approval for all changes would be both cumbersome and counterproductive to the management of the aerodrome. To enable an aerodrome operator to implement changes without prior competent authority approval in accordance with ADR.OR.B.040, the competent authority shall approve a procedure submitted by the aerodrome operator defining the scope of such changes and describing how such changes will be managed and notified.

[6] Article 7 of the draft Regulation contains the deviation mechanism from the Certification Specification requirements.

### Structure of rules

37. The proposed aerodrome (ADR) rules are structured into three parts: 'Part Authority Requirements (AR)', 'Part Organisation Requirements (OR)' and 'Part Operational Requirements (OPS)'.

38. Part-AR contains the requirements to be fulfilled by the competent authority. The part contains three sections covering *General Requirements, Management and Oversight and Certification and Enforcement*. It includes (Annex I):

    - the requirements for the competent authorities' management systems;
    - the procedure for reviewing and accepting a proposed applicable aerodrome certification basis submitted by an applicant;
    - the conditions for a decision to grant exemptions foreseen in Article 4.3b of the Basic Regulation;
    - the approval process for the aerodrome manual defining aerodrome particulars, services and operations;
    - the authority requirements for the issuing, maintaining, amending, suspending or revoking certificates for aerodromes and aerodrome operators as applicable in a Member State;
    - measures and provision of details for the acceptance and the conversion of existing aerodrome certificates issued by the EASA Member States;
    - the authority requirements in relation to continuing safety oversight of aerodromes, their operations and services and the aerodrome operators;
    - the conditions under which operations shall be prohibited, limited or shall be subject to certain conditions in the interest of safety.

39. To supplement the requirements as per Part-AR, this NPA includes the draft Decision 201X/XXX/R detailing related AMC and GM.

40. Part-OR contains the requirements to be fulfilled by the aerodrome operator. The part contains five sections covering *General Requirements, Certification — Declaration, Operator Responsibilities and Management and Manuals*. It includes (Annex II):

    - the conditions for operating an aerodrome in compliance with the ERs of Annex Va and, if applicable, Annex Vb to the Basic Regulation;
    - the eligibility criteria, responsibilities and privileges of an aerodrome operator organisation;
    - the requirements for an aerodrome management system, containing the Safety Management System;
    - the process for the development and the content of the aerodrome manual and the requirements to operate the aerodrome in accordance with it;
    - in collaboration with group ADR.002, the aerodrome operational services, detailed related competences, procedures and obligations of the provider of those services;
    - the responsibilities of the aerodrome operator and third parties providing aerodrome operational services, including procedures for the aerodrome operator's monitoring and supervision of third parties' operations on the movement area.

41. To supplement the requirements as per Part-OR, this NPA includes the draft Decision 201X/XXX/R detailing related AMC and GM.

42. Part-OPS contains the requirements to be fulfilled by the aerodrome operator. The part contains three sections covering *Aerodrome Data, Aerodrome Operational Services, Equipment and Installations and Aerodrome Maintenance.* It includes (Annex III):

- requirements and processes for the safe operations of aerodromes, including aerodrome maintenance;
- requirements and processes for safe aerodrome operational services, regardless of whether the aerodrome operator or a third party is providing them;
- requirements for the safety of aircraft-related ground operations provided on the movement area.

43. To supplement the requirements as per Part-OPS, this NPA includes the draft Decision 201X/XXX/R detailing related AMC and GM.
44. To support the introduction of the rules mentioned above, the Agency has included two additional books detailing the CSs required to construct the CB and a book of Guidance Material (GM) to describe the application of the CSs in more detail.
45. These specifications prescribe the physical characteristics and obstacle limitation surfaces to be provided for at aerodromes, and certain facilities normally provided at an aerodrome. It is not intended that these specifications will limit or regulate the operation of an aeroplane.
46. To a great extent, the specifications for individual facilities have been interrelated by a reference code system, described in this Regulation and by the designation of the type of runway for which they are to be provided as specified in the definitions. This doesn't only simplify the reading of this Regulation, but it provides in most cases for efficiently proportioned aerodromes when the specifications are followed.
47. This Regulation sets forth the minimum aerodrome specifications for aircraft which have the characteristics of those which are currently operating or for similar aircraft that are planned for introduction. Accordingly, any additional safeguards that might be considered appropriate to provide for more demanding aircraft are not taken into account. Such matters are left to the appropriate competent authority to evaluate for each particular aerodrome.
48. It is to be noted that the specifications for category II and III precision approach runways are only applicable to runways intended to be used by aeroplanes in code numbers 3 and 4.
49. The CSs do not include specifications relating to the overall planning of aerodromes (such as separation between adjacent aerodromes or capacity of individual aerodromes), impact on the environment, or to economic and other non-technical factors that need to be considered in the development of an aerodrome.
50. Book 1 contains the CSs for Aerodrome Physical Characteristics. It includes:
    - the design of the infrastructure;
    - the location of the infrastructure;
    - the performance requirements of the infrastructure;
    - marking of the infrastructure; and
    - lighting associated with the infrastructure.
51. Book 2 contains the Guidance Material to support Book 1.

## IV. Regulatory Impact Assessment summary[7]

Aerodromes national requirements have been increasingly diverging over the years due to differences in the application of ICAO Annex 14. As a consequence, those different requirements can be interpreted in different ways, creating a difficult operational environment for flight crews. Currently there are no imminent aerodrome safety issues known. However, traffic forecasts indicate an increase from 10 million commercial flights in 2010 to a peak of 15–21 million in 2030 (EUROCONTROL). This traffic increase could lead to safety challenges in the absence of a common approach to safety at aerodrome level. This is referred in the RIA as the ‘baseline scenario’.

### *Challenges*

In response to the challenges described above, Regulation (EC) No 1108/2009 provides the basic framework for the development of European Implementing Rules for aerodromes which should address the following issues:

1. Provision of a standardised interpretation of ICAO Annex 14 requirements and other technical requirements to maintain the current high safety level at airports with the future increase of airlines traffic.
2. Development of common requirements for the certification process of European aerodromes ensuring smooth conversion of the national aerodrome certificates without disruption.

*Note: 605 aerodromes fall under the scope of Regulation (EC) No 1108/2009; 429 aerodromes are above the threshold of 10 000 commercial passengers per year, and a minimum of 151 aerodromes are under this threshold[8], where they can be exempted from the European rules for aerodrome safety.*

*Note: Aerodrome certification was introduced 10 years ago in ICAO Annex 14. 78 % of the aerodromes in Europe above 10 000 passengers per year have a national certificate; the remaining 22 % will be certified in the near future (most of them before 2015). On the contrary, only 53 % of the aerodromes below the mentioned exemption threshold will be certified. Member States may exempt these aerodromes from the application of the draft ADR rules.*

### *Objective*

The objectives of the draft aerodromes (ADR) Implementing Rules are:

- to ensure that the flexibility required by the Basic Regulation on the conversion of national certificates is achieved;
- to ensure that the authority and organisation requirements can be integrated at NAAs and aerodrome level in a timely manner; and
- to define common requirements for aerodrome design and operation ensuring adequate level of aviation safety.

[7] The full Regulatory Impact Assessment can be found in Appendix D (NPA 2011-20 (D)).

[8] These 159 aerodromes include 5 military aerodromes open for commercial traffic. 2 aerodromes are not yet in one of these categories due to insufficient information.

### *Development of options to meet the objectives*

The development of the options to meet the objectives led to two alternatives to be compared with the baseline scenario (Option 0).

Option 1 — The pragmatic approach

Technical harmonisation

The ICAO Standards and Recommended Practices have to be evaluated on a case-by-case basis and be transposed into European law at the appropriate level: Certification Specifications, Implementing Rules, Acceptable Means of Compliance and Guidance Material.

Certification process

If compliance with the new European CSs or the IRs is not met at an aerodrome an Equivalent Level of Safety (ELoS) with mitigation measures or a Special Condition (SC) may be applied to this airport due to its unusual environment.

If an existing aerodrome deviation from design CS could not be justified by using an ELoS or SC, the Member State would only have the remaining solution to send a derogation request to the European Commission (Article 14.6 of the Basic Regulation).

Option 2 — The pragmatic approach with additional flexibility

Technical harmonisation is identical to option 1.

Certification process

In case the certification process described in option 1 reveals some insufficiencies regarding the objective of flexibility (i.e. examples of deviations versus a CS or IR which cannot be justified with an ELoS or a Special Condition), there is the opportunity to develop additional processes to meet the flexibility enshrined in the Basic Regulation and in the safety objective.

To address this case of non-flexibility and to avoid the derogation process, a process leading to a document informally referred to as ‘Deviation Acceptance & Action Document’ (DAAD) was developed to justify existing deviations. The DAAD requires, as a minimum, a safety assessment to indicate how the situation at the airport (including mitigation measures) satisfies the Essential Requirements (ERs) of Annex Va to the Basic Regulation.

### *Applied methodology*

Having in mind the objectives, the impacts of the rules cannot be directly assessed because it all depends on their application and on making use of their flexibility. The most appropriate methodological approach was therefore to perform case studies on a sample of NAAs and airports to provide examples of the projected application of the rules to assess their impacts.

The global outcome is a qualitative assessment of the different impacts: safety, environmental, social, economic, proportionality issues, and regulatory harmonisation.

### *Analysis of impacts*

*Outcome of the case studies*

The case studies have shown how the certification process will be flexible in handling deviations from European rules and providing a mechanism to manage safety during the conversion period. However, this process will require resources to identify and manage deviations and carry out actions to mitigate safety risks. The resources required will depend on the scale of such deviations and a proportionate approach will be necessary.

There is not always one way to demonstrate compliance with the draft aerodrome rules. The fundamental outcome of the case study exercise is that it has been always possible to use one of the 'flexibility' tools to justify compliance with the draft aerodrome rules, providing that at least a safety assessment was or will be performed.

It was found that half of the deviations discussed for the selected aerodromes can be easily justified with the current actions already under development or planned by the aerodrome operator. The remaining half of the deviations would require a safety assessment which should not involve additional extensive studies during the conversion process[9].

*Analysis per type of impacts*

The options were assessed on several types of impacts: safety, environment, social, economic, proportionality issues, and regulatory harmonisation.

The safety challenges are addressed by option 2 which allows a smooth conversion of the existing national certificate with the adequate consideration to flexibility (thanks to the DAAD), while option 1 delivers slower benefits due to the potential risks of derogation treatments.

Environmental impacts are not relevant for these draft aerodrome rules.

There are no social risks in terms of negative impacts for economic regional development with option 2. On the contrary, in case of derogation request with option 1, the risks of suspension of airport operation would threaten the economic viability of aerodrome operators (and more particularly smaller ones). This would have potential detrimental impacts on regional development.

Option 2 ensures that economic resources are efficiently used by avoiding time spent on justification of derogations which would occur with Option 1. The additional flexibility introduced by Option 2 also allows proportionate rules for smaller aerodromes. Proportionate rules have been ensured by following the ICAO breakdown according to different types of aerodromes. SMS requirements were tailored to the size of aerodrome operators.

Both options are a key step for a smooth aerodrome certification harmonisation of 31 European countries with requirements most identical to ICAO Annex 14. Europe will more effectively coordinate the development of ICAO SARPs.

### *Conclusion*

Option 2 combines a pragmatic approach with additional flexibility and thus ensures that the objectives defined above are met.

9 Based on the information gathered during the case study exercise.

### Monitoring

Developing rules is one activity; making sure that they are correctly applied is another one. In the case of the draft aerodrome rules, the wide scope of these rules and their flexibility could be factors for misunderstanding unless training is provided and monitoring supports the identification of raising concerns.

## V. Guidance to the reader

The following section (B — Draft Opinions and Decisions) contains the Implementing Rules (IRs) for competent authorities and aerodrome operators as well as the underpinning material, available at this stage, to add definition to the higher IRs level.

As a result of providing the reader with this additional material to help them get the full picture of the proposed aerodrome safety regulation, this NPA is large and appears complex too. The number of pages and the highly technical content cannot be avoided as it is necessitated by the use of existing regulatory material as a basis, particularly Annex 14, Volume 1, to the Chicago Convention.

The readers' comments, however, are crucial for the improvement of the draft proposal. In order to ensure the involvement of the highest professional and expert knowledge in the process, the draft rule has included some features — unique to this NPA — to help achieve that goal. Therefore, to overcome the apparent complexity of this NPA, several technical attributes were designed and incorporated to facilitate the reading, comprehension and commenting of the proposed rules.
Particular attention has been paid to improve transparency and to provide a visible structure of the document.

The cross-referencing of the proposed rules to existing material is crucial and is facilitated by the following:

At the end of every proposed rule, an indication is made to inform the reader about the origin of the individual rule. This provides direct and easy information as to whether the rule is identical, altered, deleted or moved to GM, revised or in addition to ICAO SARPs or proposals established by the working groups. This is indicated by the following examples:

*Where the Rule is the same as the **ICAO** SARP:*

**ADR.OPS.000 — Access to the movement area** ***ICAO***

No additional information is required.

*Where the NPA **text** differs marginally from the ICAO SARP mainly for editorial reasons, without changing meaning:*

**ADR.OPS.000 — Aerodrome works safety** ***TXT***

Followed by a description of the alteration; e.g. order of the text within a sentence, paragraph or section; use of a different word or phrase.

*Where the NPA text proposes to **delete** or **move** the ICAO SARP, either in its entirety:*

**ADR.A.000 — Choice of maximum permissible crosswind components** ***DEL or MOVE to GM***

Followed by the rationale for deletion or move to GM.

*Where the NPA text presents a **revision** of the working group text:*

**ADR.A.000 — Approach slope and elevation setting of light units (for PAPI and APAPI)** ***REV***

Followed by a description of the revised text, figure or table; e.g. if any of the above actions has been taken without providing justification.

**Note: By default, and if not indicated 'REV', the NPA text follows the Working Group proposal.**

*Where the NPA text presents an addition to the ICAO SARP:*

**ADR.A.000 — Aiming point marking** ***ADD***

Followed by the additional text, table or figure.

Furthermore, Chapter C lists the differences proposed and provides respective explanation to the proposed change. It is suggested that this chapter is read concurrently with the proposed rules described above.

In addition to all the above, the layout of each page will clearly show which Annex, Part and Sub-part it is located in so that the readers can easily identify where they are within the NPA.

The Agency hopes that these features will be found to be instrumental in creating the most conducive basis for the readers' understanding of the rules and to allow for the development of a considered contribution for improvement. However, to help the reader further understand the intent of the regulations, additional information has been provided in the form of Frequently Asked Questions (FAQ) located on the Aerodromes/ATM section of the Agency's website. In addition to those FAQ, to test the results of this work and to ensure the rules developed by the group could be implemented, the Aerodrome Rulemaking Section undertook a simulation exercise to create a Certification Basis (CB) for an existing yet fictitious certified aerodrome. To ensure the exercise covered all the known alternative measures available to an NAA undertaking the exercise in the future, the Rulemaking Section developed its own model aerodrome, known as 'Kolndorf' to use as a basis for the exercise. The report of this simulation exercise can also be found on the Aerodromes/ATM Section of the Agency's website.

## VI. How to comment on this NPA

52. Comments to this NPA may be submitted to the Agency within 3 months as of the date of publication in accordance with Article 6(4) of the Rulemaking Procedure.

53. Comments should be submitted by one of the following methods:

**CRT:** Submit your comments using the Comment Response Tool (CRT) available at **http://hub.easa.europa.eu/crt/**.

**E-mail:** Comments can be sent by e-mail **only** in case the use of the CRT is prevented by technical problems. The(se) problem(s) should be reported to the CRT webmaster and comments should be sent by e-mail to NPA@easa.europa.eu.

**Correspondence:** If you do not have access to the Internet or e-mail, you can send your comments by regular mail to:

European Aviation Safety Agency (EASA)
Rulemaking Directorate
R.6 — Process Support Department
Postfach 10 12 53
D-50452 Cologne

The deadline for submission of comments is **31 March 2012**. Comments received after this date may not be taken into account.

## VII. Next steps

54. Following the closing of the NPA consultation, the Agency will consider all comments and will publish a Comment Response Document (CRD). The CRD will be available on the Agency's website and in the Comment Response Tool (CRT).

55. Following the CRD publication, the Agency performs a final review and publishes the Opinion and/or Decision in due course.

# B. Proposed rules

## I. Draft Implementing Rule (see NPA 2011-20 (B.I))

*a. Draft Commission Regulation*

*b. Annex I — Part-AR*

*c. Annex II — Part-OR*

*d. Annex III — Part-OPS*

## II. Draft Acceptable Means of Compliance and Guidance Material (AMC/GM) (see NPA 2011-20 (B.II))

*a. AMC/GM to Annex I — Part-AR*

*b. AMC/GM to Annex II — Part-OR*

*c. AMC/GM to Annex III — Part-OPS*

## III. Draft Certification Specifications (CSs) (see NPA 2011-20 (B.III))

*a. CS-ADR-DSN Book 1*

*b. CS-ADR-DSN Book 2*

# C. Cross reference tables (see NPA 2011-20 (C))

*a. Cross references and Explanation to Annex I — Part-AR*

*b. Cross references and Explanation to Annex II — Part-OR*

*c. Cross references and Explanation to Annex III — Part-OPS*

*d. Cross references and Explanation to CS-ADR-DSN Book 1*

# D. Regulatory Impact Assessment (see NPA 2011-20 (D))

European Aviation Safety Agency

**NOTICE OF PROPOSED AMENDMENT**

# NPA 2011-20 (B.I)

RMT.0136 (ADR.001 (a)) & RMT.0137 (ADR.001 (b))

RMT.0140 (ADR.002 (a)) & RMT.0141 (ADR.002 (b))

RMT.0144 (ADR.003 (a)) & RMT.0145 (ADR.003 (b))

# Authority, Organisation and Operations Requirements for Aerodromes

## NPA 2011-20 (B.I) — Draft Implementing Rules

COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, …
C

Draft

**COMMISSION REGULATION (EU) No …/…**

**of […]**

**laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council**

**(Text with EEA relevance)**

Draft

**COMMISSION REGULATION (EU) No …/…**

**of […]**

**laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council**

THE COMMISSION OF THE EUROPEAN UNION,

Having regard to the Treaty on the functioning of the European Union,

Having regard to Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC[1], amended by Regulation (EC) No 1108/2009 of the European Parliament and of the Council of 21 October 2009[2], and in particular Article 8a(5) thereof,

Whereas:

(1) Regulation (EC) No 216/2008 aims at establishing and maintaining a high uniform level of civil aviation safety in Europe. That Regulation provides for the means of achieving that objective and other objectives in the field of civil aviation safety.

(2) The implementation of Regulation (EC) No 216/2008 requires the establishment of more detailed Implementing Rules, in particular concerning the safety regulation of aerodromes, in order to maintain a high uniform level of civil aviation safety in Europe while pursuing the objective of an overall improvement in aerodrome safety.

(3) Aerodromes and aerodrome equipment as well as the operation of aerodromes shall comply with the essential requirements set out in Annex Va and, if applicable, Annex Vb. According to Regulation (EC) No 216/2008, a certificate shall be required in respect of each aerodrome; compliance with the certification basis and the Implementing Rules should mean that the essential requirements set out in Annex Va and, if applicable, Annex Vb have been

[1] OJ L 79, 13.3.2008, p. 1.

[2] OJ L 309, 24.11.2009, p. 51.

complied with; the certificate and certification of changes to that certificate shall be issued when the applicant has shown that the aerodrome complies with the aerodrome certification basis; organisations responsible for the operation of aerodromes shall demonstrate their capability and means to discharge the responsibilities associated with their privileges.

(4) These capabilities and means shall be recognised through the issuance of a single or separate certificate if the Member State where the aerodrome is located so decides. The privileges granted to the certified organisation and the scope of the certificate, including a list of aerodromes to be operated, shall be specified in the certificate.

(5) Regulation (EC) No 216/2008 requires the European Commission to adopt the necessary Implementing Rules for establishing the conditions for the design and safe operation of aerodromes referred to in Article 8a(5) before 31 December 2013. This Regulation provides for those Implementing Rules.

(6) In order to ensure a smooth transition and a high level of civil aviation safety in the European Union, the Implementing Rules should reflect the state of the art and the best practices in the field of aerodromes; take into account the applicable International Civil Aviation Organisation (hereinafter referred to as 'ICAO') Standards and Recommended Practices; and worldwide aerodrome operation experience, and scientific and technical progress in the field of aerodromes; be proportionate to the size, traffic, category and complexity of the aerodrome and nature and volume of operations thereon; provide for the necessary flexibility for customised compliance; and cater for the cases of aerodrome infrastructure which has been developed, prior to the coming into force of this Regulation, in accordance with the different requirements contained in the national legislations of the Member States.

(7) It is necessary to provide sufficient time for the aerodrome industry and Member State administrations to adapt to the new regulatory framework and to verify the continued validity of certificates issued before the applicability of this Regulation.

(8) Member States should ensure, as far as practicable, that any aerodromes controlled and operated by the military and open to public use offer a level of safety that is at least equivalent to the level required by the essential requirements set out in Annex Va and Vb to Regulation (EC) No 216/2008. Therefore, Member States may also decide to apply this Regulation to said aerodromes.

(9) Member States may decide to exempt from the provisions of Regulation (EC) No 216/2008 an aerodrome which handles no more than 10 000 passengers per year and handles no more than 850 movements related to cargo operations per year. However, said aerodrome and the operation thereon should be expected to comply with the general safety objectives of Regulation (EC) No 216/2008and any other rule of European Union law. Therefore, Member States may also decide to apply this Regulation to said aerodromes.

(10) Requirements for heliports (Annex 14, Volume II, Heliports) both in terms of stand-alone Instrument Flight Rule (IFR) heliports as well as Visual Flight Rules (VFR) heliports co-located at certified aerodromes will be undertaken at a later stage. Until these Implementing Rules are in place, the respective national regulations should be applicable, to the extent they do not conflict with applicable Community rules.

(11) Requirements for the certification of aerodrome equipment, as well as for the oversight of designers and producers of safety-critical aerodrome equipment, should follow at a later stage jointly with the work to be done for specific ATM systems and constituents.

(12) Requirements for apron management services should follow at a later stage, to be developed jointly with ATM and aerodrome experts, and thus certain articles of this Regulation should come into effect when such requirements for apron management services have been adopted.

(13) The measures provided for in this Regulation are based on the Opinion issued by the EASA (hereafter referred to as the 'Agency') in accordance with Articles 17(2)(b) and 19(1) of Regulation (EC) No 216/2008.

(14) The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 65 of Regulation (EC) No 216/2008,

HAS ADOPTED THIS REGULATION:

*Article 1*

**Subject matter**

1. This Regulation and its Annexes lay down detailed rules for the uniform implementation of Regulation (EC) No 216/2008 and its Implementing Rules in the area of aerodromes.

2. This Regulation and its Annexes also lay down detailed rules on the conditions:

   (a) for establishing and notifying to the applicant the certification basis applicable to an aerodrome;

   (b) for issuing, maintaining, amending, limiting, suspending or revoking certificates for aerodromes, certificates for organisations responsible for the operation or aerodromes, including operating limitations related to the specific design of the aerodrome;

(c) the conditions for operating an aerodrome in compliance with the essential requirements set out in Annex Va and, if applicable, Annex Vb to Regulation (EC) No 216/2008;

(d) the responsibilities of the holders of certificates;

(e) the conditions for the acceptance and for the conversion of existing aerodrome certificates issued by Member States;

(f) the conditions for the decision not to permit exemptions referred to in Article 4(3b) of Regulation (EC) No 216/2008, including criteria for cargo aerodromes, the notification of exempted aerodromes and for the review of granted exemptions;

(g) the conditions under which operations shall be prohibited, limited or subject to certain conditions in the interest of safety;

(h) certain conditions and procedures for the declaration by and for the oversight of service providers referred to in paragraph 2(e) of Article 8a of Regulation (EC) No 216/2008.

*Article 2*

**Definitions**

For the purpose of this Regulation, the following definitions shall apply:

'Acceptable Means of Compliance (AMC)' are non-binding standards adopted by the Agency to illustrate means to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules.

'Accelerate-stop distance available (ASDA)' means the length of the take-off run available plus the length of the stopway, if provided.

'Aerodrome' shall mean a defined area (including any buildings, installations and equipment) on land or water or on a fixed, fixed offshore or floating structure intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

'Aerodrome equipment' shall mean any equipment, apparatus, appurtenance, software or accessory, that is used or intended to be used to contribute to the operation of aircraft at an aerodrome.

'Aeronautical ground light' means any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.

'Aircraft movement' means either a take-off or landing.

'Aircraft stand' means a designated area on an apron intended to be used for parking an aircraft.

'Aircraft stand taxilane' means a portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.

'Alternative means of compliance' are those that propose an alternative to an existing Acceptable Means of Compliance or those that propose new means to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules for which no associated Acceptable Means of Compliance have been adopted by the Agency.

'Approved (by the competent authority)' means formally agreed or authorised by the competent authority.

'Apron' means a defined area intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

'Apron management service' means a service provided to manage the activities and the movement of aircraft and vehicles on an apron.

'Apron taxiway' means a portion of a taxiway system located on an apron and intended to provide a through taxi-route across the apron.

'Audit' means a systematic, independent and documented process for obtaining evidence and evaluating it objectively to determine the extent to which requirements are complied with.

'Instrument runway' means one of the following types of runways intended for the operation of aircraft using instrument approach procedures:

1. Non-precision approach runway. An instrument runway served by visual aids and a non-visual aid providing at least directional guidance adequate for a straight-in approach.

2. Precision approach runway, category I. An instrument runway served by non-visual aids and visual aids, intended for operations with a decision height not lower than 60 m (200 ft) and either a visibility not less than 800 m or a runway visual range not less than 550 m.

3. Precision approach runway, category II. An instrument runway served by non-visual aids and visual aids intended for operations with a decision height lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 300 m.

4. Precision approach runway, category III. An instrument runway served by non-visual aids and visual aids to and along the surface of the runway and:

   A — intended for operations with a decision height lower than 30 m (100 ft), or no decision height and a runway visual range not less than 175 m;

B — intended for operations with a decision height lower than 15 m (50 ft), or no decision height and a runway visual range less than 175 m but not less than 50 m;

C — intended for operations with no decision height and no runway visual range limitations.

'Certification Specifications' are technical standards adopted by the Agency indicating means to show compliance with the essential requirements of Annex Va and, if applicable, Annex Vb to Regulation (EC) No 216/2008.

'Continuing oversight' means the tasks to be conducted to verify that the conditions under which a certificate has been granted continue to be fulfilled at any time during its period of validity, as well as the taking of any safeguard measure.

'Dangerous goods' means articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Technical Instructions.

'Data quality' means a degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity.

'Declared distances' means:

— 'Take-off run available (TORA)',

— 'Take-off distance available (TODA)',

— 'Accelerate-stop distance available (ASDA)',

— 'Landing distance available (LDA)'.

'Flight information service' shall mean a service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

'Human factors principles' means principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

'Human performance' means human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

'Inspection' means an independent documented conformity evaluation by observation and judgement accompanied as appropriate by measurement, testing or gauging, in order to verify compliance with applicable requirements.

'Landing distance available (LDA)' means the length of runway which is declared available and suitable for the ground run of an aeroplane landing.

'Low visibility procedures' means procedures applied at an aerodrome for the purpose of ensuring safe operations during lower than Standard Category I, other than Standard Category II, Category II and III conditions.

'Lower than Standard Category I operation' means a Category I instrument approach and landing operation using Category I Decision Height, with an RVR lower than would normally be associated with the applicable Decision Height but not lower than 400 m.

'Obstacle' means all fixed (whether temporary or permanent) and mobile objects, or parts thereof that:

— are located on an area intended for the surface movement of aircraft; or

— extend above a defined surface intended to protect aircraft in flight; or

— stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

'Manoeuvring area' means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

'Movement area' means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft consisting of the manoeuvring area and the apron(s).

'Non-instrument runway' means a runway intended for the operation of aircraft using visual approach procedures.

'Other than Standard Category II operation' means a precision instrument approach and landing operation using ILS or MLS where some or all of the elements of the precision approach Category II light system are not available, and with:

— Decision Height (DH) below 200 ft but not lower than 100 ft; and

— Runway Visual Range (RVR) of not less than 350 m.

'Paved runway' means a runway with a hard surface that is made up of engineered and manufactured materials bound together so it is durable and either flexible or rigid.

'Rapid exit taxiway' means a taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimising runway occupancy times.

'Take-off distance available (TODA)' means the length of the take-off run available plus the length of the clearway, if provided.

'Take-off run available (TORA)' means the length of runway declared available and suitable for the ground run of an aeroplane taking off.

'Taxiway' means a defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

— aircraft stand taxilane,

— apron taxiway,

— rapid exit taxiway.

'Technical Instructions' means the latest effective edition of the *Technical Instructions for the Safe Transport of Dangerous Goods by Air*, including the

Supplement and any Addenda, approved and published by the International Civil Aviation Organisation.

'Runway visual range (RVR)' means the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

'Safety management system' means a systematic approach to managing safety including the necessary organisational structure, accountabilities, policies and procedures.

*Article 3*

**Oversight capabilities**

1. Member States shall designate one or more entities as the competent authority(ies) within that Member State with the necessary powers and responsibilities for the certification and oversight of aerodromes and aerodrome operators, and providers of apron management services, subject to Regulation (EC) No 216/2008.

   The competent authority shall be independent of aerodrome operators and providers of apron management services. This independence shall be achieved through adequate separation, at functional level at least, between the competent authority and such organisations. Member States shall ensure that competent authorities exercise their powers impartially and transparently.

2. If a Member State designates more than one entity as competent authority:

   (a) the areas of competence of each competent authority shall be clearly defined in terms of responsibilities and geographic limitation; and

   (b) coordination shall be established between those entities to ensure effective oversight of all aerodromes and aerodrome operators, as well as providers of apron management services, subject to Regulation (EC) No 216/2008.

3. Member States shall ensure that the competent authority(ies) has(ve) the necessary capability to ensure the oversight of all aerodromes, aerodrome operators, and providers of apron management services subject to their oversight programme, including sufficient resources to fulfil the requirements of this Regulation.

4. Member States shall ensure that competent authority personnel do not perform oversight activities when there is evidence that this could result directly or indirectly in a conflict of interest

5. Personnel authorised by the competent authority to carry out certification

and/or oversight tasks shall be empowered to perform at least the following tasks:

(a) examine the records, data, procedures and any other material relevant to the execution of the certification and/or oversight task;

(b) take copies of or extracts from such records, data, procedures and other material;

(c) ask for an oral explanation on site;

(d) enter aerodromes, relevant premises, operating sites or other areas and means of transport;

(e) perform audits, investigations, tests, exercises, assessments, inspections; and

(f) take enforcement measures as appropriate.

6. The tasks under paragraph 5 shall be carried out in compliance with the legal provisions of the relevant Member State.

*Article 4*

**Notification to the Agency**

Within three months after the coming into force of this Regulation, the competent authorities of the Member States shall notify the Agency of the names of the aerodromes and the aerodrome operators, as well as the number of passengers and cargo movements of the aerodromes to which the provisions of Regulation (EC) No 216/2008 and this Regulation apply.

*Article 5*

**Exemptions**

1. The competent authority of the Member State shall, within one month following the decision to grant an exemption in accordance with Article 4(3b) of Regulation (EC) No 216/2008, notify the Commission, the Agency and other Member States of the exempted aerodromes. The notification to the Commission and Agency shall further include:

(a) the name of the aerodrome operator, and the traffic figures for the number of passengers and cargo movements of the aerodrome per year, over the last four years; and

(b) a declaration and assessment that:

(i) the requirements set forth by Article 4(3b) of Regulation (EC) No 216/2008 are met,

(ii) the aerodrome is certified by the competent authority of that Member State, if it is used for international operations, and

(iii) the aerodrome offers a level of safety that is at least as effective as that required by the essential requirements as defined in Annex Va, and Vb if applicable, to Regulation (EC) No 216/2008.

2. The competent authority of the Member State shall, on annual basis within the first three months of the calendar year, review the traffic figures and report them to the Commission and the Agency, and revoke the exemption if the relevant traffic figures at that aerodrome are exceeded for three consecutive years.

3. The Commission may, in accordance with the safeguard procedure referred to in Article 65(7) of Regulation (EC) No 216/2008 at any time decide not to permit an exemption granted if:

(a) any of the requirements set forth in paragraph (1)(b) are not met; or

(b) such exemption does not comply with any other rule of Community law; or

(c) the relevant passenger and cargo traffic figures have been surpassed over the last three consecutive years.

In such a case the competent authority of the Member State concerned shall revoke the exemption.

4. The competent authority shall ensure that operators of those aerodromes whose exemption has to be revoked in accordance with paragraph (2), or (3), shall apply for a certificate in accordance with the provisions of this Regulation.

*Article 6*

**Conversion of certificates**

1. Aerodrome certificates issued by the competent authority to aerodromes and their operators, prior to the coming into force of this Regulation, shall remain valid for a maximum period of 48 months, following the coming into force of this Regulation.

2. Before the end of the period specified in (1), the competent authority may issue certificates in accordance with this Regulation for such aerodromes and aerodrome operators, if:

   (a) the competent authority has established the certification basis using the Certification Specifications issued by the Agency, including any cases of equivalent level of safety and special conditions which have been identified and documented; and

   (b) the certificate holder has demonstrated compliance with the elements of the certification basis, the requirements of Regulation (EC) No 216/2008 and its Implementing Rules which are applicable to its organisation and its operation which are different from the requirements in accordance to which the national certificate was issued.

3. The competent authority shall keep records of its conversion process.

*Article 7*

**Deviations from Certification Specifications**

1. During the certification process for the issuance of the first certificates in accordance with this Regulation and its Annexes, the competent authority may, until 31 December 2019, accept applications for a certificate including deviations from Certification Specifications issued by the Agency, if:

   (a) such deviations do not qualify as an equivalent level of safety case nor qualify as a case of special condition under ADR.AR.C.020 of Annex I; and

   (b) such deviations have existed prior to the entry into force of this Regulation; and

   (c) the essential requirements in Annex Va to Regulation (EC) No 216/2008 are respected by such deviations, supplemented by mitigating measures and corrective actions as appropriate; and

   (d) a supporting safety assessment for any such deviation has been completed.

2. The competent authority shall compile the evidence supporting the conditions above in a document. This document shall not form part of the certification basis. The competent authority shall specify the period of acceptance of such deviations and inform the Agency of all such documents it has issued.

3. The conditions referred to in paragraph (1)(a), (c) and (d) above shall be reviewed and assessed by the aerodrome operator and the competent authority for their continued validity and justification, as appropriate. This document shall be amended as necessary.

*Article 8*

**Obstacles — Objects**

1. Member States shall ensure that the competent authority and the aerodrome operators are consulted with regard to proposed constructions within the limits of the obstacle limitation and protection surfaces and other areas established by the competent authority in accordance with this Regulation.

2. Member States shall ensure that the competent authority is consulted with regard to proposed constructions beyond the limits of the obstacle limitation surfaces, established by the competent authority in accordance with this Regulation, and which extend above a height established by that authority.

*Article 9*

**Sources of lights**

1. Member States shall not permit the installation or use of such sources of light or dazzle that may confuse air navigation, endanger safety or adversely affect the operation of an aerodrome.

2. Member States shall ensure that the competent authority and the aerodrome operators are consulted when such sources of light or dazzle that may confuse air navigation, endanger safety or adversely affect the operation of an aerodrome are proposed in the vicinity of the aerodrome.

*Article 10*

**Land use planning**

Member States shall ensure that the competent authority and the aerodrome operators are consulted when developments, activities, or changes in the land use in the vicinity of an aerodrome are proposed.

*Article 11*

**Entry into force**

1. This Regulation shall enter into force on the twentieth day following its publication in the *Official Journal of the European Union*.

2. Articles ADR.AR.C.050 and ADR.OR.B.060 contained in Annex I and II to this Regulation, as well as Appendix II to Annex II, shall come into force when the Implementing Rules regarding the provision of apron management services shall be in effect. Articles ADR.AR.A.015 and ADR.OR.A.015 shall not apply for providers of apron management services until the Implementing Rules regarding the provision of apron management services shall be in effect.

3. This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, […]

*For the Commission*
*The President*
*[…]*

# ANNEX I

# Part — Authority Requirements — Aerodromes (Part-ADR.AR)

## SUBPART A — GENERAL REQUIREMENTS (ADR.AR.A)

### ADR.AR.A.001 — Scope

This Part establishes requirements for the administration and management system to be complied with by the Agency and the Member States for the implementation of Annex II (Part OR) and Annex III (Part-OPS) to Regulation (EC) No 216/2008.

### ADR.AR.A.005 — Competent authority

Aerodromes and aerodrome operators shall be certified and overseen by the designated competent authority of the Member State in which the aerodrome is located.

### ADR.AR.A.010 — Oversight documentation *REV*

The competent authority shall make available legislative acts, standards, rules, technical publications and related documents to:

(a) its relevant personnel in order to perform their tasks and to discharge its responsibilities; and

(b) the aerodrome operators and other interested parties to facilitate their compliance with the applicable requirements.

### ADR.AR.A.015 — Means of compliance *REV*

(a) The Agency shall develop Acceptable Means of Compliance (AMC) that may be used to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules. When the Acceptable Means of Compliance are complied with, the related requirements of the Implementing Rules are met.

(b) Alternative means of compliance may be used to establish compliance with the Implementing Rules.

(c) The competent authority shall establish a system to consistently evaluate that the alternative means of compliance used by itself or by aerodrome operators or providers of apron management services under its oversight provide for compliance with Regulation (EC) No 216/2008 and its Implementing Rules.

(d) The competent authority shall evaluate the alternative means of compliance proposed by an aerodrome operator for a given aerodrome, in accordance with ADR.OR.A.015, by analysing the documentation provided and, if considered necessary, conducting an inspection of the aerodrome operator or the aerodrome.

When the competent authority finds that the alternative means of compliance proposed by the aerodrome operator or the provider of apron management services are in accordance with the Implementing Rules, it shall without undue delay:

(1) notify the applicant that the alternative means of compliance may be implemented and, if applicable, amend the approval or certificate of the applicant accordingly;

(2) notify the Agency of their content, including copies of the relevant documentation;

(3) inform other Member States about alternative means of compliance that were accepted.

(e) When the competent authority itself uses alternative means of compliance to achieve compliance with Regulation (EC) No 216/2008 and its Implementing Rules, it shall:

(1) make them available to aerodrome operators and providers of apron management services under its oversight; and

(2) without undue delay notify the Agency.

The competent authority shall provide the Agency with a full description of the alternative means of compliance, including any revisions to procedures that may be relevant, as well as an assessment demonstrating that the Implementing Rules are met.

### ADR.AR.A.020 — Notification of cases of equivalent level of safety and special conditions *REV*

The competent authority shall notify the Agency of all significant cases of equivalent level of safety or special conditions contained in a certification basis.

### ADR.AR.A.025 — Information to the Agency

(a) The competent authority shall without undue delay notify the Agency in case of any problems with the implementation of Regulation (EC) No 216/2008 and its Implementing Rules.

(b) The competent authority shall provide the Agency with safety-significant information stemming from the occurrence reports it has received.

### ADR.AR.A.030 — Immediate reaction to a safety problem *REV*

(a) Without prejudice to Directive 2003/42/EC[3], the competent authority shall implement a system to appropriately collect, analyse and disseminate safety information.

(b) The Agency shall implement a system to appropriately analyse any safety information received and without undue delay provide to Member States and the Commission any information, including recommendations or corrective actions to be taken, necessary for them to react in a timely manner to a safety problem involving aerodromes, aerodrome operators and providers of apron management services subject to Regulation (EC) No 216/2008 and its Implementing Rules.

(c) Upon receiving the information referred to in (a) and (b), the competent authority shall take adequate measures to address the safety problem, including the issuing of safety directives in accordance with ADR.AR.A.040.

(d) Measures taken under (c) shall immediately be notified to the aerodrome operators or providers of apron management services which need to comply with them under Regulation (EC) No 216/2008 and its Implementing Rules. The competent authority shall also notify those measures to the Agency and, when combined action is required, the other Member States concerned.

### ADR.AR.A.040 — Safety directives

(a) The competent authority shall issue a safety directive if it has determined the existence of an unsafe condition requiring immediate action, including the showing of compliance with any amended or additional Certification Specification established by the Agency, which the competent authority finds is necessary.

(b) A safety directive shall be forwarded to the aerodrome operators or providers of apron management services concerned, as appropriate, and shall contain, as a minimum, the following information:

(1) the identification of the unsafe condition;

(2) the identification of the affected design, equipment, or operation;

(3) the actions required and their rationale, including the amended or additional Certification Specifications that have to be complied with;

(4) the time limit for compliance with the required actions; and

(5) its date of entry into force.

(c) The competent authority shall forward a copy of the safety directive to the Agency.

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[3] Directive 2003/42/EC of the European Parliament and of the Council of 13 June 2003 on occurrence reporting in civil aviation (OJ L 167, 4.7.2003, p. 23).

(d) The competent authority shall verify the compliance of aerodrome operators and providers of apron management services with the applicable safety directives.

## SUBPART B — MANAGEMENT (ADR.AR.B)

### ADR.AR.B.005 — Management system REV

(a) The competent authority shall establish and maintain a management system, including as a minimum:

(1) documented policies and procedures to describe its organisation, means and methods to achieve compliance with Regulation (EC) No 216/2008 and its Implementing Rules. The procedures shall be kept up-to-date and serve as the basic working documents within that competent authority for all related tasks;

(2) a sufficient number of personnel, including aerodrome inspectors, to perform its tasks and discharge its responsibilities. Such personnel shall be qualified to perform their allocated tasks and have the necessary knowledge, experience, initial, on-the-job and recurrent training to ensure continuing competence. A system shall be in place to plan the availability of personnel, in order to ensure the proper completion of all related tasks;

(3) adequate facilities and office accommodation to perform the allocated tasks;

(4) a function to monitor compliance of the management system with the relevant requirements and adequacy of the procedures, including the establishment of an internal audit process and a safety risk management process. Compliance monitoring shall include a feedback system of audit findings to the senior management of the competent authority to ensure implementation of corrective actions as necessary; and

(5) a person or group of persons, ultimately responsible to the senior management of the competent authority for the compliance monitoring function.

(b) The competent authority shall, for each field of activity included in the management system, appoint one or more persons with the overall responsibility for the management of the relevant task(s).

(c) The competent authority shall establish procedures for participation in a mutual exchange of all necessary information and assistance of other competent authorities concerned.

(d) A copy of the procedures related to the management system and their amendments shall be made available to the Agency for the purpose of standardisation.

## ADR.AR.B.010 — Allocation of tasks REV

(a) When allocating a task related to the initial certification or continuing oversight of aerodromes and their operators or providers or apron management services subject to Regulation (EC) No 216/2008 and its Implementing Rules to a natural or legal person, the competent authority shall ensure that it has:

(1) a system in place to initially and continuously assess their:

(i) adequate technical competence,

(ii) adequate facilities and equipment,

(iii) absence from conflict of interest, and

(iv) compliance with the criteria defined in Annex V to Regulation (EC) No 216/2008, where relevant.

This system and the results of the assessments shall be documented.

(2) established a documented agreement with the natural or legal person, approved by both parties at the appropriate management level, which clearly defines:

(i) the tasks to be performed,

(ii) the declarations, reports and records to be provided,

(iii) the technical conditions to be met in performing such tasks,

(iv) the related liability coverage, and

(v) the protection given to information acquired in carrying out such tasks.

(b) The competent authority shall ensure that the internal audit process required by ADR.AR.B.005(a)(4) covers all certification of continuing oversight tasks performed on its behalf.

## ADR.AR.B.015 — Changes to the management system REV

(a) The competent authority shall have a system in place to identify changes that affect its capability to perform its tasks and discharge its responsibilities as defined in Regulation (EC) No 216/2008 and its Implementing Rules. This system shall enable it to take action, as appropriate, to ensure that the management system remains adequate and effective.

(b) The competent authority shall update its management system to reflect any change to Regulation (EC) No 216/2008 and its Implementing Rules in a timely manner, so as to ensure effective implementation.

(c) The competent authority shall notify the Agency of changes affecting its capability to perform its tasks and discharge its responsibilities as defined in Regulation (EC) No 216/2008 and its Implementing Rules.

## ADR.AR.B.020 — Record-keeping REV

(a) The competent authority shall establish a system of record-keeping providing for adequate storage, accessibility and reliable traceability of:

(1) the management system's documented policies and procedures;

(2) training, qualification and authorisation of its personnel;

(3) the allocation of tasks, covering the elements required by ADR.AR.B.010, as well as the details of tasks allocated;

(4) certification process and continuing oversight of aerodromes and aerodrome operators;

(5) declaration process and continuing oversight of providers of apron management services;

(6) the evaluation and notification to the Agency of alternative means of compliance proposed by aerodrome operators and providers of apron management services and the assessment of alternative means of compliance used by the competent authority itself;

(7) findings, corrective actions and date of action closure;

(8) enforcement measures taken;

(9) safety information and follow-up measures; and

(10) the use of flexibility provisions in accordance with Article 14 of Regulation (EC) No 216/2008.

(b) The competent authority shall maintain a list of all certificates it issued and declarations it received.

(c) Records related to the:

(1) certification of an aerodrome and an aerodrome operator shall be kept for the lifespan of the certificate;

(2) training and qualifications of the personnel of the competent authority shall be kept until the end of their employment.

(d) All records related to oversight activities and enforcement actions shall be kept for a minimum period of five years, subject to applicable data protection law.

## SUBPART C — OVERSIGHT, CERTIFICATION AND ENFORCEMENT (ADR.AR.C)

### ADR.AR.C.005 — Oversight *REV*

(a) The competent authority shall verify:

(1) compliance with the certification basis and all requirements applicable to aerodromes and aerodrome operators prior to the issue of an approval or certificate;

(2) continued compliance, with the certification basis and applicable requirements, of aerodromes and aerodrome operators or providers of apron management service subject to declaration obligation; and

(3) implementation of appropriate safety measures as defined in ADR.AR.A.030(c) and (d).

(b) This verification shall:

(1) be supported by documentation specifically intended to provide personnel responsible for safety oversight with guidance to perform their functions;

(2) provide the aerodrome operators and providers of apron management services concerned with the results of safety oversight activity;

(3) be based on audits and inspections, including unannounced inspections, where appropriate; and

(4) provide the competent authority with the evidence needed in case further action is required, including the measures foreseen by ADR.AR.C.055.

(c) The scope of oversight shall take into account the results of past oversight activities and the safety priorities identified.

### ADR.AR.C.010 — Oversight programme *REV*

(a) The competent authority shall establish and maintain an oversight programme covering the oversight activities required by ADR.AR.C.005.

(b) For each aerodrome and its operator the oversight programme shall be developed taking into account the specific nature of the organisation, the complexity of its activities, the results of past certification and oversight activities and shall be based on the assessment of the associated risks. It shall include within each oversight planning cycle, meetings, audits and inspections, including unannounced inspections, as appropriate.

(c) For each aerodrome and its operator an oversight planning cycle not exceeding 48 months shall be applied.

(d) For providers of apron management services declaring their activity to the competent authority, the oversight programme shall be developed taking into account the specific nature of the organisation, the complexity of its activities, the results of past oversight activities and shall be based on the assessment of associated risks. It shall include audits and inspections, including unannounced inspections, as appropriate.

(e) The oversight programme shall include records of the dates when meetings, audits and inspections are due and when such meetings, audits and inspections and have been carried out.

### ADR.AR.C.015 — Initiation of certification process REV

(a) Upon receiving an application for the initial issue of a certificate, the competent authority shall verify the applicant's compliance with the eligibility criteria of Article ADR.OR.B.010.

(b) If the competent authority is satisfied that the applicant meets the eligibility criteria, it shall assess the application and notify the applicant of:

- (1) of the established certification basis, in accordance with ADR.AR.C.020; and
- (2) the use of proposed alternative means of compliance in accordance with ADR.AR.A.015(d), when applicable.

(c) In case of an existing aerodrome, the competent authority shall prescribe the conditions under which the aerodrome operator shall operate during the certification period, unless the competent authority determines that the operation of the aerodrome needs to be suspended. The competent authority shall conclude the certification within the shortest of time period practicable.

### ADR.AR.C.020 — Certification basis REV

The certification basis to be notified to an applicant by the competent authority shall consist of:

(a) the applicable Certification Specifications issued by the Agency, related to the type and operation of the aerodrome and which are effective on the date of application for that certificate, unless:

- (1) the applicant elects compliance with later effective amendments; or
- (2) the competent authority finds that compliance with such later effective amendments is necessary;

(b) any provision for which an equivalent level of safety has been accepted by the competent authority;

(c) any special condition in accordance with ADR.AR.C.025.

### ADR.AR.C.025 — Special conditions REV

(a) The competent authority shall prescribe special detailed technical specifications, named special conditions, for an aerodrome, if the related Certification Specifications issued by the Agency referred to in Article ADR.AR.C.020(a) are inadequate or inappropriate, to ensure compliance with the essential requirements of Annex Va to Regulation (EC) No 216/2008, because:

   (1) the Certification Specifications cannot be met due to physical, topographical or similar limitations related to the location of the aerodrome;

   (2) the aerodrome has novel or unusual design features; or

   (3) experience from the operation of that aerodrome or other aerodromes having similar design features, has shown that safety may be endangered.

(b) The special conditions shall contain such technical specifications, limitations or procedures to be complied with, as the competent authority finds is necessary to ensure compliance with the essential requirements set out in Annex Va to Regulation (EC) No 216/2008.

**ADR.AR.C.035 — Issuance of certificate** REV

(a) The competent authority shall issue the certificate(s) prescribed in paragraph (d) when:

   (1) it has approved the aerodrome manual submitted by the aerodrome operator; and

   (2) the aerodrome operator has demonstrated, to the satisfaction of the competent authority, compliance with the elements required in ADR.OR.B.025.

(b) The competent authority may require any inspection, test, safety assessment, or exercise it finds necessary before issuing the certificate.

(c) Findings, other than level 1 and which have not been closed prior to the date of certification, shall be safety assessed and mitigated as necessary and a corrective action plan for the closing of the finding shall be approved by the competent authority.

(d) The competent authority shall issue either:

   (1) a single certificate, as prescribed in Appendix I to this Part; or

   (2) two separate certificates, as prescribed in Appendix II to this Part, one for the aerodrome and one for the aerodrome operator.

(e) The certificate shall be issued for an unlimited duration. The privileges of the activities that the aerodrome operator is approved to conduct shall be specified in the terms of approval attached to the certificate.

(f) The certificate is considered to include the applicable certification basis with which the competent authority records compliance and any other conditions or limitations prescribed in the applicable Certification Specifications and requirements.

(g) To enable an aerodrome operator to implement changes without prior competent authority approval in accordance with ADR.OR.B.040, the competent authority shall approve a procedure submitted by the aerodrome operator defining the scope of such changes and describing how such changes will be managed and notified.

## ADR.AR.C.040 — Changes REV

(a) Upon receiving an application for a change, in accordance with ADR.OR.B.40, that requires prior approval, the competent authority shall assess the application and notify the aerodrome operator of:

(1) the applicable Certification Specifications issued by the Agency, which are applicable to the proposed change and which are effective on the date of the application, unless:

(i) the applicant elects compliance with later effective amendments, or

(ii) the competent authority finds that compliance with such later effective amendments is necessary;

(2) any other Certification Specification issued by the Agency that the competent authority finds is directly related to the proposed change;

(3) any special condition, and amendment to special conditions, prescribed by the competent authority in accordance with Article ADR.AR.C.025, the competent authority finds is necessary;

(b) The competent authority shall approve the change when:

(1) it has approved any changes to the aerodrome manual, submitted by the aerodrome operator; and

(2) the aerodrome operator has demonstrated, to the satisfaction of the competent authority, compliance with the elements required in ADR.OR.B.40.

(c) If the approved change affects the terms of approval of the certificate, the competent authority shall amend the certificate.

(d) The competent authority shall prescribe the conditions under which the aerodrome operator shall operate during the change, unless the competent authority determines that the certificate needs to be suspended.

(e) Without prejudice to any additional enforcement measures, when the aerodrome operator implements changes requiring prior approval without having received competent authority approval as defined in (a), the competent authority shall suspend, limit or revoke the certificate.

(f) For changes not requiring prior approval, the competent authority shall assess the information provided in the notification sent by the aerodrome operator in accordance with ADR.OR.B.040 to verify compliance with the Certification Specifications issued by the Agency and the applicable requirements, as appropriate. In case of any non-compliance, the competent authority shall:

(1) notify the aerodrome operator about the non-compliance and request further changes; and

(2) in case of level 1 or level 2 findings, act in accordance with Article ADR.AR.C.055.

### ADR.AR.C.045 — Change of aerodrome operator *REV*

(a) Upon receiving an application for the change of the operator of an aerodrome, in accordance with Article ADR.OR.B.055, the competent authority shall:

(1) amend the existing aerodrome operator certificate of the new operator of the aerodrome concerned, if that new operator is also the operator of other aerodrome(s); or

(2) issue a new certificate for the aerodrome concerned and another for the aerodrome operator, if the new aerodrome operator is not the operator of other aerodrome(s); and

(3) revoke the previous certificate(s).

(b) The competent authority shall issue or amend the certificates when:

(1) it has verified that the new aerodrome operator complies with the eligibility criteria of ADR.OR.B.010;

(2) it has approved the aerodrome manual submitted by the new aerodrome operator; and

(3) the aerodrome operator has demonstrated, to the satisfaction of the competent authority, compliance with the elements required in ADR.OR.B.025, as applicable.

(c) The competent authority shall prescribe any conditions it finds necessary under which the aerodrome operator shall operate during the change, unless the competent authority determines that the certificate needs to be suspended.

### ADR.AR.C.050 — Declarations of providers of apron management services *REV*

(a) Upon receiving a declaration from a provider of apron management services intending to provide such services at an aerodrome, the competent authority shall verify that the declaration contains all the information required by Part-ADR.OR and shall acknowledge receipt of the declaration to that organisation.

(b) If the declaration does not contain the required information, or contains information that indicates non-compliance with applicable requirements, the competent authority shall notify the provider of apron management services and the aerodrome operator about the non-compliance and request further information. If required, the competent authority shall carry out an inspection of the provider of apron management services and the aerodrome operator. If the non-compliance is confirmed, the competent authority shall take action as defined in ADR.AR.C.055.

### ADR.AR.C.055 — Findings, observations, corrective actions and enforcement measures *REV*

(a) The competent authority shall have a system to analyse findings for their safety significance.

(b) A level 1 finding shall be issued by the competent authority when any significant non-compliance is detected with the certification basis of the aerodrome, the applicable requirements of Regulation (EC) No 216/2008 and its Implementing Rules, with the aerodrome operator's or the provider's of apron management services procedures and manuals, with the terms of an approval or certificate or with the content of a declaration which lowers safety or seriously endangers safety.

The level 1 finding shall include, but is not limited to:

(1) failure to give the competent authority access to the aerodrome operators or providers of apron management services facilities as defined in ADR.OR.C.015 during normal operating hours and after two written requests;

(2) obtaining or maintaining the validity of a certificate by falsification of submitted documentary evidence;

(3) evidence of malpractice or fraudulent use of a certificate; and

(4) the lack of an accountable manager.

(c) A level 2 finding shall be issued by the competent authority when any non-compliance is detected with the certification basis of the aerodrome, the applicable requirements of Regulation (EC) No 216/2008 and its Implementing Rules, with the aerodrome operators or the providers of apron management services procedures and manuals, with the terms of an approval of a certificate or with the content of a declaration which could lower or possibly hazard safety.

(d) When a finding is detected, during oversight or by any other means, the competent authority shall, without prejudice to any additional action required by Regulation (EC) No 216/2008 and its Implementing Rules, communicate the finding to the aerodrome operator or the provider of apron management services in writing and request corrective action to address the non-compliance(s) identified.

(1) In the case of level 1 findings, the competent authority shall take immediate and appropriate action to prohibit or limit activities, and if appropriate, it shall take action to revoke the certificate or to limit or suspend it in whole or in part, depending upon the extent of the finding, until successful corrective action has been taken by the aerodrome operator or the provider of apron management services.

(2) In the case of level 2 findings, the competent authority shall:

(i) grant the aerodrome operator or the provider of apron management services a corrective action implementation period included in an action plan appropriate to the nature of the finding, and

(ii) assess the corrective action and implementation plan proposed by the aerodrome operator or the provider of apron management services and, if the assessment concludes that they are sufficient to address the non-compliance(s), accept these.

(3) Where the aerodrome operator or the provider of apron management services fails to submit an acceptable corrective action plan, or to perform the corrective action within the time period accepted or extended by the competent authority, the finding shall be raised to a level 1 finding, and action taken as laid down in (d)(1).

(e) The competent authority may issue observations.

(f) The competent authority shall record all findings it has raised and where applicable, the enforcement measures it has applied, as well as all corrective actions and date of action closure for findings.

### ADR.AR.C.060 — Wildlife management *REV*

(a) The competent authority shall establish and implement a procedure for the reporting and the recording of wildlife strikes to aircraft.

(b) The competent authority shall:

(1) take action to eliminate or to prevent the establishment of any source or activity which may attract wildlife on an aerodrome or its vicinity, unless a wildlife hazard assessment indicates that these sources are unlikely to create conditions conducive to a wildlife hazard problem; and

(2) allow an aerodrome operator to be consulted about the planning of such sources or activities.

### ADR.AR.C.065 — Obstacles — Objects REV

(a) The competent authority shall:

(1) establish obstacle limitation surfaces, protection surfaces and other areas associated with an aerodrome and its surroundings to define the limits to which objects may project into the airspace;

(2) not permit new objects or extensions to existing objects, remove objects or otherwise protect the surfaces and areas established in accordance with (a)(1), as appropriate;

(3) not permit developments which may endanger safety due to obstacle-induced turbulence.

(b) The competent authority shall ensure that obstacles, individual objects or constructions are marked and/or lighted, as appropriate, in accordance with the Certification Specifications issued by the Agency.

(c) The competent authority shall ensure that an aeronautical study is conducted to determine the effect on the operation of aircraft by constructions, beyond the limits of the obstacle limitation surfaces, established in accordance with paragraph (a), and which extend above a height established by that authority.

In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation shall be regarded as obstacles, unless an aeronautical study indicates that they do not constitute a hazard to aircraft.

### ADR.AR.C.070 — Confusing, misleading and hazardous lights REV

(a) The competent authority shall ensure that sources of light or dazzle that may confuse air navigation, endanger safety or adversely affect the operation of an aerodrome are extinguished, screened, or modified, or are subject to any other action required in the interest of safety.

(b) The competent authority shall establish protective zones around aerodromes to protect the safety of aircraft against the hazardous effects of laser emitters.

### ADR.AR.C.075 — Protection of communication, navigation and surveillance systems REV

The competent authority shall:

(a) establish protection areas for each aeronautical communications, navigation and surveillance system;

(b) not permit, or shall modify or otherwise mitigate sources of non-visible radiation or the presence of moving or fixed objects that may interfere with, or adversely affect, the performance of the systems mentioned in subparagraph (a).

### ADR.AR.C.080 — Other activities REV

The competent authority shall ensure that potential hazards to safety and the use of the aerodrome associated with proposed developments, activities or changes in the land use in the vicinity of an aerodrome are identified and mitigated.

# APPENDIX I

[MEMBER STATE]

A Member of the European Union[4]

*CERTIFICATE*

Certificate reference: [STATE CODE]: xxxxx

Pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council and the Commission Regulation (EC) No …/… for the time being in force and subject to the conditions specified below, [THE COMPETENT AUTHORITY OF THE MEMBER STATE[5]] hereby certifies that:

[COMPANY NAME AND ADDRESS]

is authorised to operate aerodrome [NAME OF AERODROME], in accordance with the provisions of Regulation (EC) No 216/2008 and its Implementing Rules, the aerodrome certification basis, the terms of approval attached to this certificate and the approved aerodrome manual.

This certificate shall remain valid for an unlimited duration, unless it is surrendered, suspended or revoked.

Date of original issue:…………………………………………………………………………………………………

Revision No:……………………………………………………………………………………………………………….

Signed:………………………………………………………………………………………………………………………

For the competent authority [COMPETENT AUTHORITY IDENTIFICATION]

[4] Delete for non-EU Member States.

[5] Delete for non-EU Member States.

| **TERMS OF APPROVAL** | |
|---|---|
| **Certificate reference: [STATE CODE] : xxxxx** | [MEMBER STATE][6] |
| **Aerodrome name — Location indicator:** | *XXXXX* |
| **Operating conditions:** | *Day*<br><br>*Night* |
| | *VFR only*<br>*IFR only*<br>*VFR/IFR* |
| **Runway designation — Declared distances** | *ASDA:*<br>*LDA:*<br>*TODA:*<br>*TORA:* |
| **Type of approaches:** | ***Non-instrument***<br><br>***Instrument***<br><br>***Non-precision approach***<br><br>***Precision approach***<br>• *Standard Category I*<br>• *Lower than Standard Category I*<br>• *Precision Approach Category II*<br>• *Other than Standard Category II*<br>• *Precision Approach Category III-A*<br>• *Precision Approach Category III-B*<br>• *Precision Approach Category III-C* |
| **Operating minima:** | *DA/DH — MDA/MDH*<br><br>*Visibility/RVR* |
| **Aerodrome reference code:** | *Code number/Code letter* |
| **Approved aircraft type(s) above aerodrome Reference code:** | |
| **Provision of apron management services:** | *Specify name of service provider* |
| **Rescue and fire-fighting category:** | |
| **Fuel provision at the aerodrome:** | *Yes/No* |
| **Appointed / nominated persons** | *Accountable manager:*<br>*Safety management:*<br>*Compliance monitoring:*<br>*Aerodrome operational services and maintenance:* |
| **Other:** | |

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6 Delete for non-EU Member States.

# APPENDIX II

[MEMBER STATE]

A Member of the European Union[7]

*AERODROME OPERATOR CERTIFICATE*

Certificate reference: [STATE CODE]: xxxxx

Pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council and the Commission Regulation (EC) No …/… for the time being in force and subject to the conditions specified below, [THE COMPETENT AUTHORITY OF THE MEMBER STATE[8]] hereby certifies that:

[COMPANY NAME AND ADDRESS]

is authorised to operate aerodrome [NAME OF AERODROME(S)][9], in accordance with the provisions of Regulation (EC) No 216/2008 and its Implementing Rules, the aerodrome certification basis, the terms of approval attached to the aerodrome certificate and its approved aerodrome manual and the following appointed/nominated personnel:

*Accountable manager:*

*Safety management:*

*Compliance monitoring:*

*Aerodrome operational services and maintenance:*

Apron management services are provided by [specify name of service provider].
This certificate shall remain valid for an unlimited duration, unless it is surrendered, suspended or revoked.

Date of original issue:……………………………………………….…………………………………………

Revision No:………………….……………………………………………………………………………….

Signed:……………………….………………………………………………………………………………

For the competent authority [COMPETENT AUTHORITY IDENTIFICATION]

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7 Delete for non-EU Member States.

8 Delete for non-EU Member States.

9 Delete as appropriate. If the operator operates more than one aerodrome, all aerodromes shall be listed.

EASA FORM XXXX Issue 1

[MEMBER STATE]

A Member of the European Union[1]

*AERODROME CERTIFICATE*

Certificate reference: [STATE CODE]: xxxxx

Pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council and the Commission Regulation (EC) No …/… for the time being in force and subject to the conditions specified below, [THE COMPETENT AUTHORITY OF THE MEMBER STATE] hereby certifies that:

[NAME OF AERODROME[2]]

is authorised to be operated as an aerodrome by [AERODROME OPERATOR COMPANY NAME AND ADDRESS], in accordance with the provisions of Regulation (EC) No 216/2008 and its Implementing Rules, the aerodrome certification basis, the terms of approval attached to this aerodrome certificate and the approved aerodrome manual.

This certificate shall remain valid for an unlimited duration, unless it is surrendered, suspended or revoked.

Date of original issue:.........................................................................................................

Revision No:..........................................................................................................................

Signed:...................................................................................................................................

For the competent authority [COMPETENT AUTHORITY IDENTIFICATION]

EASA FORM YYYY Issue 1

[1] Delete for non-EU Member States.

[2] Delete as appropriate.

| TERMS OF APPROVAL | |
|---|---|
| **Certificate reference: [STATE CODE] : xxxxx** | [MEMBER STATE[12]] |
| **Aerodrome name — Location indicator:** | *XXXXX* |
| **Operating conditions:** | *Day*<br><br>*Night* |
| | *VFR only*<br>*IFR only*<br>*VFR/IFR* |
| **Runway designation — Declared distances** | *ASDA:*<br>*LDA:*<br>*TODA:*<br>*TORA:* |
| **Type of approaches:** | ***Non-instrument***<br><br>***Instrument***<br><br>***Non-precision approach***<br><br>***Precision approach***<br>• *Standard Category I*<br>• *Lower than Standard Category I*<br>• *Precision Approach Category II*<br>• *Other than Standard Category II*<br>• *Precision Approach Category III-A*<br>• *Precision Approach Category III-B*<br>• *Precision Approach Category III-C* |
| **Operating minima:** | *DA/DH — MDA/MDH*<br><br>*Visibility/RVR* |
| **Aerodrome reference code:** | *Code number/Code letter* |
| **Approved aircraft type(s) above aerodrome Reference code:** | |
| **Rescue and fire-fighting category:** | |
| **Fuel provision at the aerodrome:** | *Yes/No* |
| **Other:** | |

EASA FORM ZZZZ Issue 1

[12] Delete for non-EU Member States.

# ANNEX II

## Part — Organisation Requirements — Aerodrome Operators (Part-ADR.OR)

## SUBPART A — GENERAL REQUIREMENTS (ADR.OR.A)

### ADR.OR.A.005 — Scope

This Part establishes the requirements to be followed by an aerodrome operator subject to Regulation (EC) No 216/2008 with respect to its certification, management, manuals and other responsibilities.

### ADR.OR.A.010 — Competent authority

For the purpose of this Part, the competent authority shall be the one designated by the Member State where the aerodrome is located.

### ADR.OR.A.015 — Means of compliance REV

(a) Alternative means of compliance to those adopted by the Agency may be used by an aerodrome operator or an apron management service provider to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules.

(b) When an aerodrome operator or an apron management service provider wishes to use an alternative means of compliance to those adopted by the Agency to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules, it shall, prior to implementing it, provide the competent authority with a full description of the alternative means of compliance. The description shall include any revisions to manuals or procedures that may be relevant, as well as an assessment demonstrating compliance with Regulation (EC) No 216/2008 and its Implementing Rules.

The aerodrome operator may implement these alternative means of compliance subject to prior approval by the competent authority and upon receipt of the notification, as prescribed in ADR.AR.A.015(d).

(c) Except if the apron management services are provided by the aerodrome operator itself, a provider of such services shall notify the competent authority when it uses alternative means of compliance to establish compliance with Regulation (EC) No 216/2008 and its Implementing Rules. Such notification shall require prior agreement by the operator of the aerodrome where such services are provided.

# SUBPART B — CERTIFICATION (ADR.OR.B)

## ADR.OR.B.005 — Certification obligations of aerodromes and aerodrome operators REV

Notwithstanding the provisions of Article 5 and 6 of this Regulation, prior to commencing the operation of an aerodrome, the aerodrome operator shall obtain a certificate issued by the competent authority.

## ADR.OR.B.010 — Eligibility REV

Without prejudice to the provisions of the applicable national and European Union legislation, any natural or legal person who has shown compliance with the applicable requirements established in Regulation (EC) No 216/2008 and its Implementing Rules shall be eligible for a certificate.

## ADR.OR.B.015 — Application for a certificate REV

(a) The application for a certificate shall be made in a form and manner established by the competent authority.

(b) An applicant shall provide the following information to the competent authority:

  (1) its official name and business name, address, and mailing address;

  (2) information and data regarding:

    (i) the location of the aerodrome,

    (ii) the type of operations at the aerodrome, and

    (iii) the design and facilities of the aerodrome;

  (3) the proposed applicable Certification Specifications and documentation demonstrating how it will comply with the applicable requirements established in Regulation (EC) No 216/2008 and its Implementing Rules. Such documentation shall include a procedure, contained in the aerodrome manual, describing how changes not requiring prior approval will be managed and notified to the competent authority;

(4) adequacy of resources to operate the aerodrome in accordance with the applicable requirements;

(5) document showing the relationship of the applicant with the aerodrome owner and/or the land owner;

(6) the name of the accountable manager;

(7) the names of the nominated persons required by ADR.OR.D.015, together with their qualifications and experience; and

(8) a copy of the aerodrome manual required by ADR.OR.E.005;

c) If found appropriate by the competent authority, information under subparagraphs (6), (7) and (8) may be provided at a later stage determined by the competent authority, but prior to the issuance of the certificate.

**ADR.OR.B.025 — Compliance** *REV*

(a) An aerodrome operator shall:

(1) perform and document all actions, inspections, tests, safety assessments or exercises necessary, and shall demonstrate to the competent authority:

(i) compliance with the notified certification basis, the Certification Specifications applicable to a change, any safety directive, as appropriate, and the applicable requirements of Regulation (EC) No 216/2008 and its Implementing Rules, and

(ii) that the aerodrome, as well as its defined obstacle limitation surfaces and other surfaces have no features or characteristics making it unsafe for operation;

(2) provide to the competent authority the means by which compliance has been demonstrated; and

(3) declare to the competent authority its compliance with (a)(1), in accordance with the form established in Appendix I to this Part.

(b) Relevant design information, drawings and test reports, including inspection and test records, shall be held and kept by the aerodrome operator at the disposal of the competent authority, in accordance with the provisions of ADR.OR.D.035 and provided on request to the competent authority.

### ADR.OR.B.030 — Terms of approval and privileges of the certificate holder

An aerodrome operator shall comply with the scope and privileges defined in the terms of approval attached to its certificate.

### ADR.OR.B.035 — Continued validity REV

(a) A certificate shall remain valid subject to:

(1) the aerodrome operator remaining in compliance with the relevant requirements of Regulation (EC) No 216/2008, and its Implementing Rules, and the aerodrome remaining in compliance with the certification basis, taking into account the provisions related to the handling of findings as specified under ADR.OR.C.020;

(2) the competent authority being granted access to the aerodrome operator's organisation as defined in ADR.OR.C.015 to determine continued compliance with the relevant requirements of Regulation (EC) No 216/2008 and its Implementing Rules; and

(3) the certificate not being surrendered or revoked.

(b) Upon revocation or surrender, the certificate shall be returned to the competent authority without delay.

### ADR.OR.B.040 — Changes REV

(a) Any change affecting:

(1) the terms of approval of the certificate; or

(2) any of the elements of the operator's management system as required in ADR.OR.D.005 (b)(1), (b)(3), (b)(4), (b)(6) and (b)(7); or

(3) any additional elements notified to the competent authority in accordance with paragraph (c) but found necessary to be approved by the competent authority,

shall require prior approval by the competent authority.

(b) For any changes requiring prior approval in accordance with Regulation (EC) No 216/2008 and its Implementing Rules, the operator shall apply for and obtain an approval issued by the competent authority. The application shall be submitted before any such change takes place, in order to enable the competent authority to determine continued compliance with Regulation (EC) No 216/2008 and its Implementing Rules and to amend, if necessary, the certificate and related terms of approval attached to it.

The change shall only be implemented upon receipt of formal approval by the competent authority in accordance with ADR.AR.C.040.

The operator shall operate under the conditions prescribed by the competent authority during such changes, as applicable.

(c) All changes not requiring prior approval shall be managed and notified to the competent authority as defined in the procedure approved by the competent authority in accordance with ADR.AR.C.035(g).

(d) The aerodrome operator shall provide the competent authority with the relevant documentation in accordance with ADR.OR.B.045 and ADR.OR.E.005.

### ADR.OR.B.045 — Assessment of changes REV

(a) As part of its management system as defined in ADR.OR.D.005, an aerodrome operator proposing a change to the aerodrome, its operation, its organisation or its management system, shall:

(1) determine the interdependencies with any affected parties, plan and conduct a safety assessment in coordination with these organisations;

(2) agree and align assumptions and mitigations with those parties, in a transparent and systematic way, where they are affected by the assumptions and mitigations.

(b) An aerodrome operator shall ensure that the scope of the change under assessment comprises the whole aerodrome system and the interactions of its elements.

(c) An aerodrome operator shall ensure that complete and valid arguments and evidence are established and documented to support the safety assessment.

(d) An aerodrome operator shall determine the safety acceptability of a change using specific safety criteria, where each criterion is expressed in terms of safety risk or other measures that relate to safety.

The aerodrome operator shall ensure that the safety criteria are justified for the specific change, taking into account the type of change, and support the improvement of safety whenever reasonably practicable.

### ADR.OR.B.050 — Continuing compliance with the Agency's Certification Specifications REV

An aerodrome operator, following an amendment of the Certification Specifications established by the Agency, shall:

(a) perform a review to identify any Certification Specifications which are applicable to the aerodrome; and

(b) if relevant, initiate a change process in accordance with ADR.OR.B.040 and implement the necessary changes at the aerodrome.

### ADR.OR.B.055 — Change of aerodrome operator REV

(a) An aerodrome operator shall notify the competent authority about its intention to transfer the operation of the aerodrome, indicating the date that the transfer shall take place.

(b) The new operator to whom the operation of the aerodrome is to be transferred shall apply for a certificate to the competent authority, prior to the date that the transfer shall take place.

(c) The new operator to whom the operation of the aerodrome is to be transferred shall provide the competent authority with the relevant documentation in accordance with ADR.OR.B.045 and ADR.OR.E.005.

### ADR.OR.B.060 — Declaration of providers of apron management services REV

(a) The provider of apron management services, following an agreement with an aerodrome operator for the provision of such services at an aerodrome, shall:

(1) provide the competent authority with all relevant information, using the form established in Appendix II to this Part;

(2) provide the competent authority with a list of the alternative means of compliance used, in accordance with ADR.OR.A.015(c);

(3) maintain compliance with the applicable requirements and with the information given in the declaration;

(4) notify the competent authority of any changes to its declaration or the means of compliance it uses through submission of an amended declaration; and

(5) provide its services in accordance with the aerodrome manual and comply with all relevant provisions contained therein.

(b) Before ceasing the provision of such services, the provider of apron management services shall notify the competent authority and the aerodrome operator.

**ADR.OR.B.065 — Termination of operation**

An operator intending to terminate the operation of an aerodrome shall:

(a) notify the competent authority as early as possible;

(b) provide such information to the appropriate Aeronautical Information Service provider;

(c) surrender the certificate to the competent authority upon the date of termination of operation; and

(d) ensure that appropriate measures have been taken to avoid the unintended use of the aerodrome by aircraft, unless the competent authority has approved the use of the aerodrome for other purposes.

# SUBPART C — ADDITIONAL OPERATOR RESPONSIBILITIES (ADR.OR.C)

## ADR.OR.C.005 — Operator responsibilities REV

(a) The aerodrome operator is responsible for the operation and maintenance of the aerodrome in accordance with:

(1) Regulation (EC) No 216/2008 and its Implementing Rules;

(2) the terms of approval of its certificate;

(3) the content of the aerodrome manual; and

(4) any other manual for the aerodrome equipment available at the aerodrome, as applicable.

(b) The aerodrome operator shall have formal arrangements in place with organisations that provide services at the aerodrome, including but not limited to:

(1) air traffic services;

(2) aeronautical information services;

(3) communication, navigation and surveillance services;

(4) meteorological services;

(5) design and maintenance of the flight procedures;

(6) ground handling services;

(7) security services;

unless such services are provided directly by the aerodrome operator itself.

(c) An aerodrome operator shall coordinate with the competent authority to ensure that relevant information for the safety of aircraft is published, and is contained in the aerodrome manual, including where appropriate:

(1) exemptions or derogations granted from the applicable requirements;

(2) provisions for which an equivalent level of safety was accepted by the competent authority as part of the certification basis; and

(3) special conditions and limitations with regard to the use of the aerodrome.

### ADR.OR.C.010 — Use of the aerodrome by large aircraft *REV*

(a) Subject to prior approval by the competent authority, an aerodrome operator may permit the use of the aerodrome or parts thereof by aircraft with a higher code letter than the aerodrome design characteristics specified in the terms of approval of certificate.

(b) In showing compliance with this article, the provisions of ADR.OR.B.040 shall apply.

### ADR.OR.C.015 — Access *REV*

For the purpose of determining compliance with the relevant requirements of Regulation (EC) No 216/2008 and its Implementing Rules, an aerodrome operator or provider of apron management services shall grant access to any person authorised by the competent authority, to:

(a) any facility, document, records, data, procedures or any other material relevant to its activity subject to certification or declaration, whether it is contracted or not;

(b) perform or witness any action, inspection, test, assessment or exercise the competent authority finds is necessary.

### ADR.OR.C.020 — Findings and corrective actions *REV*

After receipt of notification of findings, the aerodrome operator or the provider of apron management services shall:

(a) identify the root cause of the finding;

(b) define a corrective action plan; and

(c) demonstrate the corrective action implementation to the satisfaction of the competent authority within the period agreed with that authority as defined in ADR.AR.C.055(d).

## ADR.OR.C.025 — Immediate reaction to a safety problem — Compliance with safety directives REV

An aerodrome operator or provider of apron management services shall implement any safety measures, including safety directives, mandated by the competent authority in accordance with ADR.AR.A.030(c) and ADR.AR.A.040.

## ADR.OR.C.030 — Occurrence reporting REV

(a) The aerodrome operator and the provider of apron management services shall report to the competent authority, and to any other organisation required by the State where the aerodrome is located, any accident, serious incident and occurrence as defined in Regulation (EU) No 996/2010[13] and Directive 2003/42/EC[14].

(b) Without prejudice to paragraph (a) the operator shall report to the competent authority and to the organisation responsible for the design of aerodrome equipment any incident, malfunction, technical defect, exceeding of technical limitations, occurrence or other irregular circumstance that has or may have endangered safety and that has not resulted in an accident or serious incident.

(c) Without prejudice to Regulation (EU) No 996/2010 and Directive 2003/42/EC, the reports referred to in paragraphs (a) and (b) shall be made in a form and manner established by the competent authority and contain all pertinent information about the condition known to the aerodrome operator or the provider of apron management services.

(d) Reports shall be made as soon as practicable, but in any case within 72 hours of the aerodrome operator or the provider of the apron management services identifying the condition to which the report relates, unless exceptional circumstances prevent this.

(e) Where relevant, the aerodrome operator or the provider of apron management services shall produce a follow-up report to provide details of actions it intends to take to prevent similar occurrences in the future, as soon as these actions have been identified. This report shall be produced in a form and manner established by the competent authority.

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[13] Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation and repealing Directive 94/56/EC (OJ L 295, 12.11.2010, p. 35).

[14] Directive 2003/42/EC of the European Parliament and of the Council of 13 June 2003 on occurrence reporting in civil aviation (OJ L 167, 4.7.2003, p. 23).

**ADR.OR.C.040 — Prevention of fire**

An aerodrome operator shall ensure that no person:

(a) smokes within the movement area of the aerodrome; or

(b) displays an open flame or undertakes an activity within the movement area of the aerodrome that would create a fire hazard, unless authorised by the aerodrome operator.

**ADR.OR.C.045 — Use of alcohol and illicit or prescribed substances** *REV*

(a) An aerodrome operator shall establish and promulgate a policy stating the requirements on consumption of alcohol and illicit or prescribed substances.

(b) This policy shall include the requirements that persons undertaking duties on the aerodrome which may have an impact on safety shall:

(1) not consume alcohol during their duty period; and

(2) not perform any duties under the influence:

(i) of alcohol, or

(ii) any illicit or prescribed substances that may have an effect on his/her abilities in a manner contrary to safety.

## SUBPART D — MANAGEMENT (ADR.OR.D)

### ADR.OR.D.005 — Management REV

(a) The aerodrome operator shall implement and maintain a management system that includes a safety management system.

(b) The management system shall include:

(1) clearly defined lines of responsibility and accountability throughout the aerodrome operator, including a direct safety accountability of the accountable manager;

(2) a description of the overall philosophies and principles of the aerodrome operator with regard to safety, referred to as the safety policy, signed by the accountable manager;

(3) a formal process that ensures that hazards in operations are identified. Hazard identification shall be based on a combination of reactive, proactive and predictive methods of safety data collection;

(4) a formal process that ensures analysis, assessment and mitigation of the safety risks in aerodrome operations;

(5) the means to verify the safety performance of the aerodrome operator's organisation in reference to the safety performance indicators and safety performance targets of the safety management system, and to validate the effectiveness of safety risk controls;

(6) a formal process to:

(i) identify changes within the aerodrome operator's organisation and the aerodrome which may affect established processes, procedures and services,

(ii) describe the arrangements to ensure safety performance before implementing changes,

(iii) eliminate or modify safety risk controls that are no longer needed or effective due to changes in the operational environment;

(7) formal processes to review the management system referred to in paragraph (a), identify the causes of substandard performance of the

safety management system, determine the implications of such substandard performance in operations, and eliminate or mitigate such causes;

(8) a safety training programme that ensures that personnel are trained and competent to perform the safety management system duties;

(9) formal means for safety communication that ensure that all personnel are fully aware of the safety management system, to convey safety critical information, and explain why particular safety actions are taken and why safety procedures are introduced or changed;

(10) coordination of the safety management system with the aerodrome emergency response plan; and coordination of the aerodrome emergency response plan with the emergency response plans of those organisations it must interface with during the provision of its services.

(c) The aerodrome operator shall document all management system key processes, including a process for making personnel aware of their responsibilities, and its amendment procedure.

(d) The aerodrome operator shall establish a function to monitor compliance of the organisation with the relevant requirements and the adequacy of the procedures. Compliance monitoring shall include a feedback system of findings to the accountable manager to ensure effective implementation of corrective actions as necessary.

(e) The management system shall be proportionate to the size of the organisation and its activities, taking into account the hazards and associated risks inherent in these activities.

(f) In the case that the aerodrome operator holds a certificate to provide air navigation services, it shall ensure that the management system covers the whole range of activities.

### ADR.OR.D.007 — Management of aeronautical data and aeronautical information

(a) The aerodrome operator shall implement and maintain a quality management system covering its aeronautical data and aeronautical information provision activities.

(b) The aerodrome operator shall define procedures for meeting the safety and security management objectives with respect to aeronautical data and aeronautical information provision activities.

(c) The aerodrome operator may integrate safety, security and quality management systems into its management system.

## ADR.OR.D.010 — Contracted activities REV

(a) Contracted activities include all activities within the aerodrome operator's scope of terms of approval that are performed by other organisations working under the aerodrome operator's approval. The aerodrome operator shall ensure that when contracting or purchasing any part of its activity, the contracted or purchased service or equipment or system conforms to the applicable requirements.

(b) When an aerodrome operator contracts any part of its activity to an organisation, the contracted organisation shall work under the approval and oversight of the aerodrome operator. The contracting organisation shall ensure that the competent authority is given access to the contracted organisation, to determine continued compliance with the applicable requirements

## ADR.OR.D.015 — Personnel requirements REV

(a) The aerodrome operator shall appoint an accountable manager, who has the authority for ensuring that all activities can be financed and carried out in accordance with the applicable requirements. The accountable manager shall be responsible for establishing and maintaining an effective management system.

(b) The aerodrome operator shall nominate:

(1) a person for the management of the operational services and maintenance of the aerodrome; and

(2) a person or group of persons with the responsibility of ensuring that the organisation remains in compliance with the applicable requirements.

Such person(s) shall be ultimately responsible to the accountable manager.

(c) A person or group of persons shall be nominated by the aerodrome operator for the development, maintenance and day-to-day management of the safety management system. This(those) person(s) shall act independently of other managers within the organisation and shall have direct access to the accountable manager and appropriate management for safety matters.

(d) The aerodrome operator shall have sufficient and qualified personnel for the planned tasks and activities to be performed in accordance with the applicable requirements.

(e) The aerodrome operator shall maintain appropriate qualification and training records to show compliance with paragraph (d) above.

(f) The aerodrome operator shall ensure that all personnel are aware of the rules and procedures relevant to the exercise of their duties.

(g) In accordance with the relevant requirements of Part-ADR.OPS, the aerodrome operator shall ensure that:

(1) personnel involved in the operation, maintenance and management of the aerodrome shall:

(i) be properly trained in accordance with an adequate training programme,

(ii) demonstrate their capabilities in the performance of their assigned duties,

(iii) be aware of their responsibilities and the relationship of their duties to the operation as a whole;

(2) unescorted persons operating on the movement area and other operational areas, are properly trained; and

(3) proficiency checks programmes are implemented to ensure continuing competence of the persons referred to in (1) and (2) above;

(4) the aerodrome operator shall assign a sufficient number of personnel supervisors to defined duties and responsibilities, taking into account the structure of the organisation and the number of personnel employed.

## ADR.OR.D.020 — Facilities requirements *REV*

(a) The aerodrome operator shall ensure that adequate and appropriate facilities, including office accommodation and working space, are available to its personnel or personnel employed by parties with whom it has contracted for the provision of aerodrome operational and maintenance services, to allow the performance and management of all tasks and activities, in accordance with the applicable requirements.

(b) The aerodrome operator shall ensure, as applicable, that adequate and appropriate facilities, installations and equipment exist at the aerodrome:

(1) for the safe storage and handling of dangerous goods, in accordance with the Technical Instructions, transported through the aerodrome;

(2) for the storage and handling of aviation fuel.

## ADR.OR.D.025 — Coordination with other relevant organisations *REV*

(a) The aerodrome operator shall:

(1) ensure that the safety management system of the aerodrome explicitly addresses the coordination and interface with the safety procedures of other organisations operating or providing services at the aerodrome;

(2) ensure that such organisations have adequate safety procedures in place to comply with the requirements laid down in the aerodrome manual;

(3) coordinate and document arrangements and responsibilities of other organisations operating or providing services at the aerodrome.

(b) The aerodrome operator shall:

(1) develop, lead and implement programmes to promote safety and the exchange of safety-relevant information; and

(2) ensure that organisations mentioned in paragraph (a) are involved in such programmes.

(c) The aerodrome operator shall establish and implement a programme to ensure that the organisations mentioned in paragraph (a) comply with the applicable regulatory requirements and the content of the aerodrome manual.

## ADR.OR.D.030 — Safety reporting system *REV*

(a) The aerodrome operator shall establish and maintain a safety reporting system to be used by all personnel and organisations operating or providing services at the aerodrome, in order to promote safety at, and the safe use of, the aerodrome.

(b) The aerodrome operator, in accordance with ADR.OR.D.005 (b) (3), shall:

(1) require and ensure that the personnel and organisations mentioned in paragraph (a) use the safety reporting system for the mandatory reporting of any accident, serious incident and incidents;

(2) ensure that the safety reporting system may be used for the voluntary reporting of any defect, fault and potential safety hazard which could impact safety.

(c) The safety reporting system shall protect the identity of the reporter, encourage voluntary reporting and include the possibility that reports may be submitted anonymously.

(d) The aerodrome operator shall:

(1) record all reports submitted;

(2) analyse and assess the reports, as appropriate, in order to address safety deficiencies and identify trends;

(3) ensure that all organisations operating or providing services at the aerodrome which are relevant to the safety concern, participate to the analysis of such reports and that any corrective measures identified are implemented;

(4) conduct investigations of reports, as appropriate; and

(5) refrain from attribution of blame in line with the 'just culture' principles.

### ADR.OR.D.035 — Record-keeping REV

(a) The aerodrome operator shall establish an adequate system of record-keeping, covering in particular all the elements indicated in ADR.OR.E.005 and ADR.OR.D.015.

(b) The format of the records shall be specified in the aerodrome manual.

(c) Records shall be stored in a manner that ensures protection of damage, alteration and theft.

(d) Records shall be kept as follows:

(1) the aerodrome certification basis, the alternative means of compliance and the current aerodrome or aerodrome operator certificate(s), for unlimited duration;

(2) arrangements with other organisations, for as long as such arrangements are in effect;

(3) manuals of aerodrome equipment or systems employed at the aerodrome, for as long as they are used at the aerodrome;

(4) safety assessment reports for the lifetime of the system/procedure/activity;

(5) personnel training, qualifications, and medical records as well as their proficiency checks, until the end of their employment;

(6) the current version of the hazard register;

(7) emergency exercise reports, reviews and corrective actions for a minimum of 10 years;

(8) accident, incident and occurrence data for a minimum of 15 years.

(e) Any other safety record should be kept for a minimum of 5 years, unless otherwise agreed with the competent authority.

## SUBPART E — AERODROME MANUAL (ADR.OR.E)

### ADR.OR.E.005 — Aerodrome manual REV

(a) An aerodrome operator shall establish and maintain an aerodrome manual.

(b) The content of the aerodrome manual shall reflect the certification basis and the requirements set out in this Part and Part-ADR.OPS, as applicable, and shall not contravene the terms of approval of the certificate.

(c) The aerodrome manual may be issued in separate parts.

(d) An aerodrome operator shall ensure that all aerodrome personnel and all other relevant organisation's personnel have easy access to the portions of the aerodrome manual that are relevant to their duties and responsibilities and made aware of any changes that are relevant to their duties.

(e) An aerodrome operator shall:

(1) supply the competent authority with the intended amendments and revisions of the aerodrome manual, for items requiring prior approval in accordance with ADR.OR.B.040, in advance of the effective date and ensure that they do not become effective before obtaining the competent authority's approval; or

(2) supply the competent authority with the intended amendments and revisions of the aerodrome manual in advance of the effective date, if the proposed amendment or revision of the aerodrome manual requires only a notification to the competent authority in accordance with Article ADR.OR.B.040(c) and ADR.OR.B.015(b);

(f) Notwithstanding paragraph (e), when amendments or revisions are required in the interest of safety, they may be published and applied immediately, provided that any approval required has been applied for.

(g) The aerodrome operator shall:

(1) review the content of the aerodrome manual, ensure that it is kept up-to-date and amended whenever necessary; and

(2) incorporate all amendments and revisions required by the competent authority.

(h) The aerodrome operator shall ensure that any information taken from other approved documents, and any amendment thereof, is correctly reflected in the aerodrome manual. This does not prevent the aerodrome operator from publishing more conservative data and procedures in the aerodrome manual.

(i) The aerodrome operator shall ensure that:

(1) the aerodrome manual is written in a language acceptable to the competent authority; and

(2) all personnel are able to read and understand the language in which those parts of the aerodrome manual pertaining to their duties and responsibilities are written.

(j) The aerodrome operator shall ensure that the aerodrome manual:

(1) is signed by the accountable manager of the aerodrome;

(2) is printed or is in electronic format and is easy to revise;

(3) has a system for version control management which is applied and made visible in the aerodrome manual; and

(4) observes human factors principles and be organised in a manner that facilitates its preparation, use and review.

(l) The aerodrome operator shall keep at least one complete and current copy of the approved aerodrome manual at the aerodrome and make it available for inspection by the competent authority.

## ADR.OR.E.010 — Structure of the aerodrome manual *REV*

The aerodrome manual shall contain or refer to all necessary information for the safe use, operation and maintenance of the aerodrome, its equipment, as well as its defined obstacle limitation surfaces and other surfaces. The main structure of the aerodrome manual shall be as follows:

(a) Part A: General;

(b) Part B: Aerodrome management, safety management system, qualification and training requirements;

(c) Part C: Particulars of the aerodrome site;

(d) Part D: Particulars of the aerodrome required to be reported to the Aeronautical Information Service; and

(e) Part E: Particulars of the operating procedures of the aerodrome, its equipment and safety measures.

## Appendix I to Annex II

| |
|---|
| **DECLARATION**<br><br>in accordance with Commission Regulation (EC) No …/… on aerodrome design and operation |
| **Aerodrome name — Location indicator:** |
| **Aerodrome operator**<br><br>Name:<br><br>Place in which the operator is established or residing:<br><br>Name and contact details of the accountable manager: |
| **Statements** |
| The aerodrome as well as its defined obstacle limitation surfaces and other surfaces comply with the certification basis and are safe for use by aircraft. |
| All personnel are qualified, competent and trained in accordance with the applicable |

| |
|---|
| requirements. |
| The management system documentation, including the aerodrome manual, reflects the applicable requirements set out in Part-ADR.OR and Part-ADR.OPS. |
| The operation and maintenance of the aerodrome will be carried out in accordance with the requirements of Regulation (EC) No 216/2008 and its Implementing Rules, the terms of approval of the certificate, and the procedures and instructions specified in the aerodrome manual. |
| The aerodrome operator confirms that the information disclosed in this declaration is correct. |
| **Date, name and signature of the accountable manager** |

## Appendix II to Annex II

| Declaration |
|---|
| In accordance with Commission Regulation (EC) No XXX/2013 laying down requirements and procedures related to aerodromes pursuant to Regulation (EC) No 216/ 2008 of the European Parliament and of the Council |
| Provider of apron management services<br><br>Company name and address:<br><br>Name and contact details of the accountable manager: |
| Starting date of operation: |
| Aerodrome(s) at which the apron management services are provided: |
| ☐ Applicable requirements set out in Part-ADR.OPS on the provision of apron management services are documented and reflected in an operations manual. |
| ☐ Attached to this declaration is a list of alternative means of compliance with references to the AMCs they replace, in accordance with ADR.OR.A.015(c). |
| ☐ The service is provided in accordance with the content of the relevant aerodrome manual. |
| ☐ Personnel of the apron management services provider have received the necessary initial training and receive recurrent training to ensure continuing competence. |
| ☐ (If applicable) The operator has implemented and demonstrated conformance to an officially recognised industry standard.<br><br>Reference of the standard: Certification body:<br><br>Date of the last conformance audit: |
| ☐ Any change in the operation that affects the information disclosed in this declaration will be notified to the competent authority. |

| |
|---|
| ☐ I hereby confirm that the information disclosed in this declaration is correct. |
| ______________________________<br>Date and signature of the accountable manager |

# ANNEX III

## PART — Operations Requirements — Aerodromes (Part-ADR.OPS)

## SUBPART A — AERODROME DATA (ADR.OPS.A)

### ADR.OPS.A.005 — Aeronautical data *TXT*

The aerodrome operator shall:

(1) determine, document and maintain data relevant to the aerodrome and available services;

(2) provide data relevant to the aerodrome and available services to the users and the relevant Air Navigation Service providers, as appropriate.

### ADR.OPS.A.010 — Data quality requirements *TXT*

(a) All data relevant to the aerodrome and available services shall be provided by the aerodrome operator with the required quality and integrity.

(b) The aerodrome operator shall:

(1) monitor data relevant to the aerodrome and available services originating from the aerodrome operator and promulgated by the relevant ANS providers;

(2) notify the relevant Aeronautical Information Service (AIS) providers of any changes necessary to ensure correct and complete data relevant to the aerodrome and available services, originating from the aerodrome operator;

(3) notify the relevant ANS providers when the published data is incorrect or inappropriate.

**ADR-OPS.A.015 — Coordination between Aerodrome Operators, Aeronautical Information Services Providers and Air Navigation Service Providers** TXT

(a) The aerodrome operator shall make arrangements with the relevant ANS providers to report pre-flight and in-flight operational information with a minimum of delay. This shall include:

(1) Information on the status of certification of aerodromes and aerodrome conditions, disabled aircraft removal, rescue and fire-fighting and visual approach slope indicator systems;

(2) The operational status of associated facilities, services and navigational aids within their area of responsibility;

(3) Any other information considered to be of operational significance.

(b) Before introducing changes to the air navigation system, the aerodrome operator shall take due account of the time needed by the relevant Aeronautical Information Services for the preparation, production and issue of relevant material for promulgation.

## SUBPART B — AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATIONS (ADR.OPS.B)

### ADR-OPS.B.005 — Aerodrome emergency planning *TXT*

The aerodrome operator shall establish an aerodrome emergency plan that:

(1) is commensurate with the aircraft operations and other activities conducted at the aerodrome or in its vicinity;

(2) provides for the coordination of all appropriate agencies in response to an emergency occurring at an aerodrome or in its vicinity;

(3) contains procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

### ADR-OPS.B.010 — Rescue and fire-fighting services *TXT ADD*

(a) The aerodrome operator shall ensure that:

(1) aerodrome rescue and fire-fighting equipment and services are provided;

(2) adequate equipment, fire extinguishing agents and sufficient personnel are available in a timely manner;

(3) rescue and fire-fighting personnel are properly trained, equipped and qualified to operate in the aerodrome environment;

(4) rescue and fire-fighting personnel potentially required to act in aviation emergencies demonstrate their medical fitness to execute their functions satisfactorily, taking into account the type of activity.

(b) The aerodrome operator shall implement and maintain training and check programmes to ensure the continuing competence of rescue and fire-fighting personnel.

### ADR-OPS.B.015 — Monitoring and inspection of movement area and related facilities TXT

(a) The aerodrome operator shall monitor the condition of the movement area and the operational status of related facilities and report on matters of operational significance, whether of a temporary or permanent nature, to the relevant ANS providers;

(b) The aerodrome operator shall carry out regular inspections of the movement area and its related facilities.

### ADR-OPS.B.020 — Wildlife strike hazard reduction TXT

(a) The aerodrome operator shall:

(1) assess the wildlife hazard on, and in the surrounding, of the aerodrome;

(2) establish means and procedures to minimise the risk of collisions between wildlife and aircraft;

(3) notify the competent authority if a wildlife assessment indicates conditions in the surroundings of the aerodrome conductive to a wildlife hazard problem.

### ADR-OPS.B.025 — Operation of vehicles TXT

The aerodrome operator shall establish procedures for the formal training, assessment and authorisation of all drivers operating on the movement area.

### ADR-OPS.B.030 — Surface movement guidance and control system TXT

The aerodrome operator shall ensure that a surface movement guidance and control system is provided at the aerodrome.

## ADR-OPS.B.035 — Operations in winter conditions ADD

The aerodrome operator of aerodromes to be used during winter conditions shall establish and implement means and procedures to mitigate risks to aerodrome operations in such conditions.

## ADR-OPS.B.040 — Night operations ADD

The aerodrome operator of aerodromes to be used at night shall establish and implement means and procedures to mitigate risks to aerodrome operation in such conditions.

## ADR-OPS.B.045 — Low visibility operations ADD

The aerodrome operator of aerodromes to be used under low visibility conditions shall establish and implement means and procedures to mitigate risks to aerodrome operations in such conditions.

## ADR-OPS.B.050 — Operations in adverse weather conditions ADD

The aerodrome operator shall establish and implement means and procedures to mitigate risks to aerodrome operations in adverse weather conditions.

## ADR-OPS.B.055 — Fuel quality ADD

The aerodrome operator shall ensure that organisations involved in storing and dispensing of fuel to aircraft have procedures to verify that aircraft are provided with uncontaminated fuel and of the correct specification.

## ADR-OPS.B.060 — Access to the movement area ADD

(a) The aerodrome operator shall ensure that:

(1) only trained and qualified persons are allowed unescorted access to the movement area;

(2) a fence or other suitable barrier is provided to prevent the entrance to the movement area of animals large enough to be a hazard to aircraft and to

deter the inadvertent or premeditated access of an unauthorised person onto a movement area and other operational areas of the aerodrome;

(3) a fence or barrier is located so as to separate the movement area and other facilities or zones on the aerodrome vital to the safe operation of aircraft from areas with unrestricted access.

### ADR-OPS.B.065 — Visual aids and aerodrome electrical systems ADD

The aerodrome operator shall ensure that aerodrome visual aids are provided and meet the required specifications.

### ADR-OPS.B.070 — Aerodrome works safety ADD

(a) The aerodrome operator shall:

(1) establish procedures to ensure that aircraft manoeuvring safety is not affected by aerodrome works;

(2) establish procedures to ensure that aerodrome works are not exposed to unacceptable risks from aerodrome operational activities, in accordance with ADR.OR.D.005 (b) (3) (4).

### ADR-OPS.B.075 — Safeguarding of aerodromes ADD

(a) The aerodrome operator shall monitor on the aerodrome and its surroundings:

(1) obstacle limitation surface and protection surfaces of navigation aids in order to take appropriate action to mitigate the risk associated with penetration of obstacle limitation surfaces or other safeguarding surfaces;

(2) marking and lighting of obstacles in order to be able to take action as appropriate;

(3) hazards related to human activities and land use in order to take action as appropriate.

(b) The aerodrome operator shall have procedures in place for mitigating the risks associated with obstacles, developments and other activities within the monitored areas that could impact safe operations of aircraft operating at, to or from the aerodrome.

**ADR-OPS.B.080 — Marking and lighting of vehicles and other mobile objects** *TXT*

The aerodrome operator shall ensure that vehicles and other mobile objects, excluding aircraft, on the movement area of the aerodrome are marked and if the vehicles and aerodrome are used at night or in conditions of low visibility, lighted. Aircraft servicing equipment and vehicles used only on aprons may be exempted.

**ADR-OPS.B.085 — Handling of hazardous materials** *ADD*

The aerodrome operator shall ensure that procedures are established and maintained for the protection of persons and property on the aerodrome during the handling and storing of any hazardous materials that is or is intended to be transported by air.

## SUBPART C — AERODROME MAINTENANCE (ADR.OPS.C)

### ADR-OPS.C.005 — General *TXT*

The aerodrome operator shall establish a maintenance programme, including preventive maintenance where appropriate to maintain aerodrome facilities so that they comply with the essential requirements set in Annex Va to Regulation (EC) No 216/2008.

### ADR-OPS.C.010 — Pavements, other ground surfaces and drainage *TXT*

(a) The aerodrome operator shall inspect the surfaces of all movement areas including pavements (runways, taxiways and aprons), adjacent areas and drainage to regularly assess their condition as part of an aerodrome preventive and corrective maintenance programme.

(b) The aerodrome operator shall maintain:

  (1) the surfaces of all movement areas with the objective of avoiding and eliminating any loose object/debris that might cause damage to aircraft or impair the operation of aircraft systems;

  (2) the surface of a runway in order to prevent the formation of harmful irregularities;

  (3) each paved runway in a condition so as to provide surface friction characteristics above the minimum friction level specified by the competent authority.

### ADR-OPS.C.015 — Visual aids and electrical systems *TXT*

(a) The aerodrome operator shall establish a system of corrective and preventive maintenance of visual aids to ensure lighting and marking system availability and reliability.

European Aviation Safety Agency

**NOTICE OF PROPOSED AMENDMENT**

# NPA 2011-20 (B.II)

RMT.0136 (ADR.001 (a)) & RMT.0137 (ADR.001 (b))

RMT.0140 (ADR.002 (a)) & RMT.0141 (ADR.002 (b))

RMT.0144 (ADR.003 (a)) & RMT.0145 (ADR.003 (b))

# Authority, Organisation and Operations Requirements for Aerodromes

## NPA 2011-20 (B.II) — AMC/GM

**AMC1 — Article 3 Oversight capabilities**

CONFLICT OF INTEREST

The competent authority should ensure that the cases of conflict of interest which are related to family or financial interest are also addressed.

## AMC/GM to ANNEX I — Part Authority Requirements (Part-AR)

## SUBPART A —GENERAL REQUIREMENTS (ADR.AR.A)

**GM1-ADR.AR.A.010 — Oversight documentation**

AVAILABILITY OF DOCUMENTATION TO THIRD PARTIES

The legislative acts, standards, rules, technical publications and similar documents can be made available, in a timely manner, to the aerodrome operators and any other interested party in various ways and formats, such as via its website, the government's official gazette, or any other similar means.

The way for making such material available, including possible application of fees, it is for the competent authority to decide.

Making such documentation available is without prejudice to the application of rules regarding protection of intellectual property rights, or similar applicable legislation.

**GM1-ADR.AR.A.015 — Means of compliance**

GENERAL

Alternative means of compliance used by a competent authority or by organisations under its oversight may be used by other competent authorities or organisations only if processed again in accordance with ADR.AR.A.015 (d) and (e).

**AMC1-ADR.AR.A.020 — Notification of cases of equivalent level of safety and special conditions**

DOCUMENTATION TO BE PROVIDED

The competent authority should provide the Agency with a description of such equivalent level of safety or special conditions.

Such documentation may include but is not limited to:

- description of the situation;
- rationale;
- description and the technical and operational characteristics of the solution applied;
- safety assessments;
- mitigating measures applied, if applicable.

**AMC1-ADR.AR.A.030(d) — Immediate reaction to a safety problem**

NOTIFICATION OF MEASURES

In case that the competent authority directs a measure to a provider apron management services, then these measures should also be notified to the aerodrome operator.

**GM1-ADR.AR.A.040 — Safety Directives**

FORWARDING OF SAFETY DIRECTIVES

Member States' competent authorities may issue safety directives (which may be called operational directives, or otherwise) during its oversight activities, such as an instruction to the aerodrome operator to abstain from a certain activity, or a positive action (e.g. cutting of trees which are found to penetrate the OLS, or the removal of certain object from the aerodrome etc.) needed to maintain the level of safety. Such safety directives are not meant to be forwarded to the Agency.

The safety directives that need to be forwarded to the Agency under ADR.AR.A.040 include, but are not limited, to cases like the following ones, where the competent authority has determined:

(a) necessary to include additional certification specifications in the certification asis of an aerodrome;

(b) that aerodrome equipment has presented unusual or frequent or otherwise unjustified malfunctions or failures;

(c) that the certification specifications established by the Agency are such that under given conditions additional action is required to be undertaken in order to maintain the level of safety;

(d) that there is immediate need to take certain action in order to respond to a safety recommendation or following an accident or serious incident; or

(e) that this or similar unsafe condition may be present at other aerodromes of the same Member State.

# SUBPART B — MANAGEMENT (ADR.AR.B)

## AMC1-ADR.AR.B.005(a) — Management system

GENERAL

(a) The following should be considered when deciding upon the required organisational structure:

(1) the number of certificates and approvals to be issued;

(2) the number of declared organisations;

(3) the number and complexity of aerodromes, aerodrome operators and providers of apron management services within that Member State;

(4) the possible allocation of tasks to third natural or legal persons of resources needed to fulfil the continuing oversight obligations;

(5) the level of civil aviation activity;

(6) the size of the Member State's aviation industry; and

(7) it should also take into account the potential growth of activities in the field of civil aviation.

(b) The set-up of the organisational structure should ensure that carrying out the various tasks and obligations of the competent authority do not rely solely on individuals. That means that a continuous and undisturbed fulfilment of these tasks and obligations of the competent authority should also be guaranteed in case of illness, accident or leave of individual employees.

## GM1-ADR.AR.B.005(a) — Management system

GENERAL

(a) The competent authority designated by each Member State should be organised in such a way that:

(1) there is specific and effective management authority in the conduct of all relevant activities;

(2) the functions and processes described in the applicable requirements of Regulation (EC) No 216/2008 and its Implementing Rules and AMCs, CSs and GM may be properly implemented;

(3) the competent authority's organisation and operating procedures for the implementation of the applicable requirements of the Regulation (EC) No 216/2008 and its Implementing Rules are properly documented and applied;

(4) all competent authority personnel involved in the related activities are provided with training where necessary;

(5) specific and effective provision is made for the communication and interface as necessary with the Agency and the competent authorities of other Member States; and

(6) all functions related to implementing the applicable requirements are adequately described.

(b) A general policy in respect of activities related to the applicable requirements of Regulation (EC) No 216/2008 and its Implementing Rules, including certification specifications, should be developed, promoted and implemented by the manager at the highest appropriate level; for example the manager at the top of the functional area of the competent authority that is responsible for such activities.

(c) Appropriate steps should be taken to ensure that the policy is known and understood by all personnel involved, and all necessary steps should be taken to implement and maintain the policy.

(d) The general policy, whilst also satisfying additional national regulatory responsibilities, should in particular take into account:

(1) the provisions of Regulation (EC) No 216/2008;

(2) the provisions of the applicable Implementing Rules and their acceptable means of compliance, certification specifications and guidance material;

(3) the needs of industry; and

(4) the needs of the Agency and of the competent authority.

(e) The policy should define specific objectives for key elements of the organisation and processes for implementing related activities, including the corresponding control procedures and the measurement of the achieved standard.

**AMC1-ADR.AR.B.005(a)(1) — Management system**

DOCUMENTED POLICIES AND PROCEDURES

(a) The various elements of the organisation involved with the activities related to the applicable requirements of Regulation (EC) No 216/2008 and its Implementing Rules should be documented in order to establish a reference source for the establishment and maintenance of this organisation.

(b) The documented procedures should be established in a way that facilitates their use. They should be clearly identified, kept up-to-date and made readily available to all personnel involved in the relevant activities.

(c) The documented procedures should cover, as a minimum, the following aspects:

(1) policy and objectives;

(2) organisation structure;

(3) responsibilities and associated authority;

(4) procedures and processes;

(5) internal and external interfaces;

(6) internal control procedures;

(7) training of personnel;

(8) cross references to associated documents; and

(9) assistance from other competent authorities or the Agency (where required).

(d) Except for smaller competent authorities, it is likely that the information is held in more than one document or series of documents, and suitable cross-referencing should be provided. For example, organisational structure and job descriptions are not usually in the same documentation as the detailed working procedures. In such cases it is recommended that the documented procedures include an index of cross references to all such other related information, and the related documentation should be readily available when required.

**AMC1-ADR.AR.B.005(a)(2) — Management system**

SCOPE AND DURATION OF INITIAL TRAINING OF AERODROME INSPECTORS

Initial training should encompass:

— initial theoretical training;

— practical training; and

— on-the-job training.

(a) Initial theoretical training

The scope of the initial theoretical training is to familiarise the trainee aerodrome inspectors with the finding categorisation, reporting, follow-up procedures and enforcement. The primary scope of the theoretical training is not the transfer of technical knowledge, as the trainees should possess such knowledge, either from previous work experience or through specialised training, prior to attending the theoretical course (for areas of training see AMC4-ADR.AR.B.005 (a) (2)).

(b) Practical training

The scope of practical training is to instruct on audit/inspection techniques and specific areas of attention without interference with the operation of the aerodrome activities.

(c) On-the-job training

The objective of the on-the-job training is to familiarise the trainees with the particularities of performing an aerodrome audit/inspection in a real, operational environment. The competent authority should ensure that on-the-job training is undertaken only by trainees that have successfully completed the initial theoretical and practical training above by passing a relevant evaluation.

(d) Duration and conduct of the on-job-training

The duration of the on-the-job training should be customised to the particular training needs of every trainee, and should start as soon as possible after the completion of the practical training and cover as much as possible the audit/inspection items which the inspector will be privileged to inspect. The on-the-job training should include at least two aerodrome audits/ inspections.

(e) Elements to be covered during the on-the-job training

On-the-job training should address the following elements:

(1) Preparation of an audit/inspection:

(i) sources of information for preparation of audit/inspection;

(ii) areas of concern and/or open findings;

(iii) selection of aerodrome operator(s) to be audited/inspected;

(iv) task allocation among members of the audit/inspection team.

(2) Administrative issues of the inspection:

(i) aerodrome inspector's credentials, rights and obligations;

(ii) aerodrome access procedures;

(iii) safety and security airside procedures;

(iv) aerodrome inspector's toolkit (fluorescent vest, checklists, clinometer, distance measurement devices, digital camera, GPS, etc.).

(3) Audit/Inspection:

(i) introduction — opening meeting;

(ii) on-site activities (audit/inspection according to the area of expertise of the trainee);

(iii) findings (identification, categorisation, evidencing, reporting);

(iv) corrective actions — enforcement.

(4) Closing meeting — debriefing on the audit/inspection conclusions

(5) Preparation, completion and delivery of the audit/inspection report

(6) Human factors elements:

(i) cultural aspects;

(ii) resolution of disagreements and/or conflicts;

(iii) auditee stress.

(7) Team leading

(8) Post-audit/inspection procedures, such as monitoring the status of open audit findings, follow-up audits/inspections, and closing the findings after appropriate action has been taken by the aerodrome operator.

(f) Assessment of trainee aerodrome inspectors:

The assessment of the trainee should be done by the aerodrome inspector providing the training. A trainee should be considered to have successfully completed the on-the-job training only after demonstrating to the aerodrome inspector providing the training that he/she possesses the professional competence, knowledge, judgement and ability to perform aerodrome inspections in an operational environment, in accordance with the applicable requirements.

(g) Aerodrome inspectors providing training and assessing trainees

The aerodrome inspectors providing the training and assessing trainee aerodrome inspectors, should be appointed by the competent authority and should meet the qualification criteria established by that competent authority, which should contain at least the following requirements:

(1) the appointee has been a qualified aerodrome inspector over the three years prior to his/her appointment;

(2) the appointee has performed the required number of inspections during the last thirty-six month prior to his appointment, in accordance with AMC4-ADR.AR.B.005.

Additional factors to be considered when nominating aerodrome inspectors to provide training and assess trainee aerodrome inspectors include: knowledge of training techniques, professionalism, maturity, judgment, integrity, safety awareness, communication skills, personal standards of performance.

**AMC2-ADR.AR.B.005(a)(2) — Management system**

QUALIFICATION OF AERODROME INSPECTORS AFTER SUCCESSFUL COMPLETION OF TRAINING

(a) Upon the successful completion of the initial training (initial theoretical training; practical training and on-the-job training) the competent authority should issue a formal qualification statement for each qualified aerodrome inspector listing its privileges. The aerodrome inspectors should also be issued credentials, to facilitate their work.

(b) The background knowledge and/or working experience of the aerodrome inspector determines its privileges (the scope of his/her inspection; what he/she is entitled to inspect). The competent authority should determine what the inspector is entitled to inspect taking into account the following considerations:

 (1) background knowledge; and

 (2) working experience.

(c) The inspecting authority should put in place a system that will ensure that their aerodrome inspectors meet at all times the qualification criteria with regard to the eligibility, training and recent experience.

**AMC3-ADR.AR.B.005(a)(2) — Management system**

RECENT EXPERIENCE REQUIREMENTS FOR AERODROME INSPECTORS

(a) An aerodrome inspector will remain qualified if he/she performs a minimum number of two aerodrome audits/inspections during the previous 12 months. In case the minimum number of audits/inspections may not be achieved due to the number of aerodromes in a Member State, audits/inspections conducted on other aerodromes which are open to public use and which however do not fall within the scope of Regulation (EC) No 216/2008, may also be taken into account.

(b) If an aerodrome inspector loses his/her qualification as a result of not reaching the minimum number of inspections mentioned in paragraph (a), he/she may be re-qualified by the competent authority by performing the number of the missed audits/inspections under the supervision of a qualified aerodrome inspector. The missed audits/inspections should take place within a maximum period of 3 months following the end of the period within which he/she should have reached the minimum number of audits/inspections.

(c) If an aerodrome inspector loses his/her qualification because he/she has not been engaged in performing audits/inspections for a period larger than that established in paragraph 2 but less than 24 months, he/she should be re-qualified by the competent authority only after successfully completing on-the-job-training and any recurrent training required.

(d) If an aerodrome inspector loses his/her qualification because he/she has not been engaged in performing audits/inspections for more than 24 months, he/she should be fully re-qualified by the competent authority only after successfully completing initial theoretical, practical and on-the-job training.

**AMC4-ADR.AR.B.005(a)(2) — Management System**

TRAINING PROGRAMME AND RECURRENT TRAINING

(a) The competent authority should establish a training programme for its personnel, including its aerodrome inspectors, and a plan for its implementation. The training programme should include, as appropriate to the role, current knowledge, experience and skills, of the personnel, at least the following:

 (1) aviation legislation organisation and structure;

(2) the Chicago Convention, relevant ICAO Annexes and documents, the applicable requirements of Regulation (EC) No 216/2008, its Implementing Rules and related acceptable means of compliance, certification specifications and guidance material, as well as assessment methodology of the alternative means of compliance and the applicable national legislation;

(3) the applicable requirements and procedures;

(4) areas of particular interest include, but are not limited to:

  (i) management systems, including safety management systems, safety assurance principles, and quality and security management systems as applied to aeronautical data and aeronautical information;

  (ii) acceptability and auditing of safety managements systems;

  (iii) change management;

  (iv) aeronautical studies, safety assessments and reporting techniques;

  (v) human factors principles;

  (vi) aerodrome design;

  (vii) signs, markings and lighting;

  (viii) aerodrome maintenance;

  (ix) aerodrome operations, including:

    (A) aerodrome safeguarding;

    (B) rescue and fire-fighting;

    (C) emergency planning;

    (D) disabled aircraft removal;

    (E) low visibility operations;

    (F) adverse weather operations;

    (G) wildlife management;

    (H) apron management and apron safety management;

    (I) handling of hazardous materials;

    (J) fuel, facilities, storage and handling;

  (x) evaluation, approval and review of aerodrome manuals;

  (xi) other suitable technical training appropriate to the role and tasks of the personnel, in particular for those areas requiring approvals.

(5) The training programme and plan should be updated, as needed, to reflect, at least, changes in aviation legislation and industry. The training programme should also cover the specific needs of the personnel and the competent authority.

(6) The competent authority should ensure that its personnel, including its aerodrome inspectors, undergo recurrent training at regular intervals defined by the competent authority or whenever deemed necessary, in order to be kept-up-to-date.

**GM1-ADR.AR.B.005(a)(2) — Management system**

AERODROME INSPECTORS — DUTIES

(a) An aerodrome inspector is considered to be any person to whom the competent authority has formally assigned tasks related to the safety oversight of aerodromes.

(b) Apart from the aerodrome oversight tasks, an aerodrome inspector may also undertake other tasks that the competent authority finds necessary.

**GM2-ADR.AR.B.005 AR.200(a)(2) — Management System**

QUALIFICATION OF PERSONNEL

The term qualification denotes fitness for the purpose through fulfilment of the necessary conditions such as completion of required training or acquisition of a diploma or degree.

Qualification could also be interpreted to mean capacity, knowledge, or skill that matches or suits an occasion, or makes someone eligible for a duty, office, position, privilege, or status. Qualification does not necessarily imply competence.

Certain posts may by nature be associated with the possession of certain qualifications in a specific field (e.g. civil or electrical engineering, wildlife biology etc.). In such cases, the person occupying such a post is expected to possess the necessary qualifications at a level that is in accordance with the applicable national or community legislation.

**GM3-ADR.AR.B.005(a)(2) — Management system**

QUALIFICATION AND TRAINING — GENERAL

(a) To ensure personnel remain competent, arrangements should be made for initial and recurrent training as required.

(b) The basic capability of the competent authority's personnel is a matter of recruitment and normal management functions in selection of personnel for particular duties. Moreover, the competent authority should provide training in the basic skills as required for those duties. However, to avoid differences in understanding and interpretation, it is considered important that all personnel be provided with further training specifically related to the applicable requirements of Regulation (EC) No 216/2008, its Implementing Rules and related AMCs, CS' and GM, as well as related to the assessment of alternative means of compliance.

(c) The competent authority may provide training through its own training organisation with qualified trainers or through another qualified training source (e.g., training provided by other competent authorities or the Agency).

(d) When training is not provided through an internal training organisation, adequately experienced and qualified persons may act as trainers, provided their training skills have been assessed. If required, an individual training plan should be established covering specific training skills. Records should be kept of such training and of the assessment, as appropriate.

**GM4-ADR.AR.B.005(a)(2) — Management System**

SUFFICIENT PERSONNEL

(a) This guidance material for the determination of the required personnel is limited to the performance of certification and oversight tasks, excluding personnel required to perform tasks subject to any national regulatory requirements.

(b) The elements to be considered when determining required personnel and planning their availability may be divided into quantitative and qualitative elements:

(1) Quantitative elements:

(i) the number of initial certificates to be issued;

(ii) the number of aerodromes and aerodrome operators certified by the competent authority; and

(iii) the number of providers of apron management services having declared their activity to the competent authority.

(2) Qualitative elements:

(i) the size, nature and complexity of activities of aerodromes and aerodrome operators, as well as providers of apron management services:

(A) privileges of the aerodrome operator;

(B) type of approval, scope of approval;

(C) possible certification to industry standards;

(D) types of aerodromes operated;

(E) number of personnel; and

(F) organisational structure, existence of subsidiaries.

(ii) results of past oversight activities, including audits, inspections and reviews, in terms of risks and regulatory compliance:

(A) number and level of findings; and

(B) implementation of corrective actions.

(iii) the size of the Member State's aviation industry and the potential growth of activities in the field of civil aviation, which may be an indication of the number of new applications and changes to existing certificates to be expected.

(c) Based on existing data from previous oversight planning cycles and taking into account the situation within the Member State's aviation industry, the competent authority may estimate:

(1) the standard working time required for processing applications for new certificates;

(2) the standard working time required for processing declarations;

(3) the number of new declarations or changed declarations;

(4) the number of new certificates to be issued for each planning period; and

(5) the number of changes to existing certificates to be processed for each planning period.

(d) In line with the competent authority's oversight policy, the following planning data should be determined specifically for each aerodrome and aerodrome operator, as well as for declared providers of apron management services:

(1) standard number of audits/inspections to be performed per oversight planning cycle;

(2) standard duration of each audit/inspection;

(3) standard working time for audit/inspection preparation, on-site audit/inspection, reporting and follow-up, per aerodrome inspector; and

(4) minimum number and required qualification of aerodrome inspectors for each audit/inspection.

(e) Standard working time could be expressed either in working hours per aerodrome inspector or in working days per aerodrome inspector. All planning calculations should then be based on the same unit (hours or working days).

(f) It is recommended to use a spreadsheet application to process data defined under (c) and (d) above, to assist in determining the total number of working hours/days per oversight planning cycle required for certification, oversight and enforcement activities. This application could also serve as a basis for implementing a system for planning the availability of personnel.

(g) For each aerodrome, aerodrome operator and provider of apron management services the number of working hours/days per planning period for each qualified aerodrome inspector that may be allocated for certification, oversight and enforcement activities should be determined, taking into account:

(1) purely administrative tasks not directly related to oversight and certification;

(2) training;

(3) participation in other projects;

(4) planned absence; and

(5) the need to include a reserve for unplanned tasks or unforeseeable events.

(h) The determination of working time available for certification, oversight and enforcement activities should also consider the possible use of third natural or legal persons.

(i) Based on the elements listed above, the competent authority should be able to:

(1) monitor dates when audits and inspections are due and when they have been carried out;

(2) implement a system to plan the availability of its personnel; and

(3) identify possible gaps between the number and qualification of its personnel and the required volume of certification and oversight.

Care should be taken to keep planning data up-to-date in line with changes in the underlying planning assumptions, with particular focus on risk-based oversight principles.

**GM5-ADR.AR.B.005(a)(2) — Management System**

TRAINING PROGRAMME AND RECURRENT TRAINING

When preparing the training programme, the competent authority should determine the areas for which the training may include realistic training elements.

As an example, the RFFS training could include parts of, or be the same with that of an aerodrome operator’s RFFS personnel. If an aerodrome operator provides such training, care should be taken to avoid any possible conflict of interest.

**GM1-ADR.AR.B.005(a)(3) — Management system**

FACILITIES AND OFFICE ACCOMODATION

Facilities and office accommodation include but is not limited to:

- adequate offices;
- office equipment, including computers and communication means;

- transportation means;
- personnel protective equipment;
- equipment necessary for auditing/inspecting the aerodrome and its facilities, such cameras, clinometers, distance measurement devices, GPS etc.

**AMC1-ADR.AR.B.005(c) — Management System**

COORDINATION WITH OTHER COMPETENT AUTHORITIES OF THE MEMBER STATE

The competent authority should establish coordination arrangements with other competent authorities of the Member State. Such coordination arrangements should in particular include the following competent authorities:

(a) security agencies, in order to ensure:

 (1) international civil aviation security measures are integrated into the design and construction of aerodromes and their facilities;

 (2) the optimisation of civil aviation security measures.

(b) environmental protection authorities, for the management of conflicts between safety and environmental requirements;

(c) local planning and land use authorities.

**AMC1-ADR.AR.B.005(d) — Management system**

PROCEDURES AVAILABLE TO THE AGENCY

(a) Copies of the procedures in the competent authority’s management system should be made available to the Agency for the purpose of standardisation. These should include any amendments to the procedures. The procedures should provide at least the following information:

 (1) Regarding continuing oversight functions undertaken by the competent authority, the competent authority’s organisational structure with description of the main processes. This information should demonstrate the allocation of responsibilities within the competent authority, and that the competent authority is capable of carrying out the full range of tasks regarding the size and complexity of the Member State’s aerodrome industry. It should also consider overall proficiency and authorisation scope of competent authority personnel;

 (2) changes which significantly affect the competent authority’s oversight capabilities;

 (3) for personnel involved in oversight activities, the minimum professional qualification requirements and experience, and principles guiding appointment (e.g. assessment);

 (4) how the following are carried out: assessing applications and evaluating compliance, issuance of certificates, performance of continuing oversight, follow-up of findings, enforcement measures and resolution of safety concerns;

 (5) principles of managing exemptions, derogations, cases of equivalent level of safety and special conditions;

 (6) systems used to disseminate applicable safety information for timely reaction to a safety problem;

(7) criteria for planning continuing oversight (oversight programme), including adequate management of interfaces when conducting continuing oversight (aerodrome operations and ATS operations for example);

(8) outline of the initial training of newly recruited oversight personnel (taking future activities into account), and the basic framework for continuation training of oversight personnel.

(b) The requirements of particular domains defined within the copy of the procedures of the competent authority's management system (and amendments) should be considered.

(c) As part of the continuous monitoring of a competent authority, the Agency may request details of the working methods used, in addition to the copy of the procedures of the competent authority's management system (and amendments). These additional details are the procedures and related guidance material describing working methods for competent authority personnel conducting oversight.

(d) Information related to the competent authority's management system may be submitted in electronic format.

**AMC1-ADR.AR.B.010(a)(1) — Allocation of tasks**

INDEPENDENCE OF PERSONS TO WHOM TASKS ARE ALLOCATED

A natural person or the management and the personnel of a legal person, to whom the competent authority intends to allocate tasks related to the initial certification or continuing oversight of aerodromes, their operators or providers or apron management services should not be involved directly or indirectly in any kind of activity related to planning, design, maintenance, service provision, or any similar activity related to aerodromes, aerodrome operation or aerodrome management.

**AMC2-ADR.AR.B.010(a)(1) — Allocation of tasks**

QUALIFICATIONS OF PERSONNEL

(a) A legal person to which tasks related to the initial certification or continuing oversight tasks are to be allocated should have an adequate number of qualified technical personnel to conduct aerodrome inspections and audits and to perform any other task needed during the certification and oversight process, as required by the competent authority.

(b) The natural person or the personnel of a legal person to whom such tasks are allocated should meet the qualification criteria applicable for competent authorities' aerodrome inspectors prescribed in AMC1-ADR.AR.B.005(a)(2), AMC2-ADR.AR.B.005(a)(2), AMC3-ADR.AR.B.005(a)(2) and AMC4-ADR.AR.B.005(a)(2)..

**GM1-ADR.AR.B.020 — Allocation of tasks**

CERTIFICATION TASKS

The tasks that may be performed by a natural or legal person on behalf of the competent authority may include any tasks related to the initial certification and continuing oversight of aerodromes and aerodrome operators, as well as declared providers of apron management services, with the exclusion of the issue of certificates or approvals.

**AMC1-ADR.AR.B.020(a) — Record-keeping**

GENERAL

The record-keeping system should ensure that all records are accessible whenever needed within a reasonable time. These records should be organised in a consistent way throughout the competent authority (chronological, alphabetical order, for example).

(a) Records should be kept in paper form or in electronic format or a combination of both media. Records stored on microfilm or optical disc form are also acceptable. The records should remain legible and accessible throughout the required retention period. The retention period starts when the record has been created or last amended.

(b) Computer systems should have at least one backup system which should be updated within 24 hours of any new entry. Computer systems should include safeguards against unauthorised alteration of data.

(c) All computer hardware used to ensure data backup should be stored in a different location from that containing the working data and in an environment that ensures they remain in good condition. When hardware or software changes take place, special care should be taken that all necessary data continue to be accessible at least through the full period specified in ADR.AR.B.020(c).

**AMC1-ADR.AR.B.020(a)(1);(a)(2);(a)(3) — Record-keeping**

COMPETENT AUTHORITY MANAGEMENT SYSTEM

Records related to the competent authority’s management system should include, as a minimum and as applicable:

(a) the documented policies and procedures;

(b) the personnel files of competent authority personnel, with supporting documents related to their training and qualifications;

(c) the results of the competent authority’s internal compliance monitoring and risk assessment, including audit findings and corrective actions; and

(d) the contract(s) established with natural and legal persons to whom tasks have been allocated regarding certification or oversight tasks on behalf of the competent authority.

**AMC1-ADR.AR.B.020(a)(4);(a)(5) — Record-keeping**

AERODROMES — AERODROME OPERATORS — APRON MANAGEMENT SERVICE PROVIDERS

Records related to a certified aerodrome and its aerodrome operator, or the provider of apron management services having declared its activity to the competent authority should include, as appropriate to the type of organisation:

(a) the application for a certificate, approval, or declaration;

(b) the documentation based upon which the certificate or approval has been granted with amendments;

(c) the documentation related to notifications of changes by the applicant and their assessment;

(d) the certificate or approval issued, including any changes;

(e) a copy of the continuing oversight programme listing the dates when audits are due and when such audits were carried out;

(f) continuing oversight records including all audit and inspection records;

(g) copies of all relevant correspondence;

(h) details of any exemption or derogation and enforcement actions;

(i) any report from other competent authorities relating to the oversight of the aerodrome, the aerodrome operator and the provider of apron management services, if applicable; and

(j) a copy of any other document approved by the competent authority.

**AMC1-ADR.AR.B.020(c)(1) — Record-keeping**

AERODROMES — AERODROME OPERATORS — PROVIDERS OF APRON MANAGEMENT SERVICES

(a) Records which are considered to be related to the certification of an aerodrome and to be maintained for the lifespan of the certificate include, but are not limited to, the following:

(1) applications submitted;

(2) notifications of the certification specifications for an initial certification and any changes thereof, including:

(i) any provisions for which an equivalent level of safety has been accepted; and

(ii) any special conditions.

(3) documentation related to alternative means of compliance used;

(4) documentation related to exemptions or derogations granted;

(5) aeronautical studies and safety assessments;

(6) designs of the aerodrome;

(7) declarations made by the applicant;

(8) current version of an aerodrome manual; and

(9) approvals granted.

(b) Records for aerodrome equipment, or parts of the aerodrome infrastructure which have been removed from the aerodrome need not be maintained.

(c) For providers of apron management services, records include, but may not be limited to, the declarations and the relevant documentation submitted by the providers.

**AMC1-ADR.AR.B.020(d) — Record-keeping**

AERODROMES — AERODROME OPERATORS — PROVIDERS OF APRON MANAGEMENT SERVICES

The competent authority should determine the retention period for those records that need to be maintained for a period of at least 5 years, taking into account:

(a) the need to have access to data (e.g occurrence reports etc), that would allow it to identify trends, extract conclusions and plan its oversight activities; and

(b) the nature of the regulated area and the technical lifespan of a system.

**GM1-ADR.AR.B.020 — Record-keeping**

GENERAL

Records are required to document results achieved or to provide evidence of activities performed. Records become factual when recorded. Therefore, they are not subject to version control. Even when a new record is produced covering the same issue, the previous record remains valid.

**GM1-ADR.AR.B.020(a) — Record-keeping**

MICROFILM AND OPTICAL STORAGE

Microfilming or optical storage of records may be carried out at any time. The records should be as legible as the original record and remain so for the required retention period.

**GM2-AR.ADR.AR.B.020 (a) — Record-keeping**

AERODROMES — AERODROME OPERATORS — DOCUMENTATION

Documentation to be kept as records in support of the certificate or approval include the management system documentation, including any technical manuals, such as the aerodrome manual, that have been submitted with the initial application, and any amendments to these documents.

## SUBPART C — OVERSIGHT, CERTIFICATION AND ENFORCEMENT (ADR.AR.C)

### AMC1-ADR.AR.C.005 — Oversight

GENERAL

(a) The competent authority should assess the aerodrome operator and monitor its continued competence to conduct safe operations in compliance with the applicable requirements and the certification basis. Similarly, the competent authority should monitor the continued competence of providers of apron management services. The competent authority should ensure that accountability for assessing and monitoring aerodrome operators as well as providers apron management services is clearly defined. This accountability may be delegated or shared, in whole or in part.

(b) It is essential that the competent authority has the full capability to adequately assess the continued competence of an aerodrome operator or a provider of apron management services by ensuring that the whole range of activities is assessed by appropriately qualified personnel.

### GM1-ADR.AR.C.005 — Oversight

GENERAL

(a) Responsibility for the safe operation of an aerodrome lies with the aerodrome operator. Under these provisions a positive move is made towards devolving upon the aerodrome operator a share of the responsibility for monitoring the safety of operations. The objective cannot be attained unless aerodrome operators are prepared to accept the implications of this policy including that of committing the necessary resources to its implementation. Crucial to success of the policy is the content of Part-ADR.OR which requires the establishment of a management system by the aerodrome operator.

(b) The competent authority should continue to assess the aerodrome operator’s compliance with the applicable requirements, including the effectiveness of its management system. If the management system is judged to have failed in its effectiveness, then this in itself is a breach of the requirements which may, among others, call into question the validity of the certificate.

(c) The accountable manager is accountable to the competent authority as well as to those who may appoint him/her. It follows that the competent authority cannot accept a situation in which the accountable manager is denied sufficient funds, manpower or influence to rectify deficiencies identified by the management system.

### AMC1-ADR.AR.C.010(c) — Oversight programme

OVERSIGHT PLANNING CYCLE

(a) The oversight planning cycle is determined by the date of issue of the certificate.

(b) The oversight planning cycle should be 24 months. It may be reduced if there is evidence that the safety performance of the aerodrome operator has decreased.

Moreover, the oversight planning cycle may be extended to a maximum of 36 months if the competent authority has established that, during the previous 24 months:

(1) the aerodrome operator has demonstrated an effective identification of aviation safety hazards and management of associated risks;

(2) the aerodrome operator has continuously demonstrated under ADR.OR.B.040 that it has full control over all changes;

(3) no category 1 findings have been issued; and

(4) all corrective actions have been implemented within the time period accepted or extended by the competent authority as defined in ADR.AR.C.055(e)(2).

The oversight planning cycle may be further extended to a maximum of 48 months if, in addition to the above, the aerodrome operator has established, and the competent authority has approved, an effective continuous reporting system to the competent authority on the safety performance and regulatory compliance of the aerodrome operator itself.

(c) For aerodrome operators operating more than one aerodrome in order to avoid duplication of audits, credit may be granted for specific item audits already completed during the current oversight planning cycle subject to the following conditions:

(1) there should be satisfactory evidence on record that such specific item audits were carried out and that all corrective actions have been taken; and

(2) the competent authority should be satisfied that there is no reason to believe standards have deteriorated in respect of those specific item audits being granted a credit; and

(3) the specific item audit being granted a credit should be audited not later than 24 months after the last audit of the item.

(d) During each oversight planning cycle, meetings with the management of the aerodrome operator, including the accountable manager or its high level delegate, as determined necessary by the competent authority, should take place in order to ensure that both parties remain informed of significant issues.

**AMC2-ADR.AR.C.010(b) — Oversight programme**

AUDITS, INSPECTIONS AND OVERSIGHT PROCEDURES

(a) Each aerodrome operator and each declared provider of apron management services should have an appropriate focal point specifically assigned to it in the competent authority. Where more than one aerodrome inspector is assigned to an aerodrome operator, one of them should be nominated as having overall responsibility for supervision of, and liaison with the aerodrome operator's management, and be responsible for reporting on compliance with the requirements for its operations as a whole.

(b) Inspections, audits and oversight, on a scale and frequency appropriate to the operation, should include items from the following, indicative, list:

(1) aerodrome infrastructure and equipment;

(2) visual aids and aerodrome electrical systems;

(3) obstacle restriction and control;

(4) aerodrome data reporting ;

(5) aerodrome emergency planning;

(6) rescue and fire-fighting;

(7) removal of disabled aircraft;

(8) storage facilities and handling of dangerous goods and fuel, including fuel installations, fuel quality, and fuelling equipment;

(9) low visibility operations;

(10) winter and adverse weather operations;

(11) protection of radar, navigation aids and other aerodrome equipment;

(12) apron management;

(13) apron safety management;

(14) vehicle control on the movement area;

(15) wildlife hazard management;

(16) inspections of the movement area;

(17) maintenance of the aerodrome systems and the movement area;

(18) aerodrome works;

(19) protection against hazardous activities in the vicinity of the aerodrome;

(20) personnel training and records;

(21) aerodrome manuals and documentation;

(22) operator's management system, including its safety management system and its quality and security management system for aeronautical data.

(c) An inspection or an audit should be a 'deep cut' through the items selected and all findings and observations should be recorded.

(d) Aerodrome inspectors should analyse and assess the root cause(s) identified and be satisfied that the corrective actions taken are adequate to correct the non-compliance and to prevent re-occurrence.

(e) Inspections and audits may be conducted separately or in combination. Inspections and audits may also be coordinated with inspections and audits conducted by the competent authorities responsible for the areas of ATM/ANS to address areas of coordination between aerodrome operator and ATM services. Inspections may, at the discretion of the competent authority, be conducted with or without prior notice to the aerodrome operator or the provider of apron management services.

(f) Where it is apparent to an aerodrome inspector that an aerodrome operator or a provider of apron management services has permitted a breach of the applicable requirements, with the result that safety has been, or might have been compromised, the inspector should ensure that the responsible person within the competent authority is informed without delay.

(g) In the first few months of a new operation, physical change of the aerodrome or organisational re-structure, aerodrome inspectors should be particularly alert to any irregular procedures, evidence of inadequate facilities or equipment, or indications that management control of the operation may be ineffective.

(h) They should take account of any conditions that may indicate a significant deterioration in the operator's financial situation. Examples of trends which may indicate problems in a new aerodrome operator's financial situation could be:

(1) significant lay-offs or turnover of personnel; reduced staff resource; increased multi-tasking; changing shift patterns; increased overtime;

(2) delays in meeting payroll;

(3) reduction of safe operating standards;

(4) decreasing standards of training;

(5) withdrawal of credit by suppliers;

(6) inadequate maintenance of the aerodrome; and

(7) shortage of supplies and spare parts.

When any financial difficulties are identified, aerodrome inspectors should increase technical surveillance of the operation with particular emphasis on the upholding of safety standards.

(i) The number or the magnitude of the non-compliances identified by the competent authority will serve to support the competent authority's continuing confidence in the aerodrome operator's or the of apron management services provider's competence or, alternatively, may lead to an erosion of that confidence. In the latter case the competent authority will need to review any identifiable shortcomings of the management system and take appropriate action if required.

**AMC1-ADR.AR.C.010(b); (c) — Oversight programme**

AUDIT

(a) The oversight programme should indicate which aspects will be covered with each audit.

(b) Part of an audit should concentrate on the aerodrome operator's compliance monitoring reports produced by its compliance monitoring personnel to determine if the aerodrome operator is identifying the root causes of and correcting its problems.

(c) At the conclusion of the audit, an audit report should be completed by the auditing aerodrome inspector, including all findings raised.

**AMC2-ADR.AR.C.010(b) — Oversight programme**

AUDITS AND INSPECTIONS

(a) The competent authority should establish a schedule of audits and inspections appropriate to each aerodrome operator or provider of apron management services. The planning of audits and inspections should take into account the results of the hazard identification and risk assessments conducted and maintained by the aerodrome operator as part of its management system. Aerodrome inspectors should work in accordance with the schedule provided to them.

(b) The competent authority may, having regard to an aerodrome operator's performance, vary the frequency of an audit or inspection while ensuring that all aspects of the operation are periodically audited and inspected in accordance with the schedule.

(c) When defining the oversight programme, the competent authority should assess the risks related to the activity of each aerodrome operator or provider of apron management services and adapt the oversight means to the level of risk identified.

**GM2-ADR.AR.C.010(b) — Oversight programme**

INDUSTRY STANDARDS

(a) For aerodrome operators having demonstrated compliance with industry standards, the competent authority may adapt its oversight programme, in order to avoid duplication of audits.

(b) Demonstrated compliance with industry standards may not be considered in isolation from the other elements to be considered for the competent authority's risk-based oversight.

(c) In order to be able to credit any audits performed as part of certification in accordance with industry standards, the following should be considered:

(1) the demonstration of compliance is based on certification auditing schemes providing for independent and systematic verification;

(2) the existence of an accreditation scheme and accreditation body for certification in accordance with the industry standards has been verified;

(3) certification audits are relevant to the requirements defined in Part-ADR.OR, Part ADR.OPS or other regulations as applicable;

(4) the scope of such certification audits can easily be mapped against the scope of oversight;

(5) audit results are accessible to the competent authority; and

(6) the audit planning intervals are compatible with the oversight planning cycle.

**GM3-ADR.AR.C.010(b) — Oversight programme**

AUDITS, INSPECTIONS AND OVERSIGHT PROCEDURES

Normally the inspections that are carried out by the competent authority should be with prior notice to the aerodrome operator or the provider apron management services.

Such notice should be given in writing and in good time before the inspection, so that the inspected entity can make all the necessary arrangements and preparations and to avoid the disruption of normal operations.

In case an inspection is conducted without prior notice, the aerodrome inspectors should ensure that the operations are affected to the minimum extent possible.

**AMC1-ADR.AR.C.015(a) — Initiation of the certification process**

ELIGIBILITY CRITERIA

In the case where the application is refused because the applicant does not meet the eligibility criteria, the competent authority should inform the applicant in writing of the right of appeal, as exists under the applicable national legislation.

**AMC1-ADR.AR.C.015(a) — Initiation of the certification process**

PROCESSING OF APPLICATION

Upon receipt of an application, the competent authority should acknowledge receipt of that application, in writing, within the period defined in the applicable national legislation.

If the competent authority foresees a delay in processing the application, it should notify the applicant as soon as possible, and within the period defined in the applicable national legislation.

The competent authority should respond to any request made by the applicant within the period defined in the applicable national legislation.

If an applicant fails to submit all necessary documentation, the competent authority should inform him/her in writing, within the period defined in the applicable national legislation.

**AMC1-ADR.AR.C.015(b)(1);(2) — Initiation of the certification process**

NOTIFICATION OF CERTIFICATION BASIS

(a) Upon receipt of the application, the competent authority should examine and assess the content of the application and the related documentation, including the proposed certification specifications and any provisions for which compliance is proposed to be demonstrated in an alternative way that provides for an equivalent level of safety. (See also paragraph 1 (a) of AMC1-ADR.AR.C.035(a);(b)).

(b) The competent authority should establish the certification basis of the aerodrome, which should include:

(1) all certification specifications that it finds applicable to the aerodrome design and operation;

(2) any provision for which the competent authority is satisfied with the proposal and accepts the applicant to demonstrate an equivalent level of safety (ELOS) based on its application; and

(3) any special condition prescribed in accordance with ADR.AR.C.025, that the competent authority finds necessary to be included in the certification basis.

(c) The competent authority should document and notify the applicant:

(1) the certification basis as established in paragraph (b) above; and

(2) any change thereto, as a result of certification specifications which became effective after the notification of the certification basis and which the applicant decided to comply with, or that the competent authority has found necessary to be complied with, or design changes made, compliance demonstration results, new special conditions that the competent authority considers necessary etc.

(d) In addition, the competent authority should assess the documentation demonstrating the way the applicant is proposing to comply with the applicable requirements of the Basic Regulation, Part-ADR.OR, and Part-ADR.OPS and any other applicable requirements that are matching the aerodrome design and its operation. The competent authority should also:

(1) examine any request of the applicant for exemption or derogation from any requirement in accordance with article 14 of the Basic Regulation; and

(2) evaluate, in accordance with ADR.AR.A.015, any request of the applicant for use of alternative means of compliance.

(e) The competent authority should take all necessary actions in accordance with article 14 of the Basic Regulation and its Implementing Rules and, as appropriate, document and notify the applicant:

(1) the approved mitigation measures for ensuring that the level of safety is not adversely affected in the case of an exemption under article 14 paragraph 4 of the Basic Regulation; and the approved means for demonstrating an equivalent level of protection in the case of derogations under article 14 paragraph 6 of the Basic Regulation for the exemptions and derogations mentioned in paragraph (d)(1) above;

(2) the alternative means of compliance whose use have been accepted, mentioned in paragraph (d)(2) above; and

(3) any subsequent changes concerning subparagraphs (d)(1) or (d)(2) above, as a result of changes to the proposed operation and design, new determinations made by the competent authority or new requests made by the applicant etc.

(f) When notifying the applicant in accordance with paragraphs (c) and (e), the competent authority should also inform him/her of the right of appeal, as exist under the applicable national legislation.

**AMC1-ADR.AR.C.015(b);(1) — Initiation of the certification process**

DETERMINATION OF ELEVATION OF AERONAUTICAL BEACONS

The competent authority should determine the elevation which is sufficient for the vertical light distribution of an aerodrome beacon or an identification beacon, as described in CS-ADR-DSN.M.625.

**AMC2-ADR.AR.C.015(b);(1) — Initiation of the certification process**

RUNWAY LEAD-IN LIGHTING SYSTEM

If a runway lead-in lighting system is provided, the competent authority should determine the point from which that system should extend up to the point where the approach lighting system, or the runway or the runway lighting system is in view.

**AMC3-ADR.AR.C.015(b);(1) — Initiation of the certification process**

ELECTRICAL POWER SUPPLY SYSTEMS FOR VISUAL AIDS.

The competent authority should determine which obstacle lights are essential for the aerodrome to ensure the safe operation of aircraft and should therefore be provided with a secondary power supply capable of supplying power when there is a failure of the primary power supply.

**AMC4-ADR.AR.C.015(b);(1) — Initiation of the certification process**

MONITORING SYSTEM

The competent authority should determine the serviceability level of any element of the lighting systems of a runway meant for takeoff for use in runway visual range conditions less than a value of 550 m, below which operations should not continue, in accordance with CS-ADR-DSN.S.900 and CS-ADR-DSN.S.905.

**AMC5-ADR.AR.C.015(b);(1) — Initiation of the certification process**

COLOURS OF AERONAUTICAL GROUND LIGHTS

(a) The competent authority should review and judge the acceptability of the outermost isocandela curve, for which a measurement of colour coordinates should be made and recorded by the aerodrome operator.

(b) Certain light units may have application so that they may be viewed and used by pilots from directions beyond that of the outermost isocandela curve (e.g. stop bar lights at significantly wide runway-holding positions). In such instances, the competent authority should assess the actual application and if necessary require a check of colour shift at angular ranges beyond the outermost curve.

**AMC1-ADR.AR.C.015(c) — Initiation of the certification process**

CERTIFICATION OF EXISTING AERODROMES

The certification period of an existing aerodrome should not exceed 18 months since the filling of the application by the applicant.

**GM1-ADR.AR.C.015 — Initiation of the certification process**

INITIAL INTEREST

Prior to initiating the application process for a certificate the competent authority should arrange for a meeting with the applicant.

During this meeting, the applicant should present to the authority its plans with regard to the aerodrome. The applicant should also make arrangements so that its key personnel are present during this meeting.

In addition, during this meeting, the competent authority should provide general information to the applicant about the applicable requirements for the aerodrome. It should also provide copies of the applicable requirements, application forms and any other relevant documentation and describe the procedures that are followed during the certification process.

Such information to be provided by the competent authority may also include information about approvals, permits or clearances that the applicant may need to obtain from other competent authorities (such as security or environmental protection competent authorities, local planning authorities, etc) of the Member State prior or during the certification process.

The competent authority should make arrangements so that representatives of all involved entities of the competent authority(ies) are present during this meeting.

**GM2-ADR.AR.C.015(b) (1);(2) — Initiation of the certification process**

CERTIFICATION BASIS — PROPOSALS FOR EQUIVALENT LEVEL OF SAFETY

When the competent authority assesses a proposal of an applicant who has requested to demonstrate an equivalent level of safety (ELOS), the competent authority should pay, amongst others, particular attention to:

(a) the identification of the intent of the Agency's certification specification(s) in question and assess if the proposal satisfies that intent;

(b) any possible interconnections/relationships between the Agency's certification specification(s) which the proposal is related to, with any other certification specifications or requirements, in order to identify any implications of the proposal to other design, operational, human or other elements of the system and to establish if such interconnections/relationships and implications have been addressed.

**AMC1-ADR.AR.C.020 — Certification Basis**

EFFECTIVE CERTIFICATION SPECIFICATIONS

(a) The certification specifications that the competent authority should use to establish and notify the certification basis to the applicant should be those that were effective during the date of the application.

(b) Notwithstanding paragraph (a) above, if at any point of the certification process the applicant requests to use certification specifications which came into force after the filing of his/her application or the notification of the certification basis by the competent authority, then the competent authority should examine if it is necessary to also include in the certification basis other certification specifications, which also came into effect after the filling of the initial application and which are, in the opinion of the competent authority, directly related to those certification specifications that have been proposed by the applicant.

(c) Notwithstanding paragraph (a) and (b) above, the competent authority may at any time, after the filing of the application, decide to include in the certification basis any certification specifications that it deems necessary.

**AMC1-ADR.AR.C.035(a)(2) — Issuance of certificate**

SAFETY ASSESSEMENTS PROVIDED BY THE AERODROME OPERATOR

(a) The competent authority should validate the conclusion of a safety assessment, provided by the aerodrome operator to ensure compliance with the applicable requirements (see ADR.OR.B.065).

(b) The competent authority should analyse the safety assessment and in particular make sure that:

- the identified safety concern(s) has/have been assessed through the safety assessment process and is/are adequately documented.
- an appropriate coordination has been performed between the parties affected by the safety concern(s);
- the assessment covers the whole system and the interactions of its elements;
- the hazards have been properly identified and the level of risk assessed;
- the proposed mitigation measures are adequate and consistent with the objective of reducing the identified level of risk and the safety objectives, if relevant;
- the timeframes of the planned implementation of the any associated actions are appropriate.

(c) The competent authority should either:

- give approval to the aerodrome operator for the safety assessment and the proposed associated actions, such as mitigation measures;
- coordinate with the aerodrome operator to reach an agreement on revised mitigation measures if some risks have been underestimated or have not been identified; , or
- impose additional measures or reject the proposal if no agreement can be reached.

(d) The competent authority should define and undertake oversight actions that ensure that the mitigation and/or additional measures are properly implemented so that the measures actually meet the risk reduction objectives and that the planned timeframes are applied.

(e) The approval of the safety assessments should be undertaken by the competent authority and notified to the aerodrome operator along with the approval of the change, if such prior approval is required.

(f) When necessary, the competent authority should require the aerodrome operator to promulgate appropriate information, for use by the aerodrome organisation, various stakeholders, and notably by the air navigation service providers and aircraft operators.

**AMC1-ADR.AR.C.035(a);(b) — Issuance of certificate**

VERIFICATION OF COMPLIANCE

(a) Upon receipt of an application for a certificate, the competent authority should:

(1) nominate an individual, to become the focal point for all aspects of the applicant's certification process and to coordinate all necessary activities, including the competent authority's certification team. The nominated person should be responsible to the responsible person of the competent authority for confirming that all appropriate inspections and audits have been carried out. He/she should also ensure that the necessary prior approvals required are issued in due course.

(2) verify if the application shows compliance with the applicable requirements. The competent authority should also arrange for the steps to be followed during the certification process. This would, normally, start with the demonstration of compliance of the aerodrome with the notified certification basis (see AMC1 — ADR.AR.C.015(b);(1);(2)), which will require the conduct of technical inspections by the competent authority and/or examination of submitted documentation, the participation to demonstrations, or tests conducted by the applicant, as the case may be, and the competent authority determines appropriate. This should also include the cases where the certification basis includes provisions for which the competent authority has accepted the applicant to demonstrate an equivalent level of safety to or cases of special conditions, as applicable.

If the competent authority is not satisfied with the outcome of the demonstration process for any elements of the certification basis, it should notify the applicant in writing. At the end of this phase, the competent authority should have documented evidence that the aerodrome meets the notified certification basis.

(3) review the aerodrome manual and any other documentation provided by the applicant; and

(4) verify compliance with the applicable requirements of Part-ADR.OR, Part-ADR.OPS, as well as any other applicable requirement. When verifying compliance with such requirements, an audit should be conducted covering the following areas:

(i) compliance shown by the applicant with the applicable requirements of Part-ADR.OPS or any other applicable requirements;

(ii) the applicant's management system and its organisation, including: detailed management structure, including names and qualifications of personnel; adequacy of the organisation and management structure, including allocated resources and numbers of personnel allocated by the applicant to key management tasks and other positions. Care should be taken to verify that the system is comprehensive and is likely to be effective. Of particular importance is a careful review of the qualifications of the applicant's nominated persons. Account should be taken of the relevance of the nominee's previous experience and known record;

(iii) safety management and compliance monitoring with applicable requirements;

(iv) documentation on which the certificate shall be granted (organisation documentation as required by Part-ADR.OR, including technical manuals, such as the aerodrome manual etc.);

(v) adequacy of facilities with regard to the applicant's scope of work.

(5) in case of non-compliance, the applicant should be informed in writing of the corrections or supplements which are required.

(b) The competent authority should ensure that standardised and approved methods and tools are used by its personnel during the process described in paragraph 1.

(c) In cases where an application for a certificate is refused, the applicant should be informed of the right of appeal as exist under national regulations.

(d) Prior to issuing the certificate(s) the competent authority may require the conduct of one or more flights at the aerodrome, as well as any other test, or exercise it finds necessary.

(e) When the verification process is complete, the competent authority should issue the certificate(s) and ensure the publication of the certification status of the aerodrome in the aeronautical information publication.

**GM1-ADR.AR.C.035 — Issuance of certificate**

VERIFICATION OF COMPLIANCE

The technical inspections of the aerodrome prescribed in paragraphs (b) and (d)(i) of AMC1-ADR.AR.C.035 (a);(b) should take place prior to the approval of the aerodrome manual.

**AMC1-ADR.AR.C.035(a)(3) — Issuance of certificate**

NOMINATED PERSONS

When an aerodrome operator submits the name of a nominee for the nominated persons listed mentioned in ADR.OR.D.015, the competent authority should assess his/her qualifications and may interview the nominee or call for additional evidence of his/her suitability before deciding upon his/her acceptability.

**GM1-ADR.AR.C.035(a)(3) — Issuance of certificate**

NOMINATED PERSONS

Interview with the Accountable Manager, Safety Manager, Compliance Monitoring Manager and other nominated persons

There are two possible cases where an interview/ meeting with nominated post holders may be necessary;

– start of operations before issuing a first certificate for an aerodrome; and
– change of nominated persons at an aerodrome already certified.

Purpose of the meeting:

The aim of the interview and exchange of information between the intended nominated persons and the competent authority is, for the competent authority to acquire information on the intended work areas of the nominated persons and their competence level and give information about the competent authority and at the same time verify their suitability for the posts.

The purpose of the information exchange is to create good contact and understanding between the both parties and to come to a mutual conclusion on, if necessary, possible solutions for training and personal development over time.

Possible agenda items:

– information from the competent authority on organisation and mission of the competent authority, the regulatory framework specifically Safety Management System requirements;

- information from the nominated person concerning the intended work area;
- enforcement methodology of the competent authority;
- the role and responsibility of the Accountable Manager/Chief Operating Officer/Safety Coordinator or other nominated post holders;
- expected competence requirement of the nominated person in relation to present personal status and experience presented in a CV or equivalent documentation;
- interview/discussion concerning depth of knowledge and understanding of the applicable legislation;
- the role and responsibility of the competent authority and of the nominated person;
- understanding of aviation in general and for the specific nominated post, how operators/activities at the aerodrome including Air Navigation Service Providers, and other aviation activities can impact aircraft safety; and
- distribution of delegated powers depending on the organisational situation.

**AMC1-ADR.AR.C.035(d)(1);(2) — Issuance of certificate**

ISSUANCE OF SEPARATE CERTIFICATES

(a) In the case there is a possibility to issue both separate and single certificates, the competent authority should act in accordance with the application made by the applicant.

(b) In the case there is a possibility to issue separate certificates, both certificates should be issued by the same competent authority.

(c) In case that an aerodrome operator operates several aerodromes, these shall be listed on the aerodrome operator's certificate.

**AMC1-ADR.AR.C.035(f) — Issuance of certificate**

LIMITATIONS AND PROCEDURES

(a) If, during the certification process, a limitation or an operating procedure has been determined as necessary to be imposed on or implemented at the aerodrome, the competent authority should ensure that such limitation or procedure is also included in the aerodrome manual.

(b) The competent authority should also ensure that the aerodrome manual contains all limitations or any other similar information prescribed in the certification specifications included in the certification basis of the aerodrome.

**AMC1-ADR.AR.C.035(g) — Issuance of certificate**

APPROVAL OF PROCEDURE FOR THE MANAGEMENT OF CHANGES

The competent authority should establish and document its process to be followed by the aerodrome inspectors when assessing the scope of the changes and the procedure proposed by the aerodrome operator to be followed for the management and notification of the changes. Criteria to be used include but are not limited to:

(a) frequency of changes;

(b) magnitude of changes;

(c) complexity of the aerodrome and type of operations;

(d) density of traffic at the aerodrome;

(e) time required to assess the documentation of the changes notified by the aerodrome operator;

(f) need for the timely publication of the changes and their notification by the AIRAC system;

(g) previous conduct of the aerodrome operator;

(h) effectiveness of the safety management system of the aerodrome operator.

**AMC1-ADR.AR.C.040(a) — Changes**

CHANGES REQUIRING PRIOR APPROVAL

(a) Upon receiving an application for a proposed change that requires a prior approval, the competent authority should:

  (1) assess the proposed change in relation to the certification basis and the applicable requirements of Part-ADR.OR, Part-ADR.OPS, as well as any other applicable requirements;

  (2) assess if the aerodrome operator has identified all the certification specifications, applicable requirements of Part-ADR.OR, Part-ADR.OPS, or other applicable requirements which are related to or affected by the change, as well as any proposal of the applicant for the demonstration of an equivalent level of safety;

  (3) assess the actions proposed by the aerodrome operator in order to show compliance with (1) and (2) above;

  (4) review and assess the content of proposed changes to the aerodrome manual; and

  (5) evaluate the safety assessment that has been submitted by the aerodrome operator, in accordance with AMC1-ADR.AR.C.035(b) and verify its compliance with ADR.OR.B.065.

(b) The competent authority should also determine:

  (1) if the proposed change is directly related to any other certification specification which had been included in the certification basis. If the competent authority finds such a relationship, it should include these related certification specifications amongst those to be notified to the applicant; and

  (2) if the proposed change is such that a special condition, or an amendment to an existing special condition is required.

(c) The competent authority should document and notify in writing the aerodrome operator:

  (1) the applicable certification specifications that it has identified to be applicable in accordance with the previous paragraphs;

  (2) any special conditions, or amendments to special conditions it finds necessary; and

  (3) any provisions for which the competent authority has accepted the applicant to demonstrate an equivalent level of safety; and

(d) Any subsequent changes to the items mentioned in paragraph 3, should be documented and notified to the aerodrome operator in writing.

(e) The competent authority should verify the compliance of the aerodrome operator and, depending on the change, examine the need for prescribing any condition for the operation of the aerodrome during the change.

(f) When notifying the aerodrome operator in accordance with paragraph 3 or 4, the competent authority should also inform him/her of the right of appeal, as exists under the applicable national legislation.

**AMC2-ADR.AR.C.040(a) — Changes**

EFFECTIVE CERTIFICATION SPECIFICATIONS FOR CHANGES REQUIRING PRIOR APPROVAL

(a) The certification specifications that the competent authority should use and notify to the applicant should be those that were effective during the date of the application.

(b) Notwithstanding paragraph (a) above, if at any point of the process the aerodrome operator requests to use certification specifications which came into force after the filing of the application for a change or the notification of the certification specifications by the competent authority, then the competent authority should examine if it is necessary to also notify the aerodrome operator other certification specifications, which also came into effect after the filing of the application for the change and which are, in the opinion of the competent authority, directly related to those certification specifications that have been proposed by the aerodrome operator.

(c) Notwithstanding paragraph (a) and (b) above, the competent authority may at any time, after the filing of the application for a change, decide to notify the aerodrome operator any certification specifications that it deems necessary for the proposed change.

**AMC1-ADR.AR.C.040(f) — Changes**

CHANGES NOT REQUIRING PRIOR APPROVAL

(a) Upon receiving a notification of a change that does not require a prior approval, the competent authority should:

    (1) assess the change in relation to the certification basis and the applicable requirements of Part-ADR.OR, Part-ADR.OPS, as well as any other applicable requirements;

    (2) assess if the aerodrome operator has identified all the certification specifications, applicable requirements of Part-ADR.OR, Part-ADR.OPS, or other applicable requirements which are related to or affected by the change, as well as any cases related to demonstration of an equivalent level of safety ;

    (3) assess the actions proposed by the aerodrome operator in order to show compliance with (1) and (2) above;

    (4) review and assess the content of the changes to the aerodrome manual; and;

    (5) evaluate the safety assessment that has been submitted by the aerodrome operator, in accordance with AMC1-ADR.AR.C.035(b) and verify its compliance with ADR.OR.B.065.

(b) The competent authority should also determine:

    (1) if the proposed change is directly related to any other certification specification which had been included in the certification basis and if such relationship has been identified by the aerodrome operator; and

(2) if the proposed change is such that a special condition, or an amendment to an existing special condition is required,

and document its actions.

(c) In case the competent authority is not satisfied with the content of the documentation submitted by the aerodrome operator, or it has identified that a special condition should be prescribed or amended, or that more evidence or clarifications are needed, it should notify the applicant in writing and as soon as possible and, if needed, request further amendments or raise a finding, or take any other action it finds necessary, as appropriate.

(d) The competent authority should verify the compliance of the aerodrome operator and, depending on the change, examine the need for prescribing any condition for the operation of the aerodrome during the change.

(e) When notifying the applicant in accordance with paragraph 4, the competent authority should also inform him/her of the right of appeal, as exists under the applicable national legislation.

**AMC2-ADR.AR.C.040(f) — Changes**

EFFECTIVE CERTIFICATION SPECIFICATIONS FOR CHANGES NOT REQUIRING PRIOR APPROVAL

(a) The certification specifications that the competent authority should use and to assess the notification of the change, should be those which were effective during the date of the notification of the change by the aerodrome operator.

(b) Notwithstanding paragraph (a) above, at any point of the process the aerodrome operator may request to use certification specifications that came into force after its notification for the change. In such cases, the competent authority should examine if it is necessary to also notify the aerodrome operator other certification specifications, which also came into effect after the date of the notification of the change by the aerodrome operator, and which are, in the opinion of the competent authority, directly related to those already identified as being affected by the change.

(c) Notwithstanding paragraph (a) and (b) above, the competent authority may at any time, after the notification of change by the aerodrome operator, notify it any certification specifications that it deems necessary for the change.

**AMC3-ADR.AR.C.040(a);(f) — Changes**

GENERAL

(a) Changes in nominated persons: The competent authority should be informed of any changes to personnel specified in Part-ADR.OR that may affect the certificate or the terms of approval attached to it. When an aerodrome operator submits the name of a nominee for the nominated persons mentioned in ADR.OR.D.015, the competent authority should assess his/her qualifications and may interview the nominee or call for additional evidence of his/her suitability before deciding upon his/her acceptability (see GM1-ADR.AR.C.035 (a)(3)).

(b) A documented systematic approach should be used for maintaining the information on when an amendment was received by the competent authority and when it was approved.

(c) The competent authority should receive from the aerodrome operator each management system documentation amendment, including amendments that do not require prior approval by the competent authority. Where the amendment requires the competent authority's approval, the competent authority, when satisfied, should indicate its approval in writing. Where the amendment does not require prior approval, the competent authority should acknowledge receipt in writing within the time limits existing under the relevant national legislation.

(d) For changes requiring prior approval, in order to verify the aerodrome operator's compliance with the applicable requirements, the competent authority should consider the need to conduct an audit of the operator, limited to the extent of the changes. If required for verification, the audit should include additional interviews and inspections carried out at the aerodrome operator's facilities.

**GM1-ADR.AR.C.040(c) — Changes**

AMENDMENT OF CERTIFICATE

The competent authority should amend the certificate for any change that affects the terms of approval of the certificate, irrespectively of their magnitude.

**GM1-ADR.AR.C.040 (c) — Changes**

CHANGE OF NAME OF THE AERODROME OPERATOR

(a) On receipt of the application and proof of change of name as well as the relevant parts of the aerodrome operator's documentation as required by Part-ADR.OR, the competent authority should re-issue the certificate.

(b) A name change alone does not require the competent authority to audit the aerodrome operator, unless there is evidence that other aspects of the operator's organisation have changed.

**AMC1-ADR.AR.C.045(a);(b) — Change of aerodrome operator**

ASSESSEMENT OF RISKS ASSOCIATED WITH THE CHANGE OF THE OPERATOR

Prior to issuing the new or amending the existing certificate, the competent authority should ensure that that the new operator complies with the applicable requirements.

The competent authority should be satisfied with the arrangements between the current and the proposed operator of the aerodrome with regard to the transfer of the operations.

In addition, the competent authority should assess the safety assessment that has been submitted by the aerodrome operator, in accordance with AMC1-ADR.AR.C.035(b) and verify its compliance with ADR.OR.B.045**,** to ensure the safe transfer of the operations.

When deciding on the conditions under which the aerodrome will operate during the change, the competent authority should also take into account:

– the extent and depth of the organisational changes (e.g. new nominated persons, level of changes to management positions, restructuring of the organisational structure etc); and

– possible changes to type of operations, or the aerodrome itself.

**GM1-AR.C.050 — Declarations of providers of apron management services**

VERIFICATION — DECLARATION

The verification made by the competent authority upon receipt of a declaration does not necessarily imply an inspection. The primary aim is to check whether what is declared complies with applicable requirements.

**AMC1-ADR.AR.C.055 — Findi ngs, obser vations corr ective actions and enforcemen t measures**

FINANCIAL PENALTIES

The competent authority may additionally and depending on the nature and the repetitiveness of the findings or the level of implementation of the corrective actions, impose financial penalties as appropriate, which are effective, proportionate and dissuasive.

**GM1-ADR.AR.C.055 — Fi ndings, obs ervations c orrective actions and en forcement measures**

TRAINING

For a level 1 finding it may be necessary for the competent authority to ensure that further training by the aerodrome operator or the provider of the apron management services is carried out and audited by the competent authority before the activity is resumed, dependent upon the nature of the finding.

**GM1-ADR.AR.C.055 — Findings, corrective actions and enforcement measures**

CATEGORIES OF FINDINGS — DOCUMENTARY EVIDENCE

Examples of documentary evidence include but is not limited to:

– aerodrome or equipment manuals;
– contracts or other types of arrangements;
– training, qualification or medical records;
– inspection records;
– test or exercise results;
– internal audit results;
– maintenance records; and

other similar material required to be maintained by the aerodrome operator or the provider of apron management services.

**AMC1-ADR.AR.C.060 (a) — Wildlife hazard management**

REPORTING MECHANISM — REPORTING FORM

(a) The competent authority should establish a mechanism for the collection and analysis of wildlife strike (or near-misses) reports. It should also forward the wildlife strike reports to the ICAO to be included in the ICAO Bird Strike Information System (IBIS) database.

(b) The competent authority should ensure that the reporting forms (paper or electronic format) used by the aerodrome operators or other parties for reporting wildlife strikes, contain at least the following information:

(1) Operator involved

(2) Aircraft make/model

(3) Engine make/model

(4) Aircraft registration

(5) Date, (day, month year)

(6) Local time

(7) Dawn, day, dusk, night

(8) Aerodrome name

(9) Runway used

(10) Location if en route

(11) Height AGL in ft

(12) Speed (IAS) in kt

(13) Phase of flight:

(i) Parked;

(ii) Taxi;

(iii) Take off run;

(iv) Climb;

(v) En route;

(vi) Descent;

(vii) Approach;

(viii) Landing roll;

(14) Part(s) of aircraft struck or damaged:

(i) Radome;

(ii) Windshield;

(iii) Nose (excluding above);

(iv) Engine no (1, 2, 3, 4);

(v) Propeller;

(vi) Wing/rotor;

(vii) Fuselage;

(viii) Landing gear;

(ix) Tail;

(x) Lights;

(xi) Other (to be specified)

(15) Effect on flight:

(i) None;

(ii) Aborted take-off;

(iii) Precautionary landing;

(iv) Engines shut down;

(v) Other (to be specified)

(16) Sky condition:

(i) No cloud;

(ii) Some cloud;

(iii) Overcast

(17) Precipitation:

(i) Fog;

(ii) Rain;

(iii) Snow

(18) Bird species

(19) Number of birds:

(i) Seen

(A) 1

(B) 2–10

(C) 11–100

(D) More

(ii) Struck

(A) 1

(B) 2–10

(C) 11–100

(D) more

(20) Size of bird:

(i) Small

(ii) Medium

(iii) Large

(21) Pilot warned of birds:

(i) (A) yes/no

(22) Remarks (description of damage, injuries and other pertinent information)

(23) Reporting person/organisation

(24) Address and/or instructions for returning the form to the competent authority

(25) Address within the Member State to which any bird remains, including feather fragments, should be sent.

**GM1-ADR.AR.C.060(a) — Wildlife hazard management**

REPORTING TO ICAO

Further guidance on reporting bird strikes to ICAO is contained in ICAO Doc 9332 — Manual on the ICAO Bird Strike Information System (IBIS).

**AMC1-ADR.AR.C.060(b) — Wildlife hazard management**

MITIGATING MEASURES

Where the elimination of existing sites that may attract wildlife to the aerodrome (or its vicinity) is not possible, the competent authority should ensure that a safety assessment of the hazard posed by wildlife to aircraft operations is conducted by the aerodrome operator and that all necessary measures are identified and implemented so that the risk is reduced to a level which is as low as reasonably practicable.

**AMC1-ADR.AR.C.60(b) — Wildlife hazard management**

PREVENTION OF INCOMPATIBLE LAND USE AROUND AERODROMES — BIRD HAZARD

The following is a non-exhaustive list of types of land uses which should in particular be prevented, eliminated or mitigated:

(a) fish processing;

(b) agriculture;

(c) cattle feed lots;

(d) garbage dumps and landfill sites;

(e) factory roofs and parking lots;

(f) theatres and food outlets;

(g) wildlife refuges;

(h) artificial and natural lakes;

(i) golf or polo-courses, etc.;

(j) animal farms; and

(k) slaughter-houses.

**GM1-ADR.AR.C.060(b) — Wildlife hazard management**

PREVENTION OF INCOMPATIBLE LAND USE AROUND AERODROMES — BIRD HAZARD

Incompatible land use around an aerodrome may influence restrictions on aircraft flights as well as negatively affect aircraft safety.

Land use around an aerodrome may influence bird strikes to aircraft. Birds may be attracted to areas near the aerodrome and in turn go to the aerodrome for food, water, resting or shelter. Some birds may also be struck outside aerodrome property, over a land use that attracts them.

The location of a proposed land use in relation to the aerodrome should be considered, because an attractive land use could create flyways over the aerodrome or through flight paths at the aerodrome.

In some cases, more than one possible use of an area may have to be considered to ensure that bird hazard will not be increased at or near the aerodrome.

Further guidance on prevention of incompatible land use around aerodromes is contained in ICAO Doc 9137 (Airport Services Manual), Part 3—Bird Control and Reduction.

**GM2-ADR.AR.C.060(b) — Wildlife hazard management**

COORDINATION

Depending upon the extent of the wildlife hazards in a Member State, a coordination mechanism (e.g. a national committee or equivalent) could serve as a focal point to deal with the analysis of the problem, aerodrome and aircraft operator interface and relevant research or other related activities.

The composition of such a coordination mechanism in each Member State may vary, however, it should include all the authorities associated or interested in the problem. The coordination mechanism should act as an information source in order to identify problems, mutual understanding of concerns, identifying priorities and contribute to the development of the national wildlife hazard control policy.

Such a coordination mechanism could include:

- competent authorities for civil aviation;
- competent authorities for agriculture and environment
- aerodrome operators;
- major aircraft operators;
- pilot’s associations;
- aircraft and engine manufacturers.

The coordination mechanism should convene at regular intervals to keep apprised of new developments or serious issues and review the need for updating the wildlife hazard control policy.

Further guidance on coordination mechanisms with regard to wildlife management is included in ICAO Doc 9137, Part 3, Bird Control and Reduction.

**GM1-ADR.AR.C.065 — Obstacles — Objects**

GENERAL

The establishment of the obstacle limitation surfaces, protection surfaces and other areas associated with an aerodrome aims at ensuring the safety and regularity of operations.

Because of their significance, it is necessary to establish a mechanism to ensure that such established surfaces and areas continuously meet the applicable requirements.

Outside the boundaries of the aerodrome the aerodrome operator has normally no legal power to protect the established surfaces and areas associated with the aerodrome.

Notwithstanding the obligations of the aerodrome operator to monitor the activities around the aerodrome and to take the actions foreseen in Part-ADR.OPS, it is understood that this may not be sufficient to control/prevent the development of new obstacles, or extensions to existing ones, or to remove such obstacles that may endanger safety or make the aerodrome unusable.

Thus, it is for the Member State's competent authority to exercise its powers to prevent or correct such situations. This can be accomplished in many different ways, depending on the Member State's administrative and legal system, the coordination mechanisms and the powers vested to each competent authority.

In any case, the way in which this objective is to be accomplished, as well as the coordination mechanisms required to be set-up, are left to the Member States.

**AMC1-ADR.AR.C.065 — Obstacles (a)**

OUTER HORIZONTAL SURFACE

(a) To facilitate practicable and efficient instrument approach procedures the competent authority may establish an outer horizontal surface and define its outer limits, when an aeronautical study indicates that this is necessary;

(b) The outer horizontal surface should be a horizontal surface connected to the upper edge of conical surface and spreading outwards;

(c) The dimensions and characteristics of the outer horizontal surface should be those described in CS-ADR-DSN.H.410.

**AMC2-ADR.AR.C.065(a) — Obstacles**

ELEVATION DATUM

The competent authority should establish the elevation datum to be used for the measurement of the height of the inner horizontal surface, in accordance with CS-ADR-DSN.H.420.

**AMC1-ADR.AR.C.065(a) — Obstacles — Objects**

NON-INSTRUMENT RUNWAYS

(a) New objects or extensions of existing objects should not be permitted above an approach or transitional surface except when, in the opinion of the competent authority, the new object or extension would be shielded by an existing immovable object.

(b) New objects or extensions of existing objects should not be permitted above the conical surface or inner horizontal surface except when, in the opinion of the competent authority, the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

(c) Existing objects above any of the conical surface, inner horizontal surface, approach surface and transitional surfaces should as far as practicable be removed except when, in the opinion of the competent authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

**AMC1-ADR.AR.C.065(a) — Obstacles — Objects**

NON-PRECISION APPROACH RUNWAYS

(a) New objects or extensions of existing objects should not be permitted above an approach surface within 3.000 m of the inner edge or above a transitional surface except if in the opinion of the competent authority the new object or extension would be shielded by an existing immovable object.

(b) New objects or extensions of existing objects should not be permitted above the approach surface beyond 3.000 m from the inner edge, the conical surface or inner horizontal surface except when, in the opinion of the competent authority, the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

(c) Existing objects above the conical surface, the inner horizontal surface, the approach surface and the transitional surfaces should as far as practicable be removed except when, in the opinion of the competent authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

## AMC2-ADR.AR.C.065(a) — Obstacles — Objects

PRECISION APPROACH RUNWAYS

(a) Fixed objects should not be permitted above the inner approach surface, the inner transitional surface or the balked landing surface, except for frangible objects which because of their function must be located on the strip. Mobile objects should not be permitted above these surfaces during the use of the runway for landing.

(b) New objects or extensions of existing objects should not be permitted above an approach surface or a transitional surface except when, in the opinion of the competent authority, the new object or extension would be shielded by an existing immovable object.

(c) New objects or extensions of existing objects should not be permitted above the conical surface and the inner horizontal surface except when, in the opinion of the competent authority, an object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

(d) Existing objects above an approach surface, a transitional surface, the conical surface and inner horizontal surface should as far as practicable be removed except when, in the opinion of the competent authority, an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

## AMC3-ADR.AR.C.065(a) — Obstacles — Objects

RUNWAYS MEANT FOR TAKE-OFF

(a) New objects or extensions of existing objects should not be permitted above a take-off climb surface except when, in the opinion of the competent authority, the new object or extension would be shielded by an existing immovable object.

(b) The competent authority should limit the height of new objects t to preserve the characteristics of an obstacle free surface established in accordance with in CS.ADR.DSN.J.485

(c) Existing objects that extend above a take-off climb surface should as far as practicable be removed except when, in the opinion of the competent authority, an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

**AMC4-ADR.AR.C.065(a) — Obstacles — Objects**

OTHER OBJECTS

(a) Objects which do not project through the approach surface but which would nevertheless adversely affect the optimum siting or performance of visual or non-visual aids should, as far as practicable, be removed.

(b) (2) Anything which may, in the opinion of the competent authority after aeronautical study, endanger aeroplanes on the movement area or in the air within the limits of the inner horizontal and conical surfaces should be regarded as an obstacle and should be removed in so far as practicable.

**AMC5-ADR.AR.C.065(a) — Obstacles — Objects**

OBSTACLE PROTECTION SURFACE FOR VISUAL APPROACH SLOPE INDICATOR SYSTEMS

(a) New objects or extensions of existing objects above a protection surface should not be permitted above an obstacle protection surface except when the new object or extension would be shielded by an existing immovable object.

(b) Existing objects above a protection surface:

  (1) Existing objects above an obstacle protection surface should be removed except when, in the opinion of the competent authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of operations of aeroplanes;

  (2) Where an aeronautical study indicates that an existing object extending above an obstacle protection surface could adversely affect the safety of operations of aeroplanes, one or more of the following measures should be taken:

    (i) suitably raise the approach slope of the system;

    (ii) reduce the azimuth spread of the system so that the object is outside the confines of the beam;

    (iii) displace the axis of the system and its associated obstacle protection surface by no more than 5°;

    (iv) suitably displace the threshold; and

where (iv) is found to be impracticable, suitably displace the system upwind of the threshold to provide an increase in threshold crossing height equal to the height of the object penetration.

**AMC1-ADR-AR.C.065 (b);(c) — Obstacles — Objects**

OBSTACLES BEYOND THE OBSTACLE LIMITATION SURFACES

(a) Obstacles beyond the limits of the obstacle limitation surfaces, at least those extending to a height of 150 m or more above ground elevation, should be marked and lighted, except that the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day or medium intensity lights if it is determined by the competent authority to be sufficient.

(b) Overhead wires, cables, etc., crossing a river, valley or highway should be marked and their supporting towers marked and lighted if an aeronautical study indicates that the wires or cables could constitute a hazard to aircraft, except that the marking of the supporting towers may be omitted when they are lighted by high-intensity obstacle lights by day.

(c) When it has been determined that an overhead wire, cable, etc., needs to be marked but it is not practicable to install markers on the wire, cable, etc., then high-intensity obstacle lights, Type B, should be provided on their supporting towers.

(d) The marking and lighting of obstacles mentioned in paragraph (a), (b) and (c) above should be done in accordance with the certification specifications adopted by the Agency.

**AMC1-ADR-AR.C.065(b);(c) — Obstacles — Objects**

OBSTACLES INSIDE THE OBSTACLE LIMITATION SURFACES AND OUTSIDE THE AERODROME

(a) A fixed obstacle that extends above a take-off climb, approach or transitional surface within 3000 m of the inner edge of the take-off climb or approach surface should be marked and, if the runway is used at night, lighted, except that:

 (1) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

 (2) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;

 (3) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day if medium intensity lights are deemed insufficient; and

 (4) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

(b) A fixed object, other than an obstacle, adjacent to a take-off climb, approach or transitional surface should be marked and, if the runway is used at night, lighted, if such marking and lighting is considered necessary to ensure its avoidance, except that the marking may be omitted when:

 (1) the object is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m; or

 (2) the object is lighted by high-intensity obstacle lights by day if medium intensity lights are deemed insufficient.

(c) A fixed obstacle above a horizontal surface should be marked and, if the aerodrome is used at night, lighted, except that:

 (1) such marking and lighting may be omitted when:

  (i) the obstacle is shielded by another fixed obstacle; or

  (ii) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths; or

  (iii) an aeronautical study shows the obstacle not to be of operational significance;

 (2) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;

 (3) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day if medium intensity lights are deemed insufficient; and

 (4) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

(d) A fixed object that extends above an obstacle protection surface should be marked and, if the runway is used at night, lighted.

**AMC1-ADR-AR.C.065(b) — Obstacles - Objects**

LIGHTING OF OBJECTS OUTSIDE THE AREA CONTROLLED BY THE AERODROME OPERATOR

(a) Use of obstacle lights

(1) The presence of objects which must be lighted should be indicated by low, medium or high-intensity obstacle lights, or a combination of such lights.

(2) Low-intensity obstacle lights, Type A or B, should be used where the object is a less extensive one and its height above the surrounding ground is less than 45 m.

(3) Where the use of low-intensity obstacle lights, Type A or B would be inadequate or an early special warning is required, then medium or high-intensity obstacle lights should be used.

(4) Low-intensity obstacle lights, Type C, should be displayed on vehicles and other mobile objects excluding aircraft.

(5) Low-intensity obstacle lights, Type D, should be displayed on follow-me vehicles.

(6) Low-intensity obstacle lights, Type B, should be used either alone or in combination with medium-intensity obstacle lights, Type B, in accordance with subparagraph (7) below.

(7) Medium-intensity obstacle lights, Type A, B or C, should be used where the object is an extensive one or its height above the level of the surrounding ground is greater than 45 m medium-intensity obstacle lights, Types A and C, should be used alone, whereas medium-intensity obstacle lights, Type B, should be used either alone or in combination with low-intensity obstacle lights, Type B.

(8) High-intensity obstacle lights, Type A, should be used to indicate the presence of an object if its height above the level of the surrounding ground exceeds 150 m and an aeronautical study indicates such lights to be essential for the recognition of the object by day.

(9) High-intensity obstacle lights, Type B, should be used to indicate the presence of a tower supporting overhead wires, cables, etc., where:

(i) an aeronautical study indicates such lights to be essential for the recognition of the presence of wires, cables, etc.; or

(ii) it has not been found practicable to install markers on the wires, cables, etc.

(10) Where, in the opinion of the competent authority, the use of high-intensity obstacle lights, Type A or B, or medium-intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10 000 m radius) or cause significant environmental concerns at day and/or night, a dual obstacle lighting system should be provided. When a dual obstacle lighting system is provided, this system should be composed of high-intensity obstacle lights, Type A or B, or medium-intensity obstacle lights, Type A, as appropriate, for daytime and twilight use and medium-intensity obstacle lights, Type B or C, for night-time use.

(b) Location of obstacle lights.

(1) One or more low, medium or high-intensity obstacle lights should be located as close as practicable to the top of the object. The top lights should be so arranged as to at least indicate the points or edges of the object highest in relation to the obstacle limitation surface.

(2) In the case of chimney or other structure of like function, the top lights should be placed sufficiently below the top so as to minimise contamination by smoke, etc. (see Figures 1 and Figure 2).

(3) In the case of a tower or antenna structure indicated by high-intensity obstacle lights by day with an appurtenance, such as a rod or an antenna, greater than 12 m where it is not practicable to locate a high-intensity obstacle light on the top of the appurtenance, such a light should be located at the highest practicable point and, if practicable, a medium-intensity obstacle light, Type A, mounted on the top.

(4) In the case of an extensive object or of a group of closely spaced objects, top lights should be displayed at least on the points or edges of the objects highest in relation to the obstacle limitation surface, so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area should be marked. Where low-intensity lights are used, they should be spaced at longitudinal intervals not exceeding 45 m. Where medium-intensity lights are used, they should be spaced at longitudinal intervals not exceeding 900 m.

(5) When the obstacle limitation surface concerned is sloping and the highest point above the obstacle limitation surface is not the highest point of the object, additional obstacle lights should be placed on the highest point of the object.

(6) Where an object is indicated by medium-intensity obstacle lights, Type A, and the top of the object is more than 105 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels if technically feasible. These additional intermediate lights should be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m (see subparagraph (7) below).

(7) Where an object is indicated by medium-intensity obstacle lights, Type B, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels if technically feasible. These additional intermediate lights should be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and should be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate.

(8) Where an object is indicated by medium-intensity obstacle lights, Type C, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels if technically feasible. These additional intermediate lights should be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate.

(9) Where high-intensity obstacle lights, Type A, are used, they should be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in paragraph (b) (1) above, except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

(10) Where high-intensity obstacle lights, Type B, are used, they should be located at three levels:

(i) at the top of the tower;

(ii) at the lowest level of the catenary of the wires or cables; and

(iii) at approximately midway between these two levels.

(11) The installation setting angles for high-intensity obstacle lights, Types A and B, should be in accordance with Table 1.

(12) The number and arrangement of low, medium or high-intensity obstacle lights at each level to be marked should be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights should be provided on that object in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

(c) Low-intensity obstacle lights — Characteristics

(1) Low-intensity obstacle lights on fixed objects, Types A and B, should be fixed-red lights.

(2) Low-intensity obstacle lights, Types A and B, should be in accordance with the specifications in Table 2.

(3) Low-intensity obstacle lights, Type C, displayed on vehicles associated with emergency or security should be flashing-blue and those displayed on other vehicles should be flashing-yellow.

(4) Low-intensity obstacle lights, Type D, displayed on follow-me vehicles should be flashing-yellow.

(5) Low-intensity obstacle lights, Types C and D, should be in accordance with the specifications in Table 2.

(6) Low-intensity obstacle lights on objects with limited mobility such as aerobridges should be fixed-red. The intensity of the lights should be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed.

(7) Low-intensity obstacle lights on objects with limited mobility should as a minimum be in accordance with the specifications for low-intensity obstacle lights, Type A, in Table 2.

(d) Medium-intensity obstacle lights — Characteristics

(1) Medium-intensity obstacle lights, Type A, should be flashing-white lights, Type B should be flashing-red lights and Type C should be fixed-red lights.

(2) Medium-intensity obstacle lights, Types A, B and C, should be in accordance with the specifications in Table 2.

(3) Medium-intensity obstacle lights, Types A and B, located on an object should flash simultaneously.

(e) High-intensity obstacle lights — Characteristics

(1) High-intensity obstacle lights, Types A and B, should be flashing-white lights.

(2) High-intensity obstacle lights, Types A and B, should be in accordance with the specifications in Table 2.

(3) High-intensity obstacle lights, Type A, located on an object should flash simultaneously.

(4) High-intensity obstacle lights, Type B, indicating the presence of a tower supporting overhead wires, cables, etc., should flash sequentially; first the middle light, second the top light and last, the bottom light. The intervals between flashes of the lights should approximate the following ratios:

| **Flash interval between** | **Ratio of cycle time** |
|---|---|
| Middle and top light | 1:13 |
| Top and bottom light | 2:13 |
| Bottom and middle light | 10:13 |

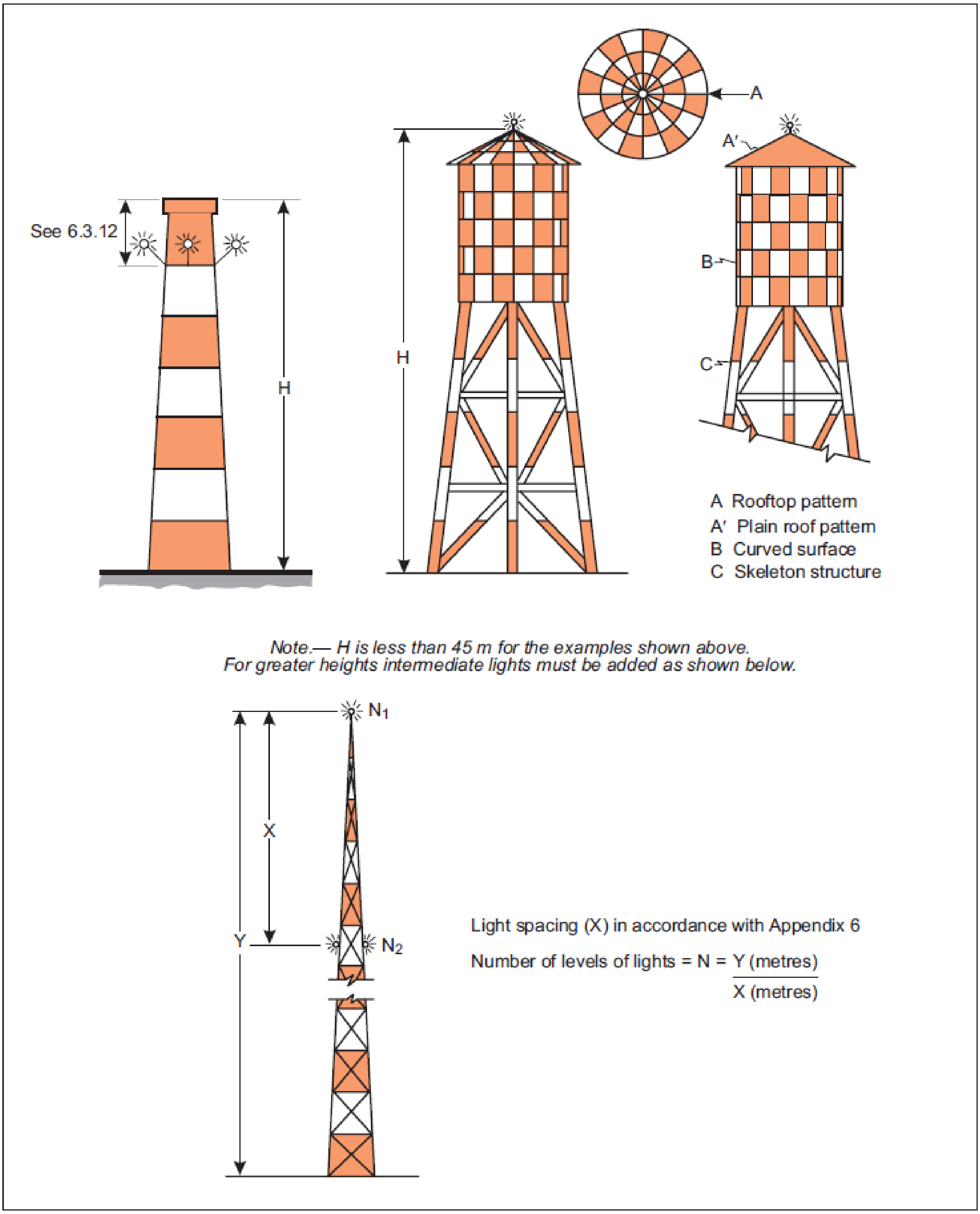

See 6.3.12
H
H
A
A′
B
C
A Rooftop pattern
A′ Plain roof pattern
B Curved surface
C Skeleton structure
Note.— H is less than 45 m for the examples shown above.
For greater heights intermediate lights must be added as shown below.
N1
X
Y
N2
Light spacing (X) in accordance with Appendix 6
Number of levels of lights = N = Y (metres) / X (metres)

Figure 1

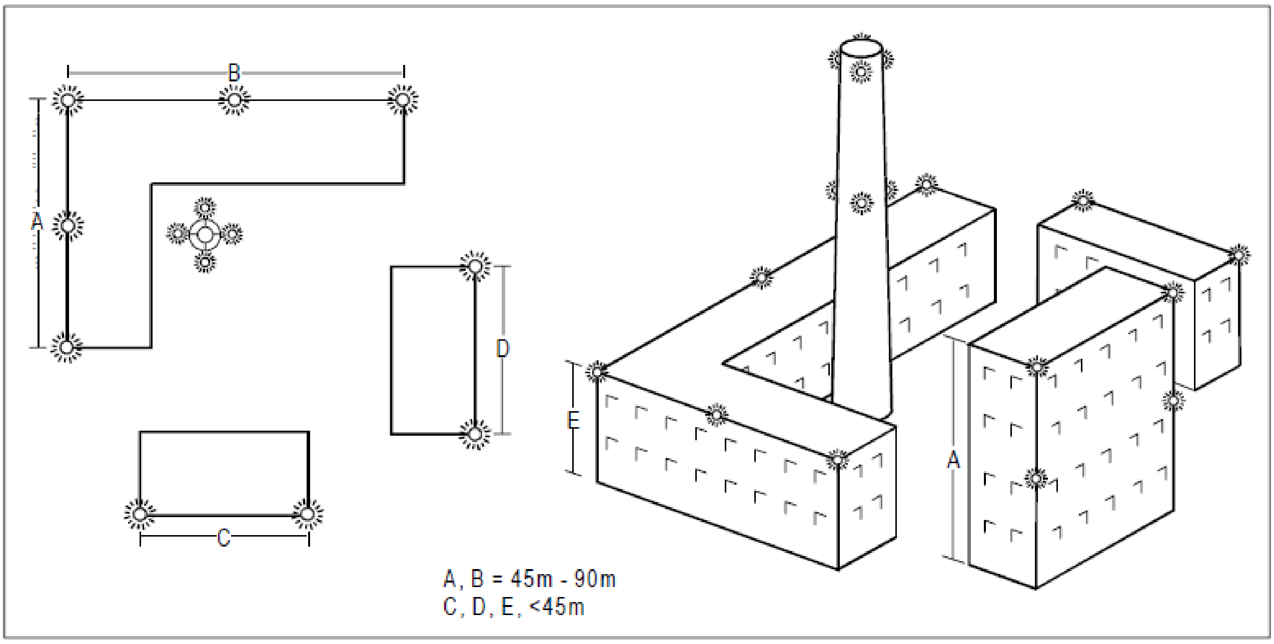



Figure 2

| Height of light unit above terrain | Angle of the peak of the beam above the horizontal |
|---|---|
| Greater than 151 m AGL | 0° |
| 122 m to 151 m AGL | 1° |
| 92 m to 122 m AGL | 2° |
| Less than p2 m AGL | 3° |
| Table 1 Installation setting angles for high-intensity obstacle lights | |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Light type | Colour | Signal type/flash rate | Peak intensity (cd) at given background luminance | | | Vertical beam spread [a] | Intensity (c) at given elevation angles when the light unit is levelled [d] | | | | |
| | | | Above $500 cd/m^2$ | 50-$500 cd/m^2$ | Below $50 cd/m^2$ | | −10° [e] | −1° [f] | ±0° [f] | +6° | +10° |
| Low-intensity Type A (fixed obstacle) | Red | Fixed | N/A | 10 mnm | 10 mnm | 10° | — | — | — | 10 mnm [g] | 10 mnm [g] |
| Low-intensity Type B (fixed obstacle) | Red | Fixed | N/A | 32 mnm | 32 mnm | 10° | — | — | — | 32 mnm [g] | 32 mnm [g] |
| Low-intensity Type C (fixed obstacle) | Yellow/blue[a] | Flashing (60–90 fpm) | N/A | 40 mnm [b] 400 max | 40 mnm [b] 400 max | 12° [h] | — | — | — | — | — |
| Low-intensity Type D (follow-me vehicle) | Yellow | Flashing (60–90 fpm) | N/A | 200 mnm [b] 400 max | 200 mnm [b] 400 max | 12° [i] | — | — | — | — | — |
| Medium-intensity Type A | White | Flashing (20–60 fpm) | 20 000 [b] ±25 %. | 20 000 [b] ±25 % | 2 000 [b] ±25 % | 3° mnm | 3° max | 50 % mnm 75 % max | 100 % mnm | — | — |
| Medium-intensity Type B | Red | Flashing (20–60 fpm) | N/A | N/A | 2 000 [b] ±25% | 3° mnm | — | 50 % mnm 75 % max | 100 % mnm | — | — |
| Medium-intensity Type C | Red | Fixed | N/A | N/A | 2 000 [b] ±25 % | 3° mnm | — | 50 % mnm 75 % max | 100 % mnm | — | — |
| High-intensity Type A | White | Flashing (40–60 fpm) | 200 000 [b] ±25% | 20 000 [b] ±25% | 2 000 [b] ±25 % | 3°–7° | 3° max | 50 % mnm 75 % max | 100 % mnm | — | — |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| High-intensity Type B | White | Flashing (40–60 fpm) | 100 000 [b] ±25 % | 20 000 [b] ±25 % | 2 000 [b] ±25 % | 3°–7° | 3° max | 50 % mnm<br>75 % max | 100 % mnm | — | — |

[a] See 6.3.25.

[b] Effective intensity as determined in accordance the Aerodrome Design Manual (Doc 9157), Part 4.

[c] Beam spread is defined as the angle between two directions in a plane for which the intensity is equal to 50 % of the lower tolerance value of the intensity shown in columns 4, 5 and 6. The beam pattern is not necessarily symmetrical about the elevation angle at which the peak intensity occurs.

[d] Elevation (vertical) angles are referenced to the horizontal.

[e] Intensity at any specified horizontal radial as a percentage of the actual peak intensity at the same radial when operated at each of the intensities shown columns 4, 5 and 6.

[f] Intensity at any specified horizontal radial as a percentage of the lower tolerance value of the intensity shown in columns 4, 5 and 6.

[g] In addition to specified values, lights should have sufficient intensity to ensure conspicuity at elevation angles between ±0° and 50°.

[h] Peak intensity should be located at approximately 2.5° vertical.

[i] Peak intensity should be located at approximately 17° vertical.

Note: fpm means flashes per minute; N/A means not applicable

Table 2 Characteristics of obstacle lights

**AMC2-ADR-AR.C.065 (b) — Obstacles - Objects**

WIND TOURBINES

(a) If determined as an obstacle a wind turbine should be marked and/or lighted if it is determined by the competent authority to be an obstacle.

(b) Markings

(1) The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, unless otherwise indicated by the competent authority.

(2) When the lower 1/3 of the supporting mast of a wind turbine penetrates any obstacle limitation surface, that part of the wind turbine should also be painted white, or the respective colour of the upper 2/3 of the mast.

(c) Lighting — day use

(1) When lighting is deemed necessary by the competent authority, medium-intensity obstacle lights should be used. In the case of a wind farm, i.e. a group of five or more wind turbines, it should be regarded as an extensive object and the lights should be installed:

(i) to identify the perimeter of the wind farm;

(ii) respecting the maximum spacing between the lights along the perimeter, unless a dedicated risk assessment shows that a greater spacing can be used;

(iii) so that, where flashing lights are used, they flash simultaneously; and

(iv) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located.

(2) Where the highest point of the blade on the vertical position is 150 m or less above ground level, medium intensity white lights should be used.

(3) Where the highest point of the blade on the vertical position exceeds 150 m above ground level, high-intensity white lights should be prescribed by the competent authority if medium intensity lights are deemed insufficient.

(4) Obstacle lights should be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching them from any direction.

(i) The competent authority should prescribe additional intermediate lighting levels.

(ii) The wind turbine rotor should not shield lights on intermediate levels.

(d) Lighting — night use

(1) The competent authority should prescribe medium-intensity flashing red lights instead of white lights. The competent authority may prescribe steady lights instead of flashing lights or coded red lights.

(2) The competent authority should prescribe additional intermediate lighting levels if it is deemed necessary; these lights should be low-intensity fixed red lights Type A or Type B. The wind turbine rotor should not shield lights on intermediate levels.

(3) In the case of a wind farm, i.e. a group of five or more wind turbines, when lighting is deemed necessary, it should regarded as an extensive object and lights should be installed:

(i) To identify the perimeter of the wind farm;

(ii) In accordance with the maximum between the lights along the perimeter spacing detailed in CS-ADR-DSN.Q.855 (b)(4), unless a dedicated assessment shows that a greater spacing can be used;

(iii) To ensure redundancy in case of perimeter lighting failure;

(iv) So that where flashing lights are used, they flash simultaneously;

(v) So that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located;

(4) The light intensity should be reduced so as to prevent dazzling effects, significant environmental concerns or if the competent authority concludes that reduction guarantees a satisfactory level of obstacle visibility.

(e) The competent authority may prescribe red light instead of white light and steady lighting instead of flashing lighting.

**AMC1-ADR.AR.C.070(a) — Confusing, misleading and hazardous lights**

LIGHTS THAT MAY ENDANGER THE SAFETY OF AIRCRAFT

(a) The use of non-aeronautical ground lights near an aerodrome, which might endanger the safety of aircraft, should not be permitted by the competent authority; such non-aeronautical ground lights should be extinguished, screened or otherwise modified, so as to eliminate the source of hazard.

(b) The competent authority should have as appropriate arrangements with other competent authorities, in order to achieve (a) above.

**AMC2-ADR.AR.C.070(a) — Confusing, misleading and hazardous lights**

LIGHTS WHICH MAY CAUSE CONFUSION

(a) The competent authority should ensure that: a non-aeronautical ground light which, by reason of its intensity, configuration or colour, might prevent, or cause confusion in, the clear interpretation of aeronautical ground lights should not be permitted. Such lights should be extinguished, screened or otherwise modified so as to eliminate such a possibility. In particular, attention should be directed to a non-aeronautical ground light visible from the air within the areas described below:

(1) Instrument runway — code number 4:

within the areas before the threshold and beyond the end of the runway extending at least 4,500 m in length from the threshold and runway end and 750 m either side of the extended runway centre line in width.

(2) Instrument runway code number 2 or 3:

as in (1), except that the length should be at least 3,000 m.

(3) Instrument runway code number 1, and non-instrument runway:

within the approach area.

(b) Arrangements with other competent authorities are in place, as appropriate, to achieve (a) above.

## AMC1-ADR.AR.C.070 (b) — Confusing, misleading and hazardous lights

LASER EMISSIONS WHICH MAY ENDANGER SAFETY

(a) The competent authority should ensure that the following protected zones are established and implemented around an aerodrome and that appropriate arrangements with other competent authorities are in place, in order to protect the safety of aircraft against the hazardous effects of laser emitters:

  (1) a laser-beam free flight zone (LFFZ);

  (2) a laser-beam critical flight zone (LCFZ);

  (3) a laser-beam sensitive flight zone (LSFZ).

(b) The competent authority should determine the exposure levels and distances that adequately protect flight operations.

## GM1-ADR.AR.C.070(b) — Confusing, misleading and hazardous lights

LASER EMISSIONS

When implementing AMC1-ADR.AR.C.070 (b), figures 1, 2 and 3 may be used to determine the exposure levels and distances that adequately protect flight operations.

The restrictions on the use of laser beams in the three protected flight zones, LFFZ, LCFZ and LSFZ, refer to visible laser beams only. Laser emitters operated by the state authorities or the aerodrome operator in a manner compatible with flight safety are excluded. In all navigable airspace, the irradiance level of any laser beam, visible or invisible, is expected to be less than or equal to the maximum permissible exposure (MPE) unless such emission has been notified to the competent authority and permission obtained.

The protected flight zones are established in order to mitigate the risk of operating laser emitters in the vicinity of aerodromes. However, the prevention of the illegal use of laser emitters may require additional measures to be taken.

Further guidance on how to protect flight operations from the hazardous effects of laser emitters is contained in the Manual on Laser Emitters and Flight Safety (ICAO Doc 9815).

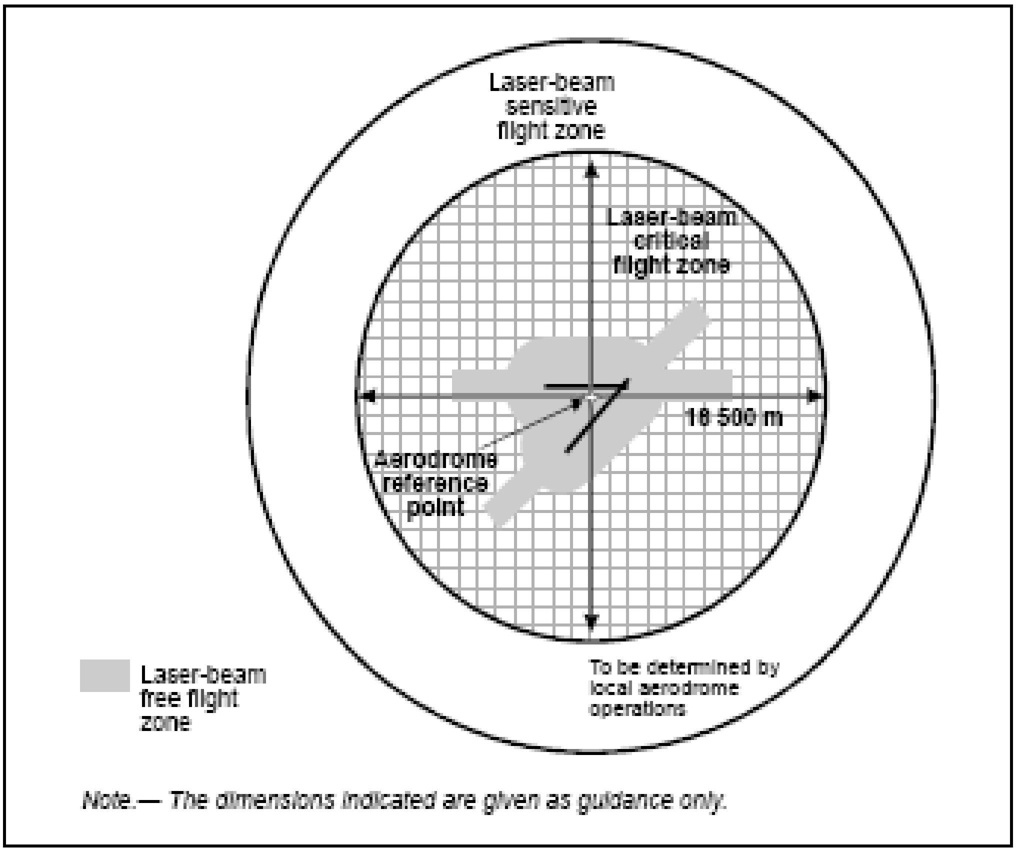



Figure 1

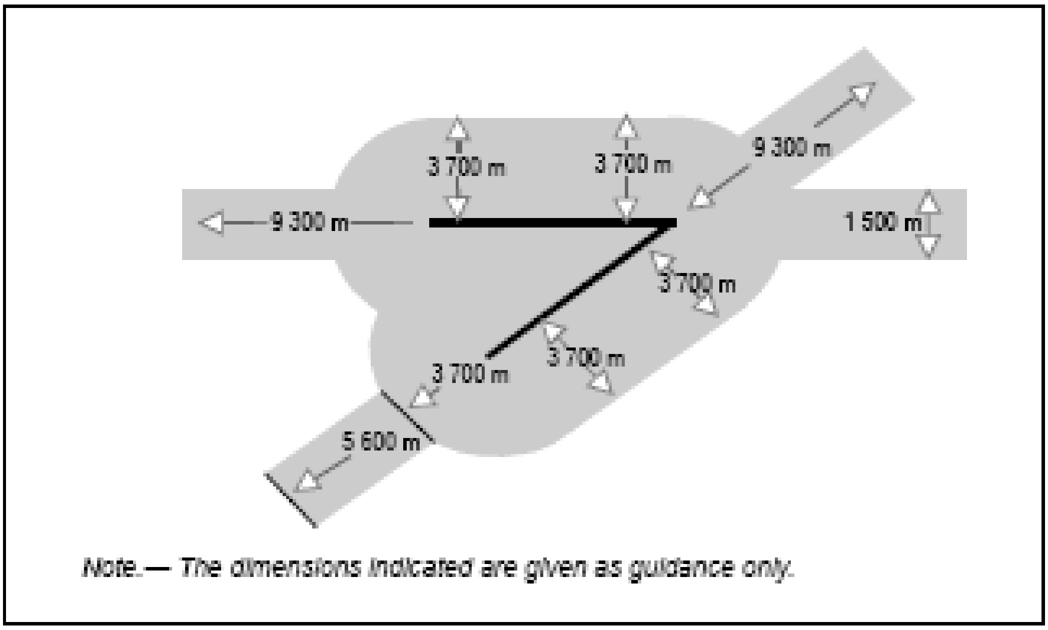



Figure 2

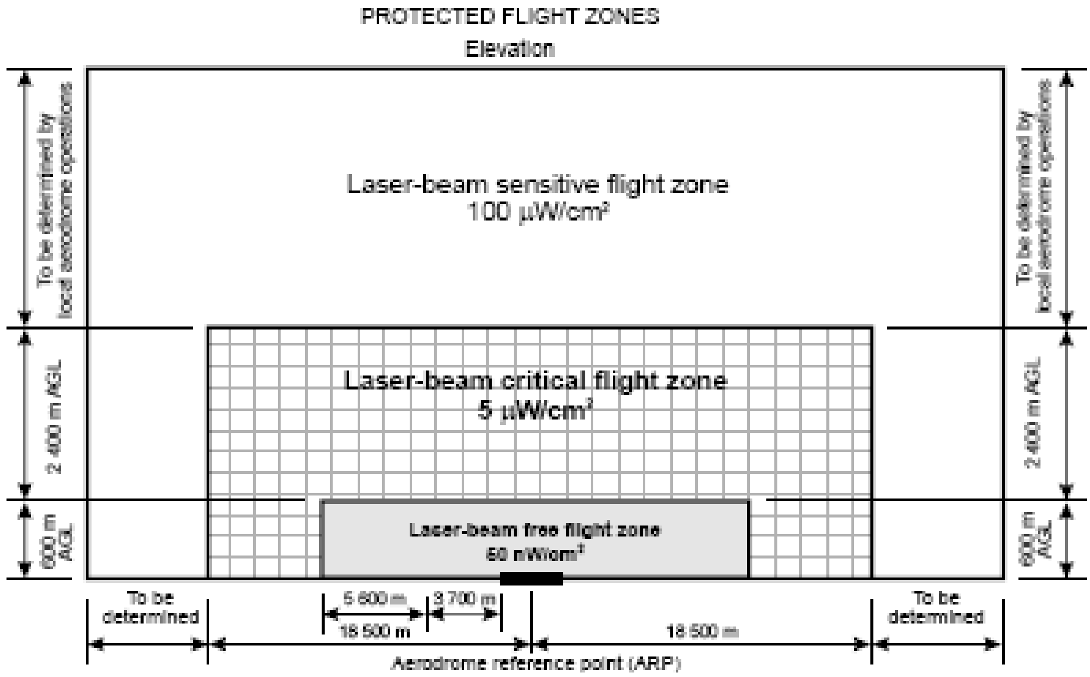



Figure 3

**GM2-ADR.AR.C.070 — Confusing, misleading and hazardous lights**

USE OF LASER EMITTERS FOR WILDLIFE HAZARD CONTROL ACTIVITIES

The use of laser emitters by aerodrome operators for wildlife hazard management activities may be allowed by the competent authority, if it is done in a manner that does not endanger safety.

## SUBPART A — GENERAL REQUIREMENTS (ADR.OR.A)

### GM1-ADR.OR.A.005 — Scope

AERODROMES OPEN TO PUBLIC USE

An aerodrome whose use may or requires prior notice to be given to its operator does not qualify that aerodrome as not being open to public use.

Similarly, the fact that certain aircraft types or operations may not be or are not allowed at a given aerodrome, or that they are allowed under certain conditions or an approval of the competent authority does not mean that such an aerodrome is not open to public use.

To the extent that an aerodrome is used for commercial air transport, by aircraft operators who comply with conditions or limitations such as those described above, an aerodrome should be considered to be under the scope of the Basic Regulation and its Implementing Rules, provided that the other criteria contained in article 4(3a) of the Basic Regulation are also met.

## SUBPART B — CERTIFICATION (ADR.OR.B)

### AMC1-ADR.OR.B.015(a) — Application for a certificate

APPLICATION

The application should be made in writing and be signed by the applicant, using a standardised form adopted by the competent authority.

### AMC1-ADR.OR.B.015(b)(1);(2);(3) — Application for a certificate

INFORMATION TO BE PROVIDED TO THE COMPETENT AUTHORITY

(a) The applicant should provide its telephone and fax number and e-mail address for communication with the competent authority. In addition, the applicant should indicate to the authority the names of its employees whom the competent authority would contact in order to address any issues that might arise during the evaluation of the application and the certification process.

(b) The applicant should provide the competent authority information with regard to:

- (1) location of the aerodrome: the exact location of the aerodrome should be depicted on a map of a suitable scale;
- (2) the type of operations at the aerodrome:
  - (i) operations during the day and/or night and type of approaches;
  - (ii) the aircraft types to be served at the aerodrome and the aircraft type to be used for the design of the aerodrome; and
  - (iii) any limitations to the operation of the aerodrome.
- (3) the design of the aerodrome should:
  - (i) be in a suitable scale;
  - (ii) meet the applicable aeronautical data requirements; and
  - (iii) be in an electronic format, if this is acceptable to the competent authority.
- (4) the design of the aerodrome should include all the necessary information, including:
  - (i) runway(s) orientation;
  - (ii) the dimensions of the aerodrome's physical characteristics;
  - (iii) the visual and non-visual aids;
  - (iv) the obstacle limitation surfaces and any other surfaces applicable, showing any obstacles or objects that could endanger safety present; and
  - (v) the aerodrome facilities, installations and equipment and their location.

(c) The applicant should propose to the competent authority the certification specifications which are applicable to the proposed aerodrome. These should consist of a list of:

- (1) the certification specifications that are matching the design and the operation of the aerodrome; and

(2) the certification specifications for which the applicant proposes to show compliance in a different manner and demonstrate and equivalent level of safety. Such a proposal has to be acceptable to the competent authority. In such cases, the applicant should also propose the method that will be used to demonstrate compliance and achieve an equivalent level of safety (ELoS) and submit all the necessary documentation to support the proposal.

(3) Any other proposal for which the applicant assumes that the certification specifications issued by the Agency are inadequate or inappropriate.

(d) The applicant should provide the competent authority documentation to demonstrate how he/she will comply with the applicable requirements of the Basic Regulation, Part-ADR.OR, and Part-ADR.OPS and any other applicable requirements that are matching the aerodrome design and its operation.

The applicant should indicate the requirements for which an exemption or derogation is proposed, if applicable. In such cases, the applicant should also submit to the competent authority the necessary justification and documentation for the exemption or the derogation, in accordance with article 14 of the Basic Regulation.

Additionally, the applicant should indicate to the competent authority the means of compliance that intends to use, in order to show compliance with the applicable requirements. Such information should also include the intended use of alternative means of compliance with the applicable requirements, and all relevant documentation in accordance with article ADR.OR.A.015.

**AMC1-ADR.OR.B.015(b)(3) — Application for a certificate**

PROVISION OF EVIDENCE OF ARRANGEMENTS WITH THIRD PARTIES

The applicant should provide all necessary evidence for arrangements with third parties that provide or intend to provide services or undertake activities at the aerodrome, whose activities may have an impact on safety. Such evidence should cover all organisations with which the aerodrome operator needs to have arrangements, including those mentioned in ADR.OR.C.005.

**AMC1-ADR.OR.B.015(b)(4) — Application for a certificate**

ADEQUACY OF RESOURCES

The applicant should provide all necessary information needed in order to demonstrate to the competent authority that its proposed organisation and management, including its financial capability, are suitable and properly matched to the scale and scope of the operation.

In demonstrating such compliance the applicant should, amongst others, take into account in its analysis the following:

— the size and complexity of the aerodrome;

— the type of traffic;

— the type of operations;

— the level and the density of the traffic;

— the operating hours of the aerodrome;

— the amount of full-time-equivalent (FTEs) necessary for each activity;

— human factors principles;

— labour legislation; and

— the degree of subcontracting.

In case of subcontracting, the applicant should provide to the authority with all necessary evidence of such contracts.

The aerodrome operator should have the ability to discharge its responsibilities with regard to safety. The accountable manager should have access, as well as the authorisation, to the necessary resources to ensure that operations are carried out in accordance with the regulations. The resources should also include personnel, tools and equipment as well as financial resources.

**AMC2-ADR.OR.B.015(b)(4) — Application for a certificate**

ARRANGEMETNS WITH PARTIES NECESSARY FOR THE OPERATION OF THE AERODROME

The applicant should indicate those services that are going to be provided directly by himself and those that will be provided by contacted third parties with regard to the adequacy of the resources.

The applicant should also provide the necessary evidence needed, that is contractual arrangements, if third parties are going to be involved in the provision of services. In addition, the applicant should provide any relevant information needed regarding such third parties.

**AMC1-ADR.OR.B.015(b)(5) — Application for a certificate**

RELATIONSHIP OF THE APPLICANT WITH THE AERODROME OWNER

The applicant should demonstrate to the competent authority, in accordance with the applicable national legislation that he/she is duly authorised to undertake all activities necessary under the provisions of the Basic Regulation and its Implementing Rules is and any other applicable national or Community rule.

The applicant should also provide the competent authority all information necessary, under the applicable national legislation, to demonstrate to the competent authority his/ her relationship between the aerodrome owner and/or the owner of the land to be used for the aerodrome development.

Such documentation should include but is not limited to, contracts, lease agreements, authorisations between the persons involved, etc.

**AMC1-ADR.OR.B.015(b)(8) — Application for a certificate**

AERODROME MANUAL

The aerodrome manual and its amendments may be submitted to the competent authority in electronic format, if this is acceptable to the competent authority.

**GM1-ADR.OR.B.015 — Application for a certificate**

INITIAL INTEREST

Prior to submitting an application for a certificate to the competent authority, an applicant should arrange for a meeting with the competent authority.

During this meeting, the applicant should present to the authority its plans with regard to the aerodrome.

The applicant should also make arrangements so that its key personnel are present during this meeting.

During the meeting, the applicant may be provided by the competent authority with general information about the applicable requirements for the aerodrome.

It may also be provided with copies of the applicable requirements and a description of the procedures that are followed during the certification process.

The applicant may also be informed by the competent authority about possible approvals, permits or clearances that may be needed to be obtained from other competent authorities of the Member State.

### GM2-ADR.OR.B.015(b)(1);(2);(3) — Application for a certificate

AERODROME BOUNDARIES

The map attached to the application for an aerodrome certificate should show the boundary of the area subject to certification. It should therefore include at least runways, taxiways, aprons, associated strips and, in most cases, the area adjacent to the terminal building. The defined area will be the subject of aerodrome oversight by the competent authority once the certificate is awarded.

The above aerodrome boundary should not be confused with boundaries established for other purposes such as the land ownership boundaries used by local planning authorities or those used to designate security restricted zones. While the aerodrome owner may own land adjacent or near to the aerodrome, they may exclude those areas, including those that may be set aside for the movement of aircraft but over which the aerodrome operator has no direct control, e.g. maintenance areas.

Any developments and activities outside of the aerodrome boundary but adjacent to it should be subject to the aerodrome operator's safety management system.

### GM1-ADR.OR.B.025 — Compliance

The obligations of the aerodrome operator prescribed under ADR.OR.B.025 are not limited to the initial certification.

On the contrary, the aerodrome operator is meant to comply with ADR.OR.B.025 at any stage and in all cases where compliance has to be demonstrated in accordance with the provisions of this Regulation e.g. a change of the infrastructure, a change in the operation, implementation of a safety directive etc.

### AMC1-ADR.OR.B.040(a) — Changes

CHANGES REQUIRING PRIOR APPROVAL

(a) The aerodrome operator should ensure that prior to initiating any change to the aerodrome or its operation, which requires prior approval, an application is submitted to the competent authority. The applicant should provide documentation containing a description of the proposed change, in which the following are identified:

(1) the parts of the aerodrome and the aerodrome manual, which are affected by the change, including relevant appropriate detailed design drawings.

(2) the certification specifications with which the proposed change has been designed to comply with; including the certification specifications for which the applicant proposes to show compliance in a different manner in order to accomplish and equivalent level of safety (for such cases see AMC1-ADR.OR.B.015(b)(1); (2); (3), paragraph 3(b));

(3) the requirements of Part-ADR.OR and Part-ADR.OPS and any other applicable requirements that have to be complied with as a result of the proposed change, including the way in which compliance is intended to be demonstrated.

(4) the safety assessment required under ADR.OR.B.065.

(b) Examples of such changes include, but are not limited to, the following:

(1) changes to the physical characteristics of a runway; such as:

(i) new runway(s): a development resulting in the construction of a 'new' runway (e.g. new construction, or the change of an existing grass surface to a paved surface);

(ii) runway extension or shortening resulting in an amendment to declared distances;.

(iii) threshold relocation (Instrument Status): a development involving relocation of the instrument runway threshold, or relocation of a non-instrument runway threshold in preparation for instrument status;

(iv) changes to runway designation.

(2) changes of the aerodrome visual aids or other changes to the aerodrome, when such changes are associated with a change (upgrade or downgrade) of the intended operations (e.g. to accommodate low visibility operations and/or night operations);

(3) changes in the aerodrome operating minima;

(4) change that affects the obstacle limitation surfaces associated with approved type of approaches;

(5) change in the level of the rescue and fire-fighting services;

(6) changes in the organisational structure of the organisation, including responsibilities, and accountabilities;

(7) changes related to fuel provision.

### AMC1-ADR.OR.B.040(c) — Changes

CHANGES NOT REQUIRING PRIOR APPROVAL

(a) The aerodrome operator should ensure that for every change that a prior approval is not required, the procedure approved by the competent authority for managing such changes, is implemented. The documentation to be provided to the competent authority in such cases is described in paragraph 1 of ADR.OR.B.040(d).

(b) The Certification Specifications that should be used for a change not requiring a prior approval are those which were in effect on the date of the notification of the change to the competent authority.

(c) Notwithstanding paragraph (b), the aerodrome operator may decide to use certification specifications that became effective after the date of the notification of the change to the competent authority.

**GM1-ADR.OR.B.040 — Changes**

MAINTENANCE ACTIVITIES

Routine maintenance activities, such as re-painting of the markings, changing of light-bulbs etc, affect certain elements of the certification basis and therefore qualify as changes, and therefore should be treated as such. The procedure to be followed depends on whether such a change requires or not a prior approval of the competent authority.

**AMC1- ADR.OR.B.045(a) — Assessment of changes**

SAFETY ASSESSEMENT FOR A CHANGE

A safety assessment for a change should include:

(a) identification of the scope of the change;

(b) identification of hazards;

(c) determination of the safety criteria applicable to the change;

(d) risk analysis in relation to the harmful effects or improvements in safety related to the change;

(e) risk evaluation and, if required, risk mitigation for the change to meet the applicable safety criteria;

(f) verification that the change conforms to the scope that was subject to safety assessment and meets the safety criteria; and

(g) the specification of the monitoring requirements necessary to ensure that the aerodrome and its operation will continue to meet the safety criteria after the change has taken place.

**AMC1- ADR.OR.B.045(b) — Assessment of changes**

SCOPE OF THE SAFETY ASSESSMENT

The scope of the safety assessment should include the following elements and their interaction:

(a) the aerodrome, its operation, management and human elements being changed;

(b) interfaces and interactions between the elements being changed and the remainder of the system;

(c) interfaces and interactions between the elements being changed and the environment in which it is intended to operate; and

(d) the full lifecycle of the change from definition to operations.

**AMC1- ADR.OR.B.045(d) — Assessment of changes**

SAFETY CRITERIA

The safety criteria used should be defined in accordance with the procedures for the management of change contained in the aerodrome manual.

The safety criteria used should, depending on the availability of data, be specified with reference to explicit quantitative acceptable safety risk levels, recognised standards and/or codes of practice, the safety performance of the existing system or a similar system elsewhere may be used.

**AMC1-ADR.OR.B.055 — Change of aerodrome operator**

REQUIRED DOCUMENTATION

(a) Apart from the safety assessment, the current and future aerodrome operator should provide detailed arrangements and plans with regard to the transfer of operations.

(b) The new aerodrome operator should also provide all the evidence and documentation required for a newly certified aerodrome in accordance with the applicable requirements, identifying also any change to the management system of the aerodrome, including but not limited to organisational structure, appointed and nominated persons, number of personnel, arrangements with other organisations etc, or any other evidence the competent authority finds is needed.

(c) However, documentation related to the design, facilities, equipment and operation of the aerodrome need not be submitted, unless changes to these elements are to take place as well.

**AMC1-ADR.OR.B.065 — Termination of operation**

TERMINATION OF OPERATION

The aerodrome operator should notify, in writing, the competent authority and the Aeronautical Information Service provider, in case of intended termination of the operation of the aerodrome. In such cases, the notification should be done in such time in advance, so as to allow for the timely publication of the changes and their notification by the Aeronautical Information Regulation And Control (AIRAC) system in accordance with the related timeframe.

Upon the termination of the operation, the aerodrome operator should apply closed runway markings, as well as any other measure the authority has found appropriate.

## SUBPART C — ADDITIONAL OPERATOR RESPONSIBILITIES (ADR.OR.C)

### AMC1-ADR.OR.C.005(e) Operator Responsibilities

PUBLICATION OF INFORMATION TO THE AERONAUTICAL INFORMATION PUBLICATION

A description of cases involving exemptions, derogations, cases of equivalent level of safety, special conditions, including limitations with regard to the use of the aerodrome, should be published in the aeronautical information publication, after coordination with the competent authority.

### GM1-ADR.OR.C.010 — Use of the aerodrome by large aircraft

ELEMENTS TO BE ASSESSED

When assessing the possibility of operation of aircraft whose code letter is higher than the code letter of the aerodrome reference code, the aerodrome operator should, amongst other issues, assess the impact of the characteristics of the aircraft on the aerodrome, its facilities, equipment and its operation, and vice versa.

Aircraft characteristics to be assessed include, but are not limited to:

(a) fuselage length;

(b) fuselage width;

(c) fuselage height;

(d) tail height;

(e) wingspan;

(f) wing tip vertical clearance;

(g) cockpit view;

(h) distance from the pilot’s eye position to the nose landing gear and to the main landing gear;

(i) landing gear design;

(j) outer main gear wheel span;

(k) wheelbase;

(l) main gear steering system;

(m) maximum aircraft mass;

(n) landing gear geometry, tire pressure and ACN values;

(o) engine data;

(p) Maximum passenger and fuel carrying capacities;

(q) flight performance;

(r) technology evolution.

Further guidance on this issue is contained in ICAO Circular 305-AN/177 and ICAO Circular 301-AN/174.

**ADR.OR.C.030 — Occurrence reporting**

GENERAL

The aerodrome operator should establish procedures to be used for reporting to the competent authority and any other organisation required. The procedures should include:

(a) description of the applicable requirements for reporting;

(b) description of the reporting mechanism, including reporting forms, means and deadlines;

(c) personnel responsible for reporting;

(d) description of mechanism and personnel responsibilities for identifying root causes and the actions that may be needed to be taken to prevent similar occurrences in the future, as appropriate.

**AMC1-ADR.OR.C.040 — Prevention of fire**

The aerodrome operator should develop procedures and assign responsibilities for the control of smoking or activities that involve the use of fire hazard.

In addition, these procedures should address the adoption and use of mitigating measures when necessary activities (e.g. maintenance etc) which might involve fire hazard need to be authorised.

Such authorised activities may never include smoking since it is prohibited.

## SUBPART D — MANAGEMENT (ADR.OR.D)

### AMC1-ADR.OR. D.005(a)(2) — Management

QUALITY MANAGEMENT SYSTEM

(a) A quality management system supporting the origination, production, storage, handling, processing, transfer and distribution of aeronautical data and aeronautical information should:

- — define the quality policy in such a way as to meet the needs of different users as closely as possible;
- — set up a quality assurance programme that contains procedures designed to verify that all operations are being conducted in accordance with applicable requirements, standards and procedures, including the relevant requirements of this Regulation;
- — provide evidence of the functioning of the quality system by means of manuals and monitoring documents;
- — appoint management representatives to monitor compliance with, and adequacy of, procedures to ensure safe and efficient operational practices; and
- — perform reviews of the quality system in place and take remedial actions, as appropriate.

(b) An EN ISO 9001 certificate, issued by an appropriately accredited organisation, is considered as a sufficient means of compliance.

### AMC2-ADR.OR.D.005(a)(2) — Management

SECURITY MANAGEMENT FOR AERONAUTICAL DATA AND AERONAUTICAL INFORMATION PROVISION ACTIVITIES

(a) The security management objectives should be:

(1) to ensure the security of aeronautical data aeronautical information received, produced or otherwise employed so that it is protected from interference and access to it is restricted only to those authorised; and

(2) to ensure that the security management measures meet appropriate national or international requirements for critical infrastructure and business continuity, and international standards for security management, including: ISO/IEC 17799:2005 — Information technology — Security techniques — Code of practice for information security management ISO 28000:2007: — Specification for security management systems for the supply chain.

(b) Regarding the ISO standards, the relevant certificates issued by an appropriately accredited organisation, are considered as a sufficient means of compliance.

**AMC1-ADR.OR. D.005(b)(1) — Management**

SAFETY MANAGEMENT SYSTEM

The safety management system of an aerodrome operator should include an organisational structure for the management of safety proportionate and appropriate to the size of the organisation and the nature and type of operations. Clearly defined lines of responsibilities, authorisations and accountabilities within the organisation should be identified. Depending on the organisational complexity and structure, this should include a Safety Services Office and a Safety Review Board or similar.

(a) Safety Services Office

(1) The Safety Services Office should be independent and neutral in terms of the processes and decisions made regarding the delivery of services by the line managers of operational units;

(2) The function of the Safety Services Office should be to:

(i) manage and oversee the hazard identification system;

(ii) monitor safety performance of operational units directly involved in aerodrome operations;

(iii) advise senior management on safety management matters; and

(iv) assist line managers with safety management matters;

(3) Operators of multiple aerodromes should either establish a central Safety Services Office and appropriate safety departments/functions at all aerodromes or separate Safety Services Office at each aerodrome. Arrangements should be made to ensure continuous flow of information and adequate coordination.

(b) Safety Review Board

(1) The Safety Review Board should be a high level committee that considers matters of strategic safety in support of the accountable manager’s safety accountability;

(2) The board should be chaired by the accountable manager and be composed of heads of functional areas;

(3) The Safety Review Board should monitor:

(i) safety performance against the safety policy and objectives;

(ii) that any safety action is taken in a timely manner; and

(iii) the effectiveness of the organisation’s safety management system

(4) The Safety Review Board should ensure that appropriate resources are allocated to achieve the established safety performance.

(5) Operators of multiple aerodromes should ensure that all aerodromes are represented in the Safety Review Board, at the appropriate management level.

**GM1-ADR.OR. D.005(b)(1) — Management**

SAFETY SERVICES OFFICE

The role of the Safety Services Office may be exercised by the nominated person(s) for the safety management function, considering the size of the organisation, the type and complexity of operations.

SAFETY REVIEW BOARD

Depending on the size of the organisation, the type and complexity of operations, the responsibilities of the Safety Review Board may be included in other high level committees of the organisation.

SAFETY ACTION GROUP

(a) A Safety Action Group may be established as a standing group or as an ad hoc group to assist or act on behalf of the Safety Review Board;

(b) More than one safety action group may be established depending on the scope of the task and specific expertise required.

(c) A safety action group should report to and take strategic direction from the safety review board and should be comprised of managers, supervisors and personnel from operational areas.

(d) The Safety Action Group should:

 (i) monitor operational safety;

 (ii) resolve identified risks;

 (iii) assess the impact on safety of operational services;

 (iv) ensure that safety actions are implemented within agreed timescales; and

 (v) review the effectiveness of previous safety recommendations and promotions.

further guidance on this issue is contained in ICAO Doc 9859.

**AMC1-ADR.OR. D.005(b)(2) — Management**

SAFETY POLICY

(a) The safety policy should:

 (1) be endorsed by the accountable manager;

 (2) clearly identify safety as the highest organisational priority over commercial, operational, environmental or social pressures;

 (3) reflect organisational commitments regarding safety and its proactive and systematic management;

 (4) be communicated, with visible endorsement, throughout the organisation;

 (5) include safety reporting principles;

 (6) be periodically reviewed to ensure it remains relevant and appropriate to the organisation.

(b) The safety policy should:

 (1) include a commitment:

  (i) to improve towards the highest safety standards;

  (ii) to comply with all applicable legal requirements, meet all applicable standards and consider best practices;

  (iii) to provide appropriate resources;

(iv) to enforce safety as one primary responsibility of all managers and staff;

(2) include the safety reporting procedures;

(3) with reference to a just culture clearly indicate which types of operational behaviours are unacceptable and include the conditions under which disciplinary action would not apply;

(4) be periodically reviewed to ensure it remains relevant and appropriate.

**GM1-ADR.OR. D.005(b)(2) — Management**

SAFETY POLICY

The safety policy is the means whereby the aerodrome operator states its intention to maintain and, where practicable, improve safety levels in all its activities and to minimise its contribution to the risk of an aircraft accident as far as is reasonably practicable.

Further guidance on this issue is contained in ICAO Doc 9859.

**GM2-ADR.OR. D.005(b)(2) — Management**

EXAMPLE SAFETY POLICY

SAFETY POLICY STATEMENT

Safety is one of our core business functions. We are committed to developing, implementing, maintaining and constantly improving strategies and processes to ensure that all our aviation activities take place under a balanced allocation of organisational resources, aimed at achieving the highest level of safety performance and meeting European Union and international standards, while delivering our services.

All levels of management and all employees are accountable for the delivery of this highest level of safety performance, starting with the [chief executive officer (CEO)/managing director/or as appropriate to the organisation].

Our commitment is to:

— Support the management of safety through the provision of all appropriate resources, that will result in an organisational culture that fosters safe practices, encourages effective safety reporting and communication, and actively manages safety with the same attention to results as the attention to the results of the other management systems of the organisation;

— Enforce the management of safety as a primary responsibility of all managers and employees;

— Clearly define for all staff, managers and employees alike, their accountabilities and responsibilities for the delivery of the organisation's safety performance and the performance of our safety management system;

— Establish and operate hazard identification and risk management processes, including a hazard reporting system, in order to eliminate or mitigate the safety risks of the consequences of hazards resulting from our operations or activities to a point which is as low as reasonably practicable (ALARP);

— Ensure that no action will be taken against any employee who discloses a safety concern through the hazard reporting system, unless such disclosure indicates, beyond any reasonable doubt, an illegal act, gross negligence, or a deliberate or wilful disregard of regulations or procedures;

— Comply with and, wherever possible, exceed, legislative and regulatory requirements and standards;

— Ensure that sufficient skilled and trained human resources are available to implement safety strategies and processes;

— Ensure that all staff are provided with adequate and appropriate aviation safety information and training, are competent in safety matters, and are allocated only tasks commensurate with their skills;

— Establish and measure our safety performance against realistic safety performance indicators and safety performance targets;

— Continually improve our safety performance through management processes that ensure that relevant safety action is taken and is effective; and

— Ensure externally supplied systems and services to support our operations are delivered meeting our safety performance standards.

(Signed) ___________________________________

CEO/Managing Director/or as appropriate

Further guidance on the issue of safety policy is contained in ICAO Doc 9859.

**GM3-ADR.OR. D.005(b)(2) — Management**

SAFETY POLICY — JUST CULTURE

The safety policy should actively encourage effective safety reporting and, by defining the line between acceptable performance (often unintended errors) and unacceptable performance (such as negligence, recklessness, violations or sabotage), provide fair protection to reporters. A safety or just culture may not however preclude the 'criminalisation of error', which is legally, ethically and morally within the sovereign rights of any Member State, provided Community law and established international agreements are observed. A judicial investigation, and consequences of some form, may be expected following an accident or serious incident especially if a system failure resulted in lives lost or property damaged, even if no negligence or ill-intent existed. A potential issue could therefore exist if voluntary hazard reports, which relate to latent deficiencies of a system or its performance, are treated in the same way as those concerning accident and serious incident investigations. The intent of protecting hazard reports should not challenge the legitimacy of a judicial investigation or demand undue immunity. However, legal argument does usually take precedence over any technical or safety-related argument.

Further guidance on safety policy and just culture is contained in see ICAO Doc 9859.

**AMC1-ADR.OR.D.005(b)(3) Management**

HAZARD IDENTIFICATION PROCESS

(a) Reactive, proactive and predictive schemes for hazard identification should be the formal means of collecting, recording, analysing, acting on and generating feedback about hazards and the associated risks that affect the safety of the operational activities.

(b) All reporting systems, including confidential reporting schemes, should include an effective feedback process.

**GM1-ADR.OR.D.005(b)(3) — Management**

HAZARD IDENTIFICATION

(a) Hazard identification may include the following factors and processes:

(1) design factors, including equipment and task design;

(2) procedures and operating practices, including their documentation and checklists, and their validation under actual operating conditions;

(3) communications, including means, terminology and language;

(4) personnel factors, such as company policies for recruitment, training, remuneration and allocation of resources;

(5) organisational factors, such as the compatibility of production and safety goals, the allocation of resources, operating pressures and the corporate safety culture;

(6) work environment factors, such as ambient noise and vibration, temperature, lighting and the availability of protective equipment and clothing;

(7) regulatory oversight factors, including the applicability and enforceability of regulations, the certification of equipment, personnel and procedures and the adequacy of oversight;

(8) defences, including such factors as the provision of adequate detection and warning systems, the error tolerance of equipment and the resilience of equipment to errors and failures; and

(9) human performance, restricted to medical conditions and physical limitations.

(b) Hazard identification may use internal and external sources.

(1) Internal sources:

(i) voluntary occurrence reporting schemes;

(ii) safety surveys;

(iii) safety audits;

(iv) normal operations;

(v) monitoring schemes;

(vi) trend analysis;

(vii) feedback from training; and

(viii) investigation and follow-up of incidents

(2) External sources:

(i) accident reports;

(ii) state mandatory occurrence reporting system; and

(iii) state voluntary reporting system.

(c) The methods used for hazard identification depends on the resources and constraints of each particular aerodrome operator and on the size and the complexity of the operations. Nevertheless, hazard identification, regardless of implementation, complexity and size, is part of the aerodrome operator's safety documentation. Under mature safety management practices, hazard identification is a continuous, ongoing daily activity. It is an integral part of the aerodrome operator's processes. There are three specific conditions under which special attention to hazard identification should be paid. These three conditions should trigger more in depth and far reaching hazard identification activities and include:

(1) any time that the aerodrome operator experiences an unexplained increase in safety related events or regulatory infractions;

(2) any time major operational changes are foreseen, including changes to key personnel or other major equipment or systems; and

(3) before and during periods of significant organisational change, including rapid growth of contraction, corporate mergers, acquisitions or downsizing.

(d) Hazard identification may use the following tools and techniques:

(1) brainstorming, which is an unbounded but facilitated discussion with a group of experts;

(2) Hazard and Operability (HAZOP) Study, which is a systematic and structured approach using parameter and deviation guidewords. This technique relies on a very detailed system description being available for study and usually involves breaking down the system into well-defined subsystems and functional or process flows between subsystems. Each element of the system is then subject to discussion within a multidisciplinary group of experts, against the various combinations of the guidewords and deviations;

(3) checklists, which are lists of known hazards or hazard causes that have been derived from past experience. The past experience could be previous risk assessments or similar systems or operations, or from actual incidents that have occurred in the past. The technique involves the systematic use of an appropriate checklist and the consideration of each item on the checklist for possible applicability to a particular system. Checklists should always be validated for applicability prior to use;

(4) Failure Modes and Effects Analysis (FMEA), which is a 'bottom up' technique, used to consider ways in which the basic components of a system can fail to perform their design intent. The technique relies on a detailed system description and considers the ways in which each sub-component of the system could fail to meet its design intent and what the consequences could be for the overall system. For each sub-component of a system the FMEA should consider:

(i) all the potential ways that the component could fail;

(ii) the effects that each of these failures would have on the system behaviour;

(iii) the possible causes of the various failure modes;

(iv) how the failures might be mitigated within the system or its environment.

The system level at which the analysis is applied can vary and is determined by the level of detail of the system description used to support the analysis. Depending on the nature and complexity of the system, the analysis could be undertaken by an individual system expert or by a team of system experts acting in group sessions.

(5) the Structured What-If Technique (SWIFT) is a simple and effective alternative technique to HAZOP and involves a multidisciplinary team of experts. It is a facilitated brainstorming group activity but is typically carried out on a higher level system description, having fewer sub-elements, than for HAZOP and with a reduced set of prompts.

(e) Identified hazards are registered in a hazard log. The nature and format of such log may vary from a simple list of hazards to a more sophisticated relational database linking hazards to mitigations, responsibilities and actions. The following information may be included in the hazard log:

(1) unique hazard reference number against each hazard;

(2) hazard description;

(3) indication of the potential causes of the hazard;

(4) qualitative assessment of the possible outcomes and severities of consequences arising from the hazard;

(5) qualitative assessment of the risk associated with the possible consequences of the hazard;

(6) description of the risk controls for the hazard;

(7) indication of responsibilities in relation to the management of risk controls.

(f) Additionally, the following information may also be included in the log:

(1) a quantitative assessment of the risk associated with the possible consequences of the hazard;

(2) record of actual incidents or events related to the hazard or its causes;

(3) risks tolerability statement;

(4) statement of formal system monitoring requirements;

(5) indication of how the hazard was identified;

(6) hazard owner;

(7) assumptions;

(8) third party stakeholders.

Further guidance on hazard identification is contained in ICAO Doc 9859.

**GM2-ADR.OR.D.005(b)(3) — Management**

HAZARD IDENTIFICATION

(a) PROACTIVE (LEADING) INDICATORS:

Metrics that measure inputs to the safety system (either within an organisation, a sector or across the total aviation system) to manage and improve safety performance.

Proactive indicators indicate good safety practices being introduced, developed and adapted, which by their inclusion seek to establish a proactive safety environment that engenders continuous improvement. They provide useful information when accident and incident rates are low to identify latent hazards and potential threats, and consequent opportunities for improvement.

There should always be a connection between a proactive indicator and the unwanted outcomes (or reactive indicators) that their monitoring is intended to warn against.

(b) REACTIVE (LAGGING) INDICATORS:

Metrics that measure events that have already occurred and that impact on safety performance.

As reactive indicators only reflect system failures their use can only result in determining a reactive response. Although they do measure failure to control hazards, they do not normally reveal why the system failed or if there are any latent hazards.

(c) PREDICTIVE INDICATORS (PRECURSOR EVENTS):

These metrics can be considered as Indicators that do not manifest themselves in accidents or serious incidents. They indicate less severe system failures or 'near misses', which when combined with other events may lead to an accident or serious incident.

In a large organisation, a mature safety management system should include all of these measures. Risk management effort, however, should be targeted at Leading Indicators and Precursor Events.

Further guidance on hazard identification is contained in ICAO Doc 9859.

**AMC1-ADR.OR.D.005(b)(4) — Management**

SAFETY RISK ASSESSMENT AND MITIGATION

(a) A formal safety risk assessment and mitigation process should be developed and maintained that ensures analysis (in terms of probability and severity of occurrence), assessment (in terms of tolerability) and control (in terms of mitigation) of risks.

(b) The levels of management who have the authority to make decisions regarding the tolerability of safety risks, in accordance with (a) above, should be specified in the aerodrome manual.

Further guidance on safety risk assessment and mitigation is contained in ICAO Doc 9859.

**GM1-ADR.OR.D.005(b)(4) — Management**

SAFETY RISK ASSESSMENT AND MITIGATION

Safety risk assessment is the analysis of the safety risks of the consequences of the hazards that have been determined. Safety risk analysis breaks down the risks into two components — the probability of occurrence of a damaging event or condition and the severity of the event or condition, should it occur. Safety risk decision making and acceptance should be specified through a risk tolerability matrix. The definition and final construction of the matrix should be left to the operator to design, be documented in the aerodrome manual and be subject to an approval by the competent authority.

Further guidance on safety risk assessment is contained in ICAO Doc 9859.

**GM1-ADR.OR.D.005 (b)(4) — Management**

SAFETY ASSESSMENT FOR RISK MANAGEMENT

(a) Applicability and Scope

(1) For the application of safety risk management to aerodromes, this guidance material presents the general methodology to conduct safety assessments on an aerodrome. It provides guidance to defining the scope of the safety concern, Hazard Identification, safety risk assessment as well as through appropriate reasoning to evaluate the suitability of proposed solutions and the need for alternate measures, operational procedures or operating restrictions for the specific operations concerned.

(2) The methodology provides a basic safety assessment process and lists some key aspects that should be taken into consideration when conducting, reviewing or evaluating a safety assessment. The purpose of this guide is to:

(i) give guidance to when a safety assessment should be carried out;

(ii) outline a suitable safety assessment process that can be used by aerodrome operators;

(iii) identify the key aspects for conducting, reviewing and evaluation of a safety assessment.

(3) The safety assessment process can be used to assess safety risks associated to each identified safety concern in the aerodrome operation.

(b) Basic considerations

(1) A safety assessment is an element of the risk management process of a Safety Management System that is used to assess safety concerns, such as; identified changes at an aerodrome or when any other safety concerns arise or hazards are identified in the aerodrome infrastructures, systems or operations.

(2) When an identified safety hazard affect service providers on the aerodrome, such as aircraft operators, Air Navigation Service Providers (ANSPs) or ground service providers, the involvement of all the affected parties in the safety assessment process is necessary.

(3) A safety assessment considers the impact of the safety concern, on all relevant factors determined to be safety-significant. The list below provides a number of items that may need to be considered when conducting a safety assessment. The items in this list are non-exhaustive and in no particular order:

(i) human factors;

(ii) training;

(iii) safety management system;

(iv) organisational structure and management;

(v) aerodrome layout, including runway configurations, runway lengths, taxiway, taxilane and apron configurations, gates, jet bridges, visual aids, RFFS infrastructure and capabilities;

(vi) types of aircraft and their dimensions and performance characteristics intended to operate at the aerodrome;

(vii) traffic density and distribution;

(viii) aerodrome ground services;

(ix) air-ground communications and time parameters for voice and data link communication;

(x) type and capabilities of surveillance systems, and the availability of systems providing controller support and alert functions;

(xi) flight instrument procedures and related aerodrome equipment;

(xii) operational procedures;

(xiii) aerodrome technical installations, such as Advanced Surface Movement Guidance and Control Systems (A-SMGCS) or NAVAIDS;

(xiv) obstacles or hazardous activities at or in the vicinity of the aerodrome;

(xv) planned construction or maintenance works at or in the vicinity of the aerodrome;

(xvi) any significant local or regional weather phenomena;

(xvii) airspace complexity, ATS route structure and classification of the airspace, which may change the pattern of operations or the capacity of the same airspace.

(4) Subsequent to the completion of the safety assessment that requires mitigation measures, the aerodrome operator is responsible for monitoring the effectiveness of the implemented mitigation measures.

(5) Any measures taken that result in a change should be adequately promulgated to all affected personnel.

(6) Documentation of the whole safety assessment process applied with all working documents and results, including a detailed description of the risk assessment conducted for each case analysed should be made available for authority oversight.

(c) Responsibility

(1) The Safety Manager is responsible for the management and application of the safety assessment process.

(2) A safety assessment should be carried out to assess if a particular risk is acceptable within the aerodrome operations or whether mitigation measures are required. When the risk is determined as acceptable the assessment results should be endorsed by an accountable manager within the senior management.

(3) To protect objectivity, care should be taken to avoid endorsement of safety assessment conclusions by persons within the management who have the responsibility to directly audit subsequent procedures.

(d) Necessity for conducting a safety assessment

(1) A safety assessment is carried out for all safety concerns, including; identified safety hazards, deviations from requirements or certification specifications or and identified change or for any other items or circumstances where such an assessment is considered a contribution to safety assurance. A safety assessment is an everyday process at an aerodrome with a functioning management system. It may be applied in different scale depending on the safety concern to be assessed. The list below is not exhaustive but identifies some of the main reasons for a safety assessment to be applied.

(i) An EASA certification specification is not met;

(ii) A hazard is identified, through the voluntary safety reporting system, through an audit or an inspection, internal or external, through an accident or incident report or through any other mechanism;

(iii) A change in applicable requirements;

(iv) The aerodrome undergoes or is affected by a change in infrastructure, systems, processes, procedures, environment or organisation that may impact the safety of aerodrome operations.

(e) Safety Assessment Process

(1) Introduction

(i) The primary objective of a safety assessment is to ensure a defined level or attain a higher level of safety by assessing how a specific safety concern affects the safety of aerodrome operations.

(ii) The safety assessment process includes the preparation for processing a safety concern, the safety risk management process, the verification of the adequacy of mitigation measures that may exist or be implemented to reduce the level of risk, the promulgation of safety information derived from the process and subsequent documentation and storage of the entire process.

(iii) The assessment process allows each identified hazard, and associated risk, to be evaluated in order of risk potential so that priorities can be established and, if necessary, resources can be allocated more effectively for the higher risks.

(iv) It is important that, all parties affected by or with a stake in the specific case under review are involved and can contribute to the assessment process. For example changes on an aerodrome often impact several activities; therefore safety assessments for potential hazards associated with changes often need to be carried out in a cross-organisational manner, involving experts from all the involved parties, internal or external, to the aerodrome organisation. Prior to the assessment, a preliminary identification of the required tasks and the organisations to be involved in the process should be conducted.

(v) A safety assessment is initially composed of four basic steps:

(A) definition of the safety concern, root cause analysis where appropriate and identification of the relevant regulatory requirements and compliance;

(B) hazard identification and identification of potential consequences;

(C) risk assessment;

(D) mitigation definition, development of mitigation implementation plan, promulgation, documentation and conclusion of the assessment.

(vi) Each one of the steps listed in (e)(1)(V) includes a number of detailed procedures, some listed here below, allowing for the full safety assessment process to be conducted. A generic safety assessment process flow chart is provided in Figure 1.

(2) Definition of the safety concern, root cause analysis where appropriate and identification of the relevant regulatory requirements and compliance.

(i) The perceived safety concern is analysed to determine if it is sustained or rejected. Justification for rejecting the safety concern should be made and documented. Sustained safety concern should be precisely described, including timescales and projected phases if relevant, location, involved or affected parties, activities and entities as well as potential influence on specific processes, procedures, systems and operations.

(ii) An initial evaluation of the compliance with the appropriate provisions in the regulations applicable to the aerodrome is conducted.

(iii) In order to ensure that the safety assessment addresses the fundamental causes of the safety concern, a root cause analysis is performed and root causes are determined.

(iv) Where special conditions are established their rationale and justification are identified, documented and taken into account in the risk assessment.

(v) If a safety assessment has been previously conducted for similar cases (e.g. maintenance of the runway or of the visual aids) in the same context, the aerodrome operator can use some elements from these assessments as a basis for the assessment to be conducted. Nevertheless, as each assessment is specific to a particular safety concern at a given aerodrome the suitability for reusing specific elements of an existing assessment is evaluated.

(3) Hazard identification and identification of potential consequences

(i) To actively seek to identify safety hazards related to every aspect of the safety concern various hazard identification methods are applied. These should be conducted in a manner in which there is an acceptable level of confidence that all hazards are identified. It may be supported by brain storming sessions, expert opinion, industry knowledge, operational experience and judgement. The identification of hazards is conducted by at least considering:

(A) Accident causal factors and critical events based on a simple causal analysis of available accident and incident databases;

(B) Events that may have occurred in similar circumstances or that have been subsequent to the resolution of a similar problem.

Prior to implementing changes, hazard identification shall be conducted for potential new hazards that may emerge in the operation during or after implementation of the planned changes.

(ii) Following the steps listed in (3)(i), for each identified hazard all potential outcomes or consequences are allocated.

(iii) Where no hazards are identified a safety justification to support that the hazard identification process was complete and correct should be documented and stored.

(4) Risk assessment overview

(i) Understanding all the risks is the basis for the subsequent evaluation of existing or potential new mitigation measures that might be needed for safe operations.

(ii) The level of risk of each identified potential consequence is estimated in the risk assessment. This risk assessment will determine the severity of a consequence and the probability of the consequence occurring.

(iii) The appropriate safety objective for each type of risk is specified in terms of verifiable safety acceptance criteria which may be defined by:

(A) Reference to a safety acceptance criteria associated with recognised standards and/or codes of practices;

(B) Reference to the safety performance of the existing system;

(C) Reference to the acceptance of a similar system elsewhere;

(D) Application of explicit safety risk levels.

(iv) Safety acceptance criteria are specified in either quantitative terms (e.g. identification of a numerical probability) or qualitative terms (e.g. comparison with an existing situation). The selection of the safety acceptance criteria is conducted according to the organisation's policy with respect to safety improvements and is justified for the specific hazard.

(iv) Risk Assessment

(A) The risk assessment takes into account the probability of occurrence of a hazard and the severity of its consequences; the risk is evaluated by combining the two values for severity and probability of occurrence.

(B) Each identified risk must be classified by probability of occurrence and severity of impact. This process of risk classification will allow the aerodrome to determine the level of risk posed by a particular hazard. The classification of probability and severity refers to potential events.

(C) The severity classification includes five classes ranging from 'catastrophic' (class A) to 'not significant' (class E). The examples in Table 1 serve as a guide to better understand the definition.

| **Severity class** | **Definition** | **Examples** |
|---|---|---|
| A<br>Catastrophic | — accident<br>— equipment destroyed<br>— loss of aircraft<br>— multiple deaths | — mid-air collision between aircraft<br>— collision between aircraft and/or other object during take-off or landing |
| B<br>Hazardous | — a large reduction in safety margins /<br>no safety barriers remaining<br>— the outcome is not under control<br>— major equipment damage<br>— serious or fatal injury to a number of people | — runway incursion, significant potential, extreme action to avoid collision)<br>— attempted take-off or landing on a closed or engaged runway<br>— take off / landing incidents, such as undershooting or overrunning<br>— Controlled Flight Into Terrain is only marginally be avoided |
| C<br>Major | — serious incident or accident<br>— significant reduction in safety margins<br>— serious equipment damages<br>— injury to persons | — runway incursion, ample time and distance, (no potential for a collision)<br>— collision with obstacle on apron/ parking position (hard collision)<br>— employee falling down from height<br>— near Controlled Flight Into Terrain<br>— missed approach with ground contact of the wing ends during the touch down<br>— large fuel puddle near the aircraft while passengers are on board |
| D<br>Minor | — nuisance, operations limitations<br>— minor incident<br>— small damages to aircraft, vehicles or<br>objects | — hard braking during landing or taxiing<br>— damage due to jet blast (objects)<br>— expendables are laying around the stands<br>— collision between maintenance vehicles on service road<br>— breakage of drawbar during pushback (damage to the A/C)<br>— slight excess of MTOW<br>— aircraft is rolling into PAX-bridge (slight collision) |

| | | |
|---|---|---|
| | | — forklift is tilting |
| E<br>Not significant | — non-significant consequences<br>— circumstances which may lead to a non-significant reduction of safety and no immediate effect on safety | — increase in work load for the crew during taxiing<br>— slight increase of braking distance<br>— hoarding is tumbling down because of strong wind<br>— cart loosing baggage |

*Table 1: Severity classification scheme with examples*

(D) The classification of the severity of an event shall be based on a 'credible case' but not on a 'worst case' scenario. A credible case is expected to be possible under reasonable conditions (probable course of events). A worst case may be expected under extreme conditions and combinations of additional and improbable hazards. If worst cases are to be introduced implicitly, it is necessary to estimate appropriate low frequencies.

(E) The probability classification includes five classes ranging from 'extremely improbable' (class 1) to 'frequent' (class 5). The examples in Table 2 serve as a guide to better understand the definition.

| **Probability class** | **Meaning** | **Definition** |
|---|---|---|
| 5<br>Frequent | Likely to occur many times<br>(has occurred frequently) | more frequent than once in a year (>1/y) |
| 4<br>Reasonably probable | Likely to occur some times (has occurred infrequently) | once in a year to once in 10 years (1–0.1/y) |
| 3<br>Remote | Unlikely to occur<br>(has occurred rarely) | once in 10 years to once in 100 years (0.1–0.01/y) |
| 2<br>Extremely remote | Very unlikely to occur (not known to have occurred) | once in 100 years to once in 1000 years (0.01–0.001/y) |
| 1<br>Extremely improbable | Almost inconceivable that the event will occur | less than once in 1'000 years (<0.001/y) |

*Table 2: Probability classification scheme*

(F) The probability classes presented in Table 2 are defined with quantitative limits.

(a) The classification refers to the probability of events per year. This is reasoned through the following:

(1) Many hazards at airports are not directly related to aircraft movements.

(2) The assessment of risks should be conducted with the emphasis to minimise use of expert judgement by using

where available, appropriate objective methods for evaluating risk.

(b) Frequencies per year are numbers which correspond to experience and they are easier to estimate and validate than extremely small frequencies per movement. If necessary probability per year can easily be transformed into frequencies per movement and vice versa. The following transformation rules must be considered:

(1) Transformation of frequencies per year to frequencies per movement:

(i) The estimated frequency per year shall be divided by the number of movement related to the respective hazard.

(2) Transformation of frequencies per movement to frequencies per year (e.g. if generally known accident rates shall be used for the estimation of a frequency per year):

(i) The known frequency per movement (= rate) shall be multiplied with the related number of movements.

(ii) Example: The failure rate to pass a stop bar on a defined airport is assumed to be $10^{-4}$ per passage. If 10'000 aircraft will annually pass that stop bar, the frequency will be one stop bar violation per year.

(G) A risk assessment matrix may be used to classify the identified risks. The aim of the matrix is to provide means to obtain a safety risk index for each risk. The index can be used to determine tolerability of the risk and to enable the prioritisation of relevant actions in order to make a decision on risk tolerability and acceptance.

(a) Given that the prioritisation is dependent on both probability and severity of the events, the prioritisation criteria will be two-dimensional. Three main classes of risk priority are defined:

(1) risks with high priority;

(2) risks with mean priority;

(3) risks with low priority.

(b) The risk assessment matrix presented in Table 3 has no fixed limits for tolerability but points to a floating assessment where identified hazards are given risk priority for their risk contribution towards the safety of aerodrome operations. For this reason, the priority classes are intentionally not edged along the probability and severity classes.

| Probability | | Risk Assessment Matrix | | | | |
|---|---|---|---|---|---|---|
| Frequent | 5 | High priority | | | | |
| Reasonably probable | 4 | | | | | |
| Remote | 3 | | | Mean priority | | |
| Extremely remote | 2 | | | | | |
| Extremely improbable | 1 | | | | | Low priority |
| Severity | | A | B | C | D | E |
| | | Catastrophic | Hazardous | Major | Minor | Not significant |

*Table 3: Risk Assessment matrix with prioritisation classes*

(c) The definition of the edged limits for the probability and severity classes can be conducted by the aerodrome operator in order to establish the specific level of risk tolerability for the aerodrome operations.

(5) Mitigation, verification, promulgation, documentation and conclusion.

(i) Risk mitigation

(A) In some cases, the result of the risk assessment can be that the safety acceptance criteria are met. In such a case no specific mitigation measures are necessary and the safety assessment process can be documented and stored. In the other cases further measures, operational procedures and operating restrictions to mitigate risks may be required to reduce the frequency of the event occurring or reduce the severity of its consequences until the specified safety acceptance criteria is met.

(B) If the risk falls in the high priority, or mean priority areas of the assessment matrix, elimination of the hazard or other mitigation measures will be required to reduce the risk to a lower level. Mitigation measures are actions such as elimination of the risk or changes to operating procedures, equipment or infrastructure that are aimed to reduce either one or both the level of severity and the level of probability.

(C) As a general guideline the following actions or measures can be associated with the risk classes defined in (e)(iv)(G)(a):

(a) High priority: Urgent mitigation measures may be necessary and, if not already conducted, a detailed safety assessment of the specific hazard shall be performed.

(b) Mean priority: If mitigation measures are identified and provide adequate risk reduction, they shall be applied. A detailed safety assessment should be performed.

(c) Low priority: The hazard shall be further monitored.

(D) Once each hazard is identified, its consequences and associated risks shall be assessed in terms of severity and probability, it must be ascertained that all the assessed hazards are appropriately managed. The exposure to a given hazard is taken into account to decide its acceptability in terms of risk. An initial identification of existing risk mitigation measures are conducted prior to identifying additional mitigation measures.

(E) Once the existing mitigation measures have been identified or additional mitigation measures have been defined, the level of risk needs to be reassessed in terms of severity and likelihood taking into account the further mitigation measures introduced.

(F) All identified risk mitigation measures should be documented and included in an implementation plan. In order to control the risk during implementation, the implementation plan should include the order of implementation, timeframes for implementation, promulgation as well as responsibilities for specific mitigation measures.

(ii) Verification that the mitigation measures reduce risk to an acceptable level may require a safety justification.

(A) Implementation should begin only after verification of the effectiveness of the mitigation measures, supported by a safety justification.

(B) The verification of the effectiveness of mitigation measure should be conducted with a review process, such as an inspection, audit or other means.

(iii) Promulgation to all affected personnel and other concerned parties of appropriate safety information derived from the safety assessment shall be ensured.

(A) In order to ensure adequate dissemination of information to interested parties, safety relevant conclusions of the safety assessment should be promulgated in the relevant aerodrome documentation or information systems.

(B) The promulgation of this information may be done by amending the appropriate procedures in the Aerodrome Manual, direct documented communication to the concerned personnel and parties, through the Aeronautical Information Publication (AIP), Notice to Airmen (NOTAM) Automated Terminal Information Service (ATIS) or by other relevant means.

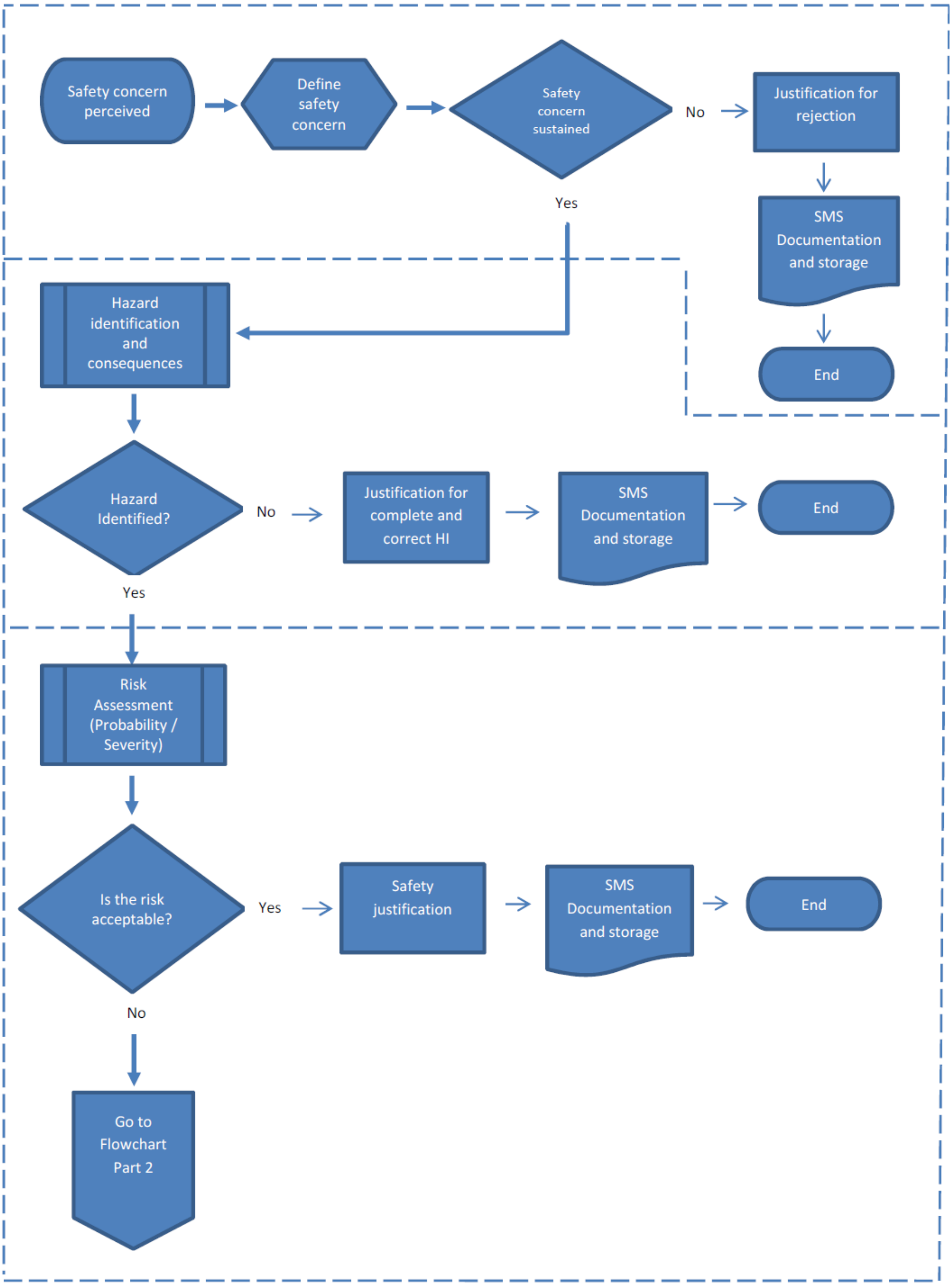
(iv) Documentation and storage

(A) The safety assessment is documented and stored according to the aerodrome operator's SMS documentation procedures.

(B) The safety assessment documentation has to be accessible in its entirety and readily available to be presented to the competent authority for oversight purposes.

(C) The safety assessment is concluded by ensuring it is referred to the appropriate regular review process.

Safety Assessment Flowchart Part 1



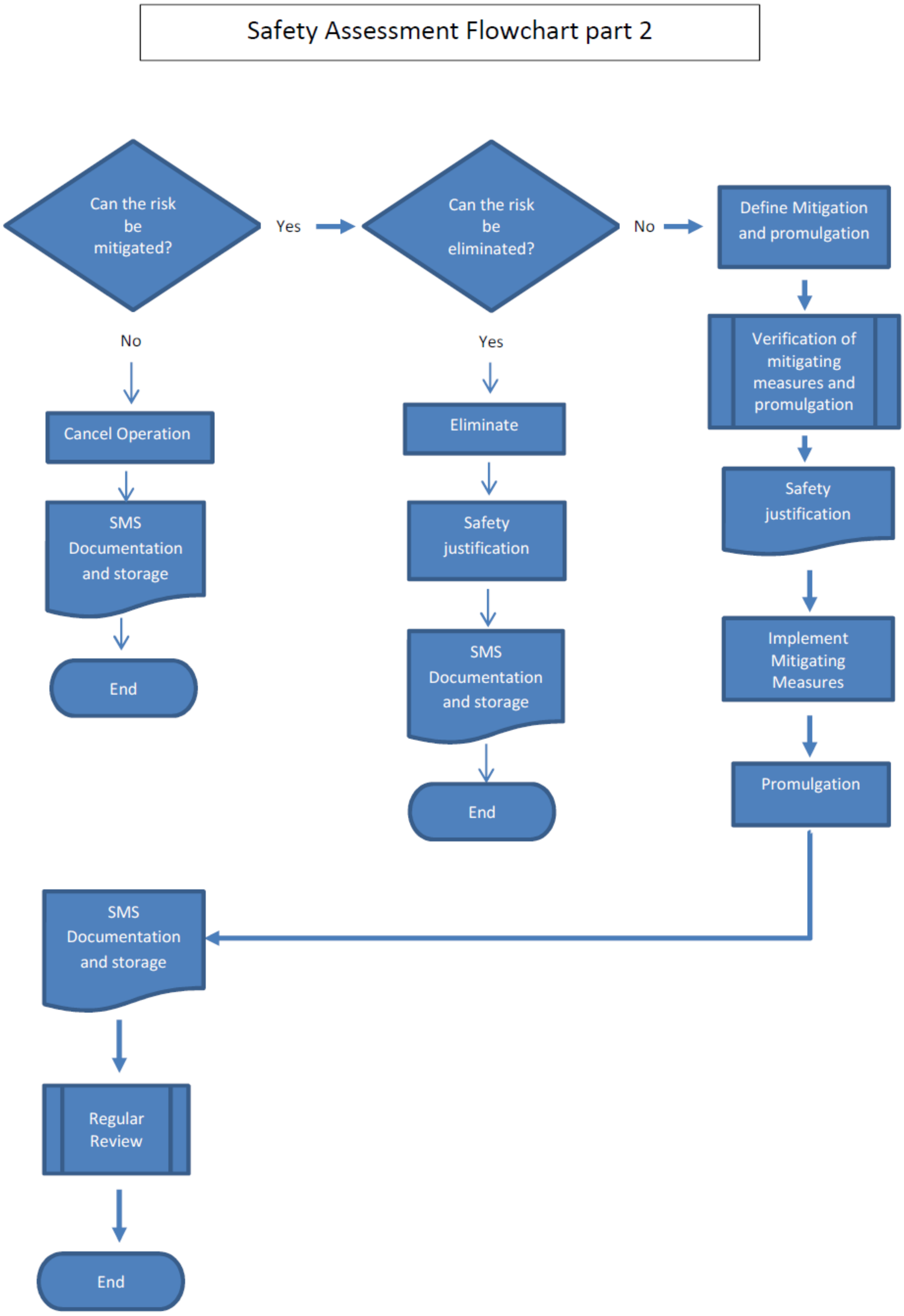



*Figure 1 — Safety Assessment Process Flow Charts Part 1 and 2*

(f) Regular review

(1) Changes applied after safety assessments should be reviewed at regular intervals to determine if the risk controls are still valid.

(2) If any of the factors involved in the safety assessment that was conducted have changed either the entire safety assessment or relevant parts will need to be reviewed in order to determine the new level of implied risk and adequacy of risk mitigation measures.

(3) The regular review can be included in the regular internal audit schedule or conducted through a separate review process established and documented in the aerodrome manual.

(g) Submitting a safety assessment to the competent authority

(1) A safety assessment should be registered and documented according to SMS documentation procedures and when requested for review or approval as foreseen in the applicable requirements, submitted to the competent authority to show that the aerodrome operator has suitably assessed the safety concern and taken subsequent actions as appropriate for elimination or mitigation measures.

**AMC1-ADR.OR.D.005(b)(5) — Management**

SAFETY PERFORMANCE MONITORING AND MEASUREMENT

(a) Safety performance monitoring and measurement should be the process by which the safety performance of the operator is verified in comparison to the safety policy and objectives, identified safety risks and the mitigation measures.

(b) This process should include:

(1) safety reporting;

(2) safety studies, which are rather large analyses encompassing broad safety concerns;

(3) safety reviews including trends reviews, which are conducted during introduction and deployment of new technologies, change or implementation of procedures, or in situations of structural change in operations, or to explore increase in incidents or safety reports;

(4) safety audits which focus in the integrity of the operator’s management system, and periodically assess the status of safety risk controls;

(5) safety surveys, which examine particular elements or procedures of a specific operation, such as problem areas or bottlenecks in daily operations, perceptions and opinions of operational personnel and areas of dissent or confusion;

(6) internal safety investigations, whose scope should extend the scope of occurrences required to be reported to the competent authority; and

(7) setting safety performance indicators and measuring performance against them.

**GM1-ADR.OR.D.005(b)(5) — Management**

SAFETY PERFORMANCE MONITORING AND MEASUREMENT

The following generic aspects/areas could be considered:

(a) accountability for management of the operational activities and its ultimate accomplishment;

(b) authority to direct, control or change the procedures as well as to make key decisions such as safety risk acceptance decisions;

(c) procedures for operational activities;

(d) controls, including hardware, software, special procedures or procedural steps and supervisory practices designed to keep operational activities on track;

(e) interfaces, including lines of authority between departments, lines of communication between employees, consistency of procedures, and clear delineation of responsibility between organisations, work units and employees;

(f) process measures to provide feedback to responsible parties that required actions are taking place, required outputs are being produced and expected outcomes are being achieved.

**AMC1-ADR.OR.D.005(b)(6) — Management**

THE MANAGEMENT OF CHANGE

The aerodrome operator should manage safety risks related to a change. The management of change should be a documented process to identify external and internal change that may have an adverse effect on safety.

It should make use of the aerodrome operator’s existing hazard identification, safety risk assessment and mitigation processes.

For assessment of changes ADR.OR.B.045 and its related AMCs also apply.

**GM1-ADR.OR.D.005(b)(6) — Management**

THE MANAGEMENT OF CHANGE

(a) Change can introduce new hazards, impact the appropriateness and/or effectiveness of existing safety risk mitigation strategies. Changes may be external to the organisation or internal.

(b) A formal process for the management of change should take into account the following considerations:

    (1) Criticality of systems and activities;

    (2) Stability of systems and operational environments;

    (3) Past performance.

(c) System description is one of the fundamental preliminary activities in the planning of the safety management system, to determine a baseline hazard analysis for the baseline system.

    As part of the formal process of the management of change, the system description and the baseline hazard analysis should be reviewed periodically, even if circumstances of change are not present, to determine their continued validity.

    When changes to the system are made, and periodically thereafter, the operator should go over its system and its actual operational environment, in order to make sure it continues to be fully aware of the circumstances under which the provision of service takes place.

Further guidance on the management of change is contained in ICAO Doc 9859.

**AMC1-ADR.OR.D.005(b)(7) — Management**

CONTINUOUS IMPROVEMENT OF THE SAFETY MANAGEMENT SYSTEM

The aerodrome operator should develop and maintain a formal process to identify the causes of substandard performance of the Safety Management System, determine the implications of substandard performance of the Safety Management System in operations, and eliminate or mitigate such causes. Continuous improvement should be achieved through:

(a) proactive evaluation of facilities, equipment, documentation and procedures;

(b) proactive evaluation of an individual's performance, to verify the fulfilment of that individual's safety responsibilities;

(c) reactive evaluations in order to verify the effectiveness of the system for control and mitigation of safety risks.

**AMC2-ADR.OR.D.005(b)(7) — Management**

CONTINUOUS IMPROVEMENT OF THE QUALITY AND SECURITY MANAGEMENT FOR AERONAUTICAL DATA AND AERONAUTICAL INFORMATION PROVISION ACTIVITIES

The aerodrome operator should develop and maintain a formal process to identify the causes of substandard performance of the Quality and Security Management Systems for aeronautical data and aeronautical information provision activities, determine the implications of their substandard performance in operations, and eliminate or mitigate such causes. Continuous improvement should be achieved through:

(a) proactive evaluation of facilities, equipment, documentation and procedures;

(b) proactive evaluation of an individual's performance, to verify the fulfilment of that individual's responsibilities;

(c) reactive evaluations in order to verify the effectiveness of the system for control and mitigation of risks.

**GM1-ADR.OR.D.005(b)(7) — Management**

CONTINUOUS IMPROVEMENT OF THE SAFETY MANAGEMENT SYSTEM

Continuous improvement of the safety management system, as part of the safety assurance, is achieved through the application of:

(a) internal evaluations;

(b) independent audits (both internal and external);

(c) strict document controls;

(d) continuous monitoring of safety controls and mitigation actions.

Further guidance on continuous improvement of the safety management system is contained in ICAO Doc 9859.

**AMC1-ADR.OR.D.005(b)(8) — Management**

TRAINING

(a) The aerodrome operator should establish a safety training programme to all staff, regardless of their level in the organisation.

(b) The safety training programme should consist of the following:

  (1) a documented process to identify training requirements for each area of activity within the aerodrome organisation, and track completion of required training;

  (2) a validation process that measures the effectiveness of training;

  (3) initial job-specific training;

  (4) induction/initial training incorporating safety management system , including Human Factors and organisational factors; and

  (5) recurrent safety training.

(c) A training file should be developed for each employee, including management, to assist in identifying and tracking employee training requirements and verifying that personnel have received the planned training.

(d) The aerodrome operator should specify initial and recurrent safety training standards for operational personnel, managers and supervisors, senior managers and the accountable manager. The amount and level of detail of safety training should be appropriate to the individual's responsibility and involvement in the SMS.

(e) The aerodrome operator should specify safety training responsibilities, including contents, frequency, validation and safety training records management.

(f) The information provided in points (d) and (e) above should be included in the aerodrome manual.

This training programme may be combined with the training programme provided for in AMC1-ADR.OR.D.015 (h).

**GM1-ADR.OR.D.005(b)(8) — Management**

STAFF SAFETY TRAINING REQUIREMENTS

(a) Operational personnel

  (1) Safety training should address safety responsibilities, including adherence to all operating and safety procedures, and recognising and reporting hazards;

  (2) The training objectives should include the organisation's safety policy and SMS fundamentals and overview;

  (3) The contents should include:

    (i) definition of hazards;

    (ii) consequences and risks;

    (iii) the safety risk management process, including roles and responsibilities; and

    (iv) safety reporting and the organisation's safety reporting system(s).

(b) Managers and supervisors

(1) Safety training should address safety responsibilities, including promoting the SMS and engaging operational personnel in hazard reporting;

(2) In addition to the training objectives established for operational personnel, training objectives for managers and supervisors should include a detailed knowledge of the safety process, hazard identification and safety risk management and mitigation, and change management;

(3) In addition to the contents specified for operational personnel, the training contents for supervisors and managers should include safety data analysis.

(c) Senior managers

(1) Safety training should include safety responsibilities, including compliance with European Union, national and the organisation's own safety requirements, allocation of resources, ensuring effective inter-departmental safety communication and active promotion of the SMS;

(2) In addition to the objectives of the two previous employee groups, safety training should include safety assurance and safety promotion, safety roles and responsibilities, and establishing acceptable levels of safety.

(d) Accountable manager

The training should provide the accountable manager with a general awareness of the organisation's safety management system, including safety management system roles and responsibilities, safety policy and objectives, safety risk management and safety assurance.

Further guidance on the issue staff safety training is contained in ICAO Doc 9859.

**AMC1-ADR.OR.D.005(b)(9) — Management**

SAFETY COMMUNICATION

(a) The aerodrome operator should communicate safety management system objectives and procedures to all operational personnel, and the SMS should be visible in all aspects of operations.

(b) Communication should flow between the safety manager and operational personnel throughout the organisation.

(c) Safety communication should aim to:

(1) ensure that all staff are fully aware of the safety management system;

(2) convey safety-critical information;

(3) explain why particular actions are taken;

(4) explain why safety procedures are introduced or changed.

**GM1-ADR.OR.D.005(b)(9) — Management**

SAFETY COMMUNICATION

(a) An aerodrome operator, may use the following tools to communicate safety information:

(1) safety Management System Manual;

(2) safety processes and procedures;

(3) safety newsletters, notices and bulletins; and

(4) websites or emails;

(b) Regular meetings with personnel where information, actions and procedures are discussed may be used to communicate safety matters.

Further guidance on safety communication is contained in ICAO Doc 9859.

**AMC1-ADR.OR.D.005(b)(10) — Management**

COORDINATION OF THE AERODROME EMERGENCY RESPONSE PLAN

(a) The coordination of the aerodrome emergency response plan, established in accordance with the requirements contained in Part-ADR.OPS, with the safety management system should ensure continuous improvement of the systems and procedures contained within the plan.

(b) Continuous improvement may, amongst others, be obtained by:

(1) conducting a review of the relevant parts of the emergency response plan after a full or partial exercise;

(2) debriefing and analysing the emergency response operations after an emergency situation;

(3) developing new emergency procedures or systems as part of the emergency response plan when new hazards are identified by the safety management system,

to ensure, amongst others, the coordination with the emergency response plans of other interfacing organisations.

**AMC1-ADR.OR.D.005(c) — Management**

AERODROME OPERATOR MANAGEMENT SYSTEM DOCUMENTATION

(a) The aerodrome operator's management system documentation should at least include the following information:

(1) a statement signed by the accountable manager to confirm that the aerodrome operator will continuously work in accordance with the applicable requirements and the operator's documentation;

(2) the aerodrome operator's scope of activities;

(3) the titles and names of persons referred to in ADR.OR.D.015;

(4) an organisation chart showing the lines of responsibility between the persons referred to in ADR.OR.D.005 (b)(1);

(5) a general description and location of the facilities;

(6) procedures specifying how the aerodrome operator ensures compliance with the applicable requirements;

(7) the amendment procedure for the operator's management system documentation; and

(8) safety management system outputs.

**AMC2-ADR.OR.D.005(c) — Management**

AERODROME OPERATOR SAFETY MANAGEMENT MANUAL

(a) In cases where safety management is set out in a Safety Management Manual (SMM) it should be the key instrument for communicating the approach to safety for the aerodrome operator. The SMM should document all aspects of safety management, including the safety policy, objectives, procedures and individual safety responsibilities;

(b) The contents of the documentation should include:

(1) scope of the safety management system;

(2) safety policy and objectives;

(3) safety responsibilities of key safety personnel;

(4) documentation control procedures;

(5) safety assessment process including hazard identification and risk management schemes;

(6) monitoring of implementation and effectiveness of safety actions and risk mitigation measures;

(7) safety performance monitoring;

(8) hazard reporting system;

(9) incident reporting and investigation;

(10) emergency response planning;

(11) management of change (including organisational changes with regard to safety responsibilities);

(12) safety promotion; and

(13) safety management system outputs.

**GM1-ADR.OR.D.005(c) — Management**

AERODROME OPERATOR MANAGEMENT SYSTEM DOCUMENTATION

It is not required to duplicate information in several manuals. The Safety Management Manual is considered to be a part of the aerodrome manual.

**AMC1-ADR.OR.D.005(d) — Management**

COMPLIANCE MONITORING

GENERAL

(a) The implementation and use of a compliance monitoring function should enable the aerodrome operator to monitor compliance with the relevant requirements of this Part, Part-ADR.OPS and any other applicable requirements.

(1) The aerodrome operator should specify the basic structure of the compliance monitoring function applicable to the activities conducted;

(2) The compliance monitoring function should be structured according to the size of organisation and the complexity of the activities to be monitored, including those which have been sub-contracted.

(b) An aerodrome operator should monitor compliance with the procedures it has designed to ensure safe activities. In doing so, an aerodrome operator should as a minimum, and where appropriate, monitor:

(1) organisational structure;

(2) plans and objectives;

(3) privileges of the organisation;

(4) manuals, logs and records;

(5) training standards;

(6) required resources; and

(7) management system.

**AMC2-ADR.OR.D.005(d) — Management**

COMPLIANCE MONITORING DOCUMENTATION

(a) Relevant documentation should include the relevant part(s) of the aerodrome operator's management system documentation.

(b) In addition, relevant documentation should also include the following:

(1) terminology;

(2) specified activity standards;

(3) a description of the organisation;

(4) the allocation of duties and responsibilities;

(5) procedures to ensure regulatory compliance;

(6) the compliance monitoring programme, reflecting:

(i) schedule of the monitoring programme;

(ii) audit procedures;

(iii) reporting procedures;

(iv) follow-up and corrective action procedures; and

(v) recording system;

(7) training syllabus for compliance monitoring; and

(8) document control.

(c) Training

(1) Staff responsible for the compliance monitoring function should receive training on this task. Such training should cover the requirements of compliance monitoring, manuals and procedures related to the task, audit techniques, reporting and recording;

(2) Time should be provided to train all personnel involved in compliance management and for briefing the remaining personnel; and

(3) The allocation of time and resources should be governed by the volume and complexity of the activities concerned.

**AMC3-ADR.OR.D.005(d) — Management**

COMPLIANCE MONITORING — STAFFING

Auditors used for compliance monitoring audits and inspections should meet the following criteria:

(a) should not have involvement in the area of the activity which is to be audited;

(b) should have relevant operational and/or maintenance experience or other appropriate experience;

(c) external auditors used, should be familiar with the type of operation, maintenance or other activities of the aerodrome operator.

**AMC4-ADR.OR.D.005(d) — Management**

COMPLIANCE MONITORING — AUDIT SCHEDULING

(a) The compliance monitoring function should include a defined audit schedule and a periodic review cycle for each area. The aerodrome operator should ensure that the compliance monitoring function is audited according to a defined audit schedule. The schedule should allow for unscheduled audits when trends are identified. Follow-up audits should be scheduled to verify that corrective action was carried out and that it was effective and completed, in accordance with the policies and procedures specified in the aerodrome manual.

(b) An aerodrome operator should establish a schedule of audits to be completed during a specified calendar period. All aspects of the aerodrome and its operation should be audited within the first 12 months since the date of the issuance of the certificate. After that, an audit or a series of audits should be conducted within a maximum period of 36 months, to cover the whole aerodrome and its operation in a manner and at intervals set out in the aerodrome manual, unless the competent authority requires further audits.

**AMC1-ADR.OR.D.010 — Contracted activities**

COMPLIANCE MONITORING RESPONSIBILITY WHEN CONTRACTING ACTIVITIES

(a) An aerodrome operator may decide to contract certain activities to external organisations.

(b) A contract should exist between the aerodrome operator and the contracted organisation clearly defining the contracted activities and the applicable requirements.

(c) The contracted safety related activities relevant to the agreement should be included in the operator’s safety assurance process;

(d) The aerodrome operator should ensure that the contracted organisation has the necessary authorisation, declaration or approval when required, and commands the resources and competence to undertake the task; to this end, a prior audit of the contracted party should be conducted to ensure that the contracted organisation meets the applicable requirements and the requirements specified by the aerodrome operator’s itself.

(e) If the aerodrome operator requires the contracted organisation to conduct an activity which exceeds the contracted organisation’s authorisation or approval, the aerodrome operator is responsible for ensuring that the contracted organisation's compliance monitoring takes account of such additional requirements.

**AMC1-ADR.OR.D.015(a) — Personnel requirements**

ACCOUNTABLE MANAGER

(a) The accountable manager should:

(1) ensure that all necessary resources are available to operate the aerodrome in accordance with the Aerodrome Manual;

(2) ensure that, if there is a reduction in the level of resources or abnormal circumstances which may affect safety, the required reduction in the level of operations at the aerodrome is implemented;

(3) establish, implement and promote the safety policy; and

(4) ensure compliance with relevant applicable requirements , certification basis and the organisation's safety management system, as well as its quality and security management system with regard to aeronautical data and aeronautical information provision activities.

(b) The accountable manager should have:

(1) an appropriate level of authority within the organisation to ensure that activities are financed and carried out to the standard required;

(2) knowledge and understanding of the documents that prescribe relevant aerodrome safety standards;

(3) understanding of the requirements for competence of aerodrome management personnel, so as to ensure that competent persons are in place;

(4) knowledge and understanding of safety, quality and security management systems related principles and practices, and how these are applied within the organisation;

(5) knowledge of the role of the accountable manager; and

(6) knowledge and understanding of the key issues of risk management within the aerodrome.

**AMC2-ADR.OR.D.015(a) — Personnel requirements**

ACCOUNTABLE MANAGER

(a) If the responsibilities mentioned in paragraph (c) are delegated, the level of technical knowledge and understanding expected of an accountable manager is high level, with particular reference to his/her own role in ensuring that standards are maintained. If the responsibilities mentioned in paragraph (c) are not delegated, the accountable manager should meet the qualification requirements for each non-delegated task and responsibility;

(b) During periods of absence, the day-to-day responsibilities of the accountable manager may be delegated; however, the accountability ultimately remains with the accountable manager.

(c) Depending on the size and the complexity of operations, the accountable manager may delegate some of the responsibilities to other persons within the organisation, who have demonstrated that they possess adequate experience, knowledge and technical expertise in those areas. Such responsibilities could be:

(1) the day-to-day management of aerodrome operations, coordination with Air Traffic Services and Apron Management Services;

(2) establishment and implementation of an aerodrome emergency plan and the provision of adequate rescue and fire-fighting services;

(3) implementation and maintenance of an appropriate aerodrome wildlife risk management programme;

(4) establishment and implementation of an appropriate aerodrome infrastructure maintenance programme;

(5) establishment, implementation, coordination and recording of a personnel training programme; and

(6) the implementation and management of the quality and security management of aeronautical data and aeronautical information provision activities.

In any case, the accountability, ultimately, remains with the accountable manager.

**GM2-ADR.OR.D.015(a) — Personnel requirements**

OPERATIONS MANAGEMENT

(a) The management of the day-to-day operations may include, but not limited to:

(1) aerodrome inspections (including visual aids inspections) according to the provisions of the Aerodrome Manual;

(2) timely and efficient application of wildlife risk management measures;

(3) implementation of the procedures related to aerodrome operations in winter operations, adverse weather conditions, reduced visibility or at night, if required;

(4) measurement of runway friction coefficient, when required;

(5) implementation of procedures to control works on the movement area;

(6) monitoring of obstacles around the aerodrome;

(7) implementation of procedures related to aerodrome emergency plan;

(8) coordination with the local Air Navigation Services Provider; and

(9) coordination with Apron Management Services.

EMERGENCY PLAN MANAGEMENT

(a) The emergency plan management may include, but not limited to:

(1) establishment of an aerodrome emergency plan;

(2) coordination with other organisations, such as aircraft operators, air navigation service provider, ground handling services providers and Local/State Authorities in implementing the aerodrome emergency plan;

(3) coordination of aerodrome emergency exercises;

(4) provision of rescue and fire-fighting services, organisation, staffing, training and periodic checking;

(5) revision of aerodrome emergency plan; and

(6) provisions for disabled aircraft removal.

WILDLIFE MANAGEMENT

(a) The wildlife management may include, but not limited to:

(1) establishment of a wildlife risk management programme;

(2) planning and Organisation of wildlife control measures according to the wildlife risk management programme;

(3) reviewing wildlife strike reports, daily wildlife activity records and maintenance reports, to determine the requirement for short or long term control measures; and

(4) ensure supply, safe keeping and correct maintenance of wildlife control equipment and consumables.

TRAINING MANAGEMENT

(a) The training management may include, but not limited to:

(1) establishment of training needs analysis for personnel involved in aerodrome operations, maintenance and rescue and fire-fighting;

(2) establishment of an effective training programme;

(3) coordination of personnel training programme; and

(4) maintenance of personnel training records;

MAINTENANCE MANAGEMENT

(a) The maintenance management may include, but not limited to:

(1) establishment of a maintenance programme for the aerodrome infrastructure;

(2) monitoring of the implementation of the maintenance programme; and

(3) provision of resources for ad hoc repairs.

QUALITY AND SECURITY MANAGEMENT FOR AERONAUTICAL DATA AND AERONATUTICAL INFORMATION PROVISION ACTIVITIES

(a) establishing and maintaining the quality and security management with regard to aeronautical data and aeronautical information;

(b) establishing and maintaining arrangements with third parties involved in the provision of required services.

**AMC1-ADR.OR.D.015(b) — Personnel requirements**

COMPLIANCE MONITORING

(a) To ensure that the aerodrome operator continues to meet the requirements of this Part and other applicable Parts, the accountable manager should identify and nominate a compliance monitoring manager whose role is to verify, by monitoring the activities of the aerodrome, that the standards required by Part-OR and other applicable parts, and any additional requirements as established by the aerodrome operator, are being carried out properly under the supervision of the relevant head of each functional area of the organisation; if more than one person is nominated, then there should be clearly defined responsibilities and one person should be the focal point and have the overall responsibilities of the compliance monitoring manager.

(b) The compliance monitoring manager should be responsible for ensuring that the compliance monitoring programme is properly established, implemented, maintained and continually reviewed and improved;

(c) The compliance monitoring manager should:

  (1) have direct access to the accountable manager;

  (2) in the fulfilment of its role be independent of line management;

  (3) have access to all parts of the organisation, and as necessary, any contracted organisation.

(d) The compliance monitoring manager should have:

  (1) adequate practical experience and expertise in aerodrome operations or maintenance or similar area;

  (2) adequate knowledge of knowledge of safety and quality assurance principles and management;

  (3) knowledge of the aerodrome manual;

  (4) comprehensive knowledge of the applicable requirements in the area of aerodrome.

**GM1-ADR.OR.D.015(b) — Personnel requirements**

COMPLIANCE MONITORING

Depending on the size of the organisation and the type and complexity of operations, the compliance monitoring function may be exercised by the accountable manager or other independent means.

**AMC1-ADR.OR.D.015(c) — Personnel requirements**

SAFETY MANAGEMENT

(a) The safety manager should be the focal point and responsible for the development, administration and maintenance of an effective safety management system. If more than one person is nominated to the safety management function, then there should be clearly defined responsibilities and one person should be the focal point and have the overall responsibilities of the safety manager.

(b) The role of the safety manager should be to:

  (1) facilitate hazard identification, risk analysis and management;

  (2) monitor the implementation and functioning of the safety management system, including the necessary safety actions;

  (3) manage the safety reporting system of the aerodrome;

  (4) provide periodic reports on safety performance;

  (5) ensure maintenance of safety management documentation;

  (6) ensure that there is safety management training available and that it meets acceptable standards;

  (7) provide advice on safety matters; and

  (8) initiate and participate in internal occurrence/accident investigations.

(c) The safety manager should have:
   (1) adequate practical experience and expertise in aerodrome operations or maintenance or similar area;
   (2) adequate knowledge of safety and quality management;
   (3) knowledge of the aerodrome manual;
   (4) comprehensive knowledge of the applicable requirements in the area of aerodrome.

(d) The safety management function should normally belong to the Safety Services Office.

**GM1-ADR.OR.D.015(c) — Personnel requirements**

SAFETY MANAGEMENT

In the case of small organisations where combination of responsibilities may prevent sufficient independence in this regard, the arrangement for safety assurance may be supplemented by additional independent means.

**AMC1-ADR.OR.D.015(d) — Personnel requirements**

AERODROME MANAGER

The aerodrome manager should have:

(a) clearly defined responsibilities, authorisations and resources available for the management and coordination of the day-to-day operation of the aerodrome, in accordance with the applicable requirements and the aerodrome manual;

(b) adequate practical experience and expertise in aerodrome operations or maintenance or similar area;

(c) comprehensive knowledge of the applicable requirements in the area of aerodromes;

(d) appropriate level of knowledge of safety and quality management; and

(e) knowledge of the aerodrome manual.

**AMC1-ADR.OR.D.015(e) — Personnel requirements**

DETERMINATION OF PERSONNEL NEEDS AND QUALIFICATIONS

(a) The aerodrome operator should determine the required personnel for the planned tasks in accordance with AMC1-ADR.OR.B.015 (b)(4).

(b) The aerodrome operator should determine the required personnel qualifications, in accordance with the applicable requirements (and the national and European Union legislation where this is applicable), and include them in the aerodrome manual. A documented system with defined responsibilities should be in place, in order to identify any needs for changes with regard to personnel qualifications.

**GM1-ADR. OR.D.015 AR.200(e) — Personnel requirements**

QUALIFICATION OF PERSONNEL

The term qualification denotes fitness for the purpose through fulfilment of the necessary conditions such as completion of required training, or acquisition of a diploma or degree.

Qualification could also be interpreted to mean capacity, knowledge, or skill that matches or suits an occasion, or makes someone eligible for a duty, office, position, privilege, or status. Qualification does not necessarily imply competence.

Certain posts may by nature be associated with the possession of certain qualifications in a specific field (e.g. rescue and fire-fighting, civil, mechanical or electrical engineering, wildlife biology etc.). In such cases, the person occupying such a post is expected to possess the necessary qualifications at a level that is in accordance with the applicable national or European Union legislation.

**AMC1-ADR.OR.D.015(f) — Personnel requirements**

PERSONNEL RECORDS

(a) The aerodrome operator should have a system in place to record the following information for each person:

    (1) personnel previous working experience;

    (2) competency checks, including language proficiency as appropriate;

    (3) training.

(b) Latest changes should be reflected into personnel records.

(c) Personnel records should be kept, as long as they are employed by the aerodrome operator.

**GM1-ADR.OR.D.015(f) — Personnel requirements**

TRAINING RECORDS

The training records maintained for each individual should include as a minimum:

(a) the name of the trainee;

(b) the date(s) and the duration of the training;

(c) the place where the training was received;

(d) the name of the organisation that provided the training;

(e) the subjects covered and the methodology of the course;

(f) any comments made by the instructor, if applicable;

(g) the performance evaluation of the trainee, if applicable;

(h) the name of the instructor; and

(i) the signature of the individual that received the training.

**AMC1-ADR.OR.D.015(k) — Personnel requirements**

DISTRIBUTION OF RULES AND PROCEDURES

(a) The aerodrome operator should have a system in place to distribute the rules and procedures to personnel to exercise their duties.

(b) The aerodrome operator should run competency checks, prescribed in the aerodrome manual, to verify that personnel are aware of the rules and procedures relevant to their duties.

**GM1-ADR.OR.D.015(g) — Personnel requirements**

DISTRIBUTION MEANS OF RULES AND PROCEDURES

The aerodrome operator may use electronic means or conventional means to distribute rules and procedures to personnel. The method used should verify that the information reached the intended recipient.

**AMC1-ADR.OR.D.015(g) — Personnel Requirements**

TRAINING PROGRAMME

(a) The training programme should cover all personnel involved in the operation, maintenance and management of the aerodrome and those persons operating unescorted on the movement area and other operational areas of the aerodrome, regardless of their level in the organisation.

(b) The training programme should consist of the following:

(1) a documented process, included in the aerodrome manual, to identify training requirements for each area of activity and track completion of required training;

(2) a documented validation process that measures the effectiveness of training;

(3) initial training;

(4) on the job training; and

(5) recurrent training.

(c) Training frequencies, contents, syllabi and checking programmes should comply with the requirements prescribed in Part-ADR.OPS.

(d) The training programme should contain procedures:

(1) for training and checking;

(2) to be applied in the event that personnel do not achieve or maintain the required standards.

(e) A training file should be developed for each employee, including management, to assist in identifying and tracking employee training requirements and verifying that personnel have received the planned training.

(f) The aerodrome operator should specify training standards for initial, on-the-job, and recurrent training, including training responsibilities, contents, syllabi, frequency, validation and training records management, of the persons referred to in paragraph (a).

(g) The information provided in paragraph (d), (e) and (f) above should be included in the aerodrome manual.

**AMC2-ADR.OR.D.015(g) — Personnel requirements**

INSTRUCTORS — ASSESSORS

(a) The aerodrome operator should nominate instructors and assessors to be used for the implementation of the training and proficiency check programmes.

(b) A person may be qualified and nominated both as an instructor and as an assessor by the aerodrome operator. However, such a person may not provide assessment for own instruction, courses or material.

(c) Instructors

(1) Theoretical instruction shall be given by appropriately qualified instructors. They should have:

(i) appropriate level and depth of knowledge in the field where instruction is to be given;

(ii) documented ability to use appropriate instructional techniques;

(iii) at least 2 years of experience in the field where instruction is to be given.

(2) Instruction on practical skills shall be given by appropriately qualified instructors, who have the following qualifications:

(i) meet the theoretical knowledge and the working experience requirements appropriate to the instruction being given;

(ii) have demonstrated the ability to instruct and to use appropriate instructional techniques;

(iii) have practiced instructional techniques in the areas in which it is intended to provide instruction; and

(iv) receive regular refresher training to ensure that the instructional competences are maintained.

(d) Assessors

(1) The persons who are responsible for assessing the competence and skills of the personnel should:

(i) have demonstrated the ability to assess the performance of, and conduct tests and checks in the areas covered by the training;

(ii) (ii) receive regular refresher training to ensure that the assessment standards are maintained up to date; and

(iii) meet the theoretical knowledge requirements appropriate to the instruction being given and have at least 2 years of working experience in the area of instruction.

**AMC1-ADR.OR.D.025(a) — Coordination with other relevant organisations**

COORDINATION OF SAFETY PROCEDURES

Coordination and interface with the safety procedures of other relevant organisations that are active at the aerodrome include but is not limited to the following: aircraft operators, air navigation service providers, providers of apron management services, ground handling service providers, providers of services to persons with reduced mobility, aircraft maintenance organisations, public authorities that operate on the movement area etc, as well as other organisations that perform activities independently at the aerodrome.

**AMC2-ADR.OR.D.025(b) — Coordination with other relevant organisations**

SAFETY PROGRAMMES — AERODROME SAFETY COMMITTEES

(a) The aerodrome operator should:

(1) organise, coordinate and implement programmes to promote safety at the aerodrome;

(2) coordinate and promote the exchange of information and joint investigation of incidents and accidents.

(b) The aerodrome operator should establish, coordinate and lead local safety committees dealing with runway safety, and the safety of the operations on the movement area and at the aerodrome in general. All relevant organisations operating or providing services at the aerodrome should participate to such safety committees.

**AMC3-ADR.OR.D.025(c) Coordination with other relevant organisations**

COMPLIANCE OF OTHER ORGANISATIONS

In order to ensure compliance of the organisations operating or providing services at the aerodrome, with the regulatory requirements and with the content of aerodrome manual, the aerodrome operator should conduct audits and inspections of such organisations, through its compliance monitoring function (see AMC3-ADR.OR.D.005 (d)).

**GM1-ADR.OR.D.025 — Coordination with other relevant organisations**

AERODROME SAFETY COMMITTEES

(a) Apron Safety Committee

(1) The operator should establish an Apron Safety Committee;

(2) The Apron Safety Committee has an advisory role to the operator;

(3) Management:

(i) The Apron Safety Committee should be chaired by an Aerodrome Operator's Official, responsible for aerodrome operations; and

(ii) The Safety Manager should act as the secretary of the Committee.

(4) Composition

Participation includes, but is not limited to:

(i) aerodrome users active in flight operations and/or aircraft handling;

(ii) aerodrome rescue and fire-fighting services;

(iii) aerodrome operations;

(iv) wildlife management;

(v) aerodrome maintenance; and

(vi) air navigation service provider(s).

(5) Tasks:

(i) To receive and evaluate reports on operational safety issues;

(ii) To receive reports and statistical information on accidents and incidents and propose solutions;

(iii) To advise on apron safety issues.

(6) The Apron Safety Committed should convene at regular intervals.

(b) Local Runway Safety Team

(1) The operator should establish and lead a Local Runway Safety Team and act on local runway safety issues.

(2) Composition

Participation includes, but is not limited, to:

(i) aerodrome operations;

(ii) air navigation service providers;

(iii) aircraft operators that operate of the Aerodrome;

(iv) airport rescue and fire-fighting services.

(3) Role

The role of the Local Runway Safety Team should be to advise the appropriate Management on potential runway safety issues and to recommend mitigating measures.

(4) The Local Runway Safety Team may have the following tasks:

(i) Identification of potential runway safety issues;

(ii) Develop and run local awareness campaigns;

(iii) Assisting in verifying that communications between Air Traffic Controllers, Pilots and Vehicle Drivers are satisfactory; and

(iv) Make observations on a regular basis in different weather and light conditions to assess whether all markings and signage are adequate and understandable by all parties.

**GM3-ADR.OR.D.025 — Coordination with other relevant organisations**

OTHER ACTIVITIES

The certification of an aerodrome is based upon aviation activities that are required to use a certified aerodrome. However, many other activities take place on an aerodrome that do not require the aerodrome to be certified such as private flights, flying training, gliding, ground handling etc. The effect of these activities on those operations requiring the use of a certificated aerodrome should be considered by the aerodrome operator, with the aim of mitigating these risks wherever practicable. There should be actions of sharing the risks and agreeing the mitigation with all relevant aerodrome users to encourage integrated safety management and closer cooperation among all stakeholders.

**AMC1-ADR.OR.D.030(a) — Safety reporting system**

REPORTING SYSTEM

(a) An effective occurrence reporting system should include, apart from aerodrome operator's personnel, aircraft operators, ground handling service providers, air navigation service providers and any other organisation operating on the aerodrome or providing services at the aerodrome;

(b) The reporting system should include voluntary reporting possibilities intended for safety hazards identified by the reporter and that may have potential safety consequences;

(c) The aerodrome operator should identify which occurrences are mandatory to be reported;

(d) The aerodrome operator should provide the means and the format for the occurrence reporting, which should be such that meets the existing reporting requirements foreseen in the applicable legislation in terms of time, format and required information to be reported;

(e) The occurrence reporting system should include an acknowledgement to the reporter for the submission of the report;

(f) The reporting process should be as simple as possible and well documented, including details as to what, how, where, whom and when to report;

(g) Regardless of the source or method of submission, once the information is received, it should be stored in a manner suitable for easy retrieval and analysis;

(h) Access to the submitted reports should be restricted to persons responsible for storing and analysing them;

(i) Protection of the identity of the reporter should be ensured. This should be achieved by not recording any identifying information of the occurrence; and

(j) Occurrence reporting system should include a feedback system to the reporting person, on the outcome of the occurrence analysis.

### GM1-ADR.OR.D.030(a);(c);(d) — Safety reporting system

NEED FOR OCCURRENCE REPORTING

(a) The overall purpose of the occurrence reporting system is to use reported information to improve the level of safety performance of the aerodrome and not to attribute blame.

(b) The objectives of the occurrence reporting system should be:

  (1) to enable an assessment to be made of the safety implications of each relevant incident and accident, including previous similar occurrences, so that any necessary action can be initiated; and

  (2) to ensure that knowledge of relevant incidents and accidents is disseminated, so that other persons and organisations may learn from them.

### AMC2-ADR.OR.D.030(b);(c) — Safety reporting system

WILDLIFE MANAGEMENT REPORTING

The aerodrome operator should ensure that the reporting system specifically addresses the requirement for all third parties (aircraft operators, aircraft mechanics, air traffic controllers, etc) and all aerodrome personnel, to submit reports related to wildlife strikes and relevant identified hazards to the aerodrome operator.

The reporting of such third parties should be done irrespectively of any other requirements according to which they have to report to the competent authority of the aerodrome or the state of registry of the aircraft involved, or any other competent authority in the context of the national occurrence reporting programme.

**AMC1-ADR.OR.D.035 — Record keeping**

DOCUMENTATION TO BE RETAINED

(a) The system employed by the aerodrome operator for record-keeping should provide for adequate procedures, storage facilities, and reliable traceability of the records related to the activities of the aerodrome operator that are subject to the Basic Regulation and its Implementing Rules.

(b) Records should be kept in paper form or in electronic format or a combination of both. Records stored on microfilm or optical disc format are also acceptable. The records should remain legible throughout the required retention period. The retention period starts when the record has been created or last amended.

(c) Paper systems should use robust material which can withstand normal handling and filing.

(d) Computer systems should have at least one backup system which should be updated within 24 hours of any new entry. Computer systems should include safeguards against the ability of unauthorised personnel to alter the data.

(e) All computer hardware used to ensure data backup should be stored in a different location from that containing the working data and in an environment that ensures they remain in good condition. When hardware or software changes take place, special care should be taken that all necessary data continues to be accessible at least through the full retention period. In the absence of any indication, all records should be kept for a minimum period of five years.

**AMC 2 — ADR.OR.D.035 Record keeping**

RECORDING OF AIRCRAFT MOVEMENTS

(a) The aerodrome operator should employ a system to be used for recording the aircraft movements at the aerodrome.

(b) Such a system should allow the aerodrome operator to record:

  (1) the number of movements of each aircraft type using the aerodrome;

  (2) the type of each aircraft movement (commercial air transportation, cargo, etc.);

  (3) the date of each movement; and

  (4) the number of passengers.

(c) Such records should be kept for a minimum of 5 years..

(d) The system used should also satisfy paragraphs (b) to (f) of AMC1-ADR.OR.D.035.

**GM1-ADR.OR.D.035 — Record keeping**

GENERAL

Microfilming or optical storage of records may be carried out at any time. The records should be as legible as the original record and remain so for the required retention period.

## SUBPART E — AERODROME MANUAL (ADR.OR.E)

### AMC1-ADR.OR.E.005 — Aerodrome manual

GENERAL

(a) The aerodrome manual may vary in detail according to the complexity of the operation and of the type of the aerodrome.

(b) The aerodrome manual or parts of it may be presented in any form, including electronic form. In all cases, the accessibility, usability and reliability should be assured.

(c) The aerodrome manual should be such that:

  (1) all parts of the manual are consistent and compatible in form and content;

  (2) the manual can be readily amended; and

  (3) the content and amendment status of the manual is controlled and clearly indicated.

(d) The aerodrome manual should include a description of its amendment and revision process specifying:

  (1) the person(s) who may approve amendments or revisions;

  (2) the conditions for temporary revisions and/or immediate amendments or revision required in the interest of safety; and

  (3) the methods by which all personnel and organisations are advised of changes to the aerodrome manual.

(e) The aerodrome manual may contain parts of, or refer to other controlled documents, such as aerodrome equipment manual, which are available at the aerodrome for use by the personnel.

### AMC2-ADR.OR.E.005 — Aerodrome manual

The aerodrome manual should include at least the following information:

*'A. PART A — GENERAL*

*0. Administration and control of the aerodrome manual including the following:*

  *0.1. Introduction:*

    *0.1.1 a statement that the aerodrome manual complies with all applicable requirements;*

    *0.1.2 a statement that the aerodrome manual contains operational instructions that are to be complied with by the relevant personnel;*

    *0.1.3 a list and brief description of the various parts, their contents, applicability and use;*

    *0.1.4 explanations and definitions of terms needed for the use of the manual;*

  *0.2 System of amendment and revision:*

    *0.2.1 details of the person (s) responsible for the issuance and insertion of amendments and revisions;*

0.2.2 a record of amendments and revisions with insertion dates and effective dates;

0.2.3 a statement that handwritten amendments and revisions are not permitted, except in situations requiring immediate amendment or revision in the interest of safety;

0.2.4 a description of the system for the annotation of pages or paragraphs and their effective dates;

0.2.5 a list of effective pages or paragraphs;

0.2.6 annotation of changes;

0.2.7 temporary revisions; and

0.2.8 description of the distribution system for the aerodrome manual, its amendments and revisions.

1. General information

General information including the following:

1.1 purpose and scope of the aerodrome manual;

1.2 legal requirements for an aerodrome certificate and the aerodrome manual as prescribed in Part-ADR.OR;

1.3 conditions for use of the aerodrome by its users;

1.4 the obligations of the aerodrome operator; rights of the competent authority.

B. PART B — AERODROME ADMINISTRATION, MANAGEMENT SYSTEM, INCLUDING SAFETY, AND QUALITY AND SECURITY MANAGEMENT FOR AERONAUTICAL DATA AND AERONAUTICAL INFORMATION PROVISION ACTIVITIES

2. A description of the management system including the following:

2.1 Aerodrome organisation and responsibilities including the following: a description of the organisational structure, including the general organigramme and other departments' organigrammes. The organigramme should depict the relationship between the departments. Subordination and reporting lines of all levels of organisational structure (Departments, Sections etc) related to safety should be shown. Responsibilities and duties of management and nominated persons as well as other operational, maintenance personnel should be included.

2.2. A description of the safety management system, including:

2.2.1 scope of the safety management system;

2.2.2 safety policy and objectives;

2.2.3 safety responsibilities of key safety personnel;

2.2.4 documentation control procedures;

2.2.5 hazard identification and risk management schemes;

2.2.6 monitoring of implementation and effectiveness of safety actions and risk mitigation measures;

2.2.7 safety performance monitoring;

2.2.8 safety reporting and investigation;

*2.2.9 emergency response planning;*

*2.2.10 management of change (including organisational changes with regard to safety responsibilities); and*

*2.2.11 safety promotion.*

*2.3 A description of the compliance monitoring function and related procedures.*

*2.4 A description of quality and security management system for aeronautical data and aeronautical information provision activities and related procedures.*

*2.5 Procedures for reporting to the competent authority.*

*2.6 Policy and procedures related to use of alcohol and illicit or prescribed substances.*

*2.7 Procedures for complying with safety directives and reaction to safety problems.*

*2.8 A description of the method for recording aircraft movements.*

*3. Procedures related to training including the following:*

*3.1 training programme, including frequencies, syllabi and checking programmes for all personnel involved in the operation, maintenance and management of the aerodrome and those persons operating unescorted on the movement area and other operational areas of the aerodrome. Training syllabi and checking programmes should be developed in accordance with the requirements pertaining to their duties, as prescribed in Part-ADR.OPS.*

*3.2 procedures:*

*3.2.1 for training and checking;*

*3.2.2 to be applied in the event that personnel do not achieve or maintain the required standards.*

*3.3 description of documentation to be stored and storage periods.*

*C. PART C — PARTICULARS OF THE AERODROME SITE*

*4. A description of the aerodrome site including in particular, the following information:*

*4.1 a plan showing the distance of the aerodrome from the nearest city, town or other populous area;*

*4.2 detailed maps and charts of the aerodrome showing the aerodrome's location (longitude and latitude) and boundaries, major facilities, aerodrome reference point, layout of runways, taxiways and aprons, aerodrome visual and non-visual aids, and wind direction indicators;*

*4.3 a plan showing the location of any aerodrome facilities and equipment outside the boundaries of the aerodrome;*

*4.4 description of the physical characteristics of the aerodrome, elevations, visual and non-visual aids, as well as the information regarding the aerodrome reference temperature, strength of pavements, rescue and fire fighting level, ground aids and main obstacles;*

*4.5 description of any cases of exemptions or derogations, equivalent level of safety, special conditions and operating limitations.*

*4.6 description of the types of operations that the aerodrome is approved to conduct.*

*D. PART C — PARTICULARS OF THE AERODROME REQUIRED TO BE REPORTED TO THE AERONAUTICAL INFORMATION SERVICE*

*5. The aeronautical information services available and the procedures for the promulgation of general information, including the following:*

*5.1 the name of the aerodrome;*

*5.2 the location of the aerodrome;*

*5.3 the geographical coordinates of the aerodrome reference point determined in terms of the World Geodetic System — 1984 (WGS-84) reference datum;*

*5.4 the aerodrome elevation and geoid undulation;*

*5.5 the elevation of each threshold and geoid undulation, the elevation of the runway end and any significant high and low points along the runway, and the highest elevation of the touchdown zone of a precision approach runway;*

*5.6 the aerodrome reference temperature;*

*5.7 details of the aerodrome beacon; and*

*5.8 the name of the aerodrome operator and contact details of the aerodrome operator.*

*6. Aerodrome dimensions and related information, inducing the following:*

*6.1 runway — true bearing, designation number, length, width, displaced threshold location, slope, surface type, type of runway and, for a precision approach runway, the existence of an obstacle free zone;*

*6.2 length, width and surface type of strip, runway end safety areas, stopways; length, width and surface type of taxiways; apron surface type and aircraft stands; clearway length and ground profile;*

*6.3 visual aids for approach procedures, approach lighting type and visual approach slope indicator system; marking and lighting of runways, taxiways, and aprons; other visual guidance and control aids on taxiways and aprons, location and type of visual docking guidance system; availability of standby power for lighting;*

*6.4 the location and radio frequency of VOR aerodrome checkpoints;*

*6.5 the location and designation of standard taxi routes;*

*6.6 the geographical coordinates of each threshold, appropriate taxiway centre line points and aircraft stands;*

*6.7 the geographical coordinates and the top elevation of significant obstacles in the approach and take-off areas, in the circling area and in the vicinity of the aerodrome;*

*6.8 pavement surface type and bearing strength using the Aircraft Classification Number — Pavement Classification Number (ACN-PCN) method;*

*6.9 pre-flight altimeter check locations established and their elevation;*

*6.10 declared distances;*

*6.11 contact details and capability of with regard to the removal of disabled aircraft;*

*6.12 category of rescue and fire fighting; and*

*6.13 exemptions or derogations from the applicable requirements, cases of equivalent* *level of safety, special conditions and limitations.*

*E. PART D — PARTICULARS OF THE AERODROME OPERATING PROCEDURES AND SAFETY MEASURES*

*7. Aerodrome reporting, including:*

*7.1 arrangements for reporting any changes to the competent authority and recording the reporting of changes;*

*8. Procedures for accessing the aerodrome movement area, including:*

*8.1 coordination with the security agencies;*

*8.2 prevention of unauthorised entry into the movement area;*

*9. Aerodrome emergency plan including:*

*9.1 dealing with emergencies at the aerodrome or in its vicinity;*

*9.2 tests for aerodrome facilities and equipment to be used in emergencies, including their frequency;*

*9.3 exercises to test emergency plans, including their frequency.*

*10. Rescue and fire fighting, including:*

*10.2 description of facilities, equipment, personnel and procedures for meeting the fire fighting requirements.*

*11. Procedures for the inspection of the aerodrome movement area and obstacle limitation surfaces, including:*

*11.1 responsible personnel for runway friction characteristics assessments and water-depth measurements;*

*11.2 communicating with air traffic services during inspections;*

*11.3 inspection checklists, logbook and record keeping;*

*11.4 inspection intervals and times; reporting results and follow-up actions.*

*12. Procedures for the inspection and routine and emergency maintenance of visual aids and non-visual, as appropriate, and aerodrome electrical systems, including:*

*12.1 inspection checklists, logbook and record keeping;*

*12.2 inspection intervals and times; reporting results and follow-up actions.*

*13. Maintenance and repair instructions, servicing information, troubleshooting and inspection procedures of aerodrome equipment.*

*14. Procedures for maintenance of the movement area, including:*

*14.1 paved areas; unpaved runways and taxiways; runways and runway strips and aerodrome drainage.*

*15. Procedures for aerodrome works, including:*

*15.1 coordinating, planning and carrying out construction and maintenance work;*

*15.2 communicating with air traffic control during the progress of such work.*

*16. Procedures for apron management including:*

*16.1 transfer of the aircraft between air traffic control and the apron management unit;*

*16.2 allocation of aircraft parking positions;*

*16.3 engine start and aircraft push-back;*

*16.4 marshalling and follow-me service.*

*17. Procedures for apron safety management including:*

*17.1 protection from jet blasts;*

*17.2 enforcement of safety precautions during aircraft refuelling operations;*

*17.3 apron cleaning/sweeping;*

*17.4 monitoring compliance of personnel on the apron with safety procedures.*

*18. Procedures for the control of vehicles operating on or in the vicinity or the movement area, including traffic rules, speed limits, and method for issuing driving permits and enforcement means.*

*19. Procedures for wildlife hazard management, including assessing wildlife hazards and arrangements for implementation of wildlife control programme.*

*20. Procedures for obstacle control and monitoring within and outside of the aerodrome boundaries and notification to the competent authority.*

*21. Removal plan of disabled aircraft, relevant arrangements, equipment and procedures for its implementation~~.~~*

*22. Procedures for ensuring the safe handling and storage of fuel and dangerous goods in the aerodrome, including:*

*22.1 equipment, storage areas, delivery, dispensing and handling;*

*22.2 quality and correct specification of aviation fuel; audit and inspection intervals, record keeping.*

*23. Low visibility operations: description of operational procedures including coordination with Air Traffic Services, standard taxiing routes , control of activities and measurement and reporting of runway visual range.*

*24. Procedures for the winter operations.*

*25. Snow removal plan and procedures for its implementation, including a description of the available means and relevant arrangements.*

*26. Procedures for operations in adverse weather conditions.*

*27. Procedures for night operations.*

*28. Procedures for the protection of radar and other navigational aids, control of activities , and ground maintenance in the vicinity of these installations.*

*29. Procedures and measures for the prevention of fire at the aerodrome.'*

All procedures contained in the aerodrome manual should include and clearly define the roles, responsibilities and contact details of responsible aerodrome personnel, other persons or organisations, including the competent authority and other state agencies involved, as appropriate, and take into account the need for establishing direct communication during non-working hours.

## GM1-ADR.OR.E.010 — Aerodrome manual

FORM OF THE AERODROME MANUAL

The aerodrome manual is a key document both for the aerodrome operator and the competent authority. The manual is the source document describing how the aerodrome infrastructure, facilities and operational procedures will operate safely.

As well as the operational procedures, the competent authority will expect the aerodrome manual to be an accurate reflection of the day-to-day functioning of the aerodrome's safety management system and its safety culture. It will need to show how the aerodrome intends to measure its performance against safety targets and objectives. The reader of an aerodrome manual should be given a clear statement of how safety is developed, managed and maintained on the aerodrome. All safety policies, operational procedures and instructions should be contained in detail when relevant or cross-referenced to other formally accepted or recognised publications.

At larger aerodromes the size and complexity of operations and related procedures may dictate that these procedures could not easily be included in a single document. In such circumstances it is acceptable to identify and reference within the manual the procedures which are not included within it. If this system is to be successful it is essential that any referenced information, documentation and procedures are made available as necessary to all operational staff in a similar way as the aerodrome manual itself. For that purpose, a computerised database containing the referenced procedures and information could be suitable. For many small aerodromes, the manual can be both simple and brief as long as it covers procedures essential for satisfactory day-to-day operations. Nevertheless it is possible to adopt a common format embracing the essential elements that define a safety management system.

## GM2-ADR.OR.E.005 — Structure of the aerodrome manual

PURPOSE AND SCOPE OF THE AERODROME MANUAL

An efficient management structure and a systematic approach to aerodrome operation is essential. The aerodrome manual should contain all the relevant information to describe this structure satisfactorily. It is one of the means by which all aerodrome operating staff can be informed as to their duties and responsibilities with regard to safety. It should describe the aerodrome infrastructure, services and facilities, all operating procedures, and any restrictions on aerodrome availability.

Accountability for safety must start at the very top of any organisation. One of the key elements in establishing safe working practices is the 'top down' approach where all staff should understand the safety aims of the organisation, the chain of command, and their own responsibilities and accountabilities. As safety management principles are applied, the aerodrome manual should be expanded to describe clearly how the safety of operations is to be managed. To a reader or user of the aerodrome manual there should never be any doubt in terms of 'safety accountability' for each domain or activity described. Each section should define who is accountable, who is responsible, who has the authority, who has the expertise and who actually carries out the tasks described in any section.

The principle objective of an aerodrome manual should be to show how management will accomplish its safety responsibilities. The manual will set out the policy and expected standards of performance and the procedures by which they will be achieved.

The aerodrome operator should ensure that:

— the responsibilities of the aerodrome operator are clearly described;

— the tasks and activities that are to be done by the aerodrome operator or its subcontractors are listed;

— the means and procedures in order to complete these tasks and activities are described or appended, together with the necessary details on their frequencies and operating modes.

Where responsibilities are attributed to other stakeholders, the aerodrome manual should clearly identify them.

## AMC/GM to ANNEX III — Part Operations Requirements (Part-OPS)

## SUBPART A — AERODROME DATA (ADR.OPS.A)

### AMC-ADR-OPS.A.005 Aer onautical Data TXT ADD

(a) Data relevant to the aerodrome and available services should include, but may not be limited to, items in the following list:

(1) aerodrome reference point;

(2) aerodrome and runway elevations;

(3) aerodrome reference temperature;

(4) aerodrome dimensions and related information;

(5) strength of pavements;

(6) pre-flight altimeter check location;

(7) declared distances;

(8) condition of the movement area and related facilities;

(9) disabled aircraft removal;

(10) rescue and fire-fighting;

(11) visual approach slope indicator systems;

(b) The aerodrome operator should provide obstacles and terrain data within the boundary of the aerodrome (Area 3) and in the Terminal Control Area (Area 2) within the aerodrome boundary;

(c) The aerodrome operator should establish arrangements with the ANS providers and the competent authority for the provision of obstacles and terrain data in the Terminal Control Area (Area 2) outside of the aerodrome boundary;

### GM- ADR-OPS.A.005 — Aeronautical data

AERODROME REFERENCE POINT

(a) The aerodrome reference point is located near the initial or planned geometric centre of the aerodrome and normally remains where first established;

(b) The aerodrome reference point is reported to the AIS in degrees, minutes and seconds;

AERODROME AND RUNWAY ELEVATIONS

The following are measured and reported to the AIS:

(a) The aerodrome elevation and geoid undulation at the aerodrome elevation position to the accuracy of one-half metre or foot;

(b) For non-precision approaches, the elevation and geoid undulation of each threshold, the elevation of the runway end and any significant high and low points along the runway, to the accuracy of one-half metre or foot;

(c) For precision approach runway, the elevation and geoid undulation of the threshold, the elevation of the runway end and the highest elevation of the touchdown zone, to the accuracy of one-quarter metre or foot;

AERODROME REFERENCE TEMPERATURE

(a) The aerodrome reference temperature is determined in degrees Celsius;

(b) The aerodrome reference temperature is the monthly mean of the daily maximum temperatures for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature), averaged over a period of years;

AERODROME DIMENSIONS AND RELATED INFORMATION

The following data are measured or described, as appropriate, for each facility provided on the aerodrome:

(a) Runway:

(1) true bearing to one-hundredth of a degree;

(2) designation number;

(3) length;

(4) width;

(5) displaced threshold location to the nearest metre or foot;

(6) slope;

(7) surface type;

(8) type of runway, and

(9) for a precision approach runway category I, the existence of an obstacle free zone when provided;

(b) Strip/Runway End Safety Area/Stopway

(1) Length and width to the nearest metre or foot;

(2) Surface type;

(c) Taxiway

(1) Designation;

(2) Width;

(3) Surface type;

(d) Apron

(1) Surface type;

(2) Aircraft stands;

(e) the boundaries of the air traffic control service;

(f) clearway:

(1) length to the nearest metre or foot;

(2) ground profile;

(g) visual aids for approach procedures, marking and lighting of runways, taxiways and aprons, other visual guidance and control aids on taxiways and aprons, including taxi-holding positions and stopbars, and location and type of visual docking guidance systems;

(h) location and radio frequency of any VOR aerodrome checkpoint;

(i) location and designation of standard taxi-routes; and

(j) distances to the nearest metre or foot of localiser and glide path elements comprising an instrument landing system (ILS) or azimuth and elevation antenna of a microwave landing system (MLS) in relation to the associated runway extremities.

(k) The geographical coordinates of:

(1) each threshold;

(2) appropriate taxiway centre line points; and

(3) each aircraft stand;

are measured and reported to the AIS in degrees, minutes, seconds and hundredths of seconds.

STRENGTH OF PAVEMENTS

(a) The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5 700 kg is made available using the aircraft classification — pavement classification number (ACN–PCN) method, by reporting all of the following information:

(1) the pavement classification number (PCN);

(2) pavement type for ACN-PCN determination;

(3) subgrade strength category;

(4) maximum allowable tire pressure category or maximum allowable tire pressure value; and

(5) evaluation method;

(b) Information on pavement type for ACN-PCN determination, subgrade strength category, maximum allowable tire pressure category and evaluation method, is reported using the following codes:

(1) Pavement type for ACN-PCN determination:

(i) Rigid pavement: Code R;

(ii) Flexible pavement: Code F;

(2) Subgrade strength category:

(i) High strength: characterized by K = 150 $MN/m^3$ and representing all K values above 120 $MN/m^3$ for rigid pavements, and by CBR = 15 and representing all CBR values above 13 for flexible pavements — Code A;

(ii) Medium strength: characterised by K = 80 $MN/m^3$ and representing a range in K of 60 to 120 $MN/m^3$ for rigid pavements, and by CBR = 10 and representing a range in CBR of 8 to 13 for flexible pavements — Code B;

(iii) Low strength: characterized by K = 40 MN/m3 and representing a range in K of 25 to 60 MN/m3 for rigid pavements, and by CBR = 6 and representing a range in CBR of 4 to 8 for flexible pavements — Code C;

(iv) Ultra low strength: characterized by K = 20 MN/m3 and representing all K values below 25 MN/m3 for rigid pavements, and by CBR = 3 and representing all CBR values below 4 for flexible pavements — Code D;

(3) Maximum allowable tire pressure category:

(i) Unlimited: no pressure limit — Code W;

(ii) High: pressure limited to 1.75 MPa — Code X;

(iii) Medium: pressure limited to 1.25 MPa — Code Y;

(iv) Low: pressure limited to 0.50 MPa — Code Z;

(4) Evaluation method:

(i) Technical evaluation: representing a specific study of the pavement characteristics and application of pavement behaviour technology — Code T;

(ii) Using aircraft experience: representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use — Code U;

(c) The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5 700 kg, is reported by giving the following information:

(1) maximum allowable aircraft mass; and

(2) maximum allowable tire pressure.

PRE-FLIGHT ALTIMETER CHECK LOCATION

(a) One or more pre-flight altimeter check locations may be established;

(b) The elevation of a pre-flight altimeter check location is given as the average elevation, rounded to the nearest metre or foot, of the area which is located. The elevation of any portion of a pre-flight altimeter check location may be within 3 m (10 ft) of the average elevation for that location;

(c) Pre-flight check location may be located on an apron. Locating a pre-flight altimeter check location on an apron enables an altimeter check to be made prior to obtaining taxi clearance and eliminates the need for stopping for that purpose after leaving the apron. Normally an entire apron can serve as a satisfactory altimeter check location.

DECLARED DISTANCES

(a) The following distances are calculated to the nearest metre or foot for a runway and reported to the AIS and ANSP:

(1) Take-off run available (TORA);

(2) Take-off distance available (TODA);

(3) Accelerate stop distance available (ASDA);

(4) Landing distance available (LDA).

(b) The take-off run available (TORA), take-off distance available (TODA), accelerate stop distance available (ASDA) and landing distance available (LDA) are calculated according to the following:

(1) Where a runway is not provided with a stopway or a clearway and the threshold is located at the extremity of the runway, the four declared distances should normally be equal to the length of the runway

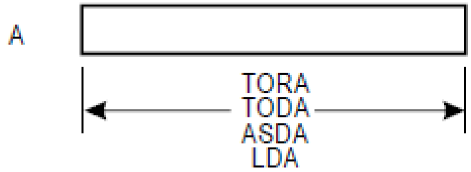



Figure 1

(2) When a runway is provided with a clearway (CWY), then the TODA will include the length of clearway

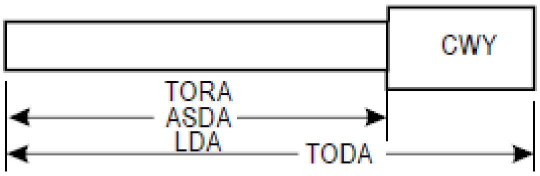



Figure 2

(3) Where a runway is provided with a stopway (SWY), then the ASDA will include the length of stopway

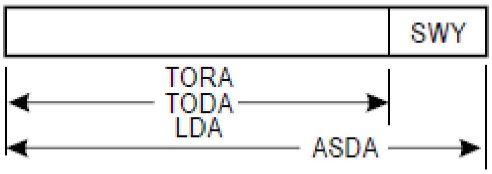



Figure 3

(4) Where a runway has a displaced threshold, then the LDA will be reduced by the distance the threshold is displaced. A displaced threshold affects only the LDA for approaches made to that threshold; all declared distances for operations in the reciprocal direction are unaffected

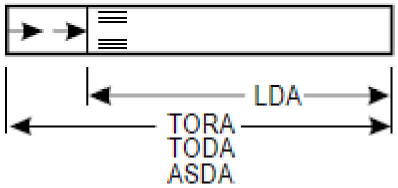



Figure 4

(5) Where a runway is provided with more than one of the clearway, stopway or having a displaced threshold, then more than one of the declared distances will be modified. The modification will follow the same principle as in (1)–(4)

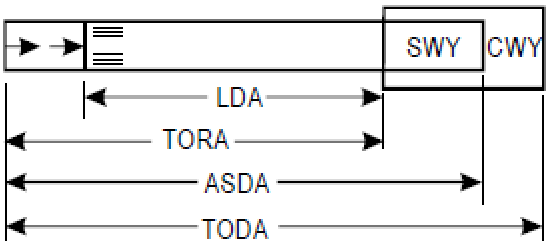



Figure 5

(c) The information on declared distances may be provided according to the following table:

| RUNWAY | TORA | ASDA | TODA | LDA |
|---|---|---|---|---|
| | m | m | m | m |
| 09 | 2 000 | 2 300 | 2 580 | 1 850 |
| 27 | 2 000 | 2 350 | 2 350 | 2 000 |
| 17 | NU | NU | NU | 1 800 |
| 35 | 1 800 | 1 800 | 1 800 | NU |

Table 1

If a runway direction cannot be used for take-off or landing, or both, because it is operationally forbidden, then this should be declared and the words 'not usable' or the abbreviation 'NU' entered.

CONDITION OF THE MOVEMENT AREA AND RELATED FACILITIES

(a) The condition of the movement area and the operational status of related facilities is monitored and report is made on matters of operational significance or affecting aircraft performance, particularly in respect of the following:

(1) construction or maintenance work;

(2) rough or broken surfaces on a runway, a taxiway or an apron;

(3) snow, slush, ice, wet ice, wet snow on ice or frost on a runway, a taxiway or an apron;

(4) water on a runway, a taxiway or an apron;

(5) snow banks or drifts adjacent to a runway, a taxiway or an apron;

(6) anti-icing or de-icing liquid chemicals or other contaminants on a runway, a taxiway or apron;

(7) other temporary hazards, including parked aircraft;

(8) failure or irregular operation of part or all of the aerodrome visual aids; and

(9) failure of the normal or secondary power supply.

Water on a runway

(b) Whenever water is present on a runway and a report of the runway surface conditions is made, the following terms are used:

(1) Wet — the surface is soaked but there is no standing water;

(2) STANDING WATER — for aeroplane performance purposes, a runway where more than 25 % of the runway surface area (whether in isolated areas or not) within the required length and width being used is covered by water more than 3 mm deep;

(c) Information that a runway or portion thereof maybe slippery when wet is made available to the aerodrome users.

Snow, slush or ice on a runway

(a) Runway surface condition is assessed and reported whenever an operational runway is contaminated by snow, slush, ice or frost;

(b) The following terms are used to describe the runway surface condition whenever snow, slush, ice or frost is present and reported:

(1) Dry snow;

(2) Wet snow;

(3) Compacted snow;

(4) Wet compacted snow;

(5) Slush;

(6) Ice;

(7) Wet ice;

(8) Frost;

(9) Dry snow on ice;

(10) Wet snow on ice;

(11) Chemically treated;

(12) Sanded;

and include, where applicable, the assessment of contaminant depth;

(c) The contaminant type, distribution and for loose contaminants, depth for each third of the runway, is assessed;

(d) Runway surface friction measurements are used to conduct runway condition assessment. Runway surface friction measurements made on a runway that is contaminated by slush, wet snow or wet ice should not be reported;

(e) Assessment of the friction of a runway is made in descriptive terms of 'estimated' surface friction. The estimated surface friction should be categorised as good, medium to good, medium, medium to poor, and poor and promulgated in SNOWTAM format as well as using appropriate ATC phraseologies;

(f) The estimated surface friction, based on the measured coefficient, when the runway is covered by compacted snow or ice only is reported according to the following table (indicative):

| Measured Coefficient (μ) | Estimated Surface Friction | Code |
|---|---|---|
| 0.40 and above | Good | 5 |
| 0.39 to 0.36 | Medium to good | 4 |
| 0.35 to 0.30 | Medium | 3 |
| 0.29 to 0.26 | Medium to poor | 2 |
| 0.25 and below | Poor | 1 |

Table 2

(g) Assessed surface condition information, including estimated surface friction, is reported for each third of a runway. The thirds are called A, B and C;

(1) For the purpose of reporting information to aeronautical service units, Section A should always be the section associated with the lower runway designation number;

(2) When giving landing information to a pilot before landing, the sections should be referred to as first, second or third part of the runway. The first part should always mean the first third of the runway as seen in the direction of landing;

(3) Assessments are made along two lines parallel to the runway, i.e. along a line on each side of the centreline approximately 3 m, or that distance from the centreline at which most operations take place;

(4) In cases where a continuous friction measuring device is used, the mean values are obtained from the friction values recorded for each section;

(5) In cases where a spot measuring friction measuring device is used as part of the total assessment of the estimated surface friction, each third of the runway should have three tests carried out on it, where achievable;

(h) Whenever dry snow, wet snow or slush is present on a runway, the mean depth over each third of the runway is assessed to an accuracy of approximately 2 cm for dry snow, 1 cm for wet snow and 0.3 cm for slush.

DISABLED AIRCRAFT REMOVAL

(a) The contact details (telephone/telex number(s), email address, etc.) of the office of the aerodrome coordinator of operations for the removal of an aircraft disabled on or adjacent to the movement area is made available on request to aircraft operators;

(b) Information concerning the capability to remove an aircraft disabled on or adjacent to the movement area is made available;

(c) The capability to remove a disabled aircraft may be expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove.

RESCUE AND FIRE-FIGHTING

(a) Information concerning the level of protection provided at an aerodrome for aircraft rescue and fire-fighting purposes is made available;

(b) The level of protection normally available at the aerodrome is expressed in terms of the category of the rescue and fire-fighting services and in accordance with the types and amounts of extinguishing agents normally available at the aerodrome;

(c) Changes in the level of protection normally available at the aerodrome for rescue and fire-fighting is notified to the appropriate air traffic services units and aeronautical information services units to enable those units to provide the necessary information to arriving and departing aircraft. When such a change has been corrected, the above units are advised accordingly;

(d) A change in the level of protection is expressed in terms of the new category of the rescue and fire-fighting services available at the aerodrome.

VISUAL APPROACH SLOPE INDICATOR SYSTEMS

The following information concerning a visual approach indicator system is made available:

(a) associated runway designation number;

(b) Type of system. For an AT-VASIS, PAPI or APAPI installation, the side of the runway on which the lights are installed, i.e. left or right, is given;

(c) where the axis of the system is not parallel to the runway centre line, the angle of displacement and the direction of displacement, i.e. left or right, is indicated;

(d) nominal approach slope angle(s); and

(e) minimum eye height(s) over the threshold of the on-slope signal(s).

**AMC-ADR-OPS.A.010 — Data quality requirements** *TXT*

(a) Aeronautical data integrity requirements should be based upon the potential risk resulting from the corruption of data and upon the use to which the data item is put. Consequently, the following classifications and data integrity levels should apply:

(1) critical data, integrity level $1 \times 10^{-8}$: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;

(2) essential data, integrity level $1 \times 10^{-5}$: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and

(3) routine data, integrity level $1 \times 10^{-3}$: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

(b) The aerodrome operator should determine and report aerodrome-related aeronautical data in accordance with the accuracy and integrity requirements set in the following tables:

**Table 3. Latitude and longitude**

| Latitude and longitude | Accuracy Data Type | Integrity Classification |
|---|---|---|
| Aerodrome reference point | 30 m<br>surveyed/calculated | $1x10^{-3}$<br>routine |
| Navaids located at the aerodrome | 3 m<br>surveyed | $1x10^{-5}$<br>essential |
| Obstacles in Area 3 | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| Obstacles in Area 2 (the part within the aerodrome boundary) | 5 m<br>surveyed | $1x10^{-5}$<br>essential |
| Runway thresholds | 1 m<br>surveyed | $1x10^{-8}$<br>critical |
| Runway end (flight path alignment point) | 1 m<br>surveyed | $1x10^{-8}$<br>critical |
| Runway centre line points | 1 m | $1x10^{-8}$ |

| | | |
|---|---|---|
| | surveyed | critical |
| Runway-holding position | 0.5 m<br>surveyed | $1x10^{-8}$<br>critical |
| Taxiway centre line/parking guidance line points | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| Taxiway intersection marking line | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| Exit guidance line | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| Apron boundaries (polygon) | 1 m<br>surveyed | $1x10^{-3}$<br>Routine |
| De-icing/anti-icing facility (polygon) | 1 m<br>surveyed | $1x10^{-3}$<br>Routine |
| Aircraft stand points/INS checkpoints | 0.5 m<br>surveyed | $1x10^{-3}$<br>Routine |

| **Table 4. Elevation/altitude/height** | | |
|---|---|---|
| Elevation/altitude/height | Accuracy data type | Integrity classification |
| Aerodrome elevation | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| WGS-84 geoid undulation at aerodrome elevation position | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| Runway threshold, non-precision approaches | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| WGS-84 geoid undulation at runway threshold, non-precision approaches | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| Runway threshold, precision approaches | 0.25 m<br>surveyed | $1x10^{-8}$<br>critical |
| WGS-84 geoid undulation at runway threshold, precision approaches | 0.25 m<br>surveyed | $1x10^{-8}$<br>critical |
| Runway centre line points | 0.25 m<br>surveyed | $1x10^{-8}$<br>critical |
| Taxiway centre line/parking guidance line points | 1 m<br>surveyed | $1x10^{-5}$<br>essential |

| | | |
|---|---|---|
| Obstacles in Area 2 (the part within the aerodrome boundary) | 3 m<br>surveyed | $1x10^{-5}$<br>essential |
| Obstacles in Area 3 | 0.5 m<br>surveyed | $1x10^{-5}$<br>essential |
| Distance measuring equipment/precision (DME/P) | 3 m<br>surveyed | $1x10^{-5}$<br>essential |

| **Table 5. Declination and magnetic variation** | | |
|---|---|---|
| Declination/variation | Accuracy data type | Integrity classification |
| Aerodrome magnetic variation | 1 degree<br>surveyed | $1x10^{-5}$<br>essential |
| ILS localizer antenna magnetic variation | 1 degree<br>surveyed | $1x10^{-5}$<br>essential |
| MLS azimuth antenna magnetic variation | 1 degree<br>surveyed | $1x10^{-5}$<br>essential |

| **Table 6. Bearing** | | |
|---|---|---|
| Bearing | Accuracy data type | Integrity classification |
| ILS localizer alignment | 1/100 degree<br>surveyed | $1x10^{-5}$<br>essential |
| MLS zero azimuth alignment | 1/100 degree<br>surveyed | $1x10^{-5}$<br>essential |
| Runway bearing (True) | 1/100 degree<br>surveyed | $1x10^{-3}$<br>routine |

| **Table 7. Length/distance/dimension** | | |
|---|---|---|
| Length/distance/dimension | Accuracy data type | Integrity classification |
| Runway length | 1 m<br>surveyed | $1x10^{-8}$<br>critical |
| Runway width | 1 m<br>surveyed | $1x10^{-5}$<br>essential |
| Displaced threshold distance | 1 m<br>surveyed | $1x10^{-3}$<br>routine |
| Stopway length and width | 1 m<br>surveyed | $1x10^{-8}$<br>critical |
| Clearway length and width | 1 m<br>surveyed | $1x10^{-5}$<br>essential |
| Landing distance available | 1 m<br>surveyed | $1x10^{-8}$<br>critical |

| | | |
|---|---|---|
| Take-off run available | 1 m<br>surveyed | $1x10^{-8}$<br>critical |
| Take-off distance available | 1 m<br>surveyed | $1x10^{-8}$<br>critical |
| Accelerate-stop distance available | 1 m<br>surveyed | $1x10^{-8}$<br>critical |
| Runway shoulder width | 1 m<br>surveyed | $1x10^{-5}$<br>essential |
| Taxiway width | 1 m<br>surveyed | $1x10^{-5}$<br>essential |
| Taxiway shoulder width | 1 m<br>surveyed | $1x10^{-5}$<br>essential |
| ILS localizer antenna-runway end, distance | 3 m<br>calculated | $1x10^{-3}$<br>routine |
| ILS glide slope antenna-threshold, distance along centre line | 3 m<br>calculated | $1x10^{-3}$<br>routine |
| ILS marker-threshold distance | 3 m<br>calculated | $1x10^{-5}$<br>essential |
| ILS DME antenna-threshold, distance along centre line | 3 m<br>calculated | $1x10^{-5}$<br>essential |
| MLS azimuth antenna-runway end, distance | 3 m<br>calculated | $1x10^{-3}$<br>routine |
| MLS elevation antenna-threshold, distance along centre line | 3 m<br>calculated | $1x10^{-3}$<br>routine |
| MLS DME/P antenna-threshold, distance along centre line | 3 m<br>calculated | $1x10^{-5}$<br>essential |

(c) Accuracy requirements for aeronautical data should be based upon a 95 % confidence level and in that respect, three types of positional data should be identified: surveyed points (e.g. runway threshold), calculated points (mathematical calculations from the known surveyed points of points in space, fixes) and declared points (e.g. flight information region boundary points);

(d) Geographical coordinates indicating latitude and longitude should be determined and reported to the aeronautical information services in terms of the World Geodetic System — 1984 (WGS-84) geodetic reference datum, identifying those geographical coordinates which have been transformed into WGS-84 coordinates by mathematical means and whose accuracy of original field work does not meet the requirements in Table 3;

(e) The order of accuracy of the field work should be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as indicated in the Tables 3–7;

(f) In addition to the elevation (referenced to mean sea level) of the specific surveyed ground positions at aerodromes, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions as indicated in Tables 3–7 should be determined and reported to the aeronautical information services authority;

(g) Protection of electronic aeronautical data while stored or in transit should be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity level of critical and essential aeronautical data as classified in (a)(1) and (a)(2) above, a 32 or 24-bit CRC algorithm should apply respectively;

(h) To achieve protection of the integrity level of routine aeronautical data as classified in (a)(3) above, a 16-bit CRC algorithm should apply;

(i) The aerodrome operator should implement the procedures to:

   (1) monitor data relevant to the aerodrome and available services originating from the aerodrome operator and promulgated by the relevant ANS providers;

   (2) notify the relevant AIS and ANS providers of any changes necessary to ensure correct and complete data relevant to the aerodrome and available services.

**AMC-ADR-OPS.A.015 — Co ordination be tween Ae ronautical Information Ser vices Providers, ANSPs and Aerodrome Operators** *TXT REV*

(a) The aerodrome operator should report on matters of operational significance or affecting aircraft and aerodrome operations in order to take appropriate action, particularly in respect of the following:

   (1) construction or maintenance work;

   (2) rough or broken surfaces on a runway, a taxiway or an apron;

   (3) snow, slush, ice, wet ice, wet snow on ice or frost on a runway, a taxiway or an apron;

   (4) water on a runway, a taxiway or an apron;

   (5) snow banks or drifts adjacent to a runway, a taxiway or an apron;

   (6) anti-icing or de-icing liquid chemicals or other contaminants on a runway, a taxiway or an apron;

   (7) other temporary hazards, including parked aircraft;

   (8) failure or irregular operation of part or all of the aerodrome visual aids; and

   (9) failure of the normal or secondary power supply;

   (10) changes to the disabled aircraft removal;

(11) changes to visual approach slope indicator system.

(b) The aerodrome operator should notify the changes in the level of protection normally available at an aerodrome for rescue and fire-fighting to the appropriate ANSPs and aeronautical information services providers to enable them to provide the necessary information to arriving and departing aircraft. When such a change has been corrected, the above units shall be advised accordingly;

(c) The aerodrome operator should observe the predetermined, internationally agreed AIRAC effective dates in addition to 14 days postage time when submitting the raw information/data to aeronautical information services that affect charts and/or computer-based navigation systems which qualify to be notified by the aeronautical information regulation and control (AIRAC) system.

## SUBPART B — AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATIONS

### AMC1-ADR-OPS.B.005 — Aerodrome Emergency Planning *TXT*

(a) The aerodrome emergency plan of the operator should observe human factors principles to ensure optimum response in emergency operations;

(b) The aerodrome operator should ensure the plan includes the ready availability of, and coordination with, appropriate specialist rescue services to be able to respond to emergencies where an aerodrome is located close to water and/or swampy areas and where a significant portion of approach or departure operations takes place over these areas.

### AMC2-ADR-OPS.B.005 — Aerodrome Emergency Plan Document *TXT REV*

(a) The aerodrome operator should include at least the following in the aerodrome emergency plan document:

(1) Types of emergencies planned for;

(2) Agencies involved in the plan;

(3) Responsibility and role of each agency, the emergency operations centre and the command post for each type of emergency;

(4) Information on names and telephone numbers of offices or people to be contacted in the case of a particular emergency; and

(5) A grid map of the aerodrome and its immediate vicinity.

### AMC3-ADR-OPS.B.005 — Aerodrome emergency exercise *TXT REV*

The aerodrome operator should ensure that the emergency plan is tested by conducting:

(a) a full-scale aerodrome emergency exercise at intervals not exceeding two years; and

(b) partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected;

and reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency; (we have to check with R1 responses to SL).

### GM1-ADR-OPS.B.005 — Purpose of the Aerodrome Emergency Plan

(a) The purpose of the aerodrome emergency plan is to ensure that there is:

(1) orderly and efficient transition from normal to emergency operations;

(2) delegation of airport emergency authority;

(3) assignment of emergency responsibilities;

(4) authorisation by key personnel for actions contained in the plan;

(5) co-ordination of efforts to cope with the emergency; and

(6) safe continuation of aircraft operations or return to normal operations as soon as possible.

**GM2-ADR-OPS.B.005 — Coordination with other agencies**

(a) The aerodrome emergency plan establishes the procedures for coordinating the response of different aerodrome agencies (or services) and those agencies in the surrounding community that could be of assistance in responding to an emergency;

(b) Coordination of the aerodrome emergency plan with the surrounding community is required;

(c) Emergency mutual aid agreements are necessary to define responsibilities and/or liabilities of each contributing party with surrounding communities. These agreements could include the following:

(1) clarification of the political and jurisdictional responsibilities of the several agencies that may be involved in order to avoid problems when an emergency occurs;

(2) establishment of the command authority; i.e. a single on-scene commander (with designated alternates if necessary);

(3) designation of communication priorities at the accident site;

(4) organisation of emergency transportation facilities under a pre-designated coordinator(s);

(5) predetermination of the legal authorities and liabilities of all cooperating emergency personnel; and

(6) prearrangements for use of portable and heavy rescue equipment from available sources.

(d) The aerodrome emergency plan is implemented similarly whether it is an on-airport or an off-airport aircraft accident/incident.

**GM3-ADR-OPS.B.005 — Command during emergencies**

(a) In an on-airport aircraft accident/incident the aerodrome operator is normally in command;

(b) In an off-airport aircraft accident/incident, the agency in command will be the agency agreed upon in the mutual aid emergency agreement between the aerodrome operator and the surrounding community.

(c) When an aircraft accident/incident occurs just outside the aerodrome perimeter, the jurisdictional responsibility will be as agreed upon in the mutual aid emergency agreement between the aerodrome operator and the surrounding community. This, however, should not affect the immediate response by aerodrome personnel or by agencies having roles in the aerodrome emergency plan.

**GM4-ADR-OPS.B.005 — Aerodrome Emergency Plan Document**

(a) The aerodrome emergency plan document, may include the following:

(1) plans for dealing with emergencies occurring at the aerodrome or in its vicinity, including the malfunction of aircraft in flight; structural fires; sabotage, including bomb threats (aircraft or structure); unlawful seizure of aircraft; and incidents on the airport covering 'during the emergency' and 'after the emergency' considerations;

(2) details of tests for aerodrome facilities and equipment to be used in emergencies, including the frequency of those tests;

(3) details of exercises to test emergency plans, including the frequency of those exercises;

(4) a list of organisations, agencies and persons of authority, both on and off-airport, for site roles; their telephone and facsimile numbers, e-mail and SITA addresses and the radio frequencies of their offices;

(5) the establishment of an aerodrome emergency committee to organize training and other preparations for dealing with emergencies; and

(6) the appointment of an on-scene commander for the overall emergency operation.

**GM5-ADR-OPS.B.005 — Contents of an Aerodrome Emergency Plan Document**

(a) The structure of the aerodrome emergency plan may be as follows:

**Section 1 — Emergency telephone numbers**

This section is limited to essential telephone numbers according to the aerodrome needs, including:

(1) air traffic services;

(2) rescue and fire-fighting services (fire departments);

(3) police and security;

(4) medical services:

(i) hospitals;

(ii) ambulances; and

(iii) doctors — business/residence;

(5) aircraft operators;

(6) ground handling agencies;

(7) government authorities;

(8) civil defence; and

(9) others.

**Section 2 — Aircraft accident on the airport**

(1) action by air traffic services (airport control tower or airport flight information service);

(2) action by rescue and fire-fighting services;

(3) action by police and security services;

(4) action by the aerodrome operator:

  (i) vehicle escort; and

  (ii) maintenance;

(5) action by medical services:

  (i) hospitals;

  (ii) ambulances;

  (iii) doctors; and

  (iv) medical personnel.

(6) action by aircraft operator involved;

(7) action by emergency operations centre and mobile command post;

(8) action by government authorities;

(9) communication network (emergency operations centre and mobile command post);

(10) action by agencies involved in mutual aid emergency agreements;

(11) action by transportation authorities (land, sea, air);

(12) action by public information officer(s);

(13) action by local fire departments when structures involved; and

(14) action by all other agencies.

**Section 3 — Aircraft accident off the airport**

(1) action by air traffic services (airport control tower or airport flight information service);

(2) action by rescue and fire-fighting services;

(3) action by local fire departments;

(4) action by police and security services;

(5) action by aerodrome operator;

(6) action by medical services;

   (i) hospitals;

   (ii) ambulances;

   (iii) doctors; and

   (iv) medical personnel.

(7) action by agencies involved in mutual aid emergency agreements;

(8) action by aircraft operator involved;

(9) action by emergency operations centre and mobile command post;

(10) action by government authorities;

(11) action by communication networks (emergency operations centre and mobile command post);

(12) action by transportation authorities (land, sea, air);

(13) action by public information officer; and

(14) action by all other agencies.

**Section 4 — Malfunction of aircraft in flight (Full emergency or local standby)**

(1) action by air traffic services (airport control tower or flight information service);

(2) action by airport rescue and fire-fighting services;

(3) action by police and security services;

(4) action by the aerodrome operator;

(5) action by medical services:

   (i) hospitals;

   (ii) ambulances;

   (iii) doctors; and

   (iv) medical personnel.

(6) action by aircraft operator involved;

(7) action by emergency operations centre and mobile command post; and

(8) action by all other agencies.

**Section 5 — Structural fires**

(1) action by air traffic services (airport control tower or airport flight information service);

(2) action by rescue and fire-fighting services (local fire department);

(3) action by police and security services;

(4) action by airport authority;

(5) evacuation of structure;

(6) action by medical services:

   (i) hospitals;

   (ii) ambulances;

   (iii) doctors; and

   (iv) medical personnel.

(7) action by emergency operations centre and mobile command post;

(8) action by public information officer; and

(9) action by all other agencies.

**Section 6 — Sabotage including bomb threat (aircraft or structure)**

(1) action by air traffic services (airport control tower or airport flight information service);

(2) action by emergency operations centre and mobile command post;

(3) action by police and security services;

(4) action by the aerodrome operator;

(5) action by rescue and fire-fighting services;

(6) action by medical services:

   (i) hospitals;

   (ii) ambulances;

   (iii) doctors; and

   (iv) medical personnel.

(7) action by aircraft operator involved;

(8) action by government authorities;

(9) isolated aircraft parking position;

(10) evacuation;

(11) searches by dogs and trained personnel;

(12) handling and identification of luggage and cargo on board aircraft;

(13) handling and disposal of suspected bomb;

(14) action by public information officer; and

(15) action by all other agencies.

**Section 7 — Unlawful seizure of aircraft**

(1) action by air traffic services (airport control tower or airport flight information service);

(2) action by rescue and fire-fighting services;

(3) action by police and security services;

(4) action by the aerodrome operator;

(5) action by medical services;

(i) hospitals;

(ii) ambulances;

(iii) doctors; and

(iv) medical personnel.

(6) action by aircraft operator involved;

(7) action by government authorities;

(8) action by emergency operations centre and mobile command post;

(9) isolated aircraft parking position;

(10) action by public information officer; and

(11) action by all other agencies.

**Section 8 — Incident on the airport**

An incident on the airport may require any or all of the actions detailed in Section 2, 'Aircraft accident on the airport'. Examples of incidents the airport authority should consider include fuel spills at the ramp, passenger loading bridge, and fuel storage area; dangerous goods occurrences at freight handling areas; collapse of structures; vehicle/aircraft collisions; etc.

**Section 9 — Persons of authority - site roles**

To include but not limited to the following according to local requirements:

(1) On-airport:

(i) Aerodrome chief fire officer;

(ii) Airport authority;

(iii) Police and security — Officer-in-charge; and

(iv) Medical coordinator.

(2) Off-airport:

(i) Local chief fire officer;

(ii) Government authority; and

(iii) Police and security — officer-in-charge.

The on-scene commander will be designated as required from within the pre-arranged mutual aid emergency agreement.

### GM6-ADR-OPS.B.005 — Types of Emergencies

(a) At least the following types of emergencies may be included in the aerodrome emergency plan:

(1) Aircraft emergencies;

(2) Sabotage including bomb threats;

(3) Unlawfully seized aircraft;

(4) Dangerous goods occurrences;

(5) Building fires;

(6) Natural disasters; and

(7) Public health emergencies;

(b) The aircraft emergencies for which services may be required are generally classified as:

(1) 'aircraft accident': an aircraft accident which has occurred on or in the vicinity of the airport;

(2) 'full emergency': an aircraft approaching the airport is, or is suspected to be, in such trouble that there is imminent danger of an accident; and

(3) 'local standby': an aircraft approaching the airport is known or is suspected to have developed some defect, but the trouble is not such as would normally involve any serious difficulty in effecting a safe landing.

### GM7-ADR-OPS.B.005 — Involved Agencies in Emergencies

(a) The following agencies should participate in response to an emergency:

(1) On the aerodrome:

(i) Air Traffic Control Unit;

(ii) Rescue and fire-fighting services;

(iii) Aerodrome administration;

(iv) Medical and ambulance services;

(v) Aircraft operators;

(vi) Ground handling agencies;

(vii) Security services; and

(viii) Police.

(2) Off the aerodrome:

(i) Fire departments;

(ii) Police;

(iii) Health authorities (including medical, ambulance, hospital and public health services);

(iv) Military; and

(v) Harbour or coast guard, if applicable.

**GM8-ADR-OPS.B.005 — Emergency Operations Centre**

(a) An emergency operations centre and a command post could be available for use during an emergency;

(b) The emergency operations centre may be a part of the aerodrome facilities and responsible for the overall coordination and general direction of the response to an emergency;

(c) The command post is a facility capable of being moved rapidly to the site of an emergency, when required, and undertakes the local coordination of those agencies responding to the emergency;

(d) A person may be assigned to assume control of the emergency operations centre and, when appropriate, another person the command post;

(e) The role of the emergency operations centre is to support the on-scene commander in the mobile command post for aircraft accidents/incidents;

(f) The emergency operations centre could be the command, co-ordination and communication centre for unlawful seizure of aircraft and bomb threats;

(g) The emergency operations centre may be operationally available 24 hours a day;

(h) The efficiency of the emergency operations centre could be enhanced by establishing it at location having a clear view of the movement area and isolated aircraft parking position, wherever possible;

(i) The emergency operations centre is necessary to have adequate equipment and personnel to communicate with the appropriate agencies involved in the emergency, including the mobile post, when this is deployed. The communication and electronic devices may be checked daily.

**GM9-ADR-OPS.B.005 — Mobile Command Post**

(a) The mobile command post contains the necessary equipment and personnel to communicate with all agencies involved in the emergency, including the emergency operations centre. The communication and electronic devices may be checked each month.

(b) Maps, charts, and other relevant equipment and information needs to be available at the mobile command post.

**GM10 — ADR-OPS.B.005 — Communication System**

(a) Adequate communication systems linking the command post and the emergency operations centre with each other and with the participating agencies may be provided in accordance with the plan and consistent with the particular requirements of the aerodrome;

(b) The communication systems used may consist of a sufficient number of radio transceivers, telephones and other communication devices to establish and maintain a primary and a secondary means of communication;

(c) The role of the communication systems is to provide a primary, and, where necessary, an alternate means for effective direct communications between the following, as applicable:

(1) The alerting authority and the rescue and fire-fighting (RFF) units serving the airport;

(2) Air traffic control tower and/or flight service station, the appropriate fire department alarm room/dispatch centre(s) and the fire-fighting and rescue crews en route to an aircraft emergency and at the accident/incident site;

(3) Appropriate mutual aid agencies located on or off the airport, including an alert procedure for all auxiliary personnel expected to respond;

(4) The RFF vehicles, including a communication capability between crew members on each RFF vehicle.

(d) A communications system may be established in order to provide rapid response of the emergency equipment to accidents and incidents occurring in the terminal areas and at the apron. Apron accidents include aircraft cabin fires, refuelling spills and fires, aircraft and vehicle collisions and medical emergencies;

(e) It is important to test frequently the communication systems used during emergencies to verify the operability of all radio and telephone networks;

(f) A complete and current list of interagency telephone numbers could be available to all agencies and to personnel responsible for the aerodrome emergency plan, to ensure rapid notification in case of emergencies. These phone numbers need to be verified frequently to ensure they are correct. Updated lists may be distributed to all emergency plan participants on a continual basis.

### GM11 — ADR-OPS.B.005 — Emergencies in difficult environments

At those aerodromes located close to water and/or swampy areas, or difficult terrain, the aerodrome emergency plan may include the establishment, testing and assessment at regular intervals of a predetermined response for the specialist rescue services.

### GM12 — ADR-OPS.B.005 Emergency Exercises

(a) Full-scale exercises

(1) Full-scale emergency exercises need to be supported by all aerodrome and community authorities concerned;

(2) Objectives of the exercise needs to be defined;

(3) Involved departments and agencies have to be thoroughly familiar with the airport emergency plan and develop individual plans in coordination with the general plan;

(4) The emergency exercises may be held in locations which will provide maximum realism while ensuring minimum disruption of the airport operations. Various scenarios can be used. The exercise may be held either during the day or at night on the airport;

(5) In order to obtain the maximum benefit from a full-scale emergency exercise, it is important to review the entire proceedings. An observer critique team could be organised, comprised of members who are familiar with mass casualty accident proceedings. Each member of the critique team observes the entire exercise and completes the appropriate emergency drill critique forms. As soon as convenient after the exercise (not later than seven days), a critique meeting needs to be held so members of the team can present their observations and recommendations for improvement of the airport emergency plan procedures and associated airport emergency plan document.

(6) The exercise may be followed by a full debriefing, critique and analysis. It is important that representatives of all organisations which participate in the exercise actively participate in the critique.

(b) Partial emergency exercises

(1) Partial emergency exercises could involve at least one unit, such as rescue and fire-fighting services or medical, or combination of several units, as appropriate;

(2) Partial emergency exercises ensure that any deficiencies found during the full-scale airport emergency exercise have been corrected.

(c) Tabletop exercises

(1) Tabletop exercises may be held every six months, except during that six month period when a full-scale emergency exercise is held.

## AMC1-ADR-OPS.B.010 — Communication and alerting systems TXT

The aerodrome operator should ensure that:

(a) a discrete communication system is provided linking a fire station with the control tower, any other fire station on the aerodrome and the rescue and fire-fighting vehicles;

(b) an alerting system for rescue and fire-fighting personnel, capable of being operated from that station, is provided at the fire station, any other fire station on the aerodrome and the aerodrome control tower.

## AMC2-ADR-OPS.B.010 — RFFS level of protection TXT

(a) The aerodrome operator should ensure that:

(1) the level of protection normally available at an aerodrome is determined and expressed in terms of the category of the rescue and fire-fighting services (RFF category) as described in (2), (3) and (4)_ below and in accordance with the types and amounts of extinguishing agents normally available at the aerodrome;

(2) the RFF category is determined according to the Table 1, based on the longest aeroplanes expected to operate at the aerodrome and their fuselage width. If, after selecting the category appropriate to the longest aeroplane's overall length, that aeroplane's fuselage width is greater than the maximum width in Table 1, column 3, for that category, then the category for that aeroplane should actually be one category higher;

| Aerodrome category for rescue and fire fighting | | |
|---|---|---|
| Aerodrome Category (1) | Aeroplane overall length (2) | Maximum fuselage width (3) |
| 1 | 0 m up to but not including 9 m | 2 m |
| 2 | 9 m up to but not including 12 m | 2 m |
| 3 | 12 m up to but not including 18 m | 3 m |
| 4 | 18 m up to but not including 24 m | 4 m |
| 5 | 24 m up to but not including 28 m | 4 m |
| 6 | 28 m up to but not including 39 m | 5 m |
| 7 | 39 m up to but not including 49 m | 5 m |
| 8 | 49 m up to but not including 61 m | 7 m |
| 9 | 61 m up to but not including 76 m | 7 m |
| 10 | 76 m up to but not including 90 m | 8 m |

Table 1

(3) If the number of expected movements of the aeroplanes in the RFF category is less than 700 in the busiest consecutive three months, the level of protection is not less than one category below the determined category;

(4) If the number of expected movements of the aeroplanes in the RFF category is equal or above 700 in the busiest consecutive three months, the level of protection is equal to the determined category;

(b) The aerodrome operator should ensure that during anticipated periods of reduced activity, the level of protection available is no less than that needed for the highest category of aeroplane planned to use the aerodrome during that time irrespective of the number of movements.

**AMC3-ADR-OPS.B.010 — Number of RFFS vehicles and rescue equipment** *TXT*

(a) The aerodrome operator should ensure that:

(1) the minimum number of rescue and fire-fighting vehicles at the aerodrome, will be in accordance with the following table:

| Aerodrome category | Rescue and fire-fighting vehicles |
|---|---|
| 1 | 1 |
| 2 | 1 |
| 3 | 1 |
| 4 | 1 |
| 5 | 1 |
| 6 | 2 |
| 7 | 2 |
| 8 | 3 |
| 9 | 3 |
| 10 | 3 |

Table 1

(2) Rescue equipment commensurate with the level of aircraft operations is provided on the rescue and fire-fighting vehicles;

(b) If the aerodrome is located near a water/swampy area or other difficult environment, or a significant portion of the approach/departure operations take over these areas, the aerodrome operator should ensure that suitable rescue equipment and services are available.

## AMC4-ADR-OPS.B.010 — Extinguishing agents TXT

The aerodrome operator should ensure that:

(a) Both principal and complementary extinguishing agents are provided at the aerodrome;

(b) Principal extinguishing agent includes:

(1) a foam meeting the minimum performance level A; or

(2) a foam meeting the minimum performance level B; or

(3) a foam meeting the minimum performance level C; or

(4) a combination of these agents;

except for aerodromes in categories 1 to 3, where it should preferably meet the minimum performance level B;

(c) The complementary extinguishing agent is a dry chemical powder suitable for extinguishing hydrocarbon fires, or any other alternate agent having equivalent fire-fighting capability;

(d) The amounts of water for foam production and of the complementary agents provided on the rescue and fire-fighting vehicles are in accordance with the determined aerodrome category and Table 1;

| **Minimum usable amounts of extinguishing agents** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Foam meeting performance level A | | Foam meeting performance level B | | Foam meeting performance level C | | Complementary agents | |
| Aerodrome category (1) | Water (L) (2) | Discharge rate foam solution/minute (L) (3) | Water (L) (4) | Discharge rate foam solution/minute (L) (5) | Water (L) (6) | Discharge rate foam solution/minute (L) (7) | Dry chemical powders (kg) (8) | Discharge Rate (kg/sec) (9) |
| 1 | 350 | 350 | 230 | 230 | 160 | 160 | 45 | 2.25 |
| 2 | 1 000 | 800 | 670 | 550 | 460 | 360 | 90 | 2.25 |
| 3 | 1 800 | 1 300 | 1 200 | 900 | 820 | 630 | 135 | 2.25 |
| 4 | 3 600 | 2 600 | 2 400 | 1800 | 1 700 | 1 100 | 135 | 2.25 |
| 5 | 8 100 | 4 500 | 5 400 | 3 000 | 3 900 | 2 200 | 180 | 2.25 |
| 6 | 11 800 | 6 000 | 7 900 | 4 000 | 5 800 | 2 900 | 225 | 2.25 |
| 7 | 18 200 | 7 900 | 12 100 | 5 300 | 8 800 | 3 800 | 225 | 2.25 |
| 8 | 27 300 | 10 800 | 18 200 | 7 200 | 12 800 | 5 100 | 450 | 4.5 |
| 9 | 36 400 | 13 500 | 24 300 | 9 000 | 17 100 | 6 300 | 450 | 4.5 |
| 10 | 48 200 | 16 600 | 32 300 | 11 200 | 22 800 | 7 900 | 450 | 4.5 |
| Note: The quantities of water shown in columns 2, 4 and 6 are based on the average overall length of aeroplanes in a given category | | | | | | | | |

Table 1

except that for aerodrome categories 1 and 2, up to 100 % of the water may be replaced by complementary agent.

For the purpose of agent substitution, 1 kg of complementary agent is equivalent if to 1 L of water for foam production.

Note: The amounts of water specified for foam production are predicated on an application rate of 8.2 L/min/$m^2$ for a foam meeting performance level A, or 5.5.L/min/$m^2$ for a foam meeting performance level B and 3.75L/min/$m^2$ for a foam meeting performance level C.

(e) The quantity of foam concentrates separately provided on vehicles for foam production is proportionate to the quantity of water provided and the foam concentration selected;

(f) When different performance level foams are provided at an aerodrome the conversion ratio should be calculated, documented for each rescue and fire-fighting vehicle and applied to the overall rescue and fire-fighting requirement;

(g) The discharge rate of the foam solution is not less than the rates shown in Table 1;

(h) The complementary agents comply with the appropriate specifications of the International Organisation for Standardisation (ISO);

(i) The discharge rate of complementary agents is not less than the values shown in Table 1.

**AMC5-ADR-OPS.B.010 — Response time** *TXT REV*

(a) The aerodrome operator should ensure that:

(1) Rescue and fire-fighting service achieve a response time of two minutes, but in no case exceeding three minutes, to any point of each operational runway, in optimum visibility and surface conditions;

(2) Rescue and fire-fighting service achieve a response time not exceeding three minutes to any other part of the movement area, in optimum visibility and surface conditions;

(3) Any vehicle, other than the first responding vehicle(s), required to deliver the amount of extinguishing agents specified in Table 1 of AMC4-ADR-OPS.B.010 achieve continuous agent application and arrive in three minutes, but in no case exceeding four minutes, from the initial call;

(4) Suitable guidance, equipment and/or procedures for rescue and fire-fighting services are provided, to meet the operational objective as nearly as possible in less than optimum conditions of visibility, especially during low visibility operations.

**AMC6-ADR-OPS.B.010 — Personnel** *TXT REV*

(a) The aerodrome operator should ensure that:

(1) During flight operations, sufficient trained personnel is detailed and readily available to ride the rescue and fire-fighting vehicles and to operate the equipment at maximum capacity;

(2) Personnel is deployed in a way that ensures the minimum response times can be achieved and continuous agent application at the appropriate rate can be fully maintained considering also the use of hand lines, ladders and other rescue and fire-fighting equipment normally associated with aircraft rescue and fire-fighting operations;

(3) All responding rescue and fire-fighting personnel are provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner.

**AMC7-ADR-OPS.B.010 — Training of RFFS personnel** *TXT REV*

(a) The aerodrome operator should ensure that:

(1) The rescue and fire-fighting personnel are properly trained to perform their duties in an efficient manner and actively participate in live fire drills commensurate with the types of aircraft and type of rescue and fire-fighting equipment in use at the aerodrome, including pressure-fed fuel fires drills;

(2) The rescue and fire-fighting personnel training programme includes training in human performance, including team coordination.

**AMC8-ADR-OPS.B.010 — Medical standards for RFFS personnel** *ADD REV*

The aerodrome operator should determine/ensure an appropriate medical standard to be met by RFF personnel.

**GM1-ADR-OPS.B.010 — Availability of rescue and fire-fighting services**

Public or private organisations, suitably located and equipped, may be designated to provide the rescue and fire-fighting service. The fire station housing these organisations may normally be located on the aerodrome, although an off-aerodrome location is not precluded, provided that the response time can be met.

**GM2-ADR-OPS.B.010 — Communication System**

(a) Communication means are provided for direct communication between the rescue and fire-fighting service and the flight crew of an aircraft in emergency;

(b) Communication means are provided to ensure the immediate summoning of designated personnel not on standby duty;

(c) Communication means are provided to ensure two-way communication with the rescue and fire-fighting vehicles in attendance at an aircraft accident or incident.

**GM3-ADR-OPS.B.010 — Number of RFFS personnel**

In determining the number of personnel required to provide for rescue, consideration is necessary to be given to the types of aircraft using the aerodrome. Staffing levels are promulgated, or reference to, the Aerodrome Manual.

**GM4-ADR-OPS.B.010 — Training of Rescue and Fire Fighting Personnel**

(a) The training of rescue and fire-fighting personnel may include initial and recurrent training in at least the following areas:

(1) airport familiarisation;

(2) aircraft familiarisation;

(3) rescue and fire-fighting personnel safety;

(4) emergency communications systems on the aerodrome, including aircraft fire-related alarms;

(5) use of the fire hoses, nozzles, turrets and other appliances;

(6) application of the types of extinguishing agents required;

(7) emergency aircraft evacuation assistance;

(8) fire-fighting operations;

(9) adaptation and use of structural rescue and fire-fighting equipment for aircraft rescue and fire-fighting;

(10) dangerous goods;

(11) familiarisation with fire fighters' duties under the aerodrome emergency plan; and

(12) protective clothing and respiratory protection;

(13) low visibility procedures;

(14) human performance including team coordination;

(15) protective clothing and respiratory protection;

(16) composite materials;

(17) recognition of aircraft ballistic parachute systems during emergency operations.

**AMC-ADR.OPS.B.015 — M onitoring and Inspection of m ovement ar ea an d rel ated facilities** *ADD*

(a) The aerodrome operator should establish a monitoring and inspection program of the movement area which is commensurate with the traffic expected at the aerodrome. Inspections of the movement area should be carried out each day at least once where the code number is 1 or 2 and at least twice where the code number is 3 or 4;

The inspections should cover at least the following items:

(1) Visual aids;

(2) Other lighting systems required for the safety of aerodrome operations;

(3) Pavements and adjacent ground surfaces;

(4) Drainage systems;

(5) Fencing and other access control devices;

(6) The movement area environment inside the aerodrome boundary, and outside the aerodrome boundary within line of sight;

(7) FOD and wildlife;

in order to identify any default or potential hazards to the safety of aircraft or aerodrome operations.

### GM1-ADR-OPS.B.015 — Pavements and adjacent ground surfaces inspection

(a) Paved Areas Inspection

The following may be observed during a paved areas inspection:

(1) General cleanliness with particular attention to material which could cause engine ingestion damage. This may include debris from runway maintenance operations or excessive grit remaining after runway gritting. Any build-up of tire rubber deposits should be noted;

(2) Signs of damage to the pavement surface including cracking and spalling of concrete, condition of joint sealing, cracking and looseness of aggregate in asphalt surfaces or break-up of friction courses;

(3) After rain, flooded areas should be identified and marked, if possible, to facilitate later resurfacing;

(4) damage of light fittings;

(5) cleanliness of runway markings;

(6) the condition and fit of pit covers;

(7) The extremities of the runway should be inspected for early touchdown marks; blast damage to approach lights, marker cones and threshold lights; cleanliness and obstacles in the runway end safety area.

(b) Adjacent ground surfaces inspection

The following may be observed during the inspection:

(1) the general state of ground cover vegetation ensuring in particular that excessive length is not obscuring lights, signs, markers, etc.;

(2) any developing depressions should be noted and plotted;

(3) any unreported aircraft wheel tracks should be carefully plotted and reported;

(4) the condition of signs and markers;

(5) the general bearing strength of grass areas, particularly those close to aircraft pavement surface;

(6) waterlogged grass areas.

### GM2-ADR-OPS.B.015 — Visual Aids Inspection

(a) Flight checks of visual aids

Flight checks of approach and runway lighting systems are periodically carried out to ensure the pattern is correct and the lights are working. The opportunity should also be taken to identify any confusing or misleading lights in the vicinity of the aerodrome.

(b) Ground checks of visual aids

Ground checks of light units in approach lighting systems and runway lighting systems may be performed regularly. The checks ensure that the requirements for intensity, beam coverage and beam direction are fulfilled.

**GM3-ADR-OPS.B.015 — Obstacles**

(a) All authorised obstacles are checked for proper lighting and marking;

(b) Any unauthorised obstacles are reported to the designated persons or organisations immediately.

**GM4-ADR-OPS.B.015 — Inspection logbook**

(a) It is necessary to keep a logbook for all the routine and non-routine inspections of the movement area and related facilities;

(b) The inspection logbook should include:

   (1) Details of inspection intervals and times;

   (2) Names of persons carrying out the inspection;

   (3) Findings, if any.

**GM5-ADR-OPS.B.015 — Follow up of inspections**

Arrangements may exist for reporting the results of inspections and for taking prompt follow-up actions to ensure correction of unsafe conditions.

**GM6-ADR-OPS.B.015 — Personnel requirements for movement area inspections**

(a) The names and roles of persons responsible for carrying out inspections may be designated.

(b) Personnel who conduct inspections may receive training in at least the following areas:

   (1) Aerodrome familiarisation, including airport signs, markings and lighting;

   (2) Aerodrome Manual;

   (3) Aerodrome Emergency Plan;

   (4) Notice to Airmen (NOTAM) notification procedures;

   (5) Aerodrome driving rules;

   (6) Aerodrome inspection procedures and techniques;

   (7) Procedures for reporting inspection findings.

(c) Inspectors may use checklists covering the various inspection areas. A sketch of the aerodrome should accompany the checklist so that the location of problems can be marked for easy identification.

(d) Inspectors may review the most recently completed checklist from the previous inspection cycle prior to beginning the inspection.

(e) If construction is in progress, inspectors should be familiar with the safety plan of the construction.

### AMC-ADR-OPS.B.020 — Wildlife Strike Hazard Reduction *ADD*

(a) The aerodrome operator should:

  (1) participate in the national wildlife strike hazard reduction programme;

  (2) record and report to the competent authority wildlife strikes to aircraft;

  (3) ensure that wildlife hazard assessments are made by competent personnel;

  (4) establish, implement and maintain a wildlife risk management programme.

### GM1-ADR-OPS.B.020 — Wildlife Risk Assessment

(a) The aerodrome operator may:

  (1) conduct a risk assessment using strike data for each species and update this regularly;

  (2) take into account the number of strikes for each species and the severity of damage arising from those strikes;

  (3) target actions on those species which occur with the highest frequency and create the greatest damage.

(b) Wildlife risk assessments may be made by competent personnel.

### GM2-ADR-OPS.B.020 — Wildlife Risk Management Program

The wildlife risk management program may include at least the following elements:

(a) assignment of personnel:

  (1) a person who is accountable for developing and implementing the wildlife risk programme;

  (2) a person who oversees the daily activities and analyses the collected data and carry out risk assessments in order to develop and implement the wildlife risk management programme;

  (3) trained and qualified staff who detect and record the birds/wildlife and assess the bird/wildlife hazard and to expel hazardous birds/wildlife.

(b) a process to report, collect and record data of struck and living birds/wildlife;

(c) a process to analyse the data and to assess the bird/wildlife hazard to develop mitigation, proactive and reactive measures. This should include a risk assessment methodology;

(d) a process of habitat and land management both on and in its vicinity in order to reduce the attractiveness of the area to birds/wildlife;

(e) a process to expel or remove hazardous birds/wildlife, including by lethal means where appropriate;

(f) a process for liaison with non-airport agencies and local landowners etc. to ensure the airport is aware of developments that may contribute to creating additional bird hazards within the airport vicinity's infrastructure, vegetation, land use and activities (for example crop harvesting, seed planting, ploughing, establishment of land or water features, hunting, etc. that might attract birds/wildlife).

**GM3-ADR-OPS.B.020 — Wildlife training**

(a) The aerodrome wildlife control personnel is necessary to receive formal training prior to their initial engagement as wildlife controllers;

(b) Training for aerodrome wildlife control may be documented and records retained, to satisfy periodic reviews, audits and competence checks;

(c) Training of airport wildlife control personnel is conducted by qualified aerodrome wildlife control personnel or specialists with proven experience in this field;

(d) Successful completion of an airport wildlife training course is demonstrated by completion of a written and/or practical test to an agreed pass score;

(e) Wildlife control initial training may at least address the following general areas:

    (1) understand the nature and extent of the aviation wildlife management problem and local hazard identification;

    (2) an understanding of the national and local regulations, standards and guidance material related to airport wildlife management programs (use of best-practice models);

    (3) appreciation of the local wildlife ecology and biology, including (where applicable) the importance of good airfield grass management policies and the benefits to wildlife control they can deliver;

    (4) the importance of accurate wildlife identification and observations, including the use of field guides;

    (5) local and national laws and regulations relating to rare and endangered species and species of special concern, and the aerodrome operators policies relating to them;

    (6) wildlife strike remains collection and identification policies and procedures;

    (7) long-term (passive) control measures, including on and off airport habitat management including identification of wildlife attractions, vegetation policies, air

navigation aids protection, and drainage system and water body management practicalities;

(8) short-term (active) tactical measures, using well established effective wildlife removal, dispersal and control techniques;

(9) documentation of wildlife activities and control measures, and reporting procedures (the aerodrome wildlife management plan);

(10) firearms and field safety, including the use of personal protective equipment; and

(11) wildlife strike risk assessment and risk management principles and how these programs integrate with the aerodrome's safety management system.

(f) Wildlife control staff is necessary to be fully aware of the conditions and terms of the operations of the aerodrome environment. Where this is not relevant, the wildlife control personnel should receive appropriate training, including:

(1) Aerodrome airside driver training including aerodrome familiarisation, air traffic control communications, signs and marking, navigational aids, aerodrome operations and safety and other matters the aerodrome operator deem appropriate;

(2) Aircraft familiarisation, including aircraft identification, aircraft engine design, and impact of wildlife strikes on aircraft systems.

(g) It has to be ensured that wildlife control staff maintains competence in the role. This could be achieved either by annual refresher training or another system of monitoring acceptable to the competent authority. The maintenance of competence may include the areas in (e) and (f) above and also include:

(1) reviewing firearms safety;

(2) changes in the local environment;

(3) changes in risk management policy;

(4) recent wildlife events at the aerodrome;

(5) improvements in active and passive measures; and

(6) any other matters as the airport operator deems appropriate.

**GM4-ADR-OPS.B.020 — Reco rding and reporting of wildlife strikes and obser ved wildlife**

(a) It is necessary to maintain a record of all wildlife activity or 'bird/wildlife log'. The log may include at least the following information:

(1) Numbers, species and location of birds/wildlife seen;

(2) Actions taken tom disperse birds/wildlife and the results of these actions;

(b) The log is completed at regular intervals by the wildlife control staff;

(c) The log is analysed to identify which species represent a hazard at which times of day or year, or under which weather conditions, etc.;

(d) The aerodrome operator may have a system in place to collect bird/wildlife strike reports.

### AMC-OPS.B.025 — Operation of vehicles ADD

(a) Depending upon the scale and complexity of the aerodrome and the individual requirements of the driver, the training programme should take into account the following main areas:

(1) a generic airside vehicle driver training programme which covers operational safety and the health and safety aspects of operating vehicles, plant and equipment in close proximity to aircraft on the movement and manoeuvring areas, aprons, stands and airside roads;

(2) specific training on the vehicle, plant and equipment, e.g. car, tug, high loader, coach;

(3) Drivers required to operate on the manoeuvring area should receive additional training on the hazards associated with runways and taxiways and in the correct use of RTF and standard phraseology;

(b) An aerodrome operator should establish a system for issuing movement area driving authorisations and the conditions of their renewal.

### GM1-ADR-OPS.B.025 — Movement Area Driving Training

(a) The training for driving on the movement area may include the following:

(1) the geography of the aerodrome;

(2) aerodrome signs, markings and lights;

(3) radiotelephone operating procedures, if the duties require to drive on the manoeuvring area;

(4) terms and phrases used in aerodrome control including the ICAO spelling alphabet, if the duties require interaction with aerodrome control;

(5) rules of air traffic services as they relate to ground operations;

(6) airport rules and procedures;

(7) low visibility procedures; and

(8) specialist functions as required, for example, in rescue and fire-fighting.

### GM2-ADR-OPS.B.025 — Grant, suspension or revocation of an airside driving permit

(a) The aerodrome operator may grant an airside driving permit to persons provided that:

(1) Their tasks involve driving on the movement area;

(2) They hold a State driving license or any other driving license recognised by the State;

(3) They hold a special State driving license if their duties involve the operation of a specialised vehicle;

(4) Meet the medical criteria according to the National Legislation;

(5) Hold a State Radiotelephony Operating License if its duties involve driving on the manoeuvring area;

(6) Have successfully completed an airside driving classroom course and passed the written exams;

(7) Have successfully demonstrated competency, as appropriate, in:

(i) The operation or use of vehicle transmit/receive equipment;

(ii) Understanding and complying with air traffic control and local procedures;

(iii) Vehicle navigation on the aerodrome; and

(iv) Special skills required for the particular function;

(b) The airside driving permit may be valid for 2 years and renewed thereafter, provided that the driver has successfully completed a refresher training course and meets the requirements (a)(1)–(a)(4) above;

(c) The aerodrome operator may suspend or revoke an airside driving permit when the person:

(1) Does not fulfil the requirements (a)(1)–(a)(4);

(2) Has repeatedly been reported to violate movement area driving rules;

(3) Has been reported to drive under the effect of alcohol or drugs.

**AMC-ADR-OPS.B.030 — Surface Movement Guidance and Control System** *TXT REV*

(a) The aerodrome operator should develop a surface movement guidance and control system taking into account:

(1) the density of air traffic;

(2) the visibility conditions under which operations are intended;

(3) the need for pilot orientation;

(4) the complexity of the aerodrome layout; and

(5) movements of vehicles.

(b) The aerodrome operator should ensure that:

(1) The surface movement guidance and control system is designed to assist in the prevention of inadvertent incursions of aircraft and vehicles onto an active runway;

(2) The system is designed to assist in the prevention of collisions between aircraft, and between aircraft and vehicles or objects, on any part of the movement area.

(c) The aerodrome operator should ensure that where a surface movement guidance and control system is provided by selective switching of stop bars and taxiway centre line lights, the following requirements are met:

(1) taxiway routes which are indicated by illuminated taxiway centre line lights should be capable of being terminated by an illuminated stop bar;

(2) the control circuits shall be so arranged that when a stop bar located ahead of an aircraft is illuminated, the appropriate section of taxiway centre line lights beyond it is suppressed; and

(3) the taxiway centre line lights are activated ahead of an aircraft when the stop bar is suppressed.

(d) The aerodrome operator should develop the surface movement guidance and control system (SMGCS) procedures in cooperation with the aerodrome Air Traffic Service Provider and the major aircraft operators at the aerodrome.

**GM- ADR-OPS.B.030 — Surface Movement Guidance and Control System**

(a) The SMGC system comprises an appropriate combination of visual aids, non-visual aids, procedures, control, regulation, management and information facilities;

(b) Surface movement radar for the manoeuvring area may be provided at an aerodrome intended for use in runway visual range conditions less than a value of 350 m;

(c) Surface movement radar for the manoeuvring area may be provided at an aerodrome other than that in (b) above when traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities.

**AMC-ADR-OPS.B.035 — Operations in winter conditions** *ADD*

(a) The aerodrome operator should prepare in collaboration with ANSP, major aircraft operators and other relevant parties, procedures for winter maintenance (snow plan). The procedures should include requirements for inspections, criteria for snow-clearing, priorities for snow-clearing, criteria for preparation of operational surfaces, requirements for marking of snow-covered operational surfaces and methods for assessing and reporting the surface conditions. The criteria specified in the winter maintenance procedures should be minimum criteria for maintaining safe aerodrome operations, incl. criteria for suspension of runway operation;

(b) The aerodrome operator should ensure that snow, slush, ice, standing water and other contaminants are removed from the surface of a paved runway as rapidly and completely as possible to minimise accumulation;

(c) The aerodrome operator should not use chemicals which may have harmful effects on aircraft or pavements.

**GM1-ADR-OPS.B.035 — Aerodrome Snow Plan**

(a) The aerodrome snow plan is published and made available to all concerned in snow clearance;

(b) Details of the equipment available at the aerodrome are published in the AIP;

(c) The aerodrome snow plan may include the following:

(1) The Snow Committee members and the person in charge of the snow clearance operation, with a chain of command giving a breakdown in duties;

(2) Methods of communication between aerodrome operations, air traffic control and the Meteorological Office;

(3) The equipment available for snow clearance. This should include equipment for ploughing, sweeping and blowing snow;

(4) Priority of surfaces to be cleared and clearance limits for aircraft using the aerodrome;

(5) Collection of information for SNOWTAM and dissemination of this information;

(6) Designated snow dumping or melting areas to avoid confusion during the actual clearance operations;

(7) An alerting system in order that sufficient warning to be given to all bodies concerned;

(8) The manpower available, including staff for equipment maintenance arrangements for shifts, and call out procedures;

(9) Deployment of equipment and tactical approaches to be used;

(10) General principles to be followed in deciding when to close runways for snow clearance and designation of management personnel authorised to make the decision;

(11) Methods of assessing and reporting the surface conditions;

(12) Criteria for the suspension of runway operations.

**AMC-ADR-OPS.B.040 — Night Operations** *ADD*

The aerodrome operator for aerodromes operated at night should ensure that visual aids are installed, operated and maintained to permit aircraft operations to be performed safely.

**AMC-ADR-OPS.B.045 — Low Visibility Operations** *ADD*

(a) The aerodrome operator should, in collaboration with ANSPs and major aircraft operators at the aerodrome establish low visibility procedures (LVP) if movement of aircraft is permitted when the RVR is less than 550 metres;

(b) Low visibility procedures (LVP) should be approved by the competent authority before implementation;

(c) When low visibility procedures (LVP) are in effect, the aerodrome operator should make available to AIS and/or ATS, as appropriate, information on the status of the aerodrome facilities;

(d) The aerodrome operator should establish and implement procedures to ensure that, when low visibility procedures (LVP) are in effect, persons and vehicles operating on an apron are restricted to the essential minimum;

(e) The procedures to be established by the aerodrome operator to ensure safe aerodrome operations during low visibility conditions should cover the following subjects:

(1) physical characteristics of the runway environment, including approach and departure areas;

(2) obstacle limitation surfaces;

(3) visual aids compliant to AMC-ADR-OPS.B.040 (night operations);

(4) non-visual aids;

(5) secondary power supplies;

(6) movement area safety;

(7) RFFS.

**AMC-ADR-OPS.B.050 — Operations in adverse weather conditions** ADD

The aerodrome operator should, together with the ANSPs and major aircraft operators at the aerodrome, and other parties, establish and implement procedures required to mitigate the risk of operation of the aerodrome under adverse weather conditions such as strong winds, heavy rain and thunderstorms, including the suspension of operations on the runway(s) if deemed necessary.

**AMC-ADR-OPS.B.055 — Fuel quality**ADD

(a) The aerodrome operator should ensure, either by itself or through formal arrangements with third parties, that organisations involved in storing and dispensing of fuel to aircraft, implement procedures to:

(1) Maintain the installations and equipment for storing and dispensing the fuel in such condition so as not to render unfit for use in aircraft;

(2) Mark such installations and equipment in a manner appropriate to the grade of the fuel;

(3) Take fuel samples at appropriate stages during the storing and dispensing of fuel to aircraft, and maintain records of such samples; and

(4) Use adequately qualified and trained staff in storing, dispensing and otherwise handling fuel on the aerodrome.

**GM–ADR-OPS.B.055 — Fuel quality**

The aerodrome operator, in order to ensure compliance, may use:

(a) audit reports to organisations involved in storing and dispensing of fuel to aircraft, or

(b) relevant national procedures providing for the assurance of fuel quality.

**AMC-ADR-OPS.B.060 — Access to the movement area** *ADD*

(a) The aerodrome operator should:

(1) Establish a system for issuing movement area access authorisations and the conditions of their renewal;

(2) Define the training syllabus for persons operating at the apron and on the movement area or other operational areas appropriate to the functions performed;

(3) Establish an access control system.

**GM- ADR-OPS.B.060 — Access to the movement area**

(a) Access to the movement area may be granted to persons, provided that:

(1) Their duties require access to the movement area; and

(2) They have successfully completed a movement area safety training course.

(b) Access authorisations to persons may be renewed provided that:

(1) Their duties require access to the movement area; and

(2) They have successfully completed a refresher movement area safety training course.

(c) The movement area safety training may include the following:

(1) Aerodrome familiarisation;

(2) Privileges of the access authorisations;

(3) Apron markings and signs;

(4) Safety measures;

(5) Emergency procedures.

(d) Access authorisations to persons may be suspended or revoked when:

(1) Their duties doesn't require access to the movement area anymore; or

(2) They change employer; or

(3) They repeatedly violated the privileges of the access authorisations; or

(4) They repeatedly violated the safety rules on the movement area;

(e) Temporary movement area access authorisations may be granted to persons for a limited period of time provided that:

(1) Their duties require access to the movement area for a limited period of time; and

(2) They are escorted by persons holding movement area access authorisations;

**AMC-ADR-OPS.B.065 — Visual Aids and Aerodrome Electrical Systems** ADD

(a) The aerodrome operator should establish a monitoring system of aerodrome ground lights so as to automatically inform the local Air Navigation Service Provider when safe operation is no longer possible;

(b) The aerodrome operator should establish procedures with the ANS provider for the provision and operation of visual aids;

(c) The aerodrome operator should establish procedures in coordination with the ANS provider for the provision and removal of temporary markings, lights and signs.

**GM-ADR-OPS.B.065 — Visual aids**

The term 'visual aids' includes also apron markings, lighting and visual docking systems.

**AMC1-ADR-OPS.B.070 — Aerodrome works safety** ADD

(a) The procedures should be appropriate to the volume and nature of operations at the aerodrome;

(b) Construction or maintenance work on the aerodrome should be planned, established, implemented or approved by the aerodrome operator;

(c) The scope of work, physical extent and time period should be notified to concerned relevant parties. If such work will render limitations to the use of a particular runway, additional measures should be implemented to ensure safety;

(d) Roles and responsibilities for operations and tasks associated with the reduction of runway length available and the work in progress (WIP) are clearly understood and complied with;

(e) The aerodrome operator should put in place appropriate measures to monitor the safety of the aerodrome and aircraft operations during aerodrome works such that timely corrective action is taken when necessary to assure continued safe operations;

(f) The aerodrome operator should ensure the works site is returned to operational use in a safe and timely manner by ensuring:

(1) The works site is cleared of personnel, vehicles and plant in a safe and timely manner;

(2) The works-affected area is inspected for operational serviceability in accordance with the hand-back procedures;

(3) Relevant authorities or organisations are notified of the restoration of aerodrome serviceability in accordance with procedures, using suitable means of communication.

**AMC2-ADR-OPS.B.070 — Runway pavement overlays** *TXT*

The aerodrome operator should ensure that:

(a) When a runway is to be returned temporarily to an operational status before resurfacing is complete, the temporary ramp should comply with the applicable CSs;

(b) Before a runway being overlaid is returned to a temporary operational status, a runway centre line marking conforming to the applicable CSs should be provided;

(c) The location of any temporary threshold should conform to the applicable CSs.

**AMC3-ADR-OPS.B.070 — Marking and lighting of Unserviceable areas** *TXT ADD*

(a) The aerodrome operator should ensure that:

(1) Unserviceability markers are displayed whenever any portion of a taxiway, apron or holding bay is unfit got the movement of aircraft but it is still possible for aircraft to bypass the area safely;

(2) On a movement area used at night, unserviceability lights should be used;

(3) Unserviceability markers and lights are placed at intervals sufficiently close so as to delineate the unserviceable area.

(b) Unserviceability markers shall consist of conspicuous upstanding devices such as flags, cones or marker boards;

(c) Unserviceability markers and lights should meet the applicable CSs.

**GM1-ADR-OPS.B.070 — Routine Maintenance works**

(a) Persons or sections entering the movement area to perform routine maintenance need to have a written approval by the aerodrome operator;

(b) Entrance to the movement area is be subject to clearance by the unit responsible for that area (ATC, apron management, aerodrome operator, etc.) using appropriate means (R/T, telephone, etc.);

(c) For individuals carrying out routine maintenance duties it is necessary to comply with local rules concerning the control and operation of vehicles in the movement area.

**GM2-ADR-OPS.B.070 — Minor construction/maintenance work**

(a) A system of work permits is necessary for minor works on the movement area;

(b) The actual system employed at each aerodrome is jointly agreed between the aerodrome operator and air traffic control;

(c) The objectives of the work permits are:

(1) no work is taking place on the movement area without the knowledge of aerodrome operator's staff and air traffic control;

(2) permitted times of work are strictly followed; and

(3) all individuals taking part in the work are briefed in detail on the following:

(i) precise areas in which work may be done;

(ii) the routes to be followed to and from the working area;

(iii) the R/T procedures to be used;

(iv) the safety precautions to be observed , the maintenance of a listening watch and the use of look-outs; and

(v) the reporting procedure to be followed on completion of work.

(d) At the conclusion of work, aerodrome operator's staff, or other appropriate staff, is necessary to inspect the working area to ensure that it has been left in a satisfactory condition.

**GM3-ADR-OPS.B.070 — Major construction/maintenance work**

(a) Before the commencement of any substantial work on the movement area liaison group comprising representatives from the Aerodrome Operator, Air Traffic Control and subcontractors' agents may be established;

(b) The group could meet as often as considered necessary to review progress and consider the need for any change in working practices to meet operational requirements;

(c) As far as practicable, working areas are blocked off from the active parts of the movement area by the erection of physical barriers;

(d) Consideration should be given to the marking and lighting of barriers;

(e) The lights of taxiways leading into working areas should be permanently 'off';

(f) Before works commence, the following needs to be established:

(1) the hours of work;

(2) the authorised routes;

(3) the communications facilities to be used;

(4) the permitted heights of vehicles and equipment and the limitations to be placed on operating heights of cranes; and

(5) any limitation to be placed on use of electrical equipment which might cause interference with navigational facilities or aircraft communications.

(g) Contractors need to be informed for possible hazards to personnel working on aerodromes, in particular the jet blast problem and noise;

(h) Where contractors work on or traverse aircraft pavement areas, these areas needs to be inspected thoroughly before they are opened again for aircraft use, with particular attention to the presence of debris and the general cleanliness of the surface;

(i) Where aircraft are constantly using areas open to contractors, inspections at frequent intervals are required to ensure that the contractor has carried out any necessary cleaning;

(j) Adequate marking arrangements are provided for crane jibs when extra conspicuity is considered desirable;

(k) If work is of prolonged duration, a constant watch is required to ensure that the marking and lighting of obstacles and unserviceable areas does not degrade below acceptable limits;

(l) The effect of tall cranes on ILS and radar in conjunction with those responsible for electronic landing aids and steps taken to reduce limitations to the minimum, needs to be considered.

**GM4-ADR.OPS.B.070 — Use of unserviceability lights**

When lights are used to mark temporary unserviceable areas at night or during reduced visibility conditions, these lights mark the most potentially dangerous extremities of the area. A minimum of four such lights could be used, except where the area is triangular in shape where a minimum of three lights may be employed. The number of lights may be increased when the area is large or of unusual configuration. At least one light is installed for each 7.5 m of peripheral distance of the area. If the lights are directional, they are orientated so that as far as possible their beams are aligned in the direction from which aircraft or vehicles will approach. Where aircraft or vehicles will normally approach from several directions, consideration should be given to adding extra lights or using omnidirectional lights to show the area from these directions. Unserviceable area lights should be frangible. Their height should be sufficiently low to preserve clearance for propellers and for engine pods of jet aircraft.

**AMC1-ADR-OPS.B.075 — Safeguarding of aerodromes** *ADD*

(a) The aerodrome operator should have procedures to monitor the changes in the obstacle environment, marking and lighting and in human activities or land use on the aerodrome and its surroundings. The scope, limits, tasks and responsibilities for the monitoring should be defined in coordination with the relevant ANS providers and with the competent authority and other relevant authorities.

(b) The limits of the aerodrome surroundings that should be monitored by the aerodrome operator are defined in coordination with the competent authority and should include the areas that can be visually monitored during the inspections of the manoeuvring area.

(c) The aerodrome operator should have procedures to mitigate the risks associated with changes on the aerodrome and its surroundings identified with the monitoring procedures. The scope, limits, tasks and responsibilities for the mitigation of risks associated to obstacles or hazards outside the perimeter fence of the aerodrome should be defined in coordination with the relevant ANS providers and with the competent authority and other relevant authorities.

(d) The risks caused by human activities and land use which should be assessed and mitigated should include:

(1) obstacles and the possibility of induced turbulence;

(2) the use of hazardous, confusing and misleading lights;

(3) the dazzling caused by large and highly reflective surfaces;

(4) sources of non-visible radiation or the presence of moving or fixed objects which may interfere with, or adversely affect, the performance of aeronautical communications, navigation and surveillance systems;

(5) non-aeronautical ground light near an aerodrome which may endanger the safety of aircraft and which should be extinguished, screened or otherwise modified so as to eliminate the source of danger.

### AMC2-ADR-OPS.B.075 — Obstacle restriction and removal *TXT REV*

(a) The aerodrome operator should ensure that, within its area of responsibility as defined in AMC1-ADR-OPS.B.075 (b) and (c), obstacles are restricted and removed as follows:

(1) Objects on runway strips

(i) An object situated on a runway strip which may endanger aeroplanes should be regarded as an obstacle and should, as far as practicable, be removed;

(ii) No fixed object, other than visual aids required for air navigation purposes and satisfying the relevant frangibility requirements as defined in the applicable CSs, should be permitted on a runway strip:

(A) within 77.5 m of the runway centre line of a precision approach runway category I, II or III where the code number is 4 and the code letter is F; or

(B) within 60 m of the runway centre line of a precision approach runway category I, II or III where the code number is 3 or 4; or

(C) within 45 m of the runway centre line of a precision approach runway category I where the code number is 1 or 2.

(iii) No mobile object shall be permitted on this part of the runway strip during the use of the runway for landing or take-off.

(2) Non-precision approach runways

(i) New objects or extensions of existing objects should not be permitted above an approach surface within 3 000 m of the inner edge or above a transitional surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object;

(ii) New objects or extensions of existing objects should not be permitted above the approach surface beyond 3 000 m from the inner edge, the conical surface or inner horizontal surface except when, in the opinion of the competent authority, the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes;

(iii) Existing objects above the conical surface, the inner horizontal surface, the approach surface and the transitional surfaces should as far as practicable be removed except when, in the opinion of the competent authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(3) Precision approach runways

(i) Unless its function requires it to be there for air navigation purposes, no equipment or installation should be:

(A) on a runway strip, a runway end safety area, a taxiway strip or within the distances specified in Table 1, if it would endanger an aircraft; or

| Code letter | Taxiway, other than aircraft stand taxilane, centre line to object (metres) |
|---|---|
| A | 16.25 |
| B | 21.5 |
| C | 26 |
| D | 40.5 |
| E | 47.5 |
| F | 57.5 |

Table 1

(B) on a clearway if it would endanger an aircraft in the air.

(ii) Any equipment or installation required for air navigation purposes which must be located:

(A) on that portion of a runway strip within:

(a) 75 m of the runway centre line where the code number is 3 or 4; or

(b) 45 m of the runway centre line where the code number is 1 or 2; or

(B) on a runway end safety area, a taxiway strip or within the distances in Table 1; or

(C) on a clearway and which would endanger an aircraft in the air;

shall be frangible and mounted as low as possible.

(iii) Any equipment or installation required for air navigation purposes which must be located on the non-graded portion of a runway strip should be regarded as an obstacle and should be frangible and mounted as low as possible.

(iv) Unless its function requires it to be there for air navigation purposes, no equipment or installation should be located within 240 m from the end of the strip and within:

(A) 60 m of the extended centre line where the code number is 3 or 4; or

(B) 45 m of the extended centre line where the code number is 1 or 2;

of a precision approach runway category I, II or III.

(v) Any equipment or installation required for air navigation purposes which must be located on or near a strip of a precision approach runway category I, II or III and which:

(A) is situated on that portion of the strip within 77.5 m of the runway centre line where the code number is 4 and the code letter is F; or

(B) is situated within 240 m from the end of the strip and within:

(a) 60 m of the extended runway centre line where the code number is 3 or 4; or

(b) 45 m of the extended runway centre line where the code number is 1 or 2; or

(C) penetrates the inner approach surface, the inner transitional surface or the balked landing surface;

should be frangible and mounted as low as possible.

(vi) Fixed objects should not be permitted above the inner approach surface, the inner transitional surface or the balked landing surface, except for frangible objects which because of their function must be located on the strip. Mobile objects should not be permitted above these surfaces during the use of the runway for landing.

(vii) New objects or extensions of existing objects should not be permitted above an approach surface or a transitional surface except when, in the opinion of the competent authority, the new object or extension would be shielded by an existing immovable object.

(viii) New objects or extensions of existing objects should not be permitted above the conical surface and the inner horizontal surface except when, in the opinion of the competent authority, an object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(ix) Existing objects above an approach surface, a transitional surface, the conical surface and inner horizontal surface should as far as practicable be removed except when, in the opinion of the competent authority, an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(4) Runways meant for take-off

(i) New objects or extensions of existing objects should not be permitted above a take-off climb surface except when, in the opinion of the competent authority, the new object or extension would be shielded by an existing immovable object.

(ii) If no object reaches the 2 % (1:50) take-off climb surface, new objects should be limited to preserve the existing obstacle free surface or a surface down to a slope of 1.6 % (1:62.5).

(iii) Existing objects that extend above a take-off climb surface should as far as practicable be removed except when, in the opinion of the competent authority, an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(5) Other objects

(i) Objects which do not project through the approach surface but which would nevertheless adversely affect the optimum siting or performance of visual or non-visual aids should, as far as practicable, be removed.

(ii) Anything which may, in the opinion of the competent authority after aeronautical study, endanger aeroplanes on the movement area or in the air within the limits of the inner horizontal and conical surfaces should be regarded as an obstacle and should be removed in so far as practicable.

## AMC3-ADR-OPS.075 — Marking and lighting of obstacles *TXT REV*

(a) The aerodrome operator should ensure that all obstacles penetrating the obstacle limitation surfaces of an aerodrome within its area of responsibility should be marked and/or lighted unless such marking or lighting can be omitted when an aeronautical study shows that marking and/or lighting is not required from a safety view-point;

(b) The aerodrome operator should ensure that fixed objects that extend above an obstacle protection surface within its area of responsibility should be marked and, if the runway is used at night, lighted;

(c) The aerodrome operator should ensure that elevated aeronautical ground lights within the movement area should be marked so as to be conspicuous by day. Obstacle lights should not be installed on elevated ground lights or signs in the movement area;

(d) The aerodrome operator should ensure that obstacles within the distance specified in Table 1, from the centre line of a taxiway, an apron taxiway or aircraft stand taxilane should be marked and, if the taxiway, apron taxiway or aircraft stand taxilane is used at night, lighted.

| Code letter | Taxiway other than aircraft stand taxilane, centre line to object (m) | Aircraft stand taxilane centre line to object (m) |
|---|---|---|
| A | 16.25 | 12 |
| B | 21.5 | 16.5 |
| C | 26 | 24.5 |
| D | 40.5 | 36 |
| E | 47.5 | 42.5 |
| F | 57.5 | 50.5 |

Table 1

**AMC4-ADR-OPS.B.075 — Obstacles that extends above a take-off climb surface** *TXT REV*

The aerodrome operator should ensure that fixed obstacles extending above a take-off climb surface within its area of responsibility, should be marked and, if the runway is used at night, lighted, except that:

(a) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(b) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;

(c) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and

(d) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

**AMC5-ADR-OPS.B.075 — Objects, other than obstacles, adjacent to a take-off climb surface** *TXT REV*

The aerodrome operator should ensure that fixed objects, other than obstacles, adjacent to a take-off surface and within its area of responsibility should be marked and, if the runway is used at night, lighted, if such marking and lighting is considered necessary to ensure its avoidance, except that the marking may be omitted when:

(a) the object is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m; or

(b) the object is lighted by high-intensity obstacle lights by day.

**AMC6-ADR-OPS.B.075 — Obstacles that extends above an approach or transitional surface** TXT REV

The aerodrome operator should ensure that fixed obstacles extending above an approach or transitional surface and within its area of responsibility is marked and, if the runway is used at night, lighted, except that:

(a) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(b) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;

(c) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and

(d) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

**AMC7-ADR-OPS.B.075 — Fixed obstacles above a horizontal surface** TXT REV

The aerodrome operator should ensure that fixed obstacles above a horizontal surface and within its area of responsibility are marked and, if the aerodrome is used at night, lighted, except that:

(a) such marking and lighting may be omitted when:

   (1) the obstacle is shielded by another fixed obstacle; or

   (2) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths; or

   (3) an aeronautical study shows the obstacle not to be of operational significance.

(b) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;

(c) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and

(d) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

**AMC8-ADR-OPS.B.075 — Marking of objects** *TXT REV*

(a) The aerodrome operator should ensure that an object within its area of responsibility should be coloured to show a chequered pattern if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions; The pattern and the colours should be in accordance with the applicable CSs;

(b) The aerodrome operator should ensure that an object within its area of responsibility should be coloured to show alternating contrasting bands if:

(1) it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1.5 m, and the other dimension, horizontal or vertical, less than 4.5 m; or

(2) it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m.

The dimensions and colours of the bands should be in accordance with the applicable CSs.

(c) The aerodrome operator should ensure that an object within its area of responsibility is coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5 m. Orange or red should be used, except where such colours merge with the background;

(d) The aerodrome operator should ensure that markers displayed on or adjacent to objects within its area of responsibility are located in conspicuous positions so as to retain the general definition of the object and shall be recognizable in clear weather from a distance of at least 1 000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object;

(e) Spacing, dimensions and colours of markers should be in accordance with the applicable CSs;

(f) The aerodrome operator should ensure that flags used to mark objects within its area of responsibility are displayed around, on top of, or around the highest edge of, the object. When flags are used to mark extensive objects or groups of closely spaced objects, they should be displayed at least every 15 m. Flags should not increase the hazard presented by the object they mark;

(g) The aerodrome operator should ensure that flags meet the applicable CSs.

**AMC9-ADR-OPS.B.075 — Location of obstacle lights** *TXT REV*

The aerodrome operator should ensure that the location and characteristics of the obstacle lights within its area of responsibility are in accordance with the applicable CSs for obstacle lights.

### AMC-ADR-OPS.B.080 — Marking and lighting of vehicles and other mobile objects TXT REV

(a) The aerodrome operator should ensure that all vehicles operating on the manoeuvring area are marked by colours or display flags;

(b) When mobile objects are marked by colour, a single conspicuous colour, preferably green for emergency vehicles and yellow for service vehicles, should be used;

(c) When flags are used to mark mobile objects, they should comply with the applicable CSs;

(d) Low-intensity obstacle lights, Type C, should be displayed on vehicles and other mobile objects excluding aircraft;

(e) Low-intensity obstacle lights, Type D, should be displayed on follow-me vehicles.

### AMC-OPS.B.085 — Handling of hazardous materials TXT

(a) The aerodrome operator shall ensure that all agents involved in the handling and storing of any hazardous materials comply with the established procedures;

(b) The procedures shall include at least the following:

(1) Designated personnel to receive and handle hazardous substances and materials;

(2) Assurance from the shipper that the cargo can be handled safely, including any special handling procedures required for safety;

(3) Special areas for storage of hazardous materials while on the airport.

### GM- OPS.B.085 — Handling of hazardous materials

(a) The procedure should ensure the safe handling of hazardous materials or dangerous goods on the aerodrome, including:

(1) Flammable liquids and solids;

(2) Corrosive liquids;

(3) Compressed gases;

(4) Magnetised or radioactive materials;

(5) Explosives;

(6) Biological substances.

(b) The aerodrome operator should include the following information in the procedure for handling hazardous materials:

(1) Responsibilities of the aerodrome operator and each organisation involved in the handling, storage and transport by air of hazardous materials;

(2) Applicable regulations, standards and technical references;

(3) Handling of hazardous materials incidents;

(4) Handling procedures.

## SUBPART C — AERODROME MAINTENANCE

### AMC-ADR-OPS.C.005 — General *ADD*

(a) The aerodrome operator should ensure that a maintenance programme is established, including preventive maintenance where appropriate to maintain aerodrome facilities in a condition which does not impair the safety of aeronautical operations. The scope of the maintenance programme should include, but may not be limited to, the following items:

(1) Visual aids and other lighting systems required for the safety of aerodrome operations;

(2) Power supply and other electrical systems;

(3) Pavements, other ground surfaces and drainage systems;

(4) Fencing and other access control devices;

(5) Equipment and vehicles which are necessary for the safety of aerodrome operations;

(6) Buildings which are necessary for the safety of aerodrome operations.

(b) The design and application of the maintenance programme should observe human factors principles.

### AMC-ADR-OPS.C.010 — Pavements, other ground surfaces and drainage *ADD*

(a) The aerodrome operator should remove mud, dust, sand, oil, rubber deposits and other pollutants from the surface of a paved runway as rapidly and completely as possible to minimize accumulation, and not to impair the surface friction characteristics of the runway;

(b) Taxiways and aprons should be kept clear of pollutants to the extent necessary to enable aircraft to be taxied to and from an operational runway;

(c) Drainage systems should be periodically checked and, if necessary cleaned or maintained, to ensure efficient water run-off;

(d) The aerodrome operator should measure the runway surface friction characteristics for maintenance purpose with a continuous friction measuring device using self-wetting features . The frequency of these measurements should be sufficient to determine the trend of the surface friction characteristics of the runway;

(e) The aerodrome operator should take corrective maintenance action to prevent the runway surface friction characteristics for either the entire runway or a portion thereof from falling below the minimum friction level specified by the State;

(f) When the friction of a significant portion of a runway is found to be below the minimum friction level value, the aerodrome operator should report such information in order to promulgate it in a NOTAM specifying which portion of the runway is below the minimum friction level and its location on the runway.

**AMC-ADR-OPS.C.015 — Visual Aids and Electrical Systems** *ADD*

(a) The aerodrome operator should establish a system of corrective and preventive maintenance which ensures that a light is deemed unserviceable when the main beam average intensity is less than 50 % of the value specified in the applicable CSs. For light units where the designed main beam average intensity is above the specified in the applicable CSs, the 50 % value shall be related to that design value;

(b) The aerodrome operator should establish a system of preventive maintenance of visual aids to ensure lighting and marking system reliability and serviceability as required for the intended operations.

European Aviation Safety Agency

**NOTICE OF PROPOSED AMENDMENT**

# NPA 2011-20 (B.III)

RMT.0136 (ADR.001 (a)) & RMT.0137 (ADR.001 (b))

RMT.0140 (ADR.002 (a)) & RMT.0141 (ADR.002 (b))

RMT.0144 (ADR.003 (a)) & RMT.0145 (ADR.003 (b))

# Authority, Organisation and Operations Requirements for Aerodromes

**DRAFT DECISION OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY**

## NPA 2011-20 (B.III) — Draft Certification Specifications

**CONTENTS**

**CS–ADR-DSN – AERODROMES DESIGN**

# BOOK 1

## EASA CERTIFICATION SPECIFICATIONS FOR AERODROME DESIGN

## CHAPTER A — GENERAL

### CS-ADR-DSN.A.001 — Applicability

The design specifications in this book are applicable to aerodromes falling within the scope of the Regulation (EC) No 216/2008 (hereafter referred to as the 'Basic Regulation')[1] and its amending regulations, viz.:

*Aerodromes, including equipment, located in the territory subject to the provisions of the Treaty, open to public use and which serve commercial air transport and where operations using instrument approach or departure procedures are provided, and:*

*(a) have a paved runway of 800 metres or above; or*

*(b) exclusively serve helicopters.*

The applicable specifications should be used in constructing the aerodrome's Certification Basis.

Supplementary Guidance Material (GM) is located in Book 2 — EASA Guidance Material for Aerodrome Design. For ease of cross-referencing, the GM numbering format mirrors the CS numbering sequence.

### CS-ADR-DSN.A.002 — Definitions

For the purposes of this Regulation, the following definitions should apply:

**'Accuracy'** means a degree of conformance between the estimated or measured value and the true value.

**'Aerodrome'** means a defined area (including any buildings, installations and equipment) on land or water or on a fixed offshore or floating structure intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

**'Aerodrome beacon'** means an aeronautical beacon used to indicate the location of an aerodrome from the air.

**'Aerodrome elevation'** means the elevation of the highest point of the landing area.

**'Aerodrome equipment'** means any equipment, apparatus, appurtenance, software or accessory that is used or intended to be used to contribute to the operation of aircraft at an aerodrome.

**'Aerodrome identification sign'** means a sign placed on an aerodrome to aid in identifying the aerodrome from the air.

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[1] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC. (OJ L 79, 19.03.2008, p. 1). Regulation as last amended by Regulation 1108/2009 of the European Parliament and of the Council of 21 October 2009 (OJ L 309, 24.11.2009, p. 51).

**'Aerodrome operator'** means any legal or natural person, operating or proposing to operate one or more aerodromes.

**'Aerodrome reference point'** means the designated geographical location of an aerodrome.

**'Aeronautical beacon'** means an aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth.

**'Aeronautical ground light'** means any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.

**'Aeroplane reference field length'** means the minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.

**'Aircraft'** means a machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

**'Aircraft Arresting System'** means a series of components used to stop an aircraft by absorbing its momentum in a routine or emergency landing or rejected take-off.

**'Aircraft classification number (ACN)'** means the number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

**'Aircraft stand'** means a designated area on an apron intended to be used for parking an aircraft.

**'Apron'** means a defined area intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

**'Balked landing'** means a landing manoeuvre that is unexpectedly discontinued at any point below the obstacle clearance altitude/height (OCA/H).

**'Barrette'** means three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.

**'Capacitor discharge light'** means a lamp in which high-intensity flashes of extremely short duration are produced by the discharge of electricity at high voltage through a gas enclosed in a tube.

**'Cleared and Graded Area (CGA)'** means that part of the Runway Strip cleared of all obstacles except for minor specified items and graded, intended to reduce the risk of damage to an aircraft running off the runway.

**'Clearway**' means a defined rectangular area on the ground or water under the control of the appropriate authority, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

**'Critical Area'** means an area of defined dimensions extending about the ground antennae of a precision instrument approach equipment within which the presence of vehicles or aircraft will cause unacceptable disturbance of the guidance signals.

**'Datum'** Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104).

**'Declared distances'**

(a) 'Take-off run available (TORA)' means the length of runway declared available and suitable for the ground run of an aeroplane taking off.

(b) 'Take-off distance available (TODA)' means the length of the take-off run available plus the length of the clearway, if provided.

(c) 'Accelerate-stop distance available (ASDA)' means the length of the take-off run available plus the length of the stopway, if provided.

(d) 'Landing distance available (LDA)' means the length of runway which is declared available and suitable for the ground run of an aeroplane landing.

**'De-icing/anti-icing facility'** means a facility where frost, ice or snow is removed (de-icing) from the aeroplane to provide clean surfaces, and/or where clean surfaces of the aeroplane receive protection (anti-icing) against the formation of frost or ice and accumulation of snow or slush for a limited period of time.

**'De-icing/anti-icing pad'** means an area comprising an inner area for the parking of an aeroplane to receive de-icing/anti-icing treatment and an outer area for the manoeuvring of two or more mobile de-icing/anti-icing equipment.

**'Dependent parallel approaches'** means simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed.

**'Displaced threshold'** means a threshold not located at the extremity of a runway.

**'Fixed light'** means a light having constant luminous intensity when observed from a fixed point.

**'Frangibility'** means the ability of an object to retain its structural integrity and stiffness up to a specified maximum load but when subject to a load greater than specified or struck by an aircraft will break, distort or yield in a manner designed to present minimum hazard to an aircraft.

**'Frangible object'** means an object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.

**'Hazard beacon'** means an aeronautical beacon used to designate a danger to air navigation.

**'Holding bay'** means a defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft.

**'Holdover time'** means the estimated time during which the anti-icing fluid (treatment) will prevent the formation of ice and frost and the accumulation of snow on the protected (treated) surfaces of an aeroplane.

**'Identification beacon'** means an aeronautical beacon emitting a coded signal by means of which a particular point of reference can be identified.

**'Independent parallel approaches'** means simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are not prescribed.

**'Independent parallel departures'** means simultaneous departures from parallel or near-parallel instrument runways.

**'Instrument runway'** means one of the following types of runways intended for the operation of aircraft using instrument approach procedures:

(a) Non-precision approach runway means an instrument runway served by visual aids and a non-visual aid providing at least directional guidance adequate for a straight-in approach.

(b) Precision approach runway, category I means an instrument runway served by non-visual aids and visual aids intended for operations with a decision height not lower than 60 m

(200 ft) and either a visibility not less than 800 m or a runway visual range not less than 550 m.

(c) Precision approach runway, category II means an instrument runway served by non-visual aids and visual aids intended for operations with a decision height lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 300 m.

(d) Precision approach runway, category III means an instrument runway served by non-visual aids and visual aids to and along the surface of the runway and:

A — intended for operations with a decision height lower than 30 m (100 ft), or no decision height and a runway visual range not less than 175 m;

B — intended for operations with a decision height lower than 15 m (50 ft), or no decision height and a runway visual range less than 175 m but not less than 50 m;

C — intended for operations with no decision height and no runway visual range limitations.

*Note — Visual aids need not necessarily be matched to the scale of non-visual aids provided. The criterion for the selection of visual aids is the conditions in which operations are intended to be conducted.*

**'Intermediate holding position'** means a designated position intended for traffic control at which taxiing aircraft and vehicles should stop and hold until further cleared to proceed, when so instructed by the aerodrome control tower.

**'Isolated Aircraft Parking Position'** means an area suitable for the parking of an aircraft which is known or suspected to be the subject of unlawful interference, or for other reasons needs isolation from normal aerodrome activities.

**'Landing area'** means that part of a movement area intended for the landing or take-off of aircraft.

**'Landing direction indicator'** means a device to indicate visually the direction currently designated for landing and for take-off.

**'Manoeuvring area'** means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

**'Marker'** means an object displayed above ground level in order to indicate an obstacle or delineate a boundary.

**'Marking'** means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

**'Movement area'** means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).

**'Non-instrument runway'** means a runway intended for the operation of aircraft using visual approach procedures.

**'Obstacle'** means all fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

(a) are located on an area intended for the surface movement of aircraft; or

(b) extend above a defined surface intended to protect aircraft in flight; or

(c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

**'Obstacle free zone (OFZ)'** means the airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangibly mounted one required for air navigation purposes.

**'Obstacle limitation surfaces'** means a series of surfaces that define the limits to which objects may project into the airspace around aerodrome to be ideally maintained free from obstacles.

**'Operator'** means any legal or natural person, operating or proposing to operate one or more aircraft or one or more aerodromes.

**'Paved runway'** means a runway with a hard surface that is made up of engineered and manufactured materials bound together so it is durable and either flexible or rigid.

**'Pavement classification number (PCN)'** means a number expressing the bearing strength of a pavement for unrestricted operations.

**'Precision approach runway',** see Instrument runway.

**'Primary runway(s)'** means runway(s) used in preference to others whenever conditions permit.

**'Road'** means an established surface route on the movement area meant for the exclusive use of vehicles.

**'Road-holding position'** means a designated position at which vehicles may be required to hold.

**'Runway'** means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

**'Runway end safety area (RESA)'** means an area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.

**'Runway guard lights'** means a light system intended to caution pilots or vehicle drivers that they are about to enter an active runway.

**'Runway-holding position'** means a designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles should stop and hold, unless otherwise authorised by the aerodrome control tower.

Note — in radiotelephony phraseologies, the expression 'holding point' is used to designate the runway-holding position.

**'Runway strip'** means a defined area including the runway and stopway, if provided, intended:

(a) to reduce the risk of damage to aircraft running off a runway; and

(b) to protect aircraft flying over it during take-off or landing operations.

**'Runway turn pad'** means a defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on a runway.

**'Runway visual range (RVR)'** means the range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

**'Sensitive Area'** means an area extending beyond the Critical Area where the parking and/or movement of aircraft or vehicles will affect the guidance signal to the extent that it may be rendered unacceptable to aircraft using the signal.

**'Shoulder'** means an area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

**'Sign'**

(a) Fixed message sign means a sign presenting only one message.

(b) Variable message sign means a sign capable of presenting several predetermined messages or no message, as applicable.

**'Signal area'** means an area on an aerodrome used for the display of ground signals.

**'Stopway'** means a defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

**'Surface friction'** means the resistance offered to the movement of one body past a surface with which it is in contact.

**'Switch-over time (light)'** means the time required for the actual intensity of a light measured in a given direction to fall from 50 % and recover to 50 % during a power supply changeover, when the light is being operated at intensities of 25 % or above.

**'Take-off runway'** means a runway intended for take-off only.

**'Taxiway'** means a defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including:

(a) Aircraft stand taxilane means a portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.

(b) Apron taxiway means a portion of a taxiway system located on an apron and intended to provide a through taxi-route across the apron.

(c) Rapid exit taxiway means a taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimising runway occupancy times.

**'Taxiway intersection'** means a junction of two or more taxiways.

**'Taxiway strip'** means an area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.

**'Threshold'** means the beginning of that portion of the runway usable for landing.

**'Touchdown zone'** means the portion of a runway, beyond the threshold, where landing aeroplanes are intended to first contact the runway.

**'Visual approach slope indicator system'** means a system of lights arranged to provide visual descent guidance information during the approach to a runway.

**CS-ADR-DSN.A.005 — Aerodrome reference code** *REV MOVE to GM TXT*

(a) An aerodrome reference code, consisting of a code number and letter, which is selected for aerodrome planning purposes, should be determined in accordance with the characteristics of the aeroplane for which an aerodrome facility is intended.

(b) The aerodrome reference code numbers and letters should have the meanings assigned to them in Table A-1.

(c) The code number for element 1 should be determined from Table A-1, column 1, selecting the code number corresponding to the highest value of the aeroplane reference field lengths of the aeroplanes for which the runway is intended. The determination of the aeroplane reference field length is solely for the selection of a code number and is not intended to influence the actual runway length provided.

(d) The code letter for element 2 should be determined from Table A-1, column 3, by selecting the code letter which corresponds to the greatest wingspan, or the greatest outer main gear wheel span, whichever gives the more demanding code letter of the aeroplanes for which the facility is intended.

| **CODE ELEMENT ONE** | | | **CODE ELEMENT TWO** | |
|---|---|---|---|---|
| **Code Number** | **The greater of TODA or ASDA** | **Code Letter** | **Wing Span** | **Outer Main Gear Wheel Span**[a] |
| 1 | Less than 800 m | A | Up to but not including 15 m | Up to but not including 4.5 m |
| 2 | 800 m up to but not including 1200 m | B | 15 m up to but not including 24 m | 4.5 m up to but not including 6 m |
| 3 | 1200 m up to but not including 1800 m | C | 24 m up to but not including 36 m | 6 m up to but not including 9 m |
| 4 | 1800 m and over | D | 36 m up to but not including 52 m | 9 m up to but not including 14 m |
| | | E | 52 m up to but not including 65 m | 9 m up to but not including 14 m |
| | | F | 65 m up to but not including 80m | 14 m up to but not including 16 m |

[a] Distance between the outside edges of the main gear wheels

Table A-1 Aerodrome reference code

# CHAPTER B — RUNWAYS

## CS-ADR-DSN.B.015 — Number, siting and orientation of runways *MOVE to GM TXT*

The number and orientation of runways at an aerodrome should be such that the usability of the aerodrome is optimised taking into account that safety is not compromised.

## CS-ADR-DSN.B.020 — Choice of maximum permissible crosswind components *MOVE to GM*

See GM-ADR-DSN.B.020.

## CS-ADR-DSN.B.025 Data to be used *MOVE to GM*

See GM-ADR-DSN.B.025.

## CS-ADR-DSN.B.030 — Runway threshold *MOVE to GM TXT*

(a) A threshold should be provided on a runway.

(b) A threshold need not to be provided on a take-off runway.

(c) A threshold should be located at the extremity of a runway, unless operational considerations justify the choice of another location.

(d) The runway threshold should be measured at the start of pavement.

(e) When it is necessary to displace a threshold, either permanently or temporarily, from its normal location, account should be taken of the various factors which may have a bearing on the location of the threshold.

(f) The width of the runway should be measured at the outside edge of the runway edge marking.

(g) When the threshold is displaced, the threshold location should be measured at the inner (upwind) edge of the threshold marking (the painted band across the runway).

## CS-ADR-DSN.B.035 — Actual length of runway and declared distances *ADD MOVE to GM*

(a) The length of a runway should provide declared distances adequate to meet the operational requirements for the aircraft which the runway is intended to serve.

(b) The following distances should be calculated to the nearest metre for each runway:

  (1) Take-off run available;

  (2) Take-off distance available;

  (3) Accelerate-stop distance available;

  (4) Landing distance available.

(c) A detailed description of declared distances is set out in GM-ADR-DSN.B.035.

### CS-ADR-DSN.B.040 Runways with stopways or clearways MOVE to GM ADD

The length(s) of a stopway or clearway, where provided, should be of adequate distance to meet the operational requirements for the aircraft which the runway is intended to serve.

### CS-ADR-DSN.B.045 — Width of runways ICAO

(a) The width of a runway should be not less than the appropriate dimension specified in the following tabulation:

| | Code letter | | | | | |
|---|---|---|---|---|---|---|
| Code No | A | B | C | D | E | F |
| 1[a] | 18 m | 18 m | 23 m | — | — | — |
| 2[a] | 23 m | 23 m | 30 m | — | — | — |
| 3 | 30 m | 30 m | 30 m | 45 m | — | — |
| 4 | — | — | 45 m | 45 m | 45 m | 60 m |

[a] *The width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.*

(b) The width of the runway should be measured at the outside edge of the runway edge marking.

### CS-ADR-DSN.B.050 — Minimum distance between parallel non-instrument runways ICAO

(a) Where parallel non-instrument runways are intended for simultaneous use, the minimum distance between their centre lines should be:

(1) 210 m where the higher code number is 3 or 4;

(2) 150 m where the higher code number is 2; and

(3) 120 m where the higher code number is 1.

### CS-ADR-DSN.B.055 — Minimum distance between parallel instrument runways TXT MOVE to GM

(a) Where parallel instrument runways are intended for simultaneous use, the minimum distance between their centre lines should be:

(1) 1 035 m for independent parallel approaches;

(2) 915 m for dependent parallel approaches;

(3) 760 m for independent parallel departures;

(4) 760 m for segregated parallel operations.

(b) except that: for segregated parallel operations the specified minimum distance:

(1) may be decreased by 30 m for each 150 m that the arrival runway is staggered toward the arriving aircraft, to a minimum of 300 m; and

(2) should be increased by 30 m for each 150 m that the arrival runway is staggered away from the arriving aircraft.

(c) other combinations of minimum distances may apply taking into account ATM and operational aspects.

## CS-ADR-DSN.B.060 — Longitudinal slopes of runways ICAO

(a) The slope computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length should not exceed:

(1) 1 % where the code number is 3 or 4; and

(2) 2 % where the code number is 1 or 2.

(b) Along no portion of a runway should the longitudinal slope exceed:

(1) 1.25 % where the code number is 4, except that for the first and last quarter of the length of the runway the longitudinal slope should not exceed 0.8 %;

(2) 1.5 % where the code number is 3, except that for the first and last quarter of the length of a precision approach runway category II or III the longitudinal slope should not exceed 0.8 %; and

(3) 2 % where the code number is 1 or 2.

## CS-ADR-DSN.B.065 — Longitudinal slope changes on runways ICAO

(a) Where slope changes cannot be avoided, a slope change between two consecutive slopes should not exceed:

(1) 1.5 % where the code number is 3 or 4; and

(2) 2 % where the code number is 1 or 2.

(b) The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding:

(1) 0.1 % per 30 m (minimum radius of curvature of 30 000 m) where the code number is 4;

(2) 0.2 % per 30 m (minimum radius of curvature of 15 000 m) where the code number is 3; and

(3) 0.4 % per 30 m (minimum radius of curvature of 7 500 m) where the code number is 1 or 2.

**CS-ADR-DSN.B.070 — Sight distance for slopes on runways** *ICAO*

(a) Where slope changes on runways cannot be avoided, they should be such that there will be an unobstructed line of sight from:

(1) any point 3 m above a runway to all other points 3 m above the runway within a distance of at least half the length of the runway where the code letter is C, D, E or F;

(2) any point 2 m above a runway to all other points 2 m above the runway within a distance of at least half the length of the runway where the code letter is B; and

(3) any point 1.5 m above a runway to all other points 1.5 m above the runway within a distance of at least half the length of the runway where the code letter is A.

**CS-ADR-DSN.B.075 — Distance between slope changes** *ICAO*

(a) Undulations or appreciable changes in slopes located close together along a runway should be avoided. The distance between the points of intersection of two successive curves should not be less than:

(1) the sum of the absolute numerical values of the corresponding slope changes multiplied by the appropriate value as follows:

(i) 30 000 m where the code number is 4;

(ii) 15 000 m where the code number is 3; and

(iii) 5 000 m where the code number is 1 or 2; or

(2) 45 m; whichever is greater.

**CS-ADR-DSN.B.080 — Transverse slopes** *ICAO*

(a) To promote the most rapid drainage of water, the runway surface should be cambered, except where a single crossfall from high to low in the direction of the wind most frequently associated with rain would ensure rapid drainage. The transverse slope should be:

(1) not less than 1 % and not more than 1.5 % where the code letter is C, D, E or F; and

(2) not less than 1 % and not more than 2 % where the code letter is A or B;

except at runway or taxiway intersections where flatter slopes may be necessary.

(b) For a cambered surface, the transverse slope on each side of the centre line should be symmetrical.

(c) The transverse slope should be the same throughout the length of a runway except at an intersection with another runway or a taxiway where an even transition should be provided taking account of the need for adequate drainage.

**CS-ADR-DSN.B.085 — Runway strength** *TXT*

The runway should be of sufficient strength to support normal operations of the most critical aeroplane without risk of damage either to the aeroplane or the runway. Conditions for overload operations and ACN/PCN are in Book 2 – Guidance Material for Aerodrome Design.

## CS-ADR-DSN.B.090 — Surface of runways ICAO MOVE to OPS

(a) The surface of a runway should be constructed without irregularities that would result in loss in friction characteristics or otherwise adversely affect the take-off or landing of an aeroplane.

(b) The surface of a paved runway should be so constructed as to provide good friction characteristics when the runway is wet.

(c) The average surface texture depth of a new surface should be not less than 1.0 mm.

(d) If he surface is grooved or scored, the grooves or scorings should be either perpendicular to the runway centre line or parallel to non-perpendicular transverse joints, where applicable.

## SECTION 1 RUNWAY TURN PADS

## CS-ADR-DSN.B.095 — Runway turn pads ICAO TXT

(a) Where the end of a runway is not served by a taxiway or a taxiway turnaround, a runway turn pad should be provided to facilitate a 180-degree turn of aeroplanes. (See Figure B-1.)

(b) The design of a runway turn pad should be such that, when the cockpit of the aeroplane for which the turn pad is intended remains over the turn pad marking, the clearance distance between any wheel of the aeroplane landing gear and the edge of the turn pad should be appropriate to the most demanding aircraft:

(c) On runway turn pads, the clearance distance between any wheel of the aeroplane landing gear and the edge of the turn pad should be not less than that given by the following tabulation:

| Code letter | Clearance |
|---|---|
| A | 1.5 m |
| B | 2.25 m |
| C | 3 m if the turn pad is intended to be used by aeroplanes with a wheel base less than 18 m; or<br>4.5 m if the turn pad is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m. |
| D | 4.5 m |
| E | 4.5 m |
| F | 4.5 m |

(d) The runway turn pad may be located on either the left or right side of the runway and adjoining the runway pavement at both ends of the runway and at some intermediate locations where deemed necessary.

(e) The intersection angle of the runway turn pad with the runway should not exceed 30 degrees.

(f) The nose wheel steering angle to be used in the design of the runway turn pad should not exceed 45 degrees.

(g) Where severe weather conditions and resultant lowering of surface friction characteristics prevail, a larger wheel-to-edge clearance of 6 m should be provided where the code letter is E or F.

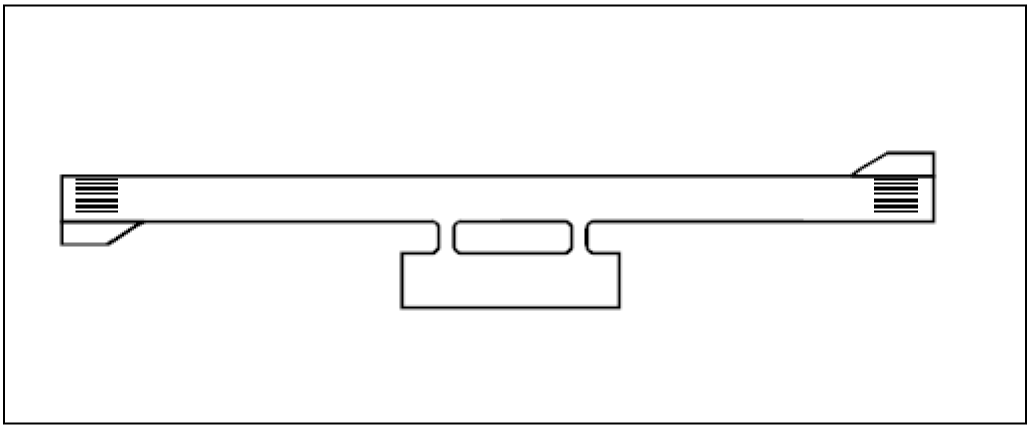


Figure B-1. Typical turn pad layout

### CS-ADR-DSN.B.100 Slopes on runway turn pads *ICAO*

The longitudinal and transverse slopes on a runway turn pad should be sufficient to prevent the accumulation of water on the surface and facilitate rapid drainage of surface water. The slopes should be the same as those on the adjacent runway pavement surface.

### CS-ADR-DSN.B.105 — Strength of runway turn pads *TXT*

The strength of a runway turn pad should be compatible with the adjoining runway which it serves, due consideration being given to the fact that the turn pad will be subjected to slow-moving traffic making hard turns and consequent higher stresses on the pavement.

### CS-ADR-DSN.B.110 — Surface of runway turn pads *TXT*

(a) The surface of a runway turn pad should not have surface irregularities that may cause damage to an aeroplane using the turn pad.

(b) The surface of a runway turn pad should be constructed or resurfaced to provide friction characteristics compatible with the runway friction characteristics.

### CS-ADR-DSN.B.115 — Width of shoulders for runway turn pads *ICAO*

The runway turn pads should be provided with shoulders of such width as is necessary to prevent surface erosion by the jet blast of the most demanding aeroplane for which the turn pad is intended and any possible foreign object damage to the aeroplane engines.

### CS-ADR-DSN.B.120 — Strength of shoulders for runway turn pads ICAO

The strength of runway turn pad shoulders should be capable of withstanding the occasional passage of the most demanding aeroplane it is designed to serve without inducing structural damage to the aeroplane and to the supporting ground vehicles that may operate on the shoulder.

## SECTION 2 RUNWAY SHOULDERS

### CS-ADR-DSN.B.125 — Runway shoulders ICAO

(a) Runway shoulders should be provided for a runway where the code letter is D or E, and the runway width is less than 60 m.

(b) Runway shoulders should be provided for a runway where the code letter is F.

### CS-ADR-DSN.B.130 — Slopes on runway shoulders ICAO

The surface of the paved shoulder that abuts the runway should be flush with the surface of the runway and its transverse slope should not exceed 2.5 %.

### CS-ADR-DSN.B.135 — Width of runway shoulders ICAO

(a) The runway shoulders should extend symmetrically on each side of the runway so that the overall width of the runway and its shoulders is not less than:

(1) 60 m where the code letter is D or E; and

(2) 75 m where the code letter is F.

### CS-ADR-DSN.B.140 — Strength of runway shoulders ICAO

A runway shoulder should be prepared or constructed so as to be capable, in the event of an aeroplane running off the runway, of supporting the aeroplane without inducing structural damage to the aeroplane and of supporting ground vehicles which may operate on the shoulder.

### CS-ADR-DSN.B.145 — Surface of runway shoulders ICAO

The surface of a runway shoulder should be so prepared as to resist erosion and prevent the ingestion of the surface material by aeroplane engines.

## SECTION 3 RUNWAY STRIP

### CS-ADR-DSN.B.150 — Runway strip to be provided ADD

(a) A runway and any associated stopways should be included in a strip. The runway strip is a defined area including the runway and stopway, if provided, intended:

(1) to reduce the risk of damage to aircraft running off a runway; and

(2) to protect aircraft flying over it during take-off or landing operations.

### CS-ADR-DSN.B.155 — Length of runway strip *ICAO*

(a) A strip should extend before the threshold and beyond the end of the runway or stopway for a distance of at least:

(3) 60 m where the code number is 2, 3 or 4;

(4) 60 m where the code number is 1 and the runway is an instrument one; and

(5) 30 m where the code number is 1 and the runway is a non-instrument one.

### CS-ADR-DSN.B.160 — Width of runway strip *ICAO*

(a) A strip including a precision approach runway should, wherever practicable, extend laterally to a distance of at least:

(1) 150 m where the code number is 3 or 4; and

(2) 75 m where the code number is 1 or 2; on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(b) A strip including a non-precision approach runway should extend laterally to a distance of at least:

(1) 150 m where the code number is 3 or 4; and

(2) 75 m where the code number is 1 or 2; on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(c) A strip including a non-instrument runway should extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least:

(1) 75 m where the code number is 3 or 4;

(2) 40 m where the code number is 2; and

(3) 30 m where the code number is 1.

### CS-ADR-DSN.B.165 — Objects on runway strips *ICAO* ***MOVE to OPS***

(a) An object situated on a runway strip which may endanger aeroplanes should be regarded as an obstacle and should, as far as practicable, be removed.

(b) No fixed object, other than visual aids required for air navigation or for aircraft safety purposes and satisfying the relevant frangibility requirement in Chapter 5, should be permitted on a runway strip:

(1) within 77.5 m of the runway centre line of a precision approach runway category I, II or III where the code number is 4 and the code letter is F; or

(2) within 60 m of the runway centre line of a precision approach runway category I, II or III where the code number is 3 or 4;or

(3) within 45 m of the runway centre line of a precision approach runway category I where the code number is 1 or 2.

## CS-ADR-DSN.B.170 — Non-precision approach and non-instrument runway strips ADD

(a) No fixed object, other than visual aids required for air navigation or for aircraft safety purposes and satisfying the relevant frangibility requirement in CS-ADR-DSN.T.920, should be permitted on a runway strip:

(1) within 75 m of the runway centre line where the code number is 3 or 4 , and;

(2) within 45 m of the runway centre line where the code number is 2, and;

(3) within 30 m of the runway centre line where the code number is 1.

## CS-ADR-DSN.B.175 — Grading of runway strips ICAO

(a) That portion of a strip of an instrument runway within a distance of at least:

(1) 75 m where the code number is 3 or 4; and

(2) 40 m where the code number is 1 or 2;

from the centre line of the runway and its extended centre line should provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

(b) That portion of a strip of a non-instrument runway within a distance of at least:

(1) 75 m where the code number is 3 or 4;

(2) 40 m where the code number is 2; and

(3) 30 m where the code number is 1;

from the centre line of the runway and its extended centre line should provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

(c) The surface of that portion of a strip that abuts a runway, shoulder or stopway should be flush with the surface of the runway, shoulder or stopway.

(d) That portion of a strip to at least 30 m before a threshold should be prepared against blast erosion in order to protect a landing aeroplane from the danger of an exposed edge.

## CS-ADR-DSN.B.180 — Longitudinal Slopes on runway strips ICAO

(a) A longitudinal slope along that portion of a strip to be graded should not exceed:

(1) 1.5 % where the code number is 4;

(2) 1.75 % where the code number is 3; and

(3) 2 % where the code number is 1 or 2.

(b) Longitudinal slope changes on that portion of a strip to be graded should be as gradual as practicable and abrupt changes or sudden reversals of slopes should be avoided.

## CS-ADR-DSN.B.185 — Transverse Slopes on runway strips ICAO

(a) Transverse slopes on that portion of a strip to be graded should be adequate to prevent the accumulation of water on the surface but should not exceed:

(1) 2.5 % where the code number is 3 or 4; and

(2) 3 % where the code number is 1 or 2;

except that to facilitate drainage the slope for the first 3 m outward from the runway, shoulder or stopway edge should be negative as measured in the direction away from the runway and may be as great as 5 %.

(b) The transverse slopes of any portion of a strip beyond that to be graded should not exceed an upward slope of 5 % as measured in the direction away from the runway.

### CS-ADR-DSN.B.190 — Strength of runway strips *ICAO*

(a) That portion of a strip of an instrument runway within a distance of at least:

(1) 75 m where the code number is 3 or 4; and

(2) 40 m where the code number is 1 or 2;

from the centre line of the runway and its extended centre line should be so prepared or constructed as to minimise hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

(b) That portion of a strip containing a non-instrument runway within a distance of at least:

(1) 75 m where the code number is 3 or 4;

(2) 40 m where the code number is 2; and

(3) 30 m where the code number is 1;

from the centre line of the runway and its extended centre line should be so prepared or constructed as to minimise hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

## SECTION 4 CLEARWAYS, STOPWAYS AND RADIO ALTIMETER OPERATING AREA

### CS-ADR-DSN.B.195 — Clearways *MOVE to GM ADD*

(a) The inclusion of detailed specifications for clearways in this section is not intended to imply that a clearway has to be provided; Book 2 – Guidance Material for Aerodrome Design provides information on the use of clearways.

(b) Location of clearways:

The origin of a clearway should be at the end of the take-off run available.

(c) Length of clearways

The length of a clearway should be defined and published.

(d) Width of clearways:

(1) The width of a clearway should be defined and published.

(2) A clearway should extend laterally to a distance of at least 75 m on each side of the extended centre line of the runway, or, in the case of a non-instrument runway, the width of the runway strip.

(e) Slopes on clearways:

The ground in a clearway should not project above a plane having an upward slope of 1.25 %, the lower limit of this plane being a horizontal line which:

(1) is perpendicular to the vertical plane containing the runway centre line; and

(2) passes through a point located on the runway centre line at the end of the take-off run available.

(f) Objects on clearways:

The detailed requirements for siting objects on clearways are in CS-ADR-DSN.T.915 (Siting of equipment and installations on operational areas).

## CS-ADR-DSN.B.200 — Stopways *MOVE to GM ADD*

(a) Width of stopways:

A stopway should have the same width as the runway with which it is associated.

(b) Slopes on stopways:

Slopes on stopways should be defined and optimised.

(c) Strength of stopways:

A stopway should be prepared or constructed so as to be capable, in the event of an abandoned take-off, of supporting the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane. Book 2 – Guidance Material for Aerodrome Design presents guidance relative to the support capability of a stopway.

(d) Surface of stopways:

(1) The surface of a paved stopway should be so constructed as to provide a good coefficient of friction to be compatible with that of the associated runway when the stopway is wet.

(2) The friction characteristics of an unpaved stopway should not be substantially less than that of the runway with which the stopway is associated.

## CS-ADR-DSN.B.205 — Radio altimeter operating area *MOVE to GM*

(a) Length of the area:

A radio altimeter operating area should extend before the threshold for a distance of at least 300 m.

(b) Width of the area:

A radio altimeter operating area should extend laterally, on each side of the extended centre line of the runway, to a distance of 60 m, except that, when special circumstances so warrant, the distance may be reduced to no less than 30 m if an aeronautical study indicates that such reduction would not affect the safety of operations of aircraft.

# CHAPTER C — RUNWAY END SAFETY AREA

## CS-ADR-DSN.C.210 — Runway End Safety Areas ICAO

(a) A runway end safety area should be provided at each end of a runway strip where:

(1) the code number is 3 or 4; and

(2) the code number is 1 or 2 and the runway is an instrument one.

## CS-ADR-DSN.C.215 — Dimensions of runway end safety areas TXT ADD

(a) Length of RESA

A runway end safety area should, as far as practicable, extend from the end of a runway strip to a distance of at least:

(1) 240 m where the code number is 3 or 4;

(2) 120 m where the code number is 1 or 2; and

(3) with a minimum distance of at least 90 m.

(b) Where a RESA exceeding the minimum distance, but less than the distance in (a)(1) and (a)(2) is considered necessary, the aerodrome operator should undertake a safety assessment to identify the hazards and appropriate actions to reduce the risk.

(c) Where an arresting system of demonstrated performance capability is installed, the specifications above may be reduced in accordance with the design specification of the arresting system.

(d) Width of RESA

The width of a runway end safety area should, wherever practicable, be equal to that of the graded portion of the associated runway strip.

## CS-ADR-DSN.C.220 — Objects on runway end safety areas TXT

No fixed object, other than visual aids required for air navigation or for aircraft safety purposes and satisfying the relevant frangibility requirement CS-ADR-DSN.T.920, should be permitted on a runway end safety area. The detailed requirements for siting objects on a RESA are in CS-ADR-DSN.T.925 (Siting of equipment and installations on operational areas).

## CS-ADR-DSN.C.225 — Clearing and grading of runway end safety areas ADD

(a) A runway end safety area should provide a cleared and graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane undershooting or overrunning the runway.

(b) The surface of the runway end safety area should be prepared, but does not need to be prepared to the same quality as the runway strip.

## CS-ADR-DSN.C.230 — Slopes on runway end safety areas ICAO

(a) Longitudinal slopes

(1) The slopes of a runway end safety area should be such that no part of the runway end safety area penetrates the approach or take-off climb surface.

(2) The longitudinal slopes of a runway end safety area should not exceed a downward slope of 5 %. Longitudinal slope changes should be as gradual as practicable and abrupt changes or sudden reversals of slopes should be avoided.

(b) Transverse slopes

(1) The transverse slopes of a runway end safety area should not exceed an upward or downward slope of 5 %. Transitions between differing slopes should be as gradual as practicable.

**CS-ADR-DSN.C.235 — Strength of runway end safety areas** ***MOVE to GM***

See GM-ADR-DSN.C.235.

# CHAPTER D — TAXIWAYS

## CS-ADR-DSN.D.240 — Taxiways General ICAO

Unless otherwise indicated, the requirements in this Chapter are applicable to all types of taxiways.

(a) The design of a taxiway should be such that, when the cockpit of the aeroplane for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway should be not less than that given by the following tabulation:

| Code letter | Clearance |
|---|---|
| A | 1.5 m |
| B | 2.25 m |
| C | 3 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; or<br>4.5 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m. |
| D | 4.5 m |
| E | 4.5 m |
| F | 4.5 m |

## CS-ADR-DSN.D.245 — Width of Taxiways ICAO

(a) A straight portion of a taxiway should have a width of not less than that given by the following tabulation:

| Code letter | Taxiway width |
|---|---|
| A | 7.5 m |
| B | 10.5 m |
| C | 15 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; or<br>18 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m |
| D | 18 m if the taxiway is intended to be used by aeroplanes with an outer main gear wheel span of less than 9 m; or<br>23 m if the taxiway is intended to be used by aeroplanes with an outer main gear wheel span equal to or greater than 9 m. |
| E | 23 m |
| F | 25 m |

## CS-ADR-DSN.D.250 — Taxiways curves *ICAO*

Changes in direction of taxiways should be as few and small as possible. The radii of the curves should be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the taxiway is intended. The design of the curve should be such that, when the cockpit of the aeroplane for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheels of the aeroplane and the edge of the taxiway should be not less than those specified in CS-ADR-DSN.D.240.

## CS-ADR-DSN.D.255 — Junction and intersection of taxiways *ICAO*

To facilitate the movement of aeroplanes, fillets should be provided at junctions and intersections of taxiways with runways, aprons and other taxiways. The design of the fillets should ensure that the minimum wheel clearances specified in CS-ADR-DSN.D.240 are maintained when aeroplanes are manoeuvring through the junctions or intersections.

## CS-ADR-DSN.D.260 — Taxiway minimum separation distance *TXT ADD*

The separation distance between the centre line of a taxiway and the centre line of a runway, the centre line of a parallel taxiway or an object should not be less than the appropriate dimension specified in Table D-1, except that it may be permissible to operate with lower separation distances at an existing aerodrome if an aeronautical study indicates that such lower separation distances would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

| | Distance between taxiway centre line and runway centre line (metres) | | | | | | | | | Taxiway centre line to taxiway centre line (metres) | Taxiway, other than aircraft stand taxilane, centre line to object (metres) | Aircraft stand taxilane centre line to object (metres) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Instrument runways Code number | | | | | Non-instrument runways Code number | | | | | | |
| Code letter | 1 | 2 | 3 | 4 | | 1 | 2 | 3 | 4 | | | |
| (1) | (2) | (3) | (4) | (5) | | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| A | 82.5 | 82.5 | — | — | | 37.5 | 47.5 | — | — | 23.75 | 16.25 | 12 |
| B | 87 | 87 | — | — | | 42 | 42 | — | — | 33.5 | 21.5 | 16.5 |
| C | — | — | 168 | — | | — | — | 93 | | 44 | 26 | 24.5 |
| D | — | — | 176 | 176 | | — | — | 101 | 101 | 66.5 | 40.5 | 36 |
| E | — | — | — | 182.5 | | — | — | — | 107.5 | 80 | 47.5 | 42.5 |
| F | — | — | — | 190 | | — | — | — | 115 | 95 | 55 | 50.5 |

*Note 1 — The separation distances shown in columns (2) to (9) represent ordinary combinations of runways and taxiways. The basis for development of these distances is given in the* Aerodrome Design Manual *(Doc 9157), Part 2*.

*Note 2 — The distances in columns (2) to (9) do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aeroplane on a parallel taxiway. See the* Aerodrome Design Manual *(Doc 9157), Part 2.*

*Note 3 — For service roads with the height limited objects, clearances referring to height limited objects or service roads that do not enhance the safety of aeroplane operation can be reduced to not less than 4.50 m.*

Table D-1. Taxiway minimum separation distances

**CS-ADR-DSN.D.265 — Longitudinal slopes on taxiways** *ICAO*

(a) The longitudinal slope of a taxiway should not exceed:

(1) 1.5 % where the code letter is C, D, E or F; and

(2) 3 % where the code letter is A or B.

**CS-ADR-DSN.D.270 — Longitudinal slope changes on taxiways** *ICAO*

(a) Where slope changes on a taxiway cannot be avoided, the transition from one slope to another slope should be accomplished by a curved surface with a rate of change not exceeding:

(1) 1 % per 30 m (minimum radius of curvature of 3 000 m) where the code letter is C, D, E or F; and

(2) 1 % per 25 m (minimum radius of curvature of 2 500 m) where the code letter is A or B.

(b) Where slope changes in (a)(1) and (2) are not achieved and slopes on a taxiway cannot be avoided, the transition from one slope to another slope should be accomplished by a curved surface which will allow the safe operation of all aircraft in all weather conditions.

**CS-ADR-DSN.D.275 — Sight distance of taxiways** *ICAO*

(a) Where a change in slope on a taxiway cannot be avoided, the change should be such that, from any point:

(1) 3 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 300 m from that point, where the code letter is C, D, E or F;

(2) 2 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 200 m from that point, where the code letter is B; and

(3) 1.5 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 150 m from that point, where the code letter is A.

**CS-ADR-DSN.D.280 — Transverse slopes on taxiways** *ICAO*

(a) The transverse slopes of a taxiway should be sufficient to prevent the accumulation of water on the surface of the taxiway but should not exceed:

(1) 1.5 % where the code letter is C, D, E or F; and

(2) 2 % where the code letter is A or B.

### CS-ADR-DSN.D.285 — Strength of taxiways TXT

The strength of a taxiway should be suitable for the aircraft that the taxiway is intended to serve. (Book 2 – Guidance Material for Aerodrome Design), due consideration being given to the fact that a taxiway will be subjected to a greater density of traffic and, as a result of slow moving and stationary aeroplanes, to higher stresses than the runway it serves.

### CS-ADR-DSN.D.290 — Surface of taxiways ICAO

(a) The surface of a taxiway should not have irregularities that cause damage to aeroplane structures.

(b) The surface of a paved taxiway should be so constructed as to provide good friction characteristics when the taxiway is wet.

### CS-ADR-DSN.D.295 — Rapid exit taxiways TXT

(a) A rapid exit taxiway should be designed with a radius of turn-off curve of at least:

(1) 550 m where the code number is 3 or 4; and

(2) 275 m where the code number is 1 or 2; to enable exit speeds under wet conditions of:

(i) 93 km/h where the code number is 3 or 4; and

(ii) 65 km/h where the code number is 1 or 2.

(b) The radius of the fillet on the inside of the curve at a rapid exit taxiway should be sufficient to provide a widened taxiway throat in order to facilitate early recognition of the entrance and turn-off onto the taxiway.

(c) A rapid exit taxiway should include a straight distance after the turn-off curve sufficient for an exiting aircraft to come to a full stop clear of any intersecting taxiway (Figure D-1).

(d) The intersection angle of a rapid exit taxiway with the runway should not be greater than 45°, preferably be 30°, but lower angles may be suitable depending on the aerodrome layout and traffic mix.

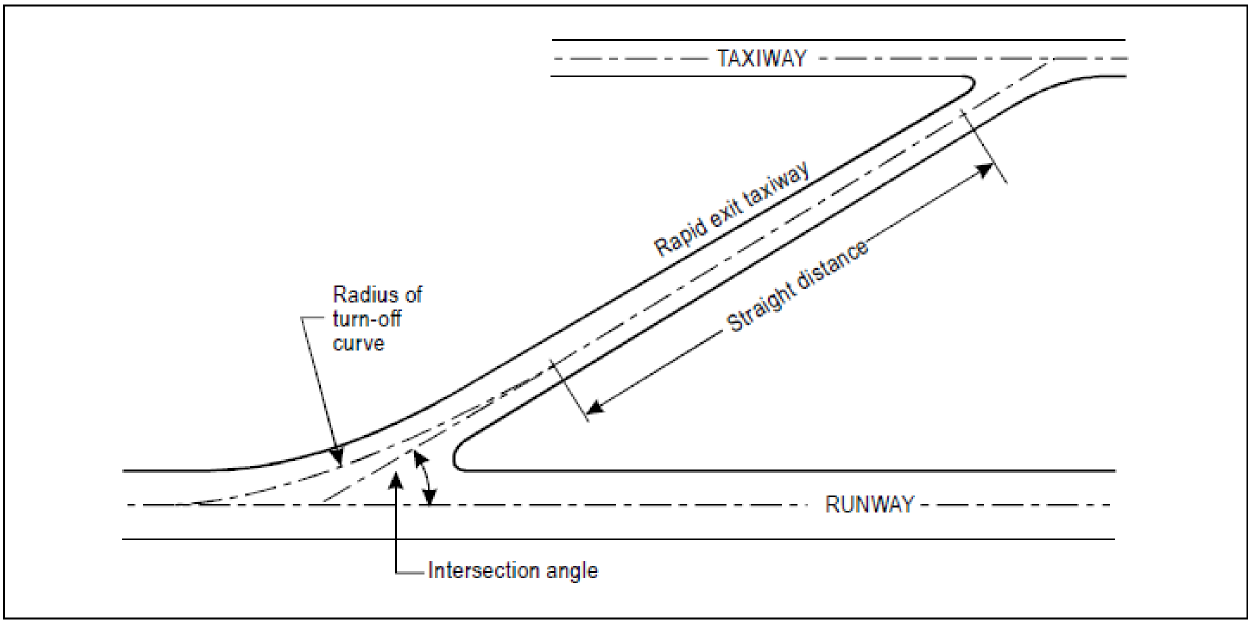



Figure D-1. Rapid exit taxiway

**CS-ADR-DSN.D.300 — Taxiways on bridges** *ICAO*

(a) The width of that portion of a taxiway bridge capable of supporting aeroplanes, as measured perpendicularly to the taxiway centre line, should not be less than the width of the graded area of the strip provided for that taxiway, unless a proven method of lateral restraint is provided which should not be hazardous for aeroplanes for which the taxiway is intended.

(b) Access should be provided to allow rescue and fire-fighting vehicles to intervene in both directions within the specified response time to the largest aeroplane for which the taxiway bridge is intended.

(c) A bridge should be constructed on a straight section of the taxiway with a straight section on both ends of the bridge to facilitate the alignment of aeroplanes approaching the bridge.

**CS-ADR-DSN.D.305 — Taxiway shoulders** *ICAO*

(a) Straight portions of a taxiway where the code letter is C, D, E or F should be provided with shoulders which extend symmetrically on each side of the taxiway so that the overall width of the taxiway and its shoulders on straight portions is not less than:

  (1) 60 m where the code letter is F;

  (2) 44 m where the code letter is E;

  (3) 38 m where the code letter is D; and

  (4) 25 m where the code letter is C.

(b) On taxiway curves and on junctions or intersections where increased pavement is provided, the shoulder width should be not less than that on the adjacent straight portions of the taxiway.

(c) When a taxiway is intended to be used by turbine-engined aeroplanes, the surface of the taxiway shoulder should be so prepared as to resist erosion and the ingestion of the surface material by aeroplane engines.

**CS-ADR-DSN.D.310 — Taxiway Strip** *ICAO*

A taxiway, other than an aircraft stand taxilane, should be included in a strip.

**CS-ADR-DSN.D.315 — Width of taxiway strips** *ICAO*

A taxiway strip should extend symmetrically on each side of the centre line of the taxiway throughout the length of the taxiway to at least the distance from the centre line given in Table ADR-D-1, column 11.

**CS-ADR-DSN.D.320 — Objects on taxiway strips** *TXT ADD*

The taxiway strip should provide an area which should be free from objects which might create an unacceptable risk to taxiing aeroplanes. This should not preclude parking equipment required for that area in specifically identified positions or zones. The detailed requirements for siting objects on taxiway strips are in CS-ADR-DSN.T.925 (Siting of equipment and installations on operational areas).

**CS-ADR-DSN.D.325 — Grading of taxiway strips** *ICAO*

(a) The centre portion of a taxiway strip should provide a graded area to a distance from the centre line of the taxiway of at least:

(1) 11 m where the code letter is A;

(2) 12.5 m where the code letter is B or C;

(3) 19 m where the code letter is D;

(4) 22 m where the code letter is E; and

(5) 30 m where the code letter is F.

**CS-ADR-DSN.D.330 — Slopes on taxiway strips** *ICAO*

(a) The surface of the strip should be flush at the edge of the taxiway or shoulder, if provided, and the graded portion should not have an upward transverse slope exceeding:

(1) 2.5 % for strips where the code letter is C, D, E or F; and

(2) 3 % for strips of taxiways where the code letter is A or B;

the upward slope being measured with reference to the transverse slope of the adjacent taxiway surface and not the horizontal. The downward transverse slope should not exceed 5 % measured with reference to the horizontal.

(b) The transverse slopes on any portion of a taxiway strip beyond that to be graded should not exceed an upward or downward slope of 5 % as measured in the direction away from the taxiway.

**CS-ADR-DSN.D.335 — Holding Bays, runway-holding positions, intermediate holding positions and road-holding positions** *TXT*

(a) Holding bay(s) or other bypasses of sufficient size and adequate construction should be provided where necessary to make deviations in the departure sequence possible.

(b) A runway-holding position or positions should be established on a taxiway when an aircraft on the taxiway could endanger aircraft operations.

(c) An intermediate holding position should be established on a taxiway at any point other than a runway-holding position where it is desirable to define a specific holding limit.

(d) An emergency access road need not be equipped with road holding positions, if it is declared, marked and physically closed for all other traffic than emergency access.

(e) A road-holding position should be established at each intersection of a road with a runway.

**CS-ADR-DSN.D.340 — Location of holding Bays, runway-holding positions, intermediate holding positions and road-holding positions** *TXT*

(a) The distance between a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position and the centre line of a runway should be in accordance with Table D-2 and such that a holding aircraft or vehicle will not interfere with the operation of radio navigation aids.

(b) At elevations greater than 700 m the distance of 90 m specified in Table D-2 for a precision approach runway code number 4 should be increased as follows:

   (1) up to an elevation of 2 000 m; 1 m for every 100 m in excess of 700 m;

   (2) elevation in excess of 2 000 m and up to 4 000 m; 13 m plus 1.5 m for every 100 m in excess of 2 000 m; and

   (3) elevation in excess of 4 000 m and up to 5 000 m; 43 m plus 2 m for every 100 m in excess of 4 000 m.

| | Code number | | | |
|---|---|---|---|---|
| Type of runway | 1 | 2 | 3 | 4 |
| Non-instrument | 30m | 40m | 75m | 75m |
| Non-precision approach | 40m | 40m | 75m | 75m |
| Precision approach category I | 60m[b] | 60m[b] | 90m[a,b] | 90m[a,b,c] |
| Precision approach categories II and III | — | — | 90m[a,b] | 90m[a,b,c] |
| Take-off runway | 30m | 40m | 75m | 75m |

a. If a holding bay, runway-holding position or road-holding position is at a lower elevation compared to the threshold, the distance may be decreased 5 m for every metre the bay or holding position is lower than the threshold, contingent upon not infringing the inner transitional surface.

b. This distance may need to be increased to avoid interference with radio navigation aids, particularly the glide path and localiser facilities (see CS-ADR-DSN.D.340). Information on critical and sensitive areas of ILS and MLS is contained in Annex 10, Volume I, Attachments C and G, respectively.

*Note 1.— The distance of 90 m for code number 3 or 4 is based on an aircraft with a tail height of 20 m, a distance from the nose to the highest part of the tail of 52.7 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle free zone and not accountable for the calculation of OCA/H.*

*Note 2.— The distance of 60 m for code number 2 is based on an aircraft with a tail height of 8 m, a distance from the nose to the highest part of the tail of 24.6 m and a nose height of 5.2 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle free zone.*

c. Where the code letter is F, this distance should be 107.5 m.

*Note.— The distance of 107.5 m for code number 4 where the code letter is F is based on an aircraft with a tail height of 24 m, a distance from the nose to the highest part of the tail of 62.2 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle free zone.*

Table D-2 — Minimum distance from the runway centre line to a holding bay, runway-holding point or road-holding position

# CHAPTER E — APRONS

## CS-ADR-DSN.E.345 — General TXT

Aprons should be provided to permit the safe loading and off-loading of passengers, cargo or mail as well as the servicing of aircraft without interfering with the aerodrome traffic and without causing damage to aircraft.

## CS-ADR-DSN.E.350 — Size of aprons MOVE to GM

See GM-ADR-DSN.E.350.

## CS-ADR-DSN.E.355 — Strength of aprons ICAO

Each part of an apron should be capable of withstanding the traffic of the aircraft it is intended to serve, due consideration being given to the fact that some portions of the apron will be subjected to a higher density of traffic and, as a result of slow moving or stationary aircraft, to higher stresses than a runway.

## CS-ADR-DSN.E.360 Slopes on aprons ICAO

(a) Slopes on an apron should be sufficient to prevent accumulation of water on the surface of the apron but should be kept to the minimum required to facilitate effective drainage.

(b) On an aircraft stand the maximum slope should not exceed 1 % in any direction.

## CS-ADR-DSN.E.365 Clearance distances on aircraft stands TXT ADD

(a) An aircraft stand should provide the following minimum clearances between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects:

| Code Letter | Clearance |
|---|---|
| A | 3 m |
| B | 3 m |
| C | 4.5 m |
| D | 7.5 m |
| E | 7.5 m |
| F | 7.5 m |

(b) The minimum clearance distance for code letters D, E and F can be reduced:

(1) for height limited objects,

(2) if the stand is restricted for aircraft with specific characteristics,

(3) in the following locations (for aircraft using a taxi-in, push-back procedure only):

(i) between the terminal (including passenger loading bridges) and the nose of an aircraft; and

(ii) over a portion of the stand provided with azimuth guidance by a visual docking guidance system.

## CHAPTER F — ISOLATED AIRCRAFT PARKING POSITION

### CS-ADR-DSN.F.370 — Isolated aircraft parking position MOVE to GM

(a) General

An isolated aircraft parking position should be designated by the aerodrome operator for parking of aircraft that needs isolation from normal aerodrome activities.

(b) Location

The isolated aircraft parking position should be located at the maximum distance practicable and in any case never less than 100 m from other parking positions, buildings or public areas, etc.

## CHAPTER G — DE-ICING/ANTI-ICING FACILITIES

### CS-ADR-DSN.G.375 General REV

Aeroplane de-icing/anti-icing facilities should be provided at an aerodrome where icing conditions are expected to occur.

### CS-ADR-DSN.G.380 Location TXT MOVE to GM

(a) De-icing/anti-icing facilities should be provided either at aircraft stands or at specified remote areas.

(b) The de-icing/anti-icing facilities should be located to be clear of the obstacle limitation surfaces to not cause interference to the radio navigation aids and be clearly visible from the air traffic control tower for clearing the treated aeroplane.

(c) The de-icing/anti-icing facilities should be so located as to provide for an expeditious traffic flow, perhaps with a bypass configuration, and not require unusual taxiing manoeuvre into and out of the pads.

### CS-ADR-DSN.G.385 Size and number of de-icing/anti-icing pads MOVE to GM

The size of a de-icing/anti-icing pad should be equal to the parking area required by the most demanding aeroplane in a given category with at least 3.8 m clear paved area all around the aeroplane for the movement of the de-icing/anti-icing vehicles.

### CS-ADR-DSN.G.390 Slopes on de-icing/anti-icing pads MOVE to GM ADD

(a) The de-icing/anti-icing pads should be provided with suitable slopes:

  (1) to ensure satisfactory drainage of the area;

  (2) to permit collection of all excess de-icing/anti-icing fluid running off an aeroplane;

  (3) not to hinder the movement of aircraft on or off the pad.

### CS-ADR-DSN.G.395 Strength of de-icing/anti-icing pads MOVE to GM

The de-icing/anti-icing pad should be capable of withstanding the traffic of the aircraft it is intended to serve.

### CS-ADR-DSN.G.400 Clearance distances on a de-icing/anti-icing pad MOVE to GM

(a) A de-icing/anti-icing pad should provide the following minimum clearances between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects:

| Code Letter | Clearance |
|---|---|
| A | 3.8 m |
| B | 3.8 m |

| | |
|---|---|
| C | 4.5 m |
| D | 7.5 m |
| E | 7.5 m |
| F | 7.5 m |

(b) If the pad layout is such as to include bypass configuration, the minimum separation distances specified in Table D-1, column (12) should be provided.

(c) Where the de-icing/anti-icing facility is located adjoining a regular taxiway, the taxiway minimum separation distance specified in Table D-1, column (11) should be provided. (See Figure G-1.)

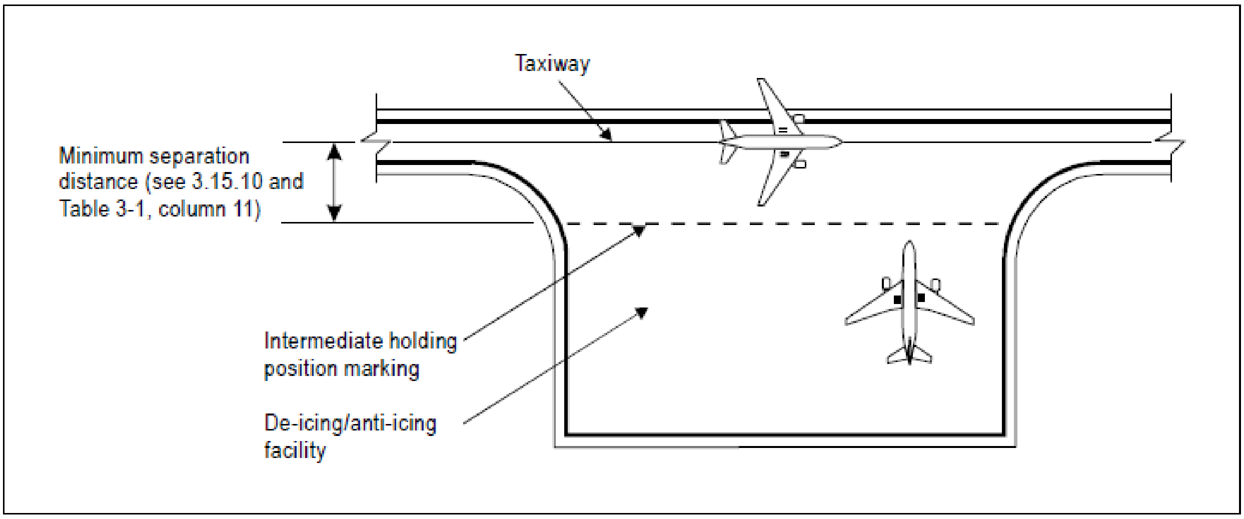



Figure G-1 Minimum separation distance on a de-icing/anti-icing facility

# CHAPTER H — OBSTACLE LIMITATION SURFACES

## CS-ADR-DSN.H.405 — Applicability TXT MOVE to GM

The purpose of the obstacle limitation surfaces is to define the airspace around aerodromes to be maintained free from obstacles so as to permit the intended aeroplane operations at the aerodromes to be conducted safely.

## CS-ADR-DSN.H.410 — Outer horizontal surface ADD MOVE to GM and AR/AMC REV

The outer horizontal surface should extend from the periphery of the conical surface to a minimum radius of 15 000 m from the aerodrome reference point when the main runway is 1860 m or more in length and to a minimum radius of 10 000 m where the main runway is 1100 m or more but less than 1860 m in length.

## CS-ADR-DSN.H.415 — Conical surface ADD

(a) Applicability: To facilitate safe visual manoeuvring in the vicinity of the aerodrome.

(b) Description: A surface sloping upwards and outwards from the periphery of the inner horizontal surface.

(c) Characteristics: The limits of the conical surface should comprise:

(1) a lower edge coincident with the periphery of the inner horizontal surface; and

(2) an upper edge located at a specified height above the inner horizontal surface.

(d) The slope of the conical surface should be measured in a vertical plane perpendicular to the periphery of the inner horizontal surface.

## CS-ADR-DSN.H.420 — Inner horizontal surface ADD DEL REV

(a) Applicability: The purpose of the inner horizontal surface is to protect airspace for visual manoeuvring prior to landing.

(b) Description: A surface located in a horizontal plane above an aerodrome and its environs.

(c) Characteristics: The outer limits of the inner horizontal surface are defined by circular arcs centred on the intersection of the extended RWY centre line with the end of the RWY strip joined tangentially by straight lines. (Figure H-1.)

(d) The height of the inner horizontal surface should be measured above an established elevation datum.

(1) The elevation datum used for the height of the inner horizontal surface may be:

(i) the elevation of the highest point of the lowest threshold of the related runway;

(ii) the elevation of the highest point of the highest threshold of the related runway;

(iii) the elevation of the highest point of the runway;

(iv) the aerodrome elevation.

## CS-ADR-DSN.H.425 — Approach surface *ADD*

(a) Applicability: The purpose of the approach surface is to protect an aircraft during the final approach to the runway by defining the area that should be kept free from obstacles to protect an aeroplane in the final phase of the approach-to-land manoeuvre.

(b) Description: An inclined plane or combination of planes preceding the threshold.

(c) Characteristics. The limits of the approach surface should comprise:

(1) An inner edge of specified length, horizontal and perpendicular to the extended centre line of the runway and located at a specified distance before the threshold;

(2) Two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the runway; and

(3) An outer edge parallel to the inner edge.

The above surfaces should be varied when lateral offset, offset or curved approaches are utilised, specifically, two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the lateral offset, offset or curved ground track.

(d) The elevation of the inner edge should be equal to the elevation of the mid-point of the threshold.

(e) The slope(s) of the approach surface should be measured in the vertical plane containing the centre line of the runway and should continue containing the centre line of any lateral offset or curved ground track.

(f) The above surfaces shall be varied when lateral offset, offset or curved approaches are utilised, specifically, two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the lateral offset, offset or curved ground track.

(g) The elevation of the inner edge shall be equal to the elevation of the midpoint of the threshold.

(h) The slope(s) of the approach surface shall be measured in the vertical plane containing the centre line of the runway and shall continue containing the centre line of any lateral offset or curved ground track.

## CS-ADR-DSN.H.430 — Transitional surface *ADD*

(a) Applicability: The purpose of the transitional surface to define the limit of the area available for buildings or other structures.

(b) Description:

(1) A complex surface along the side of the strip and part of the side of the approach surface that slopes upwards and outwards to the inner horizontal surface; or

(2) Where the transitional surface is not coincident with the runway strip: a complex surface along the side of a support line, parallel to and at a specified distance from the runway centre line, and part of the side of the approach surface, that slopes upwards and outwards to the inner horizontal surface.

(c) Characteristics: The limits of a transitional surface should comprise:

(1) a lower edge beginning at the intersection of the side of the approach surface with the inner horizontal surface and extending down the side of the approach surface to the inner edge of the approach surface and from there along the length of the strip parallel to the runway centre line; and

(2) An upper edge located in the plane of the inner horizontal surface; or

(3) Where the transitional surface is not coincident with the runway strip:

(i) a lower edge beginning at the intersection of the side of the approach surface with the inner horizontal surface and extending down the side of the approach surface to the inner edge of the approach surface and from there along a support line parallel to the runway centre line, whose distance to the runway centre line is according to table H-1 below; and

(ii) An upper edge located in the plane of the inner horizontal surface.

(d) The elevation of a point on the lower edge should be:

(1) Along the side of the approach surface — equal to the elevation of the approach surface at that point; and

(2) Along the strip — equal to the elevation of the nearest point on the centre line of the runway or its extension;

(3) Along the transitional surface support line – equal to the elevation of this line at that point.

(e) The slope of the transitional surface should be measured in a vertical plane at right angles to the centre line of the runway.

| Runway Code | Instrument approach runway | Other runway |
|---|---|---|
| 3 and 4 | 150 m | 75 m |
| Code 2 | 75 m | 40 m |
| Code 1 | 75 m | 30 m |

Table H-1: distance between transitional surface support line and runway centre line

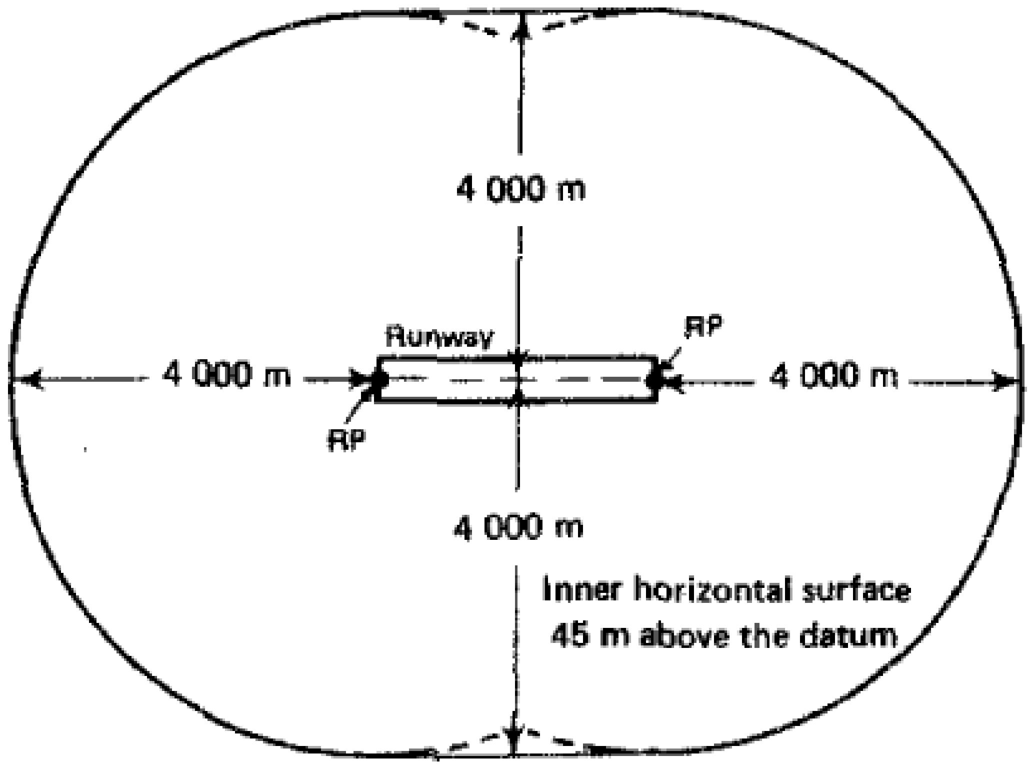
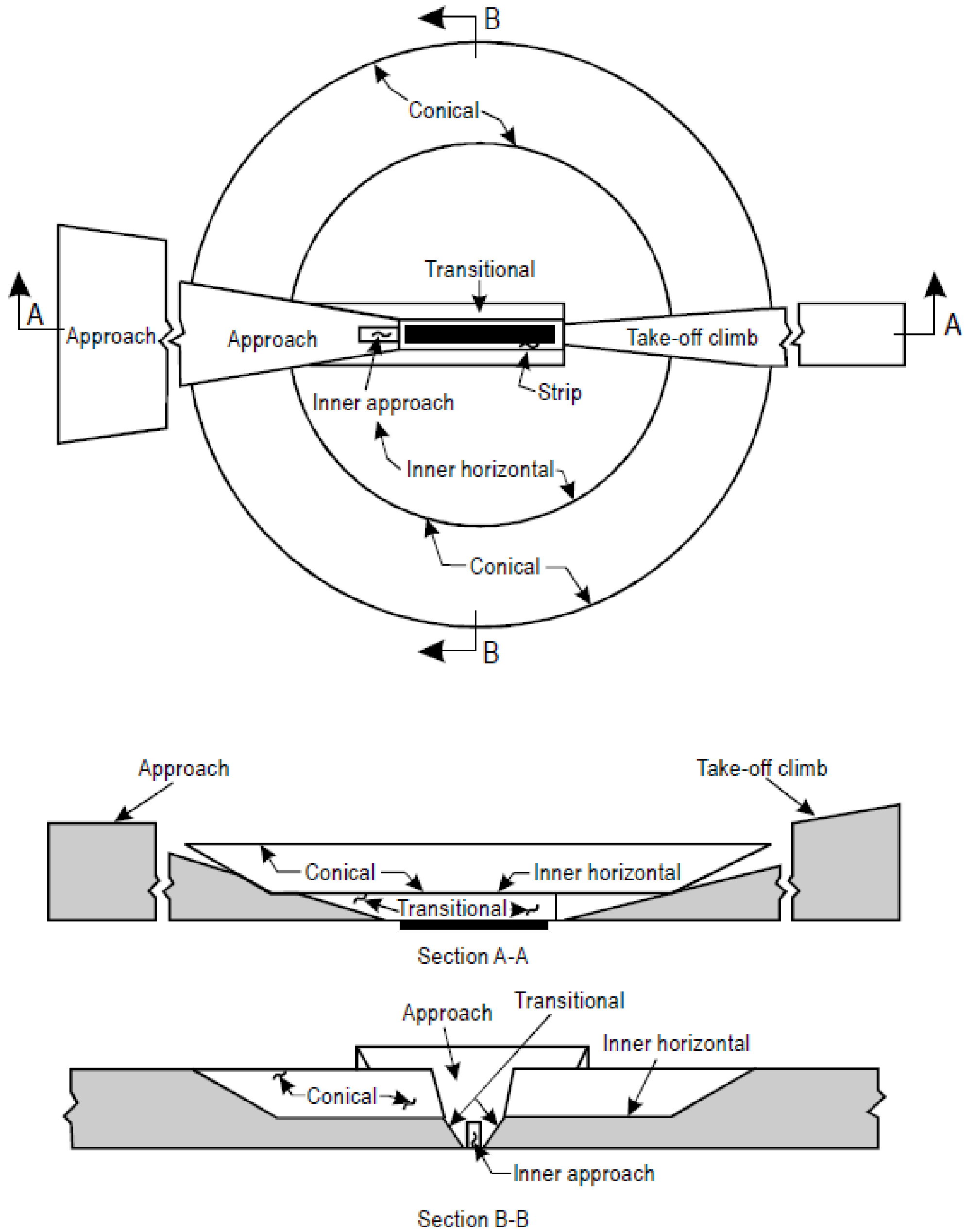



Figure H-1. Inner horizontal surface where the runway is code 4




*See Figure 4-2 for inner transitional and balked landing obstacle limitation surfaces and Attachment B for a three-dimensional view*

Figure H-2. Obstacle limitation surfaces

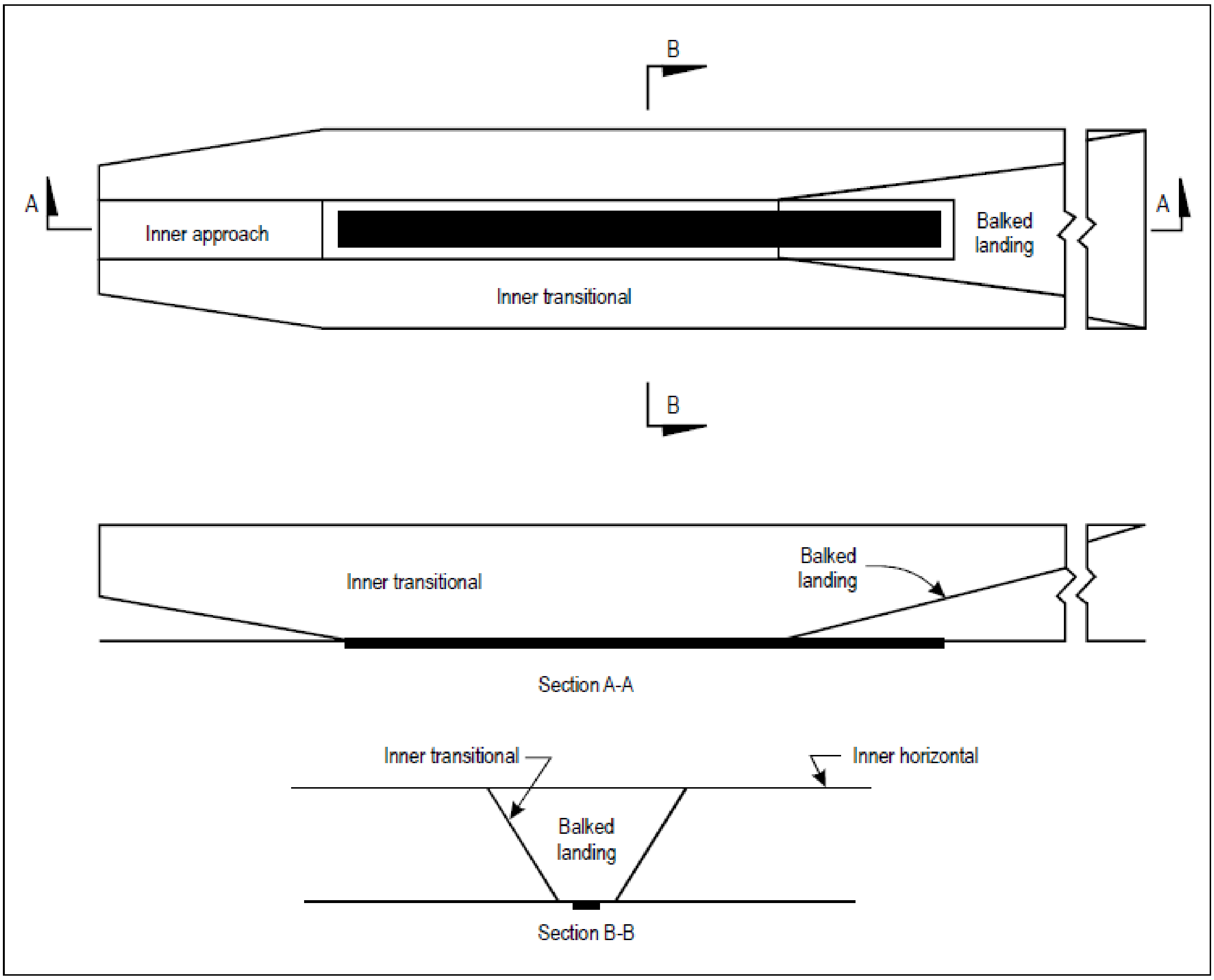



Figure H-3. Inner approach, inner transitional and balked landing obstacle limitation surfaces

**CS-ADR-DSN.H.435 — Take-off climb surface** *ADD*

(a) Applicability: The purpose of the take-off climb surface (TOCS) is to protect an aircraft on take-off and during climb-out.

(b) Description: An inclined plane or other specified surface beyond the end of a runway or clearway.

(c) Characteristics: The limits of the take-off climb surface should comprise:

(1) an inner edge horizontal and perpendicular to the centre line of the runway and located either at a specified distance beyond the end of the runway or at the end of the clearway when such is provided and its length exceeds the specified distance;

(2) two sides originating at the ends of the inner edge, diverging uniformly at a specified rate from the take-off track to a specified final width and continuing thereafter at that width for the remainder of the length of the take-off climb surface; and

(3) an outer edge horizontal and perpendicular to the specified take-off track.

(d) The elevation of the inner edge should be equal to the highest point on the extended runway centre line between the end of the runway and the inner edge, except that when a clearway is provided, the elevation should be equal to the highest point on the ground on the centre line of the clearway.

(e) In the case of a straight take-off flight path, the slope of the take-off climb surface should be measured in the vertical plane containing the centre line of the runway.

(f) In the case of a take-off flight path involving a turn, the take-off climb surface should be a complex surface containing the horizontal normal to its centre line, and the slope of the centre line should be the same as that for a straight take-off flight path.

### CS-ADR-DSN.H.440 — Slewed Take-off climb surface *ADD*

The edge of a TOCS may be slewed in the direction of a turn away from the extended runway centre line up to a maximum of 15° splay. The portion of TOCS encompassing the new departure track should be the same shape and dimensions as the original TOCS measured relative to the new departure track. The opposite edge of the TOCS should remain unchanged unless there is another turning departure towards that side as well, in which case, the edge may be slewed in that direction too.

### CS-ADR-DSN.H.445 — Obstacle Free Zone *ADD*

(a) An OFZ is intended to protect aeroplanes from fixed and mobile obstacles during Category I, II or III operations when approaches are continued below decision height and during any subsequent missed approach or balked landing with all engines operating normally. It is not intended to supplant the requirement of other surfaces or areas where these are more demanding.

(b) The OFZ is made up of the following obstacle limitation surfaces:

(1) inner approach surface;

(2) inner transitional surfaces; and

(3) balked landing surface.

### CS-ADR-DSN.H.450 — Inner approach surface *ICAO*

(a) Applicability: A rectangular portion of the approach surface immediately preceding the threshold.

(b) Characteristics: The limits of the inner approach surface should comprise:

(1) an inner edge coincident with the location of the inner edge of the approach surface but of its own specified length;

(2) two sides originating at the ends of the inner edge and extending parallel to the vertical plane containing the centre line of the runway; and

(3) an outer edge parallel to the inner edge.

### CS-ADR-DSN.H.455 — Inner transitional surface *ICAO*

(a) Applicability: A surface similar to the transitional surface but closer to the runway.

(b) Characteristics: The limits of an inner transitional surface should comprise:

(1) a lower edge beginning at the end of the inner approach surface and extending down the side of the inner approach surface to the inner edge of that surface, from there along the strip parallel to the runway centre line to the inner edge of the balked landing surface and from there up the side of the balked landing surface to the point where the side intersects the inner horizontal surface; and

(2) an upper edge located in the plane of the inner horizontal surface.

(c) The elevation of a point on the lower edge should be:

(1) along the side of the inner approach surface and balked landing surface — equal to the elevation of the particular surface at that point; and

(2) along the strip — equal to the elevation of the nearest point on the centre line of the runway or its extension.

(d) The slope of the inner transitional surface should be measured in a vertical plane at right angles to the centre line of the runway.

**CS-ADR-DSN.H.460 — Balked landing surface** *ICAO*

(a) Applicability: An inclined plane located at a specified distance after the threshold, extending between the inner transitional surfaces.

(b) Characteristics: The limits of the balked landing surface should comprise:

(1) an inner edge horizontal and perpendicular to the centre line of the runway and located at a specified distance after the threshold;

(2) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the runway; and

(3) an outer edge parallel to the inner edge and located in the plane of the inner horizontal surface.

(c) The elevation of the inner edge should be equal to the elevation of the runway centre line at the location of the inner edge.

(d) The slope of the balked landing surface should be measured in the vertical plane containing the centre line of the runway.

# CHAPTER J — OBSTACLE LIMITATION REQUIREMENTS

## CS-ADR-DSN.J.465 — General *ADD*

(a) Obstacle limitation requirements have to be distinguished between:

(1) Non-instrument runways;

(2) Non-precision approach runways;

(3) Precision approach runways; and

(4) Runways meant for take-off.

## CS-ADR-DSN.J.470 Non-instrument runways *DEL REV*

(a) The following obstacle limitation surfaces should be established for a non-instrument runway:

(1) conical surface;

(2) inner horizontal surface;

(3) approach surface; and

(4) transitional surfaces.

(b) The heights and slopes of the surfaces should not be greater than, and their other dimensions not less than, those specified in Table J-1.

(c) New objects or extensions of existing objects should not be permitted above an approach or transitional surface except when the new object or extension is shielded by an existing immovable object.

(d) New objects or extensions of existing objects should not be permitted above the conical surface or inner horizontal surface except when the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(e) Existing objects above any of the conical surface, inner horizontal surface, approach surface and transitional surfaces should as far as practicable be removed except when the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(f) In considering proposed construction, account should be taken of the possible future development of an instrument runway and consequent requirement for more stringent obstacle limitation surfaces.

## CS-ADR-DSN.J.475 — Non-precision approach runways *ICAO REV*

(a) The following obstacle limitation surfaces should be established for a non-precision approach runway:

(1) conical surface;

(2) inner horizontal surface;

(3) approach surface; and

(4) transitional surfaces.

(b) The heights and slopes of the surfaces should not be greater than, and their other dimensions not less than, those specified in Table J-1, except in the case of the horizontal section of the approach surface (see paragraph (c) below).

(c) The approach surface should be horizontal beyond the point at which the 2.5 % slope intersects:

(1) a horizontal plane 150 m above the threshold elevation; or

(2) the horizontal plane passing through the top of any object that governs the obstacle clearance altitude/height (OCA/H);

whichever is the higher.

(d) New objects or extensions of existing objects should not be permitted above an approach surface within 3 000 m of the inner edge or above a transitional surface except when the new object or extension would be shielded by an existing immovable object.

(e) New objects or extensions of existing objects should not be permitted above the approach surface beyond 3 000 m from the inner edge, the conical surface or inner horizontal surface except when the object is shielded by an existing immovable object, or after an aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(f) Existing objects above any of the surfaces required by CS-ADR-DSN.J.465 General, paragraph (a) should as far as practicable be removed except when the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

## CS-ADR-DSN.J.480 — Precision approach runways *ICAO REV MOVE to OPS*

(a) The following obstacle limitation surfaces should be established for a precision approach runway category I:

(1) conical surface;

(2) inner horizontal surface;

(3) approach surface; and

(4) transitional surfaces.

(b) The following obstacle limitation surfaces should be established for a precision approach runway category I:

(1) inner approach surface;

(2) inner transitional surfaces; and

(3) balked landing surface.

(c) The following obstacle limitation surfaces should be established for a precision approach runway category II or III:

(1) conical surface;

(2) inner horizontal surface;

(3) approach surface and inner approach surface;

(4) transitional surfaces and inner transitional surfaces; and

(5) balked landing surface.

(d) The heights and slopes of the surfaces should not be greater than, and their other dimensions not less than, those specified in Table ADR-DSN-J-1, except in the case of the horizontal section of the approach surface in paragraph (e) below.

(e) The approach surface should be horizontal beyond the point at which the 2.5 % slope intersects:

(1) a horizontal plane 150 m above the threshold elevation; or

(2) the horizontal plane passing through the top of any object that governs the obstacle clearance limit;

whichever is the higher.

(f) Fixed objects should not be permitted above the inner approach surface, the inner transitional surface or the balked landing surface, except for frangible objects which must be located on the strip because of their function.

(g) New objects or extensions of existing objects should not be permitted above an approach surface or a transitional surface except when the new object or extension is shielded by an existing immovable object.

(h) New objects or extensions of existing objects should not be permitted above the conical surface and the inner horizontal surface except when an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(i) Existing objects above an approach surface, a transitional surface, the conical surface and inner horizontal surface should as far as practicable be removed except when an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

## CS-ADR-DSN.J.485 — Runways meant for take-off ICAO REV

(a) A take-off climb surface should be established for a runway meant for take-off.

(b) The dimensions of the surface should be not less than the dimensions specified in Table J-2, except that a lesser length may be adopted for the take-off climb surface where such lesser length would be consistent with procedural measures adopted to govern the outward flight of aeroplanes.

(c) The operational characteristics of aeroplanes for which the runway is intended should be examined to see if it is desirable to reduce the slope specified in Table J-2 when critical operating conditions are to be catered to. If the specified slope is reduced, corresponding adjustment in the length of the take-off climb surface should be made so as to provide protection to a height of 300 m.

(d) New objects or extensions of existing objects should not be permitted above a take-off climb surface except when the new object or extension is shielded by an existing immovable object.

(e) If no object reaches the 2 % (1:50) take- off climb surface, an obstacle free surface of 1.6 % (1:62.5) should be established.

(f) Existing objects that extend above a take-off climb surface should as far as practicable be removed except when an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

| RUNWAY CLASSIFICATION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Non-instrument Code number | | | | Non-precision approach Code number | | | Precision approach category | | |
| | | | | | | | | I Code number | | II or III Code number |
| Surface and dimensions [a] | 1 | 2 | 3 | 4 | 1,2 | 3 | 4 | 1,2 | 3 | 4 |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| CONICAL | | | | | | | | | | |
| Slope | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% |
| Height | 35m | 55m | 75m | 100m | 60m | 75m | 100m | 60m | 100m | 100m |
| INNER HORIZONTAL | | | | | | | | | | |
| Height | 45m | 45m | 45m | 45m | 45m | 45m | 45m | 45m | 45m | 45m |
| Radius | 2000m | 2500m | 4000m | 4000m | 3500m | 4000m | 4000m | 3500m | 4000m | 4000m |
| INNER APPROACH | | | | | | | | | | |
| Width | - | - | - | - | - | - | - | 90m | 120m[e] | 120m[e] |
| Distance from threshold | - | - | - | - | - | - | - | 60m | 60m | 60m |
| Length | - | - | - | - | - | - | - | 900m | 900m | 900m |
| Slope | - | - | - | - | - | - | - | 2.5% | 2% | 2% |
| APPROACH | | | | | | | | | | |
| Length of inner edge | 60m | 80m | 150m | 150m | 150m | 300m | 300m | 150m | 300m | 300m |
| Distance from threshold | 30m | 60m | 60m | 60m | 60m | 60m | 60m | 60m | 60m | 60m |
| Divergence (each side | 10% | 10% | 10% | 10% | 15% | 15% | 15% | 15% | 15% | 15% |
| First section | | | | | | | | | | |
| Length | 1600m | 2500m | 3000m | 3000m | 2500m | 3000m | 3000m | 3000m | 3000m | 3000m |
| Slope | 5% | 4% | 3.33% | 2.5% | 3.33% | 2% | 2% | 2.5% | 2% | 2% |
| Second section | | | | | | | | | | |
| Length | - | - | - | - | - | 3600m[b] | 3600m[b] | 12000m | 3600m[b] | 3600m[b] |
| Slope | - | - | - | - | - | 2.5% | 2.5% | 3% | 2.5% | 2.5% |
| Horizontal section | | | | | | | | | | |
| Length | - | - | - | - | - | 8400m[b] | 8400m[b] | - | 8400m[b] | 8400m[b] |
| Total length | - | - | - | - | - | 15000m | 15000m | 15000m | 15000m | 15000m |
| TRANSITIONAL | | | | | | | | | | |
| Slope | 20% | 20% | 14.3% | 14.3% | 20% | 14.3% | 14.3% | 14.3% | 14.3% | 14.3% |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| INNER TRANSITIONAL | | | | | | | | | | |
| Slope | - | - | - | - | - | - | - | 40% | 33.3% | 33.3% |
| BALKED LANDING SURFACE | | | | | | | | | | |
| Length of inner edge | - | - | - | - | - | - | - | 90m | 120m[e] | 120m[e] |
| Distance from threshold | - | - | - | - | - | - | - | c | 1800m[d] | 1800m[d] |
| Divergence (each side) | - | - | - | - | - | - | - | 10% | 10% | 10% |
| Slope | - | - | - | - | - | - | - | 4% | 3.33% | 3.33% |

a. All dimensions are measured horizontally unless specified otherwise.
b. Variable length (CS-ADR-DSN.J.455 (c) or CS-ADR-DSN.J.460 (e)).
c. Distance to the end of strip.
d. Or end of runway whichever is less.
e. Where the code letter is F, the width is increased to 155 m. For information on code letter F aeroplanes equipped with digital avionics that provide steering commands to maintain an established track during the go-around manoeuvre.

Table J-1. Dimensions and slopes of obstacle limitation surfaces — Approach runways

| RUNWAYS MEANT FOR TAKE-OFF | | | |
|---|---|---|---|
| | Code number | | |
| Surface and dimensions[a] | 1 | 2 | 3 or 4 |
| (1) | (2) | (3) | (4) |
| TAKE-OFF CLIMB | | | |
| Length of inner edge | 60 m | 80 m | 180 m |
| Distance from runway end[b] | 30 m | 60 m | 60 m |
| Divergence (each side) | 10 % | 10 % | 12.5 % |
| Final width | 280 m | 580 m | 1 200 m<br>1 800 m[c] |
| Length | 1 600 m | 2 500 m | 15 000 m |
| Slope | 5 % | 4 % | 2 %[d] |

a. All dimensions are measured horizontally unless specified otherwise.

b. The take-off climb surface starts at the end of the clearway if the clearway length exceeds the specified distance.

c. 1 800 m when the intended track includes changes of heading greater than 15° for operations conducted in IMC, VMC by night.

d. See CS-ADR-DSN.J.465 (c) and (e).

Table J-2 Dimensions and slopes of obstacle limitation surfaces

# CHAPTER K — VISUAL AIDS FOR NAVIGATION (INDICATORS AND SIGNALLING DEVICES)

## CS-ADR-DSN.K.490 — Wind direction indicator TXT MOVE to GM

(a) An aerodrome should be equipped with a sufficient number of wind direction indicators in order to provide wind information to the pilot during approach and take-off.

(b) Location:

Each wind direction indicator should be located so that at least one wind direction indicator is visible from aircraft in flight, during approach or on the movement area before take-off, and in such a way as to be free from the effects of air disturbances caused by nearby objects.

(c) Characteristics:

(1) Each wind direction indicator should be in the form of a truncated cone made of fabric and should have a length of not less than 3.6 m and a diameter, at the larger end, of not less than 0.9 m.

(2) It should be constructed so that it gives a clear indication of the direction of the surface wind and a general indication of the wind speed.

(3) The colour or colours should be so selected as to make the wind direction indicator clearly visible and understandable from a height of at least 300 m, having regard to background:

(i) Where practicable, a single colour should be used.

(ii) Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should be arranged in five alternate bands, the first and last bands being the darker colour.

(d) Night conditions:

Provision should be made for illuminating a sufficient number of wind indicators at an aerodrome intended for use at night.

## CS-ADR-DSN.K.495 — Landing direction indicator ICAO

(a) Location:

Where provided, a landing direction indicator should be located in a conspicuous place on the aerodrome.

(b) Characteristics:

(1) The landing direction indicator should be in the form of a 'T'.

(2) The shape and minimum dimensions of a landing 'T' should be as shown in Figure K-1.

(3) The colour of the landing 'T' should be either white or orange, the choice being dependent on the colour that contrasts best with the background against which the indicator will be viewed.

(4) Where used at night, the landing 'T' should either be illuminated or outlined by

white lights.

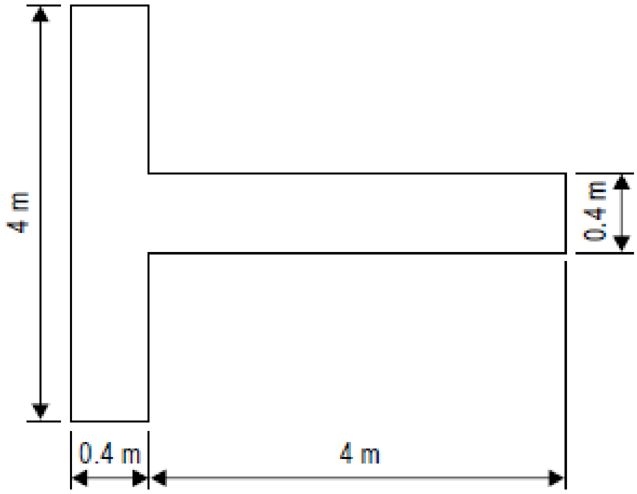



Figure K-1. Landing direction indicator

**CS-ADR-DSN.K.500 — Signalling lamp** *MOVE to GM*

See GM-ADR-DSN.K.500.

**CS-ADR-DSN.K.505 — Signal panels and signal area** *ICAO*

(a) Applicability:

A signal area should be provided when visual ground signals are used to communicate with aircraft in flight.

(b) Location:

The signal area should be located so as to be visible for all angles of azimuth above an angle of 10° above the horizontal when viewed from a height of 300 m.

(c) Characteristics:

(1) The signal area should be an even horizontal surface at least 9 m square.

(2) The colour of the signal area should be chosen to contrast with the colours of the signal panels used, and it should be surrounded by a white border not less than 0.3 m wide.

**CS-ADR-DSN.K.510 — Location of signal area GM** *MOVE to GM*

See GM-ADR-DSN.K.510.

**CS-ADR-DSN.K.515 — Characteristics of signal area GM** *MOVE to GM*

See GM-ADR-DSN.K.515.

# CHAPTER L — VISUAL AIDS FOR NAVIGATION (MARKINGS)

## CS-ADR-DSN.L.520 — General – Colour and conspicuity TXT MOVE to GM ADD

Markings should be of a conspicuous colour and contrast with the surface on which they are laid.

(a) Runway markings should be white.

(b) Markings for taxiways, runway turn pads and aircraft stands should be yellow.

(c) When it is operationally necessary to apply temporary runway or taxiway markings, those markings should comply with the relevant CS. Additional Guidance Material is set out in GM-AD-DSN-520.

## CS-ADR-DSN.L.525 — Runway designation marking ICAO

(a) Applicability: A runway designation marking should be provided at the thresholds of a runway.

(1) Location and positioning: A runway designation marking should be located at a threshold as shown in Figure L-1 as appropriate.

(b) Characteristics:

(1) A runway designation marking should consist of a two-digit number and on parallel runways should be supplemented with a letter.

(i) On a single runway, dual parallel runways and triple parallel runways, the two-digit number should be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach.

(ii) On four or more parallel runways, one set of adjacent runways should be numbered to the nearest one-tenth magnetic azimuth and the other set of adjacent runways numbered to the next nearest one-tenth of the magnetic azimuth. When this rule gives a single digit number, it should be preceded by a zero.

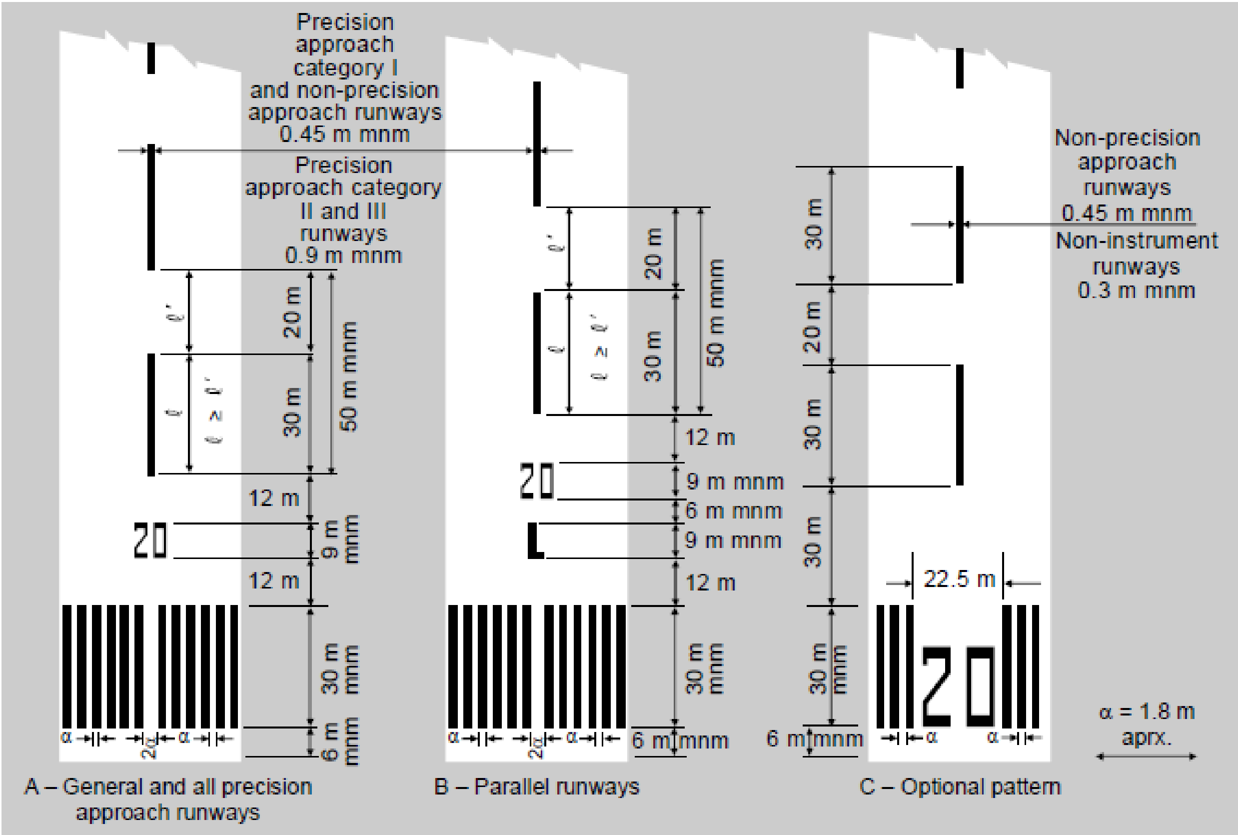



Figure L-1 Runway designation, centre line and threshold markings

(2) In the case of parallel runways, each runway designation number should be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach:

(i) for two parallel runways: 'L' 'R';

(ii) for three parallel runways: 'L' 'C' 'R';

(iii) for four parallel runways: 'L' 'R' 'L' 'R';

(iv) for five parallel runways: 'L' 'C' 'R' 'L' R' or 'L' 'R' 'L' 'C' 'R'; and

(v) for six parallel runways: 'L' 'C' 'R' 'L' 'C' 'R'.

(3) The numbers and letters should be in the form and proportion shown in Figure L-2. The dimensions should be not less than those shown in Figure L-2.

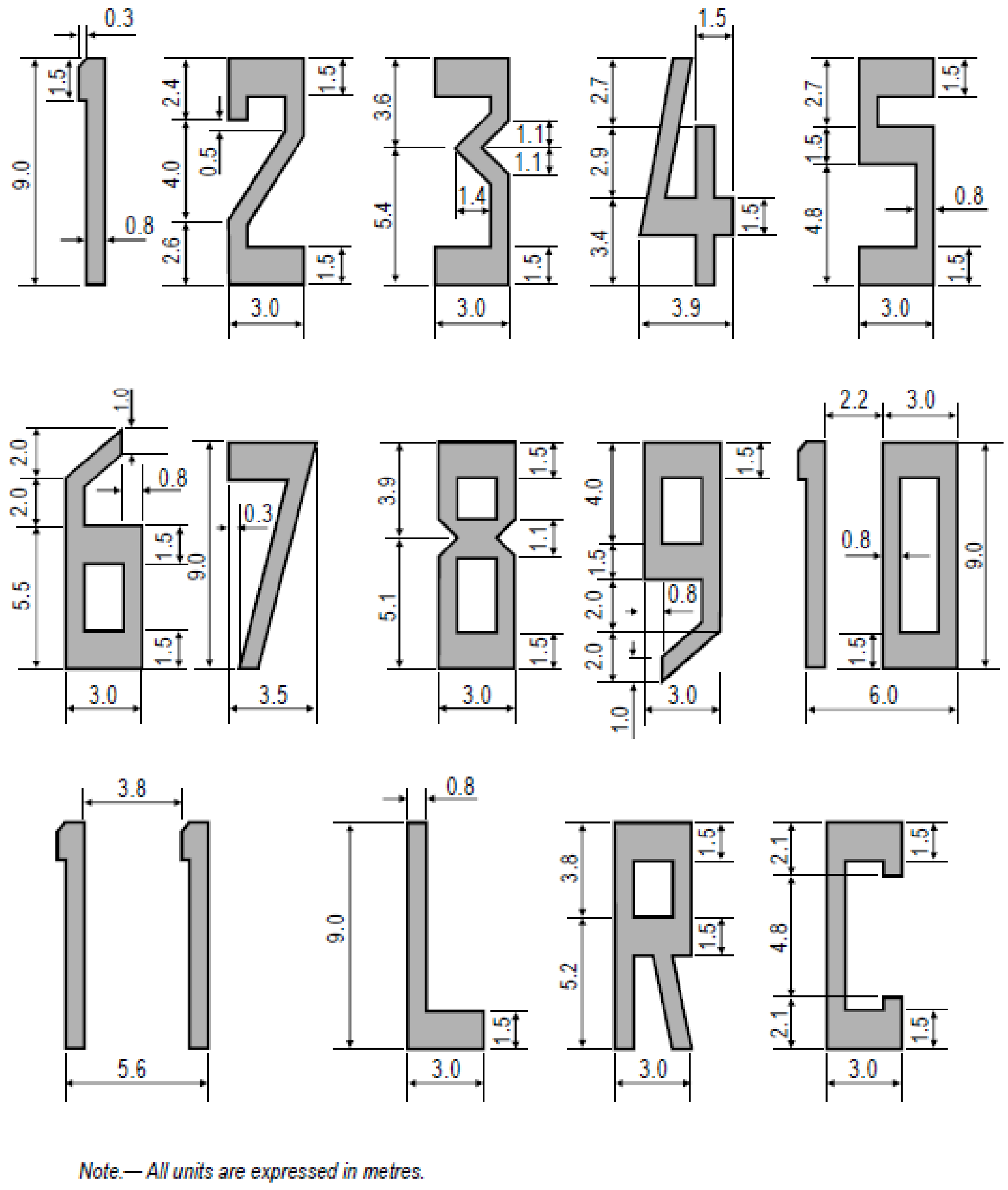



Figure L-2. Form and proportions of numbers and letters for runway designation markings

**CS-ADR-DSN.L.530 — Runway centre line marking** ICAO

(a) Applicability: A runway centre line marking should be provided on a paved runway.

(b) Location: A runway centre line marking should be located along the centre line of the runway between the runway designation marking as shown in Figure L-1, except when interrupted as given in this Regulation in Interruption of runway markings.

(c) Characteristics:

(1) A runway centre line marking should consist of a line of uniformly spaced stripes and gaps. The length of a stripe plus a gap should be not less than 50 m or more than 75 m. The length of each stripe should be at least equal to the length of the gap or 30 m, whichever is greater.

(2) The width of the stripes should be not less than:

(i) 0.90 m on precision approach category II and III runways;

(ii) 0.45 m on non-precision approach runways where the code number is 3 or 4, and precision approach category I runways; and

(iii) 0.30 m on non-precision approach runways where the code number is 1 or 2, and on non-instrument runways.

**CS-ADR-DSN.L.535 — Threshold marking** TXT MOVE to GM REV

(a) Applicability and location: A threshold marking should be provided at the threshold of a runway.

(b) Characteristics:

(1) The stripes of the threshold marking should commence 6 m from the threshold.

(2) A runway threshold marking should consist of a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of a runway as shown in Figure L-1 (A) and (B) for a runway width of 45 m. The number of stripes should be in accordance with the runway width as follows:

| Runway width | Number of stripes |
|---|---|
| 18 m | 4 |
| 23 m | 6 |
| 30 m | 8 |
| 45 m | 12 |
| 60 m | 16 |

except that on non-precision approach and non-instrument runways 45 m or greater in width, they may be as shown in Figure L-1 (C).

(3) The stripes should extend laterally to within 3 m of the edge of a runway or to a distance of 27 m on either side of a runway centre line, whichever results in the smaller lateral distance.

(4) Where a runway designation marking is placed within a threshold marking, there should be a minimum of three stripes on each side of the centre line of the runway.

(5) Where a runway designation marking is placed above a threshold marking, the stripes should be continued across the runway. The stripes should be at least 30 m long and approximately 1.80 m wide with spacings of approximately 1.80 m between them. Where the stripes are continued across a runway, a double spacing should be used to separate the two stripes nearest the centre line of the runway, and in the case where the designation marking is included within the threshold marking, this spacing should be 22.5 m.

(c) Displaced threshold:

(1) Where a threshold is displaced from the extremity of a runway or where the extremity of a runway is not square with the runway centre line, a transverse stripe as shown in Figure L-3 (B) should be added to the threshold marking.

(2) A transverse stripe should be not less than 1.80 m wide.

(3) Where a runway threshold is permanently displaced, arrows conforming to Figure L-3 (B) should be provided on the portion of the runway before the displaced threshold.

(4) When a runway threshold is temporarily displaced from the normal position, it should be marked as shown in Figure L-3 (A) or (B) and all markings prior to the displaced threshold should be obscured except the runway centre line marking, which should be converted to arrows.

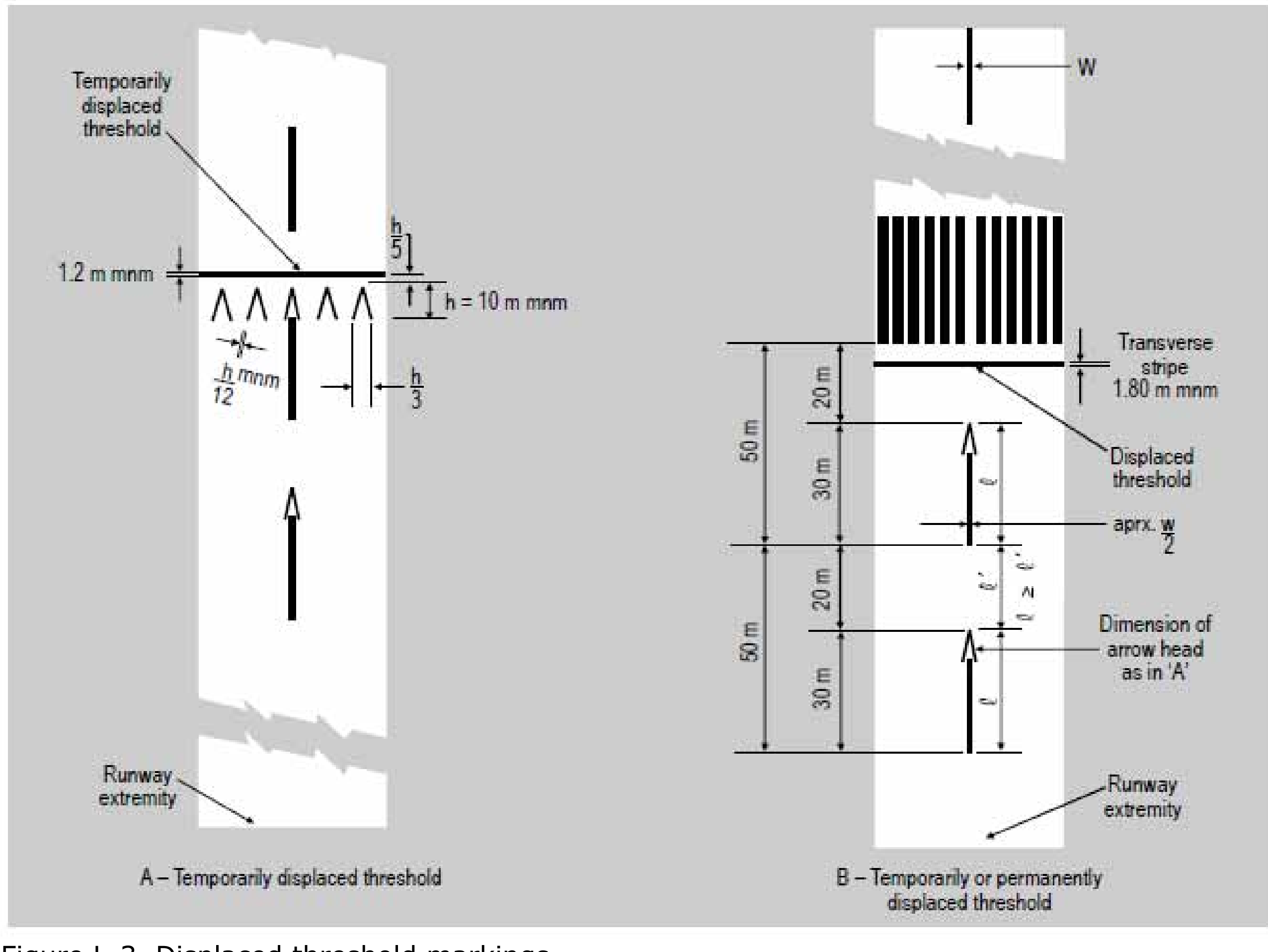



Figure L-3. Displaced threshold markings

(d) When the runway before a threshold is unfit for the surface movement of aircraft, chevron markings, as described in this Regulation, should be provided.

**CS-ADR-DSN.L.540 — Aiming point marking** *ADD*

(a) Applicability:

(1) An aiming point marking should be provided at each approach end of an instrument runway where the code number is 2, 3 or 4.

(2) When additional conspicuity of the aiming point is desirable, an aiming point marking should be provided at each approach end of:

(i) a non-instrument runway where the code number is 3 or 4,

(ii) an instrument runway where the code number is 1.

(b) Characteristics. The aiming point marking should commence no closer to the threshold than the distance indicated in the appropriate column of Table L-1, except that, on a runway equipped with a PAPI system, the beginning of the marking should be coincident with the visual approach slope origin.

| | Landing distance available | | | |
|---|---|---|---|---|
| Location and dimensions | Less than 800 m | 800 m up to but not including 1 200 m | 1 200 m up to but not including 2 400 m | 2 400 m and above |
| (1) | (2) | (3) | (4) | (5) |
| Distance from threshold to beginning of marking[a] | 150 m | 250 m | 300 m | 400 m |
| Length of stripe[b] | 30-45 m | 30-45 m | 45-60 m | 45-60 m |
| Width of stripe | 4 m | 6 m | 6-10 m[c] | 6-10 m[c] |
| Lateral spacing between inner sides of stripes | 6 m[d] | 9 m[d] | 18 m[d] -22.5 m | 18-22.5 m |

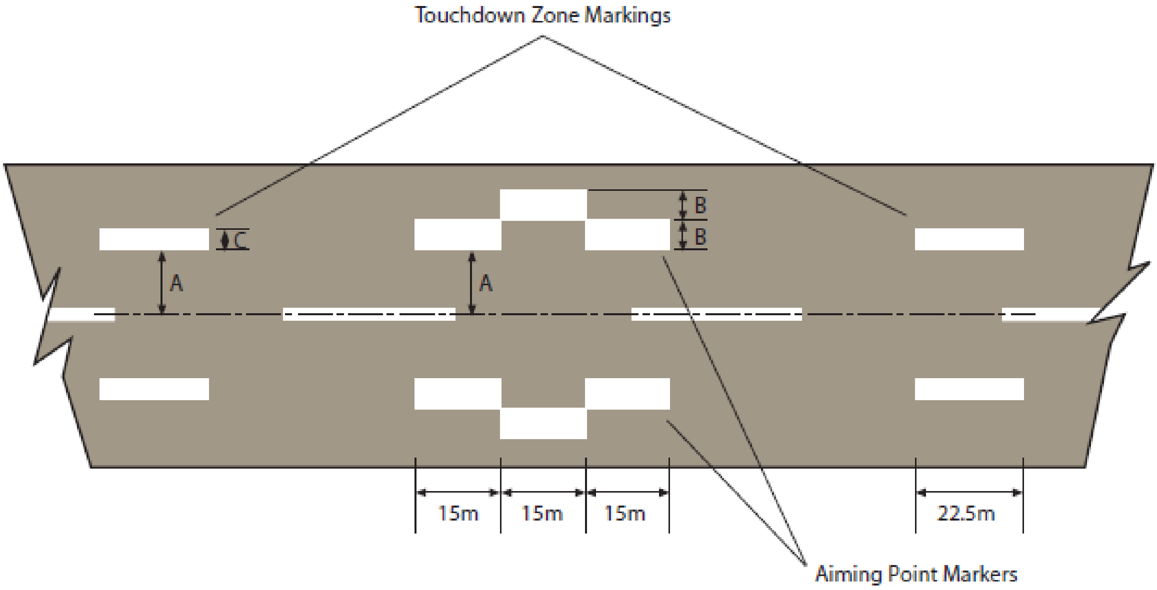
| | |
|---|---|
| a | here a PAPI system is provided for the runway, the beginning of the marking should be coincident with the visual approach slope origin. |
| b | here greater dimensions of the specified ranges are intended to be used where increased conspicuity is required. |
| c | here lateral spacing may be varied within these limits to minimise the contamination of the marking by rubber deposits. |
| d | here a touchdown zone marking is provided, the lateral spacing between the markings should be the same as that of the touchdown zone marking. |

Table L-1 Location and dimensions of aiming point marking - Landing distance available

(c) An aiming point marking should consist of:

(1) two conspicuous stripes. The dimensions of the stripes and the lateral spacing between their inner sides should be in accordance with the provisions of the appropriate column of Table L-1; or

(2) an alternative aiming point consisting of a broken stripe, with the mid-point offset to the outside of the stripe, by the width of the stripe as shown in Figure L-4.




| Runway Width (metres) | Distance (A) Rwy C/L To Marker (metres) | Marker Width B (metres) | Marker Width C (metres) |
|---|---|---|---|
| 45 | 9 | 5.5 | 3 |
| 30 | 3 | 5.0 | 3 |
| 23 | 5 | 2.5 | 1.5 |
| 18 | 3 | 2.5 | 1.5 |

Figure L-4 – Alternative aiming point marking

## CS-ADR-DSN.L.545 — Touchdown zone marking ADD

(a) Applicability:

(1) A touchdown zone marking should be provided in the touchdown zone of a paved precision approach runway where the code number is 2, 3 or 4.

(2) A touchdown zone marking should be provided in the touchdown zone of a paved non-precision approach or non-instrument runway where the code number is 3 or 4 and additional conspicuity of the touchdown zone is desirable.

(c) Location: A touchdown zone marking should consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway, the distance between the thresholds, as follows:

| **Landing distance available or the distance between thresholds** | **Pair(s) of markings** |
|---|---|
| less than 900 m | 1 |
| 900 m up to but not including 1 200 m | 2 |
| 1 200 m up to but not including 1 500 m | 3 |
| 1 500 m up to but not including 2 400 m | 4 |
| 2 400 m or more | 6 |

(d) Characteristics:

(1) A touchdown zone marking should conform to the patterns shown in Figure L-5. For the pattern shown in Figure L-5 A, the markings should be not less than 22.5 m long and 3 m wide. For the pattern shown in Figure L-5 B, each stripe of each marking should be not less than 22.5 m long and 1.8 m wide with spacing of 1.5 m between adjacent stripes.

(2) The lateral spacing between the inner sides of the rectangles should be equal to that of the aiming point marking where provided. Where an aiming point marking is not provided, the lateral spacing between the inner sides of the rectangles should correspond to the lateral spacing specified for the aiming point marking in Table L-1 (columns 2, 3, 4 or 5, as appropriate). The pairs of markings should be provided at longitudinal spacings of 150 m beginning from the threshold except that pairs of touchdown zone markings coincident with or located within 50 m of an aiming point marking should be deleted from the pattern.

(3) On a non-precision approach runway where the code number is 2, an additional pair of touchdown zone marking stripes should be provided 150 m beyond the beginning of the aiming point marking.

(4) When the alternative aiming point marking is used, the touchdown zone marking pattern should be as shown in figure L-6.

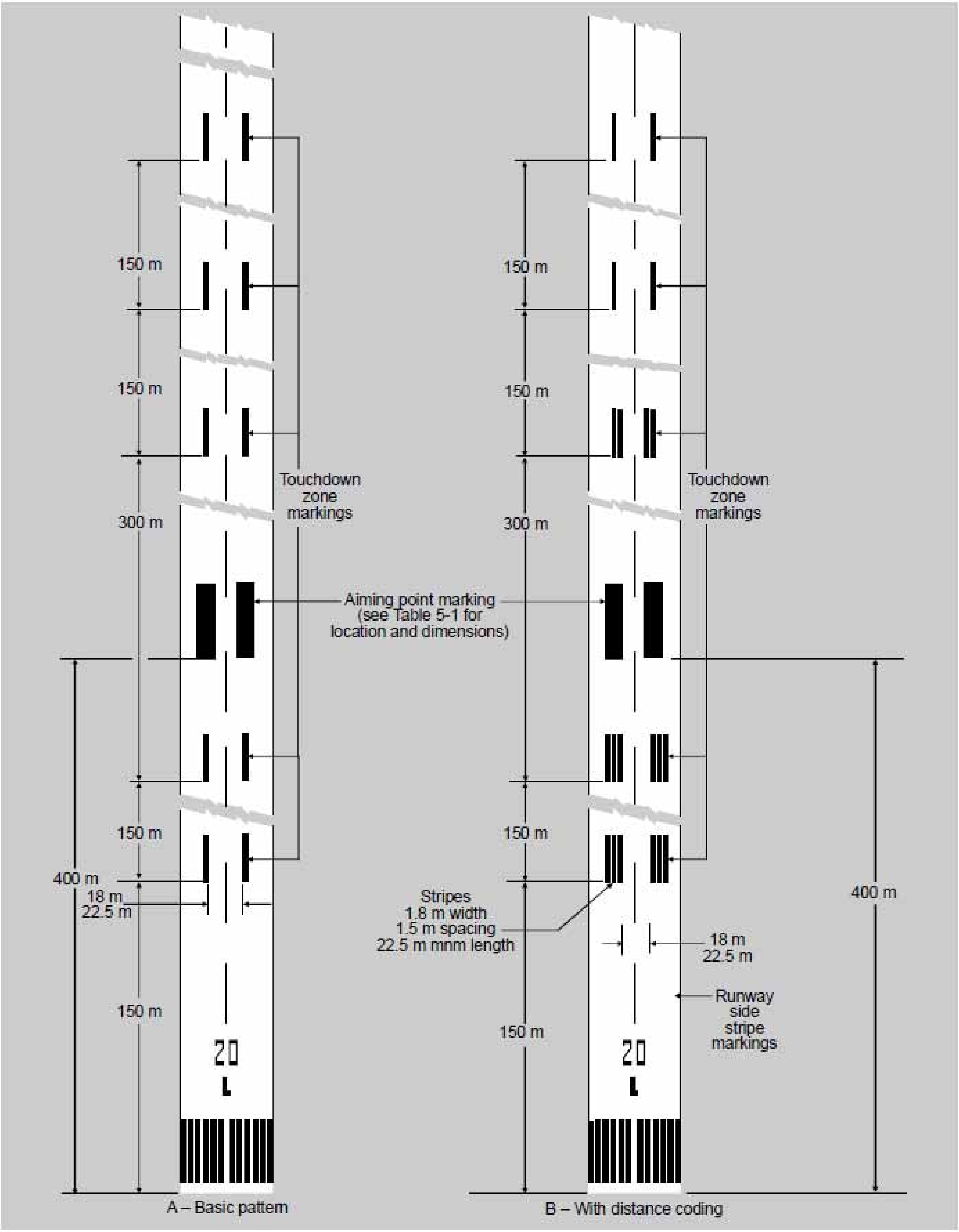
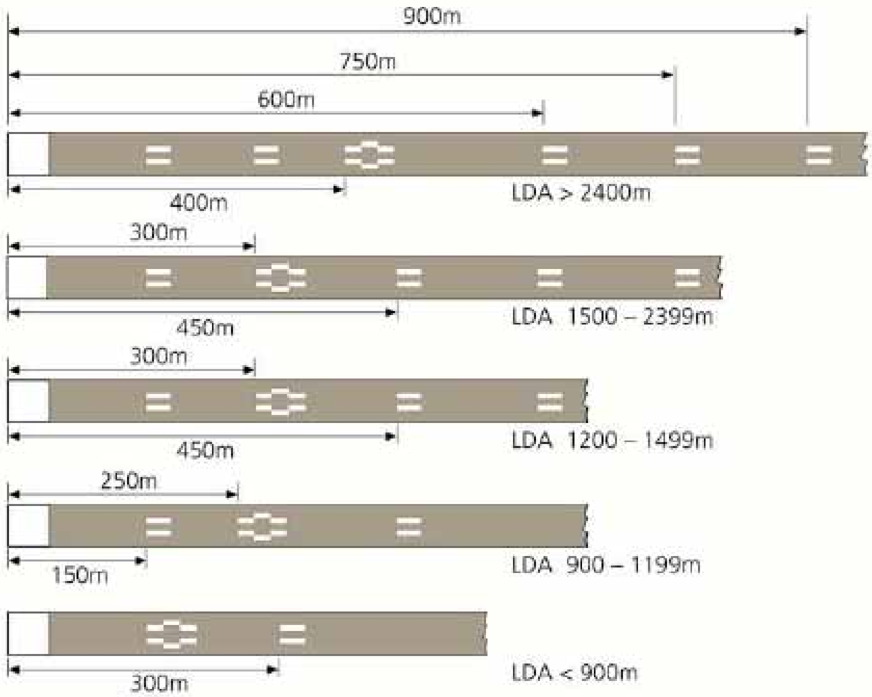



Figure L-5 Aiming point and touchdown zone markings (illustrated for a runway with a length of 2 400 m or more)




| Distance between Thresholds/ Declared LDA metres (1) | Location of TDZ markers distance in metres from Threshold | Location of AP marker distance in metres from Threshold |
|---|---|---|
| > 2400 | 150, 300, 600, 750 and 900 | 400 |
| 1500 – 2399 | 150, 450, 600 and 750 | 300 |
| 1200 – 1499 | 150, 450 and 600 | 300 |
| 900 – 1199 | 150 and 450 | 250 |
| <900 | 300 | 150 |

Figure L-6 Alternative aiming point and touchdown zone markings

### CS-ADR-DSN.L.550 — Runway side stripe marking ICAO

(a) Applicability:

(1) A runway side stripe marking should be provided between the thresholds of a runway where there is a lack of contrast between the runway edges and the shoulders or the surrounding terrain.

(2) A runway side stripe marking should be provided on a precision approach runway irrespective of the contrast between the runway edges and the shoulders or the surrounding terrain.

(b) Location and characteristics:

(1) A runway side stripe marking should consist of two stripes, one placed along each edge of the runway with the outer edge of each stripe approximately on the edge of the runway, except that, where the runway is greater than 60 m in width, the stripes should be located 30 m from the runway centre line.

(2) Where a runway turn pad is provided, the runway side stripe marking should be continued between the runway and the runway turn pad.

(3) A runway side stripe should have an overall width of at least 0.9 m on runways 30 m or more in width and at least 0.45 m on narrower runways.

## CS-ADR-DSN.L.555 — Taxiway centre line marking TXT MOVE to GM

(a) Applicability:

(1) Taxiway centre line marking should be provided on a taxiway, de-icing/anti-icing facility and apron in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

(2) Taxiway centre line marking should be provided on a runway when the runway is part of a standard taxi-route and:

(i) there is no runway centre line marking; or

(ii) where the taxiway centre line is not coincident with the runway centre line.

(b) Characteristics:

(1) On a straight section of a taxiway, the taxiway centre line marking should be located along the taxiway centre line.

(2) On a taxiway curve, the marking should continue from the straight portion of the taxiway at a constant distance from the outside edge of the curve.

(3) At an intersection of a taxiway with a runway, where the taxiway serves as an exit from the runway, the taxiway centre line marking should be curved into the runway centre line marking as shown in Figure L-7. The taxiway centre line marking should be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

(4) Where taxiway centre line marking is provided on a runway in accordance with Interruption of runway markings, the marking should be located on the centre line of the designated taxiway.

(5) A taxiway centre line marking should be at least 15 cm in width and continuous in length except where it intersects with a runway-holding position marking or an intermediate holding position marking as shown in Figure L-7.

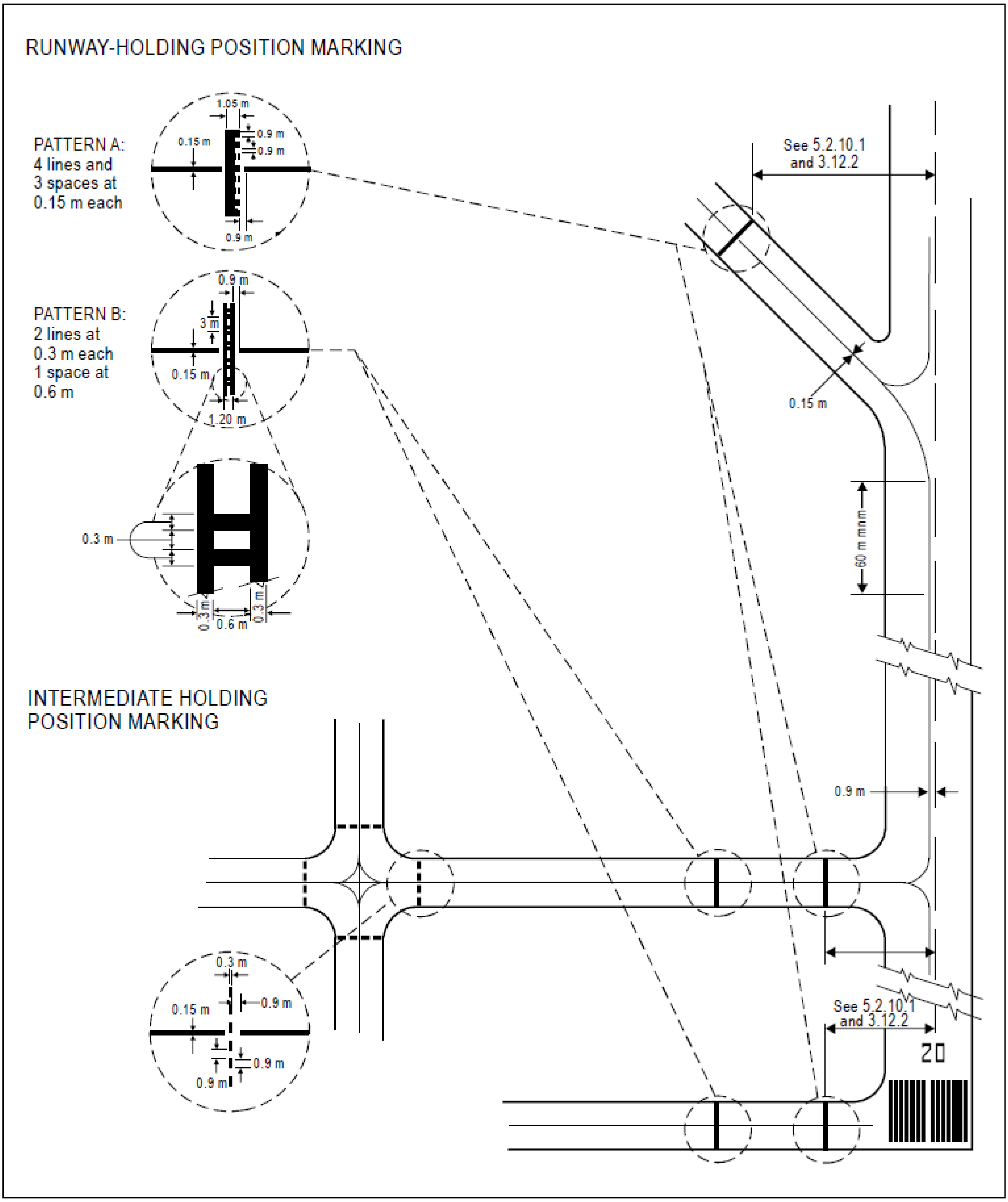



Figure L-7 Taxiway markings *(shown with basic runway markings)*

**CS-ADR-DSN.L.560 — Interruption of runway markings** *ICAO*

(a) At an intersection of two (or more) runways, the markings of the more important runway, except for the runway side stripe marking, should be displayed and the markings of the other runway(s) should be interrupted. The runway side stripe marking of the more important runway should be either continued across the intersection or interrupted.

(b) The order of importance of runways for the display of runway markings should be as follows:

(1) precision approach runway;

(2) non-precision approach runway; and

(3) non-instrument runway.

(c) At an intersection of a runway and taxiway the markings of the runway should be displayed and the markings of the taxiway interrupted, except that runway side stripe markings should be either continued across the intersection or interrupted.

**CS-ADR-DSN.L.565 — Runway turn pad marking** *ICAO*

(a) Applicability: Where a runway turn pad is provided, a runway turn pad marking should be provided for continuous guidance to enable an aeroplane to complete a 180-degree turn and align with the runway centre line.

(b) Characteristics:

(1) The runway turn pad marking should be curved from the runway centre line into the turn pad. The radius of the curve should be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the runway turn pad is intended.

(2) The intersection angle of the runway turn pad marking with the runway centre line should not be greater than 30 degrees.

(3) The runway turn pad marking should be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

(4) A runway turn pad marking should guide the aeroplane in such a way as to allow a straight portion of taxiing before the point where a 180-degree turn is to be made. The straight portion of the runway turn pad marking should be parallel to the outer edge of the runway turn pad.

(5) The design of the curve allowing the aeroplane to negotiate a 180-degree turn should be based on a nose wheel steering angle not exceeding 45 degrees.

(6) The design of the turn pad marking should be such that, when the cockpit of the aeroplane remains over the runway turn pad marking, the clearance distance between any wheel of the aeroplane landing gear and the edge of the runway turn pad should be not less than those specified in the following tabulation:

| Code letter | Clearance |
|---|---|
| A | 1.5 m |
| B | 2.25 m |
| C | 3 m if the turn pad is intended to be used by aeroplanes with a wheel base less than 18 m |
| | 4.5 m if the turn pad is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m |

| | |
|---|---|
| D | 4.5 m |
| E | 4.5 m |
| F | 4.5 m |

(7) A runway turn pad marking should be at least 15 cm in width and continuous in length.

## CS-ADR-DSN.L.570 — Enhanced taxiway centre line marking ADD

(a) An enhanced taxiway centre line marking should extend from the runway holding position Pattern A (as defined in Figure L-7, Taxiway markings) to a distance of up to 45 m (a minimum of three (3) dashed lines) in the direction of travel away from the runway or to the next runway holding position, if within 45 m distance.

(b) Characteristics: Enhanced taxiway centre line marking should be as shown in Figure L-8.

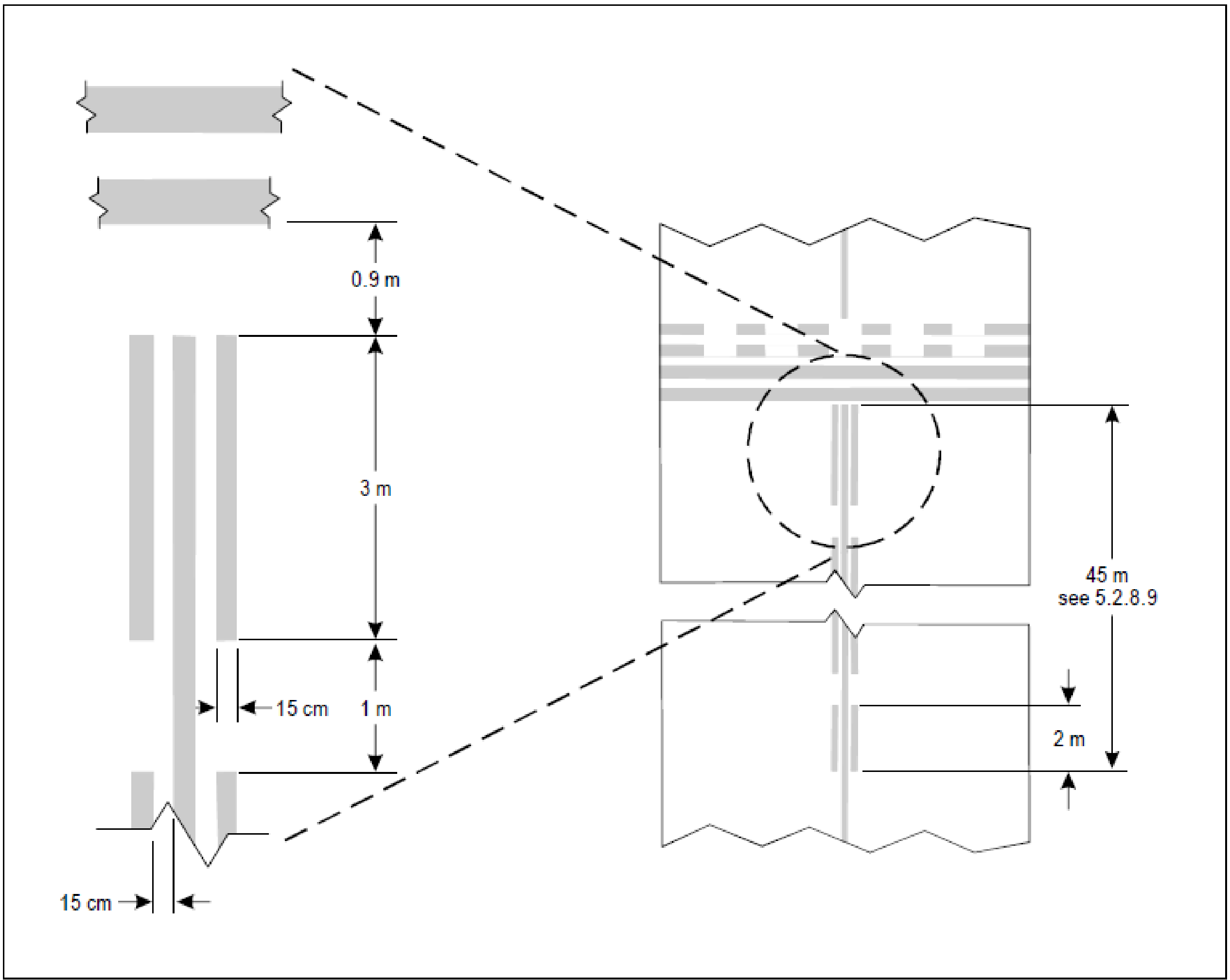



Figure L-8 Enhanced taxiway centre line marking

## CS-ADR-DSN.L.575 — Runway-holding position marking ICAO

A runway-holding position marking should be displayed along a runway-holding position.

(a) Characteristics:

(1) At an intersection of a taxiway and a non-instrument, non-precision approach or take-off runway, the runway-holding position marking should be as shown in Figure L-9, pattern A.

(2) Where a single runway-holding position is provided at an intersection of a taxiway and a precision approach category I, II or III runway, the runway-holding position marking should be as shown in Figure L-9, pattern A.

(3) Where two or three runway-holding positions are provided at such an intersection, the runway-holding position marking closer (closest) to the runway should be as shown in Figure L-9, pattern A and the markings farther from the runway should be as shown in Figure L-9, pattern B.

(4) The runway-holding position marking displayed at a runway-holding position established in accordance to (b)(1) or (2) should be as shown in Figure L-9, pattern A.

(5) Where increased conspicuity of the runway-holding position is required, the runway-holding position marking should be as shown in Figure L-9, pattern A or pattern B, as appropriate.

(6) Where a pattern B runway-holding position marking is located on an area where it would exceed 60 m in length, the term 'CAT II' or 'CAT III' as appropriate should be marked on the surface at the ends of the runway-holding position marking and at equal intervals of 45 m maximum between successive marks. The letters should be not less than 1.8 m high and should be placed not more than 0.9 m beyond the holding position marking.

(7) The runway-holding position marking displayed at a runway/runway intersection should be perpendicular to the centre line of the runway forming part of the standard taxi-route. The pattern of the marking should be as shown in Figure L-9, pattern A.

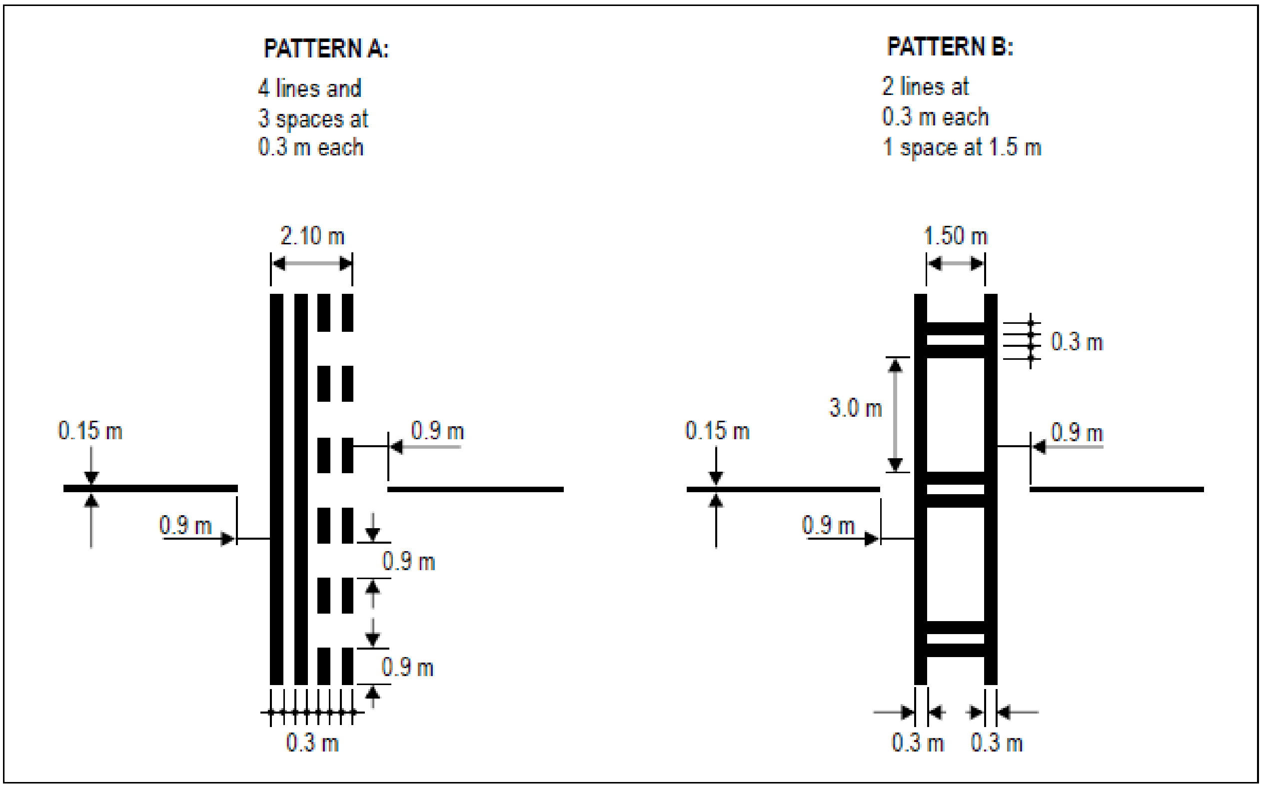



Figure L-9 Runway-holding position markings

## CS-ADR-DSN.L.580 Intermediate holding position marking ICAO

(a) Applicability:

(1) An intermediate holding position marking should be displayed along an intermediate holding position.

(2) An intermediate holding position marking should be displayed at the exit boundary of a remote de-icing/anti-icing facility adjoining a taxiway.

(b) Location:

(1) Where an intermediate holding position marking is displayed at an intersection of two taxiways, it should be located across the taxiway at sufficient distance from the near edge of the intersecting taxiway to ensure safe clearance between taxiing aircraft. It should be coincident with a stop bar or intermediate holding position lights, where provided.

(2) The distance between an intermediate holding position marking at the exit boundary of a remote de-icing/anti-icing facility and the centre line of the adjoining taxiway should not be less than the dimension specified in the table below.

| **Code letter** | **Distance (metres)** |
|---|---|
| A | 16.25 |
| B | 21.5 |
| C | 26 |

| | |
|---|---|
| D | 40.5 |
| E | 47.5 |
| F | 57.5 |

(c) Characteristics: An intermediate holding position marking should consist of a single broken line as shown in Figure L-7.

## CS-ADR-DSN.L.585 — VOR aerodrome checkpoint marking *ICAO*

(a) When a VOR aerodrome check-point is established, it should be indicated by a VOR aerodrome check-point marking and sign.

(b) Location: A VOR aerodrome check-point marking should be centred on the spot at which an aircraft is to be parked to receive the correct VOR signal.

(c) Characteristics:

(1) A VOR aerodrome check-point marking should consist of a circle 6 m in diameter and have a line width of 15 cm (see Figure L-10 (A)).

(2) When it is preferable for an aircraft to be aligned in a specific direction, a line should be provided that passes through the centre of the circle on the desired azimuth. The line should extend 6 m outside the circle in the desired direction of heading and terminate in an arrowhead. The width of the line should be 15 cm (see Figure L-10 (B)).

(3) A VOR aerodrome check-point marking should differ from the colour used for the taxiway markings and, when applicable from a contrasting viewpoint, be white in colour.

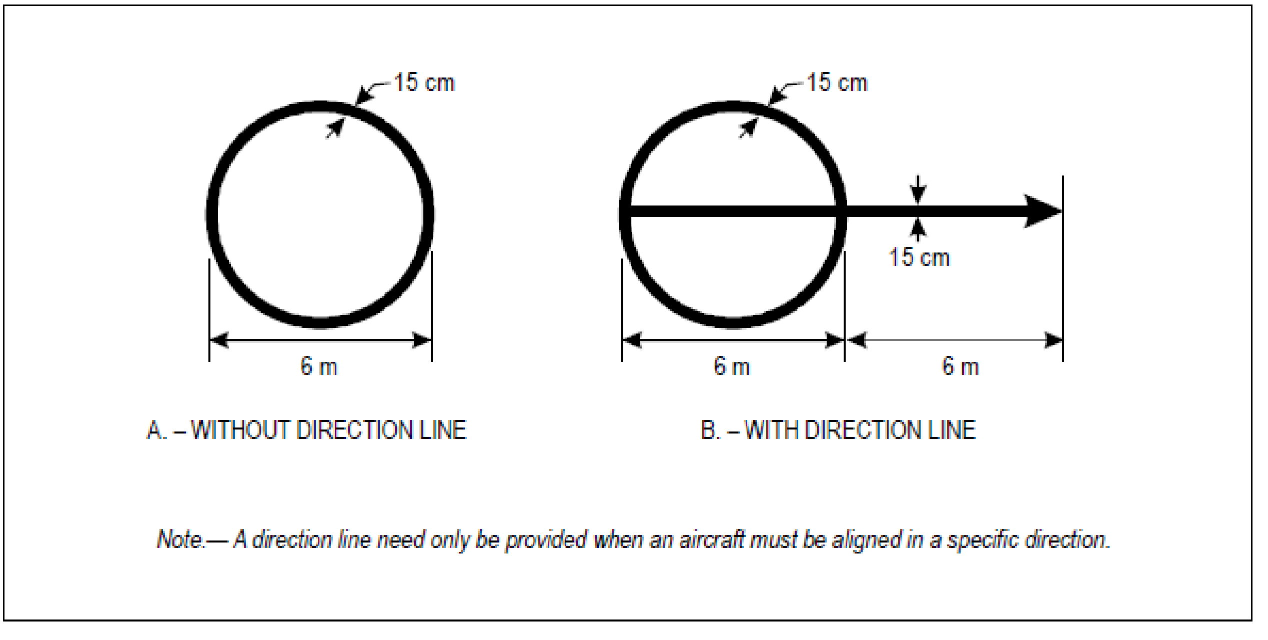



Figure L-10 VOR check-point markings

## CS-ADR-DSN.L.590 — Aircraft stand marking TXT MOVE to GM

(a) Applicability: Aircraft stand markings should be provided for designated parking positions on an apron and on a de-icing/anti-icing facility.

(b) General characteristics: Aircraft stand markings should include such elements as stand identification, lead-in line, turn bar, turning line, alignment bar, stop line and lead-out line, as are required by the parking configuration and to complement other parking aids.

(c) Stand identification:

(1) A stand identification (letter and/or number) should be included in the lead-in line a short distance after the beginning of the lead-in line. The height of the identification should be adequate to be readable from the cockpit of aircraft using the stand.

(2) Identification of the aircraft for which each set of markings is intended should be added to the stand identification where:

(i) two sets of aircraft stand markings are superimposed on each other in order to permit more flexible use of the apron and safety would be impaired if the wrong marking was followed.

(d) Lead-in, turning and lead-out lines:

(1) Lead-in, turning and lead-out lines should, as far as practicable, be continuous in length and have a width of not less than 15 cm. Where one or more sets of stand markings are superimposed on a stand marking, the lines should be continuous for the most demanding aircraft and broken for other aircraft.

(2) The curved portions of lead-in, turning and lead-out lines should have radii appropriate to the most demanding aircraft type for which the markings are intended.

(3) Where it is intended that an aircraft proceeds in one direction only, arrows pointing in the direction to be followed should be added as part of the lead-in and lead-out lines.

(e) Alignment bar: An alignment bar should be placed so as to be coincident with the extended centre line of the aircraft in the specified parking position and visible to the pilot during the final part of the parking manoeuvre. It should have a width of not less than 15 cm.

(f) Turn bar and stop line:

(1) A turn bar should be located at right angles to the lead-in line, abeam the left pilot position at the point of initiation of any intended turn. It should have a length and width of not less than 6 m and 15 cm, respectively, and include an arrowhead to indicate the direction of turn.

(2) A stop line should be located at right angles to the alignment bar, abeam the left pilot position at the intended point of stop. It should have a length and width of not less than 6 m and 15 cm, respectively.

(3) If more than one turn bar and/or stop line is required, they should be designated for the appropriate aircraft types.

## CS-ADR-DSN.L.595 — Apron safety lines ICAO

(a) Applicability: Apron safety lines should be provided on an apron as required by the parking configurations and ground facilities.

(b) Location: Apron safety lines should be located so as to define the areas intended for use by ground vehicles and other aircraft servicing equipment to provide safe separation from aircraft.

(c) Characteristics:

(1) Apron safety lines should include such elements as wing tip clearance lines and service road boundary lines as required by the parking configurations and ground facilities.

(2) Apron safety lines should be of a conspicuous colour which should contrast with that used for aircraft stand markings.

(3) An apron safety line should be continuous in length and at least 10 cm in width.

**CS-ADR-DSN.L.600 — Road-holding position marking** *ADD*

(a) Applicability: A road-holding position marking should be provided at all service road entrances to a runway.

(b) Location:

(1) The road-holding position marking should be located across the road at the holding position.

(2) Where a road intersects a taxiway, a suitable marking should be located across the road at the appropriate distance to ensure vehicles remain clear of the taxiway strip.

(c) Characteristics:

(1) The road-holding position marking should be in accordance with the local road traffic regulations.

(2) The road marking at the intersection of a road with a taxiway should be in accordance with the local road traffic regulations for a yield right of way.

**CS-ADR-DSN.L.605 — Mandatory instruction marking** *MOVE to GM*

(a) Applicability: Where operationally required, such as on taxiways exceeding 60 m in width, or to assist in the prevention of a runway incursion, a mandatory instruction sign should be supplemented by a mandatory instruction marking.

(b) Location:

(1) The mandatory instruction marking on taxiways, where the code letter is A, B, C, or D, should be located across the taxiway equally placed about the taxiway centre line and on the holding side of the runway-holding position marking as shown in Figure L-11 (A). The distance between the nearest edge of the marking and the runway holding position marking or the taxiway centre line marking should be not less than 1 m.

(2) The mandatory instruction marking on taxiways, where the code letter is E or F, should be located on the both sides of the taxiway centre line marking and on the holding side of the runway-holding position marking as shown in Figure L-11 (B). The distance between the nearest edge of the marking and the runway holding position marking or the taxiway centre line marking should be not less than 1 m.

(c) Characteristics:

(1) A mandatory instruction marking should consist of an inscription in white on a red background. Except for a NO ENTRY marking, the inscription should provide information identical to that of the associated mandatory instruction sign.

(2) A NO ENTRY marking should consist of an inscription in white reading NO ENTRY on a red background.

(3) Where there is insufficient contrast between the marking and the pavement surface, the mandatory instruction marking should include an appropriate border, preferably white or black.

(4) The character height should be 4 m for inscriptions where the code letter is C, D, E or F, and 2 m where the code letter is A or B. The inscription should be in the form and proportions shown in Figures L-12A to L-12E.

(5) The background should be rectangular and extend a minimum of 0.5 m laterally and vertically beyond the extremities of the inscription.

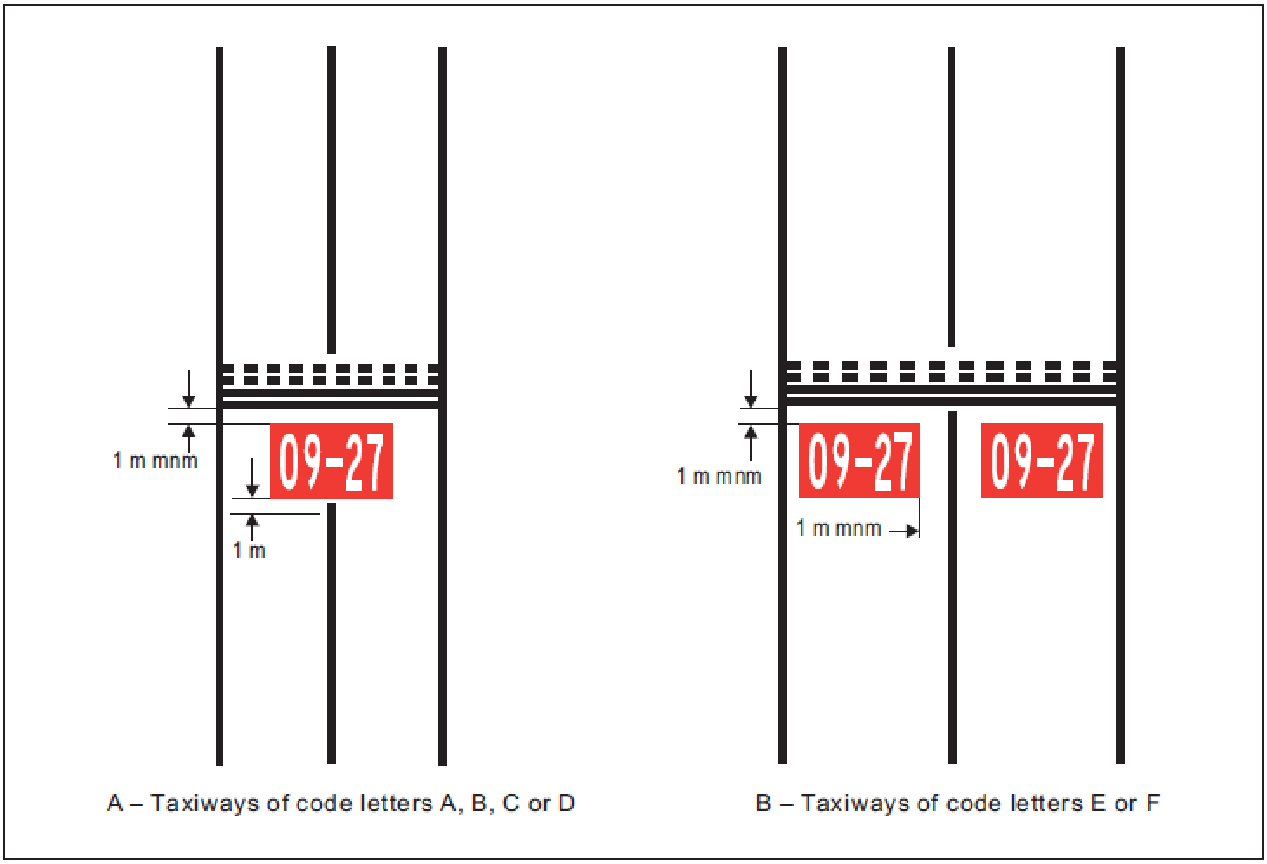



Figure L-11 Mandatory instruction marking

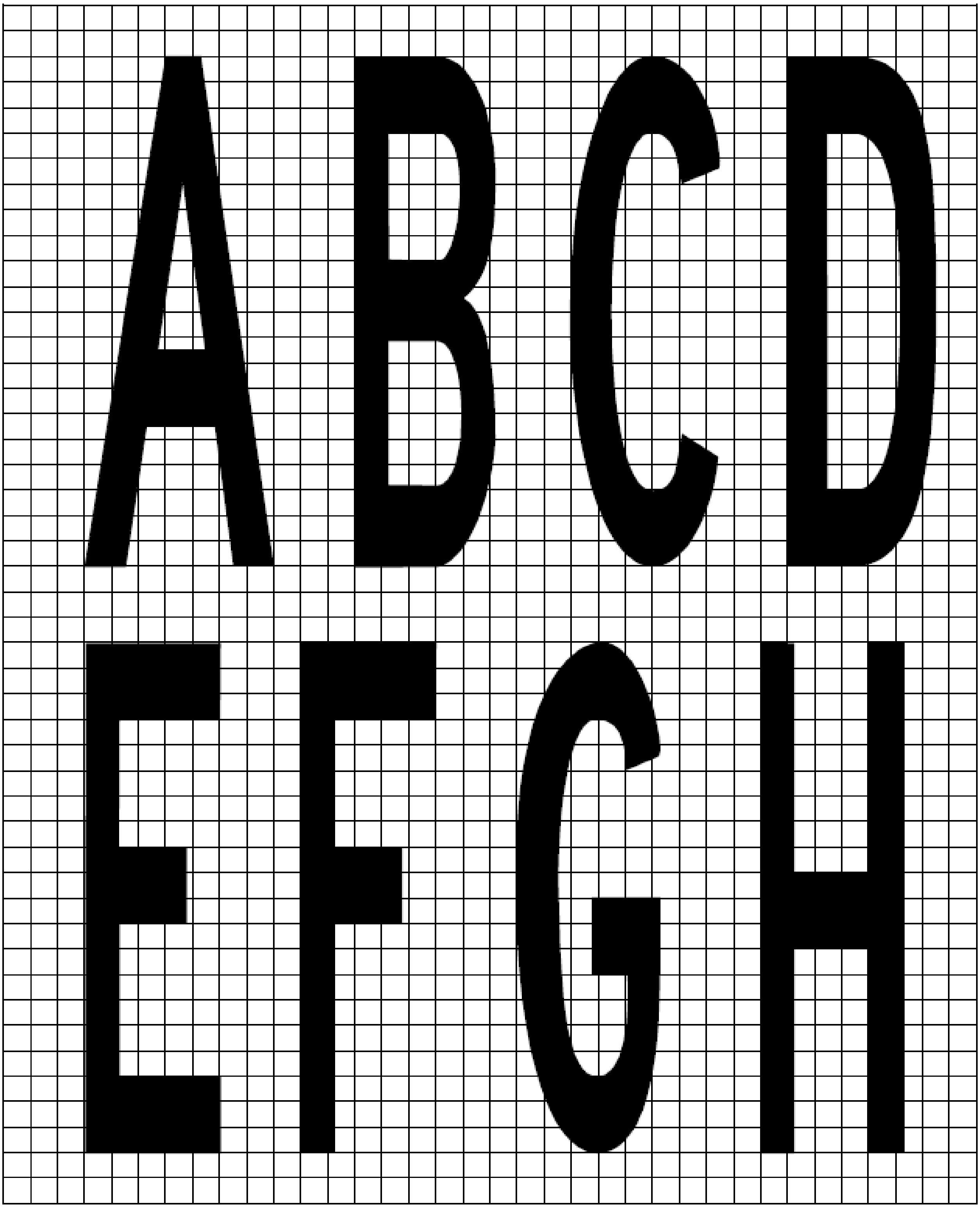


Figure L-12A Mandatory instruction marking inscription form and proportions

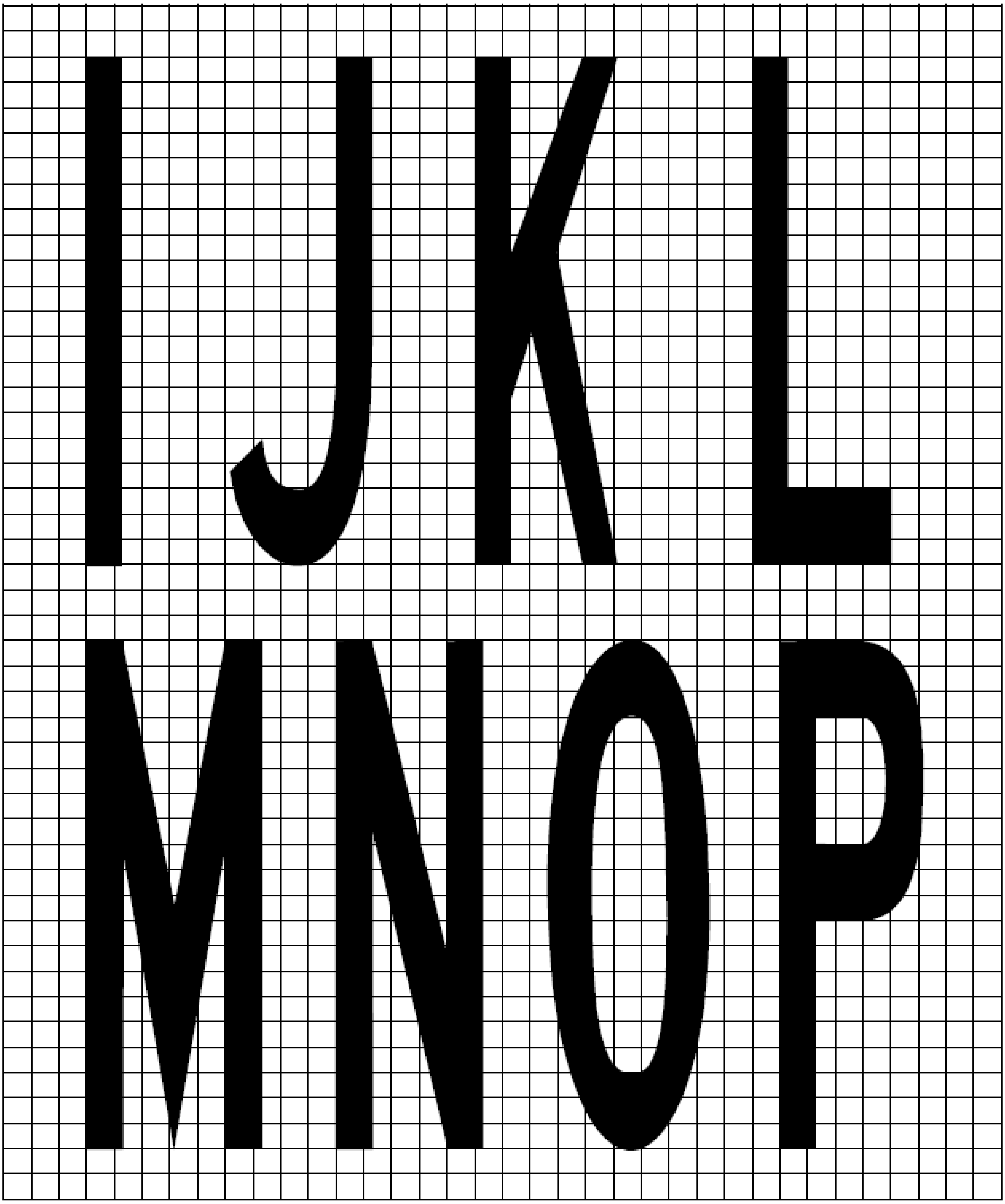



Figure L-12B Mandatory instruction marking inscription form and proportions

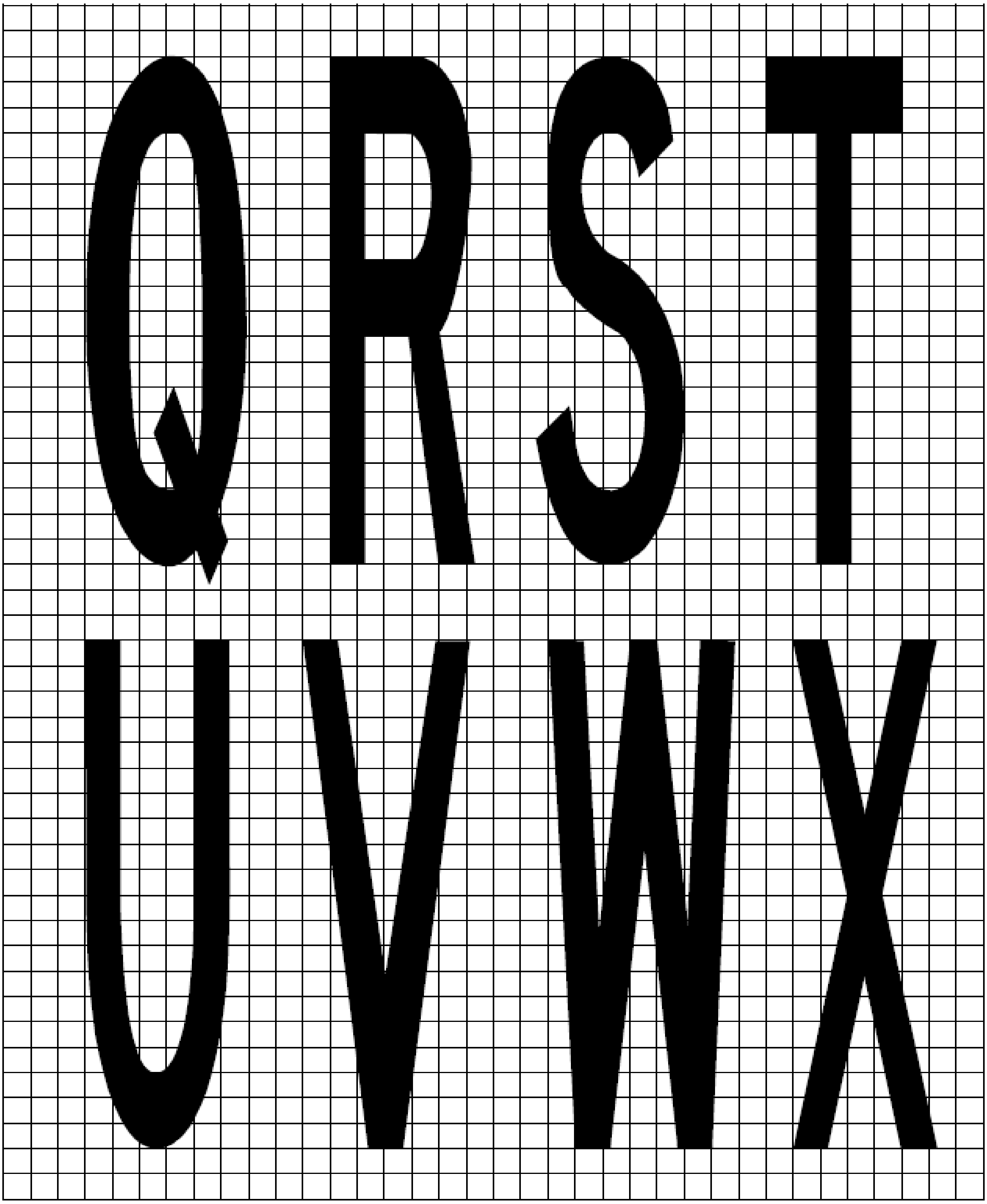



Figure L-12C Mandatory instruction marking inscription form and proportions

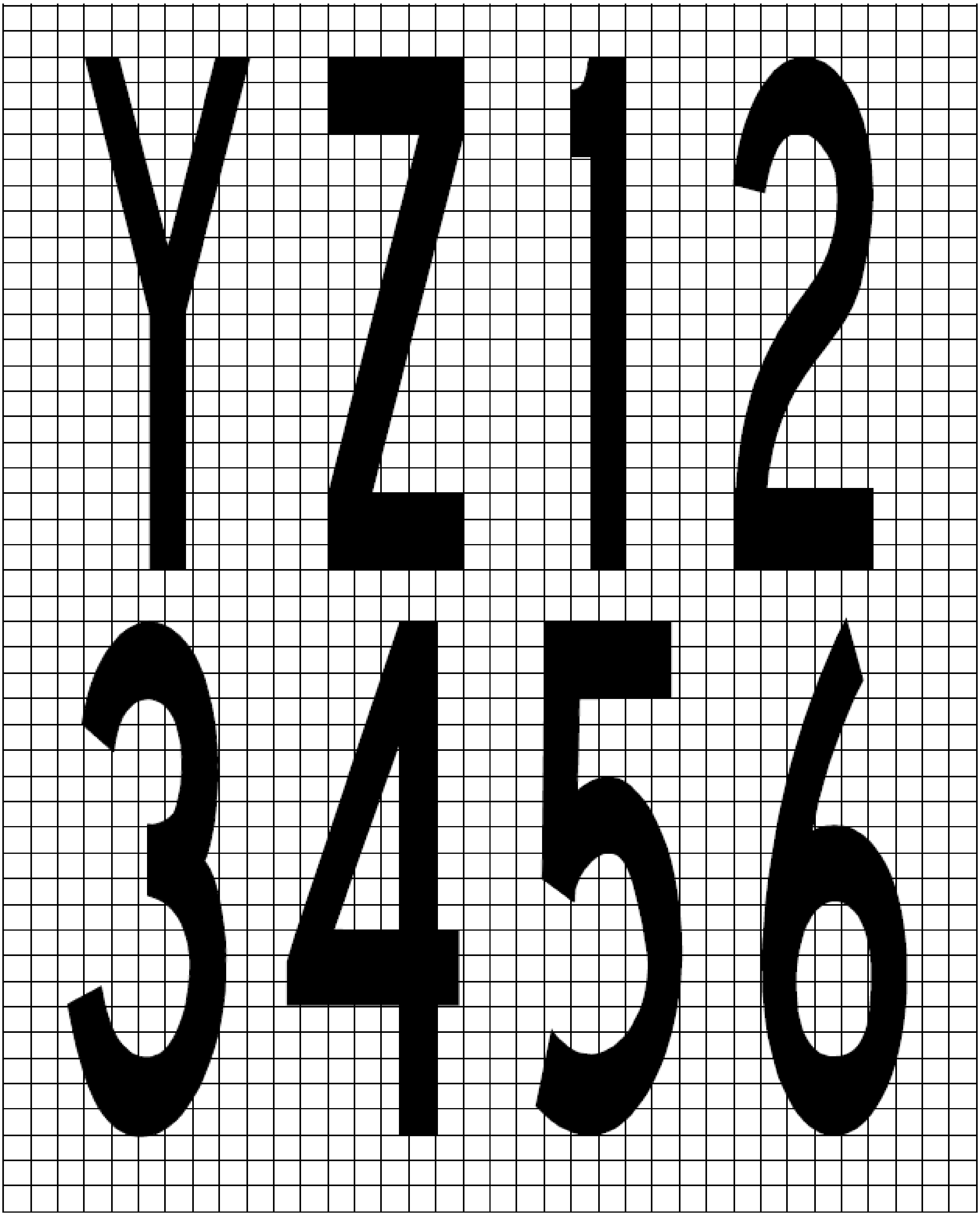
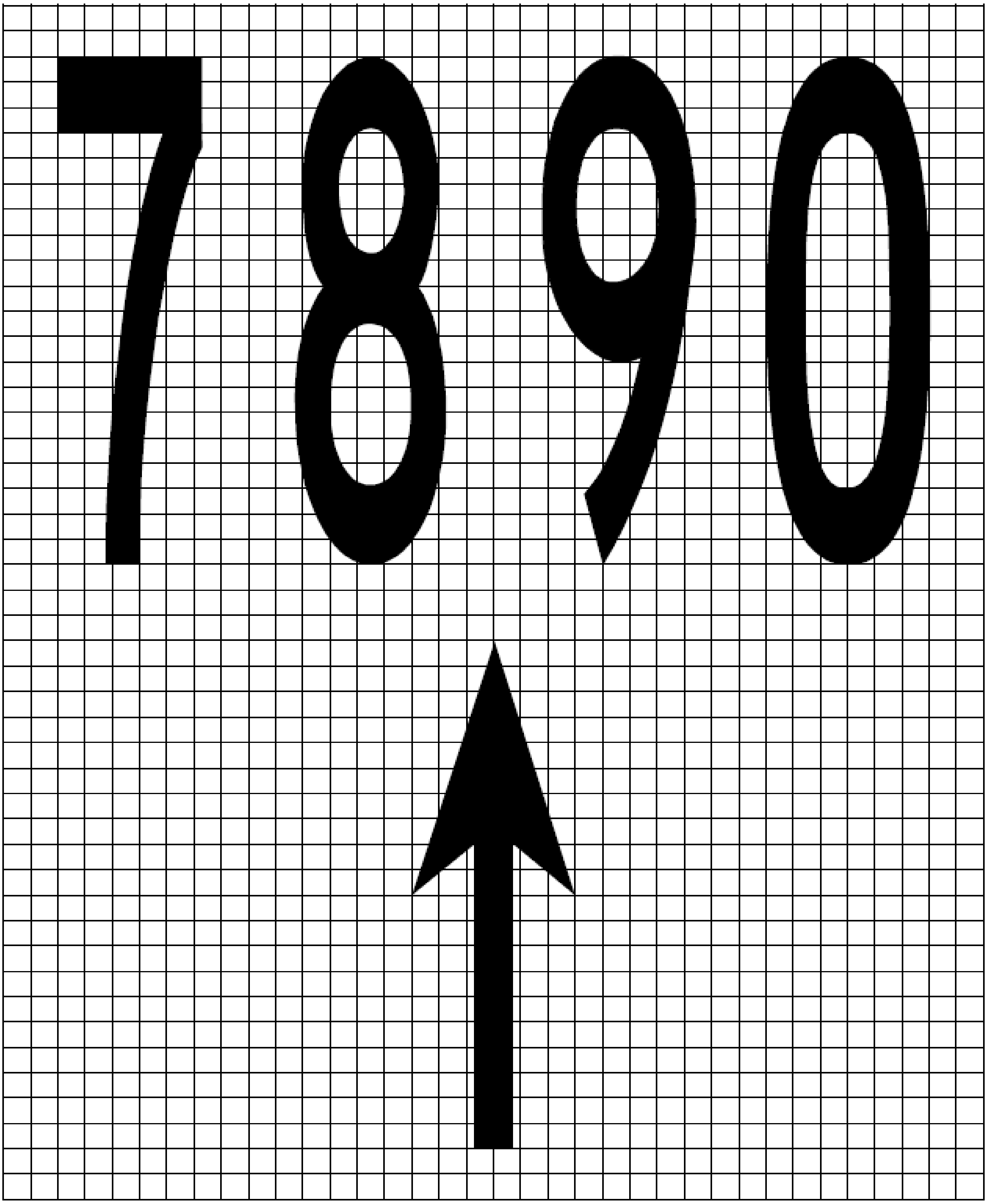



Figure L-12D Mandatory instruction marking inscription form and proportions




— Figure L-12E Mandatory instruction marking inscription form and proportions

**CS-ADR-DSN.L.610 — Information marking** *TXT MOVE to GM*

The character height should be as for mandatory instruction markings.

## CHAPTER M — VISUAL AIDS FOR NAVIGATION (LIGHTS)

### CS-ADR-DSN.M.615 — General DEL TXT

(a) Elevated approach lights:

(1) Elevated approach lights and their supporting structures should be frangible except that, in that portion of the approach lighting system beyond 300 m from the threshold:

(i) where the height of a supporting structure exceeds 12 m, the frangibility requirement will apply to the top 12 m only; and

(ii) where a supporting structure is surrounded by non-frangible objects, only that part of the structure that extends above the surrounding objects will be frangible.

(2) When an approach light fixture or supporting structure is not in itself sufficiently conspicuous, it should be suitably marked.

(b) Elevated lights:

Elevated runway, stopway and taxiway lights should be frangible. Their height will be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

(c) Surface lights:

(1) Light fixtures inset in the surface of runways, stopways, taxiways and aprons should be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the lights themselves.

(2) The temperature produced by conduction or radiation at the interface between an installed inset light and an aircraft tire should not exceed 160 °C during a 10-minute period of exposure.

(d) Light intensity and control:

(1) Whatever the light sources that are used in aerodrome lighting, they should be in accordance with general specifications included in this Regulation for aerodrome ground lighting characteristics.

(2) The intensity of runway lighting should be adequate for the minimum conditions of visibility and ambient light in which use of the runway is intended, and compatible with that of the nearest section of the approach lighting system when provided.

(3) Where a high-intensity lighting system is provided, a suitable intensity control should be incorporated to allow for adjustment of the light intensity to meet the prevailing conditions. Separate intensity controls or other suitable methods should be provided to ensure that the following systems, when installed, can be operated at compatible intensities:

(i) approach lighting system;

(ii) runway edge lights;

(iii) runway threshold lights;

(iv) runway end lights;

(v) runway centre line lights;

(vi) runway touchdown zone lights; and

(vii) taxiway centre line lights.

(4) On the perimeter of and within the ellipse defining the main beam in CS-ADR-DSN.U.940 Aeronautical ground light characteristics, the maximum light intensity value should not be greater than three times the minimum light intensity value measured in accordance with CS-ADR-DSN.U.940 Aeronautical ground light characteristics.

On the perimeter of and within the rectangle defining the main beam in CS-ADR-DSN.U.940 Aeronautical ground light characteristics, the maximum light intensity value should not be greater than three times the minimum light intensity value measured in accordance with CS-ADR-DSN.U.940 Aeronautical ground light characteristics.

## CS-ADR-DSN.M.620 — Aeronautical beacons TXT DEL REV

(a) General

(1) Only if operationally necessary, as when non-precision and/or non-instrument operations are in use, an aerodrome beacon or identification beacon should be provided at each aerodrome intended for use at night.

(2) The operational requirement should be determined having regard to the requirements of the air traffic using the aerodrome, the conspicuity of the aerodrome features in relation to its surroundings and the installation of other visual and non-visual aids useful in locating the aerodrome.

(b) Aerodrome beacon

(1) Applicability

An aerodrome beacon should be provided at an aerodrome intended for use at night if aircraft navigate predominantly by visual means and one or more of the following conditions exist:

(i) reduced visibilities are frequent; or

(ii) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

(2) Location

(i) The aerodrome beacon should be located on or adjacent to the aerodrome in an area of low ambient background lighting.

(ii) The location of the beacon should be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

(3) Characteristics

(i) The aerodrome beacon should show either coloured flashes alternating with white flashes.

(ii) The frequency of total flashes should be from 20 to 30 per minute.

(iii) The coloured flashes emitted by beacons at land aerodromes should be green and coloured flashes emitted by beacons at water aerodromes should be yellow. In the case of a combined water and land aerodrome, coloured flashes, if used, should have the colour characteristics of whichever section of the aerodrome is designated as the principal facility.

(iv) The light from the beacon should show at all angles of azimuth. The vertical light distribution should extend upwards from an elevation of not more than 1° to an elevation sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash should be not less than 2 000 cd.

(v) At locations where a high ambient background lighting level cannot be avoided, the effective intensity of the flash may be required to be increased by a factor up to a value of 10.

(c) Identification beacon

(1) Applicability

An identification beacon should be provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by other means.

(2) Location

(i) The identification beacon should be located on the aerodrome in an area of low ambient background lighting.

(ii) The location of the beacon should be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

(3) Characteristics

(i) An identification beacon at a land aerodrome should show at all angles of azimuth. The vertical light distribution should extend upwards from an elevation of not more than 1° to an elevation sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used, and the effective intensity of the flash should be not less than 2 000 cd.

(ii) At locations where a high ambient background lighting level cannot be avoided, the effective intensity of the flash may be required to be increased by a factor up to a value of 10.

(iii) An identification beacon should show flashing-green at a land aerodrome and flashing-yellow at a water aerodrome.

(iv) The identification characters should be transmitted in the International Morse Code.

(v) The speed of transmission should be between six and eight words per minute, the corresponding range of duration of the Morse dots being from 0.15 to 0.2 seconds per dot.

## SECTION 1 APPROACH LIGHTING SYSTEMS

### CS-ADR-DSN.M.625 — Approach lighting systems, general and applicability *ADD REV*

(a) Non-instrument runway

(1) Where physically practicable, a simple approach lighting system as specified in paragraph (c) (Simple approach lighting system) below should be provided to serve a non-instrument runway where the code number is 3 or 4 and intended for use at night, except when the runway is used only in conditions of good visibility, and sufficient guidance is provided by other visual aids.

(2) A simple approach lighting system can also provide visual guidance by day.

(b) Non-precision approach runway

(1) Where physically practicable, a simple approach lighting system specified in paragraph (c) (Simple approach lighting system) below should be provided to serve a non-precision approach runway, except when the runway is used only in conditions of good visibility or sufficient guidance is provided by other visual aids.

(2) It is advisable to give consideration to the installation of a precision approach category I lighting system or to the addition of a runway lead-in lighting system.

(c) Precision approach runway category I

Where physically practicable, a precision approach category I lighting system as specified in CS-ADR-DSN.M.600 should be provided to serve a precision approach runway category I.

(d) Precision approach runway categories II and III

A precision approach category II and III lighting system as specified in CS-ADR-DSN.M.605 should be provided to serve a precision approach runway category II or III.

(e) Simple approach lighting system

(1) Location and composition:

(i) A simple approach lighting system should consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of not less than 420 m from the threshold with a row of lights forming a crossbar 18 m or 30 m in length at a distance of 300 m from the threshold.

(ii) The specifications in this document provide for the basic characteristics for simple approach lighting systems. For certain aspects of these systems, some latitude is permitted, for example, in the spacing between centre line lights and crossbars. The simple approach lighting patterns that have been generally adopted are shown in Figure M-1.

(iii) The approach lighting configuration is to be provided irrespective of the location of the threshold, i.e. whether the threshold is at the extremity of the runway or displaced from the runway extremity. In both cases, the approach lighting system should extend up to the threshold. However, in the case of a displaced threshold, inset lights are used from the runway extremity up to the threshold to obtain the specified configuration. These inset lights are designed to satisfy the structural requirements specified in this Regulation and the chromaticity and characteristics specified in CS-ADR-DSN.U.930 and CS-ADR-DSN.U.940.

(e) Crossbar lights:

(1) The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights.

(2) The lights of the crossbar should be spaced so as to produce a linear effect, except that, when a crossbar of 30 m is used, gaps may be left on each side of the centre line. These gaps should be kept to a minimum to meet local requirements and each should not exceed 6 m.

(3) Spacings for the crossbar lights between 1 m and 4 m are in use. Gaps on each side of the centre line may improve directional guidance when approaches are made with a lateral error, and facilitate the movement of rescue and fire-fighting vehicles.

(f) Centre line lights:

(1) The lights forming the centre line should be placed at longitudinal intervals of 60 m, except that, when it is desired to improve the guidance, an interval of 30 m may be used.

(2) The innermost light should be located either 60 m or 30 m from the threshold, depending on the longitudinal interval selected for the centre line lights. If it is not physically possible to provide a centre line extending for a distance of 420 m from the threshold, it should be extended to 300 m so as to include the crossbar. If this is not possible, the centre line lights should be extended as far as practicable, and each centre line light should then consist of a barrette at least 3 m in length. Subject to the approach system having a crossbar at 300 m from the threshold, an additional crossbar may be provided at 150 m from the threshold.

(3) The system should lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) No object other than an ILS or MLS azimuth antenna should protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) No light other than a light located within the central part of a crossbar or a centre line barrette excluding their extremities should be screened from an approaching aircraft.

(iii) Any ILS or MLS azimuth antenna protruding through the plane of the lights should be treated as an obstacle and marked and lighted accordingly as specified in the requirements for obstacle marking and lighting.

(g) Characteristics:

(1) The lights of a simple approach lighting system should be fixed lights and the colour of the lights should be such as to ensure that the system is readily distinguishable from other aeronautical ground lights, and from extraneous lighting, if present, but should be preferably fixed lights showing variable white. Each centre line light should consist of either:

(i) a single source; or

(ii) a barrette at least 3 m in length.

(h) It may be advisable to use barrettes 4 m in length if it is anticipated that the simple approach lighting system will be developed into a precision approach lighting system.

(i) Where provided for a non-instrument runway, the lights should show at all angles in azimuth necessary to a pilot on base leg and final approach. The intensity of the lights should be adequate for all conditions of visibility and ambient light for which the system has been provided.

(j) Where provided for a non-precision approach runway, the lights should show at all angles in azimuth necessary to the pilot of an aircraft which on final approach does not deviate by an abnormal amount from the path defined by the non-visual aid. The lights should be designed to provide guidance during both day and night in the most adverse conditions of visibility and ambient light for which it is intended that the system should remain usable.

(k) No light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) should be screened from an approaching aircraft.

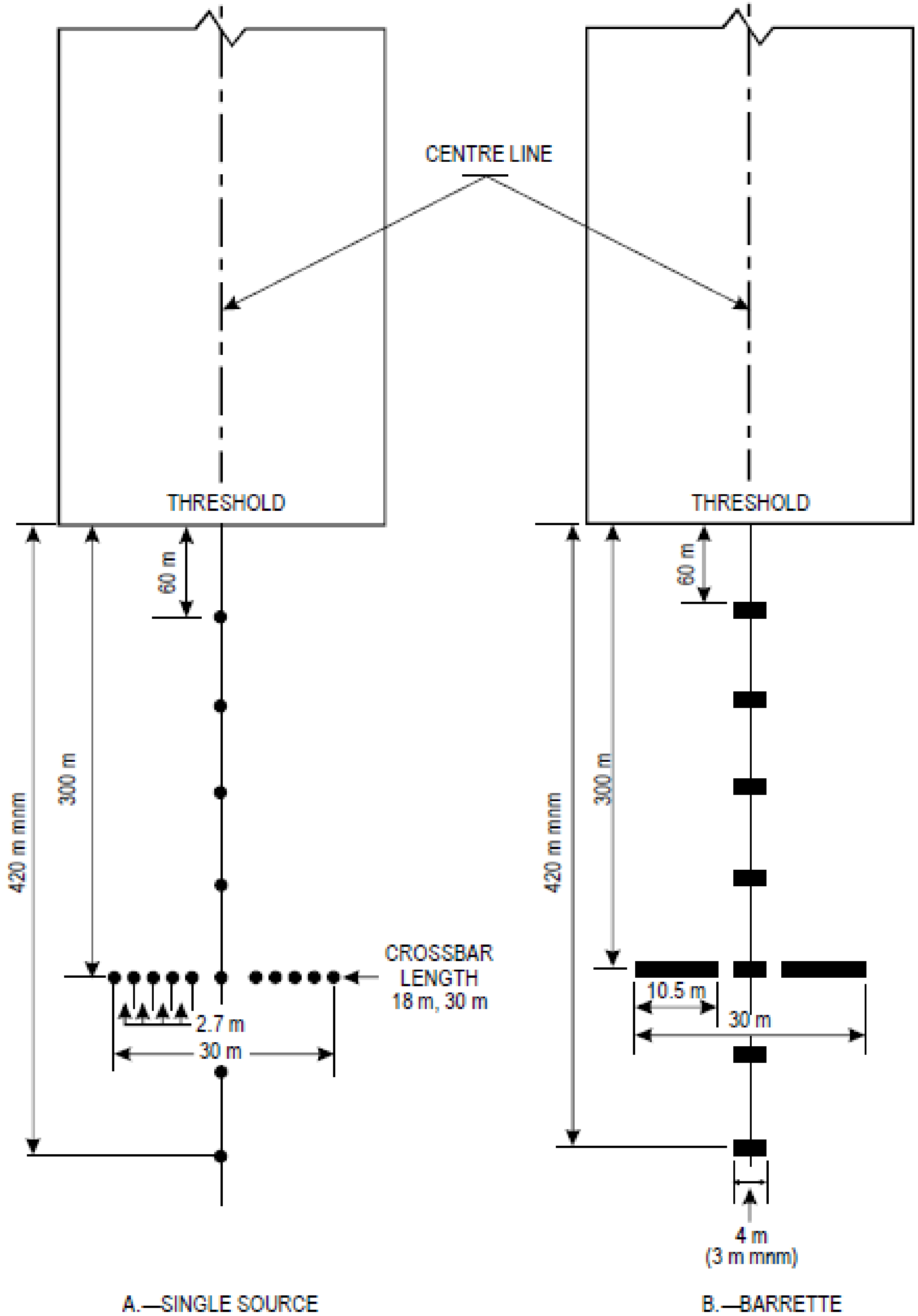



Figure M-1 Simple approach lighting systems

## CS-ADR-DSN.M.630 — Precision approach category I lighting system ADD MOVE to GM

A precision approach category I lighting system as specified in this Regulation should be provided to serve a precision approach runway category I.

(a) Location and composition

(1) General:

A precision approach category I lighting system should consist of a row of lights on the extended centre line of the runway extending, wherever possible, over a distance of 900 m from the runway threshold with a row of lights forming a crossbar 30 m in length at a distance of 300 m from the runway threshold.

(2) Crossbar lights:

The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar should be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps should be kept to a minimum to meet local requirements and each should not exceed 6 m.

(3) Centre line lights:

The lights forming the centre line should be placed at longitudinal intervals of 30 m with the innermost light located 30 m from the threshold.

(4) Screening of lights:

(i) No object other than an ILS or MLS azimuth antenna should protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) should be screened from an approaching aircraft. Any ILS or MLS azimuth antenna protruding through the plane of the lights should be treated as an obstacle and marked and lighted accordingly.

(b) Characteristics:

(1) The centre line and crossbar lights of a precision approach category I lighting system should be fixed lights showing variable white. Each centre line light position should consist of either:

(i) a single light source in the innermost 300 m of the centre line, two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line to provide distance information; or

(ii) a barrette.

(2) Where the serviceability level of the approach lights specified as a maintenance objective in the requirements for aerodrome data, operations, services and maintenance be demonstrated, each centre line light position should consist of either:

(i) a single light source; or

(ii) a barrette.

The barrettes should be at least 4 m in length.

(3) When barrettes are composed of lights approximating to point sources, the lights should be uniformly spaced at intervals of not more than 1.5 m.

(4) If the centre line consists of lights as described in (b)(1)(i) or (b)(2)(i) above, additional crossbars of lights to the crossbar provided at 300 m from the threshold should be provided at 150 m, 450 m, 600 m and 750 m from the threshold. The lights forming each crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights should be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps should be kept to a minimum to meet local requirements and each should not exceed 6 m.

(5) Where the additional crossbars are incorporated in the system, the outer ends of the crossbars should lie on two straight lines that either are parallel to the line of the centre line lights or converge to meet the runway centre line 300 m upwind from threshold.

(6) The chromaticity and characteristics of lights should be in accordance with the specifications of CS-ADR-DSN.U.930 and CS-ADR-DSN.U.940.

(c) Characteristics:

(1) If the centre line consists of barrettes as described in this Regulation, each barrette should be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(2) Each capacitor discharge light as described in this Regulation should be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit should be such that these lights can be operated independently of the other lights of the approach lighting system.

(3) The flight path envelopes used in the design of these lights are given in Figure M-3.

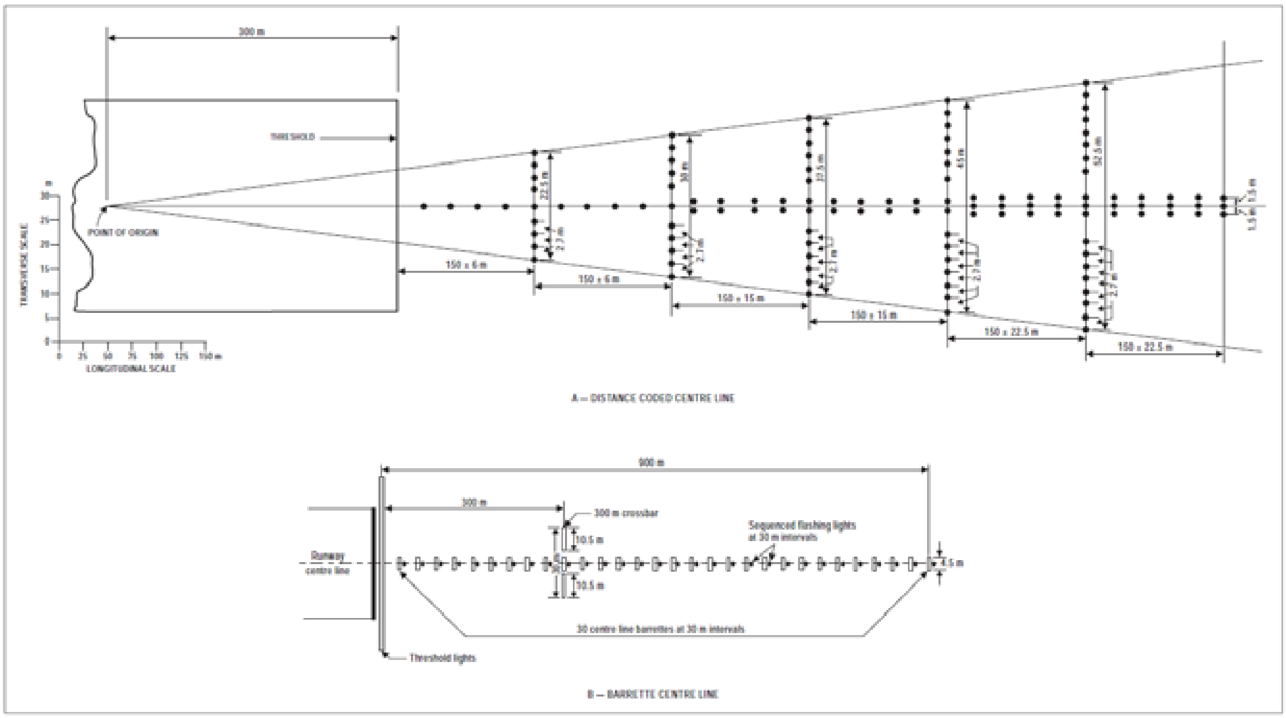



Figure M-2 Precision approach category I lighting systems

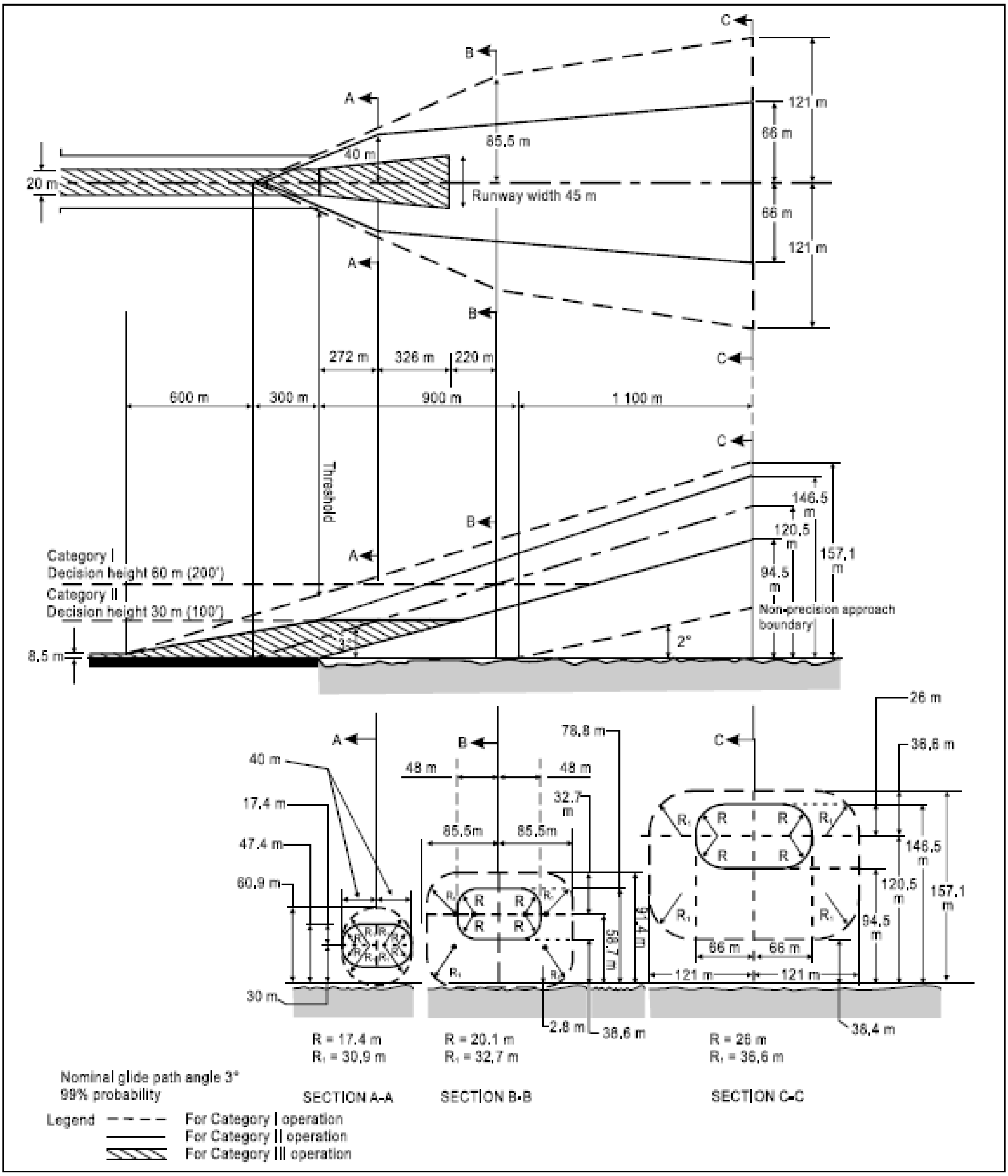



Figure M-3 Flight path envelopes to be used for lighting design for category I, II and III operations

## CS-ADR-DSN.M.635 — Precision approach category II and III lighting system REV

(a) The approach lighting system should consist of a row of lights on the extended centre line of the runway, extending, wherever possible, over a distance of 900 m from the runway threshold. In addition, the system should have two side rows of lights, extending 270 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in Figure M-4. Where the serviceability level of the approach lights specified as maintenance objectives in 10.4.7 can be demonstrated, the system may have two side rows of lights, extending 240 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in Figure M-4A.

(b) The lights forming the centre line should be placed at longitudinal intervals of 30 m with the innermost lights located 30 m from the threshold.

(c) The lights forming the side rows should be placed on each side of the centre line, at a longitudinal spacing equal to that of the centre line lights and with the first light located 30 m from the threshold. Where the serviceability level of the approach lights specified as maintenance objectives can be demonstrated, lights forming the side rows may be placed on each side of the centre line, at a longitudinal spacing of 60 m with the first light located 60 m from the threshold. The lateral spacing (or gauge) between the innermost lights of the side rows should be not less than 18 m nor more than 22.5 m, and preferably 18 m, but in any event should be equal to that of the touchdown zone lights.

(d) The crossbar provided at 150 m from the threshold should fill in the gaps between the centre line and side row lights.

(e) The crossbar provided at 300 m from the threshold should extend on both sides of the centre line lights to a distance of 15 m from the centre line.

(f) If the centre line beyond a distance of 300 m from the threshold consists of lights as described in (i)(2) and (j)(2) below, additional crossbars of lights should be provided at 450 m, 600 m and 750 m from the threshold. Where the additional crossbars described are incorporated in the system, the outer ends of these crossbars should lie on two straight lines that either are parallel to the centre line or converge to meet the runway centre line 300 m from the threshold.

(g) The system should lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(1) no object other than an ILS or MLS azimuth antenna should protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(2) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) should be screened from an approaching aircraft. Any ILS or MLS azimuth antenna protruding through the plane of the lights should be treated as an obstacle and marked and lighted accordingly.

Characteristics

(h) The centre line of a precision approach category II and III lighting system for the first 300 m from the threshold should consist of barrettes showing variable white, except that, where the threshold is displaced 300 m or more, the centre line may consist of single light sources showing variable white. Where the serviceability level of the approach lights specified as maintenance objectives can be demonstrated, the centre line of a precision approach category II and III lighting system for the first 300 m from the threshold may consist of either:

(1) barrettes, where the centre line beyond 300 m from the threshold consists of barrettes as described in (j)(1) below; or

(2) alternate single light sources and barrettes, where the centre line beyond 300 m from the threshold consists of single light sources as described in (j)(2) below, with the innermost single light source located 30 m and the innermost barrette located 60 m from the threshold; or

(3) single light sources where the threshold is displaced 300 m or more;

all of which should show variable white.

(i) Beyond 300 m from the threshold each centre line light position should consist of either:

(1) a barrette as used on the inner 300 m; or

(2) two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line;

all of which should show variable white.

(j) Where the serviceability level of the approach lights specified as maintenance objectives can be demonstrated, beyond 300 m from the threshold each centre line light position may consist of either:

(1) a barrette; or

(2) a single light source;

all of which should show variable white.

(k) The barrettes should be at least 4 m in length. When barrettes are composed of lights approximating to point sources, the lights should be uniformly spaced at intervals of not more than 1.5 m.

(l) If the centre line beyond 300 m from the threshold consists of barrettes as described in (i)(1) and (j)(1) above, each barrette beyond 300 m should be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(1) Each capacitor discharge light should be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit should be such that these lights can be operated independently of the other lights of the approach lighting system.

(2) The side row should consist of barrettes showing red. The length of a side row barrette and the spacing of its lights should be equal to those of the touchdown zone light barrettes.

(3) The lights forming the crossbars should be fixed lights showing variable white. The lights should be uniformly spaced at intervals of not more than 2.7 m.

(4) The intensity of the red lights should be compatible with the intensity of the white lights.

(5) The lights should be in accordance with the specifications of CS-ADR-DSN.U.940, Figures U-5 and U-6.

(6) The flight path envelopes used in the design of these lights are given in Figure M-3.

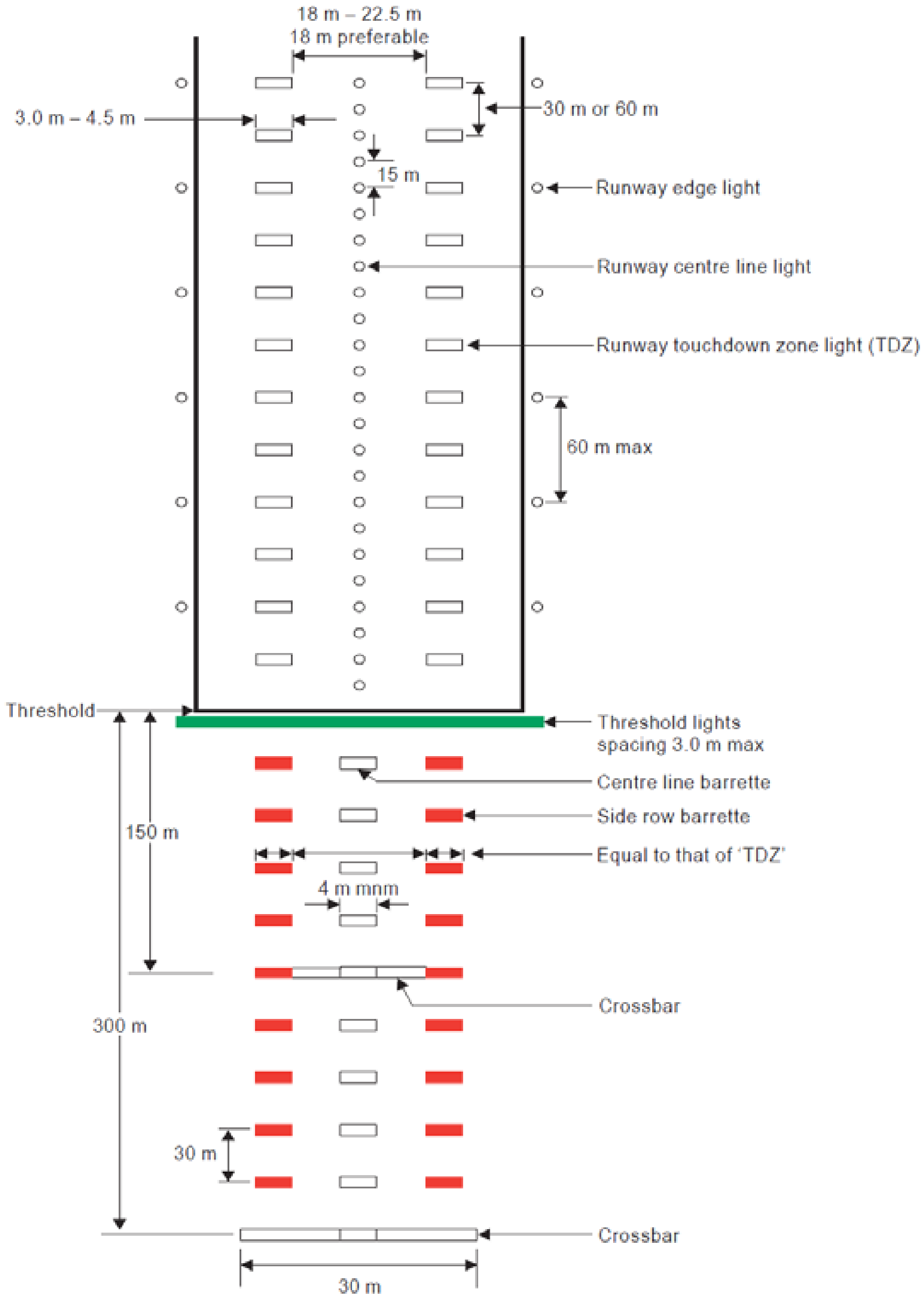



Figure M-4A Inner 300 m approach and runway lighting for precision approach runways, categories II and III

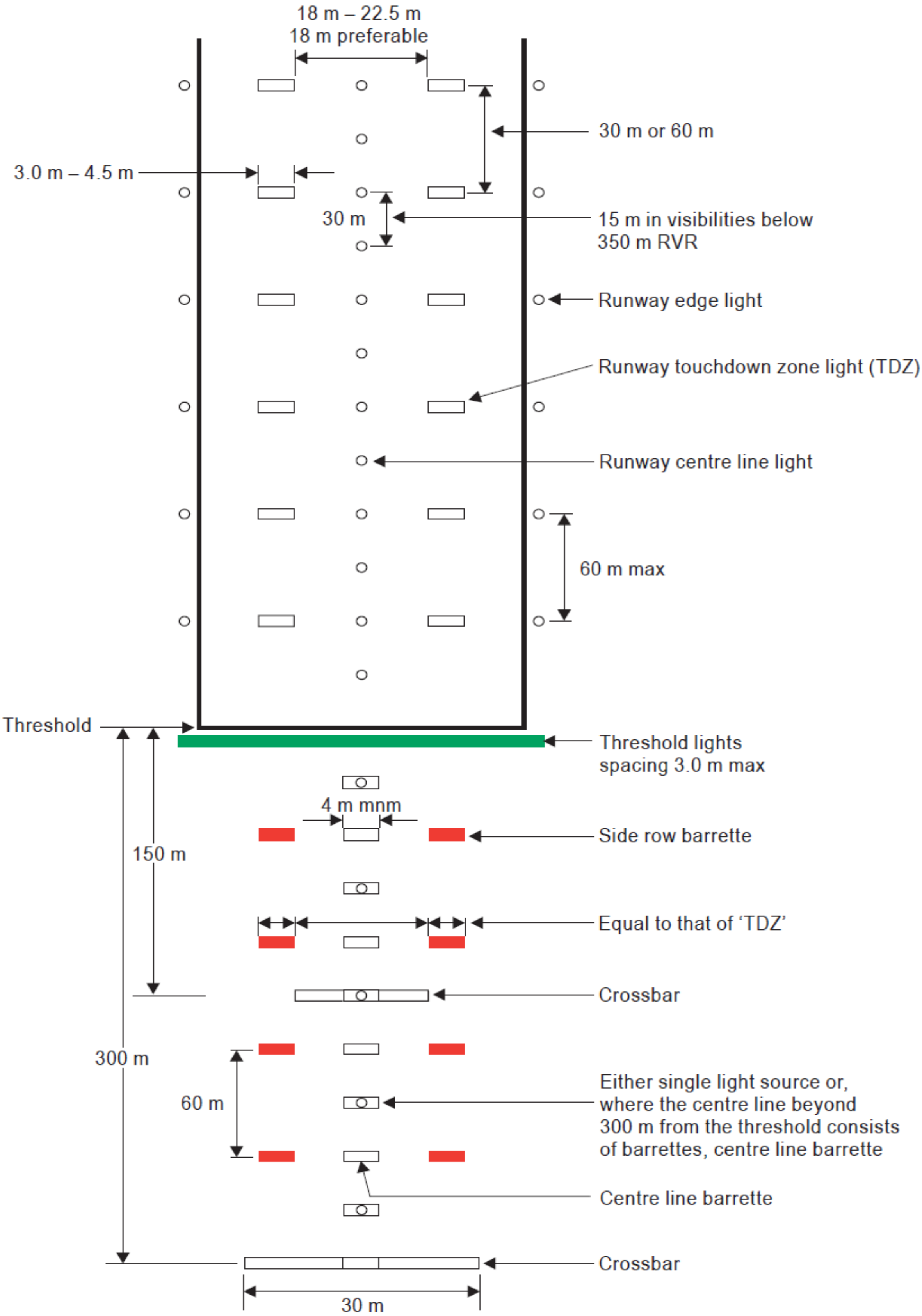

18 m – 22.5 m
18 m preferable
30 m or 60 m
3.0 m – 4.5 m
30 m
15 m in visibilities below 350 m RVR
Runway edge light
Runway touchdown zone light (TDZ)
Runway centre line light
60 m max
Threshold
Threshold lights spacing 3.0 m max
4 m mnm
Side row barrette
150 m
Equal to that of 'TDZ'
Crossbar
300 m
60 m
Either single light source or, where the centre line beyond 300 m from the threshold consists of barrettes, centre line barrette
Centre line barrette
Crossbar
30 m

Figure M-4B Inner 300 m approach and runway lighting for precision approach runways, categories II and III, where the serviceability levels of the lights specified as maintenance objectives can be demonstrated.

## SECTION 2 PAPI & APAPI

### CS-ADR-DSN.M.640 — Visual approach slope indicator systems: general DEL

(a) A visual approach slope indicator system should be provided to serve the approach to a runway whether or not the runway is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist:

(1) the runway is used by turbojet or other aeroplanes with similar approach guidance requirements;

(2) the pilot of any type of aeroplane may have difficulty in judging the approach due to:

(i) inadequate visual guidance such as is experienced during an approach over water or featureless terrain by day or in the absence of sufficient extraneous lights in the approach area by night; or

(ii) misleading information such as is produced by deceptive surrounding terrain or runway slopes.

(3) the presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non-visual or other visual aids to give warning of such objects;

(4) physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway; and

(5) terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

(b) The standard visual approach slope indicator systems should consist of the following:

(1) PAPI and APAPI systems conforming to the specifications contained in in this Regulation as shown in Figure M-5.

(c) PAPI should be provided where the code number is 3 or 4 when one or more of the conditions specified in paragraph (a) above exist.

(d) PAPI or APAPI should be provided where the code number is 1 or 2 when one or more of the conditions specified in paragraph (a) above exist.

(e) Where a runway threshold is temporarily displaced from the normal position and one or more of the conditions specified in paragraph (a) above exist, a PAPI should be provided except that where the code number is 1 or 2 either an APAPI may be provided.

### CS-ADR-DSN.M.645 PAPI and APAPI: general TXT

(a) A PAPI or APAPI should be provided as specified in this Regulation.

(b) Definition and positioning:

The PAPI system should consist of a wing bar of 4 sharp transition multi-lamp (or paired single lamp) units equally spaced. The system should be located on the left side of the runway unless it is physically impracticable to do so. Where a runway is used by aircraft requiring visual roll guidance which is not provided by other external means, then a second wing bar may be provided on the opposite side of the runway for PAPI or APAPI.

(1) The APAPI system should consist of a wing bar of 2 sharp transition multi-lamp (or paired single lamp) units. The system should be located on the left side of the runway unless it is physically impracticable to do so.

(2) The wing bar of a PAPI should be constructed and arranged in such a manner that a pilot making an approach will:

(i) when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;

(ii) when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and

(iii) when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

(3) The wing bar of an APAPI should be constructed and arranged in such a manner that a pilot making an approach will:

(i) when on or close to the approach slope, see the unit nearer the runway as red and the unit farther from the runway as white;

(ii) when above the approach slope, see both the units as white; and

(iii) when below the approach slope, see both the units as red.

(4) The light units should be located as in the basic configuration illustrated in Figure M-5, subject to the installation tolerances given below. The units forming a wing bar should be mounted so as to appear to the pilot of an approaching aeroplane to be substantially in a horizontal line. The light units should be mounted as low as possible and should be frangible.

(c) Characteristics:

(1) The system should be suitable for both day and night operations.

(2) Colour:

(i) The colour transition from red to white in the vertical plane should be such as to appear to an observer, at a distance of not less than 300 m, to occur within a vertical angle of not more than 3´.

(ii) At full intensity the red light should have a Y coordinate not exceeding 0.320.

(3) Intensity:

(i) The light intensity distribution of the light units should be as shown in CS-ADR-DSN.U.940 Aeronautical ground light characteristics.

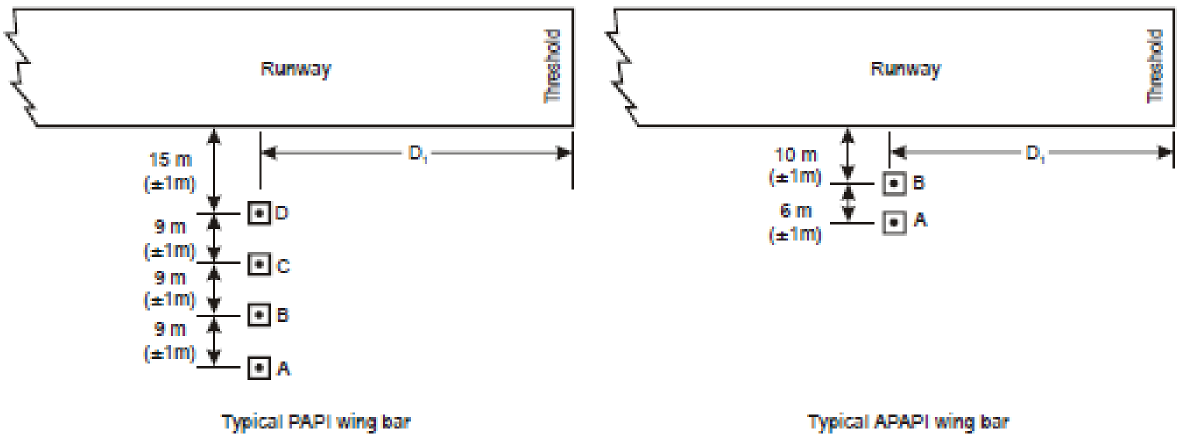
(ii) Suitable intensity control should be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

(4) Light orientation:

Each light unit should be capable of adjustment in elevation so that the lower limit of the white part of the beam may be fixed at any desired angle of elevation between 1°30´and at least 4°30´above the horizontal.

(5) Other characteristics:

The light units should be so designed that deposits of condensation, snow, ice, dirt, or other contaminants, on optically transmitting or reflecting surfaces should interfere to the least possible extent with the light signals and should not affect the contrast between the red and white signals and the elevation of the transition sector.




*INSTALLATION TOLERANCES*

a) *Where a PAPI or APAPI is installed on a runway not equipped with an ILS or MLS, the distance $D_1$ shall be calculated to ensure that the lowest height at which a pilot will see a correct approach path indication (Figure 5-20, angle B for a PAPI and angle A for an APAPI) provides the wheel clearance over the threshold specified in Table 5-2 for the most demanding amongst aeroplanes regularly using the runway.*

b) *Where a PAPI or APAPI is installed on a runway equipped with an ILS and/or MLS, the distance $D_1$ shall be calculated to provide the optimum compatibility between the visual and non-visual aids for the range of eye-to-antenna heights of the aeroplanes regularly using the runway. The distance shall be equal to that between the threshold and the effective origin of the ILS glide path or MLS minimum glide path, as appropriate, plus a correction factor for the variation of eye-to-antenna heights of the aeroplanes concerned. The correction factor is obtained by multiplying the average eye-to-antenna height of those aeroplanes by the cotangent of the approach angle. However, the distance shall be such that in no case will the wheel clearance over the threshold be lower than that specified in column (3) of Table 5-2.*

Note.— See Section 5.2.5 for specifications on aiming point marking. Guidance on the harmonization of PAPI, ILS and/or MLS signals is contained in the *Aerodrome Design Manual* (Doc 9157), Part 4.

c) *If a wheel clearance, greater than that specified in a) above is required for specific aircraft, this can be achieved by increasing $D_1$.*

d) *Distance $D_1$ shall be adjusted to compensate for differences in elevation between the lens centres of the light units and the threshold.*

e) *To ensure that units are mounted as low as possible and to allow for any transverse slope, small height adjustments of up to 5 cm between units are acceptable. A lateral gradient not greater that 1.25 per cent can be accepted provided it is uniformly applied across the units.*

f) *A spacing of 6 m (±1 m) between PAPI units should be used on code numbers 1 and 2. In such an event, the inner PAPI unit shall be located not less than 10 m (±1 m) from the runway edge.*

Note.— Reducing the spacing between light units results in a reduction in usable range of the system.

g) *The lateral spacing between APAPI units may be increased to 9 m (±1 m) if greater range is required or later conversion to a full PAPI is anticipated. In the latter case, the inner APAPI unit shall be located 15 m (±1 m) from the runway edge.*

Figure M-5 Siting of PAPI and APAPI

**CS-ADR-DSN.M.650 — Approach slope and elevation setting of light units** *REV*

(a) Approach slope:

(1) The approach slope as defined in Figure M-6 should be appropriate for use by the aeroplanes using the approach.

(2) When the runway is equipped with an ILS and/or MLS, the siting and the angle of elevation of the light units should be such that the visual approach slope conforms as closely as possible with the glide path of the ILS and/or the minimum glide path of the MLS, as appropriate.

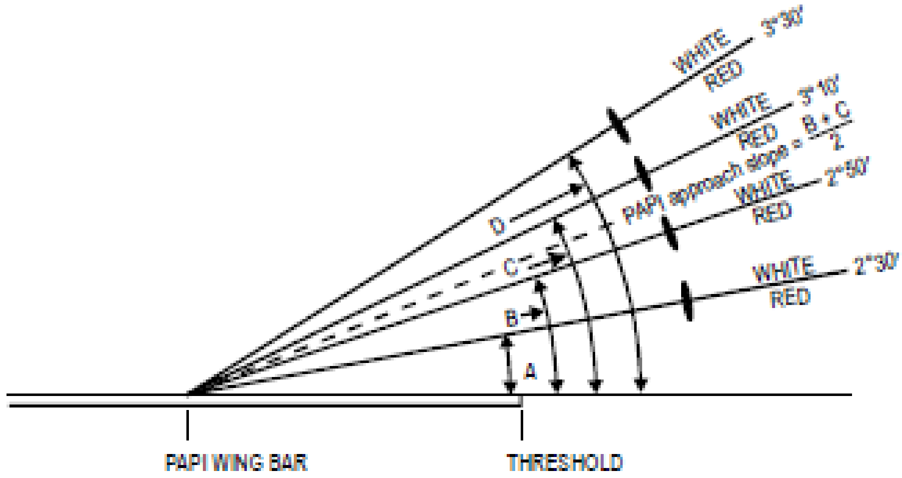
(b) Elevation setting of light units

(1) The angle of elevation settings of the light units in a PAPI wing bar should be such that, during an approach, the pilot of an aeroplane observing a signal of one white and three reds will clear all objects in the approach area by a safe margin.

(2) The angle of elevation settings of the light units in an APAPI wing bar should be such that, during an approach, the pilot of an aeroplane observing the lowest onslope signal, i.e. one white and one red, will clear all objects in the approach area by a safe margin.

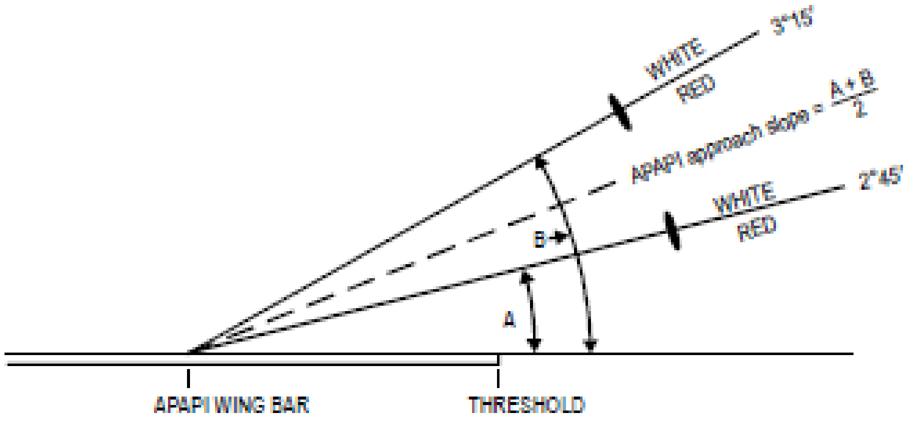
(3) The azimuth spread of the light beam should be suitably restricted where an object located outside the obstacle protection surface of the PAPI or APAPI system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and an aeronautical study indicates that the object could adversely affect the safety of operations. The extent of the restriction should be such that the object remains outside the confines of the light beam.

(4) Where wing bars are installed on each side of the runway to provide roll guidance, corresponding units should be set at the same angle so that the signals of each wing bar change symmetrically at the same time.




The height of the pilot's eye above the aircraft's ILS glide path/MLS antenna varies with the type of aeroplane and approach attitude. Harmonization of the PAPI signal and ILS glide path and/or MLS minimum glide path to a point closer to the threshold may be achieved by increasing the on-course sector from 20' to 30'. The setting angles for a 3° glide slope would then be 2°25', 2°45', 3°15' and 3°35'.

A — 3° PAPI ILLUSTRATED




B — 3° APAPI ILLUSTRATED

Figure M-6. Light beams and angle of elevation setting of PAPI and APAPI

**CS-ADR-DSN.M.655 — Obstacle protection surface for PAPI and APAPI** MOVE to GM

(a) Applicability:

An obstacle protection surface should be established when it is intended to provide a visual approach slope indicator system.

(b) Characteristics:

The characteristics of the obstacle protection surface, i.e. origin, divergence, length and slope should correspond to those specified in the relevant column of Table M-2 and in Figure M-7.

(c) New objects or extensions of existing objects above a protection surface:

New objects or extensions of existing objects should not be permitted above an obstacle protection surface except when the new object or extension is shielded by an existing immovable object.

| Eye-to-wheel height of aeroplane in the approach configuration[a] | Desired wheel clearance (metres)[b,c] | Minimum wheel clearance (metres)[d] |
|---|---|---|
| (1) | (2) | (3) |
| up to but not including 3 m | 6 | 3[e] |
| 3 m up to but not including 5 m | 9 | 4 |
| 5 m up to but not including 8 m | 9 | 5 |
| 8 m up to but not including 14 m | 9 | 6 |

a. In selecting the eye-to-wheel height group, only aeroplanes meant to use the system on a regular basis should be considered. The most demanding amongst such aeroplanes should determine the eye-to-wheel height group.

b. Where practicable, the desired wheel clearances shown in column (2) should be provided.

c. The wheel clearances in column (2) should be reduced to no less than those in column (3) where an aeronautical study indicates that such reduced wheel clearances are acceptable.

d. When a reduced wheel clearance is provided at a displaced threshold, it should be ensured that the corresponding desired wheel clearance specified in column (2) will be available when an aeroplane at the top end of the eye-to-wheel height group chosen overflies the extremity of the runway.

e. This wheel clearance should be reduced to 1.5 m on runways used mainly by light-weight non-turbo-jet aeroplanes.

Table M-1. PAPI and APAPI tolerances, wheel clearance over threshold for PAPI and APAPI (see Note (a) in Figure M-5)

Table M-2. Dimensions and slopes of the obstacle protection surface

| | Runway type/code number | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Non-instrument | | | | Instrument | | | |
| | Code number | | | | Code number | | | |
| Surface dimensions | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| Length of inner edge | 60 m | 80 m | 150 m | 150 m | 150 m | 150 m | 300 m | 300 m |
| Distance from threshold | 30 m | 60 m | 60 m | 60 m | 60 m | 60 m | 60 m | 60 m |
| Divergence (each side) | 10% | 10% | 10% | 10% | 15% | 15% | 15% | 15% |
| Total length | 7 500 m | 7 500 m | 15 000 m | 15 000 m | 7 500 m | 7 500 m | 15 000 m | 15 000 m |
| a) PAPI[1] | — | A–0.57° | A–0.57° | A–0.57° | A–0.57° | A–0.57° | A–0.57° | A–0.57° |
| b) APAPI[2] | A–0.9° | A–0.9° | – | – | A–0.9° | A–0.9° | – | – |

[1] Angles as indicated in Figure ADR-M-6.

[2] No slope has been specified if a system is unlikely to be used on runway type/code number indicated.

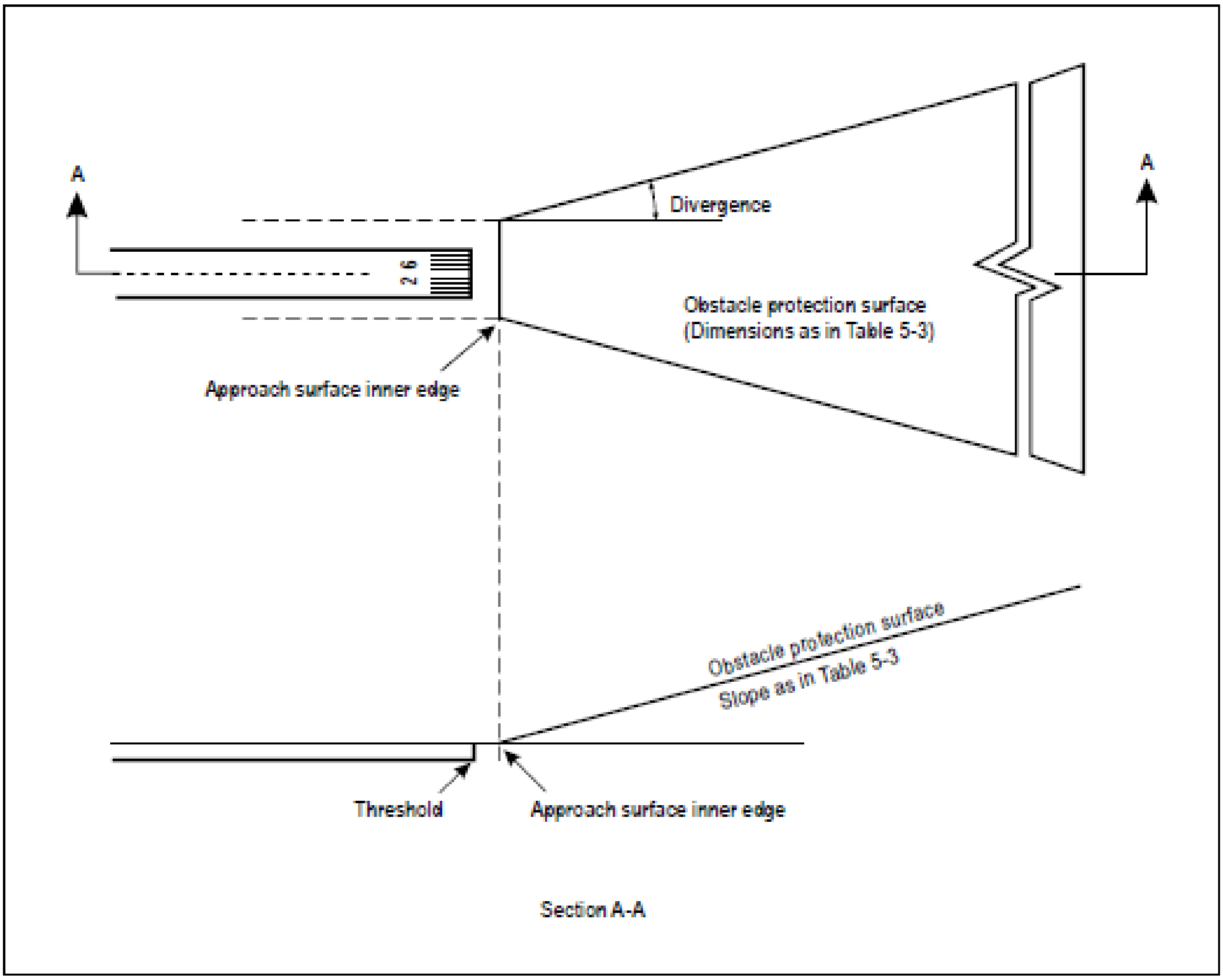



Figure M-7 Obstacle protection surface for visual approach slope indicator systems

**CS-ADR-DSN.M.660 — Circling guidance lights** *ICAO*

(a) Applicability:

Circling guidance lights should be provided when existing approach and runway lighting systems do not satisfactorily permit identification of the runway and/or approach area to a circling aircraft that are intending to carry out circling approaches.

(b) Location and positioning:

(1) The location and number of circling guidance lights should be adequate to enable a pilot, as appropriate, to:

(i) join the downwind leg or align and adjust the aircraft's track to the runway at a required distance from it and to distinguish the threshold in passing; and

(ii) keep in sight the runway threshold and/or other features which will make it possible to judge the turn on to base leg and final approach, taking into account the guidance provided by other visual aids.

(2) Circling guidance lights should consist of:

(i) lights indicating the extended centre line of the runway and/or parts of any approach lighting system; or

(ii) lights indicating the position of the runway threshold; or

(iii) lights indicating the direction or location of the runway;

or a combination of such lights as is appropriate to the runway under consideration.

(c) Characteristics:

(1) Circling guidance lights should be fixed or flashing lights of an intensity and beam spread adequate for the conditions of visibility and ambient light in which it is intended to make visual circling approaches. The flashing lights should be white, and the steady lights either white or gaseous discharge lights.

(2) The lights should be designed and be installed in such a manner that they will not dazzle or confuse a pilot when approaching to land, taking off or taxiing.

## SECTION 3 RUNWAY & TAXIWAY LIGHTS

### CS-ADR-DSN.M.665 — Runway lead-in lighting systems ICAO

(a) Applicability:

A runway lead-in lighting system should be provided where it is desired to provide visual guidance along a specific approach path, for reasons such as avoiding hazardous terrain or for purposes of noise abatement.

(b) Location and positioning

(1) A runway lead-in lighting system should consist of groups of lights positioned:

(i) so as to define the desired approach path. Runway lead-in lighting systems may be curved, straight or a combination thereof; and

(ii) so that one group should be sighted from the preceding group.

(2) The interval between adjacent groups should not exceed approximately 1 600 m.

(3) A runway lead-in lighting system should extend from a point up to a point where the approach lighting system, if provided, or the runway lighting system is in view.

(4) Each group of lights of a runway lead-in lighting system should consist of at least three flashing lights in a linear or cluster configuration. The system should be augmented by steady burning lights where such lights would assist in identifying the system.

(c) Characteristics:

(1) The flashing lights should be white, and the steady burning lights should be gaseous discharge lights.

(2) Where practicable, the flashing lights in each group should flash in sequence towards the runway.

### CS-ADR-DSN.M.670 — Runway threshold identification lights ICAO DEL

(a) Applicability:

Runway threshold identification lights should be installed:

(1) at the threshold of a non-precision approach runway when additional threshold conspicuity is necessary or where it is not practicable to provide other approach lighting aids; and

(2) where a runway threshold is permanently displaced from the runway extremity or temporarily displaced from the normal position and additional threshold conspicuity is necessary.

(b) Location and positioning:

Runway threshold identification lights should be located symmetrically about the runway centre line, in line with the threshold and approximately 10 m outside each line of runway edge lights.

(c) Characteristics:

(1) Runway threshold identification lights should be flashing white lights with a flash frequency between 60 and 120 per minute.

(2) The lights should be visible only in the direction of approach to the runway.

**CS-ADR-DSN.M.675 — Runway edge lights** *ICAO*

(a) Applicability:

(1) Runway edge lights should be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.

(2) Runway edge lights should be provided on a runway intended for take-off with an operating minimum below an RVR of the order of 800 m by day.

(b) Location and positioning:

(1) Runway edge lights should be placed along the full length of the runway and should be in two parallel rows equidistant from the centre line.

(2) Runway edge lights should be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3 m.

(3) Where the width of the area which could be declared as runway exceeds 60 m, the distance between the rows of lights should be determined taking into account the nature of the operations, the light distribution characteristics of the runway edge lights, and other visual aids serving the runway.

(4) The lights should be uniformly spaced in rows at intervals of not more than 60 m for an instrument runway, and at intervals of not more than 100 m for a non-instrument runway. The lights on opposite sides of the runway axis should be on lines at right angles to that axis. At intersections of runways, lights may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.

(c) Characteristics:

(1) Runway edge lights should be fixed lights showing variable white, except that:

(i) in the case of a displaced threshold, the lights between the beginning of the runway and the displaced threshold should show red in the approach direction; and

(ii) a section of the lights 600 m or one-third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is started, should show yellow.

(2) The runway edge lights should show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction. When the runway edge lights are intended to provide circling guidance, they should show at all angles in azimuth.

(d) In all angles of azimuth required in this Regulation, runway edge lights should show at angles up to 15° above the horizontal with intensity adequate for the conditions of visibility and ambient light in which use of the runway for take-off or landing is intended. In any case, the intensity should be at least 50 cd except that at an aerodrome without extraneous lighting the intensity of the lights may be reduced to not less than 25 cd to avoid dazzling the pilot.

(e) Runway edge lights on a precision approach runway should be in accordance with the specifications in CS-ADR-DSN.U.940 Aeronautical ground light characteristics.

**CS-ADR-DSN.M.680 — Runway threshold and wing bar lights** *ICAO*

(a) Applicability of runway threshold:

Runway threshold lights should be provided for a runway equipped with runway edge lights, except on a non-instrument or non-precision approach runway where the threshold is displaced and wing bar lights are provided.

(b) Location and positioning of runway threshold:

(1) When a threshold is at the extremity of a runway, the threshold lights should be placed in a row at right angles to the runway axis as near to the extremity of the runway as possible and, in any case, not more than 3 m outside the extremity.

(2) When a threshold is displaced from the extremity of a runway, threshold lights should be placed in a row at right angles to the runway axis at the displaced threshold.

(3) Threshold lighting should consist of:

(i) on a non-instrument or non-precision approach runway, at least six lights;

(ii) on a precision approach runway category I, at least the number of lights that would be required if the lights were uniformly spaced at intervals of 3 m between the rows of runway edge lights; and

(iii) on a precision approach runway category II or III, lights uniformly spaced between the rows of runway edge lights at intervals of not more than 3 m.

(4) The lights prescribed in (b)(3) (i) and (ii) above should be either:

(i) equally spaced between the rows of runway edge lights, or

(ii) symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group and with a gap between the groups equal to the gauge of the touchdown zone marking or lighting, where such is provided, or otherwise not more than half the distance between the rows of runway edge lights.

(c) Applicability of wing bar lights:

(1) Wing bar lights should be provided on a precision approach runway when additional conspicuity is considered desirable.

(2) Wing bar lights should be provided on a non-instrument or non-precision approach runway where the threshold is displaced and runway threshold lights are required, but are not provided.

(d) Location and positioning of wing bar lights:

Wing bar lights should be symmetrically disposed about the runway centre line at the threshold in two groups, i.e. wing bars. Each wing bar should be formed by at least five lights extending at least 10 m outward from, and at right angles to, the line of the runway edge lights, with the innermost light of each wing bar in the line of the runway edge lights.

(e) Characteristics of runway threshold and wing bar lights:

(1) Runway threshold and wing bar lights should be fixed unidirectional lights showing green in the direction of approach to the runway. The intensity and beam spread of the lights should be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

(2) Runway threshold lights on a precision approach runway should be in accordance with the specifications in CS-ADR-DSN.U.940 Aeronautical ground light characteristics.

(3) Threshold wing bar lights on a precision approach runway should be in accordance with the specifications in CS-ADR-DSN.U.940 Aeronautical ground light characteristics.

### CS-ADR-DSN.M.685 — Runway end lights *ICAO*

(a) Applicability:

Runway end lights should be provided for a runway equipped with runway edge lights.

(b) Location and positioning:

(1) Runway end lights should be placed on a line at right angles to the runway axis as near to the end of the runway as possible and, in any case, not more than 3 m outside the end.

(2) Runway end lighting should consist of at least six lights. The lights should be either:

(i) equally spaced between the rows of runway edge lights, or

(ii) symmetrically disposed about the runway centre line in two groups with the lights uniformly spaced in each group and with a gap between the groups of not more than half the distance between the rows of runway edge lights.

(3) For a precision approach runway category III, the spacing between runway end lights, except between the two innermost lights if a gap is used, should not exceed 6 m.

(c) Characteristics:

(1) Runway end lights should be fixed unidirectional lights showing red in the direction of the runway. The intensity and beam spread of the lights should be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

Runway end lights on a precision approach runway should be in accordance with the chromaticity and characteristics specifications in CS-ADR-DSN.U.930 and CS-ADR-DSN.U.940.

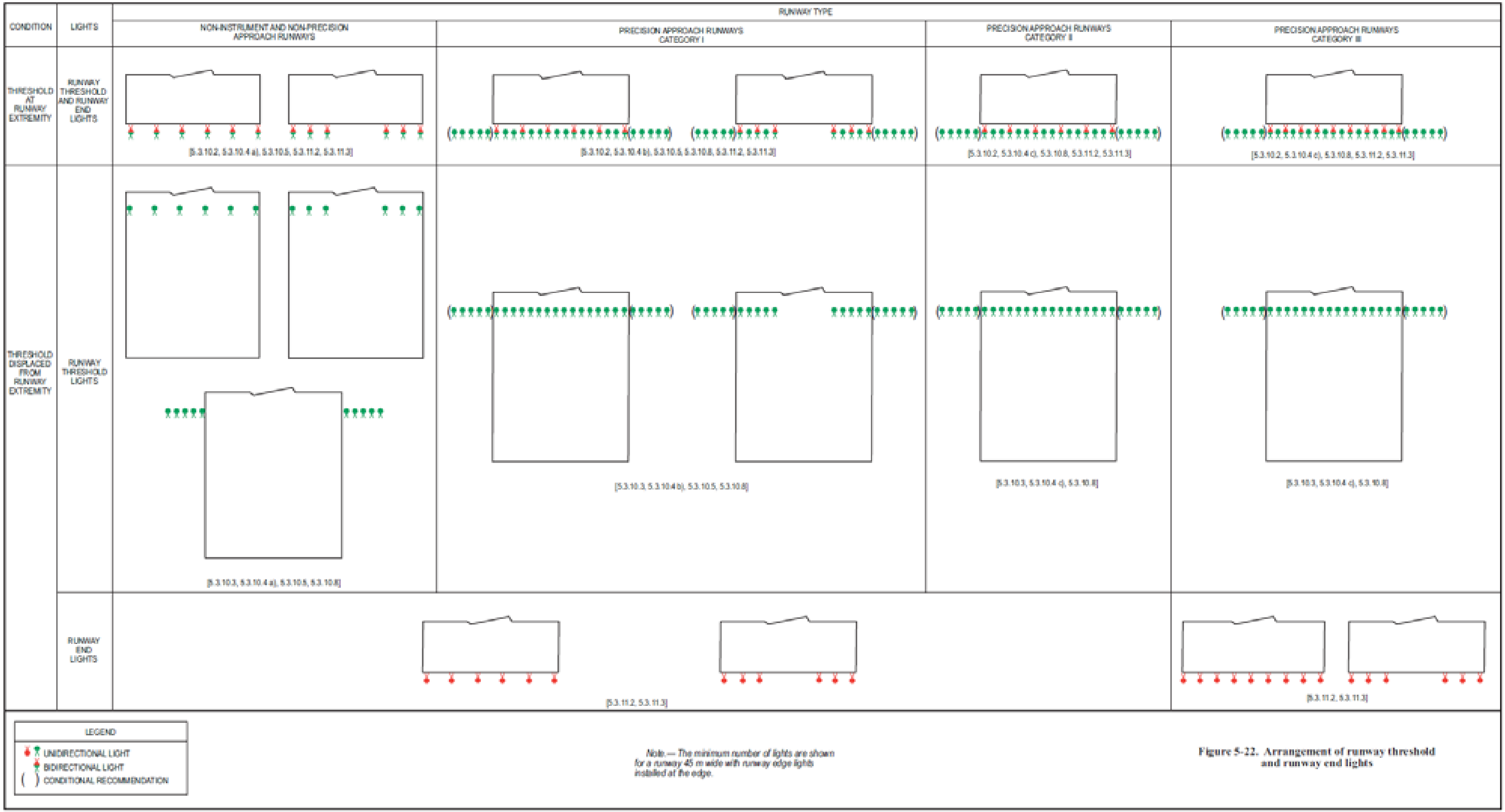



Figure M-8 Arrangement of runway threshold and runway end lights

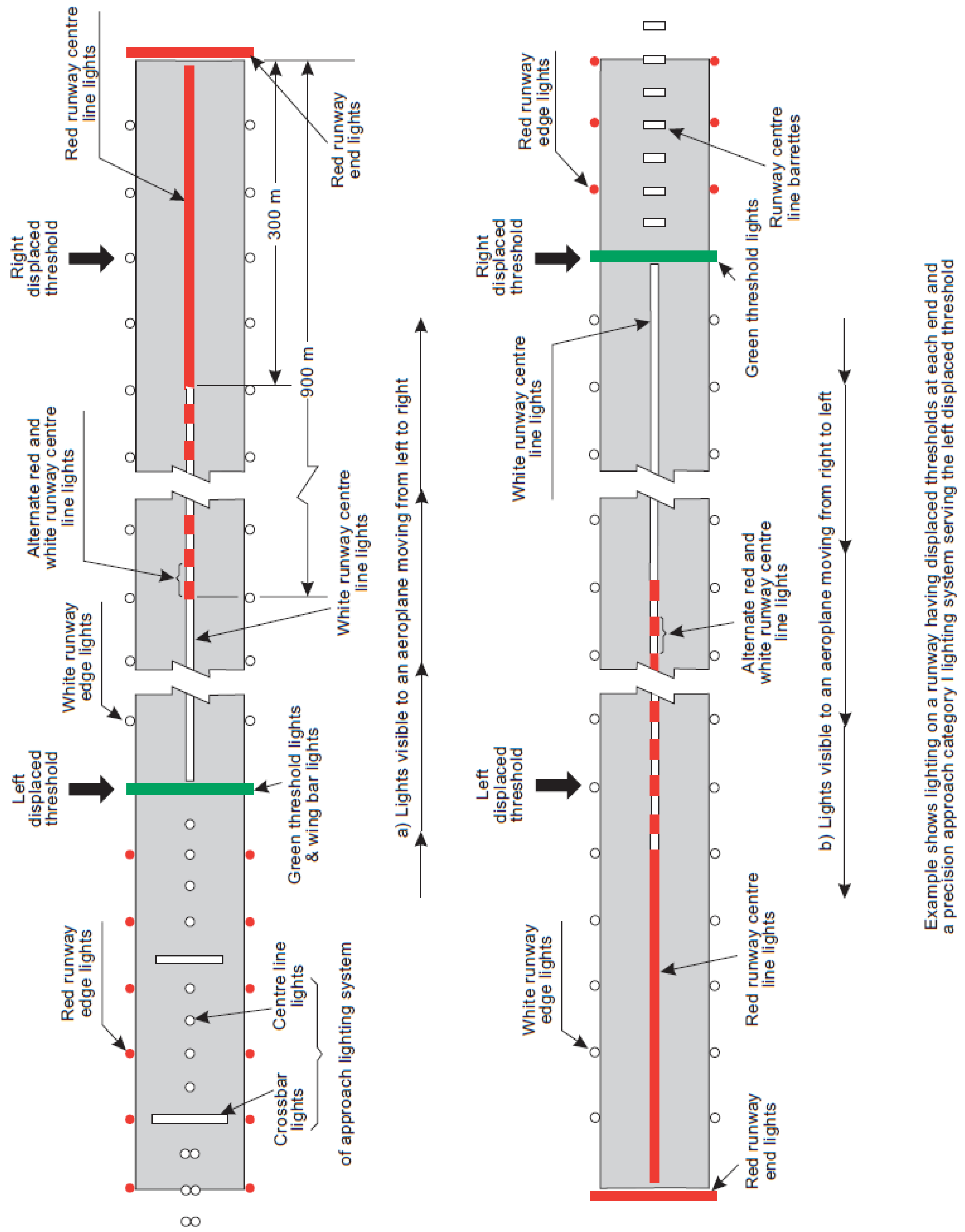



Figure M-9 Example of approach and runway lighting for runway with displaced thresholds

**CS-ADR-DSN.M.690 — Runway centre line lights** *DEL*

(a) Applicability:

(1) Runway centre line lights should be provided on a precision approach runway category II or III.

(2) Runway centre line lights should be provided on a precision approach runway category I, when the runway is used by aircraft with high landing speeds or where the width between the runway edge lights is greater than 50 m.

(3) Runway centre line lights should be provided on a runway intended to be used for take-off with an operating minimum below an RVR of the order of 400 m.

(4) Runway centre line lights should be provided on a runway intended to be used for take-off with an operating minimum of an RVR of the order of 400 m or higher when used by aeroplanes with a very high take-off speed, where the width between the runway edge lights is greater than 50 m.

(b) Location:

(1) Runway centre line lights should be located along the centre line of the runway, except that the lights may be uniformly offset to the same side of the runway centre line by not more than 60 cm where it is not practicable to locate them along the centre line. The lights should be located from the threshold to the end at longitudinal spacing of approximately 15 m.

(c) Characteristics:

(1) Runway centre line lights should be fixed lights showing variable white from the threshold to the point 900 m from the runway end; alternate red and variable white from 900 m to 300 m from the runway end; and red from 300 m to the runway end, except that for runways less than 1 800 m in length, the alternate red and variable white lights should extend from the midpoint of the runway usable for landing to 300 m from the runway end.

(2) Runway centre line lights should be in accordance with the chromaticity and characteristics specifications in CS-ADR-DSN.U.930 and CS-ADR-DSN.U.940.

(d) Centre line guidance for take-off from the beginning of a runway to a displaced threshold should be provided by:

(1) an approach lighting system if its characteristics and intensity settings afford the guidance required during take-off and it does not dazzle the pilot of an aircraft taking off; or

(2) runway centre line lights; or

(3) barrettes of at least 3 m length and spaced at uniform intervals of 30 m, as shown in Figure 20, designed so that their photometric characteristics and intensity setting afford the guidance required during take-off without dazzling the pilot of an aircraft taking off.

Where necessary, provision should be made to extinguish those centre line lights specified in this Regulation or reset the intensity of the approach lighting system or barrettes when the runway is being used for landing. In no case should only the single source runway centre line lights show from the beginning of the runway to a displaced threshold when the runway is being used for landing.

## CS-ADR-DSN.M.695 — Runway touchdown zone lights ICAO

(a) Applicability:

Touchdown zone lights should be provided in the touchdown zone of a precision approach runway category II or III.

(b) Location and positioning:

(1) Touchdown zone lights should extend from the threshold for a longitudinal distance of 900 m, except that, on runways less than 1 800 m in length, the system should be shortened so that it does not extend beyond the midpoint of the runway.

(2) The pattern should be formed by pairs of barrettes symmetrically located about the runway centre line. The lateral spacing between the innermost lights of a pair of barrettes should be equal to the lateral spacing selected for the touchdown zone marking. The longitudinal spacing between pairs of barrettes should be either 30 m or 60 m.

(c) Characteristics:

(1) A barrette should be composed of at least three lights with spacing between the lights of not more than 1.5 m.

(2) A barrette should be not less than 3 m or more than 4.5 m in length.

(3) Touchdown zone lights should be fixed unidirectional lights showing variable white.

(4) Touchdown zone lights should be in accordance with the chromaticity and characteristics specifications in CS-ADR-DSN.U.930 and CS-ADR-DSN.U.940.

## CS-ADR-DSN.M.700 — Rapid exit taxiway indicator lights DEL TXT

(a) Applicability:

Rapid exit taxiway indicator lights should be considered where the traffic density is heavy on a runway intended for use in runway visual range conditions less than a value of 350 m. Where Rapid exit taxiway indicator lights are provided, they should be as follows:

(1) Rapid exit taxiway indicator lights should not be displayed in the event of any lamp failure or other failure that prevents the display of the light pattern depicted in M-10, in full.

(b) Location:

(1) A set of rapid exit taxiway indicator lights should be located on the runway on the same side of the runway centre line as the associated rapid exit taxiway, in the configuration shown in Figure M-10. In each set, the lights should be located 2 m apart and the light nearest to the runway centre line should be displaced 2 m from the runway centre line.

(2) Where more than one rapid exit taxiway exists on a runway, the set of rapid exit taxiway indicator lights for each exit should not overlap when displayed.

(c) Characteristics:

Rapid exit taxiway indicator lights should be fixed unidirectional yellow lights, aligned so as to be visible to the pilot of a landing aeroplane in the direction of approach to the runway.

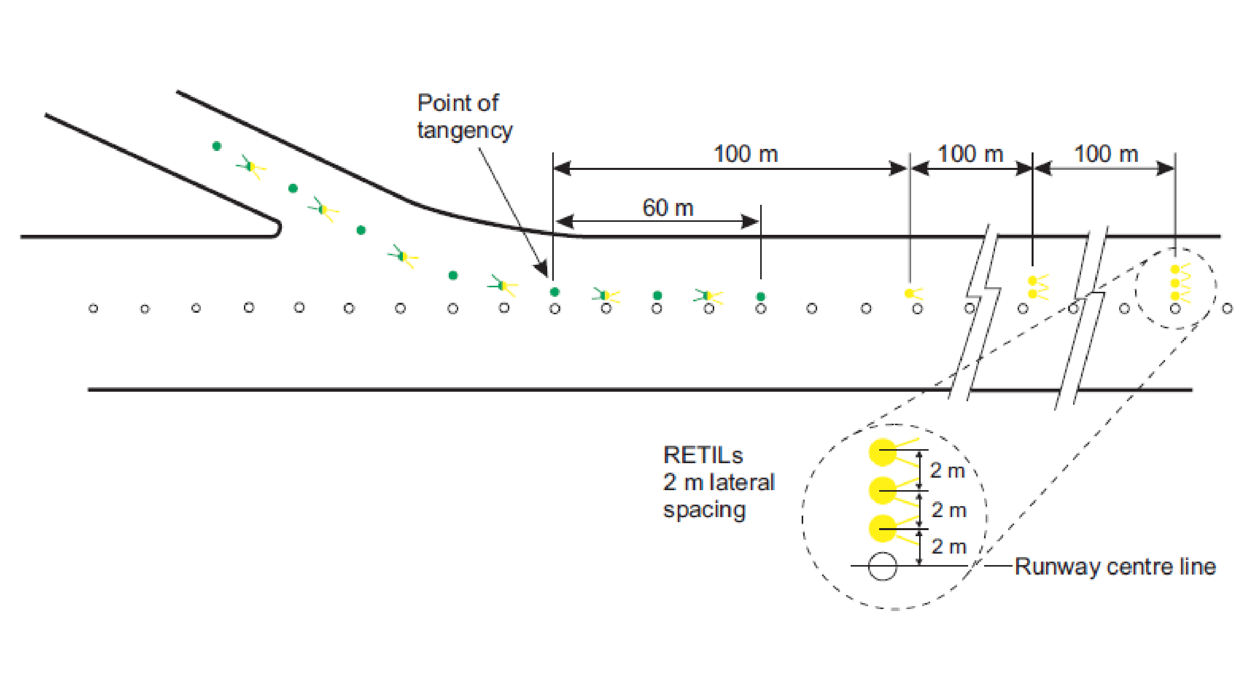



Figure M-10 Rapid exit taxiway indicator lights (RETILS)

(1) Rapid exit taxiway indicator lights should be in accordance with the specifications in Chapter U, as appropriate.

(2) Rapid exit taxiway indicator lights should be supplied with power on a separate circuit to other runway lighting so that they may be used when other lighting is switched off.

**CS-ADR-DSN.M.705 — Stopway lights** *ADD*

(a) Applicability and purpose:

Stopway lights should be provided for a stopway intended for use at night.

(b) Location:

Stopway lights should be placed along the full length of the stopway and should be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights. Stopway lights should also be provided across the end of a stopway on a line at right angles to the stopway axis as near to the end of the stopway as possible and, in any case, not more than 3 m outside the end.

(c) Characteristics:

(1) Stopway lights should be fixed unidirectional lights showing red in the direction of the runway.

(2) Stopway lights should be in accordance with the specifications of CS-ADR-DSN.U.940 Aeronautical ground light characteristics.

**CS-ADR-DSN.M.710 — Taxiway centre line lights** *TXT REV*

(a) Applicability:

(1) Taxiway centre line lights should be provided on an exit taxiway, taxiway, de-icing/anti-icing facility and apron intended for use in runway visual range conditions less than a value of 350 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

(2) Taxiway centre line lights should be provided on a taxiway intended for use at night in runway visual range conditions of 350 m or greater, and particularly on complex taxiway intersections and exit taxiways, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

(3) Taxiway centre line lights should be provided on an exit taxiway, taxiway, de-icing/anti icing facility and apron in all visibility conditions where specified as components of an advanced surface movement guidance and control system in such a manner as to provide continuous guidance between the runway centre line and aircraft stands.

(4) Taxiway centre line lights should be provided in all visibility conditions on a runway forming part of a standard taxi-route where specified as components of an advanced surface movement guidance and control system.

(5) Where a runway forming part of a standard taxi route is provided with runway lighting and taxiway lighting, the lighting systems should be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

(b) Characteristics:

(1) Taxiway centre line lights on a taxiway other than an exit taxiway and on a runway forming part of a standard taxi-route should be fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or in the vicinity of the taxiway.

(2) On a runway served by ILS/MLS, taxiway centre line lights on an exit taxiway should be fixed lights. Alternate taxiway centre line lights should show green and yellow from their beginning near the runway centre line to the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway; and thereafter all lights should show green (Figure M-12 Taxiway lighting). The light nearest to the perimeter should always show yellow.

(i) Where aircraft follow the same centre line in both directions, the centre line lights should show either green, or alternate green and yellow to aircraft approaching the runway. Specifications on runway vacated signs are contained in this Regulation.

(3) Taxiway centre line lights should be in accordance with the specifications of CS-ADR-DSN.U.905, Figure U-16, U-17, or U-18, for taxiways intended for use in runway visual range conditions of less than a value of 350 m; Figure U-19 or U-20, for other taxiways.

(4) Where higher intensities are required, from an operational point of view, taxiway centre line lights on rapid exit taxiways intended for use in runway visual range conditions less than a value of 350 m should be in accordance with the

specifications of CS-ADR-DSN.U.940, Figure U-11. The number of levels of brilliancy settings for these lights should be the same as that for the runway centre line lights.

(5) Where taxiway centre line lights are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, taxiway centre line lights should be in accordance with the specifications of CS-ADR-DSN.U.940, Figure U-21, U-22 or U-23.

(6) High-intensity centre line lights should only be used in case of an absolute necessity and following a specific study.

(c) Location and positioning:

(1) Taxiway centre line lights should normally be located on the taxiway centre line marking, except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking (see Figure M-11).

(2) Taxiway centre line lights on taxiways, runways, rapid exit taxiways or on other exit taxiways should be positioned in accordance with CS-ADR-DSN.M.715.

**CS-ADR-DSN.M.715 — Taxiway centre line lights on taxiways, runways, rapid exit taxiways or on other exit taxiways** *TXT*

(a) Taxiway centre line lights on taxiways:

(1) Taxiway centre line lights on a straight section of a taxiway should be spaced at longitudinal intervals of not more than 30 m, except that:

(i) intervals less than 30 m should be provided on short straight sections;

(ii) on a taxiway intended for use in RVR conditions of less than a value of 350 m, the longitudinal spacing should not exceed 15 m.

(2) Taxiway centre line lights on a taxiway curve should continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway curve. The lights should be spaced at intervals such that a clear indication of the curve is provided.

(3) On a taxiway intended for use in RVR conditions of less than a value of 350 m, the lights on a curve should not exceed spacing of 15 m and on a curve of less than 400 m radius the lights should be spaced at intervals of not greater than 7.5 m. This spacing should extend for 60 m before and after the curve.

(b) Taxiway centre line lights on rapid exit taxiways:

(1) Taxiway centre line lights on a rapid exit taxiway should commence at a point at least 60 m before the beginning of the taxiway centre line curve and continue beyond the end of the curve to a point on the centre line of the taxiway where an aeroplane can be expected to reach normal taxiing speed, as shown in Figure M-10. The lights on that portion parallel to the runway centre line should always be at least 60 cm from any row of runway centre line lights, as shown in Figure M-10.

(2) The lights should be spaced at longitudinal intervals of not more than 15 m.

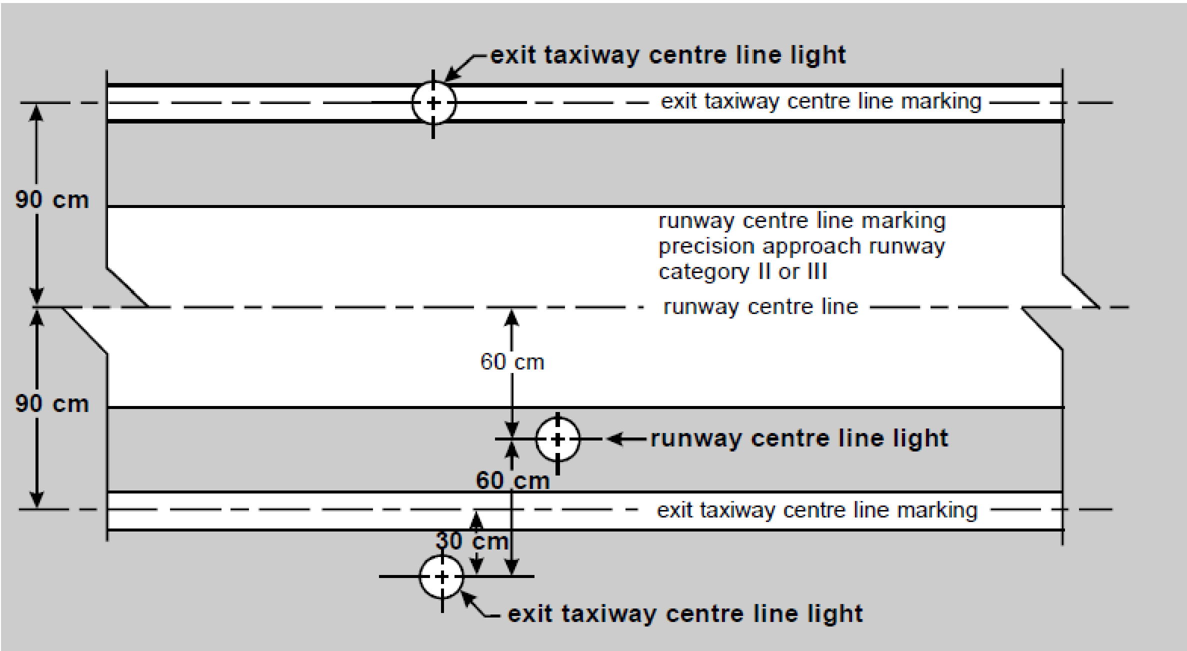
(c) Taxiway centre line lights on other exit taxiways:

(1) Taxiway centre line lights on exit taxiways other than rapid exit taxiways should commence at the point where the taxiway centre line marking begins to curve from the runway centre line, and follow the curved taxiway centre line marking at least to the point where the marking leaves the runway. The first light should be at least 60 cm from any row of runway centre line lights, as shown in Figure M-8, Arrangement of runway threshold and runway end lights.

(2) The lights should be spaced at longitudinal intervals of not more than 7.5 m.

(d) Taxiway centre line lights on runways:

Taxiway centre line lights on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350 m should be spaced at longitudinal intervals not exceeding 15 m.




Tolerances for offset runway centre line lights and
taxiway centre line lights to maintain 60 cm separation.

Figure M-11

(e) Positioning of Taxiway centre line lights on taxiway:

(1) The spacing on a particular section of taxiway centre line lighting, (straight or curved section), should be such that a clear indication of the taxiway centre line is provided, particularly on a curved section.

(2) Where a taxiway is only intended for use in RVR conditions of 350 m or greater, the spacing of taxiway centre line lights on curves should not exceed the table below:

| Curve radius | Light spacing |
|---|---|
| up to 400 m | 7.5 m |
| 401 m to 899 m | 15 m |

900 m or greater 30 m

(f) Taxiway centre line lights on straight sections of taxiways:

Larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing.

(g) Taxiway centre line lights on rapid exit taxiways:

Where runway centre line lights are not provided, a greater interval not exceeding 30 m may be used.

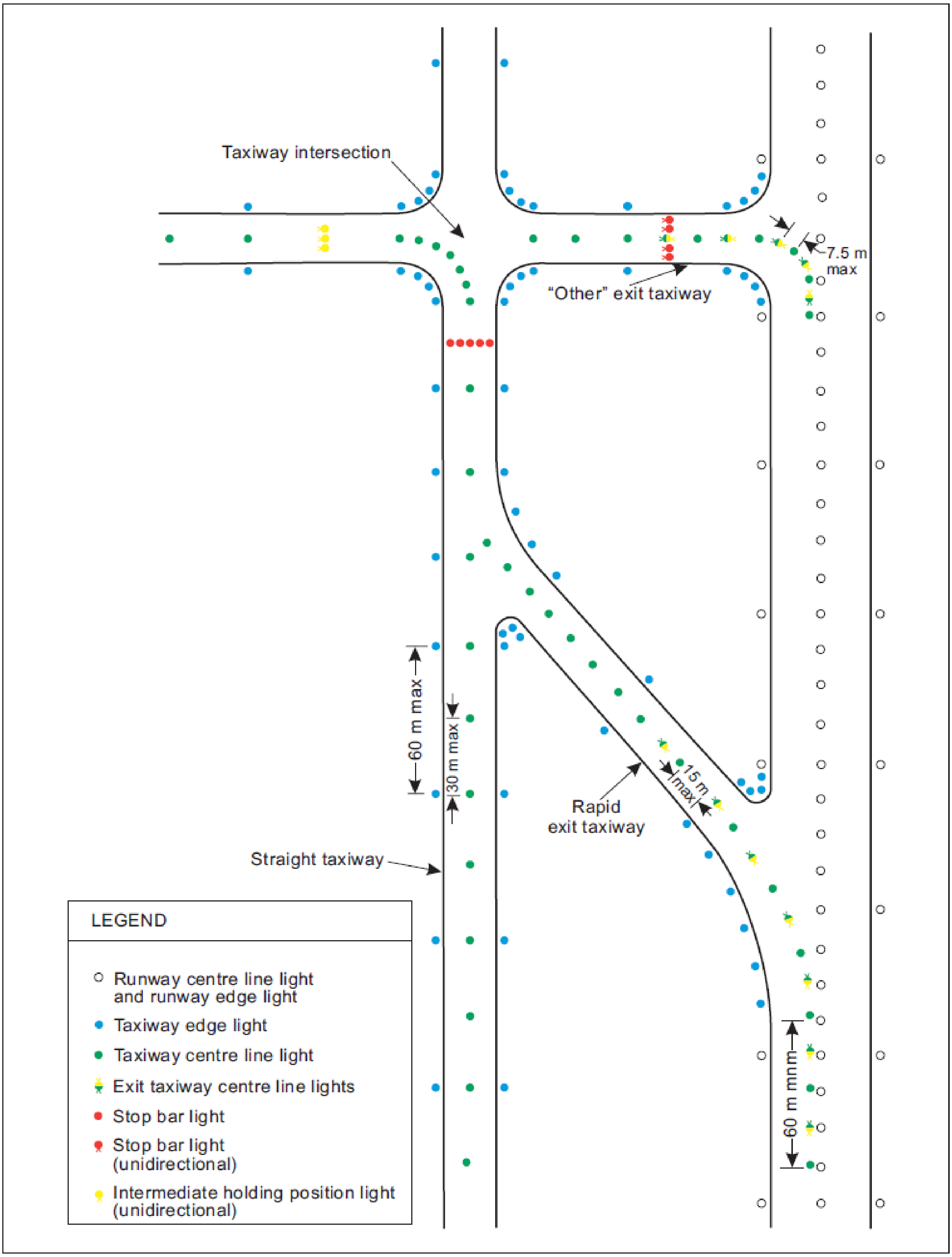



Figure M-12 Taxiway lighting

### CS-ADR-DSN.M.720 — Taxiway edge lights *ICAO*

(a) Applicability:

(1) Taxiway edge lights should be provided at the edges of a runway turn pad, holding bay, de-icing/anti-icing facility, apron, etc. intended for use at night and on a taxiway not provided with taxiway centre line lights and intended for use at night, except that taxiway edge lights need not be provided where, considering the nature of the operations, adequate guidance can be achieved by surface illumination or other means.

(2) Taxiway edge lights should be provided on a runway forming part of a standard taxi-route and intended for taxiing at night where the runway is not provided with taxiway centre line lights.

(3) Where a runway forming part of a standard taxi route is provided with runway lighting and taxiway lighting, the lighting systems should be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

(b) Location and positioning:

(1) Taxiway edge lights on a straight section of a taxiway and on a runway forming part of a standard taxi-route should be spaced at uniform longitudinal intervals of not more than 60 m. The lights on a curve should be spaced at intervals less than 60 m so that a clear indication of the curve is provided.

(2) Taxiway edge lights on a holding bay, de-icing/anti-icing facility, apron, etc. should be spaced at uniform longitudinal intervals of not more than 60 m.

(3) Taxiway edge lights on a runway turn pad should be spaced at uniform longitudinal intervals of not more than 30 m.

(4) The lights should be located as near as practicable to the edges of the taxiway, runway turn pad, holding bay, de-icing/anti-icing facility, apron or runway, etc. or outside the edges at a distance of not more than 3 m.

(c) Characteristics:

(1) Taxiway edge lights should be fixed lights showing blue.

(2) The lights should show up to at least 75° above the horizontal and at all angles in azimuth necessary to provide guidance to a pilot taxiing in either direction. At an intersection, exit or curve the lights should be shielded as far as practicable so that they cannot be seen in angles of azimuth in which they may be confused with other lights.

(3) The intensity of taxiway edge lights should be at least 2 cd from 0° to 6° vertical, and 0.2 cd at any vertical angles between 6° and 75°.

### CS-ADR-DSN.M.725 — Runway turn pad lights *ICAO*

(a) Applicability:

(1) Runway turn pad lights should be provided for continuous guidance on a runway turn pad intended for use in runway visual range conditions less than a value of 350 m to enable an aeroplane to complete a 180-degree turn and align with the runway centre line.

(2) Runway turn pad lights should be provided on a runway turn pad intended for use at night.

(b) Location:

(1) Runway turn pad lights should normally be located on the runway turn pad marking, except that they should be offset by not more than 30 cm where it is not practicable to locate them on the marking.

(2) Runway turn pad lights on a straight section of the runway turn pad marking should be spaced at longitudinal intervals of not more than 15 m.

(3) Runway turn pad lights on a curved section of the runway turn pad marking should not exceed a spacing of 7.5 m.

(c) Characteristics:

(1) Runway turn pad lights should be unidirectional fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or approaching the runway turn pad.

(2) Runway turn pad lights should be in accordance with the specifications of CS-ADR-DSN.U.940 Aeronautical ground light characteristics, Figure U-17 and Figure U-18.

**CS-ADR-DSN.M.730 — Stop bar lights** *REV*

(a) Applicability:

(1) A stop bar should be provided at every runway-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 350 m, and values between 350 m and 550 m except where:

(i) appropriate aids and procedures are available to assist in preventing inadvertent incursions of aircraft and vehicles onto the runway; or

(ii) operational procedures exist to limit, in runway visual range conditions less than a value of 550 m, the number of:

(A) aircraft on the manoeuvring area to one at a time; and

(B) vehicles on the manoeuvring area to the essential minimum.

(2) A stop bar should be provided at an intermediate holding position when it is desired to supplement markings with lights and to provide traffic control by visual means.

(3) Where the normal stop bar lights might be obscured from a pilot's view, for example, by snow or rain, or where a pilot may be required to stop the aircraft in a position so close to the lights that they are blocked from view by the structure of the aircraft, then a pair of elevated lights should be added to each end of the stop bar.

(b) Location:

Stop bars should be located across the taxiway at the point where it is desired that traffic stop. Where the additional lights specified in this Regulation are provided, these lights should be located not less than 3 m from the taxiway edge.

(c) Characteristics:

(1) Stop bars should consist of lights spaced at intervals of 3 m across the taxiway, showing red in the intended direction(s) of approach to the intersection or runway-holding position.

(2) Stop bars installed at a runway-holding position should be unidirectional and should show red in the direction of approach to the runway.

(3) Where the additional lights specified in (a)(3) above are provided, these lights should have the same characteristics as the lights in the stop bar, but should be visible to approaching aircraft up to the stop bar position.

(4) Selectively switchable stop bars should be installed in conjunction with at least three taxiway centre line lights (extending for a distance of at least 90 m from the stop bar) in the direction that it is intended for an aircraft to proceed from the stop bar.

(5) The intensity in red light and beam spreads of stop bar lights should be in accordance with the specifications in CS-ADR-DSN.U.940, Figures U-16 to U-20.

(6) Where stop bars are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, the intensity in red light and beam spreads of stop bar lights should be in accordance with the specifications in CS-ADR-DSN.U.940, Figure U-21, U-22 or U-23.

(7) High-intensity stop bars should only be used in case of an absolute necessity and following a specific study.

(8) Where a wide beam fixture is required, the intensity in red light and beam spreads of stop bar lights should be in accordance with the specifications in CS-ADR-DSN.U.940, Figure U-21 or U-23.

(9) The lighting circuit should be designed so that:

(i) stop bars located across entrance taxiways are selectively switchable;

(ii) stop bars located across taxiways intended to be used only as exit taxiways are switchable selectively or in groups;

(iii) when a stop bar is illuminated, any taxiway centre line lights installed beyond the stop bar should be extinguished for a distance of at least 90 m; and

(iv) stop bars should be interlocked with the taxiway centre line lights so that when the centre line lights beyond the stop bar are illuminated, the stop bar is extinguished and vice versa.

## CS-ADR-DSN.M.735 — Intermediate holding position lights ICAO

(a) Applicability:

(1) Except where a stop bar has been installed, intermediate holding position lights should be provided at an intermediate holding position intended for use in runway visual range conditions less than a value of 350 m.

(2) Intermediate holding position lights should be provided at an intermediate holding position where there is no need for stop-and-go signals as provided by a stop bar.

(b) Location:

Intermediate holding position lights should be located along the intermediate holding position marking at a distance of 0.3 m prior to the marking.

(c) Characteristics:

Intermediate holding position lights should consist of three fixed unidirectional lights showing yellow in the direction of approach to the intermediate holding position with a light distribution similar to taxiway centre line lights, if provided. The lights should be disposed symmetrically about and at right angle to the taxiway centre line, with individual lights spaced 1.5 m apart.

## CS-ADR-DSN.M.740 — De-icing/anti-icing facility exit lights ICAO

(a) Applicability:

De-icing/anti-icing facility exit lights should be provided at the exit boundary of a remote de-icing/anti-icing facility adjoining a taxiway.

(b) Location:

De-icing/anti-icing facility exit lights should be located 0.3 m inward of the intermediate holding position marking displayed at the exit boundary of a remote de-icing/ anti-icing facility.

(c) Characteristics:

De-icing/anti-icing facility exit lights should consist of in-pavement fixed unidirectional lights spaced at intervals of 6 m showing yellow in the direction of the approach to the exit boundary with a light distribution similar to taxiway centre line lights (see Figure M-13).

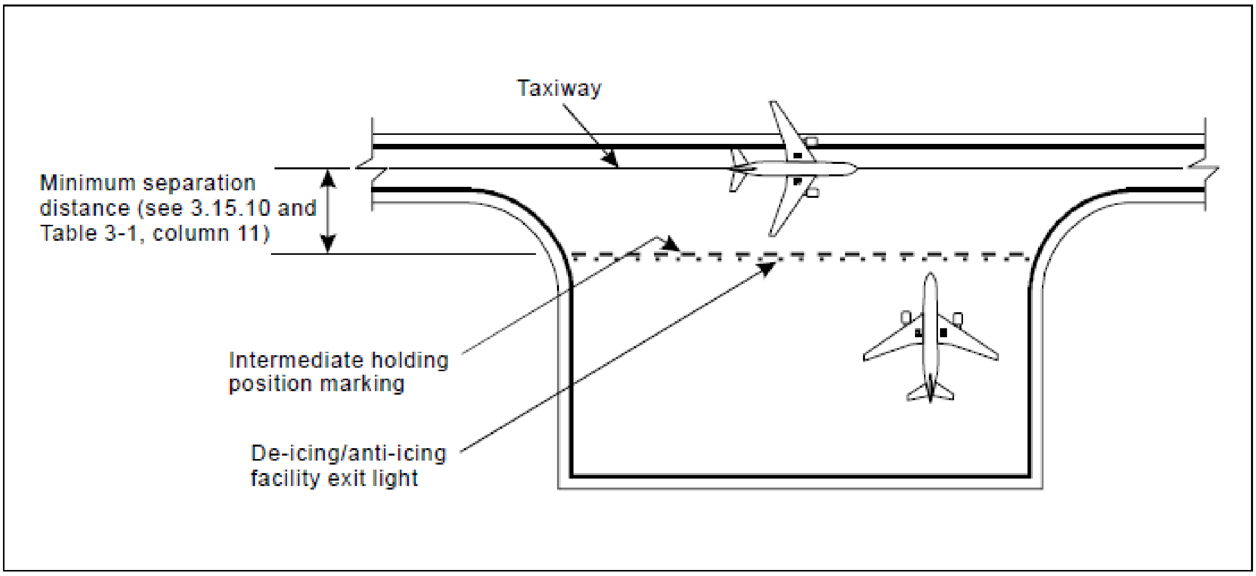



Figure M-13 Typical remote de-icing/anti-icing facility

## CS-ADR-DSN.M.745 — Runway guard lights ICAO

(a) The purpose is to warn pilots and drivers of vehicles, when they are operating on taxiways, that they are about to enter an active runway. There are two standard configurations of runway guard lights as illustrated in Figure M-14.

(b) Applicability:

(1) Runway guard lights, Configuration A, should be provided at each taxiway/runway intersection associated with a runway intended for use in:

(i) runway visual range conditions less than a value of 550 m regardless of whether or not a stop bar is installed; and

(ii) runway visual range conditions of values between 550 m and 1 200 m where the traffic density is heavy.

(2) Runway guard lights, Configuration A, Configuration B, or both, should be provided at each taxiway/runway intersection where enhanced conspicuity of the taxiway/runway intersection is needed, such as on a wide-throat taxiway, except that Configuration B should not be collocated with a stop bar.

(c) Location:

(1) Runway guard lights, Configuration A, Configuration B, or both, should be located at each side of the taxiway and at the same distance as the runway holding position marking.

(2) Runway guard lights, Configuration B, should be located across the taxiway and at the same distance as the runway holding position marking.

(d) Characteristics:

(1) Runway guard lights, Configuration A, should consist of two pairs of yellow lights.

(2) Where there is a need to enhance the contrast between the on- and off-state of runway guard lights, Configuration A, intended for use during the day, a visor of sufficient size to prevent sunlight from entering the lens without interfering with the function of the fixture should be located above each lamp.

(3) Runway guard lights, Configuration B, should consist of yellow lights spaced at intervals of 3 m across the taxiway.

(4) The light beam should be unidirectional and aligned so as to be visible to the pilot of an aeroplane taxiing to the holding position.

(5) The intensity in yellow light and beam spreads of lights of Configuration A should be in accordance with the specifications in CS-ADR-DSN.U.940, Figure U-27.

(6) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration A should be in accordance with the specifications in CS-ADR-DSN.U.940, Figure U-28.

(7) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration A should be in accordance with the specifications in CS-ADR-DSN.U.940, Figure U-28.

(8) The intensity in yellow light and beam spreads of lights of Configuration B should be in accordance with the specifications in CS-ADR-DSN.U.940, Figure U-28.

(9) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration B should be in accordance with the specifications in CS-ADR-DSN.U.940, Figure U-24.

(10) Where runway guard lights are specified as components of an advanced surface movement guidance and control system, where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration B should be in accordance with the specifications in CS-ADR-DSN.U.940, Figure U-24.

(11) The lights in each unit of Configuration A should be illuminated alternately.

(12) For Configuration B, adjacent lights should be alternately illuminated and alternative lights should be illuminated in unison.

(13) The lights should be illuminated between 30 and 60 cycles per minute and the light suppression and illumination periods should be equal and opposite in each light.

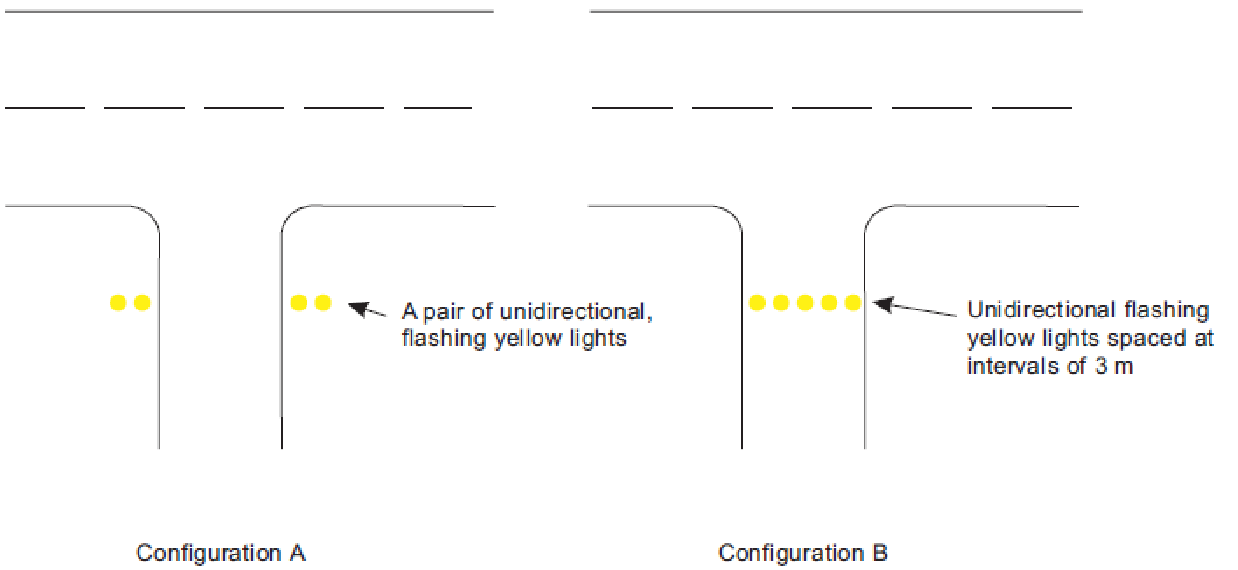



Figure M-14 Runway guard lights

## SECTION 4 APRON LIGHTING

### CS-ADR-DSN.M.750 — Apron floodlighting *ICAO*

(a) Applicability:

Apron floodlighting should be provided on an apron, on a de-icing/anti-icing facility and on a designated isolated aircraft parking position intended to be used at night.

(b) Location:

Apron floodlights should be located so as to provide adequate illumination on all apron service areas, with a minimum of glare to pilots of aircraft in flight and on the ground, aerodrome and apron controllers, and personnel on the apron. The arrangement and aiming of floodlights should be such that an aircraft stand receives light from two or more directions to minimise shadows.

(c) Characteristics:

(1) The spectral distribution of apron floodlights should be such that the colours used for aircraft marking connected with routine servicing, and for surface and obstacle marking, can be correctly identified.

(2) The average illuminance should be at least the following:

(i) Aircraft stand:

(A) horizontal illuminance — 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and

(B) vertical illuminance — 20 lux at a height of 2 m above the apron in relevant directions.

(ii) Other apron areas:

horizontal illuminance — 50 % of the average illuminance on the aircraft stands with a uniformity ratio (average to minimum) of not more than 4 to 1.

## CS-ADR-DSN.M.755 — Visual docking guidance system REV

(a) Applicability:

A visual docking guidance system should be provided when it is intended to indicate, by a visual aid, the precise positioning of an aircraft on an aircraft stand and other alternative means, such as marshallers, are not practicable.

(b) Characteristics:

(1) The system should provide both azimuth and stopping guidance.

(2) The azimuth guidance unit and the stopping position indicator should be adequate for use in all weather, visibility, background lighting and pavement conditions for which the system is intended both by day and night, but should not dazzle the pilot.

(3) The azimuth guidance unit and the stopping position indicator should be of a design such that:

(i) a clear indication of malfunction of either or both is available to the pilot; and

(ii) they can be turned off.

(4) The azimuth guidance unit and the stopping position indicator should be located in such a way that there is continuity of guidance between the aircraft stand markings, the aircraft stand manoeuvring guidance lights, if present, and the visual docking guidance system.

(5) The accuracy of the system should be adequate for the type of loading bridge and fixed aircraft servicing installations with which it is to be used.

(6) The system should be usable by all types of aircraft for which the aircraft stand is intended, preferably without selective operation.

(7) If selective operation is required to prepare the system for use by a particular type of aircraft, then the system should provide an identification of the selected aircraft type to both the pilot and the system operator as a means of ensuring that the system has been set properly.

(c) Location:

(1) The azimuth guidance unit and the stopping position indicator should be located in such a way that there is continuity of guidance between the aircraft stand markings, the aircraft stand manoeuvring guidance lights, if present, and the visual docking guidance system.

(2) The azimuth guidance unit and the stopping position indicator should be positioned as prescribed below.

**CS-ADR-DSN.M.760 — Advanced visual docking guidance system** REV

(a) Application:

(1) Advanced visual docking guidance systems should include those systems that, in addition to basic and passive azimuth and stop position information, provide pilots with active (usually sensor-based) guidance information, such as aircraft type indication, distance-to-go information and closing speed.

(2) Advanced visual docking guidance systems should provide docking guidance information in three stages: the acquisition of the aircraft by the system, the azimuth alignment of the aircraft, and the stopping position information.

(3) Advanced visual docking guidance systems should be provided, where it is operationally desirable, to confirm the correct aircraft type for which guidance is being provided, and/or to indicate the stand centre line in use, where more than one is provided for.

(4) Advanced visual docking guidance systems should be suitable for use by all types of aircraft for which the aircraft stand is intended.

(5) The Advanced visual docking guidance systems should only be used in conditions in which its operational performance is specified.

(6) The use of the Advanced visual docking guidance systems in conditions such as weather, visibility, and background lighting both by day and night would need to be specified.

(7) Care is required in both the design and on-site installation of the system to ensure that glare, reflection of sunlight, or other light in the vicinity, does not degrade the clarity and conspicuity of the visual cues provided by the system.

(8) The docking guidance information provided by an advanced visual docking guidance system should not conflict with that provided by a conventional visual docking guidance system on an aircraft stand if both types are provided and are in operational use. A method of indicating that the system is not in operational use or unserviceable, should be provided.

(b) Location:

(1) The Advanced visual docking guidance system should be located such that unobstructed and unambiguous guidance is provided to the person responsible for, and persons assisting, the docking of the aircraft throughout the docking manoeuvre.

(2) Usually the pilot-in-command is responsible for the docking of the aircraft. However, in some circumstances, another person could be responsible and this person may be the driver of a vehicle that is towing the aircraft.

(c) Characteristics:

(1) The Advanced visual docking guidance system should provide, at minimum, the following guidance information at the appropriate stage of the docking manoeuvre:

(i) an emergency stop indication;

(ii) the aircraft type and model for which the guidance is provided;

(iii) an indication of the lateral displacement of the aircraft relative to the stand centre line;

(iv) the direction of azimuth correction needed to correct a displacement from the stand centre line;

(v) an indication of the distance to the stop position;

(vi) an indication when the aircraft has reached the correct stopping position; and

(vii) a warning indication if the aircraft goes beyond the appropriate stop position.

(2) The Advanced visual docking guidance system should be capable of providing docking guidance information for all aircraft taxi speeds encountered during the docking manoeuvre.

(3) The time taken from the determination of the lateral displacement to its display should not result in a deviation of the aircraft, when operated in normal conditions, from the stand centre line greater than 1 m.

(4) The information on displacement of the aircraft relative to the stand centre line and distance to the stopping position, when displayed, should be provided with the accuracy specified in Table M-3 Symbols and graphics used to depict guidance information should be intuitively representative of the type of information provided.

(i) The use of colour needs to be appropriate and should follow signal convention, i.e. red, yellow and green mean hazard, caution and normal/correct conditions, respectively. The effects of colour contrasts also needs to be considered.

(ii) Information on the lateral displacement of the aircraft relative to the stand centre line should be provided at least 25 m prior to the stop position.

(iii) The indication of the distance of the aircraft from the stop position may be colour-coded and presented at a rate and distance proportional to the actual closure rate and distance of the aircraft approaching the stop point.

(iv) Continuous closure distance and closure rate shall be provided from at least 15 m prior to the stop position.

(v) Where provided, closure distance displayed in numerals should be provided in metre integers to the stop position and displayed to 1 decimal place at least 3 m prior to the stop position.

(vi) Throughout the docking manoeuvre, an appropriate means should be provided on the Advanced visual docking guidance system to indicate the need to bring the aircraft to an immediate halt. In such an event, which includes a failure of the system, no other information shall be displayed.

(vii) Provision to initiate an immediate halt to the docking procedure should be made available to personnel responsible for the operational safety of the stand.

(viii) The word 'STOP' in red characters should be displayed when an immediate cessation of the docking manoeuvre is required.

(5) Symbols and graphics used to depict guidance information should be intuitively representative of the type of information provided.

(6) Information on the lateral displacement of the aircraft relative to the stand centre line should be provided at least 25 m prior to the stop position.

(7) Continuous closure distance and closure rate should be provided from at least 15 m prior to the stop position. Where provided, closure distance displayed in numerals

should be provided in metre integers to the stop position and displayed to 1 decimal place at least 3 m prior to the stop position.

(8) Throughout the docking manoeuvre, an appropriate means should be provided on the A-VDGS to indicate the need to bring the aircraft to an immediate halt. In such an event, which includes a failure of the A-VDGS, no other information should be displayed.

(9) Provision to initiate an immediate halt to the docking procedure should be made available to personnel responsible for the operational safety of the stand.

(10) The word 'stop' in red characters should be displayed when an immediate cessation of the docking manoeuvre is required.

| Guidance information | Maximum deviation at stop position (stop area) | Maximum deviation at 9 m from stop position | Maximum deviation at 15 m from stop position | Maximum deviation at 25 m from stop position |
|---|---|---|---|---|
| Azimuth | ±250 mm | ±340 mm | ±400 mm | ±50 mm |
| Distance | ±50 mm | ±1 000 mm | ±1 300 mm | Not specified |

Table M-3 A-VDGS recommended displacement accuracy

## CS-ADR-DSN.M.765 — Aircraft stand manoeuvring guidance lights TXT REV

(a) Applicability:

Where deemed necessary, aircraft stand manoeuvring guidance lights should be provided to facilitate the positioning of an aircraft on an aircraft stand on a paved apron or on a de-icing/anti-icing facility intended for use in poor visibility conditions.

(b) Characteristics:

(1) Aircraft stand manoeuvring guidance lights should be collocated with the aircraft stand markings.

(2) Aircraft stand manoeuvring guidance lights, other than those indicating a stop position, should be fixed yellow lights, visible throughout the segments within which they are intended to provide guidance.

(3) The lights used to delineate lead-in, turning and lead-out lines should be spaced at intervals of not more than 7.5 m on curves and 15 m on straight sections.

(4) The lights indicating a stop position should be fixed, unidirectional lights, showing red.

(5) The intensity of the lights should be adequate for the condition of visibility and ambient light in which the use of the aircraft stand is intended.

(6) The lighting circuit should be designed so that the lights may be switched on to indicate that an aircraft stand is to be used and switched off to indicate that it is not to be used.

## CS-ADR-DSN.M.770 — Road-holding position light *TXT ADD*

(a) Applicability:

(1) A road-holding position light should be provided at each road-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 550 m.

(b) Location:

(1) A road-holding position light should be located adjacent to the holding position marking 1.5 m (±0.5 m) from one edge of the road, i.e. left or right as appropriate to the local traffic regulations.

(2) Where a road intersects a taxiway, where operationally required, a suitable holding position light may be located adjacent to the roadway/taxiway intersection marking 1.5 m (±0.5 m) from one edge of the road, i.e. left or right as appropriate to the local traffic regulations.

(c) Characteristics:

(1) The road-holding position light should comprise:

(i) a controllable red (stop)/green (go) traffic light; or

(ii) runway guard lights.

(2) Provisions for control of the lights should be installed in the positions for the air traffic services.

(3) The road-holding position light beam should be unidirectional and aligned so as to be visible to the driver of a vehicle approaching the holding position.

(4) The intensity of the light beam should be adequate for the conditions of visibility and ambient light in which the use of the holding position is intended, but should not dazzle the driver.

(5) Where provided, the lights in each runway guard light unit should be illuminated alternately between 30 and 60 cycles per minute and the light suppression and illumination periods should be equal and opposite in each light.

(6) Runway guard lights may be provided, where operationally required, at an intersection of a road with a taxiway. These lights should be in accordance with the local road traffic regulations for a yield right of way.

# CHAPTER N — VISUAL AIDS FOR NAVIGATION (SIGNS)

## CS-ADR-DSN.N.775 — General ADD

(a) Signs may be either fixed message signs or variable message signs.

(b) Application:

(1) Signs should be provided to convey a mandatory instruction, information on a specific location or destination on a movement area or to provide other information.

(2) A variable message sign should be provided where:

(i) the instruction or information displayed on the sign is relevant only during a certain period of time; and/or

(ii) there is a need for variable predetermined information to be displayed.

(c) Characteristics:

(1) Signs should be frangible. Those located near a runway or taxiway should be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign should not exceed the dimension shown in the appropriate column of Table N-1.

(2) Signs should be rectangular, as shown in Figures N-1 and N-2 with the longer side horizontal.

(3) The only signs on the movement area utilising red should be mandatory instruction signs.

(4) The inscriptions on a sign should be in accordance with the provisions of Figures N-3A to N-3F.

(5) Signs should be illuminated when intended for use:

(i) in runway visual range conditions less than a value of 800 m; or

(ii) at night in association with instrument runways; or

(iii) at night in association with non-instrument runways where the code number is 3 or 4.

(6) Where operations are conducted in runway visual range conditions less than a value of 800 m, average sign luminance should be at least:

| | |
|---|---|
| Red | 30 cd/m2 |
| Yellow | 150 cd/m2 |
| White | 300 cd/m2 |

(7) Signs should be retroreflective and/or illuminated when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

(8) Where operations are conducted at night in association with instrument runways ((5)(ii) above), or at night in association with non-instrument runways where the code number is 1 or 2 ((7) above), average sign luminance should be at least:

| | |
|---|---|
| Red | 10 cd/m2 |
| Yellow | 50 cd/m2 |

White 100 cd/m2

(9) If instruction or information during a certain period of time, and/or there is a need to display variable pre-determined information, a variable information sign should be provided.

(i) A variable message sign should show a blank face when not in use.

(ii) In case of failure, a variable message sign should not provide information that could lead to unsafe action from a pilot or a vehicle driver.

(iii) The time interval to change from one message to another on a variable message sign should be as short as practicable and should not exceed 5 seconds.

(iv) If the runway threshold is displaced from the extremity of the runway, a sign showing the designation of the runway may be provided for aeroplanes taking off.

| Sign height (mm) | | | | Perpendicular distance from defined taxiway pavement edge to near side of sign | Perpendicular distance from defined runway pavement edge to near side of sign |
|---|---|---|---|---|---|
| Code number | Legend | Face (min) | Installed (max) | | |
| 1 or 2 | 200 | 400 | 700 | 5–11 m | 3–10 m |
| 1 or 2 | 300 | 600 | 900 | 5–11 m | 3–10 m |
| 3 or 4 | 300 | 600 | 900 | 11–21 m | 8–15 m |
| 3 or 4 | 400 | 800 | 1 100 | 11–21 m | 8–15 m |

Table N-1 Location distances for taxiing guidance signs including runway exit signs

## CS-ADR-DSN.N.780 — Mandatory instruction signs MOVE to GM

(a) Application:

(1) A mandatory instruction sign should be provided to identify a location beyond which an aircraft taxiing or vehicle should not proceed unless authorised by the aerodrome control tower.

(2) Mandatory instruction signs should include runway designation signs, category I, II or III holding position signs, runway-holding position signs, road-holding position signs and NO ENTRY signs.

(3) A pattern 'A' runway-holding position marking should be supplemented at a taxiway/runway intersection or a runway/runway intersection with a runway designation sign.

(4) A pattern 'B' runway-holding position marking should be supplemented with a category I, II or III holding position sign.

(5) A pattern 'A' runway-holding position marking at a runway-holding position should be supplemented with a runway-holding position sign.

(6) A runway designation sign at a taxiway/runway intersection should be supplemented with a location sign in the outboard (farthest from the taxiway) position, as appropriate.

(7) A road holding position sign should be provided at all road entrances to a runway and may also be provided at road entrances to taxiways.

(8) A NO ENTRY sign should be provided when entry into an area is prohibited.

(b) Location:

(1) A runway designation sign at a taxiway/runway intersection or a runway/runway intersection should be located on each side of the runway-holding position marking facing the direction of approach to the runway.

(2) A category I, II or III holding position sign should be located on each side of the runway-holding position marking facing the direction of the approach to the critical area.

(3) A NO ENTRY sign should be located at the beginning of the area to which entrance is prohibited on each side of the taxiway as viewed by the pilot.

(4) A runway-holding position sign should be located on each side of the runway-holding position facing the approach to the obstacle limitation surface or ILS/MLS critical/sensitive area, as appropriate.

(c) Characteristics:

(1) A mandatory instruction sign should consist of an inscription in white on a red background.

(2) The inscription on a runway designation sign should consist of the runway designations of the intersecting runway properly oriented with respect to the viewing position of the sign, except that a runway designation sign installed in the vicinity of a runway extremity may show the runway designation of the concerned runway extremity only.

(3) The inscription on a category I, II, III or joint II/III holding position sign should consist of the runway designator followed by CAT I, CAT II, CAT III or CAT II/III, as appropriate.

(4) The inscription on a NO ENTRY sign should be in accordance with Figure N-1.

(5) The inscription on a runway-holding position sign at a runway-holding position should consist of the taxiway designation and a number.

(d) Where appropriate, the following inscriptions/symbol should be used:

| **Inscription/Symbol** | **Use** |
|---|---|
| Runway designation of runway extremity | To indicate a runway holding position at a runway extremity |
| or | |
| Runway designation of both extremities of a runway | To indicate a runway holding position located at other taxiway/runway intersections or runway/runway intersections |
| 25 CAT I (Example) | To indicate a category I runway-holding position at the threshold of runway 25 |
| 25 CAT II (Example) | To indicate a category II runway-holding position at the threshold of runway 25 |
| 25 CAT III (Example) | To indicate a category III runway-holding position at the threshold of runway 25 |
| 25 CAT II/III (Example) | To indicate a joint category II/III runway holding position at the threshold of runway 25 |
| NO ENTRY symbol | To indicate that entry to an area is prohibited |
| B2 (Example) | To indicate a runway holding position established in accordance with the regulation for physical characteristics |

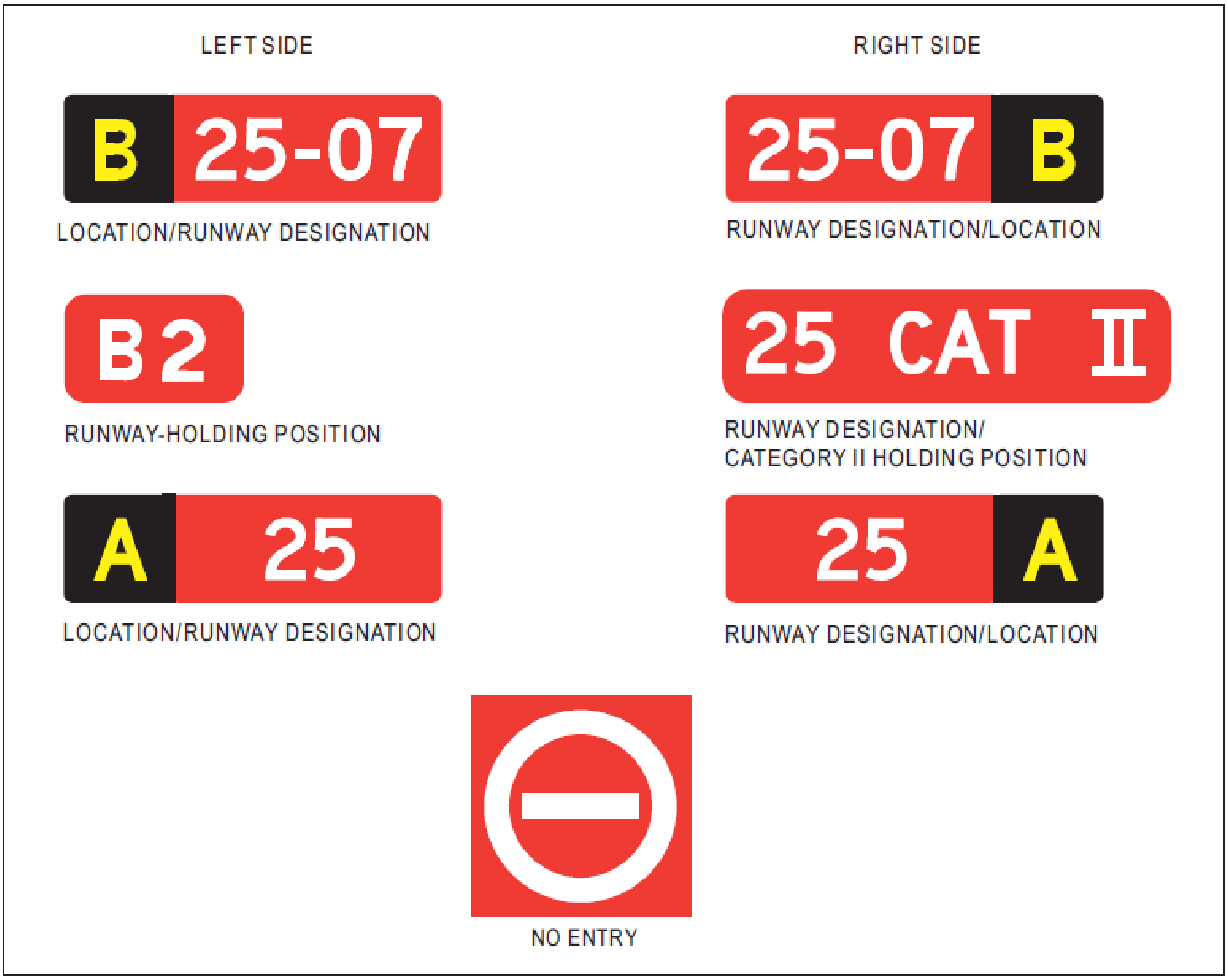



Figure N-1 Mandatory instruction signs

**CS-ADR-DSN.N.785 — Information signs** *ICAO*

(a) Application:

(1) An information sign should be provided where there is an operational need to identify by a sign, a specific location, or routing (direction or destination) information.

(2) Information signs should include: direction signs, location signs, destination signs, runway exit signs, runway vacated signs and intersection take-off signs.

(3) A runway exit sign should be provided where there is an operational need to identify a runway exit.

(4) A runway vacated sign should be provided where the exit taxiway is not provided with taxiway centre line lights and there is a need to indicate to a pilot leaving a runway the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface whichever is farther from the runway centre line.

(5) An intersection take-off sign should be provided when there is an operational need to indicate the remaining take-off run available (TORA) for an intersection take-off.

(6) Where necessary, a destination sign should be provided to indicate the direction to a specific destination on the aerodrome, such as cargo area, general aviation, etc.

(7) A combined location and direction sign should be provided when it is intended to indicate routing information prior to a taxiway intersection.

(8) A direction sign should be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

(9) A location sign should be provided at an intermediate holding position.

(10) A location sign should be provided in conjunction with a runway designation sign except at a runway/runway intersection.

(11) A location sign should be provided in conjunction with a direction sign, except that it may be omitted where an aeronautical study indicates that it is not needed.

(12) Where necessary, a location sign should be provided to identify taxiways exiting an apron or taxiways beyond an intersection.

(13) Where a taxiway ends at an intersection such as a ‘T’ and it is necessary to identify this, a barricade, direction sign and/or other appropriate visual aid should be used.

(b) Location:

(1) Except as specified in (3), information signs should, wherever practicable, be located on the left-hand side of the taxiway in accordance with Table N-1.

(2) At a taxiway intersection, information signs should be located prior to the intersection and in line with the taxiway intersection marking. Where there is no taxiway intersection marking, the signs should be installed at least 60 m from the centre line of the intersecting taxiway where the code number is 3 or 4 and at least 40 m where the code number is 1 or 2.

(3) A runway exit sign should be located on the same side of the runway as the exit is located (i.e. left or right) and positioned in accordance with Table N-1.

(4) A runway exit sign should be located prior to the runway exit point in line with a position at least 60 m prior to the point of tangency where the code number is 3 or 4, and at least 30 m where the code number is 1 or 2.

(5) A runway vacated sign should be located at least on one side of the taxiway. The distance between the sign and the centre line of a runway should be not less than the greater of the following:

(i) the distance between the centre line of the runway and the perimeter of the ILS/MLS critical/sensitive area; or

(ii) the distance between the centre line of the runway and the lower edge of the inner transitional surface.

(6) Where provided in conjunction with a runway vacated sign, the taxiway location sign should be positioned outboard of the runway vacated sign.

(7) An intersection take-off sign should be located at the left-hand side of the entry taxiway. The distance between the sign and the centre line of the runway should be not less than 60 m where the code number is 3 or 4 and not less than 45 m where the code number is 1 or 2.

(8) A taxiway location sign installed in conjunction with a runway designation sign should be positioned outboard of the runway designation sign.

(9) Whenever practicable, a destination sign should not be collocated with a location or direction sign.

(10) An information sign other than a location sign should not be collocated with a mandatory instruction sign.

(c) Characteristics:

(1) An information sign other than a location sign should consist of an inscription in black on a yellow background.

(2) A location sign should consist of an inscription in yellow on a black background and, where it is a stand-alone sign, should have a yellow border.

(3) The inscription on a runway exit sign should consist of the designator of the exit taxiway and an arrow indicating the direction to follow.

(4) The inscription on a runway vacated sign should depict the pattern A runway-holding position marking as shown in Figure N-2.

(5) The inscription on an intersection take-off sign should consist of a numerical message indicating the remaining take-off run available in metres plus an arrow, appropriately located and oriented, indicating the direction of the take-off as shown in Figure N-2.

(6) The inscription on a destination sign should comprise an alpha, alphanumerical or numerical message identifying the destination plus an arrow indicating the direction to proceed as shown in Figure N-2.

(7) The inscription on a direction sign should comprise an alpha or alphanumerical message identifying the taxiway(s) plus an arrow or arrows appropriately oriented as shown in Figure N-2.

(8) The inscription on a location sign should comprise the designation of the location taxiway, runway or other pavement the aircraft is on or is entering and should not contain arrows.

(9) Where it is necessary to identify each of a series of intermediate holding positions on the same taxiway, the location sign should consist of the taxiway designation and a progressive number.

(10) Where a location sign and direction signs are used in combination:

(i) all direction signs related to left turns should be placed on the left side of the location sign and all direction signs related to right turns should be placed on the right side of the location sign, except that where the junction consists of one intersecting taxiway, the location sign may alternatively be placed on the left hand side;

(ii) the direction signs should be placed such that the direction of the arrows departs increasingly from the vertical with increasing deviation of the corresponding taxiway;

(iii) an appropriate direction sign should be placed next to the location sign where the direction of the location taxiway changes significantly beyond the intersection; and

(iv) adjacent direction signs should be delineated by a vertical black line as shown in Figure N-2.

(11) A taxiway should be identified by a designator comprising a letter, letters or a combination of a letter or letters followed by a number.

(12) When designating taxiways, the use of the letters I, O or X and the use of words such as inner and outer should be avoided wherever possible to avoid confusion with the numerals 1, 0 and closed marking.

(13) The use of numbers alone on the manoeuvring area should be reserved for the designation of runways, or to indicate the location of aircraft stands.

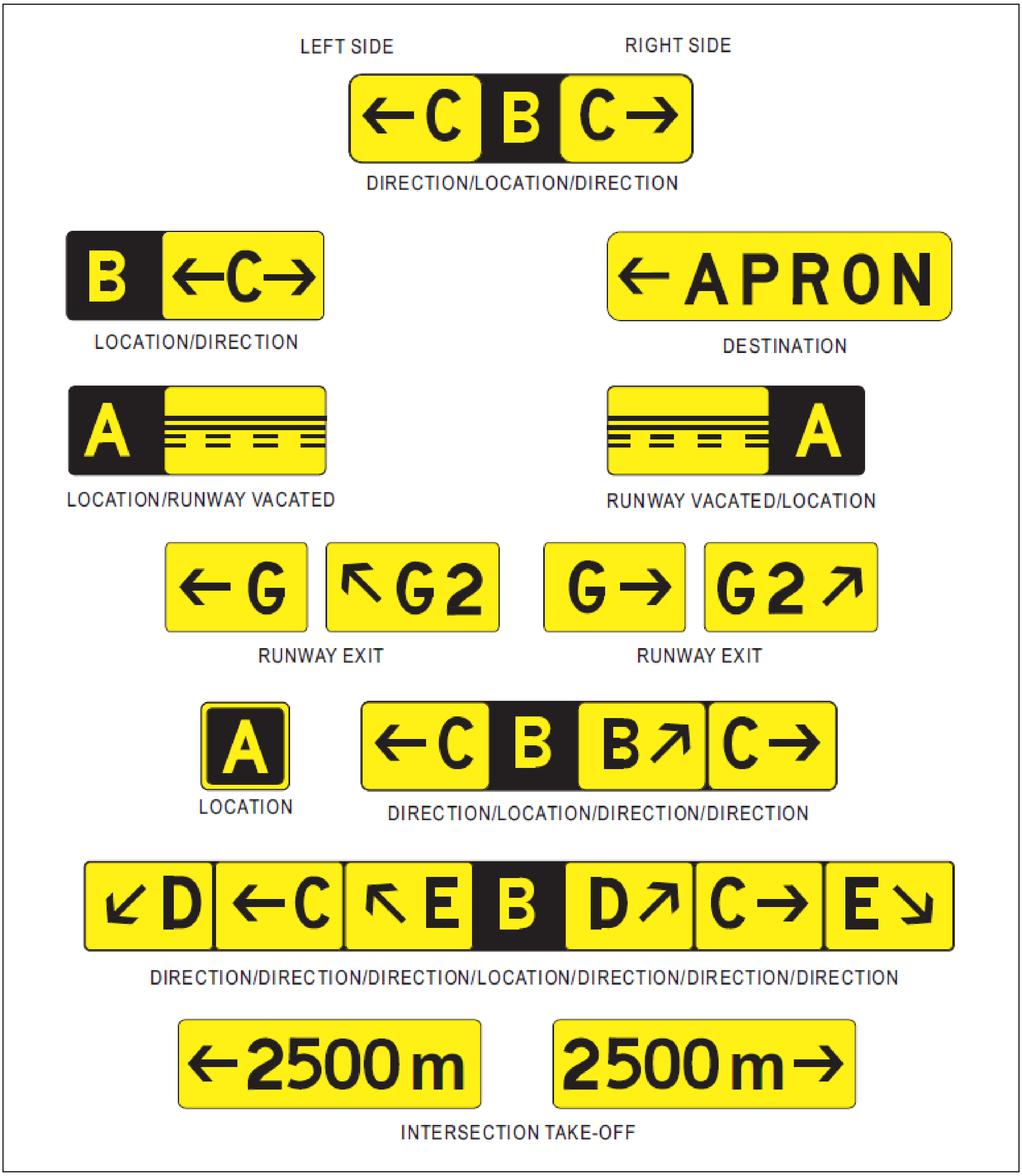



Figure N-2 Information signs

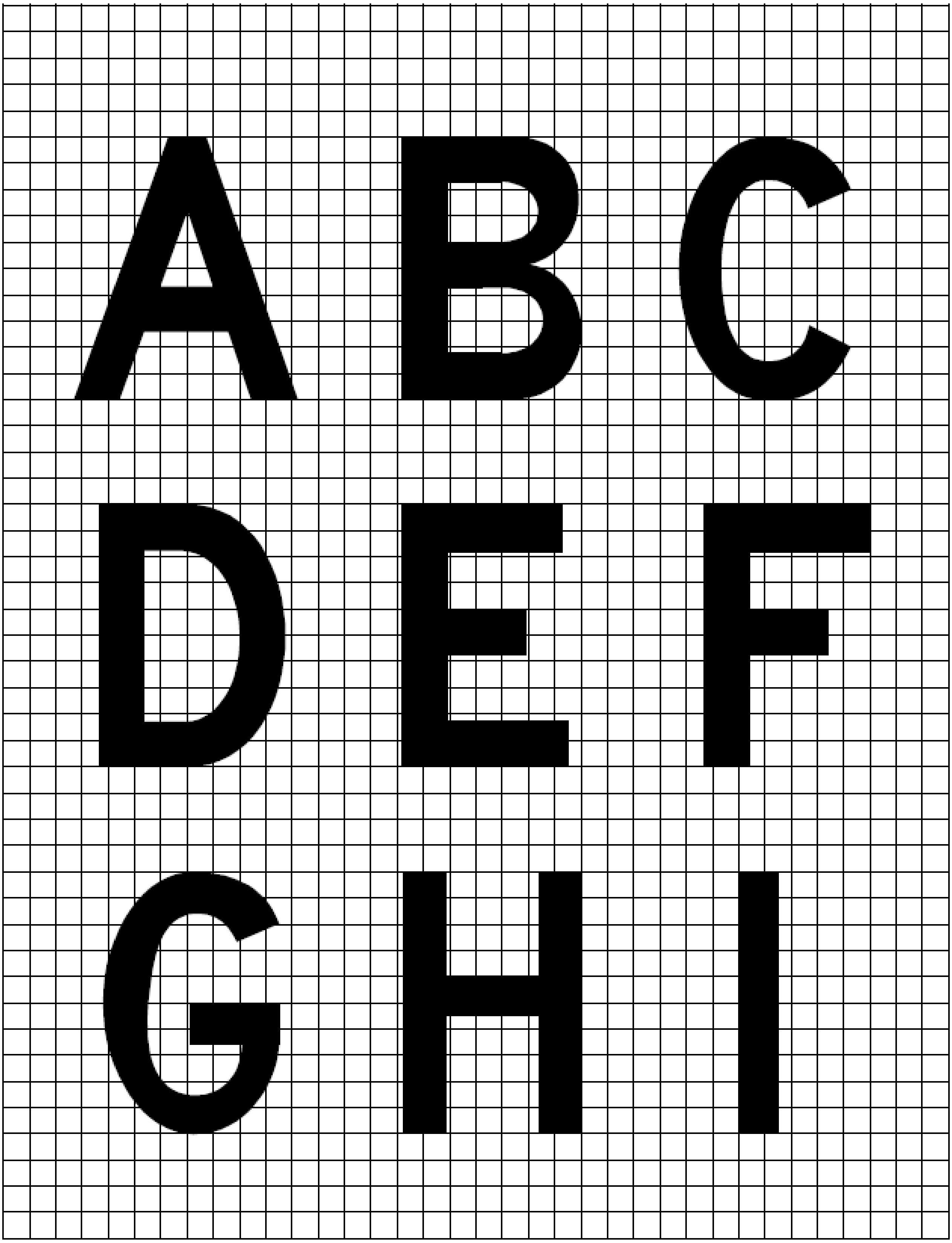



Figure N-3A Forms of characters for signs

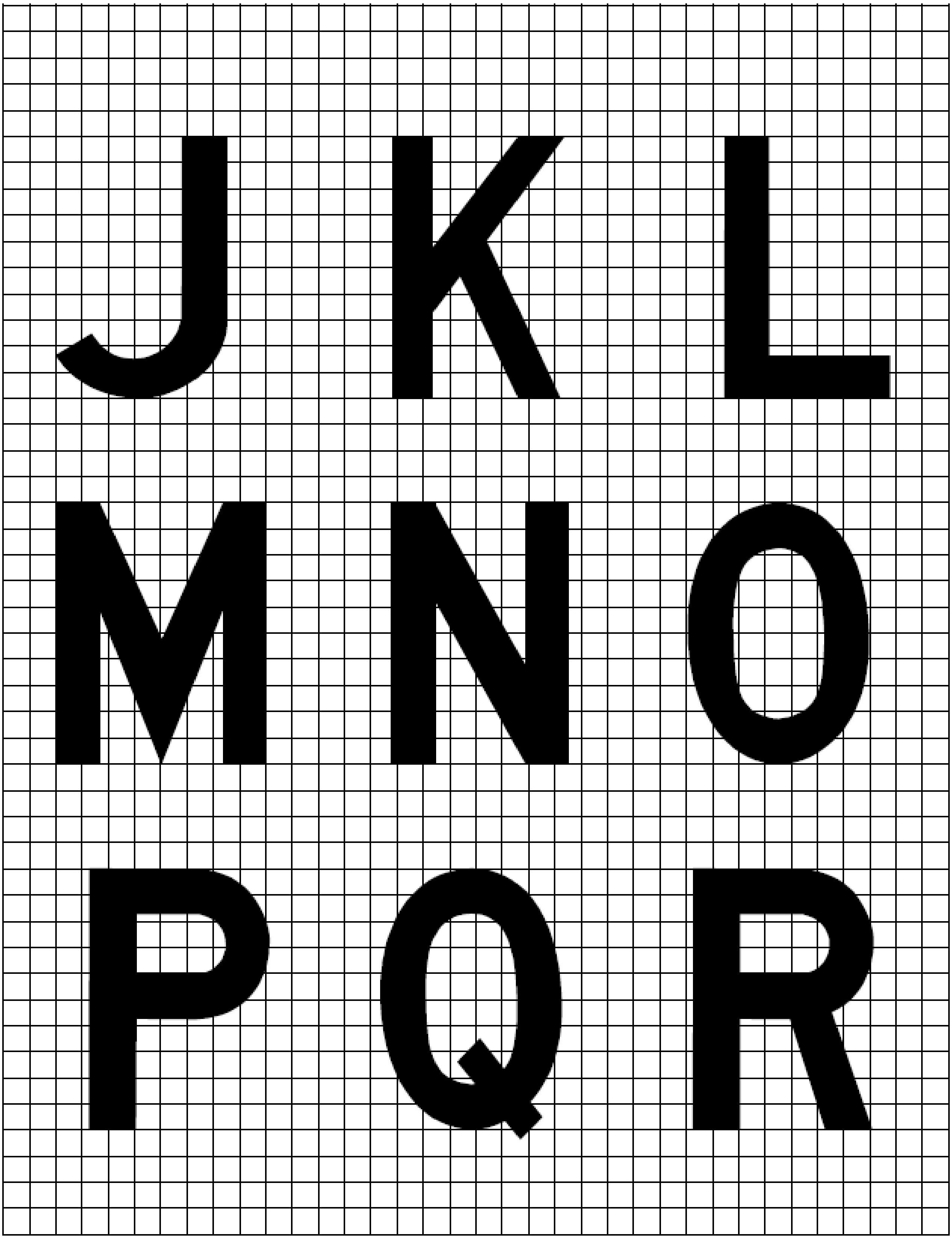


Figure N-3B Forms of characters for signs

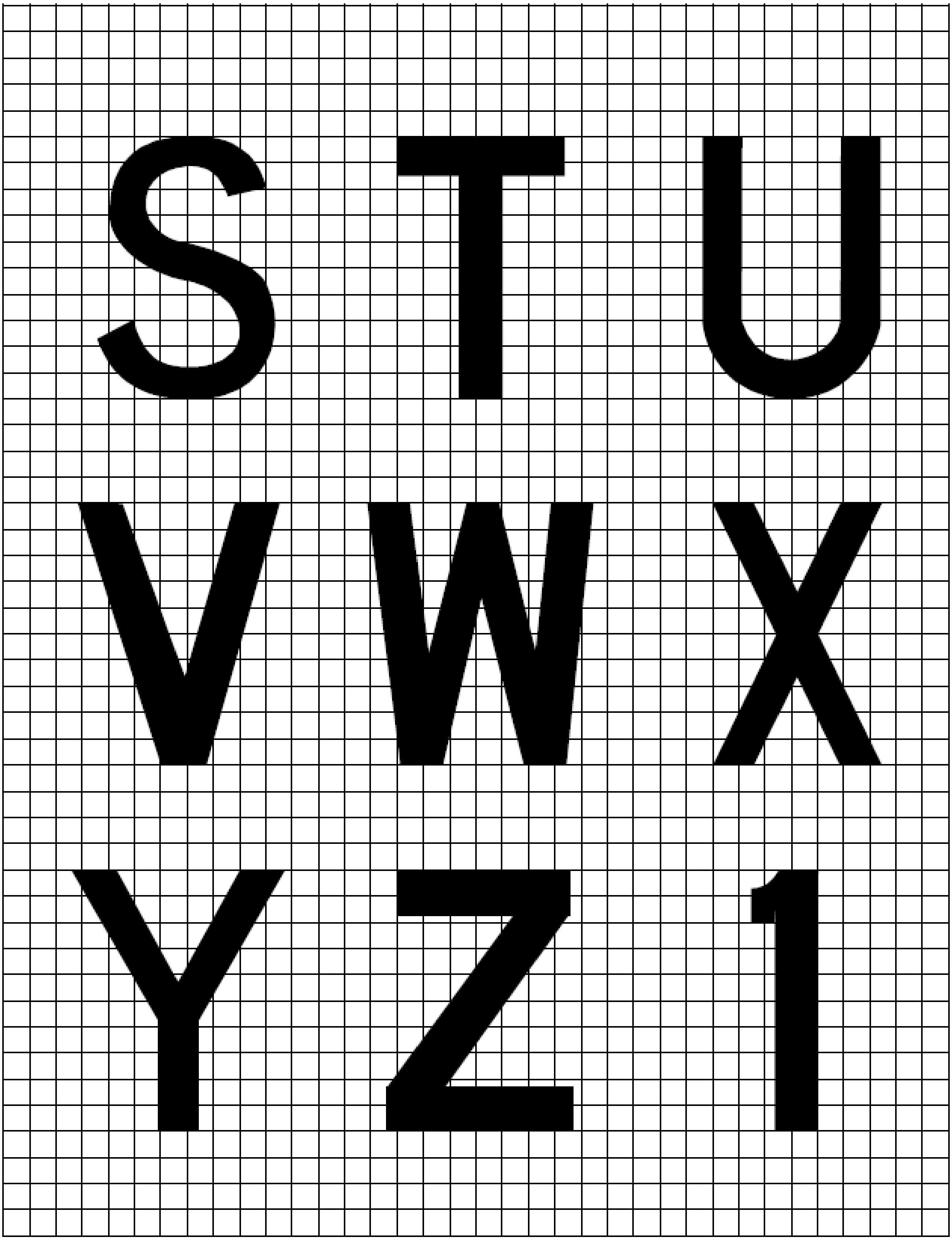



Figure N-3C Forms of characters for signs

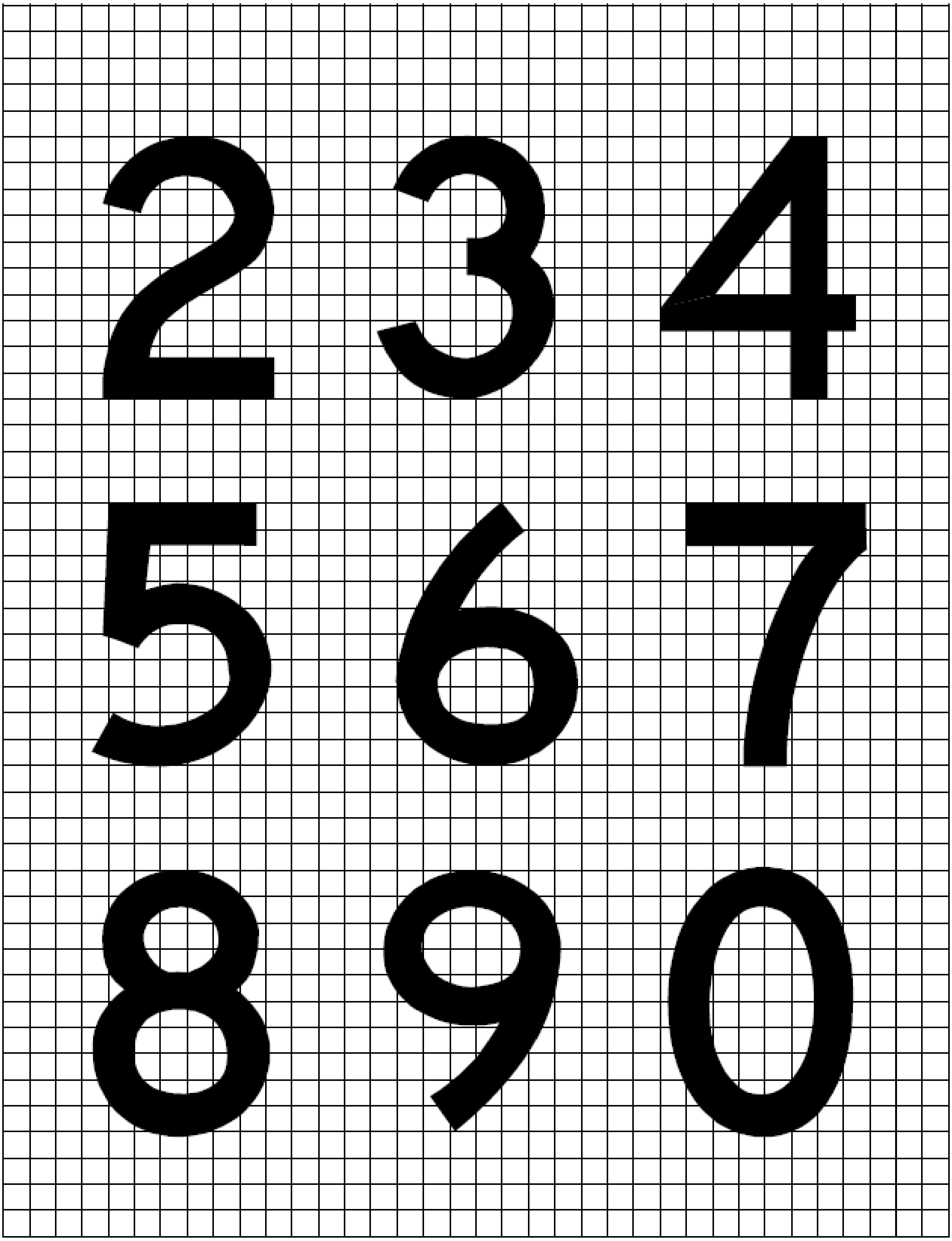



Figure N-3D Forms of characters for signs

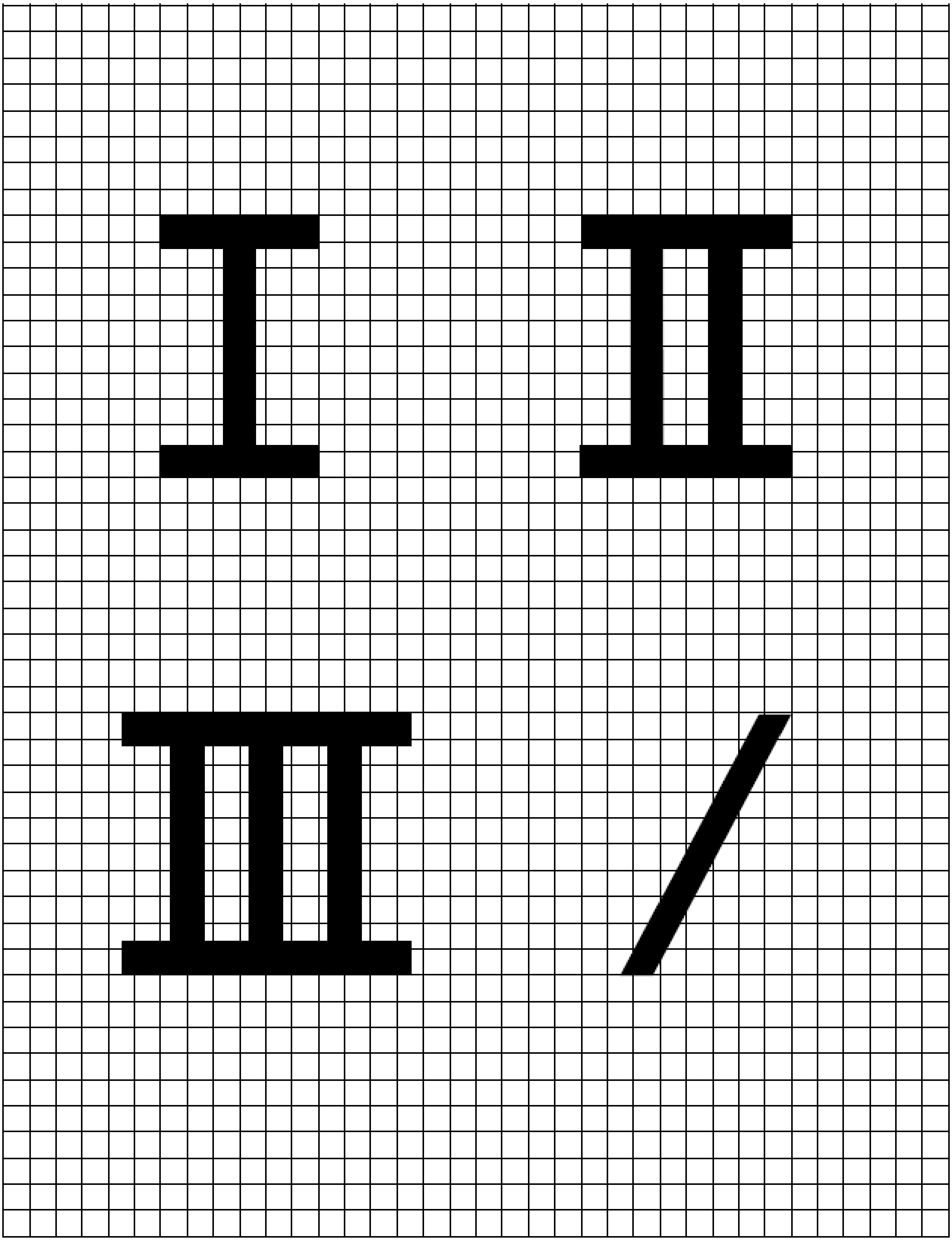
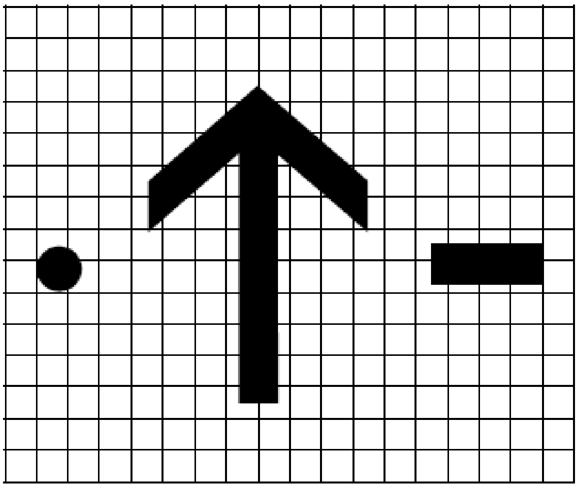


Figure N-3E Forms of characters for signs



*Note 1.— The arrow stroke width, diameter of the dot, and both width and length of the dash shall be proportioned to the character stroke widths.*

*Note 2.— The dimensions of the arrow shall remain constant for a particular sign size, regardless of orientation.*

Figure N-3F Forms of characters for signs

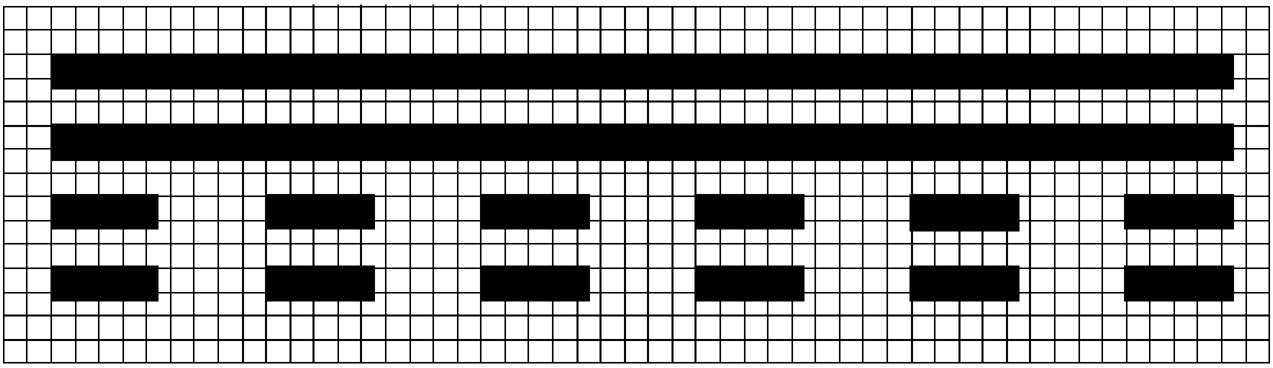


Figure N-3G Runway vacated sign

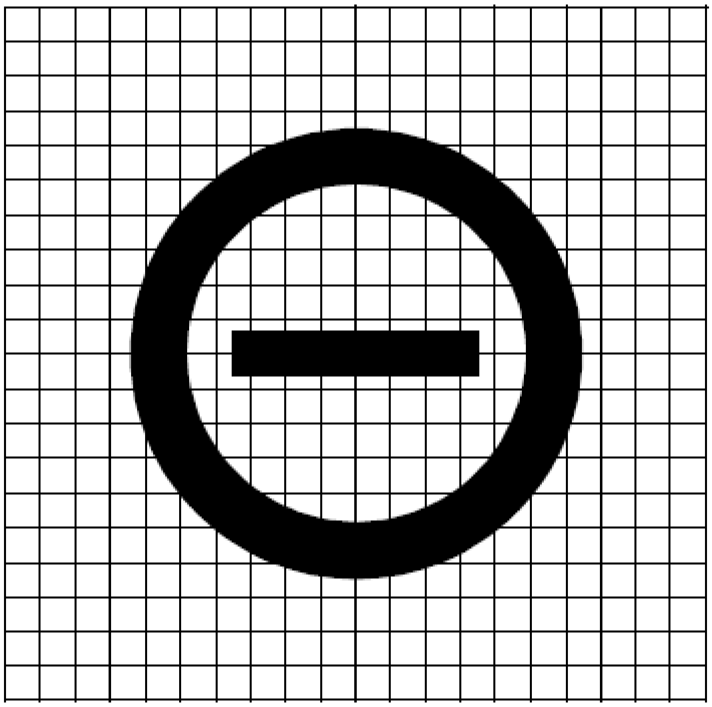


Figure N-3H No entry sign

### CS-ADR-DSN.N.790 — VOR aerodrome checkpoint sign ICAO

When a VOR aerodrome check-point is established, it should be indicated by a VOR aerodrome check-point marking and sign.

(a) Location:

A VOR aerodrome check-point sign should be located as near as possible to the check-point and so that the inscriptions are visible from the cockpit of an aircraft properly positioned on the VOR aerodrome check-point marking.

(b) Characteristics:

(1) A VOR aerodrome check-point sign should consist of an inscription in black on a yellow background.

(2) The inscriptions on a VOR check-point sign should be in accordance with one of the alternatives shown in Figure 29 in which:

| | |
|---|---|
| VOR | is an abbreviation identifying this as a VOR check-point |
| 116.3 | is an example of the radio frequency of the VOR concerned |
| 147° | is an example of the VOR bearing, to the nearest degree, which should be indicated at the VOR check-point; and |
| 4.3 NM | is an example of the distance in nautical miles to a DME collocated with the VOR concerned. |

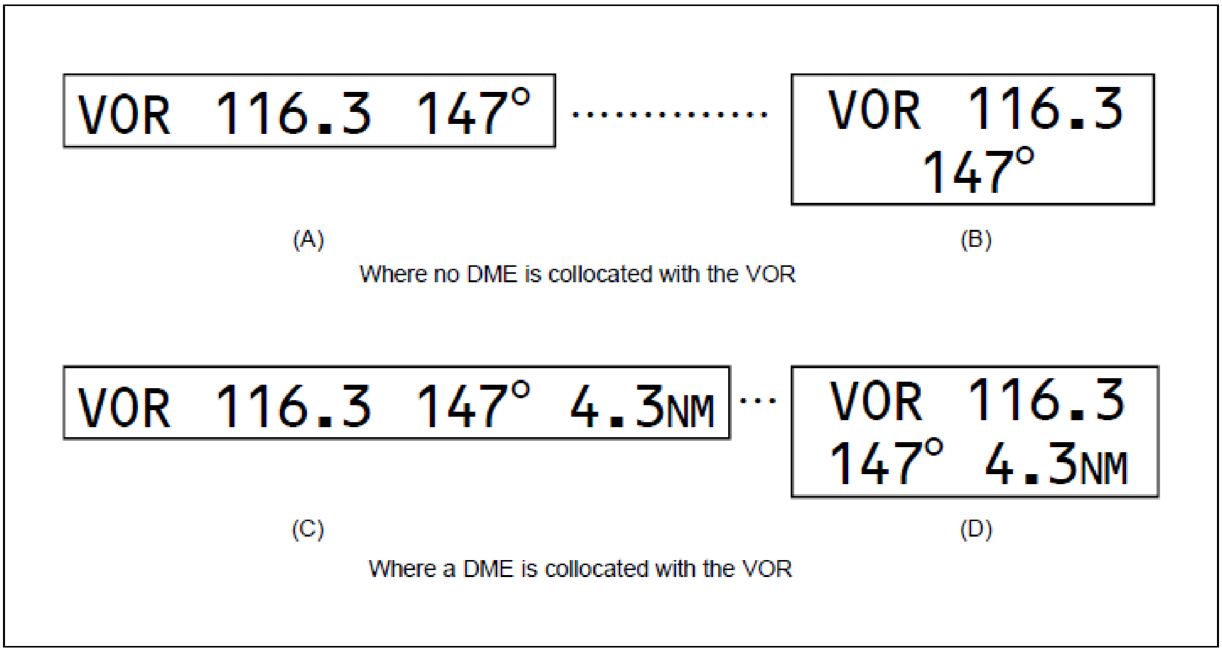



**Figure 5-32. VOR aerodrome checkpoint sign**

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Figure N-4 VOR aerodrome check-point sign

**CS-ADR-DSN.N.795 — Aircraft stand identification signs** *TXT*

(a) Application: An aircraft stand identification marking should be supplemented with an aircraft stand identification sign, where feasible.

(b) Location: An aircraft stand identification sign should be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.

(c) Characteristics: An aircraft stand identification sign should consist of an inscription in black on a yellow background. However, other conspicuous combination may also be used, except for combinations including red.

**CS-ADR-DSN.N.800 — Road-holding position sign** *ADD*

(a) Application: A road-holding position sign should be provided at all road entrances to a runway.

(b) Location:

(1) The road-holding position sign should be located 1.5 m from one edge of the road (left or right as appropriate to the local traffic regulations) at the holding position.

(c) Where a road intersects a taxiway, a suitable sign may be located adjacent to the roadway/taxiway intersection marking 1.5 m from one edge of the road, i.e. left or right as appropriate to the local traffic regulations.

(d) Characteristics:

(1) A road-holding position sign at an intersection of a road with a runway should consist of an inscription in white on a red background.

(2) The inscription on a road-holding position sign should be in the national language, be in conformity with the local traffic regulations and include the following:

(i) a requirement to stop; and

(ii) where appropriate:

(A) a requirement to obtain ATC clearance; and

(B) location designator.

(3) A road-holding position sign intended for night use should be retroreflective or illuminated.

(4) A road sign at the intersection of a road with a taxiway should be in accordance with the local road traffic regulations for a yield right of way sign or a stop sign, as appropriate, and, if intended for night use, should be retroreflective or illuminated.

# CHAPTER P — VISUAL AIDS FOR NAVIGATION (MARKERS)

## CS-ADR-DSN.P.805 — General ADD

Markers should be frangible. Those located near a runway or taxiway should be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

## CS-ADR-DSN.P.810 — Unpaved runway edge markers ICAO

(a) Applicability: Markers should be provided when the extent of an unpaved runway is not clearly indicated by the appearance of its surface compared with that of the surrounding ground.

(b) Characteristics:

(1) Where runway lights are provided, the markers should be incorporated in the light fixtures. Where there are no lights, markers of flat rectangular or conical shape should be placed so as to delimit the runway clearly.

(2) The flat rectangular markers should have a minimum size of 1 m by 3 m and should be placed with their long dimension parallel to the runway centre line. The conical markers should have a height not exceeding 0.50 m.

## CS-ADR-DSN.P.815 — Stopway edge markers ICAO

(a) Applicability: Stopway edge markers should be provided when the extent of a stopway is not clearly indicated by its appearance compared with that of the surrounding ground.

(b) Characteristics: The stopway edge markers should be sufficiently different from any runway edge markers used to ensure that the two types of markers cannot be confused.

## CS-ADR-DSN.P.820 — Edge markers for snow-covered runways TXT

(a) Applicability: Edge markers for snow-covered runways should be used to indicate the usable limits of a snow-covered runway when the limits are not otherwise indicated.

(b) Location: Edge markers for snow-covered runways should be placed along the sides of the usable runway at intervals of not more than 100 m. Sufficient markers should be placed across the threshold and end of the usable runway.

(c) Characteristics: Edge markers for snow covered runways should consist of conspicuous objects such as evergreen trees about 1.5 m high, or light-weight markers.

## CS-ADR-DSN.P.825 — Taxiway edge markers TXT

(a) Applicability: Taxiway edge markers should be provided on a taxiway where taxiway centre line or edge lights or taxiway centre line markers are not provided and where the edge of the taxiway needs to be identified.

(b) Location: Taxiway edge markers should be installed at least at the same locations as would the taxiway edge lights had they been used.

(c) Characteristics:

(1) A taxiway edge marker should be retroreflective blue.

(2) The marked surface as viewed by the pilot should be a rectangle and should have a minimum viewing area of 150 $cm^2$.

(3) Taxiway edge markers should be frangible. Their height should be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

## CS-ADR-DSN.P.830 — Taxiway centre line markers *TXT*

(a) Applicability:

(1) Taxiway centre line markers should be provided on a taxiway where taxiway centre line or edge lights or taxiway edge markers are not provided.

(2) Taxiway centre line markers should be provided on a taxiway where taxiway centre line lights are not provided if there is a need to improve the guidance provided by the taxiway centre line marking.

(b) Location

(1) Taxiway centre line markers should be installed at least at the same location as would taxiway centre line lights had they been used.

(2) Taxiway centre line markers should be located on the taxiway centre line marking except that they may be offset by not more than 0.3 m.

(c) Characteristics:

(1) A taxiway centre line marker should be retroreflective green.

(2) The marked surface as viewed by the pilot should be a rectangle and should have a minimum viewing area of 20 $cm^2$.

(3) Taxiway centre line markers should be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the markers themselves.

## CS-ADR-DSN.P.835 — Unpaved taxiway edge markers *ICAO*

(a) Applicability: Where the extent of an unpaved taxiway is not clearly indicated by its appearance compared with that of the surrounding ground, markers should be provided.

(b) Characteristics:

(1) Where taxiway lights are provided, the markers should be incorporated in the light fixtures.

(2) Where there are no lights, markers of conical shape should be placed so as to delimit the taxiway clearly.

## CHAPTER Q — VISUAL AIDS FOR DENOTING OBSTACLES

### CS-ADR-DSN.Q.840 — Objects to be marked and/or lighted TXT DEL ADD MOVE to OPS/AR (AMC)

(a) The specifications below apply only to the area under the control of the aerodrome operator.

(b) A fixed obstacle that extends above a take-off climb, approach or transitional surface within 3 000 m of the inner edge of the take-off climb or approach surface should be marked and, if the runway is used at night, lighted, except that:

(1) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(2) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;

(3) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day if medium intensity lights are deemed insufficient; and

(4) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

(c) A fixed object, other than an obstacle, adjacent to a take-off climb, approach or transitional surface should be marked and, if the runway is used at night, lighted, if such marking and lighting is considered necessary to ensure its avoidance, except that the marking may be omitted when:

(1) the object is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m; or

(2) the object is lighted by high-intensity obstacle lights by day if medium intensity lights are deemed insufficient.

(d) A fixed obstacle above a horizontal surface should be marked and, if the aerodrome is used at night, lighted, except that:

(1) such marking and lighting may be omitted when:

(i) the obstacle is shielded by another fixed obstacle; or

(ii) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths; or

(iii) an aeronautical study shows the obstacle not to be of operational significance.

(2) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150 m;

(3) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day if medium intensity lights are deemed insufficient.

(e) A fixed object that extends above an obstacle protection surface should be marked and, if the runway is used at night, lighted.

(f) Elevated aeronautical ground lights within the movement area should be marked so as to be conspicuous by day. Obstacle lights should not be installed on elevated ground lights or signs in the movement area.

(g) All obstacles within the distance specified in Table D-1, from the centre line of a taxiway, an apron taxiway or aircraft stand taxilane should be marked and, if the taxiway, apron taxiway or aircraft stand taxilane is used at night, lighted.

## CS-ADR-DSN.Q.845 — Marking of objects MOVE to GM/OPS TXT

(a) All fixed objects to be marked should, whenever practicable, be coloured, but, if this is not practicable, markers or flags should be displayed on or above them, except that objects that are sufficiently conspicuous by their shape, size or colour need not be otherwise marked.

(b) Use of colours

(1) An object should be coloured to show a chequered pattern if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions. The pattern should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern should contrast each with the other and with the background against which they will be seen.

(2) An object should be coloured to show alternating contrasting bands if:

(iv) it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1.5 m, and the other dimension, horizontal or vertical, less than 4.5 m; or

(v) it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m.

(3) The bands should be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less. The colours of the bands should contrast with the background against which they will be seen. Orange and white should be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object should be of the darker colour, see Figures Q-1 and Q-2.

(4) An object should be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5 m. Orange or red should be used, except where such colours merge with the background.

(c) Use of markers:

(1) Markers displayed on or adjacent to objects should be located in conspicuous positions so as to retain the general definition of the object and should be recognisable in clear weather from a distance of at least 1 000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object. The shape of markers should be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they should be such that the hazard presented by the object they mark is not increased.

(2) Marker displayed on an overhead wire, cable, etc., should be spherical and have a diameter of not less than 60 cm.

(3) The spacing between two consecutive markers or between a marker and a supporting tower should be appropriate to the diameter of the marker. The spacing should normally not exceed:

(i) 30 m where the marker diameter is 60 cm, increasing progressively with increase of the marker diameter to:

(A) 35 m where the marker diameter is 80 cm; and

(B) further progressive increases to a maximum of 40 m where the marker diameter is of at least 130 cm.

Where multiple wires, cables, etc., are involved, a marker should be located not lower than the level of the highest wire at the point marked.

(4) A marker should be of one colour. When installed, white and red, or white and orange markers should be displayed alternately. The colour selected should contrast with the background against which it will be seen.

(d) Use of flags

(1) Flags used to mark objects should be displayed around, on top of, or around the highest edge of, the object. When flags are used to mark extensive objects or groups of closely spaced objects, they should be displayed at least every 15 m. Flags should not increase the hazard presented by the object they mark.

(2) Flags used to mark fixed objects should not be less than 0.6 m square.

(3) Flags used to mark fixed objects should be orange in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white, except that where such colours merge with the background, other conspicuous colours should be used.

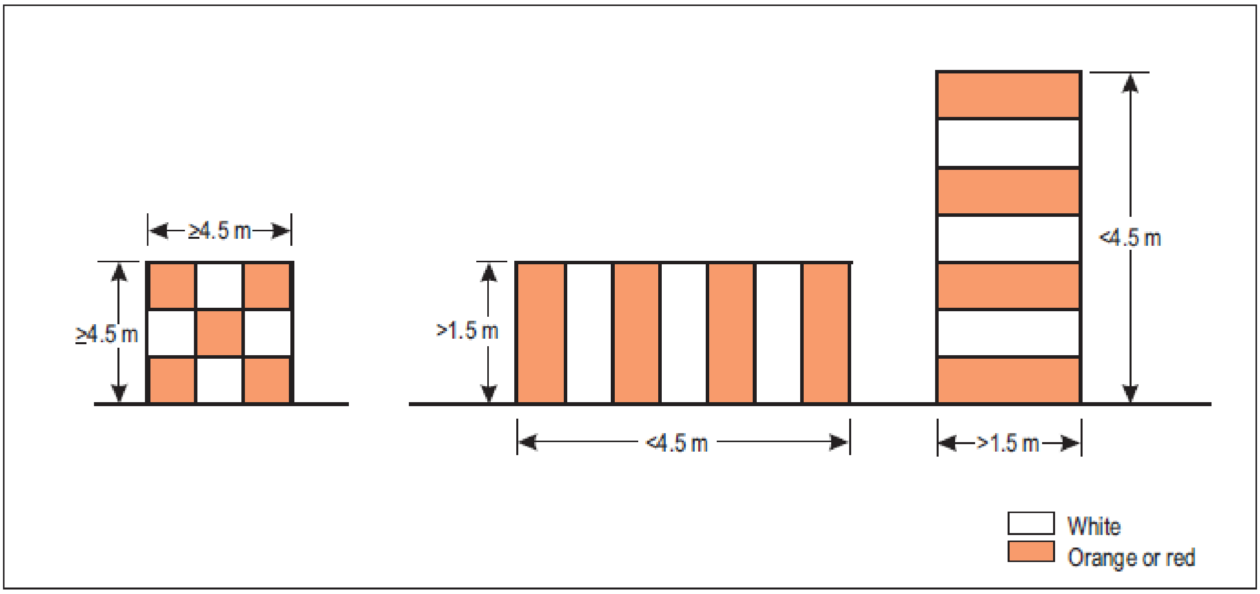



Figure Q-1 Basic marking patterns

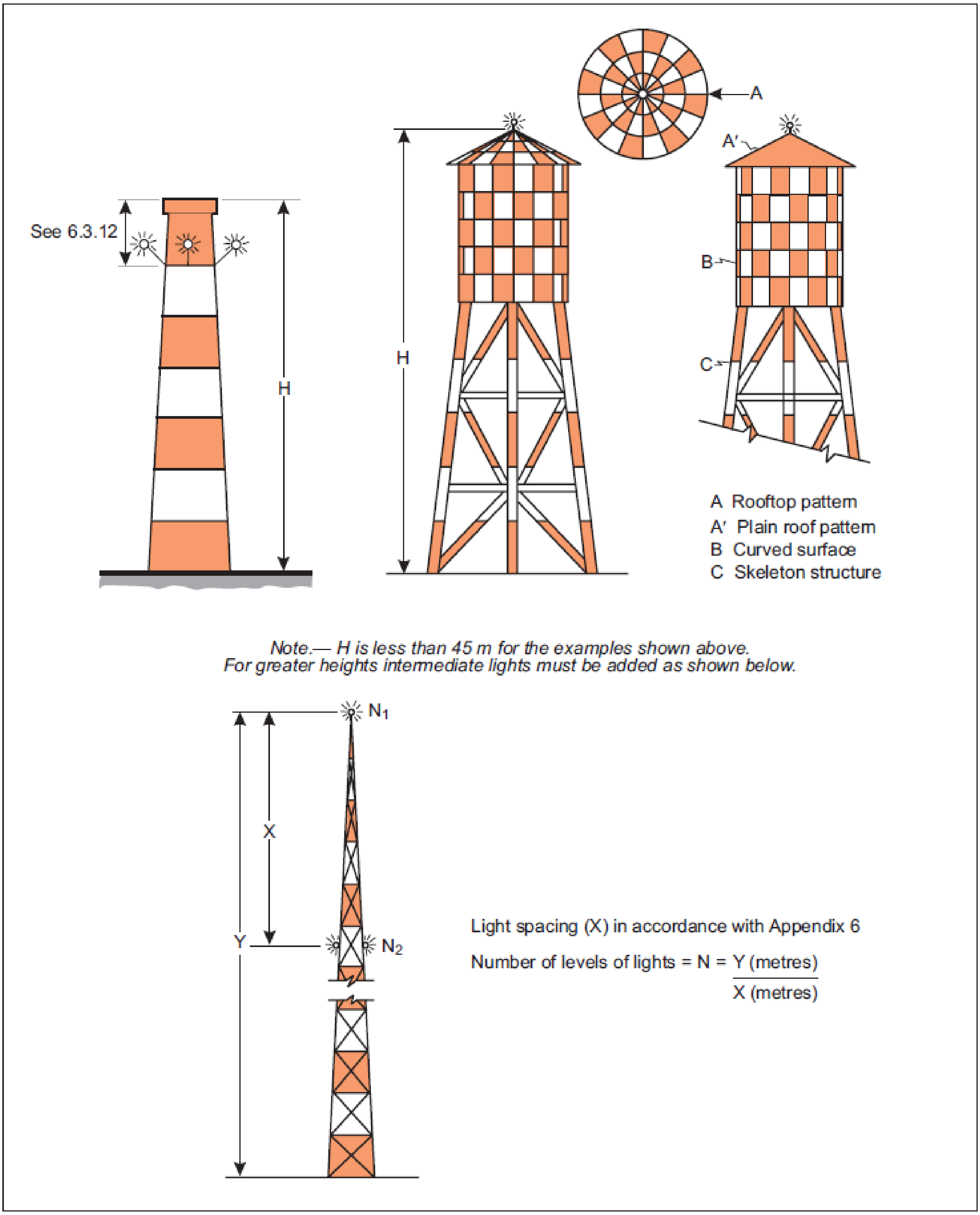



Figure Q-2 Examples of lighting and marking of tall structures

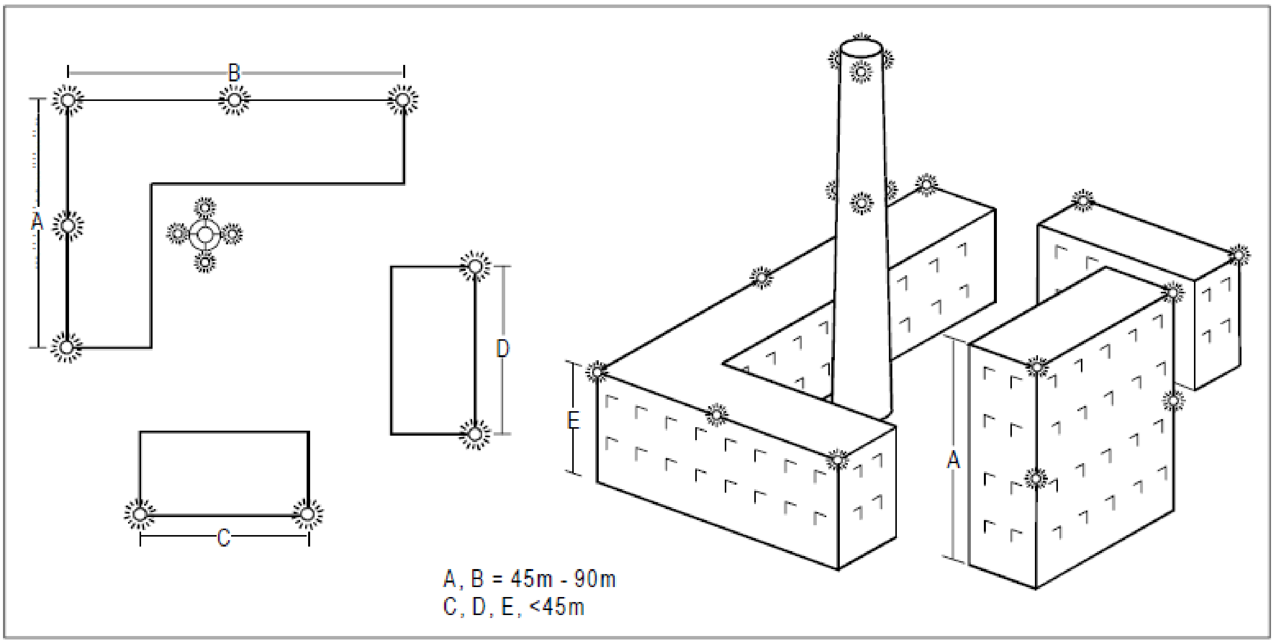



Figure Q-3 Lighting of buildings

## CS-ADR-DSN.Q.850 — Lighting of objects MOVE to GM/OPS TXT ADD

(a) The specifications below apply only to the area under control of the aerodrome operator.

(b) Use of obstacle lights:

(1) The presence of objects which must be lighted should be indicated by low-, medium- or high-intensity obstacle lights, or a combination of such lights.

(2) Low-intensity obstacle lights, Type A or B, should be used where the object is a less extensive one and its height above the surrounding ground is less than 45 m.

(3) Where the use of low-intensity obstacle lights, Type A or B would be inadequate or an early special warning is required, then medium- or high-intensity obstacle lights should be used.

(4) Low-intensity obstacle lights, Type B, should be used either alone or in combination with medium-intensity obstacle lights, Type B, in accordance with subparagraph (7) below.

(5) Medium-intensity obstacle lights, Type A, B or C, should be used where the object is an extensive one or its height above the level of the surrounding ground is greater than 45 m. Medium-intensity obstacle lights, Types A and C, should be used alone, whereas medium-intensity obstacle lights, Type B, should be used either alone or in combination with low-intensity obstacle lights, Type B.

(6) High-intensity obstacle lights, Type A, should be used to indicate the presence of an object if its height above the level of the surrounding ground exceeds 150 m and an aeronautical study indicates such lights to be essential for the recognition of the object by day.

(7) When a dual obstacle lighting system is provided, the system should be composed of high-intensity obstacle lights, Type A or B, or medium-intensity obstacle lights,

Type A, as appropriate, for daytime and twilight use and medium-intensity obstacle lights, Type B or C, for night-time use.

(c) Location of obstacle lights:

(1) One or more low-, medium- or high-intensity obstacle lights should be located as close as practicable to the top of the object. The top lights should be so arranged as to at least indicate the points or edges of the object highest in relation to the obstacle limitation surface.

(2) In the case of chimney or other structure of like function, the top lights should be placed sufficiently below the top so as to minimise contamination by smoke, etc. (see Figures Q-2 and Figure Q-3).

(3) In the case of a tower or antenna structure indicated by high-intensity obstacle lights by day with an appurtenance, such as a rod or an antenna, greater than 12 m, where it is not practicable to locate a high-intensity obstacle light on the top of the appurtenance, such a light should be located at the highest practicable point and, if practicable, a medium-intensity obstacle light, Type A, mounted on the top.

(4) In the case of an extensive object or of a group of closely spaced objects, top lights should be displayed at least on the points or edges of the objects highest in relation to the obstacle limitation surface, so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area should be marked. Where low-intensity lights are used, they should be spaced at longitudinal intervals not exceeding 45 m. Where medium-intensity lights are used, they should be spaced at longitudinal intervals not exceeding 900 m.

(5) When the obstacle limitation surface concerned is sloping and the highest point above the obstacle limitation surface is not the highest point of the object, additional obstacle lights should be placed on the highest point of the object.

(6) Where an object is indicated by medium-intensity obstacle lights, Type A, and the top of the object is more than 105 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels, if technically feasible. These additional intermediate lights should be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m (see subparagraph (7) below).

(7) Where an object is indicated by medium-intensity obstacle lights, Type B, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels, if technically feasible. These additional intermediate lights should be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and should be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate.

(8) Where an object is indicated by medium-intensity obstacle lights, Type C, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels, if technically feasible. These additional intermediate lights should be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate.

(9) Where high-intensity obstacle lights, Type A, are used, they should be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in paragraph (b)(1) above, except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

(10) Where high-intensity obstacle lights, Type B, are used, they should be located at three levels:

(i) at the top of the tower;

(ii) at the lowest level of the catenary of the wires or cables; and

(iii) at approximately midway between these two levels.

(11) The installation setting angles for high-intensity obstacle lights, Types A and B, should be in accordance with Table Q-1.

(12) The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked should be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights should be provided on that object in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

(d) Low-intensity obstacle lights — Characteristics:

(1) Low-intensity obstacle lights on fixed objects, Types A and B, should be fixed-red lights.

(2) Low-intensity obstacle lights, Types A and B, should be in accordance with the specifications in Table Q-2.

(3) Low-intensity obstacle lights, Type C, displayed on vehicles associated with emergency or security should be flashing-blue and those displayed on other vehicles should be flashing-yellow.

(4) Low-intensity obstacle lights, Type D, displayed on follow-me vehicles should be flashing-yellow.

(5) Low-intensity obstacle lights, Types C and D, should be in accordance with the specifications in Table Q-2.

(6) Low-intensity obstacle lights on objects with limited mobility such as aerobridges should be fixed-red. The intensity of the lights should be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed.

(7) Low-intensity obstacle lights on objects with limited mobility should as a minimum be in accordance with the specifications for low-intensity obstacle lights, Type A, in Table Q-2.

(e) Medium-intensity obstacle lights — Characteristics:

(1) Medium-intensity obstacle lights, Type A, should be flashing-white lights, Type B should be flashing-red lights and Type C should be fixed-red lights.

(2) Medium-intensity obstacle lights, Types A, B and C, should be in accordance with the specifications in Table Q-2.

(3) Medium-intensity obstacle lights, Types A and B, located on an object should flash simultaneously.

(a) High-intensity obstacle lights — Characteristics:

(1) High-intensity obstacle lights, Types A and B, should be flashing-white lights.

(2) High-intensity obstacle lights, Types A and B, should be in accordance with the specifications in Table Q-2.

(3) High-intensity obstacle lights, Type A, located on an object should flash simultaneously.

(4) High-intensity obstacle lights, Type B, indicating the presence of a tower supporting overhead wires, cables, etc., should flash sequentially; first the middle light, second the top light and last, the bottom light. The intervals between flashes of the lights should approximate the following ratios:

| **Flash interval between** | **Ratio of cycle time** |
|---|---|
| Middle and top light | 1:13 |
| Top and bottom light | 2:13 |
| Bottom and middle light | 10:13 |

| Height of light unit above terrain | Angle of the peak of the beam above the horizontal |
|---|---|
| Greater than 151 m AGL | 0° |
| 122 m to 151 m AGL | 1° |
| 92 m to 122 m AGL | 2° |
| Less than p2 m AGL | 3° |

Table Q-1 Installation setting angles for high-intensity obstacle lights

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Light type | Colour | Signal type/flash rate | Peak intensity (cd) at given background luminance | | | Vertical beam spread [a] | Intensity (c) at given elevation angles when the light unit is levelled [d] | | | | |
| | | | Above 500 cd/m² | 50-500 cd/m² | Below 50 cd/m² | | -10° [e] | -1° [f] | ±0° [f] | +6° | +10° |
| Low-intensity Type A (fixed obstacle) | Red | Fixed | N/A | 10 mnm | 10 mnm | 10° | — | — | — | 10 mnm [g] | 10 mnm [g] |
| Low-intensity Type B (fixed obstacle) | Red | Fixed | N/A | 32 mnm | 32 mnm | 10° | — | — | — | 32 mnm [g] | 32 mnm [g] |
| Low-intensity Type C (fixed obstacle) | Yellow/blue [a] | Flashing (60-90 fpm) | N/A | 40 mnm [b] 400 max | 40 mnm [b] 400 max | 12° [h] | — | — | — | — | — |
| Low-intensity Type D (follow-me vehicle) | Yellow | Flashing (60-90 fpm) | N/A | 200 mnm [b] 400 max | 200 mnm [b] 400 max | 12° [i] | — | — | — | — | — |
| Medium-intensity Type A | White | Flashing (20-60 fpm) | 20 000 [b] ±25% | 20 000 [b] ±25% | 2 000 [b] ±25% | 3° mnm | 3° max | 50% mnm 75% max | 100% mnm | — | — |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Medium-intensity Type B | Red | Flashing (20-60 fpm) | N/A | N/A | 2 000 [b] ±25% | 3° mnm | — | 50% mnm<br>75% max | 100% mnm | — | — |
| Medium-intensity Type C | Red | Fixed | N/A | N/A | 2 000 [b] ±25% | 3° mnm | — | 50% mnm<br>75% max | 100% mnm | — | — |
| High-intensity Type A | White | Flashing (40-60 fpm) | 200 000 [b] ±25% | 20 000 [b] ±25% | 2 000 [b] ±25% | 3°-7° | 3° max | 50% mnm<br>75% max | 100% mnm | — | — |
| High-intensity Type B | White | Flashing (40-60 fpm) | 100 000 [b] ±25% | 20 000 [b] ±25% | 2 000 [b] ±25% | 3°-7° | 3° max | 50% mnm<br>75% max | 100% mnm | — | — |

[a] See 6.3.25.

[b] Effective intensity as determined in accordance with the Aerodrome Design Manual (Doc 9157), Part 4.

[c] Beam spread is defined as the angle between two directions in a plane for which the intensity is equal to 50% of the lower tolerance value of the intensity shown in columns 4, 5 and 6. The beam pattern is not necessarily symmetrical about the elevation angle at which the peak intensity occurs.

[d] Elevation (vertical) angles are referenced to the horizontal.

[e] Intensity at any specified horizontal radial as a percentage of the actual peak intensity at the same radial when operated at each of the intensities shown columns 4, 5 and 6.

[f] Intensity at any specified horizontal radial as a percentage of the lower tolerance value of the intensity shown in columns 4, 5 and 6.

[g] In addition to specified values, lights should have sufficient intensity to ensure conspicuity at elevation angles between ±0° and 50°.

[h] Peak intensity should be located at approximately 2.5° vertical.

[i] Peak intensity should be located at approximately 17° vertical.

fpm = flashes per minute; N/A = not applicable

Table Q-2 Characteristics of obstacle lights

# CHAPTER R — VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

## CS-ADR-DSN.R.855 — Closed runways and taxiways, or parts thereof ICAO

Applicability of closed marking:

(1) A closed marking should be displayed on a runway or taxiway, or portion thereof, which is permanently closed to the use of all aircraft.

(2) A closed marking should be displayed on a temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided.

(a) Location of closed markings:

(1) On a runway, a closed marking should be placed at each end of the runway, or portion thereof, declared closed, and additional markings should be so placed that the maximum interval between markings does not exceed 300 m. On a taxiway a closed marking should be placed at least at each end of the taxiway or portion thereof closed.

(b) Characteristics of closed markings:

(1) The closed marking should be of the form and proportions as detailed in Figure R-1, Illustration (a), when displayed on a runway, and should be of the form and proportions as detailed in Figure R-1, Illustration (b), when displayed on a taxiway. The marking should be white when displayed on a runway and should be yellow when displayed on a taxiway.

(2) When a runway or taxiway or portion thereof is permanently closed, all normal runway and taxiway markings should be obliterated.

(c) Lighting on a closed runway or taxiway or portion thereof should not be operated, except as required for maintenance purposes.

(d) In addition to closed markings, when the runway or taxiway or portion thereof closed is intercepted by a usable runway or taxiway which is used at night, unserviceability lights should be placed across the entrance to the closed area at intervals not exceeding 3 m (see CS-ADR-DSN.R.870 [Unserviceable areas] paragraph (c)(2)).

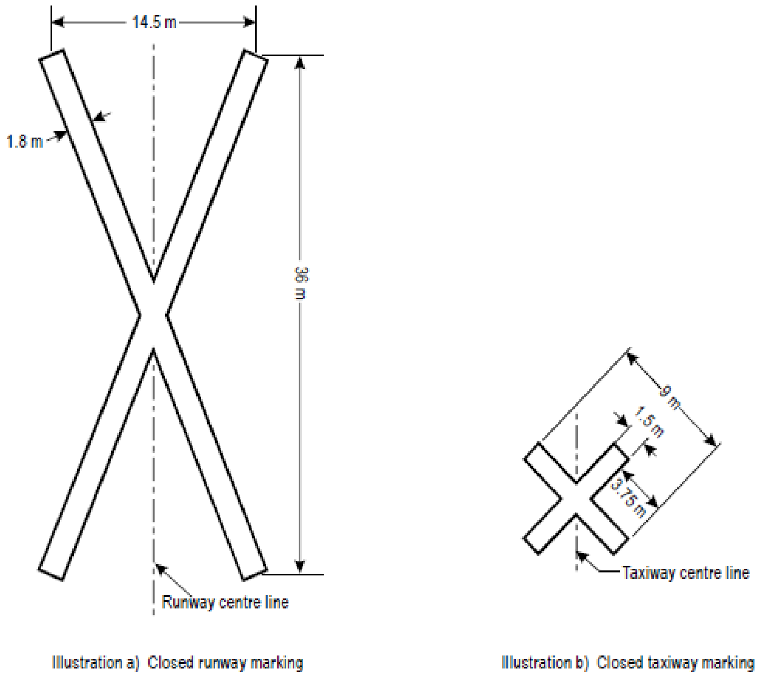



Figure R-1 Runway and taxiway closed markings

## CS-ADR-DSN.R.860 — Non-load-bearing surfaces ICAO

(a) Shoulders for taxiways, runway turn pads, holding bays and aprons and other non-load-bearing surfaces which cannot readily be distinguished from load-bearing surfaces and which, if used by aircraft, might result in damage to the aircraft should have the boundary between such areas and the load-bearing surface marked by a taxi side stripe marking (specifications for markings are in CS-ADR-DSN.L.550).

(b) A taxi side stripe marking should consist of a pair of solid lines, each 15 cm wide and spaced 15 cm apart and the same colour as the taxiway centre line marking.

## CS-ADR-DSN.R.865 — Pre-threshold area ADD

(a) Applicability of Pre-threshold area:

When the surface before a threshold is paved and exceeds 60 m in length and is not suitable for normal use by aircraft, the entire length before the threshold should be marked with a chevron marking.

(b) Location:

A chevron marking should point in the direction of the runway and be placed as shown in Figure R-2.

(c) Characteristics:

(1) A chevron marking should be of conspicuous colour and contrast with the colour used for the runway markings; it should preferably be yellow. It should have an overall width of at least 0.9 m.

(2) For pre-threshold areas shorter than 60 m, markings may be modified or reduced in size so as to present the correct picture to aircrew.

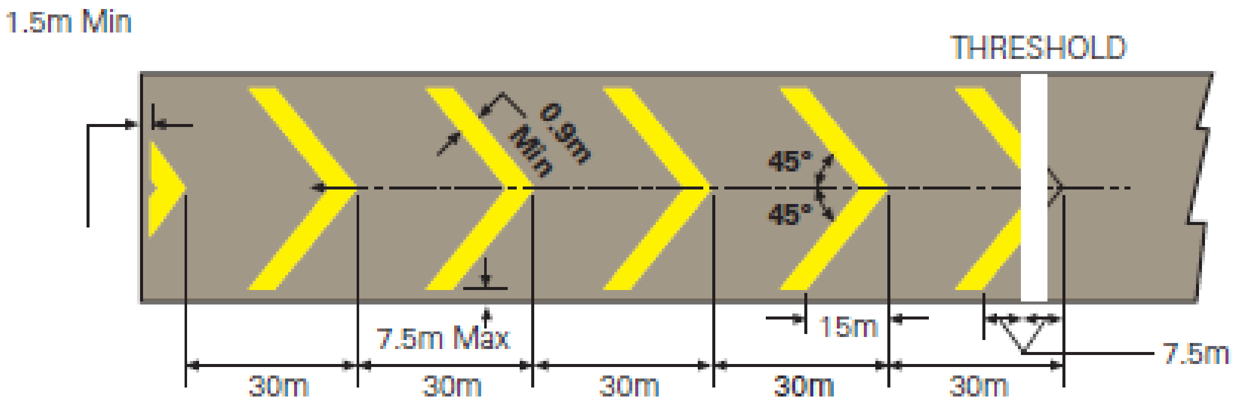



Figure R-2 Pre-threshold area marking

**CS-ADR-DSN.R.870 — Unserviceable areas** ICAO

(a) Applicability of unserviceability markers and lights:

Unserviceability markers should be displayed wherever any portion of a taxiway, apron or holding bay is declared unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely. On a movement area used at night, unserviceability lights should be used.

(b) Location:

Unserviceability markers and lights should be placed at intervals sufficiently close so as to delineate the unserviceable area.

(c) Characteristics

(1) Unserviceability markers should consist of conspicuous upstanding devices such as flags, cones or marker boards.

(2) An unserviceability light should consist of a red fixed light. The light should have intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which it would normally be viewed. In no case should the intensity be less than 10 cd of red light.

(3) An unserviceability cone should be at least 0.5 m in height and red, orange or yellow or any one of these colours in combination with white.

(4) An unserviceability flag should be at least 0.5 m square and red, orange or yellow or any one of these colours in combination with white.

(5) An unserviceability marker board should be at least 0.5 m in height and 0.9 m in length, with alternate red and white or orange and white vertical stripes.

# CHAPTER S — ELECTRICAL SYSTEMS

## CS-ADR-DSN.S.875 — Electrical power supply systems for air navigation facilities ICAO

(a) Adequate primary power supply should be available at aerodromes for the safe functioning of air navigation facilities.

(b) The design and provision of electrical power systems for aerodrome visual and radio navigation aids should be such that an equipment failure will not leave the pilot with inadequate visual and non-visual guidance or misleading information.

(c) Electric power supply connections to those facilities for which secondary power is required should be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(d) The time interval between failure of the primary source of power and the complete restoration of the services required by CS-ADR-DSN.S.880(e) should be as short as practicable, except that for visual aids associated with non-precision, precision approach or take-off runways the requirements of Table S-1 for maximum switch-over times should apply.

## CS-ADR-DSN.S.880 — Electrical power supply systems for visual aids ICAO

(a) For a precision approach runway, a secondary power supply capable of meeting the requirements of Table S-1 for the appropriate category of precision approach runway should be provided. Electric power supply connections to those facilities for which secondary power is required should be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(b) For a runway meant for take-off in runway visual range conditions less than a value of 800 m, a secondary power supply capable of meeting the relevant requirements of Table 1 should be provided.

(c) At an aerodrome where the primary runway is a non-precision approach runway, a secondary power supply capable of meeting the requirements of Table 1 should be provided except that a secondary power supply for visual aids need not be provided for more than one non-precision approach runway.

(d) At an aerodrome where the primary runway is a non-instrument runway, a secondary power supply capable of meeting the requirements of CS-ADR-DSN.S.875(d) should be provided, except that a secondary power supply for visual aids need not be provided if an emergency lighting is provided and capable of being deployed in 15 minutes.

(e) The following aerodrome facilities should be provided with a secondary power supply capable of supplying power when there is a failure of the primary power supply:

(1) the signalling lamp and the minimum lighting necessary to enable air traffic services personnel to carry out their duties;

(2) obstacle lights which are essential to ensure the safe operation of aircraft;

(3) approach, runway and taxiway lighting as specified in CS-ADR-DSN.M.625 to CS-ADR-DSN.M.745;

(4) meteorological equipment;

(5) essential equipment and facilities for the parking position if provided in accordance with CS-ADR-DSN.M.755 (a); and

(6) illumination of apron areas over which passengers may walk.

## CS-ADR-DSN.S.885 — System design ICAO

(a) For a runway meant for use in runway visual range conditions less than a value of 550 m, the electrical systems for the power supply, lighting and control of the lighting systems included in Table S-1 should be so designed that an equipment failure will not leave the pilot with inadequate visual guidance or misleading information.

(b) Where the secondary power supply of an aerodrome is provided by the use of duplicate feeders, such supplies should be physically and electrically separate so as to ensure the required level of availability and independence.

(c) Where a runway forming part of a standard taxi-route is provided with runway lighting and taxiway lighting, the lighting systems should be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

## CS-ADR-DSN.S.890 — Monitoring ICAO REV DEL

(a) A system of monitoring should be employed to indicate the operational status of the lighting systems.

(b) Where lighting systems are used for aircraft control purposes, such systems should be monitored automatically so as to provide an indication of any fault which may affect the control functions. This information should be automatically relayed to the air traffic service unit.

(c) Where a change in the operational status of lights has occurred, an indication should be provided within two seconds for a stop bar at a runway-holding position and within five seconds for all other types of visual aids.

(d) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table S-1 should be monitored automatically so as to provide an indication when the serviceability level of any element falls below a minimum serviceability level specified in CS-ADR-DSN.S.895. This information should be automatically relayed to the maintenance crew.

(e) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table S-1 should be monitored automatically to provide an indication when the serviceability level of any element falls below a minimum level specified in CS-ADR-DSN.S.895, below which operations should not continue. This information should be automatically relayed to the air traffic services unit and displayed in a prominent position.

## CS-ADR-DSN.S.895 — Serviceability levels ICAO REV

(a) A light should be deemed to be unserviceable when the main beam average intensity is less than 50 % of the value specified in the appropriate figure in CS-ADR-DSN.U.940. For light units where the designed main beam average intensity is above the value shown in CS-ADR-DSN.U.940, the 50 % value should be related to that design value.

(b) A system of preventive maintenance of visual aids should be employed to ensure lighting and marking system reliability.

(c) The system of preventive maintenance employed for a precision approach runway category II or III should have as its objective that, during any period of category II or III operations, all approach and runway lights are serviceable and that, in any event, at least:

(1) 95 % of the lights are serviceable in each of the following particular significant elements:

(i) precision approach category II and III lighting system, the inner 450 m;

(ii) runway centre line lights;

(iii) runway threshold lights; and

(iv) runway edge lights.

(2) 90 % of the lights are serviceable in the touchdown zone lights;

(3) 85 % of the lights are serviceable in the approach lighting system beyond 450 m; and

(4) 75 % of the lights are serviceable in the runway end lights.

(5) In order to provide continuity of guidance, the allowable percentage of unserviceable lights should not be permitted in such a way as to alter the basic pattern of the lighting system.

(6) Additionally, an unserviceable light should not be permitted adjacent to another unserviceable light, except in a barrette or a crossbar where two adjacent unserviceable lights may be permitted.

(d) The system of preventive maintenance employed for a stop bar provided at a runway-holding position used in conjunction with a runway intended for operations in runway visual range conditions less than a value of 350 m should have the following objectives:

(1) no more than two lights will remain unserviceable; and

(2) two adjacent lights will not remain unserviceable unless the light spacing is significantly less than that specified.

(e) The system of preventive maintenance employed for a taxiway intended for use in runway visual range conditions less than a value of 350 m should have as its objective that no two adjacent taxiway centre line lights be unserviceable.

(f) The system of preventive maintenance employed for a precision approach runway category I should have as its objective that, during any period of category I operations, all approach and runway lights are serviceable and that, in any event, at least 85 % of the lights are serviceable in each of the following:

(1) precision approach category I lighting system;

(2) runway threshold lights;

(3) runway edge lights; and

(4) runway end lights.

In order to provide continuity of guidance an unserviceable light should not be permitted adjacent to another unserviceable light unless the light spacing is significantly less than that specified.

(g) The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions less than a value of 550 m should have as its objective that, during any period of operations, all runway lights are serviceable and that in any event:

(1) at least 95 % of the lights are serviceable in the runway centre line lights (where provided) and in the runway;

(2) edge lights; and

(3) at least 75 % of the lights are serviceable in the runway end lights.

In order to provide continuity of guidance, an unserviceable light should not be permitted adjacent to another unserviceable light.

(h) The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions of a value of 550 m or greater should have as its objective that, during any period of operations, all runway lights are serviceable and that, in any event, at least 85 % of the lights are serviceable in the runway edge lights and runway end lights. In order to provide continuity of guidance, an unserviceable light should not be permitted adjacent to another unserviceable light.

| Runway | Lighting aids requiring power | Maximum switch-over time |
|---|---|---|
| Non-instrument | Visual approach slope indicators[a]<br>Runway edge[b]<br>Runway threshold[b]<br>Runway end[b]<br>Obstacle[a] | See<br>CS-ADR-DSN.M.850(d) and<br>CS-ADR-DSN.M.855(d) |
| Non-precision approach | Approach lighting system<br>Visual approach slope indicators[a, d]<br>Runway edge[d]<br>Runway threshold[d]<br>Runway end[d]<br>Obstacle[a] | 15 seconds<br>15 seconds<br>15 seconds<br>15 seconds<br>15 seconds<br>15 seconds |
| Precision approach category I | Approach lighting system<br>Runway edge[d]<br>Visual approach slope indicators[a, d]<br>Runway threshold[d]<br>Runway end<br>Essential taxiway[a]<br>Obstacle[a] | 15 seconds<br>15 seconds<br>15 seconds<br>15 seconds<br>15 seconds<br>15 seconds<br>15 seconds |
| Precision approach category II/III | Inner 300 m of the approach lighting system<br>Other parts of the approach lighting system<br>Obstacle[a]<br>Runway edge<br>Runway threshold<br>Runway end<br>Runway centre line<br>Runway touchdown zone | 1 second<br>15 seconds<br>15 seconds<br>15 seconds<br>1 second<br>1 second<br>1 second<br>1 second<br>1 second<br>15 seconds |

| | | |
|---|---|---|
| | All stop bars<br>Essential taxiway | |
| Runway meant for take-off in runway visual range<br>conditions less than a value of 800 m | Runway edge<br>Runway end<br>Runway centre line<br>All stop bars<br>Essential taxiway[a]<br>Obstacle[a] | 15 seconds<br>1 second<br>1 second<br>1 second<br>15 seconds<br>15 seconds |
| a. Supplied with secondary power when their operation is essential to the safety of flight operation.<br>b. The use of emergency lighting should be in accordance with any procedures established.<br>c. One second where no runway centre line lights are provided.<br>d. One second where approaches are over hazardous or precipitous terrain. | | |
| Table S-1 - Secondary power supply requirements | | |

| Light type | CAT II/III Approach | CAT I Approach | RVR<550m take-off | RVR>550m take-off |
|---|---|---|---|---|
| Approach inner 450 m | 95% | 85% | - | - |
| Approach outer 450 m | 85% | 85% | - | - |
| Runway threshold | 95% | 85% | - | - |
| Runway centre line | 95% | 85% | 95% | 85% |
| Runway edge | 95% | 85% | 95% | 85% |
| Runway end | 75% | 85% | 75% | 85% |
| Touchdown zone | 90% | (85%)[a] | - | - |
| *Note (a): If touchdown zone lights are available.* | | | | |
| Table S-2 – Allowable percentages of unserviceable lights | | | | |

# CHAPTER T — AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATION

## CS-ADR-DSN.T.900 — Emergency access and service roads ADD MOVE to GM

Emergency access roads should not be equipped with road holding positions, if they are declared, marked and physically closed for all traffic other than emergency access.

## CS-ADR-DSN.T.905 — Fire stations REV ADD

(a) All rescue and fire-fighting vehicles should normally be housed in a fire station. Satellite fire stations should be provided whenever the response time cannot be achieved from a single fire station.

(b) The fire station should be located so that the access for rescue and fire-fighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.

(c) The fire station, and any satellite fire stations, should be located outside taxiway and runway strips and not infringe obstacle limitation surfaces.

## CS-ADR-DSN.T.910 — Equipment frangibility requirements ADD

(a) Equipment and supports required to be frangible should be designed and constructed so that they will break, distort or yield in the event that they are accidentally impacted by an aircraft. The design materials selected should preclude any tendency for the components, including the electrical conductors, etc., to 'wrap around' the colliding aircraft or any part of it.

(b) Frangible structures should be designed to withstand the static and operational wind or jet blast loads with a suitable factor of safety, but should break, distort or yield readily when subjected to the sudden collision forces of a 3 000 kg aircraft airborne and travelling at 140 km/h (75 kt) or moving on the ground at 50 km/h (27 kt).

## CS-ADR-DSN.T.915 — Siting of equipment and installations on operational areas ADD TXT

(a) Equipment and installations should be sited as far away from the runway and taxiway centre lines as practicable.

(b) Unless its function requires it to be there for air navigation or for aircraft safety purposes, no equipment or installation endangering an aircraft should be located:

(1) on a runway strip, a runway end safety area, a taxiway, strip or within the following distances:

| Code Letter | Distance to — Taxiway, other than aircraft stand taxilane centre line to object (metres) |
|---|---|
| A | 16.25 |

| | |
|---|---|
| B | 21.5 |
| C | 26 |
| D | 40.5 |
| E | 47.5 |
| F | 55 |

(2) on a clearway if it would endanger an aircraft in the air.

(c) Any equipment or installation required for air navigation or for aircraft safety purposes should be frangible and mounted as low as possible, if located:

(1) on a runway strip;

(2) within 240 m from the end of the strip and:

(i) within 60 m of the extended runway centre line where the code number is 3 or 4;

(ii) within 45 m of the extended runway centre line where the code number is 1 or 2.

(3) on a runway end safety area;

(4) on a taxiway strip;

(5) on a clearway endangering an aircraft in the air;

(6) in a way which penetrates the inner approach surface, the inner transitional surface or the balked landing surface;

(7) within the following distances:

| Code Letter | Distance to Taxiway, other than aircraft stand taxilane centre line to object (metres) |
|---|---|
| A | 16.25 |
| B | 21.5 |
| C | 26 |
| D | 40.5 |
| E | 47.5 |
| F | 55 |

(d) Any equipment or installation required for air navigation or for aircraft safety purposes that is an obstacle of operational significance in accordance with CS-ADR-DSN.J.470, CS-

ADR-DSN.J.475, CS-ADR-DSN.J.480 or CS-ADR-DSN.J.485 should be frangible and mounted as low as possible.

**CS-ADR-DSN.T.920 — Fencing** *ADD TXT MOVE to GM*

(a) Fencing should be sited as far away from the runway and taxiway centre lines as practicable.

(b) A fence or other suitable barrier should be provided on an aerodrome to prevent the entrance to the aerodrome:

(1) by animals large enough to be a hazard to aircraft;

(2) by an unauthorised person onto a non-public area.

This includes the barring of sewers, ducts, tunnels, etc., where necessary to prevent access.

(c) Suitable means of protection should be provided to deter the inadvertent or premeditated access of unauthorised persons into ground installations and facilities essential for the safety of civil aviation located off the aerodrome.

# CHAPTER U — COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS

## CS-ADR-DSN.U.925 — General ICAO

(a) The following specifications define the chromaticity limits of colours to be used for aeronautical ground lights, markings, signs and panels. The specifications are in accord with the specifications of the International Commission on Illumination (CIE).

(b) It is not possible to establish specifications for colours such that there is no possibility of confusion. For reasonably certain recognition, it is important that the eye illumination be well above the threshold of perception, that the colour not be greatly modified by selective atmospheric attenuations and that the observer's colour vision be adequate. There is also a risk of confusion of colour at an extremely high level of eye illumination such as may be obtained from a high-intensity source at very close range. Experience indicates that satisfactory recognition can be achieved if due attention is given to these factors.

(c) The chromaticities are expressed in terms of the standard observer and coordinate system adopted by the International Commission on Illumination (CIE).

## CS-ADR-DSN.U.930 Colours for aeronautical ground lights ICAO DEL

(a) The chromaticities of aeronautical ground lights should be within the following boundaries:

(1) CIE Equations (see Figure U-1):

(2) Red

Purple boundary $y = 0.980 - x$

Yellow boundary $y = 0.335$

(3) Yellow

Red boundary $y = 0.382$

White boundary $y = 0.790 - 0.667x$

Green boundary $y = x - 0.120$

(4) Green

Yellow boundary $x = 0.360 - 0.080y$

White boundary $x = 0.650y$

Blue boundary $y = 0.390 - 0.171x$

(5) Blue

Green boundary $y = 0.805x + 0.065$

White boundary $y = 0.400 - x$

Purple boundary $x = 0.600y + 0.133$

(6) White

| | |
|---|---|
| Yellow boundary | $x = 0.500$ |
| Blue boundary | $x = 0.285$ |
| Green boundary | $y = 0.440$ |
| and | $y = 0.150 + 0.640x$ |
| Purple boundary | $y = 0.050 + 0.750x$ |
| and | $y = 0.382$ |

(7) Variable white

| | |
|---|---|
| Yellow boundary | $x = 0.255 + 0.750y$ |
| and | $x = 1.185 – 1.500 y$ |
| Blue boundary | $x = 0.285$ |
| Green boundary | $y = 0.440$ |
| and | $y = 0.150 + 0.640x$ |
| Purple boundary | $y = 0.050 + 0.750x$ |
| and | $y = 0.382$ |

(b) Where dimming is not required, or where observers with defective colour vision must be able to determine the colour of the light, green signals should be within the following boundaries:

(1) Yellow boundary $y = 0.726 – 0.726x$

(2) White boundary $x = 0.650y$

(3) Blue boundary $y = 0.390 – 0.171x$

(c) Where increased certainty of recognition is more important than maximum visual range, green signals should be within the following boundaries:

(1) Yellow boundary $y = 0.726 – 0.726x$

(2) White boundary $x = 0.625y – 0.041$

(3) Blue boundary $y = 0.390 – 0.171x$

(d) Discrimination between lights

(1) If there is a requirement to discriminate yellow and white from each other, they should be displayed in close proximity of time or space as, for example, by being flashed successively from the same beacon.

(2) If there is a requirement to discriminate yellow from green and/or white, as for example on exit taxiway centre line lights, the y coordinates of the yellow light should not exceed a value of 0.40. The limits of white have been based on the assumption that they will be used in situations in which the characteristics (colour temperature) of the light source will be substantially constant.

(3) The colour variable white is intended to be used only for lights that are to be varied in intensity, e.g. to avoid dazzling. If this colour is to be discriminated from yellow, the lights should be so designed and operated that:

(i) the x coordinate of the yellow is at least 0.050 greater than the x coordinate of the white; and

(ii) the disposition of the lights will be such that the yellow lights are displayed simultaneously and in close proximity to the white lights.

(4) The colour of aeronautical ground lights should be verified as being within the boundaries specified in Figure U-1 by measurement at five points within the area limited by the innermost isocandela curve in the isocandela diagrams in CS-ADR-DSN.U.940, with operation at rated current or voltage. In the case of elliptical or circular isocandela curves, the colour measurements should be taken at the centre and at the horizontal and vertical limits. In the case of rectangular isocandela curves, the colour measurements should be taken at the centre and the limits of the diagonals (corners). In addition, the colour of the light should be checked at the outermost isocandela curve to ensure that there is no colour shift that might cause signal confusion to the pilot.

(5) For the outermost isocandela curve, a measurement of colour coordinates should be made and recorded for review and judgement of acceptability.

(6) If certain light units have application so that they may be viewed and used by pilots from directions beyond that of the outermost isocandela curve (e.g. stop bar lights at significantly wide runway-holding positions), then an assessment of the actual application should be conducted, and, if necessary, a check of colour shift at angular ranges beyond the outermost curve carried out.

(7) In the case of visual approach slope indicators and other light units having a colour transition sector, the colour should be measured at points in accordance with paragraph (4) above, except that the colour areas should be treated separately and no point should be within 0.5 degrees of the transition sector.

## CS-ADR-DSN.U.935 — Colours for markings, signs and panels ICAO

(a) The specifications of surface colours given below apply only to freshly coloured surfaces. Colours used for markings, signs and panels usually change with time and therefore require renewal.

(b) The specifications in paragraph (f) below for internally illuminated panels are interim in nature and are based on the CIE specifications for internally illuminated signs. It is intended that these specifications will be reviewed and updated as and when CIE develops specifications for internally illuminated panels.

(c) The chromaticities and luminance factors of ordinary colours, colours of retroreflective materials and colours of internally illuminated (internally illuminated) signs and panels should be determined under the following standard conditions:

(1) angle of illumination: 45°;

(2) direction of view: perpendicular to surface; and

(3) illuminant: CIE standard illuminant D65.

(d) The chromaticity and luminance factors of ordinary colours for markings and externally illuminated signs and panels should be within the following boundaries when determined under standard conditions.

(1) CIE Equations (see Figure U-2):

(2) Red

| | |
|---|---|
| Purple boundary | y = 0.345 – 0.051x |
| White boundary | y = 0.910 – x |
| Orange boundary | y = 0.314 + 0.047x |
| Luminance factor | ß = 0.07 (minimum) |

(3) Orange

| | |
|---|---|
| Red boundary | y = 0.285 + 0.100x |
| White boundary | y = 0.940 – x |
| Yellow boundary | y = 0.250 + 0.220x |
| Luminance factor | ß = 0.20 (minimum) |

(4) Yellow

| | |
|---|---|
| Orange boundary | y = 0.108 + 0.707x |
| White boundary | y = 0.910 – x |
| Green boundary | y = 1.35x – 0.093 |
| Luminance factor | ß = 0.45 (minimum) |

(5) White

| | |
|---|---|
| Purple boundary | y = 0.010 + x |
| Blue boundary | y = 0.610 – x |
| Green boundary | y = 0.030 + x |
| Yellow boundary | y = 0.710 – x |
| Luminance factor | ß = 0.75 (minimum) |

(6) Black

| | |
|---|---|
| Purple boundary | y = x – 0.030 |
| Blue boundary | y = 0.570 – x |
| Green boundary | y = 0.050 + x |
| Yellow boundary | y = 0.740 – x |
| Luminance factor | ß = 0.03 (maximum) |

(7) Yellowish green

| | |
|---|---|
| Green boundary | y = 1.317x + 0.4 |
| White boundary | y = 0.910 – x |
| Yellow boundary | y = 0.867x + 0.4 |

(8) Green

| | |
|---|---|
| Yellow boundary | x = 0.313 |

| | |
|---|---|
| White boundary | y = 0.243 + 0.670x |
| Blue boundary | y = 0.493 – 0.524x |
| Luminance factor | β = 0.10 (minimum) |

The small separation between surface red and surface orange is not sufficient to ensure the distinction of these colours when seen separately.

(e) The chromaticity and luminance factors of colours of retroreflective materials for markings, signs and panels should be within the following boundaries when determined under standard conditions.

(1) CIE Equations (see Figure U-3):

(2) Red

| | |
|---|---|
| Purple boundary | y = 0.345 – 0.051x |
| White boundary | y = 0.910 – x |
| Orange boundary | y = 0.314 + 0.047x |
| Luminance factor | ß = 0.03 (minimum) |

(3) Orange

| | |
|---|---|
| Red boundary | y = 0.265 + 0.205x |
| White boundary | y = 0.910 – x |
| Yellow boundary | y = 0.207 + 0.390x |
| Luminance factor | ß = 0.14 (minimum) |

(4) Yellow

| | |
|---|---|
| Orange boundary | y = 0.160 + 0.540x |
| White boundary | y = 0.910 – x |
| Green boundary | y = 1.35x – 0.093 |
| Luminance factor | ß = 0.16 (minimum) |

(5) White

| | |
|---|---|
| Purple boundary | y = x |
| Blue boundary | y = 0.610 – x |
| Green boundary | y = 0.040 + x |
| Yellow boundary | y = 0.710 – x |
| Luminance factor | ß = 0.27 (minimum) |

(6) Blue

| | |
|---|---|
| Green boundary | y = 0.118 + 0.675x |
| White boundary | y = 0.370 – x |
| Purple boundary | y = 1.65x – 0.187 |

| | |
|---|---|
| Luminance factor | ß = 0.01 (minimum) |

(7) Green

| | |
|---|---|
| Yellow boundary | y = 0.711 – 1.22x |
| White boundary | y = 0.243 + 0.670x |
| Blue boundary | y = 0.405 – 0.243x |
| Luminance factor | ß = 0.03 (minimum) |

(f) The chromaticity and luminance factors of colours for luminescent or internally illuminated signs and panels should be within the following boundaries when determined under standard conditions.

(1) CIE Equations (see Figure U-4):

(2) Red

| | |
|---|---|
| Purple boundary | y = 0.345 – 0.051x |
| White boundary | y = 0.910 – x |
| Orange boundary | y = 0.314 + 0.047x |
| Luminance factor | |
| (day condition) | ß = 0.07 (minimum) |
| Relative luminance | 5% (minimum) |
| to white (night | |
| condition) | 20% (max) |

(3) Yellow

| | |
|---|---|
| Orange boundary | y = 0.108 + 0.707x |
| White boundary | y = 0.910 – x |
| Green boundary | y = 1.35x – 0.093 |
| Luminance factor | |
| (day condition) | ß = 0.45 (minimum) |
| Relative luminance | 30% (minimum) |
| to white (night | |
| condition) | 80% (max) |

(4) White

| | |
|---|---|
| Purple boundary | y = 0.010 + x |
| Blue boundary | y = 0.610 – x |
| Green boundary | y = 0.030 + x |
| Yellow boundary | y = 0.710 – x |
| Luminance factor | |

| | | |
|---|---|---|
| | (day condition) | ß = 0.75 (minimum) |
| | Relative luminance to white (night conditions) | 100% |
| (5) | Black | |
| | Purple boundary | y = x – 0.030 |
| | Blue boundary | y = 0.570 – x |
| | Green boundary | y = 0.050 + x |
| | Yellow boundary | y = 0.740 – x |
| | Luminance factor (day condition) | ß = 0.03 (max) |
| | Relative luminance to white (night condition) | 0% (minimum)<br>2% (maximum) |
| (6) | Green | |
| | Yellow boundary | x = 0.313 |
| | White boundary | y = 0.243 + 0.670x |
| | Blue boundary | y = 0.493 – 0.524x |
| | Luminance factor (day conditions) | β = 0.10 minimum |
| | Relative luminance to white (night conditions) | 5% (minimum)<br>30% (maximum) |

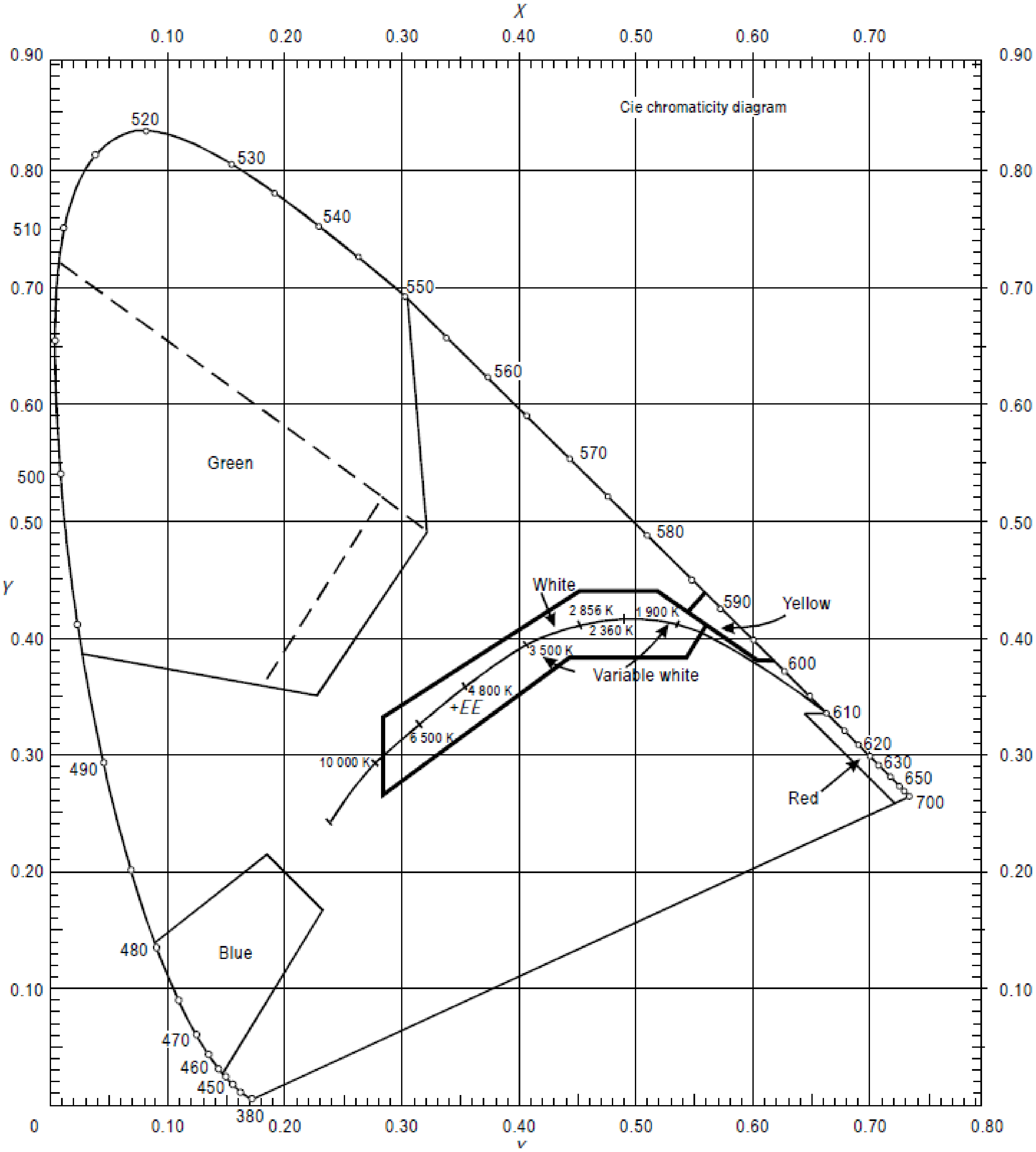



Figure U-1 Colours for aeronautical ground lights

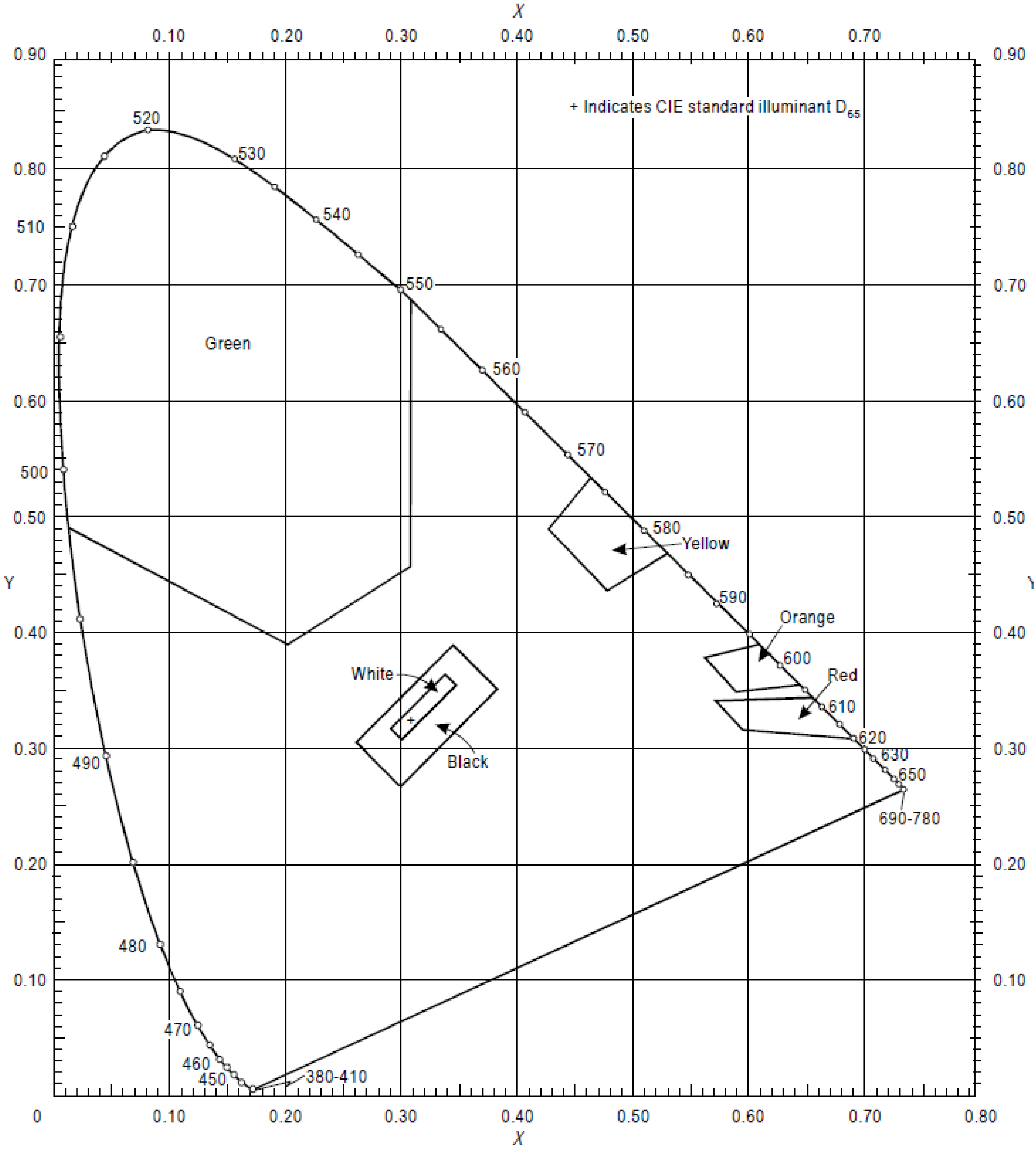



Figure U-2 Ordinary colours for markings and externally illuminated signs and panels

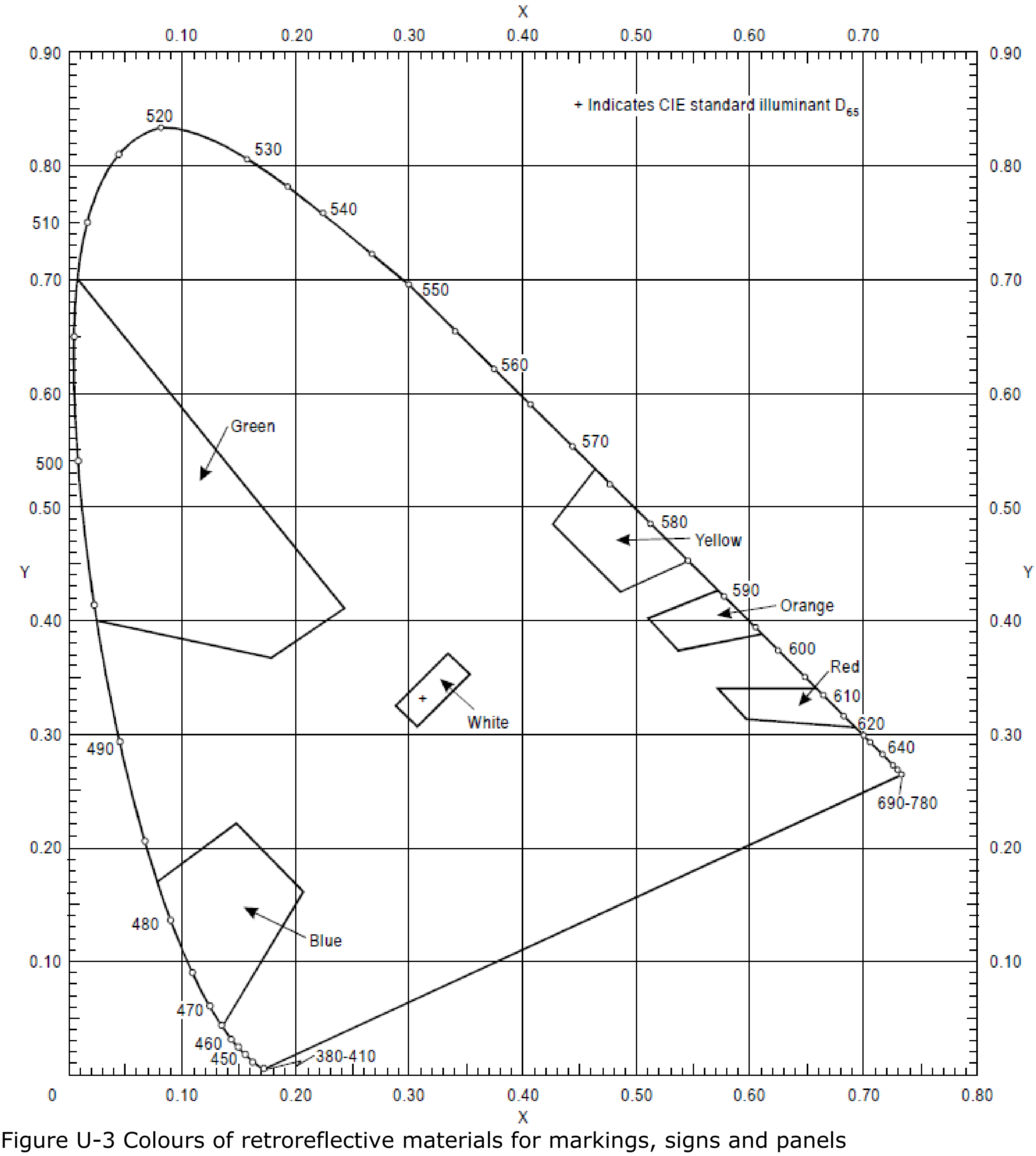



Figure U-3 Colours of retroreflective materials for markings, signs and panels

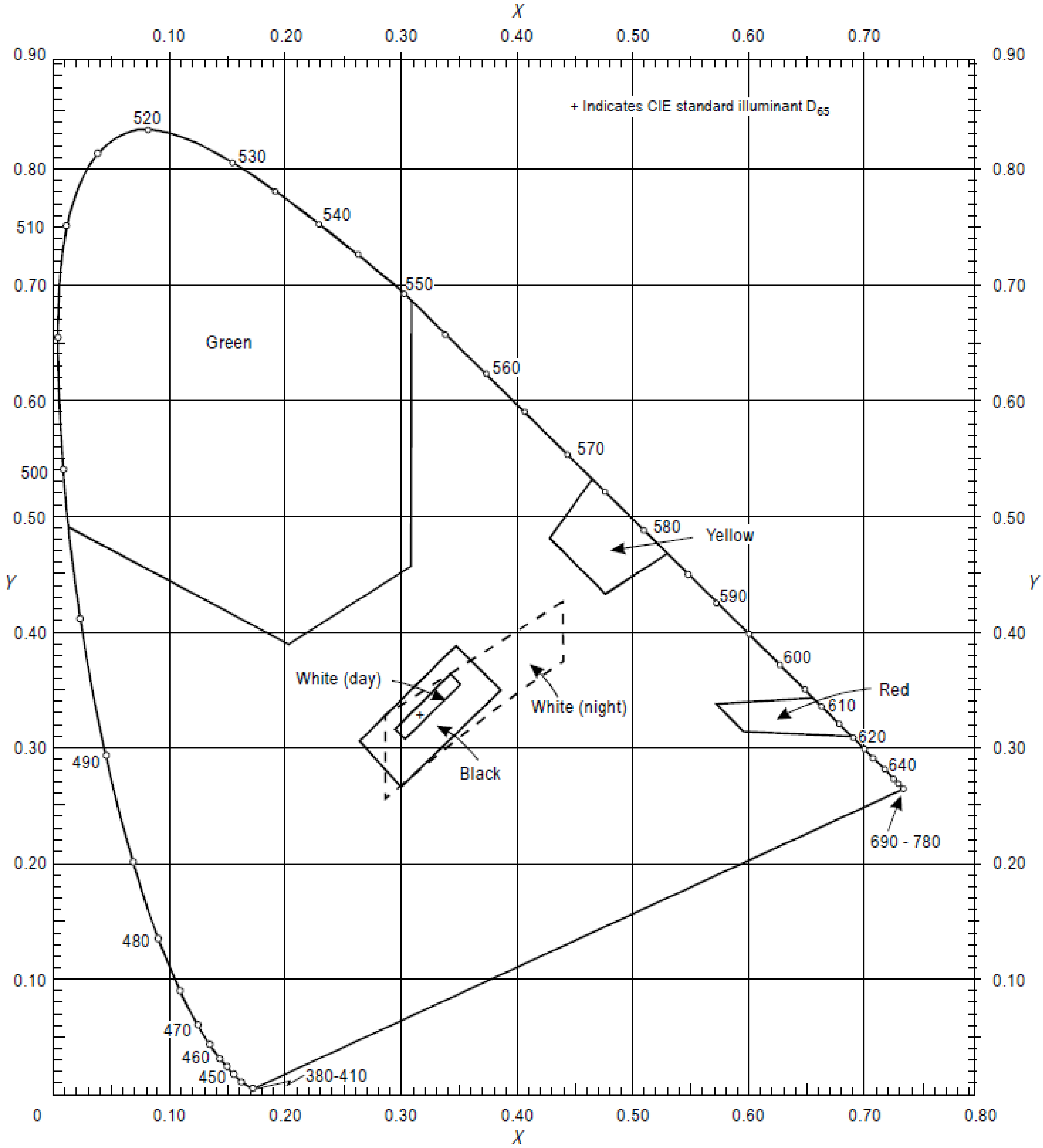



Figure U-4 Colours of luminescent or internally illuminated signs and panels

**CS-ADR-DSN.U.940 — Aeronautical ground light characteristics ICAO**

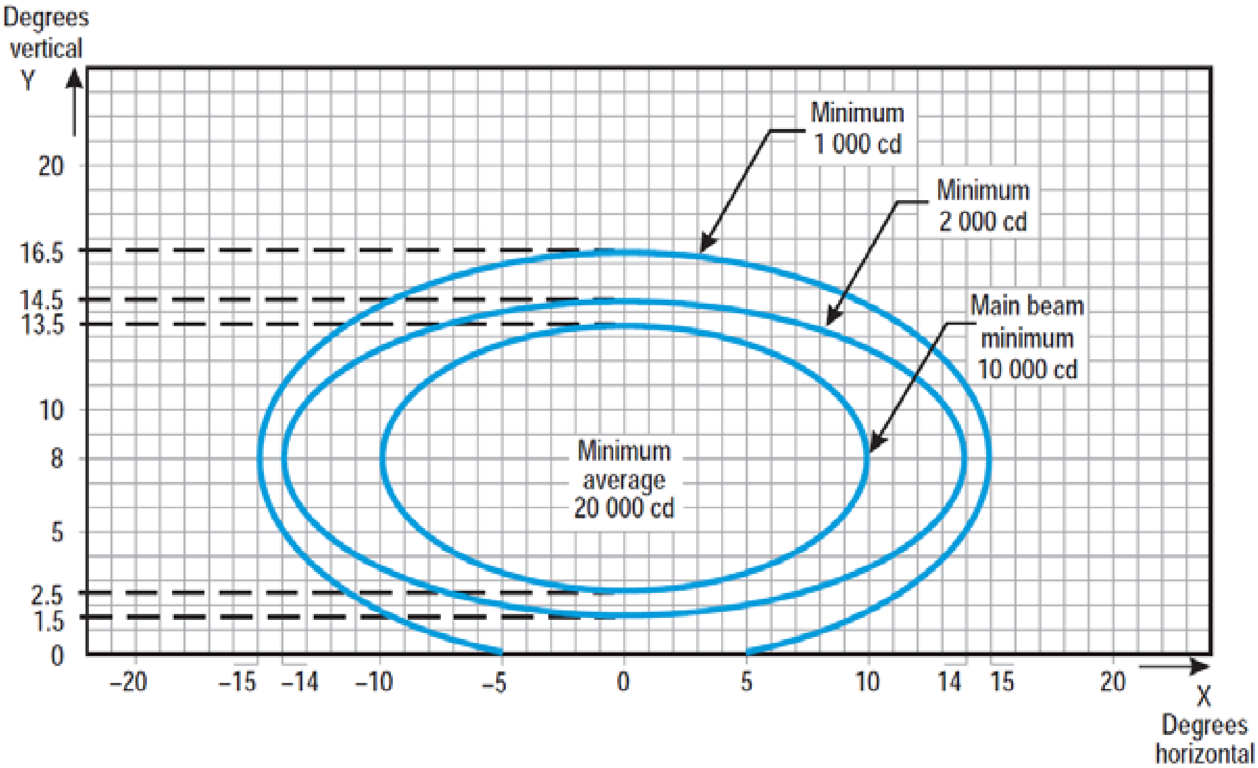



Figure U-5 Isocandela diagram for approach centre line light and crossbars (white light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

| | | | |
|---|---|---|---|
| a | 10 | 14 | 15 |
| b | 5.5 | 6.5 | 8.5 |

(b) vertical setting angles of the lights should be such that the following vertical coverage of the main beam will be met:

| distance from threshold | vertical main beam coverage |
|---|---|
| threshold to 315 m | 0° - 11° |
| 316 m to 475 m | 0.5° - 11.5° |
| 476 m to 640 m | 1.5° - 12.5° |
| 641 m and beyond | 2.5° -13.5° (as illustrated above) |

(c) Lights in crossbars beyond 22.5 m from the centre line should be toed-in 2 degrees. All other lights should be aligned parallel to the centre line of the runway.

(d) See collective notes for Figures U-5 to U-15.

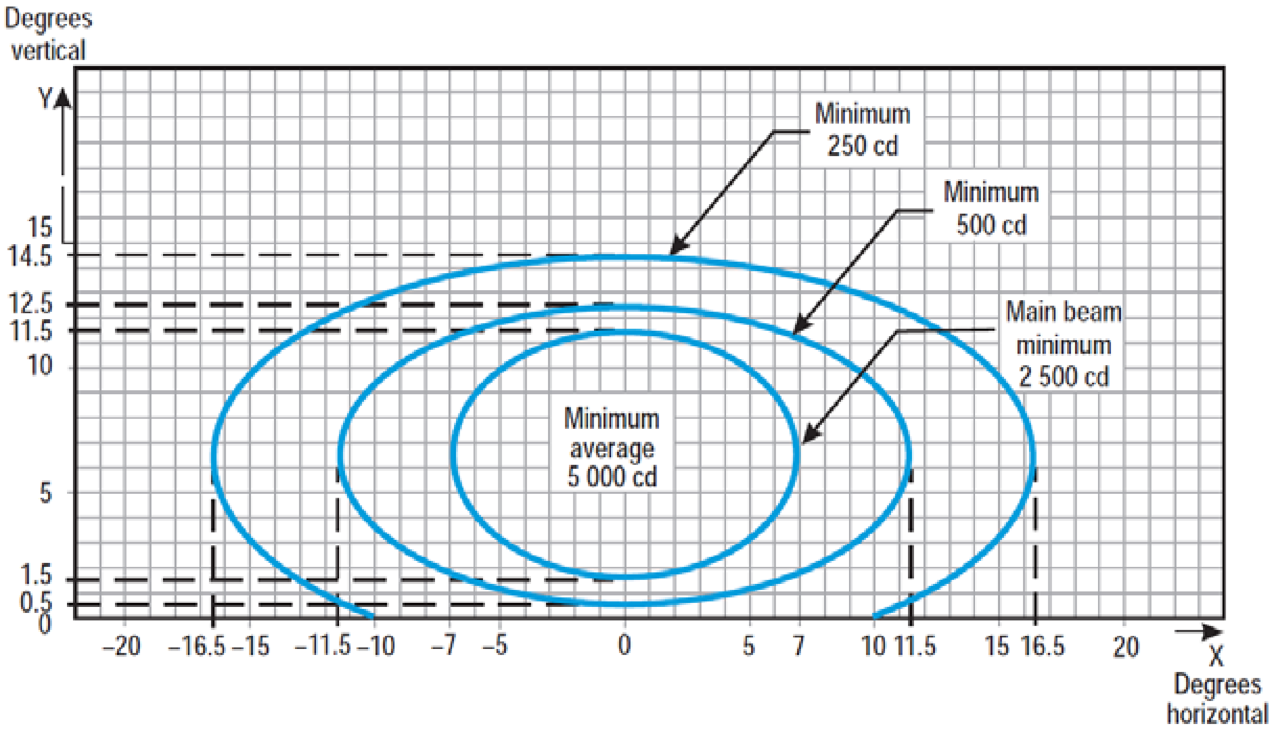



Figure U-6 Isocandela diagram for approach side row light (red light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

| a | 7.0 | 11.5 | 16.5 |
|---|---|---|---|
| b | 5.0 | 6.0 | 8.0 |

(b) Toe-in 2 degrees

(c) Vertical setting angles of the lights should be such that the following vertical coverage of the main beam will be met:

| distance from threshold | vertical main beam coverage |
|---|---|
| threshold to 115 m | 0.5° - 10.5° |
| 116 m to 215 m | 1° - 11° |
| 216 m and beyond | 1.5° - 11.5° (as illustrated above) |

(d) See collective notes for Figures U-5 to U-15.

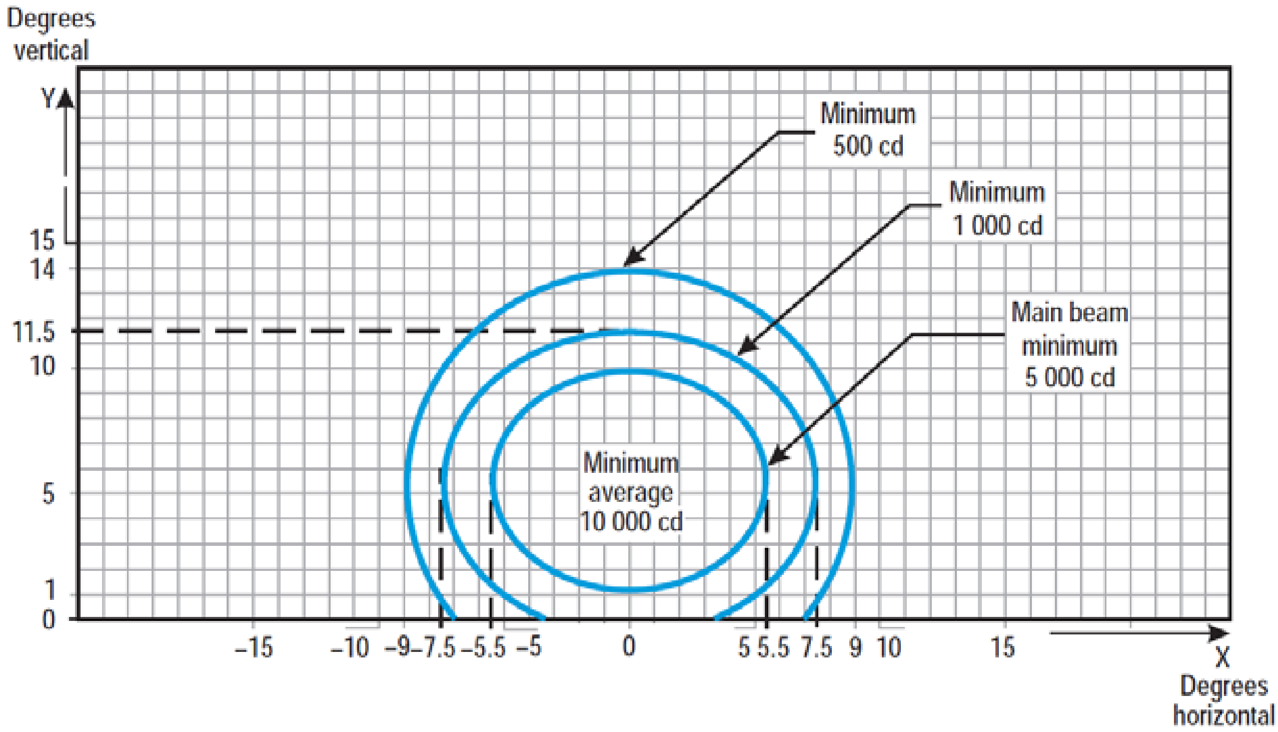



Figure U-7 Isocandela diagram for threshold light (green light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

| | | | |
|---|---|---|---|
| a | 5.5 | 7.5 | 9.0 |
| b | 4.5 | 6.0 | 8.5 |

(b) Toe-in 3.5 degrees

(c) See collective notes for Figures U-5 to U-15.

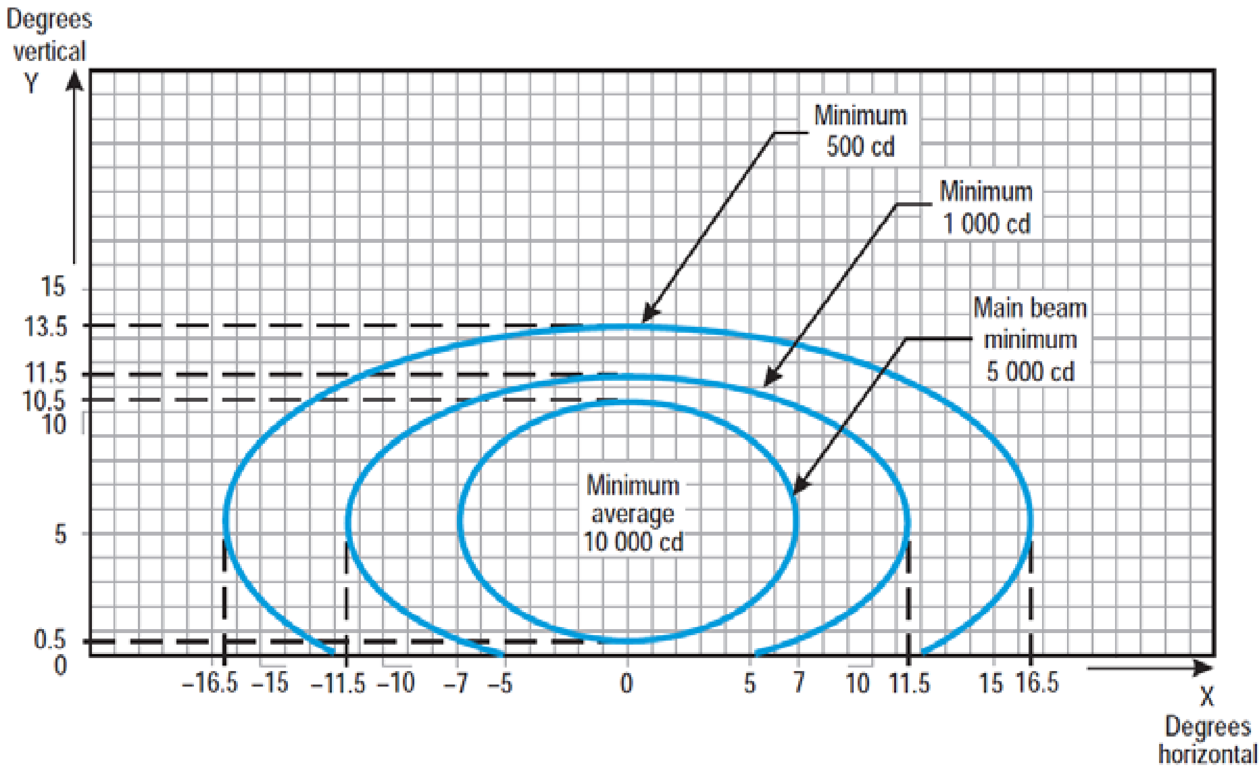



Figure U-8 Isocandela diagram for threshold wing bar light (green light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

| | | | |
|---|---|---|---|
| a | 7.0 | 11.5 | 16.5 |
| b | 5.0 | 6.0 | 8.0 |

(b) Toe-in 2 degrees

(c) See collective notes for Figures U-5 to U-15.

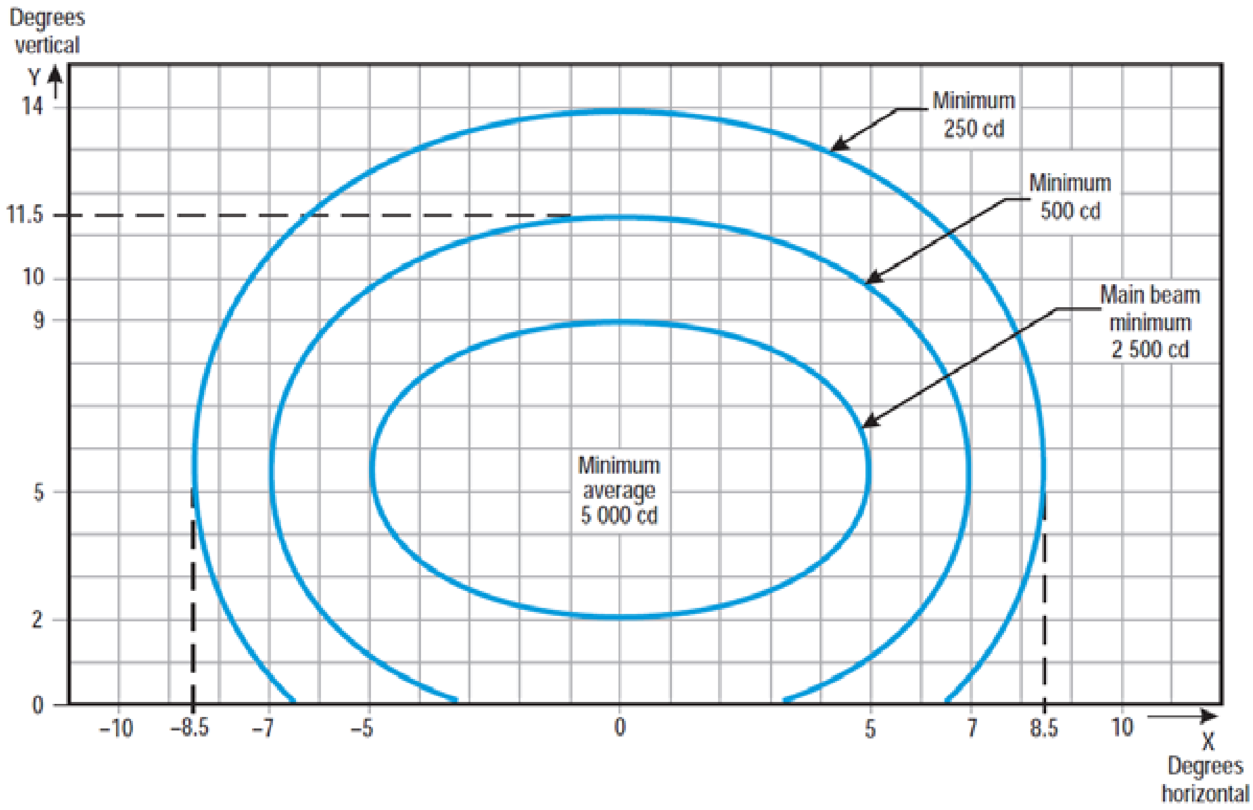



Figure U-9 Isocandela diagram for touchdown zone light (white light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

| | | | |
|---|---|---|---|
| a | 5.0 | 7.0 | 8.5 |
| b | 3.5 | 6.0 | 8.5 |

(b) Toe-in 4 degrees

(c) See collective notes for Figures U-5 to U-15.

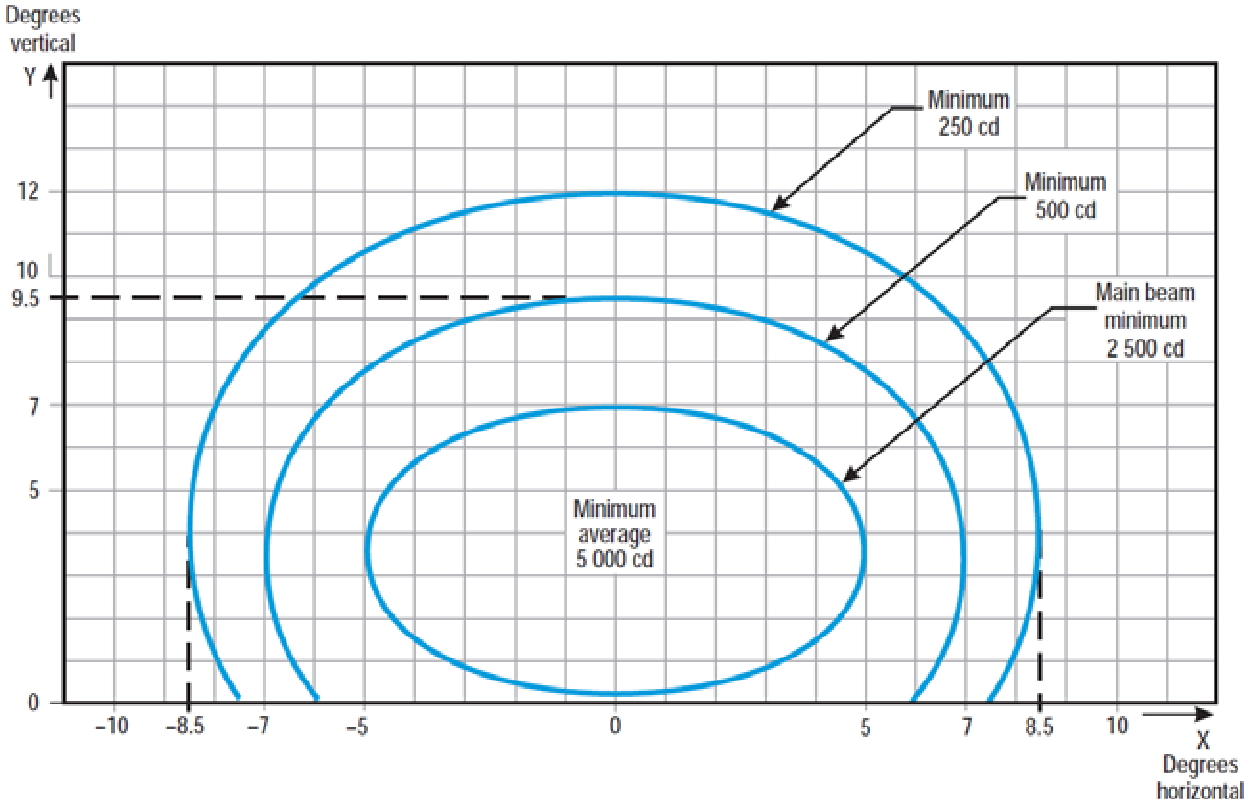



Figure U-10 Isocandela diagram for runway centre line light with 30 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

| | | | |
|---|---|---|---|
| a | 5.0 | 7.0 | 8.5 |
| b | 3.5 | 6.0 | 8.5 |

(b) For red light, multiply values by 0.15.

(c) For yellow light, multiply values by 0.40.

(d) See collective notes for Figures U-5 to U-15.

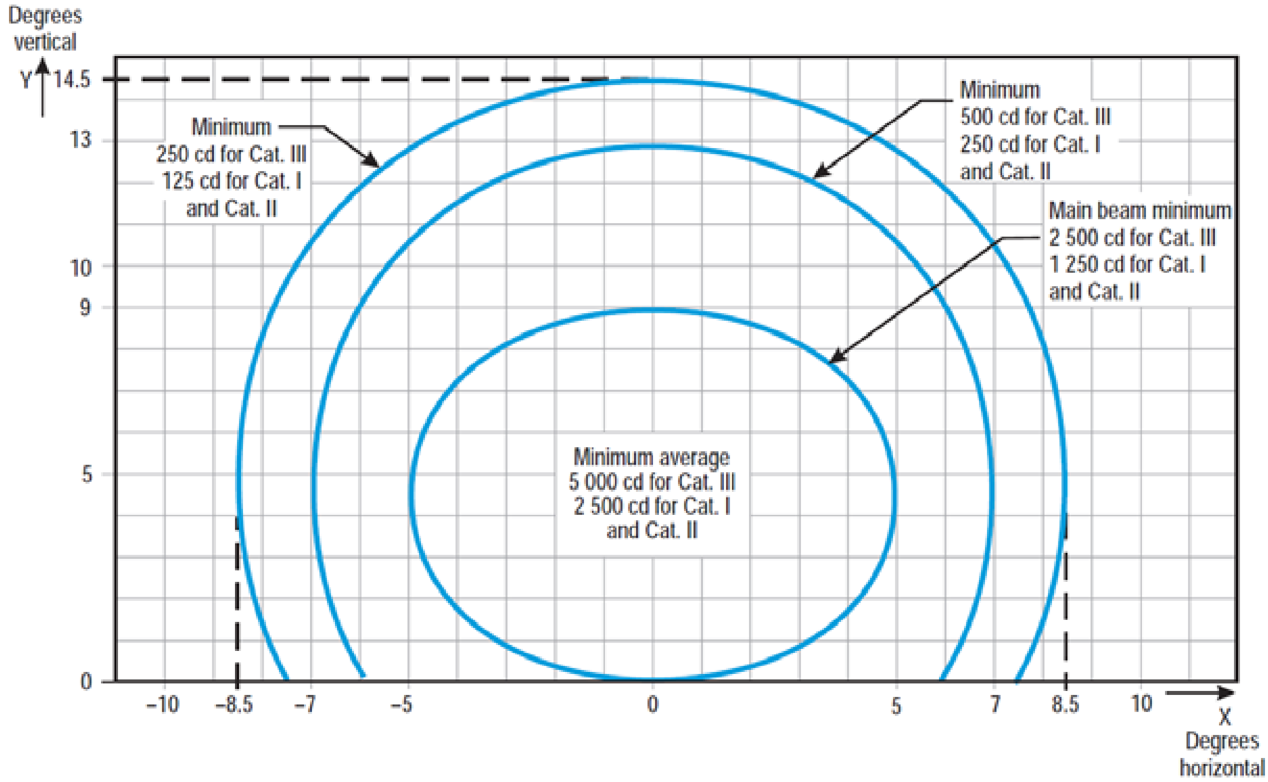



Figure U-11 Isocandela diagram for runway centre line light with 15 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

| | | | |
|---|---|---|---|
| a | 5.0 | 7.0 | 8.5 |
| b | 4.5 | 8.5 | 10 |

(b) For red light, multiply values by 0.15.

(c) For yellow light, multiply values by 0.40.

(d) See collective notes for Figures U-5 to U-15.

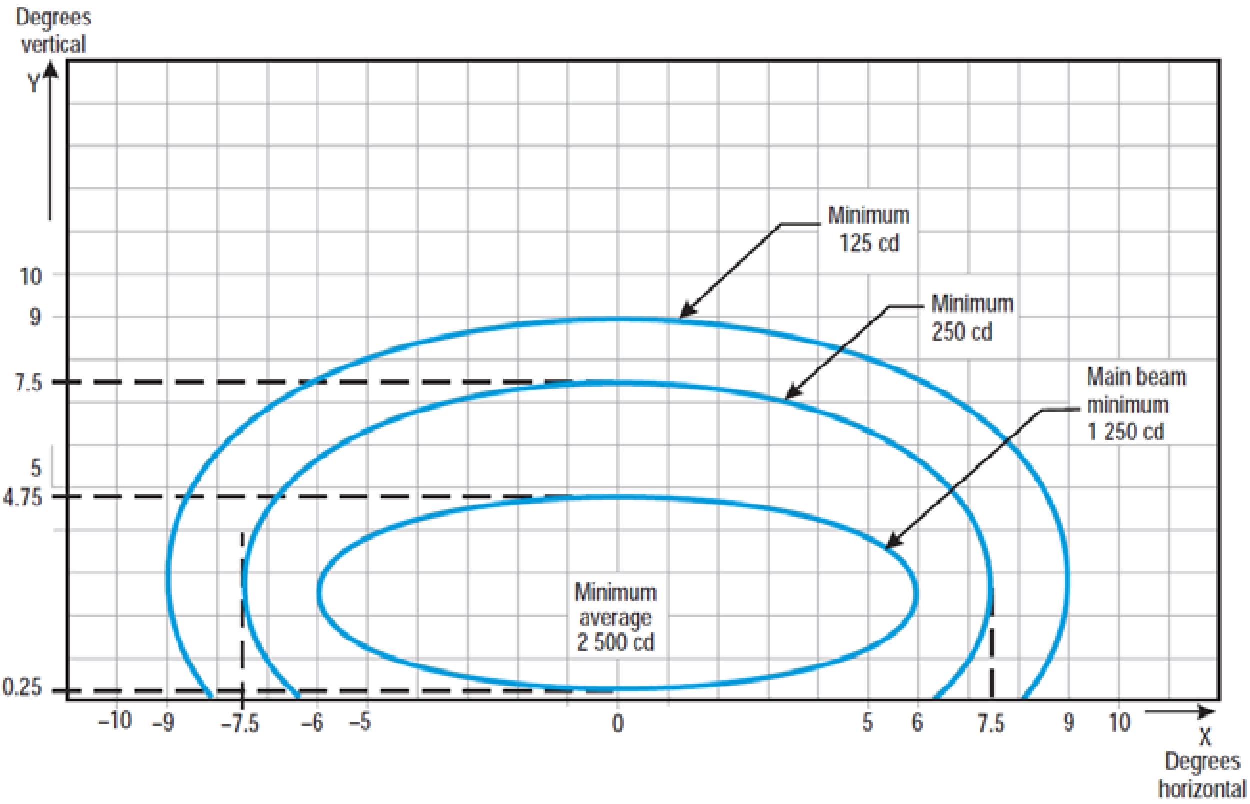



Figure U-12 Isocandela diagram for runway end light (red light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

| | | | |
|---|---|---|---|
| a | 6.0 | 7.5 | 9.0 |
| b | 2.25 | 5.0 | 6.5 |

(b) See collective notes for Figures U-5 to U-15.

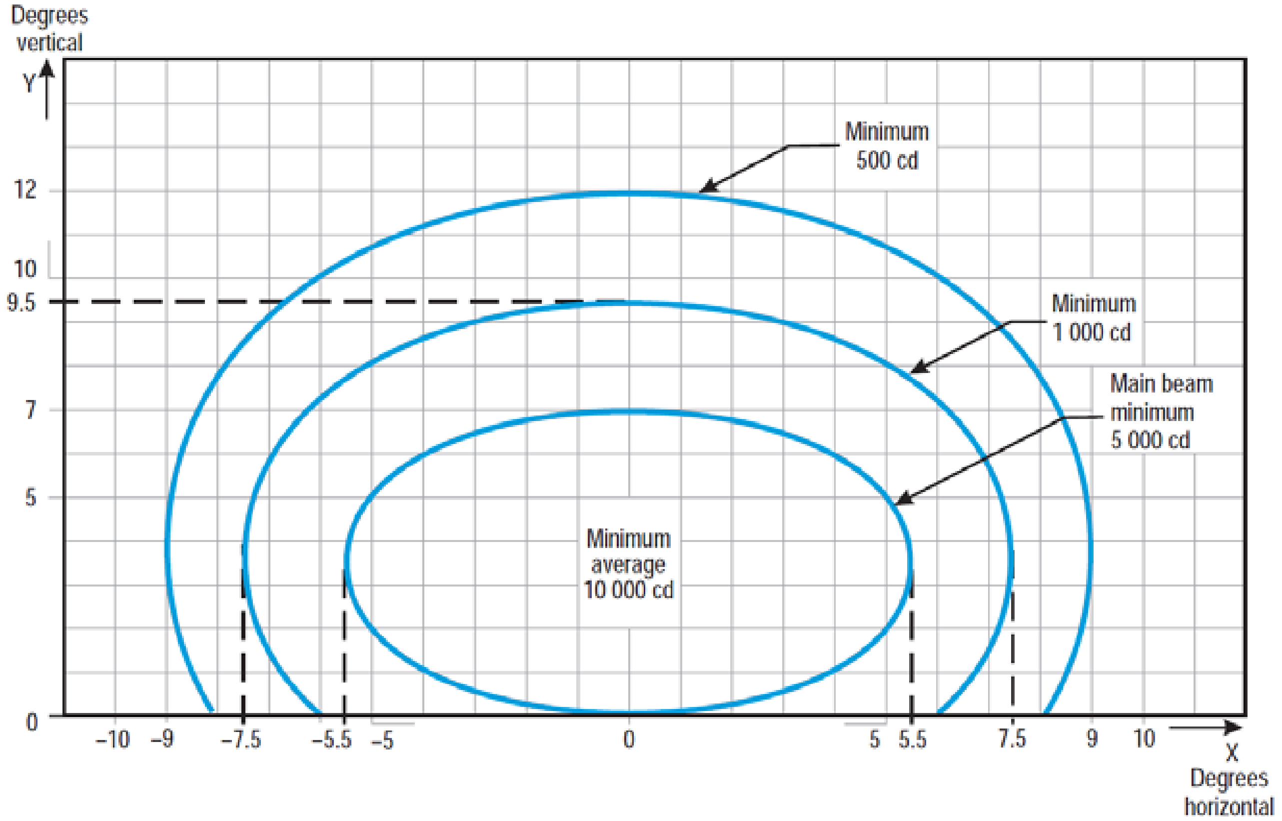



Figure U-13 Isocandela diagram for runway edge light where width of runway is 45 m (white light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

| | | | |
|---|---|---|---|
| a | 5.5 | 7.5 | 9.0 |
| b | 3.5 | 6.0 | 8.5 |

(b) Toe-in 3.5 degrees

(c) For red light, multiply values by 0.15.

(d) For yellow light, multiply values by 0.40.

(e) See collective notes for Figures U-5 to U-15.

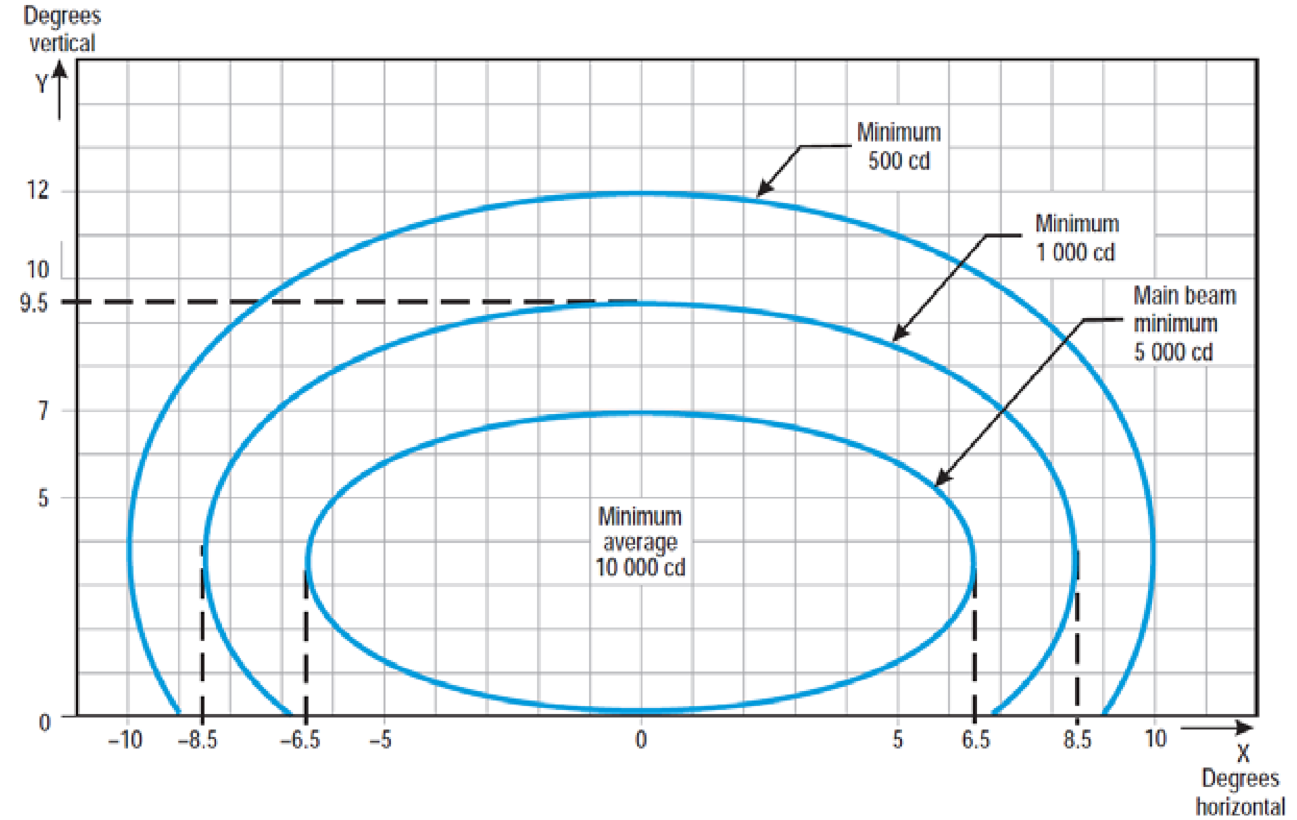



Figure U-14 Isocandela diagram for runway edge light where width of runway is 60 m (white light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

| | | | |
|---|---|---|---|
| a | 6.5 | 8.5 | 10.0 |
| b | 3.5 | 6.0 | 8.5 |

(b) Toe-in 4.5 degrees

(c) For red light, multiply values by 0.15.

(d) For yellow light, multiply values by 0.40.

(e) See collective notes for Figures U-5 to U-15.

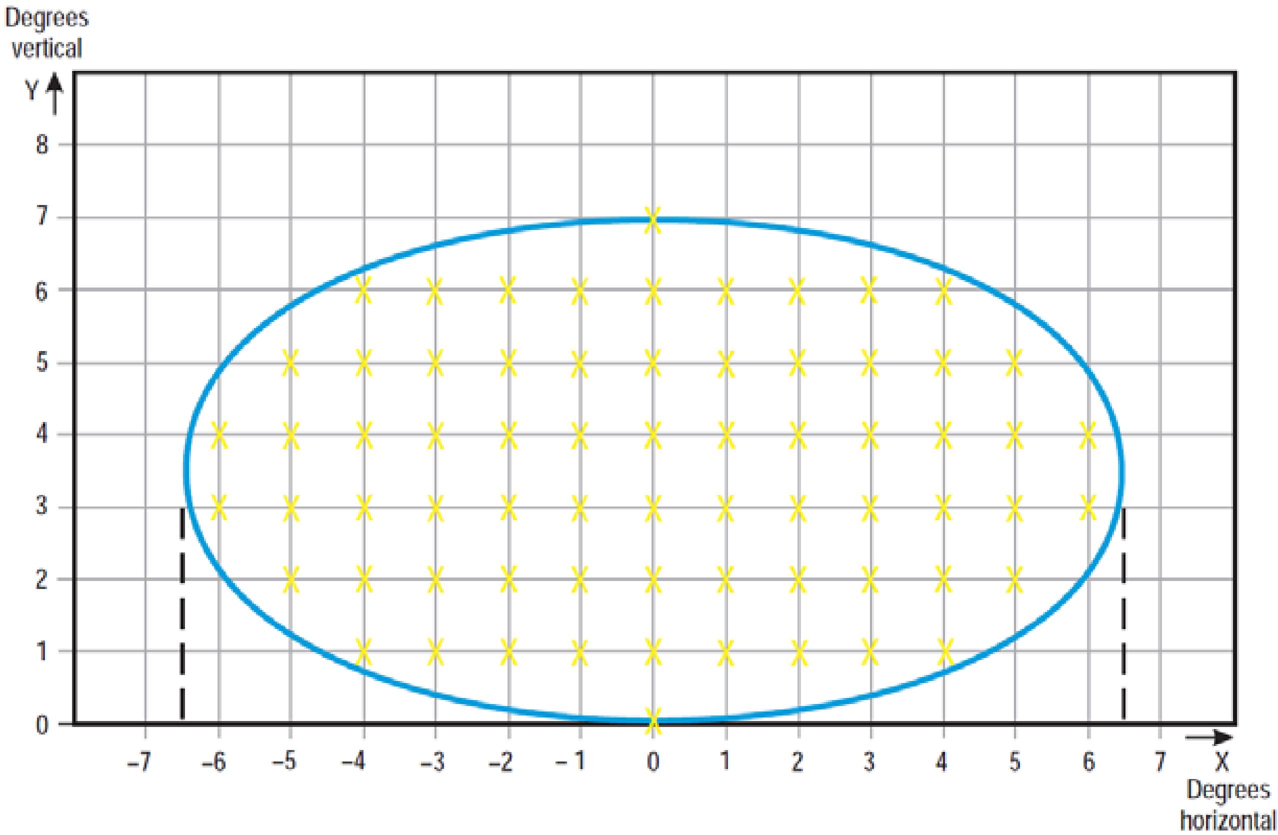



Figure U-15 Grid points to be used for the calculation of average intensity of approach and runway lights

**Collective notes to Figures U-5 to U-15**

(a) The ellipses in each figure are symmetrical about the common vertical and horizontal axes.

(b) Figures U-5 to U-14 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure U-15 and using the intensity value measures at all grid points located within and on the perimeter of the ellipse representing the main beam. The average value is the arithmetic average of light intensities measured at all considered grid points.

(c) No deviations are acceptable in the main beam pattern when the lighting fixture is properly aimed.

(d) Average intensity ratio. The ratio between the average intensity within the ellipse defining the main beam of a typical new light and the average light intensity of the main beam of a new runway edge light should be as follows:

| | | | |
|---|---|---|---|
| Figure U-5 | Approach centre line and crossbars | 1.5 to 2.0 | (white light) |
| Figure U-6 | Approach side row | 0.5 to 1.0 | (red light) |
| Figure U-7 | Threshold | 1.0 to 1.5 | (green light) |
| Figure U-8 | Threshold wing bar | 1.0 to 1.5 | (green light) |
| Figure U-9 | Touchdown zone | 0.5 to 1.0 | (white light) |
| Figure U-10 | Runway centre line (longitudinal spacing 30 m) | 0.5 to 1.0 | (white light) |
| Figure U-11 | Runway centre line (longitudinal spacing 15 m) | 0.5 to 1.0 for CAT III | (white light) |
| | | 0.25 to 0.5 for CAT I, II | (white light) |
| Figure U-12 | Runway end | 0.25 to 0.5 | (red light) |
| Figure U-13 | Runway edge (45 m runway width) | 1.0 | (white light) |
| Figure U-14 | Runway edge (60 m runway width) | 1.0 | (white light) |

(e) The beam coverages in the figures provide the necessary guidance for approaches down to an RVR of the order of 150 m and take-offs down to an RVR of the order of 100 m.

(f) Horizontal angles are measured with respect to the vertical plane through the runway centre line. For lights other than centre line lights, the direction towards the runway centre line is considered positive. Vertical angles are measured with respect to the horizontal plane.

(g) Where, for approach centre line lights and crossbars and for approach side row lights, inset lights are used in lieu of elevated lights, e.g. on a runway with a displaced threshold, the intensity requirements can be met by installing two or three fittings (lower intensity) at each position.

(h) The importance of adequate maintenance cannot be overemphasised. The average intensity should never fall to a value less than 50 % of the value shown in the figures, and it should be the aim of airport authorities to maintain a level of light output close to the specified minimum average intensity.

(i) The light unit should be installed so that the main beam is aligned within one-half degree of the specified.

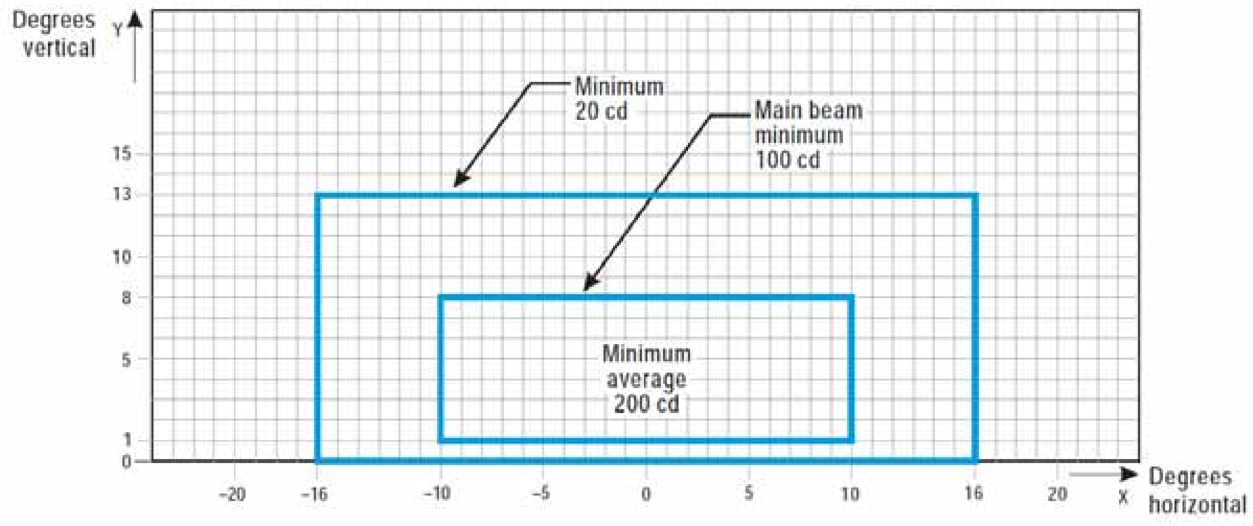



Figure U-16 Isocandela diagram for taxiway centre line (15 m spacing) and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m where large offsets can occur and for low-intensity runway guard lights, Configuration B

Notes:

(a) These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m and are intended for use before and after curves.

(b) See collective notes for Figures U-16 to U-25.

(c) Increased intensities for enhanced rapid exit taxiway centre line lights are four times the respective intensities in the figure (i.e. 800 cd for minimum average main beam).

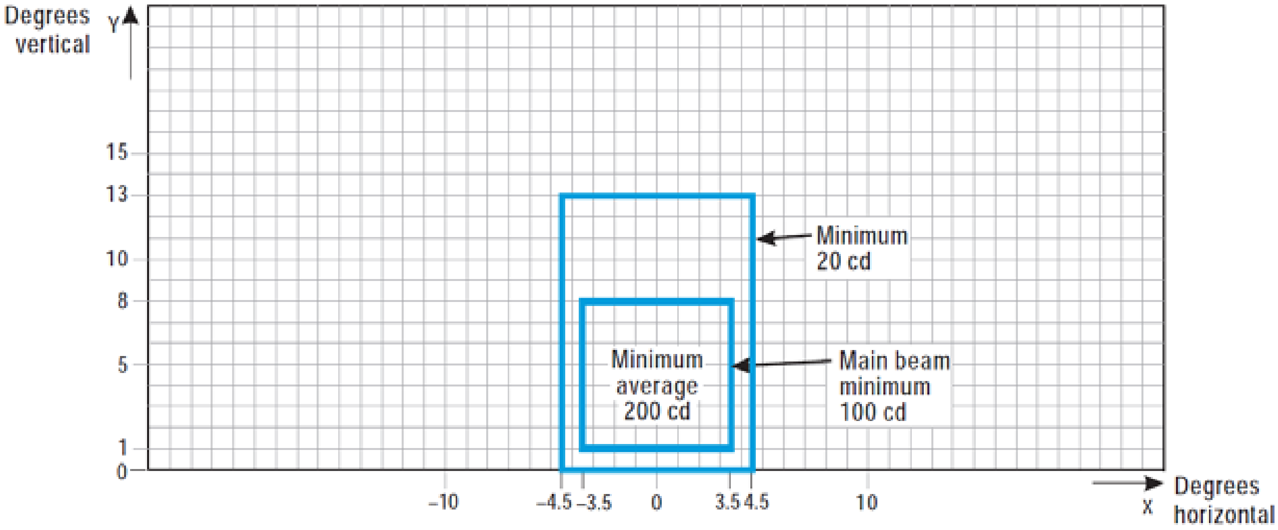



Figure U-17 Isocandela diagram for taxiway centre line (15 m spacing) and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m

Notes:

(a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit from the centre line of approximately 3 m.

(b) See collective notes for Figures U-16 to U-25.

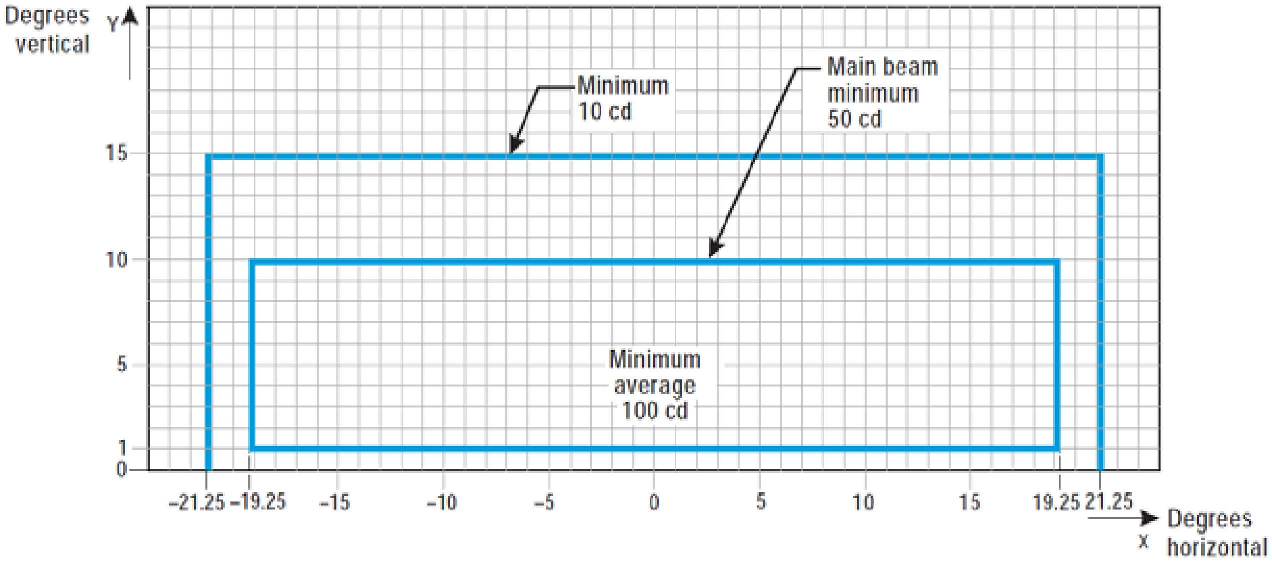



Figure U-18 Isocandela diagram for taxiway centre line (7.5 m spacing) and stop bar lights in curved sections intended for use in runway visual range conditions of less than a value of 350 m

Notes:

(a) Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve.

(b) See collective notes for Figures U-16 to U-25.

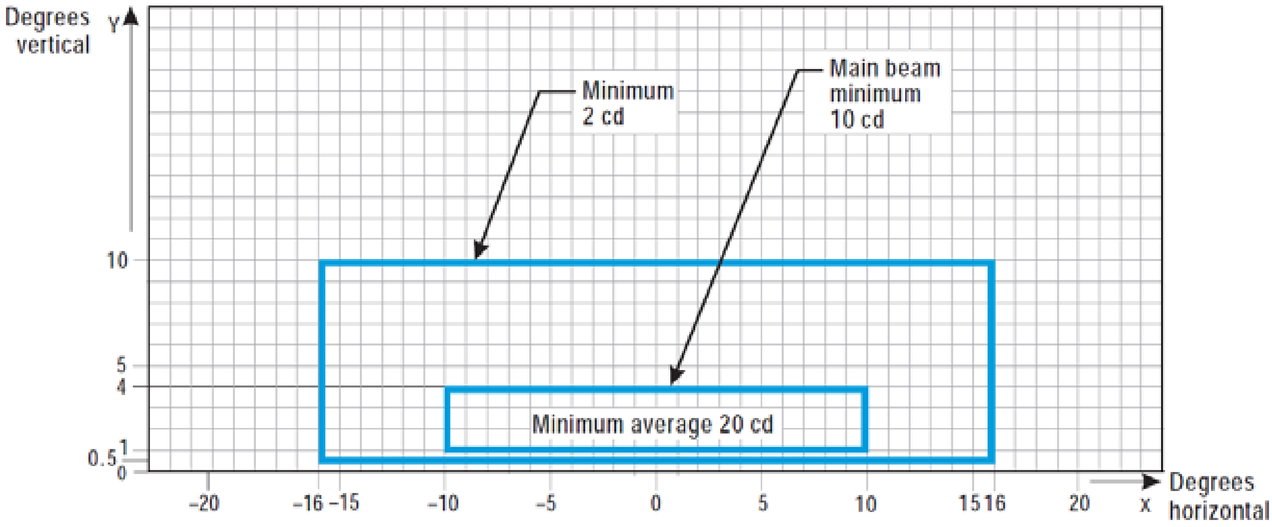



Figure U-19 Isocandela diagram for taxiway centre line (30 m, 60 m spacing) and stop bar lights in straight sections intended for use in runway visual range conditions of 350 m or greater

Notes:

(a) At locations where high background luminance is usual and where deterioration of light output resulting from dust, snow and local contamination is a significant factor, the cd-values should be multiplied by 2.5.

(b) Where omnidirectional lights are used they should comply with the vertical beam requirements in this Figure.

(c) See collective notes for Figures U-16 to U-25.

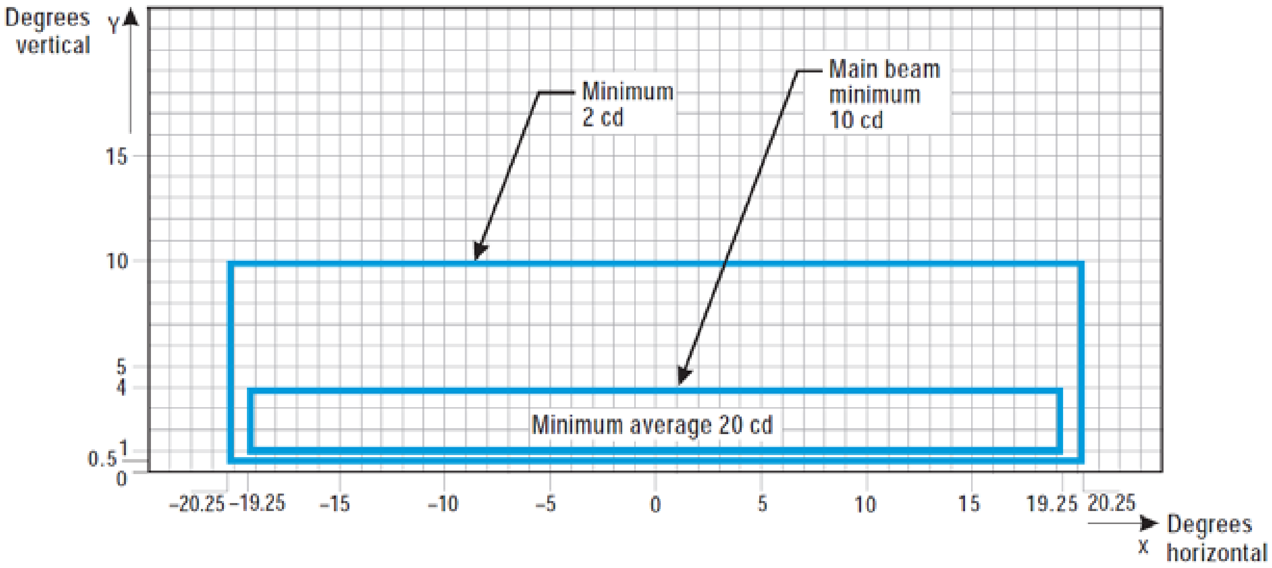



Figure U-20 Isocandela diagram for taxiway centre line (7.5 m, 15 m, 30 m spacing) and stop bar lights in curved sections intended for use in runway visual range conditions of 350 m or greater

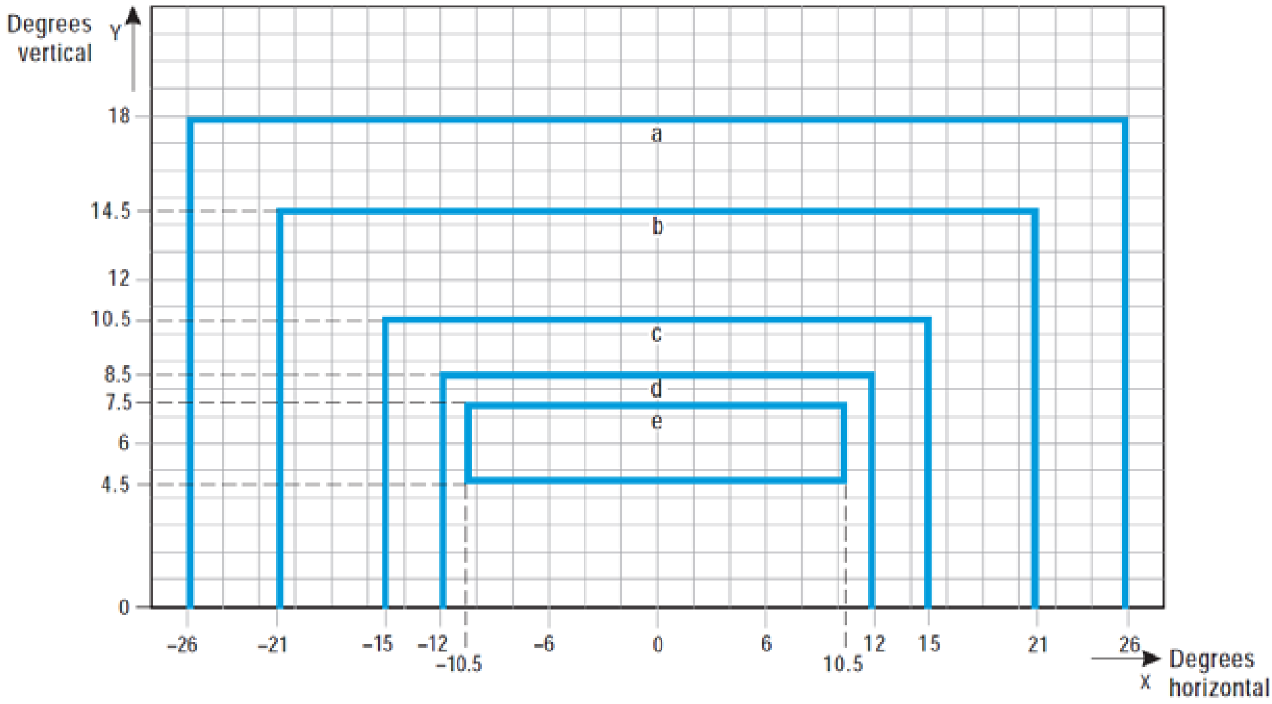
Notes:

(a) Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve.

(b) At locations where high background luminance is usual and where deterioration of light output resulting from dust, snow and local contamination is a significant factor, the cd-values should be multiplied by 2.5.

(c) These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m as could occur at the end of curves.

(d) See collective notes for Figures U-16 to U-25.



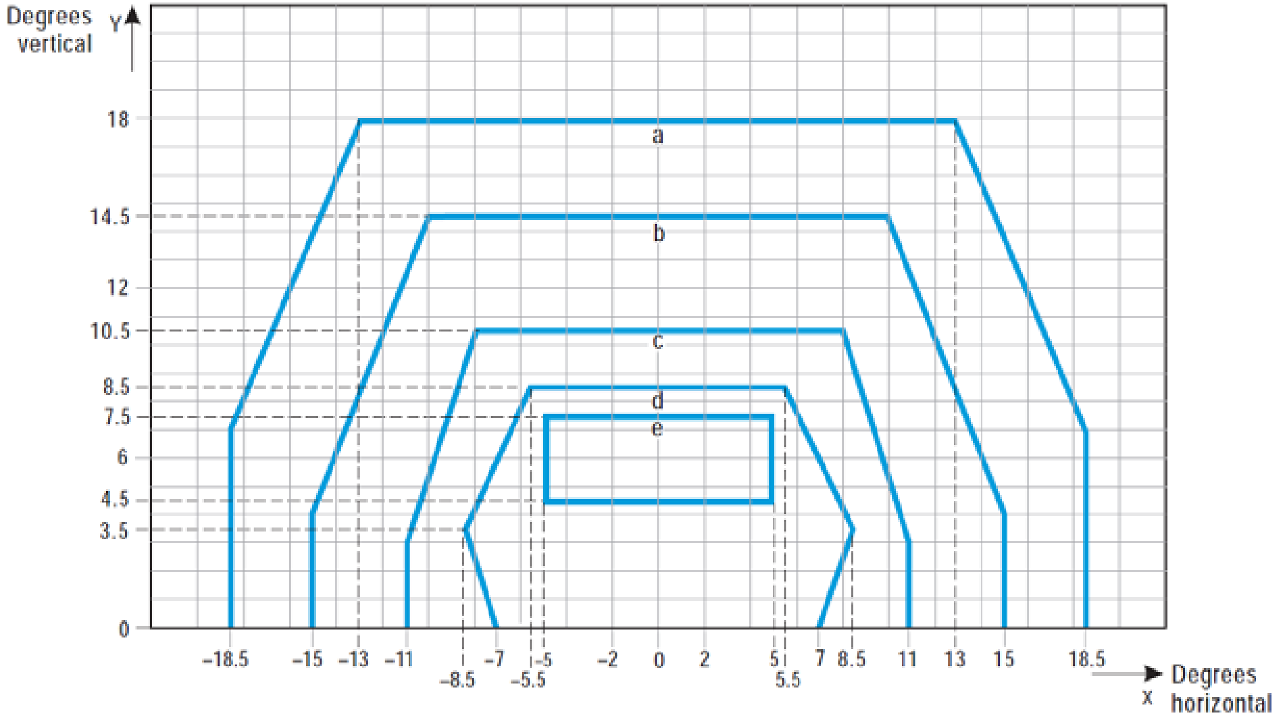

| Curve | a | b | c | d | e |
|---|---|---|---|---|---|
| Intensity (cd) | 8 | 20 | 100 | 450 | 1800 |

Figure U-21 Isocandela diagram for high-intensity taxiway centre line (15 m spacing) and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required and where large offsets can occur.

Notes:

(a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.

(b) See collective notes for Figures U-16 to U-25.



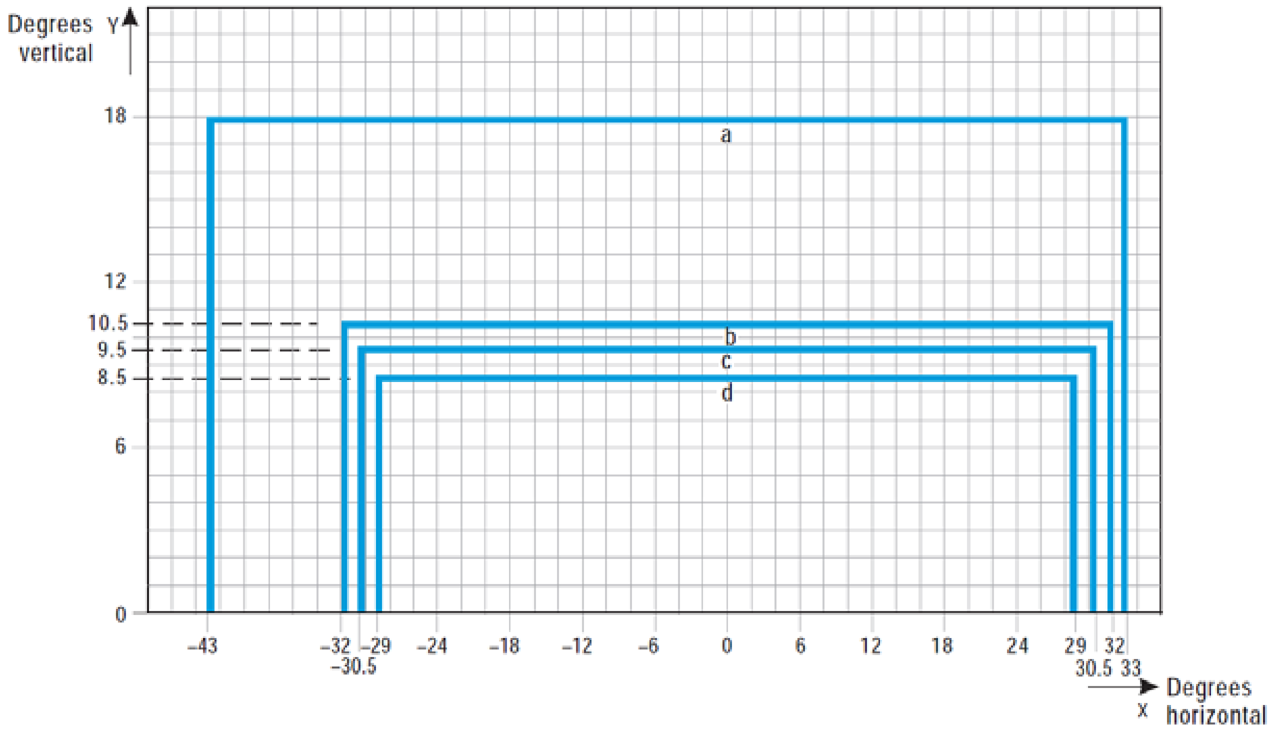

| Curve | a | b | c | d | e |
|---|---|---|---|---|---|
| Intensity (cd) | 8 | 20 | 100 | 450 | 1800 |

Figure U-22 Isocandela diagram for high-intensity taxiway centre line (15 m spacing) and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required

Notes:

(a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.

(b) See collective notes for Figures U-16 to U-25.




| Curve | a | b | c | d |
|---|---|---|---|---|
| Intensity (cd) | 8 | 100 | 200 | 400 |

Figure U-23 Isocandela diagram for high-intensity taxiway centre line (7.5 m spacing) and stop bar lights in curved sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required

Notes:

(a) Lights on curves to be toed-in 17 degrees with respect to the tangent of the curve.

(b) See collective notes for Figures U-16 to U-25.

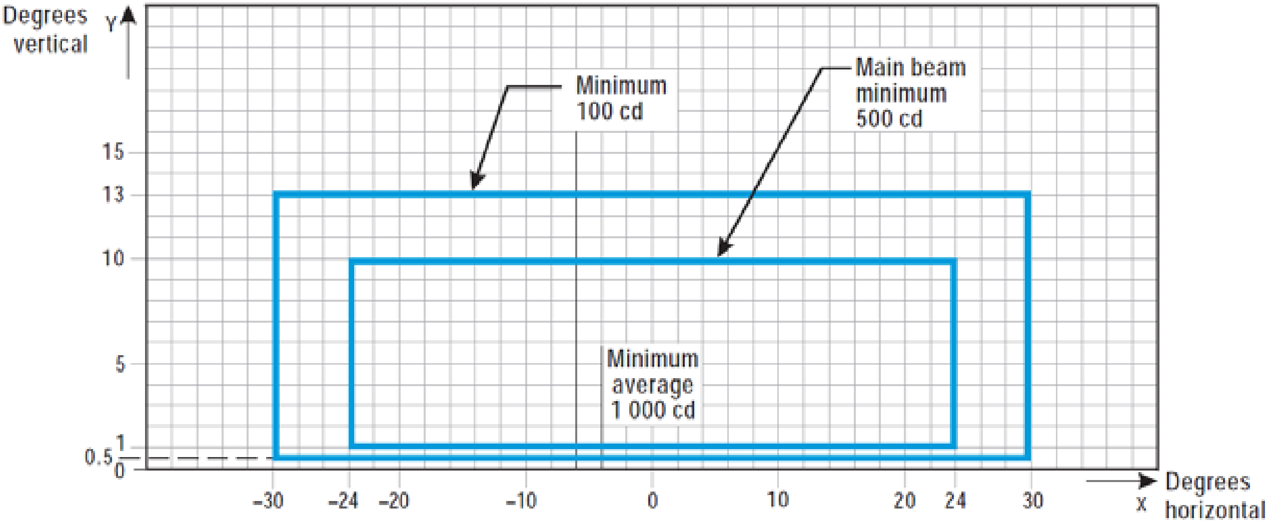



Figure U-24 Isocandela diagram for high-intensity runway guard lights, Configuration B

Notes:

(a) Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

(b) See collective notes for Figures U-16 to U-25.

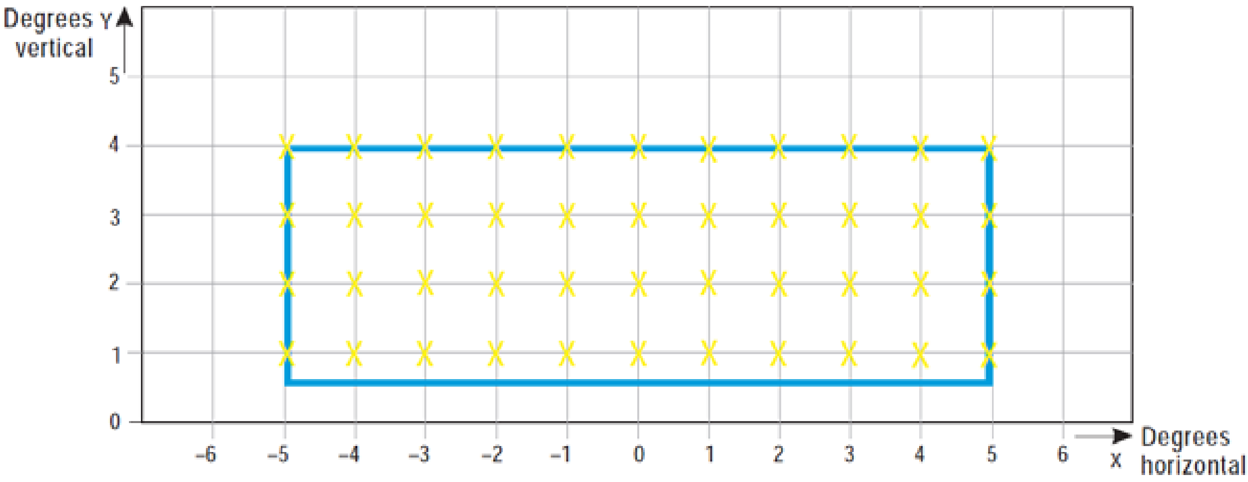



Figure U-25 Grid points to be used for calculation of average intensity of taxiway centre line and stop bar lights

**Collective notes to Figures U-16 to U-25**

(a) The intensities specified in Figures U-16 to U-24 are in green and yellow light for taxiway centre line lights, yellow light for runway guard lights and red light for stop bar lights.

(b) Figures U-16 to U-24 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure U-25 and using the intensity values measured at all grid points located within and on the perimeter of the rectangle representing the main beam. The average value is the arithmetic average of the light intensities measured at all considered grid points.

(c) No deviations are acceptable in the main beam or in the innermost beam, as applicable, when the lighting fixture is properly aimed.

(d) Horizontal angles are measured with respect to the vertical plane through the taxiway centre line except on curves where they are measured with respect to the tangent to the curve.

(e) Vertical angles are measured from the longitudinal slope of the taxiway surface.

(f) The importance of adequate maintenance cannot be overemphasised. The intensity, either average where applicable or as specified on the corresponding isocandela curves, should never fall to a value less than 50 % of the value shown in the figures, and it should be the aim of airport authorities to maintain a level of light output close to the specified minimum average intensity.

(g) The light unit should be installed so that the main beam or the innermost beam, as applicable, is aligned within one-half degree of the specified requirement.

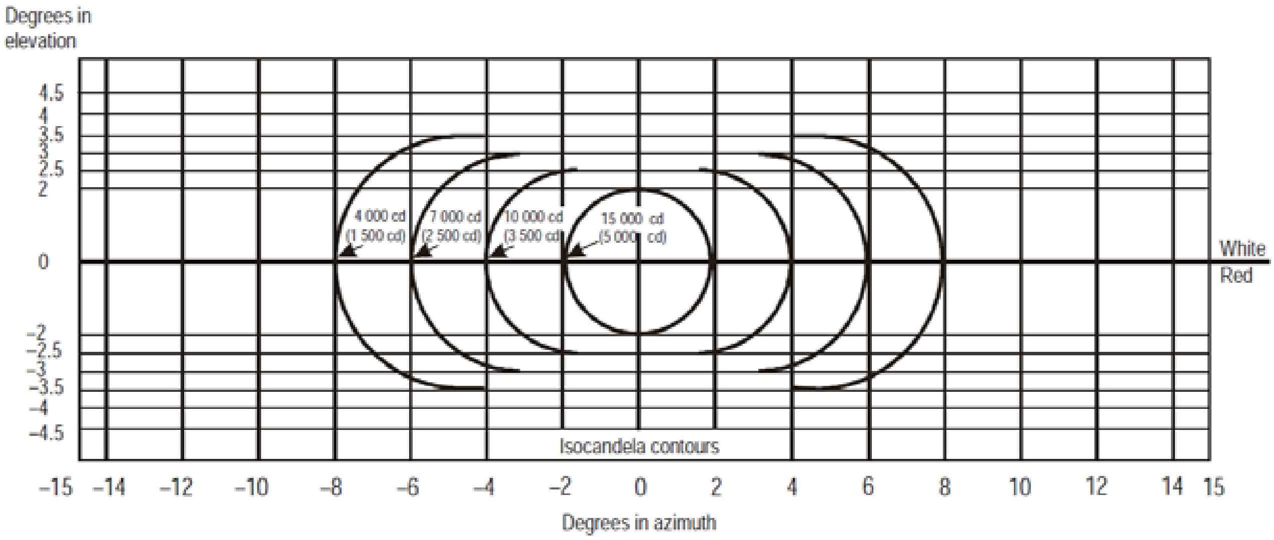



Figure U-26 Light intensity distribution of PAPI and APAPI

Notes:

(a) These curves are for minimum intensities in red light.

(b) The intensity value in the white sector of the beam is no less than 2 and may be as high as 6.5 times the corresponding intensity in the red sector.

(c) The intensity values shown in brackets are for APAPI.

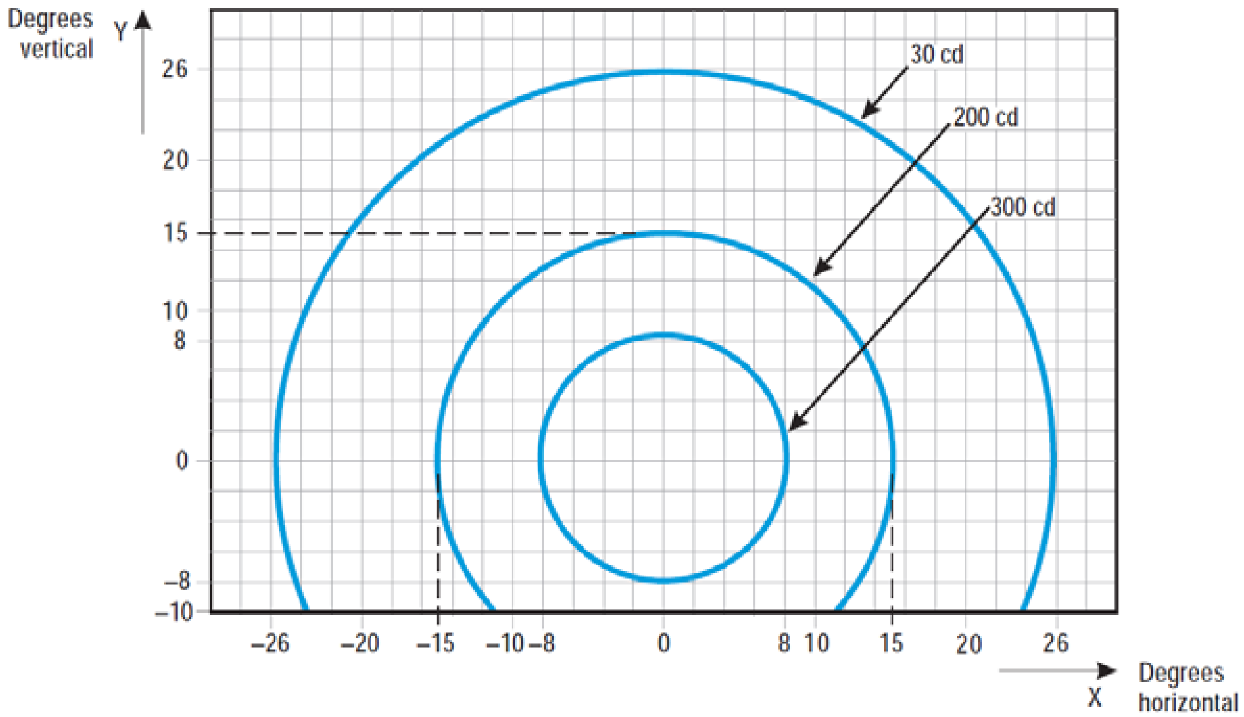



Figure U-27 Isocandela diagram for each light in low-intensity runway guard lights, Configuration A

Notes:

(a) Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

(b) The intensities specified are in yellow light.

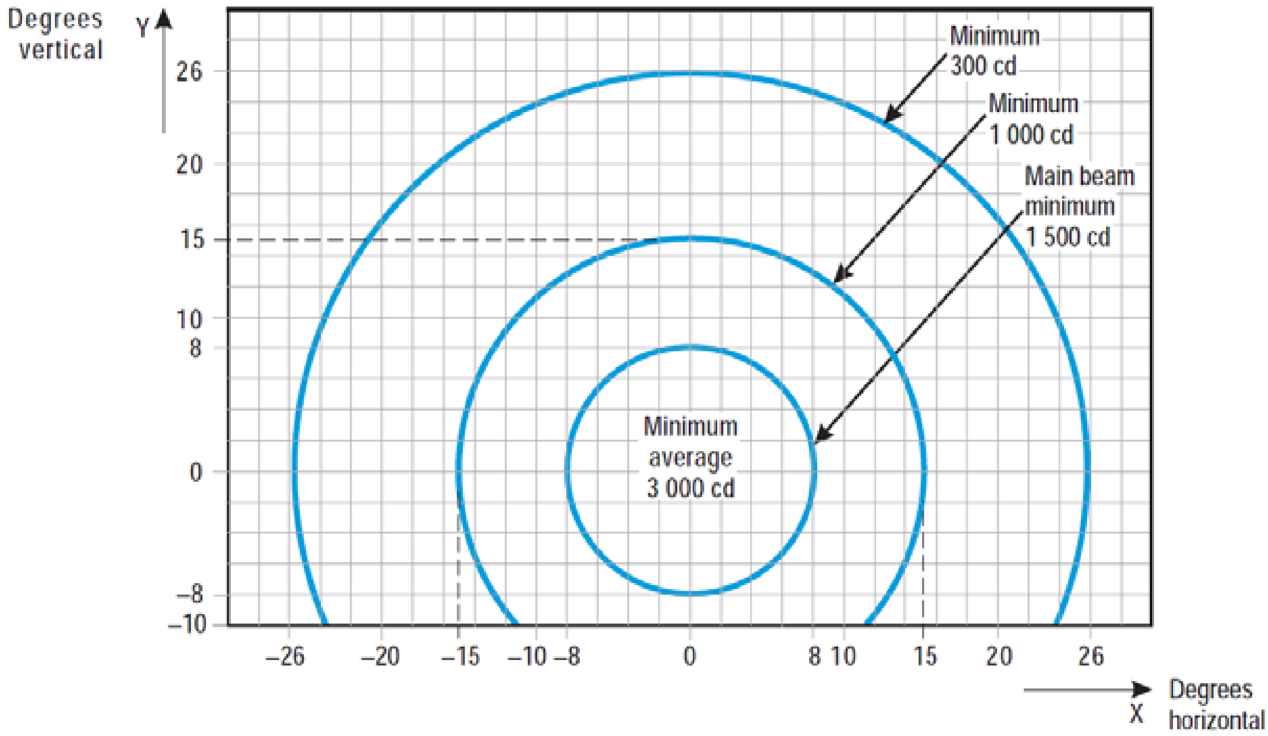



Figure U-28 Isocandela diagram for each light in high-intensity runway guard lights, Configuration A

Notes:

(a) Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

(b) The intensities specified are in yellow light.

# BOOK 2

## EASA GUIDANCE MATERIAL FOR AERODROME DESIGN

## CHAPTER A — GENERAL

### GM-ADR-DSN.A.001 — Applicability

### GM-ADR-DSN.A.002 — Definitions

### GM-ADR-DSN.A.005 — Aerodrome Reference Code

(a) The intent of the reference code is to provide a simple method for interrelating the numerous specifications concerning the characteristics of aerodromes so as to provide a series of aerodrome facilities that are suitable for the aeroplanes that are intended to operate at the aerodrome. The code is not intended to be used for determining runway length or pavement strength requirements. The code is composed of two elements which are related to the aeroplane performance characteristics and dimensions.

(b) Element 1 is a number based on the aeroplane reference field length and element 2 is a letter based on the aeroplane wingspan and outer main gear wheel span. A particular specification is related to the more appropriate of the two elements of the code or to an appropriate combination of the two code elements. The code letter or number within an element selected for design purposes is related to the critical aeroplane characteristics for which the facility is provided. When applying NPA text, the aeroplanes which the aerodrome is intended to serve are first identified and then the two elements of the code.

(c) The determination of the aeroplane reference field length is solely for the selection of a code number and is not intended to influence the actual runway length provided.

(d) In addition to the reference code, other aircraft characteristics, such as aircraft length and tail height, may also have an impact on the design of an aerodrome. Additionally, some characteristics of a piece of infrastructure are directly related to one element of the code (wingspan or wheel span) but are not impacted by other. The art of the aerodrome designer will be to consider all the relationships between aircraft characteristics and aerodromes and piece of infrastructures characteristics.

(e) It is not intended that the specifications deriving from the aerodrome reference code limit or regulate the operation of an aircraft.

(f) It is recognised that not all areas of the aerodrome will need to correspond to the critical aircraft that determines the ARC. Elements of the aerodrome infrastructure that do not meet the requirements of the ARC for the design aircraft should be designated with an appropriate code letter for its dimensions. Limitations should be identified to a/c size permitted or operating limitations. ICAO, Annex 14 does not provide sufficient flexibility for infrastructure intended for different sizes of aircraft. It addresses only the 'design aircraft'. This enables all areas of the aerodrome to reflect the aerodrome reference code.

## CHAPTER B — RUNWAYS

### GM-ADR-DSN.B.015 — Number, siting and orientation of runways

(a) In practice the number and orientation of runways at an aerodrome should normally be such that the usability factor of the aerodrome would normally be not less than 95 % for the aeroplanes that the aerodrome is intended to serve.

(b) Many factors affect the determination of the orientation, siting and number of runways:

(1) The wind distribution (to minimise crosswinds liable to affect runways);

(i) Wind statistics used for the calculation of the usability factor are normally available in ranges of speed and direction, and the accuracy of the results obtained depends, to a large extent, on the assumed distribution of observations within these ranges. In the absence of any sure information as to the true distribution, it is usual to assume a uniform distribution since, in relation to the most favorable runway orientations, this generally results in a slightly conservative usability factor.

(ii) The maximum mean crosswind components given in GM-ADR-DSN.B.020, refer to normal circumstances. There are some factors which may require that a reduction of those maximum values be taken into account at a particular aerodrome. These include:

A. the wide variations which may exist, in handling characteristics and maximum permissible crosswind components, among diverse types of aeroplanes (including future types) within each of the three groups given in GM-ADR-DSN.B.020;

B. prevalence and nature of gusts;

C. prevalence and nature of turbulence;

D. the availability of a secondary runway;

E. the width of runways;

F. the runway surface conditions — water, snow and ice on the runway materially reduce the allowable crosswind component; and

G. the strength of the wind associated with the limiting crosswind component.

(2) The need to facilitate the provision of approaches conforming to the approach surface specifications, ensuring that obstacles in these areas or other factors will not restrict the operation of the aeroplanes for which the runway is intended. This may relate to individual obstacles to or local geography (e.g. high ground).

(3) The need to minimise interference with areas approved for residential use and other noise-sensitive areas close to the aerodrome.

(4) The need to avoid the turbulence impacts of buildings on or close to the aerodrome.

(5) Type of operation. Attention should be paid in particular to whether the aerodrome is to be used in all meteorological conditions or only in visual meteorological conditions, and whether it is intended for use by day and night, or only by day.

(6) Topography of the aerodrome site, its approaches, and surroundings, particularly:

(i) compliance with the obstacle limitation surfaces;

(ii) current and future land use. The orientation and layout should be selected so as to protect as far as possible the particularly sensitive areas, such as residential, school and hospital zones, from the discomfort caused by aircraft noise. Detailed information on this topic is provided in the Airport Planning Manual (Doc 9184), Part 2, and in Guidance on the Balanced Approach to Aircraft Noise Management (Doc 9829);

(iii) current and future runway lengths to be provided;

(iv) construction costs; and

(v) possibility of installing suitable non-visual and visual aids for approach-to-land.

(7) Air traffic in the vicinity of the aerodrome, particularly:

(i) proximity of other aerodromes or ATS routes;

(ii) traffic density; and

(iii) air traffic control and missed approach procedures.

(c) The number of runways to be provided in each direction depends on the number of aircraft movements to be catered for.

(d) Whatever the factors that determine the runway orientation, the siting and orientation of runways at an aerodrome should, where possible, be such that safety is optimised.

(e) One important factor is the usability factor, as determined by the wind distribution, which is specified hereunder. Another important factor is the alignment of the runway to facilitate the provision of approaches conforming to the approach surface specifications of CS-ADR-DSN.H.425. In ICAO Annex 14, Attachment A, Section 1, information is given concerning these and other factors. When a new instrument runway is being located, particular attention needs to be given to areas over which aeroplanes will be required to fly when following instrument approach and missed approach procedures, so as to ensure that obstacles in these areas or other factors will not restrict the operation of the aeroplanes for which the runway is intended.

## GM-ADR-DSN.B.020 — Choice of maximum permissible crosswind components

(a) Choice of maximum permissible crosswind components.

(1) In the application of (1)(i) it should be assumed that landing or take-off of aeroplanes is, in normal circumstances, precluded when the crosswind component exceeds:

(i) 37 km/h (20 kt) in the case of aeroplanes whose reference field length is 1 500 m or over, except that when poor runway braking action owing to an insufficient longitudinal coefficient of friction is experienced with some frequency, a crosswind component not exceeding 24 km/h (13 kt) should be assumed;

(ii) 24 km/h (13 kt) in the case of aeroplanes whose reference field length is 1 200 m or up to but not including 1 500 m; and

(iii) 19 km/h (10 kt) in the case of aeroplanes whose reference field length is less than 1 200 m.

## GM-ADR-DSN.B.025 — Data to be used

The selection of data to be used for the calculation of the usability factor should be based on reliable wind distribution statistics that extend over as long a period as possible, preferably of not less than five years. The observations used should be made at least eight times daily and spaced at equal intervals of time.

## GM-ADR-DSN.B.030 — Runway threshold

(a) Additional distance should be provided to meet the requirements of the runway end safety area, as appropriate (this is to be added to the RESA related provisions).

(b) Where this displacement is due to an unserviceable runway condition, a cleared and graded area of at least 60 m in length should be available between the unserviceable area and the displaced threshold.

(c) Guidance Material on the survey requirements for aerodromes is provided in the ICAO World Geodetic system – 1984 (WGS-84) Manual, notably in Section 5.3. However, this guidance does not accurately define the survey locations for the runway edge or the runway threshold, because, in both cases, the measurement point is not the centre of the relevant paint marking.

(d) Location of threshold:

  (1) The threshold is normally located at the extremity of a runway, if there are no obstacles penetrating above the approach surface. In some cases, however, due to local conditions it may be desirable to displace the threshold permanently (see below). When studying the location of a threshold, consideration should also be given to the height of the ILS reference datum and/or MLS approach reference datum and the determination of the obstacle clearance limits. (Specifications concerning the height of the ILS reference datum and MLS approach reference datum are given in ICAO Annex 10, Volume I.)

  (2) In determining that no obstacles penetrate above the approach surface, account should be taken of mobile objects (vehicles on roads, trains, etc.) at least within that portion of the approach area within 1 200 m longitudinally from the threshold and of an overall width of not less than 150 m.

(e) Displaced threshold:

  (1) If an object extends above the approach surface and the object cannot be removed, consideration should be given to displacing the threshold permanently.

  (2) To meet the obstacle limitation objectives of Book 1, Chapter H, the threshold should ideally be displaced down the runway for the distance necessary to provide that the approach surface is cleared of obstacles.

  (3) However, displacement of the threshold from the runway extremity will inevitably cause reduction of the landing distance available, and this may be of greater operational significance than penetration of the approach surface by marked and lighted obstacles. A decision to displace the threshold, and the extent of such displacement, should therefore have regard to an optimum balance between the considerations of clear approach surfaces and adequate landing distance. In deciding this question, account will need to be taken of the types of aeroplanes which the runway is intended to serve, the limiting visibility and cloud base conditions under which the runway will be used, the position of the obstacles in relation to the threshold and extended centre line and, in the case of a precision

approach runway, the significance of the obstacles to the determination of the obstacle clearance limit.

(4) Notwithstanding the consideration of landing distance available, the selected position for the threshold should not be such that the obstacle-free surface to the threshold is steeper than 3.3 % where the code number is 4 or steeper than 5 % where the code number is 3.

(5) In the event of a threshold being located according to the criteria for obstacle-free surfaces in the preceding paragraph, the obstacle marking requirements of Chapter 6 should continue to be met in relation to the displaced threshold.

(6) Depending on the length of the displacement, the RVR at the threshold could differ from that at the beginning of the runway for take-offs. The use of red runway edge lights with photometric intensities lower than the nominal value of 10 000 cd for white lights increases that phenomenon. The impact of a displaced threshold on take-off minima should be assessed by the appropriate authority.

**GM-ADR-DSN.B.035 — Actual length of the runway and declared distances**

(a) Length of the runway:

(1) This specification does not necessarily mean providing for operations by the critical aeroplane at its maximum mass.

(2) Both take-off and landing requirements need to be considered when determining the length of runway to be provided and the need for operations to be conducted in both directions of the runway.

(3) Local conditions that may need to be considered include elevation, temperature, runway slope, humidity and the runway surface characteristics.

(4) When performance data on aeroplanes for which the runway is intended are not known, guidance on the determination of the actual length of a primary runway by application of general correction factors is given in the Aerodrome Design Manual (Doc 9157), Part 1.

(5) Except as provided in GM-ADR-DSN.B.040, the actual runway length to be provided for a runway should be adequate to meet the operational requirements of the aeroplanes for which the runway is intended and should be not less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant aeroplanes.

(b) Declared distances:

(1) The declared distances to be calculated for each runway direction comprise: the take-off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA) and landing distance available (LDA).

(2) Where a runway is not provided with a stopway or clearway and the threshold is located at the extremity of the runway, the four declared distances should normally be equal to the length of the runway, as shown in Figure GM-B-1 (A).

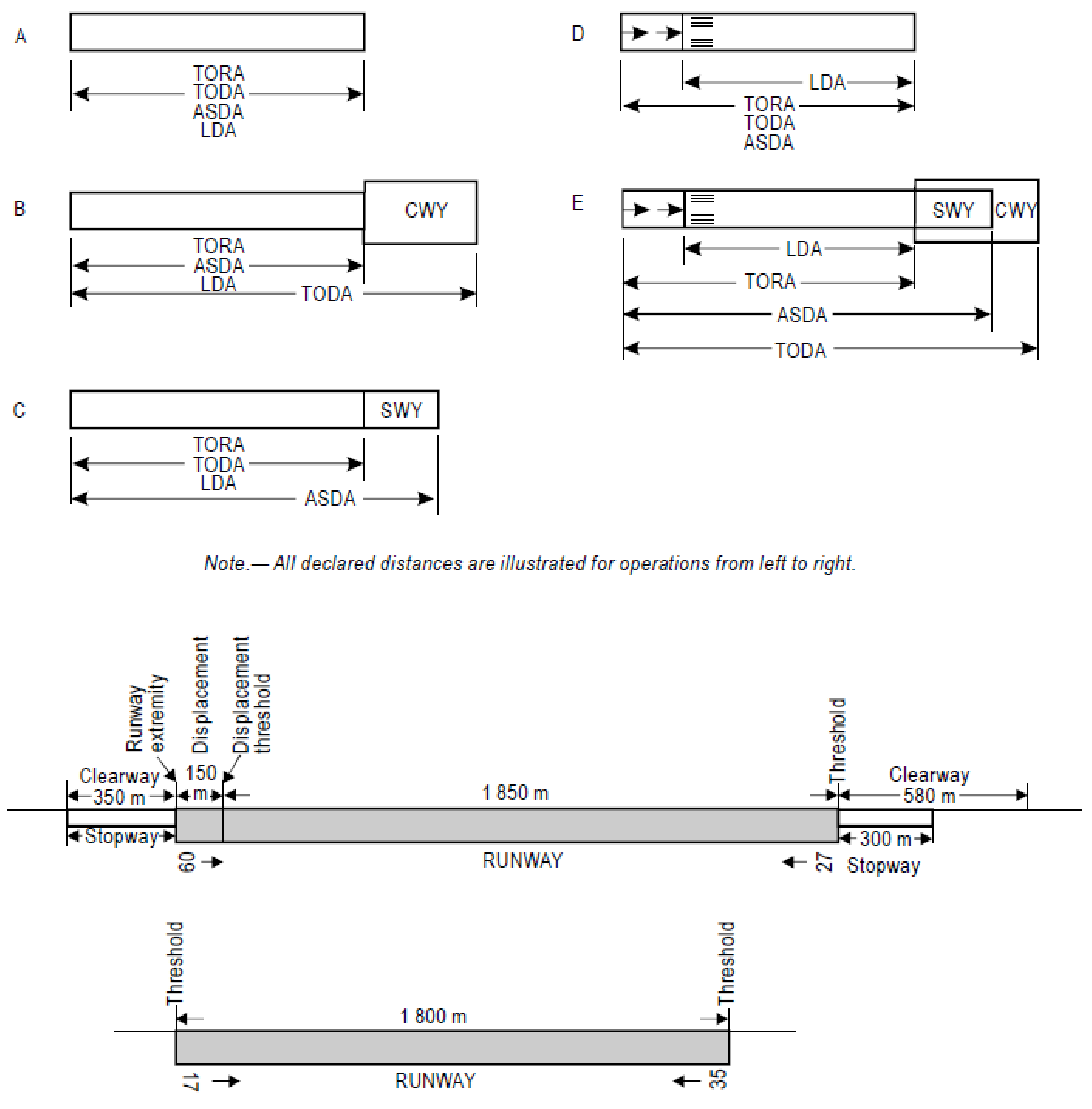
(3) Where a runway is provided with a clearway (CWY), then the TODA will include the length of clearway, as shown in Figure GM-B-1 (B).

(4) Where a runway is provided with a stopway (SWY), then the ASDA will include the length of stopway, as shown in Figure GM-B-1 (C).

(5) Where a runway has a displaced threshold, then the LDA will be reduced by the distance the threshold is displaced, as shown in Figure GM-B-1 (D). A displaced threshold affects only the LDA for approaches made to that threshold; all declared distances for operations in the reciprocal direction are unaffected.

(6) Figures GM-B-1 (B) through GM-B-1 (D) illustrate a runway provided with a clearway or a stopway or having a displaced threshold. Where more than one of these features exist, then more than one of the declared distances will be modified — but the modification will follow the same principle illustrated. An example showing a situation where all these features exist is given in Figure GM-B-1 (E).

(7) A suggested format for providing information on declared distances is given in Figure GM-B-1 (F). If a runway direction cannot be used for take-off or landing, or both, because it is operationally forbidden, then this should be declared and the words 'not usable' or the abbreviation 'NU' entered.




F

| RUNWAY | TORA | ASDA | TODA | LDA |
|---|---|---|---|---|
| | m | m | m | m |
| 09 | 2 000 | 2 300 | 2 580 | 1 850 |
| 27 | 2 000 | 2 350 | 2 350 | 2 000 |
| 17 | NU | NU | NU | 1 800 |
| 35 | 1 800 | 1 800 | 1 800 | NU |

Figure GM-B-1 Illustration of declared distances

**GM-ADR-DSN.B.040 — Runways with stopways or clearways**

Where a runway is associated with a stopway or clearway, an actual runway length less than that resulting from application of GM-ADR-DSN.B.035, as appropriate, may be considered satisfactory, but in such a case any combination of runway, stopway and clearway provided should permit compliance with the operational requirements for take-off and landing of the aeroplanes the runway is intended to serve.

**GM-ADR-DSN.B.045 — Width of runways**

(a) The combinations of code numbers and letters for which widths are specified have been developed for typical aeroplane characteristics.

(b) Factors affecting runway width are given in the ICAO Aerodrome Design Manual (Doc 9157), Part 1.

(c) The width of the runway should be measured at the outside edge of the runway edge marking, where provided.

(d) The length of the runway is measured from the start of the runway pavement or, where a transverse stripe is provided, at the inner edge of the painted band across the runway.

**GM-ADR-DSN.B.050 — Minimum distance between parallel non-instrument runways**

(a) Except that: for independent parallel approaches, combinations of minimum distances and associated conditions other than those specified in the PANS-ATM (Doc 4444) may be applied when it is determined that such combinations would not adversely affect the safety of aircraft operations.

(b) Where parallel non-instrument runways are intended for simultaneous use, the minimum distance between their centre lines should be:

   (1) 210 m where the higher code number is 3 or 4;

   (2) 150 m where the higher code number is 2; and

   (3) 120 m where the higher code number is 1.

(c) Procedures for wake turbulence categorisation of aircraft and wake turbulence separation minima are contained in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM), Doc 4444, Chapter 4, 4.9 and Chapter 5, 5.8, respectively.

**GM-ADR-DSN.B.055 — Minimum distance between parallel instrument runways**

Where parallel instrument runways are intended for simultaneous use, the conditions are specified in the PANS-ATM (Doc 4444) and the PANS-OPS (Doc 8168), Volume I.

**GM-ADR-DSN.B.060 Longitudinal slopes on runways**

The slopes on a runway are intended to prevent the accumulation of water (or possible fluid contaminant) on the surface and to facilitate rapid drainage of surface water (or possible fluid contaminant). The water (or possible fluid contaminant) evacuation is facilitated by an adequate combination between longitudinal and transverse slopes, and may also be assisted by grooving the runway surface. Slopes should be so designed as to minimise impact on aircraft and so not to hamper the operation of aircraft. For precision approach runways, slopes in a specified area from the runway end, and including the touchdown area, should be designed so that they will correspond to the characteristics needed for such type of approach.

**GM-ADR-DSN.B.065 — Longitudinal slopes changes on runways**

(a) Slope changes are so designed as to reduce dynamic loads on the undercarriage system of the aeroplane. Minimising slope changes is especially important on runways, where aircraft move at high speeds.

(b) For precision approach runways, slopes in a specified area from the runway end, and including the touchdown area, are so designed that they will correspond to the characteristics needed for such type of approach.

**GM-ADR-DSN.B.070 — Sight distance**

Runway longitudinal slopes and slopes changes are so designed that the pilot in the aircraft has an unobstructed line of sight over all or as much of the runway as possible, thereby enabling him to see aircraft or vehicles on the runway, and to be able to manoeuvre and take avoiding action.

**GM-ADR-DSN.B.075 Distance between slope changes**

The following example illustrates how the distance between slope changes is to be determined (see Figure GM-B-2):

D for a runway where the code number is 3 should be at least:

15 000 (x – y + y – z) m

x – y being the absolute numerical value of x – y

y – z being the absolute numerical value of y – z

Assuming x = +0.01

y = –0.005

z = +0.005

then x – y = 0.015

y – z = 0.01

To comply with the specifications, D should be not less than:

15 000 (0.015 + 0.01) m,

that is, 15 000 × 0.025 = 375 m

When a runway is planned that will combine the extreme values for the slopes and changes in slope permitted under Book 1, CS-ADR-DSN.B.060 to CS-ADR-DSN.B.080, a study should be made to ensure that the resulting surface profile will not hamper the operation of aeroplanes.

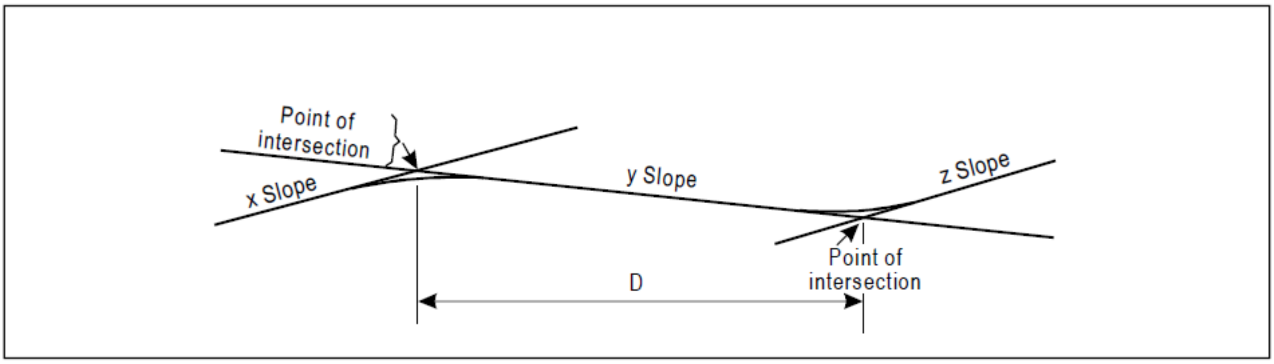



Figure GM-B-2 Profile on centre line of runway

**GM-ADR-DSN.B.080 — Transverse slopes on runways**

The transverse slope should be substantially the same throughout the length of a runway except at an intersection with another runway or a taxiway where an even transition should be provided taking account of the need for adequate drainage.

**GM-ADR-DSN.B.085 — Runway strength**

(a) Pavement forming part of the movement area needs to be of sufficient strength to allow aircraft to operate without risk of damage either to the pavement or to the aircraft. Pavements subject to overload conditions will deteriorate at an increasing rate depending upon the degree of overload. To control this, it is necessary to classify both pavement and aircraft under a system whereby the load-bearing capacity of the pavement and the loads imposed by the aircraft can be compared. The method used is the Aircraft Classification Number - Pavement Classification Number (ACN/PCN) method. The ACN/PCN method has been developed by ICAO as an international method of reporting the bearing strength of pavements.

(b) All pavements forming part of the movement area should be of adequate bearing strength for the types of aircraft expected to use the aerodrome. All pavements should be regularly examined by a suitably qualified person. Any pavements which have been subjected to overload conditions should be closely monitored by suitably qualified staff for a period of several weeks or until it is clear that no rapid deterioration of the pavement has been triggered.

(c) Reporting pavement bearing strength:

(1) The ACN/PCN method of classifying the bearing strength of pavements considers the load imposed on the pavement by the aircraft. In this respect, the load rating of the aircraft is most significantly affected by the subgrade support strength of the pavement. ACNs are therefore numbers giving a relative load rating of the aircraft on pavements for certain specified subgrade strengths. ACN values for most aeroplanes have been calculated by ICAO and are published in Aeronautical Information Publications. The PCN is also a number which represents the load-bearing

strength of the pavement in terms of the highest ACN which can be accepted on the pavement for unrestricted use.

(2) A PCN can also be identified and reported without a technical evaluation of the pavement by means of an assessment of the results of aircraft using the pavement. Providing the type and subgrade support strength of the pavement are known, the ACN of the most critical aircraft successfully using the pavement can be reported as the PCN.

(3) A PCN is reported in a five-part format. Apart from the numerical value, notification is also required of the pavement type (rigid or flexible) and the subgrade support category. Additionally, provision is made for the aerodrome authority to limit the maximum allowable tyre pressure. A final indication is whether the assessment has been made by a technical evaluation or from past experience of aircraft using the pavement.

(d) Overload operations

(1) Overloading of pavements can result either from loads too large, or from a substantially increased application rate, or both. Loads larger than the defined (design or evaluation) load shorten the design life, whilst smaller loads extend it. With the exception of massive overloading, pavements in their structural behaviour are not subject to a particular limiting load above which they suddenly or catastrophically fail. Behaviour is such that a pavement can sustain a definable load for an expected number of repetitions during its design life. As a result, occasional minor overloading is acceptable, when expedient, with only limited loss in pavement life expectancy and relatively small acceleration of pavement deterioration. For those operations in which magnitude of overload and/or the frequency of use do not justify a detailed analysis, the following criteria are suggested:

(i) for flexible pavements, occasional movements by aircraft with ACN not exceeding 10 % above the reported PCN should not adversely affect the pavement;

(ii) for rigid or composite pavements, in which a rigid pavement layer provides a primary element of the structure, occasional movements by aircraft with ACN not exceeding 5 % above the reported PCN should not adversely affect the pavement; and

(iii) if the pavement structure is unknown, the 5 % limitation should apply;

(iv) the annual number of overload movements should not exceed approximately 5 % of the total annual aircraft movements.

(e) Such overload movements should not normally be permitted on pavements exhibiting signs of distress or failure. Furthermore, overloading should be avoided during any periods of thaw following frost penetration, or when the strength of the pavement or its subgrade could be weakened by water. Where overload operations are conducted, the appropriate authority should review the relevant pavement condition regularly, and should also review the criteria for overload operations periodically since excessive repetition of overloads can cause severe shortening of pavement life or require major rehabilitation of pavement. Further information is contained in the Aerodrome Design Manual (ICAO, Doc 9157, Part 3).

## GM-ADR-DSN.B.090 — Surface of runways

(a) In adopting tolerances for runway surface irregularities, a good engineering practice is that: except across the crown of a camber or across drainage channels, the finished surface of the wearing course is to be of such regularity that, when tested with a 3 m straight-edge placed anywhere in any direction on the surface, there is no deviation greater than 3 mm between the bottom of the straight-edge and the surface of the pavement anywhere along the straight-edge.

(b) Caution should also be exercised when inserting runway lights or drainage grilles in runway surfaces to ensure that adequate smoothness of the surface is maintained.

(c) The operation of aircraft and differential settlement of surface foundations will eventually lead to increases in surface irregularities. Small deviations in the above tolerances will not seriously hamper aircraft operations. In general, isolated irregularities of the order of 2.5 cm to 3 cm over a 45 m distance are tolerable. Although maximum acceptable deviations vary with the type and speed of an aircraft, the limits of acceptable surface irregularities can be estimated to a reasonable extent. The following table describes possible maximum and temporarily acceptable limits. The principles underpinning this table are:

(1) If the maximum limits are exceeded, corrective action should be undertaken as soon as reasonably practicable to improve the ride quality.

(2) If the temporarily acceptable limits are exceeded, the portions of the runway that exhibit such roughness should have corrective measures taken immediately if aircraft operations are to be continued.

| | Minimum acceptable length of irregularity (m) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Surface irregularity | 3 | 6 | 9 | 12 | 15 | 20 | 30 | 45 | 60 |
| Maximum surface irregularity height (or depth) (cm) | 3 | 3.5 | 4 | 5 | 5.5 | 6 | 6.5 | 8 | 10 |
| Temporary acceptable surface irregularity height (or depth) (cm) | 3. | 5.5 | 6.5 | 7.5 | 8 | 9 | 11 | 13 | 15 |

(d) The term 'surface irregularity' is defined herein to mean isolated surface elevation deviations that do not lie along a uniform slope through any given section of a runway. For the purposes of this concern, a 'section of a runway' is defined herein to mean a segment of a runway throughout which a continuing general uphill, downhill or flat slope is prevalent. The length of this section is generally between 30 and 60 metres, and can be greater, depending on the longitudinal profile and the condition of the pavement.

(e) Deformation of the runway with time may also increase the possibility of the formation of water pools. Pools as shallow as approximately 3 mm in depth, particularly if they are located where they are likely to be encountered at high speed by landing aeroplanes, can induce aquaplaning, which can then be sustained on a wet runway by a much shallower depth of water. Improved guidance regarding the significant length and depth of pools relative to aquaplaning is the subject of further research. It is, of course, especially necessary to prevent pools from forming whenever there is a possibility that they might become frozen.

(f) Macrotexture and microtexture are taken into consideration in order to provide the required surface friction characteristics. This normally requires some form of special surface treatment. The average surface texture depth of a new surface should be not less than 1.0 mm.

## SECTION 1 RUNWAY TURN PADS

### GM-ADR-DSN.B.095 — Runway turn pads

### GM-ADR-DSN.B.100 — Slopes on runway turn pads

Slopes should be so designed as to minimise impact on aircraft and so not to hamper the operation of aircraft.

### GM-ADR-DSN.B.105 — Strength of runway turn pads

### GM-ADR-DSN.B.110 — Surface of runway turn pads

### GM-ADR-DSN.B.115 — Width of shoulders for runway turn pads

### GM-ADR-DSN.B.120 — Strength of shoulders for runway turn pads

## SECTION 2 RUNWAY SHOULDERS

### GM-ADR-DSN.B.125 — Runway shoulders

(a) Runway shoulders should be so prepared as to be capable of supporting the aeroplanes using the runway without causing structural damage to those aeroplanes. They should also be capable of supporting vehicles such as fire-fighting appliances. In some cases, whilst the bearing strength of the natural ground may be sufficient, special preparation may be necessary to avoid erosion and the possible ingestion of debris by engines.

(b) Runway shoulders are required because strong crosswinds may result in significant deviation from the runway centre line. As a result, with some large aircraft the wing-mounted engines may overhang the runway edge and there is then a risk of jet blast eroding the surface adjacent to the runway. This can cause dust and the possible ingestion of debris by the engines.

(c) However, for runways where the code letter is D, there may be circumstances where the shoulder need not be paved. Where the runway is not used by 4-engined aircraft, it may be possible to contain the risk from erosion or the ingestion of debris in the absence of paved shoulders. In such cases:

   (1) The ground should be prepared so that there is full grass coverage with no loose gravel or other material. This may include additional materials if the bearing strength and surface of the ground are not sufficient.

   (2) A programme of inspections of the shoulders and runway may be implemented to confirm its continuing serviceability and ensure that there is no deterioration that could create a risk of FOD or otherwise hazard aircraft operations.

(3) A programme of sweeping may be required before and after movements should debris be drawn onto the runway surface.

(4) If movements of 4-engined aircraft take place, the need for full paved width shoulders should be assessed by local hazard analysis.

(d) For runways where the code letter is F, there may be circumstances where a lesser paved width may be acceptable, minimum paved width should be 60 m.

(e) Where a reduced paved width of 60 m is accepted:

(1) The outer unpaved 7.5 m of runway shoulder should be stabilised; the ground is prepared so that there is full grass coverage with no loose gravel or other material. This may include additional materials if the bearing strength and surface of the ground are not sufficient.

(2) A programme of inspections of the shoulders and runway should be implemented to confirm its continuing serviceability and ensure that there is no deterioration that could create a risk of FOD or otherwise hazard aircraft operations.

(3) As movements of code letter F aircraft increase, the need for full paved width shoulders should be assessed by local hazard analysis.

(f) There may be circumstances where reduced shoulder widths may be possible if the width of the runway and the configuration of the aircraft so permit, subject to local safety assessment. Further guidance is given in Aerodrome Design Manual (ICAO Doc 9157, Part 1).

(g) Guidance on characteristics and treatment of runway shoulders:

(1) The shoulder of a runway or stopway should be prepared or constructed so as to minimise any hazard to an aeroplane running off the runway or stopway. Some guidance is given in the following paragraphs on certain special problems which may arise, and on the further question of measures to avoid the ingestion of loose stones or other objects by turbine engines.

(2) In some cases, the bearing strength of the natural ground in the strip may be sufficient, without special preparation, to meet the requirements for shoulders. Where special preparation is necessary, the method used will depend on local soil conditions and the mass of the aeroplanes the runway is intended to serve. Soil tests will help in determining the best method of improvement (e.g. drainage, stabilisation, surfacing, light paving).

(h) Attention should also be paid when designing shoulders to prevent the ingestion of stones or other objects by turbine engines. Similar considerations apply here to those which are discussed for the margins of taxiways in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2), both as to the special measures which may be necessary and as to the distance over which such special measures, if required, should be taken.

(i) Where shoulders have been treated specially, either to provide the required bearing strength or to prevent the presence of stones or debris, difficulties may arise because of a lack of visual contrast between the runway surface and that of the adjacent strip. This difficulty can be overcome either by providing a good visual contrast in the surfacing of the runway or strip, or by providing a runway side stripe marking.

## GM-ADR-DSN.B.130 — Slopes on runway shoulders

### GM-ADR-DSN.B.135 — Width of runway shoulders

### GM-ADR-DSN.B.140 — Strength of runway shoulders

The strength needed for inner shoulder may be different for that of the outer shoulder.

Guidance on strength of runway shoulders is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 1).

### GM-ADR-DSN.B.145 — Surface of runway shoulders

Where a runway shoulder is not paved, additional surface treatment or inspections may be necessary, especially for runways that accept operations by 4-engined aircraft.

## SECTION 3 RUNWAY STRIP

### GM-ADR-DSN.B.150 — Runway strip to be provided

### GM-ADR-DSN.B.155 — Length of runway strip

### GM-ADR-DSN.B.160 — Width of runway strip

### GM-ADR-DSN.B.165 — Objects on runway strips

(a) Within the general area of the strip adjacent to the runway, measures should be taken to prevent an aeroplane's wheel, when sinking into the ground, from striking a hard vertical face. Special problems may arise for runway light fittings or other objects mounted in the strip or at the intersection with a taxiway or another runway. In the case of construction, such as runways or taxiways, where the surface must also be flush with the strip surface, a vertical face can be eliminated by chamfering from the top of the construction to not less than 30 cm below the strip surface level. Other objects, the functions of which do not require them to be at surface level, should be buried to a depth of not less than 30 cm. Where this is not feasible, to eliminate a buried vertical surface, a slope should be provided which extends from the top of the construction to not less than 0.3 m below ground level. The slope should be no greater than 1:10.

(b) ICAO Annex 14 prescribes distances only for precision approach runways. Suggested figures have been added for non-precision and non-instrument runways. These distances reflect the minimum distance from runway centre line of the runway holding position.

### GM-ADR-DSN.B.170 — Non-precision approach and non-instrument runway strips

### GM-ADR-DSN.B.175 — Grading of runway strips

(a) Where the areas adjacent to the ends of runways have paved surfaces, they should, if required, be able to accommodate the occasional passage of the critical aircraft for runway pavement design.

(b) The areas adjacent to the end of a runway are sometimes referred to as blast pads.

(c) A graded area of 90 m for code 4 precision approach runways may be designed.

**GM-ADR-DSN.B.180 — Longitudinal Slopes on runway strips**

**GM-ADR-DSN.B.185 — Transverse Slopes on runway strips**

**GM-ADR-DSN.B.190 — Strength of runway strips**

Guidance on preparation of runway strips is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 1).

**SECTION 4 CLEARWAYS, STOPWAYS AND RADIO ALTIMETER OPERATING AREA**

**GM-ADR-DSN.B.195 Clearways**

(a) The length of a clearway should not exceed half the length of the take-off run available.

(b) Because of transverse or longitudinal slopes on a runway, shoulder or strip, in certain cases the lower limit of the clearway plane specified above may be below the corresponding elevation of the runway, shoulder or strip. It is not intended that these surfaces be graded to conform with the lower limit of the clearway plane, nor is it intended that terrain or objects which are above the clearway plane beyond the end of the strip but below the level of the strip be removed unless it is considered that they may endanger aeroplanes.

(c) Abrupt upward changes in slope should be avoided when the slope on the ground in a clearway is relatively small or when the mean slope is upward. In such situations, in that portion of the clearway within a distance of 22.5 m or half the runway width, whichever is greater, on each side of the extended centre line, the slopes, slope changes and the transition from runway to clearway should generally conform with those of the runway with which the clearway is associated.

(d) The decision to provide a stopway and/or a clearway as an alternative to an increased length of runway will depend on the physical characteristics of the area beyond the runway end, and on the operating performance requirements of the prospective aeroplanes. The runway, stopway and clearway lengths to be provided are determined by the aeroplane take-off performance, but a check should also be made of the landing distance required by the aeroplanes using the runway to ensure that adequate runway length is provided for landing. The length of a clearway, however, cannot exceed half the length of take-off run available.

(e) The aeroplane performance operating limitations require a length which is enough to ensure that the aeroplane can, after starting a take-off, either be brought safely to a stop or complete the take-off safely. For the purpose of discussion, it is supposed that the runway, stopway and clearway lengths provided at the aerodrome are only just adequate for the aeroplane requiring the longest take-off and accelerate-stop distances, taking into account its take-off mass, runway characteristics and ambient atmospheric conditions. Under these circumstances there is, for each take-off, a speed, called the decision speed; below this speed, the take-off must be abandoned if an engine fails, while above it the take-off must be completed. A very long take-off run and take-off distance would be required to complete a take-off when an engine fails before the decision speed is reached, because of the insufficient speed and the reduced power available. There would be no difficulty in stopping in the remaining accelerate-stop distance available provided action is taken immediately. In these circumstances the correct course of action would be to abandon the take-off.

(f) On the other hand, if an engine fails after the decision speed is reached, the aeroplane will have sufficient speed and power available to complete the take-off safely in the remaining take-off distance available. However, because of the high speed, there would be difficulty in stopping the aeroplane in the remaining accelerate-stop distance available.

(g) The decision speed is not a fixed speed for any aeroplane, but can be selected by the pilot within limits to suit the accelerate-stop and take-off distance available, aeroplane take-off mass, runway characteristics and ambient atmospheric conditions at the aerodrome. Normally, a higher decision speed is selected as the accelerate-stop distance available increases.

(h) A variety of combinations of accelerate-stop distances required and take-off distances required can be obtained to accommodate a particular aeroplane, taking into account the aeroplane take-off mass, runway characteristics, and ambient atmospheric conditions. Each combination requires its particular length of take-off run.

(i) The most familiar case is where the decision speed is such that the take-off distance required is equal to the accelerate-stop distance required; this value is known as the balanced field length. Where stopway and clearway are not provided, these distances are both equal to the runway length. However, if landing distance is for the moment ignored, runway is not essential for the whole of the balanced field length, as the take-off run required is, of course, less than the balanced field length. The balanced field length can, therefore, be provided by a runway supplemented by an equal length of clearway and stopway, instead of wholly as a runway. If the runway is used for take-off in both directions, an equal length of clearway and stopway has to be provided at each runway end. The saving in runway length is, therefore, bought at the cost of a greater overall length.

(j) In case economic considerations preclude the provision of stopway and, as a result, only runway and clearway are to be provided, the runway length (neglecting landing requirements) should be equal to the accelerate-stop distance required or the take-off run required, whichever is greater. The take-off distance available will be the length of the runway plus the length of clearway.

(k) The minimum runway length and the maximum stopway or clearway length to be provided may be determined as follows, from the data in the aeroplane flight manual for the aeroplane considered to be critical from the viewpoint of runway length requirements:

(1) If a stopway is economically possible, the lengths to be provided are those for the balanced field length. The runway length is the take-off run required or the landing distance required, whichever is greater. If the accelerate-stop distance required is greater than the runway length so determined, the excess may be provided as stopway, usually at each end of the runway. In addition, a clearway of the same length as the stopway must also be provided;

(2) If a stopway is not to be provided, the runway length is the landing distance required, or if it is greater, the accelerate-stop distance required, which corresponds to the lowest practical value of the decision speed. The excess of the

take-off distance required over the runway length may be provided as clearway, usually at each end of the runway.

(l) In addition to the above consideration, the concept of clearways in certain circumstances can be applied to a situation where the take-off distance required for all engines operating exceeds that required for the engine failure case.

(m) The economy of a stopway can be entirely lost if, after each usage, it must be regraded and compacted. Therefore, it should be designed to withstand at least a certain number of loadings of the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane. Notwithstanding that a stopway may have a paved surface, it is not intended that PCN figures need to be developed for a stopway. Further guidance may be found in ICAO Doc 4444, PANS-OPS.

**GM-ADR-DSN.B.200 — Stopways**

(a) The inclusion of detailed specifications for stopways in this GM is not intended to imply that a stopway has to be provided. GM-ADR-DSN.B.195 provides information on the use of stopways.

(b) The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding:

(1) 0.3 % per 30 m (minimum radius of curvature of 10 000 m) where the code number is 3 or 4; and

(2) 0.4 % per 30 m (minimum radius of curvature of 7 500 m) where the code number is 1 or 2.

(c) Slopes and changes in slope on a stopway, and the transition from a runway to a stopway, should comply with the specifications CS-ADR-DSN.B.060 to CS-ADR-DSN.B.080 for the runway with which the stopway is associated except that:

(1) the limitation in CS-ADR-DSN.B.065 of a 0.8 % slope for the first and last quarter of the length of a runway need not be applied to the stopway; and

(2) drainage aspects should also be taken into account.

**GM-ADR-DSN.B.205 — Radio altimeter operating area**

(a) In order to accommodate aeroplanes making auto-coupled approaches and automatic landings (irrespective of weather conditions), it is desirable that slope changes be avoided or kept to a minimum, on a rectangular area at least 300 m long before the threshold of a precision approach runway. The area should be symmetrical about the extended centre line, 120 m wide. When special circumstances so warrant, the width may be reduced to no less than 60 m if an aeronautical study indicates that such reduction would not affect the safety of operations of aircraft. This is desirable because these aeroplanes are equipped with a radio altimeter for final height and flare guidance, and when the aeroplane is above the terrain immediately prior to the threshold, the radio altimeter will begin to provide information to the automatic pilot for auto-flare. Where slope changes cannot be avoided, the rate of change between two consecutive slopes should not exceed 2 % per 30 m.

(b) The inclusion of detailed specifications for radio altimeter operating area in this GM is not intended to imply that a radio altimeter operating area has to be provided.

(c) With a radio altimeter operating area in the pre-threshold area of a precision approach runway the margin to calculate the decision altitude should be smaller and the usability of the adjacent runway may be enhanced.

(d) Further guidance on radio altimeter operating area is given in Manual of All-Weather Operations, (ICAO, Doc 9365, Section 5.2). Guidance on the use of radio altimeter is given in the ICAO, PANS-OPS, Volume II, Part II, Section 1.

## CHAPTER C – RUNWAY END SAFETY AREA

### GM-ADR-DSN.C.210 — Runway end safety areas

(a) General

(1) A runway end safety area should provide an area long and wide enough and suitable to contain overruns and undershoots resulting from a reasonably probable combination of adverse operational factors. On a precision approach runway, the ILS localiser is normally the first upstanding obstacle, and the runway end safety area should extend up to this facility. In other circumstances and on a non-precision approach runway, the first upstanding obstacle may be a road, a railroad or other constructed or natural feature. In such circumstances, the runway end safety area should extend as far as the obstacle.

(2) Whatever length of RESA is provided, it is important to ensure that likelihood of and potential impacts arising from an overrun are minimised as far as reasonably practicable.

(3) It is recognised that achieving the recommended distance presents challenges to aerodromes and Member States. Therefore, the aim of this guidance is to identify the types of aerodrome activities that can be undertaken to reduce the likelihood and consequences of an overrun occurring, and to decide on appropriate actions.

(4) The overrun is a complex risk to assess because there are a number of variables, such as prevailing weather, type of aeroplane, the landing aids available, runway characteristics and available distances, the surrounding environment, and human factors. Each of these can have a significant contribution to the overall hazard; furthermore, the nature of the hazard and level of risk will be different for each aerodrome and even for each runway direction at any one aerodrome. The aerodrome may address some and these are included below. Additionally, aircraft operating procedures may impact but the aerodrome may have little ability to influence these. This should not prevent aerodromes from working with aircraft operators so that the operations are conducted so as to minimise the likelihood of an overrun occurring.

(5) Noting the requirement for a runway end safety area (RESA) consideration should be given to providing an area long enough to contain overruns and undershoots resulting from a reasonably probable combination of adverse operational factors. Therefore, aerodromes should try to maximise the length of RESA available on all applicable runways. When considering the RESA distance required for individual circumstances, aerodromes operators should take into account factors, such as:

(i) The runway length and slope, in particular the general operating lengths required for take-off and landing versus the runway distances available, including the excess of available length over that required;

(ii) current RESA provision (length & width – how much the RESA complies with the recommended distance) and options to increase or improve this;

(iii) the nature and location of any hazard beyond the runway end, including the topography and obstruction environment in and beyond the RESA and outside the runway strip;

(iv) the type of aeroplane and level of traffic at the aerodrome, and actual or proposed changes to either;

(v) aircraft performance limitations arising from runway and RESA length – high performance aircraft, operating at high loads and speeds have greater length requirements than smaller, low-performance aircraft, the relationship between required balanced field length and available distances;

(vi) navigation aids available (PBN, instrument or visual - if an ILS is only available on one runway direction, a downwind approach and landing may be necessary in poor weather) and the availability of vertical guidance ;

(vii) friction and drainage characteristics of the runway, which impact on runway susceptibility to surface contamination and aeroplane braking action;

(viii) traffic density, which may lead to increased pressure to vacate so increased speed;

(ix) aerodrome weather patterns, including wind shear;

(x) aerodrome overrun history;

(xi) overrun/undershoot causal factors.

(b) Assessment of runway end safety areas

(1) The RESA assessment should help the aerodrome operator identify the hazards and appropriate actions to reduce the risk. A range of measures may be available, singly or in combination, to reduce the risks of an overrun occurring or becoming an accident. Measures aimed at reducing the likelihood of an overrun/undershoot include:

(i) improving runway surfaces and friction measurement, particularly when the runway is contaminated — know your runways and their condition and characteristics in precipitation;

(ii) ensuring that accurate and up-to-date information on weather, the runway state and characteristics, is notified and passed to flight crews in a timely way, particularly when flight crews need to make operational adjustments;

(iii) improving an aerodrome management's knowledge, recording, prediction and dissemination of wind data, including wind shear, and any other relevant weather information, particularly when it is a significant feature of an aerodrome's weather pattern;

(iv) upgrading visual and instrument landing aids to improve the accuracy of aeroplane delivery at the correct landing position on runways (including the provision of Instrument Landing PBN approach systems, location of aiming point and harmonisation with PAPIs);

(v) formulating, in consultation with aeroplane operators, adverse weather and any other relevant aerodrome operating procedures or restrictions, and promulgating such information appropriately;

(vi) working with aircraft operators to optimise the operation.

(2) Combined with this, measures may be considered that would reduce the severity of the consequences should an event occur. Wherever practicable, aerodrome operators should seek to optimise the RESA. This may be achieved through a combination of:

(i) Relocation, shifting or realignment of the runway — it may be possible to construct additional pavement at the start of take-off end to make more pavement available to retain the declared distances. The start and end of declared distances can be moved towards the downwind (start of take-off) end, thereby retaining the declared distance and creating space for a longer RESA, as shown in GM-ADR-DSN.B.035;

(ii) In the case where landing RESA is limited and the runway has a displaced landing threshold, examine whether the threshold can be moved (downwind) to increase the RESA and/or runway length;

(iii) Reducing declared runway distances in order to provide the necessary RESA. Reducing declared distances may be a viable option where the existing runway length exceeds that which is required for the existing or projected design aircraft — if the take-off distance required for the critical aircraft operating at the aerodrome is less than the take-off distance available, there may be opportunity to reduce the TODR;

(iv) Increasing the length of a RESA, and/or minimising the obstruction environment in the area beyond the RESA. Means to increase the RESA provision include land acquisition, improvements to the grading, realigning fences or roads to provide additional area;

(v) Installing suitably positioned and designed arresting systems, to supplement or as an alternative to a RESA where an equivalent level of safety is demonstrated;

(vi) Improving the slopes in the RESA to minimise or remove downward slopes;

(vii) Providing paved RESA with known friction characteristics.

(3) A runway meant for take-off and landing in both directions will have 2 RESAs extending for the required distance beyond the end of the strip extending from the runway end. Depending of the position of the threshold on a runway, the RESA related to the reverse runway will protect aircraft undershooting the threshold. Assessments of overruns and undershoots have shown that the likelihood of an undershoot is approximately four times less than for an overrun. Additionally, the undershoot rate shows that the likelihood of an event is further reduced by the availability of precision approach aids, especially those with vertical guidance. Therefore, on a precision approach runway consideration may include whether to reduce the minimum length of RESA towards the length of the runway strip before the runway.

(4) It is recognised that improving RESAs is often difficult. However, it is important to note that incremental gains should be obtained wherever possible, as any gain is valuable. Therefore, whenever a runway project involves construction, consideration should also be given to improving the RESA.

(5) The above lists are not in any particular order, are not exhaustive and should complement action by aeroplane operators, designers and aviation regulators. Aerodrome operators are reminded of the need to inform the state aviation authority about changes to the physical characteristics of the aerodrome and that such changes are safely managed, in accordance with the aerodrome certificate conditions.

(6) RESA provision should be considered by the LRST.

(c) Arresting systems on runway end safety areas

(1) In recent years, recognising the difficulties associated with achieving a standard runway end safety area (RESA) at all airports, research programmes have been undertaken on the use of various materials for arresting systems. Furthermore, research programmes have been undertaken to evaluate and develop arrestor systems using engineered materials (EMAS). This research was driven by the recognition that many runways, where natural obstacles, local development, and/or environmental constraints inhibit the provision of RESA (as required by changes to ICAO SARPS in 1999) leads to limited dimension RESAs. Additionally, there had been accidents at some airports where the ability to stop an overrunning aeroplane within the RESA would have prevented major damage to aeroplane and/or injuries to passengers.

(2) The research programmes, as well as evaluation of actual aeroplane overruns into an EMAS installation, have demonstrated that EMAS systems are effective in arresting aeroplane overruns.

(3) EMAS or other arresting system designs must be supported by a validated design method that can predict the performance of the system. The design method must be derived from field or laboratory tests. Testing may be based either on passage of an actual aircraft or an equivalent single wheel load through a test bed. The design must consider multiple aircraft parameters, including but not limited to allowable aircraft gear loads, gear configuration, tire contact pressure, aircraft centre of gravity, and aircraft speed. The model must calculate imposed aircraft gear loads, g-forces on aircraft occupants, deceleration rates, and stopping distances within the arresting system. Any rebound of the crushed material that may lessen its effectiveness must also be considered.

(4) The system design should be based on a critical (or design) aircraft, which is defined as aircraft using the associated runway that imposes the greatest demand upon the arresting system. This is usually, but not always, the heaviest/largest aircraft that regularly uses the runway. Arresting system performance is dependent not only on aircraft weight, but landing gear configuration and tire pressure. All configurations should be considered in optimising the arresting system design. The airport sponsor, arresting system manufacturer, and the NAA should consult regarding the selection of the design aircraft that will optimise the arresting system for a specific airport.

(5) EASA considers that the FAA performance specifications and requirements, which have been accepted by the ICAO Aerodromes Panel, provide suitable information for aerodromes considering the installation of EMAS. Therefore, attention is drawn to the documents listed below which give guidance on the requirements and evaluation process used by the FAA:

  (i) FAA Advisory Circular 150/5300-13 — 'Airport Design';

  (ii) FAA Advisory Circular 150/5220-22A — 'Engineered Materials Arresting Systems (EMAS) for Aeroplane Overruns';

  (iii) FAA Order 5200.8 — 'Runway Safety Area Program';

  (iv) FAA Order 5200.9 — 'EMAS Financial Feasibility and Equivalency'.

(6) The presence of an arresting system should be published in the aerodrome AIP entry and information/instructions promulgated to local runway safety teams and others to promote awareness in the pilot community.

**CS-ADR-DSN.C.215 — Dimensions of runway end safety areas** *TXT* *ADD*

It is accepted that many aerodromes were constructed before requirements for RESAs were introduced. Where the CS cannot be achieved, the aerodrome should undertake a safety assessment to confirm that a suitable level of safety is achieved.

### CS-ADR-DSN.C.220 — Objects on runway end safety areas *TXT*

Information regarding siting of equipment and installations on operational areas, including RESA, is detailed in CS-ADR-DSN.T.915.

### CS-ADR-DSN.C.225 — Clearing and grading of runway end safety areas *ADD*

Guidance on Clearing and grading of runway end safety areas is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 1).

### CS-ADR-DSN.C.230 — Slopes on runway end safety areas *ICAO*

Where clearway is provided, the slope on the REASA should be amended accordingly.

### CS-ADR-DSN.C.235 — Strength of runway end safety areas *MOVE to GM*

A runway end safety area should be so prepared or constructed as to reduce the risk of damage to an aeroplane undershooting or overrunning the runway, enhance aeroplane deceleration and facilitate the movement of rescue and fire-fighting vehicles.

Guidance on the strength of a runway end safety area is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 1).

# CHAPTER D — TAXIWAYS

## GM-ADR-DSN.D.240 — Taxiways General

(a) Taxiways should be provided to permit the safe and expeditious surface movement of aircraft. Sufficient entrance and exit taxiways for a runway should be provided to expedite the movement of aeroplanes to and from the runway and provision of rapid exit taxiways considered when traffic volumes are high.

(b) Guidance on layout of taxiways is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

## GM-ADR-DSN.D.245 — Width of Taxiways

The width of the taxiway should be measured at the edge of the paved surface or, where the taxiway edge is marked, at the outside edge of the taxiway edge marking.

## GM-ADR-DSN.D.250 — Taxiways curves

(a) The design of the curve should be such that, when the cockpit of the aeroplane remains over the taxiway centre line markings, the clearance distance between the outer main wheels of the aeroplane and the edge of the taxiway should not be less than those specified in CS-ADR-DSN.D.250.

(b) The location of taxiway centre line markings and lights is specified in CS-ADR-DSN.L.555 and CS-ADR-DSN.M.710.

(c) Compound curves may reduce or eliminate the need for extra taxiway width.

(d) An example of widening taxiways to achieve the wheel clearance specified is illustrated in Figure GM-D-1. Guidance on the values of suitable dimensions is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

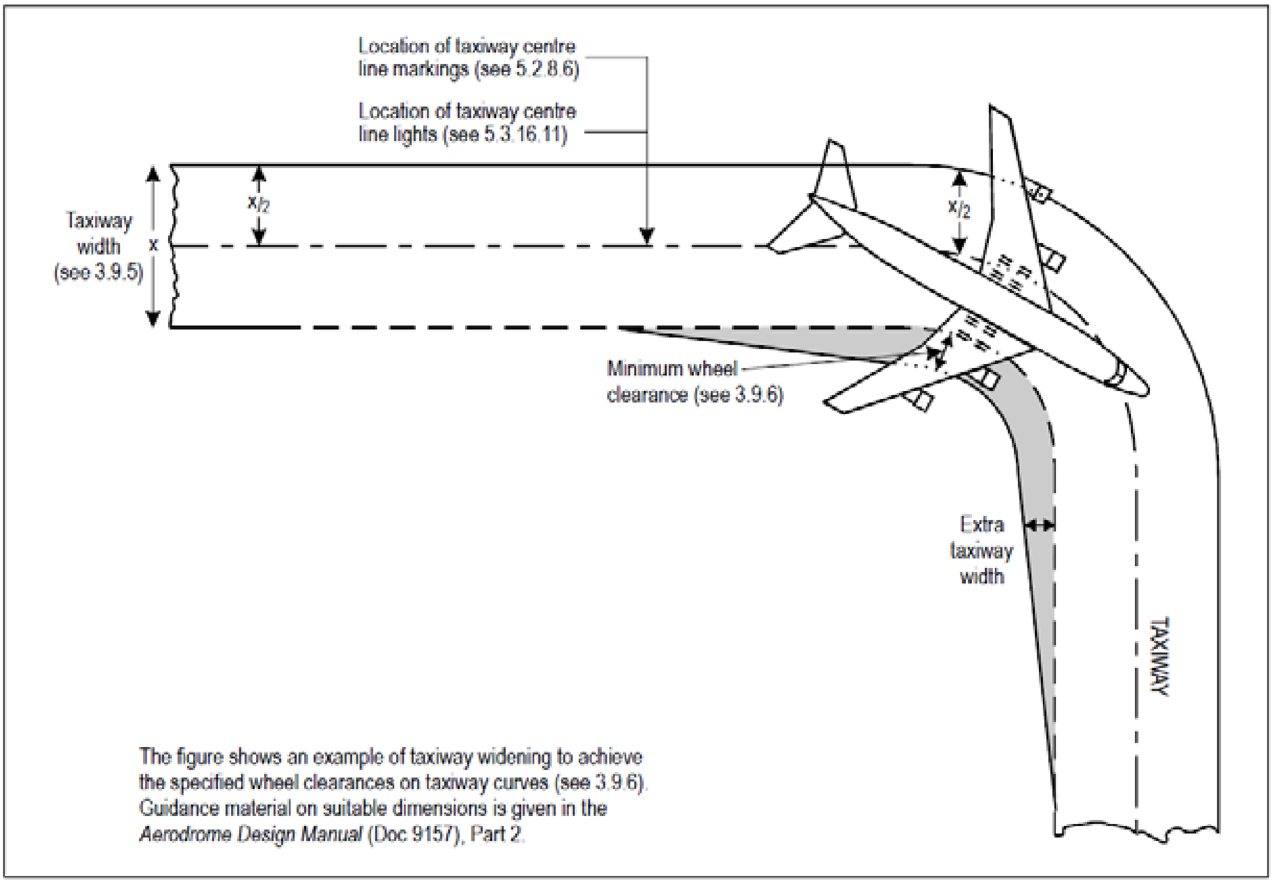



Figure GM-D-1 Taxiway curve

**GM-ADR-DSN.D.255 — Junction and intersection of taxiways**

(a) The design of the fillets should ensure that the minimum wheel clearances specified in CS-ADR-DSN.D.240 are maintained when aeroplanes are manoeuvring through the junctions or intersections.

(b) Consideration should be given to the aeroplane datum length when designing fillets. Guidance on the design of fillets and the definition of the term aeroplane datum length are given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

(c) Guidance on factors which may be considered in the aeronautical study is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

(d) ILS and MLS installations may also influence the location of taxiways due to interferences to ILS and MLS signals by a taxiing or stopped aircraft. Information on critical and sensitive areas surrounding ILS and MLS installations is contained in ICAO, Annex 10, Volume I, Attachments C and G (respectively).

(e) The separation distances of Book 1, Table D-1, column 10, do not necessarily provide the capability of making a normal turn from one taxiway to another parallel taxiway. Guidance for this condition is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

(f) The separation distance between the centre line of an aircraft stand taxilane and an object shown in Book 1, Table D-1, column 12, may need to be increased when jet exhaust wake velocity may cause hazardous conditions for ground servicing.

## GM-ADR-DSN.D.260 260 — Taxiway minimum separation distance

(a) Guidance on factors which may be considered in the aeronautical study is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

(b) ILS and MLS installations may also influence the location of taxiways due to interferences to ILS and MLS signals by a taxiing or stopped aircraft. Information on critical and sensitive areas surrounding ILS and MLS installations is contained in ICAO, Annex 10, Volume I, Attachments C and G (respectively).

(c) The separation distances of Book 1, Table D-1, column 10, do not necessarily provide the capability of making a normal turn from one taxiway to another parallel taxiway. Guidance for this condition is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

(d) The separation distance between the centre line of an aircraft stand taxilane and an object shown in Book 1, Table D-1, column 12, may need to be increased when jet exhaust wake velocity may cause hazardous conditions for ground servicing.

## GM-ADR-DSN.D.265 — Longitudinal slopes on taxiways *ICAO*

## GM-ADR-DSN.D.270 — Longitudinal slope changes on taxiways *ICAO*

## GM-ADR-DSN.D.275 — Sight distance of taxiways *ICAO*

## GM-ADR-DSN.D.280 — Transverse slopes on taxiways *ICAO*

The slopes on a taxiway are intended to prevent the accumulation of water (or possible fluid contaminant) on the surface and to facilitate rapid drainage of surface water (or possible fluid contaminant). Slopes should so designed as to minimise impact on aircraft and so not to hamper the operation of aircraft.

## GM-ADR-DSN.D.285 — Strength of taxiways *TXT*

Information regarding pavement bearing strength, including the ACN/PCN classification system may be found in GM-ADR-DSN.B.085.

## GM-ADR-DSN.D.290 — Surface of taxiways *ICAO*

## GM-ADR-DSN.D.295 — Rapid exit taxiways *TXT*

(a) The following specifications detail requirements particular to rapid exit taxiways. See Book 1, Figure D-1. General requirements for taxiways also apply to this type of taxiway. Guidance on the provision, location and design of rapid exit taxiways is included in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

(b) The locations of rapid exit taxiways along a runway are based on several criteria described in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2), in addition to different speed criteria.

(c) The intersection angle of a rapid exit taxiway with the runway should preferably be 30°, but lower angles may be suitable depending on the aerodrome layout and traffic mix.

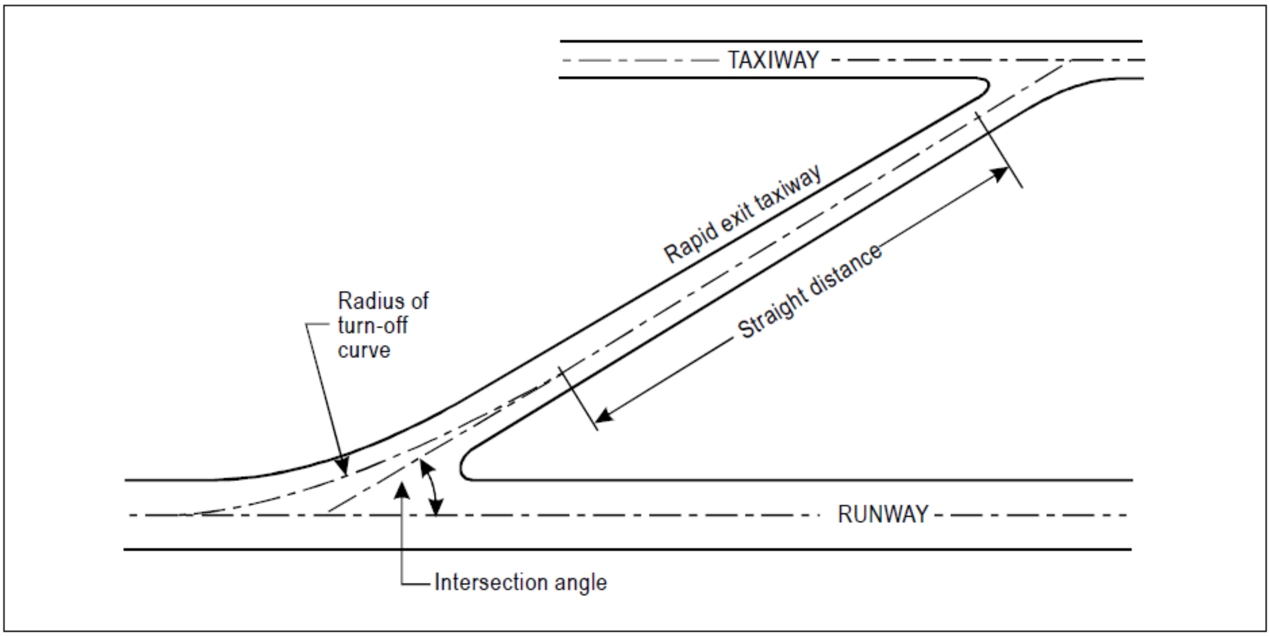



Figure GM-D-2 Rapid exit taxiway

### GM-ADR-DSN.D.300 — Taxiways on bridges ICAO

If aeroplane engines overhang the bridge structure, protection of adjacent areas below the bridge from engine blast may be required.

### GM-ADR-DSN.D.305 — Taxiway shoulders ICAO

Guidance on characteristics of taxiway shoulders and on shoulder treatment is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

### GM-ADR-DSN.D.310 Taxiway Strip ICAO

Guidance on characteristics of taxiway strips is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 2).

### GM-ADR-DSN.D.315 — Width of taxiway strips ICAO

### GM-ADR-DSN.D.320 — Objects on taxiway strips TXT ADD

## GM-ADR-DSN.D.325 — Grading of taxiway strips ICAO

## GM-ADR-DSN.D.330 — Slopes on taxiway strips ICAO

## GM-ADR-DSN.D.335 — Holding Bays, runway-holding positions, intermediate holding positions and road-holding positions

(a) At low levels of aerodrome activity (less than approximately 50 000 annual operations), there is normally little need to make deviations in the departure sequence. However, for higher activity levels, aerodromes with single taxiways and no holding bays or other bypasses provide aerodrome control units with no opportunity to change the sequence of departures once the aircraft have left the apron. In particular, at aerodromes with large apron areas, it is often difficult to arrange for aircraft to leave the apron in such a way that they will arrive at the end of the runway in the sequence required by air traffic services units.

(b) The provision of an adequate number of holding bay spaces or other bypasses, based upon an analysis of the current and near-term hourly aircraft departure demand, will allow a large degree of flexibility in generating the departure sequence.

(c) The space required for a holding bay depends on the number of aircraft positions to be provided, the size of the aircraft to be accommodated and the frequency of their utilisation. The dimensions will allow for sufficient space between aircraft to enable them to manoeuvre independently.

(d) Emergency access roads are not intended for use for the functions of airport service roads. Therefore, it is possible to provide different access control which will be clearly visible for all service ground traffic. Road holding position markings, lights or Runway guard lights are not necessary if the access to an emergency access road is ensured for RFF only.

(e) Further guidance is given in Aerodrome Design Manual (ICAO, Doc 9157, Part 2) and Procedures for Air Navigation Services — Air Traffic Management (ICAO, Doc 4444).

## GM-ADR-DSN.D.340 — Location of holding Bays, runway-holding positions, intermediate holding positions and road-holding positions

(a) Care will be taken so that propeller wash and jet blast from holding aircraft do not interfere with aircraft operations, cause damage to vehicles or injure people.

(b) Generally, when used to allow flexible departure sequencing, the most advantageous location for a holding bay is adjacent to the taxiway serving the runway end. Other locations along the taxiway are satisfactory for aircraft performing pre-flight checks or engine run-ups or as a holding point for aircraft awaiting departure clearance.

(c) An aircraft taxiing could endanger aircraft operations when the aircraft is too close to the runway during take-off and landings. It is so advised to check if the aircraft taking off or landing could be hinder. For this OLS and specially approach surfaces, take-off climb surfaces and OFZ are the first aspects to consider. An aircraft taxiing could also endanger aircraft operations when the aircraft location and orientation are so that the aircraft interfere with navaids. It is specific to instrument runways and especially important for precision approach runways. The non-penetration of critical/sensitive areas is the first check.

(d) For all runways, it will be verified that the distance between a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position and the centre line of a runway is so that a holding aircraft or vehicle will not infringe the approach surface and/or take-off climb surface.

(e) If the affected runway is used under precision approach procedures, it will be also verified that the distance between a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position and the centre line of a runway is so that a holding aircraft or vehicle will not infringe the obstacle-free zone and the critical/sensitive areas of precision approach navaids (e.g. ILS/MLS).

(f) In case that the affected runways is mainly used under precision approach procedures, a specific study can be used to locate a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position closer to the obstacle-free zone within the approach surface. In some cases (for larger aircraft), it could happen that even if the areas mentioned above are not infringed, interferences with navaids may occur leading to consider specific studies.

(g) If a holding bay, runway-holding position or road-holding position for a precision approach runway code number 4 is at a greater elevation compared to the threshold, the distance of 90 m or 107.5 m, as appropriate, specified in Book 1, Table D-2 could be further increased 5 m for every metre the bay or position is higher than the threshold.

(h) An aircraft taxiing could also endanger aircraft operation, when the aircraft is too close to other taxiing aircraft. For this, separation distances or margins between taxiing aircraft or taxiways will be considered.

(i) Further guidance is given in Aerodrome Design Manual (Doc 9157, Part 2).

## CHAPTER E — APRONS

### GM-ADR-DSN.E.345 General

### GM-ADR-DSN.E.350 Size of aprons *3.13.2*

(a) The total apron area should be adequate to permit safe and expeditious handling of aerodrome traffic at its maximum anticipated density.

(b) The amount of area required for a particular apron layout depends upon the following factors:

(1) the size and manoeuvrability characteristics of the aircraft using the apron;

(2) the volume of traffic using the apron;

(3) clearance requirements;

(4) type of ingress and egress to the aircraft stand;

(5) basic terminal layout or other airport use;

(6) aircraft ground activity requirements; and

(7) taxiways and service roads.

(c) Passenger aircraft services that are carried out during the time the aircraft is parked in a stand position include: galley; toilet and potable water service; baggage handling; fuelling; provision of air conditioning, oxygen, electrical power supply and starting air; and aircraft towing. Most of these functions have a vehicle and/or equipment associated with them, or have some type of fixed installation established to conduct these services. (ICAO Aerodrome Design Manual, Part 2, par. 3.4.6).

(d) Consideration should be given to providing sufficient area on the starboard side of the aircraft to support the level of activity that take place in the turnaround operation (ICAO Aerodrome Design Manual Part 2, par. 3.4.6).

### GM-ADR-DSN.E.355 — Strength of aprons

(a) Apron pavement protection against fuel: On aircraft stands, pavement surface in bituminous concrete and joints between concrete slabs should be protected from fuel effects.

(b) Fuel on bituminous concrete provokes a disintegration of the concrete, which becomes a kind of dark powder. On aircraft stands, it is not rare to have fuel on the pavement surface, due to leakage from aircraft or refuelling devices or due to a wrong move during refuelling. Therefore, if the aircraft stand pavement is in bituminous concrete, a specific protection is considered. Such protection is:

(1) A surface protection consisting in an overlay with a material inert against fuel;

(2) A product incorporated in the mass of the bituminous concrete during its fabrication, protecting aggregates and binder.

(c) The first solution has the disadvantages to be fragile against stamping effects due to aircraft at the stand, but is very useful for existing pavement protection.

(d) Taking into account the stamping due to aircraft at stands and the weakness of bituminous concrete against fuel, the aircraft stand pavements are often in cement concrete, which offers a much better resistance to stamping and to fuel. Nevertheless, joints between cement concrete slabs could be also damaged by fuel. According to the location of such joints regarding aircraft location and refuelling devices location, it is preferable to manufacture such joints in a material resistant to the fuel.

**GM-ADR-DSN.E.360 — Slopes on aprons – and GM**

(a) The design of slopes should direct spilled fuel away from building and apron service areas. Where such slopes are unavoidable, special measures should be taken to reduce the fire hazard resulting from fuel spillage.

(b) Slopes on apron have the same purpose as other pavement slopes, meaning to prevent the accumulation of water (or possible fluid contaminant) on the surface and to facilitate rapid drainage of surface water (or possible fluid contaminant). Nevertheless, the design of the apron, especially for the parts containing airplane stands, will specifically take into account the impact of the slopes on the airplane during its braking at the stand and during its start for departure (with push-back or with its own engines). The aims are, on the one hand, to avoid that an airplane passes its stop point and goes on the service road or to the closest building and on the other hand, to save fuel and optimise the manoeuvrability of the airplane or of the push-back device.

(c) Where the slope limitation of 1% on the stands cannot be achieved, the slope should be kept as shallow as possible and should be such that the operation of the aircraft and vehicles is not compromised.

**GM-ADR-DSN.E.365 — Clearance distances on aircraft stands**

(a) Reduced separation at the gate is possible where azimuth guidance by a visual docking guidance system is provided, in combination with additional mitigation measures, such as:

(1) good condition of marking and signage;

(2) apron stand in lights;

(3) maintenance of visual docking systems.

(b) Reduced Clearance Distances on Aircraft Stands:

(1) On aircraft stands where reduced clearance distances exist, guidance by visual docking guidance system should be provided.

(2) All objects for which reduced clearances apply should be properly marked or lighted (ICAO Annex 14, chapter 6).

(3) Aircraft stands where reduced clearance distances apply should be identified and the information published in the AIP.

(4) An aircraft stand equipped with a visual docking guidance system should provide the minimum clearance of 5.0 metres between an aircraft using the stand and any adjacent building, aircraft on another stand or other objects.

(c) The clearance distance between an aircraft on a stand provided with azimuth guidance by visual docking guidance system and an object or edge of service road may further be reduced subject to local circumstances provided that the object (e.g. blast fence) does not exceed a height of 3.0 metres above the surface of the relative aircraft stand.

# CHAPTER F — ISOLATED AIRCRAFT PARKING POSITION

## GM-ADR-DSN.F.370 — Isolated aircraft parking position

Care should be taken to ensure that the position is not located over underground utilities, such as gas and aviation fuel and, to the extent feasible, electrical or communication cables. The aerodrome control tower should be advised of an area or areas suitable for the parking of an aircraft.

# CHAPTER G — DE-ICING/ANTI-ICING FACILITIES

## GM-ADR-DSN.G.375 — General

## GM-ADR-DSN.G.380 — Location

(a) The de-icing/anti-icing facilities should be so located as to ensure that the holdover time of the anti-icing treatment is still in effect at the end of taxiing and when take-off clearance of the treated aeroplane is given.

(b) To further maximise departure flow rates for all aeroplanes, the location and size of de-icing/anti-icing facilities should be such that they allow for bypass taxiing during de-icing/anti-icing operations. (Doc 9640: — Manual of aircraft ground de-icing/anti-icing operations, paragraph 8.5(e).)

(c) Remote de-icing/anti-icing facilities located near departure runway ends or along taxiways are recommended when taxi times from terminals or off-terminal de-icing/anti-icing locations frequently exceed holdover times.

(d) Remote facilities compensate for changing weather conditions when icing conditions or blowing snow are expected to occur along the taxi-route taken by the aeroplane to the runway meant for take-off.

(e) The jet blast effects caused by a moving aeroplane on other aeroplanes receiving the anti-icing treatment or taxiing behind will have to be taken into account to prevent degradation of the treatment.

## GM-ADR-DSN.G.385 — Size and number of de-icing/anti-icing pads – and GM

(a) It is recommended that the aerodrome have facilities with a de-icing/anti-icing capability equivalent to the maximum peak hour departure rate that can be managed by the ATC units during de-icing/anti-icing operations. (Doc 9640: Manual of aircraft ground de-icing/anti-icing operations, paragraph 8.3.)

(b) The number of de-icing/anti-icing pads required should be determined based on the meteorological conditions, the type of aeroplanes to be treated, the method of application of de-icing/anti-icing fluid, the type and capacity of the dispensing equipment used, and the volume of traffic and departure flow rates.

(c) An aeroplane de-icing/anti-icing pad consists of:

   (1) an inner area for parking of an aeroplane to be treated; and

   (2) an outer area for movement of two or more mobile de-icing/anti-icing equipment.

(d) Where more than one de-icing/anti-icing pad is provided, consideration will have to be given to providing de-icing/anti-icing vehicle movement areas of adjacent pads that do not overlap, but are exclusive for each pad. Consideration will also need to be given to bypassing of the area by other aeroplanes with the clearances specified in CS-ADR-DSN.G.400.

## GM-ADR-DSN.G.390 — Slopes on de-icing/anti-icing pads – and GM

It is recommended that the drainage arrangements for the collection and safe disposal of excess de-icing/anti-icing fluids prevent ground water contamination.

**GM-ADR-DSN.G.395 — Strength of de-icing/anti-icing pads – and GM**

Consideration should be given to the fact that the de-icing/anti-icing pad (in common with an apron) will be subjected to a higher density of traffic and, as a result of slow-moving or stationary aircraft, to higher stresses than a runway.

**GM-ADR-DSN.G.400 — Clearance distances on a de-icing/anti-icing pad**

(a) The separation criteria should take into account the need for individual de-icing/anti-icing pads to provide sufficient maneuvering area around the airplane to allow simultaneous treatment by two or more mobile de-icing/anti-icing vehicles and sufficient non-overlapping space for a vehicle safety zone between adjacent de-icing pads and for other de-icing/anti-icing pads.

(b) The minimum clearance distance of 3.8 m is necessary for the movement of de-icing/anti-icing vehicles round the aircraft.

(c) Where the de-icing/anti-icing facility is located in a non-movement area, the minimum clearance distance can be reduced.

# CHAPTER H — OBSTACLE LIMITATION SURFACES

## GM-ADR-DSN.H.405 — Applicability

(a) The obstacle limitation surfaces define the limits to which objects may project into the airspace. Each surface is related to one or more phases of a flight, and provides protection to aircraft during that phase.

(b) The OLS also help to prevent the aerodromes from becoming unusable by the growth of obstacles around the aerodromes.

(c) The effective utilisation of an aerodrome may be considerably influenced by natural features and man-made constructions outside its boundary. These may result in limitations on the distance available for take-off and landing and on the range of meteorological conditions in which take-off and landing can be undertaken. For these reasons, certain areas of the local airspace must be regarded as integral parts of the aerodrome environment.

(d) Objects which penetrate the obstacle limitation surfaces may in certain circumstances cause an increase in the obstacle clearance altitude/height for an instrument approach procedure or any associated visual circling procedure or have other operational impact on flight procedure design. Criteria for flight procedure design are contained in the Procedures for Air Navigation Services — Aircraft Operations (ICAO, PANS-OPS, Doc 8168).

(e) In ideal circumstances all the surfaces will be free from obstacles but when a surface is infringed, any safety measures required will have regard to:

  (1) the nature of the obstacle and its location relative to the surface origin, to the extended centre line of the runway or normal approach and departure paths and to existing obstructions;

  (2) the amount by which the surface is infringed;

  (3) the gradient presented by the obstacle to the surface origin;

  (4) the type of air traffic at the aerodrome; and

  (5) the instrument approach procedures published for the aerodrome.

(f) Safety measures could be as follows:

  (1) promulgation in the AIP of appropriate information;

  (2) marking and/or lighting of the obstacle;

  (3) variation of the runway distances declared as available;

  (4) limitation of the use of the runway to visual approaches only;

  (5) restrictions on the type of traffic.

(g) In addition to the requirements described in Book 1, Chapter H (CS-ADR-DSN.H.405 et al.), it may be necessary to call for other restrictions to development on and in the vicinity of the aerodrome in order to protect the performance of visual and electronic aids to navigation and to ensure that such development does not adversely affect instrument approach procedures and the associated obstacle clearance limits.

**GM-ADR-DSN.H.410 — Outer horizontal surface**

(a) An outer horizontal surface is a specified portion of a horizontal plane around an aerodrome beyond the limits of the conical surface. It represents the level above which consideration needs to be given to the control of new obstacles in order to facilitate practicable and efficient instrument approach procedures, and together with the conical and inner horizontal surfaces to ensure safe visual manoeuvring in the vicinity of an aerodrome.

(b) The OHS is of particular importance for safe operations in areas of high ground or where there are concentrations of obstacles.

**GM-ADR-DSN.H.415 — Conical surface**

**GM-ADR-DSN.H.420 — Inner horizontal surface**

(a) The shape of the inner horizontal surface need not necessarily be circular. Guidance on determining the extent of the inner horizontal surface is contained in the Airport Services Manual (ICAO, Doc 9137, Part 6).

(b) The limits of the inner horizontal surface for longer runways (1 800 m or more in length) are defined as circles of radius 4 000 m centred on the strip ends of the runway. These circles are joined by common tangents parallel to the runway centre line to form a racetrack pattern. The boundary of this pattern is the boundary of the inner horizontal surface.

(c) For runways less than 1 800 m in length, the inner horizontal surface is defined as a circles centred on the midpoint of the runway.

(d) To protect two or more runways, a more complex pattern could become necessary. In this situation, all the circles are joined tangentially by straight lines: illustrated at the Figure GM-H-1.

(e) For more complex inner horizontal surfaces, with runways on different levels or runways where the thresholds differ more than 6 m, a common elevation is not essential, but where surfaces overlap, the lower surface should be regarded as dominant.

(f) Further guidance is contained in the Airport Services Manual (ICAO, DOC 9137, part 6).

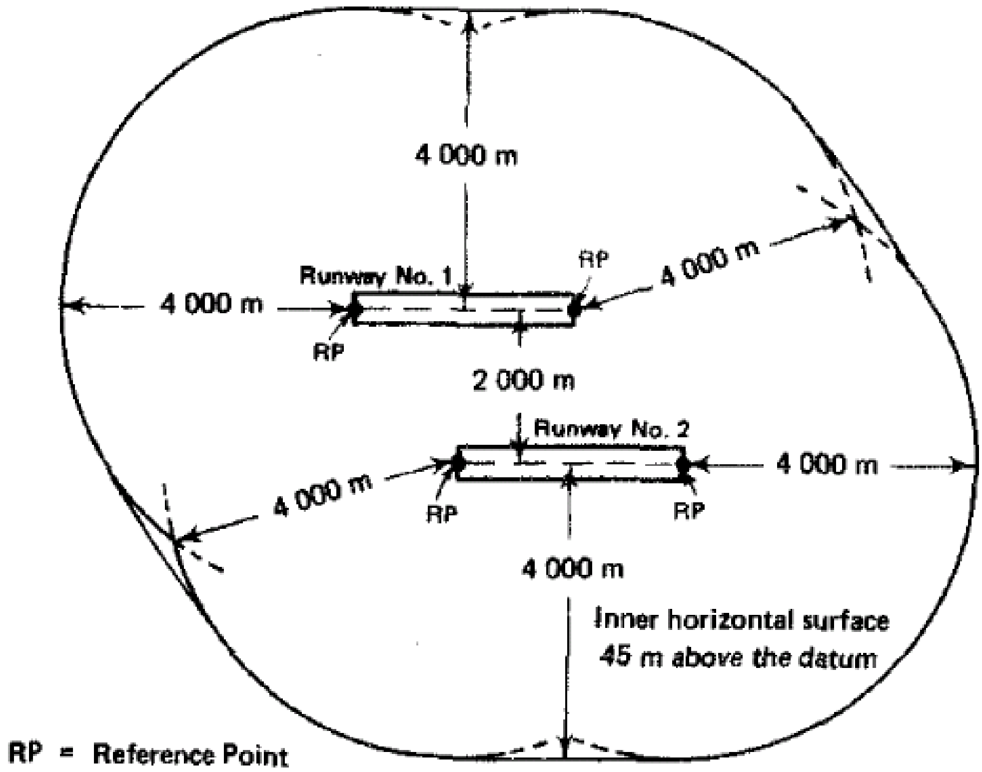



Figure 1-2. Composite inner horizontal surface for two parallel runways (where the runway code number is 4)

Figure GM-H-1

**GM-ADR-DSN.H.425 — Approach surface**

**GM-ADR-DSN.H.430 — Transitional surface** *ADD*

**GM-ADR-DSN.H.435 — Take-off climb surface** *ADD*

**GM-ADR-DSN.H.440 — Slewed Take-off climb surface** *ADD*

**GM-ADR-DSN.H.445 — Obstacle-Free Zone**

**GM-ADR-DSN.H.450 — Inner approach surface** *ICAO*

## GM-ADR-DSN.H.455 — Inner transitional surface ICAO

(a) It is intended that the inner transitional surface be the controlling obstacle limitation surface for navigation aids, aircraft and other vehicles that must be near the runway and which is not to be penetrated except for frangible objects. The transitional surface is intended to remain as the controlling obstacle limitation surface for buildings, etc.

(b) The inner transitional surface along the strip should be curved if the runway profile is curved or a plane if the runway profile is a straight line. The intersection of the inner transitional surface with the inner horizontal surface should also be a curved or straight line depending on the runway profile.

## GM-ADR-DSN.H.460 — Balked landing surface ICAO

# CHAPTER J — OBSTACLE LIMITATION REQUIREMENTS

## GM-ADR-DSN.J.465 — General

The requirements for obstacle limitation surfaces are specified on the basis of the intended use of a runway, i.e. take-off or landing and type of approach, and are intended to be applied when such use of the runway is made. In cases where operations are conducted to or from both directions of a runway, the function of certain surfaces may be nullified because of more stringent requirements of another lower surface.

## GM-ADR-DSN.J.470 — Non-instrument runways

(a) Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual (ICAO, Doc 9137, Part 6).

(b) Because of transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip. It is not intended that the strip be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, be removed unless it is considered that they may endanger aeroplanes.

## GM-ADR-DSN.J.475 — Non-precision approach runways

(a) If it is of particular importance for safe operation on circuits, arrival routes towards the airport or on departure or missed approach climb-paths, the appropriate authority should establish an outer horizontal surface for non-precision approach runways.

(b) Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual (ICAO, Doc 9137, Part 6).

(c) Because of transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip. It is not intended that the strip be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, be removed unless it is considered they may endanger aeroplanes.

## GM-ADR-DSN.J.480 — Precision approach runways

(a) See CS-ADR-DSN.T.915 for information regarding siting of equipment and installations on operational areas.

(b) Guidance on obstacle limitation surfaces for precision approach runways is given in the Airport Services Manual (ICAO, Doc 9137, Part 6).

(c) Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual (ICAO, Doc 9137, Part 6).

(d) Because of transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip. It is not intended that the strip be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, be removed unless it is considered that they may endanger aeroplanes.

**GM-ADR-DSN.J.485 — Runways meant for take-off**

(a) When local conditions differ widely from sea level standard atmospheric conditions, it may be advisable for the slope specified in Book 1, Table J-2 (repeated below as Table GM-J-1) to be reduced. The degree of this reduction depends on the divergence between local conditions and sea level standard atmospheric conditions, and on the performance characteristics and operational requirements of the aeroplanes for which the runway is intended.

(b) Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual (ICAO, Doc 9137, Part 6).

(c) Because of transverse slopes on a strip or clearway, in certain cases portions of the inner edge of the take-off climb surface may be below the corresponding elevation of the strip or clearway. It is not intended that the strip or clearway be graded to conform with the inner edge of the take-off climb surface, nor is it intended that terrain or objects which are above the take-off climb surface beyond the end of the strip or clearway, but below the level of the strip or clearway, be removed unless it is considered that they may endanger aeroplanes. Similar considerations apply at the junction of a clearway and strip where differences in transverse slopes exist.

RUNWAYS MEANT FOR TAKE-OFF

| | Code number | | |
|---|---|---|---|
| Surface and dimensions[a] | 1 | 2 | 3 or 4 |
| (1) | (2) | (3) | (4) |
| TAKE-OFF CLIMB | | | |
| Length of inner edge | 60 m | 80 m | 180 m |
| Distance from runway end[b] | 30 m | 60 m | 60 m |
| Divergence (each side) | 10% | 10% | 12.5% |
| Final width | 280 m | 580 m | 1 200 m<br>1 800 m[c] |
| Length | 1 600 m | 2 500 m | 15 000 m |
| Slope | 5% | 4% | 2%[d] |

a. All dimensions are measured horizontally unless specified otherwise.
b. The take-off climb surface starts at the end of the clearway if the clearway length exceeds the specified distance.
c. 1 800 m when the intended track includes changes of heading greater than 15° for operations conducted in IMC, VMC by night.
d. See CS-ADR-DSN.J.465(c) and (e).

Table GM-J-1 Dimensions and slopes of obstacle limitation surfaces

# CHAPTER K — VISUAL AIDS FOR NAVIGATION (INDICATORS AND SIGNALLING DEVICES)

## GM-ADR-DSN.K.490 — Wind direction indicator

(a) Wind direction indicators (wind socks) are important visual aids for all runway ends. Large wind direction indicators are particularly important at airports where landing information is not available through radio communications. On the other hand, landing direction indicators are seldom used due to the necessity and, consequently, responsibility, of changing their direction as wind direction shifts. Visual ground signals for runway and taxiway serviceability are contained in Annex 2. See also Aerodrome Design Manual (ICAO, Doc 9157, Part 4, Chapter 3).

(b) A fabric wind cone is generally the type preferred by pilots because it provides a general indication of wind speed. Cones that extend fully at wind speeds of about 15 kt are most useful since this is the maximum crosswind landing component for small aircraft.

(c) For an indicator of a single colour white or orange should preferably be used. Where a combination of two colours is required, they should preferably be orange and white, red and white, or black and white.

(d) It may be possible to improve the perception by the pilot of the location of the wind indicator by several means notably by circular marking arround this indicator.

(e) The usefulness of any visual aid is determined largely by its size, conspicuity and location. Given conditions of good atmospheric visibility, the maximum distance at which the information available from an illuminated wind sleeve can be usefully interpreted is 1 km. Thus, in order that a pilot may make use of this information whilst on approach, the wind sleeve should be sited no farther from the runway threshold than 600 m. Obstacle criteria excluded, the ideal location is 300 m along the runway from the threshold and laterally displaced at 80 m from the runway centre line.

(f) This means, in effect, that only those aerodromes where the thresholds are less than 1 200 m apart can meet the minimum requirement with a single unit. Most code 3 and 4 aerodromes will require two or more units suitably sited in order to provide the best possible coverage.

(g) The final choice of unit numbers and location will depend on a number of factors which will vary from aerodrome to aerodrome. However, when deciding on the most appropriate location, account should be taken to ensure that the windsleeve is:

(1) outside the Cleared and Graded Area of the runways and taxiways and beneath the 1:10 obstacle surface;

(2) clear of the OFZ and ILS critical/sensitive areas where appropriate;

(3) preferably not more than 200 m lateral displacement from the runway edge;

(4) preferably between 300 m and 600 m from the runway threshold measured along the runway;

(5) in an area with low background levels of illumination;

(6) visible from the approach and take-off positions of all runways used for public transport operations;

(7) free from the effects of air disturbance caused by nearby objects.

## GM-ADR-DSN.K.495 — Landing direction indicator

The landing 'T' may be constructed of wood or other light material and its dimensions may correspond to those shown in Book 1, Figure K-1. It may be painted white or orange. The landing 'T' should be mounted on a cement concrete pedestal adequately reinforced with steel bars to avoid cracks resulting from unequal settlement. The surface of the pedestal should be finished smooth with a steel trowel and coated with paint of appropriate colour. The colour of the pedestal should be chosen to contrast with the colour of the landing 'T'. Before fastening the landing 'T' base to the concrete pedestal, the mounting bolts should be checked for correct spacing. The landing 'T' should be assembled and mounted in accordance with the manufacturer's installation instructions. It should be free to move about a vertical axis so that it can be set in any direction. The under surface of the landing 'T', when mounted on its pedestal, should be not less than 1.25 m above ground level. Where required for use at night, the landing 'T' should either be illuminated or outlined by white lights.

## GM-ADR-DSN.K.500 — Signalling lamp

(a) A signalling lamp should be provided at a controlled aerodrome in the aerodrome control tower when required for air traffic management reasons.

(b) Characteristics:

(1) A signalling lamp should be capable of producing red, green and white signals, and of:

(i) Being aimed manually at any target as required;

(ii) Giving a signal in any one colour followed by a signal in either of the two other colours; and

(iii) When selecting the green light, use shall be made of the restricted boundary of green as specified in Book 1 Chapter U.

(iv) The beam spread should be not less than 1° or greater than 3°, with negligible light beyond 3°. When the signalling lamp is intended for use in the daytime, the intensity of the coloured light should be not less than 6 000 cd.

## GM-ADR-DSN.K.505 — Signal panels and signal area

(a) A signal panel and signal area may be needed when the aerodrome does not have an aerodrome control tower or an aerodrome flight information service unit, or when the aerodrome is used by aeroplanes not equipped with radio. Visual ground signals may also be useful in the case of failure of two-way radio communication with aircraft. It should be recognised, however, that the type of information which may be conveyed by visual ground signals should normally be available in AIPs or NOTAM. The potential need for visual ground signals should therefore be evaluated before deciding to provide a signal area.

(b) The inclusion of detailed specifications for a signal area in this GM is not intended to imply that one has to be provided. ICAO Annex 14 Attachment A provides guidance on the need to provide ground signals.

(c) ICAO Annex 2, Appendix 1, specifies the shape, colour and use of visual ground signals.

(d) Visual ground signals may also be useful in the case of failure of two-way radio communication with aircraft. It should be recognised, however, that the type of information which may be conveyed by visual ground signals should normally be available in AIPs or NOTAM. The potential need for visual ground signals should therefore be evaluated before deciding to provide a signal area.

## GM-ADR-DSN.K.510 — Location of signal area

A signal area need only be provided when it is intended to use visual ground signals to communicate with aircraft in flight. Such signals may be needed when the aerodrome does not have an aerodrome control tower or an aerodrome flight information service unit, or when the aerodrome is used by aeroplanes not equipped with a radio.

## GM-ADR-DSN.K.515 — Characteristics of signal area

The signal area should be constructed of cement concrete reinforced with an adequate quantity of steel to avoid cracks resulting from unequal settlement. The top surface should be finished smooth with a steel trowel and coated with paint of appropriate colour. The colour of the signal area should be chosen to contrast with the colours of the signal panels to be displayed thereon. (More guidance could be find in Aerodrome Design Manual (ICAO, Doc 9157, Part 4, Chapter 3).

**CHAPTER L — VISUAL AIDS FOR NAVIGATION (MARKINGS) (009 – 16032011)**

**GM-ADR-DSN.L.520 — General – Colour and conspicuity**

(a) Where there is insufficient contrast between the marking and the pavement surface, the marking should include an appropriate border.

(1) This border should be white or black;

(2) It is preferable that the risk of uneven friction characteristics on markings be reduced in so far as practicable by the use of a suitable kind of paint;

(3) Markings may consist of solid areas or a series of longitudinal stripes providing an effect equivalent to the solid areas.

(b) At aerodromes where operations take place at night, pavement markings should be made with reflective materials designed to enhance the visibility of the markings.

(c) Circumstances may occur when it is not practicable to install permanent markings, for example during runway resurfacing. So as to provide sufficient visual guidance to aircraft, the following markings should be considered:

(1) Runway centre line – required for operations below PA Category I;

(2) Taxiway centre line lead on/off;

(3) Runway edge line;

(4) Runway threshold;

(5) Touchdown zone and aiming point markings.

(d) Centre line and edge lights widths can be replaced by reduced width temporary markings and can reduce from 0.9 m to 0.6 m, if required.

(e) Touchdown zone and aiming point markings need not be repainted during the same shift as the asphalting but should be done as soon as practicable.

(f) Threshold piano keys should be returned as soon as possible initially in temporary materials, then permanent materials.

**GM-ADR-DSN.L.525 — Runway designation marking**

**GM-ADR-DSN.L.530 — Runway centre line marking**

For the centre line marking the 30 m length of and gap between stripes may be adjusted to take into consideration the runway thresholds locations.

**GM-ADR-DSN.L.535 Threshold marking**

**GM-ADR-DSN.L.540 Aiming point marking**

(a) The shape of alternative broken stripe markings provides additional advantages, as:

(1) one third of the marking is displaced transversely from the centre third of the runway width and is therefore less prone to rubber contamination;

(2) the marking is more easily identifiable as it differs from the TDZ markings;

(3) it provides enhanced visual cues for the angle of approach.

**GM-ADR-DSN.L.545 — Touchdown zone marking**

(a) In order to give information regarding the overall extension of a distance coding touchdown marking, as specified in Book 1 CS-ADR-DSN.L.545, the last pair of markings after the threshold should consist of two single stripes and the other pairs should correspond to the patterns shown in Book 1, Figure L-5.

(b) Such sequential layout gives intuitive information about the extension of the touchdown zone and, as a consequence, of the LDA or of the distance between thresholds.

**GM-ADR-DSN.L.550 — Runway side stripe marking**

When turn pads are not available at the end of a runway for back-track manoeuvres and threshold is displaced, in order to better identify full-strength bearing surface, it may be useful to display specific dashed markings as showed by Figure GM-L-1 and with dimensions described in Table GM-L-1.

**GM-ADR-DSN.L.555 — Taxiway centre line marking**

(a) The term ‘continuous guidance’ is not intended to require that taxiway centre line markings are provided onto aircraft stands. Instead, it is intended that the centre line marking be provided on taxiways leading to aircraft stands or other apron areas, from which visual cues or other means exist, such as lead-in arrows and stand number indicators, to enable aircrew to manoeuvre the aircraft onto a stand or other parking area.

(b) When RETIL lights are installed on a runway, it may be useful to provide related markings, whose pattern follows in the same way the layout of such lights.

(c) An example of RETIL associated markings is displayed in Figure GM-L-2.

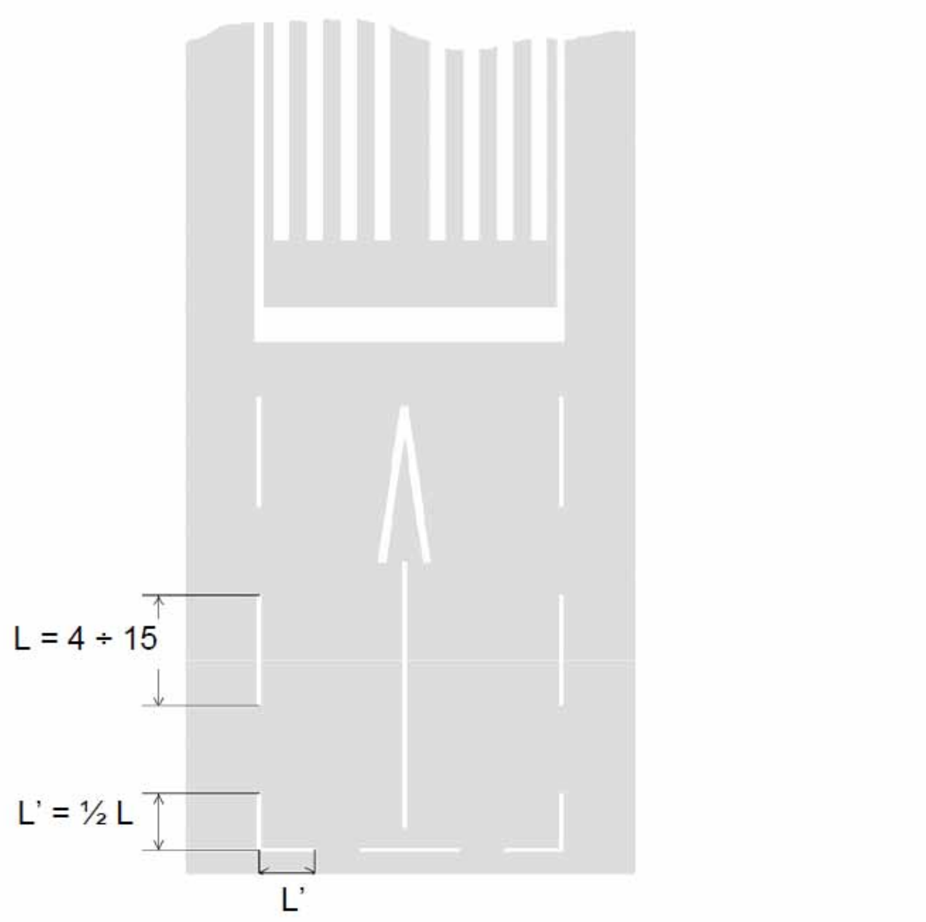



Figure GM-L-1 Dashed runway side stripe marking

| Table GM-L-1 – Runway Dashed Markings | | |
|---|---|---|
| Runway width (m) | Single dash dimensions | |
| | Length (minimum m) | Width (m) |
| 60 | 15 | 0.45 |
| 45 | 15 | 0.45 |
| 30 | 10 | 0.45 |
| 23 | 6 | 0.25 |
| 18 | 4 | 0.25 |

Table GM-L-1 Runway dashed markings

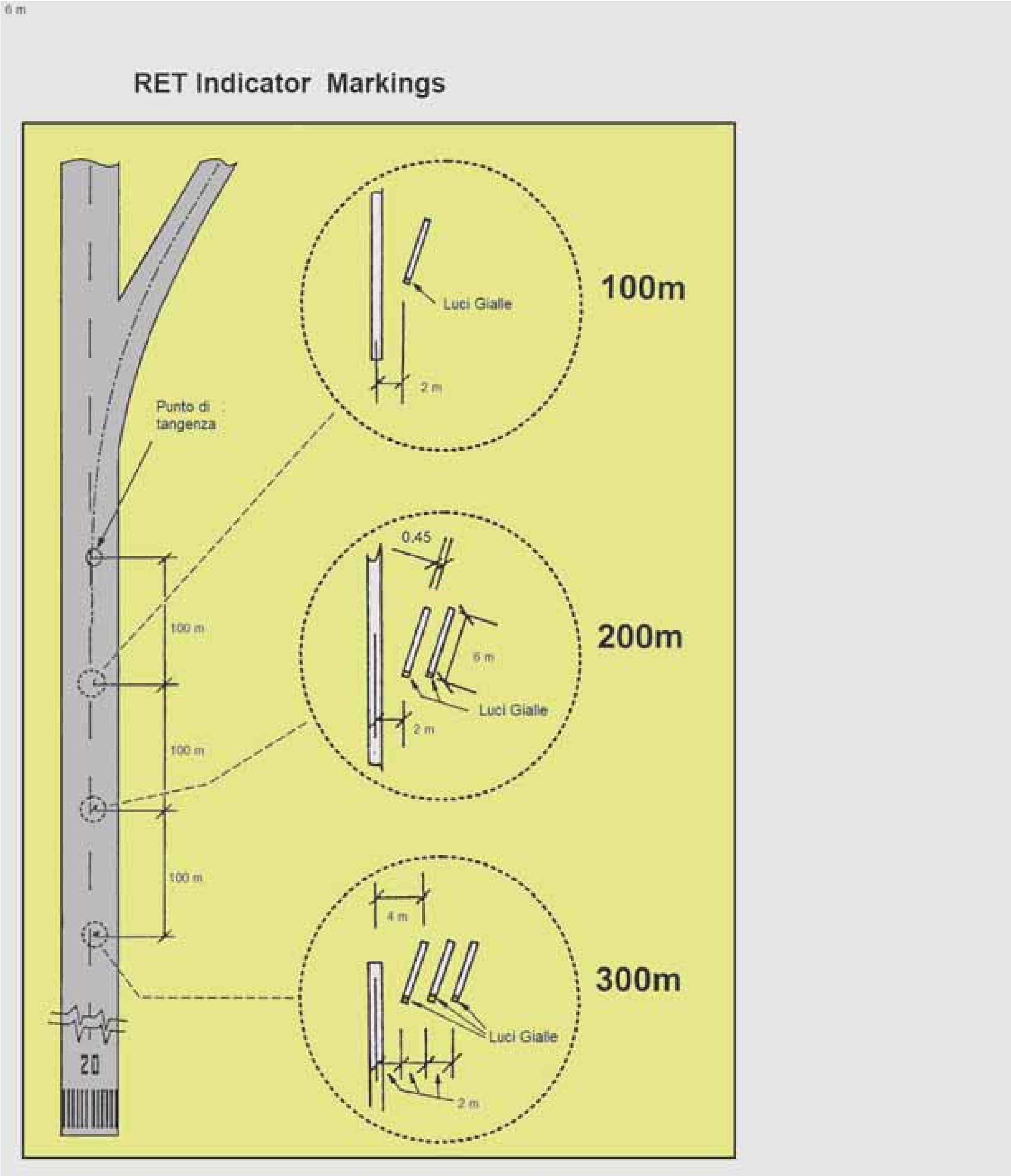



Figure GM-L-2 RETIL markings

## GM-ADR-DSN.L.560 — Interruption of runway markings

## GM-ADR-DSN.L.565 — Runway turn pad marking

**GM-ADR-DSN.L.570 — Enhanced taxiway centre line marking**

(a) Enhanced taxiway centre line marking may be provided to denote the proximity of a runway-holding position. The provision of enhanced taxiway centre line marking may form part of runway incursion prevention measures.

(b) Enhanced taxiway centre line marking may be installed at taxiway/runway intersections at that aerodrome as determined by the aerodrome operator/runway safety team as part of the aerodrome's runway incursion prevention programme.

(c) Those locations where enhanced taxiway centre lines are installed should be promulgated to AIS and included on the aerodrome chart, if required.

**GM-ADR-DSN.L.575 — Runway-holding position marking**

**GM-ADR-DSN.L.580 — Intermediate holding position marking**

**GM-ADR-DSN.L.585 — VOR aerodrome checkpoint marking**

**GM-ADR-DSN.L.590 — Aircraft stand marking**

(a) The distances to be maintained between the stop line and the lead-in line may vary according to different aircraft types, taking into account the pilot's field of view.

(b) Apron markings are installed to support the safe operation of aircraft on stands and apron areas. Markings may not be required where appropriate procedures are employed, giving flexibility of operations. Examples would include situations where aircraft marshallers are used or where aircraft are required to self-park on an open apron where different combinations of aircraft preclude dedicated markings. Specific markings/stands are normally more applicable for larger aircraft.

**GM-ADR-DSN.L.595 — Apron safety lines**

**GM-ADR-DSN.L.600 — Road-holding position marking**

(a) A road-holding position marking may be provided, as far as practicable, at all unpaved road entrances to a runway.

(b) Therefore, where a road that accesses a runway is unpaved, it may not be possible to install markings. In such cases, a road-holding position signs and/or lights should be installed, combined with appropriate instructions on how the driver of a vehicle should proceed.

(c) Where it is possible to install markings, they should conform to national regulations for traffic sings and markings.

**GM-ADR-DSN.L.605 Mandatory instruction marking** *(008 – 16032011)*

Except where operationally required, a mandatory instruction marking should not be located on a runway.

**GM-ADR-DSN.L.610 — Information marking**

(a) Applicability:

(1) Where an information sign would normally be installed and is impractical to install, as determined by the appropriate authority in consultation with the aerodrome operator, information marking should be displayed on the surface of the pavement.

(2) Where operationally required information sign should be supplemented by a marking on the pavement surface.

(b) Location:

(1) An information (location/direction) marking should be displayed prior to and following complex taxiway intersections and where operational experience has indicated the addition of a taxiway location marking could assist flight crew ground navigation and on the pavement surface at regular intervals along taxiways of great length.

(2) The information marking should be displayed across the surface of the taxiway or apron, where necessary, and positioned so as to be legible from the cockpit of an approaching aircraft.

(c) Characteristics:

(1) An information marking should consist of:

(i) an inscription in yellow upon a black background, when it replaces or supplements a location sign; and

(ii) an inscription in black upon a yellow background, when it replaces or supplements a direction or destination sign.

(2) Where there is insufficient contrast between the marking background and the pavement surface, the marking should include:

(i) a black border where the inscriptions are in black; and

(ii) a yellow border where the inscriptions are in yellow.

## CHAPTER M — VISUAL AIDS FOR NAVIGATION (LIGHTS)

### GM-ADR-DSN.M.615 — General

(a) Aeronautical ground lights near navigable waters should be taken into consideration to ensure that the lights do not cause confusion to mariners.

(b) In dusk or poor visibility conditions by day, lighting can be more effective than marking. For lights to be effective in such conditions or in poor visibility by night, they should be of adequate intensity. To obtain the required intensity, it will usually be necessary to make the light directional, in which case the arcs over which the light shows will have to be adequate and so orientated as to meet the operational requirements. The runway lighting system will have to be considered as a whole, to ensure that the relative light intensities are suitably matched to the same end.

(c) While the lights of an approach lighting system may be of higher intensity than the runway lighting, it is good practice to avoid abrupt changes in intensity as these could give a pilot a false impression that the visibility is changing during approach.

(d) The conspicuity of a light depends on the impression received of contrast between the light and its background. If a light is to be useful to a pilot by day when on approach, it must have an intensity of at least 2 000 or 3 000 cd, and in the case of approach lights an intensity of the order of 20 000 cd is desirable. In conditions of very bright daylight fog it may not be possible to provide lights of sufficient intensity to be effective.

(e) On the other hand, in clear weather on a dark night, an intensity of the order of 100 cd for approach lights and 50 cd for the runway edge lights may be found suitable. Even then, owing to the closer range at which they are viewed, pilots have sometimes complained that the runway edge lights seemed unduly bright.

(f) In fog the amount of light scattered is high. At night this scattered light increases the brightness of the fog over the approach area and runway to the extent that little increase in the visual range of the lights can be obtained by increasing their intensity beyond 2 000 or 3 000 cd. In an endeavour to increase the range at which lights would first be sighted at night, their intensity must not be raised to an extent that a pilot might find excessively dazzling at diminished range.

(g) From the foregoing will be evident the importance of adjusting the intensity of the lights of an aerodrome lighting system according to the prevailing conditions, so as to obtain the best results without excessive dazzle that would disconcert the pilot. The appropriate intensity setting on any particular occasion will depend both on the conditions of background brightness and the visibility.

(h) Assessment on dazzle in the aerodrome vicinity:

(1) Human vision is a complex mechanism using both eye and brain. Even though this mechanism is quite handled for eye, there is still a lack of knowledge on the interpretation of it by the brain. Thus, vision varies from one human being to another.

(2) The field of view is defined by the area perceived by eyes. The perception of details is based on the luminance ratio between elements of the scene, taking into account spatial distribution. Luminance and contrast are key elements of vision mechanism.

(3) Four sectors can be identified in the field of view (FOV):

(i) sensation field, corresponding to the absolute boundaries of FOV; it opens up to approximately 90° on each side of the eye direction;

(ii) visibility field, which is narrower and enables the perception of an object; it opens up to 60°;

(iii) conspicuity field, which enable the recognition, it opens up to 30°;

(iv) working conspicuity field, which is further tightly centred on the eye direction (1 to 2°); it enables the identification and is the working area of the vision.

It is reminded that the retina is composed in its centre by cone cells (that see colours and details) and at the periphery by rod cells (that perceive movements and change of state).

(i) A safety assessment is conducted in order to identify situations where the risk of dazzling becomes unacceptable. Thus, it is noted that dazzle represents such a risk in the following situations:

(1) during approach, especially after the aircraft has descended below the decision height: the pilot shall not lose any visual cue;

(2) at touchdown the pilot shall not be surprised by a flash;

(3) during rolling (landing or take-off), the pilot shall be able to perceive his environment and detect any deviation from the centre line: the pilot shall not lose any visual cue.

(4) Thus:

(i) prejudicial dazzle due to veiling luminance shall not occur during approach (slightly before the decision height) and rolling;

(ii) surprise effect shall not occur at touchdown.

(j) Regarding air traffic controllers, it has been considered that dazzle induced by veiling effect should not reduce the visual perception of aircraft operations on, and close to the runway.

(k) The elements here above can be applied to solar panels.

(l) The following assumptions can be made:

(1) solar panels are inclined so as to efficiently capture the sunlight, conducting to a range of cross section surfaces;

(2) the maximum acceptable luminance value has been fixed to 20,000 cd/m$^2$;

(3) the surfaces varied from 100 m$^2$ to several hectares;

(m) It is assumed that the aircraft maintains precisely its trajectory whereas in reality the approach is conducted into a conical envelop around the expected trajectory.

**GM-ADR-DSN.M.620 — Aeronautical beacons**

**SECTION 1 APPROACH LIGHTING SYSTEMS**

**GM-ADR-DSN.M.625 — Approach lighting systems, general and applicability**

(a) Types and characteristics

(1) The specifications in this volume provide for the basic characteristics for simple and precision approach lighting systems. For certain aspects of these systems, some latitude is permitted, for example, in the spacing between centre line lights and crossbars. The approach lighting patterns that have been generally adopted are shown in Figures GM-M-1 and GM-M-2. A diagram of the inner 300 m of the precision approach category II and III lighting system is shown in Figure GM-M-5A and GM-M-5B.

(2) The approach lighting configuration is to be provided irrespective of the location of the threshold, i.e. whether the threshold is at the extremity of the runway or displaced from the runway extremity. In both cases, the approach lighting system should extend up to the threshold. However, in the case of a displaced threshold, inset lights are used from the runway extremity up to the threshold to obtain the specified configuration. These inset lights are designed to satisfy the structural requirements specified in CS.XX.110(c), and the photometric requirements specified in Book 1, CS-ADR-DSN.U.940 Figure U-5 or U-6.

(3) Flight path envelopes to be used in designing the lighting are shown in Figure GM-M-4.

(b) Horizontal Installation tolerances:

(1) The dimensional tolerances are shown in Book 1, CS-ADR-DSN.U.940 Figure U-11.

(2) The centre line of an approach lighting system should be as coincident as possible with the extended centre line of the runway with a maximum tolerance of ±15′.

(3) The longitudinal spacing of the centre line lights should be such that one light (or group of lights) is located in the centre of each crossbar, and the intervening centre line lights are spaced as evenly as practicable between two crossbars or a crossbar and a threshold.

(4) The crossbars and barrettes should be at right angles to the centre line of the approach lighting system with a tolerance of ±30′, if the pattern in Figure GM-M-2 (A) is adopted or ± 2°, if Figure GM-M-2 (B) is adopted.

(5) When a crossbar has to be displaced from its standard position, any adjacent crossbar should, where possible, be displaced by appropriate amounts in order to reduce the differences in the crossbar spacing.

(6) When a crossbar in the system shown in Figure GM-M-2 (A) is displaced from its standard position, its overall length should be adjusted so that it remains one-twentieth of the actual distance of the crossbar from the point of origin. It is not necessary, however, to adjust the standard 2.7 m spacing between the crossbar lights, but the crossbars should be kept symmetrical about the centre line of the approach lighting.

(c) Vertical Installation tolerances:

(1) The ideal arrangement is to mount all the approach lights in the horizontal plane passing through the threshold (see Figure GM-M-3), and this should be the general aim as far as local conditions permit. However, buildings, trees, etc., should not obscure the lights from the view of a pilot who is assumed to be 1° below the electronic glide path in the vicinity of the outer marker.

(2) Within a stopway or clearway, and within 150 m of the end of a runway, the lights should be mounted as near to the ground as local conditions permit in order to minimise risk of damage to aeroplanes in the event of an overrun or undershoot. Beyond

the stopway and clearway, it is not so necessary for the lights to be mounted close to the ground, and therefore undulations in the ground contours can be compensated for by mounting the lights on poles of appropriate height.

(3) It is desirable that the lights be mounted so that, as far as possible, no object within a distance of 60 m on each side of the centre line protrudes through the plane of the approach lighting system. Where a tall object exists within 60 m of the centre line and within 1 350 m from the threshold for a precision approach lighting system, or 900 m for a simple approach lighting system, it may be advisable to install the lights so that the plane of the outer half of the pattern clears the top of the object.

(4) In order to avoid giving a misleading impression of the plane of the ground, the lights should not be mounted below a gradient of 1 in 66 downwards from the threshold to a point 300 m out, and below a gradient of 1 in 40 beyond the 300 m point. For a precision approach category II and III lighting system, more stringent criteria may be necessary, e.g. negative slopes not permitted within 450 m of the threshold.

(i) *Centre line.* The gradients of the centre line in any section (including a stopway or clearway) should be as small as practicable, and the changes in gradients should be as few and small as can be arranged and should not exceed 1 in 60. Experience has shown that as one proceeds outwards from the runway, rising gradients in any section of up to 1 in 66, and falling gradients of down to 1 in 40, are acceptable.

(ii) *Crossbars.* The crossbar lights should be so arranged as to lie on a straight line passing through the associated centre line lights, and, wherever possible, this line should be horizontal. It is permissible, however, to mount the lights on a transverse gradient not more than 1 in 80, if this enables crossbar lights within a stopway or clearway to be mounted nearer to the ground on sites where there is a cross-fall.

(5) When the barrette is composed of lights approximating to point sources, a spacing of 1.5 m between adjacent lights in the barrette has been found satisfactory.

(6) At locations where identification of the simple approach lighting system is difficult at night due to surrounding lights, sequence flashing lights installed in the outer portion of the system may resolve this problem.

(d) Clearance of obstacles:

(1) An area, hereinafter referred to as the light plane, has been established for obstacle clearance purposes, and all lights of the system are in this plane. This plane is rectangular in shape and symmetrically located about the approach lighting system's centre line. It starts at the threshold and extends 60 m beyond the approach end of the system, and is 120 m wide.

(2) No objects are permitted to exist within the boundaries of the light plane which are higher than the light plane except as designated herein. All roads and highways are considered as obstacles extending 4.8 m above the crown of the road, except aerodrome service roads where all vehicular traffic is under control of the aerodrome authorities and coordinated with the aerodrome traffic control tower. Railroads, regardless of the amount of traffic, are considered as obstacles extending 5.4 m above the top of the rails.

(3) It is recognised that some components of electronic landing aids systems, such as reflectors, antennas, monitors, etc., must be installed above the light plane. Every effort should be made to relocate such components outside the boundaries of the light plane. In the case of reflectors and monitors, this can be done in many instances.

(4) Where an ILS localiser is installed within the light plane boundaries, it is recognised that the localiser, or screen, if used, must extend above the light plane. In such

cases, the height of these structures should be held to a minimum and they should be located as far from the threshold as possible. In general, the rule regarding permissible heights is 15 cm for each 30 m the structure is located from the threshold. As an example, if the localiser is located 300 m from the threshold, the screen will be permitted to extend above the plane of the approach lighting system by 10 × 15 = 150 cm maximum, but preferably should be kept as low as possible consistent with proper operation of the ILS.

(5) In locating an MLS azimuth antenna the guidance contained in ICAO Annex 10, Volume I, Attachment G, should be followed. This material, which also provides guidance on collocating an MLS azimuth antenna with an ILS localiser antenna, suggests that the MLS azimuth antenna may be sited within the light plane boundaries where it is not possible or practical to locate it beyond the outer end of the approach lighting for the opposite direction of approach. If the MLS azimuth antenna is located on the extended centre line of the runway, it should be as far as possible from the closest light position to the MLS azimuth antenna in the direction of the runway end. Furthermore, the MLS azimuth antenna phase centre should be at least 0.3 m above the light centre of the light position closest to the MLS azimuth antenna in the direction of the runway end. (This could be relaxed to 0.15 m if the site is otherwise free of significant multipath problems.)

(6) Compliance with this requirement, which is intended to ensure that the MLS signal quality is not affected by the approach lighting system, could result in the partial obstruction of the lighting system by the MLS azimuth antenna. To ensure that the resulting obstruction does not degrade visual guidance beyond an acceptable level, the MLS azimuth antenna should not be located closer to the runway end than 300 m and the preferred location is 25 m beyond the 300 m crossbar (this would place the antenna 5 m behind the light position 330 m from the runway end). Where an MLS azimuth antenna is so located, a central part of the 300 m crossbar of the approach lighting system would alone be partially obstructed. Nevertheless, it is important to ensure that the unobstructed lights of the crossbar remain serviceable all the time.

(7) Objects existing within the boundaries of the light plane, requiring the light plane to be raised in order to meet the criteria contained herein, should be removed, lowered or relocated where this can be accomplished more economically than raising the light plane.

(8) In some instances objects may exist which cannot be removed, lowered or relocated economically. These objects may be located so close to the threshold that they cannot be cleared by the 2 % slope. Where such conditions exist and no alternative is possible, the 2 % slope may be exceeded or a 'stair step' resorted to in order to keep the approach lights above the objects. Such 'step' or increased gradients should be resorted to only when it is impracticable to follow standard slope criteria, and they should be held to the absolute minimum. Under this criterion no negative slope is permitted in the outermost portion of the system.

(e) Consideration of the effects of reduced lengths:

(1) The need for an adequate approach lighting system to support precision approaches where the pilot is required to acquire visual references prior to landing, cannot be stressed too strongly. The safety and regularity of such operations is dependent on this visual acquisition. The height above runway threshold at which the pilot decides there are sufficient visual cues to continue the precision approach and land will vary, depending on the type of approach being conducted and other factors such as meteorological conditions, ground and airborne equipment, etc. The required length of approach lighting system which will support all the variations of such approaches is 900 m, and this shall always be provided whenever possible.

(2) However, there are some runway locations where it is impossible to provide the 900 m length of approach lighting system to support precision approaches.

(3) In such cases, every effort should be made to provide as much approach lighting system as possible. The appropriate authority may impose restrictions on operations to runways equipped with reduced lengths of lighting. There are many factors which determine at what height the pilot must have decided to continue the approach to land or execute a missed approach. It must be understood that the pilot does not make an instantaneous judgement upon reaching a specified height. The actual decision to continue the approach and landing sequence is an accumulative process which is only concluded at the specified height. Unless lights are available prior to reaching the decision point, the visual assessment process is impaired and the likelihood of missed approaches will increase substantially. There are many operational considerations which must be taken into account by the appropriate authorities in deciding if any restrictions are necessary to any precision approach and these are detailed in ICAO Annex 6.

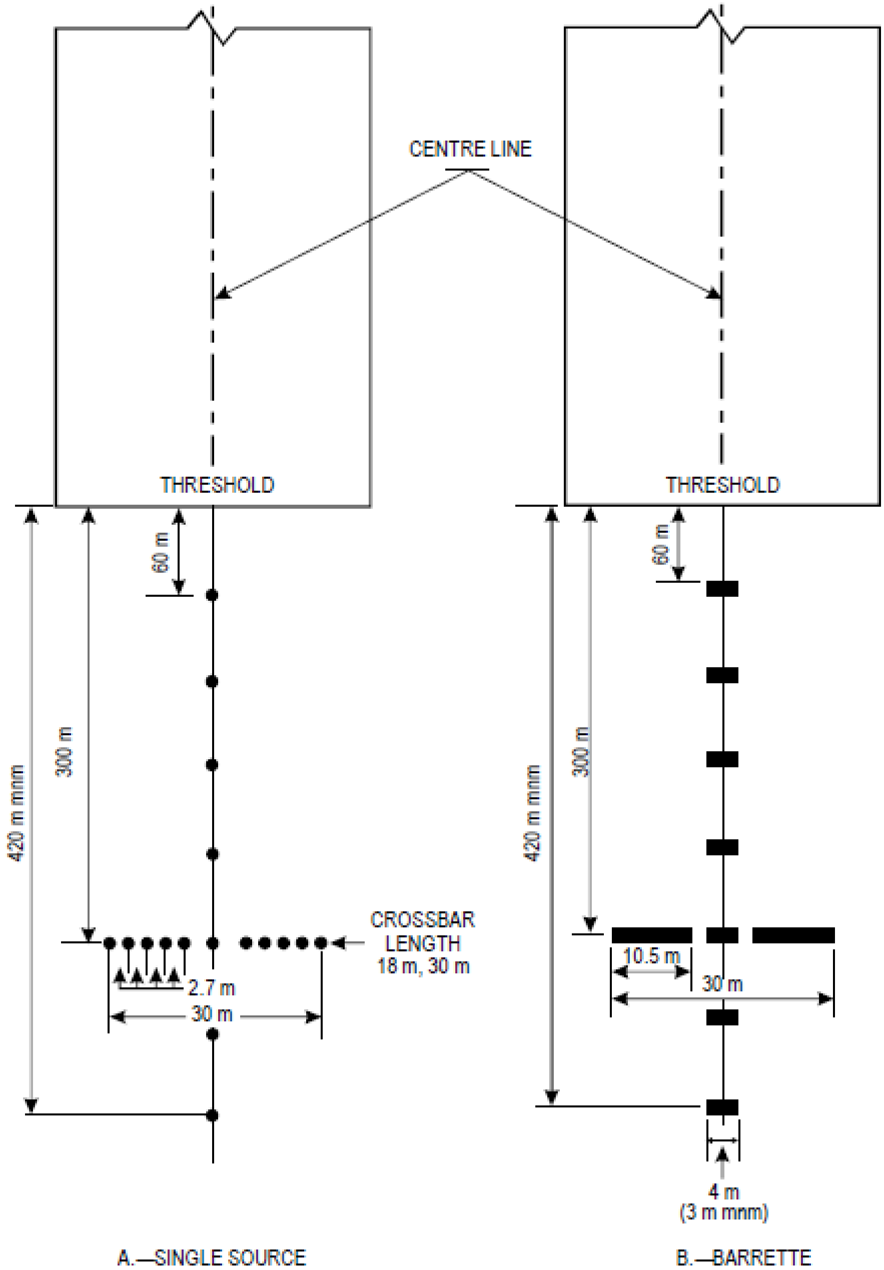



Figure GM-M-1 Simple approach lighting system

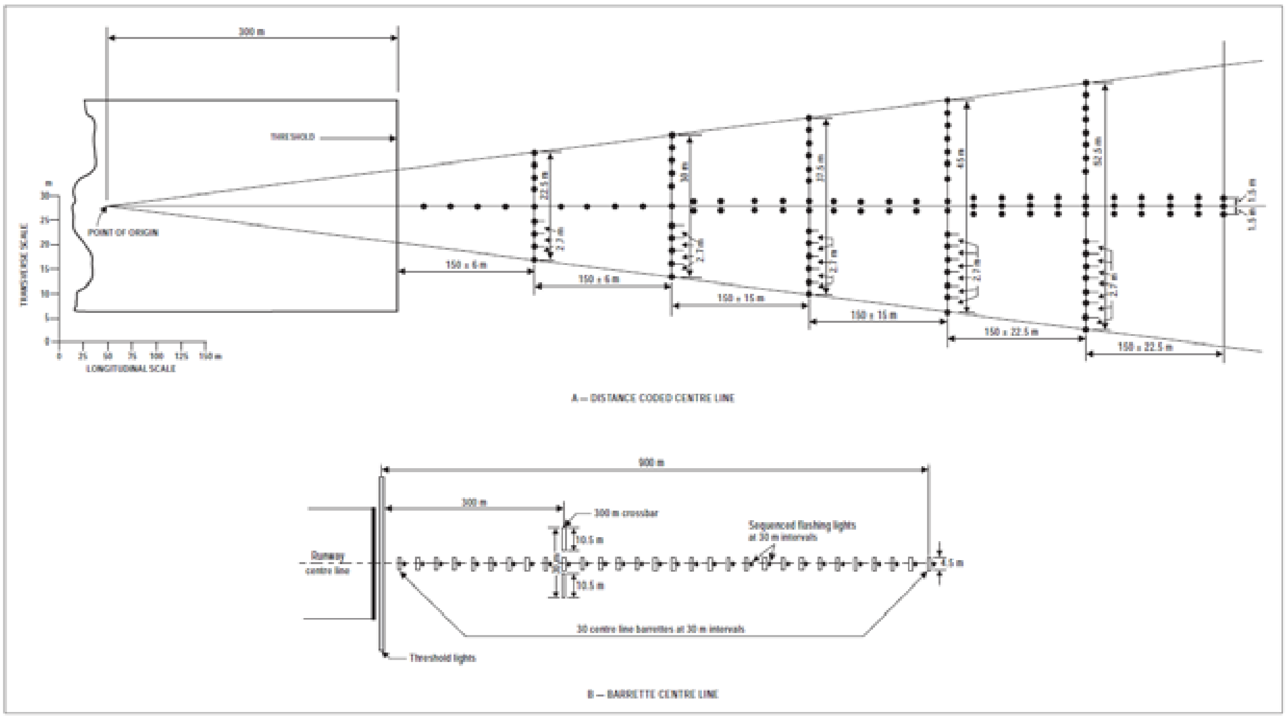



Figure GM-M-2 Precision approach category I lighting system

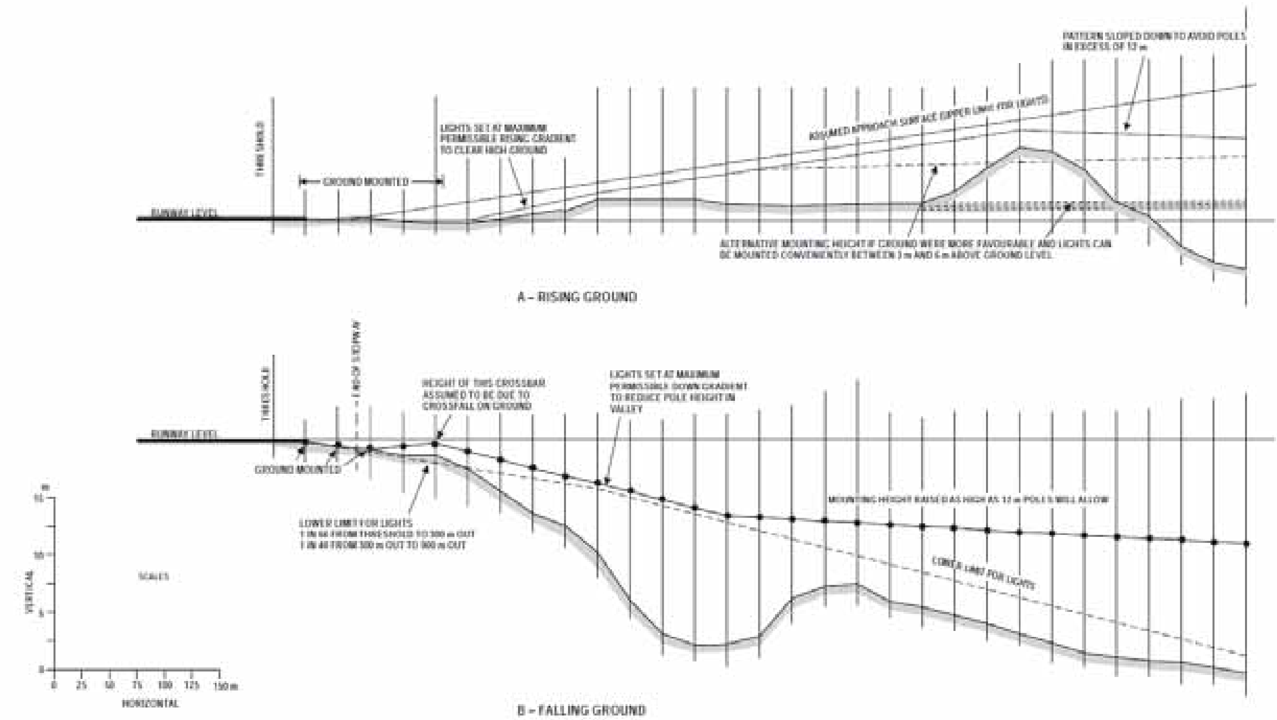



Figure GM-M-3 Vertical installation tolerances

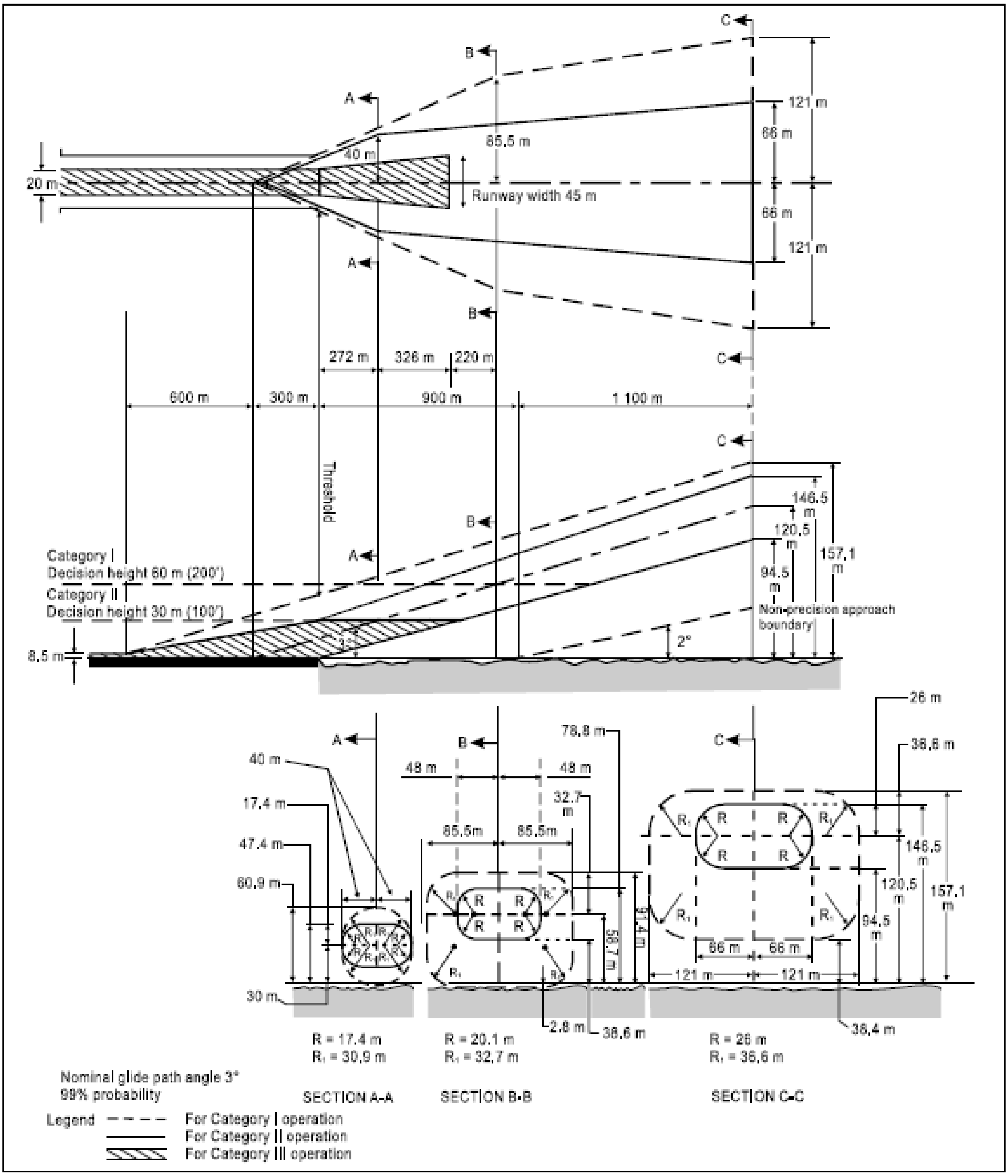



Figure GM-M-4 Flight path envelopes to be used for lighting design for category I, II and III operations - Centre line lights

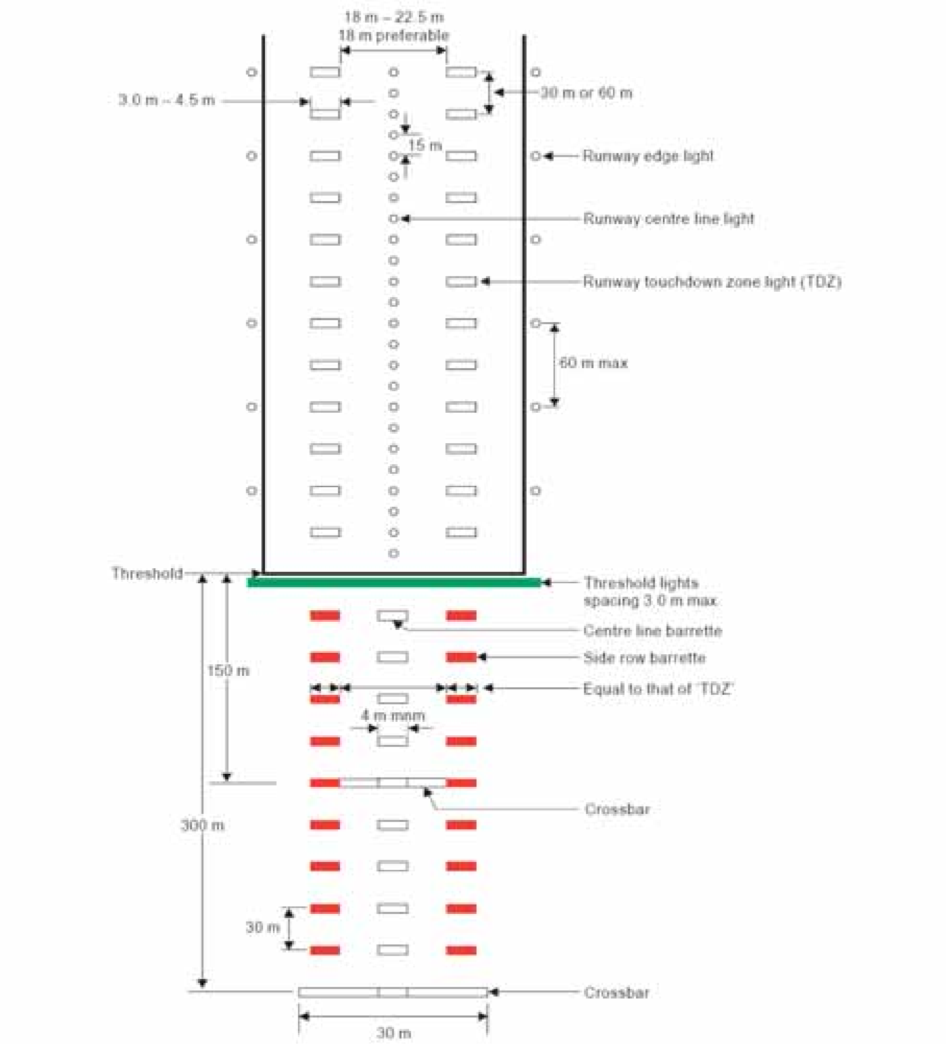



Figure GM-M-5A Inner 300 m approach and runway lighting for precision approach runways, categories II and III

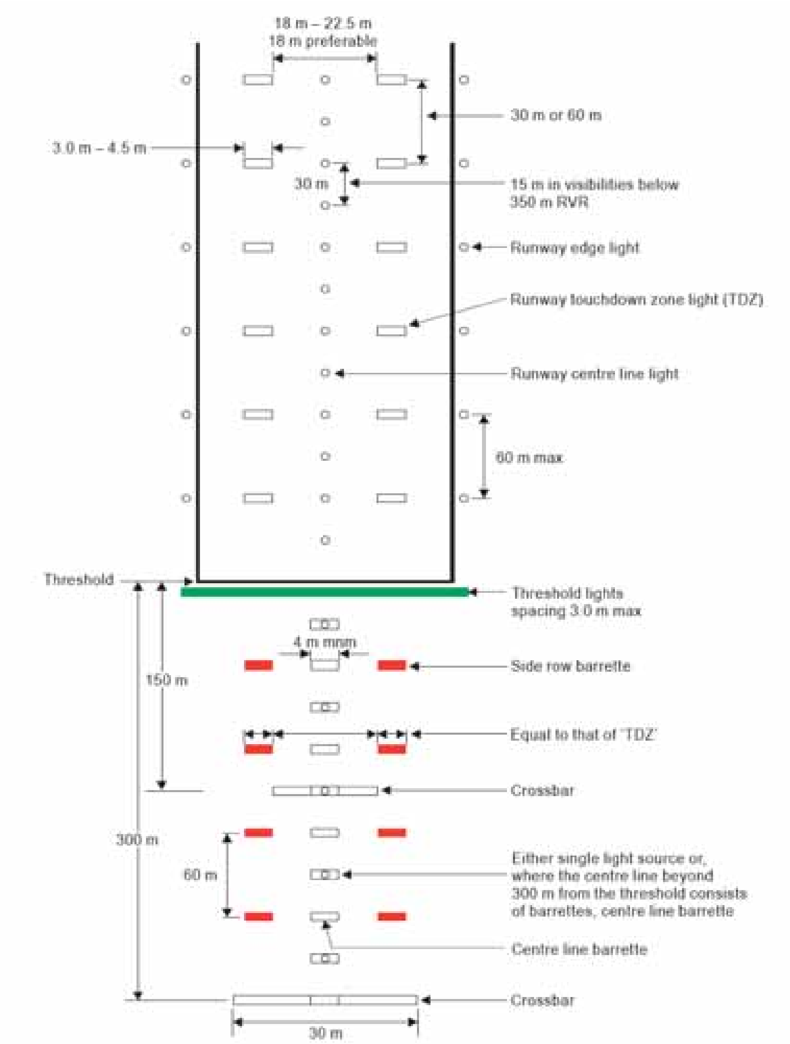



Figure GM-M-5B Inner 300 m approach and runway lighting for precision approach runways, categories II and III, where the serviceability levels of the lights specified as maintenance objectives in Chapter 10 can be demonstrated.

**GM-ADR-DSN.M.630 — Precision approach category I lighting system**

(a) Location and Composition:

(1) The installation of an approach lighting system of less than 900 m in length may result in operational limitations on the use of the runway.

(2) Spacings for the crossbar lights between 1 m and 4 m are in use. Gaps on each side of the centre line may improve directional guidance when approaches are made with a lateral error, and facilitate the movement of rescue and fire-fighting vehicles.

(3) The system should lie as nearly as practicable in the horizontal plane passing through the threshold.

(4) The specifications in this document provide for the basic characteristics for precision approach lighting systems. For certain aspects of these systems, some latitude is permitted, for example, in the spacing between centre line lights and crossbars. The approach lighting patterns that have been generally adopted are shown in Figure GM-M-2.

(5) The approach lighting configuration is to be provided irrespective of the location of the threshold, i.e. whether the threshold is at the extremity of the runway or displaced from the runway extremity. In both cases, the approach lighting system should extend up to the threshold. However, in the case of a displaced threshold, inset lights are used from the runway extremity up to the threshold to obtain the specified configuration. These inset lights are designed to satisfy the structural requirements specified in this Regulation and the chromaticity and characteristics specified in CS-ADR-DSN.U.930 and CS-ADR-DSN.U.940.

(b) Horizontal tolerances:

(1) The applicable dimensional tolerances are shown in Figure GM-M-2.

(2) The centre line of an approach lighting system should be as coincident as possible with the extended centre line of the runway with a maximum tolerance of ±15´.

(3) The longitudinal spacing of the centre line lights should be such that one light (or group of lights) is located in the centre of each crossbar, and the intervening centre line lights are spaced as evenly as practicable between two crossbars or a crossbar and a threshold.

(4) The crossbars and barrettes should be at right angles to the centre line of the approach lighting system with a tolerance of ±30´, if the pattern in Figure GM-M-2 (A) is adopted or ±2°, if Figure GM-M-2 (B) is adopted.

(5) When a crossbar has to be displaced from its standard position, any adjacent crossbar should, where possible, be displaced by appropriate amounts in order to reduce the differences in the crossbar spacing.

(6) When a crossbar in the system shown in Figure GM-M-2 (A) is displaced from its standard position, its overall length should be adjusted so that it remains one twentieth of the actual distance of the crossbar from the point of origin. It is not necessary, however, to adjust the standard 2.7 m spacing between the crossbar lights, but the crossbars should be kept symmetrical about the centre line of the approach lighting.

(a) Vertical tolerances:

(1) The ideal arrangement is to mount all the approach lights in the horizontal plane passing through the threshold (see Figure GM-M-3), and this should be the general aim as far as local conditions permit. However, buildings, trees, etc., should not obscure the lights from the view of a pilot who is assumed to be 1° below the electronic glide path in the vicinity of the outer marker.

(2) Within a stopway or clearway, and within 150 m of the end of a runway, the lights should be mounted as near to the ground as local conditions permit in order to minimise risk of damage to aeroplanes in the event of an overrun or undershoot. Beyond the stopway and clearway, it is not so necessary for the lights to be mounted close to the ground and therefore undulations in the ground contours can be compensated for by mounting the lights on poles of appropriate height.

(3) It is desirable that the lights be mounted so that, as far as possible, no object within a distance of 60 m on each side of the centre line protrudes through the

plane of the approach lighting system. Where a tall object exists within 60 m of the centre line and within 1 300 m from the threshold for a precision approach lighting system, it may be advisable to install the lights so that the plane of the outer half of the pattern clears the top of the object.

**GM-ADR-DSN.M.635 — Precision approach category II and III lighting system**

(a) Horizontal tolerances

(1) The applicable dimensional tolerances are shown in Figure GM-M-2.

(2) The centre line of an approach lighting system should be as coincident as possible with the extended centre line of the runway with a maximum tolerance of ±15´.

(3) The longitudinal spacing of the centre line lights should be such that one light (or group of lights) is located in the centre of each crossbar, and the intervening centre line lights are spaced as evenly as practicable between two crossbars or a crossbar and a threshold.

(4) The crossbars and barrettes should be at right angles to the centre line of the approach lighting system with a tolerance of ±30´, if the pattern in GM-M-2 (A) is adopted or ±2°, if GM-M-2 (B) is adopted.

(5) When a crossbar has to be displaced from its standard position, any adjacent crossbar should, where possible, be displaced by appropriate amounts in order to reduce the differences in the crossbar spacing.

(6) When a crossbar in the system shown in Figure GM-M-2 (A) is displaced from its standard position, its overall length should be adjusted so that it remains one twentieth of the actual distance of the crossbar from the point of origin. It is not necessary, however, to adjust the standard 2.7 m spacing between the crossbar lights, but the crossbars should be kept symmetrical about the centre line of the approach lighting.

(b) Vertical tolerances:

(1) The ideal arrangement is to mount all the approach lights in the horizontal plane passing through the threshold (see Figure GM-M-3), and this should be the general aim as far as local conditions permit. However, buildings, trees, etc., should not obscure the lights from the view of a pilot who is assumed to be 1° below the electronic glide path in the vicinity of the outer marker.

(2) Within a stopway or clearway, and within 150 m of the end of a runway, the lights should be mounted as near to the ground as local conditions permit in order to minimise risk of damage to aeroplanes in the event of an overrun or undershoot. Beyond the stopway and clearway, it is not so necessary for the lights to be mounted close to the ground and therefore undulations in the ground contours can be compensated for by mounting the lights on poles of appropriate height.

(3) It is desirable that the lights be mounted so that, as far as possible, no object within a distance of 60 m on each side of the centre line protrudes through the plane of the approach lighting system. Where a tall object exists within 60 m of the centre line and within 1 300 m from the threshold for a precision approach lighting system, it may be advisable to install the lights so that the plane of the outer half of the pattern clears the top of the object.

(c) In order to avoid giving a misleading impression of the plane of the ground, the lights should not be mounted below a gradient of 1 in 66 downwards from the threshold to a point 300 m out, and below a gradient of 1 in 40 beyond the 300 m point. For a precision approach category II and III lighting system, more stringent criteria may be necessary, e.g. negative slopes not permitted within 450 m of the threshold.

(d) The gradients of the centre line in any section (including a stopway or clearway) should be as small as practicable, and the changes in gradients should be as few and small as can be arranged and should not exceed 1 in 60. Experience has shown that as one proceeds outwards from the runway, rising gradients in any section of up to 1 in 66, and falling gradients of down to 1 in 40, are acceptable.

(e) The crossbar lights should be so arranged as to lie on a straight line passing through the associated centre line lights, and, wherever possible, this line should be horizontal. It is permissible, however, to mount the lights on a transverse gradient not more than 1 in 80, if this enables crossbar lights within a stopway or clearway to be mounted nearer to the ground on sites where there is a cross-fall.

(f) The length of 900 m is based on providing guidance for operations under category I, II and III conditions. Reduced lengths may support category II and III operations but may impose limitations on category I operations. See ICAO Annex 14, Attachment A, Section 11.

(g) Location and composition:

(1) The specifications provide for the basic characteristics for precision approach lighting systems. For certain aspects of these systems, some latitude is permitted, for example, in the spacing between centre line lights and crossbars. The approach lighting patterns that have been generally adopted are shown in Figure GM-M-2. A diagram of the inner 300 m of the precision approach category II and III lighting system is shown in Figure GM-M-5.

(2) The approach lighting configuration is to be provided irrespective of the location of the threshold, i.e. whether the threshold is at the extremity of the runway or displaced from the runway extremity. In both cases, the approach lighting system should extend up to the threshold. However, in the case of a displaced threshold, inset lights are used from the runway extremity up to the threshold to obtain the specified configuration. The photometric requirements should apply as specified in Book 1, Chapter U.

## SECTION 2 PAPI & APAPI

### GM-ADR-DSN.M.640 — Visual approach slope indicator systems: general

(a) It has been found impracticable to develop Guidance Material that will permit a completely objective analysis to be made of which runway on an aerodrome should receive first priority for the installation of a visual approach slope indicator system. However, factors that must be considered when making such a decision are:

(1) frequency of use;

(2) seriousness of the hazard;

(3) presence of other visual and non-visual aids;

(4) type of aeroplanes using the runway; and

(5) frequency and type of adverse weather conditions under which the runway will be used.

(b) With respect to the seriousness of the hazard, the order given in the application specifications for a visual approach slope indicator system, 5.3.5.1 (b) to (e) of Chapter 5, may be used as a general guide. These may be summarised as:

(1) inadequate visual guidance because of:

(i) approaches over water or featureless terrain, or absence of sufficient extraneous light in the approach area by night;

(ii) deceptive surrounding terrain.

(2) serious hazard in approach;

(3) serious hazard if aeroplanes undershoot or overrun; and

(4) unusual turbulence.

(c) The presence of other visual or non-visual aids is a very important factor. Runways equipped with ILS or MLS would generally receive the lowest priority for a visual approach slope indicator system installation. It must be remembered, though, that visual approach slope indicator systems are visual approach aids in their own right and can supplement electronic aids. When serious hazards exist and/or a substantial number of aeroplanes not equipped for ILS or MLS use a runway, priority might be given to installing a visual approach slope indicator on this runway.

(d) Priority should be given to runways used by turbojet aeroplanes.

**GM-ADR-DSN.M.645 — PAPI and APAPI: general**

**CS-ADR-DSN.M.650 — Approach slope and elevation setting of light units (for PAPI and APAPI)** *REV*

**CS-ADR-DSN.M.655 — Obstacle protection surface for PAPI and APAPI** *ICAO*

**CS-ADR-DSN.M.660 — Circling guidance lights** *ICAO*

**SECTION 3 RUNWAY & TAXIWAY LIGHTS**

**GM-ADR-DSN.M.665 — Runway lead-in lighting systems**

**GM-ADR-DSN.M.670 — Runway threshold identification lights**

**GM-ADR-DSN.M.675 — Runway edge lights**

**GM-ADR-DSN.M.680 — Runway threshold and wing bar lights**

**GM-ADR-DSN.M.685 — Runway end lights** *(see Figure 19)*

When the threshold is at the runway extremity, fittings serving as threshold lights may be used as runway end lights.

**GM-ADR-DSN.M.690 — Runway centre line lights**

Where it is not practicable to locate them along the centre line, the lights may be uniformly offset to the same side of the runway centre line by not more than 60 cm.

**GM-ADR-DSN.M.695 — Runway touchdown zone lights**

To allow for operations at lower visibility minima, it may be advisable to use a 30 m longitudinal spacing between barrettes.

**GM-ADR-DSN.M.700 — Rapid exit taxiway indicator lights**

(a) Rapid exit taxiway indicator lights (RETILs) comprise a set of yellow unidirectional lights installed in the runway adjacent to the centre line. The lights are positioned in a 3-2-1 sequence at 100 m intervals prior to the point of tangency of the rapid exit taxiway centre line. They are intended to give an indication to pilots of the location of the next available rapid exit taxiway.

(b) In low visibility conditions, RETILs provide useful situational awareness cues while allowing the pilot to concentrate on keeping the aircraft on the runway centre line.

(c) Following a landing, runway occupancy time has a significant effect on achievable runway capacity. RETILs allow pilots to maintain a good roll-out speed until it is necessary to decelerate to an appropriate speed for the turn into a rapid exit turn-off. A roll-out speed of 60 knots until the first RETIL (three-light barrette) is reached is seen as the optimum.

**GM-ADR-DSN.M.705 — Stopway lights**

**GM-ADR-DSN.M.710 — Taxiway centre line lights**

(a) In the case where taxiway centre line lights are provided and where there may be a need to delineate the edges of a taxiway, e.g. on a rapid exit taxiway, narrow taxiway or in snow conditions, this may be done with taxiway edge lights or markers. Care is necessary to limit the light distribution of green lights on or near a runway so as to avoid possible confusion with threshold lights.

(b) The term 'continuous guidance' is not intended to require that taxiway centre line lighting is provided onto aircraft stands. Instead, it is intended that centre line lighting be provided on taxiways leading to aircraft stands or other apron areas, from which visual cues or other means exist to enable aircrew to manoeuvre the aircraft onto a stand or other parking area.

**GM-ADR-DSN.M.715 — Taxiway centre line lights on taxiways, runways, rapid exit taxiways or on other exit taxiways**

**GM-ADR-DSN.M.720 — Taxiway edge lights**

**GM-ADR-DSN.M.725 — Runway turn pad lights**

**GM-ADR-DSN.M.730 — Stop bar lights**

**GM-ADR-DSN.M.735 — Intermediate holding position lights**

**GM-ADR-DSN.M.740 — De-icing/anti-icing facility exit lights**

**GM-ADR-DSN.M.745 — Runway guard lights**

(a) Some other device or design, e.g. specially designed optics, may be used in lieu of the visor.

(b) Higher light intensities may be required to maintain ground movement at a certain speed in low visibilities

(c) The optimum flash rate is dependent on the rise and fall times of the lamps used. Runway guard lights, Configuration A, installed on 6.6 ampere series circuits have been found to look best when operated at 45 to 50 flashes per minute per lamp. Runway guard lights, Configuration B, installed on 6.6 ampere series circuits have been found to look best when operated at 30 to 32 flashes per minute per lamp.

**SECTION 4 APRON LIGHTING**

**GM-ADR-DSN.M.750 — Apron floodlighting**

Where a de-icing/anti-icing facility is located in close proximity to the runway and permanent floodlighting could be confusing to pilots, other means of illumination of the facility may be required.

**GM-ADR-DSN.M.755 — Visual docking guidance system**

(a) The factors to be considered in evaluating the need for a visual docking guidance system are in particular: the number and type(s) of aircraft using the aircraft stand, weather conditions, space available on the apron and the precision required for manoeuvring into the parking position due to aircraft servicing installation, passenger loading bridges, etc.

(b) Care is required in both the design and on-site installation of the system to ensure that reflection of sunlight, or other light in the vicinity, does not degrade the clarity and conspicuity of the visual cues provided by the system.

## GM-ADR-DSN.M.760 — Advanced visual docking guidance system

## GM-ADR-DSN.M.765 — Aircraft stand manoeuvring guidance lights

## GM-ADR-DSN.M.770 — Road-holding position light

## CHAPTER N — VISUAL AIDS FOR NAVIGATION (SIGNS)

### GM-ADR-DSN.N.775 — General

(a) Guidance on signs is contained in the Aerodrome Design Manual (Doc 9157), Part 4, Chapter 11.

(b) Guidance on frangibility is contained in the Aerodrome Design Manual (Doc 9157), Part 6.

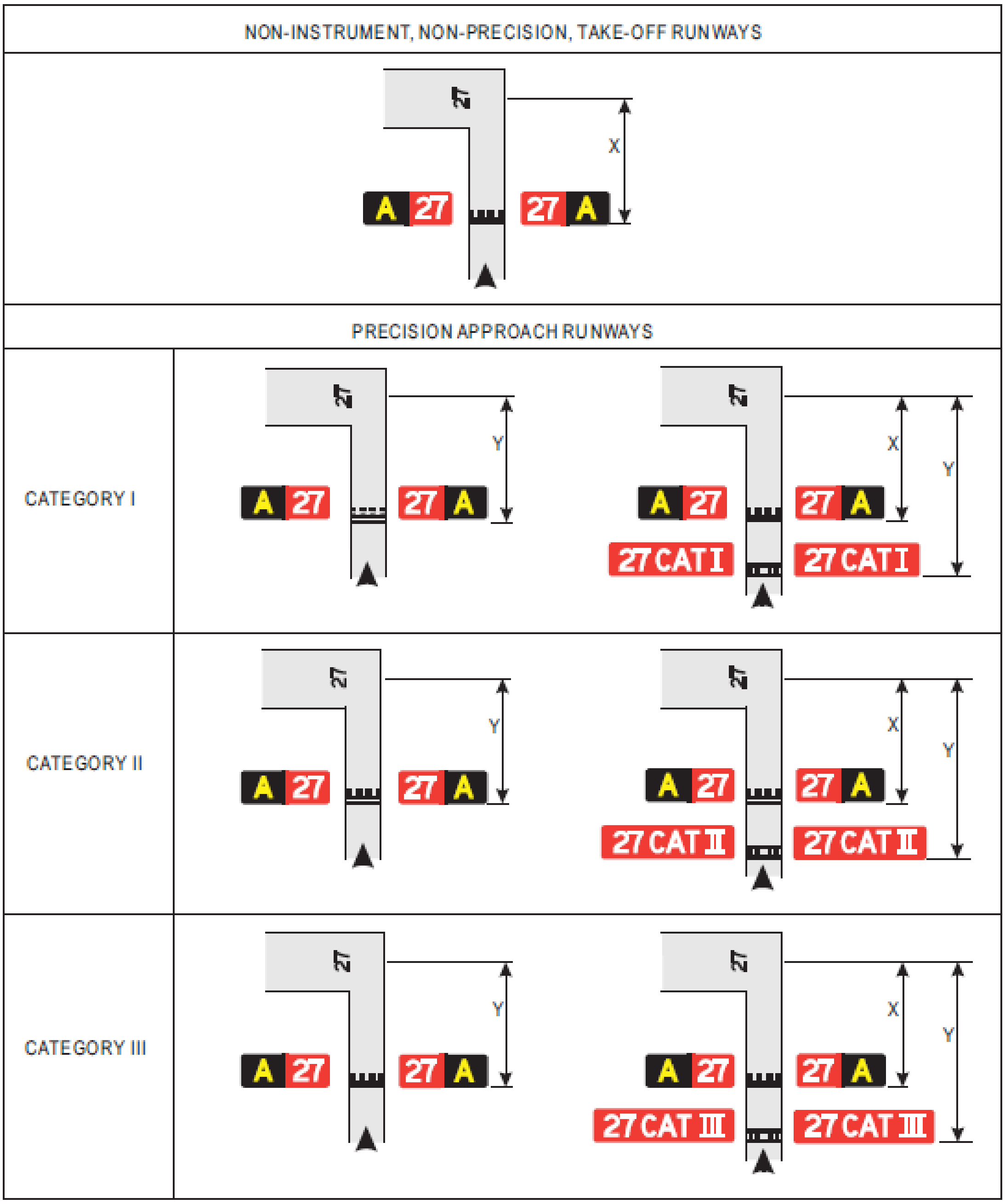
(c) Signs may need to be orientated to improve readability.

### GM-ADR-DSN.N.780 — Mandatory instruction signs

Where, owing to environmental or other factors, the conspicuity of the inscription on a mandatory instruction sign needs to be enhanced, the outside edge of the white inscription should be supplemented by a black outline measuring 10 mm in width for runway code numbers 1 and 2, and 20 mm in width for runway code numbers 3 and 4.

### GM-ADR-DSN.N.785 — Information signs

Examples of design of taxiing guidance signs are below:




*Note.— Distance X is established in accordance with Table 3-2. Distance Y is established at the edge of the ILS/MLS critical/sensitive area.*

**5-31. Examples of sign positions at taxiway/runway intersections**

# APPENDIX 4. REQUIREMENTS CONCERNING DESIGN OF TAXIING GUIDANCE SIGNS

*Note.— See Chapter 5, Section 5.4, for specifications on the application, location and characteristics of signs.*

1. Inscription heights shall conform to the following tabulation.

| Runway code number | Minimum character height | | |
|---|---|---|---|
| | | Information sign | |
| | Mandatory instruction sign | Runway exit and runway vacated signs | Other signs |
| 1 or 2 | 300 mm | 300 mm | 200 mm |
| 3 or 4 | 400 mm | 400 mm | 300 mm |

*Note.— Where a taxiway location sign is installed in conjunction with a runway designation sign (see 5.4.3.22), the character size shall be that specified for mandatory instruction signs.*

2. Arrow dimensions shall be as follows:

| *Legend height* | *Stroke* |
|---|---|
| 200 mm | 32 mm |
| 300 mm | 48 mm |
| 400 mm | 64 mm |

3. Stroke width for single letter shall be as follows:

| *Legend height* | *Stroke* |
|---|---|
| 200 mm | 32 mm |
| 300 mm | 48 mm |
| 400 mm | 64 mm |

4. Sign luminance shall be as follows:

a) Where operations are conducted in runway visual range conditions less than a value of 800 m, average sign luminance shall be at least:

| | |
|---|---|
| Red | 30 cd/$m^2$ |
| Yellow | 150 cd/$m^2$ |
| White | 300 cd/$m^2$ |

b) Where operations are conducted in accordance with 5.4.1.7 b) and c) and 5.4.1.8, average sign luminance shall be at least:

| | |
|---|---|
| Red | 10 cd/m$^2$ |
| Yellow | 50 cd/m$^2$ |
| White | 100 cd/m$^2$ |

*Note.— In runway visual range conditions less than a value of 400 m, there will be some degradation in the performance of signs.*

5. The luminance ratio between red and white elements of a mandatory sign shall be between 1:5 and 1:10.

6. The average luminance of the sign is calculated by establishing grid points as shown in Figure A4-1 and using the luminance values measured at all grid points located within the rectangle representing the sign.

7. The average value is the arithmetic average of the luminance values measured at all considered grid points.

*Note.— Guidance on measuring the average luminance of a sign is contained in the* Aerodrome Design Manual *(Doc 9157),* Part 4.

8. The ratio between luminance values of adjacent grid points shall not exceed 1.5:1. For areas on the sign face where the grid spacing is 7.5 cm, the ratio between luminance values of adjacent grid points shall not exceed 1.25:1. The ratio between the maximum and minimum luminance value over the whole sign face shall not exceed 5:1.

9. The forms of characters, i.e. letters, numbers, arrows and symbols, shall conform to those shown in Figure A4-2. The width of characters and the space between individual characters shall be determined as indicated in Table A4-1.

10. The face height of signs shall be as follows:

| *Legend height* | *Face height (min)* |
|---|---|
| 200 mm | 400 mm |
| 300 mm | 600 mm |
| 400 mm | 800 mm |

11. The face width of signs shall be determined using Figure A4-3 except that, where a mandatory instruction sign is provided on one side of a taxiway only, the face width shall not be less than:

a) 1.94 m where the code number is 3 or 4; and

b) 1.46 m where the code number is 1 or 2.

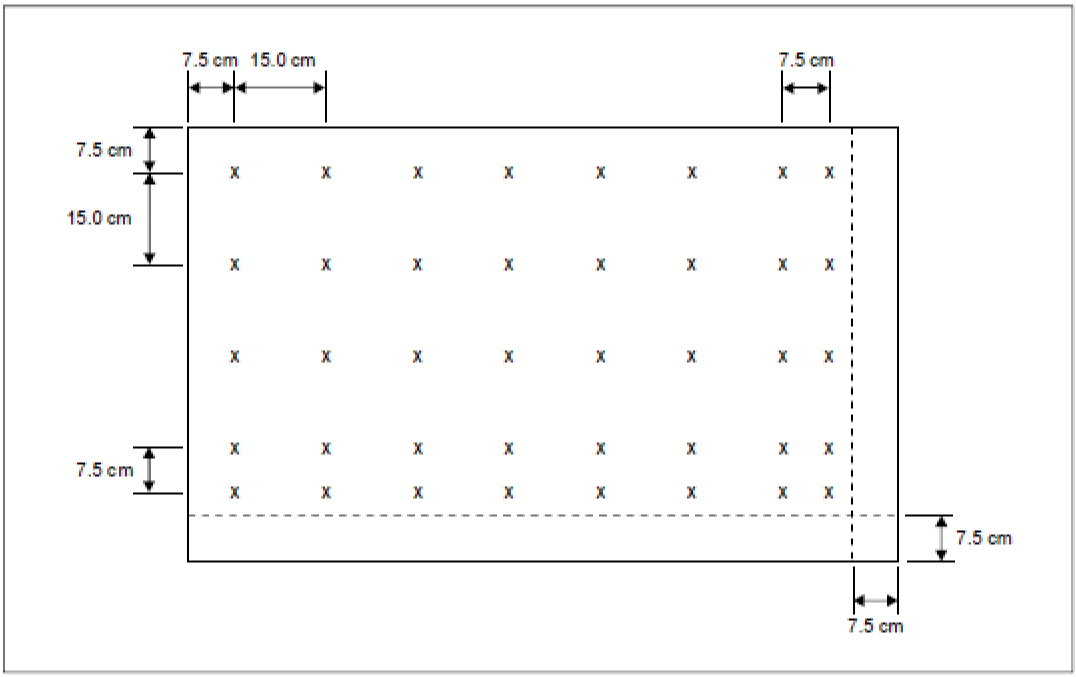
*Note.— Additional guidance on determining the face width of a sign is contained in the* Aerodrome Design Manual *(Doc 9157), Part 4.*

12. Borders

a) The black vertical delineator between adjacent direction signs should have a width of approximately 0.7 of the stroke width.

b) The yellow border on a stand-alone location sign should be approximately 0.5 stroke width.

13. The colours of signs shall be in accordance with the appropriate specifications in Appendix 1.




*Note 1.— The average luminance of a sign is calculated by establishing grid points on a sign face showing typical inscriptions and a background of the appropriate colour (red for mandatory instruction signs and yellow for direction and destination signs) as follows:*

*a) Starting at the top left corner of the sign face, establish a reference grid point at 7.5 cm from the left edge and the top of the sign face.*

*b) Create a grid of 15 cm spacing horizontally and vertically from the reference grid point. Grid points within 7.5 cm of the edge of the sign face shall be excluded.*

*c) Where the last point in a row/column of grid points is located between 22.5 cm and 15 cm from the edge of the sign face (but not inclusive), an additional point shall be added 7.5 cm from this point.*

*d) Where a grid point falls on the boundary of a character and the background, the grid point shall be slightly shifted to be completely outside the character.*

*Note 2.— Additional grid points may be required to ensure that each character includes at least five evenly spaced grid points.*

*Note 3.— Where one unit includes two types of signs, a separate grid shall be established for each type.*

**Figure A4-1. Grid points for calculating average luminance of a sign**

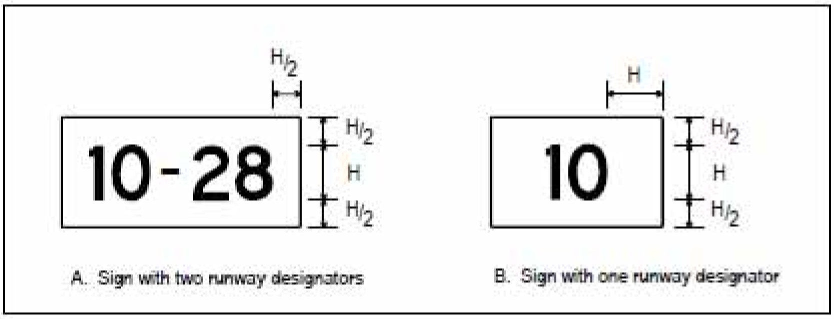



**Figure A4-3. Sign dimensions**

**Table A4-1. Letter and numeral widths and space between letters or numerals**

a) Letter to letter code number

| Preceding Letter | Following Letter: B, D, E, F, H, I, K, L, M, N, P, R, U | Following Letter: C, G, O, Q, S, X, Z | Following Letter: A, J, T, V, W, Y |
|---|---|---|---|
| | Code number | | |
| A | 2 | 2 | 4 |
| B | 1 | 2 | 2 |
| C | 2 | 2 | 3 |
| D | 1 | 2 | 2 |
| E | 2 | 2 | 3 |
| F | 2 | 2 | 3 |
| G | 1 | 2 | 2 |
| H | 1 | 1 | 2 |
| I | 1 | 1 | 2 |
| J | 1 | 1 | 2 |
| K | 2 | 2 | 3 |
| L | 2 | 2 | 4 |
| M | 1 | 1 | 2 |
| N | 1 | 1 | 2 |
| O | 1 | 2 | 2 |
| P | 1 | 2 | 2 |
| Q | 1 | 2 | 2 |
| R | 1 | 2 | 2 |
| S | 1 | 2 | 2 |
| T | 2 | 2 | 4 |
| U | 1 | 1 | 2 |
| V | 2 | 2 | 4 |
| W | 2 | 2 | 4 |
| X | 2 | 2 | 3 |
| Y | 2 | 2 | 4 |
| Z | 2 | 2 | 3 |

b) Numeral to numeral code number

| Preceding Numeral | Following number: 1, 5 | Following number: 2, 3, 6, 8, 9, 0 | Following number: 4, 7 |
|---|---|---|---|
| | Code number | | |
| 1 | 1 | 1 | 2 |
| 2 | 1 | 2 | 2 |
| 3 | 1 | 2 | 2 |
| 4 | 2 | 2 | 4 |
| 5 | 1 | 2 | 2 |
| 6 | 1 | 2 | 2 |
| 7 | 2 | 2 | 4 |
| 8 | 1 | 2 | 2 |
| 9 | 1 | 2 | 2 |
| 0 | 1 | 2 | 2 |

c) Space between characters

| Code No. | Letter height (mm) 200 | 300 | 400 |
|---|---|---|---|
| | Space (mm) | | |
| 1 | 48 | 71 | 96 |
| 2 | 38 | 57 | 76 |
| 3 | 25 | 38 | 50 |
| 4 | 13 | 19 | 26 |

d) Width of letter

| Letter | Letter height (mm) 200 | 300 | 400 |
|---|---|---|---|
| | Width (mm) | | |
| A | 170 | 255 | 340 |
| B | 137 | 205 | 274 |
| C | 137 | 205 | 274 |
| D | 137 | 205 | 274 |
| E | 124 | 186 | 248 |
| F | 124 | 186 | 248 |
| G | 137 | 205 | 274 |
| H | 137 | 205 | 274 |
| I | 32 | 48 | 64 |
| J | 127 | 190 | 254 |
| K | 140 | 210 | 280 |
| L | 124 | 186 | 248 |
| M | 157 | 236 | 314 |
| N | 137 | 205 | 274 |
| O | 143 | 214 | 286 |
| P | 137 | 205 | 274 |
| Q | 143 | 214 | 286 |
| R | 137 | 205 | 274 |
| S | 137 | 205 | 274 |
| T | 124 | 186 | 248 |
| U | 137 | 205 | 274 |
| V | 152 | 229 | 304 |
| W | 178 | 267 | 356 |
| X | 137 | 205 | 274 |
| Y | 171 | 257 | 342 |
| Z | 137 | 205 | 274 |

e) Width of numeral

| Numeral | Numeral height (mm) 200 | 300 | 400 |
|---|---|---|---|
| | Width (mm) | | |
| 1 | 50 | 74 | 98 |
| 2 | 137 | 205 | 274 |
| 3 | 137 | 205 | 274 |
| 4 | 149 | 224 | 298 |
| 5 | 137 | 205 | 274 |
| 6 | 137 | 205 | 274 |
| 7 | 137 | 205 | 274 |
| 8 | 137 | 205 | 274 |
| 9 | 137 | 205 | 274 |
| 0 | 143 | 214 | 286 |

INSTRUCTIONS

1. To determine the proper SPACE between letters or numerals, obtain the code number from table a) or b) and enter table c) for that code number to the desired letter or numeral height.
2. The space between words or groups of characters forming an abbreviation or symbol should be equal to 0.5 to 0.75 of the height of the characters used except that where an arrow is located with a single character such as 'A →', the space may be reduced to not less than one quarter of the height of the character in order to provide a good visual balance.
3. Where the numeral follows a letter or vice versa use Code 1.
4. Where a hyphen, dot, or diagonal stroke follows a character or vice versa use Code 1.

———————————

## GM-ADR-DSN.N.790 — VOR aerodrome checkpoint sign

## GM-ADR-DSN.N.795 — Aircraft stand identification signs

## GM-ADR-DSN.N.800 — Road-holding position sign

# CHAPTER P – VISUAL AIDS FOR NAVIGATION (MARKERS)

## GM-ADR-DSN.P.805 — General

## GM-ADR-DSN.P.810 — Unpaved runway edge markers

## GM-ADR-DSN.P.815 — Stopway edge markers

## GM-ADR-DSN.P.820 — Edge markers for snow-covered runways

Runway lights could be used to indicate the limits.

## GM-ADR-DSN.P.825 — Taxiway edge markers

(a) At small aerodromes, taxiway edge markers may be used, in lieu of taxiway edge lights, to delineate the edges of taxiways, particularly at night (ICAO, Aerodrome Design Manual (Doc 9157), Part 4, Chapter 2, 2.4.1).

(b) On a straight section of a taxiway, taxiway edge markers should be spaced at uniform longitudinal intervals of not more than 60 m. On a curve the markers should be spaced at intervals less than 60 m so that a clear indication of the curve is provided. The markers should be located as near as practicable to the edges of the taxiway, or outside the edges at a distance of not more than 3 m (ICAO, Aerodrome Design Manual (Doc 9157), Part 4, Chapter 2, 2.4.2).

(c) The markers commonly used are cylindrical in shape. Ideally, the design of the marker should be such that, when installed properly, no portion will exceed 35 cm total height above the mounting surface. However, where significant snow heights are possible, markers exceeding 35 cm in height may be used, but their total height should be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft (ICAO, Aerodrome Design Manual (Doc 9157), Part 4, Chapter 2, 2.4.4).

(d) A taxiway edge marker should be lightweight and frangible. One type of marker meeting these requirements is detailed in Figure 2-10. The post is made up of flexible PVC and its colour is blue. The sleeve, which is retro-reflective, is also blue. Note that the area of the marked surface is 150 $cm^2$ (Aerodrome Design Manual (Doc 9157), Part 4, Chapter 2, 2.4.5).

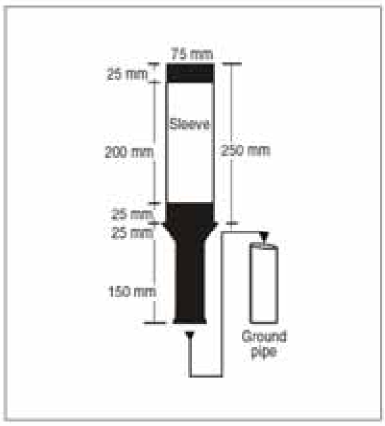


Figure 2-10. Taxiway edge marker

Figure GM-P-1 Taxiway edge marker

## GM-ADR-DSN.P.830 — Taxiway centre line markers

## GM-ADR-DSN.P.835 — Unpaved taxiway edge markers

## CHAPTER Q – VISUAL AIDS FOR DENOTING OBSTACLES

### GM-ADR-DSN.Q.840 — Objects to be marked and/or lighted

The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of the obstacles. It does not necessarily reduce operating limitations which may be imposed by an obstacle.

### GM-ADR-DSN.Q.845 — Marking of objects

(a) Orange and white or alternatively red and white are preferably used, except where such colours merge with the background.

(b) Table GM-Q-1 shows a formula for determining band widths and for having an odd number of bands, thus permitting both the top and bottom bands to be of the darker colour.

(c) Against some backgrounds it may be found necessary to use a different colour from orange or red to obtain sufficient contrast.

(d) A single colour, preferably red or yellowish green for emergency vehicles and yellow for service vehicles, is generally used.

(e) Alternative spacing may be suitable; priority is to highlight the location and definition of the object.

(f) Flags used to mark mobile objects should normally consist of a chequered pattern, each square having sides of not less than 0.3 m; the colours of the pattern contrasting each with the other and with the background against which they will be seen. Orange and white or alternatively red and white may be used, except where such colours merge with the background.

**Table 6-1. Marking band widths**

| Longest dimension Greater than | Longest dimension Not exceeding | Band width |
|---|---|---|
| 1.5 m | 210 m | 1/7 of longest dimension |
| 210 m | 270 m | 1/9 " " " |
| 270 m | 330 m | 1/11 " " " |
| 330 m | 390 m | 1/13 " " " |
| 390 m | 450 m | 1/15 " " " |
| 450 m | 510 m | 1/17 " " " |
| 510 m | 570 m | 1/19 " " " |
| 570 m | 630 m | 1/21 " " " |

Table GM-Q-1 Obstacle marking band widths

## GM-ADR-DSN.Q.850 — Lighting of objects

(a) High-intensity obstacle lights are intended for day use as well as night use. Care is needed to ensure that these lights do not create disconcerting dazzle or environmental concerns. Guidance on the design, location and operation of high-intensity obstacle lights is given in the Aerodrome Design Manual (Doc 9157), Part 4.

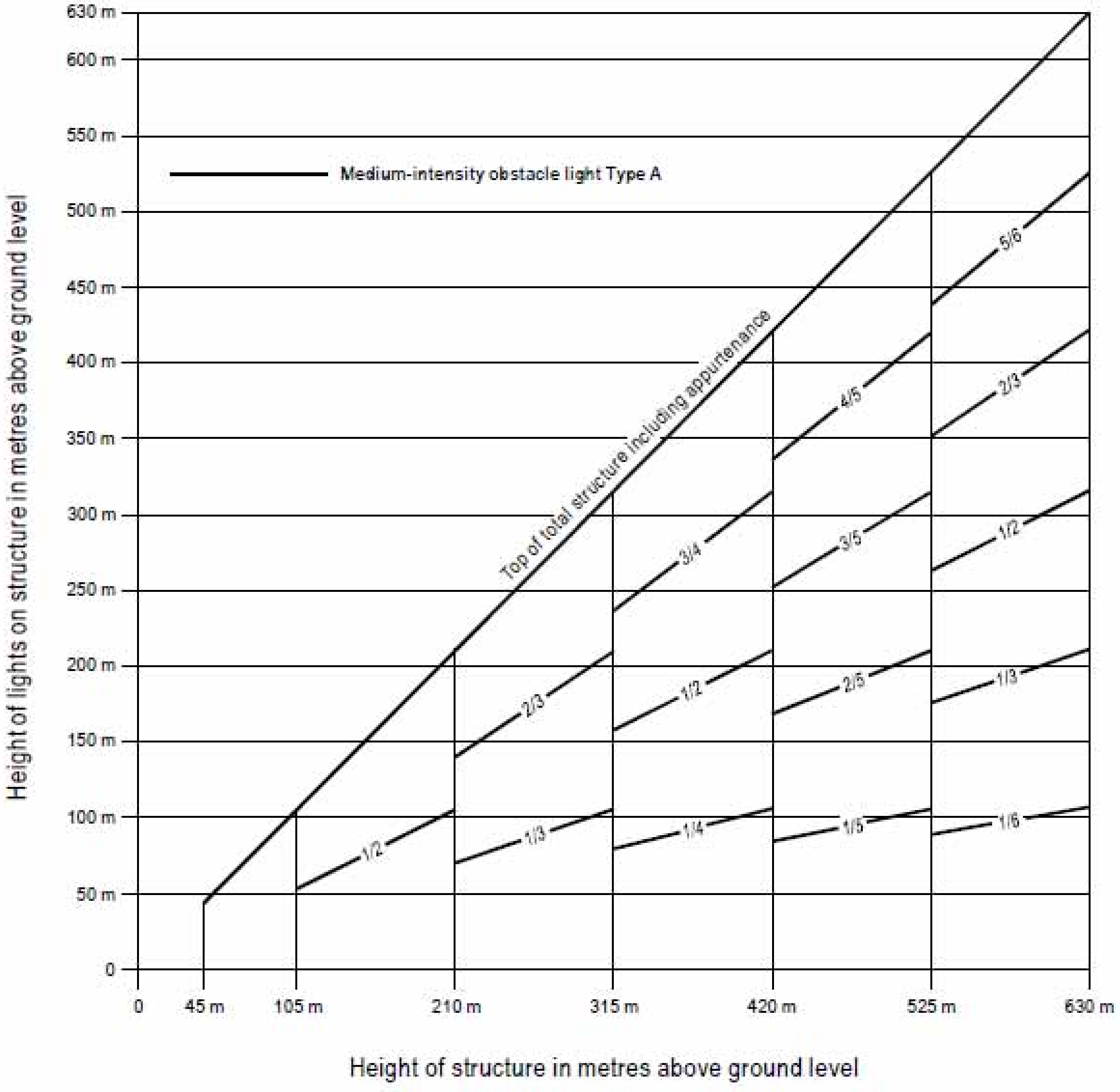
(b) Low-intensity obstacle lights may be used, Type A or B for obstacles higher than 45 m if it is determined to be sufficient.

(c) A group of trees or buildings is regarded as an extensive object.

Note.— In some cases, this may require locating the lights off the tower.

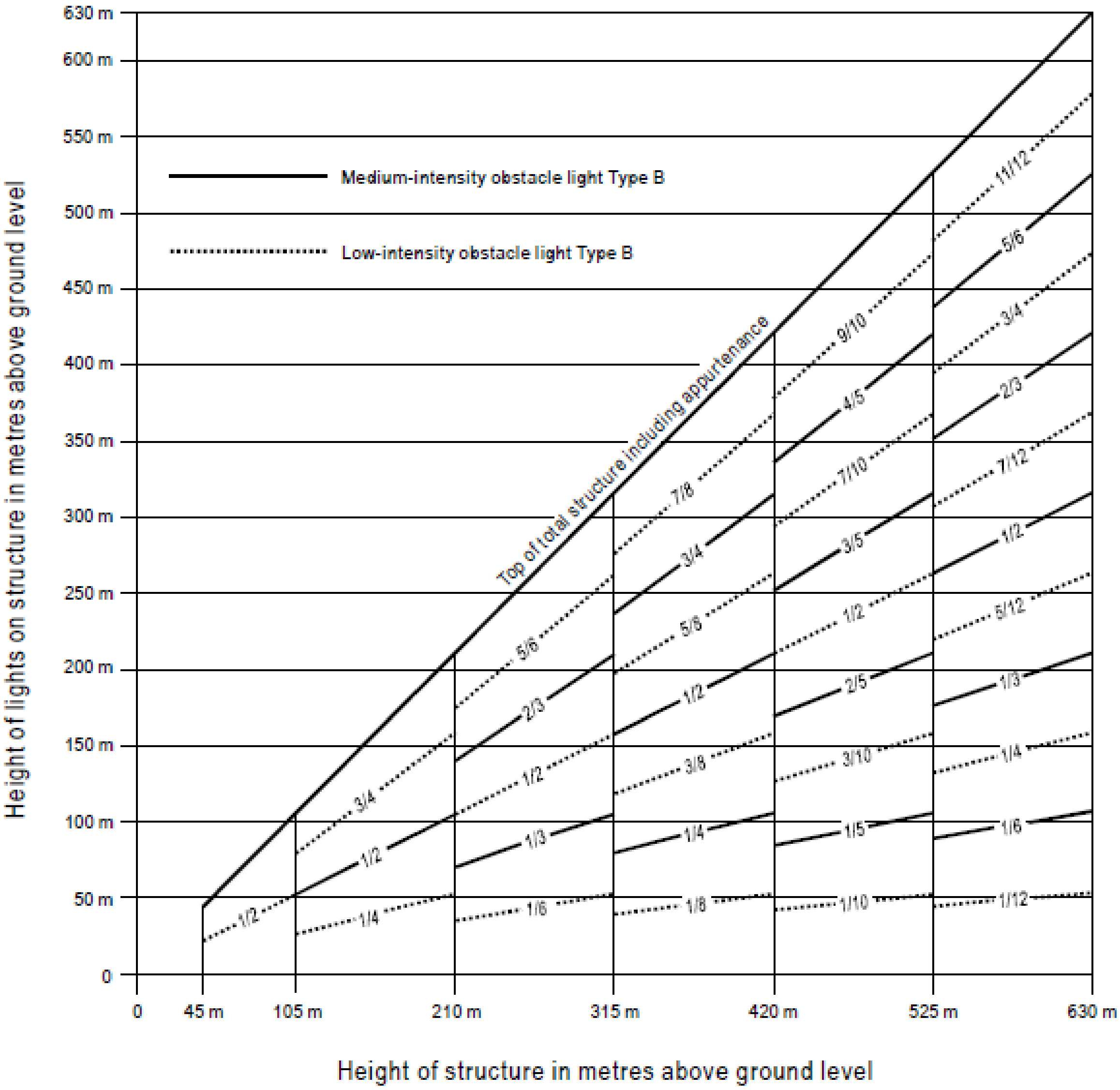
(d) Guidance Material on how a combination of low, medium, and/or high-intensity lights on obstacles should be displayed is given in the following Figures:

# APPENDIX 6. LOCATION OF LIGHTS ON OBSTACLES



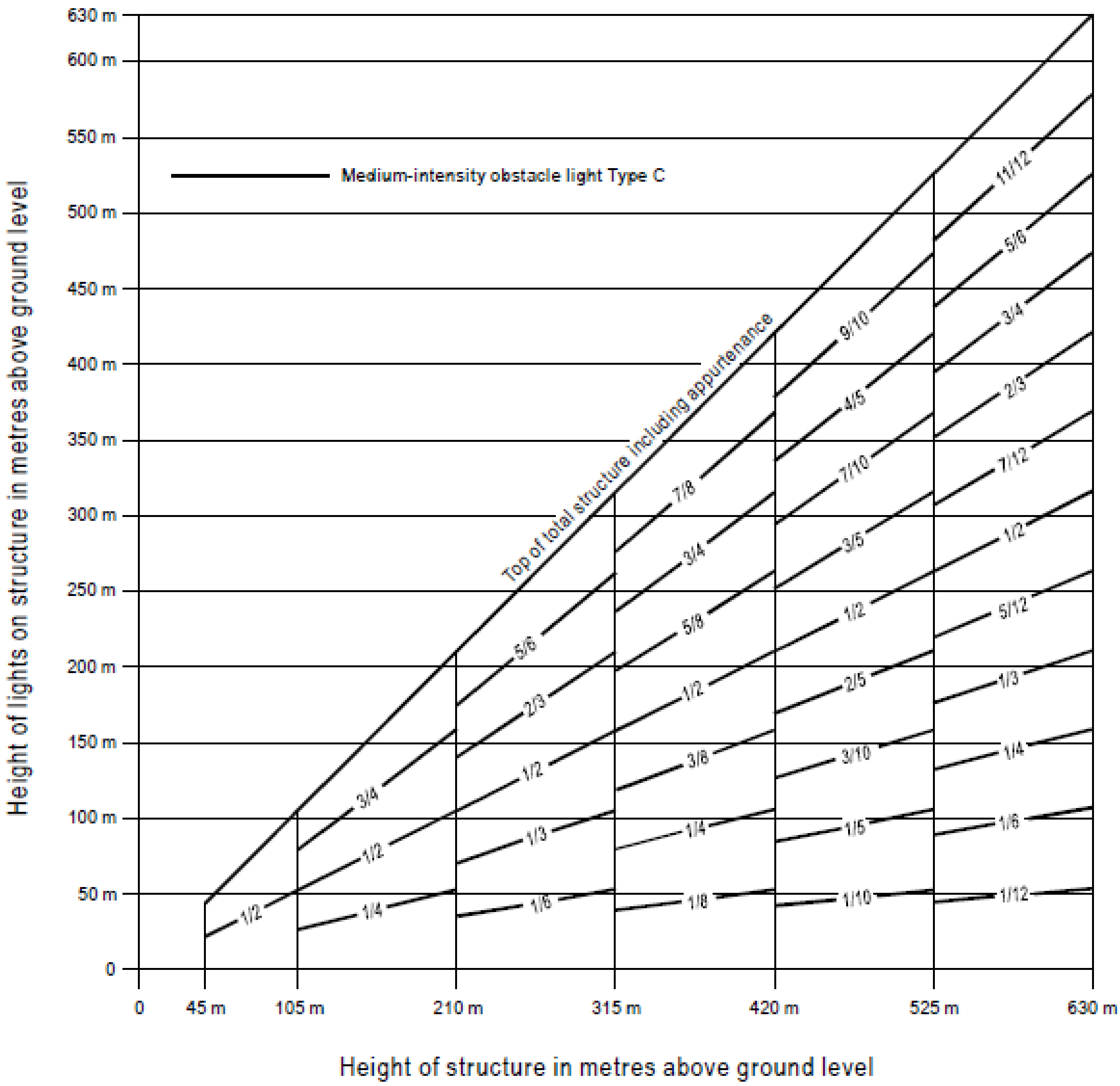

*Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.*

**Figure A6-1. Medium-intensity flashing-white obstacle lighting system, Type A**



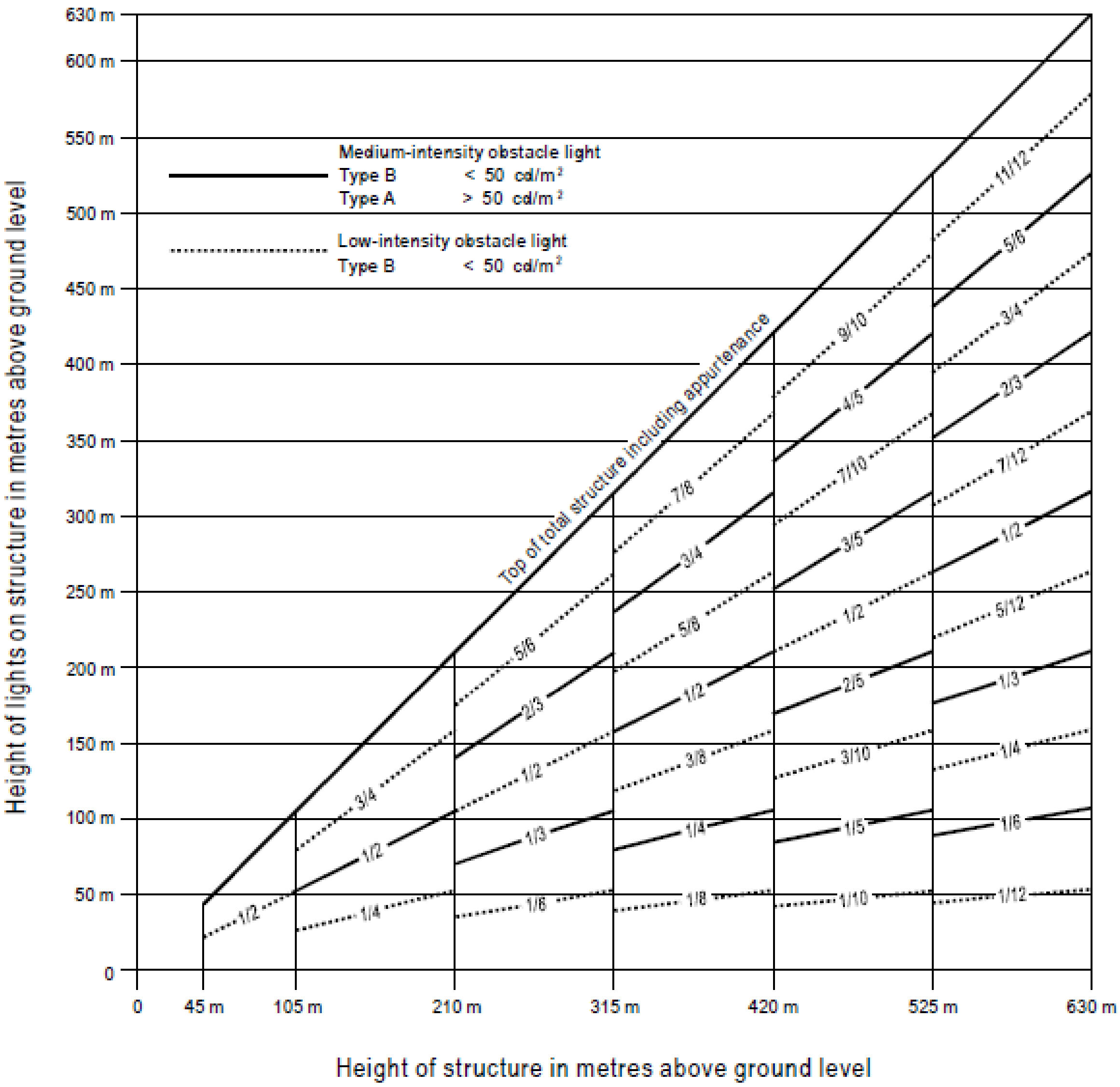

*Note.— For night-time use only.*

**Figure A6-2. Medium-intensity flashing-red obstacle lighting system, Type B**



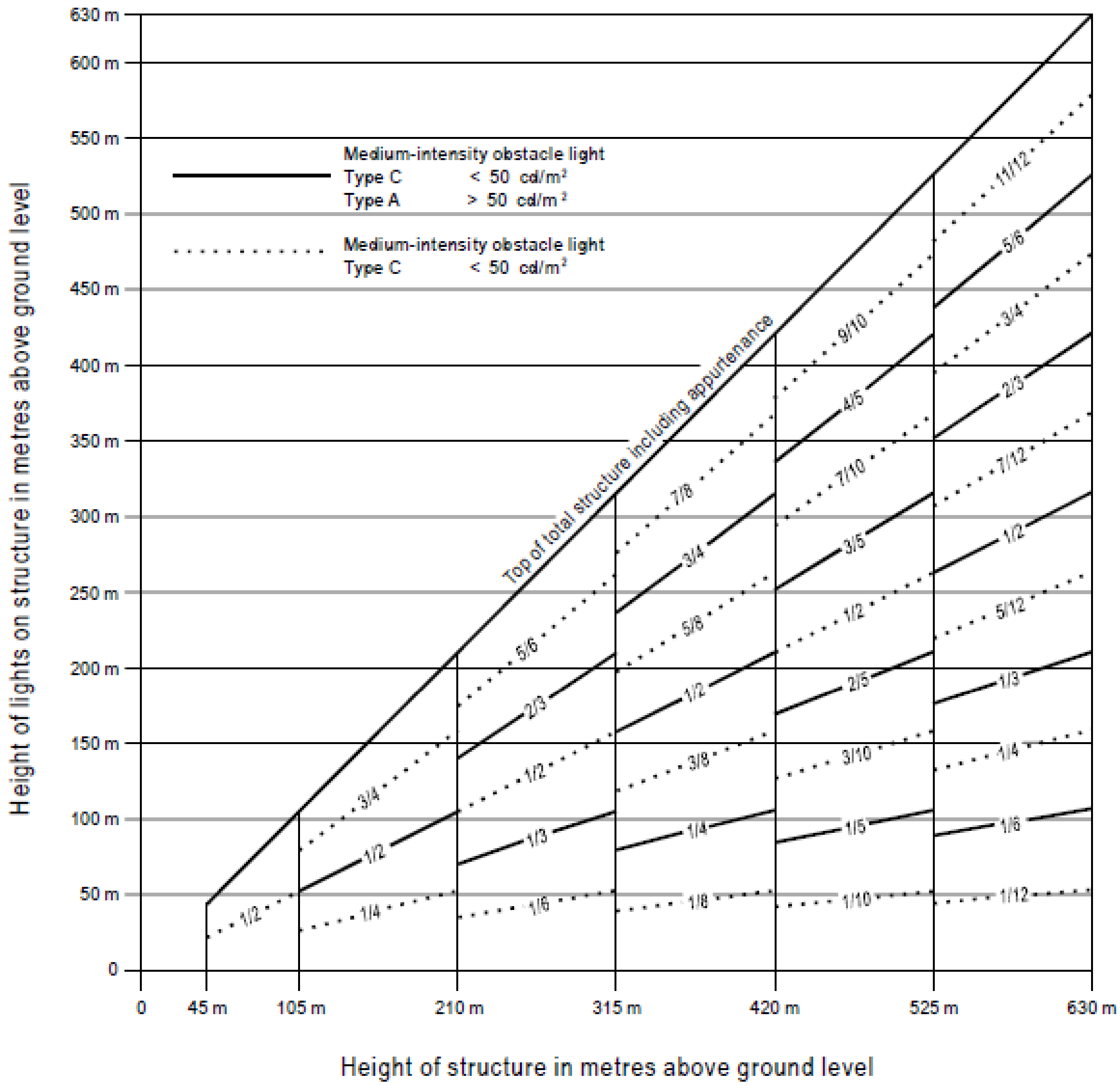

*Note.— For night-time use only.*

**Figure A6-3. Medium-intensity fixed-red obstacle lighting system, Type C**




*Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.*

**Figure A6-4. Medium-intensity dual obstacle lighting system, Type A/Type B**




*Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.*

**Figure A6-5. Medium-intensity dual obstacle lighting system, Type A/Type C**

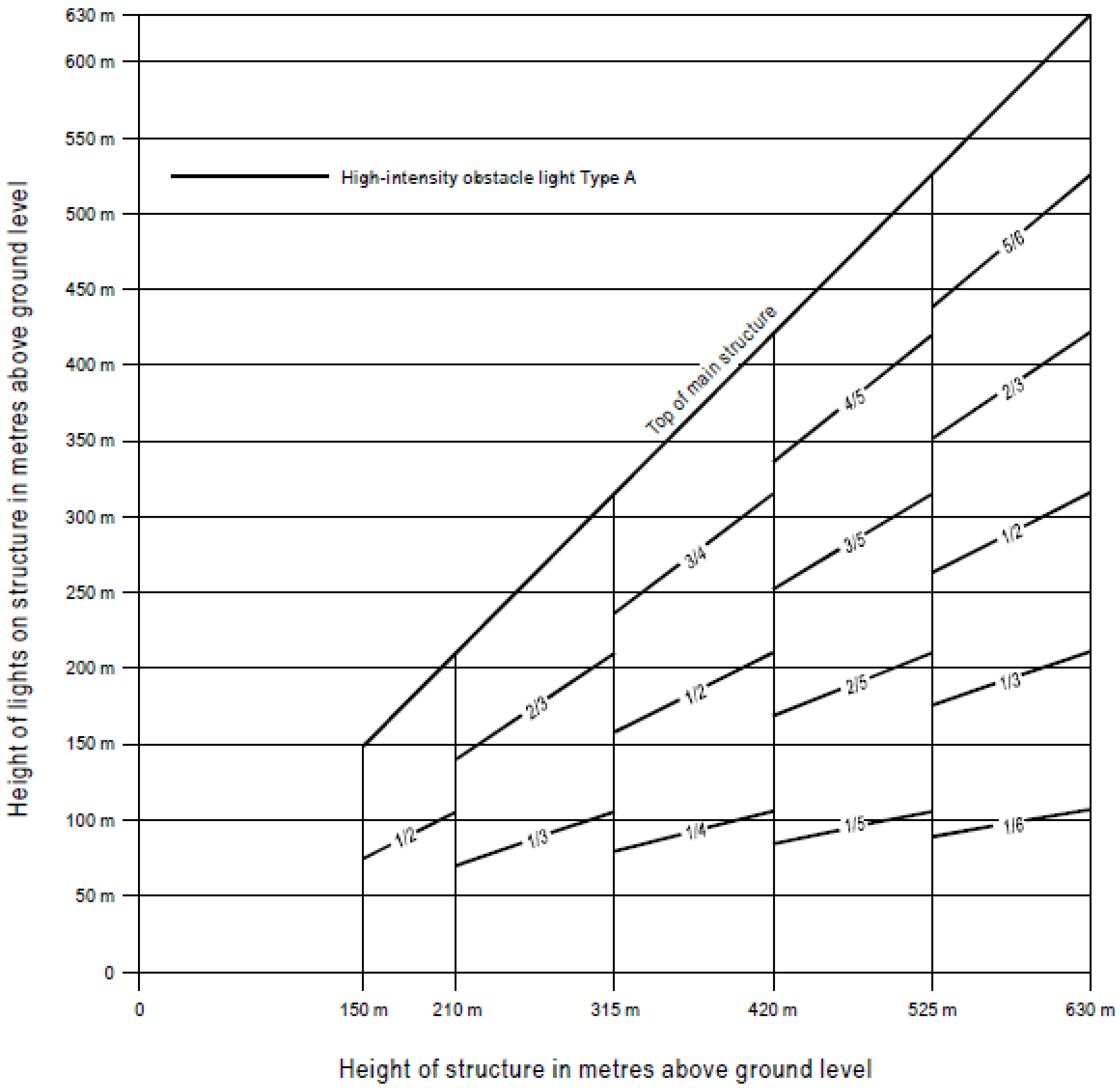



**Figure A6-6. High-intensity flashing-white obstacle lighting system, Type A**

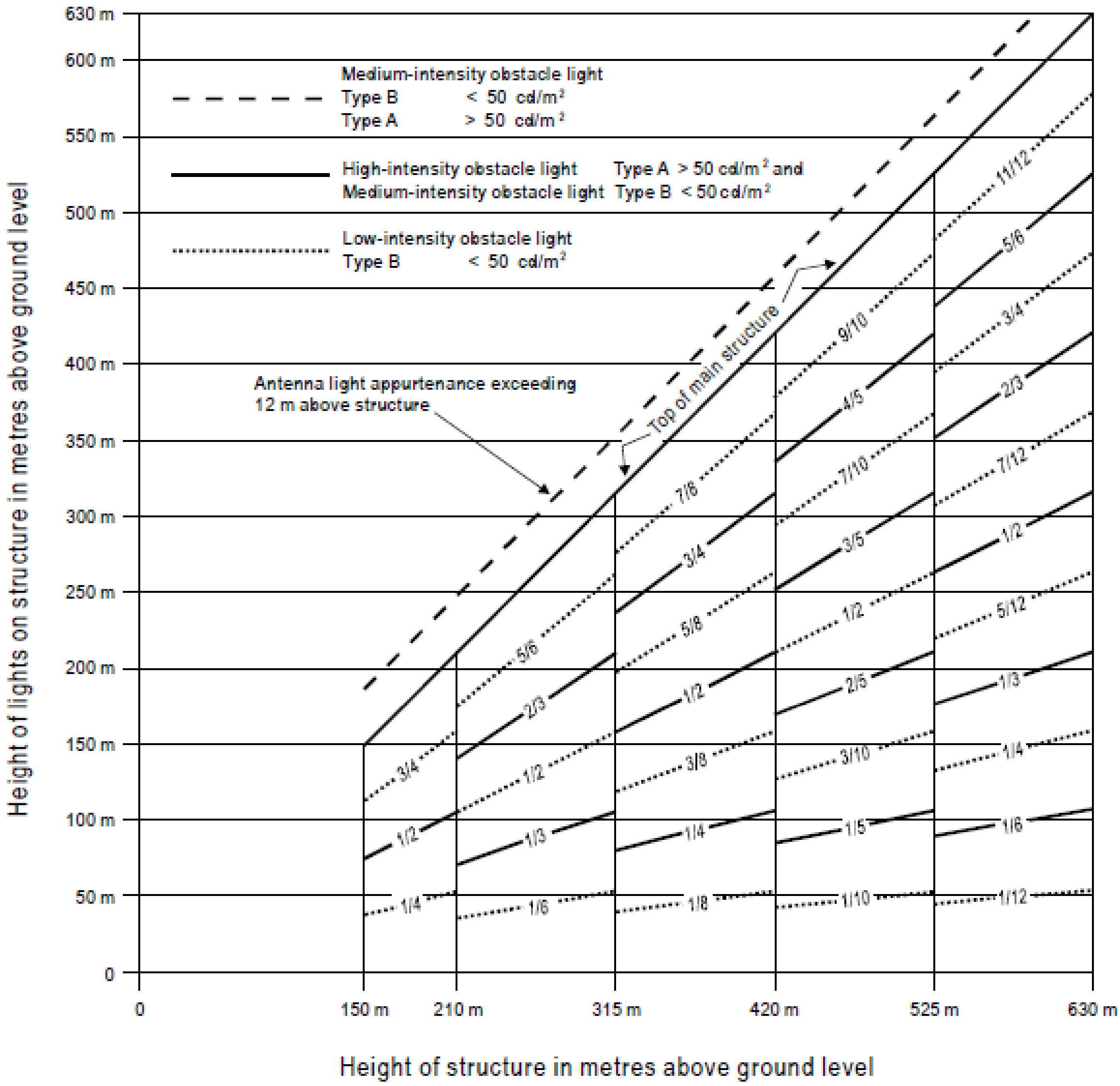



**Figure A6-7. High-/medium-intensity dual obstacle lighting system, Type A/Type B**

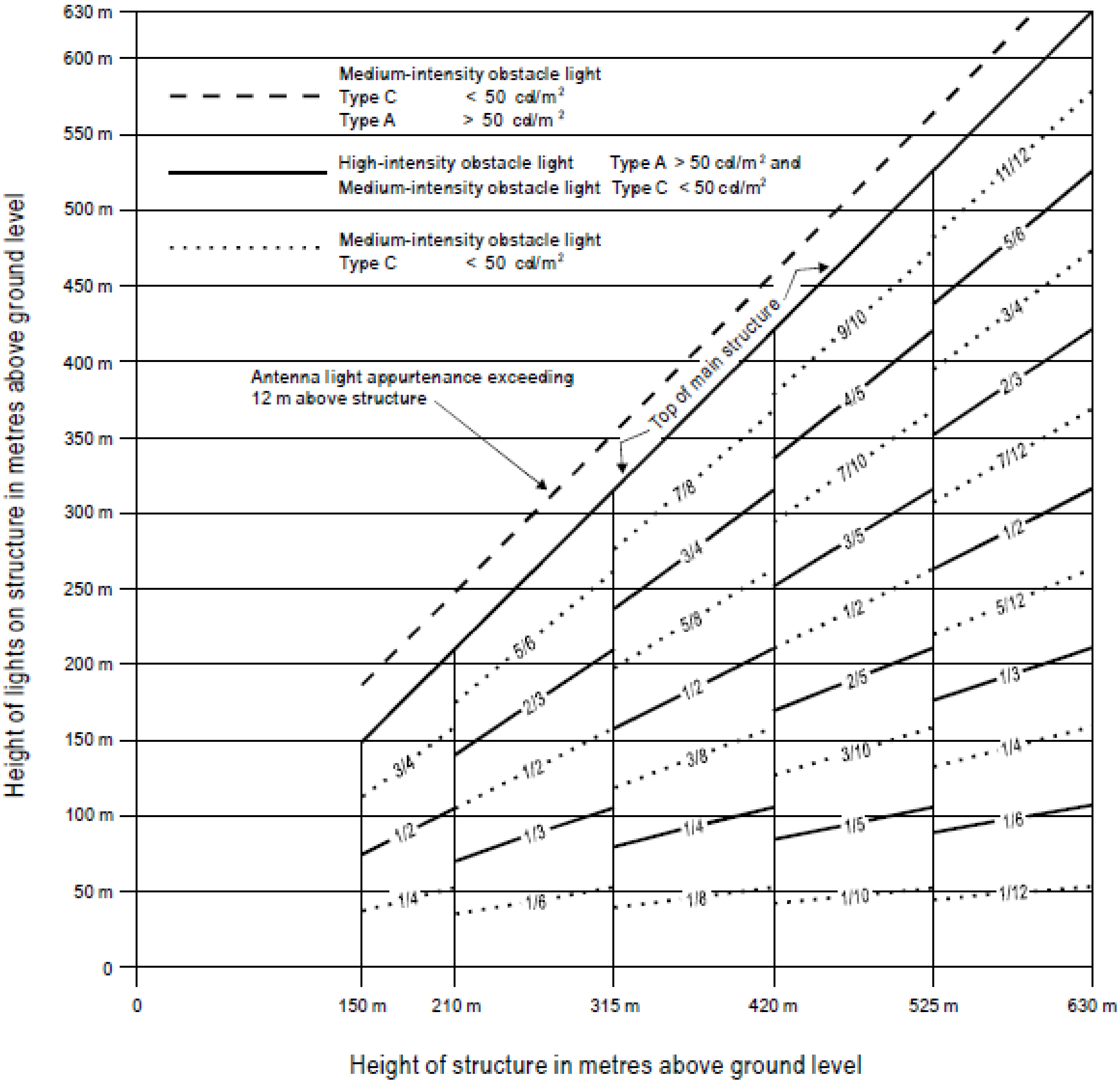



Figure A6-8. High-/medium-intensity dual obstacle lighting system, Type A/Type C

In the cases as stated in CS-ADR-DSN.Q.855(b)(7) and (b)(8), normally the spacing would not exceed 52 m.

# CHAPTER R — VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

## GM-ADR-DSN.R.855 — Closed runways and taxiways, or parts thereof

## GM-ADR-DSN.R.860 — Non-load-bearing surfaces

The marking characteristics of runway sides is specified in ADR-DSN.L.550.

A taxi side stripe marking could also be placed along the edge of the load-bearing pavement to emphasise the location of the taxiway edge, with the outer edge of the marking approximately on the edge of the load-bearing pavement.

At intersections of taxiways and on other areas where, due to turning, the possibility for confusion between the side stripe markings and centre line markings may exist or where the pilot may not be sure on which side of the edge marking the non-load bearing pavement is, the additional provision of transverse stripes on the non-load bearing surface has been found to be of assistance.

As shown in Figure GM-R-1, the transverse stripes should be placed perpendicular to the side stripe marking.

On curves, a stripe should be placed at each point of tangency of the curve and at intermediate points along the curve so that the interval between stripes does not exceed 15 m. If deemed desirable to place transverse stripes on small straight sections, the spacing should not exceed 30 m.

The width of the marks should be 0.9 m, and they should extend to within 1.5 m of the outside edge of the stabilised paving or be 7.5 m long, whichever is shorter. The colour of the transverse stripes should be the same as that of the edge stripes, i.e. yellow.

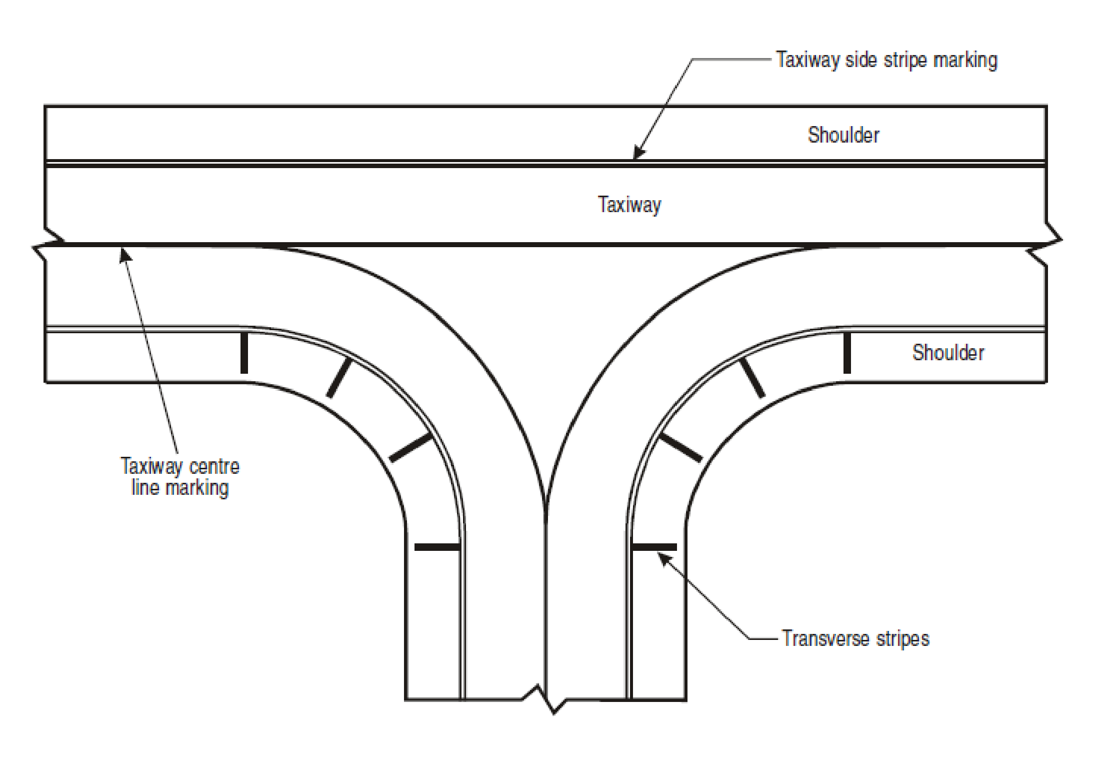



**Figure 2-1. Marking of paved taxiway shoulders**

Figure GN-R-1 Marking of non-load bearing paved taxiway surface

More guidance on providing additional transverse stripes at an intersection or a small area on the apron is given in the Aerodrome Design Manual (ICAO, Doc 9157 – Part 4).

### GM-ADR-DSN.R.865 — Pre-threshold area

For pre-threshold areas shorter than 60 m, markings may be modified or reduced in size so as to present the correct picture to aircrew.

### GM-ADR-DSN.R.870 — Unserviceable areas

(a) Unserviceability markers and lights are used for such purposes as warning pilots of a hole in a taxiway or apron pavement or outlining a portion of pavement, such as on an apron, that is under repair. They are not suitable for use when a portion of a runway becomes unserviceable, nor on a taxiway when a major portion of the width becomes unserviceable. In such instances, the runway or taxiway is normally closed.

(b) The spacing required for marking and lights should take into account visibility conditions, geometric configurations of the area, potential height differences of terrain, so that the limits of uncervicable area is readily visible to pilot.

(c) Where a temporarily unserviceable area exists, it may be marked with fixed-red lights. These lights mark the most potentially dangerous extremities of the area.

(d) A minimum of four such lights may be used, except where the area is triangular in shape, in which case a minimum of three lights may be used.

(e) The number of lights may be increased when the area is large or of unusual configuration. At least one light should be installed for each 7.5 m of peripheral distance of the area.

(f) If the lights are directional, they should be orientated so that as far as possible their beams are aligned in the direction from which aircraft or vehicles will approach.

(g) Where aircraft or vehicles will normally approach from several directions, consideration be given to adding extra lights or using omnidirectional lights to show the area from these directions.

(h) Unserviceable area lights should be frangible. Their height should be sufficiently low to preserve clearance for propellers and for engine pods of jet aircraft.

## CHAPTER S — ELECTRICAL SYSTEMS

### GM-ADR-DSN.S.875 — Electrical power supply systems for air navigation facilities

(a) The safety of operations at aerodromes depends on the quality of the supplied power. The total electrical power supply system may include connections to one or more external sources of electric power supply, one or more local generating facilities and to a distribution network including transformers and switchgear. Many other aerodrome facilities supplied from the same system need to be taken into account while planning the electrical power system at aerodromes.

(b) The design and installation of the electrical systems need to take into consideration factors that can lead to malfunction, such as electromagnetic disturbances, line losses, power quality, etc. Additional guidance is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 5).

(c) Switchover time is the time required for the actual intensity of a light measured in a given direction to fall from 50 % and recover to 50 % during a power supply changeover, when the light is being operated at intensities of 25 % or above.

### GM-ADR-DSN.S.880 — Electrical power supply for visual aids

(a) Specifications for secondary power supply for radio navigation aids and ground elements of communications systems are given in ICAO Annex 10, Volume I, Chapter 2.

(b) Requirements for a secondary power supply should be met by either of the following:

  (1) independent public power, which is a source of power supplying the aerodrome service from a substation other than the normal substation through a transmission line following a route different from the normal power supply route and such that the possibility of a simultaneous failure of the normal and independent public power supplies is extremely remote; or

  (2) standby power unit(s), which are engine generators, batteries, etc., from which electric power can be obtained.

(c) Guidance on electrical systems is included in the Aerodrome Design Manual (ICAO, Doc 9157), Part 5.

(d) The requirement for minimum lighting may be met by other than electrical means.

### GM-ADR-DSN.S.885 — System design

Guidance on means of providing this protection is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 5).

### GM-ADR-DSN.S.890 — Monitoring

Guidance on this subject and on air traffic control interface and visual aids monitoring is included in the Aerodrome Design Manual (ICAO, Doc 9157, Part 5).

**GM-ADR-DSN.S.895 — Serviceability levels**

(a) Serviceability levels are intended to define the maintenance performance level objectives. They are not intended to define whether the lighting system is operationally out of service.

(b) Guidance on preventive maintenance of visual aids is given in the Airport Services Manual (ICAO, Doc 9137, Part 9).

(c) With respect to barrettes, crossbars and runway edge lights, lights are considered to be adjacent if located consecutively and:

(1) laterally: in the same barrette or crossbar; or

(2) longitudinally: in the same row of edge lights or barrettes.

(d) In barrettes and crossbars, guidance is not lost by having two adjacent unserviceable lights.

# CHAPTER T — AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATION

## GM-ADR-DSN.T.900 — Emergency and service access roads

(a) Air side service roads are installed to support all apron processes. Furthermore, service roads can be used as aerodrome perimeter service roads, providing access to navigation aids, as temporary roads for construction vehicles, etc.

(b) Some general considerations in the planning of roads are described as follows:

(1) Every effort should be made to plan air side service roads so that they do not cross runways and taxiways.

(2) The planning of the aerodrome road layout should take into account the need to provide emergency access roads for use by rescue and fire-fighting vehicles to various areas on the aerodrome and in particular to the approach areas. Service roads to navigation aids should be planned in such a manner as to present minimal interference to the function of the aids. If it is necessary for an service road to cross an approach area, the road should be located so that vehicles travelling on it are not obstacles to aircraft operations.

(3) The air side service road system must be designed to account for local security measures. Access points to the system will thus need to be restricted. Should ground vehicle movements affect surface movement of aircraft on runways and taxiways, it will be required that the ground vehicle movements be coordinated by the appropriate aerodrome control. Control is normally exercised by means of two-way radio communication, although visual signals, such as signal lamps, are adequate when traffic at the aerodrome is light. Signs or signals may also be employed to aid control at intersections.

(4) At intersections with runways consideration should be given to providing runway guard lights or road holding position lights as part of the aerodrome's runway incursion prevention programme. Runway guard lights should conform to the specifications provided in CS-ADR-DSN.M.745.

(5) Roads should be designed and constructed to prevent FOD transfer to the runway and taxiways.

(6) Roads within 90 m of a runway generally should be surfaced to prevent surface erosion and the transfer of debris to the runway and taxiways.

(7) To facilitate the control and maintenance of the fencing, a perimeter service road should be constructed inside the aerodrome fencing.

(8) Perimeter service road is also used by security patrols.

(9) Where a fence is provided, the need for convenient access to outside areas should be taken into account.

(10) When greater security is thought necessary, a cleared area should be provided on both sides of the fence or barrier to facilitate the work of patrols and to make trespassing more difficult.

(11) Special measures should be required to prevent the access of an unauthorised person to runways or taxiways which overpass public roads.

(c) Emergency access roads should be considered on an aerodrome, so as to facilitate achieving minimum response times for RFF vehicles.

(d) Particular attention should be given to the provision of ready access to approach areas up to 1 000 m from the threshold, or at least within the aerodrome boundary.

(e) Emergency access roads are not intended for use for the functions of airport service roads. Therefore, it is possible to provide different access control which will be clearly visible for all service ground traffic. Road holding position markings, lights or runway guard lights are not necessary if the access to an emergency access road is ensured for RFF only.

(f) Aerodrome service roads may serve as emergency access roads when they are suitably located and constructed.

(g) Emergency access roads should be capable of supporting the heaviest vehicles which will use them, and be usable in all weather conditions. Roads within 90 m of a runway should be surfaced to prevent surface erosion and the transfer of debris to the runway. Sufficient vertical clearance should be provided from overhead obstructions for the largest vehicles.

(h) When the surface of the road is indistinguishable from the surrounding area, or in areas where snow may obscure the location of the roads, edge markers should be placed at intervals of about 10 m.

**GM-ADR-DSN.T.905 — Fire stations**

**CS-ADR-DSN.T.910 — Equipment frangibility requirements** *ADD*

Note — Guidance on design for frangibility is contained in the Aerodrome Design Manual (ICAO, Doc 9157, Part 6).

**GM-ADR-DSN.T.915 — Siting of equipment and installations on operational areas**

(a) The design of light fixtures and their supporting structures, light units of visual approach slope indicators, signs and markers is specified in CS-ADR-DSN.M.615, CS-ADR-DSN.M.640, CS-ADR-DSN.N.775 and Book 1 Chapter P, respectively.

(b) Guidance on siting of equipment and installations on operational areas are given in Aerodrome Design Manuals (ICAO, Doc 9157, Part 2 and Part 6).

(c) Guidance on the frangible design of visual and non-visual aids for navigation is given in the Aerodrome Design Manual (ICAO, Doc 9157, Part 6).

(d) Requirements for obstacle limitation surfaces are specified in Book 1, Chapter J.

**GM-ADR-DSN.T.920 — Fencing**

(a) The fence or barrier should be located so as to separate the movement area and other facilities or zones on the aerodrome vital to the safe operation of aircraft from areas open to public access.

(b) When greater security is thought necessary, a cleared area should be provided on both sides of the fence or barrier to facilitate the work of patrols and to make trespassing more difficult. Consideration should be given to the provision of a perimeter road inside the aerodrome fencing for the use of both maintenance personnel and security patrols.

(c) Special measures may be required to prevent the access of an unauthorised person to runways or taxiways which overpass public roads.

(d) A fence or other barrier provided for the protection of civil aviation and its facilities may be illuminated at a minimum essential level.

(e) Consideration should be given to locating security lights so that the ground area on both sides of the fence or barrier, particularly at access points, is illuminated.

# CHAPTER U — COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS (APPENDIX 1)

## GM-ADR-DSN.U.925 — General

## GM-ADR-DSN.U.930 — Colours for aeronautical ground lights

## GM-ADR-DSN.U.935 — Colours for markings, signs and panels

## GM-ADR-DSN.U.940 — Aeronautical ground light characteristics

European Aviation Safety Agency

**NOTICE OF PROPOSED AMENDMENT**

# NPA 2011-20 (C)

RMT.0136 (ADR.001 (a)) & RMT.0137 (ADR.001 (b))

RMT.0140 (ADR.002 (a)) & RMT.0141 (ADR.002 (b))

RMT.0144 (ADR.003 (a)) & RMT.0145 (ADR.003 (b))

# Authority, Organisation and Operations Requirements for Aerodromes

## NPA 2011-20 (C) — Cross references

## Cross references — Annex I — Part-AR

| Article | Source | Working Group |
|---|---|---|
| ADR.AR.A.001 — Scope | EASA Basic Regulation (BR) (EC) No 216/2008[1] and ARO.GEN.005 Scope of Opinion 04/2011 | No proposal from the WG. The article is installed by the Agency. |
| ADR.AR.A.005 — Competent authority | ICAO Doc. 9734 | WG proposal (AR.100). |
| ADR.AR.A.010 — Oversight documentation REV | ARA.GEN.115 Oversight documentation of Opinion 03/2011[2] | WG proposal (AR.115) with minor editorial rewording: The excess word 'to' was deleted from (a) and (b), and the word 'rules' at the end of (b) was changed to 'requirements'. |
| ADR.AR.A.015 — Means of compliance REV | EASA BR art. 18 and 19 ARA.GEN.120 Means of compliance of Opinion 03/2011 | WG Proposal (AR.120) with minor editorial changes and the following added to (c) 'all' AMCs was replaced by 'the'; '...providers of apron management services...'. To (d) the words '...subject to certification...' were removed and the words '...in accordance with ADR.OR.A.015...' were added. The words '...proposed by the aerodrome operator or the provider of apron management services...' were added to para 2 of (d) and the numerical (3) was added to say that the Member State informs other Member States about AMCs. The word 'all' was removed from numerical (1) in (e). |
| ADR.AR.A.020 — Notification of cases of Equivalent level of safety and Special Conditions REV | EASA BR Art. 8a 5(a) | WG Proposal (AR.123) with the word 'important' changed to 'significant'. |
| ADR.AR.A.025 Information to the Agency | ARA.GEN.125 Information to the Agency of Opinion 03/2011 | WG Proposal (AR.125) unchanged. |
| ADR.AR.A.030 — | ARA.GEN.135 | WG Proposal (AR.135) with the following |

1 Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC. (OJ L 79, 19.03.2008, p. 1). Regulation as last amended by Regulation 1108/2009 of the European Parliament and of the Council of 21 October 2009 (OJ L 309, 24.11.2009, p. 51).

2 This means that the text is based on the said Opinion 3/2011 as it has now been treated and changed in the EU comitology process.EASA based itself on the last available version of that text. In most cases only necessary and ADR specific changes or additions were made. This explanation goes for most references made to Opinion 3/2011.

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| Immediate reaction to a safety problem REV | Immediate reaction to a safety problem | text changes: The footnote [1] inserted to (a) pointing to 'Directive 2003/42/EC of the European Parliament and of the Council of 13 June 2003 on occurrence reporting in civil aviation, OJ L 167, 4.7.2003, p. 23–36.'.<br><br>'…providers of apron management services…' added to (b).<br><br>Reference to (a) was added to (c).<br><br>'…to all aerodrome operators …' was changed to '…to the aerodrome operators…' in (d). |
| ADR.AR.A.040 — Safety Directives | ICAO Doc 9774, 2.2. c) Aerodrome Directives, and 3.3.D | WG Proposal (AR.140) unchanged. |
| ADR.AR.B.005 — Management system REV | ICOA Doc. 9734/ ARA.GEN.200 Management System of Opinion 03/2011 | WG Proposal (AR.200) with the following changes: '…including aerodrome inspectors…' was added to the numerical (a)(2).<br>'…and a safety risk management process…' was added to numerical (a)(4). |
| ADR.AR.B.010 — Allocation of tasks REV | ICAO Doc. 9734/ ARA.GEN.205 Allocation of Tasks to qualified entities of Opinion 03/2011 | WG Proposal (AR.205 Use of qualified entities); heading and text and content have been revised. |
| ADR.AR.B.015 — Changes to the management system REV | ICAO Doc. 9734/ ARA.GEN.210 Changes in the Management system of Opinion 03/2011 | WG Proposal (AR.210), minor editorial changes in text in (a) and (b). |
| ADR.AR.B.020 — Record-keeping REV | ICAO Doc. 9734/ ARA.GEN.220 of Opinion 03/2011 | WG Proposal (AR.220) with revision of numerical (a)(3) into: 'the allocation of tasks, covering the elements required by ADR.AR.B.010, as well as the details of tasks allocated;'<br>The deletion of numerical (a)(6), resulting numbers in (a) being (1) to (10).<br>The words 'by the competent authority' were deleted from (c)(2) and the words 'subject to applicable data protection law' were added to (d). |
| ADR.AR.C.005 — Oversight REV | ICAO Doc. 9734/ ARA.GEN.300 | WG Proposal (AR.300) with the following changes: 'the certification basis' was |

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| | Oversight of Opinion 03/2011 | added to (a)(1) and (2).<br>Reference to rule ADR.AR.A.030 (c) and (d) was adjusted in (a)(3).<br>The words; 'including unannounced inspections, where appropriate' were added to (b)(3).<br>Slight editorial changes to text and a reference corrected in (b)(4).<br>(c) has been revised.<br>(d) has been deleted. |
| ADR.AR.C.010 — Oversight programme REV | ICAO Doc. 9734/ ARA.GEN.305 Oversight programme in Opinion 03/2011 | WG Proposal (AR.305) Text and content revised and time limit of 48 months for oversight planning cycle added under (c ). (d) is therefore old (c ) and '...unannounced inspections...' was retained. — Rule has now considerable less detail on oversight planning cycle than mirror rule under ARA.GEN.305. |
| ADR.AR.C.015 — Initiation of certification process REV | ICAO Doc 9774, 4.4 Assessment of a formal application for an aerodrome certificate | WG Proposal (AR.310). Reference corrected in (a). Reference corrected in (b)(1). (b)(2) has been revised and (c) had been added. |
| ADR.AR.C.020 — Certification basis REV | EASA BR Art. 8a 2. (a) and Art. 8a 5(a) | WG Proposal (AR.315). The words '...and operation...' have been added to (a). (a)(3) has been deleted. Reference has been corrected in (c). |
| ADR.AR.C.025 — Special conditions REV | EASA BR Art. 8a 2. (a) and Art. 8a 5(a) | WG Proposal (AR.320). The word '...determine...' in (a) has been replaced with 'prescribe' and a reference has been corrected.<br>Numerical (1) has been added to (a) and the former (1) and (2) have become (2) and (3). |
| ADR.AR.C.035 — Issuance of certificate REV | EASA BR Art. 8a 2. (a) and Art. 8a 5(a)<br><br>ICAO Doc 9774 4.5 The grant or refusal of certificate/ ARA.GEN.310 Initial certification procedure — organisations — of Opinion 03/2011 | WG Proposal (AR.325). Title has been revised to only say 'Issuance of a certificate'. (a) has been revised. Reference to '...national legislation...' has been deleted from (c) and some editorial changes to text in the article. Reference has been corrected. |
| ADR.AR.C.040 — Changes REV | Largely based on ARA.GEN.330 | WG Proposal articles (AR.330 Process for amendment of certificate and AR.333 |

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| | Changes — organisations but also Part-21, as changes may occur both to the aerodrome design as well as operator organisation. | Process for other changes) have been combined and content revised.<br>WG Proposal (AR.340 Other organisational changes) is now part of ADR.AR.C.040. Complex changes were made to make the process simpler and some details have been moved to AMCs. |
| ADR.AR.C.045 — Change of aerodrome operator *REV* | ICAO Doc. 9774 4.7 Transfer of an aerodrome certificate | WG Proposal (AR.335). Reference and changes to (a) and (b) have been made. |
| ADR.AR.C.050 — Declarations of providers of apron management services *REV* | EASA BR Art. 8a2.(e) and 8a5.(j) | WG Proposal (AR.345). The beginning of (a) has been removed, that is the part referring to declaration of apron management services. References have been fixed and editorial changes have been made to the remaining text. |
| ADR.AR.C.055 — Findings, observations, corrective actions and enforcement measures *REV* | ICAO Doc. 9734/ ARA.GEN.350 Findings and corrective actions — organisations Opinion 03/2011. | WG Proposal (AR.350). Text has been revised slightly, item (d) about observations was removed and item (e) installed instead.. Editorial changes have been made. |
| ADR.AR.C.060 — Wildlife management *REV* | EASA BR Essential Requirement C-2(e)<br><br>ICAO Annex 14 chapter 9.4 | WG Proposal (AR.360). Minor editorial changes have been made to text. |
| ADR.AR.C.065 — Obstacles — Objects *REV* | EASA BR C-1 | WG Proposal (AR.365). Title now called 'Obstacles — Objects'. Article has been revised. (c) and (d) have been deleted from this article and moved to article 8. |
| ADR.AR.C.070 — Confusing, misleading and hazardous lights *REV* | EASA BR Essential Requirement C-2(c) and (d) | WG Proposal (AR.370). Article has been revised. |
| ADR.AR.C.075 — Protection of communication, navigation and surveillance systems *REV* | EASA BR Essential Requirement C-2(f) | No proposal from the WG. The article has been installed by the Agency. |
| ADR.AR.C.080 — Other activities *REV* | EASA BR Essential Requirement C-2(a) | No proposal from the WG. The article has been installed by the Agency. |

## Cross references — Annex II — Part-OR

| Article | Source | Working Group |
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| ADR.OR.A.005 — Scope | EASA Basic Regulation (BR) (EC) No 216/2008 | No proposal from the WG. The article has been installed by the Agency. |
| ADR.OR.A.010 — Competent authority *REV* | ICAO Doc. 9734 | WG proposal (OR.405) with text reworded to have it in line with other EASA text for competent authorities. References to the aerodrome, its operator and provider of apron management services have been removed from text. |
| ADR.OR.A.015 — Means of compliance *REV* | EASA BR Art. 18 and 19<br><br>ORA.GEN.120 Means of compliance of Opinion 03/2011 | WG proposal (OR.410) with editorial changes to text in (b) and (c). The words; 'proof of compliance' have been replaced by using 'assessments' instead in (b). The word 'prior' has been added to the last paragraph of (b). |
| ADR.OR.B.005 — Certification obligations of aerodromes and aerodrome operators *REV* | EASA BR Art. 8a 2 (a) and (d)<br><br>ICAO Annex 14 chapter 1.4 | WG proposal (OR.430) with wording of the text changed in (a) but the content has not been changed. A reference to the conversion article of the cover regulation has been added to (a).<br>(b) has been deleted from this article and substance moved to article 5. |
| ADR.OR.B.010 — Eligibility *REV* | | WG proposal (OR.435) with minor editorial changes. |
| ADR.OR.B.015 — Application for a certificate *REV* | EASA BR Art. 8a5.(b)<br><br>ICAO Doc. 9774, chapter 4 | WG Proposal (OR.440) with editorial changes to (b)(1) and (3).<br>In (b)(3) the last sentence '*Such documentation shall include a procedure, contained in the aerodrome manual, describing how changes not requiring prior approval will be managed and notified to the competent authority*.' has been added.<br>References have been corrected in (b)(7) and (8).<br>Editorial changes have been made to the last paragraph of the article. |
| Working Group proposal — OR.445 *DEL* | N/A | WG proposal (OR.445 Validity of the application) has been removed as it was found not to be necessary by the Agency. |
| ADR.OR.B.025 — Compliance *REV* | EASA BR Art. 8a 2 (a) and (d)<br><br>ICAO Doc 9774, 4.4 Assessment of a formal | WG proposal (OR.450) with editorial changes, and revisions of the text.<br>Heading of the article has been changed from 'Compliance with the certification basis and requirements'.<br>(a) refers now to the 'aerodrome |

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| | application for an aerodrome certificate | operator' instead of 'applicant'.<br>The following words have been added to the text in (a)(1); 'safety assessments, exercises necessary' and the word 'show' has been replaced by the word; 'demonstrate'. (i) and (ii) have been added to (a)(1).<br>The word 'show' has been replaced by 'demonstrate' in (a)(2) and a reference has been added to (a)(3).<br>(b) and (d) have been deleted. |
| ADR.OR.B.030 — Terms of approval and privileges of the certificate holder | EASA BR Art. 8a5.(c)<br><br>ICAO Doc 9774 4.5 The grant or refusal of certificate | WG proposal (OR.455) unchanged. |
| ADR.OR.B.035 — Continued validity *REV* | EASA BR Art. 8a5.(c)<br><br>ICAO Doc 9774 Section B aerodrome certification, note 11. | WG proposal (OR.460) with minor editorial changes and corrected references. |
| ADR.OR.B.040 — Changes *REV* | EASA BR Art. 8a5.(c)<br><br>ICAO Annex 14, Appendix 7 Art. 3.2 and ICAO Doc. 9774, 3C.5 Notification of changes to the aerodrome manual | WG proposal (OR.465 Amendment to the certificate and OR.470 Application for other changes) have been revised and appear now in this one simplified article.<br>The article addresses changes that need prior approval from the competent authority on one hand and other changes on the other hand. Changes that need prior approval are changes affecting the approval of the certificate, key elements of the management system or additional elements found necessary by the competent authority.<br>Item (c) of the article states that other changes, do not require prior approval from the competent authority but should be managed and notified to the competent authority in accordance with a prior approved procedure. |
| ADR.OR.B.045 Assessment of changes *REV* | EASA BR Art. 8a6.(c)<br><br>ICAO Annex 14, Appendix 7 Art. 3.2 and ICAO Doc. 9774, 3C.5 Notification of | The article was added by the Agency. It requires changes to be assessed for safety impact and refers them to a safety assessment process. |

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| | changes to the aerodrome manual | |
| ADR.OR.B.050 — Continuing compliance with Agency Certification Specifications REV | EASA BR Art. 8a5.(c)<br><br>ICAO Annex 14, Appendix 7 Art. 3.2 and ICAO Doc. 9774, 3C.5 Notification of changes to the aerodrome manual | WG proposal (OR.475) with a revised (b) where instead of the operator always having to apply for prior approval for changes to the competent authority, after an amendment of the Certification Specifications, now the operator required to initiate a change process in accordance with ADR.OR.B.040 if relevant. |
| ADR.OR.B.055 — Change of aerodrome operator REV | EASA BR Art. 8a5.(c)<br><br>ICAO Annex 14, Appendix 7 Art. 3.2 and ICAO Doc. 9774, 3C.5 Notification of changes to the aerodrome manual and 4.7 Transfer of an aerodrome certificate | WG proposal (OR.480) with the changes to the text in (a); the words 'in writing' have been removed and in (b) the words 'new operator' replace the word 'person'. Item (c) has been added to the article since the WG proposal; it now requires the operator to provide relevant documents to the competent authorities and referres to ADR.OR.045 and ADR.OR.E.005. |
| ADR.OR.B.060[3] — Declaration of providers of apron management services REV | EASA BR Art. 8a2.(e) and 8a5.(j) | WG proposal (OR.495) with the change of reference to national legislation is removed along with editorial changes to the beginning of paragraph (a) and other references corrected.<br>(b) has been revised so that the provider of apron management services shall notify both the aerodrome operator and the competent authority. |
| ADR.OR.B.065 — Termination of operation | EASA BR Art. 8a5.(c) | WG proposal (OR.500) Reference to national rules has been removed from (d).. |
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| ADR.OR.C.005 — Operator Responsibilities REV | EASA BR Art. 8a 5(d) and Essential | WG proposal (OR.530) with the following changes: Reference was edited in (a)(1). Numerical (4) has been added to (a) and |

[3] Articles ADR.AR.C.050 and ADR.OR.B.060 contained in Annex I and II to this Regulation, as well as Appendix II to Annex II shall come into force when the implementing rules regarding the provision of apron management services shall be in effect. Articles ADR.AR.A.015 and ADR.OR.A.015 shall not apply for providers of apron management services, until the implementing rules regarding the provision of apron management services shall be in effect.

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| | Requirements B<br><br>ICAO Annex 14, Appendix 7, 1.1 and 1.2 and ICAO Doc. 9774 2.3 Basic principles for aerodrome certification regulations under (c ) | requires the operator to ensure operation and maintenance of aerodrome equipment in accordance to the relevant manuals for that equipment. (b)(1) has been replaced with 'air traffic services'. (b) and (c) have been revised to accommodate arrangements required to be in place for service providers (third parties) at the aerodrome and a non-exhaustive list of such possible service providers is provided. There is the requirement for the operator to ensure that service providers have in place proper procedures in regard to their aerodrome safety related activities. Item (e) from the WG proposal has been deleted as it is addressed in (b) and (c). These requirements refer to the aerodrome operator having the proper safety management processes in place at his aerodrome to ensure safe operation. Item (f) in the WG proposal has been deleted as it referred to arrival and departure procedures.<br>WG proposal (g) is now item (e) mostly unchanged. It requires the aerodrome operators to ensure that exemptions, derogations, ELoS's, SC or other differences are published and documented in the aerodrome manual. |
| ADR.OR.C.010 — Use of the aerodrome by large aircraft *REV* | EASA BR Art. Essential Requirements D | This article has been revised by the Agency from the WG proposal to accommodate the requirement in the BR and requires a safety assessment for such use. |
| ADR.OR.C.015 — Access — *REV* | EASA BR Art. 10 Oversight and enforcement<br><br>ICAO Annex 14, chapter 1.4 and Attachment C, ICAO Doc. 9774 under 2.2 Basic Aviation Law under (g) | WG proposal (OR.535) but has been revised and item (b) has been deleted from it. |
| ADR.OR.C.020 — Findings and corrective actions *REV* | EASA BR Art. 8a 5(c) Essential requirement B-2 Management system (a).<br><br>ICAO Annex 14, | WG proposal (OR.540) where the second (redundant) part of (a)(2) has been deleted, and with slight editorial changes to the text in (3).<br>Item (b) of the article was deleted. |

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| | chapter 1.5 Safety Management and appendix 7, chapter 3. Doc. 9774 Part 6.<br><br>ICAO Doc. 9859 | |
| ADR.OR.C.025 — Immediate reaction to a safety problem — Compliance with Safety Directives REV | EASA BR Art. 8a 5(d)<br><br>Annex 14, 1.5 Safety Management<br><br>ICAO Doc. 9774 | WG proposal (OR.545) (b) and (C) have been deleted and editorial changes made to the remaining text. |
| ADR.OR.C.030 — Occurrence reporting REV | EASA BR Essential Requirement B-2(b)<br><br>Regulation (EU) No 996/2010 and Directive 2003/42/EC.<br><br>ICAO Annex 14, chapter 1.5 Safety Management and appendix 7, chapter 3<br><br>ICAO Doc. 9859 | This article has been added by the Agency to accommodate the mandatory occurrence reporting requirement. The mandatory occurrence reporting has been moved from former (OR.585). |
| ADR.OR.C.040 — Prevention of fire | EASA BR Art. 8a 5(d) and 8a 6 (c) | WG proposal (OR.550) Minor editorial changes. |
| ADR.OR.C.045 — Use of alcohol and illicit or prescribed substances REV | EASA BR Art. 8a 5(d) and 8a 6 (c) | WG proposal (OR.555) has been revised significantly and simplified. It now requires the aerodrome operator to ensure and promulgate a policy for no alcohol and drugs use of staff on duty. |
| ADR.OR.D.005 — Management REV | EASA BR Art. 8a 5(d) and ER B Operations and Management<br><br>ICAO Annex 14, chapter 1.5 and appendix 7.<br><br>ICAO Doc. 9859 | WG proposal (OR.560) has been revised in some areas.<br>A reference has been added to safety performance indicators and targets in (b)(5).<br>(b)(6) the purpose of the process has been more detailed.<br>(b)(7) has been more detailed in describing the purpose of the processes needed, including now the review of the system. |

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| | ICAO Doc. 9774 | (b)(9) meaning has been described in more details.<br>(b)(10) meaning has been described in more details to ensure the SMS addresses the interfacing between the aerodrome and any other organisation applicable to the emergency planning.<br>(e) from the WG proposal was abundant and therefore has been deleted and the (f) moved to (e) which now contains the proportionality provision for the management system, which shall contain an SMS that is tailored to the size and complexity of the organisation.<br>(f) the references to single or dual SMS' have been removed as they are not necessary. Rather it is required that the management system covers the whole range of activities. |
| ADR.OR.D.007 — Management of aeronautical data and aeronautical information | Commission regulation (EU) 73/2010 | No proposal from the WG. This article was added by the Agency. |
| ADR.OR.D.010 — Contracted activities REV | EASA BR Art. 8a 5(d)<br><br>EASA BR Essential Requirement B-1(a) and (f)<br><br>ICAO Doc. 9859 | WG proposal (OR.565) with editorial changes to the paragraph. Abundant items have been removed and items combined. The heading has been changed from 'Contracting and purchasing'. |
| ADR.OR.D.015 — Personnel requirements REV | EASA BR Art. 8a 5(d)<br><br>EASA BR Essential Requirement B-1(k), (l)<br><br>Annex 14, Appendix 7, 4.1<br><br>ICAO Doc. 9859 | WG proposal (OR.570) with the following revisions:<br>In (a) the responsibility of the accountable manager for the effective management system has been added.<br>In (d) the person responsible for the day-to-day operation of the aerodrome has been referred to as the person nominated for the management of the operational services and maintenance of the aerodrome. The compliance monitoring person has been added to (b) and has been deleted from (d).<br>Item (i) is now item (d)<br>Item (j) is now item (e)<br>Item (k) is now item (f)<br>Item (l) is now item (g) and has changes to numerical (1) where items (i), (ii) and (iii) have been added. Those items contain the requirements former in numerical 1–3 in this paragraph, for |

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| | | training and competency of the personnel involved in operation, maintenance and management of the aerodrome.<br>(g)(2) has been added, it contains requirement for unescorted persons on the movement area to be properly trained.<br>(g)(3) has been added, it contains requirements for check programs as required by the EASA BR.<br>(g)(4) has been added, it contains the requirement that the aerodrome operator assigns a sufficient number of personnel supervisors in the operation. |
| ADR.OR.D.020 — Facilities Requirements *REV* | EASA BR Art. 8a 5(d)<br><br>EASA BR Essential Requirement B-1(a) | WG proposal (OR.575) with editorial changes to (a).<br>(b) has been added. It requires the aerodrome operator to ensure as applicable, that adequate and appropriate facilities, installations and equipment exists at the aerodrome for the safe storage and handling of dangerous goods and for the storage and handling of aviation fuel. |
| ADR.OR.D.025 — Coordination with other relevant organisations *REV* | EASA BR Art. 8a 5(d)<br><br>EASA BR Essential Requirement B-1 (f)<br><br>ICAO Doc. 9859 | WG proposal (OR.580) with changes to clarify the meaning of the text and ensure it addresses the audit duty of the aerodrome operator to the other relevant organisations. |
| ADR.OR.D.030 — Safety reporting system *REV* | EASA BR Art. 8a 5(d)<br><br>EASA BR Essential Requirement B-2(b)<br><br>Annex 14, appendix 7<br><br>ICAO Doc. 9859 | WG proposal (OR.585) revised so that it now contains requirements for a safety reporting system for the reporting of occurrences and a possibility for voluntary safety reports. Just culture principles are referred to. The mandatory reporting requirements have been moved to article 'ADR.OR.C.030 Occurrence reporting'. The handling of safety reports from the reporting system have been addressed in this article. |
| ADR.OR.D.035 — Record-keeping *REV* | EASA BR Art. 8a 5(d)<br><br>EASA BR Essential Requirement B-2(a) | WG proposal (OR.590) with the following revisions: (a) the word 'adequate' has been removed and a references corrected.<br>(d) has been removed, abundant. |

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| | Annex 14, appendix 7<br><br>ICAO Doc. 9859 | |
| ADR.OR.E.005 — Aerodrome manual REV | EASA BR Art. 8a 5(d)<br><br>EASA BR Essential Requirement B-2(c)<br><br>ICOA Annex 14, 1.4.4<br><br>ICAO Doc 9859 | WG proposal (OR.600 (OR.605 has been incorporated into this article as well)) but has been revised to reflect the intention in (e)(2) that the aerodrome operator can amend the aerodrome manual with a notification but without an approval for items that do not require an approval by the competent authority. Further revision describes the establishment and maintenance of the aerodrome manual which are in conformance with ICAO provisions. |
| ADR.OR.E.010 — Structure of the aerodrome manual REV | ICAO Doc 9774, Appendix 1 | WG proposal (OR.600). The structure of the aerodrome manual has been put into separate article since the WG proposal but the content is the same. The structure is in line with ICAO provisions. |

Note: The basic document underlying this justification is the final working group proposal. When text is changed in any way from the WG proposal, those changes are indicated with the superscript and an explanation.

## Cross references — Annex III — Part-OPS

| Article | Source | Working Group |
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| ADR-OPS.A.005 | EASA Basic Regulation (BR) Requirement (Regulation (EC) No 216/2008) Annex Va. A.4.a<br><br>ICAO A14 2.1 (Std.) | WG proposal<br><br>High level statements to cover aeronautical data requirements. Details have been included in the relevant AMCs. |
| ADR-OPS.A.010 | EASA BR Requirement (Regulation (EC) No 216/2008), Annex Va, A.4.b<br><br>ICAO A14, 2.1 (Std.), 2.13.4 (Std.), 2.9.1 (Std.) | WG proposal<br><br>The word 'Data' has been added to the title to give more clarity.<br>High level statement to cover quality requirements. Details have been included in the relevant AMCs. |
| ADR-OPS.A.015 | EASA BR Requirement (Regulation (EC) No 216/2008), Annex Va, 4.a.c<br><br>ICAO A14, 2.9.1 (Std.), 2.9.2 (Std.), 2.13.1 (Std.), 2.13.2 (Std.) | WG proposal<br><br>High level statement to cover coordination issues between AIS, ANSP and Aerodrome Operator. Details have been included in the relevant AMCs. |
| ADR-OPS.B.005 | EASA BR Requirement (Regulation (EC) No 216/2008), Annex Va, B.1.i<br><br>ICAO A14, 9.1.1 (Std.), 9.1.2 (Std.), 9.1.3 (Std.), 9.1.12 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator as required by the ER. Proposed text has the same intent with ICAO. |
| ADR-OPS.B.010 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.j, B.1.m, B.1.n<br><br>ICAO A14, 9.2.1 (Std.), 9.2.35 (Rec.), 9.2.36 (Rec.), 9.2.3 (Std.), 9.2.11 (Std.), 9.2.38 (Std.), 9.2.23 (Std.), 9.2.40 (Rec.), 9.2.42 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator as required by the ER. High level statement that includes the requirements for RFFS training and medical fitness as stipulated by the Essential Requirements. The text summarizes the requirements of ICAO Annex 14 for RFFS. Details, based on ICAO SARPS have been included in the relevant AMCs. |
| ADR-OPS.B.015 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.a<br><br>ICAO A14, 2.9.1 (Std.), 2.9.2 (Std.), 2.9.3 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator as required by the ER. Different wording from ICAO but with the same intent. Details have been included in the AMCs. |
| ADR-OPS.B.020 | EASA BR Requirement (Regulation (EC) No | WG proposal |

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| | 216/2008) Annex Va, B.1.c<br><br>ICAO A14, 9.4.1 (Std.), 9.4.3 (Std.), 9.4.4 (std.) | Allocation of tasks between the competent authority and the aerodrome operator. Details have been included in the AMCs. |
| ADR-OPS.B.025 | EASA BR Requirement (Regulation (EC) No 216/2008), Annex Va, B.1.d<br><br>ICAO A14, 9.7 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator as required by the ER. Rule is based on ICAO standard, but has different wording. |
| ADR-OPS.B.030 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.d<br><br>ICAO A14, 9.8.1 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator for the provision of SMGCS. Details have been included in the AMC. |
| ADR-OPS.B.035 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.e<br><br>ICAO A14, 10.3 | WG proposal<br><br>Different from ICAO. High level statement to meet the Essential Requirements. Details have been included in the AMC. |
| ADR-OPS.B.040 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.e | WG proposal<br><br>Different from ICAO. High level statement to meet the Essential Requirements. Details have been included in the AMC. |
| ADR-OPS.B.045 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.e | WG proposal<br><br>High level statement to meet the Essential Requirements. Details have been included in the AMC. Annex 14 contains few specifications related to Low Visibility Operations. |
| ADR-OPS.B.050 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.e | WG proposal<br><br>High level statement to meet the Essential Requirements. Details have been included in the AMC. |
| ADR-OPS.B.055 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.g | Agency proposal<br><br>High level statement to meet the Essential Requirements. Details have been included in the AMC. |
| ADR-OPS.B.060 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.k<br><br>ICAO A14, 9.10.1 (Std.), 9.10.2 (Std.) 9.10.4 (Std.), Attachment A, section 18 | WG proposal<br><br>Allocation of the responsibility to the aerodrome operator. The proposed rule satisfies Essential Requirements as well as ICAO Annex 14 provisions. |

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| ADR-OPS.B.065 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.a, B.1.b, B.1.e | WG proposal<br><br>High level statement to cover the Essential Requirements |
| ADR-OPS.B.070 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.b, B.1.d, B.1.f | WG proposal<br><br>High level statement to cover the Essential Requirements. Annex 14 contains no specific SARPS with regard to aerodrome works safety, except for runway pavement overlays and marking and lighting of unserviceable areas. |
| ADR-OPS.B.075 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, A.2, B.1.b, C.1, C.2 | WG proposal<br><br>Higher than ICAO, since Annex 14 doesn't contain specific requirements related to the operational monitoring of obstacles and other hazards or mitigation of risks related to their existence. |
| ADR-OPS.B.080 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, C.1<br><br>ICAO A14, 6.1.6 (Std.) | Agency proposal<br><br>Same as ICAO. Assignment of responsibility for marking and lighting of vehicles and other mobile objects to the aerodrome operator. |
| ADR-OPS.B.085 | ICAO Doc.9774 | Agency proposal<br><br>IR proposed by ADR.001 RMG to be included in OPS. |
| ADR-OPS.C.005 | EASA BR Requirement (Regulation (EC) No 216/2008) B.1.b, B.1.h<br><br>ICAO A14, 10.1.1 (Std.) | WG proposal<br><br>The proposal considers ICAO SL41-2011. Purpose of the maintenance is worded differently in Annex 14 and the Essential Requirements. |
| ADR-OPS.C.010 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, A.1.a.iii, A.1.a.iv, A.1.a.v, A.1.a.vi, A.1.d.2, B.1.b<br><br>ICAO A14, 10.2.1 (Std.), 10.2.2 (Std.), 10.2.3 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator for maintenance inspections which are different from operational inspections. |
| ADR-OPS.C.015 | EASA BR Requirement (Regulation (EC) No 216/2008) Annex Va, B.1.b, B.1.h<br><br>ICAO A14, 10.4.2 (Std.) | WG proposal<br><br>Allocation of responsibilities to the aerodrome operator. |

## Cross references AMC to Part-OPS

| Article | Source | Working Group |
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| AMC-ADR-OPS.A.005 (a) (1) | ICAO A14, 2.2 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (2) | ICAO A14, 2.3 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (3) | ICAO A14, 2.4 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (4) | ICAO A14, 2.5 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (5) | ICAO A14, 2.6 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (6) | ICAO A14, 2.7 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (7) | ICAO A14, 2.8 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (8) | ICAO A14, 2.9 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (9) | ICAO A14, 2.10 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (10) | ICAO A14, 2.11 | WG proposal |

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| | | Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (a) (11) | ICAO A14, 2.12 | WG proposal<br><br>Group considered only the headline. Details have been included in GM. |
| AMC-ADR-OPS.A.005 (b) | ICAO A14, 2.5.5 | WG proposal<br><br>Group considered to include also the provision of terrain data. |
| AMC-ADR-OPS.A.005 (c) | ICAO A14, 2.5.5 | WG proposal<br><br>Group considered to include also the provision of terrain data. |
| AMC-ADR-OPS.A.010 (a) | ICAO A14, 2.1.2 | WG proposal<br><br>Text is the same as in ICAO Annex 14. |
| AMC-ADR-OPS.A.010 (b) | ICAO A14, 2.1.1 (Std.) and Appendix 5 | WG proposal<br><br>Text is changed to assign the responsibility to the aerodrome operator but the intent is the same as in ICAO Annex 14. |
| AMC-ADR-OPS.A.010 (c) | ICAO A14, 2.1.1 (Std.) | WG proposal<br><br>Text is the same as in ICAO Annex 14. |
| AMC-ADR-OPS.A.010 (d) | ICAO A14, 2.1.5 (Std.) | WG proposal<br><br>Text is the same as in ICAO Annex 14. |
| AMC-ADR-OPS.A.010 (e) | ICAO A14, 2.1.6 (Std.) | WG proposal<br><br>Text is the same as in ICAO Annex 14. |
| AMC-ADR-OPS.A.010 (f) | ICAO A14, 2.1.7 (Std.) | WG proposal<br><br>Text is the same as in ICAO Annex 14. |
| AMC-ADR-OPS.A.010 (g) | ICAO A14, 2.1.3 (Std.) | WG proposal<br><br>Text is the same as in ICAO Annex 14. |
| AMC-ADR-OPS.A.010 (h) | ICAO A14, 2.1.4 (Rec.) | WG proposal<br><br>Text is the same as in ICAO Annex 14. |

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| AMC-ADR-OPS.A.010 (i) (1) | | WG proposal<br><br>No specific provision in Annex 14. Text proposed in order to ensure that data originated by the aerodrome operator are promulgated correctly. |
| AMC-ADR-OPS.A.010 (i) (2) | | WG proposal<br><br>No specific provision in A14. Text proposed in order to ensure that the aerodrome operator notifies AIS and ANSPs whenever there is a change in the data originated by the aerodrome operator. |
| AMC-ADR-OPS.A.015 (a) | ICAO A14, 2.13.1.a (Std.) and 2.9.2 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Text has the same intent as in ICAO Annex 14. The Agency also added points (a) (10) and (a) (1) that were missing from the WG proposal. |
| AMC-ADR-OPS.A.015 (b) | ICAO A14, 2.13.1.a (Std.) and 2.11.3 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Combination of two standards. Text has the same intent as in ICAO Annex 14. |
| AMC-ADR-OPS.A.015 (c) | ICAO A14, 2.13.3 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Text rephrased but has the same intent as in ICAO Annex 14. |
| AMC1-ADR-OPS.B.005 (a) | ICAO A14, 9.1.6 (Std.) | WG proposal<br><br>Different from ICAO Annex 14. The aerodrome operator can only ensure an optimum response of the organisations under the control of its own emergency plan. The coordination of all agencies involved in an emergency is the responsibility of another local or national authority. |
| AMC1-ADR-OPS.B.005 (b) | ICAO A14, 9.1.14 (Std.) | WG proposal |

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| | | Text rephrased to allocate the responsibility to the aerodrome operator but has the same intent as in ICAO Annex 14. |
| AMC2-ADR-OPS.B.005 (a) | ICAO A14, 9.1.5 (Rec.) | Agency proposal<br><br>Text proposed by the Agency to ensure that the aerodrome emergency plan document contains at least some required information. Text rephrased to allocate the responsibility to the aerodrome operator but has the same intent as in ICAO Annex 14. |
| AMC3-ADR-OPS.B.005 | ICAO A14, 9.1.13 (Std.) | WG proposal<br><br>The Agency changed WG proposal and deleted the modular exercises proposed in ICAO SL41-2011 since it was not recommended by the Agency. |
| AMC1-ADR-OPS.B.010 (a) | ICAO A14, 9.2.35 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Same text as in ICAO Annex 14. |
| AMC1-ADR-OPS.B.010 (b) | ICAO A14, 9.2.36 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Same text as in ICAO Annex 14. |
| AMC2-ADR-OPS.B.010 (a) (1) | ICAO A14, 2.11.2 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Same text as in ICAO Annex 14. |
| AMC2-ADR-OPS.B.010 (a) (2) | ICAO A14, 9.2.5 (Std.) and 9.2.6 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Combination of two standards. Text has the same intent as with ICAO Annex 14. |
| AMC2-ADR-OPS.B.010 (a) (3) | ICAO A14, 9.2.3 (Std.) | WG proposal<br><br>Allocation of the responsibility to the aerodrome operator. The term 'normally using' at 9.2.3 is substituted by the term 'expected' as the determination |

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| | | of the level of protection to be provided at an aerodrome is actually made when planning the expected aerodrome operations. |
| AMC2-ADR-OPS.B.010 (a) (4) | | WG proposal<br><br>The proposed text ensures that if the number of movements is expected to be more than 700 in the busiest consecutive three months, the level of protection is equal to the determined category and not less. |
| AMC2-ADR-OPS.B.010 (b) | ICAO A14, 9.2.7 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC3-ADR-OPS.B.010 (a) (1) | ICAO A14, 9.2.37 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC3-ADR-OPS.B.010 (a) (2) | ICAO A14, 9.2.22 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC3-ADR-OPS.B.010 (b) | ICAO A14, 9.2.2 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Proposed text is different from ICAO Annex 14. |
| AMC4-ADR-OPS.B.010 (a) | ICAO A14, 9.2.8 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC4-ADR-OPS.B.010 (b) | ICAO A14, 9.2.9 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14 and considers also ICAO SL41-2011. |
| AMC4-ADR-OPS.B.010 (c) | ICAO A14, 9.2.10 (Rec.) and Note 2 | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |

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| AMC4-ADR-OPS.B.010 (d) | ICAO A14, 9.2.11 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14 and considers also ICAO SL41-2011. |
| AMC4-ADR-OPS.B.010 (e) | ICAO A14, 9.2.13 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC4-ADR-OPS.B.010 (f) | ICAO A14, 9.2.16 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14 and considers also ICAO SL41-2011. |
| AMC4-ADR-OPS.B.010 (g) | ICAO A14, 9.2.17 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC4-ADR-OPS.B.010 (h) | ICAO A14, 9.2.18 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC4-ADR-OPS.B.010 (h) | ICAO A14, 9.2.19 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC5-ADR-OPS.B.010 (a) (1) | ICAO A14, 9.2.23 (Std.) and 9.2.24 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The proposed text is a combination of one standard and one recommendation. Text is different from ICAO Annex 14. |
| AMC5-ADR-OPS.B.010 (a) (2) | ICAO A14, 9.2.25 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with ICAO Annex 14. |
| AMC5-ADR-OPS.B.010 (a) (3) | ICAO A14, 9.2.27 (Std.) and 9.2.28 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The proposed text is a combination of one standard and one |

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| | | recommendation. Text is different from ICAO Annex 14. |
| AMC5-ADR-OPS.B.010 (a) (4) | ICAO A14, 9.2.26 (Rec.) | Agency proposal<br><br>Allocation of responsibility to the aerodrome operator. The proposed text ensures that all the necessary measures are taken to achieve as nearly as possible the operational objective in less than optimum conditions of visibility. The text is in line with ICAO Annex 14. |
| AMC6-ADR-OPS.B.010 (a) (1) | ICAO A14, 9.2.40 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The ICAO Recommendation is split in two parts. The text is in line with ICAO Annex 14. |
| AMC6-ADR-OPS.B.010 (a) (2) | ICAO A14, 9.2.40 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The ICAO Recommendation is split in two parts. The text is in line with ICAO Annex 14. |
| AMC6-ADR-OPS.B.010 (a) (3) | ICAO A14, 9.2.42 (Std.) | Agency proposal<br><br>Allocation of responsibility to the aerodrome operator. The text proposed in order to ensure that RFFS personnel are provided with the necessary self-protection equipment. The text is in line with Annex 14. |
| AMC7-ADR-OPS.B.010 (a) (1) | ICAO A14, 9.2.38 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with Annex 14. |
| AMC7-ADR-OPS.B.010 (a) (2) | ICAO A14, 9.2.39 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The text is in line with Annex 14. |
| AMC8-ADR-OPS.B.010 | EASA BR Annex Va B.1.n | WG proposal<br><br>Allocation of responsibility to the aerodrome operator to determine/ensure that appropriate medical standards |

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| | | are met by the RFFS personnel. |
| AMC-ADR-OPS.B.015 | ICAO A14, 2.9.3 (Std.) and Doc.9137 Part 8, 3.1.1 | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The requirement is more stringent than ICAO A14, 2.9.3 because for some aerodromes having a lot of traffic, movement area inspections once or twice per day is not considered adequate. |
| AMC-ADR-OPS.B.020 | ICAO A14, 9.4.1 (Std.), 9.4.2 (Std.), 9.4.3 (Std.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. The requirement is more stringent than ICAO Annex 14 since it adds the requirement for the aerodrome operator to develop a wildlife risk management programme. |
| AMC-ADR-OPS.B.025 | EAPPRI | WG proposal<br><br>The AMC requires the establishment of an airside driving training programme as well the requirement of additional training and RTF training to persons driving on the manoeuvring area. The AMC requires also from the aerodrome operator to establish a system for issuing driving authorisations on the movement area and the conditions of their renewal. |
| AMC-ADR-OPS.B.030 (a) | ICAO A14, 9.8.2 (Rec.) | WG proposal<br><br>Allocation of responsibility to the aerodrome operator. Text is in line with ICAO Annex 14. |
| AMC-ADR-OPS.B.030 (b) | ICAO A14, 9.8.4 (Rec.), 9.8.5 (Rec.) | Agency proposal<br><br>Text proposed by the Agency in order to ensure that during the design phase of an SMGCS the operational objectives of the system has been taken into account. The text is in line with ICAO Annex 14. |
| AMC-ADR-OPS.B.030 (c) | ICAO A14, 9.8.6 (Std.) | Agency proposal |

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| | | Text proposed by the Agency in order to ensure essential operating requirements of the SMGCS. The text is in line with ICAO Annex 14. |
| AMC-ADR-OPS.B.030 (d) | | WG proposal<br><br>Text proposed to ensure that during the development of an SMGCS, the requirements of the ANSPs and aircraft operators are taken into account by the aerodrome operator. |
| AMC-ADR-OPS.B.035 (a) | ICAO A14 10.3.1 — 10.3.4<br><br>ICAO Doc.9137 Part 8, 6.7.1 | WG proposal<br><br>Text proposed ensures that all requirements for safe winter operations are included in a ‘snow plan’. Text is different than ICAO Annex 14. |
| AMC-ADR-OPS.B.035 (b) | ICAO A14, 10.3.1 (Std.) | WG proposal<br><br>Text proposed includes only the requirements for winter operations. |
| AMC-ADR-OPS.B.035 (c) | ICAO A14, 10.3.5 (Std.) | WG proposal<br><br>Text proposed doesn’t consider effects on environment when using chemicals since it is not a safety requirement. |
| AMC-ADR-OPS.B.040 | | WG proposal<br><br>This type of operations are mentioned under a number of visual aids provisions in ICAO A14 which are transposed in CSs. The actual operation of visual aids is generally the responsibility of the ANSP. |
| AMC-ADR-OPS.B.045 | ICAO EUR Doc.013, Chapter 3, ICAO A14 9.5.4, ICAO Doc.9365 3.2.1 and 3.3.3 | WG proposal<br><br>Proposed text covers the basic requirements for LVO. |
| AMC-ADR-OPS.B.050 | | WG proposal<br><br>Proposed text covers the requirements for the aerodrome operator to establish and implement procedures to mitigate risks to operations due |

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| | | to adverse weather conditions. |
| AMC-ADR-OPS.B.055 | | Agency proposal<br><br>Proposed text details Implementing Rule's requirements. |
| AMC-ADR-OPS.B.060 | | WG proposal<br><br>Allocation of responsibility to the aerodrome operator |
| AMC-ADR-OPS.B.065 | | WG proposal |
| AMC1-ADR-OPS.B.070 | | WG proposal<br><br>Text proposed by the group in order to ensure a proper planning for aerodrome works. |
| AMC2-ADR-OPS.B.070 | ICAO A14, 10.3.1 (Std.) and 10.3.4 | WG proposal<br><br>Text is in line with ICAO Annex 14 |
| AMC3-ADR-OPS.B.070 | ICAO A14, 7.4.1, 7.4.2, 7.4.3 and ATT. A 13 | Agency proposal<br><br>Text proposed by the Agency in order to allocate the responsibility to the aerodrome operator to ensure that unserviceable areas are marked and lighted properly. |
| AMC1-ADR-OPS.B.075 | | WG proposal<br><br>Text proposed allocates the responsibility to the aerodrome operator to monitor the surroundings of the aerodrome. |
| AMC2-ADR-OPS.B.075 | ICAO A14, 3.4.6 (Rec.), 3.4.7 (Std.), 4.2.10 (Std.), 4.2.11 (Rec.), 4.2.12 (Rec.), 9.9.1 (Std.), 9.9.2 (Std.), 9.9.4 (Rec.), 9.9.5 (Std.), 9.9.6 (Std.), 4.2.18 (Std.), 4.2.19 (Std.), 4.2.20 (Rec.), 4.2.21 (Rec.), 4.2.25 (Std.), 4.2.26 (Rec.), 4.4.1 (Rec.), 4.4.2 (Rec.) | Agency proposal<br><br>Text proposed by the Agency to ensure that the aerodrome operator, within its area of responsibility removes and restricts obstacles. |
| AMC3-ADR-OPS.B.075 | ICAO A14, 6.1.5 (Std.), 6.1.7 (Std.), | Agency proposal |

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| | 6.1.8 (Std.) | Text proposed by the Agency to ensure that the aerodrome operator, within its area of responsibility, marks and lights obstacles. |
| AMC4-ADR-OPS.B.075 | ICAO A14, 6.1.1 (Rec.) | Agency proposal<br><br>Text proposed by the Agency allocating the responsibility to the aerodrome operator to ensure that obstacles extending above a take-off climb surface within its area of responsibility are properly marked and lighted. |
| AMC5-ADR-OPS.B.075 | ICAO A14, 6.1.2 (Rec.) | Agency proposal<br><br>Text proposed by the Agency allocating the responsibility to the aerodrome operator to ensure that objects, other than obstacles, adjacent to a take-off climb surface within its area of responsibility are properly marked and lighted. |
| AMC6-ADR-OPS.B.075 | ICAO A14, 6.1.3 (Std.) | Agency proposal<br><br>Text proposed by the Agency allocating the responsibility to the aerodrome operator to ensure that obstacles that extends above an approach or transitional surface within its area of responsibility are properly marked and lighted. |
| AMC7-ADR-OPS.B.075 | ICAO A14, 6.1.4 (Rec.) | Agency proposal<br><br>Text proposed by the Agency allocating the responsibility to the aerodrome operator to ensure that fixed obstacles that extend above a horizontal surface within its area of responsibility are properly marked and lighted. |
| AMC8-ADR-OPS.B.075 | ICAO A14, 6.2.3 (Rec.), 6.2.4 (Rec.), 6.2.5 (Rec.), 6.2.7 (Std.), 6.2.11 (Std.) | Agency proposal<br><br>Text proposed by the Agency allocating the responsibility to the aerodrome operator to ensure that objects are properly marked. |

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| AMC8-ADR-OPS.B.075 | ICAO A14 | Agency proposal<br><br>Text proposed by the Agency allocating the responsibility to the aerodrome operator to ensure that location and characteristics of obstacle lights conform with the applicable CSs. |
| AMC-ADR-OPS.B.080 | ICAO A14, 6.2.2 (Std.), 6.2.6 (Rec.), 6.2.14 (Std.), 6.3.4 (Std.), 6.3.5 (Std.) | Agency proposal<br><br>Text proposed by the Agency allocating the responsibility to the aerodrome operator to ensure that vehicles and other mobile objects on the manoeuvring area are marked and lighted properly. |
| AMC-ADR-OPS.085 | ICAO Doc. 9774 | Agency proposal based on ADR.001 proposal<br><br>Text proposed by the Agency to allocate the responsibility to the aerodrome operator to ensure that procedures exist for the handling of hazardous materials within the aerodrome. |
| AMC-ADR-OPS.C.005 | ICAO A14, 9.2.29 (Rec.), 10.1.2 (Rec.)<br><br>ICAO Doc.9137 Part 9 | WG proposal<br><br>Content derived from table of contents of ICAO Doc.9137 Part 9. |
| AMC-ADR-OPS.C.010 | | WG proposal<br><br>Text included changes to ICAO Annex 14 as described in ICAO SL41-2011. |
| AMC-ADR-OPS.C.015 | ICAO A14, 10.4.1 (Std.), 10.4.2 (Std.) | WG proposal |

## Cross references Book 1 CS-ADR-DSN

This section details the differences in content between ICAO Annex 14, Volume I, International Standards and Recommended Practices (SARP) (and other international source material), and EASA Certification Specifications (CS) for aerodrome design in the NPA.

Note: By default, and if not indicated 'REV' the NPA text follows the Working Group proposal.

The format for identifying the differences follows the layout of CS Book 1 as follows:

Where the NPA text is the same as the ICAO SARP:

### CS-ADR-DSN.B.035 — Width of runways *ICAO*

No additional information is required.

Where the NPA *text* differs marginally from the ICAO SARP mainly for editorial reasons, without changing meaning:

### CS-ADR-DSN.B.035 — Actual length of runways *TXT*

Followed by a description of the alteration; e.g. order of the text within a sentence, paragraph or section; use of a different word or phrase.

Where the NPA text proposes to delete or move the ICAO SARP, either in its entirety:

### CS-ADR-DSN.B.020 — Choice of maximum permissible crosswind components *DEL or MOVE to GM*

Followed by the rationale for deletion or move to GM.

Where the NPA text presents an addition to the ICAO SARP:

### CS-ADR-DSN.L.540 — Aiming point marking *ADD*

Followed by the additional text, table or figure.

Where the NPA text presents a revision of the Working Group text:

### CS-ADR-DSN.M.650 — Approach slope and elevation setting of light units *REV*

Followed by a description of the revised text, figure or table; e.g. if any of the above actions has been taken without providing justification.

**NB:** throughout the Book 1 specifications, the verb 'shall' has been replaced with the verb 'should'.

*In the Annex 14 references, Standards are red, Recommended Practices are blue.*

**BOOK 1**

**EASA CERTIFICATION SPECIFICATIONS FOR AERODROME DESIGN**

**CHAPTER A — GENERAL**

**CS-ADR-DSN.A.001 — Applicability**

**CS-ADR-DSN.A.002 — Definitions**

**CS-ADR-DSN.A.005 — Aerodrome reference code** ***MOVE to GM TXT REV***

ICAO text relating to the intent of the aerodrome reference code has been moved to GM; there is a minor editorial text change in NPA paragraph (a). The working group text relating to different parts of an aerodrome being assigned different aerodrome reference codes for additional flexibility has been moved to GM. The remaining NPA text is the same as ICAO.

**CHAPTER B — RUNWAYS**

**CS-ADR-DSN.B.015 — Number, siting and orientation of runways** ***MOVE to GM TXT***

It was considered that the number and orientation of the runways is ultimately a decision by the aerodrome operator based on economic factors; the NPA text is moved to GM as this is not primarily safety-related.

**CS-ADR-DSN.B.020 — Choice of maximum permissible crosswind components** ***MOVE to GM***

See GM-ADR-DSN.B.020

The ICAO recommendation 3.1.3 was considered to be commercially orientated and to not have safety relevance; the equivalent NPA text is moved to Guidance Material (GM).

**CS-ADR-DSN.B.025 — Data to be used** ***MOVE to GM***

See GM-ADR-DSN.B.025

The ICAO recommendation 3.1.4 was considered to not have safety relevance; the equivalent NPA text is moved to GM.

**CS-ADR-DSN.B.030 — Runway threshold** ***MOVE to GM TXT***

The revised NPA text is considered to specify the existence and location of the threshold better than ICAO Annex 14 text. Numerical values are not provided, so the comparison to ICAO is transparent and raises no additional obligation on the aerodrome operator. (*Because there were no figures in ICAO Annex 14, paragraphs 3.1.5 and 3.1.6, there is no increase compared to ICAO*).

Parts of the NPA description are moved to GM because an improvement of safety is given but it is not mandatory. This does not dilute the ICAO meaning.

**CS-ADR-DSN.B.035 — Actual length of runway and declared distances** ***ADD MOVE to GM***

The added CS relates to the declared distances of the aeroplanes that are intended to use the runway, so in that respect the NPA is more specific than the ICAO definition; the NPA text giving detailed description of declared distances is moved to GM.

**CS-ADR-DSN.B.040 — Runways with stopways or clearways** ***MOVE to GM ADD***

It was considered that because there are no figures in the ICAO text, the NPA should be moved to Guidance Material and the CS reduced to a minimum; the new NPA text replaces the ICAO text.

**CS-ADR-DSN.B.045 — Width of runways** ***ICAO***

**CS-ADR-DSN.B.050 — Minimum distance between parallel non instrument runways** ***ICAO***

**CS-ADR-DSN.B.055 — Minimum distance between parallel instrument runways** ***TXT MOVE to GM***

Text has been amended as there are no numerical values attached to ICAO Annex 14, 3.1.12, paragraph (b) (sub-paragraph (3) in the NPA) to indicate that other combinations of minimum separation distances may be applied, depending on local circumstances and factors; the NPA text for this portion has been moved to GM. 3.1.11 and 3.1.12 paragraph a) is the same as ICAO.

**CS-ADR-DSN.B.060 — Longitudinal slopes of runways** ***ICAO***

**CS-ADR-DSN.B.065 — Longitudinal slopes changes on runways** ***ICAO***

**CS-ADR-DSN.B.070 — Sight distance for slopes on runways** ***ICAO***

**CS-ADR-DSN.B.075 — Distance between slope changes** ***ICAO***

**CS-ADR-DSN.B.080 — Transverse slopes** ***ICAO***

### CS-ADR-DSN.B.085 — Runway strength *TXT*

The amended NPA text exceeds the ICAO description and is considered to be an improvement by including the ACN/PCN runway classification method.

### CS-ADR-DSN.B.090 — Surface of runways *ICAO MOVE to OPS REV*

The former paragraph (d) relating to surface friction measurement is an operational issue and has therefore been moved to OPS.

## SECTION 1 RUNWAY TURN PADS

### CS-ADR-DSN.B.095 — Runway turn pads *ICAO TXT*

ICAO Annex 14 paragraphs 3.3.1 and 3.3.2 have been amalgamated as they have the same wording, but apply respectively to code letter D, E or F and A, B or C; the order of the remaining NPA text has been rearranged, but is has the same content as ICAO.

### CS-ADR-DSN.B.100 — Slopes on runway turn pads *ICAO*

### CS-ADR-DSN.B.105 — Strength of runway turn pads *TXT*

The ICAO term 'at least equal' has been replaced in the NPA text by 'compatible'.

### CS-ADR-DSN.B.110 — Surface of runway turn pads *TXT*

The NPA text:

(a) 'The surface of a runway turn pad should be constructed *or resurfaced* to provide friction characteristics *compatible with the runway friction characteristics*.'

Modifies the ICAO text:

'The surface of a runway turn pad should be so constructed as to provide good friction characteristics for aeroplanes using the facility when the surface is wet.'

### CS-ADR-DSN.B.115 — Width of shoulders for runway turn pads *ICAO*

### CS-ADR-DSN.B.120 — Strength of shoulders for runway turn pads *ICAO*

## SECTION 2 RUNWAY SHOULDERS

### CS-ADR-DSN.B.125 — Runway shoulders *ICAO*

### CS-ADR-DSN.B.130 — Slopes on runway shoulders *ICAO*

### CS-ADR-DSN.B.135 — Width of runway shoulders *ICAO*

### CS-ADR-DSN.B.140 — Strength of runway shoulders ICAO

### CS-ADR-DSN.B.145 — Surface of runway shoulders ICAO

## SECTION 3 RUNWAY STRIP

### CS-ADR-DSN.B.150 — Runway strip to be provided ADD

The first sentence is the same as ICAO; additional NPA text in the second sentence of paragraph (a) and sub-paragraphs (1) and (2) is added to describe the purpose of the runway strip.

### CS-ADR-DSN.B.155 — Length of runway strip ICAO

### CS-ADR-DSN.B.160 — Width of runway strip ICAO

### CS-ADR-DSN.B.165 — Objects on runway strips ICAO MOVE to OPS REV

The former paragraph (c) relating to mobile obstacles is an operational issue and has therefore been moved to OPS.

### CS-ADR-DSN.B.170 — Non-precision approach and non-instrument runway strips ADD

This CS was added to NPA text to clarify the siting of objects on runway strips using the criteria for the non-instrument strip (which coincides with the graded portion of the non-precision approach runway strip).

### CS-ADR-DSN.B.175 — Grading of runway strips ICAO

### CS-ADR-DSN.B.180 — Longitudinal Slopes on runway strips ICAO

### CS-ADR-DSN.B.185 — Transverse Slopes on runway strips ICAO

### CS-ADR-DSN.B.190 — Strength of runway strips ICAO

## SECTION 4 CLEARWAYS, STOPWAYS AND RADIO ALTIMETER OPERATING AREA

### CS-ADR-DSN.B.195 — Clearways MOVE to GM ADD

Paragraph (c) in the NPA text adds a generalised statement on the requirement to publish clearway dimension available; the ICAO text has been moved to GM as the amount of clearway useable is an aircraft performance matter. Paragraph (d)(1) is added to the NPA.

Paragraph (e), the recommendation to avoid abrupt upward slopes (ICAO 3.6.5) has been moved to GM as this cannot be quantified as a CS in the NPA text. Paragraph (f), the ICAO text (3.6.6) has been moved to GM and the new text cross-referencing to CS-ADR-DSN.T.915 in the NPA is added as this contains detailed specifications for siting of objects on operational areas.

### CS-ADR-DSN.B.200 — Stopways *MOVE to GM* *ADD*

Paragraph (b) is now a generalised statement and the ICAO text is moved to GM; paragraph (c) has a cross reference to GM added. Remaining NPA text is the same as ICAO.

### CS-ADR-DSN.B.205 — Radio altimeter operating area *MOVE to GM*

The ICAO length and width specifications for the radio altimeter operating area have been retained in the NPA; the remaining ICAO text has been moved to GM as it was considered not to have safety implications and it was a desirable rather than essential operational adjunct.

## CHAPTER C — RUNWAY END SAFETY AREA *(Doc 004)*

### CS-ADR-DSN.C.210 — Runway end safety areas *ICAO*

### CS-ADR-DSN.C.215 — Dimensions of runway end safety areas *TXT* *ADD*

The order of ICAO text has been changed to place the minimum RESA length requirement (90 m) after the desired greater distances (paragraph (a) (3)). This is justified by additional text allowing the flexibility to provide a range of RESA lengths, if necessary supplemented by an arresting system and determined by a safety assessment (paragraphs (b) and (c)). The width of the RESA is amended to be (if practicable) equal to the graded portion of the associated runway strip (paragraph (d)).

### CS-ADR-DSN.C.220 — Objects on runway end safety areas *TXT*

The ICAO text is revised to be consistent with the objects requirements on runway strips. The NPA text includes new wording ‘or for aircraft safety’ to permit the installation of frangible arresting systems.

### CS-ADR-DSN.C.225 — Clearing and grading of runway end safety areas *ADD*

Paragraph (b) added to explain the surface characteristics of the RESA; paragraph (a) of the NPA is the same as ICAO.

### CS-ADR-DSN.C.230 — Slopes on runway end safety areas *ICAO*

### CS-ADR-DSN.C.235 — Strength of runway end safety areas *MOVE to GM*

See GM-ADR-DSN.C.235

There are no numerical specifications attached to the ICAO recommendation, it was therefore considered appropriate to move the text to GM.

## CHAPTER D — TAXIWAYS

### CS-ADR-DSN.D.240 — Taxiways General *ICAO*

### CS-ADR-DSN.D.245 — Width of Taxiways *ICAO*

### CS-ADR-DSN.D.250 — Taxiways curves *ICAO*

### CS-ADR-DSN.D.255 — Junction and intersection of taxiways *ICAO*

### CS-ADR-DSN.D.260 — Taxiway minimum separation distance *TXT ADD*

Separation distances in Table ADR-DSN-D-1, columns (10) and (11) for Code F have been modified to reflect imminent ICAO changes (small reduction 97.5 m and 57.5 m to 95 m and 55 m respectively). Note 3 has been added to the table to facilitate operation of large aeroplanes on existing Code E infrastructure.

### CS-ADR-DSN.D.265 — Longitudinal slopes on taxiways *ICAO*

### CS-ADR-DSN.D.270 — Longitudinal slope changes on taxiways *ICAO*

### CS-ADR-DSN.D.275 — Sight distance of taxiways *ICAO*

### CS-ADR-DSN.D.280 — Transverse slopes on taxiways *ICAO*

### CS-ADR-DSN.D.285 — Strength of taxiways *TXT*

ICAO term ‘at least equal to that of the runway it serves’ is replaced by ‘should be suitable for the aircraft that the taxiway is intended to serve’; remaining NPA text is the same as ICAO.

### CS-ADR-DSN.D.290 — Surface of taxiways *ICAO*

### CS-ADR-DSN.D.295 Rapid exit taxiways *TXT*

The order of words in paragraph (d) has been rearranged and reference to the minimum angle of 25° replaced with a statement allowing angles of less than 30°, but without giving a specific numerical value (to permit operational flexibility).

**CS-ADR-DSN.D.300 — Taxiways on bridges** *ICAO*

**CS-ADR-DSN.D.305 — Taxiway shoulders** *ICAO*

**CS-ADR-DSN.D.310 — Taxiway Strip** *ICAO*

**CS-ADR-DSN.D.315 — Width of taxiway strips** *ICAO*

**CS-ADR-DSN.D.320 — Objects on taxiway strips** *TXT ADD*

The first sentence of the NPA text is amended slightly, but does not alter the ICAO meaning. Additional guidance on placing specified equipment in the strip is added to the text, and a cross reference to the CS for siting equipment on operational areas.

**CS-ADR-DSN.D.325 — Grading of taxiway strips** *ICAO*

**CS-ADR-DSN.D.330 — Slopes on taxiway strips** *ICAO*

**CS-ADR-DSN.D.335 — Holding Bays, runway-holding positions, intermediate holding positions and road-holding positions** *TXT*

Text has been modified to make the CS more specific; Annex 14 was considered to provide insufficient guidance for aerodrome designers and operators. Where the ICAO text was considered to be over-prescriptive, the NPA has been made more objective-based to allow greater flexibility.

**CS-ADR-DSN.D.340 — Location of holding Bays, runway-holding positions, intermediate holding positions and road-holding positions** *TXT*

Text in paragraph (a) has been amended to remove reference to precision approach runway (applicable now to all runways); ICAO 3.12.9 details are included in Table ADR-DSN-D-2, therefore the paragraph has been deleted.

**CHAPTER E — APRONS**

**CS-ADR-DSN.E.345 — General** *TXT*

**CS-ADR-DSN.E.350 — Size of aprons** *MOVE to GM*

See GM-ADR-DSN.E.350

The size of the apron was considered to be a commercial decision, not safety-related, therefore the paragraph has been moved to GM.

**CS-ADR-DSN.E.355 — Strength of aprons** *ICAO*

### CS-ADR-DSN.E.360 — Slopes on aprons ICAO

### CS-ADR-DSN.E.365 — Clearance distances on aircraft stands TXT ADD

There is a small change to ICAO text in paragraph (b), but the meaning is not changed; sub-paragraphs (1) and (2) have been added to expand the cases when distances may be reduced.

## CHAPTER F — ISOLATED AIRCRAFT PARKING POSITION

### CS-ADR-DSN.F.370 — Isolated aircraft parking position MOVE to GM

ICAO text has been moved to GM from paragraphs (a) and (b) to make them compatible with design specifications; (a) — reference to the aerodrome control tower and (b) — reference to underground utilities.

## CHAPTER G — DE-ICING/ANTI-ICING FACILITIES

### CS-ADR-DSN.G.375 — General REV

The proposed group text was overly elaborate; original ICAO Annex 14 text has been reinstated.

### CS-ADR-DSN.G.380 — Location TXT MOVE to GM

Text relating to drainage and environmental factors has been moved from paragraph (a) to GM; reference to ‘remote’ facilities has been deleted from the text. ICAO notes have been moved to GM.

### CS-ADR-DSN.G.385 — Size and number of de-icing/anti-icing pads MOVE to GM

The ICAO recommendation on number of de-icing pads to be provided was considered to be a commercial decision, not safety-related and therefore has been moved GM; the ICAO notes have been moved to GM.

### CS-ADR-DSN.G.390 — Slopes on de-icing/anti-icing pads MOVE to GM ADD

ICAO notes on environmental considerations/drainage were considered to be not safety-related and have been moved to GM. The ICAO text relating to slopes has been replaced by a more flexible requirement to not hinder movement of aircraft.

### CS-ADR-DSN.G.395 — Strength of de-icing/anti-icing pads MOVE to GM

The second sentence of the ICAO text giving consideration to the slow moving traffic need for greater strength pavement has been moved to GM (leaving the minimum requirement, which implies that need).

### CS-ADR-DSN.G.400 — Clearance distances on a de-icing/anti-icing pad MOVE to GM

The environmental and drainage notes have been moved to GM the remaining NPA text, table and figures are the same as ICAO.

## CHAPTER H — OBSTACLE LIMITATION SURFACES

### CS-ADR-DSN.H.405 — Applicability TXT MOVE to GM

The text from ICAO Note 1 has been paraphrased; the meaning is retained. Parts of Note 1 (along with Notes 2 and 3) have been moved to Guidance Material.

### CS-ADR-DSN.H.410 — Outer horizontal surface ADD MOVE AR / AMC REV

There are no specifications for the outer horizontal surface in ICAO Annex 14. The NPA text has been derived from the ICAO Airport Services Manual (Doc 9137), Part 6 and is included to ensure obstacle clearance for instrument approaches, especially at aerodromes where there is high ground in the vicinity.

Text relating to physical dimensions is retained; all other text is moved to AMC to Part-AR.

### CS-ADR-DSN.H.415 — Conical surface ADD

Paragraph (a) has been added to describe the purpose of the conical surface; remaining NPA text as ICAO.

### CS-ADR-DSN.H.420 — Inner horizontal surface ADD DEL REV

Paragraph (a) is added to describe the purpose of the inner horizontal surface. Paragraph (c) has been modified to cover the case where the IHS is not circular. Paragraph (d) is expanded to allow selection of an appropriate datum for height of the IHS.

Text relating to national aviation authorities has been deleted.

### CS-ADR-DSN.H.425 — Approach surface ADD

Paragraph (a) has been added to describe the purpose of the approach surface; remaining NPA text as ICAO.

### CS-ADR-DSN.H.430 — Transitional surface ADD

Text and a table have been added to the NPA to cater for the case where the transitional surface origin is not coincident with the outer edge of the runway strip (i.e. where the runway strip is of greater width than prescribed in CS-ADR-DSN.B.150); additions are done at (b)(2), (c)(3) and (d)(3).

### CS-ADR-DSN.H.435 — Take-off climb surface ADD

Paragraph (a) has been added to describe the purpose of the take-off climb surface; remaining NPA text as ICAO.

### CS-ADR-DSN.H.440 — Slewed Take-off climb surface ADD

Text and specification added to the NPA for the case where the departure track is slewed from straight ahead, requiring the TOCS to be slewed as well.

### CS-ADR-DSN.H.445 — Obstacle Free Zone *ADD*

The OFZ is defined in Annex 14 but its characteristics are not expressly defined as part of it. This addition to NPA text ties the OFZ and its characteristics together more effectively. The characteristics are not changed from those in ICAO Annex 14.

### CS-ADR-DSN.H.450 — Inner approach surface *ICAO*

### CS-ADR-DSN.H.455 — Inner transitional surface *ICAO*

### CS-ADR-DSN.H.460 — Balked landing surface *ICAO*

## CHAPTER J — OBSTACLE LIMITATION REQUIREMENTS

### CS-ADR-DSN.J.465 — General *ADD*

The additional NPA text brings Annex 14 advice into requirements to specify where obstacle limitation requirements are required.

### CS-ADR-DSN.J.470 — Non-instrument runways *ICAO REV*

References in NPA text to 'appropriate authority' have been deleted as this falls into the AR area.

### CS-ADR-DSN.J.475 — Non-precision approach runways *ICAO REV*

References in NPA text to 'appropriate authority' have been deleted as this falls into the AR area.

### CS-ADR-DSN.J.480 — Precision approach runways *ICAO REV MOVE to OPS*

References in NPA text to 'appropriate authority' have been deleted as this falls into the AR area.

Text in paragraph (f) relating to mobile objects is an operational issue and has therefore been moved to OPS.

### CS-ADR-DSN.J.485 — Runways meant for take-off *ICAO*

References to 'appropriate authority' have been deleted as this falls into the AR area.

## CHAPTER K — VISUAL AIDS FOR NAVIGATION (INDICATORS AND SIGNALLING DEVICES)

### CS-ADR-DSN.K.490 — Wind direction indicator TXT MOVE to GM

The word 'sufficient' is considered more precise than the ICAO term 'at least', with clarification on what phases of flight are important for provision of a wind direction indicator.

This provision for the 15m diameter circular band is downgraded to GM as it was considered that it only small added value in some cases (e.g. weather condition). The circular band has no direct impact on safety; a circular band of this type is primarily intended for smaller aerodromes accepting non-radio aircraft. The ICAO text stipulating colours to be used for the wind direction indicator has been moved to GM and replaced in the NPA with more flexible wording for choosing colours.

### CS-ADR-DSN.K.495 — Landing direction indicator ICAO

### CS-ADR-DSN.K.500 — Signalling lamp MOVE to GM

See GM-ADR-DSN.K.500.

The group considered this to be primarily an ATS/Ops issue and therefore moved the text to GM.

### CS-ADR-DSN.K.505 — Signal panels and signal area ICAO

### CS-ADR-DSN.K.510 — Location of signal area GM MOVE to GM

See GM-ADR-DSN.K.510.

Location is included in CS-ADR-DSN-K.505 above with additional GM.

### CS-ADR-DSN.K.515 — Characteristics of signal area GM MOVE to GM

See GM-ADR-DSN.K.515

Characteristics are included in CS-ADR-DSN-K.510 above with additional GM.

## CHAPTER L — VISUAL AIDS FOR NAVIGATION (MARKINGS)

### CS-ADR-DSN.L.520 — General — Colour and conspicuity TXT MOVE to GM ADD

Minimum requirements are retained in the NPA text; a consolidated sentence requiring conspicuity and contrast is added. The remaining ICAO text is moved to Guidance Material

Paragraph (c) has been added to provide a link to OPS and working group GM.

### CS-ADR-DSN.L.525 — Runway designation marking ICAO

### CS-ADR-DSN.L.530 — Runway centre line marking ICAO

### CS-ADR-DSN.L.535 — Threshold marking TXT MOVE to GM REV

Paragraph (a) consolidates ICAO text, which recommends that all codes and types of runway have threshold markings (in three separate paragraphs). Some ICAO text has not been included and does not appear in GM; there appears to be no justification in the working group submission for the omissions, which are considered to be germane to the NPA CS, so have been reinstated. Note 1, relating to temporary displaced thresholds has been moved to GM.

### CS-ADR-DSN.L.540 — Aiming point marking ADD

Specifications for an alternative pattern aiming point marking have been added at paragraph (c) (2) and Figure ADR-DSN-L-4.

### CS-ADR-DSN.L.545 — Touchdown zone marking ADD

Specifications for alternative pattern touchdown point markings have been added at paragraph (d) (4) and Figure ADR-DSN-L-6 to conform to the alternative aiming point marking in CS-ADR-DSN.L.540.

### CS-ADR-DSN.L.550 — Runway side stripe marking ICAO

### CS-ADR-DSN.L.555 Taxiway centre line marking TXT MOVE to GM

Paragraph (a)(1) consolidates marking for all taxiways from ICAO text split over separate recommendations. Text and figure relating to enhanced taxiway centreline marking have been moved to CS-ADR-DSN.L.570 and to GM; the NPA text for the CS has been amended to remove the recommendation to be installed at all taxiway entrances to runways, thus allowing greater flexibility as part of runway incursion measures.

### CS-ADR-DSN.L.560 — Interruption of runway markings ICAO

### CS-ADR-DSN.L.565 — Runway turn pad marking ICAO

### CS-ADR-DSN.L.570 — Enhanced taxiway centre line marking ADD

Text from CS-ADR-DSN.L.530 and L.555 has been used to formulate this CS.

### CS-ADR-DSN.L.575 — Runway-holding position marking ICAO

### CS-ADR-DSN.L.580 — Intermediate holding position marking ICAO

### CS-ADR-DSN.L.585 — VOR aerodrome checkpoint marking ICAO

### CS-ADR-DSN.L.590 — Aircraft stand marking *TXT MOVE to GM*

Text relating to aircraft stand clearance distances has been moved to Guidance Material. The ICAO text relating to multiple stand markings for different aircraft types has been reworded, but the meaning is unaltered. The order of some recommendations has been changed.

### CS-ADR-DSN.L.595 — Apron safety lines *ICAO*

### CS-ADR-DSN.L.600 — Road-holding position marking *ADD*

Text relating to road holding positions at road/taxiway intersections has been added to the NPA.

### CS-ADR-DSN.L.605 — Mandatory instruction marking *MOVE to GM*

The text describing the need to place markings on paved surfaces where it is impracticable to install mandatory signs has been omitted. Text recommending that markings should not, unless operationally necessary, be placed on a runway has been moved to Guidance Material.

### CS-ADR-DSN.L.610 Information marking *TXT MOVE to GM*

This CS has been limited to stipulate only the character height for markings; remaining ICAO text has been moved to Guidance Material.

## CHAPTER M — VISUAL AIDS FOR NAVIGATION (LIGHTS)

### CS-ADR-DSN.M.615 — General *DEL TXT*

The note in ICAO text on light intensity and control has been paraphrased as the operational requirements and characteristics are captured in other parts of the CS. The remaining NPA text is the same as ICAO.

### CS-ADR-DSN.M.620 — Aeronautical beacons *TXT DEL REV*

The ICAO text relating to flashing beacons in 5.3.3.12 is repeating information in an earlier paragraph, so has been deleted. The references to Morse code have been deleted as the RMG considered them irrelevant in the modern era, where pilots are not familiar with the code.

Details of the Identification beacon have been deleted, with no rationale or justification; the text relating to the identification beacon has been reinstated in the NPA from ICAO text.

Text relating to 'appropriate authority' has been deleted as this refers to AR/OR requirements.

## SECTION 1 APPROACH LIGHTING SYSTEMS

**CS-ADR-DSN.M.625 — Approach lighting systems, general and applicability** ADD REV

Text has been added to the NPA at (c) (1) (iii) to describe provision of lights at differing threshold positions. Paragraph (k) is added for clarification.

ICAO text has reinstated in the NPA at paragraphs (c) and (d), which was deleted with no justification.

**CS-ADR-DSN.M.630 — Precision approach category I lighting system** ADD MOVE to GM

A short preamble has been added. Paragraph (c), giving guidance for location and composition of approach lights when the length is less than 900 m, has been moved to GM.

**CS-ADR-DSN.M.635 — Precision approach category II and III lighting system** REV

The working group made the CS unclear and difficult to read; no justification was given, so the ICAO text has been reinstated in the NPA.

**SECTION 2 PAPI & APAPI**

**CS-ADR-DSN.M.640 — Visual approach slope indicator systems: general** DEL

ICAO references to T-VASIs and AT-VASIs have been removed as these systems are not in use within the EASA's ambit. Remaining text is the same as ICAO.

**CS-ADR-DSN.M.645 — PAPI and APAPI: general** ICAO TXT

Minor change in order of text, otherwise, the same as ICAO.

**CS-ADR-DSN.M.650 — Approach slope and elevation setting of light units (for PAPI and APAPI)** REV

The working group moved this to GM; subsequent assessment determined that the continuity of text and a major part of the rationale for siting the PAPI/APAPI units could be unclear without the text and accompanying figures. The text was reinstated in the NPA for clarity of purpose.

**CS-ADR-DSN.M.655 — Obstacle protection surface for PAPI and APAPI** MOVE to AR/AMC

Text relating to 'appropriate authority' and all of former paragraph (d) has been deleted and moved to AR/AMC.

**CS-ADR-DSN.M.660 — Circling guidance lights** ICAO

**SECTION 3 RUNWAY & TAXIWAY LIGHTS**

### CS-ADR-DSN.M.665 — Runway lead-in lighting systems *ICAO*

### CS-ADR-DSN.M.670 — Runway threshold identification lights *ICAO DEL*

Text relating to 'appropriate authority' has been deleted as this refers to AR/OR requirements.

### CS-ADR-DSN.M.675 — Runway edge lights *ICAO*

### CS-ADR-DSN.M.680 — Runway threshold and wing bar lights *ICAO*

### CS-ADR-DSN.M.685 — Runway end lights *ICAO*

### CS-ADR-DSN.M.690 — Runway centre line lights *DEL*

The ICAO text in 5.3.12.5 (location) relating to serviceability level of centre line lights versus spacing has been deleted.

### CS-ADR-DSN.M.695 — Runway touchdown zone lights *ICAO*

### CS-ADR-DSN.M.700 — Rapid exit taxiway indicator lights *DEL TXT*

The ICAO note on purpose of the rapid exit taxiway lights (5.3.14) has been deleted; the text in paragraph (a) has been amended to make reference to considering installation of rapid exit taxiway lights contingent on traffic density.

### CS-ADR-DSN.M.705 — Stopway lights *ADD*

Sub-paragraph (c) (2) added to the NPA text for lights specification.

### CS-ADR-DSN.M.710 — Taxiway centre line lights *TXT REV*

The text in paragraph (a) (1) 'runway visual range conditions less than a value of 350 m' has been drafted by the working group as '300 m'; this is thought to be a typographical error and has been amended back to the ICAO value of 350 m.

Text in paragraph (a)(4) and (5) has been amended to include reference to the lights as components of an advanced surface movement guidance and control system and to require interlocking of runway and taxiway lights to preclude simultaneous operation of both forms of light.

### CS-ADR-DSN.M.715 — Taxiway centre line lights on taxiways, runways, rapid exit taxiways or on other exit taxiways *TXT*

The order of some NPA text has been rearranged; the ICAO meaning is unchanged.

### CS-ADR-DSN.M.720 — Taxiway edge lights *ICAO*

### CS-ADR-DSN.M.725 — Runway turn pad lights *ICAO*

### CS-ADR-DSN.M.730 — Stop bars *REV*

The ICAO numerical value in 5.3.19.1 is 350m and in 5.3.19.2 it is between 350m and 550m; the text of those two paragraphs is otherwise the same; the combined values from both paragraphs has been inserted in (a) (1) of the NPA text to reflect the full ICAO range.

### CS-ADR-DSN.M.735 — Intermediate holding position lights *ICAO*

### CS-ADR-DSN.M.740 — De-icing/anti-icing facility exit lights *ICAO*

### CS-ADR-DSN.M.745 — Runway guard lights *ICAO*

## SECTION 4 APRON LIGHTING

### CS-ADR-DSN.M.750 — Apron floodlighting *ICAO*

### CS-ADR-DSN.M.755 — Visual docking guidance system *REV*

Paragraph (4) has been reinstated in the NPA as the working group omitted to include the text with no justification.

### CS-ADR-DSN.M.760 — Advanced visual docking guidance system *REV*

The text from ICAO recommendation in 5.3.25.9 onwards that was moved to Guidance Material by the working group has been reinstated in the NPA. the remaining text is the same as ICAO.

### CS-ADR-DSN.M.765 — Aircraft stand manoeuvring guidance lights *TXT REV*

The text in paragraph (a) has been amended to remove the phrase 'unless adequate guidance is provided by other means'. Remaining NPA text is the same as ICAO. Text in paragraphs (c)(4) to (c)(10) has been reinstated as there are ICAO standards included with the recommendations; no justification was given for removing the original ICAO text.

### CS-ADR-DSN.M.770 — Road-holding position light *TXT ADD*

The text in paragraph (a) has been amended to remove reference to runway visual range conditions below 350 m and between 350 m and 550 m and now refers only to a value of less than 550 m; no Group justification is provided. A requirement for a road holding position light at an intersection with a taxiway has been added to the NPA at paragraphs (b)(2) and (c)(6).

## CHAPTER N — VISUAL AIDS FOR NAVIGATION (SIGNS)

### CS-ADR-DSN.N.775 — General ADD

Paragraph (7) is added to reinforce the applicability and use of variable message signs; remaining text is the same as ICAO.

### CS-ADR-DSN.N.780 — Mandatory instruction signs MOVE to GM

ICAO text relating to enhancing conspicuity under certain environmental conditions has been moved to GM. Remaining text is the same as ICAO.

### CS-ADR-DSN.N.785 — Information signs ICAO

### CS-ADR-DSN.N.790 — VOR aerodrome checkpoint sign ICAO

### CS-ADR-DSN.N.795 — Aircraft stand identification signs TXT

Paragraph (c) — characteristics — is expanded to allow the use of other conspicuous colours (except red) for stand identification.

### CS-ADR-DSN.N.800 — Road-holding position sign ADD

Paragraphs (c) and (d) (4) are added to include road holding position signs at taxiway intersections.

## CHAPTER P — VISUAL AIDS FOR NAVIGATION (MARKERS)

### CS-ADR-DSN.P.805 — General ADD

A statement on frangibility and location of markers on a runway or taxiway vis-à-vis aircraft engines has been added to the NPA text.

### CS-ADR-DSN.P.810 — Unpaved runway edge markers ICAO

### CS-ADR-DSN.P.815 — Stopway edge markers ICAO

### CS-ADR-DSN.P.820 — Edge markers for snow-covered runways TXT

Paragraph (b) has been amended to remove the guidance text 'be located symmetrically about the runway centre line at such a distance from the centre line that there is adequate clearance for wing tips and powerplants', leaving the basic specification.

### CS-ADR-DSN.P.825 — Taxiway edge markers TXT

The NPA text in paragraph (a) has been amended to remove the reference to a runway code (1 or 2) and add the text ‘and where the edge of the taxiway needs to be identified’.

#### CS-ADR-DSN.P.830 — Taxiway centre line markers TXT

The text in paragraphs (a) (1) and (2) has been amended to remove the reference to a runway code.

#### CS-ADR-DSN.P.835 — Unpaved taxiway edge markers ICAO

### CHAPTER Q — VISUAL AIDS FOR DENOTING OBSTACLES

#### CS-ADR-DSN.Q.840 — Objects to be marked and/or lighted TXT DEL ADD MOVE to OPS/AR (AMC) REV

A new paragraph (a) has been added to clarify that the CSs are applicable only to the area under control of the aerodrome operator, otherwise they are an AR/OR issue.

The CS text in paragraph (b) has been amended to reverse the meaning of the ICAO text vis-à-vis marking of obstacles adjacent to the obstacle to the take-off climb, approach and transitional surface. ICAO makes the requirement for ‘other than adjacent to…’, the CS removes the word ‘other’; no justification is given.

Paragraph (d)(4) relating to lighthouses was considered non-applicable and has been deleted from the NPA.

CS paragraph (e)(3) seems to be incorrectly worded; the intention of the working group was probably to remove the requirement for marking the obstacle if ‘the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day *or* if medium intensity lights are deemed ~~in~~sufficient’. It is not clear from the limited justification what the group’s intentions are.

Paragraph (f) relating to lighting of vehicle and mobile objects is an operational issue and has therefore been moved to OPS.

Paragraphs (f) and (g) are re-allocated, (l) is redundant and (i), (j) and (k) are moved to AR/AMC.

The remaining text is the same as ICAO.

#### CS-ADR-DSN.Q.845 — Marking of objects MOVE to GM/OPS TXT REV

Paragraphs (b), (c)(5) and (renamed) (d)(2) relating to mobile objects have been moved to OPS (new paragraph (b) — Use of colours — is also repeated in OPS).

Text in CS paragraph (c) (1) relating to colours for markings has been moved to GM. CS paragraph (e)(5) has been amended to remove reference to specific colours, thereby allowing a wider choice of conspicuous colours to suit local conditions.

The ICAO text relating to use of flags on mobile objects was considered to be unnecessarily prescriptive and inflexible, so was moved to GM.

### CS-ADR-DSN.Q.850 — Lighting of objects MOVE to GM TXT ADD REV

A new paragraph (a) has been added to clarify that the CSs are applicable only to the area under control of the aerodrome operator, otherwise they are an AR/OR issue.

Paragraphs (renamed) (b)(4) and (5) relating to vehicles and mobile objects are operational issues and have therefore been moved to OPS.

Paragraphs (renamed) (b)(9) and (10) relate to areas outside the aerodrome operator's control and have therefore been moved to OPS/AMC.

The ICAO note that should follow CS (a)(1) relating to use of high-intensity obstacle lights by day and night has been moved to GM.

The CS text in paragraph (b)(7) relating to spacing of obstacle lights not exceeding 52 m has been moved to GM. The following justification is given: 'The design of buildings is such that installation of additional lights may not be feasible. The need for additional lights should be subject to a safety assessment into the visibility of the object.'

The remaining text is the same as ICAO.

### ~~CS-ADR-DSN.Q.860 Wind turbines~~ MOVE to AR/AMC REV

This has been deleted and moved to AR/AMC.

## CHAPTER R — VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

### CS-ADR-DSN.R.855 — Closed runways and taxiways, or parts thereof ICAO

### CS-ADR-DSN.R.860 — Non-load-bearing surfaces ICAO

### CS-ADR-DSN.R.865 — Pre-threshold area ADD

Paragraph (c)(2) has been added to cover the case where the pre-threshold area is less than 60 m.

### CS-ADR-DSN.R.870 — Unserviceable areas ICAO

## CHAPTER S — ELECTRICAL SYSTEMS

### CS-ADR-DSN.S.875 — Electrical power supply systems for air navigation facilities ICAO

### CS-ADR-DSN.S.880 — Electrical power supply systems for visual aids ICAO DEL

Text in paragraph (e) (2) relating to 'appropriate' authority has been deleted as this falls into the AR area.

### CS-ADR-DSN.S.885 — System design ICAO

### CS-ADR-DSN.S.890 — Monitoring ICAO REV DEL

Reference to 'appropriate' authority has been deleted as this falls into the AR area; cross reference to CS-ADR-DSN.S.895 relates to minimum serviceability levels. Paragraphs (d) and (e) will also be in AR/AMC.

### CS-ADR-DSN.S.895 — Serviceability levels ICAO REV

Although not discussed by the group, the specifications have been included as they have relevance to other CS.

## CHAPTER T — AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATION

### CS-ADR-DSN.T.900 — Emergency access and service roads ADD MOVE to GM

The working group added a statement about use and marking of emergency access roads. The ICAO text was moved to GM.

### CS-ADR-DSN.T.905 — Fire stations REV ADD

Although this topic was discussed briefly, the group did not document any CS or GM for the NPA. Paragraphs (a) and (b) from ICAO text and additional paragraph (c) to clarify location in the aerodrome infrastructure have been added to the NPA text.

### CS-ADR-DSN.T.910 — Equipment frangibility requirements ADD

This CS has been added by to provide clarification on frangibility characteristics for references in other CSs. The source document is ICAO Aerodrome Design Manual — Doc 9157, AN/901; the NPA paraphrases the essential information from the source document.

### CS-ADR-DSN.T.915 — Siting of equipment and installations on operational areas ADD TXT

Paragraph (a) has been added; the phrase 'endangering an aircraft' has been added to the ICAO text in paragraph (b). The phrases 'or for aircraft safety' and 'should be frangible and mounted as low as possible' have been added to the ICAO text in paragraph (c); the distance stipulated in ICAO text, paragraph 9.9.2 (1) has been changed in the CS, paragraph (c)(2)(i) from 75 m to 60 m.

Paragraph (c) has been added. The remaining ICAO SARPS, 9.9.4 to 9.9.8, appear to have been combined, with the working group's comment; viz.:

'This CS goes above some standards of the Annex 14 as graded an ungraded runway strips are treated equally (recommendation 9.9.4). There is no differentiation between Precision and non-precision runway. This is due to the fact that the equipment mentioned under point 2 should be frangible and mounted as low as possible in any case to prevent damage in case of a runway excursion, undershoot and overshoot.'

### CS-ADR-DSN.T.920 — Fencing ADD TXT MOVE to GM

Paragraph (a) has been added; text relating to preventing entrance to animals and people has been amalgamated. ICAO text relating to location of fences and recommendations for when greater security is considered to be necessary has been moved to GM.

### ~~CS-ADR-DSN.T.xxx Security lighting~~ DEL

ICAO text relating to security lighting has been omitted as it is not safety-related and therefore outside EASA's remit.

Aerodrome maintenance is covered by OR and OPS rules and should therefore be removed from the CS.

## CHAPTER U — Colours for aeronautical ground lights, markings, signs and panels

### CS-ADR-DSN.U.925 — General ICAO

### CS-ADR-DSN.U.930 — Colours for aeronautical ground lights ICAO DEL REV

References to 'appropriate authority' in paragraphs (d) (5) and (6) have been deleted as this would be AR/AMC.

### CS-ADR-DSN.U.935 — Colours for markings, signs and panels ICAO

### CS-ADR-DSN.U.940 — Aeronautical ground light characteristics ICAO

European Aviation Safety Agency

**NOTICE OF PROPOSED AMENDMENT**

# NPA 2011-20 (D)

Regulatory Impact Assessment

RMT.0136 (ADR.001 (a)) & RMT.0137 (ADR.001 (b))
RMT.0140 (ADR.002 (a)) & RMT.0141 (ADR.002 (b))
RMT.0144 (ADR.003 (a)) & RMT.0145 (ADR.003 (b))

# Authority, Organisation and Operations Requirements for Aerodromes

## NPA 2011-20 (D) — Regulatory Impact Assessment

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## Executive summary

*(identical to NPA 2011-20 (A), Section IV)*

Aerodromes national requirements have been increasingly diverging over the years due to differences in the application of ICAO Annex 14. As a consequence, those different requirements can be interpreted in different ways, creating a difficult operational environment for flight crews. Currently there are no imminent aerodrome safety issues known. However, traffic forecasts indicate an increase from 10 million commercial flights in 2010 to a peak of 15–21 million in 2030 (EUROCONTROL). This traffic increase could lead to safety challenges in the absence of a common approach to safety at aerodrome level. This is referred in the RIA as the 'baseline scenario'.

### *Challenges*

In response to the challenges described above, Regulation (EC) No 1108/2009 provides the basic framework for the development of European Implementing Rules for aerodromes which should address the following issues:

1. Provision of a standardised interpretation of ICAO Annex 14 requirements and other technical requirements to maintain the current high safety level at airports with the future increase of airlines traffic.
2. Development of common requirements for the certification process of European aerodromes ensuring smooth conversion of the national aerodrome certificates without disruption.

*Note: 605 aerodromes fall under the scope of Regulation (EC) No 1108/2009; 429 aerodromes are above the threshold of 10 000 commercial passengers per year, and a minimum of 151 aerodromes are under this threshold[1], where they can be exempted from the European rules for aerodrome safety.*

*Note: Aerodrome certification was introduced 10 years ago in ICAO Annex 14. 78 % of the aerodromes in Europe above 10 000 passengers per year have a national certificate; the remaining 22 % will be certified in the near future (most of them before 2015). On the contrary, only 53 % of the aerodromes below the mentioned exemption threshold will be certified. Member States may exempt these aerodromes from the application of the draft ADR rules.*

### *Objective*

The objectives of the draft aerodromes (ADR) Implementing Rules are:

- to ensure that the flexibility required by the Basic Regulation on the conversion of national certificates is achieved;
- to ensure that the authority and organisation requirements can be integrated at NAAs and aerodrome level in a timely manner; and
- to define common requirements for aerodrome design and operation ensuring adequate level of aviation safety.

### *Development of options to meet the objectives*

The development of the options to meet the objectives led to two alternatives to be compared with the baseline scenario (Option 0).

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[1] These 159 aerodromes include 5 military aerodromes open for commercial traffic. 2 aerodromes are not yet in one of these categories due to insufficient information.

Option 1 — The pragmatic approach

Technical harmonisation

The ICAO Standards and Recommended Practices have to be evaluated on a case-by-case basis and be transposed into European law at the appropriate level: Certification Specifications, Implementing Rules, Acceptable Means of Compliance and Guidance Material.

Certification process

If compliance with the new European CSs or the IRs is not met at an aerodrome an Equivalent Level of Safety (ELoS) with mitigation measures or a Special Condition (SC) may be applied to this airport due to its unusual environment.

If an existing aerodrome deviation from design CS could not be justified by using an ELoS or SC, the Member State would only have the remaining solution to send a derogation request to the European Commission (Article 14.6 of the Basic Regulation).

Option 2 — The pragmatic approach with additional flexibility

Technical harmonisation is identical to option 1.

Certification process

In case the certification process described in option 1 reveals some insufficiencies regarding the objective of flexibility (i.e. examples of deviations versus a CS or IR which cannot be justified with an ELoS or a Special Condition), there is the opportunity to develop additional processes to meet the flexibility enshrined in the Basic Regulation and in the safety objective.

To address this case of non-flexibility and to avoid the derogation process, a process leading to a document informally referred to as 'Deviation Acceptance & Action Document' (DAAD) was developed to justify existing deviations. The DAAD requires, as a minimum, a safety assessment to indicate how the situation at the airport (including mitigation measures) satisfies the Essential Requirements (ERs) of Annex Va to the Basic Regulation.

### *Applied methodology*

Having in mind the objectives, the impacts of the rules cannot be directly assessed because it all depends on their application and on making use of their flexibility. The most appropriate methodological approach was therefore to perform case studies on a sample of NAAs and airports to provide examples of the projected application of the rules to assess their impacts.

The global outcome is a qualitative assessment of the different impacts: safety, environmental, social, economic, proportionality issues, and regulatory harmonisation.

### *Analysis of impacts*

*Outcome of the case studies*

The case studies have shown how the certification process will be flexible in handling deviations from European rules and providing a mechanism to manage safety during the conversion period. However, this process will require resources to identify and manage deviations and carry out actions to mitigate safety risks. The resources required will depend on the scale of such deviations and a proportionate approach will be necessary.

There is not always one way to demonstrate compliance with the draft aerodrome rules. The fundamental outcome of the case study exercise is that it has been always possible to use one of the 'flexibility' tools to justify compliance with the draft aerodrome rules, providing that at least a safety assessment was or will be performed.

It was found that half of the deviations discussed for the selected aerodromes can be easily justified with the current actions already under development or planned by the aerodrome operator. The remaining half of the deviations would require a safety assessment which should not involve additional extensive studies during the conversion process[2].

*Analysis per type of impacts*

The options were assessed on several types of impacts: safety, environment, social, economic, proportionality issues, and regulatory harmonisation.

The safety challenges are addressed by option 2 which allows a smooth conversion of the existing national certificate with the adequate consideration to flexibility (thanks to the DAAD), while option 1 delivers slower benefits due to the potential risks of derogation treatments.

Environmental impacts are not relevant for these draft aerodrome rules.

There are no social risks in terms of negative impacts for economic regional development with option 2. On the contrary, in case of derogation request with option 1, the risks of suspension of airport operation would threaten the economic viability of aerodrome operators (and more particularly smaller ones). This would have potential detrimental impacts on regional development.

Option 2 ensures that economic resources are efficiently used by avoiding time spent on justification of derogations which would occur with Option 1. The additional flexibility introduced by Option 2 also allows proportionate rules for smaller aerodromes. Proportionate rules have been ensured by following the ICAO breakdown according to different types of aerodromes. SMS requirements were tailored to the size of aerodrome operators.

Both options are a key step for a smooth aerodrome certification harmonisation of 31 European countries with requirements most identical to ICAO Annex 14. Europe will more effectively coordinate the development of ICAO SARPs.

### *Conclusion*

Option 2 combines a pragmatic approach with additional flexibility and thus ensures that the objectives defined above are met.

### *Monitoring*

Developing rules is one activity; making sure that they are correctly applied is another one. In the case of the draft aerodrome rules, the wide scope of these rules and their flexibility could be factors for misunderstanding unless training is provided and monitoring supports the identification of raising concerns.

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[2] Based on the information gathered during the case study exercise.

## 1 Process and consultation

The draft rules for the European certification process of aerodromes were developed by EASA with the support of rulemaking working groups comprising experts from the Aerodromes, ATM and other stakeholder representatives and Member States. (See Explanatory Note for more details.)

EASA started at the end of 2010 to develop an internal roadmap to tackle the different activities linked with the Regulatory Impact Assessment (RIA). A number of documents and studies were used to develop this RIA[3]. On 9 March 2011 a document was presented to the rulemaking working groups summarising the approach proposed for the development of this RIA, the so-called 'ADR RIA Applied Methodology'.

The methodology included case studies of certain Member States' National Aviation Authorities (NAAs) to assess the impacts of the application of the future rules on some individual aerodromes (performed between March and July 2011). These NAAs and aerodromes were consulted on a preliminary version of the draft rules and their feedback was used to adapt where necessary the draft rules.

## 2 Issue analysis and risk assessment

This chapter summarises the available information on the different issues that future common requirements of the certification process of European aerodromes should address.

### *2.1 What is the issue and the current regulatory framework?*

With the adoption of Regulation (EC) No 1108/2009, the European Union decided to include into the EASA scope the rules for aerodrome certification to ensure a common approach on safety and a level playing field for all operators involved in aerodrome operations. The rules proposed in this NPA have been drafted between 2010 and 2011: they are in general referred to as the 'draft ADR rules' in the current document.

#### *2.1.1 Baseline scenario*

In order to assess the impacts of the draft ADR rules proposed in this NPA, it is necessary to understand how the situation would evolve in the absence of these draft ADR rules. This is the so-called 'baseline scenario'. The baseline scenario essentially describes the future developments if no regulatory change had taken place, i.e. the various national requirements for aerodromes would continue to exist.

National requirements have been increasingly diverging over the years due to differences in the transposition of ICAO Annex 14. As a consequence, those different requirements can be interpreted in different ways, potentially creating hazards and reducing safety margins.

Currently, there is no urgent safety concern for the aerodromes under the scope of the Basic Regulation (EC) No 1108/2009 (see section 2.3). However, traffic forecasts indicate an increase from 10 million commercial flights in 2010 to 15–21 million in 2030[4]. This traffic increase could lead to safety challenges in the absence of a common approach to safety at aerodrome level.

Member States would continue to follow the requirements of ICAO Annex 14 with the possibility to notify differences to ICAO and develop other national legislation, where deemed necessary, for the safe design and operation of an aerodrome.

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[3] EASA Opinion 3-2007 RIA; EU IA report on ATM and ADR (2008); TÜV & Airsight Study on 'ICAO Annex 14 implementation in the EU MS', 2009.

[4] *Source:* EUROCONTROL, Long Term Forecast Flight Movements 2010–2030, edition: 17/12/2010.

In addition to the safety concerns which can be created by a different implementation of ICAO Annex 14, this leads to an inefficient system where countries notifying differences have to maintain rulemaking activities[5].

Problems with the current system of filing of differences are illustrated in Table 1 below. This records the wide variation in differences notified to ICAO by EU Member States, knowing that 12 Member States adopted another approach merely by installing a direct legal reference to ICAO Annex 14. It also suggests that the process of filing of differences is not being implemented in Europe in a consistent manner, so it is difficult to draw any reliable conclusions from this information.

**Table 1: List of national differences notified to ICAO per Annex 14 chapter**

| **Country** | **Chapter** | | | | | | | | | | | **Differences with ICAO*** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | **Grand total** | Cat A | Cat B | Cat C |
| CH | 1 | 0 | 3 | 0 | 3 | 4 | 0 | 0 | 1 | | **12** | 0 | 12 | 0 |
| CZ | 5 | 15 | 130 | 10 | 121 | 28 | 10 | 3 | 33 | 12 | **367** | 337 | 28 | 2 |
| DE | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | **n/a** | n/a | n/a | n/a |
| EE | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | **4** | n/a | n/a | n/a |
| ES | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | n/a | n/a | n/a |
| FI | 1 | 0 | 4 | 0 | 7 | 2 | 1 | 0 | 34 | 2 | **51** | 0 | 45 | 6 |
| FR | 37 | 24 | 84 | 34 | 274 | 43 | 11 | 15 | 74 | 13 | **609** | 233 | 200 | 176 |
| IT | 1 | 1 | 30 | 3 | 44 | 0 | 0 | 0 | 0 | 0 | **79** | n/a | n/a | n/a |
| LT | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | **1** | n/a | n/a | n/a |
| MT | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | **6** | n/a | n/a | n/a |
| NL | 0 | 7 | 0 | 0 | 6 | 1 | 1 | 0 | 1 | 0 | **16** | 2 | 10 | 4 |
| NO | 2 | 5 | 4 | 0 | 4 | 0 | 0 | 0 | 0 | 2 | **17** | 3 | 11 | 3 |
| PL | 2 | 1 | 0 | 2 | 1 | 2 | 0 | 0 | 2 | 1 | **11** | 0 | 0 | 11 |
| SI | 6 | 0 | 15 | 10 | 10 | 0 | 0 | 0 | 0 | 0 | **41** | n/a | n/a | n/a |
| UK | 0 | 1 | 4 | | 13 | 0 | 1 | 0 | 3 | 0 | **22** | 7 | 6 | 9 |
| **Grand total** | **59** | **56** | **278** | **61** | **488** | **81** | **25** | **19** | **149** | **31** | **1 247** | **582** | **312** | **211** |

***Legend:***

*n/a: not available*

**Differences with ICAO:*

*Category A: National regulation is more exacting or exceeds the ICAO Standard (S) or Recommended Practice (R).*

*Category B: National regulation is different in character or in other means of compliance.*

*Category C: National regulation is less protective or partially implemented/not implemented.*

Details per country can be found in Appendix C, Table 21.

***Note for the reading of this table:***

A difference notified by a country to ICAO does not mean necessarily that **each** aerodrome of this country would also have this difference.

[5] EC Impact Assessment 2008 and EASA 'RIA Opinion-3 2007': see Appendix on reference documents.

### 2.1.2 Key corner stones for developing Implementing Rules from Regulation (EC) No 1108/2009

Having described the baseline scenario without new European rules, this chapter now explores what Regulation (EC) No 1108/2009 provides as a basic framework to develop European Implementing Rules for aerodromes.

Recognising that the continuous growth of aviation is a challenge when trying to maintain a uniform high level of safety, Regulation (EC) No 1108/2009 indicates:

*Regulation (EC) No 1108/2009, recital 2*

*(2) The continuous growth of aviation in Europe leads to many challenges, in particular regarding the key safety factors of aerodromes and ATM/ANS. Therefore, necessary risk mitigation measures need to be established to ensure safety through a harmonised, holistic regulatory approach across the Member States.*

Furthermore, Regulation (EC) No 1108/2009 indicates that each aerodrome has its specificities due to various factors (geography, speed and level of ICAO Annex 14 implementation at national level, etc.). In its recital 7 the said Regulation states that:

*(7) Taking into account the large variety of aerodromes and their highly individual infrastructures and environments, common aerodrome safety rules should provide for the necessary flexibility for customised compliance, through an adequate balance between implementing rules, certification specifications and acceptable means of compliance.*

*These rules should be proportionate to the size, traffic, category and complexity of the aerodrome and nature and volume of operations thereon, thereby avoiding unnecessary bureaucratic and economic burdens in particular for smaller aerodromes which only involve very limited passenger traffic.*

The scope of the future European aerodrome rules is comprehensive: they shall encompass requirements on authorities and aerodrome operators, aerodrome design and operations.

Based on the above, two main questions were identified for the development of Implementing Rules:

1. How to take into account ICAO Annex 14 and other relevant aerodrome technical requirements (GASR, best practices) into the European legislation given the variety of approaches across Europe; and
2. How to create a European certification system for aerodromes with the necessary flexibility for existing infrastructure based on historical requirements.

These two questions will be further analysed in the following sections.

### 2.1.3 Common technical requirements for ADR design and operations

ICAO Annex 14 is the starting point for this European rulemaking effort, covering most of the safety-related issues. However, when transposing Annex 14 requirements into European legislation a number of issues need to be addressed:

- Annex 14 does not differentiate between requirements for authorities and requirements for operators.
- Annex 14 differentiates between Standards and Recommended Practices, which need to be translated into the European system with Implementing Rules, Certification Specifications, Acceptable Means of Compliance and Guidance Material (see the summary below). The issue is to both:

- assess in which way to be best in line with ICAO Annex 14 Recommended Practices[6], and
- ensure that the flexibility of the ADR rules for certification do not add irrelevant burdens on Member States or aerodrome industry who follow national rules instead of ICAO Annex 14 Recommended Practices;

- Some rules necessary at EU level are not described in Annex 14 (mainly authority and organisation requirements).
- Diverging implementation of ICAO Annex 14 at Member State level, due to the possibility for a MS to notify differences with its national regulation.

Other sources for aerodrome requirements (GASR, best practices) have also to be considered when relevant.

Many existing aerodromes have their infrastructure based on historical requirements. Any potential changes required under the new legislation cannot be undertaken quickly and could be very resource intensive.

**EU and EASA legislation in short**

- The EASA rulemaking process can result either in an Opinion to the European Commission containing proposals for Implementing Rules (IRs) or in Decisions of the Executive Director of the Agency containing Acceptable Means of Compliance (AMCs), Certification Specifications (CSs), or Guidance Material (GM).
- IRs are directly applicable and binding on persons (e.g. ATCOs, pilots), organisations (e.g. aerodrome operators, ANSPs, air operators) and competent authorities (e.g. NSAs, NAAs) in their entirety. They are used to specify high and uniform level of safety and uniform behaviour in relation to the subject being regulated.
- AMCs are non-essential and non-binding. AMCs serve as a means by which the requirements contained in the Basic Regulation and in the IRs can be met. The AMCs have the presumption of compliance with the IRs, meaning that, by achieving compliance with the AMC, compliance with the related IR is also achieved. However, applicants may decide to show compliance with the requirements using other means, and competent authorities may also produce their own alternative AMCs (which is used by the competent authority itself to comply with the IRs applicable to them), based on those issued by the Agency or not.
- CSs are non-binding technical standards to meet the requirements of the Basic Regulation and applicable IRs. However, they are made binding through the certification basis.
- GM is non-binding but provides an explanation on how to achieve the requirements in the Basic Regulation or the IRs. It contains information, including examples, to assist the user, regulated persons and organisations in the interpretation of the IRs.

### *2.1.4 Common requirements for the certification process of European aerodromes*

Aerodrome certification was introduced 10 years ago in ICAO Annex 14. 77 % of the aerodromes in Europe, which serve above 10 000 passengers per year have a national

[6] Standards are mandatory with the possibility for a MS to notify a difference to ICAO. Recommendations are not mandatory. However, ICAO requests that State files any differences for Recommended Practices.

certificate; the remaining 23 % will be certified in the near future (most of them before 2015[7]).

**Table 2: 'Status of aerodrome certification in 2011 in Europe for aerodromes with more than 10 000 passengers/year'**

| ***Certification status*** | ***Number of aerodromes*** | ***Relative shares*** |
|---|---|---|
| Certified | 344 | 77 % |
| Scheduled | 70 | 16 % |
| In progress | 26 | 6 % |
| Not scheduled | 4 | 1 % |
| **Grand total** | **444** | **100 %** |

*Source:* EASA questionnaire to Member States on estimated number of certified aerodromes.

While Member States follow the same ICAO guidelines[8] in the approach to aerodrome certification, differences remain in the implementation of these guidelines (e.g. indefinite or temporary certificate, etc.).

In this context, two issues have to be considered:

- For the aerodromes already certified, a conversion process for European certification needs to be created.
- This conversion shall allow for the flexibility approach as laid down in Regulation (EC) No 1108/2009:
  - when the existing aerodrome deviates from a CS, alternative measure with an equivalent level of safety (ELoS) or Special Condition (SC) can be defined to justify the existing deviation. The Regulatory Impact Assessment is used to check this flexibility;
  - if any lack in flexibility is found, aerodromes would have either the lengthy process of derogations (Basic Regulation, Article 14.6) or compliance costs to be granted a certificate. In such cases, it has to be studied if an additional flexibility tool could be provided with the following details: content (which types of deviations can be addressed and how), deadline to have the right to use this tool and deadline to correct the deviations, if necessary.

### *2.2 Who is affected?*

#### *2.2.1 Geographical and technical scopes*

The 31 EASA Member States will be subject to these new rules. The development of requirements on heliports, apron management and interface equipment between ADR and ATM has been postponed to a later stage.

#### *2.2.2 Type of aerodromes under the scope of the draft regulation*

**Existing aerodromes**

The scope of the new European rules is defined in Basic Regulation (EC) No 1108/2009:

*Regulation (EC) No 1108/2009, Article 4, paragraph 3:*

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[7] If the four potential aerodromes not scheduled for certification are confirmed to be in the scope of the BR and above the exemption threshold, they will have to be certified.

[8] ICAO Docs 9734, 9774, 9859.

*3a. Aerodromes, including equipment, located in the territory subject to the provisions of the Treaty, open to public use and which serve commercial air transport and where operations using instrument approach or departure procedures are provided, and*

*(a) have a paved runway of 800 metres or above; or*

*(b) exclusively serve helicopters;*

*shall comply with this Regulation. Personnel and organisations involved in the operation of these aerodromes shall comply with this Regulation.*

*3b. By way of derogation from paragraph 3a, Member States may decide to exempt from the provisions of this Regulation an aerodrome which:*

*— handles no more than 10 000 passengers per year, and*

*— handles no more than 850 movements related to cargo operations per year.*

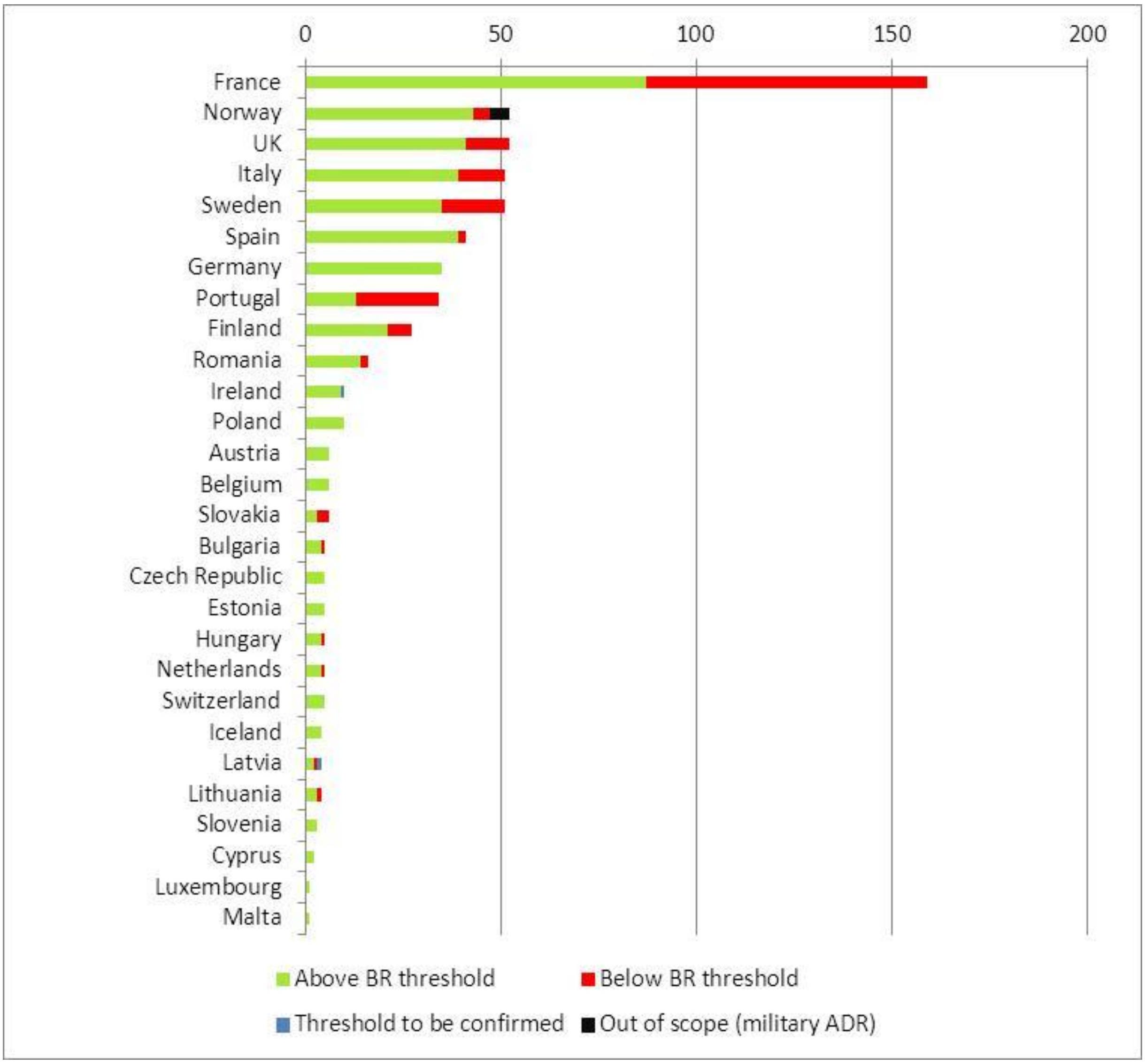
In order to establish how many aerodromes fall under this definition of scope, the Agency launched a questionnaire in 2011. Based on the answers from 29 out of 31 EASA Member States[9], 600 aerodromes are estimated to be in the regulation's scope. Approximately 450 out of those 600 aerodromes are above the exemption clause threshold in Art.4.3b (see above). In other words, 450 aerodromes will definitely have to follow the future European rules, while for some 150 aerodromes European rules may not apply depending on the decision of the Member States.

It has to be mentioned that while the number of aerodromes above the exemption threshold is considered reliable, the number of aerodromes below the threshold and following the definition above could be more than 150.

Looking at the result for individual Member States, France has two peculiarities in this European picture: it has the largest number of aerodromes (159) and it is also the country with the highest number of aerodromes below the BR passenger threshold (72, i.e. in relative share 45 %). The United Kingdom, Sweden (31 % below the BR threshold), Italy and Norway follow with approximately 50 aerodromes each. Spain (41), Germany (35), Portugal (34, 61% below the BR threshold) and Finland (27) are next in this list by number of aerodromes. A group of countries have between 10 and 16 aerodromes: Romania (16), Portugal (14), Poland and Ireland (10). The remaining European countries have less than six aerodromes each, Luxembourg and Malta having one and Liechtenstein none.

[9] Answers from Denmark and Greece are missing.

**Figure 1: The number of aerodromes by country falling under the future EASA rules**[10]

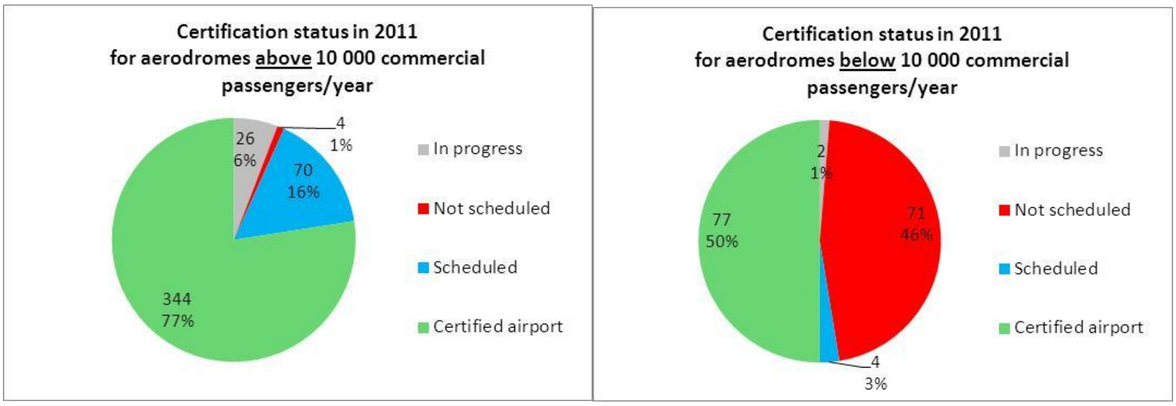



Regulation (EC) No 1108/2009, Article 4.3b, provides ground for aerodrome exemptions according to passenger traffic and freight cargo movements. Member States applying such exemptions do not need to apply the draft ADR rules.

[10] Montenegro indicated that two aerodromes would be under the Basic Regulation scope if they join the EASA system.

Figure 2 shows that the certification status for aerodromes below the Basic Regulation threshold of 10 000 passengers per year is currently significantly lower: 50 % instead of 77 %. Moreover, this 50 % rate will remain stable: only 3 % of the remaining aerodromes below the Basic Regulation threshold are scheduled to get a certification. So, although it can be estimated that 100 % of the aerodromes above the Basic Regulation threshold will be certified in 2015, only 55 % of the aerodromes below the Basic Regulation threshold will be certified.

**Figure 2: Status of aerodrome certification in 2011, according to the BR exemption threshold**




This indicates that:

- The threshold from the Regulation (EC) No 1108/2009 is in line with a significant number of Member States' approach for certification.
- Any decrease of this threshold would have significant impacts both for aerodromes and NAAs:
  - aerodromes below 10 000 commercial passengers per year have lower financial and human ressources to comply with additional regulation requirements;
  - NAAs could face staffing issue to carry out the certification of these aerodromes (specially for NAAs in countries with a large number of ADR under the BR scope, e.g. France).

More detailed information is available in Appendix C.

### New aerodromes and major change in the design of existing aerodromes

The draft ADR rules will apply fully to newly built aerodromes or to major change in design of existing aerodromes (e.g. new runway, new taxiway, etc.). Few cases are foreseen for the future. The possibility to deviate remains, but to a lower extent, because the planning of the infrastructure can integrate the draft ADR rules for design and operations as it is not at an advanced stage of development. This issue is considered to bear a very low significance, so the rest of the document deals only with the conversion of the national certificates of existing aerodromes.

### Stakeholders affected

Member States

With the adoption of Regulation (EC) No 1108/2009, the Member States committed to aerodrome legislation at European level. EASA is thus responsible for drafting and proposing rules in line with ICAO Annex 14 requirements into rules which will be directly applicable to all Member States. Certification and implementation will continue to be in the full responsibility of the Member States, albeit based on common rules.

Most of their resources for national rulemaking tasks regarding aerodrome certification will be allocated to other activities. Member States will continue to be fully responsible for rulemaking tasks with regard to aerodromes which are not within the scope described above.[11]

*Note: The RIA Opinion 3-2007 already assessed the consequences on NAAs' and EASA's workload.*

Aerodrome operators

The Essential Requirements (Basic Regulation (EC) No 1108/2009, Annex Va & Vb) determine the aerodrome operator as responsible for the aerodrome safety. The extent of this responsibility has to be described in the draft ADR rules with a pragmatic approach to clarify the responsibilities between the different actors in the aviation system, notably ATC, flight crew, operations and other operators at an aerodrome.

Third parties and sub-contractors:

Sub-contractors and third party service providers at aerodromes, such as ground handling services, fuel providers, Air Navigation Service Providers and airlines are classified as 'other operators' at an aerodrome. Aerodrome operators will ensure such entities have in place procedures to manage safety in their aerodrome-related operation.

The Basic Regulation (EC) No 1108/2009 introduced a significant change by clarifying the responsibilities for each stakeholder operating at an aerodrome (Essential Requirements in Annex Va and Vb). This major change was accepted by the Member States and the draft ADR rules will supplement these ERs by detailing the conditions which must be complied with in order to implement the Basic Regulation.

Population in the surrounding of aerodrome area:

Monitoring of Obstacle Limitation Surfaces surrounding the aerodrome ensures safe operation of aircraft with regard to preventing collisions with obstacles around aerodromes during the approach, landing and take-off. This is also a protection for the population living around the aerodrome.

### 2.3 What are the safety risks?

Air safety is very well known to be very high with a very low rate of accidents for commercial air traffic in comparison with the total number of flights or number of passengers (0.01 fatalities per 100 million miles flown, source: ICAO). The common requirements of the ADR rules will help Europe to be better prepared for the future increase in air passenger transport projected by several studies.

Looking at absolute values in Figure 3, i.e. number of accidents, aerodromes can be seen as the critical location where efforts have to be constantly made to maintain a uniform high level of safety with the involvement of different types of actors on the aerodrome platform[12].

More than 80 % of all aircraft accidents in commercial air transport operations occur at or near an aerodrome. The following figure gives a brief overview of the number of accidents per main flight phases: 'approach and landing' as well as 'standing and taxi' provides the most numerous cases of accidents compared to 'take-off'. This means that the aerodrome, as well as its surroundings, is the area which may see the largest proportion of safety events, varying from hazardous events (e.g. non-stabilised approaches of the runway by an aircraft) to fatal accidents.

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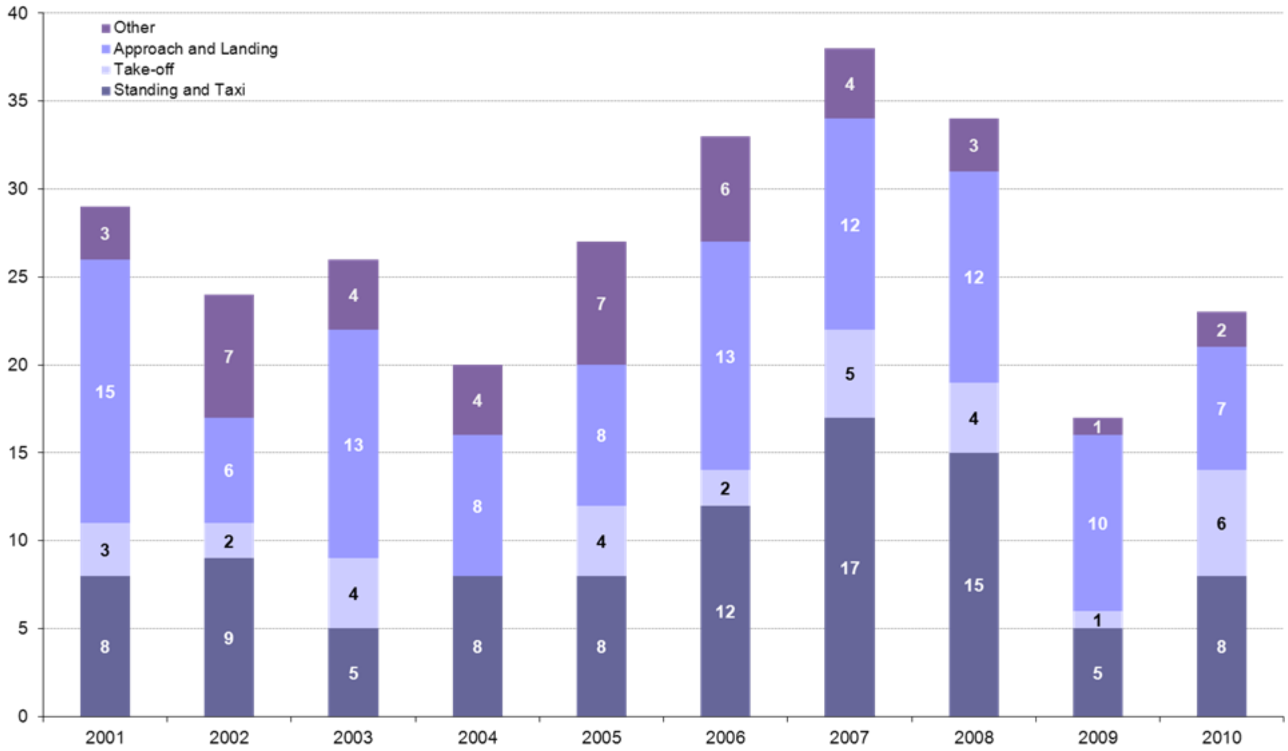
[11] Basic Regulation (EC) No 1108/2009, recital (6): '(6) It would not be appropriate to subject all aerodromes to common rules. In particular, aerodromes which are not open to public use and aerodromes mainly used for recreational flying or …'

[12] The draft aerodrome related regulation proposed by EASA does not of course aim to reduce the number of all accidents as many of them are not directly related to the airport infrastructure.

**Figure 3: Number of accidents in EASA Member States by phase of flight. Aeroplanes in commercial air transport with a MTOM above 5 700 kg.**




It is therefore imperative that rules aimed at maintaining and further improving aviation safety at such geographic aerodrome areas, provide adequate safety standards to be met, as well as guidance for their implementation by both the aerodrome operators and the national aviation competent authorities.

As accidents occur on different locations of the aerodrome field, the rules have to cover a wide range of requirements. This fact underlines the necessity to consider the ICAO 'Recommended Practices' in the development of the draft ADR rules.

The issue for the draft ADR rules proposed by EASA is to get European common requirements and certification processes to maintain the above high level of safety and to help Europe to be better prepared for the future increase in air passenger transport.

See Appendix D for more details: it highlights the reasoning, as well as safety issues, behind some of the aerodrome safety rules.

### *2.4 Conclusions for section 2*

The issues identified are:

1. To provide adequate transposition of the ICAO requirements and other technical requirements to maintain the current high safety level at aerodrome with the future increase of airlines traffic.
2. To develop common requirements of the certification process of European aerodromes ensuring smooth conversion of the national aerodrome certificates without disruption.

In order to address these two key issues, the objectives for this rulemaking activity were identified (see following section 3) and the options developed (see section 4).

# 3 Objectives[13]

## 3.1 General objective

General objectives are the overall goals of a policy and are expressed in terms of its outcome or ultimate impact. If successful, the intervention should at least induce change in the direction of general objectives. For this policy, the general objective is assessed as being the following:

*To maintain the above high level of safety and to help Europe to be better prepared for the expected future increase in air passenger transport.*

## 3.2 Specific objectives

Specific objectives are the immediate objectives of a policy and are the targets that first need to be reached in order to achieve the general objectives. They are expressed in terms of direct and short-term effects of the policy.
*Taking into account the established high safety and certification culture of the European aerodromes, the objective is to focus on a smooth transition from a national-based regulation to a harmonised European one.*

## 3.3 Operational objectives

Operational objectives are normally expressed in terms of measurable outputs that intervention should produce. For this policy, the operational objectives are assessed as being the following:

*OBJ 01: To ensure that the flexibility enshrined in the Basic Regulation to convert national certificates is achieved.*

*OBJ 02: To ensure that the authority and organisation requirements can be integrated at the level of the NAAs and the aerodromes in a timely manner.*

*OBJ 03: To define common requirements for aerodrome design and operation ensuring adequate level of aviation safety.*

# 4 Identification of options

## 4.1 Main inputs to develop options

The options describe the way the development of the draft rules can meet the objectives from section 3. In the aerodrome field, this development shall consider two different aspects:

- the rules to safely design and operate an aerodrome, hereafter referred to as 'technical content';
- the rules to issue a certificate, hereafter referred to as 'certification process'.

### 4.1.1 Technical content (i.e. how an ADR should look like)

Regulation (EC) No 1108/2009 defines ICAO Annex 14 as the main reference for technical content; the following options are therefore based mainly on Annex 14.

Basic Regulation (EC) No 1108/2009, recital (4):

*(4) The Community should lay down, in line with the Standards and Recommended Practices set by the Convention on International Civil Aviation, signed in Chicago on 7 December 1944*

[13] The overall objectives of the Agency are defined in Article 2 of Regulation (EC) No 216/2008 (the Basic Regulation). This proposal will contribute to the overall objectives by addressing the issues outlined in Section 2.

*(the Chicago Convention), essential requirements applicable to aeronautical products, parts and appliances, aerodromes and the provision of ATM/ANS; essential requirements applicable to persons and organisations involved in the operation of aerodromes and in the provision of ATM/ANS; and essential requirements applicable to persons and products involved in the training and medical assessment of air traffic controllers. The Commission should be empowered to develop the necessary related implementing rules.*

Nevertheless, best practices from other regulatory materials were also assessed during the rule drafting process.

#### *4.1.2 Certification process*

As mentioned above, aerodrome certification was introduced 10 years ago in ICAO Annex 14 and remains quite general in this annex. Therefore, on this aspect of the rules, guidelines, current and best practices were the main sources to fit the structure of the European rules (e.g. the difference between Authority Requirements and Organisation Requirements).

### *4.2 Overview of the full range of options identified*

A number of options have been developed. The following sections indicate the different possible approaches to define options (section 4.2.1), the options which have been selected as the most relevant to achieve the objectives set above (section 4.2.2), and the discarded options (section 1.1.1).

The following options are the outcome of an iterative process. Up-to-date developments of the impact assessment were presented and discussed with each joint ADR rulemaking group meetings from January 2011 to July 2011. Specific discussions on impact assessment were carried out with several Member States (see the approach with case studies described in section 5.1.2). This resulted in several inputs to check and refine these options.

#### *4.2.1 The different options*

**Option 0 — The baseline, i.e. 'No change option'**

The baseline describes what would happen if there were no change in the current rules for ADR requirements and certification. This refers to section 2.1.1: the non-harmonised implementation of ICAO Annex 14 leads to safety concerns on the long term as well as to efficiency issues in the short term.

This baseline option is always part of the analysis in order to have a benchmark to compare the options. In this rulemaking activity it is only a theoretical option as the European legislator has already decided to introduce European rules for aerodrome safety.

**Potential options introducing a change in the ADR rules for design, operation and certification**

**Several potential options** have been identified for the transposition of existing requirements from ICAO into the new European set of rules:

- ICAO standards for which no difference was notified to ICAO by any EU Member State are transposed into CS or IR.
- ICAO standards with the analysis of the notification sent to ICAO are transposed into CS or IR.
- All ICAO standards are transposed into CS or IR, but no Recommended Practices.
- ICAO standards and all Recommended Practices are transposed into CS or IR.
- A pragmatic approach using expert judgement to choose how each Standard and Recommendation shall be integrated in the EU system.

**Analysis of these approaches**

Apart from the fact that the Basic Regulation creates a legal obligation to define common European requirements in line with the ICAO Recommended Practices, and with the exception of the pragmatic approach, none of these options will meet the objectives:

- safety trend is not sustained if ADR rules are only restricted to ICAO Standards (nearly all requirements related to design consist of Recommended Practices);

  and

- The transition towards harmonised European ADR rules is:
  - neither achievable if the ADR rules deal only with ICAO standards, and all requirements related to Recommended Practices being out of the technical scope. The outcome is an inefficient European set of aerodrome rules with the continuation of important rulemaking activities at national level.
  - nor adequate if all Recommended Practices are transposed as such into CS or IR. The compliance would be more difficult to prove.

If only the ICAO Standards are transposed into the EU rules, Recommended Practices from ICAO will not be included and can lead to safety concerns.

**Conclusion: Be pragmatic!**

In conclusion, a pragmatic approach can deliver the highest benefits. The ICAO Standards and Recommended Practices have to be evaluated on a case-by-case basis and taken into account into the European law at the appropriate level:

— CS with GM,

— IR with AMC or GM.

(General explanations on IR, CS, AMC, GM are already provided in section 2.1.3)

In practice, ICAO Standards were in general suggested to be transposed into IR or CS. Recommended Practices were mostly suggested to be transposed into AMC or GM and CS for design matters.

The EASA Opinion No 04/2011 of 1 June 2011 and Opinion No 03/2011 of 19 April 2011 were the main source for the Authority and Organisation Requirements for the aerodrome field.

The ADR rulemaking groups were the forum to discuss the appropriate wording of the Standards and the Recommended Practices. Very often the original ICAO wording was kept, as it is obviously extremely difficult to change in a single year of ADR working groups the years of compromise achieved by ICAO. Nevertheless, the most appropriate wording was taken into account at the right level in the EU legislation (CS or IR or AMC or GM) with the view to ensuring flexibility when it comes to certifications for existing aerodromes. This statement has naturally to be assessed (see section 6 'Analysis of impacts').

The pragmatic approach is chosen as option 1

In addition to the positive effect on safety trend, another advantage to include ICAO Annex 14 Recommended Practices in Option 1 is the lower management costs: NAAs and aerodromes will have to deal only with one package of rules instead of having some provided at European level (the taken into account of ICAO Standards into EU law) and others maintained at national level (the national requirements mirroring the ICAO Recommended Practices). This is a benefit for both the Member States who applied already Annex 14 in full and the Member States who applied it with notifications of differences to ICAO.

Is option 1 sufficient?

The assessment of option 1 in regard to the flexibility introduced in Article 8.a.2 of the Basic Regulation (EC) No 1108/2009 led to consider that furthermore the acceptance of existing deviations (as addressed by Regulation (EC) No 1108/2009 in article 8.a.5) needs to be duly addressed. Therefore, the iterative process of discussing options led to the development of an additional possibility for the aerodromes and Member States which can be used in the conversion of existing national certificates. This outcome is described in option 2.

Options 0, 1, 2 are summarised and the main issues are highlighted in the following section.

### 4.2.2 Selected options

**Option 0 — The baseline**

(See section 4.2.1)

The non-harmonised implementation of ICAO Annex 14 leads to safety concerns on the long term as well as to efficiency issues in the short term (see section 2.1.1.).

**Option 1 — The pragmatic approach**

*Technical common requirements*

The ICAO Standards and Recommended Practices have to be evaluated on a case-by-case basis and taken into account into the European law at the appropriate level: CS, IR, AMC, GM (see section 4.2.1).

*Certification process*

Option 1 is the development of rules as strictly envisaged by the Basic Regulation (EC) No 1109/2008: if the compliance with the CS or the IR is not met at an aerodrome, can an Equivalent Level of Safety (ELoS) be found with an alternative measure or can a Special Condition (SC) be applied to this aerodrome due to its infrastructure and/or environment specificities?

*ELoS*

*An ELoS would be installed if the competent NAA found a solution, differing from the CS, reaching the same safety objective.*

*A safety assessment, supporting this decision by the NAA, would be proportionate to the wide range of ELoS applications from basic to highly sophisticated cases, hereby not necessarily involving quantifiable aspects.*

*ELoS, like CSs, becomes binding on an individual basis to the applicant as part of an agreed CB.*

*Special Conditions (SC) are non-binding special detailed technical specifications determined by the NAA for an aerodrome if the Certification Specifications established by the EASA are not adequate or are inappropriate to ensure conformity of the aerodrome with the essential requirements of Annex Va to Regulation (EC) No 216/2008. Such inadequacy or inappropriateness may be due to:*

- *the design features of the aerodrome; or*
- *where experience in the operation of that or other aerodromes, having similar design features, has shown that safety may be compromised.*

*A safety assessment, supporting this decision by the NAA, would be proportionate to the wide range of SC applications from basic to highly sophisticated cases, hereby not necessarily involving quantifiable aspects.*

*SCs, like CSs, become binding on an individual basis to the applicant as part of an agreed CB.*

If an existing aerodrome deviation from design CS could not be justified by using an ELoS or SC, the Member State would only have the remaining solution to send a derogation request to the European Commission (Basic Regulation, Article 14.6). This would threaten the objective of smooth transition for the conversion of national certificate and appears to be inadequate and overly burdensome.

**Option 2 — The pragmatic approach with additional flexibility**

*Technical common requirements*

Identical to option 1.

*Certification process*

In case the certification process described in option 1 reveals some insufficiencies regarding the objective of flexibility, i.e. examples of deviations versus a CS or IR which cannot be justified with an ELoS or a Special Condition, there is the opportunity to develop additional processes to meet the flexibility enshrined in the Basic Regulation (EC) No 1108/2009 and the safety objective.

To address this case of non-flexibility and to avoid the derogation process, a process leading to a document informally referred to as 'Deviation Acceptance & Action Document' (DAAD) was developed. The DAAD requires a safety assessment to indicate how the situation at the aerodrome (including mitigation measures) satisfies the Essential Requirements (ERs) of Annex Va to the Basic Regulation (EC) No 1108/2009.

The validity of the DAAD is not restricted to a specific period, unless this is indicated in the DAAD. In practice, the DAAD implies a safety assessment and, as a minimum, a monitoring action.

*Cover ADR Regulation, Article 8, Existing deviations from Certification Specifications:*

*(1) During the certification process for the issuance of the first certificates in accordance with this Regulation, and without prejudice to the provisions of Annex II, the competent authority may, until the 31st December 2019, accept applications for a certificate including deviations from Certification Specifications, if:*

- *(a) such deviations do not qualify as an equivalent level of safety case nor as a case of special condition according to Article ADR.AR.C.020 of Annex I; and*
- *(b) such deviations have existed prior to the entry into force of this Regulation; and*
- *(c) the essential requirements of Annex Va to Regulation (EC) No 216/2008 are respected by such deviations, supplemented by mitigating measures and corrective actions as appropriate; and*
- *(d) a safety assessment for any such deviation has been completed.*

*(2) The evidence supporting the conditions under (a), (b), (c), and (d) above shall be compiled in a document. This document shall not form part of the certification basis. The competent authority shall specify the period of acceptance of such deviations and inform the Agency of all such documents it has issued.*

*(3) The conditions referred to in paragraph (1)(a), (c) and (d) above shall be reviewed and assessed by the aerodrome operator and the competent authority for their continued validity and justification, as appropriate.*

As indicated in the article above, The Deviation Acceptance & Action Document (DAAD) has been developed to support the acceptance process only (the impact analysis in section 6.3.4.3 will assess the duration of this period). It should be produced jointly by the NAA and the aerodrome to document those existing deviations and non-compliances that remain after reviewing them with the new aerodrome rules. It should be noted that the EASA will take no part in the acceptance process; it is purely an action between the NAA and the aerodrome.

Remaining deviations and non-compliances included in the DAAD should be accompanied by a safety assessment and an action plan that indicates the conditions appropriate to removing them and/or any possible mitigation measures while they remain on the list. Once agreed, the DAAD will be attached to the new certificate, possibly with caveats requiring review obligations.

As for the ELoS and the Special Conditions, a safety assessment (supporting this decision by the NAA) would be proportionate to the wide range of SC applications from basic to highly sophisticated cases, hereby not necessarily involving quantifiable aspects.

It is intended that the DAAD will be individual to each aerodrome, but may also contain state-wide elements as deemed appropriate by the NAA.

**Table 3: Selected policy options**

| ***Option No*** | ***Description*** | ***Comment*** |
|---|---|---|
| **0 'Baseline'** | Baseline option (No change in rules; risks remain as outlined in the issue analysis.) | See section 2.1.1. |
| **1 'Pragmatic approach'** | **Technical common requirements:**<br>Draft rules in line with current ICAO Annex 14.<br>Draft rules in line with foreseen evolution of ICAO Annex 14.<br>Draft rules above ICAO Annex 14 where deemed necessary to enhance safety.<br>**Certification process:**<br>— Conversion period: 48 months.<br>— Flexibility as indicated in Regulation (EC) No 1108/2009: either the aerodrome meets a CS, or a CS can be met with a different measure providing the same ELoS, or a Special Condition has to be acknowledged for this aerodrome. | Explanation in section 4.2.1<br>**Certification process:**<br>If the flexibility failed during the conversion process of the national aerodrome certificate into a European harmonised one, the remaining solution for an aerodrome would be to ask for a derogation. This would involve automatically the EASA and the EC.<br>Investments to be compliant with the draft ADR rules or suspension of operation in case of request for derogation are both heavy threats for smaller aerodrome operators and to a certain extent for larger operators. |
| **2 'Pragmatic approach and additional flexibility** | **Technical common requirements:**<br>Identical to Option 1.<br>**Certification process:**<br>Additional tools to allow the flexibility ensured by the Basic Regulation (EC) No 1108/2009. The Deviation Acceptance & Action Document (DAAD) is proposed to limit the derogations case as far as possible. | |

### 4.2.3 Non-selected options

The following options were also considered and then discarded with these justifications.

| Option No | Description | Comment |
|---|---|---|
| **3** | Draft rules strictly identical with current ICAO Annex 14. | Discarded; not possible in terms of structure of the rules as well as in terms of content. Part of the new requirements are not in ICAO Annex 14 (details on certification). Split between IR vs CS vs AMC vs GM, AR vs OR, to be done. |
| **4** | Draft rules in line with foreseen evolution of ICAO Annex 14. | Discarded; it is not possible to foresee which proposed changes to ICAO Annex 14 will be integrated in the next edition. |
| **5** | Draft rules above ICAO Annex 14 where deemed necessary to enhance safety. | Discarded; not in line with the Basic Regulation (EC) No 1108/2009 (see above recital 4 of the said Regulation) and will not allow a level playing field compared to other ICAO countries. |
| **6** | Draft rules without Recommended Practices from ICAO Annex 14. | Discarded; not acceptable for the potential safety consequences and practicality. |

# 5 Methodology and data requirements

## 5.1 Applied methodology

Having in mind the objectives proposed in section 3, the most appropriate methodological approach was to perform RIA case studies on a sample of NAAs and aerodromes to assess directly with the affected stakeholders if the future ADR rules will achieve the flexibility objectives. The outcome is a qualitative assessment of the different impacts: safety, environment, social, economic, proportionality issues, and regulatory harmonisation.

The impacts of the rules cannot be directly assessed because they all depend on their application, knowing their flexibility. Therefore, one of the objectives of the case studies is to provide examples of application of the rules to assess their impacts.

### 5.1.1 Key questions addressed by the case study questionnaire

The case studies provide an illustration for the impacts expected at different levels:

- at NAA level:
  - What is the current status and process of aerodrome certification?
  - What is the impact of the draft European rules on:
    - the staff workload?
    - a number of ADR under the EU scope for certification?
    - the management of deviations?
    - the communication of the new certification process with the aerodromes?
    - training?
- at aerodrome level (aerodromes certified or under certification process):
  - To what extent can existing certification be re-used for the European certification?
  - What are the differences between national certification scheme and the draft European one?
  - Where are the potential problems? How can we solve them?
  - Based on some SARPs selected by the EASA, what are the justifications which were provided/could be provided in case of differences? Can this be re-used with the new European certification process?

### 5.1.2 Organisation of the case studies

Geographical scope:

A mix of Member States with different sizes of aerodromes under the scope of the Basic Regulation were part of the case study exercise[14]:

- CH: 5 aerodromes under the BR scope,
- CZ: 5 aerodromes under the BR scope,
- FR: 159 aerodromes under the BR scope,
- IT: 51 aerodromes under the BR scope,

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[14] No other countries (except from CZ, IT, FR and PL) didn't express their willingness to be part of this RIA activity, presented on 27 January 2011, except from Switzerland on 25 March 2011.

— PL: 10 aerodromes under the BR scope.

Each NAA selected two aerodromes under the Basic Regulation (EC) No 1108/2009 scope (one for Switzerland).[15]

Technical scope

There are approximately 1 000 SARPs in ICAO Annex 14, which makes a comprehensive analysis not feasible. In view of the objectives defined above, it was decided to focus on the aerodrome certification process and about 15 key SARPs. The selected SARPs were proposed by the Agency and agreed with the ADR rulemaking groups as well as with ACI and ERAC.

The selected SARPs are:

- SARPs for Design
  - Taxiways (width, signs and markings)
    - a. 3.9.4 Cockpit over centre line (Standard)
    - b. 3.9.5 Width of taxiway (Recommended Practice)
    - c. 5.2.8.1 Centre line markings (Standard)
    - d. 5.2.16. Mandatory instruction marking (Standard)
    - e. 5.4.1.1 Signs (links to 9.8.1 ST) (Standard)
  - RESA
    - a. 3.5.1 Obligation to have RESAs (Standard)
    - b. 3.5.2 RESA 90m (Standard)
    - c. 3.5.3 RESA 240m (Recommended Practice)
  - Obstacle limitation surfaces
    - a. 4.1 Obstacle limitation surfaces (Standard)
    - b. 4.3 Objects outside the OLS (Recommended Practice)
- SARPs for Operations
  - Monitoring of areas covered by Obstacle Limitation Surfaces
    - a. 4.2.14 Category 1 OFZ (Recommended Practice)
    - b. 4.2.15 Category 2 and 3 OFZ (Standard)
  - Aerodrome maintenance
    - a. 10.2.1 Maintenance of movement area (Standard)
    - b. 10.2.8 Providing good friction characteristics (Standard)
- RFFS

    9.2.23 Response time (Standard)

[15] Meetings held in 2011 with Italy on 10–11 May, with the Czech Republic on 23–24 May, with Poland on 31 May – 1 June, with France on 8–10 June, and with Switzerland on 14 July.

### 5.2 Data requirements

Based on the issues identified in section 2, the following questionnaires have been developed.

Questionnaire to all MS (see Appendix C)

- Number of aerodromes under the Basic Regulation (EC) No 1108/2009.
- MS sending differences to ICAO Annex 14 (with the latest list of differences to be sent to EASA).
- MS keeping record of a list of deviations at NAA headquarter level.
- NAA staffing.

Questionnaire to Case Studies MS

1. NAA related issues:
   - ICAO Annex 14 implementation issues,
   - Comparison between national regulation and selected SARPs,
   - Certification process,
   - Deviations management,
   - NAA training,
   - SMS follow-up.
2. Aerodromes related issues:
   - Differences, if any, between the aerodrome designs and operations with the selected SARPs, national rules, and possible corrective actions.
   - Status of implementation of SMS.
3. Issues with impacts of the draft European rules:
   - Authority and Organisation Requirements
   - Operation Implementing Rules and design Certification Specification.

The mentioned issues 1 and 2 were covered with a 60-page blank questionnaire sent 6 weeks in advance to the selected NAAs before a meeting, and then, with several weeks of exchange to get an answer to the questionnaire understood both by the Agency and the selected NAAs.

The mentioned issue 3 was covered with a 160-page blank questionnaire and discussions were handled by email exchanges and phone conversations.

*Note:* Aerodromes have a geographical location by nature, which makes them all different. Grouping by type of aerodrome is a very challenging task without proper information easily accessible on this issue. This fact supports also the case study approach.

## 6 Analysis of impacts

To understand the impact of the options identified, it is proposed to first look at the differences between the draft rules and ICAO Annex 14 as well as the outcome of the case studies and then to assess these results per type of impact (i.e. safety, economic etc.).

Thus, the first section 6.1 will assess the differences between the draft ADR rules and ICAO Annex 14. Main differences with justifications will be outlined; the complete information can be found in each relevant annex attached to the NPA.

Secondly, the outcome of the case studies will be presented in section 6.2 focussing on:

- the certification process;

- the compliances with the selected SARPs at national level;
- the compliances with the selected SARPs for the selected aerodromes. The deviations brought to the knowledge of EASA during this exercise are assessed looking at how these deviations can be justified with the new certification process.

Finally, section 6.3 will assess the overall impacts per option. The following impacts are assessed:

- safety;
- environmental;
- social;
- economic;
- proportionality issues;
- regulatory coordination and common requirements.

## *6.1 Differences ICAO Annex 14 — European draft rules*

### Technical common requirements

ICAO Annex 14 was the main input for the rules on design and aerodrome operations. Even if the ICAO SARPs have been reviewed to be accommodated to EU legislation, the requirements are in most of the cases identical. In practice, the principles were that ICAO Standards were taken into account at CS or IR level, and that Recommended Practices were taken into account at AMC or GM level.

The only major change is the designation of responsibilities for stakeholders. The requirements for stakeholder responsibilities were detailed in AMC, when appropriate, to allow Member States to perform them with alternative solutions (e.g. third party's audits, fuel providers, etc.).

The differences and justifications can be found in these documents:

- Design requirements : see NPA Book 1
- Operational requirements : see NPA Annex 3

### Certification common requirements

The differences and justifications can be found in these documents:

- Authority Requirement : see NPA Annex 1
- Organisation Requirements : see NPA Annex 2

## *6.2 Outcome of the case studies*

The certification process at MS level was analysed and found to be in line with the draft European rules. The compliance with ICAO Annex 14 from a legislative point of view and at aerodrome level was assessed for the selected SARPs (reference). The check of compliance at aerodrome level allowed getting examples of existing and concrete deviations.

Having this background information, the impact of the draft European rules was assessed:

- on the certification process, and
- on the examples of deviations to check the flexibility of the conversion process.

The persons involved in the case study exercise had also the opportunity to comment on the draft ADR rules, version of July 2011. Feedback was sent between 15 September and 10 October 2011. These comments were answered by EASA and were taken into account when relevant (see Appendix E for the summary of this iterative process between draft rules and impact of the rules).

*Note: The case study exercise was a tool to identify facts and relevant information for the RIA. It was not an audit looking for evidence to each question raised. The aim was to gather information following a structured and detailed questionnaire. While a comprehensive set of answers cannot be ensured, the time spent to collect this information and the numerous exchange of questionnaire versions gives confidence on the quality of the answers.*

### 6.2.1 Certification process and the current practice of MS

The case studies gave the opportunity to check that the MS follow the same principles and guidelines when it comes to certification, although there is not yet a complete set of SARPs in ICAO Annex 14. It gave also the opportunity to see that there has been a continuous improvement e.g. in the SMS implementation at aerodrome level and NAA staffing since the TÜV-Airsight Annex 14 study which was performed largely in 2008).

Example from Italy and France for certification process: see Appendix F.

The case studies showed that the remaining main effort would be the gathering of relevant justifications of deviations at NAA headquarters level (currently this information is generally kept at aerodrome level and also in some cases in regional NAA offices). When the selected NAAs have not yet this process to collect this information at central level, there is already identified as an area for improvement (Italy for instance will have at the end of 2011

Other comments received from the selected NAAs and aerodromes were about:

- the issuance of certificates providing that there is a full compliance to the certification basis could be unrealistic. Corrective action plans could be used to grant this certificate. The draft ADR.AR.C.035 (c) Issuance of certificate integrates now this possibility for findings which are not of level 1 category[16]:

  *ADR.AR.C.035 Issuance of certificate*
  *(c) Findings which are not of level 1 category and which have not been closed prior to the date of certification, shall be safety assessed and mitigated as necessary and a corrective action plan for the closing of the finding shall approved by the competent authority.*

- temporary aerodrome certificates are the practice for the selected NAAs. Nevertheless, the principle in the draft ADR rules of a certificate issued for an unlimited duration, ADR.AR.C.035 (e), will require minor certification process changes for these NAAs and will allow the other relevant NAAs to continue to issue unlimited duration certificate.

In conclusion, existing certification processes in the Member States are found to be in line with the draft ADR rules. No significant differences with the draft ADR rules were found.

### 6.2.2 Compliance with national regulation versus ICAO Annex 14

Based on the following table, most of the Member States participating in the case study exercise apply identically the selected ICAO Annex 14 SARPs. Nevertheless, there are several

[16] ADR.AR.C.055 Findings, observations, corrective actions and enforcement measures: '(b) A category 1 finding shall be issued by the competent authority when any significant non-compliance is detected […] which lowers safety or seriously endangers safety.'

different ways of implementation of ICAO Annex 14 for a number of SARPs, which confirms the need of flexibility.

This analysis covers only the selected SARPs for the case study: see section 6.1 for a comprehensive analysis of EU Member State differences notified to ICAO Annex 14.

There are two important considerations to take into account when analysing the below summary table:

1. Having a national difference from ICAO requirement does not mean necessarily that all the aerodromes of this country do not comply with this ICAO requirement.
2. When there is a national difference from ICAO, it is not easy to judge if this difference is significant or not. For instance, the case study Member States explained that there is a formal difference based on the legislative text, but in practice the 'spirit' of the text is implemented (see Italy 5.4.1.1.).

**Table 4: Case study comparison between ICAO Annex 14 and national legislation**

| ***ICAO Annex 14 requirements*** | ***National legislation compared with ICAO*** | | | |
|---|---|---|---|---|
| | ***Identical*** | ***More strict*** | ***Less strict*** | ***Different in character or other mean of compliance*** |
| **Design** | | | | |
| Taxiways (width, signs and markings) | | | | |
| a. 3.9.4 ST Cockpit over centre line | CH, CZ, FR, PL | IT | | |
| b. 3.9.5 REC Width of taxiway | CH, CZ, IT, PL | FR | | |
| c. 5.2.8.1 ST Centre line markings | CH, CZ, FR, PL | | | IT |
| d. 5.2.16. ST's Mandatory instruction marking | CH, CZ, PL, FR & IT= partially | FR partially | FR partially, IT 5.2.16.4: not implemented | FR partially, IT:5.2.16.3 |
| e. 5.4.1.1 ST Signs (links to 9.8.1 ST) | CH, CZ, FR, PL | | IT formally speaking (in practice it is implemented) | FR=9.8.1 |
| RESA | | | | |
| a. 3.5.1 ST obligation to have RESA's | CH, CZ, PL | IT | | FR |
| b. 3.5.2 ST 90m | CH, CZ, IT, PL | | FR | |
| c. 3.5.3 REC 240m | CH, CZ | | PL, FR: this requirement is not in the French regulation | IT |
| Obstacle limitation surfaces | | | | |

| ICAO Annex 14 requirements | National legislation compared with ICAO | | | |
|---|---|---|---|---|
| | Identical | More strict | Less strict | Different in character or other mean of compliance |
| a. 4.1 ST's Obstacle limitation surfaces | CH, CZ, PL, IT | | FR | |
| a. 4.3 ST's Objects outside the OLS | CH, IT | CZ, IT, PL, FR | | |
| **Operation** | | | | |
| Monitoring of areas covered by Obstacle Limitation Surfaces | | | | |
| a. 4.2.14 REC Category 1 OFZ | CH, IT | CZ, FR | PL | IT for 4.2.6 |
| b. 4.2.15 ST Category 2 and 3 OFZ | CH, CZ, IT, FR | | PL | |
| Aerodrome maintenance | | | | |
| a. 10.2.1 ST Maintenance of movement area | CH, CZ, FR, IT, PL | | | |
| b. 10.2.8 ST Providing good friction characteristics. | CH, CZ, IT, FR | | PL | |
| RFFS | | | | |
| 9.2.23 Response time | CH, CZ, PL | IT | FR (3mm for extremity of RWY, not any point of the RWY) | |

### 6.2.3 Comparison of selected aerodromes and national/ICAO rules for the selected SARPs

The following question was asked during the case study meetings: if the aerodromes have additional deviations from the selected case study SARPs. 2 aerodromes mentioned 2 additional SARPs (one per aerodrome): length of runway strip and distance between taxiway and runway. None of the other aerodromes mentioned deviations with these 2 additional SARPs. Even if the list of deviations for these aerodromes cannot be fully ensured (see note at the beginning of section 6.2), this information looks reliable enough for the analysis[17].

[17] At the end of the RIA report drafting, only one additional deviation was discovered in Warsaw Chopin Airport in relation with 'Runway Guard Lights': there are some taxiway and runway intersections which are not equipped in accordance to the ICAO Recommendation Annex 14 — 5.3.2.22. This case did not raise changes in the outcomes of this Regulatory Impact Assessment.

*SARPs with deviation at aerodrome (case study exercise)*

Examples of deviations for selected aerodromes were found for nearly all selected SARPs related to aerodrome design, but none for operations SARPs.

**Table 5: Existence of deviations in the selected aerodromes for the ICAO Annex 14 SARPs**

| ***Selected ICAO Annex 14 SARPs*** | ***Deviations in selected aerodromes*** |
|---|---|
| **SARPs for Design** | |
| Taxiways (width, signs and markings) | |
| a. 3.9.4 ST Cockpit over centre line | Yes |
| b. 3.9.5 REC Width of taxiway | Yes |
| c. 5.2.8.1 ST Centre line markings | Yes |
| d. 5.2.16. ST's Mandatory instruction marking | |
| e. 5.4.1.1 ST Signs (links to 9.8.1 ST) | No |
| RESA | |
| a. 3.5.1 ST obligation to have RESA's | Yes |
| b. 3.5.2 ST 90m | Yes |
| c. 3.5.3 REC 240m | Yes |
| Obstacle limitation surfaces | |
| a. 4.1 ST's Obstacle limitation surfaces | Yes |
| b. 4.3 REC's Objects outside the OLS | No |
| | |
| **SARPs for Operations** | |
| Monitoring of areas covered by Obstacle Limitation Surfaces | |
| a. 4.2.14 REC Category 1 OFZ | No |
| b. 4.2.15 ST Category 2 and 3 OFZ | No |
| Aerodrome maintenance | |
| a. 10.2.1 ST Maintenance of movement area | No |
| b. 10.2.8 ST Providing good friction characteristics. | No |
| RFFS | |
| 9.2.23 Response time | No |

*Deviations per aerodrome (case study exercise)*

**Table 6: List of deviations per selected aerodrome**

| ***Case study aerodromes*** | ***Cockpit over centre line*** | ***Distance between TXY and RWY*** | ***Marking 5-2-16*** | ***No RESA 240m*** | ***No RESA 90m*** | ***OFZ (ICAO Annex 14 - 4.1)*** | ***RWY slope*** | ***Taxiway centre line marking*** | ***Width of RWY strip*** | ***Width of taxi-way*** | ***Grand total*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Annecy | | | | | 1 | | | | | | **1** |
| Bergamo | | 1 | | 1 | | | | | | | **2** |
| Fiumicino | | | 1 | 1 | | | | | | | **2** |
| Karlovy Vary | | | | | | | | | 1 | | **1** |
| Lyon (LYS) | 1 | | | 1 | | | | | | 1 | **3** |
| Praha | | | | | | | | | | 1 | **1** |
| Warsaw | | | 1 | | | 1 | 1 | 1 | | | **4** |
| **Grand total** | **1** | **1** | **2** | **3** | **1** | **1** | **1** | **1** | **1** | **2** | **14** |

*Note:* Selected aerodromes without any differences with ICAO Annex 14: Poznan and Alterhein — St Gallen, information based on an interview.

In conclusion, only two aerodromes do not have deviations. Most of the aerodromes have one or two deviations. One aerodrome has three deviations, one has four deviations. Four deviations is the highest number of deviations per aerodrome in our case study.

### 6.2.4 Impact of the draft European rules on Member States' case studies

The analysis of the deviations then continues with the comparison of three related aspects for the conversion of the certificate:

- the compliance with the national requirement;
- the compliance with the draft CS;
- the available information to either justify this non-compliance or the actions taken to deal with this non-compliance.

For instance, if an ADR is not compliant with a CS and, in the same time, it was known during the case study exercise that either a safety assessment or a correction action plan or a study is in progress, then it was considered that the draft ADR rules would have no or limited impact because there is already information showing that the ADR is addressing this safety issue.

On the other hand, when there is no safety assessment or no information showing that the issue of the deviation is currently addressed with specific actions (correction action, specific study, etc.), it is then considered that the conversion of the national certificate has a negative impact (additional workload, etc.).

The next table addresses the following questions:

1. Is the ADR compliant with national requirement?
2. Is the ADR compliant with draft CS?
3. Is there a safety assessment or a corrective action plan or a study in progress?

There are three 'yes' or 'no' in each cell: this corresponds to the order of the questions here above.

**Table 7: Compliance with rules and potential impacts on the selected aerodromes**

| ***Case study aerodromes*** | ***Questions*** | ***Cockpit over centre line*** | ***Distance between TXY and RWY*** | ***Marking 5-2-16*** | ***No available RESA 240m*** | ***No available RESA 90m*** | ***OFZ (ICAO Annex 14 - 4.1)*** | ***RWY slope*** | ***TXY centre line marking*** | ***Width of RWY strip*** | ***Width of TXY*** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Annecy | 1.In line with national requirement?<br>2.In line with draft CS?<br>3.Safety assessment, corrective action plan, …? | | | | | Yes<br>No<br>Yes | | | | | |
| Bergamo | 1.In line with national requirement?<br>2.In line with draft CS?<br>3.Safety assessment, corrective action plan, …? | | No<br>No<br>Yes | | Yes<br>No<br>No | | | | | | |
| Fiumicino | 1.In line with national requirement?<br>2.In line with draft CS?<br>3.Safety assessment, corrective action plan, …? | | | Yes<br>No<br>Yes | Yes<br>No<br>No | | | | | | |
| Karlovy Vary | 1.In line with national requirement?<br>2.In line with draft CS?<br>3.Safety assessment, corrective action plan, …? | | | | | | | | | No<br>No<br>No | |
| Lyon (LYS) | 1.In line with national requirement?<br>2.In line with draft CS?<br>3.Safety assessment, corrective action plan, …? | No<br>No<br>Yes | | | Yes<br>No<br>No | | | | | | Yes<br>No<br>Yes |
| Praha | 1.In line with national requirement?<br>2.In line with draft CS?<br>3.Safety assessment, corrective action plan, …? | | | | | | | | | | No<br>No<br>Yes |
| Warsaw | 1.In line with national requirement?<br>2.In line with draft CS?<br>3.Safety assessment, corrective action plan, …? | | | No<br>No<br>No | | | No<br>Yes<br>Yes | No<br>No<br>Yes | No<br>No<br>No | | |

**Legend**
Green: no impact with draft rules.
Orange: additional action(s) during certificate conversion.

This table is a summary of the examples detailed in Appendix I.

*For instance:*

***Analysis of the RESA issue for the two selected French aerodromes:***

*Annecy aerodrome has no available space for a 90m RESA (so implementation of a 90m RESA would suppose to reduce significantly the commercial traffic which mainly supports the economic development of Annecy region). LYS has available space for 240m RESA.*

*There is a compliance with RESA requirement at national level but no compliance with the draft ADR CS. This draft CS requires at least a 90m RESA and a safety assessment when a longer RESA should be available depending on the aerodrome code.*

*Nevertheless, a study is currently in progress in France to assess how a 90m RESA could be efficiently made available for existing aerodromes. This study is in line with the analysis of safety issue and should come with, if any, appropriate mitigations measures or other proposals. Therefore, it is envisaged that the impact would be minor or not significant for Annecy: the cell is highlighted in green.*

*Concerning LYS, the aerodrome operator informed that the space for 240m RESA is available and the compliance costs to build these RESAs for each runway are 'not too heavy because nothing obliged to have a tar RESA'[18]. While LYS seems to accept that RESA could be implemented for their aerodrome, the outcome in the RIA is that there is an additional workload with the draft CS: the cell is highlighted in red.*

***Analysis of the runway strip issue for Karlovy Vary***

*A deviation without safety assessment was granted by the Transport Ministry to this aerodrome before the setup of the Czech NAA. The deviation is still relevant with the draft CS. In such a case, the conversion process will require a safety assessment, i.e. an additional workload.*

The details for these examples of deviations provided in Appendix I show that it is not straightforward to assess if there will be each time additional workload during the conversion process. It can be summarised that, during the conversion process for these nine selected aerodromes:

- four deviations would require additional actions, with in some cases already a certain willingness of the stakeholders to accept to be compliant (e.g. RESA deviation at Lyon Saint Exupéry, LYS).
- nine deviations would be easily justified with the current information showing that the safety issues were analysed and appropriate actions are either in place or will be decided soon or later.

**How was the compliance with CS assessed?**

Once enough information is gathered on the details of a deviation (previous section), the flexibility of the conversion of national certificate with the draft ADR rules can be assessed. As already mentioned, if the compliance with CS is not achieved, then ELoS, SC or DAAD can be used to support a justification of the deviation.

The most plausible justification of a deviation is proposed in the following table. For more information, refer to Appendix I.

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18 Annex 14 (3.5.11) or Doc 9157 part 1 (§ 5.4.13 and 5.3.22) do not require the RESA to be covered with tar. Statement made by LYS in the case study questionnaire for France.

**Table 8: Type of flexibility tools which could use to justify existing deviations**

| ***Case study aero-dromes*** | ***Cockpit over centre line*** | ***Distance between TXY and RWY*** | ***Marking 5-2-16*** | ***No RESA 240m*** | ***No RESA 90m*** | ***OFZ (ICAO Annex 14 - 4.1)*** | ***RWY slope*** | ***TXY centre line marking*** | ***Width of RWY strip*** | ***Width of TXY*** |
|---|---|---|---|---|---|---|---|---|---|---|
| Annecy | | | | | DAAD or SC | | | | | |
| Bergamo | | ELoS | | DAAD | | | | | | |
| Fiumicino | | | DAAD | DAAD | | | | | | |
| Karlovy Vary | | | | | | | | | SC | |
| Lyon (LYS) | DAAD | | | DAAD | | | | | | DAAD |
| Praha | | | | | | | | | | DAAD |
| Warsaw | | | ELoS or DAAD | | | ADR CS* | SC | ELoS | | |

**ADR CS: the aerodrome design and the measures taken by the aerodrome operator comply with the draft ADR CS.*

Note for DAAD about marking: it is expected that the markings will be changed over the conversion period. If at the deviation remains at the end of the conversion period, the DAAD could be used as a last resort.

It was not always possible to define exactly which tools can support the justification of a deviation, but at least there was always one tool to support the justification of a deviation. In fact, the choice of a specific tool will depend on the information available by the aerodrome and the NAA. As mentioned, the case studies exercise was not an audit, so detailed information on existing safety assessment was not asked.

It should be pointed out at this stage that the NAA is taking the decision how to go about deviations in each individual case.

### 6.2.5 General outcome of the analysis

The case studies have shown how the certification process will be flexible in identifying deviations from European rules and providing a mechanism to manage safety during the conversion period. However, this process will require resources to identify and manage deviations and carry out any actions to mitigate any safety risks. The resources will be a function of the scale of any deviations and a proportionate approach will be necessary.

**<u>Summary of the case study exercise</u>**

**Table 9: List of deviations for the case study aerodromes and the possible actions to justify them according the draft ADR rules**

| ***Issue*** | ***Aerodrome*** | ***Deviation in the case of national law?*** | ***Deviation with European law?*** | ***Basis for justification with the European certification process*** | ***Draft EU rules Impact*** |
|---|---|---|---|---|---|
| Cockpit over centerline | Lyon | Yes with a corrective action plan with short and long term measures | Yes | DAAD: for long term measures finishing after the conversion process | None |
| Distance between TXY and RWY | Bergamo | Yes, with mitigation measure | Yes | ELoS, mitigations measures are already in place | None |
| Marking 5-2-16 | Fiumicino | Not currently, yes with a new amendment to introduce a new ICAO requirement | Yes | Should be resolved before the conversion period, if not DAAD. | None, because the update of the Italian regulation will require Fiumicino ADR to be compliant |
| Marking 5-2-16 | Warsaw | Instead of RWY designation marking on RWY-holding position RUNWAY AHEAD marking are used. | Yes | ELoS or DAAD, both implies a safety assessment | Not significant |
| No available RESA 240m | Bergamo | No (90m RESA exists), land being purchased gradually | Yes | DAAD with safety assessment | Not significant |
| No available RESA 240m | Fiumicino | No (90m RESA exists) | Yes | DAAD with safety assessment.. | Not significant |
| No available RESA 240m | Lyon | No, but space available | Yes | DAAD with safety assessment | Not significant |
| No available | Annecy | No and no space available. A study is being carried out for the installation of | Yes | DAAD with safety assessment | None with the study |

| Issue | Aerodrome | Deviation in the case of national law? | Deviation with European law? | Basis for justification with the European certification process | Draft EU rules Impact |
|---|---|---|---|---|---|
| RESA 90m | | REASA at existing aerodromes. | | Or<br><br>Special condition with restriction or mitigations measures for operation | under progress (see left cell) |
| OFZ (ICAO Annex 14 - 4.1) | Warsaw | Different with justifications based on an aeronautical study and mitigation measure | No | Not applicable, ADR meets the CS | None |
| RWY slope | Warsaw | Change of RWY slope to be compliant with regulation | No | RWY slope has been corrected during RWY modernisation works | None |
| Taxiway centerline marking | Warsaw | TWY centre line marking Zulu Blue and Zulu Orange according to ACI recommendation are not according to the yellow colour mandated in ICAO 5.2.1.5 | Yes | ELoS or DAAD | Not significant |
| Width of RWY strip | Karlovy Vary | Yes, no mitigation measure, no safety assessment (agreed by Minister of Transport, before set up of NAA) | Yes | Special Condition with a safety assessment | Not significant |
| Width of taxiway | Lyon | Yes for all TWYs (10 kms), but accepted for the TWYs built before 2003 and safety assessment in case of rerouting of A380 to LYS aerodrome | Yes | DAAD based on cost objections, with a safety assessment to identify the relevant gear span restriction for aerodrome code D-E-F or without restriction if the safety assessment for A380 can be used for this purpose | Not significant |
| Width of taxiway | Praha | Yes, approved on a permanent basis | Yes | DAAD with reference to the plan of bring the TWY up to 23m at the next phase of pavement works | None |

A total of nine aerodromes were in the scope of the case studies. Two aerodromes were without deviations. 14 deviations were found for 7 aerodromes:

- 43 % (3/7) of these aerodromes have one deviation;
- 29 % (2/7) of these aerodromes have two deviations;
- 11 % (1/7) of these aerodromes have three deviations;
- 11 % (1/7) of these aerodromes have four deviations.

As already mentioned in section 6.2.4, there is not always one way to prove the compliance with the draft ADR rules. The fundamental outcome of the case study exercise is that it was always possible to use one of the 'flexibility' tools to justify the compliance with the draft ADR rules, providing that at least a safety assessment was or will be performed.

7 deviations out of the 14 would not require actions or should be easily justified based on the information gathered during the case study exercise. The remaining 7 deviations would require a safety assessment. Based on the information gathered during the case study exercise, these safety assessments are not deemed to be difficult and should require low resources to justify the current deviations.

Based on the case study exercise, the demonstration of compliance used[19]:

- in three cases an alternative way to demonstrate the ELoS;
- in three cases a special condition;
- in nine cases a DAAD.

In one case, the changes in the draft ADR rule versus the original ICAO SARP were sufficient to show that the national deviation would not be a European one. This was due to the introduction of safety assessment in the draft ADR rules for Obstacle Free Zones (whereas this possibility is not included in ICAO Annex 14 — Standard 4.1).

### 6.2.6 Principles to analyse deviations

**Case 1: This deviation is due to the notification of a national difference versus ICAO Annex 14**

1) This difference is considered '<u>Different in character or other mean of compliance</u>'
   - The aerodrome operator wants to continue to use the same requirement as in the past, providing that there were no safety concerns, occurrences, issues raised by stakeholders.
   - Is it allowed with the draft rules?
     - Yes, with ELoS justification based on the fact that a notification of this difference was already done to ICAO and no safety issues arose from it.
   - It is the NAA or the aerodrome operator to make this request?
     - The aerodrome has to provide a safety assessment

2) This difference is considered '<u>Less strict</u>'

[19] This total number of cases is higher than the 14 deviations because there is the possibility to use more than one flexibility tool to justify a deviation. This is the NAA decision to choose one of these tools.

- The aerodrome operator wants to continue to use the same requirement as in the past, providing that there were no safety concerns, occurrences, issues raised by stakeholders
- Is it allowed with the draft rules?
    - MS can justify this with an ELoS because there are no criteria in the law to indicate how to take into account this 'less strict' statement related to ICAO.
    - SC is an alternative depending on the cases.
    - If not yet compliant with CS at the end 2017: DAAD.

3) This difference is considered 'More strict'

- The NAA wants to continue to use the same requirement as in the past to ensure the same level of safety.
- Is it allowed with the draft rules?
    - As the draft ADR rule will in many areas provide a minimum requirement, existing stricter than minimum national requirements are expected to be kept.

**Case 2: The deviation is due to lack of national legislation and this deviation has been accepted by the NAA**

Note: in such cases, the country has not notified a difference to ICAO.

- The aerodrome operator wants to continue to use its existing requirement as in the past to ensure the same level of safety and for financial reasons (compliance costs, negative impact on operations, etc.).
- Is it allowed with the draft rules?
    - Yes, with ELoS. The aerodrome will show the safety assessment supporting its decision to choose its requirement.

**Understanding the DAAD usage**

The DAAD mechanism is to support justifications of deviations which 'have existed prior to the entry into force of this Regulation'. The minimum impact is to provide a safety assessment. The minimum action is a regular monitoring of the deviation. The DAAD is not bound by time and can be in existence for as long as required to remove all existing deviations identified at the time of certification (there is no deadline fixed by the draft ADR rules).

*Note: For more information, see section 4.2.2 'Option 2'.*

**Understanding safety assessment meaning**

A safety assessment, supporting this decision by the NAA, would be proportionate to the wide range of SC applications from basic to highly sophisticated cases, hereby not necessarily involving quantifiable aspects.

A safety assessment process is provided in text and flow charts with GM to the draft ADR rules. It is intended to be applied in different size scales depending on the safety concern in question. The process provides methods to define a safety concern, analyse root causes and identify hazards related to the concern. It provides a method for risk assessment and mitigation measures.

**Once the conversion of national aerodrome certificates is achieved**

Once the national aerodrome certificates have been converted into European ones, ELoS and SC will be used to justify potential deviations which could appear when the aerodrome operator will foresee changes in the aerodrome design and operations. The DAAD will not be used anymore because there will not be any more existing deviations.

### *6.3 Analysis per impact*

#### 6.3.1 Safety impact

The implementation of the draft rules will allow coping with the challenging increase in aerodrome traffic.

**Table 10: Safety impact**

| *Option* | *Safety impacts* | *Outcome* |
|---|---|---|
| Baseline (Option 0) | Increasing traffic create potential safety concerns without further *common requirements* | – |
| Pragmatic approach (Option 1) | **In the short term**, the lack of flexibility can threaten safety either:<br>• by putting priority on works for harmonisation which would increase the safety risks due to a sudden rise of works activities in aerodrome over the conversion period,<br>• or by the length of time to get derogations which could distract the authorities from more urgent safety issues.<br><br>*This is supported by the case study exercise where the current tools in BR 1108/2009 do not allow to provide a certificate in 5 out of 14 deviations.*<br><br>**In the long term**, once the national certificates have been converted, common requirements of aerodrome certification process will allow to cope with safety issues in relation with the constant traffic increase. | neutral |
| Pragmatic approach and additional flexibility (Option 2) | The short term negative impact mentioned for option 1 would not occur with option 2 thanks to the additional flexibility with the DAAD process. A higher number of issues will be dealt quicker and allow to convert the certificates without derogations.<br><br>*This is supported by the case study exercise: where the current tools in BR 1108/2009 do not allow to provide a certificate in 5 out of 14 deviations, these 5 cases can be treated with the DAAD process.*<br><br>As the DAAD involves at least a safety assessment to identify the best safe way to continue operation (which could mean no change in operations if already they are safe).<br><br>The fact that resources will be used in a more efficient way can only benefits for safety. | + |

**Safety and stakeholders responsibilities**

The BR 1108/2009 addresses the need to clarify the different levels of responsibility for aerodrome certification and operations. The draft ADR rules specify now the details of these responsibilities per stakeholder. The various national situations on the contractual relations between stakeholders are an issue when proposing harmonised rules. To answer to this issue:

1) the Implementing Rule ADR.OR.C.005 defines the aerodrome operator responsibilities and requires formal arrangements with organisations which provide services at the aerodrome (see Appendix G, sub-section on ADR.OR.C.005);
2) for specific subjects, IRs specify the general principles and the details set out in AMC or GM. This allows a Member State to propose another approach to comply with the IRs when the AMC or GM is not adequate for its country. (See Appendix G, sub-sections on 'Examples')

The impact of this approach is considered to be beneficial in terms of safety by allocating responsibility to the relevant stakeholders.

### 6.3.2 Environmental impact

*Not applicable*

### 6.3.3 Social impact

No social impacts identified with the current ADR threshold of 10 000 passengers per year.

Social impacts in the case of ADR certification have to consider the benefits provided by small aerodromes to allow the economic development of their regions. With the scope of the BR 1108/2009, Article 4, paragraph 3a, there was no outcome from the draft rules that smaller aerodromes would be subject to closure. A DAAD process can be established up to the end of 2019 with action, if any, that has no time limitation. This ensures that small aerodromes coming above the passenger threshold before the end of 2019 will have the possibility to get a certification while there are existing deviations.

It is the responsibility of the NAAs to use the different ways of flexibility and to plan which aerodromes could benefit from these flexibilities. A quick analysis of the data indicated in Table 19 based on Appendix C shows that a minimum of 25 % of the aerodromes under the European scope are below 10 000 passengers per year, i.e. 151 aerodromes.

**Table 11: Social impact**

| *Option* | *Social impacts* | *Outcome* |
|---|---|---|
| Baseline (Option 0) | No change | neutral |
| Pragmatic approach (Option 1) | In case of deviation which cannot be justified with an ELoS or a Specific Condition, risks of suspension of aerodrome operation in case of request for derogation are heavy threats to smaller aerodrome operators and to a certain extent to larger operators. Impact on economic regional development would in this case have detrimental social effects.<br><br>*This is supported by the case study exercise where the current tools in BR 1108/2009 do not allow to provide a certificate in 5 out of 14 deviations.* | – to neutral |
| Pragmatic approach and additional flexibility (Option 2) | The negative impact mentioned for option 1 would not occur with option 2 thanks to the additional flexibility with the DAAD process. The situation would be identical to Option 0.<br><br>*This is supported by the case study exercise: where the current tools in BR 1108/2009 do not allow to provide a certificate in 5 out of 14 deviations, these 5 cases can be treated with the DAAD process.* | neutral |

### 6.3.4 Economic impact

In the case of option 0, the national process for aerodrome certification would continue as it exists today, so there would be no impact. This statement is valid for all the sub-sections below.

#### 6.3.4.1 ADR compliance costs during the conversion period

<u>Aerodromes above BR traffic threshold:</u>

All will be certified at the date of entry into force of the draft rules; therefore, the issue is to convert the existing national certificate into a European one with a smooth transition. The RIA examples (section 6.2.5), based on concrete cases, prove that a smooth transition is partially ensured with the tools from BR 1108/2009 (option 1). This is supported by the case study exercise where the current tools in BR 1108/2009 do not allow to provide a certificate in 5 out of 14 deviations. In practice it means that either the aerodrome would need to invest on a non-scheduled plan basis to correct the deviation or to send a request for derogation to the European Commission.

A smooth transition is fully ensured with the option 2 thanks to the DAAD. This is supported by the case study exercise: where the current tools in BR 1108/2009 do not allow to provide a certificate in 5 out of 14 deviations, these 5 cases can be treated with the DAAD process. The DAAD process will always involve a safety assessment and possible action.

It is not possible to estimate the avoided costs at aerodrome level per type of deviation justification (ELoS, SC, DAAD, derogation), e.g. an avoided cost of compliance because a safety assessment with potential mitigations would be less expensive than a strict application of a CS. However, an example can be given based on the case study exercise: the deviation from runway slope in Warsaw Chopin Airport was corrected during heavy modernisation runway works. The cost of these works was approximately 10 M€, knowing that the cost of the correction of the runway slope represents major part of it. As indicated in the Appendix I on examples of deviations, 'runway slope deviations would not typically be expected to be solved by substantial rework of the runway. This appears to be a Special Condition candidate (rather than a DAAD one)'.

Aerodromes under BR traffic threshold:

Most of them will not be certified in 2013 and there is no plan to certify them. Changing this threshold will have significant economic costs for both the NAAs and ADR operators. On the NAA side, this will require additional resources at least for countries with a high number of aerodromes. On the ADR operator's side, each of them will have to deal with a significant cost impact, knowing that smaller aerodromes have fewer margins than bigger ones to adjust their budget to extra costs and they are more dependent on regional public subsidies.

**Economics and stakeholders responsibilities**

Following the analysis of the identification of safety responsibilities for the relevant stakeholders in section 6.3.1, the same logic applies to the economic impacts. The structure of the rules IR/AMC/GM allows the aerodromes to continue operations with the type of arrangements available in their country. If the relations between stakeholders change due to the draft ADR rules, there is no proof of adverse impact: therefore, the impact of the draft ADR rules is considered neutral on this aspect.

See the related information provided in section 6.3.1.

#### 6.3.4.2 Administrative burden

The administrative burden was already analysed in details in the 'RIA Opinion 3-2007' and summarised in the EC Impact Assessment 2007. The approval of BR 1108/2009 by the MS implies that these administrative costs with the introduction of new rules are accepted and will be balanced over time by a more efficient overall system. The case study exercise did not indicate an additional impact compared to what was foreseen in the RIA Opinion 3-2007 and the EC Impact Assessment 2007.

By ensuring certification flexibility with the draft ADR rules, the foreseen administrative costs from the previous studies are deemed to be equivalent: time and money are efficiently used during the conversion period and national rulemaking will disappear for the aerodromes under BR 1008/2009 with the implementation of the draft ADR rules.

The option 2 provides better efficiency than option 1 by avoiding the use of derogations.

#### 6.3.4.3 Timeframe for transition

The conversion period of 4 years after entering into force of the draft ADR rules was developed in cooperation with the ADR High Level Group. The draft ADR rules shall be adopted before the 31 December 2013. MS would have faced serious difficulties with shorter deadlines to meet a smooth transition from a national to European aerodrome certificate.

The DAAD mechanism may be used for new applications for certificate up to 31 December 2019, with the lifespan of the individual DAAD solution being decided by the competent authority.

This time window of about 10 years after the entry into force of the Basic Regulation was found to be adequate to let aerodromes, which would enter into the scope of application of the EU requirements only after the entry into force of the future ADR rules, also appropriately benefit from the DAAD mechanism.

It shall be noted, however, that the actual date does not involve a significant impact as only few cases of such aerodromes in need of a DAAD application can be envisaged: see Appendix H.

#### 6.3.4.4 Level playing field for the European aerodrome sector

With the introduction of a harmonised European process for the aerodrome certification, the European Union ensures that all NAAs, aerodromes operators and other stakeholders and third parties will face the same requirements when it comes to ensuring aviation safety with the future increase of traffic.

This should strengthen the competitiveness of the European aerodrome operators by ensuring an efficient approach to safety and an appropriate application of ICAO SARPs. Knowing that an aerodrome operator may manage more than one aerodrome, the implementation of the draft ADR rules should reinforce the credibility for European aerodrome operators willing to manage aerodromes outside Europe.

#### 6.3.4.5 Conclusion for economic impact

Various types of economic impacts have been considered here above. They are summarised in the following table.

**Table 12: Economic impact**

| *Option* | *Economic impacts — Compliance costs* | *Outcome* |
|---|---|---|
| Baseline (Option 0) | No change | neutral |
| Pragmatic approach (Option 1) | In the short term, there is a burden to send an aerodrome derogation request for existing deviations. To avoid derogations, investment should be carried out with a detrimental impact on aerodrome resources and future development. This would be certainly more difficult to handle for smaller aerodromes than larger aerodromes due to lower resources.<br>Once the conversion is done, full benefits are: efficient use of rulemaking activity at EASA level and aerodrome certification activity at NAA level. | – to + |
| Pragmatic approach and additional flexibility (Option 2) | The flexibility added by the DAAD is an improvement compared to the burden in option 1.<br>Once the conversion id done, there are full benefits. | + |

### 6.3.5 Proportionality issues

Technical common requirements

ICAO Annex 14 SARPs addressed already the proportionalities issues by breaking down the aerodromes into different categories. The draft rules follow the same logic.

The ICAO SARPs on Safety Management Systems (SMS) required close attention to allow for necessary proportionality for different sizes and complexity of aerodrome operations, mainly due to the fact that the BR threshold for aerodrome certification requires SMS also for smaller aerodromes which before were not in all cases subject to SMS requirements with their national legislation.

The case studies showed that France and Italy have national rules to distinguish SMS requirements according to the size of the aerodrome operators:

- There are no specific SMS requirements for aerodrome below 5 000 annual commercial movements in Italy.

- France considers different SMS requirements for aerodrome below 10 000 annual commercial movements over one of the last 3 years[20].

Therefore, with the feedback from countries having experienced the certification of smaller aerodromes, the draft ARD rules on SMS were adjusted to fit for this category:

*SMS requirements in the draft ADR rules*

***ADR.OR. D.005 Management** (e) The management system shall be proportionate to the size of the organisation and its activities, taking into account the hazards and associated risks inherent in these activities.*

*Note:*

- *For Italy, the threshold of 10 000 annual commercial passengers for aerodrome certification exemption (BR 1108/2009, Article A4.3b) is below the current threshold of 5 000 annual commercial movements. This implies that several small aerodromes are now subject to the draft ADR rules: this is an impact of the BR 1108/2009, not the draft ADR rules. The draft ADR rules in fact soften the potential impacts as indicated in ADR.OR.005.*

<u>Certification process</u>

With option 1, when derogations are necessary, small aerodromes may either find it more difficult to follow the adoption process or get their NAAs to apply for derogations in the first place.

The option 2 with the introduction of the DAAD promotes a higher proportionality than the option 1 because smaller aerodromes can benefits from the flexibility of this tool (without decreasing the level of safety as already explained).

[20] GUIDE RELATIF A LA MISE EN OEUVRE D'UN SYSTEME DE GESTION DE LA SECURITE PAR LES EXPLOITANTS D'AERODROME, révision 4, 17/06/2011.

**Table 13: Impact for proportionality issues**

| *Option* | *Impact with proportionality issues* | *Outcome* |
|---|---|---|
| Baseline (Option 0) | No change | neutral |
| Pragmatic approach (Option 1) | Technical common requirements<br>ICAO breakdown according to different types of aerodrome has been reproduced in the draft ADR rules.<br>SMS requirements have been tailored to the size of aerodrome operators.<br>Certification process<br>When derogations are necessary, small aerodromes may either find it more difficult to follow the adoption process or get their NAAs to apply for derogations in the first place. | +<br>–  |
| Pragmatic approach and additional flexibility (Option 2) | Technical common requirements<br>Identical to option 1<br>Certification process<br>Introduction of the DAAD mechanism promotes higher proportionality than the option 1 because smaller aerodromes can benefits of the flexibility of this tool | + |

### 6.3.6 Impact on regulatory coordination and harmonisation

The draft ADR rules being created by this NPA to support the common requirements of the certification process of European aerodromes provide the framework that should also help European Member States to show compliance with ICAO Standards and Recommended Practices (SARPs) in a more consistent and systematic manner (see section 6.1). The flexibility provisions should allow a common approach that is both transparent and proportionate. The Agency's role is to coordinate the development of this regulatory framework and the flexibility provisions in a harmonious manner at Member State level.

Once the ADR rules are adopted (by the latest on 31 December 2013), they will replace the national regulations for the aerodromes under BR 1108/2009 Article 4.3. This should ease the burden on those Member States who filed differences to ICAO Annex14. The Agency will notify ICAO of any differences between ICAO Annex 14 and the European ADR rules and will make this available to all Member States.

However, Member States will have to file differences for aerodromes they decided to exempt from the application of the BR 1108/2009 (Article 4.3b).

The new arrangements will also enable Europe to more effectively coordinate the development of new SARPs through ICAO and to promote a more pragmatic approach.

**Comparison ICAO Annex 14 — draft ADR rules**
See section 6.1

Overall, the changes per option are summarised in the following table.

**Table 14: Impact on regulatory harmonisation and coordination**

| *Option* | *Impact on regulatory harmonisation: ICAO Annex 14* | *Outcome* |
|---|---|---|
| Baseline (Option 0) | No change, divergence will remain. | neutral |
| Pragmatic approach (Option 1) | **Technical common requirements and relation with ICAO**<br>*General*<br>ICAO Annex 14 was the main input for the rules on design and aerodrome operations. Even if the ICAO SARPs have been reviewed to be accommodated within EU legislation, the requirements are in most of the cases identical. The only major change is the designation of responsibilities for stakeholders.<br><br>*Future European inputs into ICAO Annex 14*<br>The new arrangements will enable Europe to more effectively coordinate the development of international SARPs through ICAO and to promote a more pragmatic approach.<br>If an ICAO Annex 14 amendment would not be supported by the Agency (after gathering the position of the EU Member States), the Agency would, on behalf of its Member States, notify ICAO of any differences to Annex 14.<br><br>*Impact of the future ICAO Annex 14 amendments on national regulations*<br>Except for the very few cases of countries that will have to maintain national regulations for the exempted aerodromes under BR 1108/2009 Article 4.3.b, those Member States who currently notified differences will not have to handle these differences anymore.<br>**Certification process common requirements**<br>The comparison with ICAO Annex 14 is not really applicable as this field was not very detailed in ICAO or other international sources.<br>The development of the draft ADR rules is a key step towards a smooth harmonisation of the aerodrome certification process of 31 European countries. | + |
| Pragmatic approach and additional flexibility (Option 2) | Identical to Option 1 | + |

# 7 Conclusion and preferred option

## *7.1 Comparison of options and preferred option*

The overview provided in the following page indicates that the option combining a pragmatic approach with additional flexibility (i.e. option 2) provides a higher support to answer to the objectives defined in section 3.

**Table 15: Overview of the options per type of impacts**

| ***Baseline (option 0)*** | | ***Pragmatic approach (option 1)*** | | ***Practical approach and additional flexibility (option 2)*** | |
|---|---|---|---|---|---|
| Safety | | | | | |
| **–** | Increasing traffic creates potential safety concerns without harmonisation | **0** | After the conversion period, harmonisation of an aerodrome certification process will allow a safe traffic increase.<br>During the conversion period, safety issues could arise either:<br>• due to a priority given to compliance works in aerodromes instead of other developments with safety related aspects;<br>• or due to the priority given by authorities to derogation justification which could distract the authorities from more urgent safety issues. | **+** | After the conversion period: identical to option 1.<br>During the conversion period, a higher number of deviations will be dealt quicker by means of the DAAD process and allow the conversion of certificates without derogations. The level of safety will benefit from an efficient use of resources.<br>Note: The safety assessment required by the DAAD will identify the best safe way to continue operation. |
| Social | | | | | |
| **0** | No change | **– to 0** | In case of derogation request, the risks of suspension of aerodrome operation would threaten the economic viability of aerodrome operators (and more particularly smaller ones). This would have potential detrimental impacts on regional development. | **0** | The negative impact mentioned for option 1 would not occur with option 2 thanks to the additional flexibility with the DAAD process. |
| Economic impacts (summary) | | | | | |
| **0** | No change | **– to +** | Derogation request would threaten aerodrome economic viability (airlines operations might be reconsidered, cost resources attached to derogations, etc.). To avoid this, investment could be carried out with a detrimental impact on aerodrome resources and development.<br>After the conversion period, full benefits are: efficient use of rulemaking resources. | **+** | The flexibility added by the DAAD is an improvement compared to the burden in option 1.<br>Once the conversion is done, full benefits are: efficient use of rulemaking activity at EASA level and aerodrome certification activity at NAA level. |
| Proportionality issues | | | | | |
| **0** | No change | **– to +** | Certification process would be more difficult for smaller aerodromes when derogations are necessary.<br>ICAO breakdown according to different types of aerodromes is kept. SMS requirements were tailored to the size of aerodrome operators. | **+** | Technical common requirements: identical to Option 1<br>Certification process: smaller aerodromes can benefits from the DAAD |
| Regulatory coordination and harmonisation | | | | | |
| **–** | Diversity of the national rules remains | **+** | A key step towards smooth aerodrome certification harmonisation of 31 European countries with requirements almost identical to ICAO Annex 14.<br>Europe will more effectively coordinate the development of ICAO SARPs. | **+** | Identical to Option 1 |

### 7.2 Draft ADR rules … What next?

Developing rules is one activity, making sure that they are correctly applied is another one. In the case of the draft ADR rules, the wide scope of these rules and their flexibility could be factors leading to misunderstanding unless training is provided and monitoring supports the identification of raising concerns.

**Training**

The Agency should develop training for NAAs and aerodromes. This training should explain the structure of the ADR rules and the way to apply them. The objective would be for the trainee to understand the process of converting a national aerodrome certificate into a European one.

**Monitoring**

Monitoring will support the Agency's reaction in case of similar certification issues occurring in different aerodromes.

Key aspects to follow the flexibility

- A number of deviations and the corresponding types of justification (ELoS, SC, DAAD, AltMoC), with an analysis of the correct application of ELoS, SC, etc.
- A number of deviations which are difficult to solve and relation with the corresponding CS, AMC, GM, etc.

Performance indicators:

- Indicators to measure the Agency's activity on clarification of rules implementation (e.g. number of emails).
- Effective period for conversion of the national certificate per aerodrome.

## Appendix A: Acronyms and definitions

ADR: Aerodrome

AMC: Acceptable Mean of Compliance

AltMoC: Alternative Means of Compliance

ATM/ANS: Air Traffic Management/Air Navigation Services

BR: Basic Regulation (EC) No 216/2008 as last amended by Regulation (EC) No 1108/2009

CS: Certification Specification

DAAD: Deviation Acceptance & Action Document, draft Regulation on requirements and administrative procedures related to aerodromes, Article 8 'Existing deviations from Certification Specifications'

ELoS: Equivalent Level of Safety

ER: Essential Requirement

GASR: Group of Aerodrome Safety Regulators

GM: Guidance Material

ICAO: International Civil Aviation Organisation

IR: Implementing Rule

MS: Member State

NAA: National Aviation Authority

NPA: Notice of Proposed Amendment

OFZ: Obstacle Free Zone

OLS: Obstacle Limitation Surface

PCN: Pavement Classification Number

REC: Recommended Practice (from ICAO)

RESA: Runway End Safety Area

RWY: Runway

SARP: Standard and Recommended Practices (from ICAO)

SC: Special Condition

SMS: Safety Management System

ST: Standard from ICAO

TWY: Taxiway

## Appendix B: References


- EASA RIA Opinion 03/2007 Attachment 2 'Regulatory impact assessment on the extension of the scope of the EASA Basic Regulation to the safety and interoperability of aerodromes'.
- Commission Staff Working Document, Impact Assessment of extending the EASA system to the regulation of aerodromes, Air Traffic Management and Air Navigation Services (ATM/ANS), Brussels, 24.4.2008, COM(2008)
- TÜV & Airsight Study on 'ICAO Annex 14 implementation in the EU MS', 2009.
- Terms of Reference for ADR tasks (18 June 2010).

## Appendix C: General data

A questionnaire on general data in the field of aerodrome certification was sent to the 31 EASA Member States on March 2011 (EU-27 + Iceland + Liechtenstein + Norway + Switzerland).
27 countries answered to all the questions, Liechtenstein has no aerodrome under the BR scope.
There were 3 partial answers: Austria, Germany and Hungary did not send the differences notified to ICAO Annex 14.
There were 2 missing answers: Denmark and Greece.

1. *General overview on ICAO implementation, management of deviations, NAA staffing and aerodrome currently certified.*

**Table 16: Overview at country level on ICAO implementation, management of aerodrome deviations, NAA staffing and aerodrome certified (year 2011)**

| ***Member State*** | ***Did the MS notify differences with ICAO Annex 14?*** | ***Does the MS have a list of deviations between national rules and airports?*** | ***NAA staff (based on FTE)*** | | ***Number of ADR under Basic Regulation scope*** | |
|---|---|---|---|---|---|---|
| | | | ***Total staff*** | ***Staff for airport safety matters*** | ***Total*** | ***Certified*** |
| Austria | Yes [1] | In progress | | | 6 | 6 |
| Belgium | No | Yes | 179 | 4 | 6 | 6 |
| Bulgaria | No | No | 98 | 7 | 5 | 5 |
| Cyprus | No | No | 6 | 4 | 2 | 0 |
| Czech Republic | Yes | Yes | 7 | 7 | 5 | 5 |
| Denmark | no answer | | | | | |
| Estonia | Yes | Yes | 28 | 2 | 5 | 5 |
| Finland | Yes | Yes | 117 | 4 | 27 | 27 |
| France | Yes | No | 660 | 120 | 159 | 32 |
| Germany | Yes [1] | | | | 35 | 35 |
| Greece | no answer | | | | | |
| Hungary | No answer | No | 105 | 5 | 5 | 5 |
| Iceland | No | No | 42 | 2 | 4 | 4 |
| Ireland | No | No | 2,5 | 2 | 10 | 10 |
| Italy | Yes | Yes | 1006 | 174 | 51 | 45 |
| Latvia | No | No | 55 | 2 | 3 [3] | 3 |
| Liechtenstein | not applicable | | | | | |
| Lithuania | Yes | No | 58 | 4 | 4 | 4 |
| Luxembourg | No | No | 3 | 3 | 1 | 0 |
| Malta | Yes | No | 2 | 2 | 1 | 1 |
| Netherlands | Yes | Yes | 175 | 16 | 5 | 5 |
| Norway | Yes | Yes for temporary deviations<br>No for permanent deviations [2] | 170 | 8 | 47 [4] | 47 |
| Poland | Yes | Yes | 352 | 22 | 10 | 10 |
| Portugal | No | No | 195 | 5 | 34 | 34 |
| Romania | No | Yes | 204 | 18 | 16 | 16 |

| *Member State* | *Did the MS notify differences with ICAO Annex 14?* | *Does the MS have a list of deviations between national rules and airports?* | *NAA staff (based on FTE)* | | *Number of ADR under Basic Regulation scope* | |
|---|---|---|---|---|---|---|
| | | | *Total staff* | *Staff for airport safety matters* | *Total* | *Certified* |
| Slovakia | No | Yes | 89 | 4 | 6 | 5 |
| Slovenia | Yes | No | 47 | 4 | 3 | 0 |
| Spain | Yes | Yes | 633 | 33 | 41 | 1 |
| Sweden | No | Yes | 220 | 9 | 51 | 51 |
| Switzerland | Yes | No | 281 | 10 | 5 | 4 |
| United Kingdom | Yes | Yes | 800 | 34 | 52 | 52 |

[1)] *The list of differences with ICAO was not sent to EASA.*
[2)] *Indicated in Aerodrome Certificate and AIP.*
[3)] *One potential aerodrome to be considered in the future.*
[4)] *Not included: 5 certified military aerodromes with commercial passenger traffic.*

2. <u>*Overview on aerodrome certification status at European level*</u>

**Table 17: Status of aerodrome certification in 2011**

| **Certification status** | **Aerodromes according to the Basic Regulation threshold (*absolute* numbers)** | | | | |
|---|---|---|---|---|---|
| | Above BR threshold | Below BR threshold | Out of scope | Unknown | Grand total |
| In progress | 26 | 2 | 0 | 0 | 28 |
| Not scheduled | 4 | 71 | 0 | 1 | 74 |
| Scheduled | 70 | 4 | 0 | 0 | 74 |
| Certified | 344 | 77 | 5 | 1 | 427 |
| **Grand total** | **444** | **154** | **5** | **2** | **605** |

**Table 18: Status of aerodrome certification in 2011**

| | **Aerodromes according to the Basic Regulation threshold (percentage shares)** | | | | |
|---|---|---|---|---|---|
| Certification status | Above BR threshold | Below BR threshold | Out of scope | Unknown | Grand total |
| In progress | 6 % | 1 % | 0 % | 0 % | 5 % |
| Not scheduled | 1 % | 46 % | 0 % | 50 % | 12 % |
| Scheduled | 16 % | 3 % | 0 % | 0 % | 12 % |
| Certified | 77 % | 50 % | 100 % | 50 % | 71 % |
| **Grand total** | **100 %** | **100 %** | **100 %** | **100 %** | **100 %** |

3. List of aerodromes per country under the BR scope (indicative)

**Table 19: Overview of aerodromes per country under the scope of BR 1108/2009 (year 2011)**

| Country | Above BR threshold | Below BR threshold | Threshold to be confirmed | Out of scope (military ADR) | Grand total |
|---|---|---|---|---|---|
| France | 87 | 72 | | | 159 |
| Norway | 43 | 4 | | 5 | 52 |
| UK | 41 | 11 | | | 52 |
| Italy | 39 | 12 | | | 51 |
| Sweden | 35 | 16 | | | 51 |
| Spain | 39 | 2 | | | 41 |
| Germany | 35 | | | | 35 |
| Portugal | 13 | 21 | | | 34 |
| Finland | 21 | 6 | | | 27 |
| Romania | 14 | 2 | | | 16 |
| Ireland | 9 | | 1 | | 10 |
| Poland | 10 | | | | 10 |
| Austria | 6 | | | | 6 |
| Belgium | 6 | | | | 6 |
| Slovakia | 3 | 3 | | | 6 |
| Bulgaria | 4 | 1 | | | 5 |
| Czech Republic | 5 | | | | 5 |
| Estonia | 5 | | | | 5 |
| Hungary | 4 | 1 | | | 5 |
| Netherlands | 4 | 1 | | | 5 |
| Switzerland | 5 | | | | 5 |
| Iceland | 4 | | | | 4 |
| Latvia | 2 | 1 | 1 | | 4 |
| Lithuania | 3 | 1 | | | 4 |
| Slovenia | 3 | | | | 3 |
| Cyprus | 2 | | | | 2 |
| Luxembourg | 1 | | | | 1 |
| Malta | 1 | | | | 1 |
| | | | | | |
| Grand total | 429 | 151 | 20 | 5 | 605 |

*Note: The order of the rows follows the Figure 2.*

## 4. List of individual aerodromes

**Table 20: Aerodromes under BR 1108/2009: traffic for year 2011 and status of the certification in 2011**

| Country | ICAO code | Aerodrome | Number of passengers carried | Volume of freight[21] (tonnes) | Total commercial movements | Cargo move-ments | Certified aerodrome |
|---|---|---|---|---|---|---|---|
| Austria | LOWW | Wien Schwecht, Vienna Int. Airport | 19 691 206 | 219 334 | 246 146 | 6 253 | Yes |
| Austria | LOWS | Salzburg Airport — W.A. Mozart | 1 625 842 | 154 | 20 159 | 8 | Yes |
| Austria | LOWI | Innsbruck Airport | 1 033 512 | 384 | 21 135 | 0 | Yes |
| Austria | LOWG | Flughafen Graz | 996 382 | 191 | 17 387 | 10 | Yes |
| Austria | LOWL | Blue Danube Airport Linz | 698 672 | 6 571 | 13 689 | 972 | Yes |
| Austria | LOWK | Kärnten Airrport | 425 933 | 13 | 7 482 | 0 | Yes |
| Belgium | EBBR | Brussels Airport | 17 180 606 | 476 135 | 225 682 | ... | Yes |
| Belgium | EBCI | Brussels South — Charleroi Airport | 5 194 841 | 0 | 80 007 | 0 | Yes |
| Belgium | EBLG | Liège Airport | 300 032 | 639 669 | 48 505 | ... | Yes |
| Belgium | EBOS | Ostend Airport | 213 368 | 64 041 | 37 875 | ... | Yes |
| Belgium | EBAW | Antwerp Airport | 162 840 | 4 213 | 51 703 | ... | Yes |
| Belgium | EBKT | Kortrijk Airport | 65 897 | 2 | 32 020 | ... | Yes |
| Bulgaria | LBSF | SOFIA INT AIRPORT | 3 287 529 | 14 503 | 46 761 | 3 077 | Yes |
| Bulgaria | LBPV | PLOVDIV INT AIRPORT | 26 784 | 447 | 5 232 | 49 | Yes |
| Bulgaria | LBGO | GORNA ORIAHOVITSA INT AIRPORT | 1 148 | 18 | 902 | 3 | Yes |
| Bulgaria | LBBG | BOURGAS INT AIRPORT | 1 874 563 | 5 654 | 15 775 | 441 | Yes |
| Bulgaria | LBWN | VARNA INT AIRPORT | 1 198 956 | 78 | 12 577 | 378 | Yes |
| Cyprus | LCLK | Larnaka | 5 475 905 | 37 454 | 49 022 | ... | In progress |
| Cyprus | LCPH | Pafos | 1 646 937 | 407 | 12 802 | ... | In progress |
| Czech Republic | LKPR | Ruzyne Airport — Prague | 11 556 858 | 52 672 468 | 156 052 | 2 186 | Yes |
| Czech Republic | LKTB | Airport Brno — Turany | 357 671 | 5 342 000 | 25 027 | 563 | Yes |
| Czech Republic | LKMT | Mosnov Airport — Ostrava | 244 214 | 1 925 000 | 13 549 | 2 107 | Yes |
| Czech Republic | LKKV | Airport Karlovy Vary | 68 533 | 0 | 6 612 | 0 | Yes |
| Czech Republic | LKPD | Airport Pardubice | 61 485 | 238 859 | 1 235 | 22 | Yes |
| Estonia | EETN | Lennart Meri Tallinn | 1 384 831 | 11 960 | 33 587 | 1 674 | Yes |
| Estonia | EETU | Tartu | 23 504 | 0 | 4 809 | 0 | Yes |
| Estonia | EEKE | Kuressaare | 19 702 | 18 | 2 036 | 29 | Yes |
| Estonia | EEKA | Kärdla | 10 551 | 0 | 1 352 | 0 | Yes |
| Estonia | EEPU | Pärnu | 5 148 | 75 | 1 716 | 45 | Yes |
| Finland | EFHK | Helsinki-Vantaa | 12 884 500 | 158 149 | *88 480* | ... | Yes |
| Finland | EFOU | Oulu | 700 576 | 1 922 | *11 236* | ... | Yes |
| Finland | EFTP | Tampere-Pirkkala | 617 713 | 669 | *18 965* | ... | Yes |

[21] Freight and mail loaded/unloaded.

| *Country* | *ICAO code* | *Aerodrome* | *Number of passengers carried* | *Volume of freight[21] (tonnes)* | *Total commercial movements* | *Cargo move-ments* | *Certified aerodrome* |
|---|---|---|---|---|---|---|---|
| Finland | EFTU | Turku | 357 259 | 7 061 | *14 455* | … | Yes |
| Finland | EFRO | Rovaniemi | 309 821 | 174 | *10 780* | … | Yes |
| Finland | EFVA | Vaasa | 288 142 | 26 | *5 884* | … | Yes |
| Finland | EFKU | Kuopio | 253 612 | 39 | *10 941* | … | Yes |
| Finland | EFKT | Kittilä | 214 493 | 12 | *1 233* | … | Yes |
| Finland | EFJO | Joensuu | 118 761 | 46 | *3 185* | … | Yes |
| Finland | EFIV | Ivalo | 111 940 | 22 | *853* | … | Yes |
| Finland | EFKE | Kemi-Tornio | 96 562 | 27 | *2 481* | … | Yes |
| Finland | EFJY | Jyväskylä | 88 608 | 26 | *14 812* | … | Yes |
| Finland | EFKS | Kuusamo | 82 497 | 3 | *746* | … | Yes |
| Finland | EFKK | Kokkola-Pietarsari / Kruunupyy | 80 181 | 27 | *3 388* | … | Yes |
| Finland | EFKI | Kajaani | 66 013 | 60 | *978* | … | Yes |
| Finland | EFLP | Lappeenranta | 61 100 | 1 | *1 830* | … | Yes |
| Finland | EFMA | Mariehamn | 48 672 | 339 | *3 053* | … | Yes |
| Finland | EFPO | Pori | 43 185 | 14 | *15 587* | … | Yes |
| Finland | EFSI | Seinäjoki | 33 920 | 13 | *1 497* | … | Yes |
| Finland | EFET | Enontekiö | 16 023 | 0 | *140* | 0 | Yes |
| Finland | EFSA | Savonlinna | 15 899 | 8 | *840* | … | Yes |
| Finland | EFVR | Varkaus | 8 057 | 3 | *627* | … | Yes |
| Finland | EFMI | Mikkeli | 1 214 | 0 | *1 395* | 0 | Yes |
| Finland | EFKA | Kauhava | 155 | 0 | *5 900* | 0 | Yes |
| Finland | EFHF | Helsinki-Malmi | 50 | 0 | *41 570* | 0 | Yes |
| Finland | EFHA | Halli | 15 | 0 | *1 951* | 0 | Yes |
| Finland | EFUT | Utti | 14 | 0 | *2 868* | 0 | Yes |
| France | NLWF | FUTUNA * | … | … | … | | Scheduled |
| France | SOOA | MARIPASOULA * | … | … | … | | Scheduled |
| France | LFBG | PARIS LE BOURGET | … | … | 58 072 | | Scheduled |
| France | LFPG | PARIS CHARLES DE GAULLE | 58 075 239 | 2 399 067 | 491 900 | | Yes |
| France | LFPO | PARIS ORLY | 25 198 862 | 102 619 | 215 645 | | Yes |
| France | LFMN | NICE COTE D'AZUR | 9 587 928 | 17 896 | 146 671 | | Yes |
| France | LFLL | LYON SAINT-EXUPERY | 7 801 849 | 37 207 | 116 121 | | Yes |
| France | LFML | MARSEILLE PROVENCE | 7 337 897 | 59 762 | 97 317 | | Yes |
| France | LFBO | TOULOUSE BLAGNAC | 6 324 817 | 52 605 | 79 848 | | Yes |
| France | LFSB | BALE MULHOUSE | 4 091 667 | 43 772 | 60 451 | | Yes |
| France | LFBD | BORDEAUX MERIGNAC | 3 612 327 | 11 410 | 46 607 | | Yes |
| France | LFRS | NANTES ATLANTIQUE | 2 954 936 | 8 343 | 39 833 | | Yes |
| France | LFOB | BEAUVAIS TILLE | 2 929 568 | 0 | 20 528 | | Yes |
| France | FMEE | SAINT-DENIS GILLOT | 1 910 937 | 34 979 | 14 258 | | Yes |
| France | TFFR | POINTE-A-PITRE LE RAIZET | 1 836 375 | 14 307 | 26 145 | | Yes |
| France | TFFF | MARTINIQUE AIMÉ CÉSAIRE | 1 556 733 | 13 707 | 20 692 | | Yes |
| France | NTAA | TAHITI FAA'A * | 1 180 835 | 12 887 | 25 961 | | Yes |
| France | LFMT | MONTPELLIER MEDITERRANEE | 1 177 860 | 7 044 | 13 785 | | Yes |

| Country | ICAO code | Aerodrome | Number of passengers carried | Volume of freight[21] (tonnes) | Total commercial movements | Cargo move-ments | Certified aerodrome |
|---|---|---|---|---|---|---|---|
| France | LFQQ | LILLE LESQUIN | 1 149 189 | 539 | 17 104 | | Yes |
| France | LFKJ | AJACCIO-CAMPO-DELL'ORO | 1 110 067 | 5 909 | 12 781 | | Yes |
| France | LFST | STRASBOURG ENTZHEIM | 1 034 367 | 3 108 | 25 283 | | Yes |
| France | LFKB | BASTIA PORETTA | 1 006 525 | 6 976 | 13 037 | | Yes |
| France | LFBZ | BIARRITZ BAYONNE ANGLET | 989 152 | — | 8 918 | | Yes |
| France | LFRB | BREST GUIPAVAS | 890 432 | 1 251 | 13 572 | | Yes |
| France | LFBP | PAU PYRENEES | 672 289 | 1 816 | 9 425 | | Yes |
| France | NWWW | NOUMEA LA TONTOUTA * | 479 122 | 7 277 | 3 797 | | Yes |
| France | LFBT | TARBES LOURDES PYRENEES | 436 379 | — | 5 740 | | Yes |
| France | LFKF | FIGARI SUD CORSE | 435 809 | — | 7 253 | | Yes |
| France | SOCA | CAYENNE ROCHAMBEAU | 419 841 | 5 492 | 9 645 | | Yes |
| France | LFRN | RENNES SAINT-JACQUES | 408 248 | 10 857 | 12 952 | | Yes |
| France | LFMK | CARCASSONNE SALVAZA | 392 940 | — | 2 676 | | Yes |
| France | NWWM | NOUMEA MAGENTA * | 367 096 | 1 382 | 18 968 | | In Progress |
| France | LFLC | CLERMONT-FERRAND AUVERGNE | 366 107 | 2 535 | 12 669 | | Yes |
| France | LFMP | PERPIGNAN RIVESALTES | 363 205 | — | 3 664 | | Yes |
| France | LFLS | GRENOBLE SAINT GEOIRS | 350 000 | — | 3 266 | | Yes |
| France | LFBL | LIMOGES BELLEGARDE | 336 297 | 511 | 6 500 | | Yes |
| France | FMCZ | DZAOUDZI PAMANDZI | 279 932 | 2 130 | 5 928 | | In Progress |
| France | LFKC | CALVI SAINTE-CATHERINE | 273 564 | 4 | 4 803 | | In Progress |
| France | LFBE | BERGERAC ROUMANIERE | 259 723 | — | 3 375 | | In Progress |
| France | LFJL | METZ NANCY LORRAINE | 237 488 | 69 | 5 650 | | Scheduled |
| France | LFLB | CHAMBERY/AIX LES BAINS | 231 592 | — | 3 579 | | In Progress |
| France | NTTB | BORA BORA * | 222 541 | 343 | 6 064 | | In Progress |
| France | TFFG | ST MARTIN GRAND CASE | 202 077 | 331 | 4 188 | | Scheduled |
| France | LFBH | LA ROCHELLE | 191 429 | | 2 925 | | In Progress |
| France | LFTW | NIMES/ARLES CAMARGUE | 179 933 | 12 | 1 431 | | Scheduled |
| France | NTTR | RAIATEA * | 162 664 | 344 | 5 414 | | In Progress |
| France | NWWL | LIFOU (ILES LOYAUTE) * | 142 047 | 515 | 3 616 | | In Progress |
| France | TFFJ | ST BARTHELEMY | 139 066 | 242 | 27 051 | | In Progress |
| France | LFCR | RODEZ MARCILLAC | 138 311 | | 3 866 | | In Progress |
| France | LFMU | BEZIERS VIAS | 130 374 | | 1 109 | | Scheduled |
| France | LFRD | DINARD-PLEURTUIT-ST-MALO | 122 254 | 10 | 2 407 | | In Progress |
| France | FMEP | SAINT-PIERRE PIERREFONDS | 119 477 | 42 | 2 634 | | In Progress |
| France | NTTM | MOOREA * | 110 590 | 34 | 9 249 | | In Progress |

| Country | ICAO code | Aerodrome | Number of passengers carried | Volume of freight[21] (tonnes) | Total commercial movements | Cargo move-ments | Certified aerodrome |
|---|---|---|---|---|---|---|---|
| France | LFRG | DEAUVILLE ST GATIEN | 106 012 | 24 | 2 162 | | Scheduled |
| France | LFRQ | QUIMPER PLUGUFFAN | 105 767 | | 2 394 | | In Progress |
| France | LFBI | POITIERS BIARD | 98 079 | | 2 822 | | Scheduled |
| France | NTTH | HUAHINE * | 88 764 | 165 | 4 169 | | Scheduled |
| France | NWWE | ILE DES PINS * | 78 998 | 224 | 2 211 | | Scheduled |
| France | LFRK | CAEN CARPIQUET | 76 702 | 52 | 2 882 | | Scheduled |
| France | NWWV | OUVEA (ILES LOYAUTE) * | 70 147 | 293 | 1 904 | | Scheduled |
| France | LFMH | ST ETIENNE BOUTHEON | 70 125 | | 9 510 | | Scheduled |
| France | NWWR | MARE (ILES LOYAUTE) * | 69 586 | 311 | 1 932 | | Scheduled |
| France | NTTG | RANGIROA * | 54 536 | 220 | 2 944 | | Scheduled |
| France | LFLP | ANNECY MEYTHET | 51 644 | | 3 061 | | Scheduled |
| France | NLWW | WALLIS HIHIFO * | 41 848 | 290 | 1 745 | | Scheduled |
| France | LFOH | LE HAVRE OCTEVILLE | 41 606 | 0 | 1 792 | | Scheduled |
| France | NTMD | NUKU HIVA * | 40 433 | 170 | 2 235 | | Scheduled |
| France | LFMV | AVIGNON CAUMONT | 39 379 | | 8 174 | | Scheduled |
| France | LFCK | CASTRES MAZAMET | 35 428 | | 2 329 | | Scheduled |
| France | LFBV | BRIVE-SOUILLAC | 35 243 | | 1 538 | | Scheduled |
| France | LFRO | LANNION | 32 884 | | 1 435 | | Scheduled |
| France | LFBA | AGEN LA GARENNE | 31 092 | | 1 443 | | Scheduled |
| France | LFVP | SAINT-PIERRE POINTE BLANCHE ** | 29 945 | 195 | 2 018 | | Scheduled |
| France | NTGC | TIKEHAU * | 24 531 | 125 | 1 122 | | Scheduled |
| France | NTGF | FAKARAVA * | 22 453 | 93 | 1 067 | | Scheduled |
| France | NTMN | HIVA OA ATUANA * | 22 192 | 83 | 1 428 | | Scheduled |
| France | LFLW | AURILLAC TRONQUIERES | 21 891 | | 954 | | Scheduled |
| France | LFOK | PARIS-VATRY | 21 000 | 7 887 | 981 | | Scheduled |
| France | NTTP | MAUPITI * | 17 823 | 70 | 693 | | Scheduled |
| France | LFMD | CANNES MANDELIEU | 17 078 | | 6 864 | | Scheduled |
| France | NTAR | RURUTU * | 16 553 | 116 | 709 | | Scheduled |
| France | NTAT | TUBUAI/MAIAO * | 16 419 | 127 | 711 | | Scheduled |
| France | LFRZ | SAINT-NAZAIRE-MONTOIR | 15 618 | 17 088 | 1 609 | | Scheduled |
| France | NTGI | MANIHI * | 14 537 | 49 | 858 | | Scheduled |
| France | LFLY | LYON BRON | 12 020 | | 6 750 | | Scheduled |
| France | NTTO | HAO * | 11 168 | 92 | | | Scheduled |
| France | LFOP | ROUEN VALLEE DE SEINE | 4 662 | 5 | 616 | | Scheduled |
| France | LFBU | ANGOULEME | 343 | | 111 | | Scheduled |
| Germany | EDDF | Frankfurt Main (FRA) | 52 710 228 | 2 275 106 | 458 279 | 23 524 | Yes |
| Germany | EDDM | München (MUC) | 34 598 634 | 286 820 | 378 919 | 3 071 | Yes |
| Germany | EDDL | Düsseldorf (DUS) | 18 943 720 | 87 755 | 209 736 | 201 | Yes |
| Germany | EDDT | Berlin Tegel (TXL) | 14 991 115 | 21 595 | 152 948 | 843 | Yes |
| Germany | EDDH | Hamburg (HAM) | 12 962 917 | 27 203 | 157 180 | 557 | Yes |
| Germany | EDDK | Köln/Bonn (CGN) | 9 806 270 | 644 023 | 121 011 | 22 239 | Yes |
| Germany | EDDS | Stuttgart (STR) | 9 226 546 | 31 105 | 119 751 | 2 316 | Yes |

| Country | ICAO code | Aerodrome | Number of passengers carried | Volume of freight[21] (tonnes) | Total commercial movements | Cargo move-ments | Certified aerodrome |
|---|---|---|---|---|---|---|---|
| Germany | EDDB | Berlin Schoenefeld (SXF) | 7 297 911 | 9 488 | 67 801 | 1 524 | Yes |
| Germany | EDDV | Hannover (HAJ) | 5 060 956 | 16 253 | 62 575 | 658 | Yes |
| Germany | EDDN | Nürnberg (NUE) | 4 034 071 | 7 937 | 55 980 | 1 372 | Yes |
| Germany | EDFH | Frankfurt-Hahn (HHN) | 3 463 571 | 167 158 | 35 243 | 5 407 | Yes |
| Germany | EDLV | Niederrhein (NRN) | 2 889 651 | 0 | 22 624 | 0 | Yes |
| Germany | EDDW | Bremen (BRE) | 2 676 297 | 541 | 38 889 | 23 | Yes |
| Germany | EDDP | Leipzig/Halle (LEJ) | 1 847 193 | 638 489 | 57 727 | 29 920 | Yes |
| Germany | EDDC | Dresden (DRS) | 1 803 511 | 371 | 27 966 | 21 | Yes |
| Germany | EDLW | Dortmund (DTM) | 1 740 642 | 33 | 24 232 | 101 | Yes |
| Germany | EDDG | Münster/Osnabrück (FMO) | 1 312 656 | 131 | 30 301 | 63 | Yes |
| Germany | EDSB | Karlsruhe/Baden-Baden (FKB) | 1 177 180 | 728 | 28 616 | 560 | Yes |
| Germany | EDLP | Paderborn/Lippstadt (PAD) | 1 007 978 | 146 | 25 725 | 31 | Yes |
| Germany | EDJA | Memmingen (FMM) | 902 563 | 1 | 10 410 | ... | Yes |
| Germany | EDNY | Friedrichshafen (FDH) | 590 648 | 65 | 15 144 | 40 | Yes |
| Germany | EDVK | Kassel-Calden (KSF) | 540 000 | 3 000 | 8 310 | 1 400 | Yes |
| Germany | EDHL | Lübeck-Blanckensee (LBC) | 537 633 | 1 | 11 326 | 2 | Yes |
| Germany | EDDR | Saarbrücken (SCN) | 420 101 | 121 | 13 759 | 61 | Yes |
| Germany | EDDE | Erfurt (ERF) | 323 742 | 1 266 | 6 687 | 1 089 | Yes |
| Germany | EDRZ | Zweibrücken (ZGW) | 264 274 | 395 | 11 222 | 296 | Yes |
| Germany | EDXW | Sylt (GWT) | 187 925 | 0 | 3 251 | 0 | Yes |
| Germany | EDAC | Leipzig-Altenburg Airport (AOC) | 118 966 | 4 | 6 539 | 10 | Yes |
| Germany | EDVE | Braunschweig-Wolfsburg (BWE) | 105 622 | 46 | 9 830 | 104 | Yes |
| Germany | EDFM | Mannheim City (MHG) | 51 360 | 550 | 10 198 | 790 | Yes |
| Germany | EDLN | Mönchengladbach (MGL) | 25 458 | 0 | 33 664 | 0 | Yes |
| Germany | EDWI | Wilhelmshaven JadeWeserAirport (WVN) | 22 738 | 0 | 7 372 | 0 | Yes |
| Germany | EDWE | Emden (EME) | 22 345 | 640 | 8 686 | 134 | Yes |
| Germany | EDQM | Hof-Plauen (HOQ) | 14 573 | 0 | 2 412 | 0 | Yes |
| Germany | EDWB | Bremerhaven (BRV) | 12 141 | 61 | 9 900 | ... | Yes |
| Hungary | LHBP | Budapest Liszt Ferenc | 8 190 089 | 65 514 | 105 507 | 5 808 | Yes |
| Hungary | LHDC | Debrecen | 24 000 | 150 | 2 200 | 30 | Yes |
| Hungary | LHSM | FLYBALATON AIRPORT | 14 828 | 264 773 | 3 088 | 46 | Yes |
| Hungary | LHPR | Győr-Pér | 11.112 | 528 | 5.700 | 866 | Yes |
| Hungary | LHPP | Pécs-Pogány | 6 000 | 0 | 4 000 | 0 | Yes |
| Iceland | BIRK | Reykjavík Airport | 421 507 | 162 | 66 338 | ... | Yes |
| Iceland | BIKF | Keflavík International Airport | 1 791 000 | 34 708 | 52 417 | ... | Yes |
| Iceland | BIAR | Akureyri Airport | 239 206 | 333 | 13 964 | ... | Yes |
| Iceland | BIEG | Egilsstaðir Airport | 97 628 | 0 | 3 282 | ... | Yes |

| *Country* | *ICAO code* | *Aerodrome* | *Number of passengers carried* | *Volume of freight[21] (tonnes)* | *Total commercial movements* | *Cargo move-ments* | *Certified aerodrome* |
|---|---|---|---|---|---|---|---|
| Ireland | EIWT | Weston Airport | no scheduled pax | ... | ... | ... | Yes |
| Ireland | EIDW | Dublin Airport | 18 431 393 | ... | 160 327 | 3 670 | Yes |
| Ireland | EICK | Cork Airport | 2 425 131 | ... | 48 366 | 806 | Yes |
| Ireland | EINN | Shannon Airport | 1 460 659 | ... | 27 382 | 1 507 | Yes |
| Ireland | EIKN | Ireland West Airport, Knock | 589 180 | ... | 8 338 | ... | Yes |
| Ireland | EIKY | Kerry Airport | 387 223 | ... | 4 506 | ... | Yes |
| Ireland | EICM | Galway Airport | 154 602 | ... | 16 723 | ... | Yes |
| Ireland | EIWF | Waterford Airport | 105 961 | ... | 15 936 | ... | Yes |
| Ireland | EIDL | Donegal Airport | 46 825 | ... | 3 049 | ... | Yes |
| Ireland | EISG | Sligo Airport | 21 692 | ... | 6 872 | ... | Yes |
| Italy | LILE | BIELLA | ... | ... | ... | ... | Not scheduled |
| Italy | LIER | ORISTANO | ... | ... | ... | ... | Yes |
| Italy | LIPU | PADOVA | ... | ... | ... | ... | Not scheduled |
| Italy | LIDE | REGGIO EMILIA | ... | ... | ... | ... | Yes |
| Italy | LIET | TORTOLI' | ... | ... | ... | ... | In progress |
| Italy | LIRF | ROMA Fiumicino | 35 956 295 | 164 546 | 329 252 | ... | Yes |
| Italy | LIMC | MILANO Malpensa | 18 714 187 | 432 673 | 189 580 | ... | Yes |
| Italy | LIML | MILANO Linate | 8 295 436 | 19 063 | 91 907 | ... | Yes |
| Italy | LIME | BERGAMO Orio al Serio | 7 661 061 | 106 050 | 67 167 | ... | Yes |
| Italy | LIPZ | VENEZIA Tessera | 6 801 941 | 25 377 | 72 763 | ... | Yes |
| Italy | LICC | CATANIA Fontanarossa | 6 301 832 | 9 286 | 57 249 | ... | Yes |
| Italy | LIRN | NAPOLI Capodichino | 5 535 984 | 3 119 | 55 914 | ... | Yes |
| Italy | LIPE | BOLOGNA Borgo Panigale | 5 432 248 | 28 147 | 64 193 | ... | Yes |
| Italy | LIRA | ROMA Ciampino | 4 563 852 | 18 003 | 47 749 | ... | Yes |
| Italy | LICJ | PALERMO Punta Raisi | 4 341 696 | 2 827 | 46 569 | ... | Yes |
| Italy | LIRP | PISA San Giusto | 4 048 068 | 6 134 | 36 339 | ... | Yes |
| Italy | LIMF | TORINO Caselle | 3 541 073 | 1 187 | 43 769 | ... | Yes |
| Italy | LIEE | CAGLIARI Elmas | 3 426 864 | 3 610 | 34 510 | ... | Yes |
| Italy | LIBD | BARI Palese Macchie | 3 371 693 | 2 390 | 33 184 | ... | Yes |
| Italy | LIPX | VERONA Villafranca | 2 975 557 | 1 153 | 33 167 | ... | Yes |
| Italy | LIPH | TREVISO Sant'Angelo | 2 144 338 | 2 932 | 18 086 | ... | Yes |
| Italy | LICA | LAMEZIA TERME | 1 906 224 | 1 924 | 16 797 | ... | Yes |
| Italy | LIRQ | FIRENZE Peretola | 1 724 784 | 186 | 24 244 | ... | Yes |
| Italy | LICT | TRAPANI | 1 682 151 | 10 | 14 560 | ... | Yes |
| Italy | LIBR | BRINDISI Papola Casale | 1 599 533 | 120 | 13 909 | ... | Yes |
| Italy | LIEO | OLBIA Costa Smeralda | 1 591 821 | 220 | 23 723 | ... | Yes |
| Italy | LIEA | ALGHERO Fertilia | 1 385 567 | 1 440 | 13 752 | ... | Yes |
| Italy | LIMJ | GENOVA Sestri | 1 272 048 | 903 | 16 763 | ... | Yes |
| Italy | LIPQ | TRIESTE Ronchi dei Legionari | 723 075 | 121 | 10 880 | ... | Yes |
| Italy | LIPK | FORLI' | 639 853 | 1 146 | 6 848 | ... | Yes |

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|---|---|---|---|---|---|---|---|
| Italy | LIPR | RIMINI | 541 907 | 404 | 8 215 | ... | Yes |
| Italy | LIPY | ANCONA Falconara | 511 417 | 6 276 | 12 717 | ... | Yes |
| Italy | LICR | REGGIO CALABRIA | 474 534 | 185 | 5 772 | ... | Yes |
| Italy | LIPB | PESCARA | 456 104 | 2 085 | 5 677 | ... | Yes |
| Italy | LIMP | PARMA | 238 970 | ... | 4 896 | ... | Yes |
| Italy | LICD | LAMPEDUSA | 192 306 | 34 | 2 837 | ... | Not scheduled |
| Italy | LIMZ | CUNEO | 175 607 | ... | 2 755 | ... | Yes |
| Italy | LIPO | BRESCIA Montichiari | 158 265 | 20 275 | 6 270 | ... | Yes |
| Italy | LICG | PANTELLERIA | 139 805 | 60 | 4 040 | ... | Not scheduled |
| Italy | LIRZ | PERUGIA | 111 140 | 19 | 2 626 | ... | Yes |
| Italy | LIBC | CROTONE | 105 040 | ... | 2 472 | ... | Yes |
| Italy | LIBF | FOGGIA | 70 061 | 5 | 4 443 | ... | Yes |
| Italy | LIPB | BOLZANO | 53 917 | ... | 2 472 | ... | Yes |
| Italy | LIRJ | MARINA DI CAMPO | 9 112 | ... | 445 | ... | Yes |
| Italy | LIRS | GROSSETO | 8 421 | ... | 1 094 | ... | Yes |
| Italy | LIRI | SALERNO | 5 163 | ... | 1 049 | ... | Yes |
| Italy | LIMG | ALBENGA | 2 201 | ... | 1 137 | ... | Yes |
| Italy | LIQS | SIENA | 1 503 | ... | 514 | ... | Yes |
| Italy | LIBG | TARANTO | 369 | 228 | 1 814 | ... | Yes |
| Italy | LIMW | AOSTA | 0 | 0 | 0 | 0 | Yes |
| Italy | LICB | COMISO | 0 | 0 | 0 | 0 | In progress |
| Latvia | EVTA | TUKUMS | ... | ... | ... | ... | Not scheduled |
| Latvia | EVRA | RIGA | 4 663 647 | 12 294 | 68 145 | ... | Yes |
| Latvia | EVVA | VENTSPILS | 1 446 | ... | 270 | ... | Yes |
| Latvia | EVLA | LIEPAJA | 569 | ... | 94 | ... | Yes |
| Lithuania | EYVI | Vilnius Internat. Airport | 1 373 859 | 3 642 | 26 102 | 596 | Yes |
| Lithuania | EYKA | Kaunas Internat. Airport | 809 732 | 4 450 | 8 753 | 887 | Yes |
| Lithuania | EYPA | Palanga Internat. Airport | 102 528 | 22 | 3 151 | ... | Yes |
| Lithuania | EYSA | Siauliai Internat. Airport | 910 | 2 149 | 82 | 44 | Yes |
| Luxembourg | ELLX | Luxemburg-Findel | 1 630 027 | 705 080 | 80 494 | 71 077 | In progress |
| Malta | LMML | Malta International Airport | 3 293 524 | 16 844 | 32 997 | 887 | Yes |
| Netherlands | EHAM | Amsterdam Airport Schiphol | 45 211 749 | 1 512 256 | 402 375 | ... | Yes |
| Netherlands | EHRD | Rotterdam Airport | 969 480 | 80 | 52 644 | ... | Yes |
| Netherlands | EHBK | Maastricht Aachen Airport | 260 000 | 90 000 | 33 307 | ... | Yes |
| Netherlands | EHGG | Groningen Airport Eelde | 154 000 | 0 | 64 000 | ... | Yes |
| Netherlands | EHLE | Lelystad Airport | 0 | 0 | 125 675 | ... | Yes |
| Norway | ENGM | Oslo, Gardermoen | 19 074 302 | 85 738 | 219 352 | 8 934 | Yes |
| Norway | ENBR | Bergen, Flesland | 4 929 060 | 7 499 | 96 505 | 1 654 | Yes |
| Norway | ENZV | Stavanger, Sola | 3 665 207 | 5 199 | 79 161 | 2 089 | Yes |
| Norway | ENVA | Trondheim, Værnes | 3 518 314 | 5 322 | 55 474 | 1 008 | Yes |
| Norway | ENTC | Tromsø, Langnes | 1 584 308 | 2 636 | 38 873 | 2 108 | Yes |

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|---|---|---|---|---|---|---|---|
| Norway | ENTO | Sandefjord, Torp | 1 583 078 | 301 | 38 686 | 172 | Yes |
| Norway | ENBO | Bodø | 1 463 691 | 2 058 | 42 420 | 712 | Yes |
| Norway | ENRY | Moss lufthavn, Rygge | 1 423 809 | ? | 20 988 | 4 | Yes |
| Norway | ENCN | Kristiansand, Kjevik | 838 712 | 328 | 17 014 | 510 | Yes |
| Norway | ENAL | Ålesund lufthavn, Vigra | 813 126 | 985 | 13 849 | 179 | Yes |
| Norway | ENHD | Haugesund, Karmøy | 558 910 | 262 | 8 963 | 1 | Yes |
| Norway | ENEV | Harstad/Narvik, Evenes | 544 074 | 431 | 8 894 | 1 064 | Yes |
| Norway | ENML | Molde, Årø | 391 739 | 2 194 | 9 237 | 499 | Yes |
| Norway | ENKB | Kristiansund, Kvernberget | 346 934 | 215 | 13 892 | 22 | Yes |
| Norway | ENAT | Alta | 325 138 | 386 | 10 316 | 409 | Yes |
| Norway | ENKR | Kirkenes, Høybuktmoen | 277 447 | 584 | 8 529 | 32 | Yes |
| Norway | ENDU | Bardufoss | 190 351 | 13 | 3 074 | 2 | Yes |
| Norway | ENFL | Florø | 159 141 | 68 | 8 783 | 17 | Yes |
| Norway | ENSB | Svalbard, Longyear | 125 781 | 771 | 6 490 | 557 | Yes |
| Norway | ENBN | Brønnøysund, Brønnøy | 104 004 | 248 | 11 718 | 2 | Yes |
| Norway | ENOV | Ørsta/Volda, Hovden | 97 363 | 36 | 4 943 | 0 | Yes |
| Norway | ENSK | Stokmarknes, Skagen | 95 717 | 46 | 6 007 | 0 | Yes |
| Norway | ENHF | Hammerfest | 95 185 | 224 | 10 067 | 1 | Yes |
| Norway | ENRA | Mo i Rana, Røssvoll | 91 613 | 158 | 7 616 | 0 | Yes |
| Norway | ENLK | Leknes | 90 512 | 206 | 5 628 | 0 | Yes |
| Norway | ENBL | Førde, Bringeland | 79 271 | 55 | 7 077 | 45 | Yes |
| Norway | ENVD | Vadsø | 78 654 | 272 | 6 431 | 0 | Yes |
| Norway | ENSH | Svolvær, Helle | 68 693 | 210 | 4 633 | 0 | Yes |
| Norway | ENST | Sandnessjøen, Stokka | 65 841 | 234 | 6 772 | 2 | Yes |
| Norway | ENSG | Sogndal, Haukåsen | 65 773 | 38 | 5 436 | 0 | Yes |
| Norway | ENMS | Mosjøen, Kjærstad | 57 733 | 238 | 5 953 | 0 | Yes |
| Norway | ENNA | Lakselv, Banak | 53 618 | 310 | 3 495 | 0 | Yes |
| Norway | ENSN | Skien, Geiteryggen | 48 068 | 0 | 8 683 | 2 | Yes |
| Norway | ENAN | Andøya, Andenes | 39 496 | 27 | 3 186 | 0 | Yes |
| Norway | ENNK | Narvik, Framnes | 29 085 | 20 | 2 933 | 8 | Yes |
| Norway | ENRM | Rørvik, Ryum | 24 754 | 26 | 2 687 | 0 | Yes |
| Norway | ENNM | Namsos | 23 063 | 15 | 3 496 | 0 | Yes |
| Norway | ENSO | Stord/Sørstokken | 22 557 | 18 | 2 953 | 35 | Yes |
| Norway | ENSD | Sandane, Anda | 18 437 | 12 | 1 484 | 0 | Yes |
| Norway | ENHV | Honningsvåg, Valan | 15 734 | 49 | 2 500 | 2 | Yes |
| Norway | ENRO | Røros | 15 673 | 125 | 4 010 | 3 | Yes |
| Norway | ENMH | Mehamn | 15 183 | 36 | 2 808 | 0 | Yes |
| Norway | ENSR | Sørkjosen | 15 065 | 7 | 1 919 | 0 | Yes |
| Norway | ENSS | Vardø, Svartnes | 12 896 | 26 | 2 370 | 0 | Yes |
| Norway | ENBS | Båtsfjord | 11 099 | 57 | 2 572 | 0 | Yes |
| Norway | ENRS | Røst | 10 577 | 5 | 1 442 | 0 | Yes |
| Norway | ENVR | Værøy helikopterhavn (Heliport) | 10 459 | 39 | 1 294 | 0 | Yes |
| Norway | ENHK | Hasvik | 8 005 | 34 | 1 217 | 0 | Yes |
| Norway | ENOL | Ørland lufthavn | 7 117 | 0 | 2 143 | 0 | Yes |

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|---|---|---|---|---|---|---|---|
| Norway | ENFG | Fagernes, Leirin | 6 421 | 0 | 2 435 | 8 | Yes |
| Norway | ENBV | Berlevåg | 5 720 | 35 | 1 853 | 0 | Yes |
| Norway | ENNO | Notodden, Tuven | 3 134 | 1 | 3 598 | 2 | Yes |
| Poland | EPWA | WARSZAWA | 8 666 552 | 55 649 | 116 693 | 4 973 | Yes |
| Poland | EPKK | KRAKÓW | 2 839 124 | 4 464 | 29 769 | 43 | Yes |
| Poland | EPKT | KATOWICE | 2 366 410 | 11 448 | 20 599 | 1 909 | Yes |
| Poland | EPGD | GDANSK | 2 210 066 | 4 487 | 25 094 | 1 038 | Yes |
| Poland | EPWR | WROCLAW | 1 598 693 | 878 | 17 979 | 0 | Yes |
| Poland | EPPO | POZNAN | 1 384 311 | 2 395 | 16 780 | 0 | Yes |
| Poland | EPRZ | RZESZÓW | 451 720 | 465 | 4 863 | 63 | Yes |
| Poland | EPLL | LÓDZ | 413 662 | 0 | 3 245 | 3 | Yes |
| Poland | EPSC | SZCZECIN | 268 563 | 728 | 3 235 | 4 | Yes |
| Poland | EPBY | BYDGOSZCZ | 266 480 | 413 | 2 101 | 8 | Yes |
| Portugal | LPPT | LISBOA-PORTELA SACAV | 14 038 285 | 104 895 | 143 380 | 3 764 | Yes |
| Portugal | LPFR | FARO | 5 282 287 | 286 | 40 036 | 3 | Yes |
| Portugal | LPPR | PORTO-FRANC.SA CARN. | 5 228 744 | 28 663 | 55 601 | 3 302 | Yes |
| Portugal | LPMA | FUNCHAL-STA.CATARINA | 2 215 568 | 8 103 | 22 555 | 510 | Yes |
| Portugal | LPPD | P.DELG.-JOAO PAULOII | 897 083 | 7 341 | 15 388 | 5 | Yes |
| Portugal | LPLA | LAJES | 423 138 | 3 391 | 9 441 | 0 | Yes |
| Portugal | LPHR | HORTA | 180 682 | 1 079 | 5 402 | 0 | Yes |
| Portugal | LPPS | PORTO SANTO AIRPORT | 97 678 | 252 | 2 956 | 11 | Yes |
| Portugal | LPPI | PICO | 61 330 | 379 | 2 097 | 0 | Yes |
| Portugal | LPAZ | SANTA MARIA INT.AIRP | 59 764 | 232 | 2 539 | 0 | Yes |
| Portugal | LPSJ | SAO JORGE | 47 854 | 241 | 1 947 | 0 | Yes |
| Portugal | LPFL | FLORES | 42 211 | 238 | 2 138 | 0 | Yes |
| Portugal | LPGR | GRACIOSA | 39 329 | 211 | 1 970 | 244 | Yes |
| Portugal | LPBG | BRAGANÇA | 4 610 | 0 | 1 022 | 0 | Yes |
| Portugal | LPVR | VILA REAL | 4 586 | 0 | 1 941 | 0 | Yes |
| Portugal | LPCR | CORVO | 4 537 | 54 | 927 | 0 | Yes |
| Portugal | LPCS | CASCAIS-TIRES | 3 128 | 0 | 1 043 | 0 | Yes |
| Portugal | LPBR | BRAGA | 2 351 | 0 | 1 698 | … | Yes |
| Portugal | LPCH | CHAVES | 210 | 0 | 92 | … | Yes |
| Portugal | LPCO | COIMBRA | 173 | 704 | 612 | … | Yes |
| Portugal | LPAV | AVEIRO | 52 | 0 | 26 | … | Yes |
| Portugal | LPVZ | VISEU | 17 | 0 | 24 | … | Yes |
| Portugal | LPEV | ÉVORA | 14 | 0 | 6 451 | … | Yes |
| Portugal | LPPM | PORTIMÃO | 9 | 0 | 3 229 | … | Yes |
| Portugal | LPBJ | BEJA | 0 | 0 | 0 | … | Yes |
| Portugal | LPCV | COVILHÃ | 0 | 0 | 0 | … | Yes |
| Portugal | LPIN | ESPINHO | 0 | 0 | 0 | … | Yes |
| Portugal | LPLZ | LOUSÃ | 0 | 0 | 387 | … | Yes |
| Portugal | LPMU | MOGADOURO | 0 | 0 | 6 | … | Yes |
| Portugal | LPMT | MONTIJO | 0 | 0 | 0 | … | Yes |

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|---|---|---|---|---|---|---|---|
| Portugal | PROENÇA-A-NOVA | PROENÇA-A-NOVA | 0 | 0 | 0 | ... | Yes |
| Portugal | LPSC | SANTA CRUZ | 0 | 0 | 0 | ... | Yes |
| Portugal | LPSR | SANTARÉM | 0 | 0 | 942 | ... | Yes |
| Portugal | LPVL | VILAR DA LUZ | 0 | 0 | 0 | ... | Yes |
| Romania | LROP | BUCUREŞTI HENRI COANDĂ | 4 927 142 | 23 171 | 78 080 | ... | Yes |
| Romania | LRBS | BUCUREŞTI BANEASA AUREL VLAICU | 2 117 668 | 265 | 29 719 | ... | Yes |
| Romania | LRTR | TIMIŞOARA TRAIAN VUIA | 1 136 064 | 2 273 | 25 838 | ... | Yes |
| Romania | LRCL | CLUJ NAPOCA | 1 028 907 | 56 | 16 408 | ... | Yes |
| Romania | LRSB | SIBIU | 199 142 | 50 | 6 498 | ... | Yes |
| Romania | LRIA | IASI | 159 615 | 3 | 4 991 | ... | Yes |
| Romania | LRCK | CONSTANŢA MIHAIL KOGALNICEANU | 75 307 | 419 | 3 819 | ... | Yes |
| Romania | LRTM | TÂRGU MUREŞ TRANSILVANIA | 74 535 | 133 | 2 035 | ... | Yes |
| Romania | LROD | ORADEA | 40 439 | 0 | 1 809 | 0 | Yes |
| Romania | LRSV | SUCEAVA ŞTEFAN CEL MARE | 34 590 | 0 | 1 671 | 0 | Yes |
| Romania | LRCV | CRAIOVA | 23 629 | 39 | 2 121 | ... | Yes |
| Romania | LRBC | BACAU GEORGE ENESCU | 20 788 | 36 | 4 337 | ... | Yes |
| Romania | LRBM | BAIA MARE | 19 189 | 1 | 834 | ... | Yes |
| Romania | LRSM | SATU MARE | 18 856 | 0 | 1 059 | 0 | Yes |
| Romania | LRAR | ARAD | 8 261 | 673 | 1 181 | ... | Yes |
| Romania | LRTC | TULCEA DELTA DUNARII | 1 698 | 0 | 3 240 | 0 | Yes |
| Slovakia | LZIB | Bratislava (data 2010) | 1 665 704 | 17 777 | 27 220 | 0 | Yes |
| Slovakia | LZKZ | Košice (data 2009) | 352 460 | 269 | 10 674 | 0 | Yes |
| Slovakia | LZTT | Poprad (data 2010) | 27 693 | 134 | 7 595 | ... | Yes |
| Slovakia | LZZI | Žilina (data 2010) | 9 912 | 2 | 15 190 | 0 | Yes |
| Slovakia | LZPP | Piešťany (data 2009) | 638 | 1 | 0 | 0 | Yes |
| Slovakia | LZSL | Sliač (data 2009) | 212 | 25 | 0 | 0 | Yes |
| Slovenia | LJMB | Maribor Edvard Rusjan Airport | 19 520 | 184 | 544 | 88 | In progress |
| Slovenia | LJPZ | Portorož Airport | 15 382 | 0 | 5 676 | 0 | In progress |
| Slovenia | LJLJ | Ljubljana Jože Pu?nik Airport | 1388 651 | 17 310 | 42 569 | 2 771 | In progress |
| Spain | LEMD | Madrid | 49 632 904 | 372 588 193 | 426 734 | ... | Yes |
| Spain | LEBL | Barcelona | 29 172 157 | 103 938 865 | 271 307 | ... | In Progress |
| Spain | LEPA | Palma de Mallorca | 21 098 297 | 17 243 972 | 170 272 | ... | Scheduled |
| Spain | LEMG | Málaga | 11 996 139 | 3 063 929 | 99 778 | ... | Scheduled |
| Spain | LEAL | Alicante | 9 369 762 | 3 112 660 | 73 016 | ... | Scheduled |
| Spain | GCLP | Gran Canaria | 9 285 125 | 24 432 760 | 95 584 | ... | Scheduled |
| Spain | GCTS | Tenerife Sur | 7 184 562 | 4 288 338 | 46 584 | ... | Scheduled |
| Spain | LEIB | Ibiza | 5 012 690 | 3 196 183 | 51 024 | ... | In Progress |

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|---|---|---|---|---|---|---|---|
| Spain | LEVC | Valencia | 4 915 838 | 11 427 693 | 62 251 | ... | Scheduled |
| Spain | LEGE | Girona | 4 840 560 | 62 218 | 35 127 | ... | Scheduled |
| Spain | GCRR | Lanzarote | 4 826 979 | 3 786 791 | 43 892 | ... | In Progress |
| Spain | LEZL | Sevilla | 4 211 853 | 5 453 357 | 42 107 | ... | Scheduled |
| Spain | GCFV | Fuerteventura | 4 110 512 | 1 700 734 | 37 471 | ... | Scheduled |
| Spain | GCXO | Tenerife Norte | 4 045 087 | 15 912 981 | 56 022 | ... | Scheduled |
| Spain | LEBB | Bilbao | 3 875 999 | 2 547 519 | 46 825 | ... | Scheduled |
| Spain | LEMH | Menorca | 2 493 280 | 2 400 234 | 26 895 | ... | Scheduled |
| Spain | LEST | Santiago | 2 158 039 | 1 957 474 | 18 770 | ... | Scheduled |
| Spain | LERS | Reus | 1 402 969 | 241 626 | 10 137 | ... | Scheduled |
| Spain | LEAS | Asturias | 1 349 913 | 110 645 | 15 163 | ... | Scheduled |
| Spain | LEVX | Vigo | 1 092 874 | 901 192 | 13 159 | ... | Scheduled |
| Spain | LECO | Coruña | 1 085 593 | 244 819 | 11 494 | ... | Scheduled |
| Spain | LEJR | Jerez | 989 694 | 98 465 | 8 710 | ... | In Progress |
| Spain | GCLA | Palma | 969 197 | 959 007 | 17 971 | ... | Scheduled |
| Spain | LEGR | Granada | 966 238 | 37 596 | 9 348 | ... | Scheduled |
| Spain | LEXJ | Santander | 917 751 | 2 207 | 12 935 | ... | Scheduled |
| Spain | LEAM | Almería | 775 956 | 14 074 | 11 514 | ... | Scheduled |
| Spain | LEZG | Zaragoza | 603 597 | 42 531 166 | 8 462 | ... | Scheduled |
| Spain | GEML | Melilla | 288 369 | 340 714 | 8 602 | ... | Scheduled |
| Spain | LEPP | Pamplona | 284 383 | 42 095 | 6 854 | ... | Scheduled |
| Spain | LESO | San Sebastián | 278 045 | 18 809 | 6 571 | ... | Scheduled |
| Spain | GCHI | Hierro | 169 894 | 145 443 | 3 693 | ... | Scheduled |
| Spain | LEDA | Lleida | 54 858 | 0 | 2.500 | 0 | Yes |
| Spain | LEVT | Vitoria | 40 400 | 12 912 140 | 8 058 | ... | Scheduled |
| Spain | LERL | Ciudad Real | 33 469 | 1 100 | 1 006 | ... | Scheduled |
| Spain | GCGM | Gomera | 31 699 | 9 199 | 1 372 | ... | Scheduled |
| Spain | Ceuta | Ceuta | 29 521 | 1 128 | 3 432 | ... | Scheduled |
| Spain | LEBG | Burgos | 28 746 | 1 766 | 1 361 | ... | Scheduled |
| Spain | LERJ | Logroño | 16 751 | 0 | 800 | 0 | In Progress |
| Spain | LEAG | algeciras | 10 999 | 0 | 1 340 | 0 | Yes |
| Spain | LEHC | Huesca | 5 606 | 0 | 158 | 0 | Scheduled |
| Spain | LEBA | Córdoba | 1 729 | 0 | 677 | 0 | Scheduled |
| Sweden | ESSA | Stockholm Arlanda | 16 948 127 | 101 267 | 190 882 | 2 311 | Yes |
| Sweden | ESGG | Göteborg Landvetter | 4 126 467 | 49 299 | 61 176 | 2 803 | Yes |
| Sweden | ESKN | Stockholm Skavsta | 2 507 772 | 18 | 30 572 | 131 | Yes |
| Sweden | ESSB | Stockholm Broma | 2 037 382 | 256 | 64 840 | 0 | Yes |
| Sweden | ESMS | Malmö | 1 597 164 | 32 628 | 36 922 | 4 699 | Yes |
| Sweden | ESPA | Luleå | 979 135 | 1 292 | 17 684 | 2 | Yes |
| Sweden | ESNU | Umeå | 846 083 | 4 816 | 20 960 | 4 | Yes |
| Sweden | ESGP | Göteborg City | 714 798 | 13 | 53 980 | 45 | Yes |
| Sweden | ESDB | Ängelholm | 376 234 | 19 | 12 518 | 1 | Yes |
| Sweden | ESNZ | Åre Östersund | 356 093 | 78 | 9 184 | 0 | Yes |
| Sweden | ESSV | Visby | 308 145 | 867 | 20 676 | 739 | Yes |
| Sweden | ESNN | Sundsvall Härnösand | 256 132 | 2 165 | 10 574 | 0 | Yes |

| Country | ICAO code | Aerodrome | Number of passengers carried | Volume of freight[21] (tonnes) | Total commercial movements | Cargo move-ments | Certified aerodrome |
|---|---|---|---|---|---|---|---|
| Sweden | ESNS | Skellefteå | 224 477 | 29 | 6 304 | 0 | Yes |
| Sweden | ESDF | Ronneby | 208 790 | 11 | 9 254 | 0 | Yes |
| Sweden | ESNQ | Kiruna | 199 146 | 457 | 5 878 | 2 | Yes |
| Sweden | ESMQ | Kalmar | 166 461 | 0 | 15 138 | 1 | Yes |
| Sweden | ESMX | Växjö Kronoberg | 162 875 | 773 | 7 546 | 56 | Yes |
| Sweden | ESOW | Stockholm Västerås | 150 793 | 5 291 | 28 840 | 946 | Yes |
| Sweden | ESSP | Norrköping | 115 660 | 149 | 16 616 | 10 | Yes |
| Sweden | ESMT | Halmstad | 93 640 | 17 | 10 152 | 0 | Yes |
| Sweden | ESSL | Linköping | 91 521 | 0 | 18 756 | 0 | Yes |
| Sweden | ESNO | Örnsköldsvik | 86 283 | 133 | 3 654 | 1 | Yes |
| Sweden | ESOK | Karlstad | 82 423 | 786 | 6 252 | 1 | Yes |
| Sweden | ESGJ | Jönköping | 73 000 | 4 647 | 13 992 | 1 324 | Yes |
| Sweden | ESOE | Örebro | 68 517 | 6 310 | 8 606 | 675 | Yes |
| Sweden | ESNX | Arvidsjaur | 42 494 | 0 | 9 830 | 1 | Yes |
| Sweden | ESGT | Trollhättan Vänersborg | 39 603 | 2 | 8 230 | 1 | Yes |
| Sweden | ESMK | Kristianstad | 38 394 | 0 | 9 192 | 0 | Yes |
| Sweden | ESNG | Gällivare | 34 106 | 534 | 3 124 | 1 | Yes |
| Sweden | ESSD | Borlänge | 33 811 | 0 | 2 947 | 0 | Yes |
| Sweden | ESNK | Kramfors | 21 634 | 0 | 2 874 | 0 | Yes |
| Sweden | ESNL | Lycksele | 21 460 | 4 | 4 950 | 1 | Yes |
| Sweden | ESNV | Vilhelmina | 13 908 | 0 | 2 024 | 0 | Yes |
| Sweden | ESMO | Oskarshamn | 11 742 | 11 | 1 668 | 0 | Yes |
| Sweden | ESUT | Hemavan | 10 733 | 0 | 806 | 0 | Yes |
| Sweden | ESKM | Mora | 8 144 | 0 | 3 068 | 0 | Yes |
| Sweden | ESND | Sveg | 5 697 | 0 | 1 068 | 0 | Yes |
| Sweden | ESOH | Hagfors | 3 392 | 0 | 1 720 | 0 | Yes |
| Sweden | ESST | Torsby | 2 955 | 0 | 1 336 | 0 | Yes |
| Sweden | ESUD | Storuman | 2 818 | 2 | 356 | 0 | Yes |
| Sweden | ESUP | Pajala | 2 641 | 0 | 888 | 0 | Yes |
| Sweden | ESGR | Skövde | 985 | 0 | 654 | 0 | Yes |
| Sweden | ESSK | Gävle Sandviken | 303 | 0 | 974 | 0 | Yes |
| Sweden | ESSU | Eskilstuna | 60 | 0 | 4 031 | 0 | Yes |
| Sweden | ESKV | Arvika | 0 | 0 | 2 000 | 0 | Yes |
| Sweden | ESGK | Falköping | 0 | 0 | 3 947 | 0 | Yes |
| Sweden | ESGL | Lidköping Hovby | 0 | 0 | 309 | 0 | Yes |
| Sweden | ESCF | Linköping Malmen | 0 | 0 | 18 012 | 0 | Yes |
| Sweden | ESTL | Ljungbyhed | 0 | 0 | 14 245 | 0 | Yes |
| Sweden | ESIB | Såtenäs | 0 | 0 | 0 | 0 | Yes |
| Sweden | ESNY | Söderhamn | 0 | 0 | 1 200 | 0 | Yes |
| Switzerland | LSZH | Zürich | 22 910 504 | 313 | 268 630 | 404 | Yes |
| Switzerland | LSGG | Geneva | 11 845 379 | 40 | 177 391 | 1 590 | Yes |
| Switzerland | LSZA | Lugano | 169 082 | 0 | 21 309 | 0 | Yes |
| Switzerland | LSZB | Bern | 100 704 | 0 | 55 583 | 0 | Yes |
| Switzerland | LSZR | St.Gallen-Altenrhein | 81 113 | 0 | 28 952 | 0 | Yes |
| United Kingdom | EGKB | Biggin Hill | ... | ... | 49 830 | ... | Yes |
| United | EGTG | Bristol Filton | ... | ... | ... | ... | Yes |

| *Country* | *ICAO code* | *Aerodrome* | *Number of passengers carried* | *Volume of freight[21] (tonnes)* | *Total commercial movements* | *Cargo move-ments* | *Certified aerodrome* |
|---|---|---|---|---|---|---|---|
| Kingdom | | | | | | | |
| United Kingdom | EGNC | Carlisle | ... | ... | 18 419 | ... | Yes |
| United Kingdom | EGBE | Coventry | ... | ... | 6 648 | ... | Yes |
| United Kingdom | EGTC | Cranfield | ... | ... | ... | ... | Yes |
| United Kingdom | EGLF | Farnborough | ... | ... | ... | ... | Yes |
| United Kingdom | EGNR | Hawarden | ... | ... | 17 731 | ... | Yes |
| United Kingdom | EGLL | London Heathrow | 65 881 660 | 1 551 308 | 454 823 | 2 414 | Yes |
| United Kingdom | EGKK | London Gatwick | 31 375 290 | 108 587 | 240 500 | 139 | Yes |
| United Kingdom | EGSS | London Stansted | 18 573 803 | 230 089 | 155 140 | 9 770 | Yes |
| United Kingdom | EGCC | Manchester | 17 759 015 | 116 558 | 159 114 | 1 844 | Yes |
| United Kingdom | EGGW | Luton | 8 738 717 | 28 743 | 94 575 | 1 588 | Yes |
| United Kingdom | EGPH | Edinburgh | 8 596 715 | 44 083 | 108 997 | 5 203 | Yes |
| United Kingdom | EGBB | Birmingham | 8 572 398 | 21 659 | 95 454 | 736 | Yes |
| United Kingdom | EGPF | Glasgow | 6 548 865 | 2 933 | 77 755 | 56 | Yes |
| United Kingdom | EGGD | Bristol International | 5 747 604 | 3 498 | 69 134 | 955 | Yes |
| United Kingdom | EGGP | Liverpool | 5 013 940 | 276 | 68 164 | 15 | Yes |
| United Kingdom | EGNT | Newcastle | 4 356 130 | 11 712 | 66 677 | 1 406 | Yes |
| United Kingdom | EGNX | East Midlands | 4 113 501 | 304 028 | 69 452 | 17 753 | Yes |
| United Kingdom | EGAA | Belfast International | 4 016 170 | 43 878 | 60 742 | 3 516 | Yes |
| United Kingdom | EGLC | London City | 2 780 582 | ... | 68 640 | ... | Yes |
| United Kingdom | EGPD | Aberdeen | 2 763 708 | 4 258 | 102 396 | 1 406 | Yes |
| United Kingdom | EGNM | Leeds Bradford | 2 755 110 | 235 | 52 284 | ... | Yes |
| United Kingdom | EGAC | Belfast City | 2 740 341 | 155 | 40 324 | ... | Yes |
| United Kingdom | EGHI | Southampton | 1 733 690 | 116 | 45 350 | ... | Yes |
| United Kingdom | EGPK | Prestwick | 1 662 744 | 12 163 | 33 087 | 811 | Yes |
| United Kingdom | EGFF | Cardiff | 1 404 613 | 38 | 25 645 | 2 | Yes |
| United Kingdom | EGCN | Doncaster Sheffield | 876 153 | 251 | 11 030 | 12 | Yes |
| United Kingdom | EGHH | Bournemouth | 751 331 | 9 688 | 41 539 | 1 884 | Yes |
| United Kingdom | EGTE | Exeter | 744 957 | 3 755 | 33 740 | 483 | Yes |
| United Kingdom | EGPE | Inverness | 530 213 | 144 | 28 155 | ... | Yes |
| United Kingdom | EGSH | Norwich | 425 821 | 266 | 36 864 | 287 | Yes |
| United | EGAE | City of Derry | 339 432 | ... | 9 948 | ... | Yes |

| Country | ICAO code | Aerodrome | Number of passengers carried | Volume of freight[21] (tonnes) | Total commercial movements | Cargo move-ments | Certified aerodrome |
|---|---|---|---|---|---|---|---|
| Kingdom | | | | | | | |
| United Kingdom | EGDQ | Newquay | 315 107 | ... | 11 432 | ... | Yes |
| United Kingdom | EGNJ | Humberside | 283 160 | 601 | 32 813 | 857 | Yes |
| United Kingdom | EGPM | Scatsta | 279 482 | 766 | 13 841 | 61 | Yes |
| United Kingdom | EGNH | Blackpool | 235 340 | 41 | 50 905 | ... | Yes |
| United Kingdom | EGNV | Durham Tees Valley | 226 209 | ... | 20 756 | ... | Yes |
| United Kingdom | EGPA | Kirkwall | 141 399 | 109 | 14 535 | 15 | Yes |
| United Kingdom | EGPB | Sumburgh | 140 129 | 268 | 11 118 | 3 | Yes |
| United Kingdom | EGHD | Plymouth | 128 603 | ... | 18 495 | ... | Yes |
| United Kingdom | EGPO | Stornoway | 113 680 | 192 | 10 952 | 2 | Yes |
| United Kingdom | EGPN | Dundee | 70 398 | ... | 37 169 | ... | Yes |
| United Kingdom | EGPL | Benbecula | 30 406 | 195 | 4 402 | ... | Yes |
| United Kingdom | EGPC | Wick | 22 710 | ... | 4 754 | ... | Yes |
| United Kingdom | EGBJ | Gloucestershire | 16 533 | ... | 67 788 | ... | Yes |
| United Kingdom | EGMH | Kent International | 15 580 | 28 103 | 16 260 | 491 | Yes |
| United Kingdom | EGMC | Southend | 3 583 | 3 | 27 320 | 2 | Yes |
| United Kingdom | EGTK | Oxford | 2 186 | ... | 38 382 | ... | Yes |
| United Kingdom | EGSC | Cambridge | 916 | 11 | 24 304 | 17 | Yes |
| United Kingdom | EGKA | Shoreham | 886 | ... | 60 218 | ... | Yes |
| United Kingdom | EGMD | Lydd | 485 | ... | 20 527 | ... | Yes |

## 5. List of national differences notified to ICAO

The table in section 2.1.1 gives an overview of the national differences notified to ICAO Annex 14. This table is analysed more in depth per chapter and per type of difference 'A — more strict', 'B — different' or 'C — less protective or partially implemented …' in the next table.

**Table 21: List of national differences notified to ICAO Annex 14 — Status in 2011.**

*Note: only the countries which provided information are included in this table.*

***Legend***
*Differences with ICAO:*
*A: National regulation is more exacting or exceeds the ICAO Standard (S) or Recommended Practice (R).*
*B: National regulation is different in character or other means of compliance.*
*C: National regulation is less protective or partially implemented/not implemented.*

| ICAO Annex 14 | | Type of difference | | | |
|---|---|---|---|---|---|
| Chapter | Country | A | B | C | Grand total |
| 1 | CH | | 1 | | 1 |
| | CZ | 3 | 2 | | 5 |
| | FI | | 1 | | 1 |
| | FR | 8 | 15 | 14 | 37 |
| | NO | | 2 | | 2 |
| | PL | | | 2 | 2 |
| 1 Total | | 11 | 21 | 16 | 48 |
| 2 | CZ | 14 | | 1 | 15 |
| | FR | 8 | 3 | 13 | 24 |
| | NL | | 4 | 3 | 7 |
| | NO | 1 | 3 | 1 | 5 |
| | PL | | | 1 | 1 |
| | UK | | | 1 | 1 |
| 2 Total | | 23 | 10 | 20 | 53 |
| 3 | CH | | 3 | | 3 |
| | CZ | 128 | 2 | | 130 |
| | FI | | 4 | | 4 |
| | FR | 39 | 33 | 12 | 84 |
| | NO | 2 | 1 | 1 | 4 |
| | UK | | 1 | 3 | 4 |
| 3 Total | | 169 | 44 | 16 | 229 |
| 4 | CZ | 10 | | | 10 |
| | FR | 17 | 15 | 2 | 34 |
| | PL | | | 2 | 2 |
| 4 Total | | 27 | 15 | 4 | 46 |
| 5 | CH | | 3 | | 3 |
| | CZ | 112 | 8 | 1 | 121 |
| | FI | | 7 | | 7 |
| | FR | 116 | 51 | 107 | 274 |
| | NL | 1 | 5 | | 6 |
| | NO | | 4 | | 4 |
| | PL | | | 1 | 1 |
| | UK | 4 | 5 | 4 | 13 |
| 5 Total | | 233 | 83 | 113 | 429 |
| 6 | CH | | 4 | | 4 |

| ICAO Annex 14 | | Type of difference | | | |
|---|---|---|---|---|---|
| Chapter | Country | A | B | C | Grand total |
| | CZ | 19 | 9 | | 28 |
| | FI | | 2 | | 2 |
| | FR | 3 | 34 | 6 | 43 |
| | NL | 1 | | | 1 |
| | PL | | | 2 | 2 |
| 6 Total | | 23 | 49 | 8 | 80 |
| 7 | CZ | 6 | 4 | | 10 |
| | FI | | 1 | | 1 |
| | FR | 9 | 1 | 1 | 11 |
| | NL | | 1 | | 1 |
| | UK | 1 | | | 1 |
| 7 Total | | 16 | 7 | 1 | 24 |
| 8 | CZ | 3 | | | 3 |
| | FR | 6 | 9 | | 15 |
| 8 Total | | 9 | 9 | | 18 |
| 9 | CH | | 1 | | 1 |
| | CZ | 30 | 3 | | 33 |
| | FI | | 28 | 6 | 34 |
| | FR | 24 | 32 | 18 | 74 |
| | NL | | | 1 | 1 |
| | PL | | | 2 | 2 |
| | UK | 2 | | 1 | 3 |
| 9 Total | | 56 | 64 | 28 | 148 |
| 10 | CZ | 12 | | | 12 |
| | FI | | 2 | | 2 |
| | FR | 3 | 7 | 3 | 13 |
| | NO | | 1 | 1 | 2 |
| | PL | | | 1 | 1 |
| 10 Total | | 15 | 10 | 5 | 30 |
| Grand total | | 582 | 312 | 211 | 1 105 |

## Appendix D: Safety considerations in the aerodrome field

### Introduction

Air safety is well known to be very high with a very low rate of accidents for commercial air traffic in comparison with the total number of flights or number of passengers (0.01 fatalities per 100 million miles flown). The common requirements for the ADR rules will help Europe to be better prepared for the future increase in air passenger transport projected by several studies.

A first brief overview with the following figure shows that approximately 20 % of the worldwide commercial accidents[22] occur in the EASA Member States, which is a relatively low number.

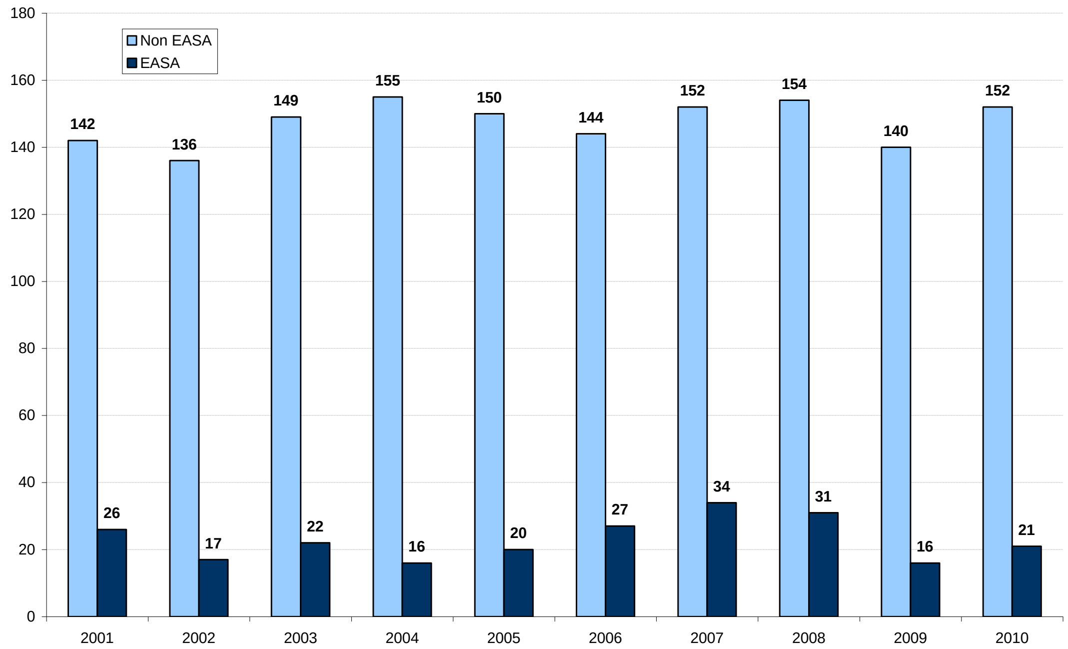


**Figure 4: Number of accidents by world regions**

Looking at absolute values by phase of flights, aerodromes can be seen as the critical location where efforts have to be constantly performed to maintain a uniform high level of safety with the involvement of different types of actors on aerodrome platform[23] (figure 3).

More than 80 % of all aircraft accidents in commercial air transport operations occur at or near an aerodrome. The following figure gives a brief overview of the number of accident per main flight phases: 'approach and landing' as well as 'standing and taxi' provides the most numerous cases of accidents compared to 'take-off'. This means that the aerodrome, as well as its surroundings, is the area which may see the largest proportion of safety events, varying from hazardous events (e.g. non-stabilised approaches of the runway by an aircraft) to fatal accidents.

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22 Aeroplanes in commercial air transport with a MTOM above 5 700 kg.

23 The draft aerodrome related regulation proposed by the Agency does not of course aim to reduce the number of all accidents as many of them are not directly related to the airport infrastructure.

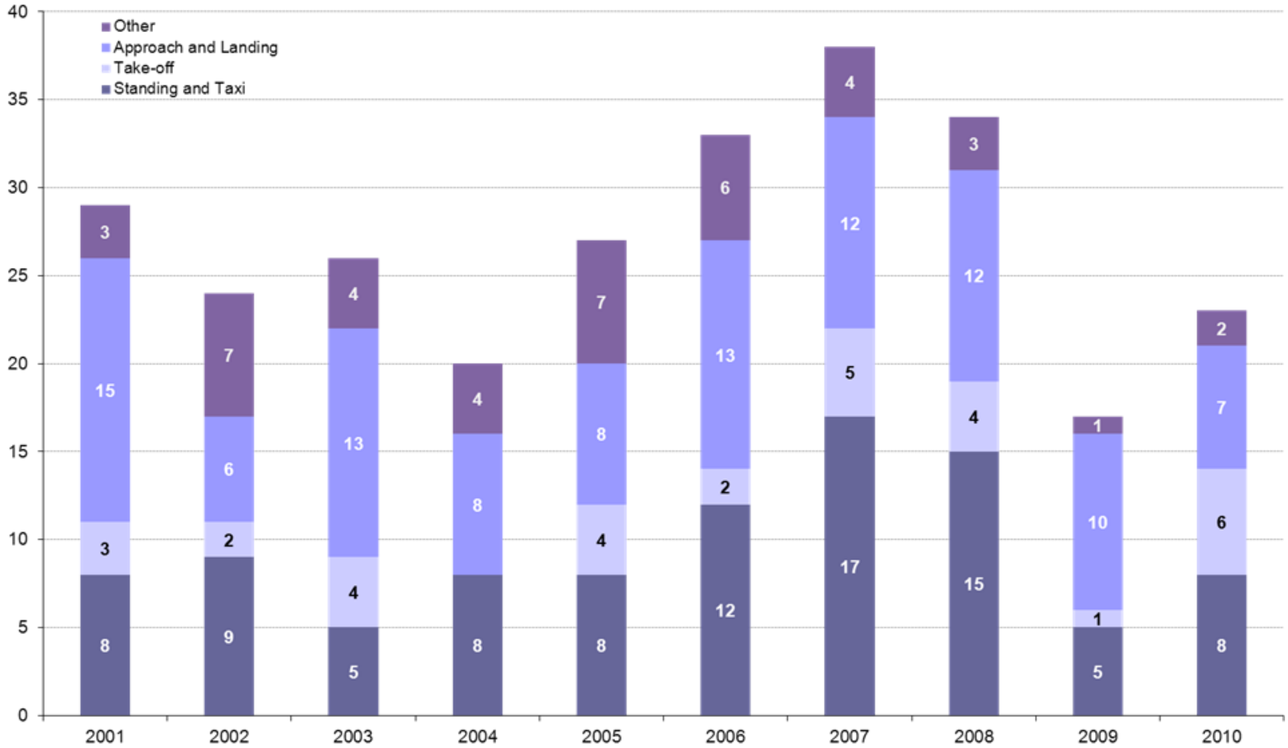


**Figure 5: Number of accidents in EASA MS by phase of flight.**
**Aeroplanes in commercial air transport with a MTOM above 5 700 kg.**

It is, therefore, imperative that rules aimed at maintaining and further improving aviation safety at such geographic areas provide adequate safety standards to be met, as well as guidance for their implementation by both the aerodrome operators and the national aviation competent authorities. The current standards and recommended practices (SARPs) contained in Annex 14 to the Chicago Convention prescribe several elements of the aerodrome system, while they constitute the minimum requirements that signatory States to the Chicago Convention agree to meet.

As accidents occur on different locations of the aerodrome field, the rules have to cover a wide range of requirements. This fact makes it worth considering if ICAO 'recommendations' have to be considered in the development of the draft ADR rules.

Also, the Chicago Convention allows for national differences from these SARPs, which may lead to seriously or otherwise differentiated aerodrome operating environments at aerodromes. However, given the need for interoperability and the undisputable relation between the various components of the aviation system, it is only for the benefit of safety that such SARPs are harmonised throughout Europe, thus aiming, to the extent possible, at creating a seamless aerodrome operating environment and therefore contribute to the provision of a harmonised and high level of safety along all European regions.

The issue of the draft aerodrome rules proposed by the Agency is to get European common requirements and certification process to maintain the above high level of safety and to help Europe to be better prepared for the future increase in air passenger transport projected (section 2.1.1).

This brief report aims to highlight the reasoning, as well as safety issues, behind some of the aerodrome safety rules. In some cases an accident is used as an example and in others the frequency or a number of accidents. The choice of these accidents was based on the amount of information available in the ADREP accident records.

**Taxiway markings and taxiway width**

The SARPs contained in Annex 14 describe design requirements for the physical characteristics of an aerodrome. These include the width of taxiways, the clearances of the wheels of the aircraft from the edges of taxiways, the separation distances between taxiways and runways, other taxiways as well as objects, etc. It is worth stating that the vast majority of these requirements have the form of recommended practices.

Such requirements intend to satisfy the need for the safety, as well as the regularity of aircraft movement around an aerodrome, taking into account the physical and operational characteristics (dimensions, turning capabilities, etc.) of the aircraft for which the aerodrome facilities are intended. On the other hand, these requirements need to provide the necessary safety margin for avoiding events that could otherwise lead to damage of individual aircraft or collisions between aircraft, mainly as a result of deviations from their intended ground route, which may be caused by factors such as human error, system malfunction, slipperiness of the pavements, lack of visual cues, etc.

The provision of the necessary markings in taxiways is of equal importance. The markings are part of the visual aids (lights, markings, signs and markers) at an aerodrome, which provide flight crews, as well as other parties (e.g. car drivers) with the necessary visual cues for their safe movement. These visual aids are of primary safety importance especially under adverse weather conditions, or at night or at aerodromes with a complex layout. It is worth noting that visual aids, along with other parameters, are considered to be essential for the avoidance of runway incursions, which in some cases have caused deadly accidents.

Markings are therefore used for many purposes at an aerodrome, such as to identify the routes to be followed by the aircraft while taxiing, the points where they have to stop, to provide mandatory instructions or information to aircraft flight crew or drivers, to identify permanently of temporarily closed operational areas of the aerodrome, etc. However, the lack of appropriate markings or additional markings necessitated by the individual aerodrome design (e.g. multiple runway ends in the same location) may result in the entry of the aircraft on the wrong runway and the consequent departure from there. In an FAA ASIAS report on 'Wrong Runway Departures' published in 2007, almost 700 events were found which related to aircraft entering a runway other than the one intended.

It follows that flight crews, as well as other personnel, rely significantly on the information provided by such visual aids. Given the international character of aviation, these visual aids have to be harmonised in all respects in order to provide unambiguous and accurate safety-related information and meet the expectations of the aerodrome users in terms of the aerodrome operating environment. Such common requirements of the markings need to cover all aspects, such as colours, dimensions, location, etc. This is already achieved in the SARPs contained in Annex 14.

On the other hand, the lack of such requirements for aerodrome design or the non-proper operation of such aerodrome facilities alone can make impossible the development of the necessary certification basis of an aerodrome, or even lead to accidents.

*As an example, on 8 August 2005 an aircraft was taxiing behind a row of parked aircraft. The taxiing aircraft's crew was instructed to park between the 5th and 6th parked aircraft in the row. According to the accident report, the aerodrome operator had failed to provide adequate clearance between taxiing and parked aeroplanes, as there were no markings (parking limit lines) installed between the parking block and the adjacent taxiway. As the aircraft was on the taxiway centre line, its right wing struck the tails of the two first aeroplanes in the row.*

This accident shows that the provision of the appropriate taxiway width, as well as the appropriate taxiway markings are important for aviation safety, especially considering the fact that in most modern large jet aircraft the wingtips are not visible from the flight crew position.

It is for these reasons that the proposed CSs contain the current ICAO Annex 14 SARPs with regard to the physical characteristics of the taxiways, as well as the aerodrome markings.

Markings are also necessary in the apron of an aerodrome to provide the necessary guidance to the aircraft and the personnel operating in the apron, as well as the necessary safety distances from other aircraft and objects, during ground operations. Lack of such guidance may lead or contribute to accidents.

*As an example, on 19 January 2004, the wing of an Airbus A320 collided with an apron light pylon during taxiing out of an apron stand, under its own power. The impact caused the lighting tower to collapse with the light array impinging on the upper aft section of the aircraft's fuselage and the upper surface of the wing causing fuel to leak from the outer fuel tank. The aircraft had been parked in a general aviation's stand, for which the previous day the pilot of another A320 had reported that the taxiing instructions were confusing, given that no detailed chart of the parking position existed and there were no clear ground and taxi markings. The accident investigation report found that the apron did not have clear and adequate markings providing guidance and wing tip clearance during taxi-out, in accordance with Annex 14 SARPs. It also identified, amongst others, the operation of the aircraft on an apron that lacked the necessary facilities to accommodate code C aircraft and the fact that there was a misjudgement of the wing-tip clearance by the crew exacerbated by the absence of appropriate apron surface lead-out and taxi markings, as factors to the accident.*

Currently, with the exemption of one standard, all other relevant requirements contained in Annex 14 in relation to apron markings are in the form of recommended practices. Given the importance of the apron markings for the safety of aircraft in this area of the aerodrome, and therefore the compelling need to establish the certification basis of each aerodrome in a way that takes into account these important elements, the Agency has decided to include these Annex 14 SARPs, as proposed in CSs, in apron markings.

**Visual aids — Runway lights**

As already stated, Annex 14 contains requirements regarding the necessary visual aids, including the lights to be provided at an aerodrome.

Thus, depending on their type of operations, aerodromes are provided with approach lighting systems, visual approach indicator systems, runway threshold identification lights, runway edge lights, runway centre line lights, runway end lights, runway touchdown zone lights, stopway lights, taxiway centre line lights taxiway edge lights, stop-bars, etc.

The lights provided at an aerodrome are used, always in conjunction with other visual aids, by the flight crew during all phases of the flight.

The configuration of the lighting system provides guidance information to the flight crews, while the colour of the lights provides information concerning the location of the aircraft within each aerodrome system. In addition, the intensity and coverage of the lighting system play an important role in the configuration and colour of the lighting system of an aerodrome.

Given the above, it does not need to be emphasised again that the characteristics of the lighting systems must be harmonised in order to provide a uniform aerodrome operating environment that anticipates the operational expectations and needs of the aerodrome users.

Put reversely, a difference in the colours of the lights or the lack of appropriate lights for certain types of operations, or the use of lights that do not have the appropriate characteristics or the non-standardised configuration of the lighting systems, may take away valuable operational information from the flight crews, or may lead to a loss of situational awareness and inappropriate decisions.

*For instance, on 15 January 2009 a Learjet 35 lined up the runway for take-off. The runway lighting had a non-standard layout. The runway edge lighting was actually 75' in from each edge of the paved surface, delineating a runway of the standard 150' width. The pilot flying thought had lined up on the centre line lighting for take-off, given that the position of the edge lighting was 75' from the pavement edge. In darkness, the crew was unaware that they had lined up with the runway edge lights instead of the centre ones. Take-off roll begun and the* *aircraft struck 20 runway lights on take-off resulting in significant damage to the landing. The significance of the damage became evident upon landing at the destination airport.*

This accident shows that a standardised layout of runway lights can be critical in ensuring safety, especially if crew are unfamiliar with an aerodrome and are expecting the same standards in all aerodromes they operate.

Therefore, given the significance of providing uniform aerodrome lighting systems, the decision was made to elaborate common requirements for CSs based on the ICAO Annex 14 SARPs. The CSs are included, as appropriate, in the certification basis of each aerodrome.

**Obstacle Free Zones (OFZ) and Limitation Surfaces (OLS)**

Annex 14 SARPs require that the area around an aerodrome, and more specifically a runway, is free from high obstacles in order to allow safe operations to and from the aerodrome. These zones are comprised of notional surfaces of specific inclination and length, depending on the runway characteristics, the operation or the area they aim to protect. The obstacle free zone aim to safeguard the direct vicinity of the runway, ensuring the safety of flight operations. This zone ensures that safety is maintained in cases where an aircraft deviates from the runway or, in general, is not aligned with the runway centre line.

*On 1 March 2008 an Airbus A320 made an off-centre line landing under strong gust and crosswind conditions, which brought great part of the aircraft wings outside of the runway shoulders. The aircraft sustained only minor damage due to scraping on the runway, but no damage from any obstacles or structures near the runway.*

Aerodromes have to be safeguarded through these zones and surfaces against other developments such as high wind turbines or other structures. A uniform standard needs to be maintained while time taking into account special local conditions and geography. This will aim to ensure the highest level of safety with minimum impact on restricting aerodrome operations.

Numerous unstabilised approaches or near-CFIT accidents would have severe consequences had it not been for these OLS prescribing areas free from any obstacles.

**Rescue and Fire-Fighting (RFFS) response time**

Annex 14 SARPs require the provision of rescue and fire-fighting equipment and services at an aerodrome. It is necessary to underline that in the same Annex it is stated that *'the principal objective of a rescue and fire-fighting service is to save lives in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. The rescue and fire-fighting service is provided to create and maintain survivable conditions, to provide egress routes for occupants and to initiate the rescue of those occupants unable to make their escape without direct aid. […] The most important factors bearing on effective rescue in a survivable aircraft accident are: […] and the speed with which personnel and equipment designated for rescue and fire-fighting purposes can be put into use'.*

To this end, Annex 14 contains SARPs related to the level of rescue and fire-fighting protection to be provided, the vehicles and extinguishing agents to be used, the rescue and fire-fighting personnel and their training, the response time of rescue and fire-fighting services, etc.

In particular, currently the relevant SARPs of Annex 14 require that *'the rescue and fire-fighting service shall […] achieve a response time not exceeding three minutes to any point of each operational runway, in optimum visibility and surface conditions',* while at the same time it recommends that the response time should be two minutes.

The reason for such response times is obvious: if an aircraft is on fire, then very high temperatures develop quickly, while the smoke produced reduces the visibility of the people on board and their ability to efficiently move and evacuate the aircraft, and additionally they may face respiratory problems[24].

Thus, in order to prevent such situations, the rescue and fire-fighting services should be able to respond as soon as possible in order to prevent the spreading of and finally, if possible, extinguish the fire, while making the evacuation of the aircraft and the rescue of the people on board possible. It is also evident that this requires suitably trained personnel and adequate organisation and coordination between all persons and organisations involved in the provision of the rescue and fire-fighting services.

In commercial air transport operations worldwide, post crash fires, which have an effect on the severity of an accident occurred, on average in 5 % of all accidents every year during the decade between 2001 and 2010. Since the majority of accidents occur at or near an aerodrome, it is important for rescue and fire-fighting services to be adequately in force as well as effective in combating such fires.

Moreover, in 2009, a study conducted by the FAA Technical Centre, focusing on commercial aircraft accidents between 1967 and 2009, showed that out of the 147 selected accidents, 101 were considered as 'survivable', out of which 70 involved fire, while 36 of them were classified as 'ground pool fire' accidents[25].

A late intervention of the rescue and fire-fighting services may lead to complete destruction of the aircraft or even cause deadly accidents.

*For instance, on 6 March 2008 a Transall C-160 completed the landing roll with the brakes having been overheated during the landing, due to the inability to use engine reverse. Smoke was identified from ATC Unit and soon the crew stopped the aircraft on the taxiway. The rescue and fire-fighting service arrived at the scene approximately 10 minutes after the aircraft stopped and fire retardant was applied another 5 minutes thereafter. The aircraft was finally consumed by the fire. The accident report determined that there was no Emergency Response Plan at the aerodrome and that the rescue and fire-fighting service's delay in applying fire suppressant, resulted in the fire engulfing the aircraft.*

Had the rescue and fire-fighting arrived at the scene within the response times stipulated in Annex 14, it is most likely that the aircraft would not have been destroyed by the fire.

> *In another case, on 7 March 2007, a Boeing 737-497 aircraft overran the departure end of the runway and impacted an embankment before stopping 252 meters from the departure end of the runway. The aircraft was destroyed by the impact forces and an intense, fuel-fed, post impact fire. There were 119 survivors, 1 cabin crew member and 20 passengers were fatally injured, while 1 cabin crew member and 11 passengers were seriously injured. The accident report concluded that the RFFS vehicles could not reach the aircraft to combat the fire due to the lack of emergency access roads, which combined with inadequate/insufficient*

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[24] To increase survivability of accidents, additional requirements related to aircraft certification and operation exist, including crew emergency evacuation training, access to emergency exits, emergency evacuation guidance, fire protection, passenger briefings, etc.

[25] Ground pool fires involve rapture of the aircraft fuel tanks or aircraft fuelling systems and the fuel leak creates an ignited fuel pool on the ground. In cases of pool fires:

i) 50 % of the aircraft evacuations are initiated within 20'' and 90 % within 40'';

ii 50 % of the evacuations are completed within 130'' and 90 % within 325'';

iii) in 50 % of the occasions the RFFS arrive within 4 minutes (240'') and in 90 % of occasions within 12 minutes (720''); and

iv) in 50 % of the occasions the RFFS establish control within 10 minutes (600 seconds) and 90 % of the occasions within 42 minutes (2520'').

Source: *Transportation Research Board, ACRP report; 'Risk Assessment of Proposed ARFF Standards', 2011. ibid at 2.*

*foam agent on the off-airport fire vehicles, the non-coordinated RFFS response, '[…] may have resulted in increasing the number of fatalities and injuries […]'* [26]

*In another case, on 12 December 2007, the wing of a 767 Boeing's collided with an apron light pylon during the parking manoeuvres, causing a 1½ metre long section of the wing to break off. Although there was no fire or fuel leak, the accident report considered that '[…] the fire-fighting vehicle's delayed arrival at the accident site must be considered unreasonably high (16 min after the a/c was brought to a stop) […]'. Had a fire started in this case, it is likely that the consequences of this accident would have been different*.

Thus, it is understood that although rescue and fire-fighting services at aerodromes are seldom needed, when their intervention is required, it should be in a timely manner and of the appropriate level.

To this end, the Agency has decided to adopt the existing SARPs of Annex 14, with regard to the emergency planning and the provision of rescue of fire-fighting services, including the response time to be met.

**Foreign Object Damage**

Aerodrome rules describe the process which has to be undertaken by aerodrome operators with regard to preventive maintenance of the movement area of an aerodrome. In this context, Annex 14 foresees that the aerodrome operator should inspect all surfaces of the movement area of an aerodrome, *'with the objective of avoiding and eliminating any loose objects/debris that might cause damage to aircraft or impair the operation of aircraft systems'*. Such objects or any other kind of objects irrespective of its size, or the material it is made of, known as Foreign Object Damage (FOD), may cause damage to aircraft.

Such damage may be caused either to the engines, the propellers of the aircraft, or other aircraft parts, or even to other aircraft, vehicles or people as a result of FOD 'thrown away' by engine blast. The damage caused by an FOD may differ depending on each case.

The presence of the FOD may be the result of many factors, such as strong winds, aircraft engine or propeller blast that have thrown debris into the runway or taxiway, damaged pavements, pieces of aircraft tire, wildlife that have been hit by aircraft, etc. In the apron, due to the different kind of activities that take place, the situation may be different, as mostly the FOD tend to include *'bottles, cans, stoppers, bottle caps, lost hand tools, personal belongings, nails, screws, bolts, paper, rubber, wire, plastic material, wooden, textile, synthetic and metal parts of all sizes from boxes, cases, pallets, containers and other packing devices'*[27].

Due to the significance of the consequences of such events, Annex 14 contains also requirements regarding the frequency of such inspections, and guidance on the implementation of such preventive maintenance.

However, as with almost all safety risks, the FOD issue may not be addressed simply by operational measures. Another way to address it is through several aerodrome infrastructure design requirements which exist in Annex 14. For instance, the emergency access roads should *'[…] be surfaced to prevent surface erosion and the transfer of debris to the runway […]'*. Again, training of all personnel operating airside an aerodrome is another effective way of addressing this issue.

There are not many accidents that have occurred due to FOD. Probably the most well known one is the destruction of a Concorde in 2001 during the take-off phase which was primarily the

[26] 'A reasonable estimate would be that one fourth of the fatalities and injuries might have been *prevented by an ARFF response that met ICAO standards'.*

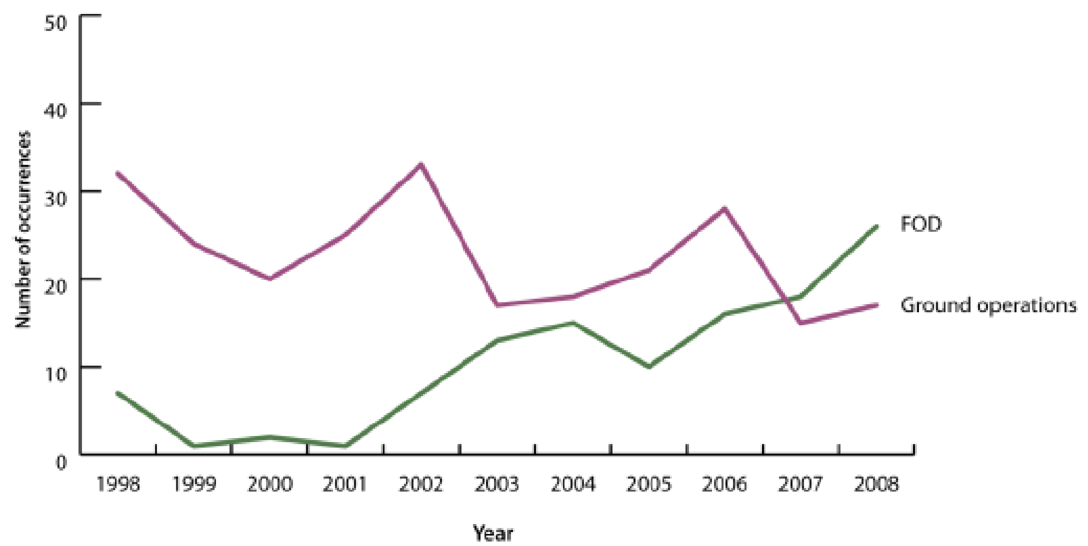
[27] ICAO, Airport Services Manual, Part 2, Pavement Surface Conditions.

result of FOD. Nonetheless, most of the FOD events are incidents which may damage engines, aircraft tyres, or the aircraft body, and result in flight returns and delays for repairs[28].

A global view for Europe is provided by the European Central Repository (ECR) for air safety occurrences: more than 800 FOD have been found in 2010 in European aerodromes. The relative short historical FOD series in the ECR does not allow for more in-depth analysis, but it is interesting to consider this analysis on Australian data.

In Australia, in the period between 1998 and 2008, 116 FOD occurrences (30 % of all reported occurrences) had been reported to the Australian Air Transport Safety Bureau, which affected high capacity air transport aircraft[29]. The number of FOD occurrences increased from 7 in 1998 to 26 in 2008.

**Figure 4: Ground occurrences by year, 1998 to 2008**




Aircraft damage from foreign objects is an issue which has to be tackled by the aerodrome operators in cooperation with several of their stakeholders. However, the primary and coordinating role in this belongs to the aerodrome operators themselves.

To address this issue, the Agency has therefore included in its draft rules all relevant ICAO SARPs at two different levels in order to encompass all available means and methods to address this issue. Therefore, the draft rules move firstly at the level of the necessary CSs, and secondly at the level of the implementing regulations, which have both an operational (maintenance procedures, etc.), as well as organisational dimension (coordination between all parties, as well as training of personnel).

**Runway friction characteristics and runway contamination**

There are numerous accidents in which runway surface condition played a role in accidents as well as incidents. In a report prepared by the NLR for Eurocontrol in 2011, contaminated

[28] Apart from the direct cost that is associated with the FOD occurrences, one should also take into account the associated indirect costs, such as: loss of business, damage to reputation, lost time and overtime, insurance premiums, fuel, airport operating disturbances, hotels, aircraft rescheduling, etc.

[29] Source: Australian Air Transport Safety Bureau, '*Ground operations occurrences at Australian airports 1998 to 2008*', 2010. The Australian Air Transport Safety Bureau defines a high capacity aircraft as one with a maximum payload exceeding 4,200 kilograms or having more than 38 seats.

runways are identified as a causal factor in almost 37 % of all occurrences involving a landing veer-off and almost 59 % for landing overruns.

In an EASA report, it has been identified that the rate of runway excursion accidents and serious incidents has overall increased in the years between 2000 and 2009.

*In one of these accidents on 6 January 2003 a DHC-8-100 an aircraft exerted the runway during landing due to poor breaking action on a slippery and ice-covered runway.*

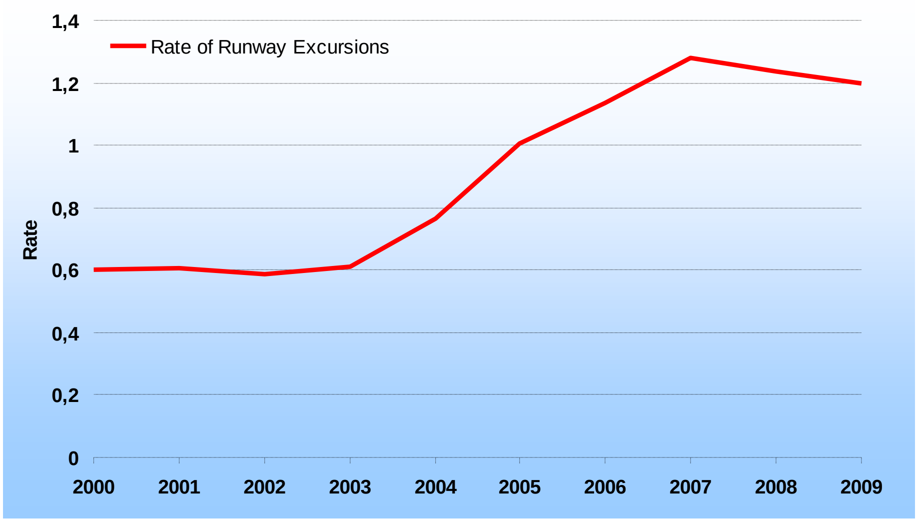



**Figure 5: Rate of runway excursions in commercial air transport 2000–2009 per million movements.**

Given the importance of this issue, the proposed rules contain operational requirements to address it.

## Appendix E — Iterative process case study/draft ADR rules

The first draft of the ADR rules was sent in July 2011 to the Member States involved in the case study exercise. The Member States sent back their comments between mid-September and mid-October 2011.

The Agency took them into account when relevant and there were exchanges of emails to clarify these comments.

Overall, the comments can be grouped in 5 categories:

1) Aerodrome operator responsibility: clarifications were provided by the Agency on the understanding of the aerodrome operator responsibility

2) The conversion process for existing certified aerodromes: the length of the conversion period (48 months) was confirmed and the DAAD was indicated as a beneficial solution to facilitate the conversion of the existing national aerodrome certificate.

3) Administrative workload: some MS pointed out the increase in administrative workload. This is already recognised in the previous impacts assessments done by the Agency and EU when the scope of the BR was extended to aerodromes. These reports indicated that this workload increase (mainly) during the conversion of the aerodrome certificates will be balanced with a better efficiency regulation process overtime. The case studies did not find counter-examples to the outcomes of these reports.

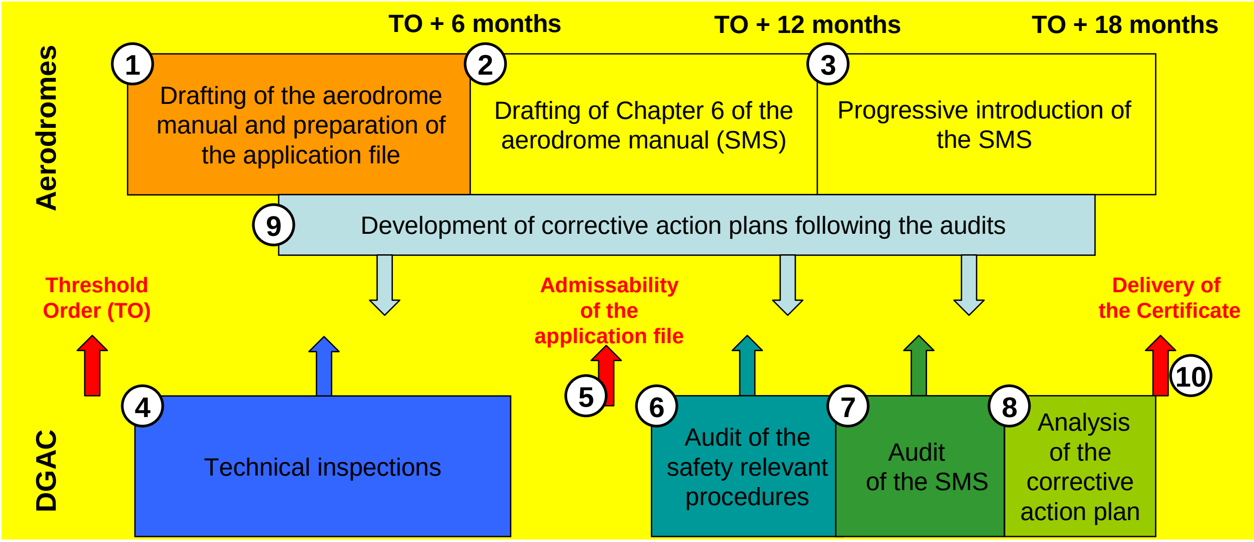
4) Comments on the CSs and IR.OPS in relation with the selected ICAO Annex 14 SARPs: clarifications were provided by the Agency on how to apply these CS and IR.OPS.

5) Some MS identified impacts on small aerodromes which are below the BR passenger threshold exemption: the fact that these aerodromes are impacted is inherited from the BR threshold and the draft ADR rules have been proportionate by providing flexibility, for instance on the SMS implementation on smaller aerodromes.

**Appendix F — Examples of existing national certification process**

**France**

**Figure 6: Aerodrome certification process in France (year 2009)**



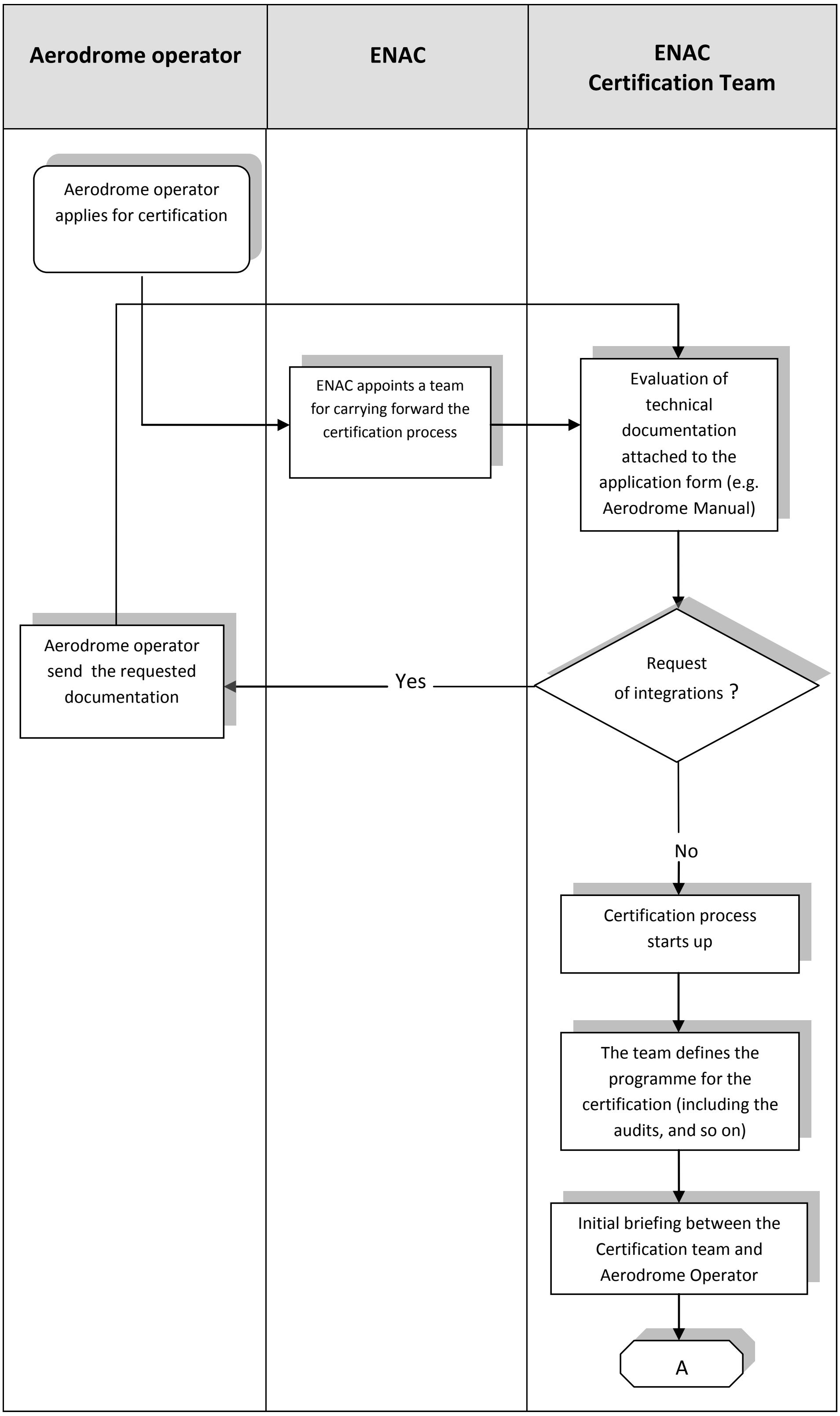

Note for the Figure 6: Update of the process in 2011

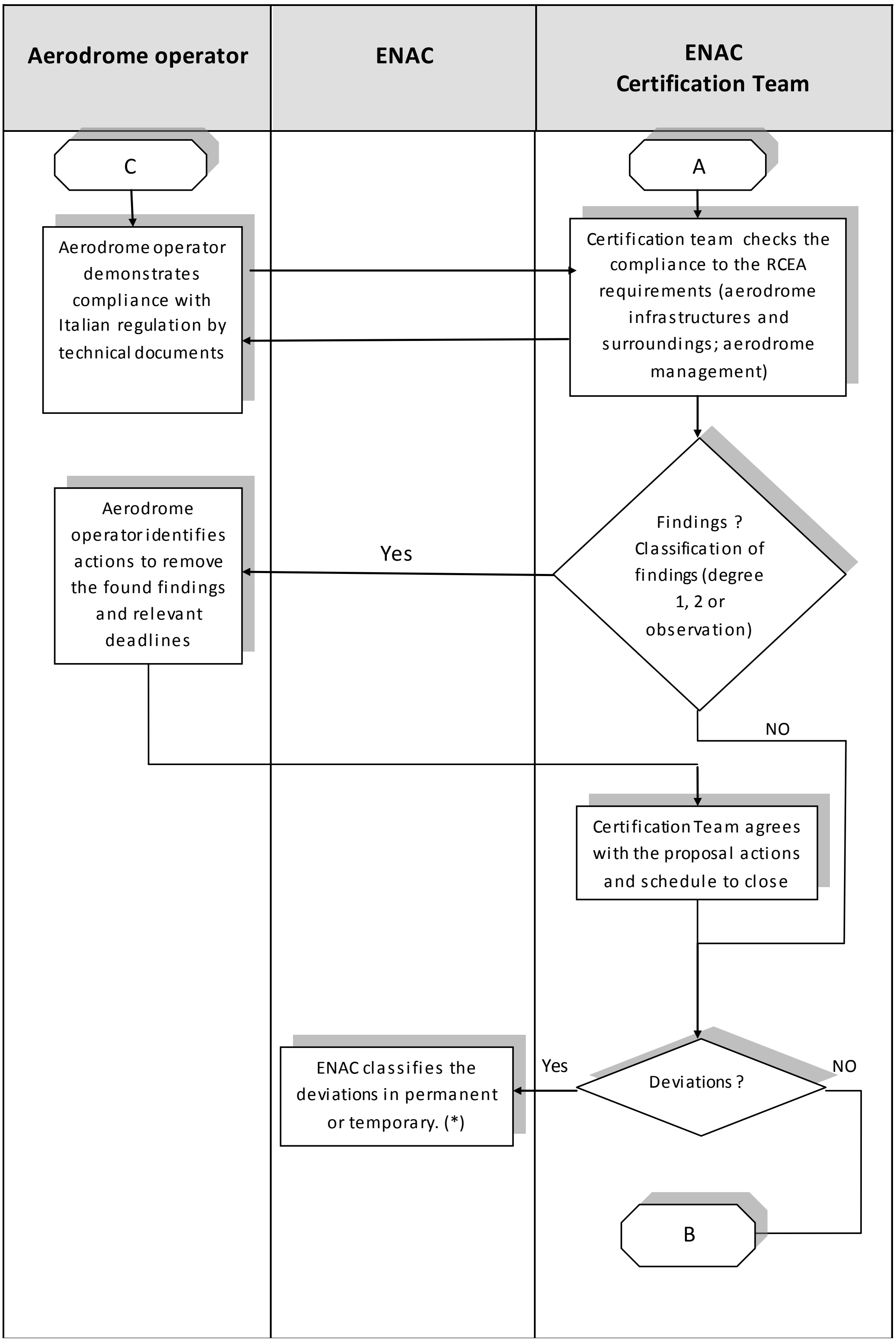
- The period between 1 and 3 on the flowchart is now requested at TO + 8 months, and not anymore TO + 12 months.
- The step 6 on the flowchart is now included in the step 7, this is performed at TO + 14 months.

*Note: the step 4 'Technical inspections' consists mainly of a re-check of the results of the 'Homologation'. This homologation is similar to a pre-certification step and gives certain rights for aerodrome operations.*

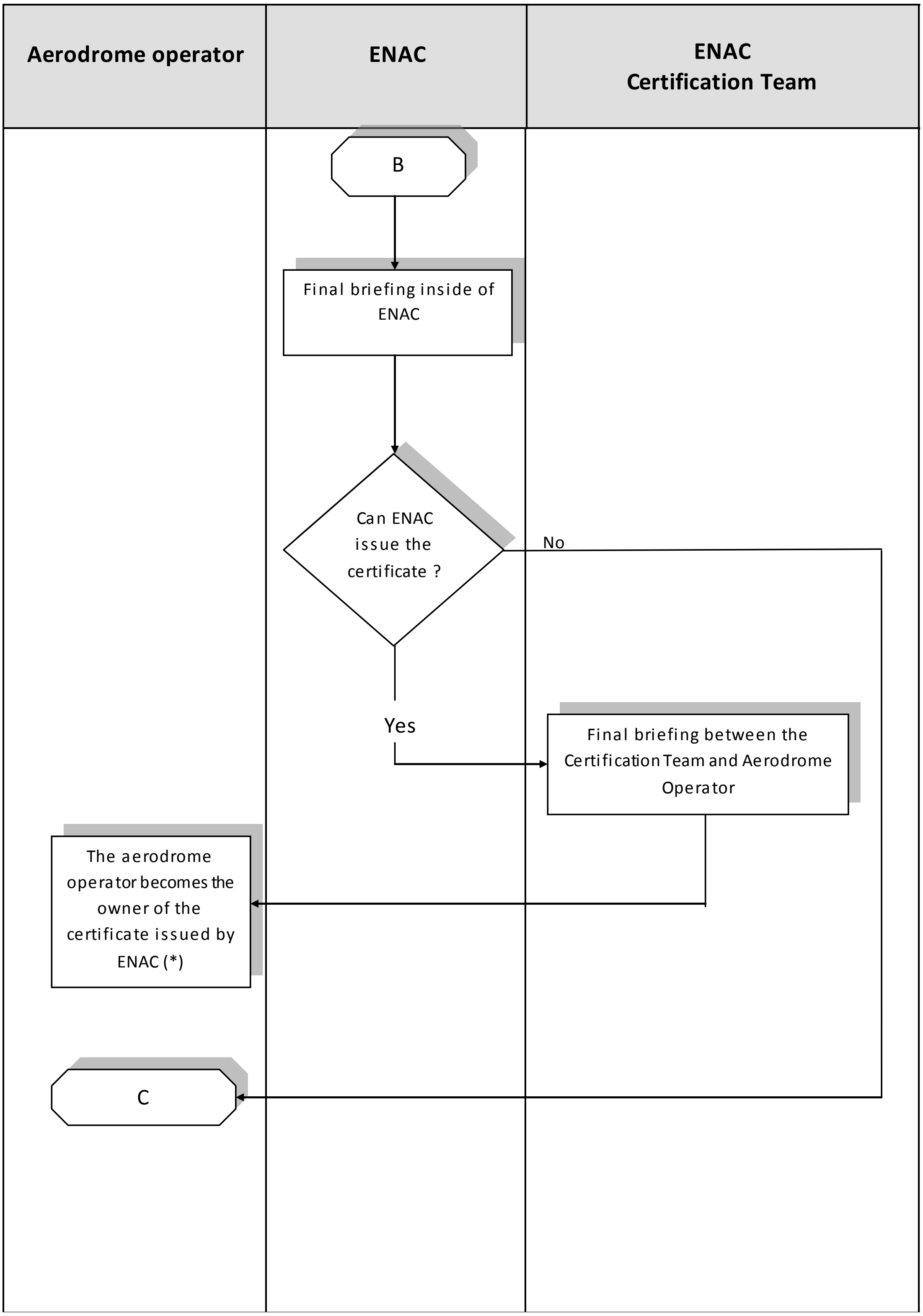
## Italy

**Figure 7: Aerodrome certification process in Italy (year 2011)**






(*) ENAC is the responsible authority regarding the acceptance of deviations to national rules.




(*) The validity period of a certificate is three (3) years.

**Appendix G — Aerodrome operator and stakeholders responsibilities**

*(in relation with section 6.3.1)*

The BR (EC) No 1108/2009 addresses the need to clarify the different levels of responsibility for aerodrome certification and operations. The draft ADR rules specify the details of these responsibilities per stakeholder.

The responsibilities for each stakeholder acting in an aerodrome are defined at two different levels in the draft ADR rules:

- in the Implementing Rule (IR) for Organisation: ADR.OR.C.005,
- in the relevant Implementing Rules for Operation and/or Acceptable Mean of Compliance and/or Guidance Material.

*ADR.OR.C.005 — Operator responsibilities*

*(a) The aerodrome operator is responsible for the operation and maintenance of the aerodrome in accordance with:*

*(1) Regulation (EC) No 216/2008 and its Implementing Rules;*

*(2) the terms of approval of its certificate;*

*(3) the content of the aerodrome manual; and*

*(4) any other manual for the aerodrome equipment available at the aerodrome, as applicable.*

*(b) The aerodrome operator shall have formal arrangements in place with organisations that provide services at the aerodrome, including, but not limited to:*

*(1) air traffic services;*

*(2) aeronautical information services;*

*(3) communication, navigation and surveillance services;*

*(4) meteorological services;*

*(5) design and maintenance of the flight procedures;*

*(6) ground handling services;*

*(7) security services;*

*unless such services are provided directly by the aerodrome operator itself.*

*(c) An aerodrome operator shall coordinate with the competent authority to ensure that relevant information for the safety of aircraft is published, and is contained in the aerodrome manual, including where appropriate:*

*(1) exemptions or derogations granted from the applicable requirements;*

*(2) provisions for which an equivalent level of safety was accepted by the competent authority as part of the certification basis; and*

*(3) special conditions and limitations with regard to the use of the aerodrome.*

Examples:

The aerodrome operator ensures that service providers and other third parties at the aerodrome have in place procedures to manage safety adequately in their aerodrome-related operations.

Third parties:

*The audit of third parties, even though it is the key element of the aerodrome operator's internal audit process, is proposed in an AMC in order to provide flexibility for alternative solutions in monitoring the safety performance.*

Fuel providers:

*ADR-OPS.B.055 — Fuel quality*

*The aerodrome operator shall ensure that organisations involved in storing and dispensing of fuel to aircraft have procedures to verify that aircraft are provided with uncontaminated fuel and of the correct specification.*

*AMC — ADR-OPS.B.055 — Fuel quality*

*(a) The aerodrome operator should ensure, either by itself or though formal arrangements with third parties, that organisations involved in storing and dispensing of fuel to aircraft, implement procedures to:*

- *a. maintain the installations and equipment for storing and dispensing the fuel in such condition so as not to render unfit for use in aircraft;*
- *b. mark such installations and equipment in a manner appropriate to the grade of the fuel;*
- *c. take fuel samples at appropriate stages during the storing and dispensing of fuel to aircraft, and maintain records of such samples;*
- *d. use adequately qualified and trained staff in storing, dispensing and otherwise handling fuel on the aerodrome.*

*GM — ADR.OPS.B.055 — Fuel quality*

*The aerodrome operator, in order to ensure compliance, may use:*

1. *audit reports to organisations involved in storing and dispensing of fuel to aircraft, or*
2. *relevant national procedures providing for the assurance of fuel quality.*

## Appendix H — Case of aerodromes fluctuating around the BR passenger threshold

The potential certification burden for existing aerodromes fluctuating around the Basic Regulation aerodrome traffic threshold (BR 1108/2009, Article 4.3b) was analysed in detail:

- Case 1) aerodrome exempted by a Member State from traffic threshold consideration which would then exceed this threshold, and this after the possibility to use the DAAD mechanism.
- Case 2) certified aerodrome falling under the traffic threshold after the conversion period.

France being the largest country in terms of aerodromes under the BR scope with also the highest share of potential exempted aerodromes, passenger traffic series for French aerodromes were used for the period between 2001 and 2010.

Case 1

Over a 10-year period for France, Table 22 shows that 20 % of the aerodromes below the annual 10 000 passengers threshold exceeded at least one year this threshold, but only 6 % of the aerodromes below the annual 10 000 passengers threshold exceeded this threshold for more than 3 consecutive years. This would mean that 4 small aerodromes would have to follow the certification process. By the end of 2019, it is envisaged that most of the aerodromes with potential traffic growth will have the chance to undertake this certification process and so be able to use the DAAD mechanism.

This factor of 3 consecutive years above 10 000 passengers has been included in the draft ADR rules to define whenever an aerodrome certificate shall be requested.

Case 2

Aerodromes between 10 and 30 000 annual passengers in 2010 are 88 % to have more than 3 consecutive years above the 10 000 annual passengers threshold, but 63 % were below this threshold at least one year. The fluctuation around the threshold looks much more important for this range of aerodrome traffic size. Nevertheless, in terms of number of aerodromes, there are only 5 out of 8 aerodromes with traffic between 10 and 30 000 passengers falling down the passenger threshold at least one over a 10-year period, and this for a country that has 3 times more aerodromes under BR scope than the following one.

Out of these 5 aerodromes, only one is not subject to the certification process because its traffic was only above 10 000 passengers during the year 2010 and only one aerodrome is below the passenger threshold for 60 % of the period analysed.

Therefore, it is considered that the impact of maintaining certification for aerodromes fluctuating around the 10 000 passenger threshold is very limited for France, and not significant or even not existing for other countries. Also, it has to be considered that by the end of 2019 several small aerodromes fluctuating around the BR threshold will be certified, thus the potential numbers of aerodromes fluctuating around this threshold will be even lower from 2020.

**Table 22: Aerodromes traffic fluctuation around the 10 000 passenger threshold**[30]

| *Country: France* | *Aerodrome per size of commercial passenger traffic, according to year 2010* | | | |
|---|---|---|---|---|
| | < 10000 | [10 to 30 000] | [30 to 120 000] | > 120 000 |
| | (Basic Regulation threshold) | | | |
| Number of aerodromes | 71 | 8 | 12 | 35 |
| The following analysis is based on a period of 10 years (2001–2010) | | | | |
| Aerodromes with at least 3 consecutive years above BR threshold | 4 | 7 | 12 | 35 |
| Percentage of aerodromes with at least 3 consecutive years above BR threshold | 6 % | 88 % | 100 % | 100 % |
| Aerodromes fluctuating around the BR threshold | 14 | 5 | 12 | 35 |
| Percentage of aerodromes fluctuating around the BR threshold | 20 % | 63 % | 17 % | 100 % |

[30] Percentage values are rounded.

**Appendix I — RIA case studies examples of deviation and conversion process**

**<u>Overview</u>**

The case studies gave the opportunity to get information on current deviations versus national rules or ICAO Annex 14. Some of the past deviations are now solved: they are mentioned when they are relevant to demonstrate what could have been done in the past if the draft European rules would have been in place.

An overview table is available in section 6.2.5.

<u>**Example of deviations — details**</u>

***Example of deviation — CZ — Karlovy Vary — Width of RWY strip***

## 1 Current situation (with national rules)

### *1.1 Facts*

Total width of runway strip = 178 m (instead of 300 m). This is not compliant with ICAO Standard 3.4 Runway Strip.

### *1.2 Issue(s)*

Width of the runway strip is too short.

### *1.3 Type of ADR operator measures to mitigate the issue*

No mitigation measure.

### *1.4 Approval of these measures in the current national ADR certification process*

This official exemption was published by the Ministry of Transport , the only government body empowered to issue regulations providing for exemptions from the environment of aerodromes on the implementation of Annex 14 to the Chicago Convention. Exception is accepted on a permanent basis without any mitigation measures.

<u>Note from NAA (July 2011):</u>

From the position of authority as a subordinate body is there is no opportunity to review individual decisions of the Ministry of Transport.

The deviation is inherited from Ministry of Transport decision done in the past. With the future European rules on aerodrome certification, NAA will re-assess these deviations.

For LKKV, NAA will certainly request a safety analysis on the deviation for width of runway strip and any mitigating procedure in place.

## 2 Future situation (with draft European rules)

### *2.1 CS 'Runway strip'*

**CS-ADR.B.140 — Runway strip to be provided**

(a) A runway and any associated stopways should be included in a strip. The runway strip is a defined area including the runway and stopway, if provided, intended:

(1) to reduce the risk of damage to aircraft running off a runway; and
(2) to protect aircraft flying over it during take-off or landing operations.

**CS-ADR.B.145 — Length of runway strip**

(a) A strip should extend before the threshold and beyond the end of the runway or stopway for a distance of at least:

(1) 60 m where the code number is 2, 3 or 4;
(2) 60 m where the code number is 1 and the runway is an instrument one; and
(3) 30 m where the code number is 1 and the runway is a non-instrument one.

**CS-ADR.B.150 — Width of runway strip**

(a) A strip including a precision approach runway should, wherever practicable, extend laterally to a distance of at least:

(1) 150 m where the code number is 3 or 4; and
(2) 75 m where the code number is 1 or 2; on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(b) A strip including a non-precision approach runway should extend laterally to a distance of at least:

(1) 150 m where the code number is 3 or 4; and
(2) 75 m where the code number is 1 or 2; on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(c) A strip including a non-instrument runway should extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least:

(1) 75 m where the code number is 3 or 4;
(2) 40 m where the code number is 2; and
(3) 30 m where the code number is 1.

### *2.2 Status of deviations with the draft European rules*

The ADR deviates from the CS.

### *2.3 Example of a possible answer to accept the ADR deviation*

Under the new European process, a possible way to justify the current deviation(s) would be supported by a 'Special Condition':

The NAA will need to determine with the aerodrome operator special conditions, based on a safety assessment, that provide a satisfactory and safe operation with the reduced width runway strip. The conditions to be applied will include: type of aeroplane operation; limiting ground movement of aeroplanes on taxiways when there is an aeroplane on approach within a specified range; limiting aeroplane approaches when the crosswind component exceeds a specified value.

The 2 other ways would be discarded for the following reasons:

- ELoS: the infrastructure constraints on the south side of the runway preclude the full width strip being available, therefore an equivalent level of safety cannot be achieved (ELoS not available);
- DAAD (Deviation Acceptance and Action Document): this is a deviation from the CS that while accepted cannot have an action to remove the deviation (infrastructure).

### *2.4 Conclusion: impacts for NAA and aerodromes*

A safety assessment has to be provided. This is already the intention of the CZ NAA.

***Example of deviation — CZ — Praha — Width of taxiway***

## 1 Current situation (with national rules)

### *1.1 Facts*

ICAO Annex 14 - 3.9.5 Width of taxiway

The width of 22.5 is not compliant with the ICAO Annex 14 3.9.5 requirement (23 m for Aerodrome Code E).

### *1.2 Issue(s)*

The aerodrome operator considers that they are nevertheless compliant with the ICAO requirement on taxiway design for Aerodrome Code E (ICAO Annex 14 - SARP 3.9.4)

*'The design of a taxiway shall be such that, when the cockpit of the aeroplane for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway shall be not less than 4,5 meter'*

The biggest wheel track of the aircraft using the aerodrome is the one from B-777. Its wheel track is 12,9 m. It means that the required 4,5 m distance is assured on the 22,5 m width TWY.

### *1.3 Type of ADR operator measures to mitigate the issue*

No need of mitigation measures.

### *1.4 Approval of these measures in the current national ADR certification process*

For the NAA, this is derogation which is approved on a permanent basis and this is document in the Aerodrome Manual.

## 2 Future situation (with draft European rules)

### *2.1 CS to be considered*

**EASA CS on width of taxiways**

CS-ADR-DSN.D.245 — Width of taxiways

(a) A straight portion of a taxiway should have a width of not less than that given by the following tabulation:

| Code letter | Taxiway width |
|---|---|
| A | 7.5 m |
| B | 10.5 m |
| C | 15 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; or |
| | 18 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m |
| D | 18 m if the taxiway is intended to be used by aeroplanes with an outer main gear wheel span of less than 9 m; or |
| | 23 m if the taxiway is intended to be used by aeroplanes with an outer main gear wheel span equal to or greater than 9 m. |
| E | 23 m |
| F | 25 m |

**EASA CS on the clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway**

CS ADR-DSN.D.240 — Taxiways General

Unless otherwise indicated, the requirements in this Subpart are applicable to all types of taxiways.

(a) The design of a taxiway should be such that when the cockpit of the aeroplane for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway should be not less than that given by the following tabulation:

| Code letter | Clearance |
|---|---|
| A | 1.5 m |
| B | 2.25 m |
| C | 3 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; or<br>4.5 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m. |
| D | 4.5 m |
| E | 4.5 m |
| F | 4.5 m |

### *2.2 Status of deviations with the draft European rules*

The width of the taxiway is a deviation from the regulation.

### *2.3 Example of a possible answer to accept the ADR deviations*

The most appropriate approach is to make it a DAAD, as the operator of Prague airport indicated that the next phase of pavement works would include bringing the taxiways up to the full standard width (23 m); this would be the 'action' element of the DAAD.

Until this work is carried out, use of the 22.5 m wide taxiway will be limited to aeroplanes with an outer main wheel span of less than 13.5 m (giving the required 4.5 m clearance to the taxiway edge on both sides; i.e. 2 x 4.5 = 9 + 13.5 = 22.5 in accordance with the CS ADR-DSN.D.225).

The 'action' part of the DAAD should include publishing the limitation in use in the Aerodrome Manual and AIP. The aerodrome operator should be required by the NAA to carry out and report a periodic (say annual) review of the situation until such time as the remedial work is carried out.

### *2.4 Conclusion: impacts for NAA and aerodromes*

As Prague indicated that they will increase the width of the taxiway up 23 m, there is no impact.

***Example of deviation — FR — Annecy — RESA***

## 1 Current situation (with national rules)

### *1.1 Facts*

There is no Runway End Safety Area (RESA).

There is no space to create a RESA and continue the aerodrome operation as today (see an aerodrome map and surroundings configuration).

### *1.2 Issue(s)*

The aerodrome design is less strict than the French regulation because:

- the French regulation was amended in the early 2000s with a requirement to have a RESA of 90 m for new aerodromes (Annecy airport was created in 1939).
- The implementation of a 90 m RESA is incompatible with the commercial operation of the aerodrome. A 90 m RESA would imply to close the commercial operations, which are fundamentals for the CEOs of Annecy region.

### *1.3 Type of ADR operator measures to mitigate the issue*

There are no mitigation measures as a RESA is not mandatory in French regulation for aerodromes existing before the introduction of RESA in the French Regulation.

### *1.4 Approval of these measures in the current national ADR certification process*

Annecy airport is currently under the process of being certified.

Generally, it was preferred to avoid reducing declared distances to provide a safety area at the end of the runway. This safety area is nevertheless recommended for existing aerodromes. A study is currently being done for the installation of RESA at existing French aerodromes.

## 2 Future situation (with draft European rules)

### *2.1 CS related to RESA*

**CS-ADR-DSN.C.210 — Runway End Safety Areas**

(a) A runway end safety area should be provided at each end of a runway strip where:

(1) the code number is 3 or 4; and

(2) the code number is 1 or 2 and the runway is an instrument one.

**CS-ADR-DSN.C.215 — Dimensions of runway end safety areas**

(a) Length of RESA

A runway end safety area should, as far as practicable, extend from the end of a runway strip to a distance of at least:

(1) 240 m where the code number is 3 or 4;

(2) 120 m where the code number is 1 or 2; and

(3) with a minimum distance of at least 90 m.

(b) Where a RESA exceeding the minimum distance, but less than the distance in (a)(1) and (a)(2) is considered necessary, the aerodrome should undertake a safety assessment to identify the hazards and appropriate actions to reduce the risk.

(c) Where an arresting system of demonstrated performance capability is installed, the specifications above may be reduced in accordance with the design specification of the arresting system.

(d) Width of RESA

The width of a runway end safety area should, wherever practicable, be equal to that of the graded portion of the associated runway strip.

**GM-ADR-DSN.C.210**

It is accepted that many aerodromes were constructed before requirements for RESAs were introduced. Where the CS cannot be achieved, the aerodrome should undertake a safety assessment to confirm that a suitable level of safety is achieved.

### 2.2 Status of deviations with the draft European rules

The aerodrome will have a deviation when the European CSs come into force.

### 2.3 Example of a possible answer to accept the ADR deviations

Under the new European process, a possible way to manage, if so decided by the NAA, the current deviation could be accepted by using the DAAD mechanism which requires a safety assessment.

Another approach would be to use the special condition mechanism with restriction or additional measures for operation.

### 2.4 Conclusion: impacts for NAA and aerodromes

In the case of France, it has to be noted that the French NAA is already carrying out a study to assess the safety risks for aerodromes without RESA and to propose possible actions. Depending on the depth of this study, this could constitute a safety assessment which could be reused for each relevant aerodrome. As a consequence, this could reduce the additional need for safety assessment to be carried out at these aerodromes on the basis of the draft European rules.

The study initiated by France to assess the safety risks for aerodromes without RESA being already in line with the future European certification process asking for safety assessment (requested in this CS, in the DAAD, etc.), it is deemed that the draft European rules do not have a significant impact.

***Example of deviation — FR — Lyon St-Exupéry (LYS) — Cockpit over centre line***

# 1 Current situation (with national rules)

## *1.1 Facts*

ICAO Annex 14 — ICAO 3.9.4 Cockpit over centre line: no compliance for some TWY.

Note: the ICAO requirement is enforced from 20 November 2008.

## *1.2 Issue(s)*

LYS refers to the French regulation 'CHEA (28/08/03 modified in 2007)' and the 'arrêté TAC (10/07/06)'. Requirements in CHEA comply with ICAO Annex 14. (Clearance of 4.50 m ).

LYS: some junction on TWY and some curves at LYS do not comply with the 4.50 m clearance.

Knowing that the compliance would require heavy infrastructure, LYS requested a derogation, based on the following justifications:

- the non-compliant shoulder PCN was checked. The PCN is sufficient for occasional rolling;
- the lateral visual aids are built-in;
- works on clearance each time the situation allows is.

DGAC accepted a corrective action plan with short and long-term actions.

The procedure to cope with code F aircraft takes into account this difference on clearance.

DGAC comment: the NAA prefers to grant few derogations and focus on corrective actions.

## *1.3 Type of ADR operator measures to mitigate the issue*

DGAC accepted a corrective action plan with short and long-term actions.

Regular visual inspection of the shoulders, once per week.

Note: in reality, no damages were observed, no negative feedback from pilots, no events[31] recorded by the aerodrome operator.

## *1.4 Approval of these measures in the current national ADR certification process*

DGAC accepted a corrective action plan with short and long-term actions and the mitigations measures above.

# 2 Future situation (with draft European rules)

## *2.1 CS related to 'Cockpit over centre line'*

### CS-ADR-DSN.D.240 Taxiways General

Unless otherwise indicated, the requirements in this Subpart are applicable to all types of taxiways.

(b) The design of a taxiway should be such that, when the cockpit of the aeroplane for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway should be not less than that given by the following tabulation:

---

[31] I.e. no 'Fiche de Notification d'Evènement' recorded.

| Code letter | Clearance |
|---|---|
| A | 1.5 m |
| B | 2.25 m |
| C | 3 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; or<br>4.5 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m. |
| D | 4.5 m |
| E | 4.5 m |
| F | 4.5 m |

### *2.2 Status of deviations with the draft European rules*

Explain if the existing ADR deviations are still relevant with the draft European rules (and indicate the changes, if any, compared to the current national rules).

### *2.3 Example of a possible answer to accept the ADR deviations*

If the corrective actions are not fulfilled at the end of the conversion period, a DAAD mentioning the remaining corrective actions will have to be issued.

### *2.4 Conclusion: impacts for NAA and aerodromes*

No impacts with the European certification process, all actions have been already decided by FR NAA.

***Example of deviation — FR — Lyon St-Exupéry (LYS) — RESA***

## 1 Current situation (with national rules)

### *1.1 Facts*

ICAO Annex 14 — 3.5.1 ST obligation to have RESA's + 3.5.3 REC 240 m.

LYS Airport does not respect these ICAO Standards and Recommended Practices, as the requirements for RESA were introduced recently in the French aerodrome regulations and are mandatory for new aerodromes or in case of runway extension. Nevertheless, the space required for a runway end safety area is available at the end of each runway.

In addition, though none of the French regulations are applicable at Lyon Airport on this matter, the regional Civil Aviation Safety Department ensures that these ICAO SARPs are fulfiled, and that no new objects are placed within the mentioned areas.

### *1.2 Issue(s)*

No compliance with ICAO. LYS has available space for a RESA 240 m and the financial impact would not be too heavy because nothing obliged to have a tar RESA (LYS statement).

### *1.3 Type of ADR operator measures to mitigate the issue*

The regional Civil Aviation Safety Department ensures that no new objects are placed within the mentioned areas.

### *1.4 Approval of these measures in the current national ADR certification process*

LYS is compliant with the French regulation.

Generally, it was preferred to avoid reducing declared distances to provide a safety area at the end of the runway. This safety area is nevertheless recommended for existing aerodromes. A study is currently being done for the installation of RESA at existing French aerodromes.

## 2 Future situation (with draft European rules)

### *2.1 CS related to RESA*

**CS-ADR-DSN.C.210 — Runway End Safety Areas**

(a) A runway end safety area should be provided at each end of a runway strip where:

(1) the code number is 3 or 4; and

(2) the code number is 1 or 2 and the runway is an instrument one.

**CS-ADR-DSN.C.215 — Dimensions of runway end safety areas**

(a) Length of RESA

A runway end safety area should, as far as practicable, extend from the end of a runway strip to a distance of at least:

(1) 240 m where the code number is 3 or 4;

(2) 120 m where the code number is 1 or 2; and

(3) with a minimum distance of at least 90 m.

(b) Where a RESA exceeding the minimum distance, but less than the distance in (a)(1) and (a)(2) is considered necessary, the aerodrome should undertake a safety assessment to identify the hazards and appropriate actions to reduce the risk.

(c) Where an arresting system of demonstrated performance capability is installed, the specifications above may be reduced in accordance with the design specification of the arresting system.

(d) Width of RESA

The width of a runway end safety area should, wherever practicable, be equal to that of the graded portion of the associated runway strip.

**GM-ADR-DSN.C.210**

It is accepted that many aerodromes were constructed before requirements for RESAs were introduced. Where the CS cannot be achieved, the aerodrome should undertake a safety assessment to confirm that a suitable level of safety is achieved.

### *2.2 Status of deviations with the draft European rules*

The ADR deviates from the required CS.

### *2.3 Example of possible answer to accept the ADR deviations*

As the aerodrome has the required space available (for at least the 90 m minimum), it can be brought into compliance with the future EU CSs within the conversion period (likely to be 48 months) by installing a suitable RESA and providing a safety assessment.

If no RESA is provided at the aerodrome after the end of the conversion period, the aerodrome can be certified but a DAAD would have to be developed and be based on a safety assessment. The action plan may include the installation of a suitable RESA.

### *2.4 Conclusion: impacts for NAA and aerodrome*

In the case of France, the French NAA is already carrying out a study to assess the safety risks for aerodromes without RESA and to propose possible actions. This could constitute a safety assessment which could be reused for each relevant aerodrome. As a consequence, this could reduce the additional need for safety assessment to be carried out at these aerodromes on the basis of the draft European rules.

This study is already in line with the future European certification process asking for safety assessment (requested in this CS, in the DAAD, etc.). It is deemed that the draft European rules do not have a significant impact.

Here are the possible cases for LYS regarding to RESA and compliance with the future European ADR certification rules:

| RESA charac-teristics at LYS airport | Today situation | If the situation changes, different cases: | | | |
|---|---|---|---|---|---|
| | No RESA, but space available | Creation of RESA lower than 90 m and without RWY extension | 90 m RESA without safety assessment | 90 m RESA + safety assessment | 240 m RESA |
| Status of compliance with: | | | | | |
| 1 — French regulation | Compliance because 90 m RESA is asked only for new aerodromes or doing RWY extension<br>Ongoing French study to assess risks on existing aerodromes and possible actions | Compliance because 90 m RESA is asked only for new aerodromes | Compliance | Compliance | Compliance |

| | | | | | |
|---|---|---|---|---|---|
| 2 — Draft European ADR rules | DAAD with safety assessment to be compliant | DAAD with safety assessment to be compliant | safety assessment to be provided | Compliance | Compliance |

***Example of deviation — FR — Lyon St-Exupéry (LYS)— Width of taxiway***

## 1 Current situation (with national rules)

### *1.1 Facts*

ICAO Annex 14 — 3.9.5 Width of taxiway

LYS is a code E aerodrome.

All TWYs have a width of 22.5 m because they were built before 2003, date when French regulation took over the ICAO requirement of 23 m for aerodrome code D and E.

Note from DGAC: Aeronautical information chapter 2 and Attachment 5, table A5-5 foresees a tolerance of 1 m for the survey on taxiway width.

### *1.2 Issue(s)*

If LYS would need to comply with the 23 m requirement, 10 km of taxiways would need to be renovated and this would have a very significant cost impact for LYS

### *1.3 Type of ADR operator measures to mitigate the issue*

A safety assessment conducted for the rerouting of the A380 at LYS provided a positive conclusion.

### *1.4 Approval of these measures in the current national ADR certification process*

The NAA approved that the TWYs built before 2003 can keep a width of 22.5 m

## 2 Future situation (with draft European rules)

### *2.1 CS Width of taxiways*

**CS-ADR-DSN.D.245 — Width of taxiways**

(a) A straight portion of a taxiway should have a width of not less than that given by the following tabulation:

| Code letter | Taxiway width |
|---|---|
| A | 7.5 m |
| B | 10.5 m |
| C | 15 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; or |
| | 18 m if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m |
| D | 18 m if the taxiway is intended to be used by aeroplanes with an outer main gear wheel span of less than 9 m; or |
| | 23 m if the taxiway is intended to be used by aeroplanes with an outer main gear wheel span equal to or greater than 9 m. |
| E | 23 m |
| F | 25 m |

### *2.2 Status of deviations with the draft European rules*

This is a deviation from the CS.

### *2.3 Example of a possible answer to accept the ADR deviations*

If Lyon St-Exupéry operator is unwilling to meet the specification and wishes to use the taxiway for Code D (second condition), E or F aeroplanes, the aerodrome could get a certificate by developing for this deviation a DAAD.

The 'acceptance' part of the DAAD shall include a safety assessment which should look at necessary measures on main gear span restriction. An input for the safety assessment could be the study on the rerouting of the A380.

The 'action' part of the DAAD should include publishing the limitation on use in the Aerodrome Manual (e.g. if the safety assessment finds that a mitigation measure should be related to restriction main gear span) and AIP. The aerodrome operator should be required by the NAA to carry out and report a periodic (say annual) review of the situation until such time as the remedial work is carried out.

Note:

This cannot be a Special Condition, as there is a solution to the non-compliance, based on cost rather that infrastructure or topographical constraints.

### *2.4 Conclusion: impacts for NAA and aerodromes*

It depends on the depth of the safety assessment conducted for the rerouting of the A380 at LYS: if there is enough available information to show that there is no need of main gear span restriction, the impact is nil.

***Example of deviation — IT — Bergamo — RESA***

## 1 Current situation (with national rules)

### *1.1 Facts*

The Runway End Safety Area of 90 m length is provided, but there is no RESA of 240 m in length. The arresting system is also not installed.

### *1.2 Issue(s)*

No issue in regard to Italian regulation. The provision of the 240 m length of RESA is mandatory for new aerodromes and in a case of runway extension or reconstruction works during the foreseen aerodrome development.

### *1.3 Type of ADR operator measures to mitigate the issue*

None. No safety assessment was performed, in accordance with the Italian regulation RCEA, chap. 3 — § 5.4.

### *1.4 Approval of these measures in the current national ADR certification process*

According to Italian regulation (Ref. RCEA, chap. 3 — § 5.3) a RESA longer than 90 m (120 m where the code is 1 or 2; 240 m where the code is 3 or 4) is required for:

a) new aerodromes, and

b) in case of existing RWY extension or reconstruction.

Only in the cases a) and b) if RESA is longer than 90 m but less than 120 m or 240 m (depending on the aerodrome code), a safety assessment is required (Ref. RCEA, chap. 3 — § 5.4).

The NAA approved the conclusions from section 1.3 in the following manner:

The provision of RESA 240 m in length is mandatory for new aerodromes and in the case of runway extension or reconstruction works during the foreseen aerodrome development.

## 2 Future situation (with draft European rules)

### *2.1 CS related to RESA*

**CS-ADR-DSN.C.210 — Runway end safety areas**

(a) A runway end safety area should be provided at each end of a runway strip where:

(1) the code number is 3 or 4; and

(2) the code number is 1 or 2 and the runway is an instrument one.

**CS-ADR-DSN.C.215 — Dimensions of runway end safety areas**

(a) Length of RESA

A runway end safety area should, as far as practicable, extend from the end of a runway strip to a distance of at least:

(1) 240 m where the code number is 3 or 4;

(2) 120 m where the code number is 1 or 2; and

(3) with a minimum distance of at least 90 m.

(b) Where a RESA exceeding the minimum distance, but less than the distance in (a)(1) and (a)(2) is considered necessary, the aerodrome should undertake a safety assessment to identify the hazards and appropriate actions to reduce the risk.

(c) Where an arresting system of demonstrated performance capability is installed, the specifications above may be reduced in accordance with the design specification of the arresting system.

(d) Width of RESA

The width of a runway end safety area should, wherever practicable, be equal to that of the graded portion of the associated runway strip*.*

**GM-ADR-DSN.C.210**

It is accepted that many aerodromes were constructed before requirements for RESAs were introduced. Where the CS cannot be achieved, the aerodrome should undertake a safety assessment to confirm that a suitable level of safety is achieved.

### *2.2 Status of deviations with the draft European rules*

The ADR complies with the minimum requirement of the particular CS, i.e. RESA distance of 90 m, but as it is less than the RESA distance of 240 m, the ADR does not comply with the CS requirement that the safety assessment is undertaken. The ADR is in the process of purchasing the land outside the aerodrome boundary in order to extend the RESA to 240 m.

### *2.3 Example of possible answer to accept the ADR deviations*

The ADR is not fully compliant with the particular CS. The ADR complies with the required minimum distance of 90 m, but as it is less than the distance of 240 m, the safety assessment has to be done to identify the hazards and appropriate actions to reduce the risk. The ADR is in the process of purchasing the land necessary to extend the length of the RESA to 240 m. This deviation may be noted in the DAAD, which should also include the action plan describing the conditions and the time frame when it will be possible to extend RESA to the distance of 240 m and to fully comply with the CS requirement.

### *2.4 Conclusion: impact*

By the Italian regulation, the provision of 240 m length of RESA is mandatory for new aerodromes and in a case of runway extension or reconstruction works during the foreseen aerodrome development.

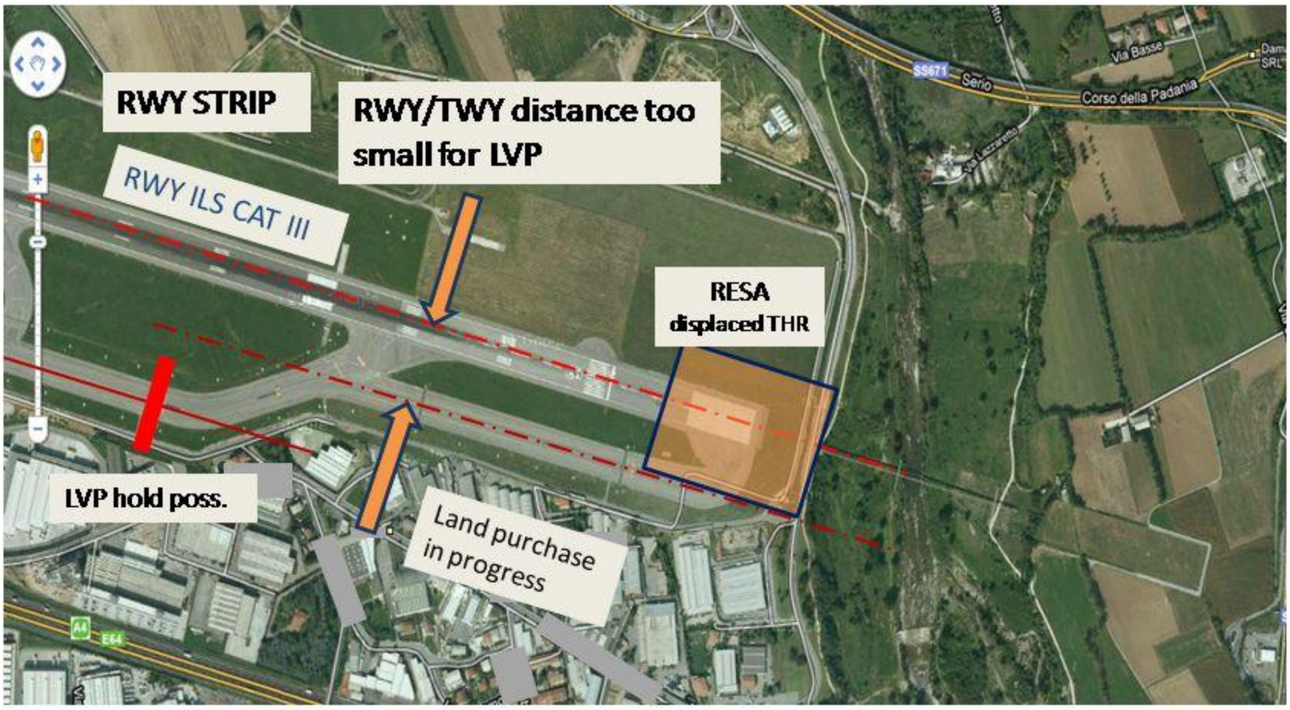
The aerodrome is not fully compliant with the European rules and it shall undertake a safety assessment to identify the hazards and appropriate actions to reduce the risk. As the ADR is already in the process of purchasing the land to extend RESA to the distance of 240 m in length, the exact plan and time frame to fulfill with the European rule may be develop and noted in a DAAD.

***Example of deviation — IT — Bergamo — Distance between taxiway and RWY***

## 1 Current situation (with national rules)

### *1.1 Facts*

The distance between taxiway A centre line and RWY centre line is less than required by the Italian regulation and ICAO Annex 14 SARP (right side of picture).




### *1.2 Issue(s)*

Bergamo text:

Following a runway incursion hazard identification, a past risk evaluation made in coordination with national CAA (ENAC) highlighted the need of a mitigating action to prevent a possible runway incursion from Main Apron and T taxiway through C taxiway.

The Agency's remark:

Even though the aerodrome is certified for the operation under CAT II/III conditions, the taxiway A is considered to operate as in CAT I conditions, with the support of radar surveillance, to ensure that there is only one aircraft in this area during the operation. The holding position is installed at the end of the taxiway T which has required RWY/TWY centre line distance for the operation under CAT II/III conditions to ensure that aircraft will not go further on taxiway A without ATC authorisation. Taxiway C is closed.

### *1.3 Type of ADR operator measures to mitigate the issue*

Considered the taxiway C tight radius of curvature (serviceable only for aircraft up to Fokker F27) and the consequent low rate of use for runway vacating and lining up, the responsible Post Holders agreed to the closure of C taxiway using markings and visual aids fully compliant with RCEA and ICAO Annex 14.

### *1.4 Approval of these measures in the current national ADR certification process*

The NAA approved the mitigations measures following the risk evaluation assessed in cooperation with Bergamo Airport.

## 2 Future situation (with draft European rules)

### *2.1 CS related to RWY/TWY distances*

### *CS-ADR-DSN.D.260 Taxiway minimum separation distance*

The separation distance between the centre line of a taxiway and the centre line of a runway, the centre line of a parallel taxiway or an object should not be less than the appropriate dimension specified in Table ADR-D-1, except that it may be permissible to operate with lower separation distances at an existing aerodrome if an aeronautical study indicates that such lower separation distances would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

Table ADR-D-1. Taxiway minimum separation distances

| | Distance between taxiway centre line and runway centre line (metres) | | | | | | | | | Taxiway Centre line to taxiway centre line (metres) | Taxiway, other than aircraft stand taxilane, centre line to object (metres) | Aircraft stand taxilane centre line to object (metres) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Instrument runways code number | | | | | Non-instrument runways code number | | | | | | |
| Code letter | 1 | 2 | 3 | 4 | | 1 | 2 | 3 | 4 | | | |
| (1) | (2) | (3) | (4) | (5) | | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| A | 82.5 | 82.5 | — | — | | 37.5 | 37.5 | — | — | 23.75 | 16.25 | 12 |
| B | 87 | 87 | — | — | | 42 | 42 | — | — | 33.5 | 21.5 | 16.5 |
| C | — | — | 168 | — | | — | — | 93 | | 44 | 26 | 24.5 |
| D | — | — | 176 | 176 | | — | — | 101 | 101 | 66.5 | 40.5 | 36 |
| E | — | — | — | 182.5 | | — | — | — | 107.5 | 80 | 47.5 | 42.5 |
| F | — | — | — | 190 | | — | — | — | 115 | 95 | 55 | 50.5 |

*Note 1 — The separation distances shown in columns (2) to (9) represent ordinary combinations of runways and taxiways. The basis for development of these distances is given in the Aerodrome Design Manual (Doc 9157), Part 2.*

*Note 2 — The distances in columns (2) to (9) do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aeroplane on a parallel taxiway. See the Aerodrome Design Manual (Doc 9157), Part 2.*

### *2.2 Status of deviations with the draft European rules*

The ADR deviates from the CS.

The ADR is in the process of purchasing the land south of the taxiway A in order to remove the taxiway T to the required distance from the RWY.

### *2.3 Example of a possible answer to accept the ADR deviations*

The ADR does not comply with the required CS regarding the RWY/TWY separation distance for the instrument runways. The holding position is placed at the taxiway T and the operational restrictions on taxiway A are in place during LVP operations. The ADR is in the process of purchasing the land necessary to remove the taxiway A at the required distance from the RWY.

Taxiway A is not meeting the required RWY/TWY distance for the instrument runways. The holding position is installed at the taxiway T to monitor and limit the movements at the taxiway A. For this procedure the safety assessment is performed (according to the information received from aerodrome operator and NAA) showing that equivalent level of safety (ELoS) is met.

### 2.4 Conclusion: impact

According to the Italian regulation and European rules the ADR does not comply with the required distance between the RWY/TWY centre lines for the instrument runways.

The holding position is installed at the taxiway T and operational restrictions are in place on taxiway A when operating in low visibility conditions. The procedures are confirmed by the safety assessment and approved by the NAA.

The deviation for the taxiway A that does not meet the RWY/TWY separation distance for the instrument runway can be accepted as 'ELoS' with the operational restrictions and performed safety assessment. There is no impact on the aerodrome with new European rules.

***Example of deviation — IT — Fiumicino — Mandatory instruction marking***

# 1 Current situation (with national rules)

## *1.1 Facts*

ICAO Annex 14 — 5.2.16. Mandatory instruction marking

According to the Italian Regulation ('RCEA') a mandatory instruction marking shall be placed on the left side only of the CL of the taxiway.

## *1.2 Issue(s)*

5.2.16. 3 ST Mandatory instruction marking Ref. RCEA 03.10.21 (amdt V — 08.09.23) chap. 7 — § 4.3.6.2. When the Italian regulation will be updated according to the last amendment of ICAO Annex 14, it will be identical to ICAO.

5.2.16.4 ST not implemented in RCEA. This ST was not in the amdt No 9 of Annex 14; it will be inserted in the next amdt of RCEA.

## *1.3 Type of ADR operator measures to mitigate the issue*

None

## *1.4 Approval of these measures in the current national ADR certification process*

According to the Italian national rules a mandatory instruction marking has to be placed on the left side of the CL of the taxiway. When the Italian regulation will be updated according to the last amendment of ICAO Annex 14, this requirement will be identical to ICAO. As long as the Italian regulation is not updated, the aerodrome is compliant.

# 2 Future situation (with draft European rules)

## *2.1 CS 'Mandatory instruction marking'*

**CS-ADR.L.605 — Mandatory instruction marking**

(a) Applicability: Where operationally required, such as on taxiways exceeding 60 m in width, or to assist in the prevention of a runway incursion, a mandatory instruction sign should be supplemented by a mandatory instruction marking.

(b) Location:

  (1) The mandatory instruction marking on taxiways, where the code letter is A, B, C, or D, should be located across the taxiway equally placed about the taxiway centre line and on the holding side of the runway-holding position marking as shown in Figure ADR-L-10 (A). The distance between the nearest edge of the marking and the runway holding position marking or the taxiway centre line marking should be not less than 1 m.

  (2) The mandatory instruction marking on taxiways, where the code letter is E or F, should be located on the both sides of the taxiway centre line marking and on the holding side of the runway, holding position marking as shown in Figure ADR-L-10 (B). The distance between the nearest edge of the marking and the runway holding position marking or the taxiway centre line marking should be not less than 1 m.

**GM**

*Location: Except where operationally required, a mandatory instruction marking should not be located on a runway.*

## *2.2 Status of deviations with the draft European rules*

The ADR deviates from the required CS.

### *2.3 Example of a possible answer to accept the ADR deviations*

The non-compliance with the above mentioned CS cannot be treated as an ELoS or as a special condition.

As soon as the European CSs are issued, a 4-year time-window will be given for certification of the individual aerodrome. The deviation like the one in subject could be rectified during this period.

The Agency assumes that there would be no need to invoke the European acceptance process (DAAD) because these minor deviations could be resolved during routine painting. Nevertheless, a DAAD could be used theoretically by mentioning that this deviation will be solved within an agreed time scale (e.g. at the next routine painting).

### *2.4 Conclusion: impact*

**For the countries that decided to update their national rules before the entry into force of the draft European ADR rules, i.e. the case of Italy:**

As the Italian NAA will change this requirement from the national regulation with the new ICAO requirement, the requirement with the new European rule will be also fulfilled. In the case of Italy and for this SARP/CS, the changes at Fiumicino airport will not be due to the future European regulation, but simply because Italy decided to update its national regulation in line with the latest version of ICAO.

**For countries that do not comply with this ICAO requirement at the entry into force of the draft European ADR rules:**

The Agency assumes that there would be no need to invoke the European acceptance process (DAAD) because these minor deviations could be resolved during routine painting. Nevertheless, a DAAD could be used theoretically through mentioning that this deviation will be resolved within an agreed time scale (e.g. at the next routine painting).

***Example of deviation — IT — Fiumicino — RESA***

## 1 Current situation (with national rules)

### *1.1 Facts*

The Runway End Safety Area of 90 m in length is provided, but there is no RESA of 240 m length. The arresting system is also not installed.

### *1.2 Issue(s)*

No issue in regard to Italian regulation. The provision of RESA 240 m length is mandatory for new aerodromes and in a case of runway extension or reconstruction works during the foreseen aerodrome development.

### *1.3 Type of ADR operator measures to mitigate the issue*

None. No safety assessment was performed, in accordance with the Italian regulation RCEA, chap. 3 — § 5.4.

### *1.4 Approval of these measures in the current national ADR certification process*

According to Italian regulation (Ref. RCEA, chap. 3 — § 5.3) RESA longer than 90 m (120 m where the code is 1 or 2; 240 m where the code is 3 or 4) is required for:

c) new aerodromes, and

d) in case of existing RWY extension or reconstruction.

Only in the cases a) and b) if RESA is longer than 90 m but less than 120 m or 240 m (depending on the aerodrome code), a safety assessment is required (Ref. RCEA, chap. 3 — § 5.4).

The NAA approved the conclusions from section 1.3 in the following manner:

The provision of RESA 240 m in length is mandatory for new aerodromes and in the case of runway extension or reconstruction works during the foreseen aerodrome development.

## 2 Future situation (with draft European rules)

### *2.1 CS related to RESA*

**CS-ADR-DSN.C.210 — Runway end safety areas**

(a) A runway end safety area should be provided at each end of a runway strip where:

(1) the code number is 3 or 4; and

(2) the code number is 1 or 2 and the runway is an instrument one.

**CS-ADR-DSN.C.215 — Dimensions of runway end safety areas**

(a) Length of RESA

A runway end safety area should, as far as practicable, extend from the end of a runway strip to a distance of at least:

(1) 240 m where the code number is 3 or 4;

(2) 120 m where the code number is 1 or 2; and

(3) with a minimum distance of at least 90 m.

(b) Where a RESA exceeding the minimum distance, but less than the distance in (a)(1) and (a)(2) is considered necessary, the aerodrome should undertake a safety assessment to identify the hazards and appropriate actions to reduce the risk.

(c) Where an arresting system of demonstrated performance capability is installed, the specifications above may be reduced in accordance with the design specification of the arresting system.

(d) Width of RESA

The width of a runway end safety area should, wherever practicable, be equal to that of the graded portion of the associated runway strip.

**GM-ADR-DSN.C.210**

It is accepted that many aerodromes were constructed before requirements for RESAs were introduced. Where the CS cannot be achieved, the aerodrome should undertake a safety assessment to confirm that a suitable level of safety is achieved.

### *2.2 Example of possible answer to accept the ADR deviations*

The ADR is not fully compliant with the particular CS. The ADR complies with the required minimum distance of 90 m, but as it is less than the distance of 240 m, the safety assessment must be done to identify the hazards and appropriate actions to reduce the risk.

If there is no safety assessment, this deviation may be noted in the DAAD, and the action part of the DAAD is the safety assessment.

### *2.3 Conclusion: impact*

By the Italian regulation, the provision of 240 m length of RESA is mandatory for new aerodromes and in a case of runway extension or reconstruction works during the foreseen aerodrome development.

The aerodrome is not fully compliant with the European rules and it shall undertake a safety assessment to identify the hazards and appropriate actions to reduce the risk.

Impact for the Fiumicino aerodrome: safety assessment.

***Example of deviation — PL — Warsaw — Mandatory instruction marking***

## 1 Current situation (with national rules)

### *1.1 Facts*

The Warsaw airport is a code E aerodrome. It does not follow ICAO Annex 14 - SARP 5-2-16 'Mandatory instruction marking' due to lack of national regulation on this subject. Instead of RWY designation marking on RWY-holding position, the 'RUNWAY AHEAD' marking is used.

Note: This RUNWAY AHEAD marking was implemented before the 5th edition of Annex 14 was adopted.

**Location of these markings:**

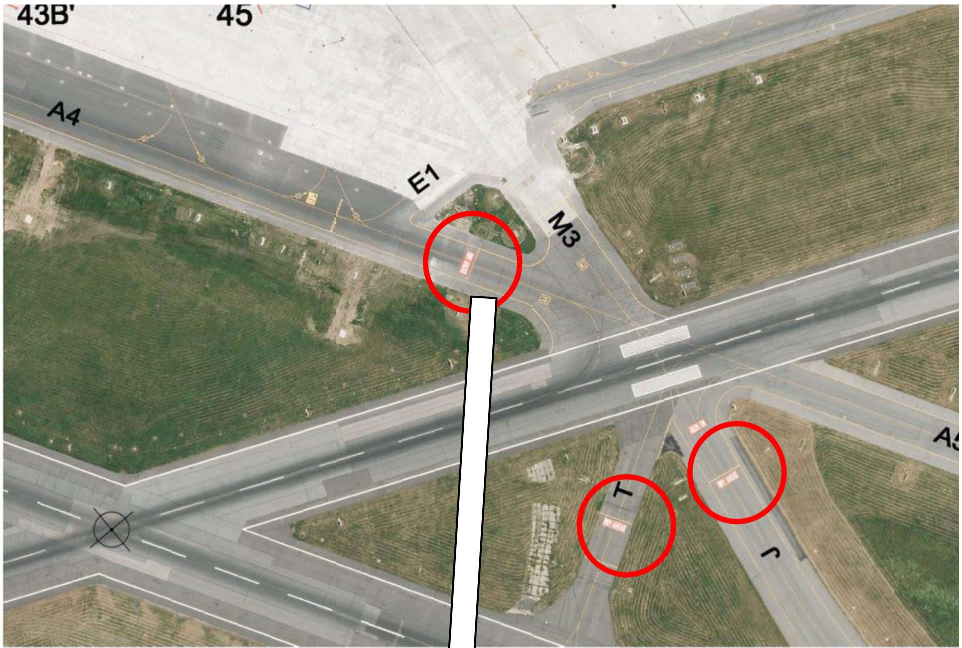



**Figure 1 — TWY A4-J-T — RWY 11/29**

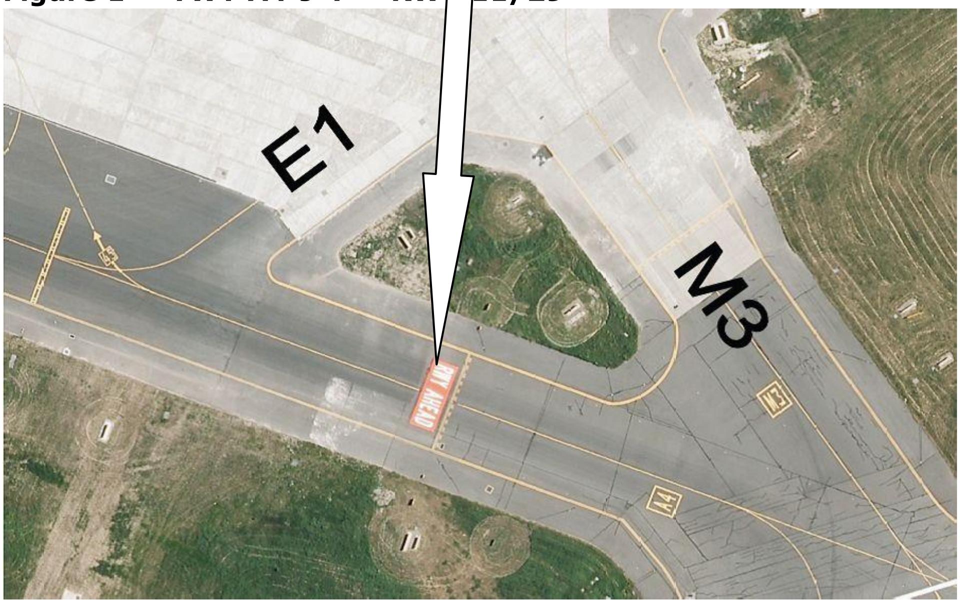



**Figure 2 — TWY A4-RWY11/29**

### 1.2 Issue(s)

Mandatory instruction marking RWY AHEAD still exist on TWYs.

### 1.3 Type of ADR operator measures to mitigate the issue

This marking is only on a hot spot to address RWY incursion (based on Runway Safety Team inputs). This is considered by the aerodrome operator to be safer than the ICAO requirement. Note: this decision was not documented. A safety assessment report is missing.

### 1.4 Approval of these measures in the current national ADR certification process

The President of Civil Aviation Office according to certification processes granted a certificate to aerodrome operator (the process includes mandatory instruction marking area).

Note: this deviation is not supported by a safety assessment report, while there was Warsaw Airport Runway Safety Team inputs to decide on the type of marking.

## 2 Future situation (with draft European rules)

### 2.1 CS 'Mandatory instruction marking'

**CS-ADR.L.605 — Mandatory instruction marking**

(a) Applicability: Where operationally required, such as on taxiways exceeding 60 m in width, or to assist in the prevention of a runway incursion, a mandatory instruction sign should be supplemented by a mandatory instruction marking.

(b) Location:

(1) The mandatory instruction marking on taxiways, where the code letter is A, B, C, or D, should be located across the taxiway equally placed about the taxiway centre line and on the holding side of the runway, holding position marking as shown in Figure L-11 (A). The distance between the nearest edge of the marking and the runway holding position marking or the taxiway centre line marking should be not less than 1 m.

(2) The mandatory instruction marking on taxiways, where the code letter is E or F, should be located on the both sides of the taxiway centre line marking and on the holding side of the runway-holding position marking as shown in Figure L-11 (B). The distance between the nearest edge of the marking and the runway holding position marking or the taxiway centre line marking should be not less than 1 m.

(c) Characteristics:

(1) A mandatory instruction marking should consist of an inscription in white on a red background. Except for a 'NO ENTRY' marking, the inscription should provide information identical to that of the associated mandatory instruction sign.

(2) A 'NO ENTRY' marking should consist of an inscription in white reading 'NO ENTRY' on a red background.

(3) Where there is insufficient contrast between the marking and the pavement surface, the mandatory instruction marking should include an appropriate border, preferably white or black.

(4) The character height should be 4 m for inscriptions where the code letter is C, D, E or F, and 2 m where the code letter is A or B. The inscription should be in the form and proportions shown in Figures L-12A to L-12E.

(5) The background should be rectangular and extend a minimum of 0.5 m laterally and vertically beyond the extremities of the inscription.

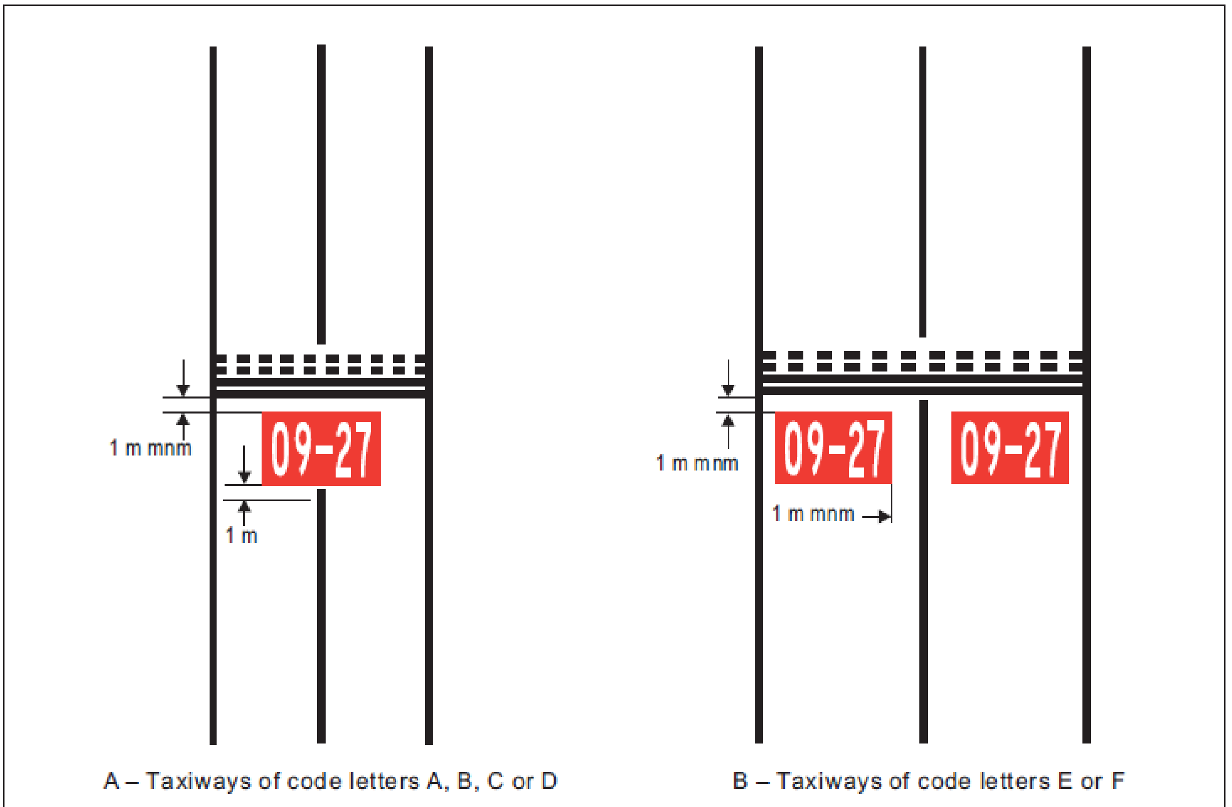



Figure L-11 (B)

**GM**

*Location: Except where operationally required, a mandatory instruction marking should not be located on a runway.*

### 2.2 Status of deviations with the draft European rules

There is a deviation.

### 2.3 Example of a possible answer to accept the ADR deviations

Under the new European process and before conversion of the national certification into a European one (a 48-month period after the adoption of the draft ADR rules by the Member States), this deviation could:

- be considered like an alternative way with an equivalent level of safety. The demonstration of equivalent level of safety shall be supported by a safety assessment;

***or***

- be justified by using the DAAD mechanism, requiring a safety assessment and any appropriate actions.

### 2.4 Conclusion: impacts for NAA and aerodromes

Due to the lack of documentation on this deviation and based on the section 2.3, the aerodrome operator could justify the deviation with an ELoS or a DAAD. This is a matter of discussion with the NAA that accepts this deviation and the supporting documents.

**1) Safety assessment to demonstrate the Equivalent Level of Safety**

The following elements can be used:

- the current practice does not raise any concern (list of negative feedback and safety events);
- the marking meets the objective of the CS a) 'Where operationally required, such as on taxiways exceeding 60 m in width, or to assist in the prevention of a runway incursion, a mandatory instruction sign should be supplemented by a mandatory instruction marking';
- the characteristics of the existing marking (size, colours ,etc.) and their compliance with the CS;
- the visibility conditions at the Warsaw airport;
- if any, the fact that these markings are used in other airports (in such cases, a list of these aerodromes and comparison of their types of operation with operations in Warsaw aerodrome)
- the AIP information on this deviation

**2) The DAAD can be justified by using the following elements:**

- Background: the deviation was granted by the NAA;
- A safety assessment taking into account the number of negative feedback and safety events. This safety assessment should confirm that:
  - the current practice does not raise any concern
  - the marking meets the objective of the CS a) 'Where operationally required, such as on taxiways exceeding 60 m in width, or to assist in the prevention of a runway incursion, a mandatory instruction sign should be supplemented by a mandatory instruction marking';
  - the characteristics of the existing marking (size, colours ,etc.) meets the CS;
  - the visibility conditions at the Warsaw airport
  - if any, the fact that these markings are used in other airports (in such cases, a list of these aerodromes and comparison of their types of operation with operations in Warsaw aerodrome).
- Actions such as:
  - the deviation is indicated in the AIP;
  - there will be a monitoring of the deviation with a special focus when related safety events are recorded;
  - the marking will be made compliant at their next scheduled repainting.

***Example of deviation — PL — Warsaw — Colours for taxiway centre line marking***

## 1 Current situation (with national rules)

### *1.1 Facts*

ICAO Annex 14 - 5.2.1.5 is a standard requiring the colour yellow for taxiway markings.

Colours used for taxiway centre lines marking Zulu are blue and orange.

- TWY Z1 and Z2 is accessible for aeroplanes with wingspan 65 m.
- TWY Z Orange 1, 2 and Blue 1 and 2 is accessible for aeroplanes wingspan up to 36 m.
- During taxiing a/c on TWY Z, taxiways Z Orange and Blue are out of order for taxiing, however it is allowed to conduct simultaneously a/c taxiing with wingspan up to 36 m on TWY ZB and ZO.
- Centre line lights TWY ZO1 and ZO2 omnidirectional, orange colour.
- Marking of TWY ZO1 and ZO2 is orange colour line width 15 cm, bordered with black colour.
- Centre line TWY ZB1 and ZB2 bidirectional, green in colour. Centre line lights TWY ZB1 and ZB2 — omnidirectional, blue in colour, installed alternate with centre line lights spaced between them no more than 30m.
- Marking TWY ZB1 and ZB2 is in blue line colour width 15 cm, bordered with black colour.
- TWY Z can be used in LVP conditions without any restrictions for RVR, whereas TWY ZO and ZB — RVR not lower than 350 m, or lower when RVR 350 centre line lights are off.

### *1.2 Issue(s)*

Lack of national regulation regarding an enhanced TWY centre line marking.

The ACI recommendation was chosen to enhance the taxiway capacity on the apron.

ICAO Annex 14 — 5.2.1.5 was not applied because it would have limited the taxiway capacity on the apron and the requirements are lower from the ADR operator point of view.

### *1.3 Type of ADR operator measures to mitigate the issue*

No mitigation measure. The project of TWY Z meets ACI requirements.

ACI APRON MARKINGS & SIGNS HANDBOOK, Second Edition 2007, page 14:

**3.5. MULTIPLE USEABLE AIRCRAFT STAND TAXILANE**

To increase flow of traffic in aircraft stand taxilanes it may be helpful to use them multiple (e.g. two aircraft with maximum wingspan 36m or one aircraft with maximum wingspan 65m). Minimum distances from the centre lines to centre lines and/or to objects can be found in ICAO Annex 14, Volume 1.

Current best practice on many aerodromes has shown, that colour coding of centre lines is recommended to guarantee safe operations and to provide proper guidance.

Due to lack of possibilities the colours blue and orange should be used. In addition the maximum wingspan for the restricted taxilane centre lines shall be marked in the same colour. If installed, taxilane centerline lights shall be in the same colour as the markings alternating with green lights.

To increase visibility of centerline markings and 'MAX SPAN' markings because of the colour of the pavement, they should have a border/background in a contrasting colour.

**Note:** the aerodrome operator considered their markings achieve more strict requirements than ICAO Annex 14 — 5.2.8.1

### *1.4 Approval of these measures in the current national ADR certification process*

TWY Z (TWY Z Blue, TWY Z Orange) has been approved by the President of Civil Aviation Office for aircraft movement.

Note: Nevertheless, there is a lack of documentation to support this deviation even if the aerodrome claims that they used the ACI recommendations in the absence of national regulation.

## 2 Future situation (with draft European rules)

### *2.1 CS 'Colour and conspicuity'*

**CS-ADR-DSN.L.525 — General — Colour and conspicuity**

*Markings should be of a conspicuous colour and contrast with the surface on which they are laid.*

(a) Runway markings should be white.

(b) Markings for taxiways, runway turn pads and aircraft stands should be yellow.

### *2.2 Status of deviations with the draft European rules*

There is a deviation.

### *2.3 Example of possible answer to accept the ADR deviations*

Under the new European process, this deviation could be considered like an alternative way with an equivalent level of safety. The demonstration of equivalent level of safety shall be supported by a safety assessment.

### *2.4 Conclusion: impacts for NAA and aerodrome*

There are 2 ways to conclude:

**Possible outcome No 1:**

The compliance with the ACI APRON MARKINGS & SIGNS HANDBOOK, Second Edition 2007, section 3.5 (also installed on several other major European aerodromes) is accepted as a proof of an alternative way with an ELoS.

**Possible outcome No 2:**

Due to the lack of documentation on this deviation, the aerodrome operator will have to produce a safety assessment to demonstrate the equivalent level of safety of the type colours for taxiway centre line marking implemented at the Warsaw airport.

The ELoS can be justified using the following elements:

- the current practice does not raise any concern (list of negative feedback and safety events);
- the markings meet the objective of the CS : 'Markings should be of a conspicuous colour and contrast with the surface on which they are laid.';
- the visibility conditions at the Warsaw airport;
- the markings meet the ACI requirements (ACI APRON MARKINGS & SIGNS HANDBOOK, Second Edition 2007, section 3.5);
- these ACI requirements are in use in several aerodromes (list of these aerodromes and comparison of their type of operation with operations in Warsaw aerodrome);
- the AIP information on this deviation;

The outcome No 1 does not appear to be sufficient because an ELoS has to be granted for an individual aerodrome. Based on the given conditions, the NAA will take their decision.

***Example of deviation — PL — Warsaw — OFZ***

## 1 Current situation (with national rules)

### *1.1 Facts*

ICAO Annex 14 - SARP 4-1: implementation is different with justification (aeronautical study).

Note: Some parameters of obstacle limitation surfaces are more strict in the Warsaw Chopin Airport than in ICAO Annex 14 e.g. on RWY 33.

### *1.2 Issue(s)*

OFZ implemented for CAT II. There was a lack of national regulation concerning inner approach surface, inner transitional surface and balked landing surface.

### *1.3 Type of ADR operator measures to mitigate the issue*

Based on an aeronautical study on possibility of infringement of OLS (Southern Station 180 AMSL and Zawisza Square 410 AMSL), the minimum radar vectoring altitude was increased.

### *1.4 Approval of these measures in the current national ADR certification process*

Justification and mitigation measures are accepted.

## 2 Future situation (with draft European rules)

### *2.1 CS 'Obstacle limitation surfaces'*

**CS-ADR-DSN.H.405 — Applicability**

The purpose of the obstacle limitation surfaces is to define the airspace around aerodromes to be maintained free from obstacles so as to permit the intended aeroplane operations at the aerodromes to be conducted safely.

**GM-ADR-DSN.H.405 — Applicability**

(a) The obstacle limitation surfaces define the limits to which objects may project into the airspace. Each surface is related to one or more phases of a flight, and provides protection to aircraft during that phase.

(b) The OLS also help to prevent the aerodromes from becoming unusable by the growth of obstacles around the aerodromes.

(c) The effective utilisation of an aerodrome may be considerably influenced by natural features and man-made constructions outside its boundary. These may result in limitations on the distance available for take-off and landing and on the range of meteorological conditions in which take-off and landing can be undertaken. For these reasons, certain areas of the local airspace must be regarded as integral parts of the aerodrome environment.

(d) Objects which penetrate the obstacle limitation surfaces may in certain circumstances cause an increase in the obstacle clearance altitude/height for an instrument approach procedure or any associated visual circling procedure or have other operational impacts on flight procedure design. Criteria for flight procedure design are contained in the Procedures for Air Navigation Services — Aircraft Operations (ICAO, PANS-OPS, Doc 8168).

(e) In ideal circumstances all the surfaces will be free from obstacles but when a surface is infringed, any safety measures required will have regard to:

(1) the nature of the obstacle and its location relative to the surface origin, to the extended centre line of the runway or normal approach and departure paths and to existing obstructions;

(2) the amount by which the surface is infringed;

(3) the gradient presented by the obstacle to the surface origin;

(4) the type of air traffic at the aerodrome; and

(5) the instrument approach procedures published for the aerodrome.

(f) Safety measures could be as follows:

(1) promulgation in the AIP of appropriate information;

(2) marking and/or lighting of the obstacle;

(3) variation of the runway distances declared as available;

(4) limitation of the use of the runway to visual approaches only;

(5) restrictions on the type of traffic.

(g) In addition to the requirements described in Book 1, Chapter H (CS-ADR-DSN.H.405 et al), it may be necessary to call for other restrictions to development on and in the vicinity of the aerodrome in order to protect the performance of visual and electronic aids to navigation and to ensure that such development does not adversely affect instrument approach procedures and the associated obstacle clearance limits.

**CS-ADR-DSN.H.410 — Outer horizontal surface**

The outer horizontal surface should extend from the periphery of the conical surface to a minimum radius of 15 000 m from the aerodrome reference point when the main runway is 1 860 m or more in length and to a minimum radius of 10 000 m where the main runway is 1 100 m or more but less than 1 860 m in length.

**GM-ADR-DSN.H.410 — Outer horizontal surface**

(a) An outer horizontal surface is a specified portion of a horizontal plane around an aerodrome beyond the limits of the conical surface. It represents the level above which consideration needs to be given to the control of new obstacles in order to facilitate practicable and efficient instrument approach procedures, and together with the conical and inner horizontal surfaces to ensure safe visual manoeuvring in the vicinity of an aerodrome.

(b) The OHS is of particular importance for safe operations in areas of high ground or where there are concentrations of obstacles.

**CS-ADR-DSN.H.420 — Inner horizontal surface**

(a) Applicability: The purpose of the inner horizontal surface is to protect airspace for visual manoeuvring prior to landing.

(b) Description: A surface located in a horizontal plane above an aerodrome and its environs.

(c) Characteristics: The outer limits of the inner horizontal surface are defined by circular arcs centred on the intersection of the extended RWY centre line with the end of the RWY strip joined tangentially by straight lines. (Figure H-1).

(d) The height of the inner horizontal surface should be measured above an established elevation datum.

(1) The elevation datum used for the height of the inner horizontal surface may be:

(i) the elevation of the highest point of the lowest threshold of the related runway;

(ii) the elevation of the highest point of the highest threshold of the related runway;

(iii) the elevation of the highest point of the runway;

(iv) the aerodrome elevation.

**CS-ADR-DSN.H.455 — Inner transitional surface *ICAO***

(a) Applicability: A surface similar to the transitional surface but closer to the runway.

(b) Characteristics: The limits of an inner transitional surface should comprise:

(1) a lower edge beginning at the end of the inner approach surface and extending down the side of the inner approach surface to the inner edge of that surface, from there along the strip parallel to the runway centre line to the inner edge of the balked landing surface and from there up the side of the balked landing surface to the point where the side intersects the inner horizontal surface; and

(2) an upper edge located in the plane of the inner horizontal surface.

(c) The elevation of a point on the lower edge should be:

(1) along the side of the inner approach surface and balked landing surface — equal to the elevation of the particular surface at that point; and

(2) along the strip — equal to the elevation of the nearest point on the centre line of the runway or its extension.

(d) The slope of the inner transitional surface should be measured in a vertical plane at right angles to the centre line of the runway.

**GM-ADR-DSN.H.455 — Inner transitional surface *ICAO***

(a) It is intended that the inner transitional surface be the controlling obstacle limitation surface for navigation aids, aircraft and other vehicles that must be near the runway and which is not to be penetrated except for frangible objects. The transitional surface is intended to remain as the controlling obstacle limitation surface for buildings, etc.

(b) The inner transitional surface along the strip should be curved if the runway profile is curved or a plane if the runway profile is a straight line. The intersection of the inner transitional surface with the inner horizontal surface should also be a curved or straight line depending on the runway profile.

### *2.2 Status of deviations with the draft European rules*

Providing that the aeronautical study on possibility of infringement of OLS is in line with the safety measures mentioned in the CS, there is no deviation.

### *2.3 Example of possible answer to accept the ADR deviations*

Not applicable.

### *2.4 Conclusion: impacts for NAA and aerodromes*

No impact.

***Example of deviation — PL — Warsaw — RWY slope***

## 1 Current situation (with national rules)

### *1.1 Facts*

There are two intersecting runways (RWY11/29 and RWY15/33) at the Warsaw Airport of very uneven pavement characteristics, varying in both their cross-section and their longitudinal profile. The recent reconstruction of the runways took place in 1992–1993 and consisted in placing a top layer on the existing pavement with no crack filling or application of a pavement stress scattering layer, which resulted in a considerable number of reflective cracks.

Currently RWY11/29 does not meet the required technical standard, also in respect of the shape of the runway longitudinal profile recommended in ICAO Annex 14 Volume I item 3.1.16 and set out in § 27 para. 5 of the Regulation of the Minister of Transport and Maritime Economy of 31.08.1998 on technical and building regulations for civil airports (Journal of Laws No 130, item 859 with later amendments) according to which the transition from one slope to another has to be accomplished by a curved surface with minimum radius of curvature not less than 30 000 m for code 4 (which corresponds to rate of change of 0.1 % every 30 m).

Before starting the reconstruction works, the radius of curvature was approximately 12 000 m instead of 30 000 m.

### *1.2 Issue(s)*

The correction of this deviation was ensured during the modernisation of the RMW 11/29. The total cost impact was approximately 10M€. The specific costs related to the deviation are included in these 10 M€ and certainly form a major part of these costs.

Therefore, the issue is that the application of RWY slope requirement has to be proportionate to the size of an aerodrome and the potential hazards when there is non-compliance. This cost impact would certainly be too demanding for a smaller aerodrome.

### *1.3 Type of ADR operator measures to mitigate the issue (before starting the works)*

The deviation was indicated in AIP. No safety-related occurrences reported.

### *1.4 Approval of these measures in the current national ADR certification process*

In the aerodrome certification processes carried out in the years 2003–2004 and 2007 the Civil Aviation Office pointed out that RWY11/29 did not meet the aforementioned requirements. The recommendations of the Civil Aviation Office made in conclusion of the certification processes provided for the next reconstruction of RWY 11/29 to be aimed at reaching the parameters set out in relevant international and Polish regulations.

The works connected with the modernisation of RWY 11/29, carried out with the purpose of improving its technical conditions, are scheduled for a period of 14 months in the years 2010–2011. The scope of works includes a general reconstruction of the runway and adjacent taxiways as well as technical roads. ICAO Annex 14 recommendations concerning the adjustment of the runway in compliance with reference code 4 and fulfilment of code E aircraft requirements were taken into account. Transverse slopes and the longitudinal profile will be corrected along the whole length of the runway, the pavement bearing strength will be upgraded to PCN 77/R/C/X/T (currently PCN 57), better surface water run-off will result in more even pavements.

## 2 Future situation (with draft European rules)

### *2.1 CS 'Runway Slope'*

**CS-ADR-DSN.B.060 — Longitudinal slopes of runways**

(a) The slope computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length should not exceed:

(1) 1 % where the code number is 3 or 4; and

(2) 2 % where the code number is 1 or 2.

(b) Along no portion of a runway should the longitudinal slope exceed:

(1) 1.25 % where the code number is 4, except that for the first and last quarter of the length of the runway the longitudinal slope should not exceed 0.8 %;

(2) 1.5 % where the code number is 3, except that for the first and last quarter of the length of a precision approach runway category II or III the longitudinal slope should not exceed 0.8 %; and

(3) 2 % where the code number is 1 or 2.

**GM-ADR-DSN.B.060 — Longitudinal slopes of runways**

The slopes on a runway are intended to prevent the accumulation of water (or possible fluid contaminant) on the surface and to facilitate rapid drainage of surface water (or possible fluid contaminant). The water (or possible fluid contaminant) evacuation is facilitated by an adequate combination between longitudinal and transverse slopes, and may also be assisted by grooving the runway surface. Slopes should be so designed to minimise impact on aircraft and not to hamper the operation of aircraft. Precision approach runways, slopes in a specified area from the runway end, and including the touchdown area, should be designed so that they will correspond to the characteristics needed for such type of approach.

### *2.2 Status of deviations with the draft European rules*

There will be no deviation for the Warsaw Airport once the works are achieved.

### *2.3 Example of a possible answer to accept the ADR deviations*

If no works would have occurred, there would have been a deviation regarding to RWY slope.

As a consequence, this section provides an answer on this theoretical case for the Warsaw Chopin Airport. This issue still remains valid for several other aerodromes.

Under the new European process, a possible way to justify this RWY slope deviation could have been supported by a Special Condition or a DAAD.

**Possible justification for a special condition:**

The deviation appears in response to the given terrain at the aerodrome, and a rework of this terrain only for this reason appears overly demanding with the given information (obviously major works in line with aerodrome development plans give the best opportunity to deal with existing deviations). Please note that given terrain is a very typical case for a need of a special condition. This always follows the notion of ‘compelling need’, which means that the CS would be inadequate or inappropriate, equalling disproportionate and overly burdensome in the given case.
A solution within this remit could therefore be to accept the given non-compliance with the CS, and to potentially insert mitigating means such as pilot awareness, publication in AIP, etc.
The solution as it was put in place by PL (acceptance and publication in AIP) appears as ‘standard case’ for such a special condition.

**Possible justification for DAAD:**

Only if a special condition could not be agreed, as a 'compelling need' could not be seen, a DAAD solution could be followed. This would mean to accept the given deviation for any period of time, as decided by the authority, requiring a safety assessment (which would have to conclude that the deviation can be accepted), and possibly subject to review requirements, and also subject to restrictions as found necessary.

## *2.4 Conclusion: impacts for NAA and aerodromes*

**Warsaw Airport**

The compliance with CS is expected due to the works carried out at the Warsaw airport. There is no impact of the draft ADR rules in this case.

**General case: existing RWY slope deviations**

As referred to above, however, RWY slope deviations would not typically be expected to be solved by a substantial rework of the runway. It appears to be a 'special condition' candidate rather than a DAAD one.