



Explanatory Note to Decision 2022/007/R

All-weather operations

Certification specifications, including airworthiness codes and acceptable means of compliance, for all-weather operations CS-AWO Issue 2

RELATED NPA/CRD: 2018-06(B) — RMT.0379

EXECUTIVE SUMMARY

The objective of this Decision is to maintain a high level of safety for the certification of aircraft that conduct all-weather operations (AWOs) through the provision of improved certification specifications that will enable efficiency gains based on the latest technological advancements. In addition, it is possible that there could be an overall improvement in safety by reducing the number of go-arounds due to the increased likelihood of aircraft being able to land in low-visibility runway conditions.

This Decision amends the Initial Issue of CS-AWO that was issued in 2003, and provides significant updates for the certification of the following:

- head-up displays (HUDs) and landing systems;
- enhanced flight vision systems (EFVSs);
- synthetic vision guidance systems (SVGs);
- combined vision systems (CVSs);
- special authorisation Category I¹ (SA CAT I) landings.

In addition, this Decision also updates the certification specifications related to Category II and Category III landings and automatic landing systems (ALSs).

There are distinct economic advantages that can be gained from the ability of an aircraft to operate and land in adverse weather conditions. This significant amendment of CS-AWO enables applicants to easily determine what is required and also provides a more performance-based approach to the certification of these systems.

Domain:	New technologies and concepts		
Related rules:	CS-AWO		
Affected stakeholders:	Design organisation approval (DOA) and production organisation approval (POA) holders		
Driver:	Efficiency	Rulemaking group:	No
Impact assessment:	No	Rulemaking Procedure:	Standard

Start	Public Consultation	Decision
Terms of Reference	NPA 2018-06(B)	Certification Specifications and Acceptable Means of Compliance
9.12.2015	13.7.2018	31.1.2022

¹ Special authorisation CAT I (SA CAT I) represents a type of low-visibility operations (LVOs) with operational credits with the following provisions:

- the decision height (DH) of an SA CAT I operation should not be lower than the highest of the minimum DH specified in the AFM (if stated), the applicable obstacle clearance height (OCH) for the category of aeroplane, the DH to which the flight crew is qualified to operate, or 150 ft; and
- the lowest RVR minima to be used are specified versus approach lighting system, and are typically between 400 and 700 m.



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1. About this Decision

The European Union Aviation Safety Agency (EASA) developed Decision 2022/007/R in line with Regulation (EU) 2018/1139² (the ‘Basic Regulation’) and the Rulemaking Procedure³.

This rulemaking task (RMT) is included in the European Plan for Aviation Safety (EPAS) for 2021-2025⁴. The scope and timescales of the RMT were defined in the related Terms of Reference (ToR)⁵.

EASA developed the *draft* text of this Decision with the support of a series of stakeholder workshops. All the interested parties were consulted through Notice of Proposed Amendment (NPA) 2018-06(B)⁶. 252 comments were received from all the interested parties, including industry, national aviation authorities (NAAs) and industry associations.

EASA reviewed the comments received during the public consultation with the support of dedicated focused workshops. The comments received and EASA’s responses to them are presented in Comment-Response Document (CRD) 2018-06(B)⁷.

EASA developed the *final* text of this Decision with the certification specifications (CSs) and acceptable means of compliance (AMC), and published it on the Official Publication⁸ of EASA.

The major milestones of this RMT are presented on the cover page.

² Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139>).

³ EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the ‘Rulemaking Procedure’. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (<http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure>).

⁴ <https://www.easa.europa.eu/document-library/general-publications/european-plan-aviation-safety-2021-2025>

⁵ <https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-concept-paper-rmt0379>

⁶ <https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2018-06>

⁷ <https://www.easa.europa.eu/document-library/comment-response-documents>

⁸ <https://www.easa.europa.eu/official-publication>



2. In summary — why and what

2.1. Why we need to amend the CSs and the AMC — issue/rationale

The term ‘all-weather operations’ (AWOs) comprises any taxi, take-off or approach operations in conditions where visual reference is limited by weather conditions.

Low-visibility operations (LVOs) are a segment of AWOs. LVOs include low-visibility take-offs (LVTOs) with a runway visual range (RVR) below 400 m, as well as approach and landing operations with an RVR below 550 m and/or a decision altitude/height (DA/H) below 200 ft. LVOs are exposed to higher risks and, therefore, necessitate specific mitigating measures, e.g. specific operational procedures or approvals.

AWOs in general, and LVOs in particular, require strong interdependencies between the main aviation domains: initial airworthiness, air operations, flight crew training and licensing, aerodromes, and air traffic management / air navigation services (ATM/ANS). Several stakeholders (type certificate (TC) and supplemental type certificate (STC) holders, maintenance personnel, air operators, their flight crew members and operations personnel, approved training organisations (ATOs), flight instructors and flight examiners, aerodrome operators, as well as ATM/ANS providers and air traffic controller (ATCO) training organisations) of different aviation domains are required to provide the necessary assurance to guarantee safe operations.

Considerable technological advancements in new airborne systems, such as enhanced vision systems (EVSs), synthetic vision systems (SVSs), combined vision systems (CVSs), new head-up display (HUD) technologies, and autoland systems have resulted in new operational concepts and several new certification applications from European and non-European manufacturers. These innovative technologies have the potential to increase the level of safety through enhanced situational awareness, thus reducing the risk of loss of control. New operational concepts based on these new vision systems (which are partly linked with ground-based augmentation systems (GBASs) and satellite-based augmentation systems (SBASs)) have been developed by SESAR and are considered in common pilot projects for new ATM functionalities. These new concepts also offer operational benefits in terms of reduced RVR and/or lower DA/H values and/or compensation of downgraded, failed or unavailable ground infrastructure. These technologies may also offer significant economic advantages for several stakeholders (such as air operators) that may be able to operate within lower aerodrome operating minima, as well as aerodrome operators that could continue operations under lower-visibility conditions without major additional investments in ground infrastructure, e.g. airfield ground lighting systems or ground-based navigation aids.

In the context of the RMT.0379 activities on AWOs, the CSs for AWOs (CS-AWO) have been significantly updated and amended. CS-AWO Issue 2 addresses the required regulatory amendments in the initial airworthiness domain to complement the relevant AWO requirements in other domains from a design and certification point of view by enabling the certification of emerging technologies, such as EFVS, synthetic vision guidance system (SVGS), and CVS, and also address special authorisations. In addition, RMT.0379 provided the opportunity to revise and update CS-AWO to reflect developments since it was first issued in 2003.



2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the Basic Regulation. This Decision will contribute to achieving the overall objectives by addressing the issue(s) outlined in Section 2.1.

The specific objectives of this RMT are, therefore, to:

- provide for safety, efficiency and consistency across all aviation domains, based on common AWO operational concepts;
- enable manufacturers, air operators and aerodrome operators to take full advantage of the safety and economic benefits accrued from new technologies and operational experience; and
- promote harmonisation, as far as possible, with the ICAO Standards and Recommended Practices (SARPs) and Documents, and with rule developments in the FAA and other major regulators.

The regulatory activities under RMT.0379 aimed to achieve a harmonised approach in all affected aviation domains. To this end, it addressed initial airworthiness, air operations, aircrew, and aerodrome design and operations aspects.

Enabling operations with operational credits (such as SA CAT I, or operations using EFVS/CVS) would provide for a greater availability of suitable destination and alternate aerodromes during periods of reduced visibility.

This would effectively reduce the number of weather-related delays, cancellations or diversions of flights to Category II/III aerodromes. It would also permit shorter routings and reduced fuel costs, a faster return to scheduled operations, and fewer passenger inconveniences.

2.3. How we want to achieve it — overview of the amendments

The initial issue of CS-AWO (dated 17 October 2003) was based upon the Joint Aviation Authorities (JAA) document JAR-AWO with the inclusion of some of the ongoing JAA Notices of Proposed Amendments (NPAs).

The subject CS-AWO Issue 2 incorporates the outstanding JAA NPAs in order to have an updated baseline document. Content from relevant certification review items (CRIs) has been considered, as well as aligned with other widely used aviation authority regulations, such as the FAA's.

CS-AWO Issue 2 addresses the CSs for Type A⁹ operations as a baseline for any applicable operational credits, the CSs for Type B¹⁰ Category I operations as a baseline for operational credits, and the revised CSs for Type B Category II and III operations to ensure that they reflect current technologies and support the intended operations. The revised CS-AWO also provides and clarifies as well the CSs for airborne equipment to gain the benefits from operational credits including SA CAT I, EFVSs to 100 ft

⁹ 'Type A instrument approach operation' means an instrument approach operation with an MDH or a DH at or above 250 ft.

¹⁰ 'Type B instrument approach operation' means an operation with a minimum DH below 250 ft.

Type B instrument approach operations are categorised as:

- (a) Category I (CAT I): a DH not lower than 200 ft and with either a visibility not less than 800 m or an RVR not less than 550 m;
- (b) Category II (CAT II): a DH lower than 200 ft but not lower than 100 ft, and an RVR not less than 300 m;
- (c) Category III (CAT III): a DH lower than 100 ft or no DH, and an RVR less than 300 m or no RVR limitation.

and EFVSs/CVSs to touchdown, and provides the CSs for aircraft that conduct taxiing and/or take-off operations in low-visibility conditions.

CS-AWO has also been completely restructured to better reflect the utility of the document. As much as possible of the original CS-AWO text was retained in order to build upon its well-established foundations. The correlation table below shows the relationship between the initial issue of CS-AWO and the restructured Issue 2.

CS-AWO Initial Issue	CS-AWO Issue 2
—	Subpart A — Enabling Equipment
Subpart 1 — Automatic Landing Systems	Section 1: Automatic Landing Systems (ALSs)
—	Section 2: Head-Up Displays (HUDs)
—	Section 3: Enhanced Flight Vision Systems (EFVSs)
—	Section 4: Synthetic Vision Guidance Systems (SVGs)
—	Section 5: Combined Vision Systems (CVSs)
—	Subpart B — Approach and Landing
—	Section 1: Airworthiness certification of aeroplanes for Type B operations with decision heights/altitude below 250 ft down to 200 ft — Category I (CAT I) operations
—	Section 2: Airworthiness certification of aeroplanes for operations with decision heights below 60 m (200 ft) and down to 45 m (150 ft) — Special Authorisation Category I (SA CAT I) operations
Subpart 2 — Category 2 operations	Section 3: Airworthiness certification of aeroplanes for operations with decision heights below 60 m (200 ft) and down to 30 m (100 ft) — Category II (CAT II) operations
Subpart 3 — Category 3 operations	Section 4: Airworthiness certification of aeroplanes for operations with decision heights below 30 m (100 ft) or no decision height — Category 3 (CAT III) operations
—	Section 5: Airworthiness certification of aeroplanes for operational credits for visual segment in reduced runway visual range (RRVR)
—	Subpart C — Take-off
Subpart 4 — Directional guidance for take-off in low visibility	Section 1: Airworthiness certification of aeroplanes for take-off operations in low visibility (TOO)

Subpart A provides the certification specifications for the various enabling equipment that can be used to facilitate AWOs or operations in low-visibility conditions. The intent is that the equipment provisions are independent (to the greatest extent possible) of the intended operation. It is possible that one or more of the sections of Subpart A will be used for a particular design or configuration (e.g. an EFVS displayed on a HUD). Subpart A includes the certification specifications for automatic landing systems, head-up displays, enhanced flight vision systems for approach and landing, synthetic vision guidance systems, and combined vision systems.

Subpart B provides the required performance of the systems that have been selected by the applicant for the chosen DH or category of landing. The certification specifications for Special Authorisation Category I (SA CAT I) have been included in CS-AWO Subpart B and should be used to demonstrate that the required performance and level of safety can be achieved for the navigation means that is selected by the applicant. Particular emphasis is placed on the need to assess the effect on the aircraft from external navigation means that may not be as robust as a Category 2 or 3 facility.

The amendments to CS-AWO include updates to Category II and III approaches and landings to ensure that they reflect current technologies and support the intended operations.

Subpart C is based upon an amendment to the original text from Subpart 4 and provides a less technology-dependent use of navigation means whilst retaining the original intent of the Subpart.

The intention of the new structure of CS-AWO is that for a particular system architecture, an applicant would need to combine the certification specifications from Subparts A and B (and possibly Subpart C) in order to achieve the required AWO certification for their product.

Due to the extensive restructuring of CS-AWO, the entire CS-AWO has been reissued as *CS-AWO Issue 2. A Change Information* document is also provided for information purposes only to allow stakeholders to determine the major changes between the Initial Issue and Issue 2 of CS-AWO.

2.4. What are the stakeholders' views — outcome of the consultation

Following the consultation of NPA 2018-06(B), a total of 252 comments were received on the proposed amendments to CS-AWO Issue 2. The comments that were received came from a wide variety of stakeholders including industry, navigation service providers, and national aviation authorities.

Two dedicated comment-review workshops were arranged with stakeholders to review the comments and prepare the responses. The comments covered a multitude of topics but there were some common themes which included the following:

- Clarifications on the eligible technologies that can be used for SA CAT I.
- Misunderstandings on the concept of SA CAT I.
- Requests to clarify the need to recalculate landing distance when using a HUD (including for EFVS imagery) that includes a flare cue (prompt or guidance).
- Requests to include flexibility in the provision of the means to identify the position of the runway (such as a synthetic runway) when conducting EFVS landings.
- Concerns regarding the stringent nature of the requirements for SVGS.
- The need to better define the term xLS and what navigation means could be included in this definition.

- Requests to align with the ICAO SARPs and guidance, and also with FAA regulations and guidance.
- Comments to complement or correct the various models that can be used for certification.

Responses to individual comments have been provided in CRD 2018-06(B).

2.5. What are the benefits and drawbacks of the amendments

The expected benefits of the amendment to CS-AWO are briefly summarised below. For the full impact assessment of the drivers and options for the amendment of CS-AWO, please refer to NPA 2018-06(B)¹¹.

CS-AWO is a set of CSs that can be used by applicants to define the certification basis for aircraft systems that enable AWOs. There are distinct economic advantages that can be gained from the ability of an aircraft to operate and land in adverse weather conditions. This significant amendment of CS-AWO enables applicants to easily determine what is required, and also provides a more performance-based approach to the certification of these systems.

Moreover, the wider promotion and proliferation of these systems could result in an overall improvement in safety due to the ability to land in adverse weather and avoiding the need to perform go-arounds. In addition, updated and harmonised CSs will reduce the costs for the certification of new products as well as for the development of new ones. The wider utilisation of these systems is facilitated by the amendment of CS-AWO.

¹¹ <https://www.easa.europa.eu/document-library/notices-of-proposed-amendment/npa-2018-06>



3. How we monitor and evaluate the amended CSs and AMC

As part of the wider monitoring of the positive effects of the outcome of RMT.0379, EASA will monitor the following aspects (as described in Opinion No 02/2021):

What to monitor	How to monitor	Who should monitor	How often to monitor
<p>Assessment on the level of implementation by operators in EASA MSs of:</p> <ul style="list-style-type: none"> — Operational credits for CAT and NCC aeroplanes (e.g. number of operators approved) — IFR flights that might otherwise have been flown under VFR for Helicopters/SPO — NCO flying IFR that might otherwise have been flown under VFR — The use of appropriate AWO visual and non-visual aids in ADR operators 	<p>Survey to operators</p> <p>Specific approvals granted by NAAs</p>	EASA/NAAs	3 years after the rules are in place
<p>Number and trend in occurrences in IFR for:</p> <ul style="list-style-type: none"> — CAT and NCC aeroplane occurrences in LVOs — aerodromes during LVOs (LVPs) — Operational credits for CAT and NCC aeroplanes other than those in LVOs — Helicopters and SPO — NCO 	Reports in ECCAIRS and information collected at Member State level	EASA/NAAs	Every 2 years
<p>Number and trend in occurrences in VFR under VFR in marginal VMC:</p> <ul style="list-style-type: none"> — Helicopters/SPO — NCO 	Reports in ECCAIRS and information collected at Member State level	EASA/NAAs	Every 2 years
Assessment of AWO-related technologies	Survey to operators and/or manufacturers (aircraft or equipment)	EASA	3 years after the rules are in place

Specifically, for CS-AWO, EASA will assess the use of AWO-related technologies through a survey of operators as well as aircraft and equipment manufacturers. The purpose of this assessment will be to determine whether the amendment of CS-AWO has been effective in promoting the installation of AWO-related technologies and whether they have provided a clear path to the certification of these systems.

4. References

4.1. Related EU regulations

- Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EU) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1)
- Commission Regulation (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 44, 14.2.2014, p. 1)

4.2. Related EASA decisions

- DECISION NO. 2003/6/RM OF THE EXECUTIVE DIRECTOR OF THE AGENCY of 17 October 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for all weather operations (« CS-AWO »)

