CS-ADR-DSN ISSUE 4 — CHANGE INFORMATION

EASA publishes issues to certification specifications as consolidated documents. These documents are used for establishing the certification basis for applications made after the date of entry into force of the amendment.

Consequently, except for a note '[Issue: ADR-DSN/4]' under the amended paragraph, the consolidated text of CS-ADR-DSN does not allow readers to see the detailed changes introduced by the new amendment. To allow readers to also see these detailed changes, this document has been created. The same format as for the publication of Notices of Proposed Amendments (NPAs) has been used to show the changes:

— deleted text is ~~struck through~~;

— new or amended text is highlighted in grey;

— an ellipsis '[…]' indicates that the rest of the text is unchanged.

A Preamble and a list of abbreviations have been created and inserted in CS-ADR-DSN.

BOOK 1 — CERTIFICATION SPECIFICATIONS FOR AERODROME DESIGN

CHAPTER A — GENERAL

CS ADR-DSN.A.002 is amended as follows:

CS ADR-DSN.A.002 Definitions

[…]

'Arresting system' means a system designed to decelerate an aeroplane overrunning the runway.

'Autonomous runway incursion warning system (ARIWS)' means a system which provides autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or a vehicle operator.

[…]

~~'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.~~

[…]

'Foreign object debris (FOD)' means an inanimate object within the movement area which has no operational or aeronautical function and which has the potential to be a hazard to aircraft operations.

[…]

'Outer main gear wheel span (OMGWS)' means the distance between the outside edges of the main gear wheels.

[…]

CS ADR-DSN.A.005 is amended as follows:

CS ADR-DSN.A.005 Aerodrome reference code (ARC)

(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)~~, by 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~~	~~Aeroplane reference field length~~	~~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 1 200 m~~	~~B~~	~~15 m up to but not including 24 m~~	~~4.5 m up to but not including 6 m~~
~~3~~	~~1 200 m up to but not including 1 800 m~~	~~C~~	~~24 m up to but not including 36 m~~	~~6 m up to but not including 9 m~~
~~4~~	~~1 800 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 80 m~~	~~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~~				

Code element 1	
Code number	Aeroplane reference field length
1	Less than 800 m
2	800 m up to but not including 1 200 m
3	1 200 m up to but not including 1 800 m
4	1 800 m and over

Code element 2	
Code letter	Wingspan
A	Up to but not including 15 m
B	15 m up to but not including 24 m
C	24 m up to but not including 36 m
D	36 m up to but not including 52 m
E	52 m up to but not including 65 m
F	65 m up to but not including 80 m

Table A-1. Aerodrome reference code

CHAPTER B — RUNWAYS

CS ADR-DSN.B.045 is amended as follows:

CS ADR-DSN.B.045 Width of runways

(a) The width of a runway should be not less than the appropriate dimension specified in the Table B-1.

	~~Code letter~~					
~~Code Number~~	~~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.*~~
~~Table B-1. Width of runway~~

	Outer Main Gear Wheel Span (OMGWS)			
Code number	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
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
[a] *The width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.*				

Table B-1. Width of runway

(b) The width of the runway should be measured at the outside edge of the runway side stripe marking where provided, or the edge of the runway.

CS ADR-DSN.B.095 is amended as follows:

CS ADR-DSN.B.095 Runway turn pads

(a) The safety objective of the runway turn pad is to facilitate a safe 180-degree turn by aeroplanes on runway ends that are not served by a taxiway or taxiway turnaround.

(b) Where the end of a runway is not served by a taxiway or a taxiway turnaround, and if required, a runway turn pad should be provided to facilitate a 180-degree turn of aeroplanes.

(c) The design of a runway turn pad should be such that when the cockpit of the most demanding aircraft 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 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~~

~~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~~

	OMGWS			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
Clearance	1.50 m	2.25 m	3 m[a] or 4 m[b]	4 m
[a] *if the turn pad is intended to be used by aeroplanes with a wheel base less than 18 m.* [b] *if the turn pad is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m*.				
Note: Wheel base means the distance from the nose gear to the geometric centre of the main gear.				

(d) The runway turn pad should 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.

CS ADR-DSN.B.125 is amended as follows:

CS ADR-DSN.B.125 Runway shoulders

(a) The safety objective of runway shoulder is that it should be so constructed as to mitigate any hazard to an aircraft running off the runway or stopway or to avoid the ingestion of loose stones or other objects by turbine engines.

(b) Runway shoulders should be provided for a runway where the code letter is D, ~~or~~ E or F,~~, and the runway width is less than 60 m~~ for aeroplanes with an OMGWS from 9 m up to but not including 15 m.

~~(c) Runway shoulders should be provided for a runway where the code letter is F.~~

CS ADR-DSN.B.135 is amended as follows:

CS ADR-DSN.B.135 Width of runway shoulders

For aeroplanes with an OMGWS from 9 m up to but not including 15 m t~~T~~he 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~~a) 60 m where the code letter is D or E; ~~and~~

(~~2~~b) 60 m where the code letter is F with two- or three-engined aeroplanes; and

(~~2~~c) 75 m where the code letter is F with four (or more) engined aeroplanes.

CS ADR-DSN.B.140 is amended as follows:

CS ADR-DSN.B.140 Strength of runway shoulders

~~A~~The portion of a runway shoulder between the runway edge and a distance of 30 m from the runway centre line 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 is amended as follows:

CS ADR-DSN.B.145 Surface of runway shoulders

(a) The surface of a runway shoulder should be prepared or constructed so as to resist erosion and prevent the ingestion of the surface material by aeroplane engines.

(b) Runway shoulders for code letter F aeroplanes should be paved to a minimum overall width of runway and shoulder of not less than 60 m.

CS ADR-DSN.B.150 is amended as follows:

CS ADR-DSN.B.150 Runway strip to be provided

(a) The safety objective of the runway strip is to reduce the risk of damage to an aircraft accidentally running off the runway, to protect aircraft flying over it when taking-off or landing, and to enable safe use by rescue and firefighting (RFF) vehicles.

(b) A runway and any associated stopways should be included in a strip.

CS ADR-DSN.B.160 is amended as follows:

CS ADR-DSN.B.160 Width of runway strip

~~(a) The safety objective of the runway strip is to reduce the probability of damage to an aircraft accidentally running off the runway, to protect aircraft flying over it when taking-off or landing and to enable safe use by rescue and firefighting vehicles'.~~

(a~~b~~) A strip including a precision approach runway should extend laterally to a distance of at least:

(1) ~~150~~140 m where the code number is 3 or 4; and

(2) ~~75~~70 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~~c~~) A strip including a non-precision approach runway should extend laterally to a distance of at least:

(1) ~~150~~140 m where the code number is 3 or 4; and

(2) ~~75~~70 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~~d~~) 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.175 is amended as follows:

CS ADR-DSN.B.175 Grading of runway strip

(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~~the start of a runway should be prepared against blast erosion in order to protect an ~~landing~~ aeroplane from the danger of an exposed edge.

CHAPTER D — TAXIWAYS

CS ADR-DSN.D.240 is amended as follows:

CS ADR-DSN.D.240 Taxiways general

Unless otherwise indicated, the requirements in Chapter D ~~–~~— Taxiways 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~~
~~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~~

	OMGWS			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
Clearance	1.50 m	2.25 m	3 m[a,b] or 4 m[c]	4 m
[a] on straight portions [b] on curved portions if the taxiway is intended to be used by aeroplanes with a wheel base of less than 18 m. [c] on curved portions if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m.				
Note: Wheel base means the distance from the nose gear to the geometric centre of the main gear.				

CS ADR-DSN.D.245 is amended as follows:

CS ADR-DSN.D.245 Width of taxiways

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~~
~~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~~

	OMGWS			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
Taxiway width	7.5 m	10.5 m	15 m	23 m

CS ADR-DSN.D.260 is amended as follows:

CS ADR-DSN.D.260 Taxiway minimum separation distance

(a) The safety objective of minimum taxi separation distances is to allow safe use of taxiways and aircraft stand taxilanes to prevent possible collision with other aeroplanes operating on adjacent runways or taxiways, or collision with adjacent objects.

(b) 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.

	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 aircraft stand taxilane centre line (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)	(13)
A	~~82.5~~ 77.5	~~82.5~~ 77.5	—	—		37.5	47.5	—	—	23	15.5	19.5	12
B	~~87~~ 82	~~87~~ 82	~~—~~ 152	—		42	52	~~—~~ 87	—	32	20	28.5	16.5
C	~~—~~ 88	~~—~~ 88	~~168~~ 158	~~—~~ 158		~~—~~ 48	~~—~~ 58	93	93	44	26	40.5	22.5
D	—	—	~~176~~ 166	~~176~~ 166		—	—	101	101	63	37	59.5	33.5
E	—	—	~~—~~ 172.5	~~182.5~~ 172.5		—	—	~~—~~ 107.5	107.5	76	43.5	72.5	40
F	—	—	~~—~~ 180	~~190~~ 180		—	—	~~—~~ 115	115	91	51	87.5	47.5

Note 1: The separation distances shown in columns (2) to (9) represent ordinary combinations of runways and taxiways.
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.

Table D-1. Taxiway minimum separation distances

CS ADR-DSN.D.305 is amended as follows:

CS ADR-DSN.D.305 Taxiway shoulders

(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~~44 m where the code letter is F;

(2) ~~44~~38 m where the code letter is E;

(3) ~~38~~34 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 prepared so as to resist erosion and the ingestion of the surface material by aeroplane engines.

CS ADR-DSN.D.325 is amended as follows:

CS ADR-DSN.D.325 Grading of taxiway strips

(a) The safety objective of the grading of a taxiway strip is to reduce the risk of damage to an aircraft accidentally running off the taxiway.

(b) 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~~not less than that given by the following tabulation:

~~(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.~~

(1) 10.25 m where the OMGWS is up to but not including 4.5 m;

(2) 11 m where the OMGWS is 4.5 m up to but not including 6 m;

(3) 12.50 m where the OMGWS is 6 m up to but not including 9 m;

(4) 18.50 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is D;

(5) 19 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is E;

(6) 22 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is F.

CHAPTER J — OBSTACLE LIMITATION REQUIREMENTS

CS ADR-DSN.J.480 is amended as follows:

CS ADR-DSN.J.480 Precision approach runways

[…]

APPROACH RUNWAYS										
RUNWAY CLASSIFICATION										
Surface and dimensions [a]	Non-instrument Code number				Non-precision approach Code number			Precision approach category I Code number		II or III Code number
	1	2	3	4	1, 2	3	4	1, 2	3, 4	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	35 m	55 m	75 m	100 m	60 m	75 m	100 m	60 m	100 m	100 m
INNER HORIZONTAL										
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m
Radius	2 000 m	2 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m
INNER APPROACH										
Width	-	-	-	-	-	-	-	90 m	120 m [e]	120 m [e]
Distance from threshold	-	-	-	-	-	-	-	60 m	60 m	60 m
Length	-	-	-	-	-	-	-	900 m	900 m	900 m
Slope	-	-	-	-	-	-	-	2.5 %	2 %	2 %

APPROACH RUNWAYS										
RUNWAY CLASSIFICATION										
Surface and dimensions [a]	Non-instrument Code number				Non-precision approach Code number			Precision approach category I Code number		II or III Code number
APPROACH										
Length of inner edge	60 m	80 m	150 m	150 m	~~150~~140 m	~~300~~280 m	~~300~~280 m	~~150~~140 m	~~300~~280 m	~~300~~280 m
Distance from threshold	30 m	60 m	60 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 %	15 %	15 %
First section										
Length	1 600 m	2 500 m	3 000 m	3 000 m	2 500 m	3 000 m	3 000 m	3 000 m	3 000 m	3 000 m
Slope	5 %	4 %	3.33 %	2.5 %	3.33 %	2 %	2 %	2.5 %	2 %	2 %
Second section										
Length	-	-	-	-	-	3 600 m[b]	3 600 m[b]	12 000 m	3 600 m[b]	3 600 m[b]
Slope	-	-	-	-	-	2.5 %	2.5 %	3 %	2.5 %	2.5 %
Horizontal section										
Length	-	-	-	-	-	8 400 m[b]	8 400 m[b]	-	8 400 m[b]	8 400 m[b]
Total length	-	-	-	-	-	15 000 m	15 000 m	15 000 m	15 000 m	15 000 m
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										

APPROACH RUNWAYS										
RUNWAY CLASSIFICATION										
Surface and dimensions [a]	Non-instrument Code number				Non-precision approach Code number			Precision approach category I Code number		II or III Code number
Length of inner edge	-	-	-	-	-	-	-	90 m	120 m[e]	120 m[e]
Distance from threshold	-	-	-	-	-	-	-	c	1 800 m[d]	1 800 m[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.475(c) or CS ADR-DSN.J.480(d)).

[c.] Distance to the end of strip.

[d.] Or end of runway whichever is less.

[e.] Where the code letter is F (Code element 2~~Column (3)~~ of Table A-1), the width is increased to ~~155~~140 m.

Table J-1. Dimensions and slopes of obstacle limitation surfaces — Approach runways

CHAPTER L — VISUAL AIDS FOR NAVIGATION (MARKINGS)

CS ADR-DSN.L.565 is amended as follows:

CS ADR-DSN.L.565 Runway turn pad marking

[...]

(b) Characteristics:

[...]

(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 CS ADR-DSN.B.095(c). ~~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~~

[...]

CS ADR-DSN.L.605 is amended as follows:

CS ADR-DSN.L.605 Mandatory instruction marking

[…]

(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 at least 2 m where the code letter is A or B. The inscription should be in the form and proportions shown in Figures L-10A to L-10~~E~~D.

(5) The background should be rectangular and extend a minimum of 0.5 m laterally and vertically beyond the extremities of the inscription.

(6) The spacing of characters for mandatory instruction marking should be obtained by first determining the equivalent elevated sign character height and then proportioning from the spacing values given in Table N-3.

CS ADR-DSN.L.610 is amended as follows:

CS ADR-DSN.L.610 Information marking

(a) Applicability: Where an information sign in accordance with CS ADR-DSN.N.785 is not installed, an information marking should be displayed on the surface of the pavement.

(b) 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:

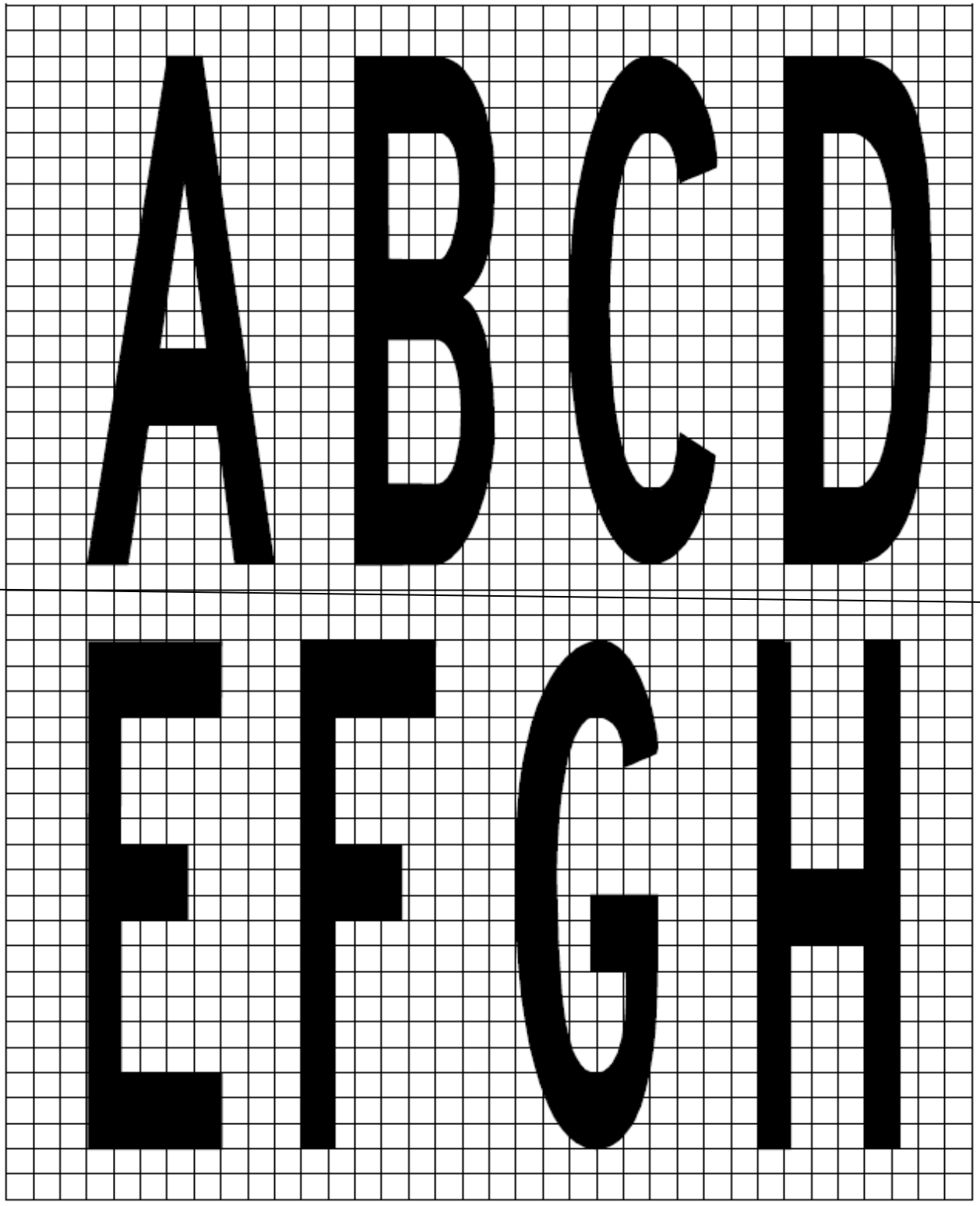
(i) a black border where the inscriptions are in black; and

(ii) a yellow border where the inscriptions are in yellow.

(3) The character height should be as for mandatory instruction markings.

(4) The spacing of characters for information marking should be as specified in Table N-3(c).

[Editorial note: Figure L-10A is deleted.]



[Editorial note: new Figure L-10A is added as follows:]

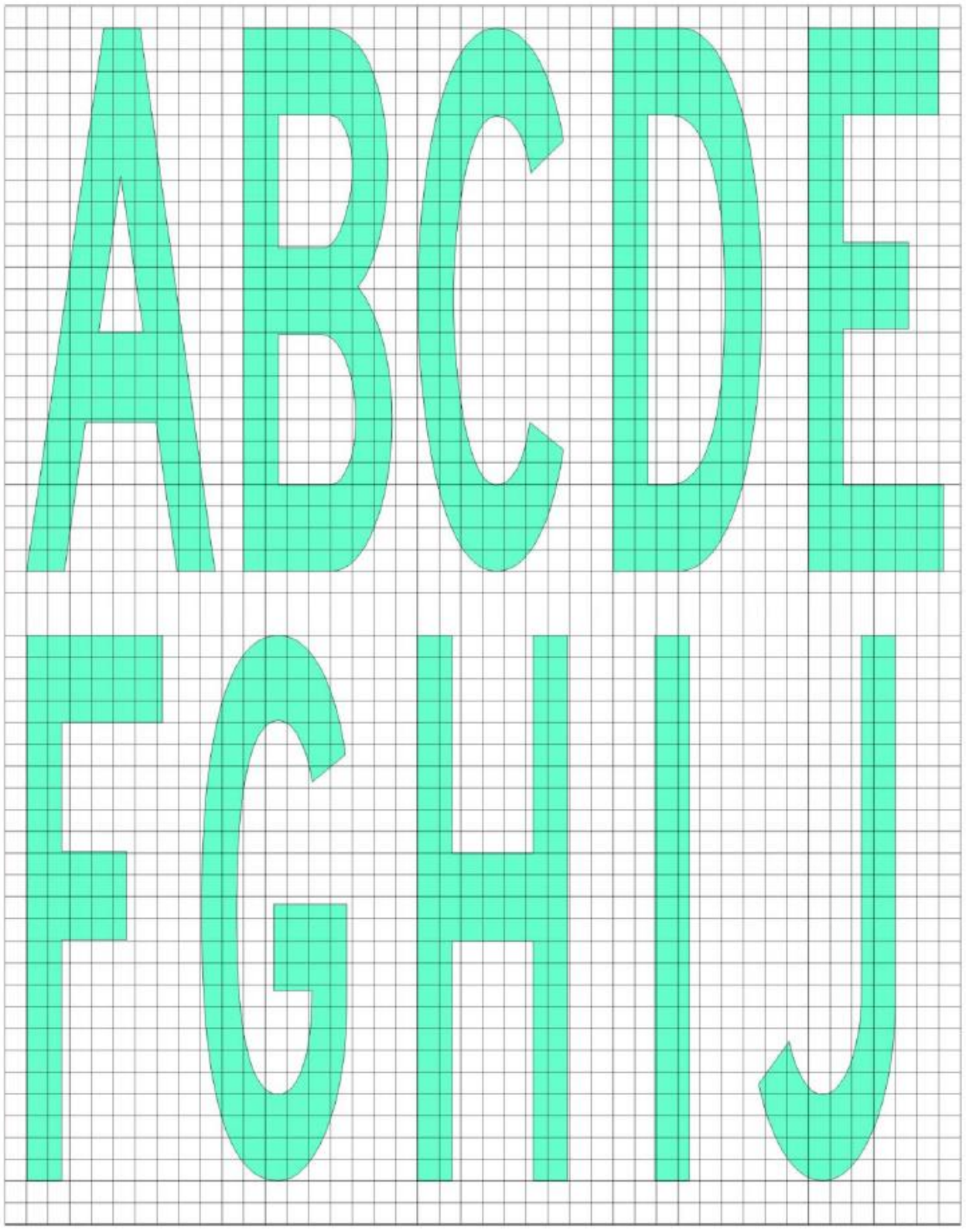
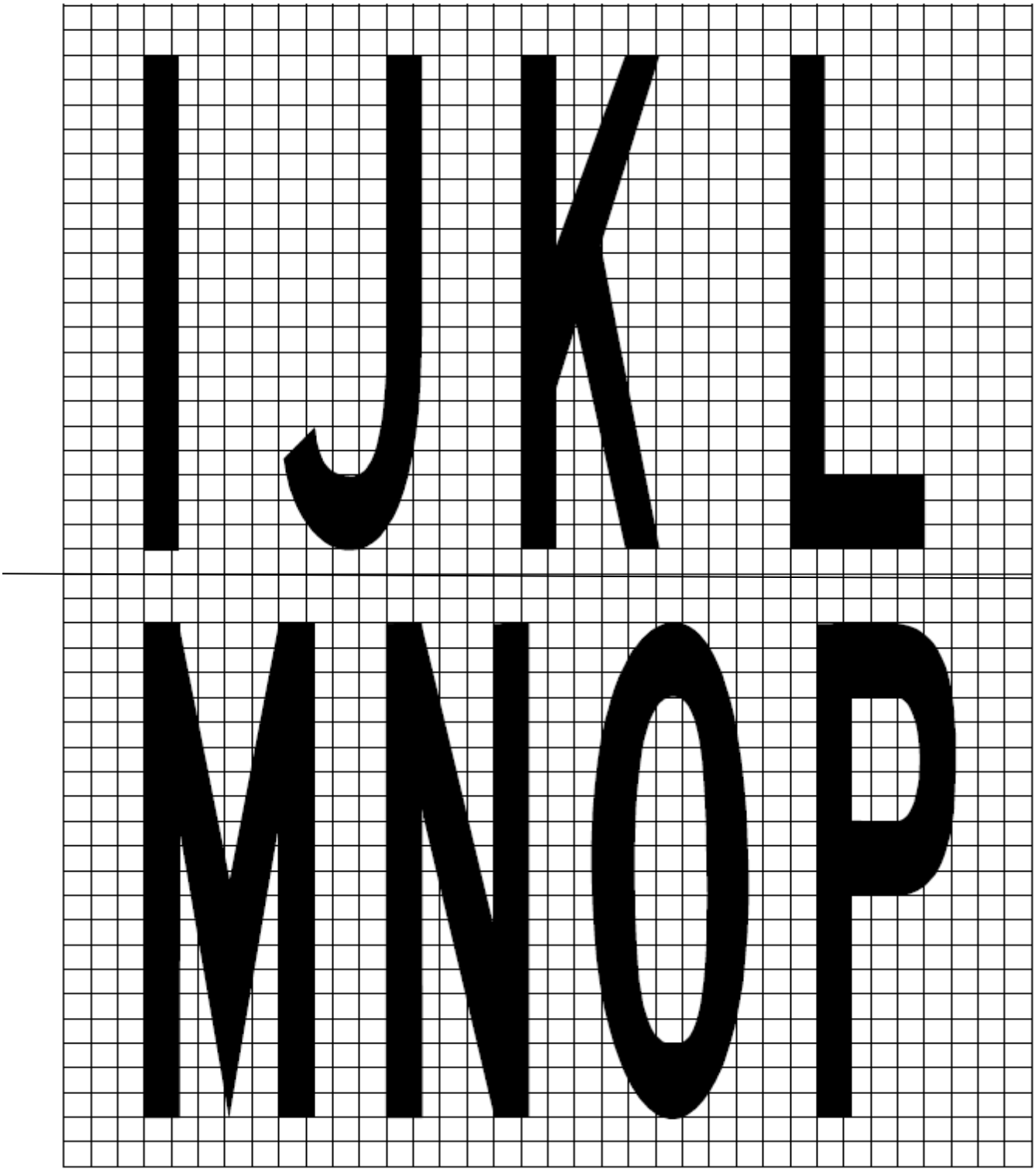


Figure L-10A. Mandatory instruction marking inscription form and proportions

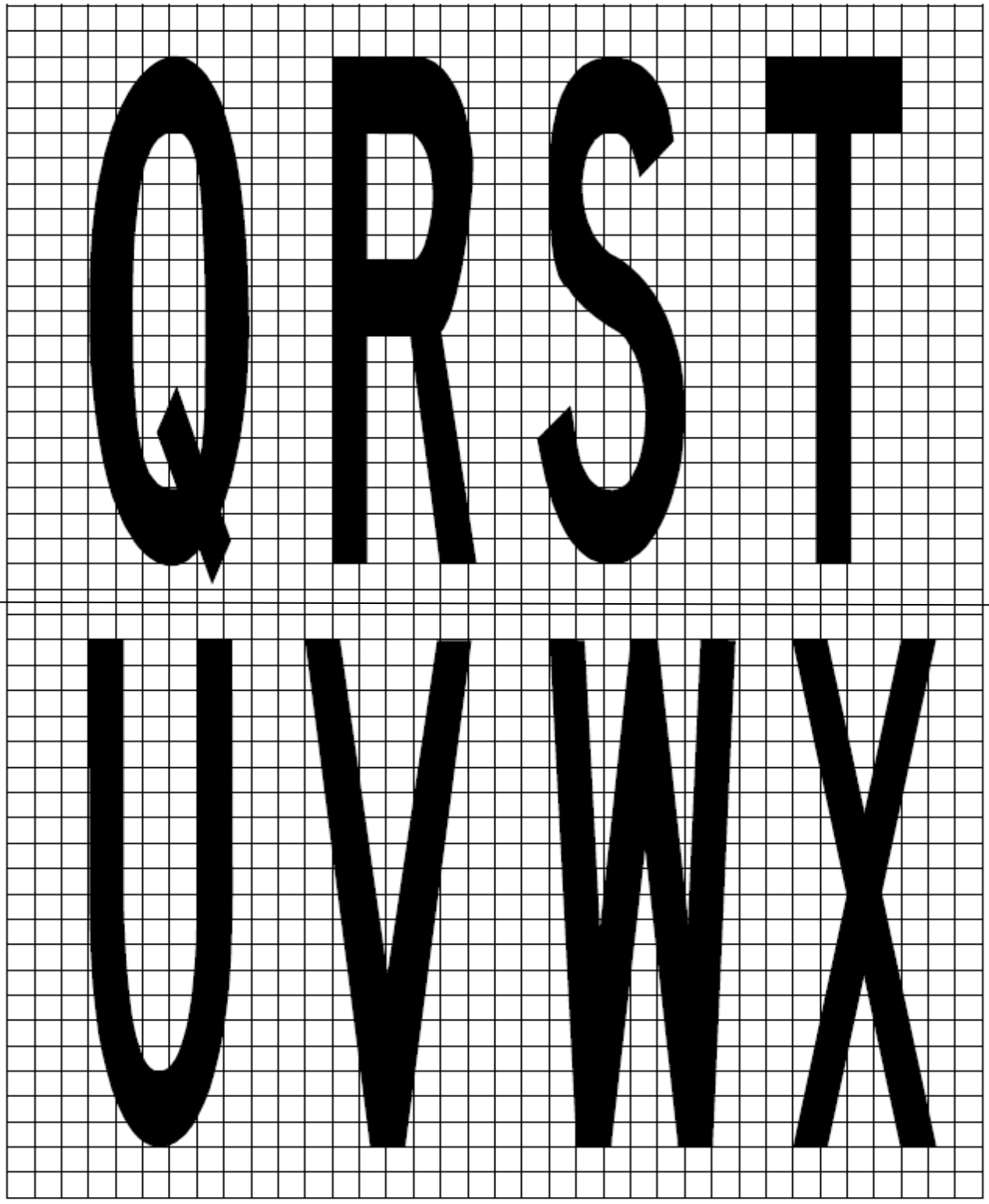
[Editorial note: Figure L-10B is deleted:]



[Editorial note: new Figure L-10B is added as follows:]

Figure L-10B. Mandatory instruction marking inscription form and proportions

[Editorial note: Figure L-10C is deleted:]



[Editorial note: new Figure L-10C is added as follows:]

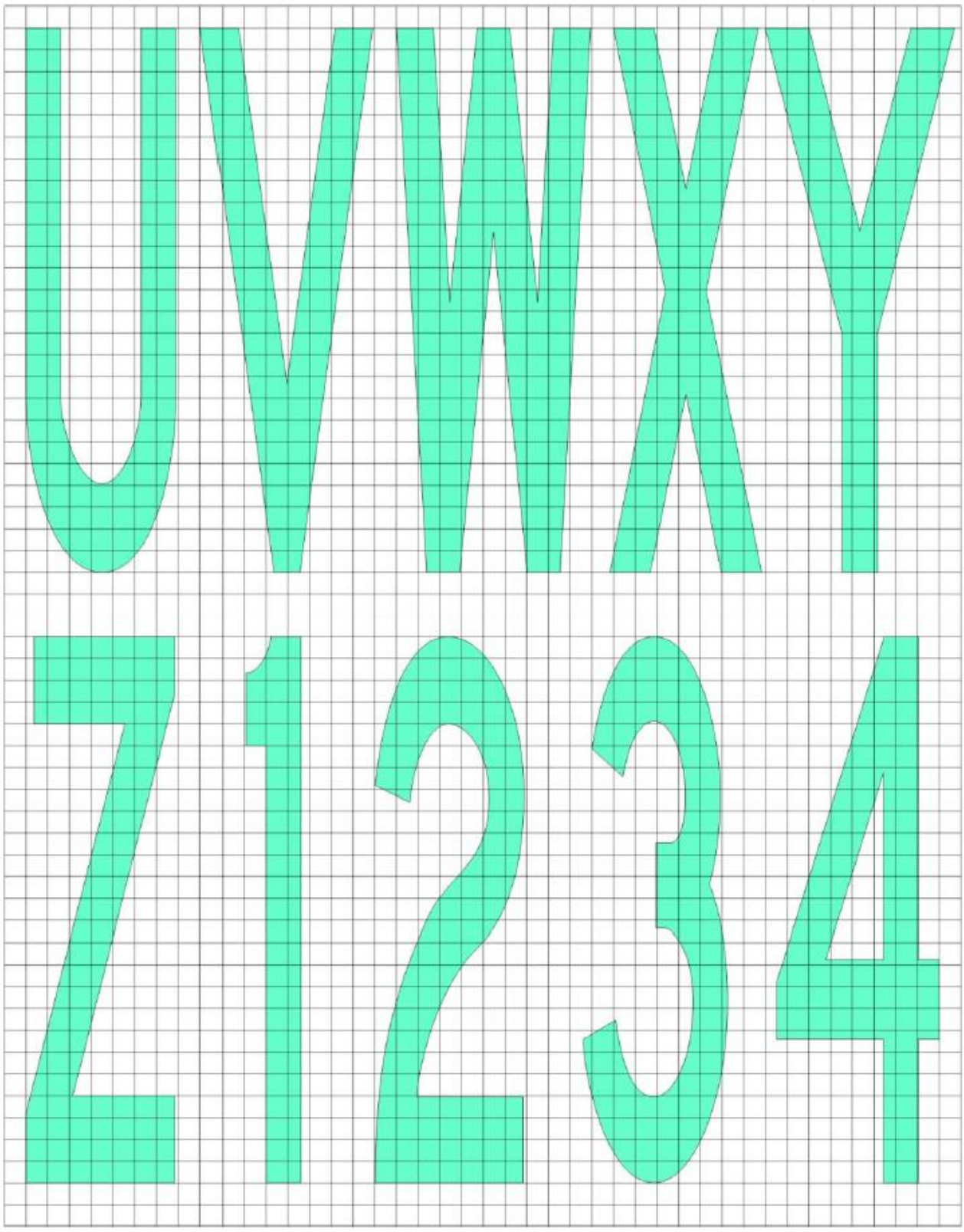
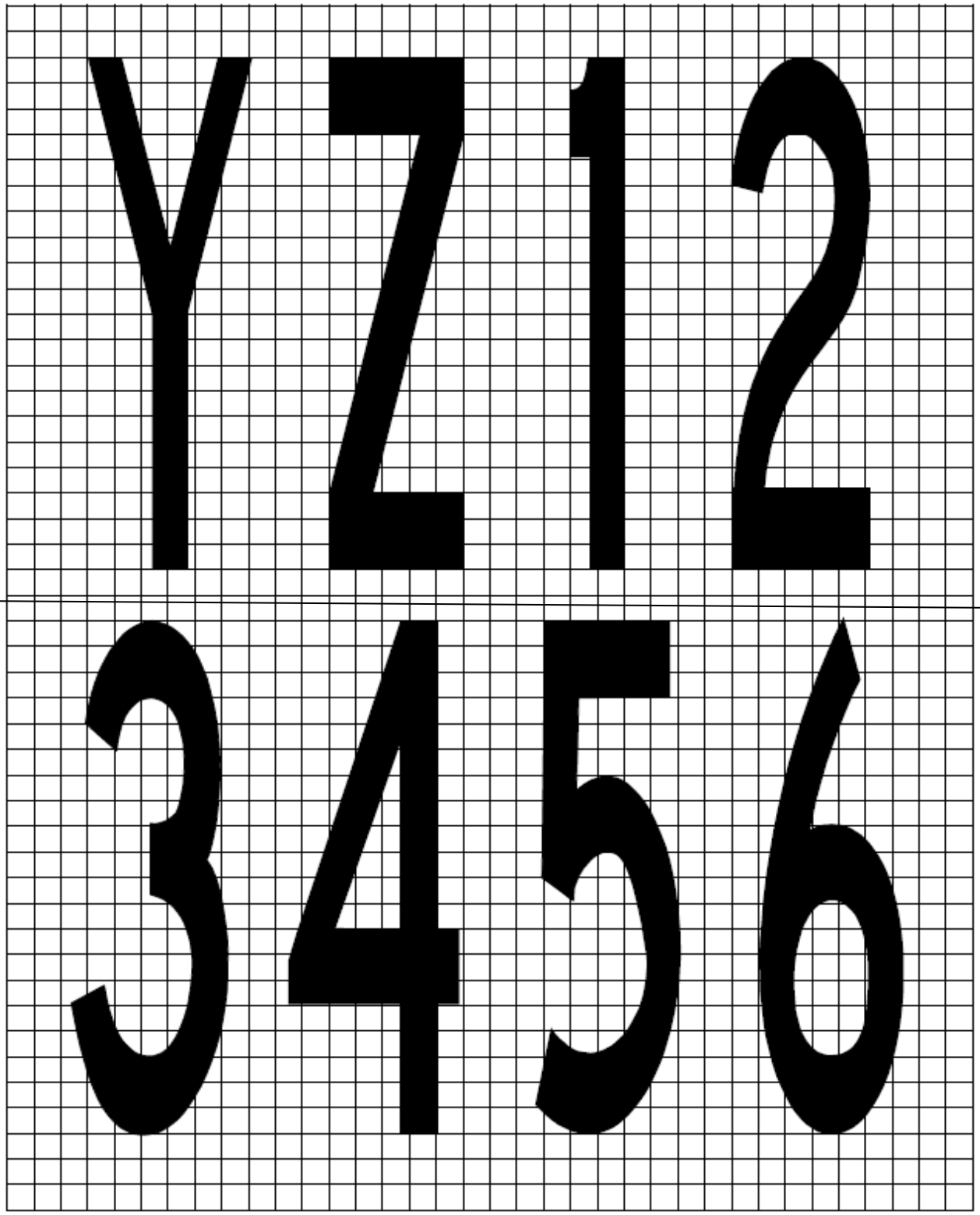


Figure L-10C. Mandatory instruction marking inscription form and proportions

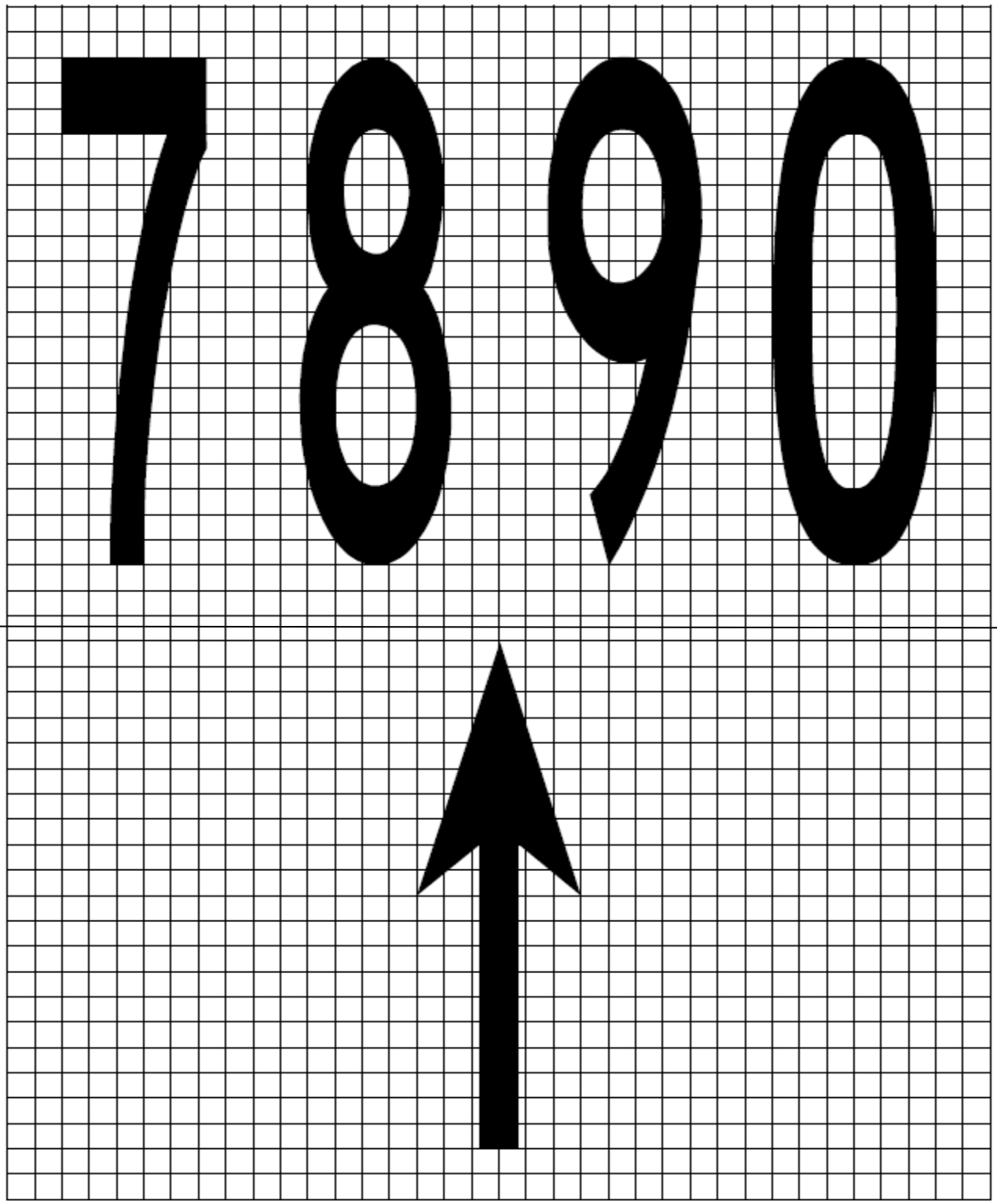
[Editorial note: Figure L-10D is deleted:]



[Editorial note: new Figure L-10D is added as follows:]

Figure L-10D. Mandatory instruction marking inscription form and proportions

[Editorial note: Figure L-10E is deleted:]



~~Figure L-10E. Mandatory instruction marking inscription form and proportions~~

CHAPTER M — VISUAL AIDS FOR NAVIGATION (LIGHTS)

CS ADR-DSN.M.630 is amended as follows:

CS ADR-DSN.M.630 Precision approach Category I lighting system

[…]

(c) 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 CS ADR-DSN.S.895 can be demonstrated, each centre line light position should consist of either:

(i) a single light source; or

(ii) a barrette.

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. The barrettes should be at least 4 m in length.

(3) If the centre line consists of lights as described in paragraph (c)(1)(i) or (c)(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.

(4) 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.

(5) The characteristics of lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-5. The chromaticity of lights should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

(6) If the centre line consists of barrettes as described in paragraph (c)(1)(ii) or (c)(2)(ii) above, each barrette should be supplemented by a ~~capacitor discharge~~flashing light, except

where such lighting is considered unnecessary taking into account the characteristics of the system, and the nature of the meteorological conditions.

(7) Each ~~capacitor discharge~~flashing light, as described in paragraph (c)(6), 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.

[…]

CS ADR-DSN.M.635 is amended as follows:

CS ADR-DSN.M.635 Precision approach Category II and III lighting system

[…]

(b) Characteristics:

(1) 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 in CS ADR.DSN.S.895 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:

(i) barrettes where the centre line beyond 300 m from the threshold consists of barrettes as described in paragraph (b)(3)(i) below; or

(ii) alternate single light sources and barrettes, where the centre line beyond 300 m from the threshold consists of single light sources as described in paragraph (b)(3)(ii) below, with the innermost single light source located 30 m and the innermost barrette located 60 m from the threshold; or

(iii) single light sources where the threshold is displaced 300 m or more;

all of which should show variable white.

(2) Beyond 300 m from the threshold each centre line light position should consist of either:

(i) a barrette as used on the inner 300 m; or

(ii) 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.

(3) Where the serviceability level of the approach lights in CS ADR.DSN.S.895 as maintenance objectives can be demonstrated beyond 300 m from the threshold, each centre line light position may consist of either:

(i) a barrette; or

(ii) a single light source;

all of which should show variable white.

(4) 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.

(5) If the centre line beyond 300 m from the threshold consists of barrettes as described in paragraphs (b)(2)(i) and (b)(3)(i), each barrette beyond 300 m should be supplemented by a ~~capacitor discharge~~flashing light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(6) Each ~~capacitor discharge~~flashing 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.

(7) 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.

(8) 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.

(9) The intensity of the red lights should be compatible with the intensity of the white lights.

(10) The characteristics of lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-5 or U-6, as appropriate.

(11) The chromaticity of lights should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.645 is amended as follows:

CS ADR-DSN.M.645 Precision approach path indicator and Abbreviated precision approach path indicator (PAPI and APAPI)

[…]

(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 chromaticity of lights units should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate, and the red light should have a Y coordinate not exceeding 0.320.

[…]

CS ADR-DSN.M.655 is amended as follows:

CS ADR-DSN.M.655 Obstacle protection surface for PAPI and APAPI

(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-6.

(c) New objects or extensions of existing objects should not be permitted above an obstacle protection surface except when the new object or extension would be shielded by an existing immovable object, or if after a safety assessment, it is determined that the object would not adversely affect the safety of operations of aeroplanes.

(d) Where a safety assessment 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:

(1) remove the object;

(2~~1~~) suitably raise the approach slope of the system;

(3~~2~~) reduce the azimuth spread of the system so that the object is outside the confines of the beam;

(4~~3~~) displace the axis of the system and its associated obstacle protection surface by no more than 5°;

(5~~4~~) suitably displace the threshold; and

(6~~5~~) where (4~~5~~) 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~~ such that the object no longer penetrates the obstacle protection surface.

[...]

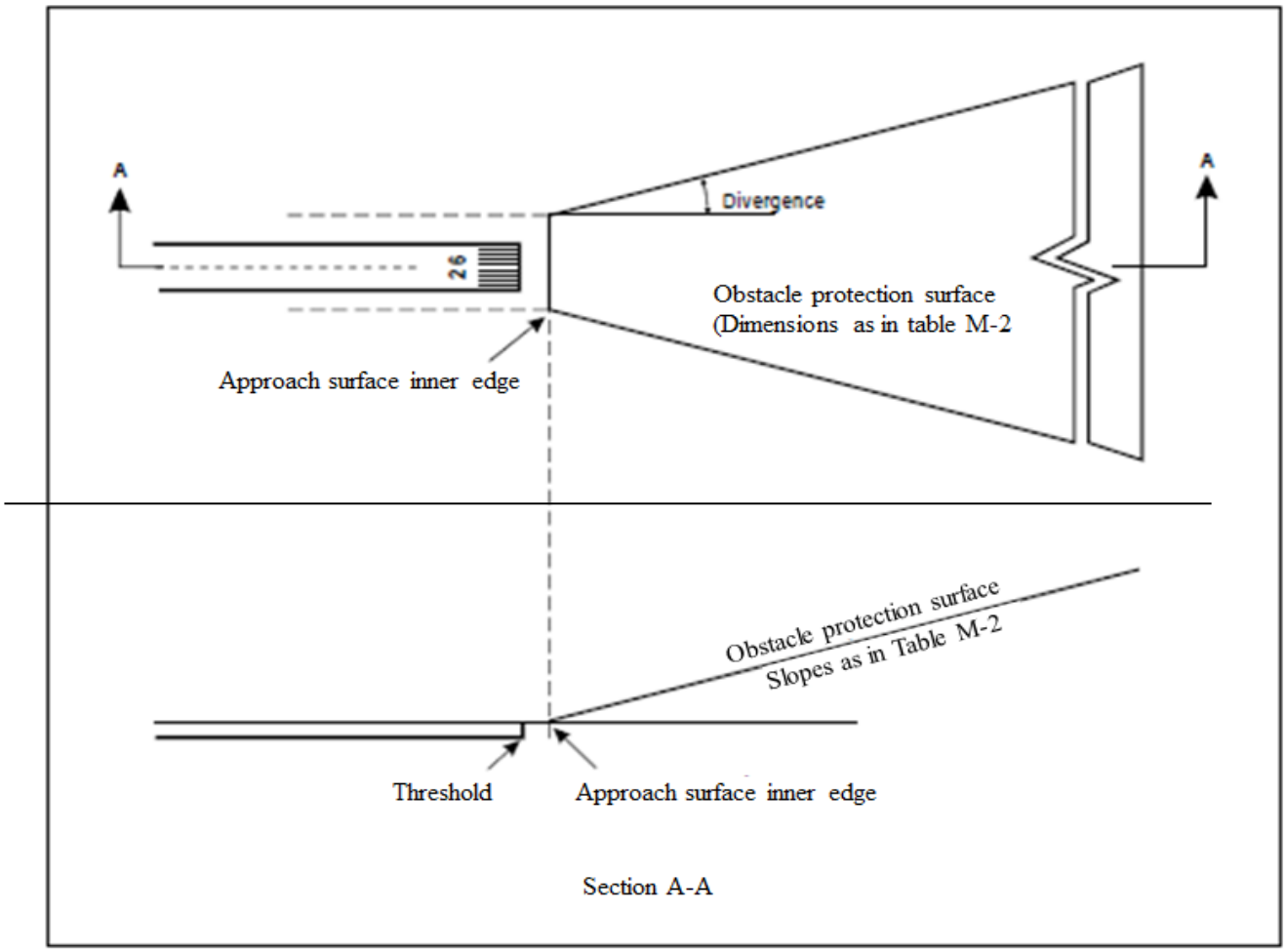
	Runway type/code number							
	Non-instrument				Instrument			
	Code number				Code number			
Surface dimensions	1	2	3	4	1	2	3	4
Length of inner edge	60 m	80 m	150 m	150 m	150 m	150 m	300 m	300 m
Distance from ~~threshold~~ the visual approach slope indicator system[2]	D_1+30 m ~~30 m~~	D_1+60 m ~~60 m~~	D_1+60 m ~~60 m~~	D_1+60 m ~~60 m~~	D_1+60 m ~~60 m~~	D_1+60 m ~~60 m~~	D_1+60 m ~~60 m~~	D_1+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[1]	A–0.9°	A–0.9°	–	–	A–0.9°	A–0.9°	–	–

[1] Angles as indicated in Figure M-5.

[2] D1 is the distance of the visual approach slope indicator system from threshold prior to any displacement to remedy object penetration of the obstacle protection surface (refer to Figure M-4). The start of the obstacle protection surface is fixed to the visual approach slope indicator system location, such that displacement of the PAPI results in an equal displacement of the start of the obstacle protection surface.

Table M-2. Dimensions and slopes of the obstacle protection surface

[Editorial note: Figure M-6 is deleted:]



[Editorial note: new Figure M-6 is added as follows:]

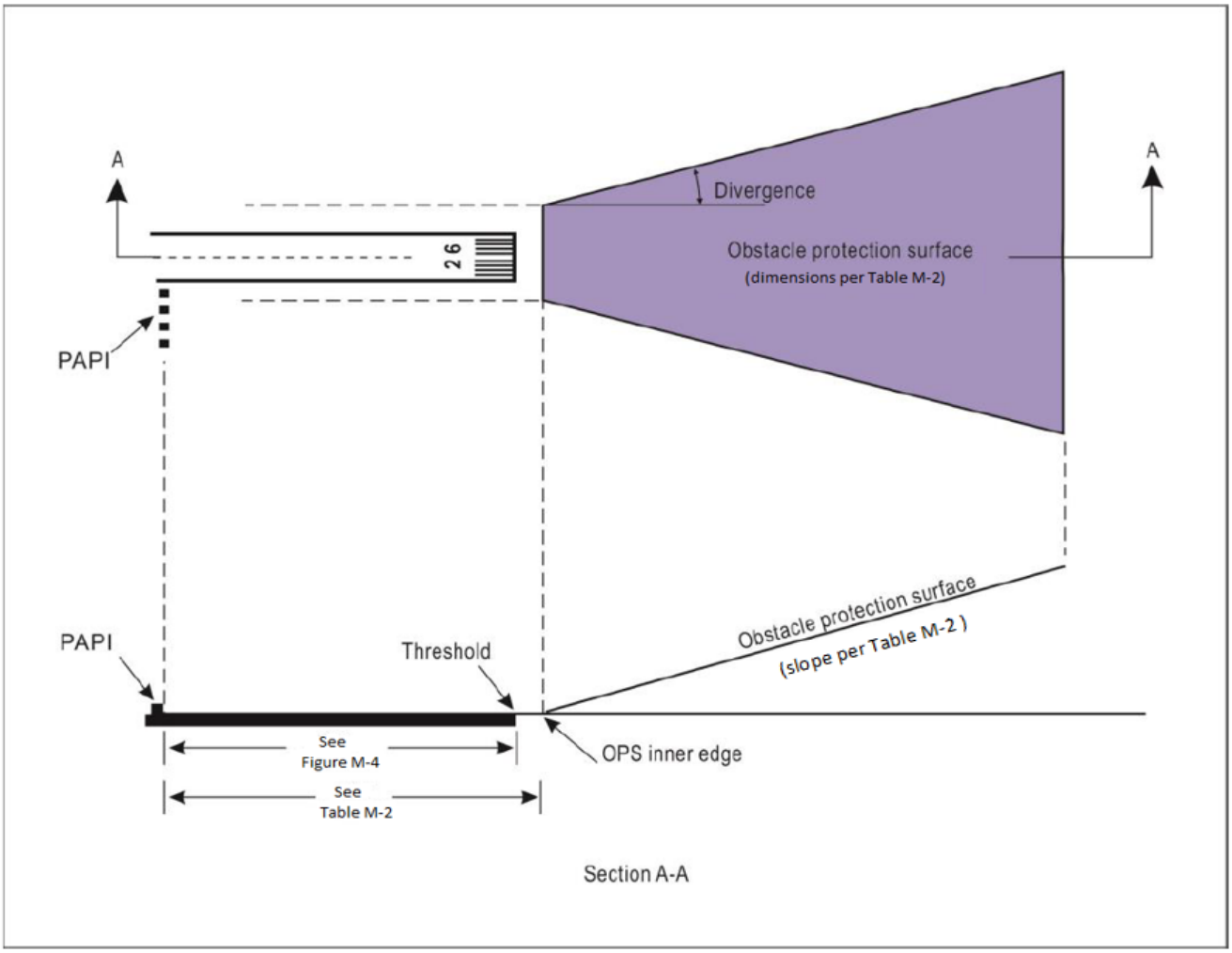


Figure M-6. Obstacle protection surface for visual approach slope indicator systems

CS ADR-DSN.M.665 is amended as follows:

CS ADR-DSN.M.665 Runway lead-in lighting systems

(a) Applicability: A runway lead-in lighting system should be provided to avoid hazardous terrain.

(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 determined 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: The flashing lights and the steady burning lights should be white~~, and the steady burning lights should be gaseous discharge lights~~.

CS ADR-DSN.M.670 is amended as follows:

CS ADR-DSN.M.670 Runway threshold identification lights

(a) Applicability:

(1) The inclusion of specifications for runway threshold identification lights is not intended to imply that the runway threshold identification lights have to be provided at an aerodrome.

(2) Where provided, runway threshold identification lights should be installed:

(i) 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

(ii) 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~~a~~) Location~~ and positioning~~: ~~Where provided,~~Rrunway 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~~b~~) 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 is amended as follows:

CS ADR-DSN.M.675 Runway edge lights

[…]

(f) The chromaticity of lights should be in accordance with the specifications in CS ADR-DSN.U.930 and in Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.680 is amended as follows:

CS ADR-DSN.M.680 Runway threshold and wing bar lights

[…]

(e) Characteristics of runway threshold and wing bar lights:

[…]

(4) The chromaticity of lights should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.685 is amended as follows:

CS ADR-DSN.M.685 Runway end lights

[…]

(c) Characteristics of runway end lights:

[…]

(3) Runway end lights on a precision approach runway should be in accordance with the chromaticity specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.690 is amended as follows:

CS ADR-DSN.M.690 Runway centre line lights

[…]

(d) Characteristics:

[…]

(3) Runway centre line lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.695 is amended as follows:

CS ADR-DSN.M.695 Runway touchdown zone lights

[…]

(c) Characteristics:

[…]

(5) Touchdown zone lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.696 is amended as follows:

CS ADR-DSN.M.696 Simple touchdown zone lights

[…]

(d) Characteristics:

[…]

(5) Simple touchdown zone lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.700 is amended as follows:

CS ADR-DSN.M.700 Rapid exit taxiway indicator lights (RETILs)

~~intentionally left blank~~

(a) Applicability:

(1) The inclusion of specifications for RETILs is not intended to imply that RETILs have to be provided at an aerodrome.

(2) Where installed, the purpose of RETILs is to provide pilots with distance-to-go information to the nearest rapid exit taxiway on the runway, to enhance situational awareness in low visibility conditions and enable pilots to apply braking action for more efficient roll-out and runway exit speeds.

(b) Location:

(1) RETILs should be located on the runway on the same side of the runway centre line as the associated rapid exit taxiway. 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 RETILs for each exit should not overlap when displayed.

(c) Characteristics:

(1) RETILs are fixed lights and 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.

(2) RETILs 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.

(3) RETILs' characteristics should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-10 or U-11, as appropriate.

(4) RETILs' chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

CS ADR-DSN.M.705 is amended as follows:

CS ADR-DSN.M.705 Stopway lights

[…]

(c) Characteristics:

(1) Stopway lights should be fixed unidirectional lights showing red in the direction of the runway.

(2) Stopway lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

New CS ADR-DSN.M.706 is added as follows:

CS ADR-DSN.M.706 Runway status lights (RWSL)

(a) Applicability:

(1) The inclusion of detailed specification for RWSL is not intended to imply that RWSL have to be provided at an aerodrome.

(2) RWSL is a type of autonomous runway incursion warning system (see CS ADR-DSN.T.921), consisting of two basic visual components: runway entrance lights (RELs) and take-off hold lights (THLs). The two components can be installed individually, but are designed to complement each other.

(b) Location:

(1) Where provided, RELs should be offset 0.6 m from the taxiway centre line on the opposite side to the taxiway centre line lights and begin 0.6 m before the runway-holding position extending to the edge of the runway. An additional single light should be placed on the runway 0.6 m from the runway centre line and aligned with the last two taxiway RELs.

(2) RELs should consist of at least five light units and should be spaced at a minimum of 3.8 m and a maximum of 15.2 m longitudinally, depending upon the taxiway length involved, except for a single light installed near the runway centre line.

(3) Where provided, THLs should be offset 1.8 m on each side of the runway centre line lights and extend, in pairs, starting at a point 115 m from the beginning of the runway and, thereafter, every 30 m for at least 450 m.

(c) Characteristics:

(1) Where provided, RELs should consist of a single line of fixed in pavement lights showing red in the direction of aircraft approaching the runway.

(2) RELs should illuminate as an array at each taxiway/runway intersection where they are installed less than two seconds after the system determines that a warning is needed.

(3) RELs intensity and beam spread should be in accordance with the specifications of Chapter U, Figures U-16 and U-18.

(4) Where provided, THLs should consist of two rows of fixed in pavement lights showing red facing the aircraft taking off.

(5) THLs should illuminate as an array on the runway less than two seconds after the system determines that a warning is needed.

(6) THLs intensity and beam spread should be in accordance with the specifications of Chapter U, Figure U-29.

(7) RELs and THLs should be automated to the extent that the only control over each system will be to disable one or both systems.

CS ADR-DSN.M.710 is amended as follows:

CS ADR-DSN.M.710 Taxiway centre line lights

[…]

(c) Characteristics:

[…]

(8) Taxiway centre line lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.720 is amended as follows:

CS ADR-DSN.M.720 Taxiway edge lights

(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°.

(4) Taxiway edge lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.725 is amended as follows:

CS ADR-DSN.M.725 Runway turn pad lights

[…]

(d) Characteristics:

[…]

(3) Runway turn pad lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.730 is amended as follows:

CS ADR-DSN.M.730 Stop bars

[…]

(c) Characteristics:

[…]

(7) Stop bar lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.735 is amended as follows:

CS ADR-DSN.M.735 Intermediate holding position lights

[…]

(c) Characteristics of intermediate holding position lights:

[…]

(3) Intermediate holding position lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and in Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.740 is amended as follows:

CS ADR-DSN.M.740 De-icing/anti-icing facility exit lights

[…]

(d) De-icing/anti-icing facility exit lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.745 is amended as follows:

CS ADR-DSN.M.745 Runway guard lights

[…]

(d) Characteristics:

[…]

(13) Runway guard lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.M.760 is amended as follows:

CS ADR-DSN.M.760 Advanced visual docking guidance system

(a) ~~Application~~Applicability:

[…]

CS ADR-DSN.N.771 is amended as follows:

CS ADR-DSN.M.771 No-entry bar

[…]

(c) Characteristics:

[…]

(4) No-entry bar lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CHAPTER N — VISUAL AIDS FOR NAVIGATION (SIGNS)

CS ADR-DSN.N.775 is amended as follows:

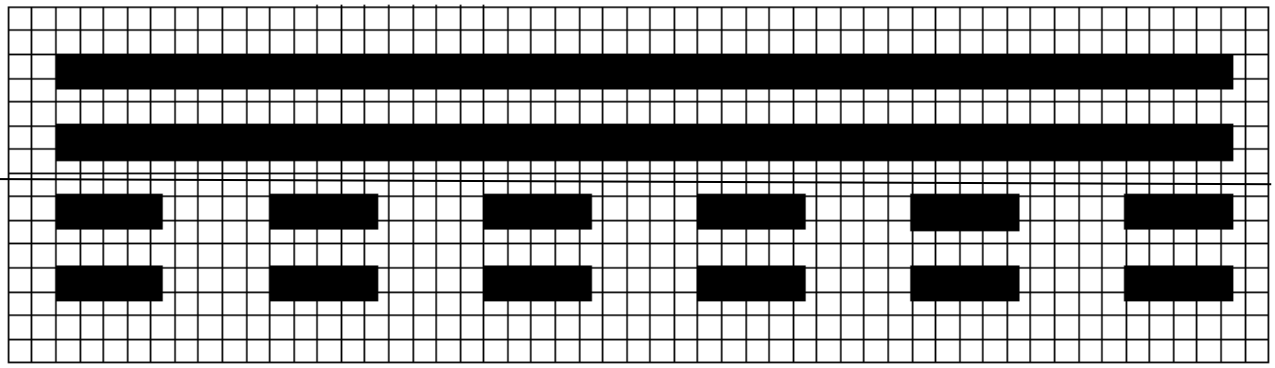
CS ADR-DSN.N.775 General

(a) Signs should be either fixed message signs or variable message signs.

(b) ~~Application~~Applicability:

[…]

[Editorial note: Figure N-2F is deleted:]



[Editorial note: new Figure N-2F is added as follows:]

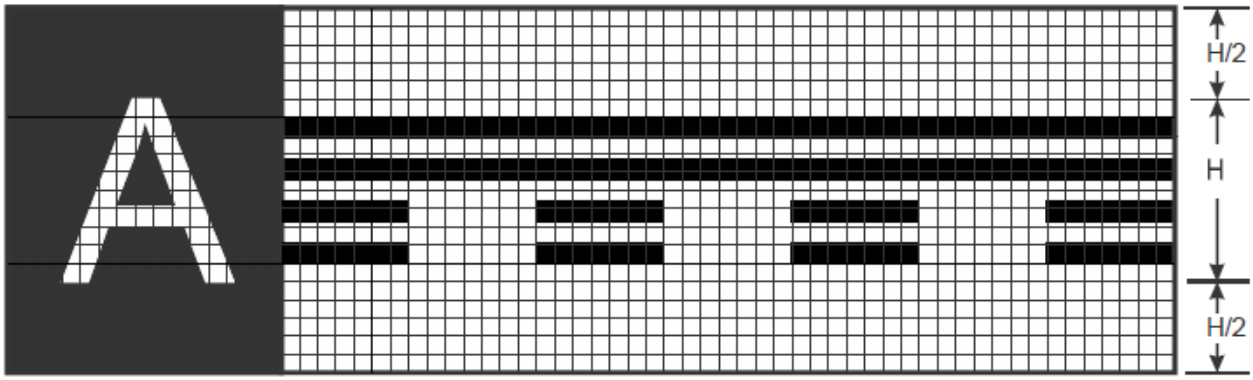
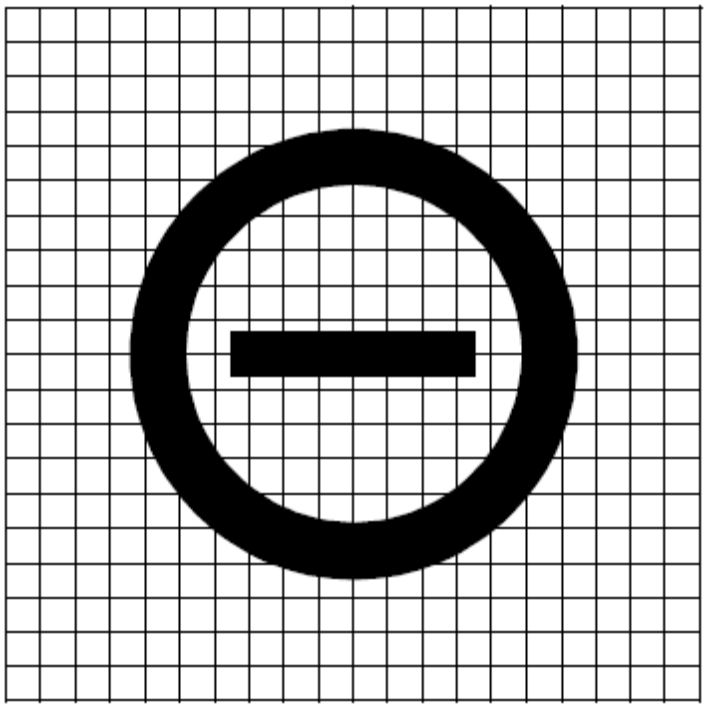


Figure N-2F~~.~~ Runway vacated sign with typical location sign

[Editorial note: Figure N-2G is deleted:]



[Editorial note: new Figure N-2G is added as follows:]

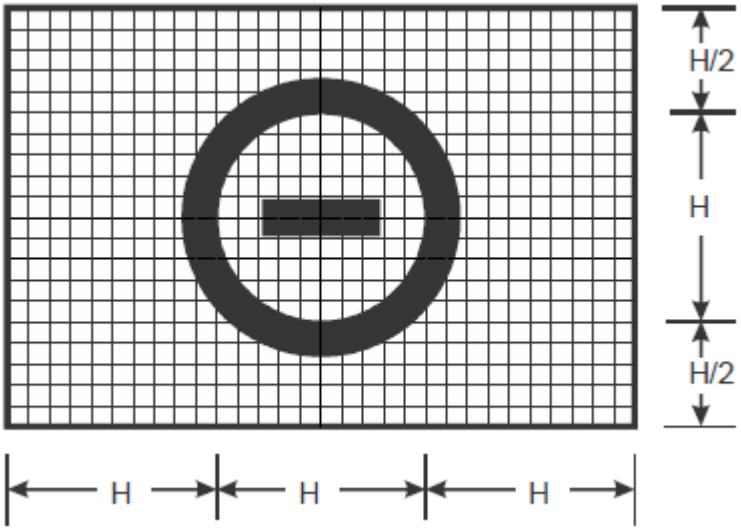


Figure N-2G. No entry sign

[…]

a) Letter to letter code number			
Preceding Letter	Following Letter		
	B, D, E, F, H, I, K, L, M, N, P, R, U	C, G, O, Q, S, X, Z	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

d) Width of letter			
	Letter height (mm)		
	200	300	400
Letter	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

b) Numeral to numeral code number			
Preceding Numeral	Following number		
	1, 5	2, 3, 6, 8, 9, 0	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

e) Width of numeral			
Code No.	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

c) Space between characters			
Code No.	~~Letter~~ Character height (mm)		
	200	300	400
	Space (mm)		
1	48	71	96
2	38	57	76
3	25	38	50
4	13	19	26

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.
5. For the intersection take-off sign, the height of the lower case 'm' is 0.75 of the height of the preceding character. The spacing from the preceding character is at Code 1 for the character height in Table N-3(c).

Table N-3. Letter and numeral width and space between letters or numerals

[…]

CS ADR-DSN.N.780 is amended as follows:

CS ADR-DSN.N.780 Mandatory instruction signs

(a) ~~Application~~Applicability:

(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. 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.

(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, joint II/III or joint I/II/III ~~or joint II/III~~ holding position sign should consist of the runway designator followed by CAT I, CAT II, CAT III, CAT II/III or CAT I/II/III ~~or CAT II/III~~ as appropriate.

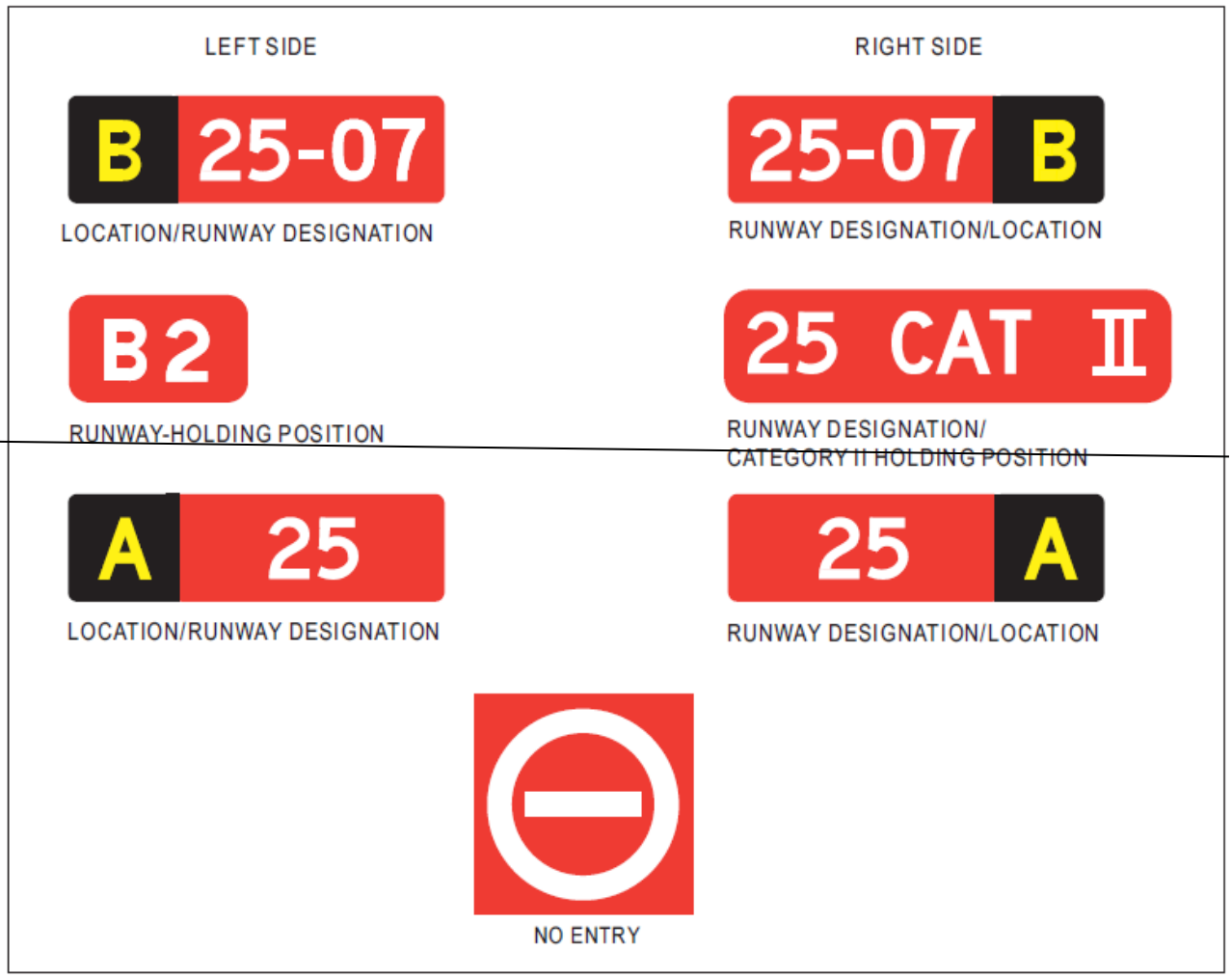
(4) The inscription on a NO ENTRY sign should be in accordance with Figure N-4.

(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~~installed, the ~~following~~ inscriptions/symbol of Figure N-4 should be used:

~~**Inscription/Symbol**~~	~~**Use**~~
~~Runway designation of runway extremity~~ ~~or~~ ~~Runway designation of both extremities of a runway~~	~~To indicate a runway-holding position at a runway extremity~~ ~~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 requirements for physical characteristics~~

[Editorial note: Figure N-4 is deleted:]



[Editorial note: new Figure N-4 is added:]

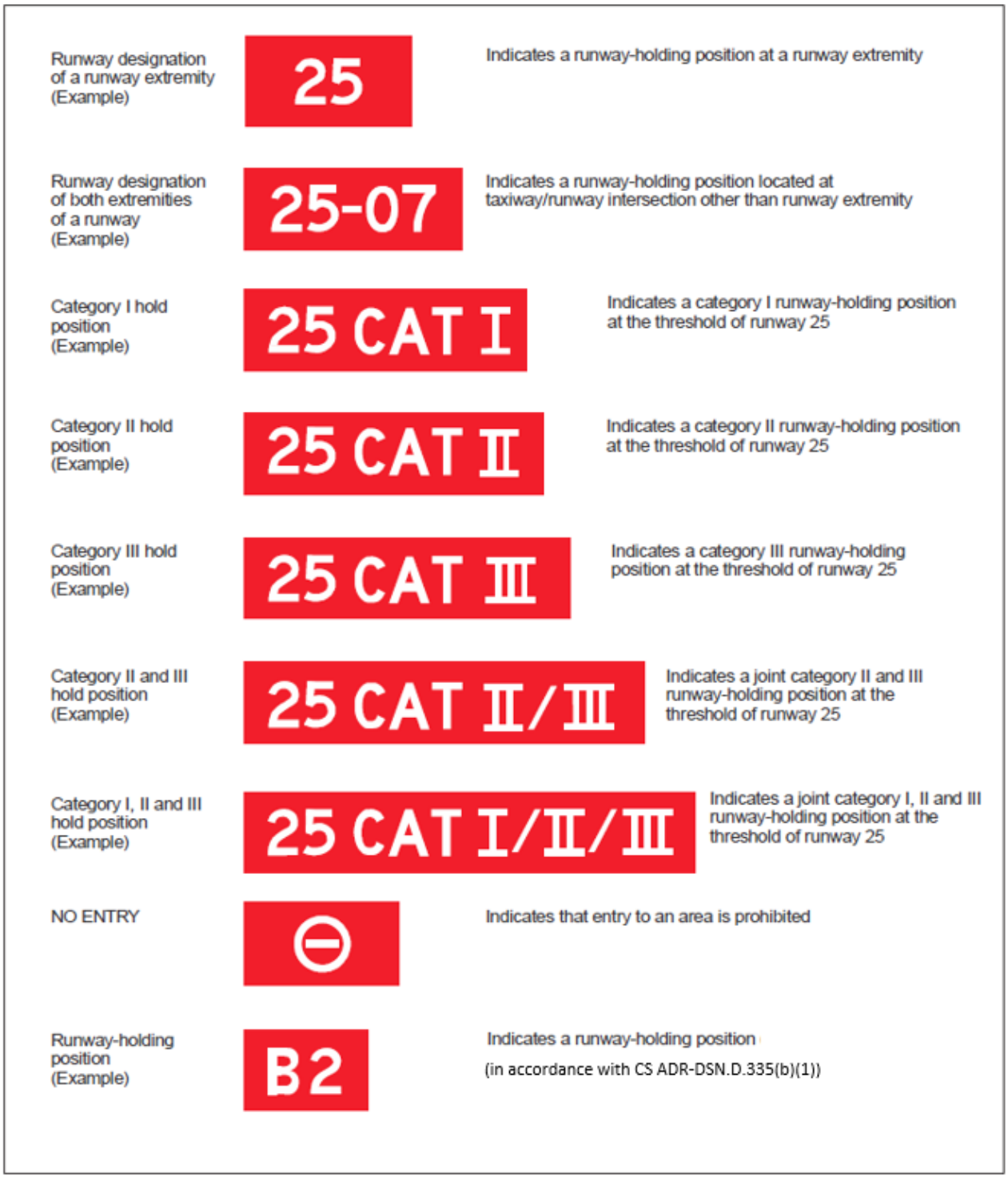
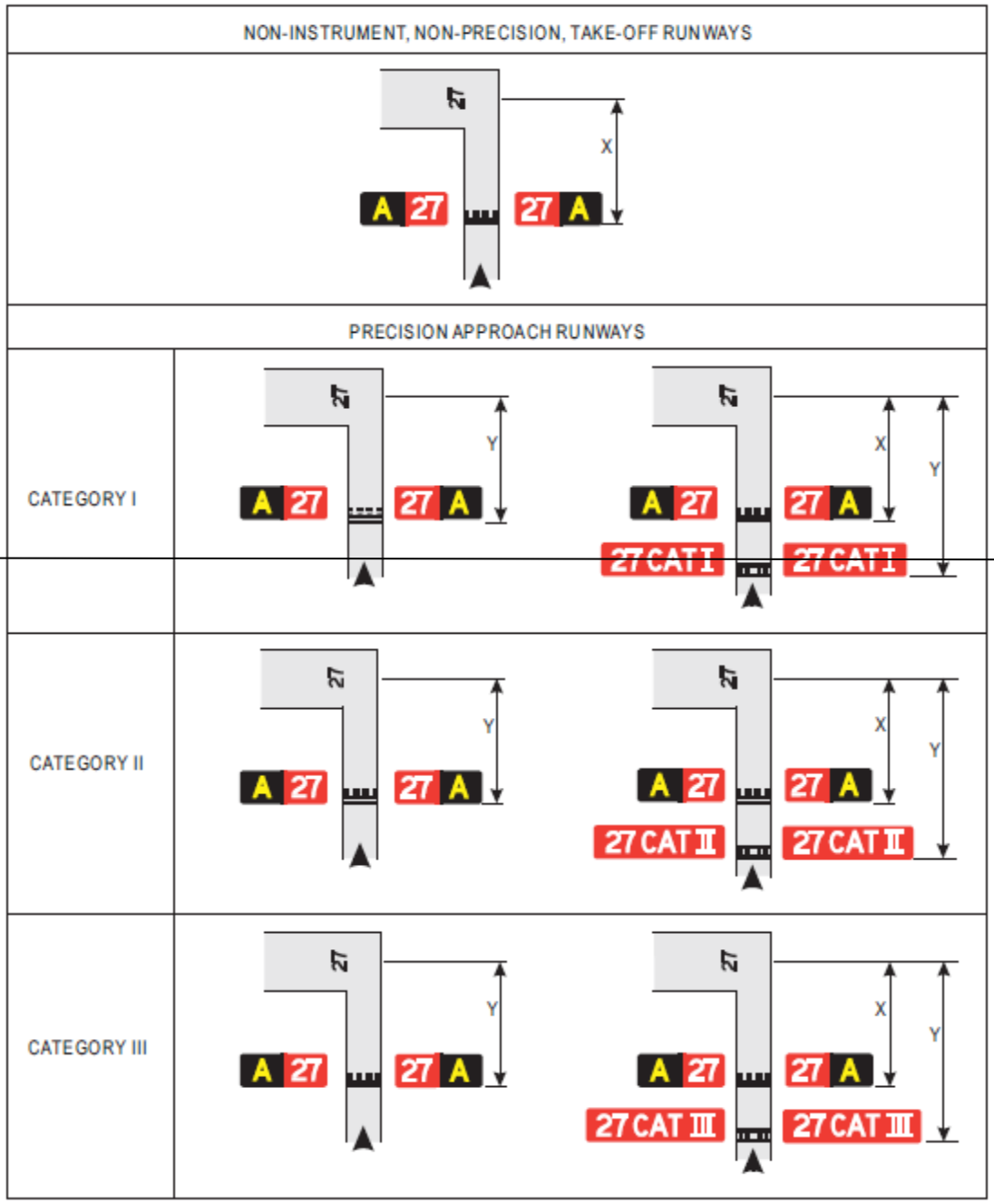
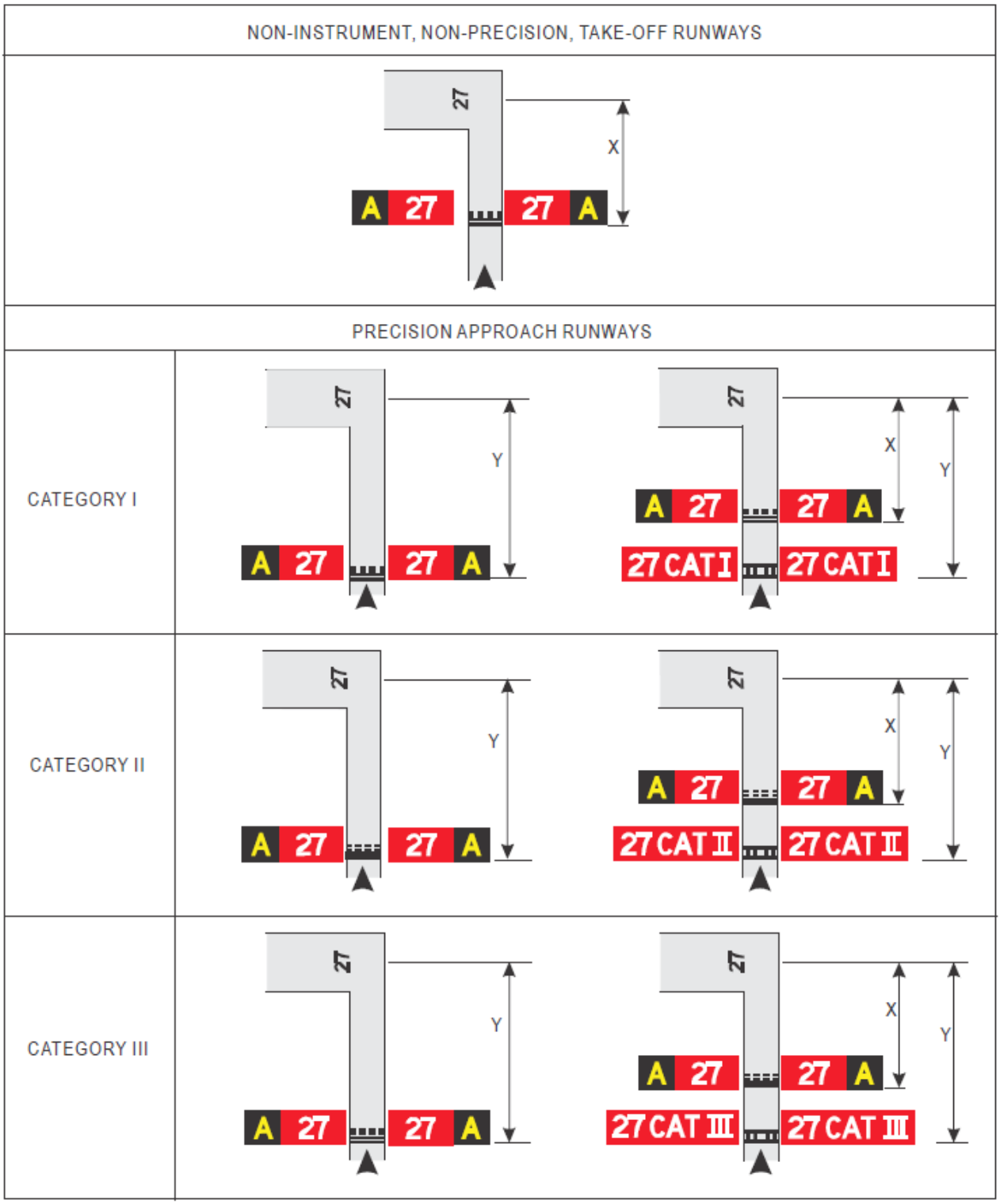


Figure N-4. Mandatory instruction signs

[Editorial note: Figure N-5 is deleted:]



[Editorial note: new Figure N-5 is inserted:]



Note: Distance X is established in accordance with Table D-2. Distance Y is established at the edge of ILS/MLS critical/sensitive area

Figure N-5. Positions of signs at taxiway/runway intersections

CS ADR-DSN.N.785 is amended as follows:

CS ADR-DSN.N.785 Information signs

(a) ~~Application~~Applicability:

[…]

(b) Location:

(1) Except as specified in paragraph (b)(3) below, 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~~intermediate holding position marking. Where there is no ~~taxiway intersection~~ intermediate holding position 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.

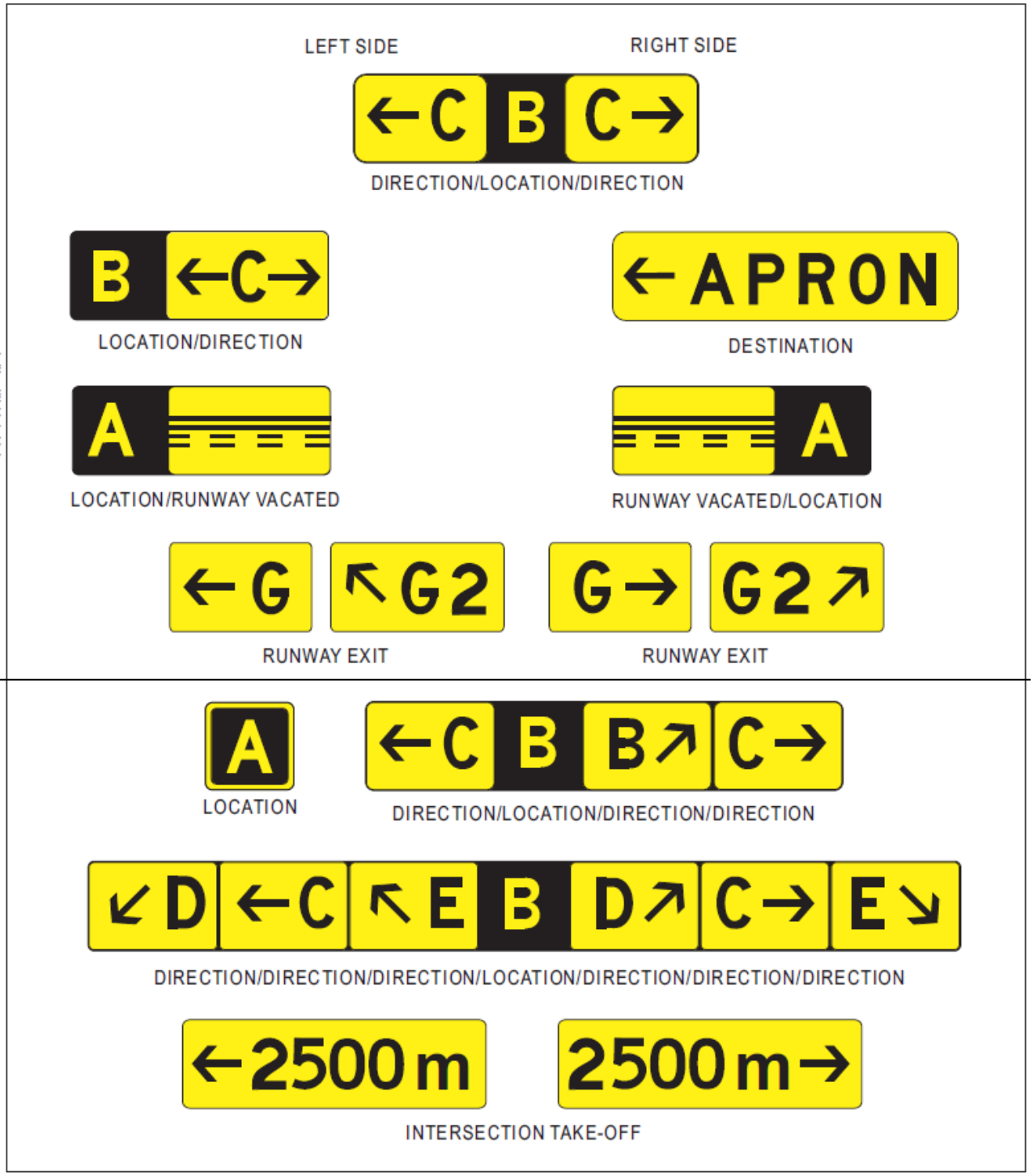
(8) A taxiway location sign installed in conjunction with a runway designation sign should be positioned outboard of the runway designation sign.

(9) A destination sign should not normally 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.

[…]

[Editorial note: Figure N-6 is deleted:]



[Editorial note: new Figure N-6 is added as follows:]

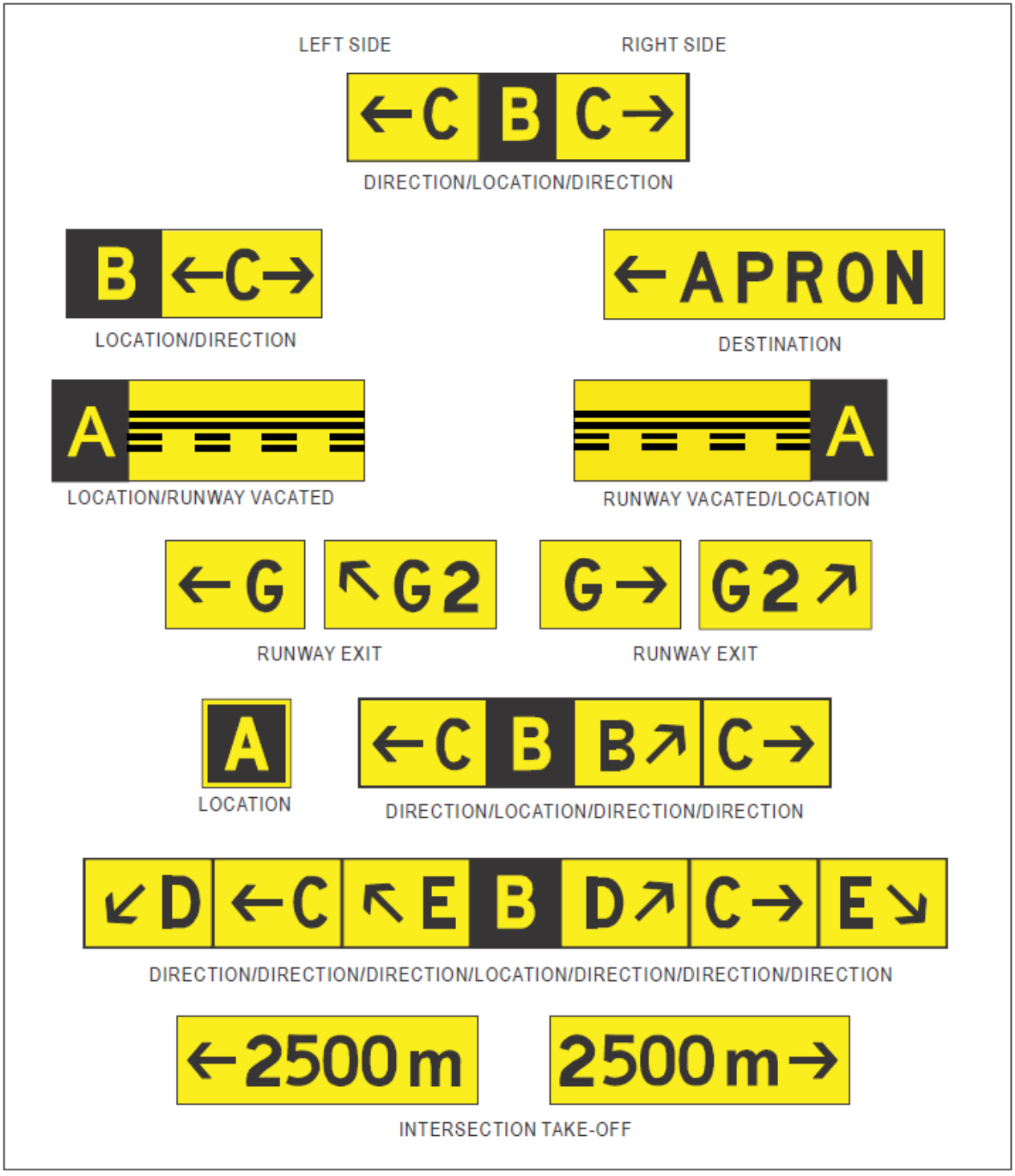


Figure N-6. Information signs

[…]

CS ADR-DSN.N.795 is amended as follows:

CS ADR-DSN.N.795 Aircraft stand identification signs

(a) ~~Application~~Applicability: An aircraft stand identification marking should be supplemented with an aircraft stand identification sign where feasible.

[…]

CS ADR-DSN.N.800 is amended as follows:

CS ADR-DSN.N.800 Road-holding position sign

(a) ~~Application~~Applicability: A road-holding position sign should be provided at all road entrances to a runway.

[…]

CHAPTER Q — VISUAL AIDS FOR DENOTING OBSTACLES

CS ADR-DSN.Q.846 is amended as follows:

CS ADR-DSN.Q.846 Lighting of fixed objects

[…]

(b) Low-intensity obstacle lights, Types A, B, C and D, medium-intensity obstacle lights, Types A, B and C and high-intensity obstacle lights Types A and B, should be in accordance with the specifications in Table Q-1, CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

CS ADR-DSN.Q.852 is amended as follows:

CS ADR-DSN.Q.852 Marking and lighting of overhead wires, cables, supporting towers, etc.

[…]

~~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 92 m AGL~~	~~3°~~

Height of light unit above terrain (AGL)		Angle of the peak of the beam above the horizontal
Greater than	Not exceeding	
151 m		0°
122 m	151 m	1°
92 m	122 m	2°
	92 m	3°

Table Q-5. Installation setting angles for high-intensity obstacle lights

[…]

CHAPTER S — ELECTRICAL SYSTEMS

CS ADR-DSN.S.880 is amended as follows:

CS ADR-DSN.S.880 Electrical power supply systems

[…]

Runway	**Lighting aids requiring power**	**Maximum switch-over time**
Non-instrument	Visual approach slope indicators[a] Runway edge[b] Runway threshold[b] Runway end[b] Obstacle[a]	See CS ADR-DSN.~~M~~S.875(d) and CS ADR-DSN.~~M~~S.880(d)
Non-precision approach	Approach lighting system Visual approach slope indicators[a, d] Runway edge[d] Runway threshold[d] Runway end[d] Obstacle[a]	15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds
Precision approach Category I	Approach lighting system Runway edge[d] Visual approach slope indicators[a, d] Runway threshold[d] Runway end Essential taxiway[a]	15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds

	Obstacle[a]	15 seconds
Precision approach Category II/III	Inner 300 m of the approach lighting system Other parts of the approach lighting system Obstacle[a] Runway edge Runway threshold Runway end Runway centre line Runway touchdown zone Runway guard lights All stop bars Essential taxiway	1 second 15 seconds 15 seconds 15 seconds 1 second 1 second 1 second 1 second 15 seconds 1 second 15 seconds
Runway meant for take-off in runway visual range conditions less than a value of 800 m	Runway edge Runway end Runway centre line All stop bars Essential taxiway[a] Obstacle[a]	15 seconds[c] 1 second 1 second 1 second 15 seconds 15 seconds

a. Supplied with secondary power when their operation is essential to the safety of flight operation.
b. The use of emergency lighting should be in accordance with any procedures established.
c. One second where no runway centre line lights are provided.
d. One second where approaches are over hazardous or precipitous terrain.

Table S-1. Secondary power supply requirements (see CS ADR-DSN.S.875(d))

[…]

CHAPTER T — AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATION

New CS ADR-DSN.T.921 is added as follows:

CS ADR-DSN.T.921 Autonomous runway incursion warning system (ARIWS)

(a) Applicability: The inclusion of detailed specifications for an ARIWS is not intended to imply that an ARIWS has to be provided at an aerodrome.

(b) Characteristics: Where an ARIWS is installed at an aerodrome:

(1) It should provide autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or vehicle operator;

(2) It should function and be controlled independently of any other visual system on the aerodrome;

(3) Its visual aid components, i.e. lights, should be designed to conform with the relevant specifications in Chapter M; and

(4) Failure of the ARIWS or part of it should not interfere with normal aerodrome operations. To this end, provision should be made to allow air traffic services (ATS) unit to partially or entirely shut down the system.

(c) Where an ARIWS is installed at an aerodrome, information on its characteristics and status should be provided to the appropriate aeronautical information services (AIS) for promulgation in the aeronautical information publication (AIP) with the description of the aerodrome surface movement guidance and control system and markings.

CHAPTER U — COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS

CS ADR-DSN.U.925 is amended as follows:

CS ADR-DSN.U.925 General

(a) The specifications in this Chapter 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 in the International Commission on Illumination (CIE), except for the colour orange in Figure U-2.

(b) The chromaticity~~ies~~ is~~are~~ expressed in terms of the standard observer and coordinate system adopted by the International Commission on Illumination (CIE).

(c) The chromaticity for solid state lighting (e.g. LEDs) is based upon the boundaries given in Standard S 004/E-2001 of the International Commission on Illumination (CIE), except for the blue boundary of white.

CS ADR-DSN.U.930 is amended as follows:

CS ADR-DSN.U.930 Colours for aeronautical ground lights

(a) The chromaticity~~ies~~ of aeronautical ground lights with filament-type light sources should be within the following boundaries:

CIE Equations (see Figure U-1A):

(1) Red

Purple boundary	y = 0.980 – x
Yellow boundary	y = 0.335

Note: see CS ADR-DSN.M.645(c)(2)(i)

(2) Yellow

Red boundary	y = 0.382
White boundary	y = 0.790 – 0.667x

Green boundary y = x – 0.120

(3) Green

Yellow boundary x = 0.360 – 0.080y

White boundary x = 0.650y

Blue boundary y = 0.390 – 0.171x

(4) Blue

Green boundary y = 0.805x + 0.065

White boundary y = 0.400 – x

Purple boundary x = 0.600y + 0.133

(5) White

~~(i) Incandescent~~

Yellow boundary x = 0.500

Blue boundary x = 0.285

Green boundary y = 0.440 and y = 0.150 + 0.640x

~~and y = 0.150 + 0.640x~~

Purple boundary y = 0.050 + 0.750x and y = 0.382

~~and y = 0.382~~

~~(ii) LED~~

~~Yellow boundary x = 0.440~~

~~Blue boundary x = 0.320~~

~~Green boundary y = 0.150 + 0.643x~~

~~Purple boundary y = 0.050 +0.757x~~

(6) Variable white

Yellow boundary x = 0.255 + 0.750y and y = 0.790 - 0.667x

and ~~x = 1.185 – 1.500y~~

Blue boundary x = 0.285

Green boundary y = 0.440 and y = 0.150 + 0.640x

~~and y = 0.150 + 0.640x~~

Purple boundary y = 0.050 + 0.750x and y = 0.382

~~and y = 0.382~~

(b) Where increased certainty of recognition from white 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 $y = 0.390 – 0.171x$

(c) Discrimination between lights having filament-type sources:

(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 should be used in situations in which the characteristics (colour temperature) of the light source should 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 should 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.~~

(d) The chromaticity of aeronautical ground lights with solid state light sources, e.g. light-emitting devices (LEDs), should be within the following boundaries:

CIE Equations (see Figure U-1B):

(1) Red

Purple boundary	y = 0.980 – x
Yellow boundary	y = 0.335;
Yellow boundary	y = 0.320.

Note: see CS ADR-DSN.M.645(c)(2)(i)

(2) Yellow

Red boundary	y = 0.387
White boundary	x = 0.980 – x
Green boundary	y = 0.727x+0.054

(3) Green (refer also to GM ADR-DSN.U.930(d) and (e))

Yellow boundary	x = 0.310
White boundary	x = 0.625y – 0.041
Blue boundary	y = 0.400

(4) Blue

Green boundary	y = 1.141x – 0.037
White boundary	x = 0.400 – y
Purple boundary	x = 0.134 + 0.590y

(5) White

Yellow boundary	x = 0.440
Blue boundary	x = 0.320
Green boundary	y = 0.150 + 0.643x
Purple boundary	y = 0.050 + 0.757x

(6) Variable white

The boundaries of variable white for solid state light sources are those specified in CS ADR-DSN.U.930(d)(5) above.

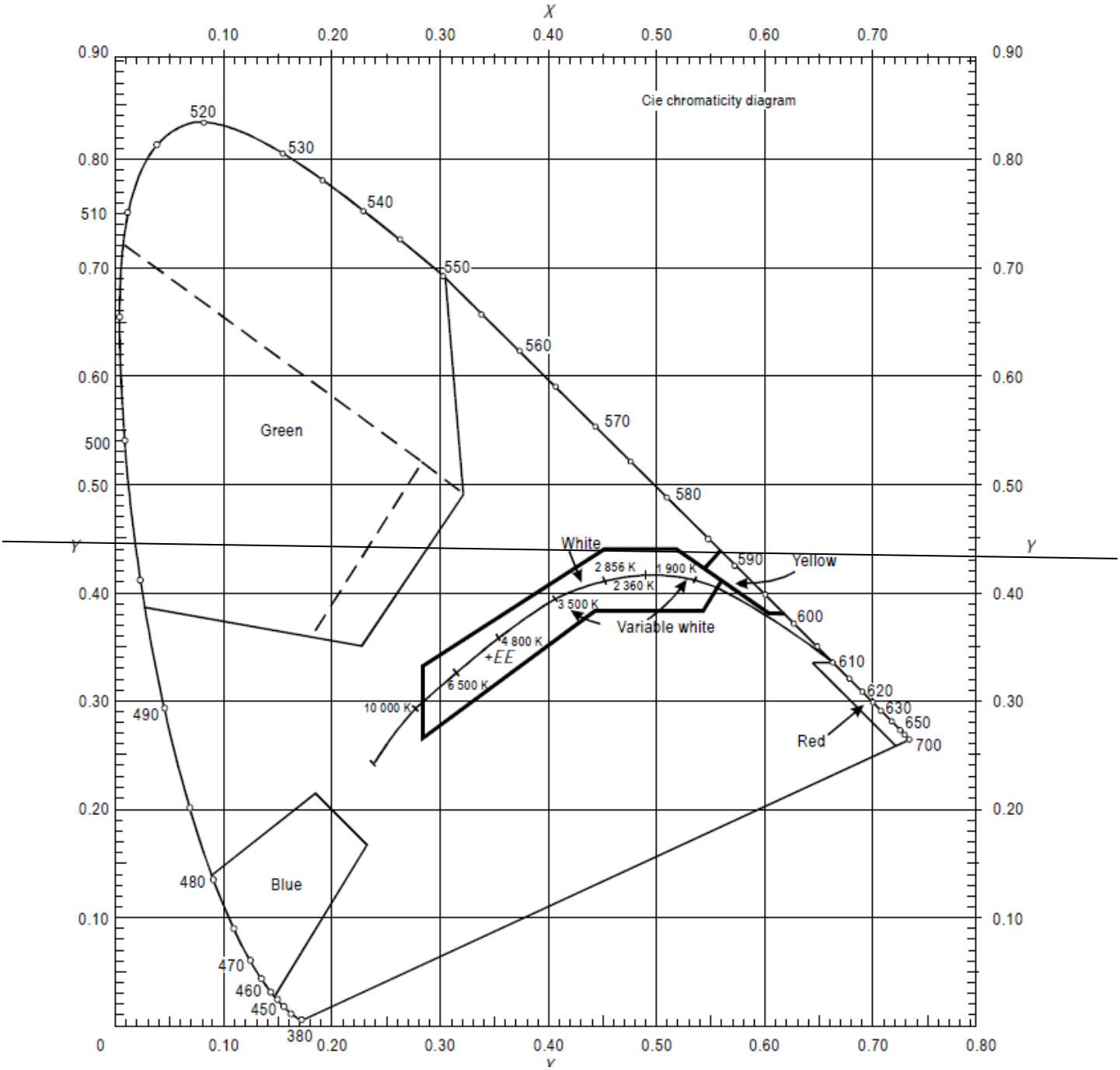
(e) Colour measurement for filament-type and solid state light sources:

(1) The colour of aeronautical ground lights should be verified as being within the boundaries specified in Figure U-1A or U-1B, as appropriate, 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.

(2) 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 CS ADR-DSN.U.930(e)(1) above, except that the colour areas should be treated separately and no point should be within 0.5 degrees of the transition sector.

[Editorial note: Figure U-1 is deleted:]



[Editorial note: new Figure U-1A is added as follows:]

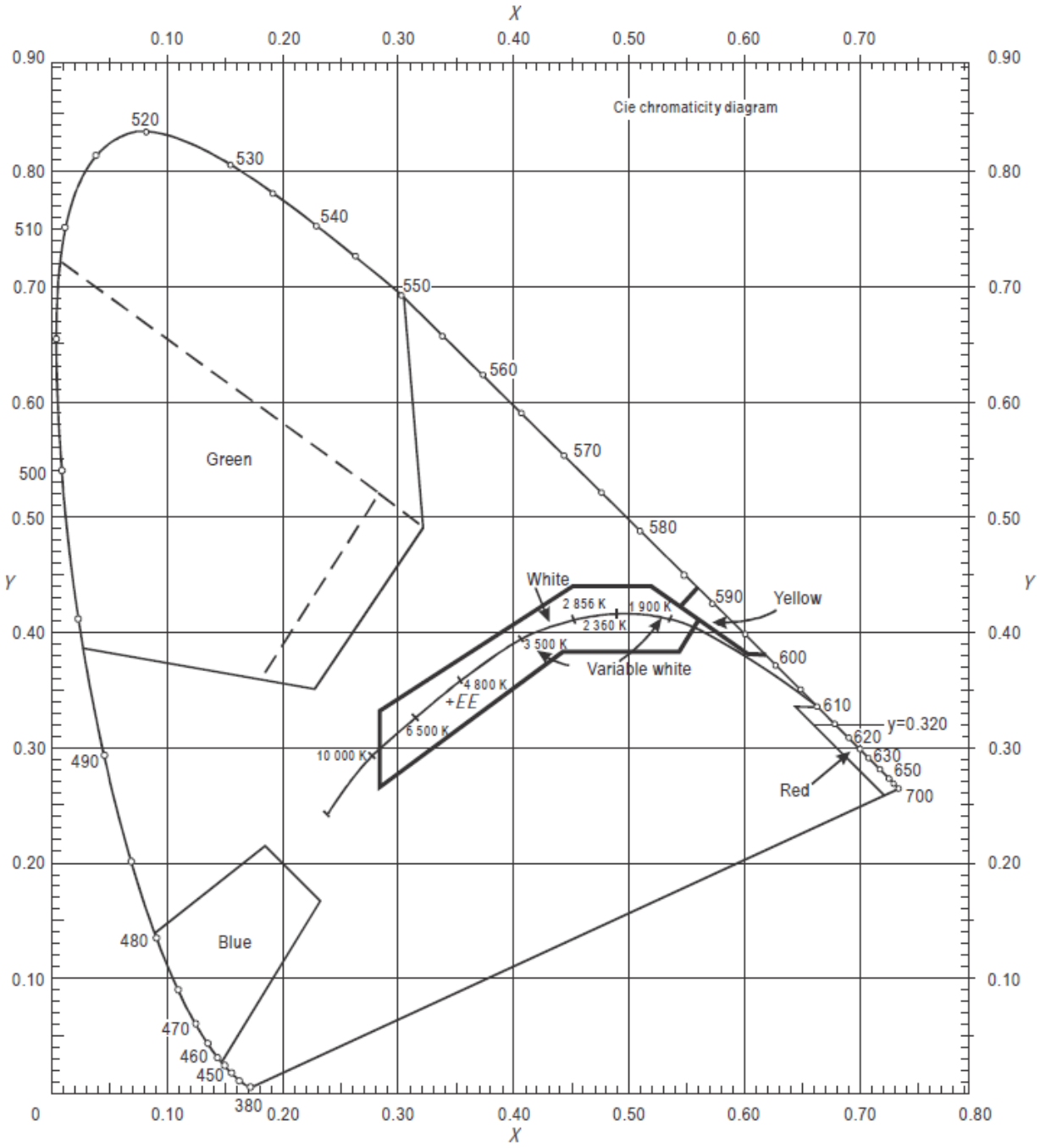


Figure U-1A. Colours for aeronautical ground lights (filament-type lamps)

[Editorial note: new Figure U-1B is added as follows:]

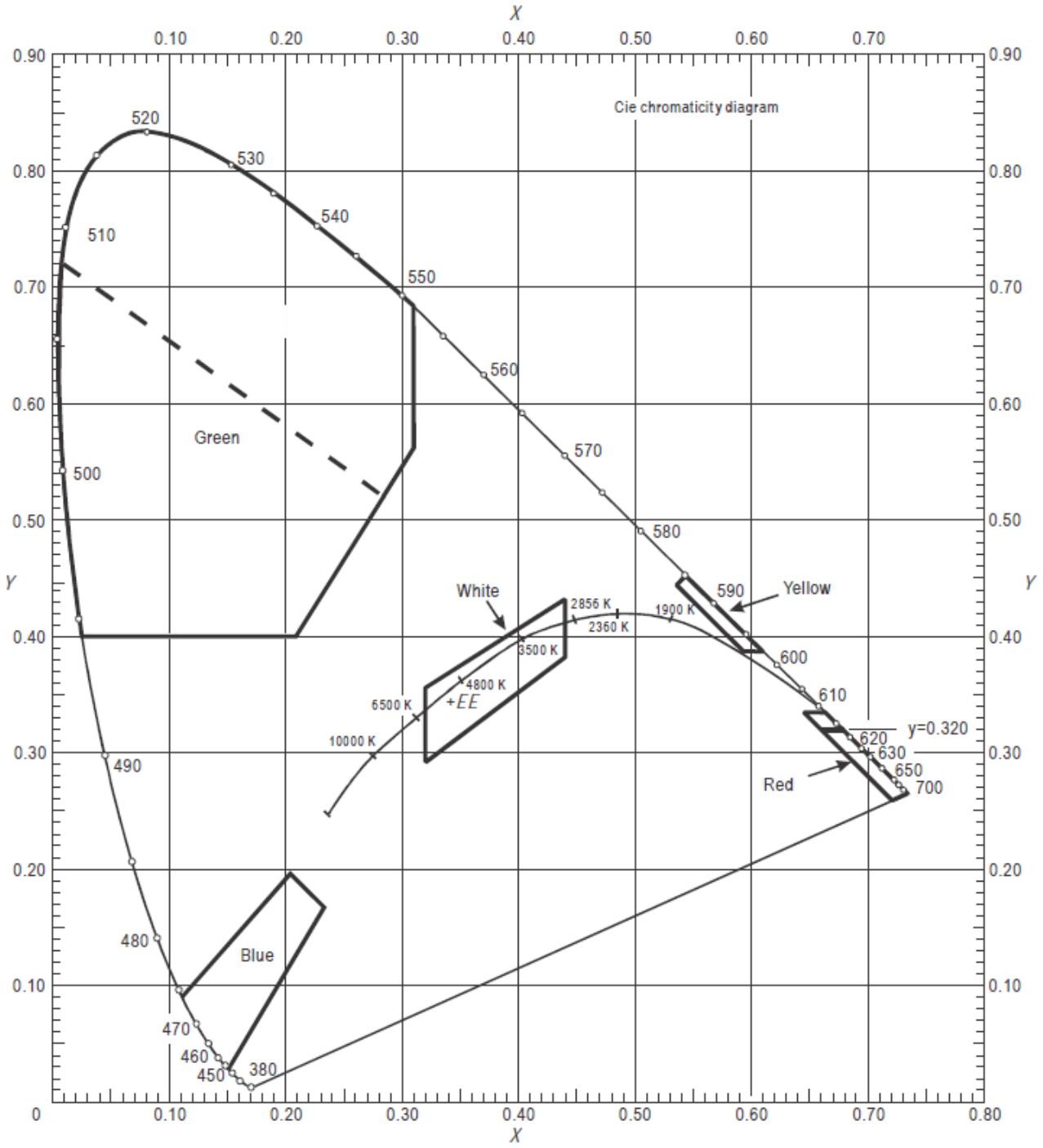


Figure U-1B. Colours for aeronautical ground lights (solid state lighting)

CS ADR-DSN.U.940 is amended as follows:

CS ADR-DSN.U.940 Aeronautical ground light characteristics

[…]

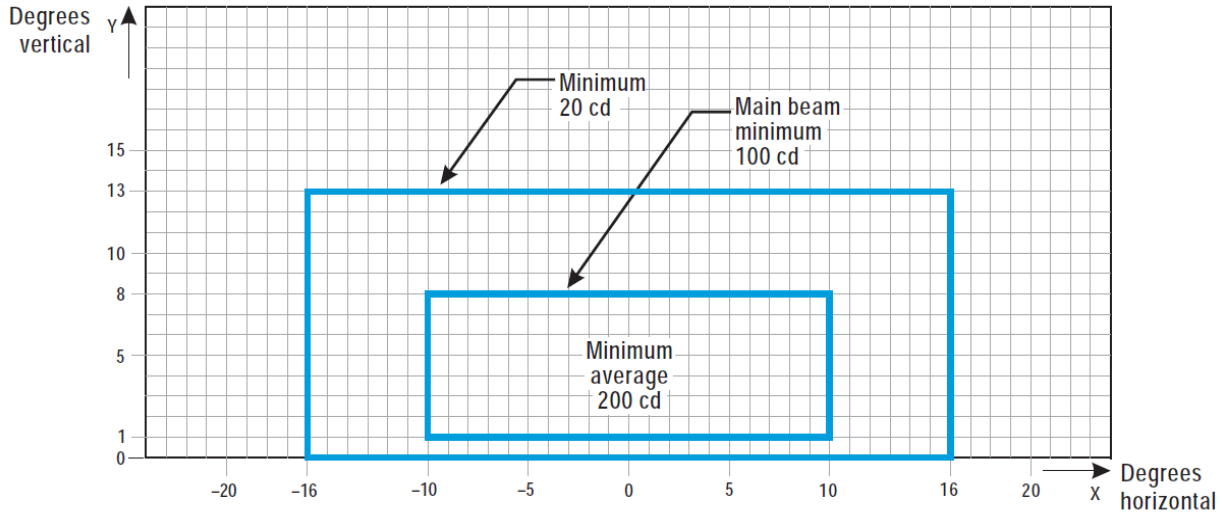


Figure U-16. Isocandela diagram for taxiway centre line (15 m spacing), RELs, no-entry bar, and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m where large offsets can occur and for low-intensity runway guard lights, Configuration 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).

[…]

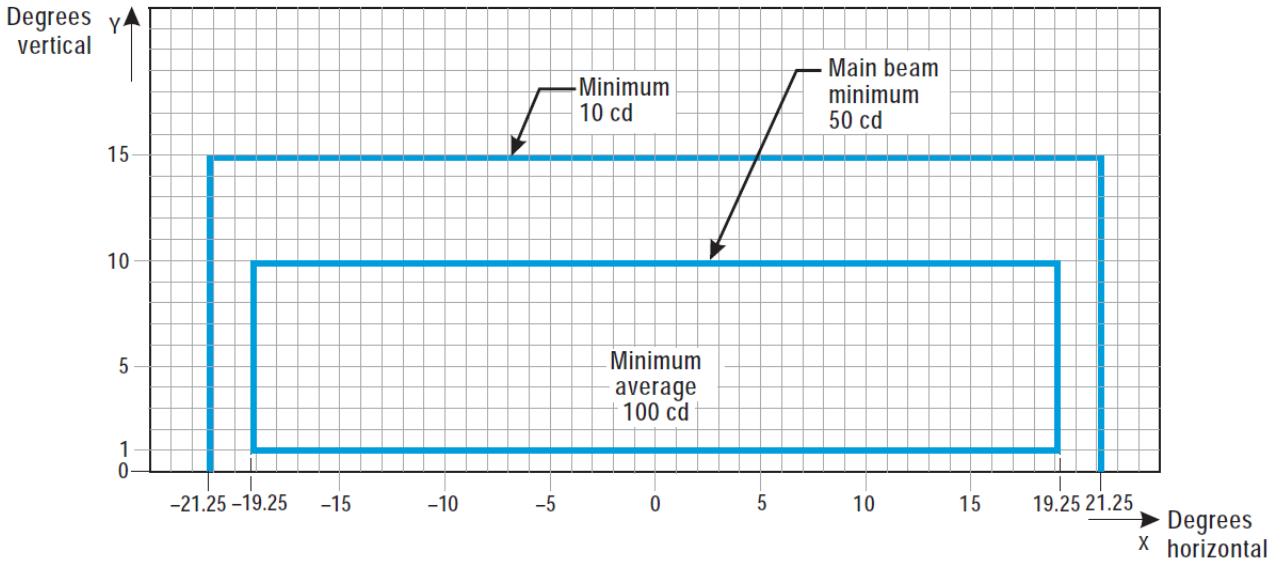


Figure U-18. Isocandela diagram for taxiway centre line (7.5 m spacing), RELs, no-entry bar, and stop bar lights in curved sections intended for use in runway visual range conditions of less than a value of 350 m

Notes:

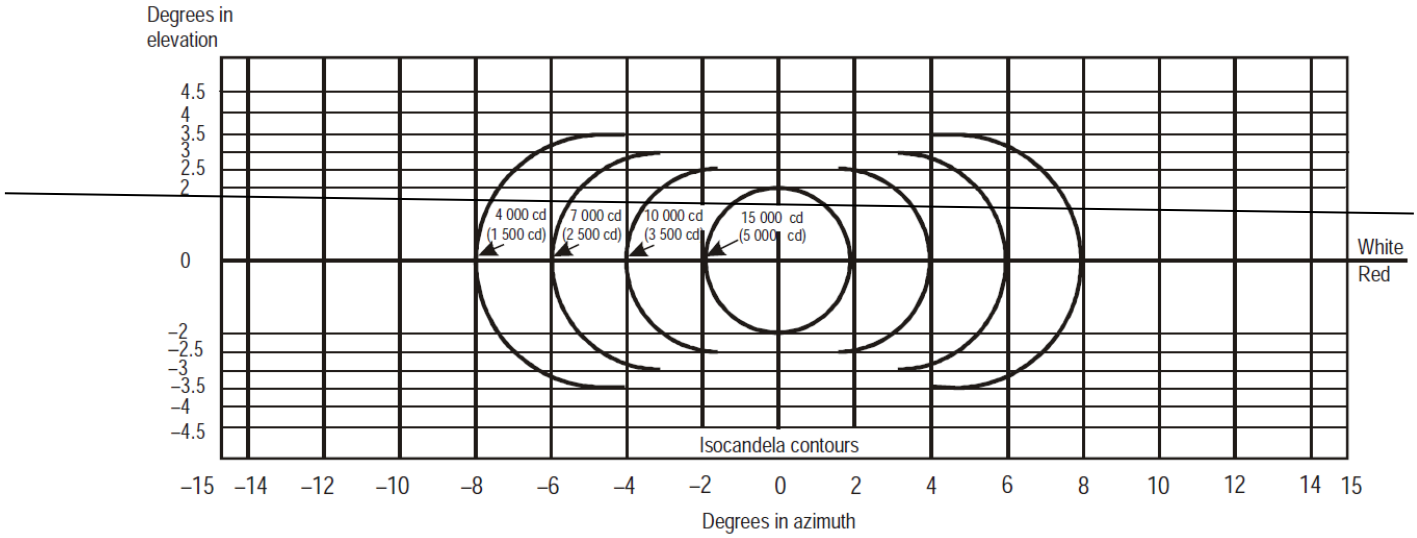
(a) Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve. This does not apply to RELs.

(b) Where provided, increased intensities for RELs should be twice the specified intensities, i.e. minimum 20 cd, main beam minimum 100 cd, and minimum average 200 cd.

(c~~b~~) See collective notes for Figures U-16 to U-25.

[…]

[Editorial note: Figure U-26 is deleted:]



[Editorial note: new Figure U-26 is added as follows:]

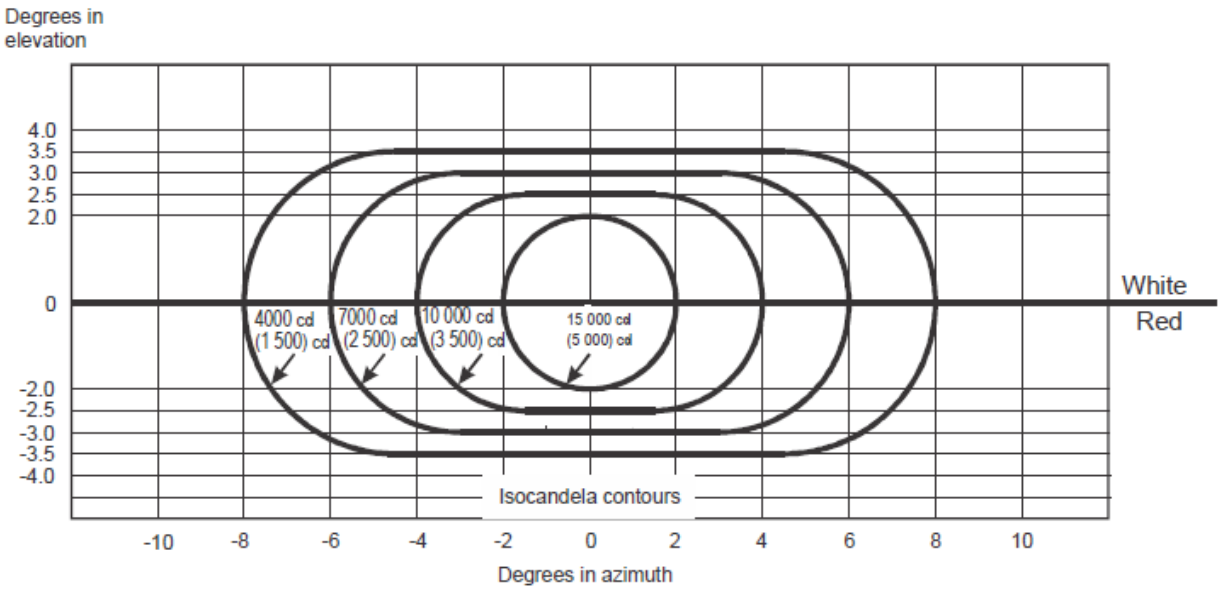


Figure U-26. Light intensity distribution of PAPI and APAPI

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.

[…]

[Editorial note: new Figure U-29 is added as follows:]

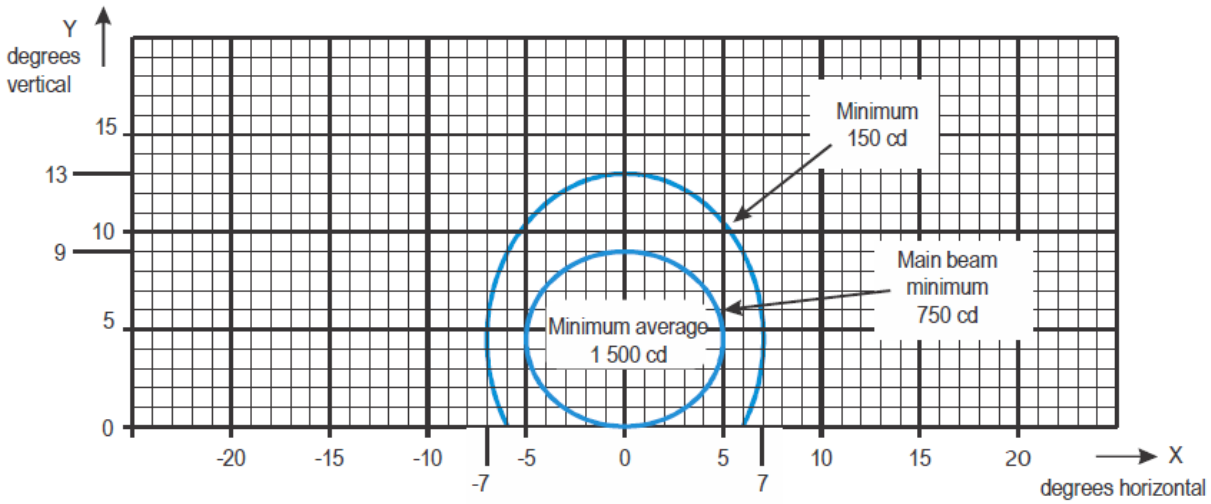


Figure U-29. Isocandela diagram for take-off and hold lights (THL) (red light)

Notes:

(a) Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	5.0	7.0
b	4.5	8.5

(b) See collective notes for Figures U-5 to U-15 and Figure U-29.

BOOK 2 — GUIDANCE MATERIAL FOR AERODROME DESIGN

CHAPTER A — GENERAL

GM1 ADR-DSN.A.005 is amended as follows:

GM1 ADR-DSN.A.005 Aerodrome ~~R~~reference ~~C~~code (ARC)

(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 CS-ADR-DSN text, the aeroplanes which the aerodrome is intended to serve, are first identified and then the two elements of the code.

(c) 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 aerodrome designer should consider all the relationships between aircraft characteristics and aerodromes and piece of infrastructures characteristics.

(d) It is not intended that the specifications deriving from the aerodrome reference code limit or regulate the operation of an aircraft.

(e) It is recognised that not all areas of the aerodrome should need to correspond to the critical aeroplane that determines the Aerodrome Reference Code. Elements of the aerodrome infrastructure that do not meet the requirements of the Aerodrome Reference Code for the design aeroplane should be designated with an appropriate code letter for its dimensions. Limitations should be identified to aircraft size permitted or operating limitations. ICAO, Annex 14, 'Aerodromes', Volume I, does not provide sufficient flexibility for infrastructure

intended for different sizes of aircraft. It only addresses the 'design aircraft'. This enables all areas of the aerodrome to reflect the aerodrome reference code.

(f) Further guidance on aerodrome reference code and on planning for aeroplanes with wingspans greater than 80 m is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways, and Part 2, Taxiways, Aprons and Holding Bays.

Additional guidance on determining the runway length is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

Note: References to the ICAO documents provided in CS-ADR-DSN are made for additional guidance. Changes in the CS-ADR-DSN regarding the aerodrome reference code are not yet fully reflected in these documents.

[…]

CHAPTER B — RUNWAYS

GM1 ADR-DSN.B.015 is amended as follows:

GM1 ADR-DSN.B.015 Number, siting, and orientation of runways

[…]

(f) 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 of time 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.

[…]

GM1 ADR-DSN.B.025 is amended as follows:

GM1 ADR-DSN.B.025 Data to be used

intentionally left blank

~~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.~~

GM1 ADR-DSN.B.030 is amended as follows:

GM1 ADR-DSN.B.030 Runway threshold

[…]

(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.

[…]

GM1 ADR-DSN.B.045 is amended as follows:

GM1 ADR-DSN.B.045 Width of runways

(a) The combinations of code numbers and OMGWSs~~letters~~ for which widths are specified have been developed for typical aeroplane characteristics.

(b) Factors affecting runway width are given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

(c) See CS ADR-DSN.B.125 to CS ADR-DSN.B.145 concerning the provision of runway shoulders, in particular for code F aeroplanes with four (or more) engines.

GM1 ADR-DSN.B.060 is amended as follows:

GM1 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 should correspond to the characteristics needed for such type of approach.

GM1 ADR-DSN.B.080 is amended as follows:

GM1 ADR-DSN.B.080 Transverse slopes on runways

~~intentionally left blank~~

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 of longitudinal and transverse slopes, and may also be assisted by grooving the runway surface.

GM1 ADR-DSN.B.095 is amended as follows:

GM1 ADR-DSN.B.095 Runway turn pads

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~~.

(a) A typical runway turn pad layout is presented in Figure GM-B3 below:

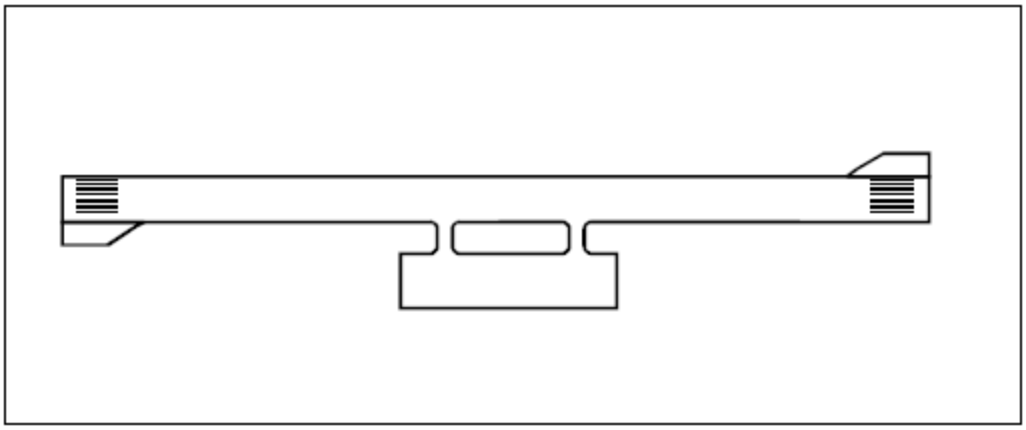


Figure GM-B-3. Typical turn pad layout

(b) Additional guidance on the design of runway turn pads is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

[…]

GM1 ADR-DSN.B.125 is amended as follows:

GM1 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 firefighting 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.~~

(a~~b~~) Runway shoulders should be considered~~are required~~ because strong crosswinds may result in significant deviation from the runway centre line. ~~As a result, with~~In the case of 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 foreign object debris (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 with a code letter D or larger take place, the need for full paved width shoulders should be assessed by local hazard analysis.~~

~~The runway shoulder width may be reduced if the width of the runway and the configuration of the aircraft so permit, and confirmed by safety assessment.~~

(b) Further guidance on runway shoulders is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways~~)~~.

~~(d) Guidance on characteristics and treatment of runway shoulders:~~

~~(1) The shoulder of a runway or stopway should be prepared or constructed so as to support an aeroplane and 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 should depend on local soil conditions and the mass of the aeroplanes the runway is intended to serve. Soil tests should help in determining the best method of improvement (e.g. drainage, stabilisation, surfacing and light paving).~~

~~(e) 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 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. Further guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1 Runways and Part 2, Taxiways, Aprons and Holding Bays.~~

~~(f) 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.~~

(c~~g~~) ~~Possible additional M~~mitigation measures ~~could be~~that can be considered are to provide the runway with inset runway edge lights (in lieu of elevated lights, to protect aeroplane from ingestion) and additional runway centre line guidance.

GM1 ADR-DSN.B.140 is amended as follows:

GM1 ADR-DSN.B.140 Strength of 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 firefighting 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) Guidance on characteristics and treatment of runway shoulders:

(1) The shoulder of a runway or stopway should be prepared or constructed so as to support an aeroplane and 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 further 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 should depend on local soil conditions and on the mass of the aeroplanes the runway is intended to serve. Soil tests should help in determining the best method of improvement (e.g. drainage, stabilisation, surfacing and light paving).

(c) 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 discussed for the margins of taxiways both as to the special measures that may be necessary and as to the distance over which such special measures, if required, should be taken. Further guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1 Runways, and Part 2, Taxiways, Aprons and Holding Bays.

(d) 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. Such difficulties can be overcome either by providing a good visual contrast between the surfacing of the runway and of the strip, or by providing a runway side stripe marking.

(e) Additional guidance on strength of runway shoulders is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

[…]

GM1 ADR-DSN.B.145 is amended as follows:

GM1 ADR-DSN.B.145 Surface of runway shoulders

(a) 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 with a code letter D or larger.

(b) Shoulders for runways where the code letter is E ~~or F~~ normally should be paved.

(c) If movements of 4-engined aircraft with a code letter D take place, the need for fully paved width shoulders should be assessed by local hazard analysis. ~~For runways where the code letter is F, a reduced paved width of shoulder may be accepted if an safety assessment indicates that such reduction would not affect the safety of operations of aircraft. The minimum paved width should be 60 m. Where a reduced paved width of 60 m is accepted the outer unpaved 7.5 m of runway shoulder should be stabilised and 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.~~ Where the runway shoulder is not paved, it may be possible to contain the risk from erosion or from the ingestion of debris. In such cases:

(1) The runway shoulder should be stabilised and 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 may be implemented to confirm their continuing serviceability, and ensure that there is no deterioration that could create a risk of foreign object debris (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.

(d) Additional guidance on surface of runway shoulders is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways

GM1 ADR-DSN.B.150 is amended as follows:

GM1 ADR-DSN.B.150 Runway strip to be provided

~~intentionally left blank~~

(a) A runway strip extends laterally to a specified distance from the runway centre line, longitudinally before the threshold, and beyond the runway end. It provides an area clear of objects that may endanger aeroplanes. Any equipment or installation required for air navigation or for aircraft safety purposes and is located in this object-free area should be frangible and mounted as low as possible.

(b) When the threshold or end of the landing distance do not coincide with the ends of a runway, the runway strip enclosing the runway and any associated stopway should extend to the lengths specified in CS ADR-DSN.B.155 at the widths specified in CS ADR-DSN.B.160, based on the threshold, end of landing distance or end of stopway, as appropriate.

GM1 ADR-DSN.B.165 is amended as follows:

GM1 ADR-DSN.B.165 Objects on runway strips

(a) Within the graded portion of the runway strip, 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 constructions within the graded portion of the runway strip, such as intersecting runways or taxiways, where the surface should

also be flush with the strip surface, they should be delethalised, that is, so constructed as to avoid presenting a buried vertical face to aircraft wheels in soft ground conditions in any direction from which an aircraft is likely to approach. A vertical face can be eliminated by chamfering from the top of those constructions to not less than 30 cm below the strip surface level. Other objects situated within the graded portion of the runway strip, 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 30 cm below ground level. The slope can be created by using a mixture of compacted gravel or asphalt or crushed aggregates and soil.

(b) Consideration should be given to the location and design of drains on a runway strip to prevent damage to an aeroplane accidentally running off a runway. Suitably designed drain covers may be required.

(c) Guidance on the design of drain covers is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways.

(d) Where open-air or covered storm water conveyances are installed, consideration should be given in order to ensure that their structure does not extend above the surrounding ground so as not to be considered an obstacle.

(e) Particular attention needs to be given to the design and maintenance of an open-air storm water conveyance in order to prevent wildlife attraction, in particular birds. The open-air storm water conveyance may be covered by a net, if required. Further guidance is given in ICAO Doc 9137, Airport Services Manual, Part 3, Wildlife Control and Reduction.

GM1 ADR-DSN.B.175 is amended as follows:

GM1 ADR-DSN.B.175 Grading of runway strips

(a) For a precision approach runway, where the code number is 3 or 4, it may be desirable a greater width of that portion of a strip to be graded should be considered. Figure GM-B-4 shows the shape and dimensions of a wider strip that may be considered for such a runway. This strip has been designed using information on aircraft running off runways. The portion to be graded extends to a distance of 105 m from the centre line, except that the distance is gradually reduced to 75 m from the centre line at both ends of the strip, for a length of 150 m from the runway end.

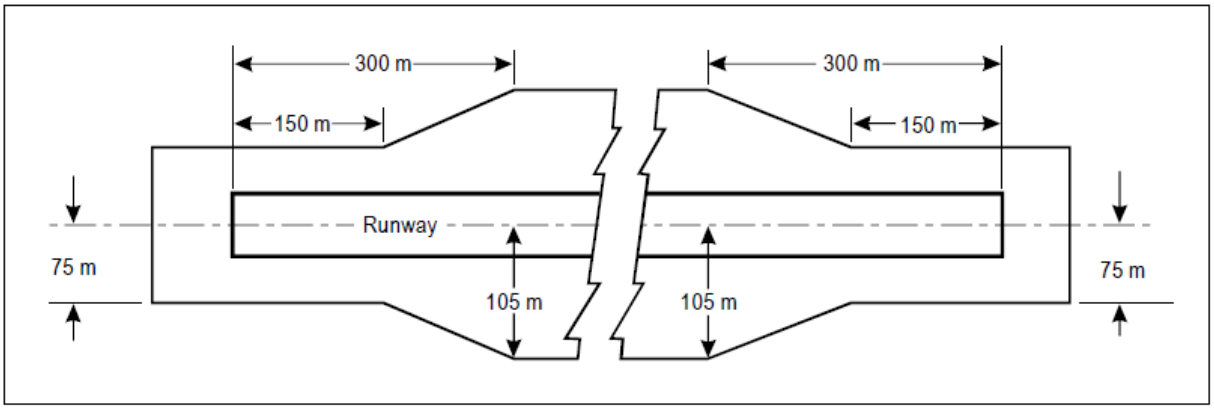


Figure GM-B-4. Graded portion of a strip including a precision approach runway where the code number is 3 or 4

(b) Where the areas in paragraph (a) above have paved surface, they should be able to withstand the occasional passage of the critical aeroplane for runway pavement design.

(c) The area adjacent to the end of a runway may be referred to as a blast pad.

(d) Additional guidance on grading is given in ICAO Doc 9157, Aerodrome Design Manual Part 1, Runways.

(e) The area provided to reduce the erosive effects of jet blast and propeller wash may be referred to as a blast pad.

(f) Guidance on protection against aeroplane engine blast is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2.

[…]

GM1 ADR-DSN.B.185 is amended as follows:

GM1 ADR-DSN.B.185 Transverse slopes on runway strips

~~Intentionally blank~~

(a) Where required for proper drainage, an open-air storm water conveyance may be allowed in the non-graded portion of a runway strip and should be placed as far as practicable from the runway.

(b) The aerodrome RFF procedure should take into account the location of open-air storm water conveyances within the non-graded portion of a runway strip.

CHAPTER D — TAXIWAYS

GM1 ADR-DSN.D.240 is amended as follows:

GM1 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) Design of runway and taxiway infrastructure that either prevents aircraft entering or crossing a runway or mitigates the risk of an aircraft runway incursion collision should be considered both in the development of any new infrastructure and as a retrospective enhancement to existing infrastructure especially in hot-spot areas (areas where risk appraisal or incident data demonstrates a higher risk). This guidance may be considered as part of a runway incursion prevention programme and to help ensure that runway incursion aspects are addressed in any new design proposal.

(c) The initial approach should be to reduce the number of available entrances to the runway, so that the potential for entry to the runway at an unintended location is minimised. Taxiway entry, crossing and runway exit taxiways should be clearly identified and promulgated, using taxiing guidance signs, lighting and pavement markings.

(d) Many aerodromes have more than one runway, notably paired parallel runways (two runways on one side of the terminal apron), which create a difficult problem in that either on arrival or departure an aircraft is required to cross a runway. The potential for runway crossings should be eliminated or at least be as low as reasonably practicable. This may be achieved by constructing a 'perimeter taxiway' to enable aircraft to get to the departure runway or to the apron without either crossing a runway, or conflicting with an approaching or departing aircraft.

(e) A perimeter taxiway is ideally designed according to the following criteria:

(1) Sufficient space is required between the landing threshold and the taxiway centre line where it crosses under the approach path, to enable the critical aeroplane to pass under the approach without violating the approach surface.

(2) The extent of the jet blast impact of aircraft taking off is considered when determining the location of a perimeter taxiway.

(3) The requirement for RESA, as well as possible interference with the ILS or other navigation aids is also taken into account: the perimeter taxiway is located behind the localiser antenna, not between the localiser antenna and the runway, due to the potential for severe ILS disturbance, noting that this is harder to achieve as the distance between the localiser and the runway increases. Likewise, perimeter roads are provided where possible.

(4) Appropriate measures should be considered in order to assist pilots to distinguish between aircraft that are crossing the runway and those that are safely on a perimeter taxiway.

(f) Taxiways crossing runways should be provided at low energy locations, preferably at the runway ends. Where runway crossings cannot be eliminated, they should only be done on taxiways at right angles to a runway. This will afford the flight crew an unobstructed view of the runway, in

both directions, to confirm that the runway and approach is clear of conflicting traffic before proceeding across.

(g) The runway/taxiway junction configuration should be simple, for example with single taxiway entrances; this is particularly relevant for taxiways crossing runways.

(h) The main design principles for entry and exit taxiways are :

(1) Taxiways should be perpendicular to the runway centre line if possible.

(2) The taxiway angle should be such that the crew of an aircraft at a taxiway holding position (if any) should be able to see an aircraft using or approaching the runway. Where the taxiway angle is such that this clear view, in both directions is not possible, consideration is given to provide a perpendicular portion of the taxiway immediately adjacent to the runway to allow for a full visual scan prior to entering (or crossing).

(3) Rapid exit taxiways are designed to be runway exits. Whilst it may be an operational practice at some airports to allow smaller aircraft the option of departing at a mid-point on the runway from one of these rapid exit taxiways, the geometry of the taxiway/runway intersection does not allow the crew to properly scan the runway in both directions to confirm that there is no conflicting traffic. This practice should thus be eliminated and from the design point of view, all signage and markings should deter any aircraft from using these rapid exit taxiways for any purpose other than what they are designed for (exiting the runway after landing). However, this may be mitigated by the addition of a fillet so that aircraft can manoeuvre to see down the approach. Note that aircraft on an angled taxiway may have a greater likelihood of causing ILS interference.

(4) A clear separation of pavement between a rapid exit taxiway and other non-rapid taxiways entering or crossing a runway should be provided. This design principle prevents two taxiways from overlapping with each other and creating an excessive paved area that would confuse pilots entering a runway.

(5) Limiting the options available to pilots on each entrance or exit helps to avoid confusion. Therefore, avoid dual or multiple taxiway entrances at one location, as Y-shaped connectors present opportunities for runway incursions and for aircraft vacating the runway to enter the wrong taxiway. Limiting the options available to pilots on each entrance or exit helps to avoid confusion.

(6~~5~~) Runway/taxiway separations should be sufficient to permit space for effective RETs.

(7~~6~~) Avoid designs which include crossing a runway to access a taxiway.

(8~~7~~) Provide clear separation between high speed (RET) and taxi speed runway exits; if RETs are provided have a series in a row without other entrances.

(9~~8~~) Where the aerodrome has more than one runway, ensure that runway ends are not too close together; if this is not possible ensure that they are clearly identified as separated. This may be achieved through visual aids, taxiway design and the taxiway naming convention.

(10~~9~~) Surface colour should not create confusion:

(i) Have different colours for runway and taxiways.

(ii) Avoid a mix of concrete & asphalt.

(11~~10~~) Wide taxiway entrances onto runways should be broken up with islands or barriers or painting taxiway edges with continuous edge markings to indicate unusable pavement. Avoid long holding position lines and excess paved areas which reduce the effectiveness of signs and markings. Use standard taxiway widths, suitable for a wide range of aeroplane, including the largest type expected to use the aerodrome.

(12~~11~~) Avoid multi-taxiway intersections and reduce the number of taxiways at any intersection as far as possible.

(13~~12~~) As far as practicable, it is preferable to redesign rather than reconfigure or repaint where possible – design errors out and reduce potential for human error.

(14~~13~~) Consistent design of runway entrances – same visual aids at each, both taxiways and service road accesses.

(15~~14~~) It is always preferable for safety reasons to have a taxiway parallel to the runway all along the runway, even if capacity constraints do not make it necessary.

(i) Aerodrome infrastructure can also be used to support design, whether by the systems installed or by their operating characteristics. Examples include:

(1) Stopbars and runway guard lights should be provided at all entrances, and preferably illuminated H24 and in all weather conditions. Runway incursions do not happen only under restricted visibilities. In fact, more incursions happen when the weather is good.

(2) Avoid confusion between CAT I and CAT III holding positions. This may be achieved in some circumstances by combining both holding positions.

(j) Multi-taxiway entrances to a runway should be parallel to each other and should be distinctly separated by an unpaved area. This design principle allows each runway holding location an earthen area for the proper placement of accompanying sign, marking, and lighting visual cues at each runway holding position. Moreover, the design principle eliminates the construction of unusable pavement and as well as the painting of taxiway edge markings to indicate such unusable pavement. In general, excess paved areas at runway holding positions reduce the effectiveness of sign, marking, and lighting visual cues.

(k) Guidance on layout of taxiways is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

[…]

<u>GM1 ADR-DSN.D.245 is amended as follows:</u>

(a) 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.

(b) Additional guidance on width of taxiways is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

GM1 ADR-DSN.D.260 is amended as follows:

GM1 ADR-DSN.D.260 Taxiway minimum separation distance

(a) Guidance on factors which may be considered in the safety assessment is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

(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, as prescribed in 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 ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

(d) The separation distance between the centre line of an aircraft stand taxilane and an object, as prescribed in Table D-1, column (13), may need to be increased when jet exhaust wake velocity may cause hazardous conditions for ground servicing.

(e) It may be permissible to operate with lower separation distances at an existing aerodrome if a safety assessment indicates that such lower separation distances would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(f) The separation distances, as prescribed in Table D-1, may have to be increased on taxiway curves to accommodate the wing sweep of the critical aeroplane or on dual parallel taxiways when, as for example, used as bypass taxiways.

(g) The requirements for apron taxiways regarding strip width, separation distances, etc., are the same as for any other type of taxiway.

[…]

GM1 ADR-DSN.D.320 is amended as follows:

GM1 ADR-DSN.D.320 Objects on taxiway strips

(a) Consideration should be given to the location and design of drains on a taxiway strip to prevent damage to an aeroplane accidentally running off a taxiway. Suitably designed drain covers may be required.

(b) The detailed requirements for siting objects on taxiway strips are in CS ADR-DSN.T.915.

(c) Where open-air or covered storm water conveyances are installed, consideration should be given in order to ensure that their structure does not extend above the surrounding ground so as not to be considered an obstacle.

(d) Particular attention needs to be given to the design and maintenance of an open-air storm water conveyance in order to prevent wildlife attraction, in particular birds. The open-air storm water

conveyance may be covered by a net, if required. Further guidance is given in ICAO Doc 9137, Airport Services Manual, Part 3, Wildlife Control and Reduction.

(e) Guidance on the design of drain covers is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

GM1 ADR-DSN.D.325 is amended as follows:

GM1 ADR-DSN.D.325 Grading of taxiway strips

~~intentionally left blank~~

Further guidance on the width of the graded portion of a taxiway is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays.

GM1 ADR-DSN.D.330 is amended as follows:

GM1 ADR-DSN.D.330 Slopes on taxiway strips

~~intentionally left blank~~

(a) Where required for proper drainage, an open-air storm water conveyance may be allowed in the non-graded portion of a taxiway strip and should be placed as far as practicable from the taxiway.

(b) The locations of open-air storm water conveyances within the non-graded portion of a taxiway strip should be so designed to permit unobstructed access for rescue and firefighting services (RFFS).

CHAPTER E — APRONS

GM1 ADR-DSN.E.365 is amended as follows:

GM1 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) maintenance of visual docking systems.

(b) On aircraft stands, where r~~R~~educed clearance distances ~~on aircraft stands~~are applied:

(1) ~~On aircraft stands where reduced clearance distances exist, G~~guidance by a visual docking guidance system should be provided.

(2) All objects for which reduced clearances apply should be properly marked or lighted (see Chapter Q Visual Aids for Denoting Obstacles).

(3) Aircraft stands where reduced clearance distances apply should be identified and the information published in the AIP.

(4) For code letters D, E or F a~~A~~n aircraft stand equipped with a visual docking guidance system ~~should provide~~ the minimum clearance of 4.5 metres may be applied between an

aircraft ~~using~~entering or exiting the stand and any adjacent building, aircraft on another stand or other objects.

(5) For code letter C an aircraft stand equipped with a visual docking guidance system the minimum clearance of 3 metres may be applied between an aircraft entering or exiting the stand and any adjacent building, aircraft on another stand or other objects if a safety assessment indicates that such reduction would not affect the safety of operations of aircraft.

(c) Any aircraft passing behind an aircraft parked on an aircraft stand should keep the required clearance distances defined in Table D-1.

[…]

CHAPTER L — VISUAL AIDS FOR NAVIGATION (MARKINGS)

GM1 ADR-DSN.L.540 is amended as follows:

GM1 ADR-DSN.L.540 Aiming point marking

~~intentionally left blank~~

For runways with widths of 30 m, the width of the rectangular stripes of the aiming point marking and the lateral spacing between the inner sides of the stripes may be adjusted in proportion to the available runway width to avoid overlapping of the aiming point marking with the runway side stripe marking.

GM1 ADR-DSN.L.560 is amended as follows:

GM1 ADR-DSN.L.560 Interruption of runway markings

~~intentionally left blank~~

(a) At an intersection of a runway and taxiway, the runway side stripe marking should be either continued across the intersection or interrupted. The interruption means one of the following:

(1) the runway side stripe marking stops at the point where the taxiway fillet starts at either side of the taxiway (see Figure GM-L-2(A)); or

(2) the runway side stripe marking stops at the point where the extended line of the taxiway edge crosses the runway (see Figure GM-L-2(B)); or

(3) the runway side stripe marking stops at a short distance on either side of the taxiway centre line marking in order to allow visible and continuous taxiway centre line marking guidance (see Figure GM-L-2(C)); or

(4) the taxiway centre line marking overlays and therefore interrupts a continuous runway side stripe marking (see Figure GM-L-2(D)).

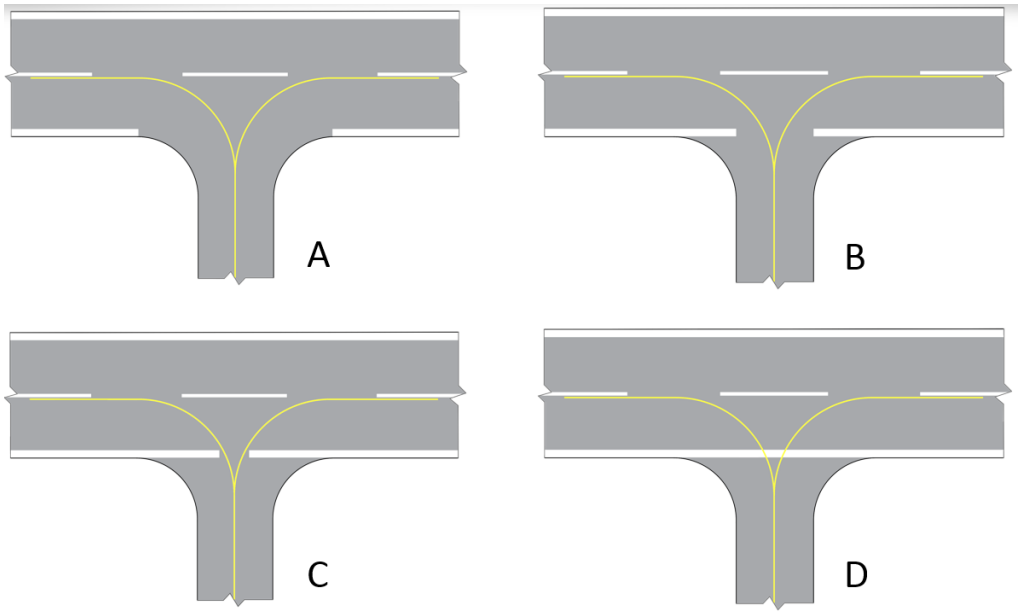


Figure GM-L-2. Illustration of runway side stripe marking interruption

(b) The overall perception of the runway side stripe marking depends on conspicuity needs and local conditions, such as the number, location and disposition of runway/taxiway intersections, nature of the surrounding terrain, operational needs at aerodrome, weather, etc.

GM1 ADR-DSN.L.565 is amended as follows:

GM1 ADR-DSN.L.565 Runway turn pad marking

~~intentionally left blank~~

Where a runway turn pad is not provided, a marking for continuous guidance to enable an aeroplane to complete a 180-degree turn and align with the runway centre line may be provided. Such marking should be yellow, at least 15 cm in width and continuous in length.

GM1 ADR-DSN.L.605 is amended as follows:

GM1 ADR-DSN.L.605 Mandatory instruction marking

(a) Except where operationally required, a mandatory instruction marking should not be located on a runway.

(b) The mandatory instruction markings and information markings on pavements are formed as if shadowed (i.e. stretched) from the characters of an equivalent elevated sign by a factor of 2.5, as illustrated in Figure GM-L-3. The shadowing only affects the vertical dimension.

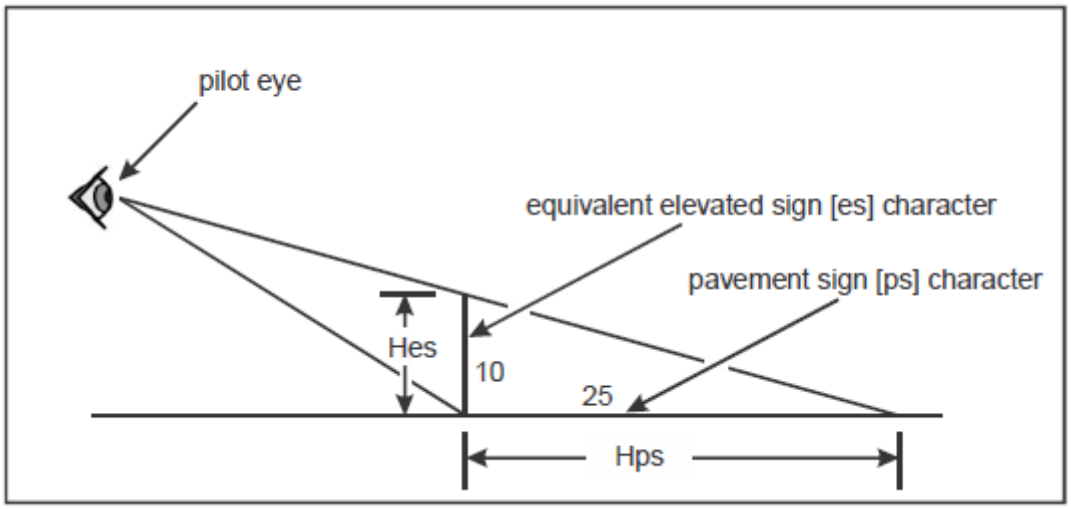


Figure GM-L-3. Illustration of pavement marking spacing calculation

(c) The following example illustrates how the pavement marking spacing is to be calculated:

(1) in the case of runway designator '10', which is to have a height of 4 000 mm (Hps), the equivalent elevated sign character height is 4 000/2.5 = 1 600 mm (Hes);

(2) Table N-3(b) indicates numeral to numeral code 1 and from Table N-3(c) this code has a dimension of 96 mm, for a character height of 400 mm;

(3) the pavement marking spacing for '10' is then (1 600/400) x 96 = 384 mm.

CHAPTER M — VISUAL AIDS FOR NAVIGATION (LIGHTS)

GM1 ADR-DSN.M.625 is amended as follows:

GM1 ADR-DSN.M.625 Approach lighting systems

(a) Types and characteristics

[…]

(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 ADR.DSN.M.615(d)(1).The characteristics of these inset lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-5 or U-6, as appropriate and the chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1A or U-1B, as appropriate.

[…]

GM1 ADR-DSN.M.630 is amended as follows:

GM1 ADR-DSN.M.630 Precision approach Category I lighting system

(a) 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.

(b) 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 firefighting vehicles.

(c) The flashing light system provides a long-distance information about the location and orientation of an active runway to the approaching pilots. Particularly in the surrounding of cities with urban lighting of streets, places and buildings, the flashing light system allows a clear identification of the approach by the flight crew. To prevent glare at night and have clear visibility, the high-intensity flashing light should be provided with an appropriate intensity control.

[…]

GM1 ADR-DSN.M.655 is amended as follows:

GM1 ADR-DSN.M.655 Obstacle protection surface for PAPI and APAPI

~~intentionally left blank~~

(a) The displacement of the system upwind of the threshold reduces the operational landing distance.

(b) Additional guidance on the calculation for siting PAPI/ APAPI on a runway with ILS/MLS is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

GM1 ADR-DSN.M.670 is amended as follows:

GM1 ADR-DSN.M.670 Runway threshold identification lights

intentionally left blank

~~(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) Characteristics: Runway threshold identification lights should be flashing white lights with a flash frequency between 60 and 120 per minute.~~

GM1 ADR-DSN.M.690 is amended as follows:

GM1 ADR-DSN.M.690 Runway centre line lights

(a) 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.

(b) 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.

(c) Consideration should be given to providing runway centre line lights where additional conspicuity is required (such as local environment, weather conditions, operational provisions and minima).

[…]

GM1 ADR-DSN.M.700 is amended as follows:

GM1 ADR-DSN.M.700 Rapid exit taxiway indicator lights (RETILs)

~~(a) The purpose of a rapid exit taxiway indicator lights (RETILs) is to provide pilots of a landing aeroplane in the direction of approach to the runway with additional distance-to-go information to the nearest rapid exit taxiway on the runway, to enhance situational awareness in low visibility conditions, and to enable pilots to apply braking action for safe and more efficient roll-out and runway exit speeds.~~

~~(b) Applicability:~~

~~(1)~~(a) In low visibility conditions, rapid exit taxiway indicator lights provide useful situational awareness cues while allowing the pilot to concentrate on keeping the aircraft on the runway centre line.

~~(2)~~(b) Rapid exit taxiway indicator lights should be considered on a runway intended for use in runway visual range conditions less than a value of 350 m where the traffic density is heavy.

~~(3)~~(c) 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 Figure GM-M-3 ~~in full~~.

(d) Following a landing, runway occupancy time has a significant effect on the achievable runway capacity. Rapid exit taxiway indicator lights 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 kt until the first RETIL (three-light barrette) is reached is seen as the optimum.

~~(c) Location:~~

~~(1) Where provided 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 GM-M-3. 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.~~

~~(d) Characteristics:~~

~~(1) Rapid exit taxiway indicator lights are fixed lights and 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.~~

~~(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.~~

~~(3) Following a landing, runway occupancy time has a significant effect on achievable runway capacity. Rapid exit taxiway indicator lights 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 kt until the first RETIL (three-light barrette) is reached is seen as the optimum.~~

~~(4) Rapid exit taxiway indicator lights characteristics should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-10 or U-11, as appropriate.~~

~~(5) Rapid exit taxiway indicator lights chromaticity should be in accordance with the specifications in CS ADR-DSN.U.930 and Figure U-1.~~

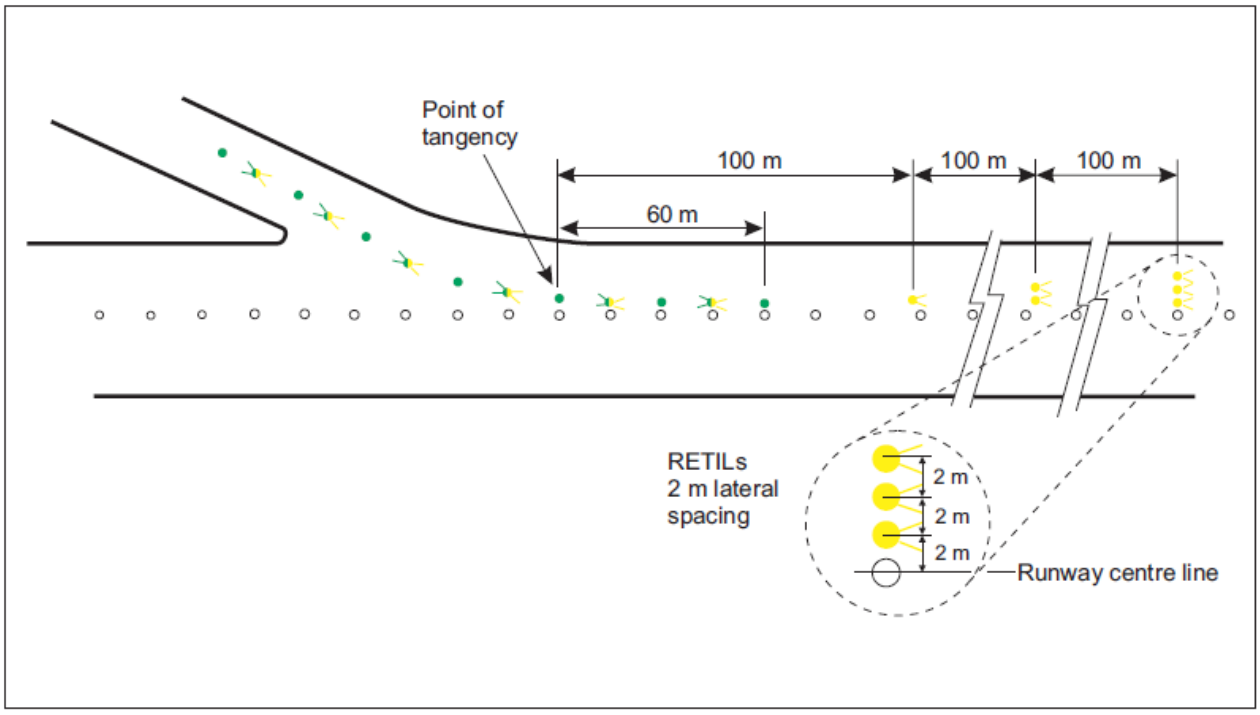


Figure GM-M-3. Rapid exit taxiway indicator lights (RETILs)

[…]

New GM1 ADR-DSN.M.706 is added as follows:

GM1 ADR-DSN.M.706 Runway status lights (RWSLs)

(a) Where two or more runway-holding positions are provided, the runway-holding position referred is that closest to the runway.

(b) Additional take-off hold lights (THLs) may be similarly provided at the starting point of the take-off roll.

(c) Consideration for reduced beam width may be required for some runway entrance lights (RELs) lights at acute-angled runway/taxiway intersections to ensure the RELs are not visible to aircraft on the runway.

GM1 ADR-DSN.M.750 is amended as follows:

GM1 ADR-DSN.M.750 Apron floodlighting

(a) 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.

(b) Additional guidance on apron floodlighting is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

CHAPTER P — VISUAL AIDS FOR NAVIGATION (MARKERS)

GM1 ADR-DSN.P.825 is amended as follows:

GM1 ADR-DSN.P.825 Taxiway edge markers

[…]

(d) A taxiway edge marker should be lightweight and frangible. One type of marker meeting these requirements is detailed in Figure GM-P-1~~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. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, Chapter 2, par. 2.4.5.

[…]

CHAPTER T — AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATION

New GM1 ADR-DSN.T.921 is added as follows:

GM1 ADR-DSN.T.921 Autonomous runway incursion warning system (ARIWS)

(a) The implementation of autonomous systems are generally quite complex in design and operation and, as such, deserves careful consideration by all involved parties such as aerodrome operators, air traffic services (ATS) and aircraft operators. This guidance provides a more clear description of the system(s) and offer some suggested actions required in order to properly implement this system(s) at an aerodrome.

(b) An ARIWS may be installed in conjunction with enhanced taxiway centre line markings, stop bars or runway guard lights.

(c) The system(s) should be operational under all weather conditions, including low visibility.

(d) An ARIWS may share common sensory components of a surface movement guidance and control system (SMGCS) or advanced surface movement guidance and control system (A-SMGCS), however, it operates independently of either system.

(e) General description:

(1) The operation of an ARIWS is based upon a surveillance system which monitors the actual situation on a runway and automatically returns this information to warning lights at the runway (take-off) thresholds and entrances. When an aircraft departs from a runway (rolling) or arrives at a runway (short final), red warning lights at the entrances will illuminate, indicating that it is unsafe to enter or cross the runway. When an aircraft is aligned on the runway for take-off and another aircraft or vehicle enters or crosses the runway, red warning lights will illuminate at the threshold area, indicating that it is unsafe to start the take-off roll.

(2) In general, an ARIWS consists of an independent surveillance system (primary radar, multilateration, specialised cameras, dedicated radar, etc.) and a warning system in the form of extra airfield lighting systems connected through a processor that generates alerts independent from the air traffic control (ATC) directly to the flight crews and vehicle operators.

(3) An ARIWS does not require circuit interleaving, secondary power supply or operational connection to other visual aid systems.

(4) In practice, not every entrance or threshold needs to be equipped with warning lights. Each aerodrome will have to assess its needs individually, depending on the characteristics of the aerodrome. There are several systems developed offering the same or similar functionality.

(f) Flight crew actions:

(1) It is of critical importance that flight crews understand the warning being transmitted by the ARIWS system. Warnings are provided in near real-time directly to the flight crew because there is no time for ‘relay’ types of communications. In other words, a conflict warning generated to ATS which must then interpret the warning, evaluate the situation and communicate to the aircraft in question, would result in several seconds being taken up where each second is critical in the ability to stop the aircraft safely and prevent a potential collision. Pilots are presented with a globally consistent signal which means ‘STOP IMMEDIATELY’ and should be taught to react accordingly. Likewise, pilots receiving an ATS clearance to take-off or cross a runway, and seeing the red light array, should STOP and advise ATS that they aborted/stopped because of the red lights. Again, the criticality of the timeline involved is so tight that there is no room for misinterpretation of the signal. It is of utmost importance that the visual signal be consistent around the world.

(2) It also has to be stressed that the extinguishing of the red lights does not, in itself, indicate a clearance to proceed. That clearance is still required from ATC. The absence of red warning lights only means that potential conflicts have not been detected.

(3) In the event that a system becomes unserviceable, one of two things will occur. If the system fails in the extinguished condition, then no procedural changes need to be accomplished. The only thing that will happen is the loss of the automatic, independent warning system. Both ATS operations and flight crew procedures (in response to ATS clearances) will remain unchanged.

(4) Procedures should be developed to address the circumstance where the system fails in the illuminated condition. It will be up to the ATS and/or aerodrome operator to establish those procedures depending on their own circumstances. It must be remembered that flight crews are instructed to 'STOP' at all red lights. If the affected portion of the system, or the entire system, is shut off the situation is reverted to the extinguished scenario described in the previous paragraph.

(g) Aerodromes:

(1) An ARIWS does not have to be provided at all aerodromes. An aerodrome considering the installation of such a system may wish to assess its needs individually, depending on traffic levels, aerodrome geometry, ground taxi patterns, etc. Local user groups such as the local runway safety team (LRST) may be of assistance in this process. Also, not every runway or taxiway needs to be equipped with the lighting array(s), and not every installation requires a comprehensive ground surveillance system to feed information to the conflict detection computer.

(2) Although there may be local specific requirements, some basic system requirements are applicable to all ARIWS:

(i) the control system and energy power supply of the system should be independent from any other system in use at the aerodrome, especially the other parts of the lighting system;

(ii) the system should operate independently from ATS communications;

(iii) the system should provide a globally accepted visual signal that is consistent and instantly understood by crews; and

(iv) local procedures should be developed in the case of malfunction or failure of a portion of or the entire system.

(h) Air traffic services:

(1) The ARIWS is designed to be complementary to normal ATS functions, providing warnings to flight crews and vehicle operators when some conflict has been unintentionally created or missed during normal aerodrome operations. The ARIWS will provide a direct warning when, for example, ground control or tower (local) control has provided a clearance to hold short of a runway but the flight crew or vehicle operator has 'missed' the hold short portion of their clearance and the tower has issued a take-off or landing clearance to that same runway, and the 'non-read back' by the flight crew or vehicle operator was missed by ATC.

(2) In the case where a clearance has been issued and a crew reports a non-compliance due to 'red lights', or aborts because of 'red lights', then it is imperative that the controller assess the situation and provide additional instructions, as necessary. It may well be that the system has generated a false warning or that the potential incursion no longer exists; however, it may also be a valid warning. In any case, additional instructions and/or a new clearance need to be provided. In the case where the system has failed, then procedures will need to be put into place, as described in paragraphs (f)(3) and (f)(4) above. In no case should the illumination of the ARIWS be dismissed without confirmation that, in fact, there is no conflict. It is worth noting that there have been numerous incidents avoided at aerodromes with such systems installed. It is also worth noting that there have been false warnings as well, usually as a result of the calibration of the warning software, but in any case, the potential conflict existence or non-existence should be confirmed.

(3) While many installations may have a visual or audio warning available to ATS personnel, it is in no way intended that ATS personnel be required to actively monitor the system. Such warnings may assist ATS personnel in quickly assessing the conflict in the event of a warning and help them to provide appropriate further instructions, but the ARIWS should not play an active part in the normal functioning of any ATS facility.

(4) Each aerodrome where the system is installed should develop procedures depending upon its unique situation. Again, it has to be stressed that under no circumstances should pilots or operators be instructed to 'cross the red lights'. As indicated above, the use of local runway safety teams may greatly assist in the development of this process.

(i) Promulgation of information:

(1) Specifications on providing information in the aeronautical information publication (AIP) are given in ICAO Annex 15, Aeronautical Information Services. Information on the characteristics and status of an ARIWS at an aerodrome is promulgated in the AIP Section AD 2.9, and its status updated as necessary through notice to airmen (NOTAM) or automatic terminal information service (ATIS).

(2) Aircraft operators are to ensure that flight crews' documentation include procedures regarding ARIWS and appropriate guidance in compliance with ICAO Annex 6, Operation of Aircraft, Part I.

(3) Aerodromes may provide additional sources of guidance on operations and procedures for their personnel, aircraft operators, ATS and third-party personnel that may have to deal with an ARIWS.

CHAPTER U — COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS (APPENDIX 1)

GM1 ADR-DSN.U.930 is amended as follows:

GM1 ADR-DSN.U.930 Colours for aeronautical ground lights

(a) The chromaticity for ground lights with filament-type light sources, ~~W~~where dimming is not required, or where observers with defective colour vision should 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

(b) Guidance on chromaticity changes resulting from the effect of temperature on filtering elements is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

(c) Where the colour signal is to be seen from long range, the current practice is to use colours within the boundaries specified in paragraph (a) above.

(d) For the chromaticity of ground lights with solid-state light sources, where observers with defective colour vision should be able to determine the colour of the light, green signals should be within the following boundaries:

Yellow boundary y = 0.726 – 0.726x

White boundary x = 0.625y – 0.041

Blue boundary y = 0.400

(e) For the chromaticity of ground lights having a solid state light source, in order to avoid a large variation of shades of green, and if colours within the boundaries below are selected, colours within the boundaries specified in paragraph (d) above should not be used:

Yellow boundary x= 0.310

White boundary x = 0.625y – 0.041

Blue boundary y = 0.726 – 0.726x

(f) Colour measurement for filament-type and solid state-type light sources:

(1) for the outermost isocandela curve, a measurement of colour coordinates should be made and recorded for review-and judgement of acceptability; and

(2) certain light units may have an 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.

[…]

In addition, some administrative and editorial corrections have been made for consistency and clarity of the text which are presented below :

Editorial note: The term ‘obstacle free zone’ is changed to ‘obstacle-free zone’ throughout the text of CS-ADR-DSN.

(...)

Editorial note: In Figure R-2. Pre-threshold area marking of CS ADR-DSN.R.865, the dimension '1.5 m max' is repositioned as per Figure 7-2 in ICAO Annex 14, Aerodromes

CS ADR-DSN.R.865 Pre-threshold area

(...)

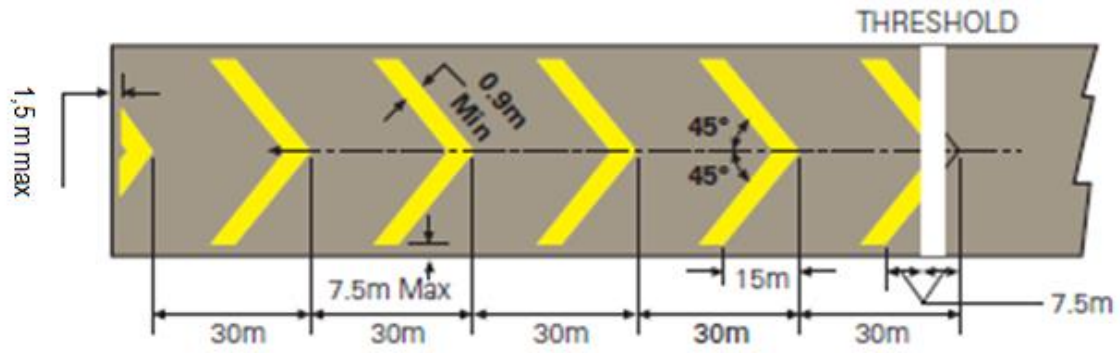


Figure R-2. Pre-threshold area marking

Editorial note: For clarity and consistency throughout the text, 'β' is replaced by 'ß' and some text is being repositioned.

CS ADR-DSN.U.935 Colours for markings, signs and panels

(...)

(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.

CIE Equations (see Figure U-2):

(1) 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)

(2) 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)

(3) 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)

(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	ß = 0.75 (minimum)

(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	ß = 0.03 (maximum)

(6) Yellowish green

Green boundary	y = 1.317x + 0.4
White boundary	y = 0.910 – x
Yellow boundary	y = 0.867x + 0.4

(7) Green

Yellow boundary	x = 0.313
White boundary	y = 0.243 + 0.670x
Blue boundary	y = 0.493 – 0.524x
Luminance factor	ßß = 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.

CIE Equations (see Figure U-3):

(1) 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)

(2) 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)

(3) 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)

(4) 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)

(5) 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)

(6) 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.

CIE Equations (see Figure U-4):

(1) 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)	5 % (minimum) 20 % (max)
	~~condition) 20 % (max)~~	
(2)	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)	30 % (minimum) 80 % (max)
	~~condition) 80 % (max)~~	
(3)	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 condition)	100 %
	~~conditions) 100 %~~	
(4)	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) 2 % (maximum)
~~condition) 2 % (maximum)~~

(5) 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~~ß = 0.10 minimum

Relative luminance ~~5 % (minimum)~~

to white

(night conditions) 5 % (minimum) 30 % (maximum)
~~conditions) 30 % (maximum)~~

Editorial note: For consistency, the abbreviation 'par.' is replaced by the full word 'paragraph' in the below GMs:

GM1 ADR-DSN.E.350 Size of aprons

GM1 ADR-DSN.P.825 Taxiway edge markers

Editorial note: The reference is corrected from 'Chapter 6' to 'Chapter Q'.

GM1 ADR-DSN.B.030 Runway threshold

(...)

(e) Displaced threshold:

(...)

(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~~ Chapter Q should continue to be met in relation to the displaced threshold.