Pursuant to Article 100 paragraph 3, Article 107 paragraph 3, Article 108 paragraph 2, Article 114, Article 118 paragraph 3, Article 120 paragraph 4, Article 121 paragraph 4, Article 122 paragraph 3, Article 123 paragraph 3, Article 239, Article 249 paragraph 1 and Article 265 of the Air Transport Law ("Official Gazette RS", Nos 73/10, 57/11, 93/12, 45/15 and 66/15- other law),

Director of the Civil Aviation Directorate herby adopts

REGULATION
on conditions and the procedure for issuing aerodrome certificates

Article 1
Subject matter

This Regulation lays down conditions and the procedure for issuing aerodrome certificates, conditions and the procedure for amending, suspension or revocation of an aerodrome certificate, conditions and the procedure for issuing temporary aerodrome certificate, conditions and the procedure for transfer of aerodrome certificate, conditions under which an aerodrome is operated in air transport operations, the procedure to mitigate risk from bird and other wildlife strikes at the aerodrome and in its surroundings, as well as the procedure of safeguarding aerodrome from uncontrolled access of persons and wildlife.

This Regulation lays down a structure, content, procedure of approval and maintenance of an aerodrome manual as well as other required documentation for making a decision upon an application for issuance of an aerodrome certificate, the content of certification specifications, the procedure to conduct aerodrome inspections and maintenance, types of inspections and maintenance, as well as plans and programmes of aerodrome inspections and maintenance, that apron management suppliers must fulfill, as well as conditions referring to submission and validity of the declaration on their capability for providing such services.

This Regulation lays down classification of civil aerodromes according to the physical characteristics and equipment of the runway and taxiway, a method of determining whether an object, installation or device represent an obstacle, as well as the procedure of obstacle marking.

Article 2
Transposition

This Regulation transposes the Commission Regulation (EU) No 139/2014 of 12 February 2014 laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council amended by:

1) Commission Regulation (EU) No 2018/401 of 14 March 2018 amending Regulation (EU) No 139/2014 as regards the classification of runways;

2) Commission Implementing Regulation (EU) No 2020/469 of 14 Febrruary 2020 amending Regulation (EU) No 923/2012, Regulation (EU) No 139/2014 and Regulation (EU) No 2017/373 as regards requirements for air traffic management/air navigation services, design of airspace and data quality, runway safety and repealing of Regulation (EC) No 73/2010.

3) Commission Delegated Regulation (EU) No 2020/1234 of 9 June 2020 amending Regulation (EU) No 139/2014 as regards the conditions and procedures for the declaration by organizations responsible for the provision of apron management services;

4) Commission Delegated Regulation (EU) No 2020/2148 of 8 October 2020 amending Regulation (EU) No 139/2014 as regards runway safety and aeronautical data;

5) Commission Delegated Regulation (EU) No 2022/208 of 14 December 2021 amending Regulation (EU) No 139/2014 as regards the requirements for all-weather operations.

Commission Regulation (EU) No 139/2014 shall be provided in the Appendix 1, printed with this Regulation and being integral part thereof.

This Regulation transposes certification requirements for aerodromes that have been adopted by EASA, and that have been included in:

1) Annex to Decision No 2014/13/R of the Executive Director of the Agency;

2) Annex to Decision No 2015/001/R of the Executive Director of the Agency;

3) Annex to Decision No 2016/027/R of the Executive Director of the Agency;

4) Annex to Decision No 2017/021/R of the Executive Director of the Agency;

5) Annex to Decision No 2021/004/R of the Executive Director of the Agency;

6) Annex to Decision No 2022/006/R of the Executive Director of the Agency.

Certifying requirements for aerodromes as referred to in paragraph 3 of this Article shall be provided in Appendix 2, printed with this Regulation and being integral part thereof.

Acceptable Means of Compliance (AMC) and Guidance Material (GM), issue 1, amendments 1-6, referred to in provisions of this Regulation and available on the internet, shall be applied as a recommended practice.

Article 3

Definitions

Certain terms used in this Regulation have following meanings:

1) *Agency* means European Union Aviation Safety Agency (EASA);

2) *aeronautical information product* means Integrated Aeronautical Information Package, within the meaning of the Air Transpor Law of the Republic of Serbia;

3) *competent authority* in the Republic of Serbia means the Civil Aviation Directorate of the Republic of Serbia (hereinafter: The Directorate);

4) *Commission Implementing Regulation (EU) No 923/2012* means Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 on laying down the common rules of the air and operational provisions regarding services and procedures in air navigation. This Regulation shall be implemented in the Republic of Serbia through Regulation on rules of the air and provision of air traffic control, alerting and flight information services (“Official Gazette RS”, Nos 142/20 and 10/22);

5) *Commission Implementing Regulation (EU) No 2017/373* means Commission Implementing Regulation (EU) No 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management and air navigation services and other air traffic management network functions and their oversight. This Regulation shall be implemented in the Republic of Serbia through Regulation on mandatory requirements for proiders of air navigation services (“Official Gazette RS”, Nos 26/20, 154/20 and 24/21);

6) *Directive 2003/42/EC* means Directive 2003/42/EC of the European Parliament and of the Council of 13 June 2003 on occurrence reporting in civil aviation. This Directive has

been repealed by Directive (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on reporting, analysis and follow-up of occurrences in civil aviation, which has been implemented in the Republic of Serbia through Regulation on occurrence reporting in civil aviation ("Official Gazette RS", No 142/20);

7) *Regulation No 2016/2008* means Regulation of the European Parliament and of the Council (EC) No 216/2008 of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency. This Regulation has been implemented in the Republic of Serbia through Regulation on common rules in the field of civil aviation and the competences of European Union Aviation Safety Agency ("Official Gazette RS", No 23/12 и 104/17);

8) *Regulation (EU) No 2018/1139* means Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency ("Official Gazette RS", No 154/20), that is implemented since 1 January 2023;

9) *Regulation (EU) No 996/2010 of the European Parliament and of the Council* means Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation. This Regulation shall be implemented in the Republic of Serbia through the Law on Accident Investigations in Air, Railway and Waterborne Transport ("Official Gazette RS", No 66/15 и 83/18);

10) *Commission Regulation (EC) No 1321/2007* means Commission Regulation (EC) No 1321/2007 of 12 November 2007 laying down implementing rules for the integration into a central repository of information on civil aviation occurrences exchanged in accordance with Directive 2003/42/EC of the European Parliament and of the Council. This Regulation shall be repealed by Directive (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on reporting, analysis and follow-up of occurrences in civil aviation, which has been implemented in the Republic of Serbia through Regulation on reporting occurrences in civil aviation ("Official Gazette RS", No 142/20);

11) *Commission Regulation (EC) No 1330/2007* means Commission Regulation (EC) of 24 September 2007 laying down implementing rules for the dissemniation to interested parties of information on civil aviation occurrences referred to in Article 7 paragraph 2 of Directive 2003/42/EC of the European Parliament and of the Council. This Directive has been revoked by Directive (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on reporting, analysis and follow-up of occurrences in civil aviation ("Official Gazette RS", No 142/20).

Term "Member State" used in the Appendix 1 to this Regulation shall be interpreted pursuant to points 2 and 3 of the Annex II to the Multilateral Agreement between the European Community and its Member States, the Republic of Albania, Bosnia and Herzegovina, the Republic of Bulgaria, the Republic of Croatia, the former Yugoslav Republic of Macedonia, the Republic of Iceland, the Republic of Montenegro, the Kingdom of Norway, Romania, the Republic of Serbia and the United Nations Interim Administration Mission in Kosovo (under the Security Council Resolution 1244 (1999)) on the establishment of a European Common Aviation Area.

Other terms used in this Regulation shall have the meanings as set forth in Article 2 and Annex I to Commission Regulation (EU) No 139/2014, as well as in certification specifications CS ADR-DSN.A.002.

Article 4

Certificate transfer

Aerodrome operator (certificate transferor) may, with the approval of the Directorate, transfer a valid aerodrome certificate to another legal or natural person (transferee of the certificate) thereby becoming the aerodrome operator.

In case of transfer of the aerodrome certificate, the transferor shall be obliged to notify the Directorate in writing on its intention to terminate the operation of the aerodrome on the date stated in the notice, as well as on the name of the transferee of the certificate, no later than 60 days prior to terminating the operation of the aerodrome.

Within the timescale referred to in paragraph 2 of this Article, the transferee of the certificate shall submit to the Directorate an application, in writing, for the approval of transfer and the following:

1) sales contract, concession contract or other document proving the right of ownership or the right to operate the aerodrome;

2) statement of the aerodrome operator declaring its consent to the transfer, unless such consent arises from the content of the document itself;

3) documents required by this Regulation for issuing an aerodrome certificate.

The Directorate shall issue an approval of transfer in case it finds that the transferee of certificate fulfills the conditions for issuing an aerodrome certificate prescribed by the Air Transport Law and by this Regulation.

Transferor of the certificate holds all responsibility for operating the aerodrome which is the subject of the transfer up to the moment the Directorate issues an approval of transfer of the aerodrome certificate.

Where the approval of transfer is issued, the Directorate shall issue the aerodrome certificate to the transferee of the certificate as a new entrant aerodrome operator and the data on the newly established aerodrome operator are entered on the aerodrome records.

Article 5

Issuing temporary aerodrome certificate

In the course of the procedure to issue or transfer an aerodrome certificate, the Director may, at the proposal of an applicant to issue or transfer an aerodrome certificate, issue a temporary aerodrome certificate.

The Director shall issue a temporary aerodrome certificate where the following conditions are fufilled:

1) if the procedure for verifying compliance with the conditions for issuing or transferring aerodrome certificate is initiated and thereby there is a significant probability that this procedure will be positive;

2) if issuing a temporary aerodrome certificate is of public importance and it does not impose any risk to safety and security of air transport operations.

A temporary aerodrome certificate shall be valid no longer than a year from the date of being issued and it shall cease to be valid under these conditions:

1) when a decision is made on issuing an aerodrome certificate or dismissing an application for issuing the said certificate; or

2) when a decision is made on appoving a transfer of an aerodrome certificate or dismissing an application for aerodrome certificate; or

3) when the validity period for which the aerodrome certificate was issued expires.

Article 6

Transitional provisions

Aerodrome approvals issued pursuant to Regulation on aerodromes ("Official Gazette RS", Nos 23/12 and 60/12- corrigendum) to operators of those aerodromes to which Article 4 paragraph 3a of the Regulation of the European Parliament and of the Council (EC) No 216/2008 applies, shall be repealed on the date of issuing the aerodrome certificate pursuant to provisions of this Regulation, and no later than 31 December 2017.

Aerodrome operators referred to in paragraph 1 of this Article shall be obliged to submit application to the Directorate for issuing an aerodrome certificate accompanied by the documents set forth by this Regulation no later than four months from the date of entry into force of this Regulation.

Article 7

Repealing of other regulations

On the day of entry into force of this Regulation, Regulation on aerodromes ("Official Gazette RS" Nos 23/12 and 60/12- corrigendum) as regards aerodromes to which Article 4 paragraph 3a of the Regulation of the European Parliament and of the Council (EC) No 216/2008 applies, shall be repealed.

Article 8

Entry into force

This Regulations shall enter into force on the eight day from the date of its publication in the "Official Gazette of the Republic of Serbia".

No
In Belgrade, 2017

Director
Mirjana Cizmarov

COMMISSION REGULATION (EU) No 139/2014 of 12 February 2014
laying down requirements and administrative procedures related to aerodromes pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council

Article 1
Subject matter and scope

1. This Regulation lays down detailed rules on:

a) the conditions for establishing and notifying to the applicant the certification basis applicable to an aerodrome as set out in Annexes II and III;

b) the conditions for issuing, maintaining, amending, limiting, suspending or revoking certificates for aerodromes, and certificates for organisations responsible for the operation of aerodromes, including operating limitations related to the specific design of the aerodrome as set out in Annexes II and III;

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

d) the responsibilities of the holders of certificates as set out in Annex III;

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

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

g) the conditions under which operations shall be prohibited, limited or subject to certain conditions in the interest of safety as set out in Annex III;

h) conditions and procedures for the declaration by and for the oversight of organisations responsible for the provision of apron management services referred to in Article 37(2) of Regulation (EU) 2018/1139 of the European Parliament and of the Council as set out in Annexes II and III.

2. Competent Authorities involved in the certification and oversight of aerodromes, aerodrome operators and apron management service providers shall comply with the requirements laid down in Annex II.

3. Aerodrome operators and organisations responsible for providing apron management service shall comply with the requirements laid down in Annexes III and IV.

Article 2
Definitions

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

1) “aerodrome” means a defined area (including any buildings, installations and equipment) on land or water or on a fixed, fixed offshore or floating structure intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft;

2) “aeroplane” means a power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight;

3) “aircraft” means a machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth’s surface;

4) “apron” means a defined area intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance;

5) “apron management service” means a service provided to manage the activities and the movement of aircraft and vehicles on an apron;

6) “audit” means a systematic, independent and documented process for obtaining evidence and evaluating it objectively to determine the extent to which requirements are complied with;

7) “certification specifications” mean technical standards adopted by the Agency indicating means to show compliance with Regulation (EC) No 216/2008 and its Implementing Rules and which can be used by an organisation for the purpose of certification;

8) “Competent Authority” means an authority designated within each Member State with the necessary powers and responsibilities for the certification and oversight of aerodromes, as well as personnel and organisations involved therein;

9) “continuing oversight” means the tasks which are conducted for the implementation of the oversight programme at any time by the Competent Authority to verify that the conditions under which a certificate has been granted continue to be fulfilled during its period of validity;

10) “Deviation Acceptance and Action Document” (DAAD) means a document established by the Competent Authority to compile evidence provided to justify the acceptance of deviations from the certification specifications issued by the Agency;

11) “inspection” means an independent evaluation by observation and judgement accompanied as appropriate by measurement, testing or gauging, in order to verify compliance with applicable requirements;

12) “movement” means either a take-off or landing;

13) “obstacle” means all fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

- are located on an area intended for the surface movement of aircraft, or
- extend above a defined surface intended to protect aircraft in flight, or
- stand outside those defined surfaces and that have been assessed as being a hazard to air navigation;

14) “obstacle limitation surface” means a surface that defines the limits to which objects may project into the airspace;

15) “obstacle protection surface” means a surface established for visual approach slope indicator system above which objects or extensions of existing objects shall not be permitted except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object.

Article 3
Oversight

1. Member States shall designate one or more entities as the Competent Authority(ies) within that Member State with the necessary powers and responsibilities for the certification and oversight of aerodromes and aerodrome operators, receiving declarations and oversight of providers of apron management service, as well as personnel involved therein.

2. The Competent Authority shall be independent from aerodrome operators and providers of apron management services. This independence shall be achieved through separation, at functional level at least, between the Competent Authority and these aerodrome operators and providers of apron management services. Member States shall ensure that Competent Authorities exercise their powers impartially and transparently.

3. If a Member State designates more than one entity as Competent Authority the following conditions shall be fulfilled:

a) each Competent Authority shall be responsible for specifically defined tasks and a determined geographic area; and

b) coordination shall be established between these Authorities in order to ensure effective oversight of all aerodromes and aerodrome operators, as well as providers of apron management services.

4. Member States shall ensure that the Competent Authority(ies) has(ve) the necessary capabilities and resources to fulfil their requirements under this Regulation.

5. Member States shall ensure that Competent Authorities' personnel do not perform oversight activities when there is evidence that this could result directly or indirectly in a conflict of interest, in particular when relating to family or financial interest.

6. Personnel authorised by the Competent Authority to carry out certification and/or oversight tasks shall be empowered to perform at least the following tasks:

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

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

c) ask for an oral explanation on-site;

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

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

f) take or initiate enforcement measures as appropriate.

7. The tasks in paragraph 6 shall be carried out in compliance with the national legislation of the Member States.

Article 4
Information to the European Aviation Safety Agency

Within three months after the entry into force of this Regulation the Member States shall inform the European Aviation Safety Agency ('the Agency') of the names, locations, ICAO airport codes of the aerodromes and the names of aerodrome operators, as well as the number of passengers and cargo movements of the aerodromes to which the provisions of Regulation (EC) No 216/2008 and this Regulation apply.

Article 5
Exemptions

1. The Member State shall notify the Agency about their decision to grant an exemption in accordance with Article 4(3b) of Regulation (EC) No 216/2008, within one month following the decision being taken. The information transmitted to the Agency shall include the list of aerodromes concerned, the name of the aerodrome operator and the number of passengers and cargo movements of the aerodrome of the relevant year.

2. The Member State shall on an annual basis examine the traffic figures of an exempted aerodrome. If the traffic figures at such an aerodrome have exceeded those provided for in Article 4(3b) of Regulation (EC) No 216/2008 over the last three consecutive years they shall inform the Agency and revoke the exemption.

3. The Commission may at any time decide not to permit an exemption in the following cases:

a) the general safety objectives of Regulation (EC) No 216/2008 are not met;

b) the relevant passenger and cargo traffic figures have been exceeded over the last three consecutive years;

c) where the exemption does not comply with any other relevant EU legislation.

4. Where the Commission decided that exemption is not allowed, the Member State concerned shall revoke the exemption.

Article 6

Conversion of certificates

1. Certificates issued by the Competent Authority prior to 31 December 2014 on the basis of national legislations shall remain valid until they are issued in accordance with this Article, or if no such certificates are issued, 31 December 2017.

2. Before the end of the period specified in paragraph 1, the Competent Authority shall issue certificates for the aerodromes and aerodrome operators concerned, if the following conditions are met:

a) the certification basis referred to in Annex II has been established using the certification specifications issued by the Agency, including any cases of equivalent level of safety and special conditions which have been identified and documented;

b) the certificate holder has demonstrated compliance with the certification specifications which are different from the national requirements on which the existing certificate was issued;

c) the certificate holder has demonstrated compliance with those requirements of Regulation (EC) No 216/2008 and its Implementing Rules which are applicable to its organisation and its operation and which are different from the national requirements on which the existing certificate was issued.

3. By way of derogation from paragraph 2 point (b), the Competent Authority may decide to waiver demonstration of compliance if it considers that this demonstration creates an excessive or disproportionate effort.

4. The Competent Authority shall keep records, for a minimum period of five years, of the documents related to the conversion of certificates procedure.

Article 7

Deviations from certification specifications

1. The Competent Authority may, until 31 December 2024, accept applications for a certificate including deviations from the certification specifications issued by the Agency, if the following conditions are met:

a) the deviations do not qualify as an equivalent level of safety case under ADR.AR.C.020, nor qualify as a case of special condition under ADR.AR.C.025 of Annex II to this Regulation;

b) the deviations existed prior to the entry into force of this Regulation;

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

d) a supporting safety assessment for each deviation has been completed.

2. The Competent Authority shall compile the evidence supporting the fulfilment of the conditions referred to in paragraph 1 in a Deviation Acceptance and Action Document

(DAAD). The DAAD shall be attached to the certificate. The Competent Authority shall specify the period of validity of the DAAD.

3. The aerodrome operator and the Competent Authority shall verify that the conditions referred to in paragraph 1 continue to be fulfilled. If such is not the case the DAAD shall be amended, suspended or withdrawn.

Article 8

Safeguarding of aerodrome surroundings

1. Member States shall ensure that consultations are conducted with regard to safety impacts of constructions proposed to be built within the limits of the obstacle limitation and protection surfaces as well as other surfaces associated with the aerodrome.

2. Member States shall ensure that consultations are conducted with regard to safety impacts of constructions proposed to be built beyond the limits of the obstacle limitation and protection surfaces as well as other surfaces associated with the aerodrome and which exceed the height established by Member States.

3. Member States shall ensure coordination of the safeguarding of aerodromes located near national borders with other Member States.

Article 9

Monitoring of aerodrome surroundings

Member States shall ensure that consultations are conducted with regard to human activities and land use such as:

a) any development or change in land use in the aerodrome area;

b) any development which may create obstacle-induced turbulence that could be hazardous to aircraft operations;

c) the use of hazardous, confusing and misleading lights;

d) the use of highly reflective surfaces which may cause dazzling;

e) the creation of areas that might encourage wildlife activity harmful to aircraft operations;

f) sources of non-visible radiation or the presence of moving or fixed objects which may interfere with, or adversely affect, the performance of aeronautical communications, navigation and surveillance systems.

Article 10

Wildlife hazard management

1. Member States shall ensure that wildlife strike hazards are assessed through:

a) the establishment of a national procedure for recording and reporting wildlife strikes to aircraft;

b) the collection of information from aircraft operators, aerodrome personnel and other sources on the presence of wildlife constituting a potential hazard to aircraft operations; and

c) an ongoing evaluation of the wildlife hazard by competent personnel.

2. Member States shall ensure that wildlife strike reports are collected and forwarded to ICAO for inclusion in the ICAO Bird Strike Information System (IBIS) database.

Article 11

Entry into force and application

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

2. Competent Authorities involved in the certification and oversight of aerodromes, aerodrome operators and apron management service providers shall comply with the requirements laid down in Annex II to this Regulation before 31 December 2017.

3. Annexes III and IV shall apply to aerodromes certified in accordance with Article 6 from the date of issuance of the certificate.

4. Aerodromes whose certification procedure was initiated before 31 December 2014, but have not been issued with a certificate by this date, shall only be issued a certificate when they comply with this Regulation.

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

ANNEX I

Definitions for terms used in Annexes II to IV

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

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

2) "accelerate-stop distance available (ASDA)" means the length of the take-off run available plus the length of the stopway, if provided;

3) "aerodrome control service" means an air traffic control (ATC) service for aerodrome traffic;

4) "aerodrome equipment" means any equipment, apparatus, appurtenance, software or accessory, that is used or intended to be used to contribute to the operation of aircraft at an aerodrome;

5) "aeronautical data" means a representation of aeronautical facts, concepts or instructions in a formalised manner suitable for communication, interpretation or processing;

6) "aeronautical information service" means a service established within the defined area of coverage responsible for the provision of aeronautical information and data necessary for the safety, regularity, and efficiency of air navigation;

6a) "Aeronautical Information Circular (AIC)" means a notice containing information that does not qualify for the origination of a notice to air men (NOTAM) or for inclusion in the AIP, but which relates to flight safety, air navigation, technical, administrative or legislative matters;

6b) "aeronautical information product" means aeronautical data and aeronautical information provided either as digital data sets or as a standardised presentation in paper or electronic media. Aeronautical information products include the following:

- AIP, including amendments and supplements,
-AIC,
-aeronautical charts,
- NOTAM,
- digital data sets;

6c) "Aeronautical Information Publication (AIP)" means a publication issued by or with the authority of a Member State and containing aeronautical information of a lasting character essential to air navigation;

7) "air navigation services" means air traffic services; communication, navigation and surveillance services; meteorological services for air navigation; and aeronautical information services;

8) "air traffic services" means the various flight information services, alerting services, air traffic advisory services and air traffic control services (area, approach and aerodrome control services);

9) "air traffic control (ATC) service" means a service provided for the purpose of:

1. preventing collisions:
- between aircraft, and
- in the manoeuvring area between aircraft and obstructions; and

2. expediting and maintaining an orderly flow of air traffic;

10) “aircraft stand” means a designated area on an apron intended to be used for parking an aircraft;

11) “aircraft stand taxilane” means a portion of an apron designated as a taxiway and intended to provide access to aircraft stands only;

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

13) “alerting service” means a service provided to notify relevant organisations regarding aircraft in need of search and rescue aid, and to assist such organisations as required;

14) “apron taxiway” means a portion of a taxiway system located on an apron and intended to provide a through taxi-route across the apron;

15) “clearway” means a defined rectangular area on the ground or water under the control of the appropriate entity, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height;

15a) “contaminated runway” means a runway whose surface area (whether in isolated areas or not) within the length and width being used is covered in significant part by one or more of the substances listed under the runway surface condition descriptors;

16) “dangerous goods” means articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those Technical Instructions;

16a) “decision altitude” (‘DA’) or ‘decision height’ (‘DH’) means a specified altitude or height in a 3D instrument approach operation at which a missed approach procedure must be initiated if the required visual reference to continue the approach has not been established;

17) “data quality” means a degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity;

17a) “data set” means an identifiable collection of data;

18) “declared distances” means:

- ‘take-off run available (TORA)’,
- ‘take-off distance available (TODA)’,
- ‘accelerate-stop distance available (ASDA)’,
- ‘landing distance available (LDA)’;

18a) “dry”, in respect of runway conditions, means that the surface of the runway is free of visible moisture and not contaminated within the area intended to be used;

19) “flight information service” means a service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights;

19a) “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 operation;

20) “human factors principles” means principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance;

21) “human performance” means human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations;

22) “instrument runway” means one of the following types of runways intended for the operation of aircraft using instrument approach procedures:

1. “non-precision approach runway”: a runway served by visual aids and at least one non-visual aid, intended for landing operations following a type A instrument approach operation;

2. “precision approach runway, category I”: a runway served by visual aids and at least one non-visual aid, intended for landing operations following a type B CAT I instrument approach operation;

3. “precision approach runway, category II”: a runway served by visual aids and at least one non-visual aid, intended for landing operations following a type B CAT II instrument approach operation;

4. “precision approach runway, category III”: a runway served by visual aids and at least one non-visual aid, intended for landing operations following a type B CAT III instrument approach operation;

23) “integrity” means a degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorized amendment;

24) “landing distance available (LDA)” means the length of runway which is declared available and suitable for the ground run of an aeroplane landing;

24a) “lighting system reliability” means the probability that the complete installation operates within the specified tolerances and the system is operationally usable;

24b) “Location Indicators” means the latest effective edition of the ‘Location Indicators’ (Doc 7910), approved and published by the International Civil Aviation Organization;

24c) “low-visibility operations (LVOs)” means approach or take-off operations on a runway with a runway visual range less than 550 m or a decision height less than 200 ft;

25) “low-visibility procedures” means procedures applied at an aerodrome for the purpose of ensuring safety during low-visibility operations;

26) “low-visibility take-off (LVTO)” means a take-off with a runway visual range less than 550 m;

27) *deleted*;

28) “manoeuvring area” means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons;

29) “meteorological services” means those facilities and services that provide aircraft with meteorological forecasts, briefs and observations as well as any other meteorological information and data provided by States for aeronautical use;

30) “marker” means an object displayed above ground level in order to indicate an obstacle or delineate a boundary;

31) “marking” means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information;

32) “movement area” means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft consisting of the manoeuvring area and the apron(s);

33) “navigation services” means those facilities and services that provide aircraft with positioning and timing information;

34) “non-instrument runway” means a runway intended for the operation of aircraft using visual approach procedures;

34a) “notice to airmen (NOTAM)” means a notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations;

34b) “NOTAM code” means the code contained in the latest effective edition of the ‘Procedures for Air Navigation Services – ICAO Abbreviations and Codes’ (PANS ABC – Doc 8400), approved and published by the International Civil Aviation Organization;

34c) “operation with operational credits” means an operation using specific aircraft or ground equipment, or a combination of aircraft and ground equipment which allows any of the following elements:

a) the application of lower than standard aerodrome operating minima for a particular classification of operation;

b) visibility requirements can be satisfied or reduced;

c) fewer ground facilities are required;

35) *deleted*;

36) “oversight planning cycle” means a time period in which continued compliance is verified;

37) “rapid exit taxiway” means a taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimising runway occupancy times;

38) “runway” means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft;

38a) “runway condition assessment matrix (RCAM)” means a matrix that allows the assessment of the runway condition code (RWYCC), using associated procedures, from a set of observed runway surface conditions and pilot report of braking action;

38b) “runway condition code (RWYCC)” means a number, to be used in the runway condition report (RCR), that describes the effect of the runway surface condition on aeroplane deceleration performance and lateral control;

38c) “runway condition report (RCR)” means a comprehensive standardised report relating to the conditions of the runway surface and their effects on the aeroplane landing and take-off performance, described by means of runway conditions code;

38d) “runway-end safety area (RESA)” means an area symmetrical about the runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway;

38e) “runway-holding position” means a designated position intended to protect a runway, an obstacle limitation surface, or an Instrument Landing Systems (ILS) or Microwave Landing System (MLS) critical or sensitive area at which taxiing aircraft and vehicles must stop and hold, unless otherwise authorised by the aerodrome control tower;

38f) “runway strip” means a defined area including the runway and stopway, if provided, intended to:

a) reduce the risk of damage to aircraft running off a runway;

b) protect aircraft flying over it during take-off or landing operations;

38g) “runway surface condition” means a description of the condition of the runway surface used in the RCR which establishes the basis for the determination of the RWYCC for aeroplane performance purposes;

38h) “runway surface condition descriptors” means one of the following substances on the surface of the runway:

a) compacted snow: snow that has been compacted into a solid mass such that aeroplane tyres, at operating pressures and loadings, will run on the surface without significant further compaction or rutting of the surface;

b) dry snow: snow from which a snowball cannot readily be made;

c) frost: ice crystals formed from airborne moisture on a surface whose temperature is at or below freezing; frost differs from ice in that frost crystals grow independently and therefore, have a more granular texture;

d) ice: water that has frozen or compacted snow that has transitioned into ice in cold and dry conditions;

e) slush: snow that is so water-saturated that water will drain from it when a handful is picked up or will splatter if stepped on forcefully;

f) standing water: water of depth greater than 3 mm;

g) wet ice: ice with water on top of it or ice that is melting;

h) wet snow: snow that contains enough water to be able to make a well compacted, solid snowball, but water will not squeeze out;

39) "runway type" means instrument runway or non-instrument runway;

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

41) "safety management system" means a systematic approach to managing safety including the necessary organisational structure, accountabilities, policies and procedures;

41a) "slippery wet runway" means a wet runway whose surface friction characteristics for a significant portion of it have been determined to be degraded;

41b) "SNOWTAM" means:

a) with effect from 7 January 2021 until 12 August 2021, a special series NOTAM notifying the presence or removal of hazardous conditions due to snow, ice, slush or standing water associated with snow, slush and ice on the movement area, by means of a specific format;

b) with effect from 12 August 2021, a special series NOTAM given in a standard format, which provides a surface condition report notifying the presence or cessation of conditions due to snow, ice, slush, frost or water associated with snow, slush, ice, or frost on the movement area;

41c) "specially prepared winter runway" means a runway with a dry frozen surface of compacted snow or ice, or both, which has been treated with sand or grit or has been mechanically treated to improve runway friction;

42) "stopway" means a defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off;

43) "take-off distance available (TODA)" means the length of the take-off run available plus the length of the clearway, if provided;

44) "take-off run available (TORA)" means the length of runway declared available and suitable for the ground run of an aeroplane taking off;

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

-aircraft stand taxilane,

- apron taxiway,

- rapid exit taxiway;

46) “Technical Instructions” means the latest effective edition of the “Technical Instructions for the Safe Transport of Dangerous Goods by Air” (Doc 9284-AN/905), including the Supplement and any Addenda, approved and published by the International Civil Aviation Organization;

47) “terms of the certificate” means the following:

- ICAO Location Indicators,
- conditions to operate (VFR/IFR, day/night),
- aeroplane operations on specially prepared winter runways,
- runway,
- declared distances,
- runway types and approaches provided,
- aerodrome reference code,
- scope of aircraft operations with higher aerodrome reference code letter,
- provision of apron management services (yes/no),
- rescue and firefighting level of protection;

47a) “type A instrument approach operation” means an instrument approach operation with a minimum descent height or decision height at or above 75 m (250 ft);

47b) “type B instrument approach operation” means an instrument approach operation with a decision height below 75 m (250 ft) categorised as follows:

1. Category I (CAT I): a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m;

2. Category II (CAT II): a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft) and a runway visual range not less than 300 m;

3. Category III (CAT III): a decision height lower than 30 m (100 ft) or no decision height and a runway visual range less than 300 m or no runway visual range limitations;

48) “visual aids” means indicators and signalling devices, markings, lights, signs and markers or combinations thereof;

49) “wet runway” means a runway whose surface is covered by any visible dampness or water up to and including 3 mm deep within the area intended to be used.

ANNEX II

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

SUBPART A – GENERAL REQUIREMENTS (ADR.AR.A)

ADR.AR.A.001 Scope

This Annex establishes requirements for the Competent Authorities responsible for:

a) the certification and oversight of aerodromes and aerodrome operators;

b) receiving declarations of capability and availability of the means to discharge the responsibilities by the organisations responsible for the provision of apron management services and their oversight.

ADR.AR.A.005 Competent Authority

The Competent Authority designated by the Member State in which an aerodrome is located shall be responsible for the:

a) certification and oversight of aerodromes and its aerodrome operators;

b) receiving declarations of capability and availability of the means to discharge the responsibilities by the organisations responsible for the provision of apron management services and their oversight.

ADR.AR.A.010 Oversight documentation

a) The Competent Authority shall provide the relevant legislative acts, standards, rules, technical publications and related documents to its relevant personnel in order to perform their tasks and to discharge their responsibilities.

b) The Competent Authority shall make available legislative acts, standards, rules, technical publications and related documents to aerodrome operators, organisations responsible for the provision of AMS and other interested parties to facilitate their compliance with the applicable requirements.

ADR.AR.A.015 Means of compliance

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

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

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

d) The Competent Authority shall evaluate the alternative means of compliance proposed by an aerodrome operator or an organisation responsible for the provision of AMS,

in accordance with point ADR.OR.A.015, by analysing the documentation provided and, if considered necessary, conducting an inspection of the aerodrome operator, the aerodrome or the organisation responsible for the provision of AMS.

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

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

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

3) inform other Member States about alternative means of compliance that were accepted; and

4) inform the certified aerodromes and the organisation responsible for the provision of AMS under its oversight, as appropriate.

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

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

2) without undue delay notify the Agency.

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

ADR.AR.A.025 Information to the Agency

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

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

ADR.AR.A.030 Immediate reaction to a safety problem

a) The Competent Authority shall implement a system to appropriately collect, analyse and disseminate safety information in accordance with Regulation (EU) No 376/2014 of the European Parliament and of the Council.

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

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

d) Measures taken in accordance with point (c) shall immediately be notified to the aerodrome operators or organisations responsible for the provision of AMS which need to comply with them under Regulation (EU) 2018/1139 and the delegated and implementing acts

adopted on the basis thereof. The Competent Authority shall also notify those measures to the Agency and, when combined action is required, the other Member States concerned.

e) Measures notified to an organisation responsible for the provision of AMS shall also be notified to the operator of the aerodrome where the service is provided.

ADR.AR.A.040 Safety directives

a) The Competent Authority shall issue a safety directive if it has determined the existence of an unsafe condition requiring immediate action, including the showing of compliance with any amended or additional certification specification established by the Agency, which the Competent Authority finds is necessary.b) A safety directive shall be forwarded to the aerodrome operators or providers of apron management services concerned, as appropriate, and shall contain, as a minimum, the following information:

1) the identification of the unsafe condition;

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

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

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

5) its date of entry into force.

c) The Competent Authority shall forward a copy of the safety directive to the Agency.

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

e) Safety directives notified to the organisation responsible for the provision of AMS shall also be notified to the operator of the aerodrome where the service is provided.

SUBPART B – MANAGEMENT (ADR.AR.B)

ADR.AR.B.005 Management system

a) The Competent Authority shall establish and maintain a management system, including as a minimum:

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

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

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

4) a formal process to monitor compliance of the management system with the relevant requirements and adequacy of the procedures, including the establishment of an internal audit process and a safety risk management process.

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

c) The Competent Authority shall establish procedures for participation in a mutual exchange of all necessary information and assistance with other competent authorities

concerned, including information on all findings raised, corrective follow-up actions taken in response to such findings, and enforcement measures taken as a result of oversight of the organisation responsible for the provision of AMS registered in more than one Member State.

ADR.AR.B.010 Allocation of tasks to qualified entities

a) Tasks related to the initial certification or continuing oversight of persons or organisations subject to Regulation (EC) No 216/2008 and its Implementing Rules shall be allocated by Member States only to qualified entities. When allocating tasks, the Competent Authority shall ensure that it has:

1) a system in place to initially and continuously asses that the qualified entity complies with Annex V to Regulation (EC) No 216/2008;

this system and the results of the assessments shall be documented;

2) established a documented agreement with the qualified entity, approved by both parties at the appropriate management level, which clearly defines:

(i) the tasks to be performed;

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

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

(iv) the related liability coverage; and

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

b) The Competent Authority shall ensure that the internal audit process and safety risk management process required by ADR.AR.B.005(a)(4) covers all certification or continuing oversight tasks performed on its behalf.

ADR.AR.B.015 Changes to the management system

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

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

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

ADR.AR.B.020 Record keeping

a) The Competent Authority shall establish a system of record keeping providing for adequate storage, accessibility and reliable traceability of:

1) the management system’s documented policies and procedures;

2) training, qualification and authorisation of its personnel;

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

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

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

6) the documentation regarding cases of equivalent level of safety and special conditions contained in the certification basis, as well as any Deviation Acceptance and Action Document (DAAD);

7) the evaluation and notification to the Agency of alternative means of compliance proposed by aerodrome operators and providers of apron management services and the assessment of alternative means of compliance used by the Competent Authority itself;

8) findings, corrective actions and date of action closure, and observations;

9) enforcement measures taken;

10) safety information and follow-up measures;

11) the use of flexibility provisions in accordance with Article 71 of Regulation (EU) 2018/1139.

b) The Competent Authority shall maintain a list of all certificates it issued and declarations it received.

c) Records related to the certification of an aerodrome and an aerodrome operator, or the declaration of a provider of apron management services shall be kept for the lifespan of the certificate or declaration, as appropriate.

d) Records relating to points (a)(1) to (a)(3) and points (a)(7) to (a)(11) shall be kept for a minimum period of five years, subject to applicable data protection law.

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

ADR.AR.C.005 Oversight

a) The Competent Authority shall verify:

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

2) continued compliance with the certification basis and applicable requirements of aerodromes and aerodrome operators or organisations responsible for the provision of AMS; and

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

b) This verification shall:

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

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

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

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

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

d) The Competent Authority shall collect and process any information deemed useful for oversight, including unannounced inspections, as appropriate.

e) Within its oversight powers, the Competent Authority may decide to require prior approval for any obstacles, developments and other activities within the areas monitored by the

aerodrome operator in accordance with ADR.OPS.B.075, which may endanger safety and adversely affect the operation of an aerodrome.

ADR.AR.C.010 Oversight programme

a) The Competent Authority shall for each aerodrome operator and organisation responsible for the provision of AMS:

1) establish and maintain an oversight programme covering the oversight activities required by ADR.AR.C.005;

2) apply an appropriate oversight planning cycle, not exceeding 48 months.

b) The oversight programme shall include within each oversight planning cycle, audits and inspections, including unannounced inspections, as appropriate.

c) The oversight programme and planning cycle shall reflect the safety performance of the aerodrome operator or the organisation responsible for the provision of AMS respectively, as well as the risk exposure of the aerodrome.

d) The oversight programme shall include records of the dates when audits and inspections are due and when audits and inspections have been carried out.

ADR.AR.C.015 Initiation of certification process

a) Upon receiving an application for the initial issuance of a certificate, the Competent Authority shall assess the application and shall verify compliance with the applicable requirements.

b) In case of an existing aerodrome, the Competent Authority shall prescribe the conditions under which the aerodrome operator shall operate during the certification period, unless the Competent Authority determines that the operation of the aerodrome needs to be suspended. The Competent Authority shall inform the aerodrome operator of the expected schedule for the certification process and conclude the certification within the shortest time period practicable.

c) The Competent Authority shall establish and notify the applicant of the certification basis in accordance with ADR.AR.C.020.

ADR.AR.C.020 Certification basis

The certification basis is to be established and notified to an applicant by the Competent Authority and shall consist of:

a) the certification specifications issued by the Agency which the Competent Authority finds applicable to the design and the type of operation of the aerodrome and which are effective on the date of application for that certificate, unless:

1) the applicant elects compliance with later effective amendments; or

2) the Competent Authority finds that compliance with such later effective amendments is necessary;

b) any provision for which an equivalent level of safety has been accepted by the Competent Authority to be demonstrated by the applicant; and

c) any special condition prescribed in accordance with ADR.AR.C.025, that the Competent Authority finds necessary to be included in the certification basis.

ADR.AR.C.025 Special conditions

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

1) the certification specifications cannot be met due to physical, topographical or similar limitations related to the location of the aerodrome;

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

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

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

ADR.AR.C.035 Issuance of certificates

a) The Competent Authority may require any inspection, test, safety assessment, or exercise it finds necessary before issuing the certificate.

b) The Competent Authority shall issue either:

1) a single aerodrome certificate; or

2) two separate certificates, one for the aerodrome and one for the aerodrome operator.

c) The Competent Authority shall issue the certificate(s) prescribed in point (b) when the aerodrome operator has demonstrated to the satisfaction of the Competent Authority compliance with ADR.OR.B.025 and ADR.OR.E.005.

d) The certificate shall be considered to include the aerodrome's certification basis, the aerodrome manual, and, if relevant, any other operating conditions or limitations prescribed by the Competent Authority and any Deviation Acceptance and Action Documents (DAAD).

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

f) Where responsibilities are attributed to other relevant organisations, they should be clearly identified and listed.

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

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

ADR.AR.C.040 Changes – aerodrome operator

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

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

a) the applicant elects compliance with later effective amendments; or

b) the Competent Authority finds that compliance with such later effective amendments is necessary;

2) any other certification specification issued by the Agency that the Competent Authority finds is directly related to the proposed change;

3) any special condition, and amendment to special conditions, prescribed by the Competent Authority in accordance with point ADR.AR.C.025, the Competent Authority finds is necessary; and

4) the amended certification basis, if affected by the proposed change.

b) The Competent Authority shall approve the change when the aerodrome operator has demonstrated, to the satisfaction of the Competent Authority, compliance with the requirements in ADR.OR.B.040 and, if applicable, with ADR.OR.E.005.

c) If the approved change affects the terms of the certificate, the Competent Authority shall amend them.

d) The Competent Authority shall approve any conditions under which the aerodrome operator shall operate during the change.

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

f) For changes not requiring prior approval, the Competent Authority shall assess the information provided in the notification sent by the aerodrome operator in accordance with ADR.OR.B.040(d) to verify their appropriate management and verify their compliance with the certification specifications and other appropriate requirements applicable to the change. In case of any non-compliance, the Competent Authority shall:

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

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

ADR.AR.C.050 Declaration of organisations responsible for the provision of AMS and notification of a change

a) Upon receiving a declaration from an organisation responsible for the provision of AMS that intends to provide such a service at an aerodrome, or upon receiving a notification of a change to the information contained in the declaration, the Competent Authority shall acknowledge receipt of the declaration or the notification of a change, and shall verify that the declaration or the notification contains all the information required by Annex III (Part-ADR.OR).

b) If the declaration or the notification of a change does not contain all the information required under point ADR.OR.F.005 of Annex III, or contains information that is not in accordance with the applicable requirements, the Competent Authority shall notify the organisation responsible for the provision of AMS and the aerodrome operator where such service is provided about the non-compliance and request further information. If deemed necessary the competent authority shall carry out an inspection of the organisation. If the non-compliance is confirmed, the Competent Authority shall take action as defined in point ADR.AR.C.055 of this Annex.

c) The Competent Authority shall keep a register of the declarations and of the notifications of a change of the organisation responsible for the provision of AMS under its oversight.

ADR.AR.C.055 Findings, observations, corrective actions and enforcement measures

a) The Competent Authority for oversight in accordance with ADR.AR.C.005(a) shall have a system to analyse findings for their safety significance.

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

The level 1 finding shall include:

1) failure to give the Competent Authority access to the aerodrome and aerodrome operator's or the apron management services provider's facilities as defined in ADR.OR.C.015 during normal operating hours and after two written requests;

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

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

4) the lack of an accountable manager.

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

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

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

2) In the case of level 2 findings, the Competent Authority shall:

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

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

3) Where the aerodrome operator or the provider of apron management services fails to submit an acceptable corrective action plan, or to perform the corrective action within the

time period accepted or extended by the Competent Authority, the finding shall be raised to a level 1 finding, and action taken as laid down in point (d)(1).

4) The Competent Authority shall record all findings it has raised and where applicable, the enforcement measures it has applied, as well as all corrective actions and date of action closure for findings.

e) For those cases not requiring level 1 or level 2 findings, the Competent Authority may issue observations.

f) Any findings issued with regard to an organisation responsible for the provision of AMS or any observations made to the organisation responsible for the provision of AMS shall be notified by the Competent Authority to the operator of the aerodrome where such service is provided.

ANNEX III

Part Organisation Requirements (Part-ADR.OR)

SUBPART A – GENERAL REQUIREMENTS (ADR.OR.A)

ADR.OR.A.005 Scope

This Annex establishes the requirements to be followed by:

a) an aerodrome operator subject to Regulation (EC) No 216/2008 with respect to its certification, management, manuals and other responsibilities; and

b) a provider of apron management services.

ADR.OR.A.010 Competent Authority

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

ADR.OR.A.015 Means of compliance

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

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

The aerodrome operator or the provider of apron management services may implement these alternative means of compliance subject to prior approval by the Competent Authority and upon receipt of the notification, as prescribed in ADR.AR.A.015(d).

c) Where apron management services are not provided by the aerodrome operator itself, the use of alternative means of compliance by providers of such services in accordance with (a) and (b), shall also require prior agreement by the operator of the aerodrome where such services are provided.

SUBPART B – CERTIFICATION – AERODROMES AND AERODROME OPERATORS (ADR.OR.B)

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

Prior to commencing the operation of an aerodrome or when an exemption in accordance with Article 5 has been revoked, the aerodrome operator shall obtain the applicable certificate(s) issued by the Competent Authority.

ADR.OR.B.015 Application for a certificate

a) The application for a certificate shall be made in a form and manner established by the Competent Authority.

b) The applicant shall provide the Competent Authority with the following:

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

2) information and data regarding:

(i) the location of the aerodrome;

(ii) the type of operations at the aerodrome and the associated airspace; and

(iii) the design and facilities of the aerodrome, in accordance with the applicable certification specifications established by the Agency;

3) any proposed deviations from the identified applicable certification specifications established by the Agency;

4) documentation demonstrating how it will comply with the applicable requirements established in Regulation (EC) No 216/2008 and its Implementing Rules. Such documentation shall include a procedure, contained in the aerodrome manual, describing how changes not requiring prior approval will be managed and notified to the Competent Authority; subsequent changes to this procedure shall require prior approval by the Competent Authority;

5) evidence of adequacy of resources to operate the aerodrome in accordance with the applicable requirements;

6) documented evidence showing the relationship of the applicant with the aerodrome owner and/or the land owner;

7) the name of and relevant information about the accountable manager and the other nominated persons required by ADR.OR.D.015; and

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

c) If acceptable to the Competent Authority, information under points (7) and (8) may be provided at a later stage determined by the Competent Authority, but prior to the issuance of the certificate.

ADR.OR.B.025 Demonstration of compliance

a) The aerodrome operator shall:

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

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

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

(iii) that the flight procedures of the aerodrome and the associated changes thereto, have been established in accordance with Commission Implementing Regulation (EU) 2017/373.

2) provide to the Competent Authority the means by which compliance has been demonstrated; and

3) declare to the Competent Authority its compliance with point (a)(1).

b) Relevant design information, including drawings, inspection, test and other relevant reports, shall be held and kept by the aerodrome operator at the disposal of the

Competent Authority, in accordance with the provisions of ADR.OR.D.035 and provided on request to the Competent Authority.

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

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

ADR.OR.B.035 Continued validity of a certificate

a) A certificate shall remain valid subject to:

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

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

3) the certificate not being surrendered or revoked.

b) Upon revocation or surrender, the certificate shall be returned to the Competent Authority without delay.

ADR.OR.B.040 Changes

a) Any change:

1) affecting the terms of the certificate, its certification basis and safety-critical aerodrome equipment; or

2) significantly affecting elements of the aerodrome operator's management system as required in ADR.OR.D.005(b) shall require prior approval by the Competent Authority.

b) For other changes requiring prior approval in accordance with Regulation (EC) No 216/2008 and its Implementing Rules, the aerodrome operator shall apply for and obtain an approval issued by the Competent Authority.

c) The application for a change in accordance with point (a) or (b) shall be submitted before any such change takes place, in order to enable the Competent Authority to determine continued compliance with Regulation (EC) No 216/2008 and its Implementing Rules and to amend, if necessary, the certificate and related terms of the certificate attached to it.

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

During the changes, the aerodrome operator shall operate under the conditions approved by the Competent Authority.

d) Changes not requiring prior approval shall be managed and notified to the Competent Authority as defined in the procedure approved by the Competent Authority in accordance with ADR.AR.C.035(h).

e) The aerodrome operator shall provide the Competent Authority with the relevant documentation in accordance with point (f) and ADR.OR.E.005.

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

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

2) align assumptions and mitigations with any affected parties, in a systematic way;

3) ensure a comprehensive assessment of the change including any necessary interactions; and

4) ensure that complete and valid arguments, evidence and safety criteria are established and documented to support the safety assessment, and that the change supports the improvement of safety whenever reasonably practicable.

ADR.OR.B.050 Continuing compliance with the Agency's certification specifications

The aerodrome operator, following an amendment of the certification specifications established by the Agency, shall:

a) perform a review to identify any certification specifications which are applicable to the aerodrome; and

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

ADR.OR.B.065 Termination of operation

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

a) notify the Competent Authority as soon as possible;

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

c) surrender the certificate to the Competent Authority upon the date of termination of operation; and

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

ADR.OR.B.070 Termination of the provision of apron management service

The aerodrome operator shall:

a) take appropriate measures to ensure that safety risks that result from the termination of operation have been assessed and mitigated;

b) provide information on the measures referred to in point (a) to the appropriate aeronautical information service provider.

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

ADR.OR.C.005 Aerodrome operator responsibilities

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

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

2) the terms of its certificate;

3) the content of the aerodrome manual; and

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

b) The aerodrome operator shall ensure directly, or coordinate through arrangements as required with the accountable entities providing the following services:

1) the provision of air navigation services appropriate to the level of traffic and the operating conditions at the aerodrome; and

2) the design and maintenance of the flight procedures, in accordance with the applicable requirements.

c) The aerodrome operator shall coordinate with the Competent Authority to ensure that relevant information for the safety of aircraft is contained in the aerodrome manual and is published where appropriate. This shall include:

1) exemptions or derogations granted from the applicable requirements;

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

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

d) If an unsafe condition develops at the aerodrome, the aerodrome operator shall, without undue delay, take all necessary measures to ensure that those parts of the aerodrome found to endanger safety are not used by aircraft.

e) The aerodrome operator, in order to ensure the safe operation of aircraft at the aerodrome, shall provide and maintain, directly or through arrangements with third parties, visual and non-visual aids, meteorological equipment and any other equipment, commensurate with the type of operations conducted at the aerodrome.

ADR.OR.C.015 Access

For the purpose of determining compliance with the relevant requirements in Regulation (EU) 2018/1139 and the delegated and implementing acts adopted on the basis thereof, an aerodrome operator shall grant access to any person authorised by the Competent Authority to:

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

b) perform or witness any action, inspection, test, assessment or exercise the Competent Authority finds is necessary.

ADR.OR.C.020 Findings and corrective actions

After receipt of a notification of findings, the aerodrome operator shall:

a) identify the root cause of the non-compliance;

b) define a corrective action plan; and

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

ADR.OR.C.025 Immediate reaction to a safety problem – compliance with safety directives

The aerodrome operator shall implement any safety measures, including safety directives, taken by the Competent Authority in accordance with points ADR.AR.A.030(c) and ADR.AR.A.040 of Annex II.

ADR.OR.C.030 Occurrence reporting

a) The aerodrome operator shall report to the Competent Authority and to any other organisation required by the State where the aerodrome is located, any accident, serious incident and occurrence as defined in Regulation (EU) No 996/2010 of the European Parliament and the Council and Regulation (EU) No 376/2014.

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

c) Without prejudice to Regulation (EU) No 996/2010 and Directive 2003/42/EC, Commission Regulation (EC) No 1321/2007 and Commission Regulation (EC) No 1330/2007 the reports referred to in points (a) and (b) shall be made in a form and manner established by the Competent Authority and contain all pertinent information about the condition known to the aerodrome operator or the provider of apron management services.

d) Reports shall be made by the aerodrome operator within 72 hours of becoming aware of the occurrence to which the report relates, unless exceptional circumstances prevent this.

e) Where relevant, the aerodrome operator shall produce a follow-up report to provide details of actions it intends to take to prevent similar occurrences in the future, as soon as those actions have been identified. That report shall be produced in a form and manner established by the Member State.

ADR.OR.C.040 Prevention of fire

The aerodrome operator shall establish procedures to prohibit:

a) smoking within the movement area, other operational areas of the aerodrome, or areas of the aerodrome where fuel or other flammable material is stored;

b) display of an open flame or undertaking of an activity that would create a fire hazard within:

1) areas of the aerodrome where fuel or other flammable material is stored;

2) the movement area or other operational areas of the aerodrome, unless authorised by the aerodrome operator.

ADR.OR.C.045 Use of alcohol, psychoactive substances and medicines

a) The aerodrome operator shall establish procedures on the level of consumption of alcohol, psychoactive substances and medicines by:

1) personnel involved in the operation, rescue and firefighting, and maintenance of the aerodrome;

2) unescorted persons operating on the movement area or other operational areas of the aerodrome.

b) These procedures shall include the requirements that such persons shall:

1) not consume alcohol during their duty period;

2) not perform any duties under the influence:

(i) of alcohol, or any psychoactive substance; or

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

SUBPART D – MANAGEMENT – AERODROME OPERATORS (ADR.OR.D)

ADR.OR.D.005 Management system

a) The aerodrome operator shall implement and maintain a management system integrating a safety management system.

b) The management system shall include:

1) clearly defined lines of responsibility and accountability throughout the aerodrome operator, including a direct accountability for safety on the part of senior management;

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

3) a formal process that ensures that hazards in operations are identified;

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

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

6) a formal process to:

(i) identify changes within the aerodrome operator's organisation, management system, the aerodrome or its operation which may affect established processes, procedures and services;

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

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

7) a formal processes to review the management system referred to in paragraph (a), identify the causes of substandard performance of the safety management system, determine the implications of such substandard performance in operations, and eliminate or mitigate such causes;

8) a safety training programme that ensures that personnel involved in the operation, rescue and firefighting, maintenance and management of the aerodrome are trained and competent to perform the safety management system duties;

9) formal means for safety communication that ensures that personnel are fully aware of the safety management system, conveys safety critical information, and explains why particular safety actions are taken and why safety procedures are introduced or changed;

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

11) a formal process to monitor compliance of the organisation with the relevant requirements.

c) The aerodrome operator shall document all management system key processes.

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

e) In the case that the aerodrome operator holds also a certificate to provide air navigation services, it shall ensure that the management system covers all activities in the scope of its certificates.

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

a) As part of its management system, the aerodrome operator shall implement and maintain a quality management system covering the following activities:

1) its aeronautical data activities;

2) its aeronautical information provision activities.

b) The aerodrome operator shall, as part of its management system, establish a security management system to ensure the security of operational data it receives, or produces, or otherwise employs, so that access to that operational data is restricted only to those authorised.

c) The security management system of the aerodrome operator shall define the following elements:

1) the procedures relating to data security risk assessment and mitigation, security monitoring and improvement, security reviews and lesson dissemination;

2) the means designed to detect security breaches and to alert personnel with appropriate security warnings;

3) the means of controlling the effects of security breaches and of identifying recovery action and mitigation procedures to prevent reoccurrence.

d) The aerodrome operator shall ensure the security clearance of its personnel with respect to aeronautical data security.

e) The aerodrome operator shall take the necessary measures to protect its aeronautical data against cyber security threats.

ADR.OR.D.010 Contracted activities

a) Contracted activities include all activities within the aerodrome operator's scope in accordance with the terms of the certificate that are performed by other organisations either itself certified to carry out such activity or if not certified, working under the aerodrome operator's approval. The aerodrome operator shall ensure that when contracting or purchasing any part of its activity, the contracted or purchased service or equipment or system conforms to the applicable requirements.

b) When an aerodrome operator contracts any part of its activity to an organisation that is not itself certified in accordance with this Part to carry out such activity, the contracted organisation shall work under the approval and oversight of the aerodrome operator. The aerodrome operator shall ensure that the Competent Authority is given access to the contracted organisation, to determine continued compliance with the applicable requirements.

ADR.OR.D.015 Personnel requirements

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

b) The aerodrome operator shall nominate persons responsible for the management and supervision of the following areas:

1) operational services of the aerodrome; and

2) maintenance of the aerodrome.

c) The aerodrome operator shall nominate a person or group of persons responsible for the development, maintenance and day-to-day management of the safety management system.

Those persons shall act independently of other managers within the organisation, shall have direct access to the accountable manager and to appropriate management for safety matters and shall be responsible to the accountable manager.

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

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

f) The aerodrome operator shall ensure that personnel involved in the operation, maintenance and management of the aerodrome are adequately trained in accordance with the training programme.

ADR.OR.D.017 Training and proficiency check programmes

a) The aerodrome operator shall establish and implement a training programme for personnel involved in the operation, maintenance and management of the aerodrome, to ensure their continued competence, and that they are aware of the rules and procedures relevant to operation of the aerodrome and the relationship of their functions and tasks to the aerodrome operation as a whole.

b) The training referred to in point (a) shall:

1) include initial, recurrent, refresher and continuation training;

2) be appropriate to the functions and tasks for the personnel;

3) include the applicable operational procedures and requirements of the aerodrome, as well as driving.

c) The aerodrome operator shall ensure that any other personnel, including personnel of other organisations that operate or provide services at the aerodrome, allowed unescorted access to the movement area and other operational areas of the aerodrome, is adequately trained and qualified for such unescorted access.

d) The training referred to in point (c) shall:

1) include initial, recurrent, refresher and continuation training;

2) include the applicable operational procedures and requirements of the aerodrome, as well as driving.

e) The aerodrome operator shall ensure that personnel referred to in points (a) and (c) have successfully completed the necessary initial training prior to being allowed:

1) to perform their duties unattended;

2) unescorted access to the movement area and other operational areas of the aerodrome.

The initial training shall include theoretical and practical training of adequate duration and competence assessments of the personnel following the provision of the training.

f) In order to continue to perform their duties unattended and being allowed unescorted access to the movement area and other operational areas of the aerodrome and unless otherwise specified in this Part and Part-ADR.OPS, the aerodrome operator shall ensure that personnel referred to in points (a) and (c) have been trained on the rules and procedures relevant to operation of the aerodrome by successfully completing:

1) recurrent training, at intervals not exceeding 24 months since the completion of their initial training. If the recurrent training is undertaken within the last 3 calendar months of the interval, the new interval period shall be counted from the expiry date of the original interval;

2) refresher training, prior to performing their duties unattended or being allowed unescorted access to the movement area or other operational area of the aerodrome, when they are absent from their duties for a period not less than 3 and not more than 12 consecutive months. In case of absence beyond 12 consecutive months, such personnel shall undergo initial training in accordance with point (c);

3) continuation training due to changes to their operating environment or assigned tasks, as necessary.

g) The aerodrome operator shall establish and implement a proficiency check programme for personnel referred to in point (a), and ensure for personnel referred to in point (c) that they have demonstrated their capabilities in the performance of their tasks, in accordance with a proficiency check programme, in order to ensure:

1) their continued competence;

2) that they are aware of the rules and procedures relevant to their functions and tasks.

Unless otherwise specified in this Part and Part-ADR.OPS, the aerodrome operator shall ensure that persons referred to in points (a) and (c) undergo proficiency checks at intervals not exceeding 24 months since the completion of their initial training.

h) The aerodrome operator shall ensure that:

1) adequately qualified and experienced instructors for the provision of training and assessors for the assessments and the proficiency checks are used;

2)suitable facilities, means and equipment are used for the provision of the training and, where applicable, for the conduct of the proficiency checks.

(i) The aerodrome operator shall establish and implement procedures for the implementation of the training and proficiency check programmes and shall:

1) maintain appropriate qualification, training and proficiency check records to demonstrate compliance with this requirement;

2) upon request, make such records available to its personnel concerned;

3) if a person is employed by another employer, upon request, make such records of that person available to that new employer.

ADR.OR.D.020 Facilities requirements

a) The aerodrome operator shall ensure that adequate and appropriate facilities are available to its personnel or personnel employed by parties with whom it has contracted for the provision of aerodrome operational and maintenance services.

b) The aerodrome operator shall designate appropriate areas at the aerodrome to be used for the storage of dangerous goods transported through the aerodrome, in accordance with the Technical Instructions.

ADR.OR.D.025 Coordination with other organisations

The aerodrome operator shall:

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

b) ensure that such organisations have safety procedures in place to comply with the applicable requirements of Regulation (EC) No 216/2008 and its Implementing Rules and the requirements laid down in the aerodrome manual.

ADR.OR.D.027 Safety programmes

The aerodrome operator shall:

a) establish, lead and implement programmes to promote safety and the exchange of safety-relevant information; and

b) encourage organisations operating or providing services at the aerodrome to be involved in such programmes.

ADR.OR.D.030 Safety reporting system

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

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

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

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

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

d) The aerodrome operator shall:

1) record all reports submitted;

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

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

4) conduct investigations of reports, as appropriate; and

5) refrain from attribution of blame in line with the ‘just culture’ principles.

ADR.OR.D.035 Record keeping

a) The aerodrome operator shall establish an adequate system of record keeping, covering all its activities undertaken under Regulation (EC) No 216/2008 and its Implementing Rules.

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

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

d) Records shall be kept for a minimum of five years, except that the below records shall be kept as follows:

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

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

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

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

5) personnel training, qualifications, and medical records as well as their proficiency checks, as appropriate, for at least four years after the end of their employment, or until the area of their employment has been audited by the Competent Authority; and

6) the current version of the hazard register;

7) driving authorisations and, if appropriate, language proficiency certificates, for at least four years after the end of a person's employment, or the revocation or cancelation of a driving authorisation, or until this area of activity has been audited by the competent authority; and

8) vehicle authorisations and aerodrome operator's vehicle maintenance records, for at least four years after a vehicle is removed from operations, or until this area has been audited by the competent authority.

e) All records shall be subject to applicable data protection law.

SUBPART E – AERODROME MANUAL AND DOCUMENTATION (ADR.OR.E)

ADR.OR.E.005 Aerodrome manual

a) The aerodrome operator shall establish and maintain an aerodrome manual.

b) The content of the aerodrome manual shall reflect the certification basis and the requirements set out in this Part and Part-ADR.OPS, as applicable, and shall not contravene the terms of the certificate. The aerodrome manual shall contain or refer to all necessary information for the safe use, operation and maintenance of the aerodrome, its equipment, as well as its obstacle limitation and protection surfaces and other areas associated with the aerodrome.

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

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

e) The aerodrome operator shall:

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

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

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

g) The aerodrome operator shall:

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

2) incorporate all amendments and revisions required by the Competent Authority; and

3) make all aerodrome personnel and other relevant organisations aware of the changes that are relevant to their duties and responsibilities.

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

(i) The aerodrome operator shall ensure that:

1) the aerodrome manual is written in a language acceptable to the Competent Authority; and

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

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

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

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

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

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

k) The aerodrome operator shall keep at least one complete and current copy of the aerodrome manual at the aerodrome and make it available for inspection by the Competent Authority.

l) The content of the aerodrome manual shall be as follows:

1) General;

2) Aerodrome management system, qualification and training requirements;

3) Particulars of the aerodrome site;

4) Particulars of the aerodrome required to be reported to the Aeronautical Information Service; and

5) Particulars of the operating procedures of the aerodrome, its equipment and safety measures.

ADR.OR.E.010 Documentation requirements

a) The aerodrome operator shall ensure the availability of any other documentation required and associated amendments.

b) The aerodrome operator shall be capable of distributing operational instructions and other information without delay.

SUBPART F – APRON MANAGEMENT SERVICE (ADR.OR.F)

ADR.OR.F.001 Responsibilities of the organisation responsible for the provision of AMS

The organisation responsible for the provision of AMS shall provide the apron management service in accordance with:

a) the requirements set out in Annex VII to Regulation (EU) 2018/1139 and in Annex III (Part-ADR.OR) and Annex IV (Part-ADR.OPS) to this Regulation;

b) its declaration;

c) the operating procedures included in the aerodrome manual;

d) its management system manual in accordance with ADR.OR.F.095;

e) any other manuals used for the provision of apron management service.

ADR.OR.F.005 Declaration of the organisation responsible for the provision of AMS

a) When an organisation responsible for the provision of AMS intends to provide guidance to aircraft as laid down in points a(1) and a(2) of point ADR.OPS.D.001 as a minimum, it shall submit a declaration to the Competent Authority at least 2 months before the date of the intended start of the provision of the service. The declaration shall contain the following information:

1) the name of the organisation responsible for the provision of AMS;

2) contact details of the organisation responsible for the provision of AMS;

3) name and contact details of the accountable manager;

4) the name(s) of the aerodrome(s) in the Member State where the service will be provided;

5) a list of aerodromes located in other Member States where the service is provided;

6) the date of the intended start of the provision of the apron management service;

7) a statement that confirms that it has established formal arrangements with the aerodrome operator and the air traffic service provider at the aerodrome where it intends to provide the apron management service;

8) a statement that confirms that the organisation responsible for the provision of AMS has developed a safety policy and will apply that policy during the provision of the service covered by the declaration, in accordance with point ADR.OR.F.045(b)(2);

9) a statement that confirms that the organisation responsible for the provision of AMS complies and will, during the provision of the service covered by the declaration, continue to comply with the applicable requirements of Annex VII to Regulation (EU) 2018/1139 and Annex III (Part-ADR.OR) and Annex IV (Part-ADR.OPS) to this Regulation;

b) By derogation from point (a), when a certified aerodrome operator or an approved air traffic services provider intends to provide apron management service, it shall:

1) notify its Competent Authority;

2) revise its safety policy to include the provision of apron management service;

3) submit to the Competent Authority the training programme of the personnel intended to be used for the provision of the service.

ADR.OR.F.010 Continued validity of the declaration

A declaration made by an organisation responsible for the provision of AMS in accordance with point ADR.OR.F.005 shall remain valid subject to the following conditions:

a) the organisation responsible for the provision of AMS is compliant with the requirements set out in Annex VII to Regulation (EU) 2018/1139 and in Annex III (Part-ADR.OR) and Annex IV (Part-ADR.OPS) to this Regulation, taking into account the provisions related to the handling of findings as specified under point ADR.OR.F.035 of this Annex;

b) the Competent Authority is granted access to the organisation responsible for the provision of AMS in accordance with point ADR.OR.F.030 of this Annex to determine continued compliance with the requirements set out in Annex VII to Regulation (EU)

2018/1139 and in Annex III (Part-ADR.OR) and Annex IV (Part-ADR.OPS) to this Regulation;

c) the declaration has not been withdrawn by the organisation responsible for the provision of AMS or been notified by the Competent Authority to cease some or all services covered by the declaration.

ADR.OR.F.015 Start of the provision of apron management service

An organisation responsible for the provision of AMS shall start the provision of apron management service at an aerodrome, when:

a) the declaration has been received by the Competent Authority;

b) it has established formal arrangements with the certified aerodrome operator and the approved air traffic service provider at the aerodrome where the service will be provided in accordance with points ADR.OR.F.085 and ADR.OR.F.090 respectively;

c) it provides evidence that its personnel have completed the required initial and unit training.

ADR.OR.F.020 Termination of the provision of apron management service

An organisation responsible for the provision of AMS that intends to terminate permanently the provision of the service at an aerodrome shall:

a) notify the aerodrome operator and the Competent Authority, as soon as possible, so as to enable appropriate measures to be taken for the safe continuation of the service;

b) submit to the Competent Authority an amended declaration or request de-registration of the declaration, upon the date of termination of the provision of the service.

ADR.OR.F.025 Changes

a) The organisation responsible for the provision of AMS shall coordinate with the aerodrome operator any changes to the information contained in the declaration specified in point ADR.OR.F.005(a) and to the training programme or the management system manual respectively referred to in point ADR.OR.F.005(b) and point ADR.OR.F.095.

b) The organisation responsible for the provision of AMS shall notify without undue delay the Competent Authority of any changes specified in point (a) and, if necessary, submit an amended declaration.

c) The organisation responsible for the provision of AMS shall provide the Competent Authority with the relevant documentation in accordance with point (d).

d) As part of its management system referred to in point ADR.OR.F.045, the organisation responsible for the provision of AMS that proposes a change to its organisation, its management system or its training programme shall:

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

2) align assumptions and mitigations with any affected parties in a systematic way;

3) ensure a comprehensive assessment of the change including any necessary interactions;

4) ensure that complete and valid arguments, evidence and safety criteria are established and documented to support the safety assessment, and that the change supports the improvement of safety whenever reasonably practicable.

ADR.OR.F.030 Access

For the purpose of determining whether an organisation responsible for the provision of AMS is acting in accordance with its declaration, the organisation responsible for the provision of AMS shall ensure that any person duly authorised by the Competent Authority, at any time:

a) is granted access to any facility, document, records, data, procedures or any other material relevant to its activity;

b) is allowed to perform or witness any action, inspection, test, assessment or exercise the Competent Authority finds necessary.

ADR.OR.F.035 Findings and corrective actions

a) After the Competent Authority has communicated a finding to an organisation responsible for the provision of AMS in accordance with point ADR.AR.C.055 of Annex II, the organisation responsible for the provision of AMS shall take the following steps within the time period determined by the Competent Authority:

1) identify the root cause of the non-compliance;

2) define a corrective action plan;

3) demonstrate the corrective action implementation to the satisfaction of the Competent Authority within the time period agreed with that authority in accordance with point ADR.AR.C.055(d) of Annex II.

b) The organisation responsible for the provision of AMS shall inform the aerodrome operator of the actions detailed in point (a) and, where appropriate, coordinate such actions with the aerodrome operator.

ADR.OR.F.040 Immediate reaction to a safety problem – compliance with safety directives

An organisation responsible for the provision of AMS shall:

a) implement any safety measures, including safety directives, taken by the Competent Authority in accordance with points ADR.AR.A.030(c) and ADR.AR.A.040 of Annex II;

b) when implementing the measures referred to in point (a), coordinate with the aerodrome operator and the air traffic service provider, where necessary.

ADR.OR.F.045 Management system

a) The organisation responsible for the provision of AMS, the aerodrome operator or the air traffic service provider, when the latter is partially or exclusively providing apron management services, shall implement and maintain a management system that integrates a safety management system that also covers those activities.

b) The management system shall include:

1) clearly defined lines of responsibility and accountability throughout the organisation, including a direct accountability for safety on the part of the senior management;

2) a description of the overall philosophies and principles of the organisation responsible for the provision of AMS with regard to safety, referred to as the safety policy, signed by the accountable manager;

3) a formal process that ensures that hazards in operations are identified;

4) a formal process that ensures analysis, assessment and mitigation of the safety risks in the provision of apron management service;

5) the means to verify the safety performance of the organisation responsible for the provision of AMS in reference to the safety performance indicators and safety performance targets of the safety management system, and to validate the effectiveness of safety risk controls;

6) a formal process to:

(i) identify changes within the organisation, its management system, or the provision of apron management service which may affect established processes, procedures and services;

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

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

7) a formal process to review the management system referred to in point (a), identify the cause(s) of substandard performance of the safety management system, determine the implications of such substandard performance in operations, and eliminate or mitigate such cause(s);

8) a safety training programme that ensures that personnel involved in the provision of apron management service are trained and competent to perform the safety management duties;

9) formal means for safety communication that ensures that personnel are fully aware of the safety management system, conveys safety-critical information, and explains why particular safety actions are taken and why safety procedures are introduced or changed;

10) a formal process to monitor the compliance of the organisation with the relevant requirements.

c) The organisation responsible for the provision of AMS shall document all management system key processes in a manual.

ADR.OR.F.050 Reporting malfunctions of systems used for the provision of apron management services

Without prejudice to Regulations (EU) No 376/2014, the organisation responsible for the provision of AMS shall report to the Competent Authority of the State where the aerodrome is located, to the aerodrome operator and to the organisation responsible for the design of any aerodrome equipment used for the provision of apron management service, any malfunction, technical defect, exceeding of technical limitations, occurrence or other irregular circumstance that has or may have endangered safety and that has not resulted in an accident or a serious incident.

ADR.OR.F.055 Safety reporting system

a) The organisation responsible for the provision of AMS shall establish and implement a safety reporting system for its personnel.

b) As part of the process referred to in point ADR.OR.F.045(b)(3), the organisation responsible for the provision of AMS shall ensure that:

1) its personnel use the safety reporting system for the mandatory reporting of any accident, serious incident and occurrence;

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

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

d) The organisation responsible for the provision of AMS shall:

1) record all reports submitted;

2) transmit the reports to the aerodrome operator, and, if relevant, to the air traffic service provider;

3) in cooperation with the aerodrome operator or the air traffic service provider, or both, analyse and assess the reports, in order to address safety deficiencies and identify trends;

4) participate in the investigation of the reports conducted by the aerodrome operator, as appropriate;

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

ADR.OR.F.060 Safety programmes

The organisation responsible for the provision of AMS shall participate in the safety programmes established by the aerodrome operator.

ADR.OR.F.065 Personnel requirements

a) The organisation responsible for the provision of AMS shall:

1) appoint an accountable manager, who has the authority to ensure that all activities can be financed and carried out in accordance with the applicable requirements. The accountable manager shall be responsible for establishing and maintaining an effective management system;

2) nominate a person responsible for the management and supervision of operational services related to apron management;

3) nominate a person responsible for the development, maintenance and day-to-day management of the safety management system. That person shall act independently of other managers within the organisation, shall have direct access to the accountable manager and to appropriate management for safety matters, and shall be responsible to the accountable manager;

4) have sufficient and qualified personnel for the planned tasks and activities to be performed in accordance with the applicable requirements;

5) assign a sufficient number of personnel supervisors to defined duties and responsibilities, taking into account the structure of the organisation and the number of personnel employed;

6) ensure that personnel involved in the provision of apron management service are adequately trained in accordance with the training programme.

b) In the case that the aerodrome operator or the air traffic service provider are partially or exclusively providing apron management service, they shall ensure that the requirements of point (a) are included in their established allocation of responsibilities within their management systems.

ADR.OR.F.075 Use of alcohol, psychoactive substances and medicines

The organisation responsible for the provision of AMS shall implement the procedures established by the aerodrome operator in accordance with point ADR.OR.C.045 with regard to the consumption of alcohol, psychoactive substances and medicines by its personnel involved in the provision of apron management service.

ADR.OR.F.080 Record-keeping

a) The organisation responsible for the provision of AMS shall establish an adequate record-keeping system that covers all its activities undertaken in accordance with Regulation (EU) 2018/1139 and the delegated and implementing acts adopted on the basis thereof.

b) The format of the records shall be specified in the management system manual.

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

d) Records shall be kept for a minimum of 5 years, except that:

1) the current declaration shall be kept for the lifespan of the declaration;

2) written agreements with other organisations shall be kept for as long as such agreements are in effect;

3) safety assessment reports shall be kept for the lifetime of the system, procedure or activity;

4) personnel training, qualifications, as well as their proficiency checks shall be kept for at least 4 years after the end of their employment, or until the area of their employment has been audited by the Competent Authority;

e) The organisation responsible for the provision of AMS shall establish and maintain a hazard register.

ADR.OR.F.085 Formal arrangement between the organisation responsible for the provision of AMS and the aerodrome operator

a) The organisation responsible for the provision of AMS shall have a formal arrangement with the operator of the aerodrome where it intends to provide apron management service.

b) The arrangement shall be concluded prior to the start of the provision of the service.

c) The formal arrangement shall include as a minimum the following:

1) duration of the arrangement;

2) definition of the area where apron management service will be provided;

3) list of the services that will be conducted by the organisation responsible for the provision of AMS;

4) methods of exchanging operational information between the aerodrome operator and the organisation responsible for the provision of AMS.

ADR.OR.F.090 Formal arrangement between the organisation responsible for the provision of AMS and the air traffic service provider

a) The organisation responsible for the provision of AMS shall have a formal arrangement with the air traffic service provider of the aerodrome where it intends to provide apron management service.

b) The arrangement shall be concluded prior to the start of the provision of the service.

c) The formal arrangement shall include as a minimum the following:

1) duration of the arrangement;

2) scope of services to be provided, including coordination of start-up clearances, taxi and push-back of aircraft;

3) handover points between apron management service and air traffic service provider;

4) methods of exchanging operational information between the air traffic service provider and the organisation responsible for the provision of AMS;

5) coordination of start-up clearances, taxi and push-back of aircraft.

ADR.OR.F.095 Management system manual

a) The organisation responsible for the provision of AMS shall:

1) establish and maintain a management system manual;

2) ensure that its personnel have easy access to the manual and are made aware of any changes;

3) after consultation and in coordination with the aerodrome operator, supply the Competent Authority with the intended amendments and revisions of the manual in advance of the effective date;

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

5) incorporate all amendments and revisions to the manual as required by the Competent Authority;

6) make other organisations concerned aware of the changes that are relevant to their duties.

7) ensure that any information taken from other approved documents, and any amendment thereof, is correctly reflected in the manual;

8) ensure that the manual is written in a language acceptable to the Competent Authority;

9) ensure that all personnel are able to read and understand the language in which those parts of the manual and other documents pertaining to their duties and responsibilities are written;

10) ensure that the manual is signed by the accountable manager of the organisation;

11) ensure that the manual is printed or is in electronic format and is easy to revise;

12) ensure that the manual has a system for version control management which is applied and made visible in the manual;

13) ensure that the manual observes human factors principles and is organised in a manner that facilitates its preparation, use and review;

14) keep at least one complete and current copy of the manual at the aerodrome where it provides service, and make it available for inspection by the Competent Authority.

b) The content of the manual shall be structured as follows:

1) general part;

2) organisation’s management system and qualification requirements.

c) In the case that the aerodrome operator or the air traffic service provider are partially or exclusively providing apron management service, they shall ensure that the relevant requirements in point (b) are included in the aerodrome manual or the air traffic service operations manual respectively.

ADR.OR.F.100 Documentation requirements

The organisation responsible for the provision of AMS shall:

a) make available the parts of the aerodrome manual related to the provision of apron management service to its operational personnel;

b) make available of any other documentation required by the Competent Authority and associated amendments;

c) disseminate operational instructions and other information without delay.

ANNEX IV

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

SUBPART A – AERODROME DATA (ADR.OPS.A)

ADR.OPS.A.005 Aerodrome data

The aerodrome operator shall as appropriate:

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

b) provide data relevant to the aerodrome and available services to the users and the relevant air traffic services and aeronautical information services providers.

ADR.OPS.A.010 Data quality requirements

The aerodrome operator shall have formal arrangements with the organisations with which it exchanges aeronautical data or aeronautical information and shall ensure the following:

a) all data relevant to the aerodrome and available services is provided with the required quality; data quality requirements (DQRs) are complied with at data origination and maintained during data transmission;

b) the accuracy of aeronautical data is as specified in the aeronautical data catalogue;

c) the integrity of aeronautical data is maintained throughout the data process from origination to transmission, based on the integrity classification specified in the aeronautical data catalogue. In addition, procedures shall be put in place so that:

1) for routine data, corruption is avoided throughout the processing of the data;

2) for essential data, corruption does not occur at any stage of the entire process and additional processes are included, as needed, to address potential risks in the overall system architecture to ensure data integrity at that level;

3) for critical data, corruption does not occur at any stage of the entire process and additional integrity assurance processes are included to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks;

d) the resolution of the aeronautical data is commensurate with the actual data accuracy;

e) the traceability of the aeronautical data;

f) the timeliness of the aeronautical data, including any limits on the effective period;

g) the completeness of the aeronautical data;

h) the format of the delivered data meets the specified requirements.

ADR.OPS.A.015 Coordination between aerodrome operators and providers of aeronautical information services

a) To ensure that aeronautical information services providers obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, the aerodrome operator shall make arrangements to report to the relevant aeronautical information service providers, with a minimum of delay, the following:

1) information on the aerodrome conditions, disabled aircraft removal, rescue and firefighting and visual approach slope indicator systems;

2) the operational status of associated facilities, services and navigational aids at the aerodrome;

3) any other information considered to be of operational significance.

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

ADR.OPS.A.020 Common reference systems

For the purpose of air navigation, the aerodrome operator shall use:

a) the World Geodetic System – 1984 (WGS-84) as the horizontal reference system;

b) the mean sea level (MSL) datum as the vertical reference system;

c) the Gregorian calendar and coordinated universal time (UTC) as the temporal reference systems.

ADR.OPS.A.025 Data error detection and authentication

When originating, processing or transmitting data to the aeronautical information service (AIS) provider, the aerodrome operator shall:

a) ensure that digital data error detection techniques are used during the transmission and storage of aeronautical data, in order to support the applicable data integrity levels;

b) ensure that the transfer of aeronautical data is subject to a suitable authentication process such that recipients are able to confirm that the data or information has been transmitted by an authorised source.

ADR.OPS.A.030 Aeronautical data catalogue

When originating, processing or transmitting data to the AIS provider, the aerodrome operator shall ensure that the aeronautical data referred to in Appendix 1 to Annex III (Part-ATM/ANS.OR) to Commission Implementing Regulation (EU) 2017/373 conform to the data catalogue specifications.

ADR.OPS.A.035 Data validation and verification

When originating, processing or transmitting data to the AIS provider, the aerodrome operator shall ensure that validation and verification techniques are employed so that the aeronautical data meets the associated DQRs. In addition:

a) the verification shall ensure that the aeronautical data is received without corruption and that the aeronautical data process does not introduce corruption;

b) aeronautical data and aeronautical information entered manually shall be subject to independent verification to detect any errors that may have been introduced;

c) when using aeronautical data to obtain or calculate new aeronautical data, the initial data shall be verified and validated, except when provided by an authoritative source.

ADR.OPS.A.040 Error handling requirements

The aerodrome operator shall ensure that:

a) errors identified during data origination and after data delivery are addressed, corrected or resolved;

b) priority is given to managing errors in critical and essential aeronautical data.

ADR.OPS.A.045 Metadata

The aerodrome operator shall ensure that metadata include, as a minimum:

a) the identification of the organisations or entities performing any action of originating, transmitting or manipulating the aeronautical data;

b) the action performed;

c) the date and time the action was performed.

ADR.OPS.A.050 Data transmission

The aerodrome operator shall ensure that aeronautical data is transmitted by electronic means.

ADR.OPS.A.055 Tools and software

When originating, processing or transmitting aeronautical data to the AIS provider, the aerodrome operator shall ensure that tools and software used to support or automate aeronautical data processes perform their functions without adversely impacting the quality of the aeronautical data.

ADR.OPS.A.057 Origination of NOTAM

a) The aerodrome operator shall:

1) establish and implement procedures in accordance with which it originates a NOTAM issued by the relevant aeronautical information services provider:

(i) that contains information on the establishment, condition, or change of any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel involved with flight operations;

(ii) that contains information of a temporary nature and of short duration or that concerns operationally significant permanent changes or temporary changes of long duration that are made at short notice, except for extensive text or graphics, or both;

2) designate aerodrome personnel, who have successfully completed relevant training and demonstrated their competence, to originate NOTAM and provide relevant information to the aeronautical information service providers with which it has arrangements;

3) ensure that all other aerodrome personnel whose duties involve the use of NOTAM have successfully completed relevant training and demonstrated their competence to do so.

b) The aerodrome operator shall originate a NOTAM when it is necessary to provide the following information:

1) establishment of, closure of, or significant changes in the operation of aerodromes or heliports or runways;

2) establishment of, withdrawal of, or significant changes in the operation of the aerodrome services;

3) establishment of, withdrawal of, or significant changes in the operational capability of radio navigation and air-ground communication services for which the aerodrome operator is responsible;

4) unavailability of backup and secondary systems, having a direct operational impact;

5) establishment of, withdrawal of, or significant changes to visual aids;

6) interruption of, or return to operation of, major components of aerodrome lighting systems;

7) establishment of, withdrawal of, or significant changes to procedures for air navigation services for which the aerodrome operator is responsible;

8) occurrence or correction of major defects or impediments in the manoeuvring area;

9) changes to, and limitations on, the availability of fuel, oil and oxygen;

10) establishment of, withdrawal of, or return to, operation of hazard beacons marking obstacles to air navigation;

11) planned laser emissions, laser displays and search lights in the aerodrome surroundings, if pilots' night vision is likely to be impaired;

12) erecting or removal of, or changes to, obstacles to air navigation in the takeoff, climb, missed approach, approach areas, as well as on the runway strip;

13) changes in aerodrome or heliport rescue and firefighting category;

14) presence of, removal of, or significant changes in, hazardous conditions due to snow, slush, ice, radioactive material, toxic chemicals, volcanic ash deposition or water on the movement area;

15) presence of a runway or portion thereof which is slippery wet;

16) presence of a runway which is not available due to runway marking works; or information about the time lag required for making the runway available, if the equipment used for such works can be removed, when necessary;

17) presence of hazards that affect air navigation, including presence of wildlife, obstacles, displays and major events.

c) For the purposes of point (b), the aerodrome operator shall ensure that:

1) NOTAM is originated with sufficient lead time for the affected parties to take any required action, except in the case of unserviceability, release of radioactive material, toxic chemicals and other events that cannot be foreseen;

2) a NOTAM notifying unserviceability of associated facilities, services and navigation aids at the aerodrome, provides an estimate of the unserviceability period or of the time at which restoration of service is expected;

3) within three months from the issuance of a permanent NOTAM, the information contained in the NOTAM is included in the aeronautical information products affected;

4) within three months from the issuance of a temporary NOTAM of long duration, the information contained in the NOTAM is included in an AIP supplement;

5) when a NOTAM with an estimated end of validity unexpectedly exceeds the three-month period, a replacement NOTAM is originated unless the condition is expected to last for a further period of more than three months; in that case, the aerodrome operator shall ensure that the information is published in an AIP supplement.

d) In addition, the aerodrome operator shall ensure that:

1) except as provided for in point (d)(4), each NOTAM it originates contains the applicable information in the order shown in the NOTAM Format set out in Appendix 1 to this Annex;

2) NOTAM text is composed of the significations or uniform abbreviated phraseology assigned to the ICAO NOTAM Code, complemented by ICAO abbreviations, indicators, identifiers, designators, call signs, frequencies, figures and plain language;

3) a NOTAM is originated in the English language or the national language, as agreed with the relevant aeronautical information services provider;

4) information concerning snow, slush, ice, frost, standing water or water associated with snow, slush, ice or frost on the movement area is disseminated by means of SNOWTAM

and contains the information in the order shown in the SNOWTAM Format set out in Appendix 2 to this Annex;

5) when an error has occurred in a NOTAM, a NOTAM with a new number is originated to replace the erroneous NOTAM or the erroneous NOTAM is cancelled and a new NOTAM is originated;

6) when a NOTAM is originated to cancel or replace a previous NOTAM:

a) the series and number/year of the previous NOTAM are indicated;

b) the Location Indicators and subject of both NOTAM are the same;

7) only one NOTAM is cancelled or replaced by a new NOTAM;

8) each originated NOTAM deals with only one subject and one condition of the subject;

9) each originated NOTAM is as brief as possible and compiled so that its meaning is clear without the need to refer to another document;

10) an originated NOTAM containing permanent or temporary information of long duration includes appropriate references to the AIP or AIP supplement;

11) the ICAO Location Indicator included in the text of an originated NOTAM for the aerodrome is the one contained in the Location Indicators. A curtailed form of such indicators shall not be used.

e) The aerodrome operator shall, following the publication of a NOTAM that it has originated, review its content to ensure its accuracy, and ensure the dissemination of the information to all relevant aerodrome personnel and organisations at the aerodrome.

f) The aerodrome operator shall maintain records:

1) of the NOTAM it originated and those that were issued;

2) regarding the implementation of points (a)(2) and (3).

ADR.OPS.A.060 Reporting of surface contaminants

The aerodrome operator shall report to the aeronautical information services and air traffic services units on matters of operational significance affecting aircraft and aerodrome operations on the movement area, particularly in respect of the presence of the following:

a) water;

b) snow;

c) slush;

d) ice;

e) frost;

f) anti-icing or de-icing liquid chemicals or other contaminants;

g) snowbanks or drifts.

ADR.OPS.A.065 Reporting of the runway surface condition

a) The aerodrome operator shall report the runway surface condition over each third of the runway using a runway condition report (RCR). The report shall include a runway condition code (RWYCC) using numbers 0 to 6, the contaminant coverage and depth, and a description using the following terms:

1) COMPACTED SNOW;

2) DRY;

3) DRY SNOW;

4) DRY SNOW ON TOP OF COMPACTED SNOW;

5) DRY SNOW ON TOP OF ICE;
6) FROST;
7) ICE;
8) SLIPPERY WET;
9) SLUSH;
10) SPECIALLY PREPARED WINTER RUNWAY;
11) STANDING WATER;
12) WATER ON TOP OF COMPACTED SNOW;
13) WET;
14) WET ICE;
15) WET SNOW;
16) WET SNOW ON TOP OF COMPACTED SNOW;
17) WET SNOW ON TOP OF ICE;
18) CHEMICALLY TREATED;
19) LOOSE SAND.

b) Reporting shall commence when a significant change in runway surface condition occurs due to water, snow, slush, ice or frost.

c) Reporting of the runway surface condition shall continue to reflect significant changes until the runway is no longer contaminated. When that situation occurs, the aerodrome operator shall issue an RCR that states that the runway is wet or dry as appropriate.

d) Friction measurements shall not be reported.

e) When a paved runway or portion thereof is slippery wet, the aerodrome operator shall make such information available to the relevant aerodrome users. That shall be done by originating a NOTAM and shall describe the location of the affected portion.

ADR.OPS.A.070 Information on the aerodrome lighting system

The aerodrome operator shall report to the aeronautical information services the information on the parts of the aerodrome lighting system where light units are light emitting diode (LED) lights.

ADR.OPS.A.075 Charts

The aerodrome operator, either directly or through arrangements with third parties, shall ensure that charts relevant to the aerodrome are published in the AIP by the aeronautical information service provider.

ADR.OPS.A.080 Information on radio navigation and landing aids

a) The aerodrome operator shall ensure, either directly or through arrangements with third parties, that information on the radio navigation and landing aids associated with the instrument approach and the terminal area procedures at the aerodrome, are provided to the aeronautical information services.

b) The information referred to in point (a) shall include the following:

1) type of aids;
2) magnetic variation to the nearest degree, as appropriate;
3) type of supported operation for ILS/MLS/GLS, basic GNSS and SBAS;
4) classification for ILS;
5) facility classification and approach facility designation(s) for GBAS;

6) for VOR/ILS/MLS also station declination to the nearest degree used for technical line-up of the aid;

7) identification, if required;

8) frequency(-ies), channel number(s), service provider and reference path identifier(s) (RPI(s)), as appropriate;

9) hours of operation, as appropriate;

10) geographical coordinates in degrees, minutes, seconds and tenths of seconds of the position of the transmitting antenna, as appropriate;

11) elevation of the DME transmitting antenna to the nearest 30 m (100 ft) and of the distance-measuring equipment precision (DME/P) to the nearest 3 m (10 ft), elevation of GBAS reference point to the nearest metre or foot, and the ellipsoid height of the point to the nearest metre or foot; for SBAS, the ellipsoid height of the landing threshold point (LTP) or the fictitious threshold point (FTP) to the nearest metre or foot;

12) service volume radius from the GBAS reference point to the nearest kilometre or nautical mile; and

13) remarks.

ADR.OPS.A.085 Information on visual segment surface (VSS) penetration

The aerodrome operator shall ensure, either directly or through arrangements with third parties, that information on visual segment surface penetration is provided to the aeronautical information services, including procedure and procedure minima affected.

Appendix 1
NOTAM Format

Priority indicator	→
Address	
	«=
Date and time of filing	→
Originator's indicator	«=(

Message series, number and identifier

NOTAM containing new information	..... NOTAMN (series and number/year)
NOTAM replacing a previous NOTAM	..... NOTAMR..... (series and number/year) (series and number/year of NOTAM to be replaced)
NOTAM cancelling a previous NOTAM	..... NOTAMC..... (series and number/year) (series and number/year of NOTAM to be cancelled) «=

Qualifiers

	FIR	NOTAM Code	Traffic	Purpose	Scope	Lower limit	Upper limit	Coordinates, Radius	
Q)		Q							«=

Identification of ICAO Location Indicators in which the facility, airspace or condition reported on is located	A) →

Period of validity

From *(date-time group)*	B)	→	
To *(PERM or date-time group)*	C)	EST* PERM*	«=
Time schedule *(if applicable)*	D)	→	
			«=

Text of NOTAM; Plain-language entry (using ICAO abbreviations)

E)	«=
Lower limit	F) →
Upper limit	G))«=
Signature	

*Delete as appropriate

Appendix 2
SNOWTAM Format

(COM heading)	(Priority indicator	(Addresses)		<≡
	(Date and time of filing)	(Originator's indicator)		<≡
(Abbreviated heading)	(SWAA* SERIAL NUMBER) S W * *	(LOCATION INDICATORS)	DATE-TIME OF ASSESSMENT	(OPTIONAL GROUP) <≡(

SNOWTAM → (Serial number) <≡

Aeroplane performance calculation section			
(AERODROME LOCATION INDICATORS)	M	A)	<≡
(DATE/TIME OF ASSESSMENT *(Time of completion of assessment in UTC)*)	M	B)	→
(LOWER RUNWAY DESIGNATION NUMBER)	M	C)	→
(RUNWAY CONDITION CODE (RWYCC) ON EACH RUNWAY THIRD) (From Runway Condition Assessment Matrix (RCAM) 0, 1, 2, 3, 4, 5 or 6)	M	D)	// →
(PER CENT COVERAGE CONTAMINANT FOR EACH RUNWAY THIRD)	C	E)	// →
DEPTH (mm) OF LOOSE CONTAMINANT FOR EACH RUNWAY THIRD)	C	F)	// →
(CONDITION DESCRIPTION OVER TOTAL RUNWAY LENGTH (Observed on each runway third, starting from threshold having the lower runway designation number) COMPACTED SNOW DRY DRY SNOW DRY SNOW ON TOP OF COMPACTED SNOW DRY SNOW ON TOP OF ICE FROST ICE SLIPPERY WET SLUSH SPECIALLY PREPARED WINTER RUNWAY STANDING WATER WATER ON TOP OF COMPACTED SNOW WET WET ICE WET SNOW WET SNOW ON TOP OF COMPACTED SNOW WET SNOW ON TOP OF ICE	M	G)	// →
(WIDTH OF RUNWAY TO WHICH THE RUNWAY CONDITIONS CODES APPLY, IF LESS THAN THE PUBLISHED WIDTH)	O	H)	<≡≡
Situational awareness section			
(REDUCED RUNWAY LENGTH, IF LESS THAN THE PUBLISHED LENGTH (m))	O	I)	→
(DRIFTING SNOW ON THE RUNWAY)	O	J)	→
(LOOSE SAND ON THE RUNWAY)	O	K)	→
(CHEMICAL TREATMENT ON RUNWAY)	O	L)	→
(SNOWBANKS ON THE RUNWAY) (If present, distance from runway centreline (m) followed by 'L', 'R' or 'LR' as applicable))	O	M)	→
(SNOWBANKS ON A TAXIWAY)	O	N)	→
(SNOWBANKS ADJACENT TO THE RUNWAY)	O	O)	→
(TAXIWAY CONDITIONS)	O	P)	→
(APRON CONDITIONS)	O	R)	→
(MEASURED FRICTION COEFFICIENT)	O	S)	→
(PLAIN-LANGUAGE REMARKS)	O	T)	) <<≡

NOTES:
1. *Enter ICAO nationality letters as given in ICAO Doc 7910, Part 2 or otherwise applicable aerodrome identifier.
2. Information on other runways, repeat from B to H.
3. Information in the situational awareness section repeated for each runway, taxiway and apron. Repeat as applicable, when reported.
4. Words in brackets () not to be transmitted.
5. For letters A) to T), refer to the *Instructions for the completion of the SNOWTAM format, paragraph 1, item b).*

SIGNATURE OF ORIGINATOR *(not for transmission)*

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

ADR.OPS.B.001 Provision of services

The services under Subpart B of this Annex shall be provided at the aerodrome by the aerodrome operator directly or indirectly.

ADR.OPS.B.003 Handover of activities – provision of operational information

a) The aerodrome operator shall establish and implement procedures for the handover of operational activities between personnel involved in the operation and maintenance of the aerodrome to ensure that all new incoming personnel are provided with operational information related to their tasks.

b) The aerodrome operator shall establish and implement procedures to provide organisations operating or providing services at the aerodrome, with aerodrome-related operational information that may affect the execution of the tasks of the personnel of such organisations.

ADR.OPS.B.005 Aerodrome emergency planning

The aerodrome operator shall have and implement an aerodrome emergency plan that:

a) is commensurate with the aircraft operations and other activities conducted at the aerodrome;

b) provides for the coordination of appropriate organisations in response to an emergency occurring at an aerodrome or in its surroundings; and

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

ADR.OPS.B.010 Rescue and firefighting services

a) The aerodrome operator shall ensure that:

1) aerodrome rescue and firefighting facilities, equipment and services are provided;

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

3) rescue and firefighting personnel are properly trained, equipped and qualified to operate in the aerodrome environment; and

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

b) The aerodrome operator shall establish and implement a training programme for persons involved in rescue and firefighting services of the aerodrome.

c) The training programme shall be conducted in accordance with point ADR.OR.D.017, with the following exceptions:

1) recurrent training shall include theoretical and continuous practical training;

2) proficiency checks shall be conducted at intervals not exceeding 12 months since the completion of the initial training.

d) The training of rescue and firefighting personnel shall be designed to impart fundamental knowledge and practical skills related to the execution of their duties.

e) Temporary reduction of the level of protection of the aerodrome's rescue and firefighting services, due to unforeseen circumstances, shall not require prior approval by the competent authority.

ADR.OPS.B.015 Monitoring and inspection of movement area and related facilities

a) The aerodrome operator shall monitor the condition of the movement area and the operational status of related facilities and report on matters of operational significance, whether of a temporary or permanent nature, to the relevant air traffic services providers and aeronautical information services providers.

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

ADR.OPS.B.016 Foreign object debris control programme

a) The aerodrome operator shall establish and implement a foreign object debris (FOD) control programme and shall require organisations operating or providing services at the aerodrome to participate in that programme.

b) As part of the FOD control programme, the aerodrome operator shall:

1) ensure personnel awareness and participation, and that such personnel have successfully completed relevant training and demonstrated their competence;

2) establish and implement measures to prevent generation of FOD;

3) establish and implement procedures to:

(i) detect FOD, including the monitoring and inspection of the movement area or adjacent areas in accordance with an inspection schedule and whenever such an inspection is required due to activities, weather phenomena, or occurrences that may have led to the generation of FOD;

(ii) promptly remove, contain, and dispose of FOD, and provide all relevant means necessary;

(iii) notify, as soon as possible, aircraft operators in the case of identified aircraft parts;

4) collect and analyse data and information to identify FOD sources and trends, and implement corrective or preventive measures, or both, to improve the effectiveness of the programme.

ADR.OPS.B.020 Wildlife strike hazard reduction

The aerodrome operator shall:

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

b) establish means and procedures to minimise the risk of collisions between wildlife and aircraft, at the aerodrome; and

c) notify the appropriate authority if a wildlife assessment indicates conditions in the surroundings of the aerodrome are conducive to a wildlife hazard problem.

ADR.OPS.B.024 Authorisation of vehicle drivers

a) Except as provided for in point (d), the driving of a vehicle on any part of the movement area or other operational areas of an aerodrome shall require an authorisation issued to the driver by the operator of that aerodrome. The driving authorisation shall be issued to a person who:

1) is allocated tasks that involve driving in such areas;

2) holds a valid driving licence, and any other licence required for the operation of specialised vehicles;

3) has successfully completed a relevant driving training programme and demonstrated his or her competence in accordance with point (b);

4) has demonstrated language proficiency in accordance with point ADR.OPS.B.029, if that person intends to drive a vehicle on the manoeuvring area;

5) has received training by its employer on the use of the vehicle intended to operate at the aerodrome.

b) The aerodrome operator shall establish and implement a driving training programme for drivers that operate on the apron or other operational areas, except the manoeuvring area, and for drivers that operate on the manoeuvring area. The training programme shall:

1) be appropriate to the characteristics and operation of the aerodrome, the driver's functions and tasks to be performed, and the areas of the aerodrome that drivers may be authorised to operate;

2) include:

(i) theoretical and practical training of adequate duration, at least in the following areas:

A) regulatory framework and personal responsibilities;

B) vehicle standards, aerodrome operational requirements and procedures;

C) communications;

D) radiotelephony, for drivers that operate in the manoeuvring area;

E) human performance;

F) familiarisation with the operating environment;

(ii) competence assessment of the drivers.

c) A driving authorisation issued in accordance with point (a) shall specify the parts of the movement area or other operational areas on which the driver is allowed to drive and shall remain valid as long as:

1) the requirements of points (a)(1) and (a)(2) are met;

2) the holder of the driving authorisation:

(i) undergoes and successfully completes training and proficiency checks in accordance with points ADR.OR.D.017 (f) and (g);

(ii) if applicable, continues to demonstrate the required language proficiency in accordance with point ADR.OPS.B.029.

d) Notwithstanding point (a), the aerodrome operator may permit a person to temporarily drive a vehicle on the movement area or other operational areas if:

1) that person holds a valid driving licence, and any other licence required for the operation of specialised vehicles;

2) that vehicle is escorted by a vehicle driven by a driver authorised in accordance with point (a).

e) The aerodrome operator shall:

1) establish a system and implement procedures for:

(i) issuing driving authorisations and temporarily permitting the driving of vehicles;

(ii) ensuring that drivers to whom a driving authorisation has been issued, continue to comply with points (c)(1) and (c)(2);

(iii) monitoring the compliance of drivers with any driving requirements applicable at the aerodrome and for taking appropriate action, including the suspension and revocation of driving authorisations or permissions to temporarily drive a vehicle;

2) maintain relevant records.

ADR.OPS.B.026 Authorisation of vehicles

a) The operation of a vehicle on the movement area or other operational areas shall require an authorisation issued by the aerodrome operator. The authorisation may be issued if the vehicle is used in activities related to the operation of the aerodrome and:

1) is serviceable and fit for the intended operation;

2) complies with the marking and lighting requirements of point ADR.OPS.B.080;

3) is equipped with a radio allowing two-way communication on the appropriate air traffic services frequency and any other frequency necessary, if it is intended to be operated on either of the following areas:

(i) the manoeuvring area;

(ii) other operational areas where communication with the air traffic services unit or other operational units of the aerodrome is necessary;

4) is fitted with a transponder or other equipment that supports surveillance, if it is intended to be operated on the manoeuvring area, and the aerodrome is equipped with a surface movement guidance and control system whose operation requires the use of a transponder or other equipment supporting surveillance fitted on the vehicles.

b) The aerodrome operator shall limit the number of vehicles authorised to operate on the movement area and other operational areas to the minimum number required for the safe and efficient operation of the aerodrome.

c) An authorisation issued in accordance with point (a) shall:

1) specify the parts of movement area or other operational areas where the vehicle may be operated;

2) remain valid as long as the requirements of point (a) are met.

d) The aerodrome operator shall assign a call sign to a vehicle authorised in accordance with point a) to operate at the aerodrome, if that vehicle is required to be radio-equipped. The call sign assigned to a vehicle shall:

1) not cause confusion regarding its identity;

2) be appropriate to its function;

3) for vehicles that operate in the manoeuvring area, be coordinated with the air traffic services unit, and disseminated to the relevant organisations at the aerodrome.

(e) By derogation from point (a), the aerodrome operator may permit:

(1) a vehicle authorised in accordance with points (a)(1) and (2), which is not equipped with a radio required under point (a)(3) and a transponder or other equipment supporting surveillance required under point (a)(4), to be occasionally operated in the areas referred to in points (a)(3) and (a)(4), provided that:

(i) that vehicle is escorted, at all times, by an authorised vehicle meeting the requirement of point (a)(3) and, if necessary, point (a)(4);

(ii) the escorting vehicle complies with the marking and lighting requirements of point ADR.OPS.B.080;

(iii) low-visibility procedures are not in effect, if the escorted vehicle is to be operated in the manoeuvring area;

2) the temporary entry of a vehicle to the aerodrome and its operation on the movement area or other operational areas, subject to the following conditions:

a) a visual inspection of that vehicle determines that its condition does not endanger safety;

b) that vehicle is escorted, at all times, by an authorised vehicle which:

(i) meets the requirement of point (a)(3) and, if necessary, point (a)(4), when operating in the areas referred to in points (a)(3) and (a)(4);

(ii) complies with the marking and lighting requirements of point ADR.OPS.B.080;

c) low-visibility procedures are not in effect, if the vehicle is to be operated in the manoeuvring area.

f) The aerodrome operator shall:

1) establish and implement procedures for:

(i) issuing vehicle authorisations and temporary permitting the entry to the aerodrome and operation of vehicles;

(ii) assigning call signs to vehicles;

(iii) monitoring the compliance of vehicles with point ADR.OPS.B.026 and for taking appropriate action, including the suspension and revocation of vehicle authorisations or permissions to temporarily operate a vehicle;

2) maintain relevant records.

ADR.OPS.B.027 Operation of vehicles

a) The driver of a vehicle on the manoeuvring area shall operate the vehicle:

1) only as authorised by the air traffic services unit, and in accordance with the instructions issued by that unit;

2) in compliance with all mandatory instructions conveyed by markings and signs unless otherwise authorised by the air traffic services unit;

3) in compliance with all mandatory instructions conveyed by lights.

b) The driver of a vehicle on the manoeuvring area shall operate the vehicle in accordance with the following rules:

1) emergency vehicles that proceed to the assistance of an aircraft in distress shall be afforded priority over all other surface movement traffic;

2) subject to the provisions of point (1):

(i) vehicles and vehicles towing aircraft shall give way to aircraft which are landing, taking off, or taxiing;

(ii) vehicles that do not tow aircraft shall give way to vehicles towing aircraft;

(iii) vehicles that do not tow aircraft shall give way to other vehicles that do not tow aircraft in accordance with the air traffic services unit instructions;

(iv) notwithstanding the provisions of points (i), (ii) and (iii), vehicles and vehicles towing aircraft shall comply with the instructions issued by the air traffic services unit.

c) The driver of a radio-equipped vehicle, intending to operate or operating on the manoeuvring area, shall:

1) establish satisfactory two-way radio communication with the air traffic services unit on the appropriate air traffic services frequency before entering the manoeuvring area, and maintain a continuous listening watch on the assigned frequency;

2) before entering the manoeuvring area, obtain authorisation from the air traffic services unit and shall operate only as authorised by the air traffic services unit. Notwithstanding such an authorisation, entry to a runway or runway strip or change in the operation authorised, shall be subject to a further specific authorisation by the air traffic services unit;

3) read back to the air traffic services personnel safety-related parts of the instructions which are transmitted by voice. Instructions to enter, hold short of, cross and operate on any runway, taxiway or runway strip shall always be read back;

4) read back to the air traffic services personnel or acknowledge instructions other than in point 3) in a manner to clearly indicate that they have been understood and shall be complied with.

d) The driver of a vehicle that is operating in the manoeuvring area, when in doubt as to the position of the vehicle with respect to the manoeuvring area, shall:

1) notify the air traffic services unit of the circumstances, including the last known position;

2) simultaneously, unless otherwise instructed by the air traffic services unit, vacate the runway, taxiway, or other part of the manoeuvring area, to a safe distance as expeditiously as possible;

3) after actions referred to in points (1) and (2), stop the vehicle.

e) The driver of a vehicle on the manoeuvring area:

1) when operating a vehicle on a runway strip when that runway is used for landing or take-off, shall not approach the runway closer than the distance at which the runway-holding position or any road-holding positions have been established for that runway;

2) when a runway is used for landing or take-off, shall not operate a vehicle on:

(i) the part of the runway strip extending beyond the runway ends of that runway;

(ii) the runway-end safety areas of that runway;

(iii) a clearway, if available, at a distance that would endanger an aircraft on the air.

f) The driver of a radio-equipped vehicle on the apron shall, if so required at the aerodrome:

1) establish satisfactory two-way radio communication with the responsible unit designated by the aerodrome operator before entering the apron;

2) maintain a continuous listening watch on the assigned frequency.

g) The driver of a vehicle on the apron shall operate the vehicle in accordance with the following:

1) only as authorised by the responsible unit designated by the aerodrome operator, and in accordance with the instructions issued by that unit;

2) in compliance with all mandatory instructions conveyed by markings and signs unless otherwise authorised by the responsible unit designated by the aerodrome operator;

3) in compliance with all mandatory instructions conveyed by lights;

4) give way to an emergency vehicle, an aircraft taxiing, about to taxi, or being pushed or towed;

5) give way to other vehicles in accordance with local regulations;

6) always give priority over emergency vehicles responding to an emergency.

h) The driver of a vehicle on the movement area and other operational areas shall:

1) operate the vehicle in accordance with the established speed limits and driving routes;

2) not be engaged in disturbing or distracting activities while driving;

3) comply with the communication requirements and the operational procedures contained in the aerodrome manual.

i) The driver of a vehicle escorting another vehicle shall ensure that the driver of the escorted vehicle operates the vehicle in accordance with the instructions given.

j) The driver of a vehicle shall park the vehicle only in areas designated by the aerodrome operator.

k) The aerodrome operator shall establish and implement procedures to ensure that drivers that operate on the movement area and other operational areas comply with points (a) to (j).

ADR.OPS.B.028 Aircraft towing

The aerodrome operator shall:

a) establish aircraft manoeuvring procedures and designate routes to be used during aircraft towing operations on the movement area, to ensure safety;

b) ensure the provision of adequate and appropriate guidance during towing operations;

c) ensure that towed aircraft display lights during towing operations, in accordance with the provisions of point SERA.3215 of the Annex to Commission Implementing Regulation (EU) No 923/2012;

d) establish and implement procedures to ensure adequate communication and coordination between the organisation executing the towing operation, the apron management services unit, and the air traffic services unit, as appropriate to the towing operation;

e) establish and implement procedures to ensure safety of towing operations in adverse weather or meteorological conditions, including by limiting or not permitting such operations.

ADR.OPS.B.029 Language proficiency

a) A person required under point ADR.OPS.B.024 to demonstrate language proficiency, shall demonstrate proficiency, at least at an operational level both in the use of phraseologies and in plain language, in accordance with point (b), in:

1) the English language; and

2) any other language or languages used at the aerodrome for radio communication purposes with the air traffic services unit of the aerodrome.

b) The applicant shall demonstrate the ability to:

1) communicate effectively in voice-only and in face-to-face situations;

2) communicate on common and work-related topics with accuracy and clarity;

3) use appropriate communicative strategies to exchange messages and to recognise and resolve misunderstandings in a general or work-related context;

4) handle successfully the linguistic challenges presented by a complication or unexpected turn of events which occurs within the context of a routine work situation or communicative task with which they are otherwise familiar;

5) use a dialect or accent which is intelligible to the aeronautical community.

c) Language proficiency shall be demonstrated by a certificate issued by the organisation that conducted the assessment, attesting the language or languages, the level or levels of proficiency, and the date of the assessment.

d) Except for persons who have demonstrated language proficiency at an expert level, the language proficiency shall be re-assessed every:

1) four years from the date of the assessment, if the level demonstrated is operational level;

2) six years from the date of the assessment, if the level demonstrated is extended level.

e) The demonstration of language proficiency shall be done through a method of assessment, which shall contain:

1) the process by which an assessment is done;

2) the qualifications of the assessors conducting assessments of language proficiency;

3) the appeal procedure.

f) The aerodrome operator shall make available language training to maintain the required level of language proficiency of its personnel.

g) By way of derogation from point (a), the Member State may decide that the English language proficiency may not be required for personnel referred to in point ADR.OPS.B.024, for radio communication purposes with the air traffic services unit of the aerodrome. In such case, it shall perform a safety assessment covering one or several aerodromes.

h) The operator of the aerodrome may issue an authorisation to a person who has not demonstrated compliance with points (a) and (b) until:

1) 7 January 2026 as regards English language;

2) 7 January 2023 as regards any language other than the English language.

ADR.OPS.B.030 Surface movement guidance and control system

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

1) take into account the design characteristics and the operational and meteorological conditions of the aerodrome, as well as human factors principles;

2) be designed to assist in the prevention of:

(i) inadvertent incursions of aircraft and vehicles on an active runway; and

(ii) collisions between aircraft as well as between aircraft and vehicles or objects on any part of the movement area; and

3) be supported by appropriate means and procedures.

b) As part of the surface movement guidance and control system, the aerodrome operator shall, in coordination with the air traffic services provider, assess the need to establish standard routes for taxiing aircraft on the aerodrome. Where standard routes are provided, the aerodrome operator shall:

1) ensure that they are adequate and suitable for the aerodrome traffic, design and intended operations, and properly identified;

2) provide relevant information to the aeronautical information services provider for publication in the AIP.

c) Where the operation of the surface movement guidance and control system requires the use of a transponder by aircraft on the movement area, the aerodrome operator shall coordinate with the air navigation services provider:

1) the relevant transponder operating procedures to be complied with by aircraft operators;

2) the provision of the relevant information to the aeronautical information services provider for publication in the AIP.

d) The aerodrome operator shall coordinate with the air traffic services provider the development of the SMGCS procedures at the aerodrome.

ADR.OPS.B.031 Communications

a) Vehicles and the air traffic services unit shall communicate in accordance with the applicable requirements of Section 14 of the Annex to Implementing Regulation (EU) No 923/2012.

b) The aerodrome operator shall, in coordination with the air traffic services provider, establish communication procedures, including:

1) the frequencies and the language or languages to be used for communication between the air traffic services unit and vehicles that intend to operate or are operating on the manoeuvring area;

2) communication between the air traffic services unit and pedestrians that intend to operate or are operating on the manoeuvring area;

3) dissemination of significant aerodrome-related information that may affect the safety of operations on the manoeuvring area, using radio communications;

4) signals and other communication means, to be used, in all visibility conditions, in the case of radio communication failure between the air traffic services unit and vehicles or pedestrians on the manoeuvring area.

ADR.OPS.B.033 Control of pedestrians

a) The aerodrome operator shall establish and implement procedures to:

1) limit the access to the movement area and other operational areas only to persons whose duties require them to have access to such areas;

2) ensure that such persons are allowed unescorted access to such areas only if they have received relevant training and demonstrated their competence;

3) control the movement of persons on the apron, and ensure that passengers embarking or disembarking an aircraft or who need to walk to, from or across the apron:

(i) are escorted by trained and competent personnel;

(ii) do not interfere with stationary aircraft and ground servicing activities;

(iii) are protected from operating aircraft, including the effects of their engines, as well as vehicular or other activities.

b) The aerodrome operator shall establish and implement procedures to ensure:

1) the orderly and safe entry and operation in the manoeuvring area of personnel whose tasks involve access to this area without a vehicle;

2) that such personnel:

(i) are properly equipped, including with high-visibility clothing, orientation means, and means allowing two-way communication with the air traffic services unit and the respective unit of the aerodrome operator during such operations;

(ii) obtain authorisation from the air traffic services unit before entering the manoeuvring area. Notwithstanding such an authorisation, entry to a runway or runway strip or change in the operation authorised shall be subject to a further specific authorisation by the air traffic services unit;

(iii) do not enter the manoeuvring area when low-visibility procedures are in effect.

ADR.OPS.B.035 Operations in winter conditions

a) The aerodrome operator shall, when the aerodrome is expected to operate in conditions when snow, slush or ice may accumulate on the movement area, develop and implement a snow plan. As part of the snow plan, the aerodrome operator shall:

1) have provisions for the use of materials to remove or to prevent the formation of ice and frost or to improve runway surface friction characteristics;

2) ensure, as far as reasonably practical, the removal of snow, slush or ice from the runways in use and the other parts of the movement area which are intended to be used for the operation of aircraft.

b) The aerodrome operator shall provide for publication in the AIP information regarding:

1) the availability of equipment for snow removal and snow and ice control operations;

2) approval status, if applicable, regarding the use of specially prepared winter runways;

3) the type of materials in use for movement area surface treatment.

ADR.OPS.B.036 Operations on specially prepared winter runways

a) An aerodrome operator may, subject to the prior approval of the competent authority, establish and use procedures for the operation of aeroplanes on specially prepared winter runways, when the contaminant type is compacted snow or ice. Specially prepared winter runways may be associated with primary RWYCC 4; however, if treatment does not justify a RWYCC 4, the normal procedure in accordance with point ADR.OPS.B.037 shall apply.

b) In order to obtain prior approval by the competent authority, the aerodrome operator shall:

1) establish procedures which include the following:

(i) the type of equipment or the type, the quality and the quantity of the material, or both, which are used to improve runway surface condition and method of application;

(ii) monitoring the meteorological parameters;

(iii) management of loose contaminants;

(iv) assessment of the achieved results;

2) obtain aeroplane data that relates to stopping performance on the runway with the special treatment from at least one aeroplane operator;

3) analyse and process the data obtained under point (2), in order to demonstrate the capability to establish runway conditions in accordance with a given RWYCC;

4) establish a maintenance programme that covers both preventive and corrective maintenance for equipment which is used in order to achieve consistent performance.

c) The aerodrome operator shall establish and implement a programme to monitor the continuous effectiveness of the procedure. The programme shall use braking action reports from aeroplane data that shall be compared with the reported runway conditions.

d) The aerodrome operator shall evaluate the performance of winter operations after the end of the winter period in order to identify necessity for:

1) additional training requirements;

2) update of the procedures;

3) additional or different equipment and materials.

ADR.OPS.B.037 Assessment of runway surface condition and assignment of runway condition code

Whenever the contaminants listed in points ADR.OPS.A.060(a) to (e) are present on the surface of a runway, the aerodrome operator shall:

a) assign a RWYCC based on the type and depth of the contaminant and temperature;

b) inspect the runway whenever the runway surface condition may have changed due to meteorological conditions, assess the runway surface condition and assign a new RWYCC;

c) use special air-reports to trigger reassessment of RWYCC.

ADR.OPS.B.040 Night operations

The aerodrome operator shall ensure that means and procedures are established and implemented for providing safe conditions for aerodrome operation during night operations.

ADR.OPS.B.045 Low-visibility procedures

a) The aerodrome operator shall ensure that the aerodrome is provided with appropriate aerodrome equipment and facilities, and that appropriate low-visibility procedures are established and implemented where it is intended to be used for any of the following operations:

1) low-visibility take-offs;

2) approach and landing operations with visibility conditions less than 550 m RVR or DH less than 200 ft (60 m);

3) operations with operational credits where the actual RVR is less than 550 m.

The low-visibility procedures shall coordinate the movement of aircraft and vehicles and shall restrict or prohibit activities on the movement area.

b) The aerodrome operator shall establish and implement the low-visibility procedures in cooperation with the air traffic services provider. The low-visibility procedures shall include criteria for their preparation, initiation and termination. The criteria shall be based on RVR and cloud ceiling values.

c) The aerodrome operator shall inform the aeronautical information services provider and air traffic services provider, as appropriate, of any change on the status of the aerodrome equipment and facilities that have an impact on low-visibility operations.

d) The aerodrome operator shall provide information on low-visibility procedures to the aeronautical information services provider, for publication in the AIP.

e) Low-visibility procedures, and any changes thereto, shall require prior approval by the competent authority.

ADR.OPS.B.050 Operations in adverse weather conditions

The aerodrome operator shall ensure that means and procedures are established and implemented to ensure the safety of aerodrome operations in adverse weather conditions.

ADR.OPS.B.055 Fuel quality

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

ADR.OPS.B.065 Visual aids and aerodrome electrical systems

The aerodrome operator shall have procedures to ensure that aerodrome visual aids and electrical systems function as intended.

ADR.OPS.B.070 Aerodrome works safety

a) The aerodrome operator shall establish and implement procedures to ensure that:

1) aircraft safety is not affected by aerodrome works; and

2) aerodrome works safety is not affected by aerodrome operational activities.

ADR.OPS.B.075 Safeguarding of aerodromes

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

1) obstacle limitation and protection surfaces as established in accordance with the certification basis, and other surfaces and areas associated with the aerodrome, in order to take, within its competence, appropriate action to mitigate the risks associated with the penetration of those surfaces and areas;

2) marking and lighting of obstacles in order to be able to take action within its competence, as appropriate; and

3) hazards related to human activities and land use in order to take action within its competence, as appropriate.

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

ADR.OPS.B.080 Marking and lighting of vehicles and other mobile objects

a) The aerodrome operator shall ensure that vehicles and other mobile objects, excluding aircraft, on the movement area of the aerodrome are:

1) marked by use of conspicuous colours, or display, at suitable locations, flags of appropriate size, chequered pattern and contrasting colours;

2) lighted with low-intensity obstacle lights whose type and characteristics are appropriate to their function, if the vehicles and the aerodrome are used at night or in conditions of low visibility. The colour of the lights to be displayed shall be as follows:

(i) flashing blue for vehicles associated with emergency or security;

(ii) flashing yellow for other vehicles, including follow-me vehicles;

(iii) fixed red for objects with limited mobility.

b) The aerodrome operator may exempt from point (a) aircraft servicing equipment and vehicles used only on aprons.

ADR.OPS.B.090 Use of the aerodrome by higher code letter aircraft

a) Except for aircraft emergency situations, an aerodrome operator may, subject to prior approval by the Competent Authority, permit the use of the aerodrome or parts thereof by aircraft with a higher code letter than the aerodrome design characteristics specified in the terms of the certificate.

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

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

ADR.OPS.C.005 Maintenance – General

a) The aerodrome operator shall establish and implement a maintenance programme, which includes preventive maintenance where appropriate, to maintain aerodrome facilities, systems and equipment necessary for the operation of the aerodrome in a condition which does not impair the safety, regularity or efficiency of air navigation. The design and implementation of the maintenance programme shall observe human factors principles.

b) The aerodrome operator shall ensure that appropriate and adequate means are provided for the effective implementation of the maintenance programme.

ADR.OPS.C.007 Maintenance of vehicles

a) The aerodrome operator shall:

1) establish and implement a maintenance programme, which includes preventive maintenance and observes human factors principles, for rescue and firefighting vehicles, to ensure effectiveness of the vehicles and their equipment and compliance with the specified response time throughout the life of the vehicle;

2) ensure the implementation of a maintenance programme for its other vehicles that operate on the movement area or other operational areas.

b) The aerodrome operator shall:

1) establish procedures to support the implementation of the maintenance programme referred to in point (a);

2) ensure that appropriate and adequate means and facilities are provided for its effective implementation;

3) keep maintenance records for each vehicle.

c) The aerodrome operator shall ensure that organisations that operate or provide services at the aerodrome:

1) maintain their vehicles that operate on the movement area or other operational areas, in accordance with an established maintenance programme, including preventive maintenance;

2) keep relevant maintenance records.

d) The aerodrome operator shall ensure that unserviceable vehicles are not used for operations.

ADR.OPS.C.010 Maintenance of pavements, other ground surfaces and drainage

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

b) The aerodrome operator shall:

1) maintain the surfaces of all movement areas with the objective of avoiding and eliminating any FOD that might cause damage to aircraft or impair the operation of aircraft systems;

2) maintain the surface of runways, taxiways and aprons in order to prevent the formation of harmful irregularities;

3) maintain the runway in a condition so as to provide surface friction characteristics at or above the minimum standards;

4) periodically inspect and document the runway surface friction characteristics for maintenance purposes. The frequency of those inspections shall be sufficient to determine the trend of the surface friction characteristics of the runway;

5) take corrective maintenance action to prevent the runway surface friction characteristics for either the entire runway or a portion thereof, when uncontaminated, from falling below the minimum standards.

ADR.OPS.C.015 Maintenance of visual aids and electrical systems

a) The aerodrome operator shall establish and implement a preventive and corrective maintenance programme to ensure the serviceability of the electrical systems and the availability of power supply to all necessary facilities of the aerodrome, in a manner that ensures the safety, regularity and efficiency of air navigation.

b) The aerodrome operator shall establish and implement a preventive and corrective maintenance programme to ensure the serviceability of the individual lights and the aerodrome's lighting systems reliability, in a manner that ensures continuity of guidance to, and control of aircraft and vehicles, as follows:

1) For a precision approach runway Category II or III, the system of preventive maintenance shall have as its objective that, during any period of Category II or III operations, all approach and runway lights are serviceable and that, in any event, at least:

(i) 95 % of the lights are serviceable in each of the following elements:

A) precision approach Category II and III lighting system, the inner 450 m;

B) runway centre line lights;

C) runway threshold lights;

D) runway edge lights.

(ii) 90 % of the lights are serviceable in the touchdown zone lights;

(iii) 85 % of the lights are serviceable in the approach lighting system beyond 450 m;

(iv) 75 % of the lights are serviceable in the runway-end lights.

2) The lights that may be unserviceable in accordance with point (1) shall not alter the basic pattern of the lighting system.

3) An unserviceable light shall not be permitted adjacent to another unserviceable light, except in a barrette or a crossbar where two adjacent unserviceable lights may be permitted.

4) For a stop bar that is provided at a runway-holding position and is used in conjunction with a runway intended for operations in runway visual range conditions less than a value of 550 m, the system of preventive maintenance shall have the following objectives:

(i) no more than two lights shall remain unserviceable;

(ii) two adjacent lights shall not remain unserviceable unless the light spacing is significantly less than that required.

5) For a taxiway intended for use in runway visual range conditions less than a value of 550 m, the system of preventive maintenance shall have as its objective that no two adjacent taxiway centre line lights be unserviceable.

6) For a precision approach runway Category I, the system of preventive maintenance employed shall have as its objective that, during any period of Category I operations, all approach and runway lights are serviceable and that, in any event:

(i) at least 85 % of the lights are serviceable in each of the following:

A) precision approach Category I lighting system;

B) runway threshold lights;

C) runway edge lights;

D) runway-end lights;

(ii) an unserviceable light shall not be permitted adjacent to another unserviceable light unless the light spacing is significantly less than that required.

7) For a runway meant for take-off in runway visual range conditions less than a value of 550 m, the system of preventive maintenance shall have as its objective that, during any period of operations, all runway lights are serviceable, and that, in any event:

(i) at least:

A) 95 % of the lights are serviceable in the runway centre line lights (where provided) and in the runway edge lights;

B) 75 % of the lights are serviceable in the runway-end lights;

(ii) an unserviceable light shall not be permitted adjacent to another unserviceable light.

8) For a runway meant for take-off in runway visual range conditions of a value of 550 m or greater, the system of preventive maintenance shall have as its objective that, during any period of operations, all runway lights are serviceable, and that, in any event:

(i) at least 85 % of the lights are serviceable in the runway edge lights and runway-end lights;

(ii) an unserviceable light shall not be permitted adjacent to another unserviceable light.

9) For a runway equipped with visual approach slope indicator systems, the system of preventive maintenance shall have as its objective that, during any period of operations, all units are serviceable. A unit shall be considered unserviceable if the number of unserviceable lights is such that the unit does not provide the intended guidance to the aircraft.

c) For the purposes of point (b), a light shall be deemed to be unserviceable if:

1) the main beam average intensity is less than 50 % of the value specified in the certification specifications issued by the Agency. For light units where the designed main beam average intensity is above the value specified in the certification specifications issued by the Agency, the 50 % value shall be related to that design value;

2) the filter associated with the light is missing, damaged, or the light does not produce the correct colour light beam.

d) The aerodrome operator shall establish and implement a preventive and corrective maintenance programme to ensure the serviceability and reliability of the system of markings and signs of the aerodrome, in a manner that ensures continuity of guidance to, and control of aircraft and vehicles.

e) Construction or maintenance activities shall not take place in the proximity of aerodrome electrical systems when low-visibility procedures are in effect at the aerodrome.

f) The aerodrome operator shall ensure that:

1) the preventive maintenance programmes referred to in points (a), (b) and (d) include appropriate inspections and checks of the individual elements of each system, and of the system itself, which are conducted in accordance with established procedures, and at defined intervals, appropriate to the intended operation and system;

2) appropriate corrective actions are taken to rectify any identified defects.

g) The aerodrome operator shall maintain records of the relevant maintenance activities.

SUBPART D – APRON MANAGEMENT OPERATIONS

ADR.OPS.D.001 Apron management safety related activities

a) The aerodrome operator shall ensure that means and procedures are established and implemented on the apron in order to:

1) regulate movement with the objective of preventing collisions between aircraft, and between aircraft and obstacles;

2) regulate entry of aircraft into, and coordinate exit of aircraft from the apron with the aerodrome control tower;

3) ensure safe and expeditious movement of vehicles;

4) and appropriate regulation of the following activities:

(i) aircraft stand allocation;

(ii) provision of marshalling services;

(iii) aircraft parking procedure and departure from the stand;

(iv) aircraft refuelling;

(v) jet blast precautions and engine tests;

(vi) start up clearances and taxi instructions.

b) The aerodrome operator, in order to implement point (a) may allocate responsibilities to other organisations. If the aerodrome operator allocates such responsibilities, it shall include the allocation in the aerodrome manual.

ADR.OPS.D.005 Apron boundaries

a) The aerodrome operator, in cooperation with the air traffic service provider, shall define and provide the apron boundaries to the aeronautical information service provider for publication in the Aeronautical Information Publication (AIP).

b) When defining the apron boundaries, at least the following shall be taken into consideration:

1) aerodrome layout;

2) runway and taxiway configuration and method of operation;

3) traffic density;

4) weather conditions;

5) operational procedures.

ADR.OPS.D.010 Coordination of aircraft entry to/exit from the apron

a) The aerodrome operator shall ensure that the aircraft entry to and exit from the apron is coordinated with the air traffic services provider, where aircraft movement on the apron is not managed by the air traffic service provider. The coordination shall include:

1) designated handover points between apron management service and air traffic service for arriving and departing aircraft;

2) designated air-ground communication facilities to be used at the apron;

3) holding areas for arriving aircraft when aircraft stands are not available.

b) The aerodrome operator shall provide to the aeronautical information service providers for publication in the Aeronautical Information Publication (AIP):

1) the designated handover points referred to in point (a)(1);

2) the designated air-ground communication facilities referred to in point (a)(2).

ADR.OPS.D.015 Management of aircraft movements on the apron

The aerodrome operator shall ensure that:

a) aircraft are provided with instructions on the route to be followed on the apron;

b) adequate visual aids are provided in order to ensure that flight crews are able to identify the assigned route;

c) the intended route is free of any obstacle that may risk collision with the moving aircraft.

ADR.OPS. D.025 Aircraft stand allocation

a) The aerodrome operator shall establish and ensure the implementation of procedures to ensure that the allocated aircraft stand is:

1) suitable for the aircraft type intended to use it;

2) communicated to the organisation responsible for the provision of AMS, when established, or to the appropriate air traffic service provider;

3) communicated to the persons responsible for the manoeuvring of the aircraft.

b) The aerodrome operator shall ensure that, at least the following parameters are taken into consideration when allocating aircraft to aircraft stands:

1) aircraft characteristics;

2) parking aids;

3) facilities serving the aircraft stand;

4) vicinity of infrastructure;

5) other parked aircraft in the neighbouring aircraft stands;

6) aircraft stand dependencies.

ADR.OPS.D.030 Marshalling of aircraft

The aerodrome operator shall ensure that marshalling of aircraft is provided using the marshalling signals in accordance with Appendix 1 to the Annex to Commission Implementing Regulation (EU) No 923/2012.

ADR.OPS.D.035 Aircraft parking

The aerodrome operator shall establish and ensure the implementation of procedures to ensure that:

a) an area designated for aircraft parking on an apron is monitored to ensure that the clearance distances are maintained during the parking manoeuvre;

b) guidance is provided to enable the aircraft to park safely;

c) automated parking guidance systems, if installed, are functioning properly;

d) persons responsible for aircraft taxiing are alerted to stop the aircraft when the clearance distances are not maintained;

e) persons, other than those required to assist the aircraft parking procedure, are prohibited to approach the aircraft when anti-collision lights are turned on and engines are running;

f) the aircraft stand is clear of any Foreign Object Debris (FOD) that may have an impact on safety.

ADR.OPS.D.040 Aircraft departure from the stand

The aerodrome operator shall establish and ensure the implementation of procedures to ensure that during the departure of an aircraft from the aircraft stand:

a) ground servicing equipment, excluding push-back trucks if required for the movement of aircraft, and vehicles have been removed from the aircraft stand or parked in designated areas;

b) if the aircraft stand is served by passenger boarding bridges, they have been retracted;

c) the designated exit route from the aircraft stand is free of foreign object debris (FOD);

d) vehicle movements on the stand and traffic on the adjacent road(s) have ceased, except for push-back trucks if required for the movement of aircraft;

e) persons, other than those required to assist the aircraft departure from the aircraft stand, are prohibited to approach the aircraft when anti-collision lights are turned on and engines are running.

ADR.OPS.D.045 Dissemination of information to organisations operating at the apron

a) The aerodrome operator shall disseminate information regarding limitations to operations on the apron in a timely manner to relevant organisations operating on the apron.

b) The information to be provided shall include the following, as applicable:

1) the type of the limitation;

2) the duration of the limitation, if known;

3) mitigation measures to be applied;

4) the operational impact of the limitation;

5) availability of aircraft stands;

6) restrictions on aircraft stands;

7) availability of fixed installations at aircraft stands;

8) special parking procedures;

9) temporary changes of driving routes;

10) work in progress;

11) any other information that has operational significance to the apron users.

ADR.OPS.D.050 Alerting of emergency services

a) The aerodrome operator shall:

1) establish and implement in the aerodrome emergency plan a procedure for alerting emergency services for accidents and incidents at the apron;

2) provide the appropriate means and facilities for alerting the relevant emergency services.

b) The procedure established by the aerodrome operator shall include at least the following:

1) the contact details and the means that shall be used for alerting the emergency services;

2) the information that has to be given to emergency services in order to handle the incident efficiently, such as:

(i) location of the accident or incident;

(ii) nature of the accident or incident;

(iii) damages;

(iv) injuries to persons;

(v) dangerous goods.

ADR.OPS.D.055 Jet blast precautions

a) The aerodrome operator shall make apron users aware of the hazards arising from jet blast and propeller slipstream.

b) The aerodrome operator shall require the apron users to secure vehicles and equipment properly and designate parking areas where the effect of jet blast or propeller slipstream is minimised.

c) When designing or making changes to apron layouts, the aerodrome operator shall take into consideration the effect of jet blast or propeller slipstream.

d) The aerodrome operator shall identify jet blast-sensitive places and shall either publish a request for minimum thrust to pilots, or take appropriate mitigating measures to minimize the jet blast effect.

ADR.OPS.D.060 Aircraft refuelling

a) The aerodrome operator shall establish a procedure for aircraft refuelling.

b) The procedure shall require the following:

1) the prohibition of open flames and the use of electrical or similar tools likely to produce sparks or arcs within the refuelling zone;

2) the prohibition to start ground power units during refuelling;

3) the existence of an unobstructed path from the aircraft to allow the quick removal of fuel bowsers and persons in case of emergency;

4) the correct bonding of aircraft and fuel supply sources and the correct application of earthing procedures;

5) the immediate notification of the fuelling supervisor in case of fuel spillage and detailed instructions on how to handle fuel spillages;

6) the positioning of ground support equipment in such a way that emergency exits are free of any obstruction to allow the expeditious evacuation of the passengers, if passengers are embarking or disembarking or remain in the aircraft during refuelling;

7) the ready availability of fire extinguishers of a suitable type for at least initial intervention in the event of a fuel fire;

8) the discontinuation of refuelling operations if electrical thunderstorms are at or in the vicinity of the aerodrome.

ADR.OPS.D.065 Engine test

a) The aerodrome operator shall establish and implement an engine test procedure.

b) The procedure shall include the following:

1) the person that has the authority to approve engine tests;

2) the areas where engine tests are conducted;

3) the safety measures that need to be taken.

ADR.OPS.D.070 High-visibility clothing

The aerodrome operator shall require that all personnel working outside, on foot, on the movement area shall wear high-visibility clothing.

ADR.OPS.D.075 Start-up clearances and taxi instructions

a) The aerodrome operator shall ensure that start-up clearances, push-back clearances, if required, and taxi instructions are coordinated with the air traffic service provider, when the aircraft movement on the apron is not managed by the air traffic service provider.

b) In this case, the aerodrome operator in cooperation with the air traffic service provider shall establish and implement a procedure, which shall include the following:

1) definition of the authority to issue start-up clearances;

2) means to inform each other for start-up clearances issued;

3) means to inform each other of push-back clearances and taxi instructions given.

ADR.OPS.D.080 Training and proficiency check programmes of marshallers and 'FOLLOW-ME' drivers

a) The aerodrome operator shall establish and ensure the implementation of a training programme for persons providing:

1) marshalling service;

2) 'FOLLOW-ME' guidance.

b) The training programme shall be implemented in accordance with point ADR.OR.D.017 of Annex III.

c) The training shall be designed to impart fundamental knowledge and practical skills related to the execution of their duties.

d) The aerodrome operator shall ensure the implementation of a proficiency check programme for personnel referred to in point (a) in order to ensure:

1) their continued competence;

2) that they are aware of the rules and procedures relevant to their functions and tasks. The aerodrome operator shall ensure that persons referred to in point (a) undergo proficiency checks at intervals not exceeding 12 months since the completion of their initial training.

ADR.OPS.D.085 Training and proficiency check programme of personnel providing taxi instructions to aircraft through radiotelephony

a) The aerodrome operator shall ensure that:

1) persons providing taxi instructions to aircraft on the apron through radiotelephony, using the assigned aeronautical radio frequencies, are appropriately trained and qualified;

2) the training programme is implemented in accordance with point ADR.OR.D.017 of Annex III, with the following exceptions:

(i) the initial training shall be followed by a unit training which comprises the following phases:

A) transitional training phase, designed primarily to impart knowledge and understanding of site-specific operational procedures and task-specific aspects;

B) on-the-job training phase, which is the final phase of unit training during which previously acquired job-related routines and skills are integrated in practice under the supervision of a qualified training instructor in a live traffic situation;

(ii) recurrent training shall be conducted at intervals not exceeding 12 calendar months and contains a review of the initial training content

(iii) refresher training shall be conducted when a person is absent from duties for a period of more than 12 months and shall include the entire initial training content.

b) Persons referred to in point (a)(1) shall demonstrate language proficiency, at least at an operational level both in the use of phraseologies and in plain language, in accordance with point (c), in the languages used for air-ground communication at the aerodrome.

c) The applicant shall demonstrate the ability to:

1) communicate effectively in voice-only and in face-to-face situations;

2) communicate on common and work-related topics with accuracy and clarity;

3) use appropriate communicative strategies to exchange messages and to recognise and resolve misunderstandings in a general or work-related context;

4) handle successfully the linguistic challenges presented by a complication or unexpected turn of events which occurs within the context of a routine work situation or communicative task with which they are otherwise familiar;

5) use a dialect or accent which is intelligible to the aeronautical community.

d) Language proficiency shall be demonstrated by a certificate issued by the organisation that conducted the assessment, attesting the language or languages, the level or levels of proficiency, and the date of the assessment.

e) Except for persons who have demonstrated language proficiency at an expert level, the language proficiency shall be re-assessed every:

1) four years from the date of the assessment, if the level demonstrated is operational level;

2) six years from the date of the assessment, if the level demonstrated is extended level.

f) The demonstration of language proficiency shall be done through a method of assessment, which shall contain:

1) the process by which an assessment is done;

2) the qualifications of the assessors conducting assessments of language proficiency;

3) the appeal procedure.

g) The aerodrome operator shall make available language training to maintain the required level of language proficiency of its personnel.

h) The aerodrome operator shall ensure the implementation of a proficiency check programme for personnel referred to in point (a)(1) in order to ensure:

1) their continued competence;

2) that they are aware of the rules and procedures relevant to their functions and tasks.

The aerodrome operator shall ensure that persons referred to in point (a) undergo proficiency checks at intervals not exceeding 12 months since the completion of their initial training.

Appendix 2

Certification Specifications
CS-ADR-DSN
Book 1

CERTIFICATION SPECIFICATIONS
CHAPTER A- GENERAL

CS ADR-DSN.A.001 Applicability

The certification specifications (CSs) and the related guidance material (GM) are applicable to aerodromes that fall within the scope of Regulation (EU) 2018/1139 (Basic Regulation).

CS ADR-DSN.A.002 Definitions

For the purposes of CS-ADR-DSN, the following definitions should apply:
'Accuracy' means a degree of conformance between the estimated or measured value and the true value.
'Aerodrome' means a defined area (including any buildings, installations and equipment) on land or water or on a fixed offshore or floating structure intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.
'Aerodrome beacon' means an aeronautical beacon used to indicate the location of an aerodrome from the air.
'Aerodrome elevation' means the elevation of the highest point of the landing area.
'Aerodrome equipment' means any equipment, apparatus, appurtenance, software or accessory, that is used or intended to be used to contribute to the operation of aircraft at an aerodrome.
'Aerodrome operator' means any legal or natural person, operating or proposing to operate one or more aerodromes.
'Aerodrome traffic density' means the number of movements in the mean busy hour and is the arithmetic mean over the year of the number of movements in the daily busiest hour. Movement is either a take-off or a landing:

a) Light. Where the number of movements in the mean busy hour is not greater than 15 per runway or typically less than 20 total aerodrome movements.
b) Medium. Where the number of movements in the mean busy hour is of the order of 16 to 25 per runway or typically between 20 to 35 total aerodrome movements.
c) Heavy. Where the number of movements in the mean busy hour is of the order of 26 or more per runway or typically more than 35 total aerodrome movements.

'Aeronautical beacon' means an aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth.
'Aeronautical ground light' means any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.
'Aeroplane' means a power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight;
'Aeroplane reference field length' means the minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and

zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.

'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.

'Aircraft' means a machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

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

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

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

'Apron service road' means a road located on or adjacent to an apron, intended for the exclusive use of vehicles.

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

'Balked landing' means a landing manoeuvre that is unexpectedly discontinued at any point below the obstacle clearance altitude/height (OCA/H).

'Barrette' means three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.

'Certification specifications' mean technical standards adopted by the Agency indicating means to show compliance with Regulation (EU) No 2018/1139 and its Implementing Rules and which can be used by an organisation for the purpose of certification.

'Clearway' means a defined rectangular area on the ground or water under the control of the appropriate entity, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.

'Critical Area' means an area of defined dimensions extending about the ground equipment of a precision instrument approach within which the presence of vehicles or aircraft will cause unacceptable disturbance of the guidance signals.

'Datum' means any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104).

'Declared distances' means:

- **'Take-off run available (TORA)'** means the length of runway declared available and suitable for the ground run of an aeroplane taking off.
- **'Take-off distance available (TODA)'** means the length of the take-off run available plus the length of the clearway if provided.
- **'Accelerate-stop distance available (ASDA)'** means the length of the take-off run available plus the length of the stopway if provided.
- **'Landing distance available (LDA)'** means the length of runway which is declared available and suitable for the ground run of an aeroplane landing.

'De-icing/anti-icing facility' means a facility where frost, ice, or snow is removed (de-icing) from the aeroplane to provide clean surfaces, and/or where clean surfaces of the aeroplane

receive protection (anti-icing) against the formation of frost or ice and accumulation of snow or slush for a limited period of time.

'De-icing/anti-icing pad' means an area comprising an inner area for the parking of an aeroplane to receive de-icing/anti-icing treatment and an outer area for the manoeuvring of two or more mobile de-icing/anti-icing equipment.

'Dependent parallel approaches' means simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed.

'Displaced threshold' means a threshold not located at the extremity of a runway.

'Effective intensity' means that the effective intensity of a flashing light is equal to the intensity of a fixed light of the same colour which will produce the same visual range under identical conditions of observation.

'Fixed light' means a light having constant luminous intensity when observed from a fixed point.

'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.

'Frangibility' means the ability of an object to retain its structural integrity and stiffness up to a specified maximum load but when subject to a load greater than specified or struck by an aircraft will break, distort or yield in a manner designed to present minimum hazard to an aircraft.

'Frangible object' means an object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.

'Frost' means ice crystals formed from airborne moisture on a surface whose temperature is below freezing; frost differs from ice in that the frost crystals grow independently and therefore have a more granular texture.

Note 1: 'Below freezing' refers to air temperature equal to or less than the freezing point of water (0 degree Celsius).

Note 2: Under certain conditions, frost can cause the surface to become very slippery and it is then reported appropriately as downgraded RWYCC.

'Graded area' means that part of the runway strip cleared of all obstacles, except for specified items and graded, intended to reduce the risk of damage to an aircraft running off the runway.

'Hazard beacon' means an aeronautical beacon used to designate a danger to air navigation.

'Holding bay' means a defined area where aircraft can be held, or bypassed to facilitate efficient surface movement of aircraft.

'Holdover time' means the estimated time during which the anti-icing fluid (treatment) will prevent the formation of ice and frost and the accumulation of snow on the protected (treated) surfaces of an aeroplane.

'Hot spot' means a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.

'Ice' means water that has frozen or compacted snow that has transitioned into ice in cold and dry conditions.

'Identification beacon' means an aeronautical beacon emitting a coded signal by means of which a particular point of reference can be identified.

'Independent parallel approaches' means simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are not prescribed.
'Independent parallel departures' means simultaneous departures from parallel or near-parallel instrument runways.
'Instrument runway' means one of the following types of runways intended for the operation of aircraft using instrument approach procedures:

1. 'Non-precision approach runway': a runway served by visual aids and at least one non-visual aid, intended for landing operations following a type A instrument approach operation.

2. 'Precision approach runway, Category I': a runway served by visual aids and at least one non-visual aid, intended for landing operations following a type B CAT I instrument approach operation.

3. 'Precision approach runway, Category II': a runway served by visual aids and at least one non-visual aid, intended for landing operations following a type B CAT II instrument approach operation.

4. 'Precision approach runway, Category III': a runway served by visual aids and at least one non-visual aid, intended for landing operations following a type B CAT III instrument approach operation.

'Intermediate holding position' means a designated position intended for traffic control at which taxiing aircraft and vehicles should stop and hold until further cleared to proceed when so instructed by the appropriate air traffic control unit.
'Isolated aircraft parking position' means an area suitable for the parking of an aircraft which is known or suspected to be the subject of unlawful interference, or for other reasons needs isolation from normal aerodrome activities.
'Landing area' means that part of a movement area intended for the landing or take-off of aircraft.
'Landing direction indicator' means a device to indicate visually the direction currently designated for landing and for take-off.
'Lighting system reliability' means the probability that the complete installation operates within the specified tolerances and that the system is operationally usable.
'Manoeuvring area' means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.
'Marker' means an object displayed above ground level in order to indicate an obstacle or delineate a boundary.
'Marking' means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.
'Movement area' means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).
'Near-parallel runways' means non-intersecting runways whose extended centre lines have an angle of convergence/divergence of 15 degrees or less.
'Non-instrument runway' means a runway intended for the operation of aircraft using visual approach procedures.
'Obstacle' means all fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

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

- extend above a defined surface intended to protect aircraft in flight; or
- stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

'Obstacle-free zone (OFZ)' means the airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low-mass and frangibly mounted one required for air navigation purposes.

'Obstacle limitation surface' means a surface that defines the limits to which objects may project into the airspace.

'Obstacle protection surface' means a surface established for visual approach slope indicator system above which objects or extensions of existing objects shall not be permitted except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object.

'Operator' means any legal or natural person, operating or proposing to operate one or more aircraft or one or more aerodromes.

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

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

'Precision approach runway', see 'instrument runway'.

'Primary runway(s)' means runway(s) used in preference to others whenever conditions permit. 'Rapid exit taxiway' means a taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimising runway occupancy times;

'Road' means an established surface route on the movement area meant for the exclusive use of vehicles.

'Road-holding position' means a designated position at which vehicles may be required to hold.

'Runway' means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

'Runway end safety area (RESA)' means an area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.

'Runway guard lights' means a light system intended to caution pilots or vehicle drivers that they are about to enter an active runway.

'Runway-holding position' means a designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS critical/sensitive area at which taxiing aircraft and vehicles should stop and hold, unless otherwise authorised by the aerodrome control tower.

'Runway strip' means a defined area including the runway and stopway, if provided, intended:
- to reduce the risk of damage to aircraft running off a runway; and
- to protect aircraft flying over it during take-off or landing operations.

'Runway turn pad' means a defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on a runway.

'Runway type' means instrument runway or non-instrument runway.

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

'Segregated parallel operations' means simultaneous operations on parallel or near-parallel instrument runways in which one runway is used exclusively for approaches and the other runway is used exclusively for departures.

'Sensitive area' means an area extending beyond the Critical Area where the parking and/or movement of aircraft or vehicles will affect the guidance signal to the extent that it may be rendered unacceptable to aircraft using the signal.

'Shoulder' means an area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.

'Sign':

- Fixed message sign means a sign presenting only one message;
- Variable message sign means a sign capable of presenting several predetermined messages or no message, as applicable.

'Signal area' means an area on an aerodrome used for the display of ground signals.

'Slush' means snow that is so water-saturated that water will drain from it when a handful is picked up or will splatter if stepped on forcefully.

'Snow' (on the ground):

- 'Dry snow' means snow from which a snowball cannot readily be made.
- 'Wet snow' means snow that contains enough water to be able to make a well-compacted, solid snowball, but water will not squeeze out.
- 'Compacted snow' means snow that has been compacted into a solid mass such that aeroplane tyres, at operating pressures and loadings, will run on the surface without significant further compaction or rutting of the surface.

'Standing water' means water of depth greater than 3 mm.

Note: Running water of depth greater than 3 mm is reported as 'standing water' by convention.

'Stopway' means a defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.

'Surface friction' means the resistance offered to the movement of one body past a surface with which it is in contact.

'Switch-over time (light)' means the time required for the actual intensity of a light measured in a given direction to fall from 50 % and recover to 50 % during a power supply changeover, when the light is being operated at intensities of 25 % or above.

'Take-off runway' means a runway intended for take-off only.

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

- Aircraft stand taxilane;
- Apron taxiway;
- Rapid exit taxiway.

'Taxiway intersection' means a junction of two or more taxiways.

'Taxiway strip' means an area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.

'Threshold' means the beginning of that portion of the runway usable for landing.
'Touchdown zone' means the portion of a runway, beyond the threshold, where landing aeroplanes are intended to first contact the runway.
'Type A instrument approach operation' means an instrument approach operation with a minimum descent height or decision height at or above 75 m (250 ft);
'Type B instrument approach operation' means an instrument approach operation with a decision height below 75 m (250 ft) categorised as follows:

1. Category I (CAT I): a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m;
2. Category II (CAT II): a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft) and a runway visual range not less than 300 m;
3. Category III (CAT III): a decision height lower than 30 m (100 ft) or no decision height and a runway visual range less than 300 m or no runway visual range limitations.

'Usability factor' means the percentage of time during which the use of a runway or system of runways is not restricted because of the crosswind component.
'Visual aids' means indicators and signalling devices, markings, lights, signs and markers or combinations thereof.
'Visual approach slope indicator system' means a system of lights arranged to provide visual descent guidance information during the approach to a runway.
'Wet ice' means ice with water on top of it or ice that is melting.
Note: Freezing precipitation can lead to runway conditions associated with wet ice from an aeroplane performance point of view. Wet ice can cause the surface to become very slippery. It is then reported appropriately as downgraded RWYCC.

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, 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, by selecting the code letter which corresponds to the greatest wingspan of the aeroplanes for which the facility is intended.

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

CS ADR-DSN.A.010

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

The number and orientation of runways at an aerodrome should be such that the usability factor of the aerodrome is optimised taking into account that safety is not compromised.

CS ADR-DSN.B.020 Choice of maximum permissible crosswind components

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

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CS ADR-DSN.B.030 Runway threshold

a) A threshold should be provided on a runway.
b) A threshold needs not to be provided on a take-off runway.
c) A threshold should be located at the extremity of a runway unless operational considerations justify the choice of another location.
d) When it is necessary to displace a threshold, either permanently or temporarily, from its normal location, account should be taken of the various factors which may have a bearing on the location of the threshold.
e) When the threshold is displaced, the threshold location should be measured at the inner edge of the threshold marking (the transverse stripe across the runway).

CS ADR-DSN.B.035 Length of runway and declared distances

(a) The length of a runway should provide declared distances adequate to meet the operational requirements for the aircraft which the runway is intended to serve.
b) The following distances should be calculated to the nearest metre for each runway:

1) Take-off run available;
2) Take-off distance available;
3) Accelerate-stop distance available; and
4) Landing distance available.

c) The length of the runway is measured from the start of the runway pavement or where a transverse stripe marking is provided to indicate threshold displacement, at the inner edge of the transverse stripe across the runway.

CS ADR-DSN.B.040 Runways with stopways or clearways

The length(s) of a stopway or clearway, where provided, should be of adequate distance to meet the operational requirements for the aircraft which the runway is intended to serve.

CS ADR-DSN.B.045 Width of runways

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

Code number	Outer Main Gear Wheel Span (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
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.050 Minimum distance between parallel noninstrument runways

a) Where parallel non-instrument runways are intended for simultaneous use, the minimum distance between their centre lines should be:
1) 210 m where the higher code number is 3 or 4;
2) 150 m where the higher code number is 2; and
3) 120 m where the higher code number is 1.

CS ADR-DSN.B.055 Minimum distance between parallel instrument runways

a) Where parallel instrument runways are intended for simultaneous use, the minimum distance between their centre lines should be:
1) 1 035 m for independent parallel approaches;

2) 915 m for dependent parallel approaches;
3) 760 m for independent parallel departures; and
4) 760 m for segregated parallel operations.

b) Apart from provided in
a) above, for segregated parallel operations the specified minimum distance:
1) may be decreased by 30 m for each 150 m that the arrival runway is staggered toward the arriving aircraft, to a minimum of 300 m; and
2) should be increased by 30 m for each 150 m that the arrival runway is staggered away from the arriving aircraft.

c) Other combinations of minimum distances should apply taking into account ATM and operational aspects.

CS ADR-DSN.B.060 Longitudinal slopes of runways

a) The safety objective of limiting the longitudinal runway slope is to enable stabilized and safe use of runway by an aircraft.

b) The slope computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length should not exceed:
1) 1 % where the code number is 3 or 4; and
2) 2 % where the code number is 1 or 2.

c) Along no portion of a runway should the longitudinal slope exceed:
1) 1.25 % where the code number is 4, except that for the first and last quarter of the length of the runway where the longitudinal slope should not exceed 0.8 %;
2) 1.5 % where the code number is 3, except that for the first and last quarter of the length of a precision approach runway Category II or III where the longitudinal slope should not exceed 0.8 %; and
3) 2 % where the code number is 1 or 2.

CS ADR-DSN.B.065 Longitudinal slope changes on runways

a) The safety objective of limiting the longitudinal runway slope changes is to avoid damage of aircraft and to enable safe use of runway by an aircraft.

b) Where slope changes cannot be avoided, a slope change between two consecutive slopes should not exceed:
1) 1.5 % where the code number is 3 or 4; and
2) 2 % where the code number is 1 or 2.

c) The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding:
1) 0.1 % per 30 m (minimum radius of curvature of 30 000 m) where the code number is 4;
2) 0.2 % per 30 m (minimum radius of curvature of 15 000 m) where the code number is 3; and
3) 0.4 % per 30 m (minimum radius of curvature of 7 500 m) where the code number is 1 or 2.

CS ADR-DSN.B.070 Sight distance for slopes on runways

a) The safety objective of minimum runway sight distance values is to achieve the necessary visibility to enable safe use of runway by an aircraft.
b) Where slope changes on runways cannot be avoided, they should be such that there should be an unobstructed line of sight from:

1) any point 3 m above a runway to all other points 3 m above the runway within a distance of at least half the length of the runway where the code letter is C, D, E, or F;
2) any point 2 m above a runway to all other points 2 m above the runway within a distance of at least half the length of the runway where the code letter is B; and
3) any point 1.5 m above a runway to all other points 1.5 m above the runway within a distance of at least half the length of the runway where the code letter is A.

CS ADR-DSN.B.075 Distance between slope changes on runways

Undulations or appreciable changes in slopes located close together along a runway should be avoided. The distance between the points of intersection of two successive curves should not be less than:

a) the sum of the absolute numerical values of the corresponding slope changes multiplied by the appropriate value as follows:
1) 30 000 m where the code number is 4;
2) 15 000 m where the code number is 3; and
3) 5 000 m where the code number is 1 or 2; or
b) 45 m;

whichever is greater.

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

a) The safety objective of runway transverse slopes is to promote the most rapid drainage of water from the runway.
b) To promote the most rapid drainage of water, the runway surface should be cambered, except where a single crossfall from high to low in the direction of the wind most frequently associated with rain would ensure rapid drainage. The transverse slope should be:

1) not less than 1 % and not more than 1.5 % where the code letter is C, D, E or F; and;
2) not less than 1 % and not more than 2 % where the code letter is A or B; except at runway or taxiway intersections where flatter slopes may be necessary.

c) For a cambered surface, the transverse slope on each side of the centre line should be symmetrical.
d) The transverse slope should be substantially the same throughout the length of a runway except at an intersection with another runway or a taxiway where an even transition should be provided taking account of the need for adequate drainage.

CS ADR-DSN.B.085 Runway strength

The runway should be of sufficient strength to support normal operations of the most

demanding aircraft without risk of damage either to the aeroplane or the runway.

CS ADR-DSN.B.090 Surface of runways

a) The surface of a runway should be constructed without irregularities that would impair the runway surface friction characteristics or otherwise adversely affect the take-off or landing of an aeroplane.
b) A paved runway should be so constructed or resurfaced as to provide surface friction characteristics at or above the minimum friction level.
c) The average surface texture depth of a new surface should be not less than 1.0 mm.
d) When the surface is grooved or scored, the grooves or scorings should be either perpendicular to the runway centre line or parallel to non-perpendicular transverse joints where applicable.

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:

Clearance	Outer Main Gear Wheel Span (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
	1.50 m	2.25 m	3 m[a] or 4 m[b]	4m
[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.100 Slopes on runway turn pads

The longitudinal and transverse slopes on a runway turn pad should be sufficient to prevent the accumulation of water on the surface and facilitate rapid drainage of surface water. The slopes

should be the same as those on the adjacent runway pavement surface.

CS ADR-DSN.B.105 Strength of runway turn pads

The strength of a runway turn pad should be compatible with the adjoining runway which it serves, due consideration being given to the fact that the turn pad should be subjected to slow-moving traffic making hard turns and consequent higher stresses on the pavement.

CS ADR-DSN.B.110 Surface of runway turn pads

a) The surface of a runway turn pad should not have surface irregularities that may cause damage to an aeroplane using the turn pad.
b) The surface of a runway turn pad should be so constructed or resurfaced as to provide surface friction characteristics at least equal to that of the adjoining runway.

CS ADR-DSN.B.115 Width of shoulders for runway turn pads

The runway turn pads should be provided with shoulders of such width as is necessary to prevent surface erosion by the jet blast of the most demanding aeroplane for which the turn pad is intended and any possible foreign object damage to the aeroplane engines.

CS ADR-DSN.B.120 Strength of shoulders for runway turn pads

The strength of runway turn pad shoulders should be capable of withstanding the occasional passage of the most demanding aircraft it is designed to serve without inducing structural damage to the aircraft and to the supporting ground vehicles that may operate on the shoulder.

CS ADR-DSN.B.125 Runway shoulders

a) The safety objective of a 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, E or F, for aeroplanes with an OMGWS from 9 m up to but not including 15 m.
c) Runway shoulders need not be provided where the runway width is 60 m, for aeroplanes with an OMGWS from 9 m up to but not including 15 m and code letter:
    1) D, E; or
    2) F with two or three engines.
d) Where the runway width is 60 m, for aeroplanes with an OMGWS from 9 m up to but not including 15 m and code letter F with four (or more) engines, only the portion of runway shoulders between the runway edge up to a distance as prescribed in paragraph (c) of CS ADR-DSN.B.135 should be provided.

CS ADR-DSN.B.130 Slopes on runway shoulders

a) The safety objective of runway shoulder transverse slopes is to promote the most rapid drainage of water from the runway and runway shoulder.

b) The surface of the paved shoulder that abuts the runway should be flush with the surface of the runway and its transverse slope should not exceed 2.5 %.

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

For aeroplanes with an OMGWS from 9 m up to but not including 15 m the runway shoulders should extend symmetrically on each side of the runway so that the overall width of the runway and its shoulders is not less than:
a) 60 m where the code letter is D or E;
b) 60 m where the code letter is F with two- or three-engined aeroplanes; and
c) 75 m where the code letter is F with four (or more) engined aeroplanes.

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

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 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 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.155 Length of runway strip

a) A strip should extend before the threshold and beyond the end of the runway or stopway for a distance of at least:
1) 60 m where the code number is 2, 3, or 4;
2) 60 m where the code number is 1 and the runway is an instrument one; and
3) 30 m where the code number is 1 and the runway is a non-instrument one.

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

a) A strip including a precision approach runway should extend laterally to a distance of at least:
1) 140 m where the code number is 3 or 4; and

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

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

2) 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) A strip including a non-instrument runway should extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least:

1) 75 m where the code number is 3 or 4;

2) 40 m where the code number is 2; and

3) 30 m where the code number is 1.

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

a) An object situated on a runway strip which may endanger aeroplanes should be regarded as an obstacle and should, as far as practicable, be removed.

b) No fixed object, other than visual aids required for air navigation or those required for aircraft safety purposes and which must be sited on the runway strip, and satisfying the relevant frangibility requirement in Chapter T, should be permitted on a runway strip:

1) within 77.5 m of the runway centre line of a precision approach runway Category I, II or III where the code number is 4 and the code letter is F; or

2) within 60 m of the runway centre line of a precision approach runway Category I, II or III where the code number is 3 or 4; or

3) within 45 m of the runway centre line of a precision approach runway Category I where the code number is 1 or 2.

c) To eliminate a buried vertical surface on objects situated on a graded portion of the runway strip, a slope should be provided to minimise hazards to aeroplanes running off the runway.

CS ADR-DSN.B.170

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

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

CS ADR-DSN.B.180 Longitudinal slopes on runway strips

a) The safety objective of longitudinal runway strip slope is to define maximum gradient values that should not interfere with the safe use of the runway strip by an aircraft.

b) A longitudinal slope along that portion of a strip to be graded should not exceed:

1) 1.5 % where the code number is 4;

2) 1.75 % where the code number is 3; and

3) 2 % where the code number is 1 or 2.

c) Longitudinal slope changes on that portion of a strip to be graded should be as gradual as practicable, and abrupt changes or sudden reversals of slopes should be avoided.

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

a) Transverse slopes on that portion of a strip to be graded should be adequate to prevent the accumulation of water on the surface but should not exceed:

1) 2.5 % where the code number is 3 or 4; and

2) 3 % where the code number is 1 or 2; except that to facilitate drainage from the slope for the first 3 m outward from the runway, shoulder or stopway edge should be negative as measured in the direction away from the runway and may be as great as 5 %.

b) The transverse slopes of any portion of a strip beyond that to be graded should not exceed an upward slope of 5 % as measured in the direction away from the runway.

CS ADR-DSN.B.190 Strength of runway strips

a) That portion of a strip of an instrument runway within a distance of at least:

1) 75 m where the code number is 3 or 4; and

2) 40 m where the code number is 1 or 2; from the centre line of the runway and its extended centre line should be prepared or constructed so as to minimise hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

b) That portion of a strip containing a non-instrument runway within a distance of at least:

1) 75 m where the code number is 3 or 4;

2) 40 m where the code number is 2; and

3) 30 m where the code number is 1;

from the centre line of the runway and its extended centre line should be prepared or constructed so as to minimise hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

CS ADR-DSN.B.191 Drainage characteristics of the movement area and adjacent areas

The safety objective of the drainage systems of the movement area and adjacent areas is to minimise water depth on the surface by draining surface water off the runway in the shortest path practicable and particularly out of the area of the wheel path.

CS ADR-DSN.B.195 Clearways

a) The inclusion of detailed specifications for clearways below is not intended to imply that a clearway has to be provided.
b) Location of clearways: The origin of a clearway should be at the end of the take-off run available.
c) Length of clearways: The length of a clearway should not exceed half the length of the take-off run available.
d) Width of clearways: A clearway should extend laterally to a distance of at least 75 m on each side of the extended centre line of the runway.
e) Slopes on clearways: The ground in a clearway should not project above a plane having an upward slope of 1.25 %, the lower limit of this plane being a horizontal line which:

1) is perpendicular to the vertical plane containing the runway centre line; and
2) passes through a point located on the runway centre line at the end of the take-off run available.

f) An object situated on a clearway which may endanger aeroplanes in the air should be regarded as an obstacle and should be removed.

CS ADR-DSN.B.200 Stopways

a) The inclusion of detailed specifications for stopways below is not intended to imply that a stopway has to be provided.
b) Width of stopways: A stopway should have the same width as the runway with which it is associated.
c) Slopes on stopways: Slopes and changes in slope on a stopway, and the transition from a runway to a stopway, should comply with the specifications in CS ADR-DSN.B.060 to CS ADR-DSN.B.080 for the runway with which the stopway is associated except that:

1) the limitation in CS ADR-DSN.B.060(c) of a 0.8 % slope for the first and last quarter of the length of a runway need not be applied to the stopway; and
2) at the junction of the stopway and runway and along the stopway the maximum rate of slope change may be 0.3 % per 30 m (minimum radius of curvature of 10 000 m) for a runway where the code number is 3 or 4.

d) Strength of stopways: A stopway should be prepared or constructed so as to be capable, in the event of an abandoned take-off, of supporting the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane.
e) Surface of stopways:
The surface of a paved stopway should be so constructed or resurfaced as to provide surface friction characteristics at or above those of the associated runway.

CS ADR-DSN.B.205 Radio altimeter operating area

a) A radio altimeter operating area should be established in the pre-threshold area of a precision approach runway Category II and III, and where practicable, in the pre-threshold area of a precision approach runway Category I.
b) Length of the area: A radio altimeter operating area should extend before the threshold for a distance of at least 300 m.
c) Width of the area:
A radio altimeter operating area should extend laterally, on each side of the extended centre line of the runway, to a distance of 60 m, except that, when special circumstances so warrant, the distance may be reduced to no less than 30 m if a safety assessment indicates that such reduction would not affect the safety of operations of aircraft.

CHAPTER C - RUNWAY END SAFETY AREA

CS ADR-DSN.C.210 Runway end safety areas (RESA)

a) The safety objective of the runway end safety area (RESA) is to minimise risks to aircraft and their occupants when an aeroplane overruns or undershoots a runway.
b) A runway end safety area should be provided at each end of a runway strip where:
1) the code number is 3 or 4; and
2) the code number is 1 or 2 and the runway is an instrument one.
c) Where practicable, a runway end safety area should be provided at each end of a runway strip where the code number is 1 or 2 and the runway is a non-instrument one.

CS ADR-DSN.C.215 Dimensions of runway end safety areas

a) Length of runway end safety area
1) A runway end safety area should extend from the end of a runway strip to a distance of at least 90 m and, as far as practicable, extend to a distance of:
(i) 240 m where the code number is 3 or 4 and
(ii) 120 m where the code number is 1 or 2 and the runway is an instrument one; and
2) A runway end safety area should extend from the end of a runway strip, as far as practicable, to a distance of 30 m where the code number is 1 or 2 and the runway is a non-instrument one.
b) Notwithstanding the provisions in (a) above, the length of the runway end safety area may be reduced where an arresting system is installed, based on the design specifications of the system.
c) Width of runway end safety area
The width of a runway end safety area should be at least twice that of the associated runway and, wherever practicable, be equal to that of the graded portion of the associated runway strip.

CS ADR-DSN.C.220 Objects on runway end safety areas

No fixed object, other than equipment and installations required for air navigation or for aeroplane safety purposes and satisfying the relevant frangibility requirement CS ADR-DSN.T.910, should be permitted on a runway end safety area. The detailed requirements for siting objects on a RESA are in CS ADR-DSN.T.915.

CS ADR-DSN.C.225 Clearing and grading of runway end safety areas

A runway end safety area should provide a cleared and graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane undershooting or overrunning the runway.

CS ADR-DSN.C.230 Slopes on runway end safety areas

a) Longitudinal slopes:

1) The slopes of a runway end safety area should be such that no part of the runway end safety area penetrates the approach or take-off climb surface.

2) The longitudinal slopes of a runway end safety area should not exceed a downward slope of 5 %. Longitudinal slope changes should be as gradual as practicable, and abrupt changes or sudden reversals of slopes should be avoided.

b) Transverse slopes:

The transverse slopes of a runway end safety area should not exceed an upward or downward slope of 5 %. Transitions between differing slopes should be as gradual as practicable.

CS ADR-DSN.C.235 Strength of runway end safety areas

A runway end safety area should have a bearing strength sufficient to serve its primary purpose.

CS ADR-DSN.C.236 Engineered Materials Arresting System (EMAS)

a) An EMAS, provided in accordance with paragraph

b) of CS ADR-DSN.C.215, is a type of arresting system consisting of high energy absorbing materials of specific strength, which will reliably and predictably crush under the weight of an aircraft.

b) Location: An EMAS should be located beyond the end of the runway or stopway, if provided, at enough setback distance to avoid damage due to jet blast.

c) General: An EMAS should:

1) be supported by a design method that can predict the performance of the system that is validated through laboratory or field tests;

2) decelerate an aircraft overrunning the runway by exerting predictable forces on the landing gear without causing major structural damage to the aircraft and avoiding injuries to its occupants;

3) be a passive system that requires no external means to initiate/trigger its operation to arrest an aircraft;

4) be constructed not to be damaged by jet blast or projected debris during normal aircraft operations;

5) use materials which do not generate nor worsen fire hazards to an incoming aircraft. The materials should be non-sparking, non-flammable, not promote combustion, and not emit toxic or malodorous fumes in a fire environment after installation;

6) be compatible with the installation of approach lighting systems, the radio altimeter operating area and with the meteorological conditions and aerodrome environment;

7) together with its surroundings, allow ice and snow removal and prevent water accumulation;

8) have enough mechanical property to avoid damage resulting from personnel walking on it for routine maintenance;

9) enable the access, movement, and egress of the RFFS vehicles without impeding their activities during an emergency;

10) be designed for repair to a usable condition (conforming to the original specifications) after an overrun or other type of physical damage, and have an established maintenance programme;

11) not increase the potential for damage and not cause control capabilities to an aircraft in case of an undershoot more than the risk associated with an undershoot in a RESA;

12) be frangible and mounted as low as possible with ramps that are provided to avoid vertical surface;

13) not impede crew and passenger evacuation nor hinder disabled aircraft removal procedures;

14) not cause visual or electromagnetic interference with any air navigation aids nor have reflecting surfaces that could cause dazzling;

15) not increase wildlife hazard;

16) not be considered to meet the definition of a stopway as provided in CS ADR-DSN.A.002.

d) Dimensions:

1) The functional length of an EMAS should be designed based on the operating conditions of the associated runway with its centre line coincidental with the extended centre line of the runway.

2) The functional width of an EMAS should not be less than the runway width.

e) Arresting performance:

1) An EMAS should be designed to decelerate the design aircraft at an exit speed of 70 knots at both maximum take-off weight (MTOW) and 80 % maximum landing weight (MLW) without imposing loads that exceed the aircraft's design limits, causing major structural damage to the aircraft or imposing excessive forces on its occupants.

2) When there is insufficient space available for the design on an EMAS in accordance with paragraph (c)(4) above, an EMAS should be designed to achieve the maximum arresting performance of the critical aeroplane.

3) The design method for EMAS should factor in no reverse thrust of the aeroplane, using a 0.25 braking friction coefficient for the runway and length of pavement prior to the arrestor bed (setback).

4) The design method for the EMAS assumes no braking friction coefficient (0.00) within the EMAS arrestor bed itself, unless the minimum actual braking friction

coefficient that can be achieved as an aeroplane passes through the EMAS arrestor bed material can be demonstrated.

f) Access:

1) Slopes or steps should be provided to allow the entrance of the RFFS vehicles from the front and sides and to facilitate crew and passenger evacuation.

2) On both sides of an EMAS, the requirements for RESA according CS ADR-DSN.C.210 to CS ADR-DSN.C.235 should be applied.

3) Service roads should be set up for maintenance and emergency access. The width of the service roads should allow access and egress of RFFS vehicles. Service roads should be graded to avoid water accumulation. The strength of the service roads pavement should be capable of supporting the passage of fully loaded RFFS vehicles.

g) Marking:

1) An EMAS should be provided with yellow chevrons in accordance with CS ADR-DSN.R.865.

CHAPTER D - TAXIWAYS

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:

Clearance	Outer Main Gear Wheel Span (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
	1.50 m	2.25 m	3 m[a,b] or 4 m[c]	4 m
[a] 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 Width of taxiways

A straight portion of a taxiway should have a width of not less than that given by the following tabulation:

	Outer Main Gear Wheel Span (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.250 Taxiways curves

a) Changes in direction of taxiways should be as few and small as possible. The radii of the curves should be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the taxiway is intended.
b) The design of the curve should be such that when the cockpit of the aeroplane for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheels of the aeroplane and the edge of the taxiway should be not less than those specified in CS ADR-DSN.D.240.

CS ADR-DSN.D.255 Junction and intersection of taxiways

a) To facilitate the movement of aeroplanes, fillets should be provided at junctions and intersections of taxiways with runways, aprons, and other taxiways.
b) The design of the fillets should ensure that the minimum wheel clearances specified in CS ADR-DSN.D.240 are maintained when aeroplanes are manoeuvring through the junctions or intersections.

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

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 center line and runway line (metres)									**Taxiway centre line to taxiway centre lie metres**	**Taxiway other than aircraft stand taxilane, centre line to object (metres)**	**Aircraft stand taxilane centre line to aircraft stand taxilane centerline (metres)**	**Aircraft stand taxilane centre line to object**
Code letter	Instrument runways Code number					**Non-instrument runways Code number**							
	1	2	3	4		**1**	**2**	**3**	**4**				
(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A	77.5	77.5	-	-		37.5	47.5	-	-	23	15.5	19.5	12
B	82	82	152	-		42	52	87	-	32	20	28.5	16.5
C	88	88	158	158		48	58	93	93	44	26	40.5	22.5
D	-	-	166	166		-	-	101	101	63	37	59.5	33.5
E	-	-	172.5	172.5		-	-	107.5	107.5	76	43.5	72.5	40
F	-	-	180	180		-	-	115	115	91	51	87.5	47.5

Note 1: The separation distances shown in columns (2) to (9) represent ordinary combination 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.

Table D-1. Taxiway minimum separation distances

CS ADR-DSN.D.265 Longitudinal slopes on taxiways

a) The safety objective of limiting the longitudinal taxiway slope is to enable stabilised safe use of taxiway by an aircraft.
b) The longitudinal slope of a taxiway should not exceed:
1) 1.5 % where the code letter is C, D, E, or F; and
2) 3 % where the code letter is A or B.

CS ADR-DSN.D.270 Longitudinal slope changes on taxiways

a) The safety objective of limiting the longitudinal taxiway slope changes is to avoid damage of aircraft and to enable safe use of taxiway by an aircraft.
b) Where slope changes on a taxiway cannot be avoided, the transition from one slope to another slope should be accomplished by a curved surface with a rate of change not exceeding:
1) 1 % per 30 m (minimum radius of curvature of 3 000 m) where the code letter is C, D, E, or F; and
2) 1 % per 25 m (minimum radius of curvature of 2 500 m) where the code letter is A or B.
c) Where slope changes in (b)(1) and (2) are not achieved and slopes on a taxiway cannot be avoided, the transition from one slope to another slope should be accomplished by a curved surface which should allow the safe operation of all aircraft in all weather conditions.

CS ADR-DSN.D.275 Sight distance of taxiways

a) The safety objective of minimum taxiway sight distance values is to achieve the necessary visibility to enable safe use of taxiway by an aircraft.
b) Where a change in slope on a taxiway cannot be avoided, the change should be such that, from any point:
1) 3 m above the taxiway, it should be possible to see the whole surface of the taxiway for a distance of at least 300 m from that point where the code letter is C, D, E, or F;
2) 2 m above the taxiway, it should be possible to see the whole surface of the taxiway for a distance of at least 200 m from that point where the code letter is B; and
3) 1.5 m above the taxiway, it should be possible to see the whole surface of the taxiway for a distance of at least 150 m from that point where the code letter is A.

CS ADR-DSN.D.280 Transverse slopes on taxiways

a) The safety objective of taxiway transverse slopes is to promote the most rapid drainage of water from the taxiway.
(b) The transverse slopes of a taxiway should be sufficient to prevent the accumulation of water on the surface of the taxiway but should not exceed:
1) 1.5 % where the code letter is C, D, E, or F; and
2) 2 % where the code letter is A or B.

CS ADR-DSN.D.285 Strength of taxiways

The strength of a taxiway should be suitable for the aircraft that the taxiway is intended to serve.

CS ADR-DSN.D.290 Surface of taxiways

a) The surface of a taxiway should not have irregularities that cause damage to aeroplane structures.

b) The surface of a paved taxiway should be so constructed or resurfaced as to provide suitable surface friction characteristics.

CS ADR-DSN.D.295 Rapid exit taxiways

a) The safety objective of rapid exit taxiway is to facilitate safe rapid exit of aeroplanes from a runway. b) A rapid exit taxiway should be designed with a radius of turn-off curve of at least:

1) 550 m where the code number is 3 or 4; and

2) 275 m where the code number is 1 or 2; to enable under wet conditions exit speeds of:

(i) 93 km/h where the code number is 3 or 4; and

(ii) 65 km/h where the code number is 1 or 2.

c) The radius of the fillet on the inside of the curve at a rapid exit taxiway should be sufficient to provide a widened taxiway throat in order to facilitate early recognition of the entrance and turn-off onto the taxiway.

d) A rapid exit taxiway should include a straight distance after the turn-off curve sufficient for an exiting aircraft to come to a full stop clear of any intersecting taxiway (Figure D-1).

e) The intersection angle of a rapid exit taxiway with the runway should not be greater than 45°, nor less than 25° and preferably should be 30°.

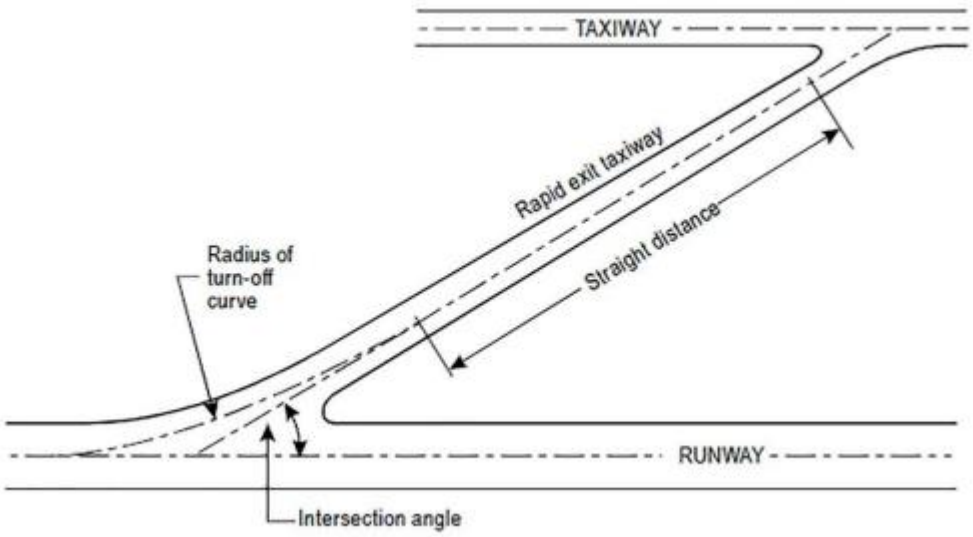

Figure D-1. Rapid exit taxiway

CS ADR-DSN.D.300 Taxiways on bridges

a) The width of that portion of a taxiway bridge capable of supporting aeroplanes, as measured perpendicularly to the taxiway centre line, should not be less than the width of the graded area of the strip provided for that taxiway unless a proven method of lateral restraint is provided which should not be hazardous for aeroplanes for which the taxiway is intended.
b) Access should be provided to allow rescue and firefighting vehicles to intervene in both directions within the specified response time to the largest aeroplane for which the taxiway bridge is intended. c) A bridge should be constructed on a straight section of the taxiway with a straight section on both ends of the bridge to facilitate the alignment of aeroplanes approaching the bridge.

CS ADR-DSN.D.305 Taxiway shoulders

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) 44 m where the code letter is F;
2) 38 m where the code letter is E;
3) 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.310 Taxiway Strip

A taxiway, other than an aircraft stand taxilane, should be included in a strip.

CS ADR-DSN.D.315 Width of taxiway strips

a) The safety objective of the width of taxiway strips is to allow safe use of taxiways in relation to adjacent objects.
b) A taxiway strip should extend symmetrically on each side of the centre line of the taxiway throughout the length of the taxiway to at least the distance from the centre line given in Table D-1, column (11).

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

The taxiway strip should provide an area clear of objects which may endanger taxiing aeroplanes.

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 not less than that given by the following tabulation:

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.

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

a) The safety objective of limiting the longitudinal taxiway strip slopes and slope changes and of minimum sight distances values is to reduce the probability of damage to an aircraft accidentally running off the taxiway and to enable safe use of these areas by rescue and firefighting vehicles.
b) The surface of the strip should be flush at the edge of the taxiway or shoulder if provided, and the graded portion should not have an upward transverse slope exceeding:

1) 2.5 % for strips where the code letter is C, D, E, or F; and
2) 3 % for strips of taxiways where the code letter is A or B; the upward slope being measured with reference to the transverse slope of the adjacent taxiway surface and not the horizontal. The downward transverse slope should not exceed 5 % measured with reference to the horizontal.

c) The transverse slopes on any portion of a taxiway strip beyond that to be graded should not exceed an upward or downward slope of 5 % as measured in the direction away from the taxiway.

CS ADR-DSN.D.335 Holding bays, runway-holding positions, intermediate holding positions, and road-holding positions

a) Holding bay(s) or other bypasses of sufficient size and adequate construction should be provided where necessary, to make deviations in the departure sequence possible.
b) A runway-holding position or positions should be established:

1) on the taxiway, if the location or alignment of the taxiway is such that a taxiing aircraft or vehicle can infringe an obstacle limitation surface or ILS/MLS critical/sensitive area or interfere with the operation of radio navigation aids;
2) on the taxiway, at the intersection of a taxiway and a runway; and
3) at an intersection of a runway with another runway when the former runway is part of a standard taxi-route.

c) An intermediate holding position should be established on a taxiway at any point other than a runway-holding position where it is desirable to define a specific holding limit.
d) An emergency access road should be equipped with road-holding positions at all intersections with runways and taxiways.
e) A road-holding position should be established at each intersection of a road with a runway.

CS ADR-DSN.D.340 Location of holding bays, runway-holding positions, intermediate holding positions, and road-holding positions

a) The distance between a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position and the centre line of a runway should be in accordance with Table D-2 and such that a holding aircraft or vehicle should not interfere with the operation of radio navigation aids or penetrate the inner transitional surface.
b) At elevations greater than 700 m the distance of 90 m specified in Table D-2 for a precision approach runway code number 4 should be increased as follows:

1) up to an elevation of 2 000 m; 1 m for every 100 m in excess of 700 m;
2) elevation in excess of 2 000 m and up to 4 000 m; 13 m plus 1.5 m for every 100 m in excess of 2 000 m; and
3) elevation in excess of 4 000 m and up to 5 000 m; 43 m plus 2 m for every 100 m in excess of 4 000 m.

c) The location of a runway-holding position established in accordance with CS ADR-DSN.D.335 should be such that a holding aircraft or vehicle will not infringe the obstacle-free zone, approach surface, take-off climb surface or ILS/MLS critical/sensitive area or interfere with the operation of radio navigation aids.

Type of runway	Code number [d]			
	1	2	3	4
Non-instrument	30 m	40 m	75 m	75 m
Non-precision approach	40 m	40 m	75 m	75 m
Precision approach Category I	60m [b]	60 m[b]	90 m [a,b]	90 m [a,b,c]
Precision approach Categories II and III	-	-	90 m [a,b]	90 m [a,b,c]
Take-off runway	30m	40 m	75 m	75 m

a. If a holding bay, runway-holding position, or road-holding position is at a lower elevation compared to the threshold, the distance may be decreased 5 m for every metre the bay or holding position is lower than the threshold, contingent upon not infringing the inner transitional surface.
b. This distance may need to be increased to avoid interference with radio navigation aids, particularly the glide path and localiser facilities (see CS ADR-DSN.D.340).

Note 1: The distance of 90 m for code number 3 or 4 is based on an aircraft with a tail height of 20 m, a distance from the nose to the highest part of the tail of 52.7 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle-free zone and not accountable for the calculation of OCA/H.
Note 2: The distance of 60 m for code number 2 is based on an aircraft with a tail height of 8 m, a distance from the nose to the highest part of the tail of 24.6 m and a nose height of 5.2 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle-free zone.

c. Where the code letter is F, this distance should be at least 100 m.

Note: The distance of 100 m for code number 4 where the code letter is F is based on an aircraft with a tail height of 24 m, a distance from the nose to the highest part of the tail of 62.2 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle-free zone.

d. Elevation of taxiway should be taken into account for possible increase of the distances indicated in this table.

Table D-2. Minimum distance from the runway centre line to a holding bay, runway-holding position, or road-holding position.

CHAPTER E – APRONS

CS ADR-DSN.E.345 General

Aprons should be provided to permit the safe loading and off-loading of passengers, cargo, or mail as well as the servicing of aircraft without interfering with the aerodrome traffic.

CS ADR-DSN.E.350 Size of aprons

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CS ADR-DSN.E.355 Strength of aprons

Each part of an apron should be capable of withstanding the traffic of the aircraft it is intended to serve, due consideration being given to the fact that some portions of the apron should be subjected to a higher density of traffic and, as a result of slow moving or stationary aircraft, to higher stresses than a runway.

CS ADR-DSN.E.360 Slopes on aprons

a) Slopes on an apron, including those on an aircraft stand taxilane, should be sufficient to prevent accumulation of water on the surface of the apron but should be kept to the minimum required to facilitate effective drainage.
b) On an aircraft stand the maximum slope should not exceed 1 % in any direction.

CS ADR-DSN.E.365 Clearance distances on aircraft stands

a) The safety objective of clearance distances on aircraft stands is to provide safe separation between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects.
b) An aircraft stand should provide the following minimum clearances between an aircraft entering or exiting the stand and any adjacent building, aircraft on another stand and other objects:

Code letter	Clearance
A	3 m
B	3 m
C	4.5 m
D	7.5 m
E	7.5 m
F	7.5 m

c) The minimum clearance distance for code letters D, E and F can be reduced:

1) for height limited objects,
2) if the stand is restricted for aircraft with specific characteristics,
3) in the following locations (for aircraft using a taxi-in, push-back procedure only):
(i) between the terminal (including passenger loading bridges) and the nose of an aircraft; and
(ii) over a portion of the stand provided with azimuth guidance by a visual docking guidance system.

CHAPTER F – ISOLATED AIRCRAFT PARKING POSITION

CS ADR-DSN.F.370 Isolated aircraft parking position

a) The safety objective of the isolated aircraft parking position is to provide safe separation between aircraft that need isolation and other aerodrome activities.
b) General An isolated aircraft parking position should be designated by the aerodrome operator for parking of aircraft that needs isolation from normal aerodrome activities.
c) Location The isolated aircraft parking position should be located at the maximum distance practicable and in any case never less than 100 m from other parking positions, buildings, or public areas, etc.

CHAPTER G – DE-ICING/ANTI-ICING FACILITIES

CS ADR-DSN.G.375 General

Aeroplane de-icing/anti-icing facilities should be provided at an aerodrome where icing conditions are expected to occur.

CS ADR-DSN.G.380 Location

a) De-icing/anti-icing facilities should be provided either at aircraft stands or at specified remote areas.
b) The remote de-icing/anti-icing facilities should be located to be clear of the obstacle limitation surfaces, not cause interference to the radio navigation aids and be clearly visible from the air traffic control tower for clearing the treated aeroplane.

CS ADR-DSN.G.385 Size of de-icing/anti-icing pads

a) The safety objective of the de-icing/anti-icing pad dimensions is to allow safe positioning of aircraft for de-icing/anti-icing, including sufficient room for the safe movement of de-icing vehicles around the aircraft.
b) The size of a de-icing/anti-icing pad should be equal to the parking area required by the most demanding aircraft in a given category with at least 3.8 m clear paved area all around the aeroplane for the movement of the de-icing/anti-icing vehicles.

CS ADR-DSN.G.390 Slopes on de-icing/anti-icing pads

The de-icing/anti-icing pads should be provided with suitable slopes:

a) to ensure satisfactory drainage of the area;
b) to permit collection of all excess de-icing/anti-icing fluid running off an aeroplane; and
c) not to hinder the movement of aircraft on or off the pad.

CS ADR-DSN.G.395 Strength of de-icing/anti-icing pads

The de-icing/anti-icing pad should be capable of withstanding the traffic of the aircraft it is intended to serve.

CS ADR-DSN.G.400 Clearance distances on a de-icing/anti-icing pad

a) The safety objective of the clearance distances on a de-icing/anti-icing pad is to provide safe separation between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects.
b) A de-icing/anti-icing pad should provide the following minimum clearances between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects:

Code letter	Clearance
A	3.8 m
B	3.8 m
C	4.5 m
D	7.5 m
E	7.5 m
F	7.5 m

c) If the pad layout is such as to include bypass configuration, the minimum separation distances specified in Table D-1, column (13) should be provided.
d) Where the de-icing/anti-icing facility is located adjoining a regular taxiway, the taxiway minimum separation distance specified in Table D-1, column (11) should be provided (see Figure G-1).

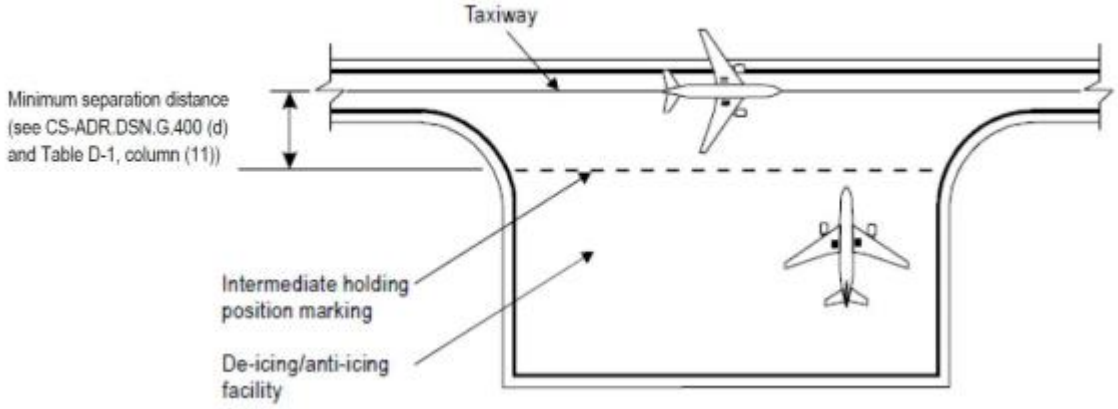

Figure G-1. Minimum separation distance on a de-icing/anti-icing facility

CHAPTER H – OBSTACLE LIMITATION SURFACES

CS ADR-DSN.H.405 Applicability

Applicability: The purpose of the obstacle limitation surfaces is to define the airspace around aerodromes to be maintained free from obstacles so as to permit the intended aeroplane operations at the aerodromes to be conducted safely.

CS ADR-DSN.H.410 Outer horizontal surface

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CS ADR-DSN.H.415 Conical surface

a) Applicability: The purpose of the conical surface is to facilitate safe visual manoeuvring in the vicinity of the aerodrome.
b) Description: A surface sloping upwards and outwards from the periphery of the inner horizontal surface.
c) Characteristics: The limits of the conical surface should comprise:
1) a lower edge coincident with the periphery of the inner horizontal surface; and
2) an upper edge located at a specified height above the inner horizontal surface.
d) The slope of the conical surface should be measured in a vertical plane perpendicular to the periphery of the inner horizontal surface.

CS ADR-DSN.H.420 Inner horizontal surface

a) Applicability: The purpose of the inner horizontal surface is to protect airspace for visual manoeuvring prior to landing.
b) Description: A surface located in a horizontal plane above an aerodrome and its environs.

c) Characteristics: The outer limits of the inner horizontal surface are defined by a circle centred on the geometric centre of the runway, by a convex contour composed of circular arcs centred on the intersections of the extended RWY centre line with the end of the RWY strip, joined tangentially by straight lines parallel to the runway centre line, as shown in Figure H-1, or on other points established for such purpose.
d) The height of the inner horizontal surface should be measured above an established elevation datum. The elevation datum used for the height of the inner horizontal surface should be:

1) the elevation of the highest point of the lowest threshold of the related runway; or
2) the elevation of the highest point of the highest threshold of the related runway; or
3) the elevation of the highest point of the runway; or
4) the aerodrome elevation.

CS ADR-DSN.H.425 Approach surface

a) Applicability: The purpose of the approach surface is to protect an aircraft during the final approach to the runway by defining the area that should be kept free from obstacles to protect an aeroplane in the final phase of the approach-to-land manoeuvre.
b) Description: An inclined plane or combination of planes preceding the threshold.
c) Characteristics. The limits of the approach surface should comprise:

1) an inner edge of specified length, horizontal and perpendicular to the extended centre line of the runway, and located at a specified distance before the threshold;
2) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the runway; and
3) an outer edge parallel to the inner edge. The above surfaces should be varied when lateral offset, offset or curved approaches are utilised, specifically, two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the lateral offset, offset or curved ground track.

d) The elevation of the inner edge should be equal to the elevation of the mid-point of the threshold.
e) The slope(s) of the approach surface should be measured in the vertical plane containing the centre line of the runway and should continue containing the centre line of any lateral offset or curved ground track.

CS ADR-DSN.H.430 Transitional surface

a) Applicability: The purpose of the transitional surface is to define the limit of the area available for buildings, other structures or natural obstructions, such as trees.
b) Description: A complex surface along the side of the strip and part of the side of the approach surface that slopes upwards and outwards to the inner horizontal surface.
c) Characteristics: The limits of a transitional surface should comprise:

1) a lower edge beginning at the intersection of the side of the approach surface with the inner horizontal surface and extending down the side of the approach surface to the inner edge of the approach surface and from there along the length of the strip parallel to the runway centre line; and
2) an upper edge located in the plane of the inner horizontal surface.

d) The elevation of a point on the lower edge should be:

1) along the side of the approach surface — equal to the elevation of the approach surface at that point; and

2) along the strip — equal to the elevation of the nearest point on the centre line of the runway or its extension.

e) The slope of the transitional surface should be measured in a vertical plane at right angles to the centre line of the runway.

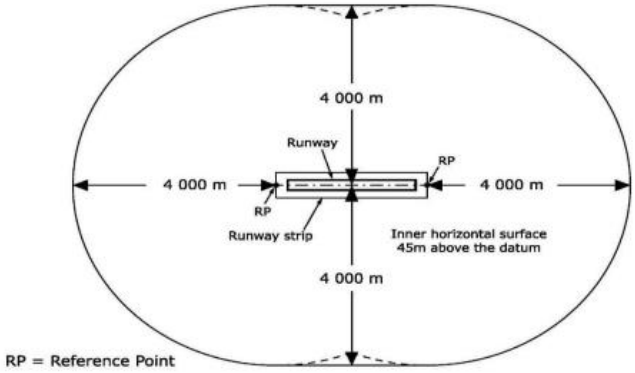
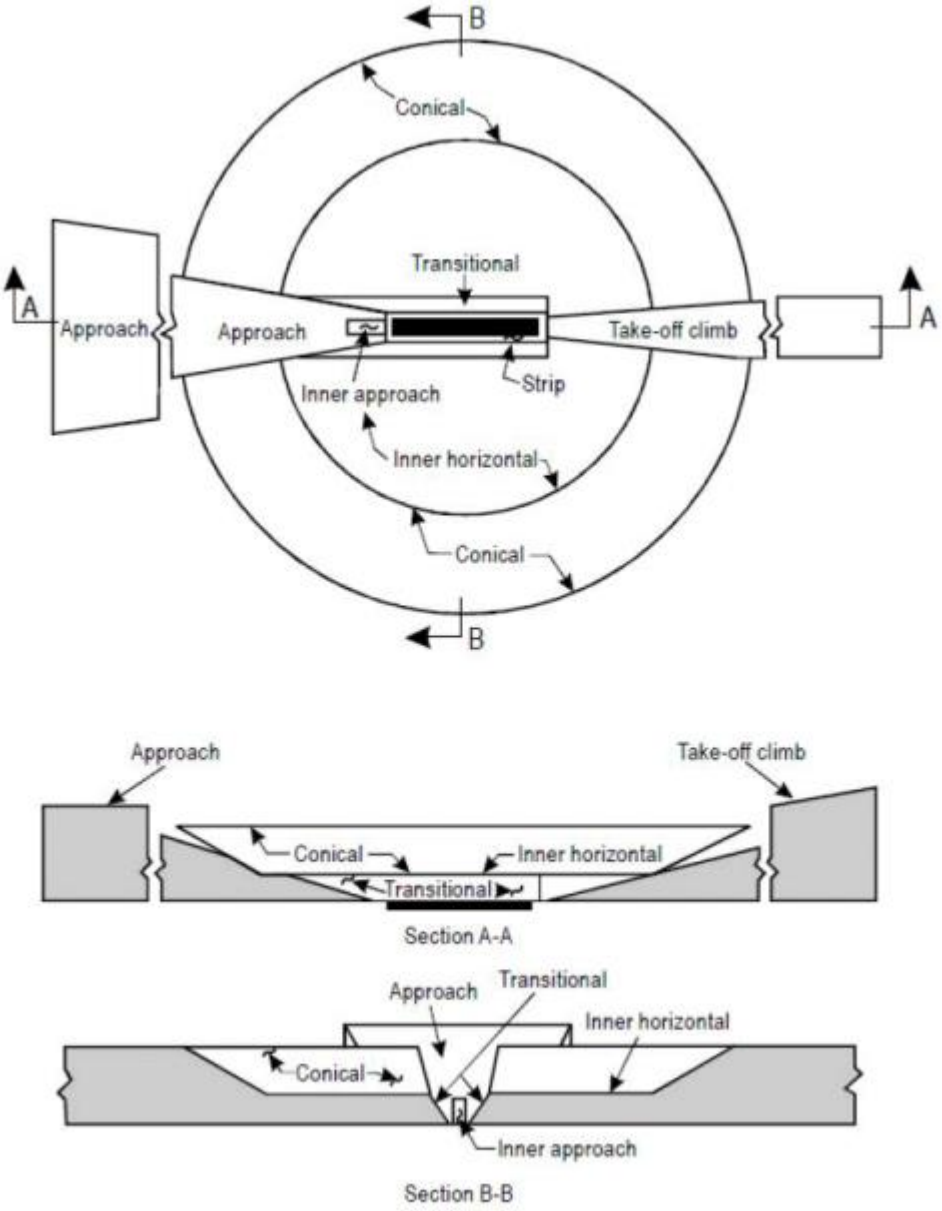


Figure H-1. Inner horizontal surface where the runway is code 4



See Figure H-3. for inner approach, inner transitional, and balked landing obstacle limitation surfaces

Figure H-2. Obstacle limitation surfaces

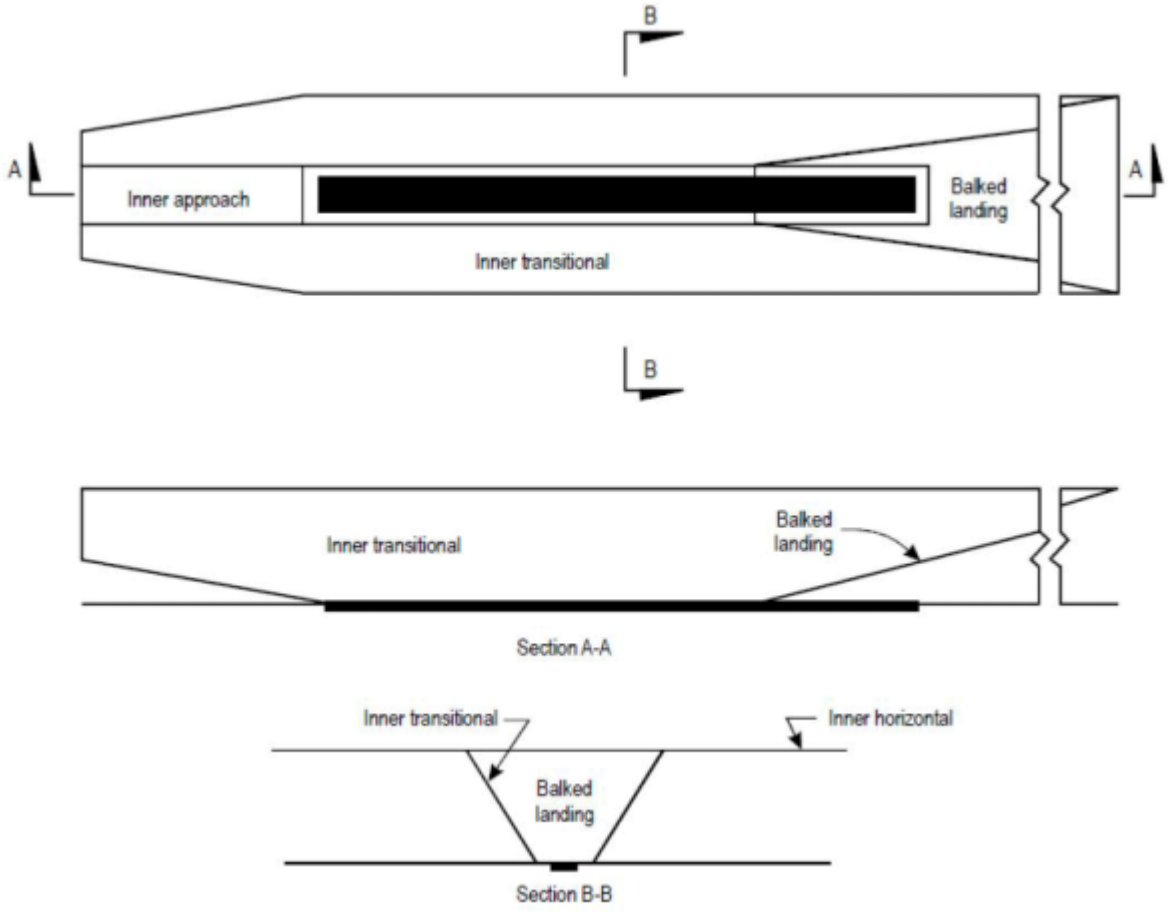


Figure H-3. Inner approach, inner transitional, and balked landing obstacle limitation surfaces

CS ADR-DSN.H.435 Take-off climb surface

a) Applicability: The purpose of the take-off climb surface is to protect an aircraft on take-off and during climb-out.
b) Description: An inclined plane or other specified surface beyond the end of a runway or clearway.
c) Characteristics: The limits of the take-off climb surface should comprise:

1) an inner edge horizontal and perpendicular to the centre line of the runway, and located either at a specified distance beyond the end of the runway, or at the end of the clearway when such is provided, and its length exceeds the specified distance;

2) two sides originating at the ends of the inner edge, diverging uniformly at a specified rate from the take-off track to a specified final width and continuing thereafter at that width for the remainder of the length of the take-off climb surface; and

3) an outer edge horizontal and perpendicular to the specified take-off track.

d) The elevation of the inner edge should be equal to the highest point on the extended runway centre line between the end of the runway and the inner edge, except that when a clearway is provided, the elevation should be equal to the highest point on the ground on the centre line of the clearway.
e) In the case of a straight take-off flight path, the slope of the take-off climb surface should be measured in the vertical plane containing the centre line of the runway.

f) In the case of a take-off flight path involving a turn, the take-off climb surface should be a complex surface containing the horizontal normals to its centre line, and the slope of the centre line should be the same as that for a straight take-off flight path.

CS ADR-DSN.H.440 Slewed take-off climb surface

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CS ADR-DSN.H.445 Obstacle-free zone (OFZ)

a) An OFZ is intended to protect aeroplanes from fixed and mobile obstacles during Category II and III operations when approaches are continued below decision height, and during any subsequent missed approach or balked landing with all engines operating normally. It is not intended to supplant the requirement of other surfaces or areas where these are more demanding.
b) The OFZ is made up of the following obstacle limitation surfaces:

1) inner approach surface;
2) inner transitional surfaces; and
3) balked landing surface.

CS ADR-DSN.H.450 Inner approach surface

a) Applicability: The purpose of the inner approach surface is to protect final precision approaches.
b) Description: A rectangular portion of the approach surface immediately preceding the threshold.
c) Characteristics: The limits of the inner approach surface should comprise:

1) an inner edge coincident with the location of the inner edge of the approach surface but of its own specified length;
2) two sides originating at the ends of the inner edge and extending parallel to the vertical plane containing the centre line of the runway; and
3) an outer edge parallel to the inner edge.

CS ADR-DSN.H.455 Inner transitional surface

a) Applicability: The purpose of the inner transitional surface is to protect aeroplanes during precision approaches and balked landing.
b) Description: A surface similar to the transitional surface but closer to the runway.
c) Characteristics: The limits of an inner transitional surface should comprise:

1) a lower edge beginning at the end of the inner approach surface and extending down the side of the inner approach surface to the inner edge of that surface, from there along the strip parallel to the runway centre line to the inner edge of the balked landing surface, and from there up the side of the balked landing surface to the point where the side intersects the inner horizontal surface; and
2) an upper edge located in the plane of the inner horizontal surface.

d) The elevation of a point on the lower edge should be:

1) along the side of the inner approach surface and balked landing surface — equal to the elevation of the particular surface at that point; and

2) along the strip — equal to the elevation of the nearest point on the centre line of the runway or its extension.

e) The slope of the inner transitional surface should be measured in a vertical plane at right angles to the centre line of the runway.

CS ADR-DSN.H.460 Balked landing surface

a) Applicability: The purpose of the balked landing surface is to protect balked landing.
b) Description: An inclined plane located at a specified distance after the threshold, extending between the inner transitional surfaces.
c) Characteristics: The limits of the balked landing surface should comprise:

1) an inner edge horizontal and perpendicular to the centre line of the runway and located at a specified distance after the threshold;

2) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the runway; and

3) an outer edge parallel to the inner edge and located in the plane of the inner horizontal surface.

d) The elevation of the inner edge should be equal to the elevation of the runway centre line at the location of the inner edge.
e) The slope of the balked landing surface should be measured in the vertical plane containing the centre line of the runway.

CHAPTER J – OBSTACLE LIMITATION REQUIREMENTS

CS ADR-DSN.J.465 General

Obstacle limitation requirements should be distinguished between:
a) non-instrument runways;
b) non-precision approach runways;
c) precision approach runways; and
d) runways meant for take-off.

CS ADR-DSN.J.470 Non-instrument runways

a) The following obstacle limitation surfaces should be established for a non-instrument runway:

1) conical surface;

2) inner horizontal surface;

3) approach surface; and

4) transitional surfaces.

b) The heights and slopes of the surfaces should not be greater than, and their other dimensions not less than, those specified in Table J-1. (c) New objects or extensions of existing objects should not be permitted above an approach or transitional surface except when the new object or extension would be shielded by an existing immovable object.

d) New objects or extensions of existing objects should not be permitted above the conical surface or inner horizontal surface except when the object 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 or significantly affect the regularity of operations of aeroplanes.
e) Existing objects above any of the conical surface, inner horizontal surface, approach surface and transitional surfaces should, as far as practicable, be removed except when the object is shielded by an existing immovable object, or if after a safety assessment, it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.
f) In considering proposed construction, account should be taken of the possible future development of an instrument runway and consequent requirement for more stringent obstacle limitation surfaces.

CS ADR-DSN.J.475 Non-precision approach runways

a) The following obstacle limitation surfaces should be established for a non-precision approach runway:
1) conical surface;
2) inner horizontal surface;
3) approach surface; and
4) transitional surfaces.
b) The heights and slopes of the surfaces should not be greater than, and their other dimensions not less than, those specified in Table J-1, except in the case of the horizontal section of the approach surface (see paragraph (c) below).
c) The approach surface should be horizontal beyond the point at which the 2.5 % slope intersects:
1) a horizontal plane 150 m above the threshold elevation; or
2) the horizontal plane passing through the top of any object that governs the obstacle clearance altitude/height (OCA/H); whichever is the higher.
d) New objects or extensions of existing objects should not be permitted above an approach surface within 3 000 m of the inner edge or above a transitional surface except when the new object or extension would be shielded by an existing immovable object.
e) New objects or extensions of existing objects should not be permitted above the approach surface beyond 3 000 m from the inner edge, the conical surface or inner horizontal surface except when the object would be shielded by an existing immovable object, or after an safety assessment, it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.
f) Existing objects above any of the surfaces required by paragraph (a) should as far as practicable be removed except when the object 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 or significantly affect the regularity of operations of aeroplanes.

CS ADR-DSN.J.480 Precision approach runways

a) The following obstacle limitation surfaces should be established for a precision approach runway Category I:

1) conical surface;
2) inner horizontal surface;
3) approach surface; and
4) transitional surfaces.

b) The following obstacle limitation surfaces should be established for a precision approach runway Category II or III:

1) conical surface;
2) inner horizontal surface;
3) approach surface and inner approach surface;
4) transitional surfaces and inner transitional surfaces; and
5) balked landing surface.

c) The heights and slopes of the surfaces should not be greater than, and their other dimensions not less than, those specified in Table J-1, except in the case of the horizontal section of the approach surface in paragraph (d) below.

d) The approach surface should be horizontal beyond the point at which the 2.5 % slope intersects:

1) a horizontal plane 150 m above the threshold elevation; or
2) the horizontal plane passing through the top of any object that governs the obstacle clearance limit; whichever is the higher.

e) Fixed objects should not be permitted above the inner approach surface, the inner transitional surface or the balked landing surface, except for frangible objects which because of their function should be located on the strip. Mobile objects should not be permitted above these surfaces during the use of the runway for landing.

f) New objects or extensions of existing objects should not be permitted above an approach surface or a transitional surface except when the new object or extension would be shielded by an existing immovable object.

g) New objects or extensions of existing objects should not be permitted above the conical surface and the inner horizontal surface except when an object 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 or significantly affect the regularity of operations of aeroplanes.

h) Existing objects above an approach surface, a transitional surface, the conical surface and inner horizontal surface should, as far as practicable, be removed except when an object 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 or significantly affect the regularity of operations of aeroplanes.

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	2000 m	2500 m	4000 m	4000 m	3500 m	4000 m	4000 m	3500 m	4000 m	4000 m
INNER APPROACH										
Width	-	-	-	-	-	-	-	90 m	120 m[e]	120 m[e]
Distance from treshold	-	-	-	-	-	-	-	60 m	60 m	60 m
Length	-	-	-	-	-	-	-	900 m	900 m	900 m
Slope	-	-	-	-	-	-	-	2.5%	2 %	2%
APPROACH										
Length of inner edge	60 m	80 m	150 m	150 m	140 m	280 m	280 m	140 m	280 m	280 m
Distance from treshold	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	1600 m	2500 m	3000 m	3000 m	2500 m	3000 m	3000 m	3000 m	3000 m	3000 m
Slope	5%	4%	3.33%	2.5%	3.33%	2%	2%	2.5%	2%	2%
Second section										
Length	-	-	-	-	-	3600 m[b]	3600 m[b]	12000 m	3600 m[b]	3600 m[b]
Slope	-	-	-	-	-	2.5%	2.5%	3%	2.5%	2.5%
Horizontal section										
Length	-	-	-	-	-	8400 m[b]	8400 m[b]	-	8400 m[b]	8400 m[b]
Total length	-	-	-	-	-	15000 m	15000 m	15000 m	15000 m	15000 m

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)
TRANSITIONAL										
Slope	20%	20%	14.3%	14.3%	20%	14.3%	14.3%	14.3%	14.3%	14.3%
INNER TRANSITIONAL										
Slope	-	-	-	-	-	-	-	40%	33.3%	33.3%
BALKED LANDING SURFACE										
Length of inner edge	-	-	-	-	-	-	-	90 m	120 m[e]	120 m[e]
Distance from threshold	-	-	-	-	-	-	-	c	1800 m[d]	1800 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 of Table A-1), the width is increased to 140 m.

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

CS ADR-DSN.J.485 Runways meant for take-off

a) The safety objective of the take-off climb surface slopes and dimensions is to allow safe take-off operations by defining the limits above which new obstacles should not be permitted unless shielded by an existing immoveable object.
b) A take-off climb surface should be established for a runway meant for take-off.
c) The dimensions of the surface should be not less than the dimensions specified in Table J-2, except that a lesser length may be adopted for the take-off climb surface where such lesser length would be consistent with procedural measures adopted to govern the outward flight of aeroplanes.
d) New objects or extensions of existing objects should not be permitted above a take-off climb surface except when the new object or extension would be shielded by an existing immovable object.

e) Existing objects that extend above a take-off climb surface should as far as practicable be removed except when an object is shielded by an existing immovable object, or if after a safety assessment, it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

RUNWAYS MEANT FOR TAKE-OFF			
	Code number		
Surface and dimensions *a*	1	2	3 or 4
(1)	(2)	(3)	(4)
TAKE-OFF CLIMB			
Length of inner edge	60 *e* m	80 *e* m	180 m
Distance from runway end b	30 m	60 m	60 m
Divergence (each side)	10 %	10 %	12.5%
Final width	380 m	580 m	1 200 m 1 800 m *c*
Length	1 600 m	2 500 m	15 000 m
Slope	5 %	4 %	2 %

a All dimensions are measured horizontally unless specified otherwise.
b The take-off climb surface starts at the end of the clearway if the clearway length exceeds the specified distance.
c 1 800 m when the intended track includes changes of heading greater than 15° for operations conducted in IMC, VMC by night.
d See GM1 ADR-DSN.J.485(a) and (e).
e Where clearway is provided the length of the inner edge should be 150 m.

Table J-2. Dimensions and slopes of obstacle limitation surfaces — Runways meant for take-off

CS ADR-DSN.J.486 Other objects

a) Objects which do not project through the approach surface but which would nevertheless adversely affect the optimum siting or performance of visual or non-visual aids should, as far as practicable, be removed.
b) Anything which may, after a safety assessment, endanger aeroplanes on the movement area or in the air within the limits of the inner horizontal and conical surfaces should be regarded as an obstacle and should be removed in so far as practicable.

CS ADR-DSN.J.487 Objects outside the obstacle limitation surfaces

a) Applicability: The specifications in paragraph (b) below apply only to the area under control of the aerodrome operator.
b) In areas beyond the limits of the obstacle limitation surfaces, at least those objects which extend to a height of 150 m or more above ground elevation should be regarded as obstacles, unless a safety assessment indicates that they do not constitute a hazard to aeroplanes.

CHAPTER K – VISUAL AIDS FOR NAVIGATION (INDICATORS AND SIGNALLING DEVICES)

CS ADR-DSN.K.490 Wind direction indicator

a) An aerodrome should be equipped with a sufficient number of wind direction indicators in order to provide wind information to the pilot during approach and take-off.
b) Location: Each wind direction indicator should be located so that at least one wind direction indicator is visible from aircraft in flight, during approach or on the movement area before take-off, and in such a way as to be free from the effects of air disturbances caused by nearby objects.
c) Characteristics:

1) Each wind direction indicator should be in the form of a truncated cone made of fabric and should have a length of not less than 3.6 m and a diameter, at the larger end, of not less than 0.9 m.
2) It should be constructed so that it gives a clear indication of the direction of the surface wind and a general indication of the wind speed.
3) The colour or colours should be so selected as to make the wind direction indicator clearly visible and understandable from a height of at least 300 m. Having regard to background:
(i) where practicable, a single colour should be used; and
(ii) where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and should be arranged in five alternate bands, the first and last bands being the darker colour.

d) Night conditions: Provision should be made for illuminating a sufficient number of wind indicators at an aerodrome intended for use at night.

CS ADR-DSN.K.495 Landing direction indicator

a) Location: Where provided, a landing direction indicator should be located in a conspicuous place on the aerodrome.
b) Characteristics:

1) The landing direction indicator should be in the form of a ‘T’.
2) The shape and minimum dimensions of a landing ‘T’ should be as shown in Figure K-1.
3) The colour of the landing ‘T’ should be either white or orange, the choice being dependent on the colour that contrasts best with the background against which the indicator should be viewed.
4) Where used at night, the landing ‘T’ should either be illuminated or outlined by white lights.

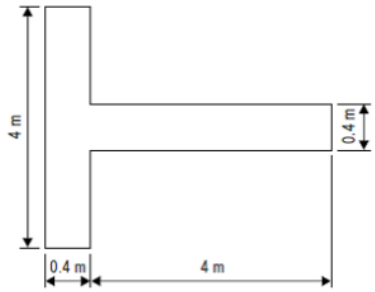

Figure K-1. Landing direction indicator

CS ADR-DSN.K.500 Signalling lamp

a) A signalling lamp should be provided at a controlled aerodrome in the aerodrome control tower.

b) Characteristics:

1) A signalling lamp should be capable of producing red, green and white signals, and of:

(i) being aimed manually at any target as required; and

(ii) giving a signal in any one colour followed by a signal in either of the two other colours.

2) The beam spread should be not less than 1° or greater than 3°, with negligible light beyond 3°. When the signalling lamp is intended for use in the daytime, the intensity of the coloured light should be not less than 6 000 cd.

CS ADR-DSN.K.505 Signal panels and signal area

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CS ADR-DSN.K.510 Location of signal panels and signal area

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CS ADR-DSN.K.515 Characteristics of signal panels and signal area

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CHAPTER L - VISUAL AIDS FOR NAVIGATION (MARKINGS)

CS ADR-DSN.L.520 General - Colour and conspicuity

Markings should be of a conspicuous colour and contrast with the surface on which they are laid.

a) Runway markings should be white.

b) Markings for taxiways, runway turn pads, and aircraft stands should be yellow.

c) Apron safety lines should be of a conspicuous colour which should contrast with that used for aircraft stand markings.
d) When it is operationally necessary to apply temporary runway or taxiway markings, those markings should comply with the relevant CS.

CS ADR-DSN.L.525 Runway designation marking

a) Applicability: A runway designation marking should be provided at the thresholds of a runway.
b) Location and positioning: A runway designation marking should be located at a threshold as shown in Figure L-1 as appropriate.
c) Characteristics:

1) A runway designation marking should consist of a two-digit number and on parallel runways should be supplemented with a letter.

(i) On a single runway, dual parallel runways and triple parallel runways, the two-digit number should be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach.

(ii) On four or more parallel runways, one set of adjacent runways should be numbered to the nearest one-tenth magnetic azimuth and the other set of adjacent runways numbered to the next nearest one-tenth of the magnetic azimuth.

(iii) When a runway designation marking consists of a single digit number, it should be preceded by a zero.

2) In the case of parallel runways, each runway designation number should be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach: (i) for two parallel runways: ‘L’ ‘R’;

(ii) for three parallel runways: ‘L’ ‘C’ ‘R’;

(iii) for four parallel runways: ‘L’ ‘R’ ‘L’ ‘R’; (iv) for five parallel runways: ‘L’ ‘C’ ‘R’ ‘L’ ‘R’ or ‘L’ ‘R’ ‘L’ ‘C’ ‘R’; and (v) for six parallel runways: ‘L’ ‘C’ ‘R’ ‘L’ ‘C’ ‘R’.

3) The numbers and letters should be in the form and proportion shown in Figure L-2. The dimensions should be not less than those shown in Figure L-2. Where the numbers are incorporated in the threshold marking, larger dimensions should be used in order to fill adequately the gap between the stripes of the threshold marking.

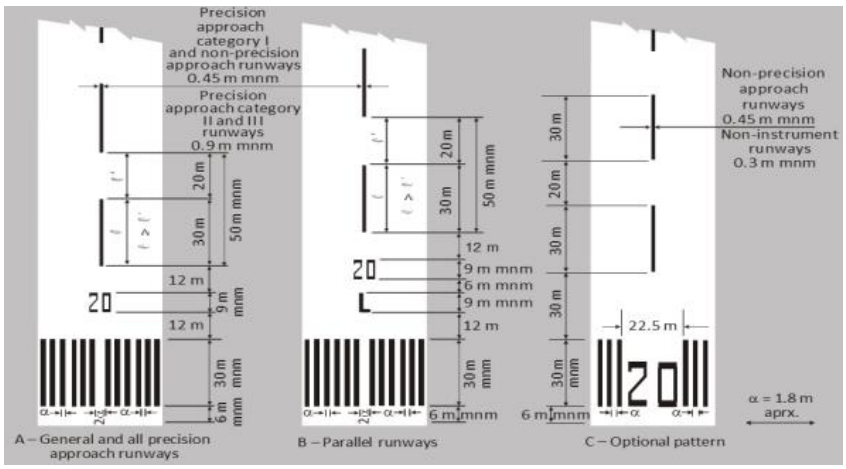


Figure L-1. Runway designation, centre line and threshold markings

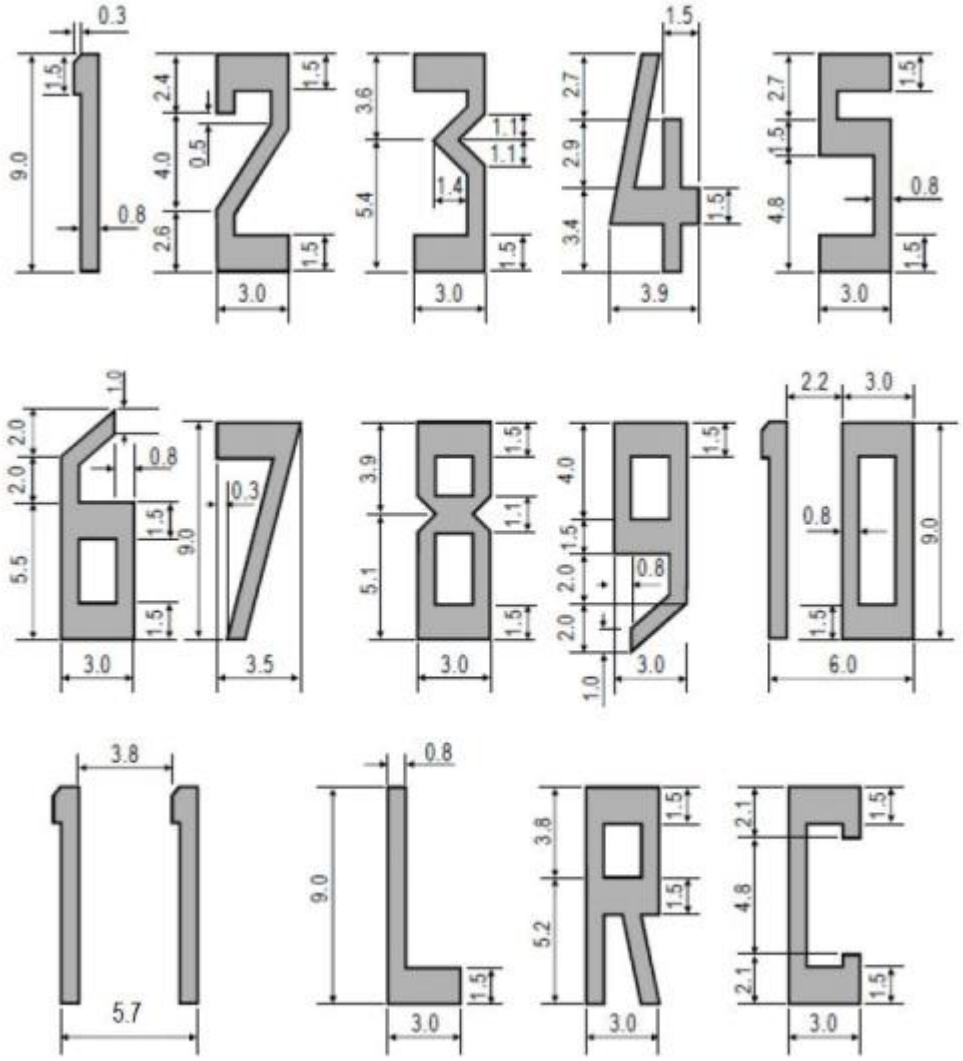


Figure L-2. Form and proportions of numbers and letters for runway designation markings

CS ADR-DSN.L.530 Runway centre line marking

a) Applicability: A runway centre line marking should be provided on a paved runway.
b) Location: A runway centre line marking should be located along the centre line of the runway between the runway designation marking as shown in Figure L-1, except when interrupted as given in CS ADR-DSN.L.560.
c) Characteristics:

1) A runway centre line marking should consist of a line of uniformly spaced stripes and gaps. The length of a stripe plus a gap should be not less than 50 m or more than 75 m. The length of each stripe should be at least equal to the length of the gap or 30 m, whichever is greater.
2) The width of the stripes should be not less than:
   (i) 0.90 m on precision approach Category II and III runways;

(ii) 0.45 m on non-precision approach runways where the code number is 3 or 4, and precision approach Category I runways; and
(iii) 0.30 m on non-precision approach runways where the code number is 1 or 2, and on non-instrument runways.

CS ADR-DSN.L.535 Threshold marking

a) Applicability: A threshold marking should be provided at the threshold of a runway.
b) Characteristics:

1) The stripes of the threshold marking should commence 6 m from the threshold.
2) A runway threshold marking should consist of a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of a runway as shown in Figure L-1(A) and L-1(B) for a runway width of 45 m. The number of stripes should be in accordance with the runway width as follows:

Runway width	Number of stripes
18 m	4
23 m	6
30 m	8
45 m	12
60 m	16

except that on non-precision approach and non-instrument runways 45 m or greater in width, they may be as shown in Figure L-1(C).
3) The stripes should extend laterally to within 3 m of the edge of a runway or to a distance of 27 m on either side of a runway centre line, whichever results in the smaller lateral distance.
4) Where a runway designation marking is placed within a threshold marking, there should be a minimum of three stripes on each side of the centre line of the runway.
5) Where a runway designation marking is placed above a threshold marking, the stripes should be continued across the runway. The stripes should be at least 30 m long and approximately 1.80 m wide with spacings of approximately 1.80 m between them. Where the stripes are continued across a runway, a double spacing should be used to separate the two stripes nearest the centre line of the runway, and in the case where the designation marking is included within the threshold marking, this spacing should be 22.5 m.

c) Displaced threshold:

1) Where a threshold is displaced from the extremity of a runway or where the extremity of a runway is not square with the runway centre line, a transverse stripe as shown in Figure L-3(B) should be added to the threshold marking.
2) A transverse stripe should be not less than 1.80 m wide.
3) Where a runway threshold is permanently displaced, arrows conforming to Figure L-3(B) should be provided on the portion of the runway before the displaced threshold.
4) When a runway threshold is temporarily displaced from the normal position, it should be marked as shown in Figure L-3(A) or L-3(B), and all markings prior to the

displaced threshold should be obscured except the runway centre line marking which should be converted to arrows.

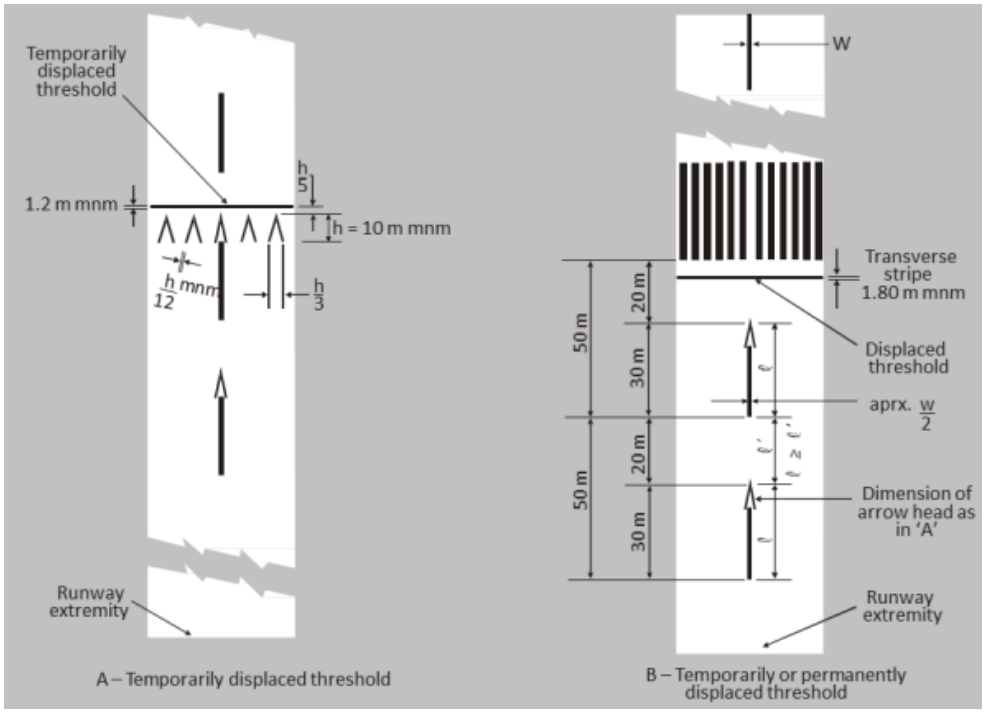


Figure L-3. Displaced threshold markings

CS ADR-DSN.L.540 Aiming point marking

a) Applicability:

1) An aiming point marking should be provided at each approach end of an instrument runway where the code number is 2, 3, or 4.

2) An aiming point marking should be provided when additional conspicuity of the aiming point is required at each approach end of:

(i) a non-instrument runway where the code number is 3 or 4,

(ii) an instrument runway where the code number is 1.

b) Characteristics. The aiming point marking should commence no closer to the threshold than the distance indicated in the appropriate column of Table L-1, except that, on a runway equipped with a PAPI system, the beginning of the marking should be coincident with the visual approach slope origin.

Location and dimensions	Landing distance available			
	Less than 800 m	800 m up to but not including 1 200 m	1 200 m up to but not including 2 400 m	2 400 m and above
(1)	(2)	(3)	(4)	(5)
Distance from threshold to beginning of marking *a*	150 m	250 m	300 m	400 m
Length of stripe *b*	30-45 m	30-45 m	45-60 m	45-60 m
Width of stripe	4 m	6 m	6-10m c	6-10 m c
Lateral spacing between inner sides of stripes	6 m d	9 m d	18-22.5 m	18-22.5 m

a Where a PAPI system is provided for the runway, the beginning of the marking should be coincident with the visual approach slope origin.
b Where greater dimensions of the specified ranges are intended to be used where increased conspicuity is required.
c Where lateral spacing may be varied within these limits to minimise the contamination of the marking by rubber deposits.
d These figures were deduced by reference to the outer main gear wheel span which is element 2 of the aerodrome reference code

Table L-1. Location and dimensions of aiming point marking

c) An aiming point marking should consist of two conspicuous stripes. The dimensions of the stripes and the lateral spacing between their inner sides should be in accordance with the provisions of the appropriate column of Table L-1.

CS ADR-DSN.L.545 Touchdown zone marking

a) Applicability:

1) A touchdown zone marking should be provided in the touchdown zone of a paved precision approach runway where the code number is 2, 3, or 4.

2) A touchdown zone marking should be provided in the touchdown zone of a paved non-precision approach or non-instrument runway where the code number is 3 or 4 and additional conspicuity of the touchdown zone is desirable.

b) Location: A touchdown zone marking should consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway, the distance between the thresholds, as follows:

Landing distance available or the distance between tresholds	Pair(s) of markings
less than 900 m	1
900 m up to but not including 1 200 m	2
1 200 m up to but not including 1 500 m	3
1 500 m up to but not including 2 400 m	4
2 400 m or more	6

c) Characteristics:

1) A touchdown zone marking should conform to the patterns shown in Figure L-4. For the pattern shown in Figure L-4(A), the markings should be not less than 22.5 m long and 3 m wide. For the pattern shown in Figure L-4(B), each stripe of each marking should be not less than 22.5 m long and 1.8 m wide with spacing of 1.5 m between adjacent stripes.

2) The lateral spacing between the inner sides of the rectangles should be equal to that of the aiming point marking where provided. Where an aiming point marking is not provided, the lateral spacing between the inner sides of the rectangles should correspond to the lateral spacing specified for the aiming point marking in Table L-1 (columns (2), (3), (4), or (5), as appropriate). The pairs of markings should be provided at longitudinal spacings of 150 m beginning from the threshold, except that pairs of touchdown zone markings coincident with or located within 50 m of an aiming point marking should be deleted from the pattern.

3) On a non-precision approach runway where the code number is 2, an additional pair of touchdown zone marking stripes should be provided 150 m beyond the beginning of the aiming point marking.

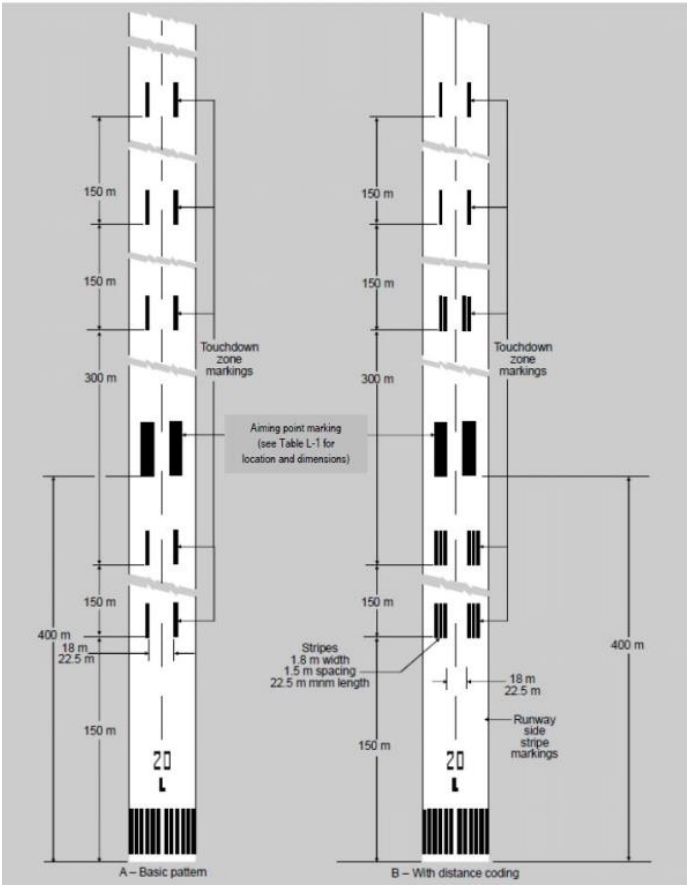


Figure L-4. Aiming point and touchdown zone markings (illustrated for a runway with a length of 2 400 m or more)

CS ADR-DSN.L.550 Runway side stripe marking

a) Applicability:

1) A runway side stripe marking should be provided between the thresholds of a runway where there is a lack of contrast between the runway edges and the shoulders or the surrounding terrain.

2) A runway side stripe marking should be provided on a precision approach runway irrespective of the contrast between the runway edges and the shoulders or the surrounding terrain.

b) Location and characteristics:

1) A runway side stripe marking should consist of two stripes, one placed along each edge of the runway with the outer edge of each stripe approximately on the edge of the runway, except that, where the runway is greater than 60 m in width, the stripes should be located 30 m from the runway centre line.

2) Where a runway turn pad is provided, the runway side stripe marking should be continued between the runway and the runway turn pad.

3) A runway side stripe should have an overall width of at least 0.9 m on runways 30 m or more in width and at least 0.45 m on narrower runways.

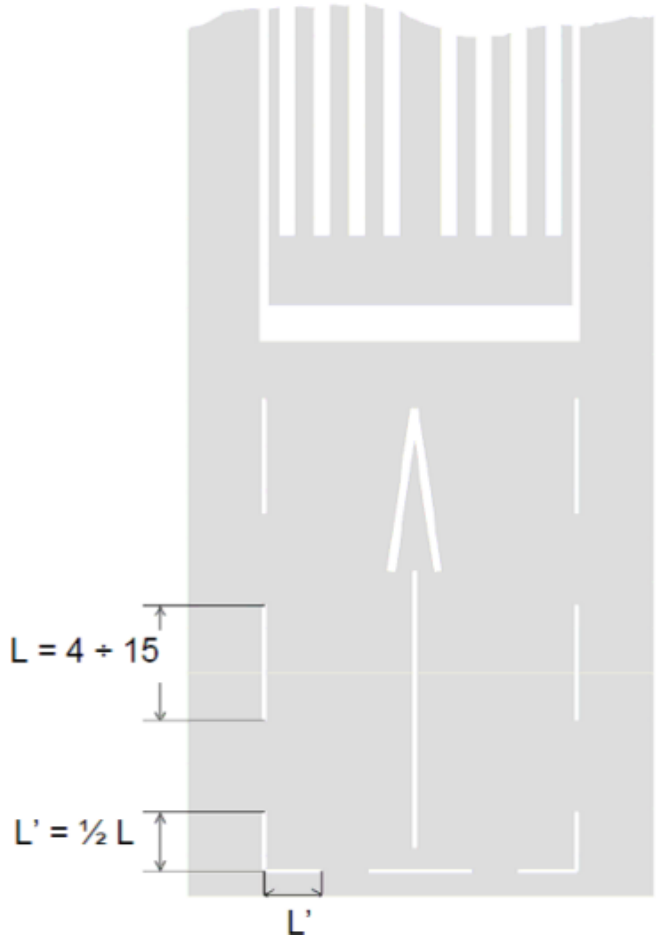


Figure GM-L-1. Dashed runway side stripe marking

Runway width (m)	Single dash dimensions	
	Length (minimum m)	Width (m)
60	15	0.45
45	15	0.45
30	10	0.45
23	6	0.25
18	4	0.25
Note: The length of the gap is much as possible equal, but no longer, to the length of the corresponding marking		

Table GM-L-1. Dashed runway side stripe markings

CS ADR-DSN.L.555 Taxiway centre line marking

a) Applicability:

1) Taxiway centre line marking should be provided on a taxiway, de-icing/anti-icing facility and apron in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

2) Taxiway centre line marking should be provided on a runway when the runway is part of a standard taxi-route and where the taxiway centre line is not coincident with the runway centre line.

b) Characteristics:

1) On a straight section of a taxiway, the taxiway centre line marking should be located along the taxiway centre line.

2) On a taxiway curve, the marking should continue from the straight portion of the taxiway at a constant distance from the outside edge of the curve.

3) At an intersection of a taxiway with a runway, where the taxiway serves as an exit from the runway, the taxiway centre line marking should be curved into the runway centre line marking as shown in Figure L-5. The taxiway centre line marking should be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

4) Where taxiway centre line marking is provided in accordance with (a)(2) above, the marking should be located on the centre line of the designated taxiway.

5) A taxiway centre line marking should be at least 15 cm in width and continuous in length except where it intersects with a runway-holding position marking or an intermediate holding position marking as shown in Figure L-5. Taxiway markings (shown with basic runway markings).

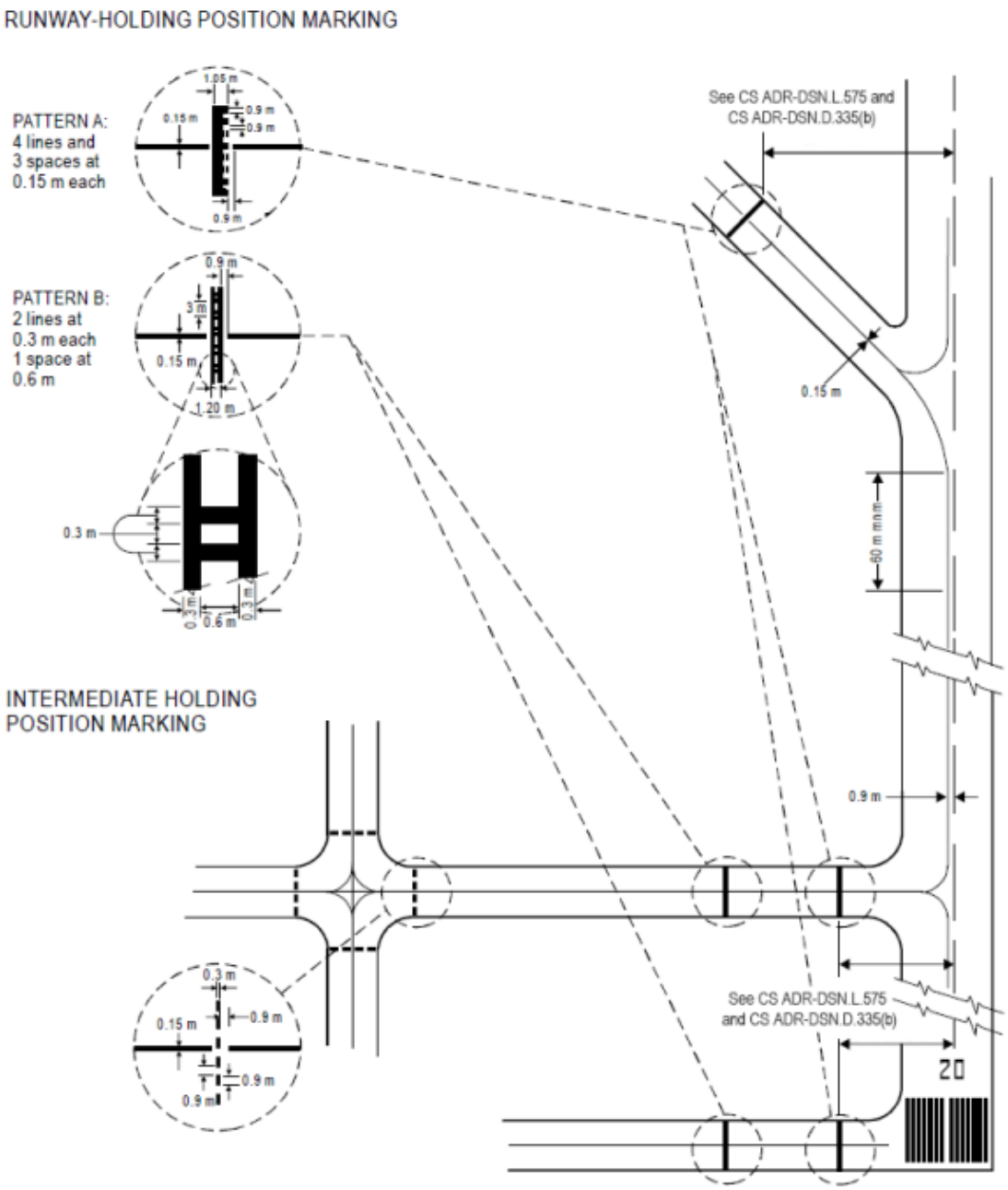


Figure L-5. Taxiway markings (shown with basic runway markings)

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

a) At an intersection of two (or more) runways, the markings of the more important runway, except for the runway side stripe marking, should be displayed and the markings of the other runway(s) should be interrupted. The runway side stripe marking of the more important runway should be either continued across the intersection or interrupted.

b) The order of importance of runways for the display of runway markings should be as follows:

1) precision approach runway;

2) non-precision approach runway; and

3) non-instrument runway.

c) At an intersection of a runway and taxiway the markings of the runway should be displayed and the markings of the taxiway interrupted, except that runway side stripe markings should be either continued across the intersection or interrupted.

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

a) Applicability: Where a runway turn pad is provided, a runway turn pad marking should be provided for continuous guidance to enable an aeroplane to complete a 180-degree turn and align with the runway centre line.

b) Characteristics:

1) The runway turn pad marking should be curved from the runway centre line into the turn pad. The radius of the curve should be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the runway turn pad is intended.

2) The intersection angle of the runway turn pad marking with the runway centre line should not be greater than 30 degrees.

3) The runway turn pad marking should be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

4) A runway turn pad marking should guide the aeroplane in such a way as to allow a straight portion of taxiing before the point where a 180-degree turn is to be made. The straight portion of the runway turn pad marking should be parallel to the outer edge of the runway turn pad.

5) The design of the curve allowing the aeroplane to negotiate a 180-degree turn should be based on a nose wheel steering angle not exceeding 45 degrees.

(6) The design of the turn pad marking should be such that when the cockpit of the aeroplane remains over the runway turn pad marking, the clearance distance between any wheel of the aeroplane landing gear and the edge of the runway turn pad should be not less than those specified in CS ADR-DSN.B.095(c).

(7) A runway turn pad marking should be at least 15 cm in width and continuous in length.

CS ADR-DSN.L.570 Enhanced taxiway centre line marking

a) Where provided, an enhanced taxiway centre line marking should be installed at each taxiway/runway intersection where it is necessary to denote the proximity of a runway-holding position.

b) Characteristics:

1) Enhanced taxiway centre line marking should be as shown in Figure L-6. An enhanced taxiway centre line marking should extend from the runway-holding position Pattern A (as defined in Figure L-5) to a distance of up to 47 m in the direction of travel away from the runway (see Figure L-6(a)).

2) If the enhanced taxiway centre line marking intersects another runway-holding position marking, such as for a precision approach Category II or III runway, that is located within 47 m of the first runway-holding position marking, the enhanced

taxiway centre line marking should be interrupted 0.9 m prior to and after the intersected runway-holding position marking. The enhanced taxiway centre line marking should continue beyond the intersected runway-holding position marking for at least three dashed line segments or 47 m from start to finish, whichever is greater (see Figure L-6(b)).

3) If the enhanced taxiway centre line marking continues through a taxiway/taxiway intersection that is located within 47 m of the runway-holding position marking, the enhanced taxiway centre line marking should be interrupted 1.5 m prior to and after the point where the intersected taxiway centre line crosses the enhanced taxiway centre line. The enhanced taxiway centre line marking should continue beyond the taxiway/taxiway intersection for at least three dashed line segments or 47 m from start to finish, whichever is greater (see Figure L-6(c)).

4) Where two taxiway centre lines converge at or before the runway-holding position marking, the inner dashed line should not be less than 3 m in length (see Figure L-6(d)).

5) Where there are two opposing runway-holding position markings and the distance between the markings is less than 94 m, the enhanced taxiway centre line markings should extend over this entire distance. The enhanced taxiway centre line markings should not extend beyond either runway-holding position marking (see Figure L-6(e)).

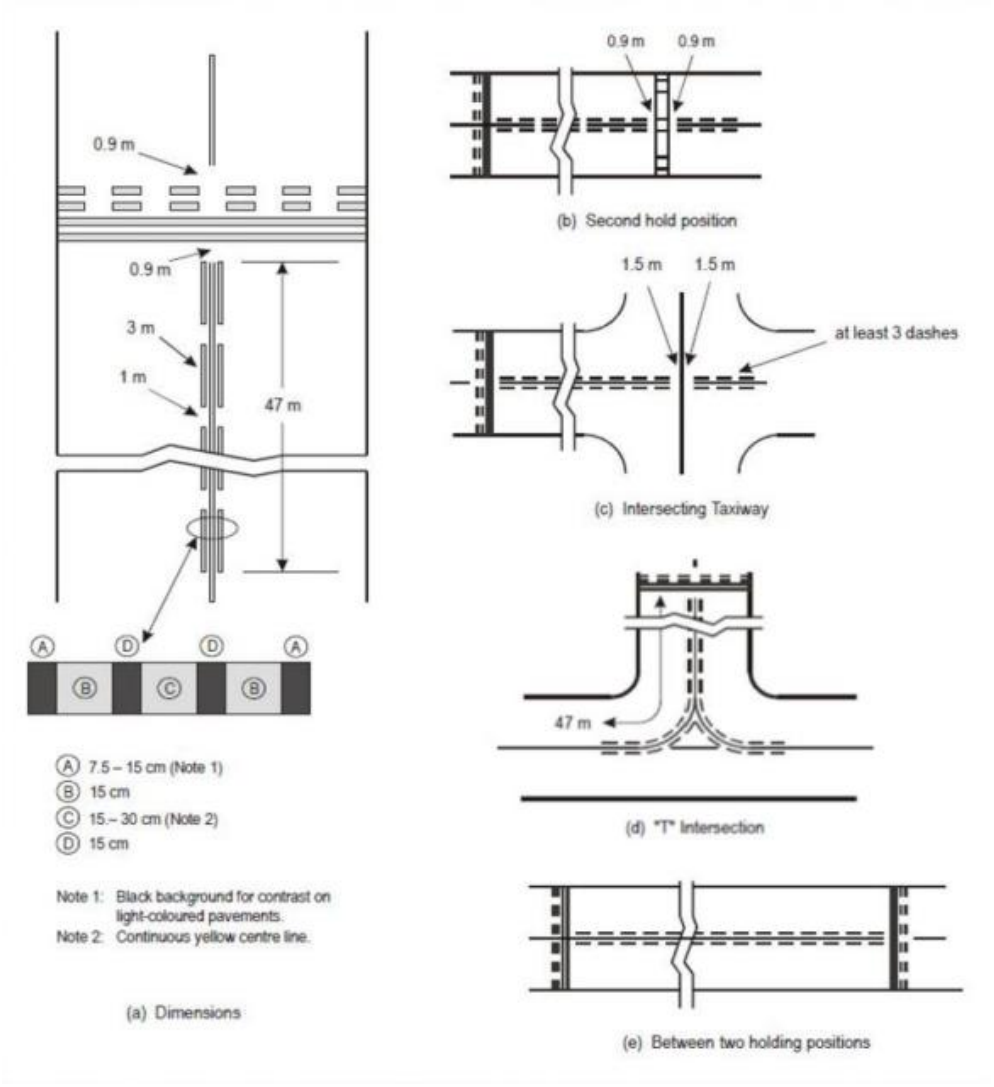


Figure L-6. Enhanced taxiway centre line marking

CS ADR-DSN.L.575 Runway-holding position marking

A runway-holding position marking should be displayed along a runway-holding position.

a) Characteristics:

1) At an intersection of a taxiway and a non-instrument, non-precision approach or takeoff runway, the runway-holding position marking should be as shown in Figure L-5, pattern A.

2) Where a single runway-holding position is provided at an intersection of a taxiway and a precision approach Category I, II or III runway, the runway-holding position marking should be as shown in Figure L-5, pattern A.

3) Where two or three runway-holding positions are provided at such an intersection, the runway-holding position marking closer (closest) to the runway should be as shown in Figure L-5, pattern A, and the markings farther from the runway should be as shown in Figure L-5, pattern B.

4) The runway-holding position marking displayed at a runway-holding position established in accordance with CS ADR-DSN.D.335(b)(1) should be as shown in Figure L-5, pattern A.

5) Where increased conspicuity of the runway-holding position is required, the runwayholding position marking should be as shown in Figure L-7, pattern A or pattern B, as appropriate.

6) Where a pattern B runway-holding position marking is located on an area where it would exceed 60 m in length, a mandatory instruction marking containing the term 'CAT II' or 'CAT III' as appropriate should be marked on the surface at the ends of the runwayholding position marking and at equal intervals of 45 m maximum between successive marks. The letters should be not less than 1.8 m high and should be placed not more than 0.9 m on the holding side of the runway holding position marking.

7) The runway-holding position marking displayed at a runway/runway intersection should be perpendicular to the centre line of the runway forming part of the standard taxi-route. The pattern of the marking should be as shown in Figure L-7, pattern A.

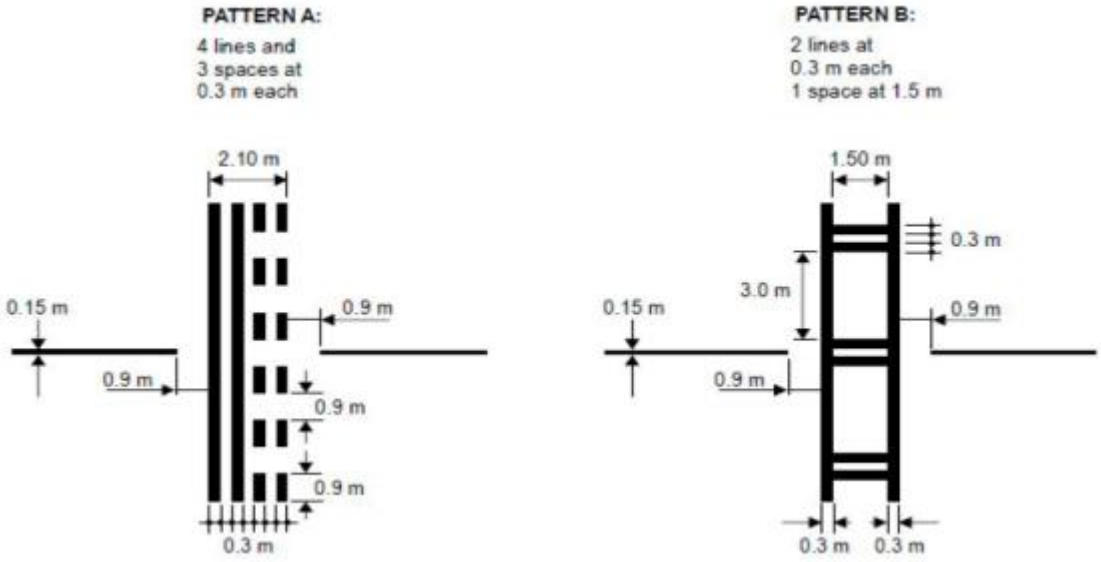


Figure L-7. Runway-holding position markings

CS ADR-DSN.L.580 Intermediate holding position marking

a) Applicability:

1) An intermediate holding position marking should be displayed along an intermediate holding position.

2) An intermediate holding position marking should be displayed at the exit boundary of a remote de-icing/anti-icing facility adjoining a taxiway.

b) Location:

1) Where an intermediate holding position marking is displayed at an intersection of two taxiways, it should be located across the taxiway at sufficient distance from the near edge of the intersecting taxiway to ensure safe clearance between taxiing aircraft. It should be coincident with a stop bar or intermediate holding position lights where provided.

2) The distance between an intermediate holding position marking at the exit boundary of a remote de-icing/anti-icing facility and the centre line of the adjoining taxiway should not be less than the dimension specified in the table below.

Code letter	Distance (metres)
A	15.5
B	20
C	26
D	37
E	43.5
F	51

(c) Characteristics: An intermediate holding position marking should consist of a single broken line as shown in Figure L-5.

CS ADR-DSN.L.585 VOR aerodrome checkpoint marking

a) Applicability: When a VOR aerodrome check-point is established, it should be indicated by a VOR aerodrome check-point marking and sign.
b) Location: A VOR aerodrome check-point marking should be centred on the spot at which an aircraft is to be parked to receive the correct VOR signal.
c) Characteristics:

1) A VOR aerodrome check-point marking should consist of a circle 6 m in diameter and have a line width of 15 cm (see Figure L-8(A)).

2) When it is preferable for an aircraft to be aligned in a specific direction, a line should be provided that passes through the centre of the circle on the desired azimuth. The line should extend 6 m outside the circle in the desired direction of heading and terminate in an arrowhead. The width of the line should be 15 cm (see Figure L-8(B)).

3) A VOR aerodrome check-point marking should differ from the colour used for the taxiway markings and when applicable from a contrasting viewpoint, be white in colour.

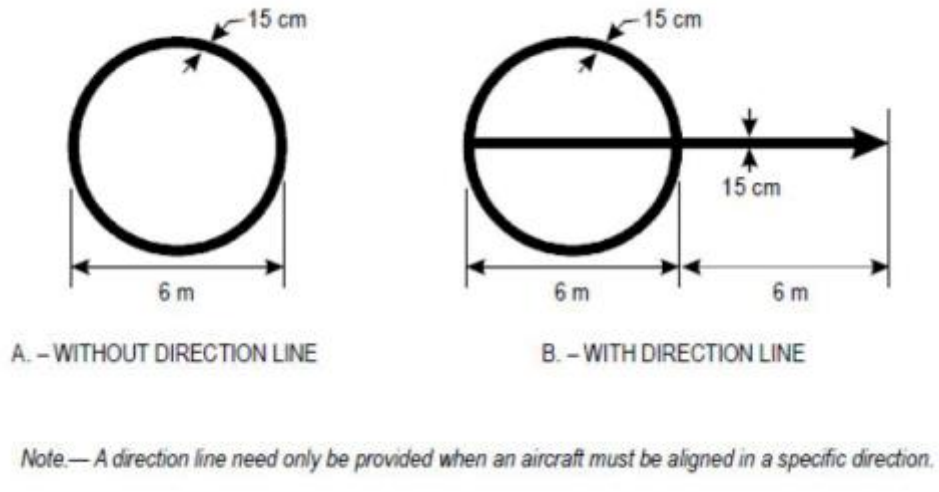


Figure L-8. VOR check-point marking

CS ADR-DSN.L.590 Aircraft stand marking

a) Applicability: Aircraft stand markings should be provided for designated parking positions on an apron and on a de-icing/anti-icing facility.
b) General characteristics: Aircraft stand markings should include such elements as stand identification, lead-in line, turn bar, turning line, alignment bar, stop line and lead-out line as are required by the parking configuration and to complement other parking aids.
c) Aircraft stand identification:

1) An aircraft stand identification (letter and/or number) should be included in the lead-in line a short distance after the beginning of the lead-in line. The height of the identification should be adequate to be readable from the cockpit of aircraft using the stand.

2) Identification of the aircraft for which each set of markings is intended, should be added to the stand identification where two sets of aircraft stand markings are superimposed on each other in order to permit more flexible use of the apron and safety would be impaired if the wrong marking was followed.

d) Lead-in, turning, and lead-out lines:

1) Lead-in, turning, and lead-out lines should, as far as practicable, be continuous in length and have a width of not less than 15 cm. Where one or more sets of stand markings are superimposed on a stand marking, the lines should be continuous for the most demanding aircraft and broken for other aircraft.

2) The curved portions of lead-in, turning, and lead-out lines should have radii appropriate to the most demanding aircraft type for which the markings are intended.

3) Where it is intended that an aircraft proceeds in one direction only, arrows pointing in the direction to be followed should be added as part of the lead-in and lead-out lines.

e) Alignment bar: An alignment bar should be placed so as to be coincident with the extended centre line of the aircraft in the specified parking position and visible to the pilot during the final part of the parking manoeuvre. It should have a width of not less than 15 cm.
f) Turn bar and stop line:

1) A turn bar should be located at right angles to the lead-in line, abeam the left pilot position at the point of initiation of any intended turn. It should have a length and width of not less than 6 m and 15 cm respectively, and include an arrowhead to indicate the direction of turn.

2) A stop line should be located at right angles to the alignment bar, abeam the left pilot position at the intended point of stop. It should have a length and width of not less than 6 m and 15 cm respectively.

3) If more than one turn bar and/or stop line is required, they should be designated for the appropriate aircraft types.

CS ADR-DSN.L.595 Apron safety lines

a) Applicability: Apron safety lines should be provided on an apron as required by the parking configurations and ground facilities.
b) Location: Apron safety lines should be located so as to define the areas intended for use by ground vehicles and other aircraft servicing equipment to provide safe separation from aircraft.
c) Characteristics:

1) Apron safety lines should include such elements as wing tip clearance lines and service road boundary lines as required by the parking configurations and ground facilities.

2) Apron safety lines should be of a conspicuous colour which should contrast with that used for aircraft stand markings.

3) An apron safety line should be continuous in length and at least 10 cm in width.

CS ADR-DSN.L.597 Apron service road marking

a) Applicability: The limits of an apron service road, should be defined by apron service road markings.

b) Location: Apron service road markings should define the areas intended for use by ground vehicles and other aircraft servicing equipment to provide safe separation from aircraft.

c) Characteristics:

1) Apron service road markings should be white.

2) Apron service road markings should be continuous in length on the edges, continuous or broken in the middle, as appropriate, and at least 10 cm in width.

3) When an apron service road crosses a taxiway or aircraft stand taxilane, the apron service road edge marking should be laterally dashed along the crossing. The stripes should be 1.0 m in length, and their width should be equal to the width of the continuous part of the marking.

d) Apron service road markings should be discontinued when they intersect with other markings on an apron. The interrupted gap should be not more than 1 m on each side from the edge of the interested marking.

CS ADR-DSN.L.600 Road-holding position marking

a) Applicability: A road-holding position marking should be provided at all road entrances or intersections to a runway or a taxiway.

b) Location:

1) The road-holding position marking should be located across the road at the holding position.

2) Where a road intersects a taxiway, a road-holding position marking should be located across the road at the appropriate distance to ensure vehicles remain clear of the taxiway strip.

c) Characteristics:

1) The road-holding position marking should be in accordance with the local road traffic regulations.

2) The road-holding position marking at the intersection of a road with a taxiway should be in accordance with the local traffic regulations for a yield right-of-way or mandatory stop.

CS ADR-DSN.L.605 Mandatory instruction marking

a) Applicability:

1) Where a mandatory instruction sign in accordance with CS ADR-DSN.N.780 is not installed, a mandatory instruction marking should be provided on the surface of the pavement.

2) On taxiways exceeding 60 m in width, or to assist in the prevention of a runway incursion, a mandatory instruction sign should be supplemented by a mandatory instruction marking.

b) Location:

1) The mandatory instruction marking on taxiways, where the code letter is A, B, C, or D, should be located across the taxiway equally placed about the taxiway centre line and on the holding side of the runway-holding position marking as shown in Figure L-9(A). The distance between the nearest edge of the marking and the runway-holding position marking or the taxiway centre line marking should be not less than 1 m.

2) The mandatory instruction marking on taxiways where the code letter is E or F, should be located on the both sides of the taxiway centre line marking and on the holding side of the runway-holding position marking as shown in Figure L-9(B). The distance between the nearest edge of the marking and the runway-holding position marking, or the taxiway centre line marking should be not less than 1 m.

c) Characteristics:

1) A mandatory instruction marking should consist of an inscription in white on a red background. Except for a no-entry marking, the inscription should provide information identical to that of the associated mandatory instruction sign.

2) A no-entry marking should consist of an inscription in white reading NO ENTRY on a red background. 3) Where there is insufficient contrast between the marking and the pavement surface, the mandatory instruction marking should include an appropriate border, preferably white or black.

4) The character height should be 4 m for inscriptions where the code letter is C, D, E, or F, and 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-10D.

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.

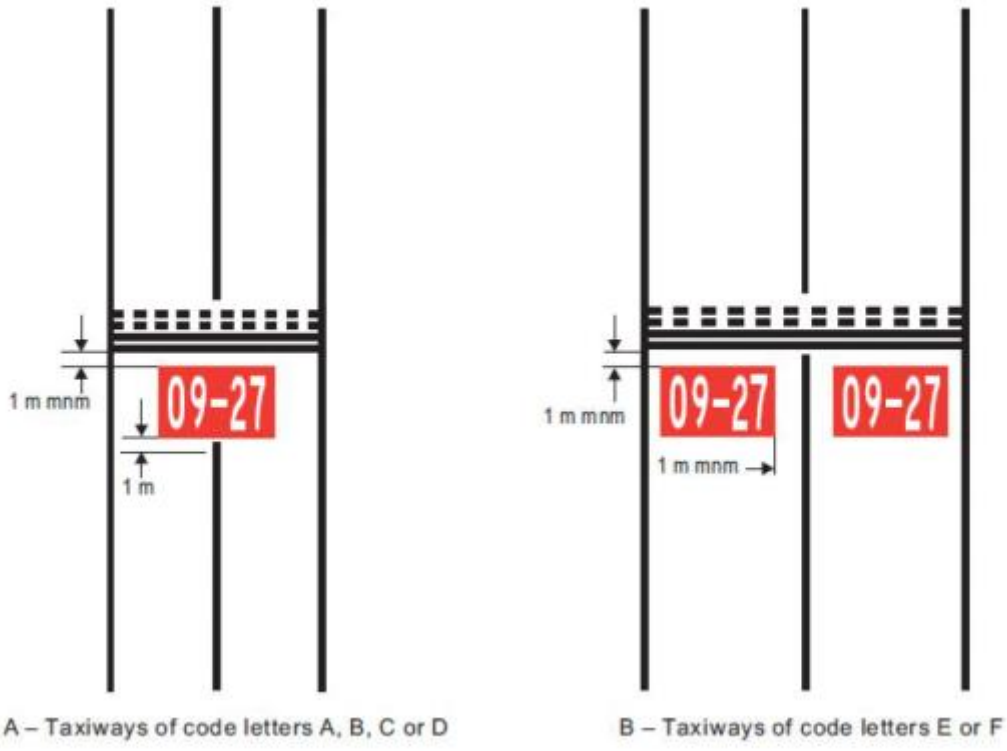


Figure L-9. Mandatory instruction marking

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, spacing, and the form and proportions of the inscription should be as for mandatory instruction markings.

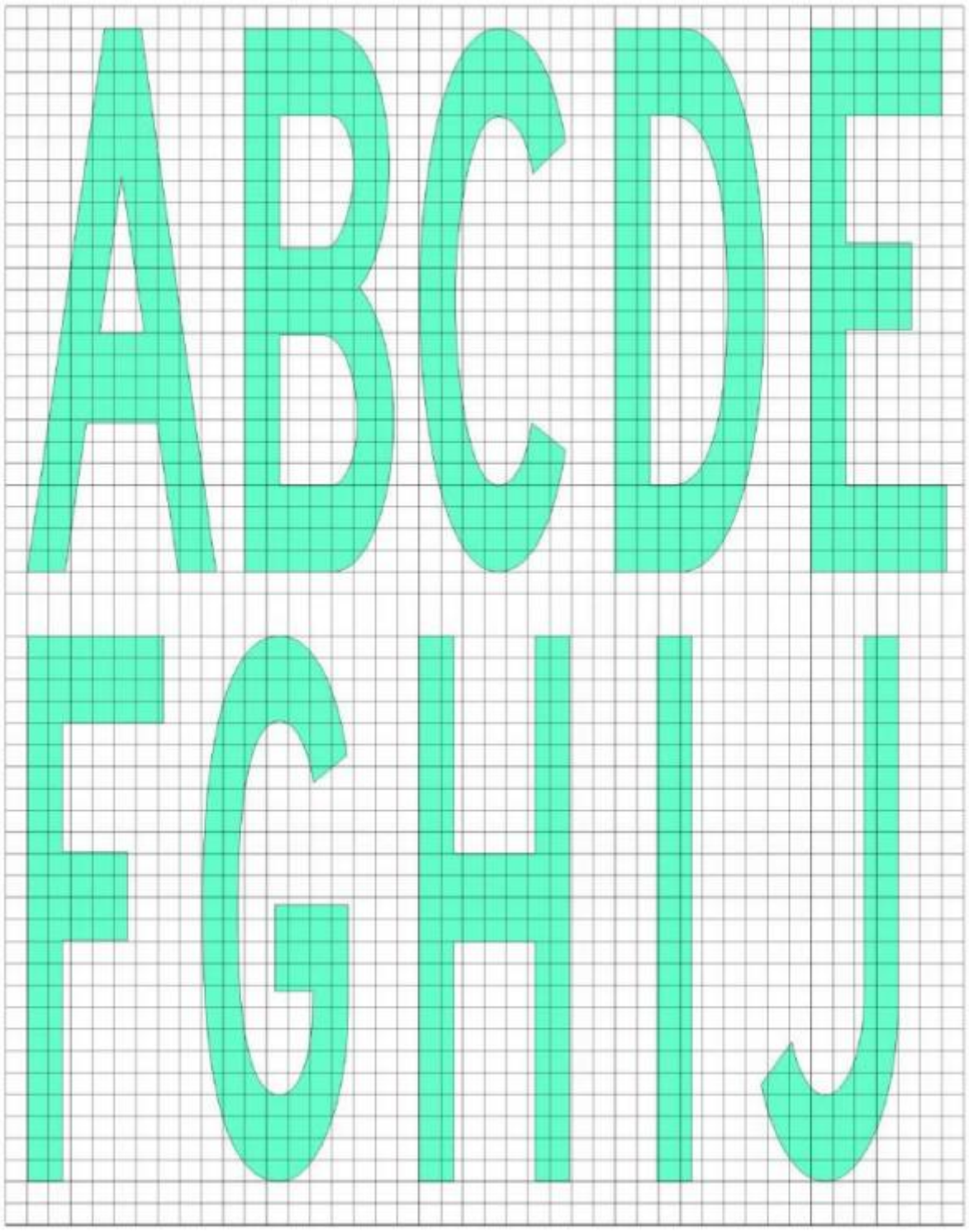


Figure L-10A. Mandatory instruction marking inscription form and proportions

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

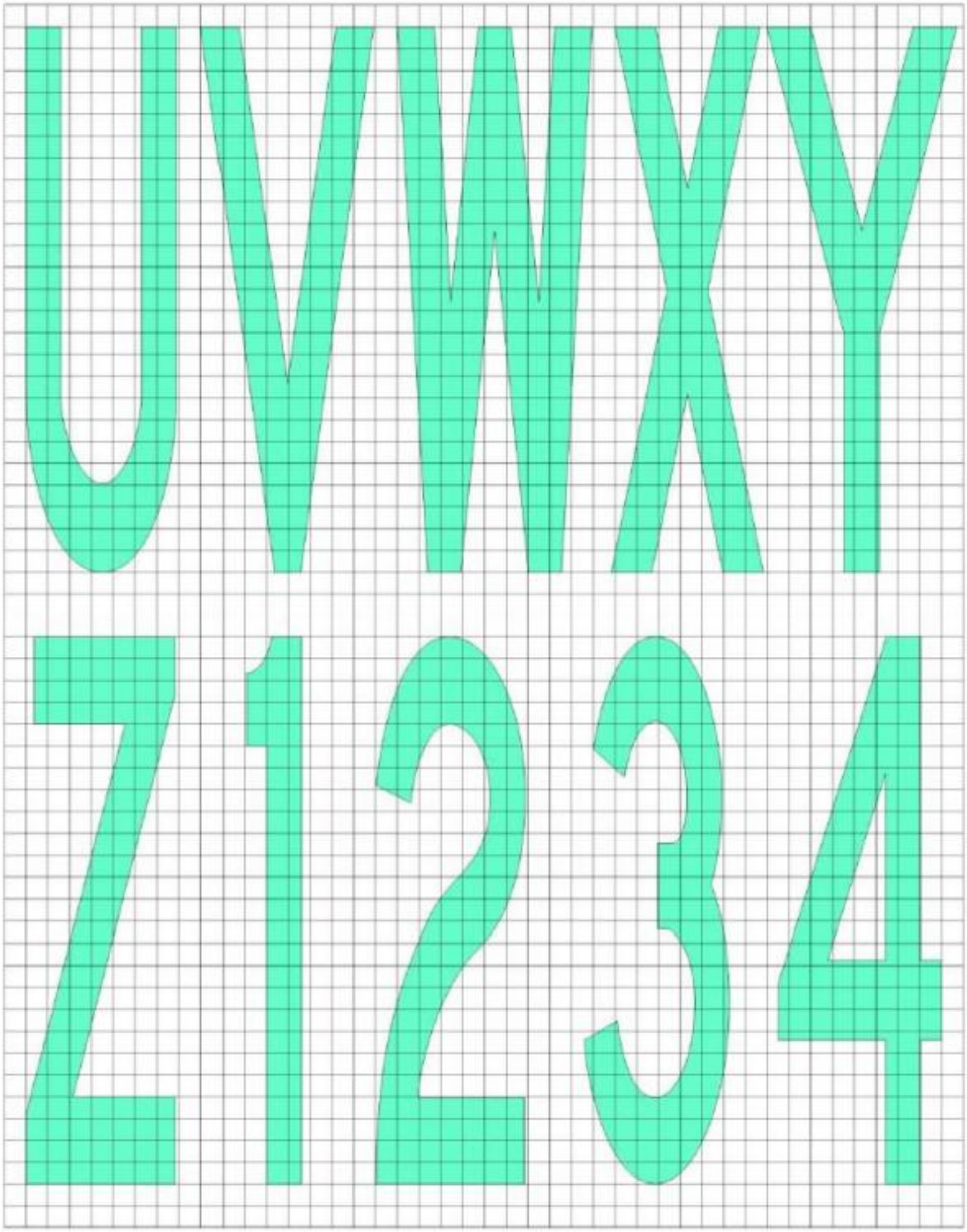


Figure L-10C. Mandatory instruction marking inscription form and proportions

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

CHAPTER M–VISUAL AIDS FOR NAVIGATION (LIGHTS)

CS ADR-DSN.M.615 General

a) Elevated approach lights:

1) Elevated approach lights and their supporting structures should be frangible except that, in that portion of the approach lighting system beyond 300 m from the threshold:

(i) where the height of a supporting structure exceeds 12 m, the frangibility requirement should apply to the top 12 m only; and

(ii) where a supporting structure is surrounded by non-frangible objects, only that part of the structure that extends above the surrounding objects should be frangible.

2) When an approach light fixture or supporting structure is not in itself sufficiently conspicuous, it should be suitably marked.

b) Elevated lights: Elevated runway, stopway, and taxiway lights should be frangible. Their height should be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft. c) Surface lights:

1) Light fixtures inset in the surface of runways, stopways, taxiways, and aprons should be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the lights themselves.

2) The temperature produced by conduction or radiation at the interface between an installed inset light and an aircraft tire should not exceed 160°C during a 10-minute period of exposure.

d) Light intensity and control:

1) The intensity of runway lighting should be adequate for the minimum conditions of visibility and ambient light in which use of the runway is intended, and compatible with that of the nearest section of the approach lighting system when provided.

2) Where a high-intensity lighting system is provided, a suitable intensity control should be incorporated to allow for adjustment of the light intensity to meet the prevailing conditions. Separate intensity controls or other suitable methods should be provided to ensure that the following systems when installed, can be operated at compatible intensities:

(i) approach lighting system;

(ii) runway edge lights;

(iii) runway threshold lights;

(iv) runway end lights;

(v) runway centre line lights;

(vi) runway touchdown zone lights; and

(vii) taxiway centre line lights.

3) On the perimeter of and within the ellipse defining the main beam in CS ADR-DSN.U.940, the maximum light intensity value should not be greater than three times the minimum light intensity value measured in accordance with CS ADR-DSN.U.940. On the perimeter of and within the rectangle defining the main beam in CS ADRDSN.U.940, the maximum light intensity value should not be greater than three times the minimum light intensity value measured in accordance with CS ADR-DSN.U.940.

CS ADR-DSN.M.620 Aeronautical beacons

a) General

1) When operationally necessary an aerodrome beacon or identification beacon should be provided at each aerodrome intended for use at night.

2) The operational requirement should be determined having regard to the requirements of the air traffic using the aerodrome, the conspicuity of the aerodrome features in relation to its surroundings, and the installation of other visual and non-visual aids useful in locating the aerodrome.

b) Aerodrome beacon

1) Applicability An aerodrome beacon should be provided at an aerodrome intended for use at night if aircraft navigate predominantly by visual means and one or more of the following conditions exist:

(i) reduced visibilities are frequent; or

(ii) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

2) Location

(i) The aerodrome beacon should be located on or adjacent to the aerodrome in an area of low ambient background lighting.

(ii) The location of the beacon should be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

3) Characteristics

(i) The aerodrome beacon should show either coloured flashes alternating with white flashes or white flashes only.

(ii) The frequency of total flashes should be from 20 to 30 per minute.

(iii) The light from the beacon should show at all angles of azimuth. The vertical light distribution should extend upwards from an elevation of not more than 1° to an elevation sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used, and the effective intensity of the flash should be not less than 2 000 cd.

(iv) At locations where a high ambient background lighting level cannot be avoided, the effective intensity of the flash should be required to be increased by a factor up to a value of 10.

c) Identification beacon

1) Applicability An identification beacon should be provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by other means.

2) Location

i) The identification beacon should be located on the aerodrome in an area of low ambient background lighting.

ii) The location of the beacon should be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

3) Characteristics

(i) An identification beacon at a land aerodrome should show at all angles of azimuth. The vertical light distribution should extend upwards from an elevation

of not more than 1° to an elevation sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used, and the effective intensity of the flash should be not less than 2 000 cd.

(ii) At locations where a high ambient background lighting level cannot be avoided, the effective intensity of the flash should be required to be increased by a factor up to a value of 10.

(iii) An identification beacon should show flashing-green.

(iv) The identification characters should be transmitted in the International Morse Code.

(v) The speed of transmission should be between six and eight words per minute, the corresponding range of duration of the Morse dots being from 0.15 to 0.2 seconds per dot.

CS ADR-DSN.M.625 Approach lighting systems

a) The safety objective of the approach lighting system is to provide alignment and roll guidance, and limited distance-to-go information to enable safe approach to a runway.

b) Non-instrument runway

Applicability: Where physically practicable, a simple approach lighting system as specified in CS ADR-DSN.M.626 should be provided to serve a non-instrument runway where the code number is 3 or 4, and intended for use at night, except when the runway is used only in conditions of good visibility, and sufficient guidance is provided by other visual aids.

c) Non-precision approach runway

Applicability: Where physically practicable, a simple approach lighting system specified in CS ADR-DSN.M.626 should be provided to serve a non-precision approach runway, except when the runway is used only in conditions of good visibility or sufficient guidance is provided by other visual aids.

d) Precision approach runway Category I

Applicability: Where physically practicable, a precision approach Category I lighting system as specified in CS ADR-DSN.M.630 should be provided to serve a precision approach runway Category I.

e) Precision approach runway Categories II and III

Applicability: A precision approach Category II and III lighting system as specified in CS ADR-DSN.M.635 should be provided to serve a precision approach runway Category II or III.

CS ADR-DSN.M.626 Simple approach lighting systems

a) Location and composition:

1) A simple approach lighting system should consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of not less than 420 m from the threshold with a row of lights forming a crossbar 18 m or 30 m in length at a distance of 300 m from the threshold (see Figure M-1).

2) The certification specifications provide for the basic characteristics for simple approach lighting systems. For certain aspects of these systems, some latitude is permitted; for example, in the spacing between centre line lights and crossbar.

b) Crossbar lights:

1) The lights forming the crossbar should be as close as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights.

2) The lights of the crossbar should be spaced so as to produce a linear effect, except that, when a crossbar of 30 m is used, gaps may be left on each side of the centre line. These gaps should be kept to a minimum to meet local requirements, and each should not exceed 6 m.

3) Spacing 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) Centre line lights:

1) The lights forming the centre line should be placed at longitudinal intervals of 60 m, except that when it is desired to improve the guidance, an interval of 30 m may be used.

2) The innermost light should be located either 60 m or 30 m from the threshold, depending on the longitudinal interval selected for the centre line lights. If it is not physically possible to provide a centre line extending for a distance of 420 m from the threshold, it should be extended to 300 m so as to include the crossbar. If this is not possible, the centre line lights should be extended as far as practicable, and each centre line light should then consist of a barrette at least 3 m in length. Subject to the approach system having a crossbar at 300 m from the threshold, an additional crossbar may be provided at 150 m from the threshold.

3) The system should lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna should protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette, excluding their extremities, should be screened from an approaching aircraft. Any ILS or MLS azimuth antenna protruding through the plane of the lights should be treated as an obstacle, and marked and lighted accordingly as specified in the requirements for obstacle marking and lighting.

d) Characteristics:

1) The lights of a simple approach lighting system should be fixed lights and the colour of the lights should be such as to ensure that the system is readily distinguishable from other aeronautical ground lights, and from extraneous lighting if present, but should be preferably fixed lights showing variable white. Each centre line light should consist of either:

(i) a single source; or

(ii) a barrette at least 3 m in length.

e) Barrettes of 4 m in length should be so designed if it is anticipated that the simple approach lighting system should be developed into a precision approach lighting system.

f) Where provided for a non-instrument runway, the lights should show at all angles in azimuth necessary to a pilot on base leg and final approach. The intensity of the lights should be adequate for all conditions of visibility and ambient light for which the system has been provided.

g) Where provided for a non-precision approach runway, the lights should show at all angles in azimuth necessary to the pilot of an aircraft which on final approach does not deviate by an abnormal amount from the path defined by the non-visual aid. The lights should be designed to provide guidance during both day and night in the most adverse conditions of visibility and ambient light for which it is intended that the system should remain usable.

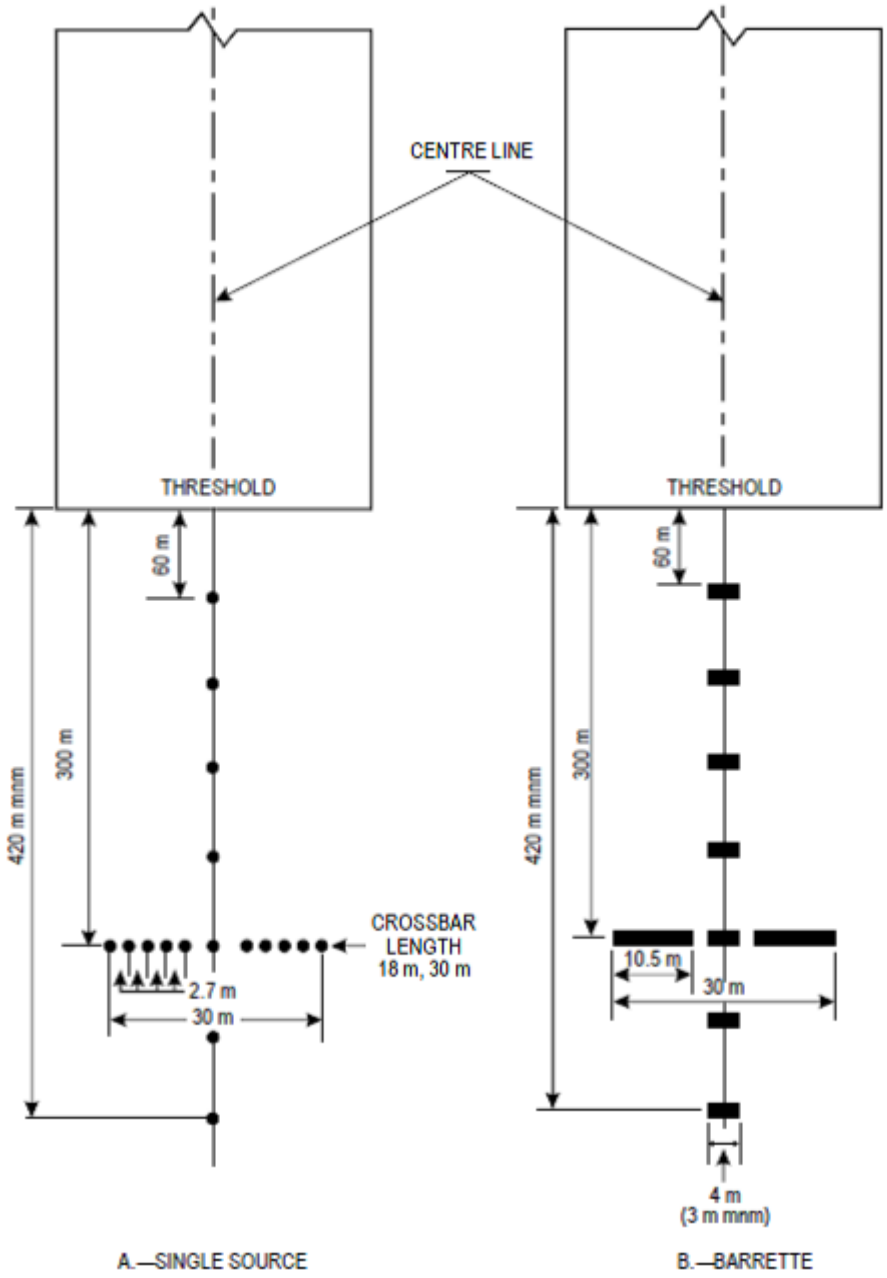


Figure M-1. Simple approach lighting systems

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

a) The safety objective of the approach lighting system is to provide alignment and roll guidance, and limited distance-to-go information to enable safe approach to a runway.

b) Location and composition

1) General: A precision approach Category I lighting system should consist of a row of lights on the extended centre line of the runway extending wherever possible, over a distance of 900 m from the runway threshold with a row of lights forming a crossbar 30 m in length at a distance of 300 m from the runway threshold (see Figure M-2).

2) Crossbar lights: The lights forming the crossbar should be as close as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar should be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps should be kept to a minimum to meet local requirements and each should not exceed 6 m.

3) Centre line lights: The lights forming the centre line should be placed at longitudinal intervals of 30 m with the innermost light located 30 m from the threshold.

4) The system should lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna should protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) should be screened from an approaching aircraft.

(iii) Any ILS or MLS azimuth antenna protruding through the plane of the lights should be treated as an obstacle and marked and lighted accordingly.

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 ADR.OPS.C.015 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 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 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.

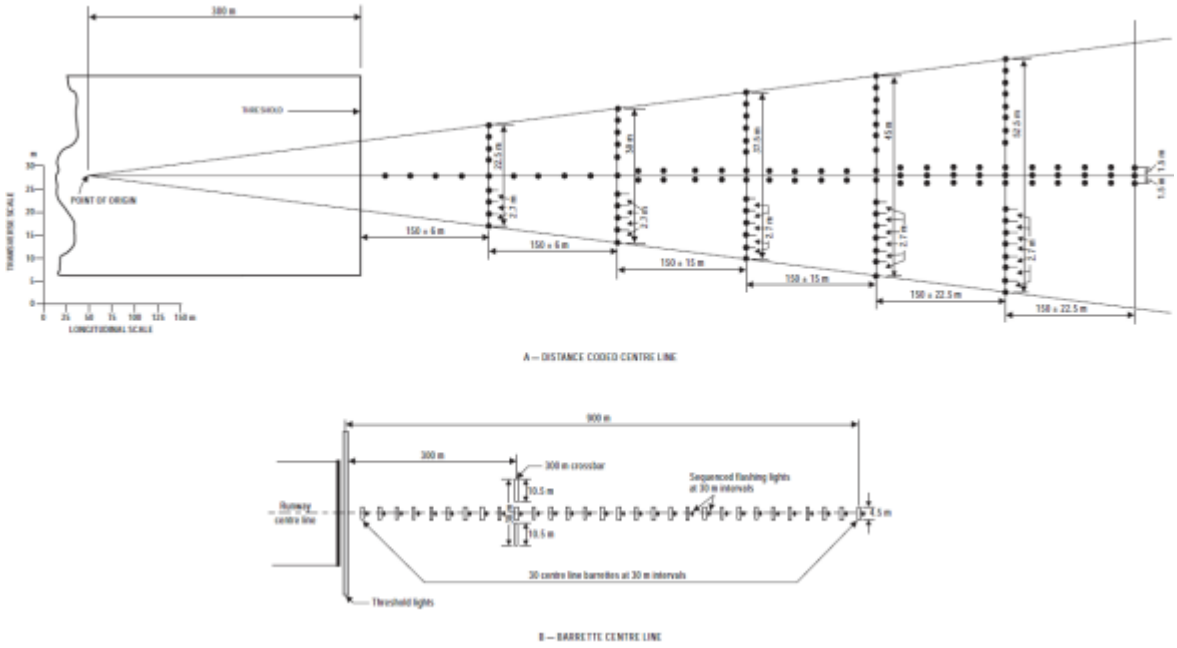


Figure M-2. Precision approach Category I lighting systems

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

a) Location and composition:

1) The approach lighting system should consist of a row of lights on the extended centre line of the runway, extending, wherever possible, over a distance of 900 m from the runway threshold. In addition, the system should have two side rows of lights, extending 270 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in Figure M-3A. Where the serviceability level of the approach lights specified as maintenance objectives in ADR.OPS.C.015 can be demonstrated, the system may have two side rows of lights extending 240 m from the

threshold, and two crossbars, one at 150 m, and one at 300 m from the threshold, all as shown in Figure M-3B.

2) The lights forming the centre line should be placed at longitudinal intervals of 30 m with the innermost lights located 30 m from the threshold.

3) The lights forming the side rows should be placed on each side of the centre line, at a longitudinal spacing equal to that of the centre line lights and with the first light located 30 m from the threshold. Where the serviceability level of the approach lights specified as maintenance objectives can be demonstrated, lights forming the side rows may be placed on each side of the centre line, at a longitudinal spacing of 60 m with the first light located 60 m from the threshold. The lateral spacing (or gauge) between the innermost lights of the side rows should be not less than 18 m nor more than 22.5 m, and preferably 18 m, but in any event should be equal to that of the touchdown zone lights.

4) The crossbar provided at 150 m from the threshold should fill in the gaps between the centre line and side row lights.

5) The crossbar provided at 300 m from the threshold should extend on both sides of the centre line lights to a distance of 15 m from the centre line.

6) If the centre line beyond a distance of 300 m from the threshold consists of lights as described in paragraphs (b)(2)(ii) and (b)(3)(ii) below, additional crossbars of lights should be provided at 450 m, 600 m and 750 m from the threshold. Where such additional crossbars are incorporated in the system, the outer ends of these crossbars should lie on two straight lines that either are parallel to the centre line or converge to meet the runway centre line 300 m from the threshold.

7) The system should lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna should protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) should be screened from an approaching aircraft.

(iii) Any ILS or MLS azimuth antenna protruding through the plane of the lights should be treated as an obstacle and marked and lighted accordingly.

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 ADR.OPS.C.015 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 ADR.OPS.C.015 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 supplementedby a 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 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.

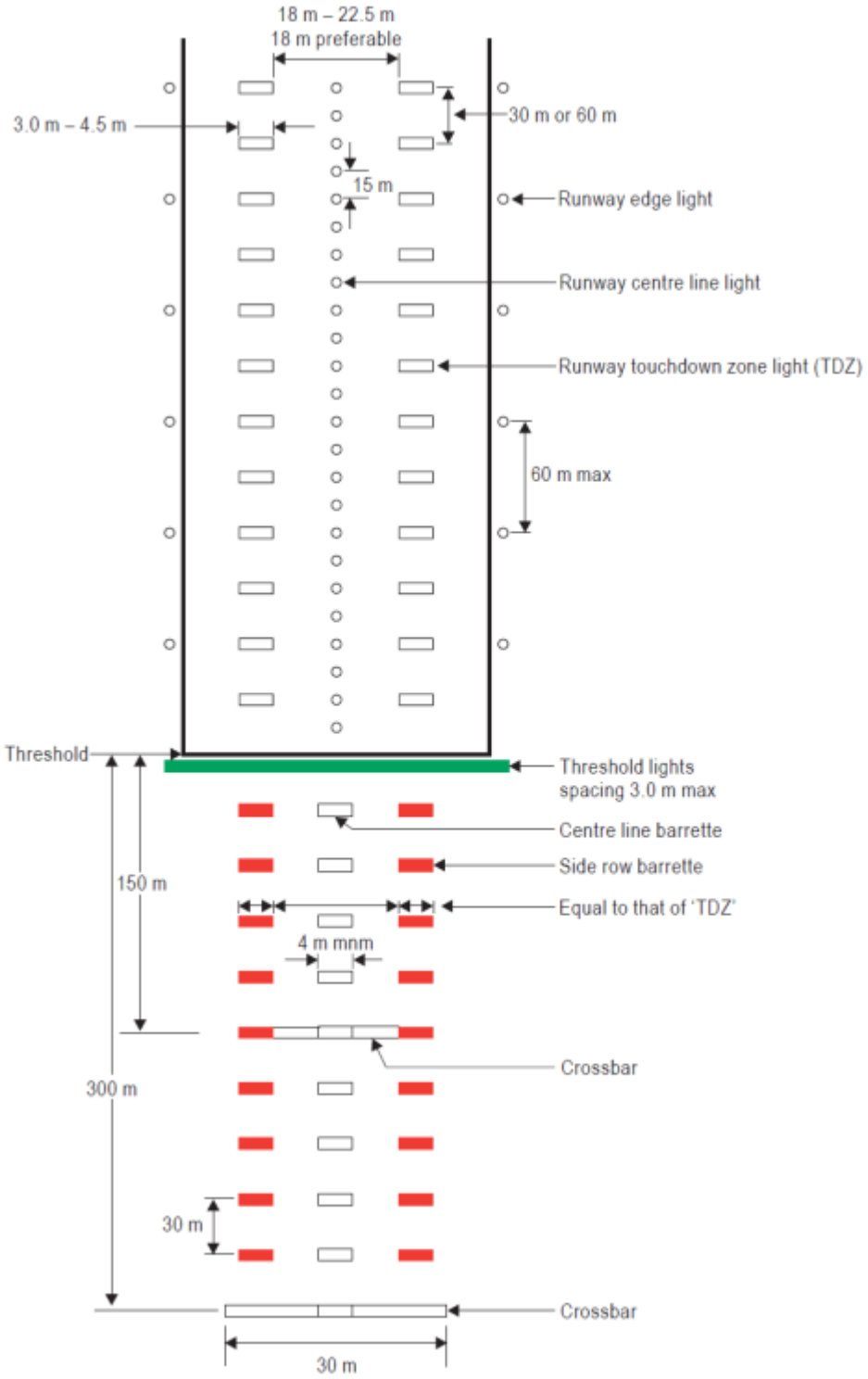


Figure M-3A. Inner 300 m approach and runway lighting for precision approach runways, Categories II and III

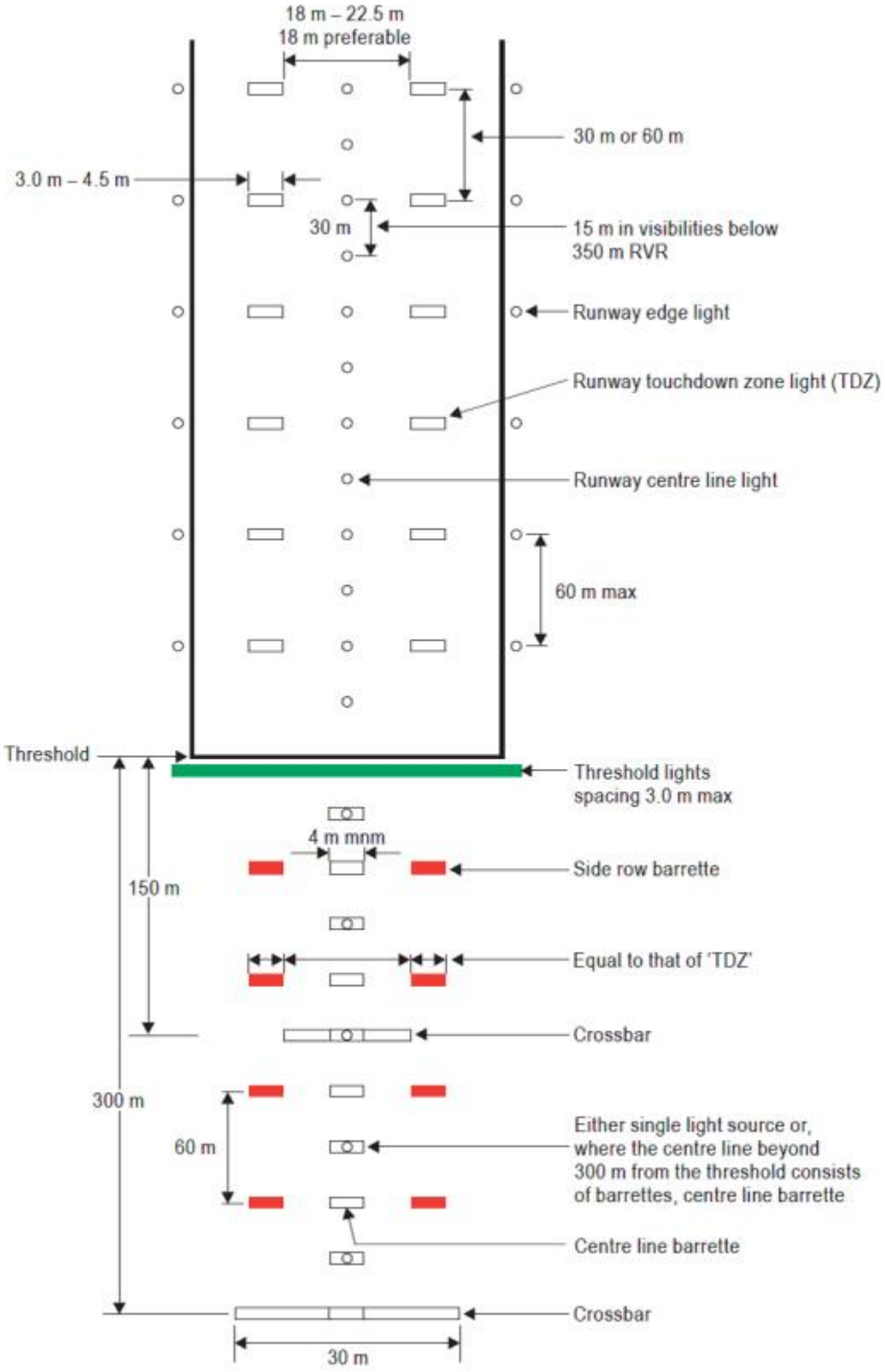


Figure M-3B. Inner 300 m approach and runway lighting for precision approach runways, Categories II and III, where the serviceability levels of the lights specified as maintenance objectives in ADR.OPS.C.015(b)(1) to (3) can be demonstrated.

CS ADR-DSN.M.640 Visual approach slope indicator systems

The safety objective of visual approach slope indicators is to provide information on the approach angle necessary to maintain a safe height over obstacles and threshold.

a) A visual approach slope indicator system should be provided to serve the approach to a runway where one or more of the following conditions exist:

1) the runway is used by turbojet or other aeroplanes with similar approach guidance requirements; 2) the pilot of any type of aeroplane may have difficulty in judging the approach due to:

(i) inadequate visual guidance such as is experienced during an approach over water or featureless terrain by day or in the absence of sufficient extraneous lights in the approach area by night; or

(ii) misleading information such as is produced by deceptive surrounding terrain or runway slopes.

3) the presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non-visual or other visual aids to give warning of such objects;

4) physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway; and

5) terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

b) The standard visual approach slope indicator systems should consist of PAPI and APAPI systems conforming to the specifications, as prescribed in CS ADR-DSN.M.645 to CS ADR-DSN.M.655.

c) PAPI should be provided where the code number is 3 or 4 when one or more of the conditions specified in paragraph (a) above exist.

d) PAPI or APAPI should be provided where the code number is 1 or 2 when one or more of the conditions specified in paragraph (a) above exist.

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

a) A PAPI or APAPI should be in accordance with the specifications provided in paragraphs CS ADR-DSN.M.645 to CS ADR-DSN.M.65

b) Definition and positioning:

1) The PAPI system should consist of a wing bar of four sharp transition multi-lamp (or paired single lamp) units equally spaced. The APAPI system should consist of a wing bar of two sharp transition multi-lamp (or paired single lamp) units. The PAPI and APAPI system should be located on the left side of the runway unless it is physically impracticable to do so. Where a runway is used by aircraft requiring visual roll guidance which is not provided by other external means, then a second wing bar may be provided on the opposite side of the runway for PAPI or APAPI.

2) The wing bar of a PAPI should be constructed and arranged in such a manner that a pilot making an approach should:

(i) when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;

(ii) when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and

(iii) when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

3) The wing bar of an APAPI should be constructed and arranged in such a manner that a pilot making an approach should:

(i) when on or close to the approach slope, see the unit nearer the runway as red and the unit farther from the runway as white;

(ii) when above the approach slope, see both the units as white; and

(iii) when below the approach slope, see both the units as red.

4) The light units should be located as in the basic configuration illustrated in Figure M-4, subject to the installation tolerances given below. The units forming a wing bar should be mounted so as to appear to the pilot of an approaching aeroplane to be substantially in a horizontal line. The light units should be mounted as low as possible and should be frangible.

c) Characteristics:

1) The system should be suitable for both day and night operations.

2) Colour:

(i) The colour transition from red to white in the vertical plane should be such as to appear to an observer, at a distance of not less than 300 m, to occur within a vertical angle of not more than 3´.

(ii) At full intensity, the 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.

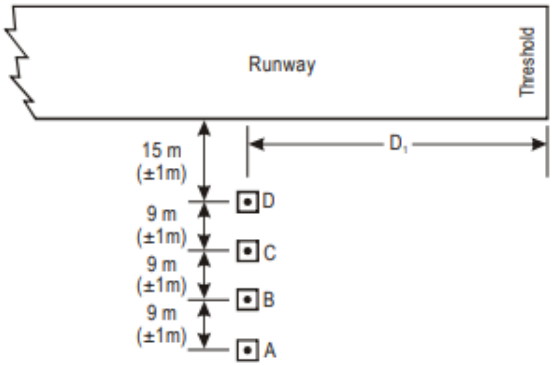
3) Intensity:

(i) The light intensity distribution of the light units should be as shown in CS ADR-DSN.U.940, Figure U-26.

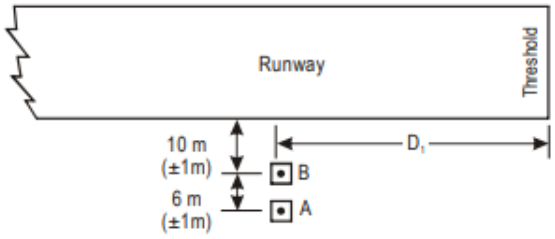
(ii) Suitable intensity control should be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

4) Light orientation: Each light unit should be capable of adjustment in elevation so that the lower limit of the white part of the beam may be fixed at any desired angle of elevation between 1°30´and at least 4°30´above the horizontal.

5) Other characteristics: The light units should be so designed that deposits of condensation, snow, ice, dirt, or other contaminants, on optically transmitting or reflecting surfaces should interfere to the least possible extent with the light signals and should not affect the contrast between the red and white signals and the elevation of the transition sector.



Typical PAPI wing bar



Typical APAPI wing bar

INSTALLATION TOLERANCES

a) Where a PAPI or APAPI is installed on a runway not equipped with an ILS or MLS, the distance D1 should be calculated to ensure that the lowest height at which a pilot will see a correct approach path indication (Figure M-5, angle B for a PAPI and angle A for an APAPI) provides the wheel clearance over the threshold specified in Table M-1 for the most demanding amongst aeroplanes regularly using the runway.

b) Where a PAPI or APAPI is installed on a runway equipped with an ILS and/or MLS, the distance D1 should be calculated to provide the optimum compatibility between the visual and non-visual aids for the range of eye-to-antenna heights of the aeroplanes regularly using the runway. The distance should be equal to that between the threshold and the effective origin of the ILS glide path or MLS minimum glide path, as appropriate, plus a correction factor for the variation of eye-to-antenna heights of the aeroplanes concerned. The correction factor is obtained by multiplying the average eye-to-antenna height of those aeroplanes by the cotangent of the approach angle. However, the distance should be such that in no case will the wheel clearance

If a wheel clearance, greater than that specified in a) above is required for specific aircraft, this can be achieved by increasing D1.

d) Distance D1 should be adjusted to compensate for differences in elevation between the lens centres of the light units and the threshold.

e) To ensure that units are mounted as low as possible and to allow for any transverse slope, small height adjustments of up to 5 cm between units are acceptable. A lateral gradient not greater than 1.25 per cent can be accepted provided it is uniformly applied across the units.

f) A spacing of 6 m (±1 m) between PAPI units should be used on code numbers 1 and 2. In such an event, the inner PAPI unit should be located not less than 10 m (±1 m) from the runway edge.

Note: Reducing the spacing between light units results in a reduction in usable range of the system.

over the threshold be lower than that specified in column (3) of Table M-1. Note: See CS ADR-DSN.L.540 for specifications on aiming point marking. Further guidance on the harmonisation of PAPI, ILS and/or MLS signals is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.	g) The lateral spacing between APAPI units may be increased to 9 m (±1 m) if greater range is required or later conversion to a full PAPI is anticipated. In the latter case, the inner APAPI unit should be located 15 m (±1 m) from the runway edge.

Figure M-4. Siting of PAPI and APAPI

CS ADR-DSN.M.650 Approach slope and elevation setting of light units for PAPI and APAPI

a) Approach slope:

1) The approach slope as defined in Figure M-5, should be so designed to be appropriate for use by the aeroplanes in the approach.

2) When the runway is equipped with an ILS and/or MLS, the siting and the angle of elevation of the light units should be such that the visual approach slope conforms as closely as possible with the glide path of the ILS and/or the minimum glide path of the MLS, as appropriate.

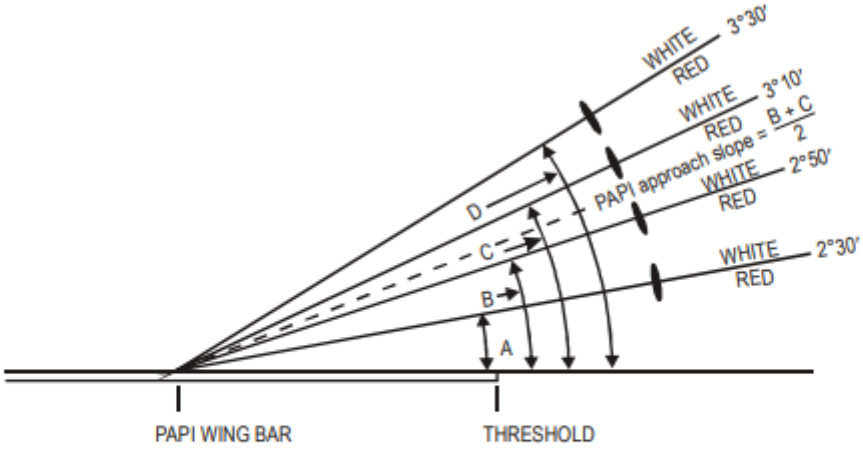
b) Elevation setting of light units

1) The angle of elevation settings of the light units in a PAPI wing bar should be such that, during an approach, the pilot of an aeroplane observing a signal of one white and three reds should clear all objects in the approach area by a safe margin (see Table M-1).

2) The angle of elevation settings of the light units in an APAPI wing bar should be such that, during an approach, the pilot of an aeroplane observing the lowest on-slope signal, i.e. one white and one red, should clear all objects in the approach area by a safe margin (see Table M-1).

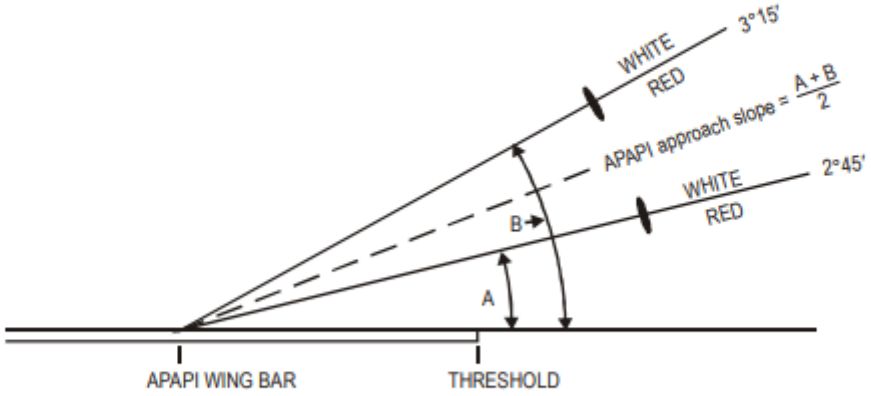
(3) The azimuth spread of the light beam should be suitably restricted where an object located outside the obstacle protection surface of the PAPI or APAPI system but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and a safety assessment indicates that the object could adversely affect the safety of operations. The extent of the restriction should be such that the object remains outside the confines of the light beam.

4) Where wing bars are installed on each side of the runway to provide roll guidance, corresponding units should be set at the same angle so that the signals of each wing bar change symmetrically at the same time.



The height of the pilot's eye above the aircraft's ILS glide path/MLS antenna varies with the type of aeroplane and approach attitude. Harmonization of the PAPI signal and ILS glide path and/or MLS minimum glide path to a point closer to the threshold may be achieved by increasing the on-course sector from 20′ to 30′. The setting angles for a 3° glide slope would then be 2°25′, 2°45′, 3°15′ and 3°35′.

A — 3° PAPI ILLUSTRATED



B — 3° APAPI ILLUSTRATED

Figure M-5. Light beams and angle of elevation setting of PAPI and APAPI

Eye-to-wheel height of aeroplane in the approach configuration [a]	Desired wheel clearance (metres) [b, c]	Minimum wheel clearance (metres) [d]
(1)	(2)	(3)
up to but not including 3 m	6	3[e]
3 m up to but not including 5 m	9	4
5 m up to but not including 8 m	9	5
8 m up to but not including 14 m	9	6

a. In selecting the eye-to-wheel height group, only aeroplanes meant to use the system on a regular basis should be considered. The most demanding amongst such aeroplanes should determine the eye-to-wheel height group.
b. Where practicable, the desired wheel clearances shown in column (2) should be provided.
c. The wheel clearances in column (2) should be reduced to no less than those in column (3) where a safety assessment indicates that such reduced wheel clearances are acceptable.
d. When a reduced wheel clearance is provided at a displaced threshold, it should be ensured that the corresponding desired wheel clearance specified in column (2) should be available when an aeroplane at the top end of the eye-to-wheel height group chosen overflies the extremity of the runway.
e. This wheel clearance should be reduced to 1.5 m on runways used mainly by light-weight non-turbo-jet aeroplanes.

Table M-1. Wheel clearance over threshold for PAPI and APAPI

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) suitably raise the approach slope of the system;
3) reduce the azimuth spread of the system so that the object is outside the confines of the beam;
4) displace the axis of the system and its associated obstacle protection surface by no more than 5°;
5) suitably displace the threshold; and
6) where (5) is found to be impracticable, suitably displace the system upwind of the threshold 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 the visual approach slope indicator	D1+30 m	D1+60 m	D1+60 m	D1+60 m	D1+60 m	D1+60 m	D1+60 m	D1+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
Slope								
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

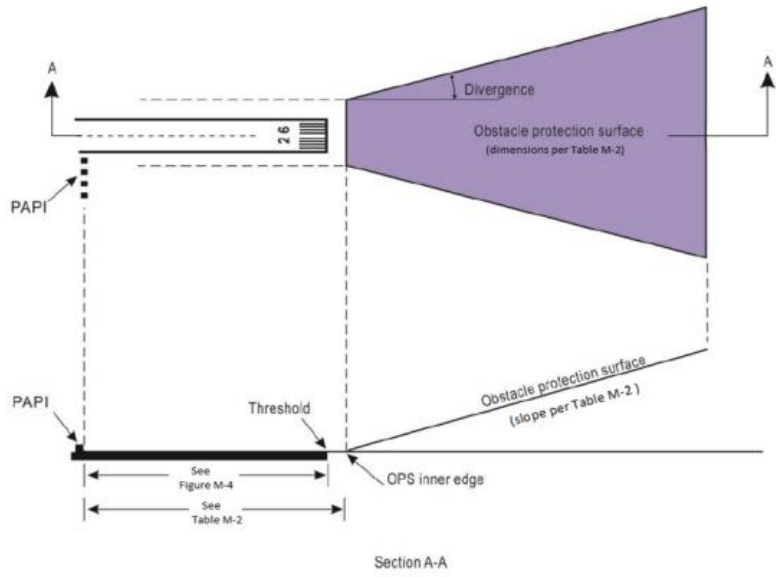


Figure M-6. Obstacle protection surface for visual approach slope indicator systems

CS ADR-DSN.M.660 Circling guidance lights

a) Applicability: Circling guidance lights should be provided when existing approach and

runway lighting systems do not satisfactorily permit identification of the runway and/or approach area to a circling aircraft intending to carry out circling approaches.

b) Location and positioning:

1) The location and number of circling guidance lights should be adequate to enable a pilot, as appropriate, to:

(i) join the downwind leg or align and adjust the aircraft's track to the runway at a required distance from it and to distinguish the threshold in passing; and

(ii) keep in sight the runway threshold and/or other features which should make it possible to judge the turn on to base leg and final approach, taking into account the guidance provided by other visual aids.

2) Circling guidance lights should consist of:

(i) lights indicating the extended centre line of the runway and/or parts of any approach lighting system; or

(ii) lights indicating the position of the runway threshold; or (iii) lights indicating the direction or location of the runway; or a combination of such lights as is appropriate to the runway under consideration.

(c) Characteristics:

1) Circling guidance lights should be fixed or flashing lights of an intensity and beam spread adequate for the conditions of visibility and ambient light in which it is intended to make visual circling approaches. The flashing lights should be white, and the steady lights either white or gaseous discharge lights.

2) The lights should be designed and be installed in such a manner that they should not dazzle or confuse a pilot when approaching to land, taking off, or taxiing.

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.

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) Location: Runway threshold identification lights should be located symmetrically about the runway centre line, in line with the threshold and approximately 10 m outside each line of runway edge lights.

(c) Characteristics:

1) Runway threshold identification lights should be flashing white lights with a flash frequency between 60 and 120 per minute;

2) The lights should be visible only in the direction of approach to the runway.

CS ADR-DSN.M.675 Runway edge lights

a) Applicability:

1) Runway edge lights should be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.

2) Runway edge lights should be provided on a runway intended for take-off with an operating minimum below an RVR of the order of 800 m by day.

b) Location and positioning:

1) Runway edge lights should be placed along the full length of the runway and should be in two parallel rows equidistant from the centre line.

2) Runway edge lights should be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3 m.

3) Where the width of the area which could be declared as runway, exceeds 60 m, the distance between the rows of lights should be determined taking into account the nature of the operations, the light distribution characteristics of the runway edge lights, and other visual aids serving the runway.

4) The lights should be uniformly spaced in rows at intervals of not more than 60 m for an instrument runway, and at intervals of not more than 100 m for a non-instrument runway. The lights on opposite sides of the runway axis should be on lines at right angles to that axis. At intersections of runways, lights may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.

c) Characteristics:

1) Runway edge lights should be fixed lights showing variable white, except that:

(i) in the case of a displaced threshold, the lights between the beginning of the runway and the displaced threshold should show red in the approach direction; and

(ii) a section of the lights 600 m or one-third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is started, should show yellow.

2) The runway edge lights should show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction. When the runway edge lights are intended to provide circling guidance, they should show at all angles in azimuth.

d) In all angles of azimuth, as prescribed in paragraph (c)(2) above, runway edge lights should show at angles up to 15° above the horizontal with intensity adequate for the conditions of visibility and ambient light in which use of the runway for take-off or landing is intended. In any case, the intensity should be at least 50 cd except that at an aerodrome without extraneous lighting the intensity of the lights may be reduced to not less than 25 cd to avoid dazzling the pilot.

e) Runway edge lights characteristics on a precision approach runway should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-13 or Figure U-14, as appropriate.

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 Runway threshold and wing bar lights

a) Applicability of runway threshold: Runway threshold lights should be provided for a runway equipped with runway edge lights, except on a non-instrument or non-precision approach runway where the threshold is displaced and wing bar lights are provided.

b) Location and positioning of runway threshold:

1) When a threshold is at the extremity of a runway, the threshold lights should be placed in a row at right angles to the runway axis as near to the extremity of the runway as possible and, in any case, not more than 3 m outside the extremity.

2) When a threshold is displaced from the extremity of a runway, threshold lights should be placed in a row at right angles to the runway axis at the displaced threshold.

3) Threshold lighting should consist of:

(i) on a non-instrument or non-precision approach runway, at least six lights;

(ii) on a precision approach runway Category I, at least the number of lights that would be required if the lights were uniformly spaced at intervals of 3 m between the rows of runway edge lights; and

(iii) on a precision approach runway Category II or III, lights uniformly spaced between the rows of runway edge lights at intervals of not more than 3 m.

4) The lights prescribed in paragraphs (b)(3)(i) and (b)(3)(ii) above should be either:

(i) equally spaced between the rows of runway edge lights, or

(ii) symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group and with a gap between the groups equal to the gauge of the touchdown zone marking or lighting, where such is provided, or otherwise not more than half the distance between the rows of runway edge lights.

c) Applicability of wing bar lights:

1) Wing bar lights should be provided on a precision approach runway when additional conspicuity is considered desirable.

2) Wing bar lights should be provided on a non-instrument or non-precision approach runway where the threshold is displaced and runway threshold lights are required, but are not provided.

d) Location and positioning of wing bar lights: Wing bar lights should be symmetrically disposed about the runway centre line at the threshold in two groups, i.e. wing bars. Each wing bar should be formed by at least five lights extending at least 10 m outward from, and at right angles to, the line of the runway edge lights, with the innermost light of each wing bar in the line of the runway edge lights.

e) Characteristics of runway threshold and wing bar lights:

1) Runway threshold and wing bar lights should be fixed unidirectional lights showing green in the direction of approach to the runway. The intensity and beam spread of the lights should be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

2) Runway threshold lights on a precision approach runway should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-7.

3) Threshold wing bar lights on a precision approach runway should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-8.

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 Runway end lights

a) Applicability: Runway end lights should be provided for a runway equipped with runway edge lights. b) Location and positioning:

1) Runway end lights should be placed on a line at right angles to the runway axis as near to the end of the runway as possible and, in any case, not more than 3 m outside the end.

2) Runway end lighting should consist of at least six lights. The lights should be either:

(i) equally spaced between the rows of runway edge lights; or

(ii) symmetrically disposed about the runway centre line in two groups with the lights uniformly spaced in each group and with a gap between the groups of not more than half the distance between the rows of runway edge lights.

3) For a precision approach runway Category III, the spacing between runway end lights, except between the two innermost lights if a gap is used, should not exceed 6 m.

c) Characteristics of runway end lights:

1) Runway end lights should be fixed unidirectional lights showing red in the direction of the runway. The intensity and beam spread of the lights should be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

2) Runway end lights characteristics on a precision approach runway should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-12.

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.

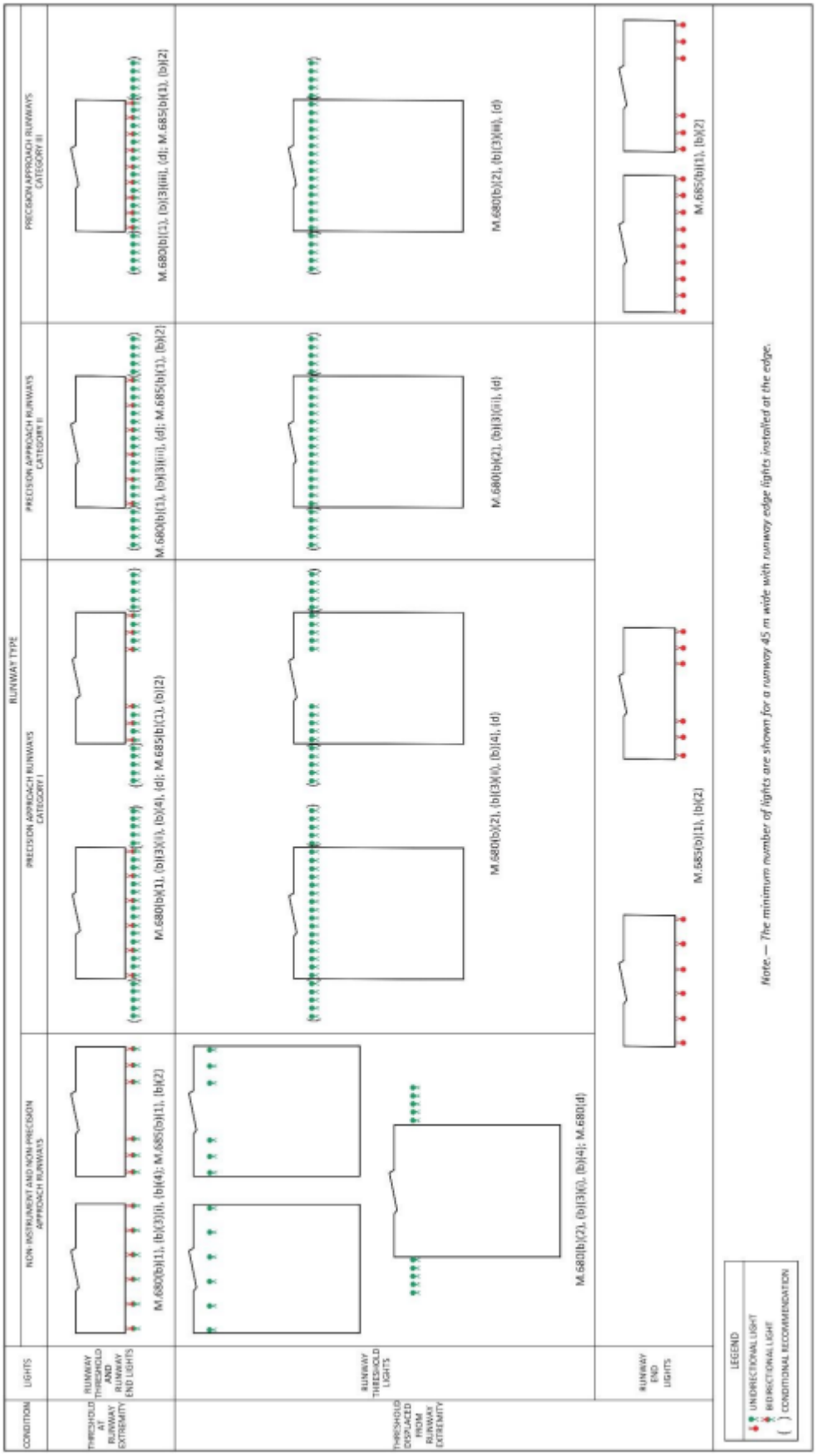


Figure M-7. Arrangement of runway threshold and runway end lights

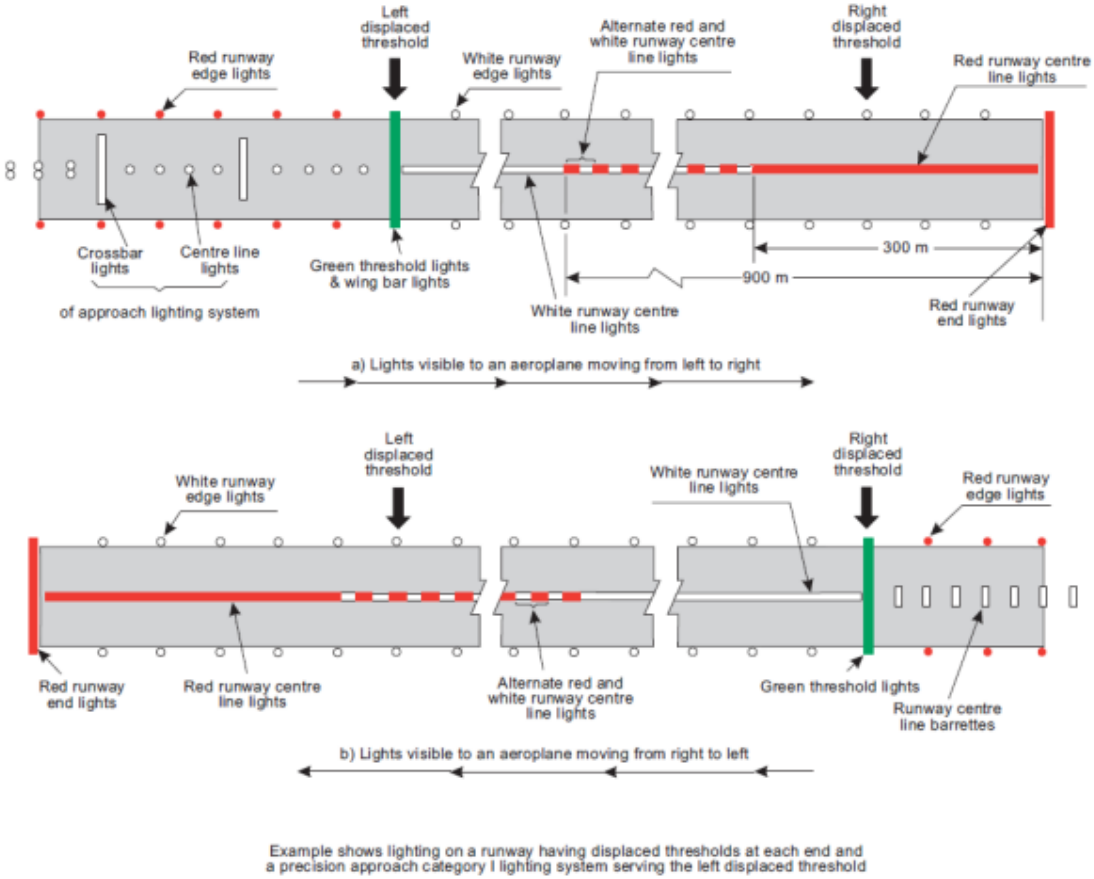


Figure M-8. Example of approach and runway lighting for runway with displaced thresholds

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

a) The safety objective of runway centre line lights is to facilitate safe take-off and landing.
b) Applicability:

1) Runway centre line lights should be provided on a precision approach runway Category II or III.

2) Runway centre line lights should be provided on a runway intended to be used for take-off with an operating minimum below an RVR of the order of 400 m.

c) Location: Runway centre line lights should be located along the centre line of the runway, except that the lights may be uniformly offset to the same side of the runway centre line by not more than 60 cm where it is not practicable to locate them along the centre line. The lights should be located from the threshold to the end at longitudinal spacing of approximately 15 m. Where the serviceability level of the runway centre line lights specified as maintenance objectives in ADR.OPS.C.015(b)(1) to (b)(3) can be demonstrated, and the runway is intended for use in runway visual range conditions of 350 m or greater, the longitudinal spacing may be approximately 30 m.
d) Characteristics:

1) Runway centre line lights should be fixed lights showing variable white from the threshold to the point 900 m from the runway end; alternate red and variable white from 900 m to 300 m from the runway end; and red from 300 m to the runway end,

except that for runways less than 1 800 m in length, the alternate red and variable white lights should extend from the midpoint of the runway usable for landing to 300 m from the runway end.

2) Runway centre line lights characteristics should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-10 or Figure U-11, as appropriate.

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.

e) Centre line guidance for take-off from the beginning of a runway to a displaced threshold should be provided by:

1) an approach lighting system if its characteristics and intensity settings afford the guidance required during take-off, and it does not dazzle the pilot of an aircraft taking off; or

2) runway centre line lights; or

3) barrettes of at least 3 m length, and spaced at uniform intervals of 30 m, as shown in Figure M-8, designed so that their photometric characteristics and intensity setting afford the guidance required during take-off without dazzling the pilot of an aircraft taking off. Where necessary, provision should be made to extinguish those centre line lights, as prescribed in paragraph (2) above or reset the intensity of the approach lighting system or barrettes when the runway is being used for landing. In no case should only the single source runway centre line lights show from the beginning of the runway to a displaced threshold when the runway is being used for landing.

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

a) Applicability: Touchdown zone lights should be provided in the touchdown zone of a precision approach runway Category II or III.

b) Location and positioning:

1) Touchdown zone lights should extend from the threshold for a longitudinal distance of 900 m, except that, on runways less than 1 800 m in length, the system should be shortened so that it does not extend beyond the midpoint of the runway.

2) The pattern should be formed by pairs of barrettes symmetrically located about the runway centre line. The lateral spacing between the innermost lights of a pair of barrettes should be equal to the lateral spacing selected for the touchdown zone marking. The longitudinal spacing between pairs of barrettes should be either 30 m or 60 m.

c) Characteristics:

1) A barrette should be composed of at least three lights with spacing between the lights of not more than 1.5 m.

2) A barrette should be not less than 3 m or more than 4.5 m in length.

3) Touchdown zone lights should be fixed unidirectional lights showing variable white.

4) Touchdown zone lights characteristics should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-9.

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 Simple touchdown zone lights

a) The purpose of simple touchdown zone lights is to provide pilots with enhanced situational awareness in all visibility conditions and to help enable pilots to decide whether to commence a go around if the aircraft has not landed by a certain point on the runway.
b) Applicability: Except where touchdown zone lights are provided in accordance with CS ADR-DSN.M.695, at a runway where the approach angle is greater than 3.5 degrees and/or the Landing Distance Available combined with other factors increases the risk of an overrun, simple touchdown zone lights should be provided.
c) Location and positioning:

1) Simple touchdown zone lights should be a pair of lights located on each side of the runway centre line 0.3 metres beyond the upwind edge of the final touchdown zone marking.
2) The lateral spacing between the inner lights of the two pairs of lights should be equal to the lateral spacing selected for the touchdown zone marking.
3) The spacing between the lights of the same pair should not be more than 1.5 m or half the width of the touchdown zone marking, whichever is greater (see Figure M-8(C)).
4) Where provided on a runway without touchdown zone markings, simple touchdown zone lights should be installed in such a position that provides the equivalent touchdown zone information.

d) Characteristics:

1) Simple touchdown zone lights should be fixed unidirectional lights showing variable white and aligned so as to be visible to the pilot of a landing aeroplane in the direction of approach to the runway.
2) Simple touchdown zone lights characteristics should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-9.
3) 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.

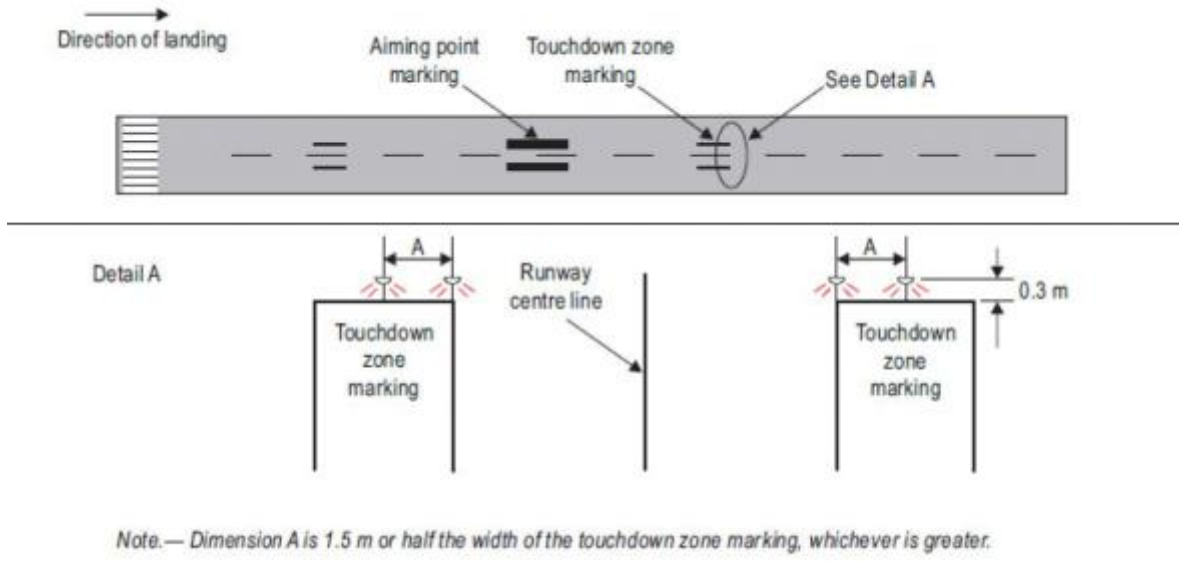


Figure M-8(C). Simple touchdown zone lighting

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

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 Stopway lights

a) Applicability: Stopway lights should be provided for a stopway intended for use at night, or in runway visual range conditions less than a value of 800 m.

b) Location:

1) Stopway lights should be placed along the full length of the stopway and should be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights. The spacing between the lights should be in accordance with CS ADR-DSN.M.675(b)(4). Stopway lights placed along the edge of the stopway should consist of at least one pair of lights.

2) At least four uni-directional stopway lights equally spaced across the width of the stopway should be provided across the end of a stopway on a line at right angles to the stopway axis as near to the end of the stopway as possible and, in any case, not more than 3 m outside the end.

c) Characteristics:

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

2) Stopway lights 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.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 ADRDSN.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 Taxiway centre line lights

a) The safety objective of taxiway centre line lights is to provide guidance for the safe taxi of aircraft as described in paragraph (b).

b) Applicability:

1) Taxiway centre line lights should be provided on an exit taxiway, taxiway, de-icing/antiicing facility, and apron intended for use in runway visual range conditions less than a value of 350 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands, except that these lights need not be provided

where the traffic density is light and taxiway edge lights, and centre line marking provide adequate guidance.

2) Taxiway centre line lights should be provided on a taxiway intended for use at night in runway visual range conditions of 350 m or greater, and particularly on complex taxiway intersections and exit taxiways, except that these lights need not be provided where taxiway edge lights, and centre line marking provide adequate guidance.

3) Taxiway centre line lights should be provided on an exit taxiway, taxiway, de-icing/anti icing facility, and apron in all visibility conditions where specified as components of an advanced surface movement guidance and control system in such a manner as to provide continuous guidance between the runway centre line and aircraft stands.

4) Taxiway centre line lights should be provided on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350 m, except that these lights need not be provided where the traffic density is light and taxiway edge lights, and centre line marking provide adequate guidance.

5) Taxiway centre line lights should be provided in all visibility conditions on a runway forming part of a standard taxi-route where specified as components of an advanced surface movement guidance and control system.

6) 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.

c) Characteristics:

1) Except as provided for in paragraph (c)(3) below, taxiway centre line lights on a taxiway other than an exit taxiway and on a runway forming part of a standard taxi-route should be fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on, or in the vicinity of the taxiway.

2) Taxiway centre line lights on an exit taxiway should be fixed lights. Alternate taxiway centre line lights should show green and yellow from their beginning near the runway centre line to the perimeter of the ILS/MLS critical/sensitive area, or the lower edge of the inner transitional surface, whichever is farthest from the runway; and thereafter all lights should show green, as shown in Figure M-10. The first light in the exit centre line should always show green and the light nearest to the perimeter should always show yellow.

3) Where necessary to denote the proximity to a runway, taxiway centre line lights should be fixed lights showing alternating green and yellow from the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway, to the runway and continue alternating green and yellow until:

(i) their end point near the runway centre line; or

(ii) in the case of the taxiway centre line lights crossing the runway, to the opposite perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway.

4) Taxiway centre line lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-16, U-17, or U-18, as appropriate, for taxiways intended

for use in runway visual range conditions of less than a value of 350 m; Figure U-19 or Figure U-20, as appropriate, for other taxiways.

5) Where higher intensities are required, from an operational point of view, taxiway centre line lights on rapid exit taxiways intended for use in runway visual range conditions less than a value of 350 m should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-16. The number of levels of brilliancy settings for these lights should be the same as that for the runway centre line lights.

6) Where taxiway centre line lights are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, taxiway centre line lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-21, U-22, or U-23, as appropriate.

7) High intensity centre line lights should only be used in case of an absolute necessity and following a specific study.

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.

d) Location and positioning:

1) Taxiway centre line lights should normally be located on the taxiway centre line marking, except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking, as shown in Figure M-9.

2) Taxiway centre line lights on taxiways, runways, rapid exit taxiways or on other exit taxiways should be positioned in accordance with CS ADR-DSN.M.715.

CS ADR-DSN.M.715 Taxiway centre line lights on taxiways, runways, rapid exit taxiways, or on other exit taxiways

a) The safety objective of taxiway centre line lights is to provide guidance for the safe taxi of aircraft as described in paragraph (b).

b) Taxiway centre line lights on taxiways:

1) Taxiway centre line lights on a straight section of a taxiway should be spaced at longitudinal intervals of not more than 30 m, except that:

(i) intervals less than 30 m should be provided on short straight sections; and

(ii) on a taxiway intended for use in RVR conditions of less than a value of 350 m, the longitudinal spacing should not exceed 15 m.

2) Taxiway centre line lights on a taxiway curve should continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway curve. The lights should be spaced at intervals such that a clear indication of the curve is provided.

3) On a taxiway curve the spacing of taxiway centre line lights should be as specified in the Table M-3.

RVR	Radius of taxiway curve	Taxiway centre line lights spacing on taxiway curves
< 350 m	< 400 m	Not greater than7.5 m. This spacing should extend for 60 m before and after the curve.
	≥ 400 m	Not greater than 15 m
≥ 350 m	< 400 m	Not greater than 7.5 m
	401 m to 899 m	Not greater than 15 m
	> 900 m	Not greater than 30 m

Table M-3. Taxiway centre line lights spacing on taxiway curves

c) Taxiway centre line lights on rapid exit taxiways:

1) Taxiway centre line lights on a rapid exit taxiway should commence at a point at least 60 m before the beginning of the taxiway centre line curve, and continue beyond the end of the curve to a point on the centre line of the taxiway where an aeroplane can be expected to reach normal taxiing speed, as shown in Figure M-10. The lights on that portion parallel to the runway centre line should always be at least 60 cm from any row of runway centre line lights, as shown in Figure M-9.

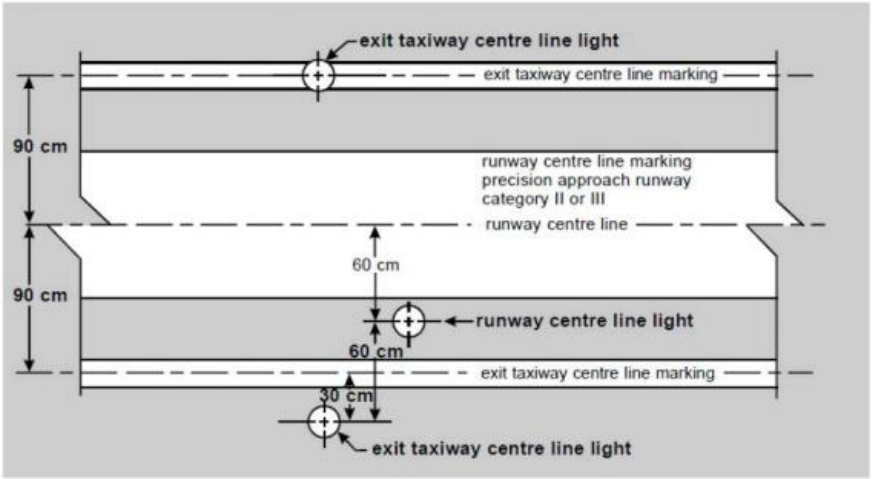
2) The lights should be spaced at longitudinal intervals of not more than 15 m. Where runway centre line lights are not provided, a greater interval not exceeding 30 m may be used.

d) Taxiway centre line lights on other exit taxiways:

1) Taxiway centre line lights on exit taxiways other than rapid exit taxiways should commence at the point where the taxiway centre line marking begins to curve from the runway centre line, and follow the curved taxiway centre line marking at least to the point where the marking leaves the runway. The first light should be at least 60 cm from any row of runway centre line lights, as shown in Figure M-9.

2) The lights should be spaced at longitudinal intervals of not more than 7.5 m.

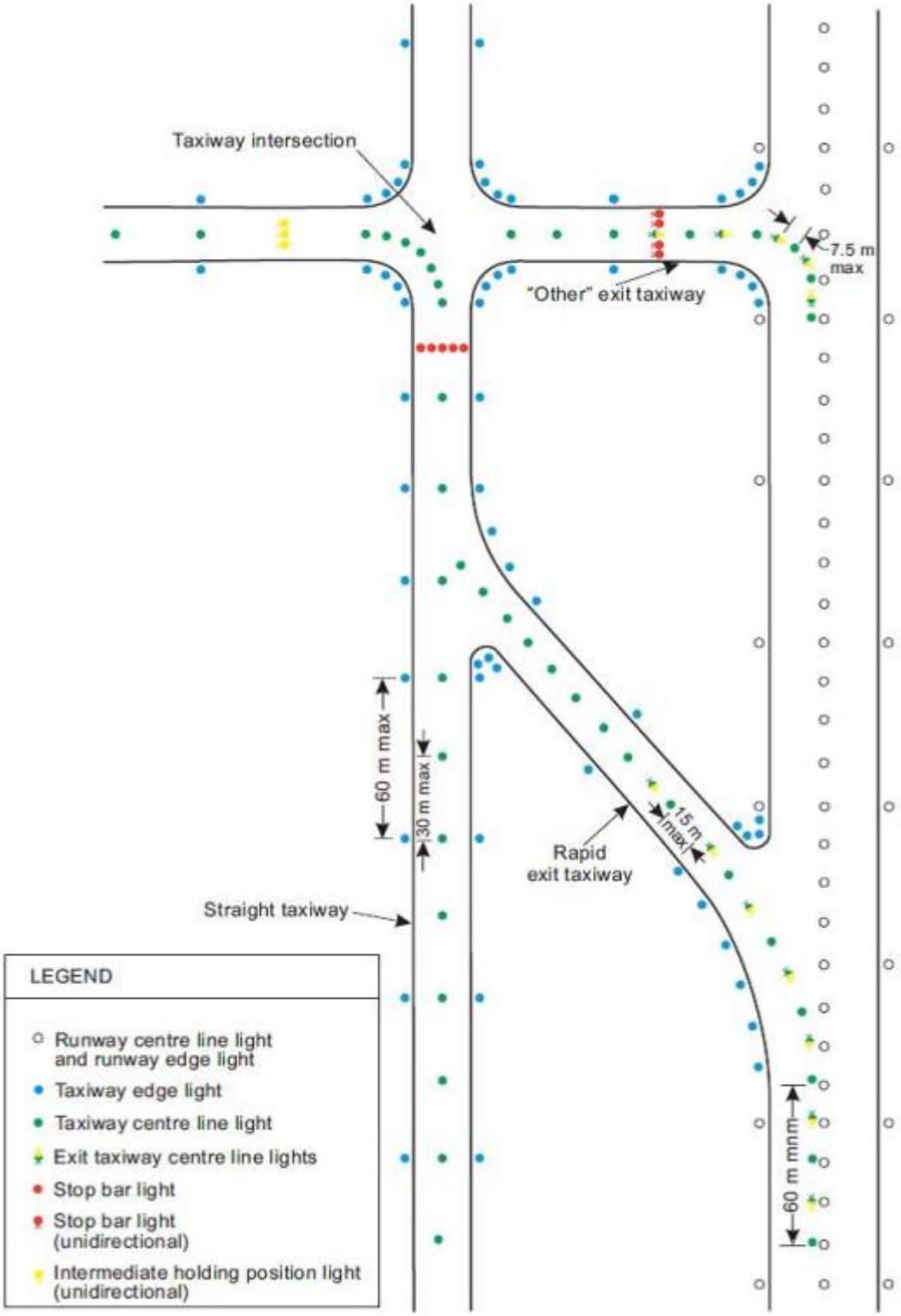
e) Taxiway centre line lights on runways: Taxiway centre line lights on a runway forming part of a standard taxi-route, and intended for taxiing in runway visual range conditions less than a value of 350 m should be spaced at longitudinal intervals not exceeding 15 m.



Tolerances for offset runway centre line lights and taxiway centre line lights to maintain 60 cm separation.

Figure M-9. Offset runway and taxiway centre line lights

f) Positioning of taxiway centre line lights on taxiway: The spacing on a particular section of taxiway centre line lighting (straight or curved section) should be such that a clear indication of the taxiway centre line is provided, particularly on a curved section.
g) Taxiway centre line lights on straight sections of taxiways: Larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing.



Слика М-10. Осветљење рулне стазе

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. (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 Runway turn pad lights

a) The safety objective of runway turn pad lights is to provide additional guidance on a runway turn pad to enable an aeroplane to complete a safe 180-degree turn, and align with the runway centre line.

b) Applicability:

1) Runway turn pad lights should be provided for continuous guidance on a runway turn pad intended for use in runway visual range conditions less than a value of 350 m to enable an aeroplane to complete a 180-degree turn, and align with the runway centre line.

2) Runway turn pad lights should be provided on a runway turn pad intended for use at night, except that these lights need not be provided where taxiway edge lights and runway turn pad marking provide adequate guidance.

c) Location:

1) Runway turn pad lights should normally be located on the runway turn pad marking, except that they should be offset by not more than 30 cm where it is not practicable to locate them on the marking.

2) Runway turn pad lights on a straight section of the runway turn pad marking should be spaced at longitudinal intervals of not more than 15 m.

3) Runway turn pad lights on a curved section of the runway turn pad marking should not exceed a spacing of 7.5 m.

d) Characteristics:

1) Runway turn pad lights should be unidirectional fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or approaching the runway turn pad.

2) Runway turn pad lights should be in accordance with the specifications in CS ADRDSN.U.940, Figure U-17 or Figure U-18, as appropriate.

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 Stop bars

a) Applicability:

1) A stop bar should be provided at every runway-holding position serving a runway when it is intended that the runway should be used in runway visual range conditions less than a value of 550 m, except where:

(i) appropriate aids and procedures are available to assist in preventing inadvertent incursions of traffic onto the runway; or

(ii) operational procedures exist to limit, in runway visual range conditions less than a value of 550 m, the number of:

A) aircraft on the manoeuvring area to one at a time; and

B) vehicles on the manoeuvring area to the essential minimum.

2) Where there is more than one stop bar associated with a taxiway/runway intersection, only one should be illuminated at any given time.

3) A stop bar should be provided at an intermediate holding position when it is desired to supplement markings with lights, and to provide traffic control by visual means.

b) Location: Stop bars should be located across the taxiway at the point where it is desired that traffic stop.

c) Characteristics:

1) Stop bars should consist of lights spaced at uniform intervals of not more than 3 m across the taxiway, showing red in the intended direction(s) of approach to the intersection or runway-holding position.

2) Stop bars installed at a runway-holding position should be unidirectional, and should show red in the direction of approach to the runway.

3) The intensity in red light and beam spreads of stop bar lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-16 to U-20, as appropriate.

4) Where stop bars are specified as components of an advanced surface movement guidance and control system, and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, the intensity in red light and beam spreads of stop bar lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-21, U-22 or U-23, as appropriate.

5) Where a wide beam fixture is required, the intensity in red light and beam spreads of stop bar lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-21 or Figure U-23, as appropriate.

6) The lighting circuit should be designed so that:

(i) stop bars located across entrance taxiways are selectively switchable;

(ii) stop bars located across taxiways intended to be used only as exit taxiways are switchable selectively or in groups;

(iii) when a stop bar is illuminated, any taxiway centre line lights installed beyond the stop bar should be extinguished for a distance of at least 90 m; and

(iv) stop bars are interlocked with the taxiway centre line lights so that when the centre line lights beyond the stop bar are illuminated, the stop bar is extinguished and vice versa.

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 Intermediate holding position lights

a) Applicability:

1) Except where a stop bar has been installed, intermediate holding position lights should be provided at an intermediate holding position intended for use in runway visual range conditions less than a value of 350 m.

2) Intermediate holding position lights should be provided at an intermediate holding position where there is no need for stop-and-go signals as provided by a stop bar.

b) Location: Intermediate holding position lights should be located along the intermediate holding position marking at a distance of 0.3 m prior to the marking.

c) Characteristics of intermediate holding position lights:

1) Intermediate holding position lights should consist of three fixed unidirectional lights showing yellow in the direction of approach to the intermediate holding position with a light distribution similar to taxiway centre line lights if provided.

(2) The lights should be disposed symmetrically about and at right angle to the taxiway centre line, with individual lights spaced 1.5 m apart. (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 De-icing/anti-icing facility exit lights

a) Applicability: The purpose of the de-icing/anti-icing facility exit lights is to indicate the exit

boundary of a remote de-icing/anti-icing facility adjoining a taxiway.
b) Location: Where provided, de-icing/anti-icing facility exit lights should be located 0.3 m inward of the intermediate holding position marking displayed at the exit boundary of a remote de-icing/ anti-icing facility.
c) Characteristics: Where provided, de-icing/anti-icing facility exit lights should consist of in-pavement fixed unidirectional lights spaced at intervals of 6 m showing yellow in the direction of the approach to the exit boundary with a light distribution similar to taxiway centre line lights (see Figure M-11).
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.

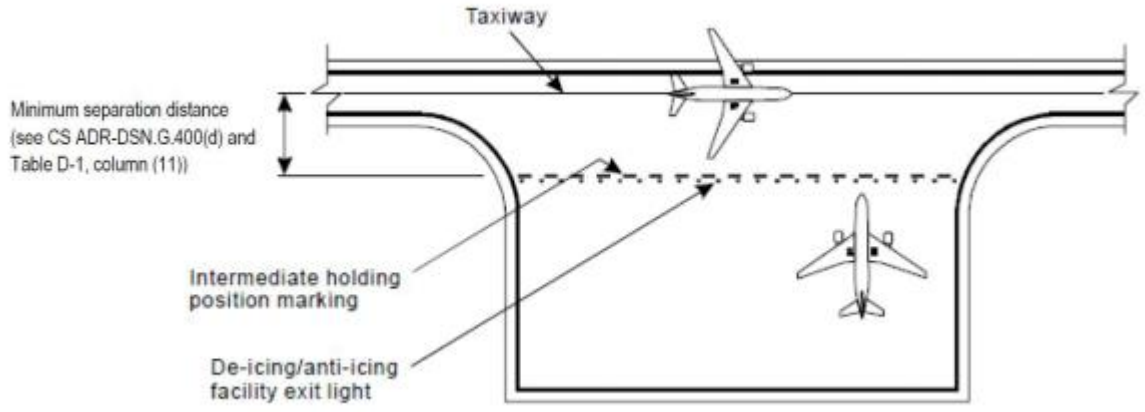


Figure M-11. Example of remote de-icing/anti-icing facility

CS ADR-DSN.M.745 Runway guard lights

a) The safety objective of the runway guard lights is to warn pilots and drivers of vehicles, when operating on taxiways, that they are about to enter a runway. There are two standard configurations of runway guard lights as illustrated in Figure M-12.
b) Applicability:

1) Runway guard lights, Configuration A, should be provided at each taxiway/runway intersection associated with a runway intended for use in:

(i) runway visual range conditions less than a value of 550 m where a stop bar is not installed; and

(ii) runway visual range conditions of values between 550 m and 1 200 m where the traffic density is heavy.

2) As part of runway incursion prevention measures, runway guard lights, Configuration A or B, should be provided at each taxiway/runway intersection where runway incursion hot spots have been identified, and used under all weather conditions during day and night.

3) Configuration B runway guard lights should not be collocated with a stop bar.

4) Where more than one runway-holding position exists at a runway/taxiway intersection, only the set of runway guard lights associated with the operational runway-holding position should be illuminated.

c) Location:

1) Runway guard lights, Configuration A, should be located at each side of the taxiway within the area delimited by the inner and the outer edges of the runway holding position marking.

2) Runway guard lights, Configuration B, should be located across the taxiway within the area delimited by the inner and the outer edges of the runway holding position marking.

d) Characteristics:

1) Runway guard lights, Configuration A, should consist of two pairs of yellow lights.

2) Runway guard lights, Configuration B, should consist of yellow lights spaced at intervals of 3 m across the taxiway.

3) The light beam should be unidirectional and should show yellow in the direction of approach to the runway-holding position.

4) The intensity in yellow light and beam spreads of lights of Configuration A should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-27.

5) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration A should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-28.

6) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration A should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-28.

7) The intensity in yellow light and beam spreads of lights of Configuration B should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-28.

8) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration B should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-24.

9) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration B should be in accordance with the specifications in CS ADR-DSN.U.940, Figure U-24.

10) The lights in each unit of Configuration A should be illuminated alternately.

11) For Configuration B, adjacent lights should be alternately illuminated and alternative lights should be illuminated in unison.

12) The lights should be illuminated between 30 and 60 cycles per minute and the light suppression and illumination periods should be equal and opposite in each light.

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.

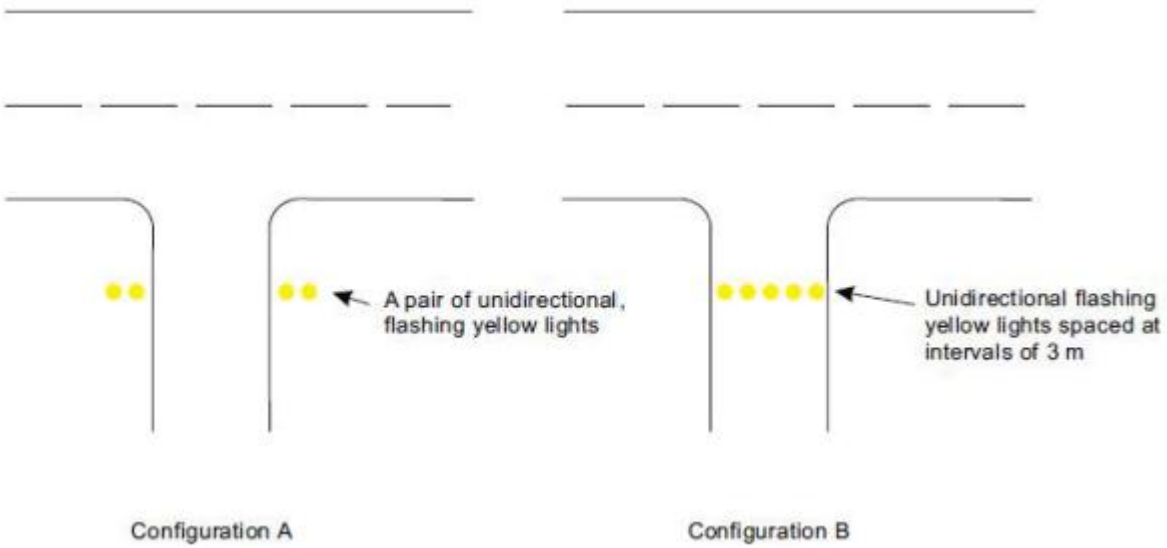


Figure M-12. Runway guard lights

CS ADR-DSN.M.750 Apron floodlighting

a) The purpose of apron floodlighting is to facilitate safe operations on an apron, on a deicing/anti-icing facility, and on a designated isolated aircraft parking position intended to be used at night.
b) Applicability: Apron floodlighting should be provided on an apron, as necessary on a deicing/anti-icing facility, and on a designated isolated aircraft parking position intended to be used at night. Aprons primarily used for recreational flying need not be illuminated.
c) Location: Apron floodlights should be located so as to provide adequate illumination on all apron service areas, with a minimum of glare to pilots of aircraft in flight and on the ground, aerodrome and apron controllers, and personnel on the apron. The arrangement and aiming of floodlights should be such that an aircraft stand receives light from two or more directions to minimise shadows.
d) Characteristics:

1) The spectral distribution of apron floodlights should be such that the colours used for aircraft marking connected with routine servicing, and for surface and obstacle marking, can be correctly identified.
2) The average illuminance should be at least the following:
(i) Aircraft stand:
A) horizontal illuminance — 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and
B) vertical illuminance — 20 lux at a height of 2 m above the apron in relevant directions.
(ii) Other apron areas: horizontal illuminance — 50 % of the average illuminance on the aircraft stands with a uniformity ratio (average to minimum) of not more than 4 to 1.

CS ADR-DSN.M.755 Visual docking guidance system

a) Applicability: A visual docking guidance system should be provided when it is intended to

indicate, by a visual aid, the precise positioning of an aircraft on an aircraft stand and other alternative means, such as marshallers, are not practicable.

b) Characteristics:

1) The system should provide both azimuth and stopping guidance.

2) The azimuth guidance unit and the stopping position indicator should be adequate for use in all weather, visibility, background lighting, and pavement conditions for which the system is intended both by day and night but should not dazzle the pilot.

3) The azimuth guidance unit and the stopping position indicator should be of a design such that:

(i) a clear indication of malfunction of either or both is available to the pilot; and

(ii) they can be turned off.

4) The accuracy of the system should be adequate for the type of loading bridge and fixed aircraft servicing installations with which it is to be used. (5) The system should be usable by all types of aircraft for which the aircraft stand is intended, preferably without selective operation.

6) If selective operation is required to prepare the system for use by a particular type of aircraft, then the system should provide an identification of the selected aircraft type to both the pilot and the system operator as a means of ensuring that the system has been set properly.

c) Location:

1) The azimuth guidance unit and the stopping position indicator should be located in such a way that there is continuity of guidance between the aircraft stand markings, the aircraft stand manoeuvring guidance lights if present, and the visual docking guidance system.

2) The azimuth guidance unit should be located on or close to the extension of the stand centre line ahead of the aircraft so that its signals are visible from the cockpit of an aircraft throughout the docking manoeuvre, and aligned for use at least by the pilot occupying the left seat, although it is preferable for it to be aligned for use by the pilots occupying both the left and right seats.

3) The azimuth guidance unit and the stopping position indicator should be positioned as prescribed below.

(i) The azimuth guidance unit should provide unambiguous left/right guidance which enables the pilot to acquire and maintain the lead-in line without over-controlling. (ii) When azimuth guidance is indicated by colour change, green should be used to identify the centre line and red for deviations from the centre line.

(iii) The stopping position indicator should be located in conjunction with, or sufficiently close to, the azimuth guidance unit so that a pilot can observe both the azimuth and stop signals without turning the head.

(iv) The stopping position indicator should be usable at least by the pilot occupying the left seat, although it is preferable for it to be usable by the pilots occupying both the left and right seats.

(v) The stopping position information provided by the indicator for a particular aircraft type should account for the anticipated range of variations in pilot eye height and/or viewing angle.

(vi) The stopping position indicator should show the stopping position for the aircraft for which guidance is being provided and should provide closing rate information to enable the pilot to gradually decelerate the aircraft to a full stop at the intended stopping position.

(vii) The stopping position indicator should provide closing rate information over a distance of at least 10 m.

(viii) When stopping guidance is indicated by colour change, green should be used to show that the aircraft can proceed and red to show that the stop point has been reached, except that for a short distance prior to the stop point a third colour may be used to warn that the stopping point is close.

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

a) Applicability:

1) Advanced visual docking guidance system (A-VDGS) should be provided where it is operationally desirable to confirm the correct aircraft type for which guidance is being provided, and/or to indicate the stand centre line in use, where more than one is provided for.

2) The Advanced visual docking guidance system should be suitable for use by all types of aircraft for which the aircraft stand is intended.

3) The Advanced visual docking guidance system should only be used in conditions in which its operational performance is specified.

4) The docking guidance information provided by an advanced visual docking guidance system should not conflict with that provided by a conventional visual docking guidance system on an aircraft stand if both types are provided, and are in operational use. A method of indicating that the system is not in operational use or unserviceable should be provided.

5) Location: The Advanced visual docking guidance system should be located such that unobstructed and unambiguous guidance is provided to the person responsible for, and persons assisting, the docking of the aircraft throughout the docking manoeuvre.

b) Characteristics:

1) The Advanced visual docking guidance system should provide, at minimum, the following guidance information at the appropriate stage of the docking manoeuvre:

(i) an emergency stop indication;

(ii) the aircraft type and model for which the guidance is provided;

(iii) an indication of the lateral displacement of the aircraft relative to the stand centre line;

(iv) the direction of azimuth correction needed to correct a displacement from the stand centre line; (v) an indication of the distance to the stop position;

(vi) an indication when the aircraft has reached the correct stopping position; and

(vii) a warning indication if the aircraft goes beyond the appropriate stop position.

2) The Advanced visual docking guidance system should be capable of providing docking guidance information for all aircraft taxi speeds encountered during the docking manoeuvre.

3) The time taken from the determination of the lateral displacement to its display should not result in a deviation of the aircraft when operated in normal conditions, from the stand centre line greater than 1 m.

4) The information on displacement of the aircraft relative to the stand centre line and distance to the stopping position, when displayed, should be provided with the accuracy specified in Table M-4. Symbols and graphics used to depict guidance information should be intuitively representative of the type of information provided.

(i) Information on the lateral displacement of the aircraft relative to the stand centre line should be provided at least 25 m prior to the stop position.

(ii) Continuous closure distance and closure rate should be provided from at least 15 m prior to the stop position.

(iii) Where provided, closure distance displayed in numerals should be provided in metre integers to the stop position and displayed to 1 decimal place at least 3 m prior to the stop position.

(iv) Throughout the docking manoeuvre, an appropriate means should be provided on the Advanced visual docking guidance system to indicate the need to bring the aircraft to an immediate halt. In such an event which includes a failure of the system, no other information should be displayed.

(v) Provision to initiate an immediate halt to the docking procedure should be made available to personnel responsible for the operational safety of the stand.

(vi) The word 'STOP' in red characters should be displayed when an immediate cessation of the docking manoeuvre is required.

Guidance information	Maximum deviation at stop position (stop position)	Maximum deviation at 9 m from stop position	Maximum deviation at 15 m from stop position	Maximum deviation at 25 m from stop position
Azimuth	±250 mm	±340 mm	± 400 mm	± 500 mm
Distance	±500 mm	± 1 000 mm	± 1 300 mm	Not specified

Table M-4. A-VDGS recommended displacement accuracy

CS ADR-DSN.M.765 Aircraft stand manoeuvring guidance lights

a) Applicability: Aircraft stand manoeuvring guidance lights should be provided to facilitate the positioning of an aircraft on an aircraft stand on a paved apron, or on a de-icing/anti-icing facility intended for use in poor visibility conditions unless adequate guidance is provided by other means.

b) Location: Aircraft stand manoeuvring guidance lights should be collocated with the aircraft stand markings.

c) Characteristics:

1) Aircraft stand manoeuvring guidance lights, other than those indicating a stop position, should be fixed yellow lights, visible throughout the segments within which they are intended to provide guidance.

2) The lights used to delineate lead-in, turning, and lead-out lines should be spaced at intervals of not more than 7.5 m on curves and 15 m on straight sections.

3) The lights indicating a stop position should be fixed, unidirectional lights showing red.

4) The intensity of the lights should be adequate for the condition of visibility and ambient light in which the use of the aircraft stand is intended.

5) The lighting circuit should be designed so that the lights may be switched on to indicate that an aircraft stand is to be used, and switched off to indicate that it is not to be used.

CS ADR-DSN.M.770 Road-holding position light

a) Applicability: A road-holding position light should be provided at each road-holding position serving a runway when it is intended that the runway should be used in runway visual range conditions less than a value of 550 m.

b) Location: A road-holding position light should be located adjacent to the holding position marking 1.5 m (±0.5 m) from one edge of the road, i.e. left or right as appropriate to the local road traffic regulations.

c) Characteristics:

1) The road-holding position light should comprise:

(i) a controllable red (stop)/green (go) traffic light; or

(ii) a flashing-red light

2) Provisions for control of the lights in paragraph (1)(i) above should be installed in the positions for the air traffic services.

3) The road-holding position light beam should be unidirectional and aligned so as to be visible to the driver of a vehicle approaching the holding position.

4) The intensity of the light beam should be adequate for the conditions of visibility and ambient light in which the use of the holding position is intended but should not dazzle the driver.

5) The flash frequency of the flashing red light should be between 30 and 60 flashes per minute.

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

a) Applicability: A no-entry bar should be provided across a taxiway which is intended to be used as an exit only taxiway. The purpose of a no-entry bar is to assist in preventing inadvertent access of traffic to that taxiway.

b) Location:

1) A no-entry bar should be located across the taxiway at the end of an exit only taxiway where it is desired to prevent traffic from entering the taxiway in the wrong direction.

2) A no-entry bar should be collocated with a no-entry sign and/or a no-entry marking.

c) Characteristics:

1) A no-entry bar should consist of unidirectional lights spaced at uniform intervals of no more than 3 m showing red in the intended direction(s) of approach to the runway.

2) Taxiway centre line lights installed beyond the no-entry bar, looking in the direction of the runway, should not be visible when viewed from the taxiway.

3) The intensity in red light and beam spreads of no-entry bar lights should be in accordance with the specifications in CS ADR-DSN.U.940, Figures U-16 to U-20, as appropriate.

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 General

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

b) Applicability:

1) Signs should be provided to convey a mandatory instruction, information on a specific location, or destination on a movement area or to provide other information necessary for the implementation of surface movement guidance and control system (SMGCS) at an aerodrome.

2) A variable message sign should be provided where:

(i) the instruction or information displayed on the sign is relevant only during a certain period of time; and/or

(ii) there is a need for variable predetermined information to be displayed on the sign to meet the requirements of the implementation of surface movement guidance and control system (SMGCS) at an aerodrome.

c) Characteristics:

1) Signs should be frangible. Those located near a runway or taxiway should be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign should not exceed the dimension shown in the appropriate column of Table N-1.

2) Signs should be rectangular, as shown in Figures N-4 and N-6 with the longer side horizontal.

3) The only signs on the movement area utilising red should be mandatory instruction signs.

4) Signs should be illuminated when intended for use:

(i) in runway visual range conditions less than a value of 800 m; or

(ii) at night in association with instrument runways; or

(iii) at night in association with non-instrument runways where the code number is 3 or 4.

5) Signs should be retroreflective and/or illuminated when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

6) Where variable pre-determined information is required, a variable sign should be provided.

(i) A variable message sign should show a blank face when not in use.

(ii) In case of failure, a variable message sign should not provide information that could lead to unsafe action from a pilot or a vehicle driver.

(iii) The time interval to change from one message to another on a variable message sign should be as short as practicable and should not exceed 5 seconds.

7) The taxiing guidance signs should be in accordance with the specifications of paragraphs (c)(8) to (c)(22).
8) The location distance for taxiing guidance signs including runway exit signs should conform to Table N-1.

Sign height (mm)				Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
Runway code number	Legend	Face (min)	Installed (max)		
1 or 2	200	400	700	5-11 m	3-10 m
1 or 2	300	600	900	5-11 m	3-10 m
3 or 4	300	600	900	11-21 m	8-15 m
3 or 4	400	800	1 100	11-21 m	8-15 m

Table N-1. Location distances for taxiing guidance signs including runway exit signs

9) Inscription heights should conform to the Table N-2.

Runway code number	Minimum character height		
	Mandatory instruction sign	Information sign	
		Runway exit and runway vacated signs	
1 or 2	300 mm	300 mm	200 mm
3 or 4	400 mm	400 mm	300 mm

Table N-2. Minimum character height

10) Where a taxiway location sign is installed in conjunction with a runway designation sign (see CS ADR-DSN.N.785(b)(9)), the character size should be that specified for mandatory instruction signs.
11) The dimensions should be as follows for:
(i) Arrow:

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

(ii) Stroke:

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

12) Sign luminance should be as follows:

(i) Where operations are conducted in runway visual range conditions less than a value of 800 m, average sign luminance should be at least:

Red	30 cd/m2
Yellow	150 cd/m2
White	300 cd/m2

(ii) Where operations are conducted in accordance with CS ADR-DSN.N.775(c)(4)(ii) and (c)(5), average sign luminance should be at least:

Red	30 cd/m2
Yellow	50 cd/m2
White	100 cd/m2

Note: In runway visual range conditions less than a value of 400 m, there will be some degradation in the performance of signs.

13) The luminance ratio between red and white elements of a mandatory instruction sign should be between 1:5 and 1:10.

14) The average luminance of the sign is calculated by establishing grid points as shown in Figure N-1, and using the luminance values measured at all grid points located within the rectangle representing the sign.

15) The average value is the arithmetic average of the luminance values measured at all considered grid points.

16) The ratio between luminance values of adjacent grid points should not exceed 1.5:1. For areas on the sign face where the grid spacing is 7.5 cm, the ratio between luminance values of adjacent grid points should not exceed 1.25:1. The ratio between the maximum and minimum luminance value over the whole sign face should not exceed 5:1.

17) The forms of characters, i.e. letters, numbers, arrows, and symbols should conform to those shown in Figures N-2A to N-2H. The width of characters and the space between individual characters should be determined as indicated in Table N-3.

18) The face height of signs should be as follows:

Legend height	Face height (min)
200 mm	400 mm
300 mm	600 mm
400 mm	800 mm

19) The face width of signs should be determined using Figure N-3 except that, where a mandatory instruction sign is provided on one side of a taxiway only, the face width should not be less than:

(i) 1.94 m where the code number is 3 or 4; and

(ii) 1.46 m where the code number is 1 or 2.

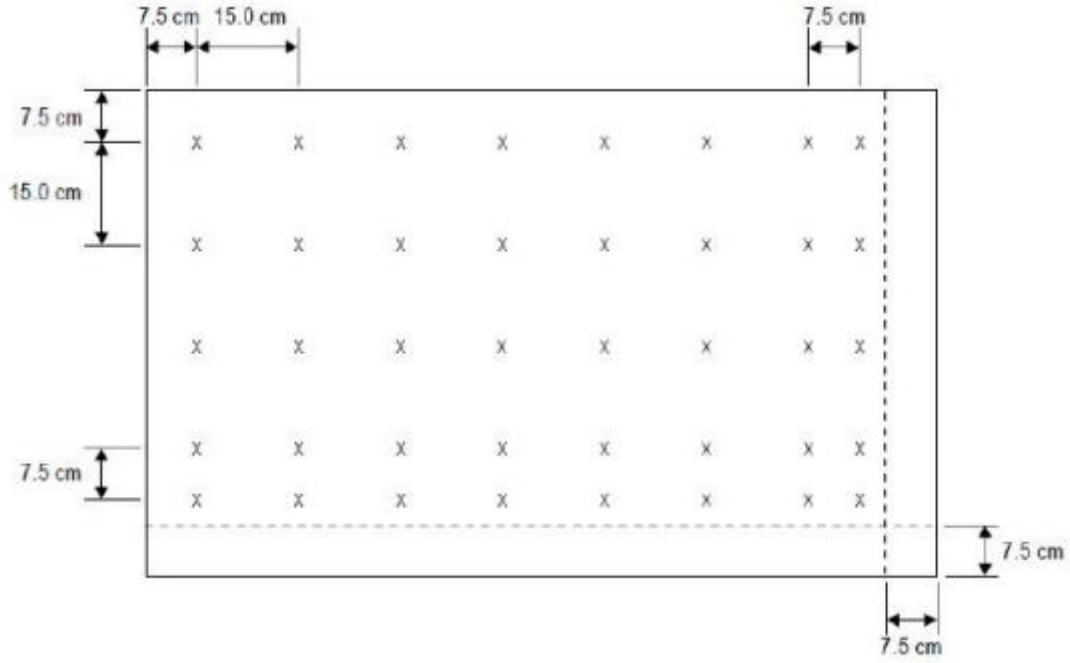
20) Borders:

(i) The black vertical delineator between adjacent direction signs should have a width of approximately 0.7 of the stroke width.

(ii) The yellow border on a stand-alone location sign should be approximately 0.5 stroke width.

21) The colours of signs should be in accordance with the appropriate specifications in CHAPTER U — Colours for aeronautical ground lights, markings, signs and panels.

22) If the runway threshold is displaced from the extremity of the runway, a sign showing the designation of the runway may be provided for aeroplanes taking off.



Note 1: The average luminance of a sign is calculated by establishing grid points on a sign face showing typical inscriptions and a background of the appropriate colour (red for mandatory instruction signs and yellow for direction and destination signs) as follows:

a) Starting at the top left corner of the sign face, establish a reference grid point at 7.5 cm from the left edge and the top of the sign face.

b) Create a grid of 15 cm spacing horizontally and vertically from the reference grid point. Grid points within 7.5 cm of the edge of the sign face should be excluded.

c) Where the last point in a row/column of grid points is located between 22.5 cm and 15 cm from the edge of the sign face (but not inclusive), an additional point should be added 7.5 cm from this point.

d) Where a grid point falls on the boundary of a character and the background, the grid point should be slightly shifted to be completely outside the character.

Note 2: Additional grid points may be required to ensure that each character includes at least five evenly spaced grid points.

Note 3: Where one unit includes two types of signs, a separate grid should be established for each type.

Figure N-1. Grid points for calculating average luminance of a sign

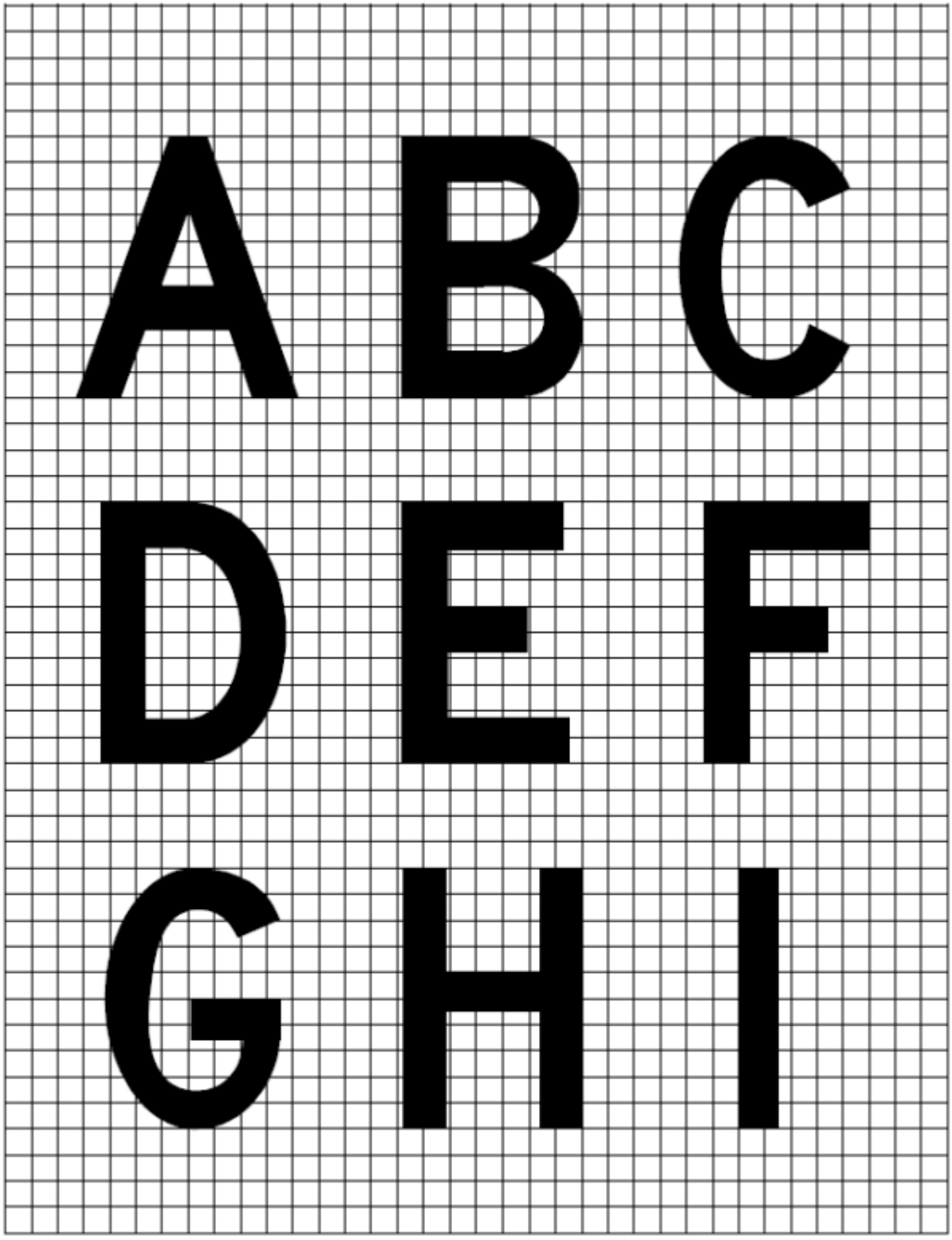


Figure N-2A. Forms of characters for signs

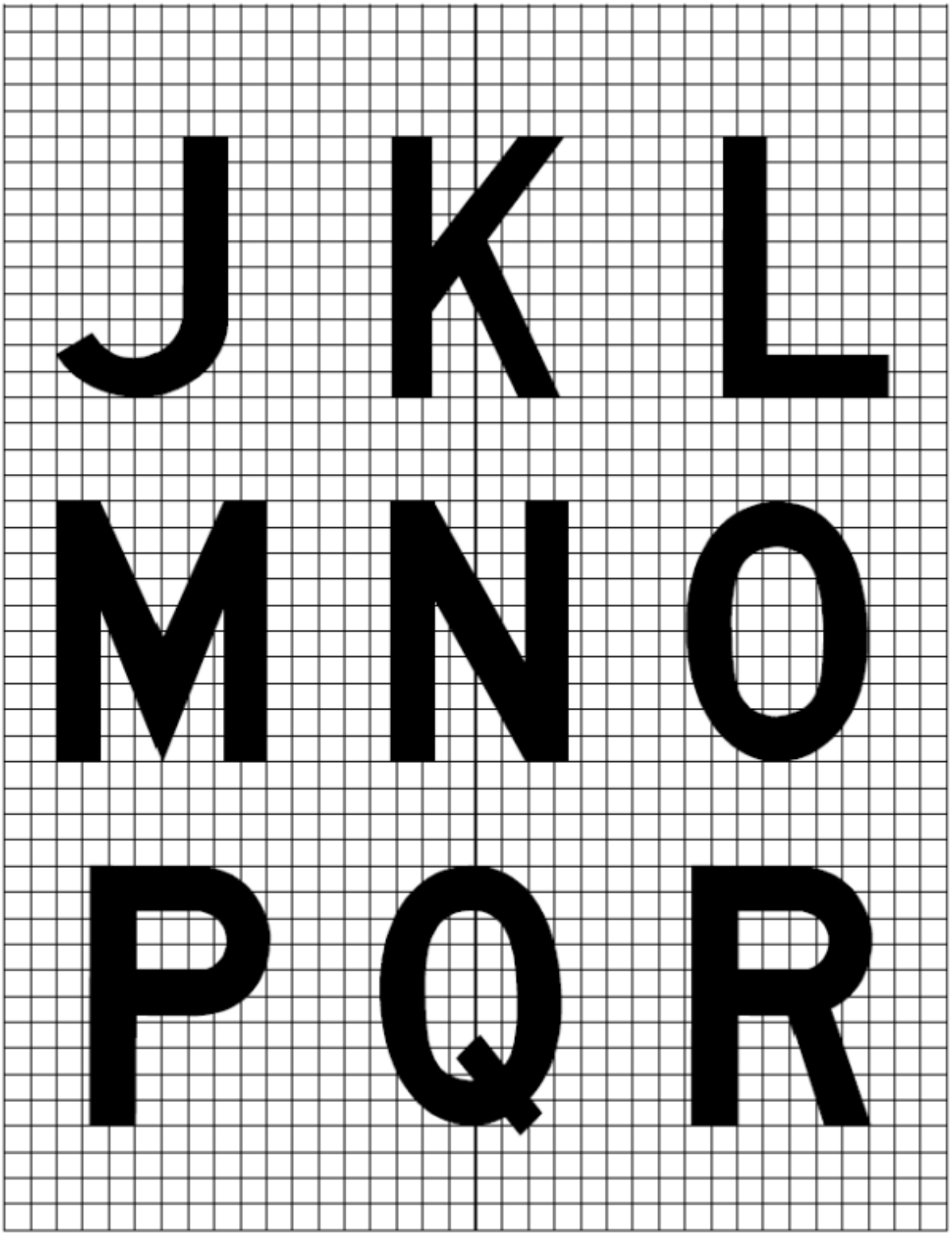


Figure N-2B. Forms of characters for signs

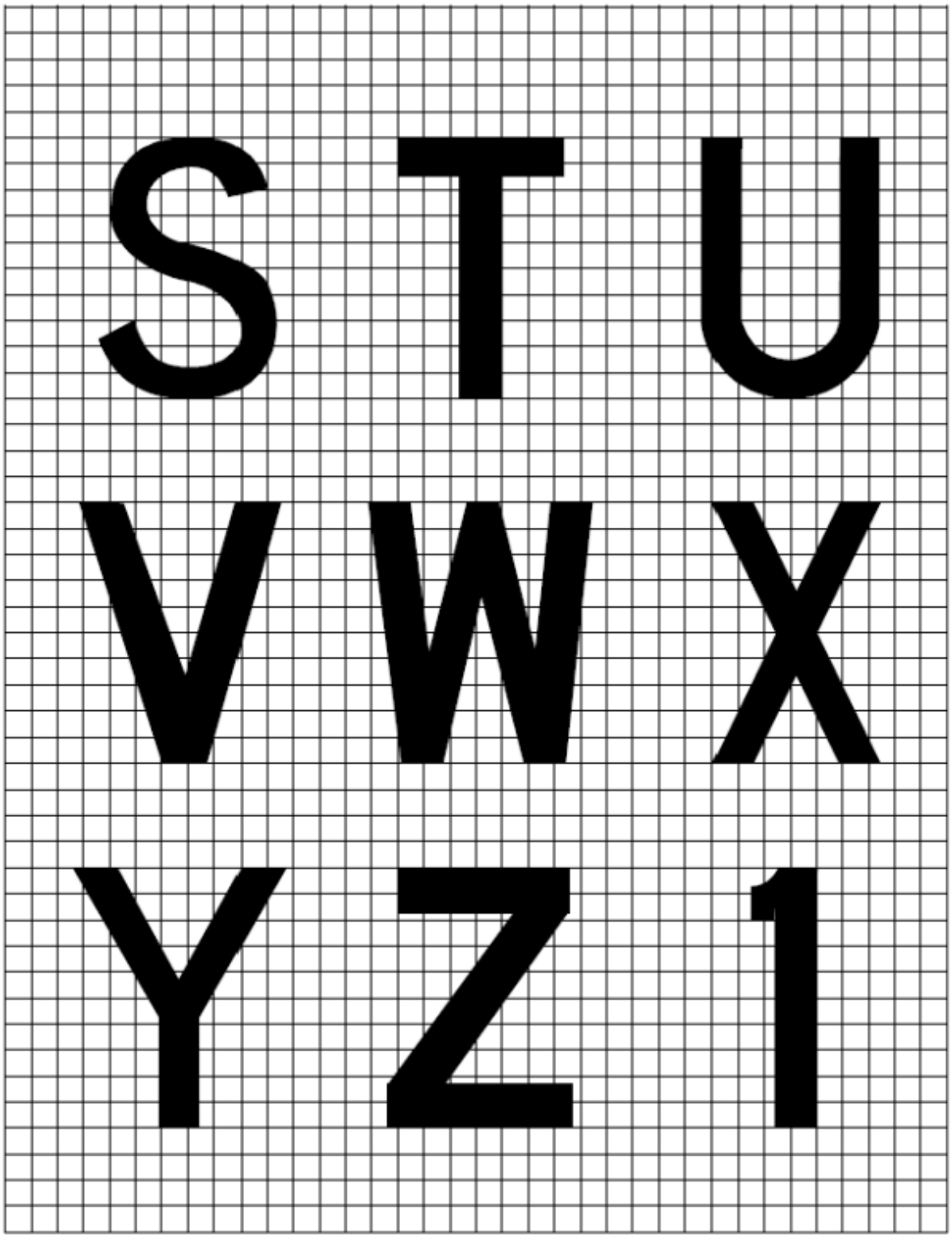


Figure N-2C. Forms of characters for signs

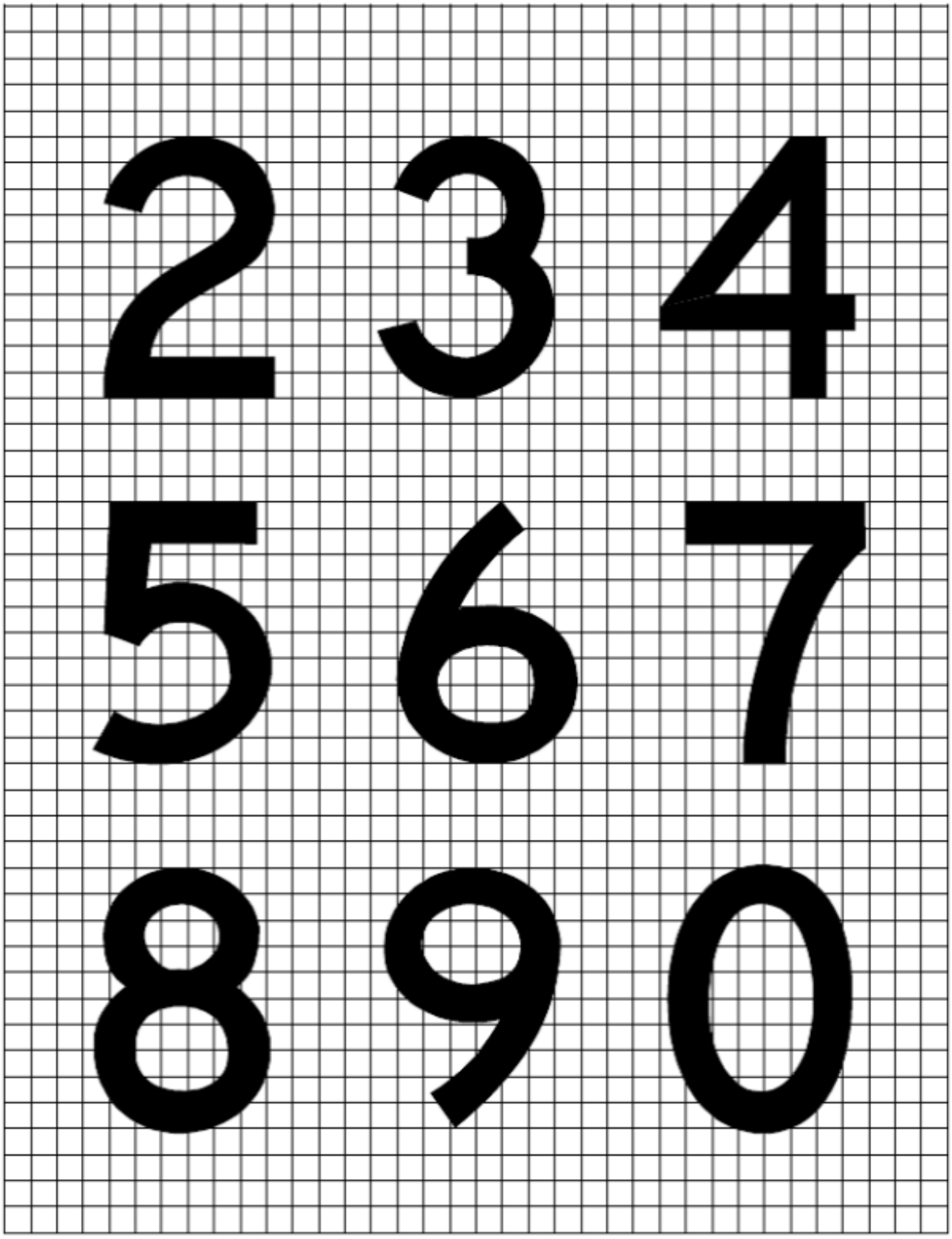


Figure N-2D. Forms of characters for signs

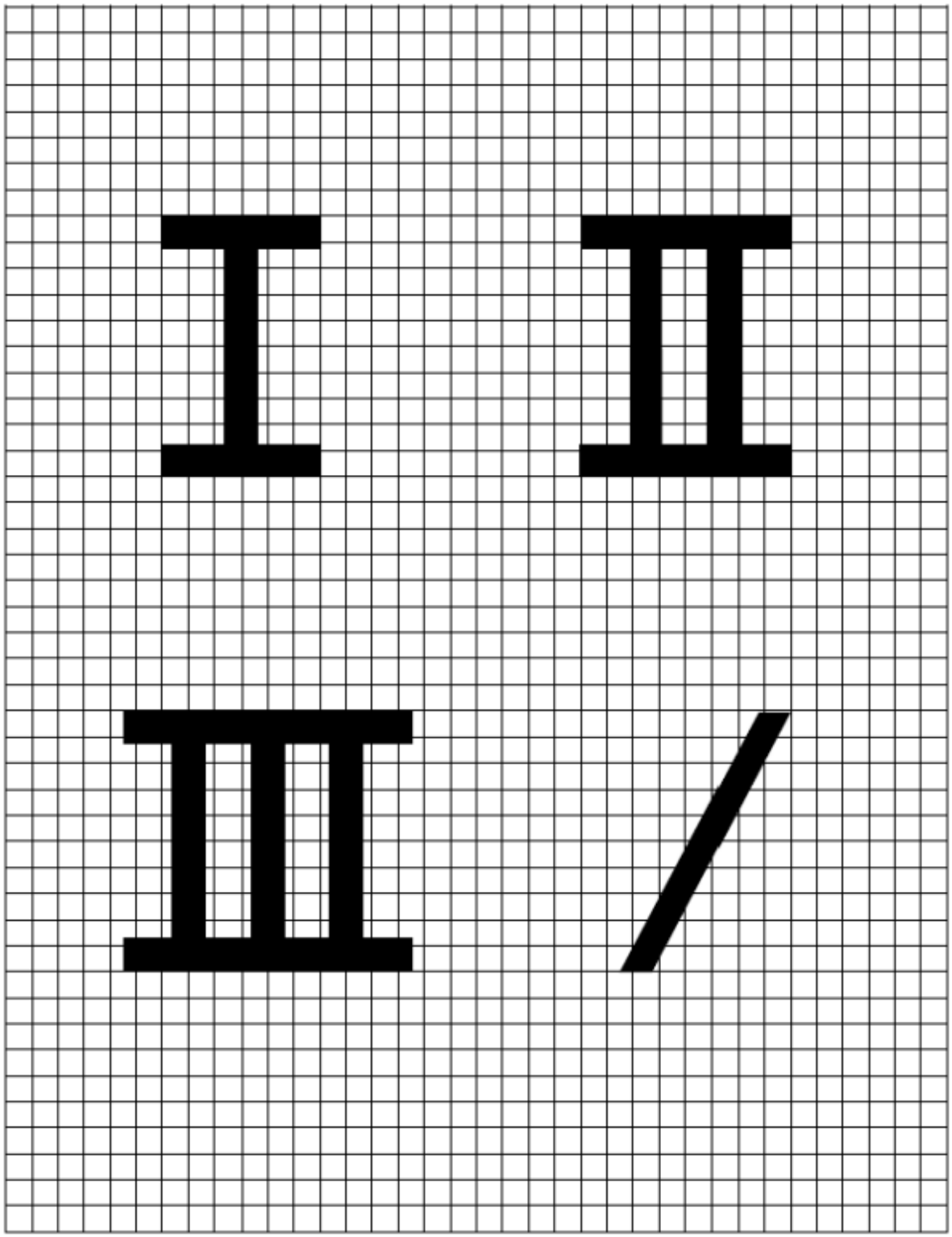


Figure N-2E. Forms of characters for signs

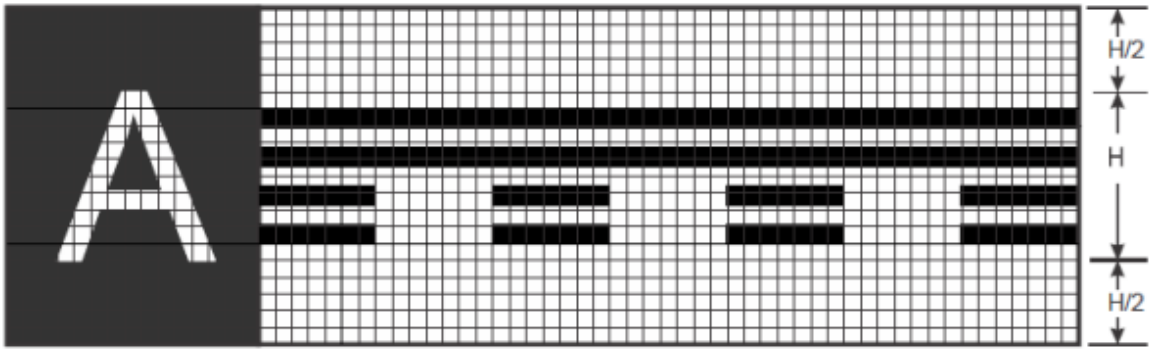


Figure N-2F. Runway vacated sign with typical location sign

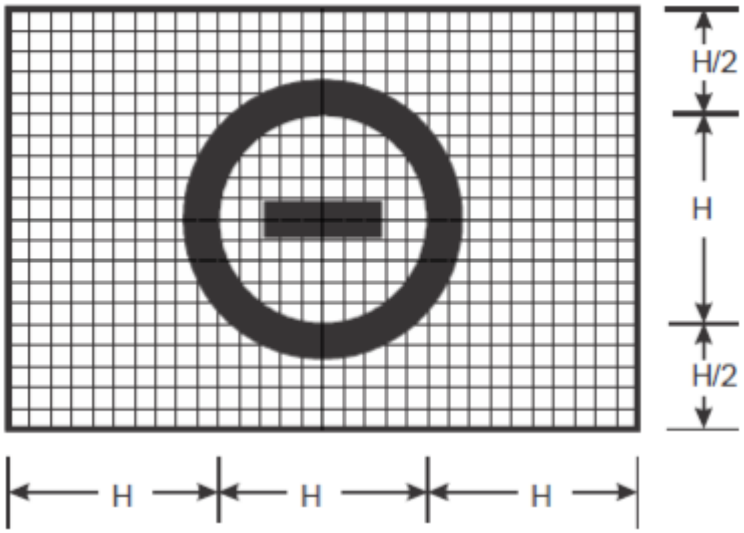
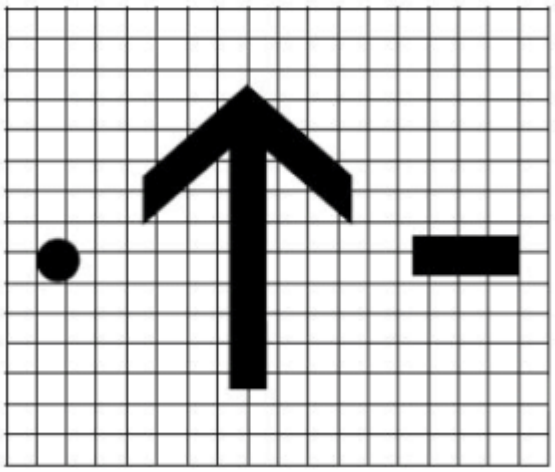


Figure N-2G. No-entry sign



Note 1.- The arrow stroke width, diameter of the dot, and both width and length of the dash should be proportioned to the character stroke width.

Note 2.- The dimensions of the arrow should remain constant for a particular sign size, regardless of orientation.

Figure N-2H. Forms of characters for signs

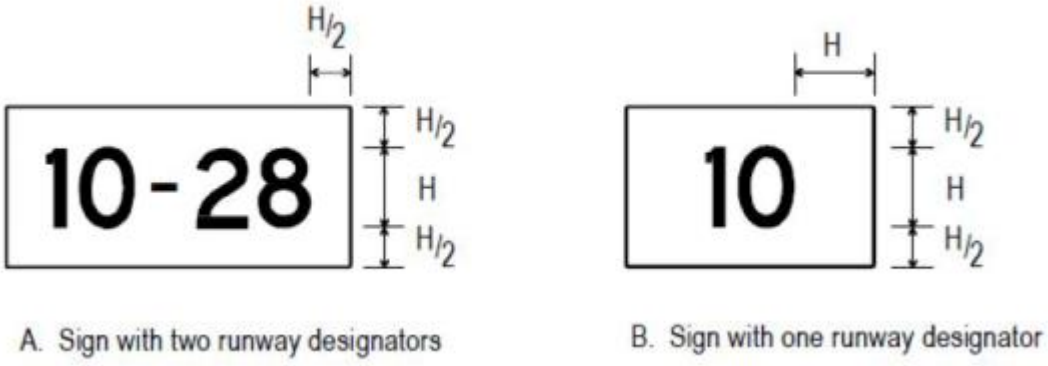


Figure N-3. Sign dimensions

a) Letter to letter code number			
Proceeding 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

b) Numeral to numeral code number			
Proceeding Numeral	Following letter		
	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

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

d) Width of letter			
Letter	Letter height		
	200	300	400
	Width (mm)		
A	170	255	340
B	137	205	274
C	137	205	274
D	137	205	274
E	124	186	248
F	124	186	248
G	137	205	274
H	137	205	274
I	32	48	64
J	127	190	254
K	140	210	280
L	124	186	248
M	157	236	314
N	137	205	274
O	143	214	286
P	137	205	274
Q	143	214	286

R	137	205	274
S	137	205	274
T	124	186	248
U	137	205	274
V	152	229	304
W	178	267	356
X	137	205	274
Y	171	257	342
Z	137	205	274

e) Width of numeral			
Numeral	Numeral height		
	200	300	400
	Width (mm)		
1	50	74	98
2	137	205	274
3	137	205	274
4	149	224	298
5	137	205	274
6	137	205	274
7	137	205	274
8	137	205	274
9	137	205	274
0	143	214	286

INSTRUCTIONS

1. To determine the proper SPACE between letters or numerals, obtain the code number from table a) or b) and enter table c) for that code number to the desired letter or numeral height.
2. The space between words or groups of characters forming an abbreviation or symbol should be equal to 0.5 to 0.75 of the height of the characters used except that where an arrow is located with a single character such as ‘A→‘, the space may be reduced to not less than one quarter of the height of the character in order to provide a good visual balance.
3. Where the numeral follows a letter or vice versa, use Code 1. 4. Where a hyphen, dot, or diagonal stroke follows a character or vice versa, use Code 1. 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 Mandatory instruction signs

a) 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 runwayholding 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 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, 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 installed, the inscriptions/symbol of Figure N-4 should be used:

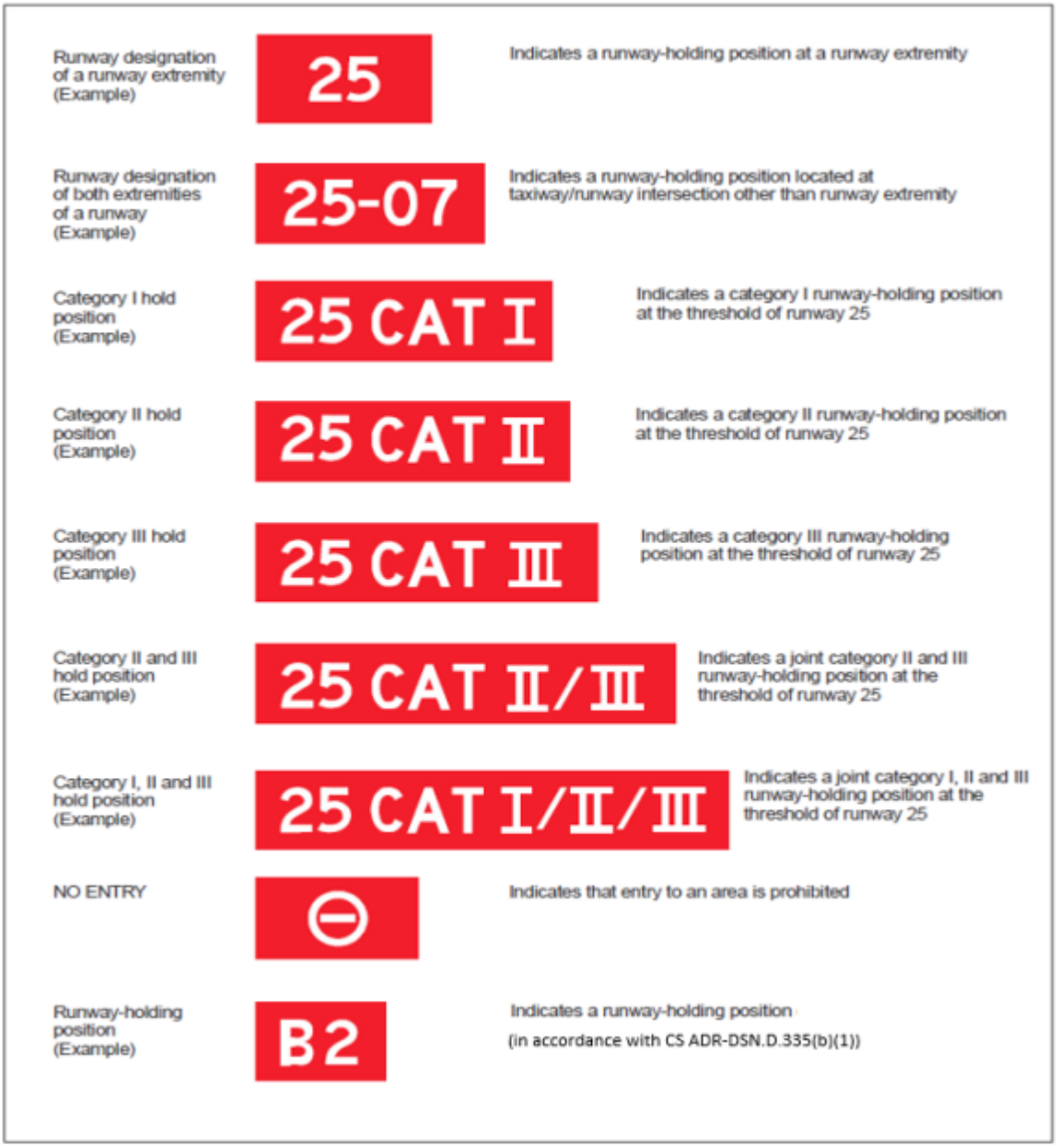
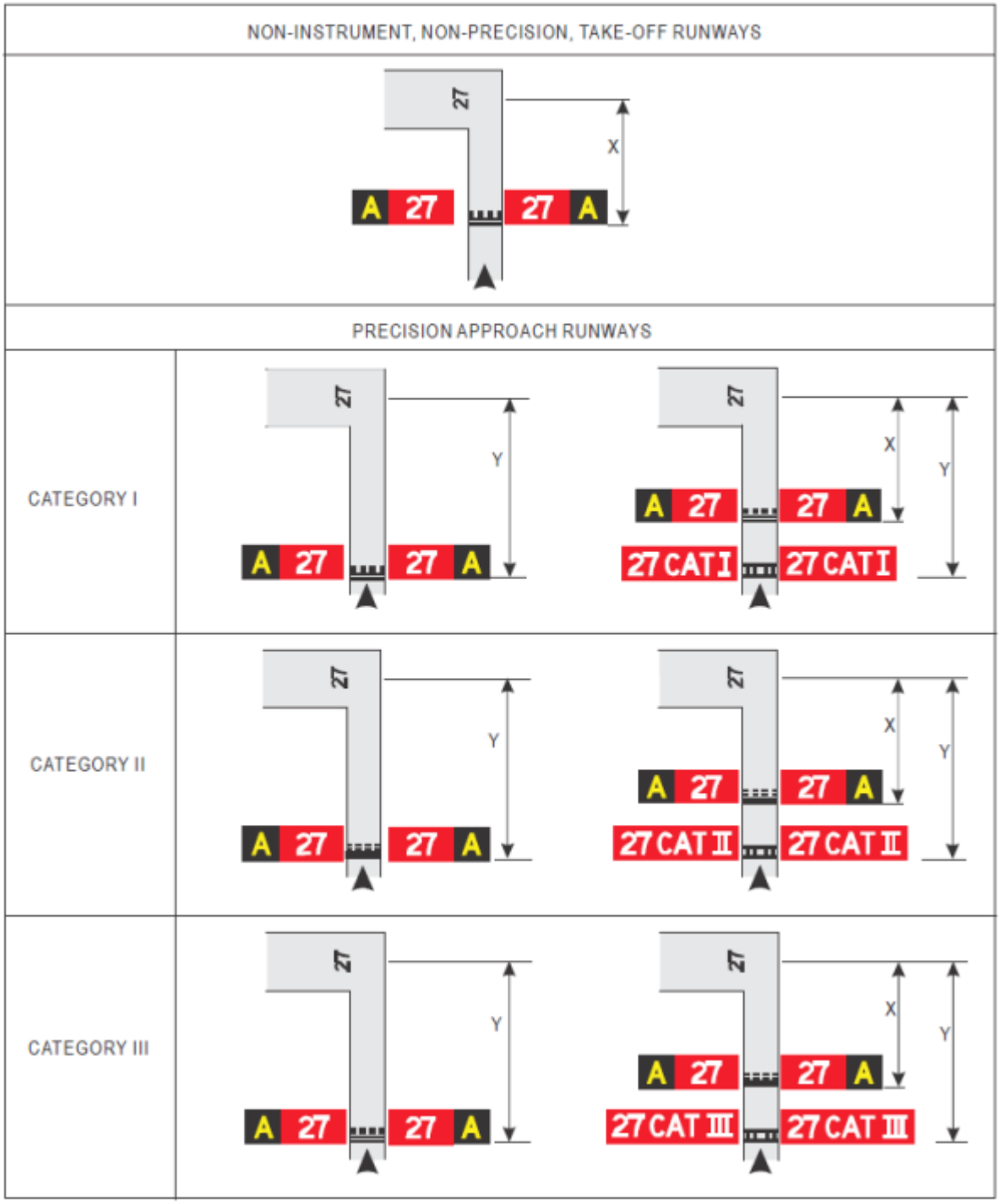


Figure N-4. Mandatory instruction signs



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 Information signs

a) Applicability:

1) An information sign should be provided where there is an operational need to identify by a sign, a specific location, or routing (direction or destination) information.

2) Information signs should include: direction signs, location signs, destination signs, runway exit signs, runway vacated signs, and intersection take-off signs.

3) A runway exit sign should be provided where there is an operational need to identify a runway exit.

4) A runway vacated sign should be provided where the exit taxiway is not provided with taxiway centre line lights and there is a need to indicate to a pilot leaving a runway the perimeter of the ILS/MLS critical/sensitive area, or the lower edge of the inner transitional surface whichever is farther from the runway centre line.

5) At runways where intersection take-offs are conducted, an intersection take-off sign should be provided to indicate the remaining take-off run available (TORA) for such take-offs.

6) Where necessary, a destination sign should be provided to indicate the direction to a specific destination on the aerodrome, such as cargo area, general aviation, etc.

7) A combined location and direction sign should be provided when it is intended to indicate routing information prior to a taxiway intersection.

8) A direction sign should be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

9) A location sign should be provided at an intermediate holding position.

10) A location sign should be provided in conjunction with a runway designation sign except at a runway/runway intersection.

11) A location sign should be provided in conjunction with a direction sign, except that it may be omitted where a safety assessment indicates that it is not needed.

12) Where necessary, a location sign should be provided to identify taxiways exiting an apron or taxiways beyond an intersection.

13) Where a taxiway ends at an intersection such as a 'T' and it is necessary to identify this, a barricade, direction sign, and/or other appropriate visual aid should be used.

b) Location:

1) Except as specified in 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.

6) The inscription on a destination sign should comprise an alpha, alphanumerical or numerical message identifying the destination, plus an arrow indicating the direction to proceed as shown in Figure N-6.

7) The inscription on a direction sign should comprise an alpha or alphanumerical message identifying the taxiway(s), plus an arrow or arrows appropriately oriented as shown in Figure N-6.

8) The inscription on a location sign should comprise the designation of the location taxiway, runway, or other pavement the aircraft is on or is entering, and should not contain arrows. 9) Where necessary to identify each of a series of intermediate holding positions on the same taxiway, the location sign should consist of the taxiway designation and a progressive number.

10) Where a location sign and direction signs are used in combination:

(i) all direction signs related to left turns should be placed on the left side of the location sign and all direction signs related to right turns should be placed on the right side of the location sign, except that where the junction consists of one intersecting taxiway, the location sign may alternatively be placed on the left hand side;

(ii) the direction signs should be placed such that the direction of the arrows departs increasingly from the vertical with increasing deviation of the corresponding taxiway;

(iii) an appropriate direction sign should be placed next to the location sign where the direction of the location taxiway changes significantly beyond the intersection; and

(iv) adjacent direction signs should be delineated by a vertical black line as shown in Figure N-6.

11) A taxiway should be identified by a designator that is used only once on an aerodrome and comprising a single letter, two letters, or a combination of a letter or letters followed by a number.

12) When designating taxiways:

(i) the letters I, O, or X should not be used to avoid confusion with the numerals 1, 0, and the closed marking;

(ii) the use of words such as ‘inner’ and ‘outer’ should be avoided wherever possible.

13) The use of numbers alone on the manoeuvring area should be reserved for the designation of runways.

14) Apron stand designators should not be the same as taxiway designators.

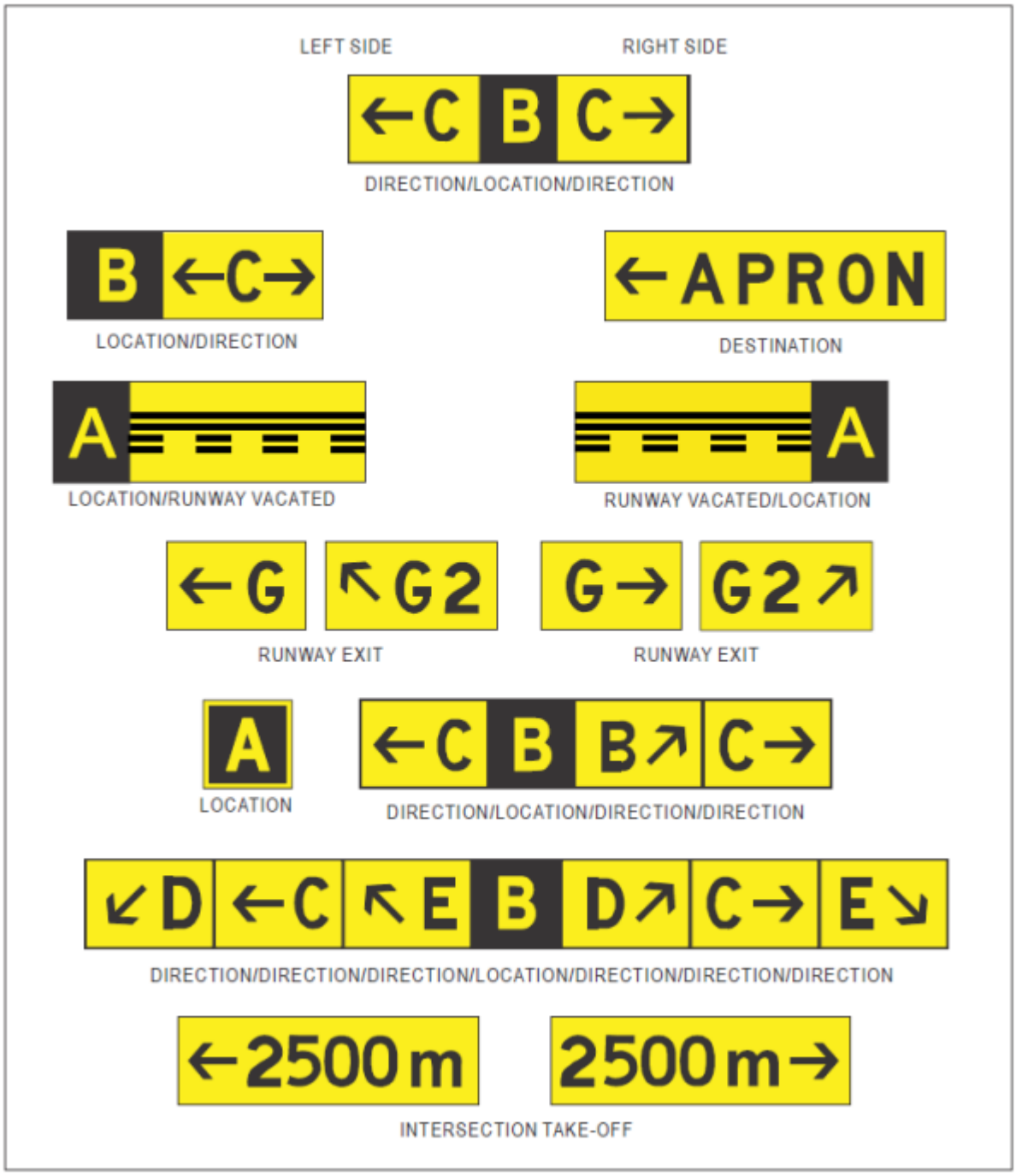


Figure N-6. Information signs

CS ADR-DSN.N.790 VOR aerodrome checkpoint sign

When a VOR aerodrome check-point is established, it should be indicated by a VOR aerodrome check-point marking and sign.
a) Location: A VOR aerodrome check-point sign should be located as near as possible to the check-point and so that the inscriptions are visible from the cockpit of an aircraft properly positioned on the VOR aerodrome check-point marking.
b) Characteristics:

1) A VOR aerodrome check-point sign should consist of an inscription in black on a yellow background.
2) The inscriptions on a VOR check-point sign should be in accordance with one of the alternatives shown in Figure N-7 in which:

VOR	is an abbreviation identifying this as a VOR check-point;
116.3	is an example of the radio frequency of the VOR concerned;
147°	is an example of the VOR bearing, to the nearest degree, which should be indicated at the VOR check-point; and
4.3 NM	is an example of the distance in nautical miles to a DME collocated with the VOR concerned.

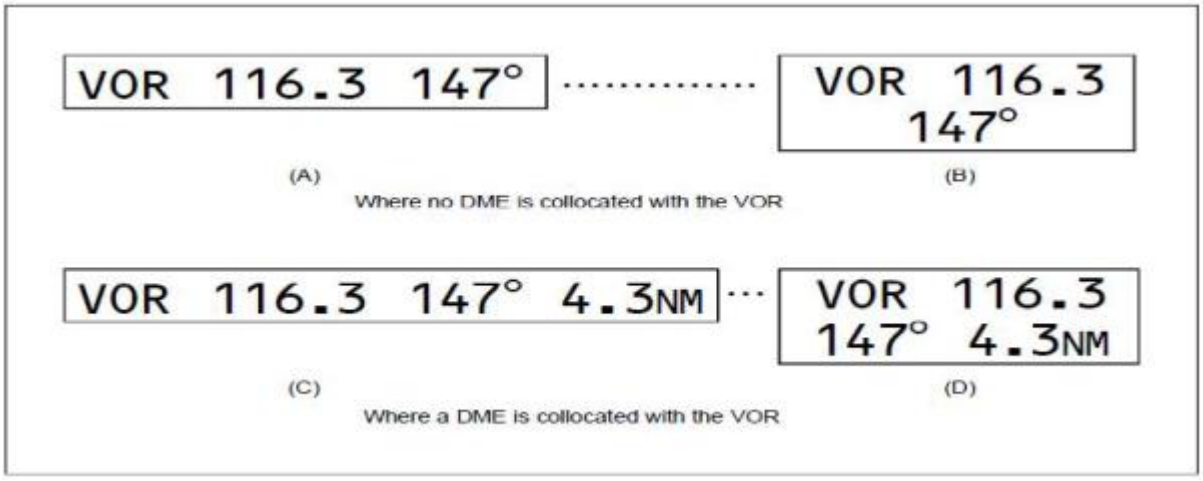


Figure N-7. VOR aerodrome check-point sign

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

a) Applicability: An aircraft stand identification marking should be supplemented with an aircraft stand identification sign where feasible.
b) Location: An aircraft stand identification sign should be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.
c) Characteristics: An aircraft stand identification sign should consist of an inscription in black on a yellow background.

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

a) Applicability: A road-holding position sign should be provided at all road entrances to a runway.
b) Location: The road-holding position sign should be located 1.5 m from one edge of the road (left or right as appropriate to the local road traffic regulations) at the holding position.
c) Where a road intersects a taxiway, a suitable sign may be located adjacent to the roadway/taxiway intersection marking 1.5 m from one edge of the road, i.e. left or right as appropriate to the local road traffic regulations.

d) Characteristics:

1) A road-holding position sign at an intersection of a road with a runway should consist of an inscription in white on a red background.

2) The inscription on a road-holding position sign should be in the national language, be in conformity with the local road traffic regulations, and include the following:

(i) a requirement to stop; and

(ii) where appropriate:

A) a requirement to obtain ATC clearance; and

B) location designator.

3) A road-holding position sign intended for night use should be retroreflective or illuminated.

4) A road-holding position sign at the intersection of a road with a taxiway should be in accordance with the local road traffic regulations for a yield right of way sign or a stop sign.

CHAPTER P — VISUAL AIDS FOR NAVIGATION (MARKERS)

CS ADR-DSN.P.805 General

Markers should be frangible. Those located near a runway or taxiway should be sufficiently low to preserve clearance for propellers, and for the engine pods of jet aircraft.

CS ADR-DSN.P.810 Unpaved runway edge markers

a) Applicability: Markers should be provided when the extent of an unpaved runway is not clearly indicated by the appearance of its surface compared with that of the surrounding ground.

b) Characteristics:

1) Where runway lights are provided, the markers should be incorporated in the light fixtures. Where there are no lights, markers of flat rectangular or conical shape should be placed so as to delimit the runway clearly.

2) The flat rectangular markers should have a minimum size of 1 m by 3 m, and should be placed with their long dimension parallel to the runway centre line. The conical markers should have a height not exceeding 0.50 m.

CS ADR-DSN.P.815 Stopway edge markers

a) Applicability: Stopway edge markers should be provided when the extent of a stopway is not clearly indicated by its appearance compared with that of the surrounding ground.

b) Characteristics: The stopway edge markers should be sufficiently different from any runway edge markers used to ensure that the two types of markers cannot be confused.

CS ADR-DSN.P.820 Edge markers for snow-covered runways

a) Applicability: Edge markers for snow-covered runways should be used to indicate the usable limits of a snow-covered runway when the limits are not otherwise indicated.

(b) Location: Edge markers for snow-covered runways should be placed along the sides of the runway at intervals of not more than 100 m, and should be located symmetrically about the runway centre line at such a distance from the centre line that there is adequate clearance for

wing tips and powerplants. Sufficient markers should be placed across the threshold and end of the runway.

CS ADR-DSN.P.825 Taxiway edge markers

a) Applicability: Taxiway edge markers should be provided on a taxiway where taxiway centre line or edge lights or taxiway centre line markers are not provided.

b) Location: Taxiway edge markers should be installed at least at the same locations as would the taxiway edge lights, had they been used.

c) Characteristics:

1) A taxiway edge marker should be retroreflective blue.

2) The marked surface as viewed by the pilot should be a rectangle and should have a minimum viewing area of 150 cm2.

3) Taxiway edge markers should be frangible. Their height should be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

CS ADR-DSN.P.830 Taxiway centre line markers

a) Applicability:

1) Taxiway centre line markers should be provided on a taxiway where taxiway centre line or edge lights or taxiway edge markers are not provided.

2) Taxiway centre line markers should be provided on a taxiway where taxiway centre line lights are not provided if there is a need to improve the guidance provided by the taxiway centre line marking.

b) Location:

1) Taxiway centre line markers should be installed at least at the same location as would taxiway centre line lights had they been used.

2) Taxiway centre line markers should be located on the taxiway centre line marking except that they may be offset by not more than 0.3 m where it is not practicable to locate them on the marking.

c) Characteristics:

1) A taxiway centre line marker should be retroreflective green.

2) The marked surface as viewed by the pilot should be a rectangle, and should have a minimum viewing area of 20 cm2.

3) Taxiway centre line markers should be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the markers themselves.

CS ADR-DSN.P.835 Unpaved taxiway edge markers

a) Applicability: Where the extent of an unpaved taxiway is not clearly indicated by its appearance compared with that of the surrounding ground, markers should be provided.

b) Characteristics:

1) Where taxiway lights are provided, the markers should be incorporated in the light fixtures.

2) Where there are no lights, suitable markers should be placed so as to clearly delineate the taxiway.

CHAPTER Q - VISUAL AIDS FOR DENOTING OBSTACLES

CS ADR-DSN.Q.840 Objects to be marked and/or lighted within the lateral boundaries of the obstacle limitation surfaces

a) Applicability: The specifications for objects to be marked and/or lighted within the lateral boundaries of the obstacle limitation surfaces apply only to the area under control of the aerodrome operator.

b) Elevated aeronautical ground lights within the movement area should be marked so as to be conspicuous by day. Obstacle lights should not be installed on elevated ground lights or signs in the movement area.

c) All obstacles within the distance specified in Table D-1, column (11), (12) or (13), from the centre line of a taxiway, an apron taxiway or aircraft stand taxilane should be marked and, if the taxiway, apron taxiway or aircraft stand taxilane is used at night, lighted.

d) A fixed obstacle that extends above a take-off climb, approach or transitional surface within 3 000 m of the inner edge of the take-off climb or approach surface should be marked and if the runway is used at night, lighted, except that:

1) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

2) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day, and its height above the level of the surrounding ground does not exceed 150 m;

3) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day if medium intensity lights, Type A, are deemed insufficient; and

4) the lighting may be omitted where the obstacle is a lighthouse and an safety assessment indicates the lighthouse light to be sufficient.

e) A fixed object, other than an obstacle, adjacent to a take-off climb, approach or transitional surface should be marked and, if the runway is used at night, lighted, if such marking and lighting is considered necessary to ensure its avoidance, except that the marking may be omitted when:

1) the object is lighted by medium-intensity obstacle lights, Type A, by day, and its height above the level of the surrounding ground does not exceed 150 m; or

2) the object is lighted by high-intensity obstacle lights by day if medium intensity lights, Type A, are deemed insufficient.

f) A fixed obstacle that extends above a horizontal surface should be marked and if the aerodrome is used at night, lighted, except that:

1) such marking and lighting may be omitted when:

(i) the obstacle is shielded by another fixed obstacle; or

(ii) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths; or

(iii) an safety assessment shows the obstacle is not of operational significance.

2) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day, and its height above the level of the surrounding ground does not exceed 150 m;

3) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day if medium intensity lights, Type A, are deemed insufficient; and
4) the lighting may be omitted where the obstacle is a lighthouse and a safety assessment indicates the lighthouse light to be sufficient. (g) A fixed object that extends above an obstacle protection surface should be marked and, if the runway is used at night, lighted, except that such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle.

CS ADR-DSN.Q.841 Objects to be marked and/or lighted outside the lateral boundaries of the obstacle limitation surfaces

a) Applicability: The specifications for objects to be marked and/or lighted outside the lateral boundaries of the obstacle limitation surfaces apply only to the area under control of the aerodrome operator.
b) Obstacles in accordance with CS ADR-DSN.J.487 should be marked and lighted, except that the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day.
c) When considered as an obstacle, other objects outside the obstacle limitation surfaces should be marked and/or lighted.

CS ADR-DSN.Q.845 Marking of fixed objects

a) General: All fixed objects to be marked should, whenever practicable, be coloured but if this is not practicable, markers or flags should be displayed on or above them, except those objects that are sufficiently conspicuous by their shape, size, or colour need not be otherwise marked.
b) Marking by colour

1) An object should be coloured to show a chequered pattern if it has essentially unbroken surfaces, and its projection on any vertical plane equals or exceeds 4.5 m in both dimensions. The pattern should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour. The colours of the pattern should contrast with each other and with the background against which they should be seen.
2) An object should be coloured to show alternating contrasting bands if:
   (i) it has essentially unbroken surfaces, and has one dimension, horizontal or vertical, greater than 1.5 m, and the other dimension, horizontal or vertical, less than 4.5 m; or
   (ii) it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5 m.
3) The bands should be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30 m, whichever is less. The colours of the bands should contrast with the background against which they should be seen. Orange and white should be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object should be of the darker colour (see Figures Q-1 and Q-2). The dimensions of the marking band widths are shown in Table Q-4.

4) An object should be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5 m. Orange or red should be used, except where such colours merge with the background.

c) Marking by flags

1) Flags used to mark fixed objects should be displayed around, on top of, or around the highest edge of the object. When flags are used to mark extensive objects or groups of closely spaced objects, they should be displayed at least every 15 m. Flags should not increase the hazard presented by the object they mark.

2) Flags used to mark fixed objects should not be less than 0.6 m on each side.

3) Flags used to mark fixed objects should be orange in colour or a combination of two triangular sections, one orange and the other white, or one red and the other white. Except where such colours merge with the background, other conspicuous colours should be used.

d) Marking by markers

1) Markers displayed on or adjacent to objects should be located in conspicuous positions so as to retain the general definition of the object and should be recognisable in clear weather from a distance of at least 1 000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object. The shape of markers should be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they should be such that the hazard presented by the object they mark is not increased.

2) A marker should be of one colour. When more than one markers are installed, white and red, or white and orange markers should be displayed alternately. The colour selected should contrast with the background against which it should be seen.

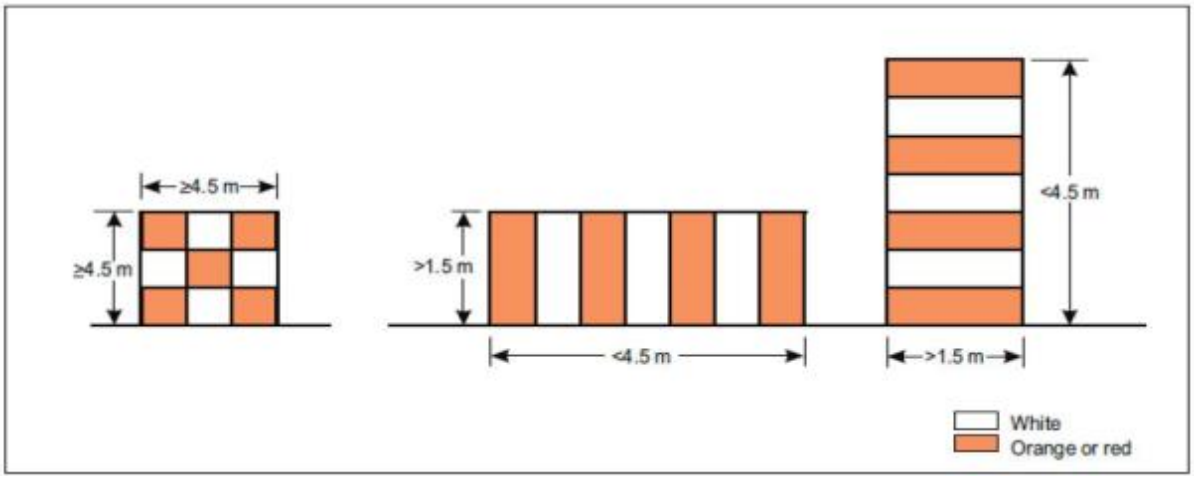


Figure Q-1. Basic marking patterns

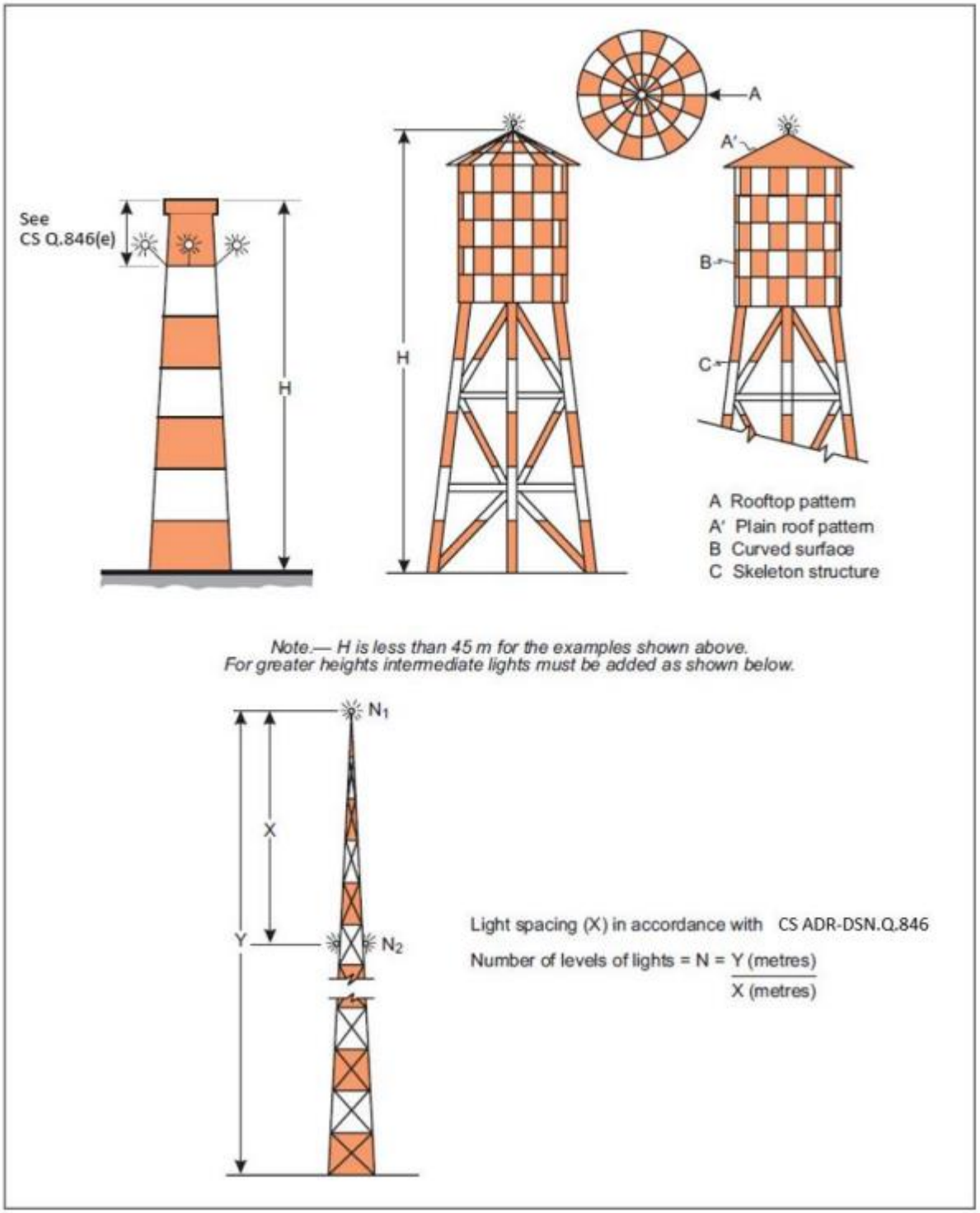


Figure Q-2. Examples of marking and lighting of tall structures

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

a) The presence of objects which should be lighted, as specified in CS ADR-DSN.Q.840 and CS ADR-DSN.Q.841 should be indicated by low-, medium- or high-intensity obstacle lights, or a combination of such lights.

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..

c) The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked should be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object or by an adjacent object, additional lights should be provided on that adjacent object, or the part of the object that is shielding the light, in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

d) In case of an object to be lighted one or more low-, medium- or high-intensity obstacle lights should be located as close as practicable to the top of the object.

e) In the case of chimney or other structure of like function, the top lights should be placed sufficiently below the top so as to minimise contamination by smoke, etc. (see Figure Q-2).

f) In the case of a tower or antenna structure indicated by high-intensity obstacle lights by day with an appurtenance such as a rod or an antenna greater than 12 m where it is not practicable to locate a high-intensity obstacle light on the top of the appurtenance, such a light should be located at the highest practicable point, and, if practicable, a medium-intensity obstacle light, Type A, mounted on the top.

g) In the case of an extensive object or of a group of closely spaced objects to be lighted that are:

1) Penetrating a horizontal obstacle limitation surface (OLS) or located outside an OLS, the top lights should be so arranged as to at least indicate the points or edges of the object highest in relation to OLS or above the ground, and so as to indicate the general definition and the extent of the objects; and

(2) Penetrating a sloping OLS, the top lights should be so arranged as to at least indicate the points or edges of the object highest in relation to the OLS, and so as to indicate the general definition and the extent of the objects. If two or more edges are of the same height, the edge nearest the landing area should be marked.

h) When the obstacle limitation surface concerned is sloping and the highest point above the obstacle limitation surface is not the highest point of the object, additional obstacle lights should be placed on the highest point of the object.

(i) Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and

1) Low-intensity lights are used, they should be spaced at longitudinal intervals not exceeding 45 m.

2) Medium-intensity lights are used, they should be spaced at longitudinal intervals not exceeding 900 m.

j) High-intensity obstacle lights, Type A, and medium-intensity obstacle lights, Types A and B, located on an object should flash simultaneously.

k) The installation setting angles for high-intensity obstacle lights, Type A, should be in accordance with Table Q-5.

CS ADR-DSN.Q.847 Lighting of fixed objects with a height less than 45 m above ground level

a) Low-intensity obstacle lights, Type A or B, should be used where the object is a less extensive one and its height above the surrounding ground is less than 45 m.
b) Where the use of low-intensity obstacle lights, Type A or B, would be inadequate, or an early special warning is required, then medium- or high-intensity obstacle lights should be used.
c) Low-intensity obstacle lights, Type B, should be used either alone or in combination with medium-intensity obstacle lights, Type B, in accordance with subparagraph (d), below.
d) Medium-intensity obstacle lights, Type A, B, or C, should be used where the object is an extensive one. Medium-intensity obstacle lights, Types A and C, should be used alone, whereas medium-intensity obstacle lights, Type B, should be used either alone or in combination with low-intensity obstacle lights, Type B.

CS ADR-DSN.Q.848 Lighting of fixed objects with a height 45 m to a height less than 150 m above ground level

a) Medium-intensity obstacle lights, Type A, B, or C, should be used where the object is an extensive one. Medium-intensity obstacle lights, Types A and C, should be used alone, whereas medium-intensity obstacle lights, Type B, should be used either alone or in combination with low-intensity obstacle lights, Type B.
b) Where an object is indicated by medium-intensity obstacle lights, Type A, and the top of the object is more than 105 m above the level of the surrounding ground, or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels. These additional intermediate lights should be spaced, as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings as appropriate, with the spacing not exceeding 105 m.
c) Where an object is indicated by medium-intensity obstacle lights, Type B, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels. These additional intermediate lights should be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and should be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings as appropriate, with the spacing not exceeding 52 m.
d) Where an object is indicated by medium-intensity obstacle lights, Type C, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights should be provided at intermediate levels. These additional intermediate lights should be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.
e) Where high-intensity obstacle lights, Type A, are used, they should be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in paragraph CS ADR-DSN.Q.846(d), except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

CS ADR-DSN.Q.849 Lighting of fixed objects with a height 150 m or more above ground level

a) High-intensity obstacle lights, Type A, should be used to indicate the presence of an object if its height above the level of the surrounding ground exceeds 150 m and a safety assessment indicates such lights to be essential for the recognition of the object by day.

b) Where high-intensity obstacle lights, Type A, are used, they should be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in CS ADR-DSN.Q.846(d), except where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

c) Where an object is indicated by medium-intensity obstacle lights, Type A, additional lights should be provided at intermediate levels. These additional intermediate lights should be spaced, as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105 m.

d) Where an object is indicated by medium-intensity obstacle lights, Type B, additional lights should be provided at intermediate levels. These additional intermediate lights should be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and should be spaced, as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

e) Where an object is indicated by medium-intensity obstacle lights, Type C, additional lights should be provided at intermediate levels. These additional intermediate lights should be spaced, as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52 m.

CS ADR-DSN.Q.850

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CS ADR-DSN.Q.851 Marking and lighting of wind turbines

a) Applicability: When considered as an obstacle a wind turbine should be marked and/or lighted.

b) Marking: The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, or if after a safety assessment, it is determined that other colour will improve safety. c) Lighting:

1) Where lighting is deemed necessary for a single wind turbine or short line of wind turbines, the installation should be in accordance with paragraph (c)(2)(v) below, or as determined by a safety assessment.

2) When lighting is deemed necessary in the case of a wind farm (i.e. a group of two or more wind turbines), the wind farm should be regarded as an extensive object and lights should be installed:

(i) to identify the perimeter of the wind farm;

(ii) respecting the maximum spacing, in accordance with CS ADR-DSN.Q.846(i), between the lights along the perimeter, or if after a safety assessment, it is determined that a greater spacing can be used;

(iii) so that, where flashing lights are used, they flash simultaneously throughout the wind farm;

(iv) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located; and

(v) at locations prescribed in (i), (ii) and (iv):

A) for wind turbines of less than 150 m in overall height (hub height plus vertical blade height), medium intensity lighting on the nacelle;

B) for wind turbines from 150 m to 315 m in overall height, in addition to the medium intensity light installed on the nacelle, a second light serving as an alternate should be provided in case of failure of the operating light; the lights should be installed to assure that the output of either light is not blocked by the other;

C) in addition, for wind turbines from 150 m to 315 m in overall height, an intermediate level at half the nacelle height of at least three low intensity Type E lights, as specified in CS ADR-DSN.Q.846(c), that are configured to flash at the same rate as the light on the nacelle; low-intensity Type A or B lights may be used if an safety assessment shows that low intensity Type E lights are not suitable.

(3) The obstacle lights should be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.

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

a) Marking: The wires, cables, etc. to be marked should be equipped with markers; the supporting tower should be coloured.

b) Marking by colours: The supporting towers of overhead wires, cables, etc. that require marking should be marked in accordance with CS ADR-DSN.Q.845(b), except that the marking of the supporting towers may be omitted when they are lighted by high-intensity obstacle lights by day.

c) Marking by markers:

1) Markers displayed on or adjacent to objects should be located in conspicuous positions so as to retain the general definition of the object and should be recognisable in clear weather from a distance of at least 1 000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object. The shape of markers should be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they should be such that the hazard presented by the object they mark is not increased.

2) A marker displayed on an overhead wire, cable, etc., should be spherical and have a diameter of not less than 60 cm.

(3) The spacing between two consecutive markers, or between a marker and a supporting tower, should be appropriate to the diameter of the marker. The spacing should normally not exceed:

(i) 30 m where the marker diameter is 60 cm, increasing progressively with increase of the marker diameter to:

(ii) 35 m where the marker diameter is 80 cm; and

(iii) further progressive increases to a maximum of 40 m where the marker diameter is of at least 130 cm. Where multiple wires, cables, etc., are involved, a marker should be located not lower than the level of the highest wire at the point marked.

4) A marker should be of one colour. When installed, white and red, or white and orange, markers should be displayed alternately. The colour selected should contrast with the background against which it should be seen.

5) When it has been determined that an overhead wire, cable, etc., needs to be marked but it is not practicable to install markers on the wire, cable, etc., then high-intensity obstacle lights, Type B, should be provided on their supporting towers.

d) Lighting:

1) High-intensity obstacle lights, Type B, should be used to indicate the presence of the tower supporting overhead wires, cables, etc. where:

(i) a safety assessment indicates such light to be essential for the recognition of the presence of wires, cables, etc.; or

(ii) it has not been found practicable to install marker on the wires, cables, etc.

2) Where high-intensity obstacle lights, Type B, are used, they should be located at three levels:

(i) at the top of the tower;

(ii) at the lowest level of the catenary of the wires or cables; and (iii) at approximately midway between these two levels.

3) High-intensity obstacle lights, Type B, indicating the presence of a tower supporting overhead wires, cables, etc., should flash sequentially; first the middle light, second the top light, and last the bottom light. The intervals between flashes of the lights should approximate the following ratios:

Flash interval between	Ratio of cycle time
Middle and top light	1/13
Top and bottom light	2/13
Bottom and middle light	10/13

(4) The installation setting angles for high-intensity obstacle lights, Types B, should be in accordance with Table Q-5.

(1)	(2)	(3)	(4)	(5)	(6)	(7)
Light type	Colour	Signal type/ (Flash Rate)	Peak intensity (cd) at given Background Luminance (b)			Light Distribution Table
			Day (Above 500 cd/m2)	Twilight (50-500 cd/m2)	Night (Below 50 cd/m2)	
Low-intensity Type A (fixed-obstacle)	Red	Fixed	N/A	N/A	10	Table Q-2
Low-intensity Type B (fixed-obstacle)	Red	Fixed	N/A	N/A	32	Table Q-2
Low-intensity Type C (mobile obstacle)	Yellow/ Blue (a)	Flashing (60-90 fpm)	N/A	40	40	Table Q-2

Low-intensity Type D (follow-me vehicle)	Yellow	Flashing (60-90 fpm)	N/A	200	200	Table Q-2
Low-intensity Type E	Red	Flashing (c)	N/A	N/A	32	Table Q-2 (Type B)
Medium-intensity Type A	White	Flashing (20-60 fpm)	20 000	20 000	2 000	Table Q-3
Medium-intensity Type B	Red	Flashing (20-60 fpm)	N/A	N/A	2 000	Table Q-3
Medium-intensity Type C	Red	Fixed	N/A	N/A	2 000	Table Q-3
High-intensity Type A	White	Flashing (40-60 fpm)	200 000	20 000	2 000	Table Q-3
High-intensity Type B	White	Flashing (40-60 fpm)	100 000	20 000	2 000	Table Q-3

a) CS ADR-DSN.Q.850(b)
b) For flashing lights, effective intensity as determined in accordance with ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.
c) For wind turbine application, to flash at the same rate as the lighting on the nacelle.

Table Q-1. Characteristics of obstacle lights

	Minimum intensity (a)	Maximum intensity (b)	Vertical beam spread (f)	
			Minimum beam spread	Intensity
Type A	10 cd (b)	N/A	10	5 cd
Type B	32 cd (b)	N/A	10	16 cd
Type C	40 cd (b)	400 cd	12 (d)	20 cd
Type D	200 cd (c)	400 cd	N/A (e)	N/A

Note: This table does not include recommended horizontal beam spreads. CS ADR-DSN.Q.846(c) requires 360° coverage around an obstacle. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.
a) 360° horizontal. For flashing lights, the intensity is read into effective intensity, as determined in accordance with ICAO, Aerodrome Design Manual, Part 4, Visual Aids.
b) Between 2 and 10° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.
c) Between 2 and 20° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.
d) Peak intensity should be located at approximately 2.5° vertical.
e) Peak intensity should be located at approximately 17° vertical.
f) Beam spread is defined as the angle between the horizontal plan and the directions for which the intensity exceeds that mentioned in the ‘intensity’ column.

Table Q-2. Light distribution for low-intensity obstacle lights

Bench-mark intensity	Minimum requirements					Recommendations				
	Vertical elevation angle (b)			Vertical beam spread (c)		Vertical elevation angle (b)			Vertical beam spread (c)	
	0°		-1°			0°	-1°	-10°		
	Mimimum average intensity (a)	Minimum intensity (a)	Minimum intensity (b)	Minimum beam spread	Intensity (a)	Maximum intensity (a)	Maximum intensity (b)	Maximum intensity (a)	Maximum beam spread	Intensity (a)
200 000	200 000	150 000	75 000	3°	75 000	250 000	112 500	7 500	7°	75 000
100 000	100 000	75 000	37 500	3°	37 5 00	125 000	56 250	3 750	7°	37 500
20 000	20 000	1 500	7 500	3°	7 500	25 000	11 250	750	N/A	N/A
2 000	2 000	1 500	750	3°	750	2 500	1 125	75	N/A	N/A

Note: This table does not include recommended horizontal beam spreads. CS ADR-DSN.Q.846(c) requires 360° coverage around an obstacle. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.
a) 360° horizontal. All intensities are expressed in Candela. For flashing lights, the intensity is read into effective intensity, as determined in accordance with ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.
b) Elevation vertical angles are referenced to the horizontal when the light unit is levelled.
c) Beam spread is defined as the angle between the horizontal plan and the directions for which the intensity exceeds that mentioned in the ‘intensity’ column.
Note: an extended beam spread may be necessary under specific configuration and justified by a safety assessment.

Table Q-3. Light distribution for medium- and high-intensity obstacle lights according to benchmark intensities of Table Q-1

Longest dimension		Band width
Greater than	Not exceeding	
1.5 m	210 m	1/7 of longest dimension
210 m	270 m	1/9 “‘ “
270 m	330 m	1/11 “‘ “
330 m	390 m	1/13 “‘ “
390 m	450 m	1/15 “‘ “
450 m	510 m	1/17 “‘ “
510 m	570 m	1/19 “‘ “
570 m	630 m	1/21 “‘ “

Table Q-4. Marking band widths

Height of light unit above terrain (AGL)		Angle of the peak 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 R – VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

CS ADR-DSN.R.855 Closed runways and taxiways, or parts thereof

a) Applicability: A closed marking should be displayed on a runway, or taxiway, or portion

thereof which is permanently closed to the use of all aircraft.

b) Location of closed markings: On a runway, a closed marking should be placed at each end of the runway, or portion thereof, declared closed, and additional markings should be so placed that the maximum interval between markings does not exceed 300 m. On a taxiway a closed marking should be placed at least at each end of the taxiway or portion thereof closed.

c) Characteristics of closed markings: The closed marking should be of the form and proportions as detailed in Figure R-1, Illustration (a), when displayed on a runway, and should be of the form and proportions as detailed in Figure R-1, Illustration (b), when displayed on a taxiway. The marking should be white when displayed on a runway and should be yellow when displayed on a taxiway.

d) When a runway, or taxiway, or portion thereof is permanently closed, all normal runway and taxiway markings should be physically removed.

e) In addition to closed markings, when the runway, or taxiway, or portion thereof closed is intercepted by a usable runway or taxiway which is used at night, unserviceability lights should be placed across the entrance to the closed area at intervals not exceeding 3 m (see CS ADR-DSN.R.870(c)(2)).

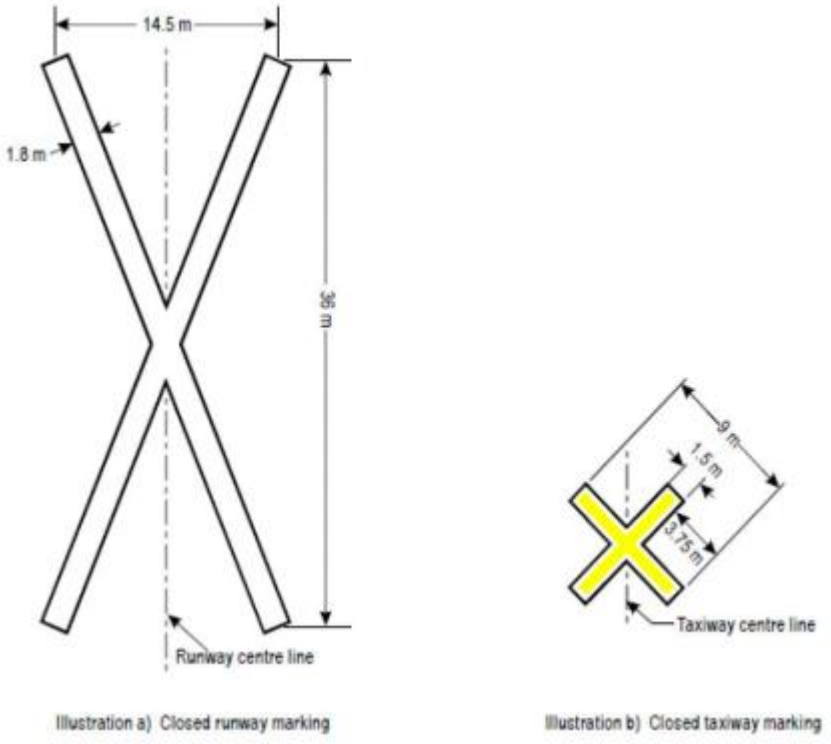


Figure R-1. Runway and taxiway closed markings

CS ADR-DSN.R.860 Non-load-bearing surfaces

a) Shoulders for taxiways, runway turn pads, holding bays and aprons, and other non-load-bearing surfaces which cannot readily be distinguished from load-bearing surfaces and which, if used by aircraft, might result in damage to the aircraft, should have the boundary between such areas and the load-bearing surface marked by a taxi side stripe marking.
b) A taxi side stripe marking should consist of a pair of solid lines, each 15 cm wide and spaced 15 cm apart, and the same colour as the taxiway centre line marking.

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

a) Applicability of Pre-threshold area: When the surface before a threshold is paved and exceeds 60 m in length, and is not suitable for normal use by aircraft, the entire length before the threshold should be marked with a chevron marking.
b) Location: A chevron marking should point in the direction of the runway and be placed as shown in Figure R-2.
c) Characteristics: A chevron marking should be of conspicuous colour and contrast with the colour used for the runway markings; it should preferably be yellow and should have an overall width of at least 0.9 m.

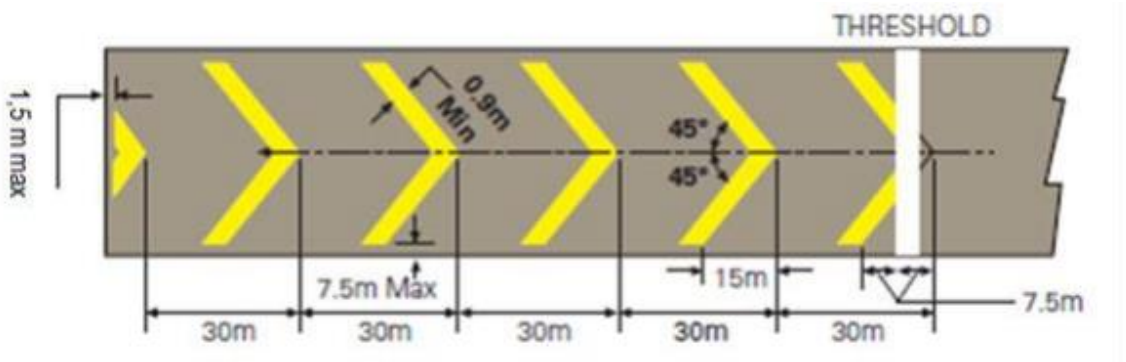


Figure R-2. Pre-threshold area marking

CS ADR-DSN.R.870 Unserviceable areas

a) Applicability of unserviceability markers and lights: Unserviceability markers should be displayed wherever any portion of a taxiway, apron, or holding bay is declared unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely. On a movement area used at night, unserviceability lights should be used.
b) Location: Unserviceability markers and lights should be placed at intervals sufficiently close so as to delineate the unserviceable area.
c) Characteristics:

1) Unserviceability markers should consist of conspicuous upstanding devices such as flags, cones, or marker boards.

2) An unserviceability light should consist of a red fixed light. The light should have intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which it would normally be viewed. In no case should the intensity be less than 10 cd of red light.

3) An unserviceability cone should be at least 0.5 m in height and red, orange, or yellow, or any one of these colours in combination with white.
4) An unserviceability flag should be at least 0.5 m square and red, orange, or yellow, or any one of these colours in combination with white. (5) An unserviceability marker board should be at least 0.5 m in height and 0.9 m in length, with alternate red and white, or orange and white vertical stripes.

CHAPTER S – ELECTRICAL SYSTEMS

CS ADR-DSN.S.875 Electrical power supply systems for air navigation facilities

a) Adequate primary power supply should be available at aerodromes for the safe functioning of air navigation facilities.
b) The design and provision of electrical power systems for aerodrome visual and radio navigation aids should be such that an equipment failure should not leave the pilot with inadequate visual and non-visual guidance, or misleading information.
c) Electric power supply connections to those facilities for which secondary power is required should be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.
d) The time interval between failure of the primary source of power and the complete restoration of the services required by CS ADR-DSN.S.880(d) should be as short as practicable, except that for visual aids associated with non-precision, precision approach, or take-off runways the requirements of Table S-1 for maximum switch-over times should apply.

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

a) For a precision approach runway, a secondary power supply capable of meeting the requirements of Table S-1 for the appropriate category of precision approach runway should be provided. Electric power supply connections to those facilities for which secondary power is required should be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.
b) For a runway meant for take-off in runway visual range conditions less than a value of 800 m, a secondary power supply capable of meeting the relevant requirements of Table S-1 should be provided.
c) At an aerodrome where the primary runway is a non-precision approach runway, a secondary power supply capable of meeting the requirements of Table S-1 should be provided except that a secondary power supply for visual aids need not be provided for more than one non-precision approach runway.
d) The following aerodrome facilities should be provided with a secondary power supply capable of supplying power when there is a failure of the primary power supply:
1) the signalling lamp and the minimum lighting necessary to enable air traffic services personnel to carry out their duties;
2) obstacle lights which are essential to ensure the safe operation of aircraft;
3) approach, runway and taxiway lighting as specified in CS ADR-DSN.M.625 to CS ADR-DSN.M.745;
4) meteorological equipment;

5) essential equipment and facilities for the parking position if provided, in accordance with CS ADR-DSN.M.750(a) and CS ADR-DSN.M.755(a); and
6) illumination of apron areas over which passengers may walk.

Runway	Lighting aids requiring power	Maximum switch-over time
Non-instrument	Visual approach slope indicatorsa Runway edgeb Runway thresholdb Runway endb Obstaclea Stopway end Stopway edge	See CS ADR-DSN.S.875(d) and CS ADR-DSN.S.880(d)
Non-precision approach	Approach lighting system Visual approach slope indicatorsa, d Runway edged Runway thresholdd Runway endd Obstaclea Stopway end Stopway edge	15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds
Precision approach Category I	Approach lighting system Runway edged Visual approach slope indicatorsa, d Runway thresholdd Runway end Essential taxiwaya Obstaclea Stopway end Stopway edge	15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds 15 seconds
Precision approach Category II/III	Inner 300 m of the approach lighting system Other parts of the approach lighting system Obstaclea Runway edge Runway threshold Runway end Runway centre line Runway touchdown zone Runway guard lights All stop bars Essential taxiway Stopway end Stopway edge	1 second 15 seconds 15 seconds 15 seconds 1 second 1 second 1 second 1 second 15 seconds 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 taxiwaya Obstaclea Stopway end Stopway edge	15 secondsc 1 second 1 second 1 second 15 seconds 15 seconds 1 second 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))

CS ADR-DSN.S.885 System design

a) For a runway meant for use in runway visual range conditions less than a value of 550 m, the electrical systems for the power supply, lighting, and control of the lighting systems included in Table S-1 should be so designed that an equipment failure should not leave the pilot with inadequate visual guidance or misleading information.
b) Where the secondary power supply of an aerodrome is provided by the use of duplicate feeders, such supplies should be physically and electrically separate so as to ensure the required level of availability and independence.
c) Where a runway forming part of a standard taxi-route is provided with runway lighting and taxiway lighting, the lighting systems should be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

CS ADR-DSN.S.890 Monitoring

a) A system of monitoring should be employed to indicate the operational status of the lighting systems. CS-ADR-DSN, Issue 6 CHAPTER S — ELECTRICAL SYSTEMS Annex to ED Decision 2022/006/R Page 285 of 328
b) Where lighting systems are used for aircraft control purposes, such systems should be monitored automatically so as to provide an indication of any fault which may affect the control functions. This information should be automatically relayed to the air traffic service unit.
c) Where a change in the operational status of lights has occurred, an indication should be provided within two seconds for a stop bar at a runway-holding position and within five seconds for all other types of visual aids.
d) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table S-1 should be monitored automatically so as to provide an indication when the serviceability level of any element falls below a minimum serviceability level specified in ADR.OPS.C.015 (b)(1) to (b)(7). This information should be automatically relayed to the maintenance crew.
e) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table S-1 should be monitored automatically to provide an indication when the serviceability level of any element falls below a minimum level, below which operations should not continue. This information should be automatically relayed to the air traffic services unit and displayed in a prominent position.

CS ADR-DSN.S.895
Intentionally left bank

CHAPTER T – AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATION

CS ADR-DSN.T.900 Emergency access and service roads

Emergency access roads and service roads should be equipped with a road-holding position, in accordance with CS ADR-DSN.L.600, CS ADR-DSN.M.770 and CS ADR-DSN.N.800, as appropriate, at all intersections with runway and taxiways.

CS ADR-DSN.T.905 Fire stations

a) All rescue and firefighting vehicles should normally be housed in a fire station. Satellite fire stations should be provided whenever the response time cannot be achieved from a single fire station.
b) The fire station should be located so that the access for rescue and firefighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.
c) The fire station, and any satellite fire stations, should be located outside taxiway and runway strips, and not infringe obstacle limitation surfaces.

CS ADR-DSN.T.910 Equipment frangibility requirements

Equipment and structures should be so designed to meet the appropriate frangibility characteristics, when required.

CS ADR-DSN.T.915 Siting of equipment and installations on operational areas

a) Equipment and installations should be sited as far away from the runway and taxiway centre lines as practicable.
b) Unless its function requires it to be there for air navigation or for aircraft safety purposes, no equipment or installation endangering an aircraft should be located:
1) on a runway strip, a runway end safety area, a taxiway strip, or within the following distances:

Code letter	Distance between taxiway, other than aircraft stand taxilane, centre line to object (metres)
A	15.5
B	20
C	26
D	37
E	43.5
F	51

if it would endanger an aircraft, or

2) on a clearway if it would endanger an aircraft in the air.

c) Any equipment or installation required for air navigation or for aircraft safety purposes which should be located: (1) on that portion of a runway strip within:

(i) 75 m of the runway centre line where the code number is 3 or 4; or

(ii) 45 m of the runway centre line where the code number is 1 or 2; or

2) on a runway end safety area, a taxiway strip, or within the distances specified in Table D-1; or

3) on a clearway and which would endanger an aircraft in the air; should be frangible and mounted as low as possible.

d) Unless its function requires it to be there for air navigation or for aircraft safety purposes, or if after a safety assessment, it is determined that it would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes, no equipment or installation should be located within 240 m from the end of the strip and within:

1) 60 m of the extended centre line where the code number is 3 or 4; or

2) 45 m of the extended centre line where the code number is 1 or 2; of a precision approach runway Category I, II or III.

e) Any equipment or installation required for air navigation or for aircraft safety purposes which should be located on or near a strip of a precision approach runway Category I, II, or III and which:

1) is situated within 240 m from the end of the strip and within:

(i) 60 m of the extended runway centre line where the code number is 3 or 4; or

(ii) 45 m of the extended runway centre line where the code number is 1 or 2; or

(2) penetrates the inner approach surface, the inner transitional surface, or the balked landing surface; should be frangible and mounted as low as possible.

f) Any equipment or installation required for air navigation or for aircraft safety purposes that is an obstacle of operational significance in accordance with CS ADR-DSN.J.470(d), CS ADR-DSN.J.475(e), CS ADR-DSN.J.480(g), or CS ADR-DSN.J.485

e) should be frangible and mounted as low as possible.

g) Any equipment or installation required for air navigation or for aircraft safety purposes which should be located on the non-graded portion of a runway strip should be regarded as an obstacle and should be frangible and mounted as low as possible.

CS ADR-DSN.T.920 Fencing

a) The safety objective of fencing is to prevent animals or unauthorised persons that could be a safety risk to aircraft operations, to enter the aerodrome.

b) Fencing should be sited as far away from the runway and taxiway centre lines as practicable.

c) Suitable means of protection such as fence or other suitable barrier should be provided on an aerodrome to prevent the entrance to the aerodrome:

1) by non-flying animals large enough to be a hazard to aircraft; and/or

2) by an unauthorised person. This includes the barring of sewers, ducts, tunnels, etc. where necessary to prevent access.

d) Suitable means of protection should be provided to deter the inadvertent or premeditated access of unauthorised persons into ground installations and facilities essential for the safety of civil aviation located off the aerodrome.

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 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 is 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 Colours for aeronautical ground lights

a) The chromaticity 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

Yellow boundary	$x = 0.500$
Blue boundary	$x = 0.285$
Green boundary	$y = 0.440$ and $y = 0.150 + 0.640x$
Purple boundary	$y = 0.050 + 0.750x$ and $y = 0.382$

6) Variable white

Yellow boundary	$x = 0.255 + 0.750y$ and $y = 0.790 – 0.667x$
Blue boundary	$x = 0.285$
Green boundary	$y = 0.440$ and $y = 0.150 + 0.640x$
Purple boundary	$y = 0.050 + 0.750x$ and $y = 0.382$

b) Where 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.

d) The chromaticity of aeronautical ground lights with solid state light sources, e.g. 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 GM1 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.

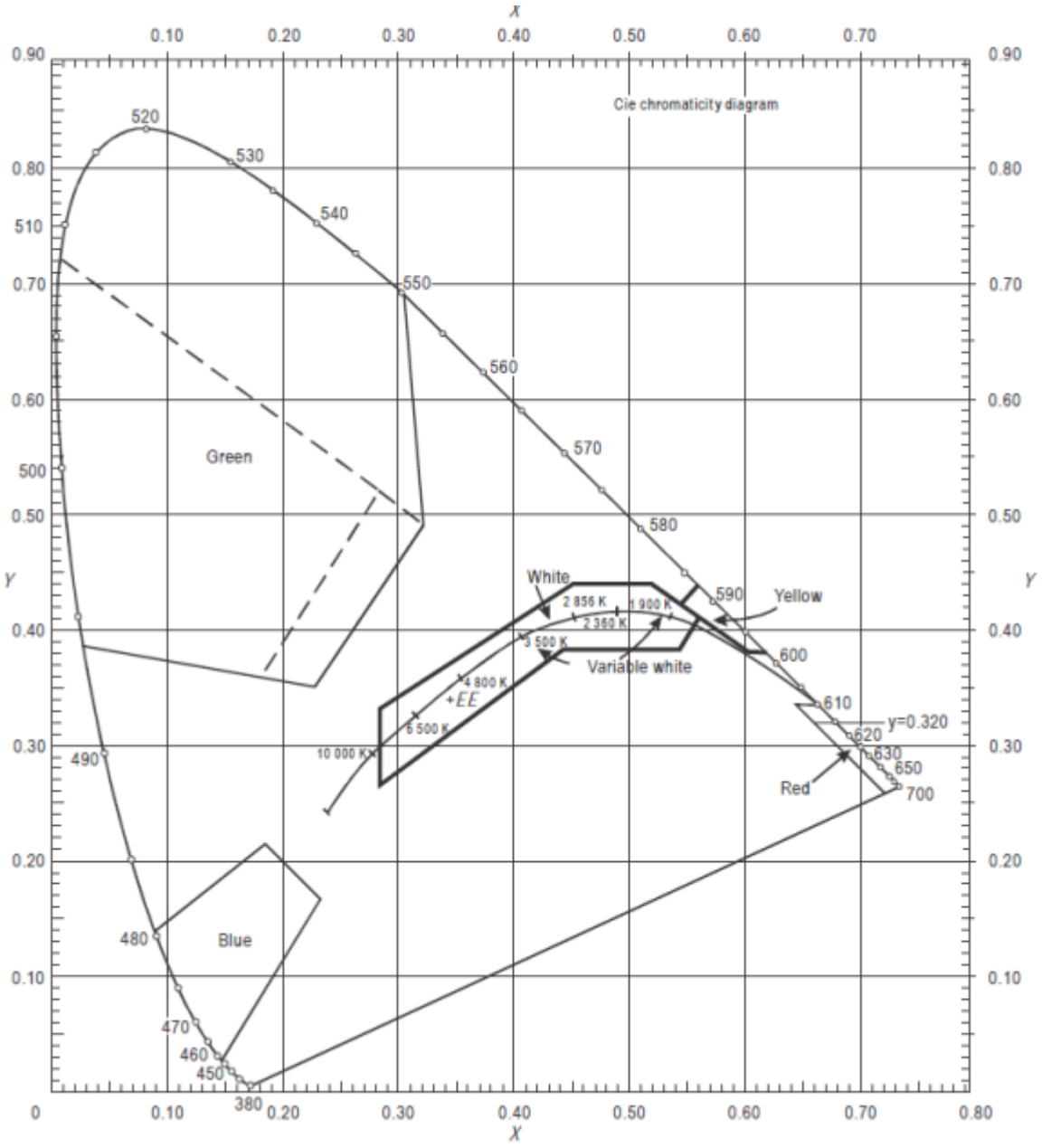


Figure U-1A. Colours for aeronautical ground lights (filament-type lamps)

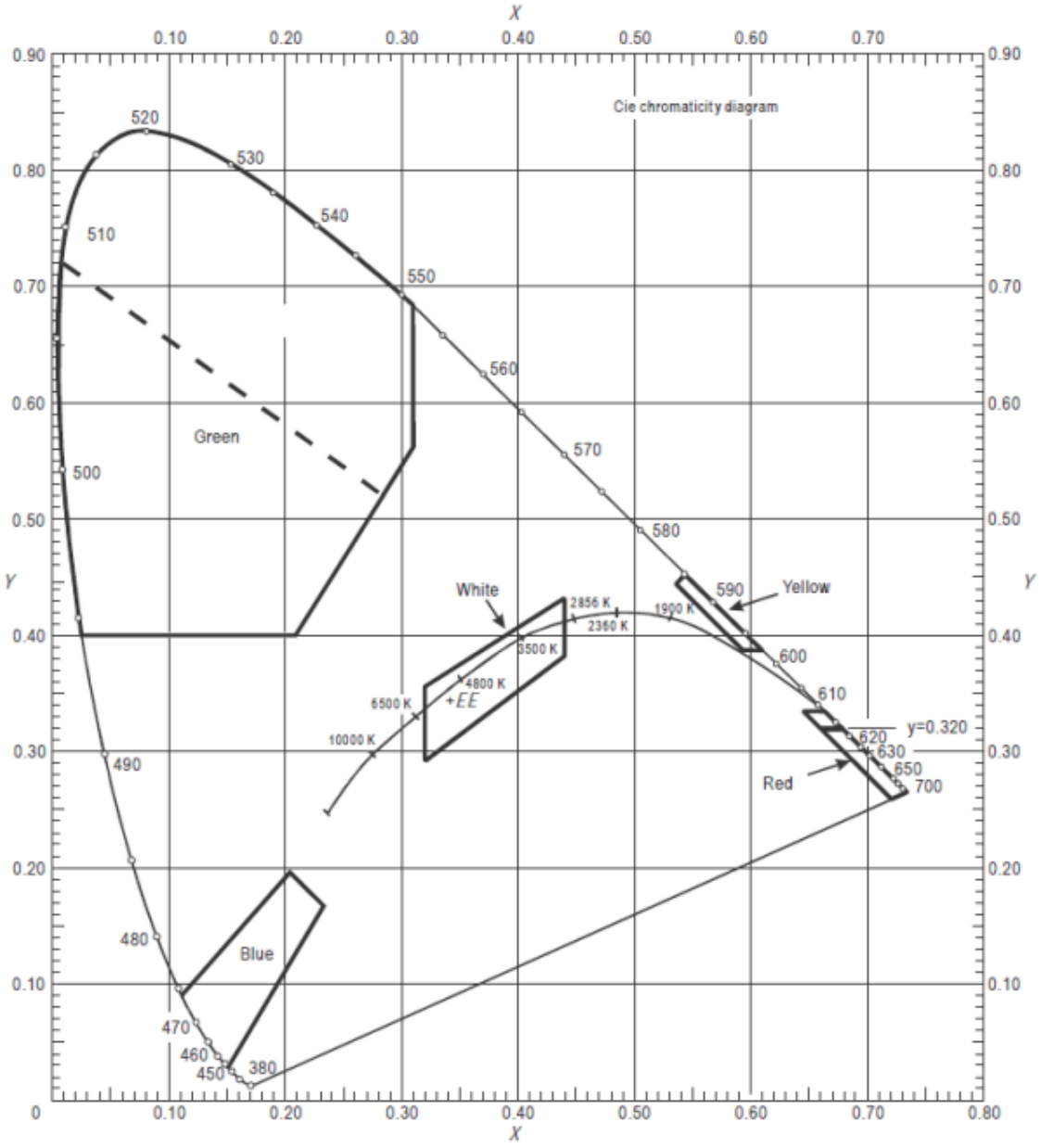


Figure U-1B. Colours for aeronautical ground lights (solid state lighting)

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

a) The specifications in surface colours given below apply only to freshly coloured surfaces. Colours used for markings, signs, and panels usually change with time and, therefore, require renewal.

b) The specifications in paragraph (f) below for internally illuminated panels are interim in nature and are based on the CIE specifications for internally illuminated signs. It is intended that these specifications should be reviewed and updated as and when CIE develops specifications for internally illuminated panels.

c) The chromaticities and luminance factors of ordinary colours, colours of retroreflective materials, and colours of internally illuminated signs and panels should be determined under the following standard conditions:

1) angle of illumination: 45°;
2) direction of view: perpendicular to surface; and (3) illuminant: CIE standard illuminant D65.

d) The chromaticity and luminance factors of ordinary colours for markings and externally illuminated signs and panels should be within the following boundaries when determined under standard conditions.

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	$\beta = 0.07$ (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	$\beta = 0.20$ (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	$\beta = 0.45$ (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	$\beta = 0.75$ (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	$\beta = 0.03$ (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	$\beta = 0.10$ (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	$\beta = 0.03$ (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	$\beta = 0.14$ (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	$\beta = 0.16$ (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	$\beta = 0.27$ (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	$\beta = 0.01$ (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	$\beta = 0.03$ (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)	$\beta = 0.07$ (minimum)
Relative luminance to white (night condition)	5 % (minimum) 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)	$\beta = 0.45$ (minimum)
Relative luminance to white (night condition)	30 % (minimum) 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)	$\beta = 0.75$ (minimum)
Relative luminance to white (night 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)	$\beta = 0.03$ (max)
Relative luminance to white (night condition)	0 % (minimum) 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) $\beta = 0.10$ minimum
Relative luminance
to white (night conditions) 5 % (minimum) 30 % (maximum)

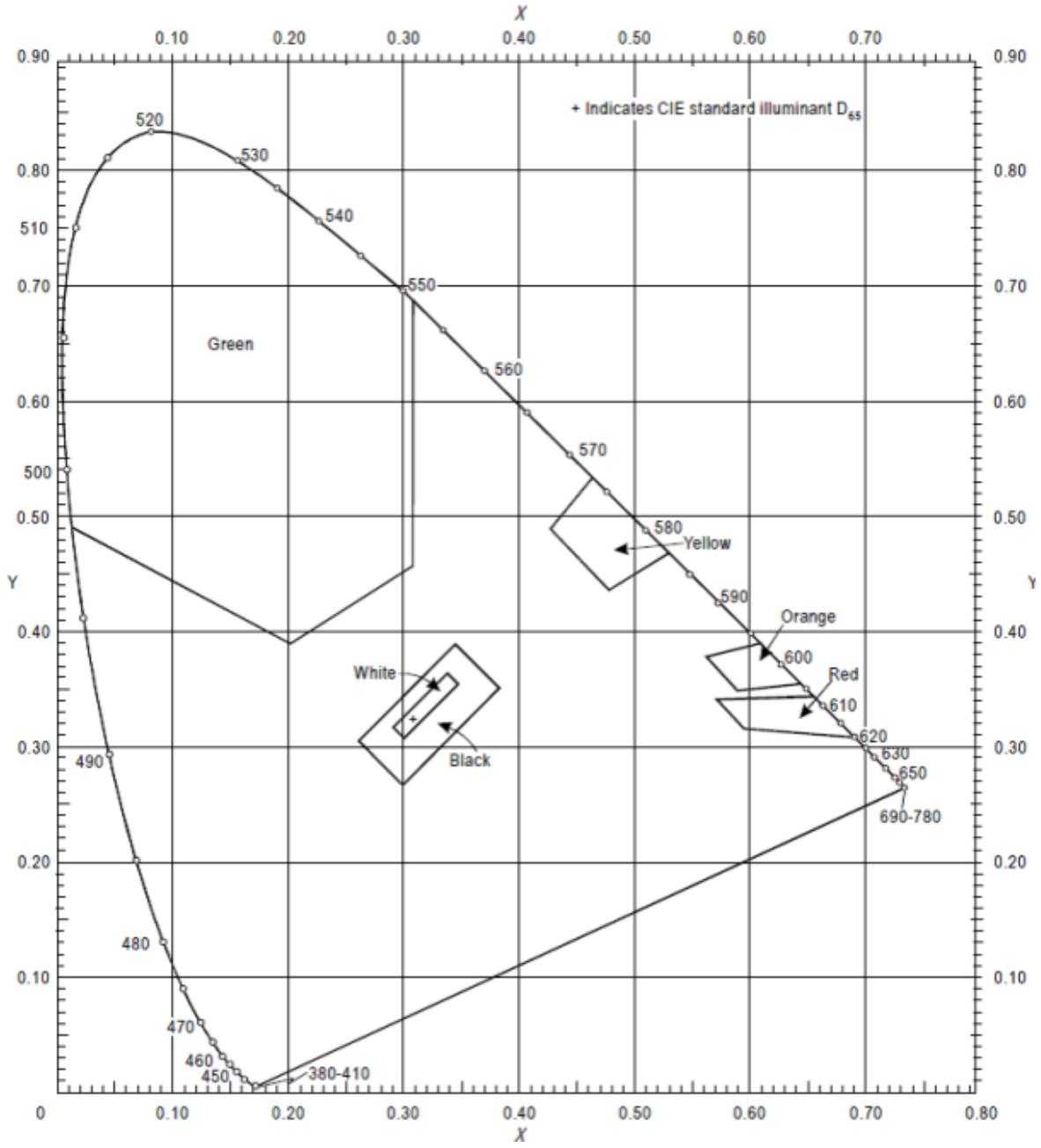


Figure U-2. Ordinary colours for markings and externally illuminated signs and panels

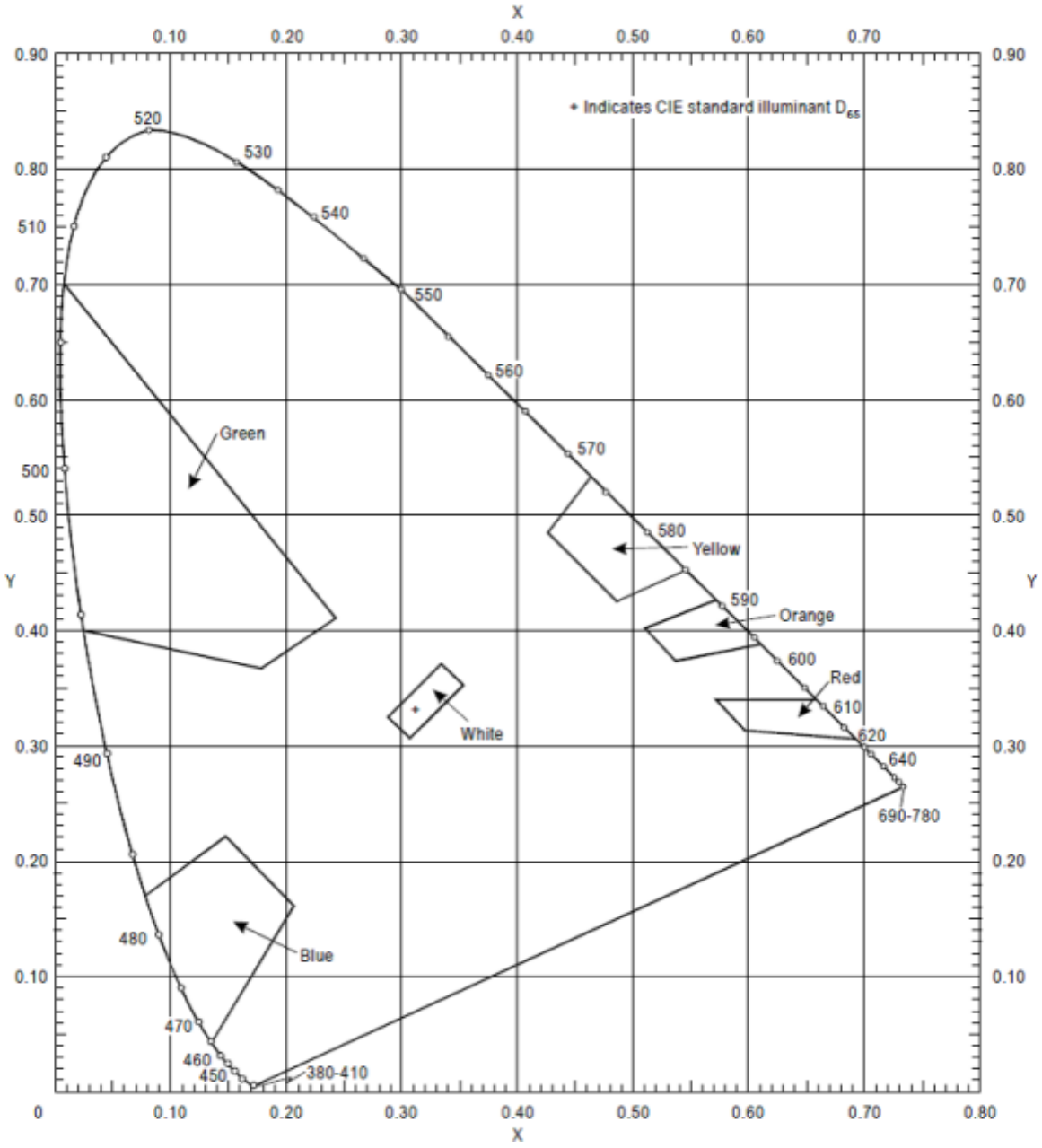


Figure U-3. Colours of retroreflective materials for markings, signs and panels

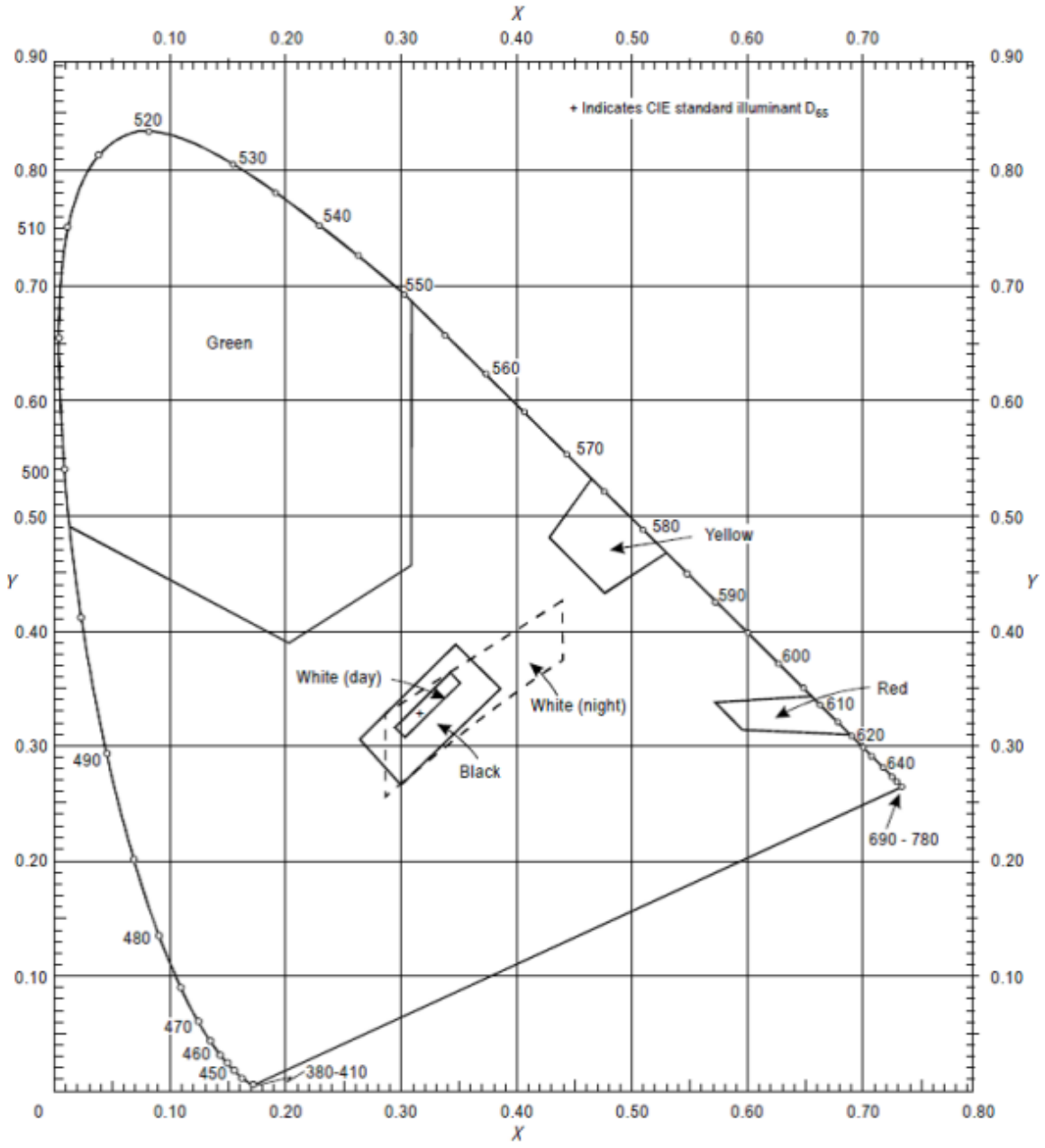


Figure U-4. Colours of luminescent or internally illuminated signs and panels

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

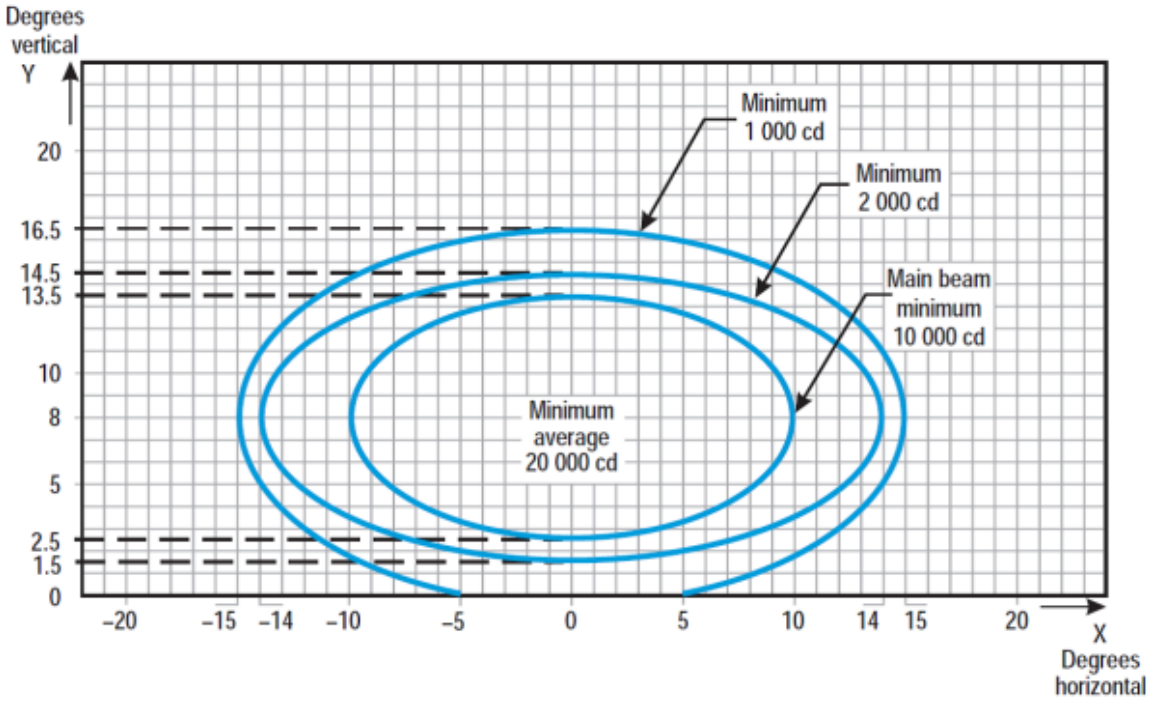


Figure U-5. Isocandela diagram for approach centre line light and crossbars (white light)

Notes:
a) Curves calculated on formula
$x\ 2\ a2 + y\ 2\ b\ 2 = 1$

a	10	14	15
b	5.5	6.5	8.5

b) Vertical setting angles of the lights should be such that the following vertical coverage of the main beam should be met:

distance from treshold	vertical main beam coverage
threshold to 315 m	0° -11°
316 m to 475 m	0.5° -11.5°
476 m to 640 m	1.5° -12.5°
641 m and beyond	2.5° -13.5° (as illustrated above)

c) Lights in crossbars beyond 22.5 m from the centre line should be toed-in 2 degrees. All other lights should be aligned parallel to the centre line of the runway.

d) See collective notes for Figures U-5 to U-15.

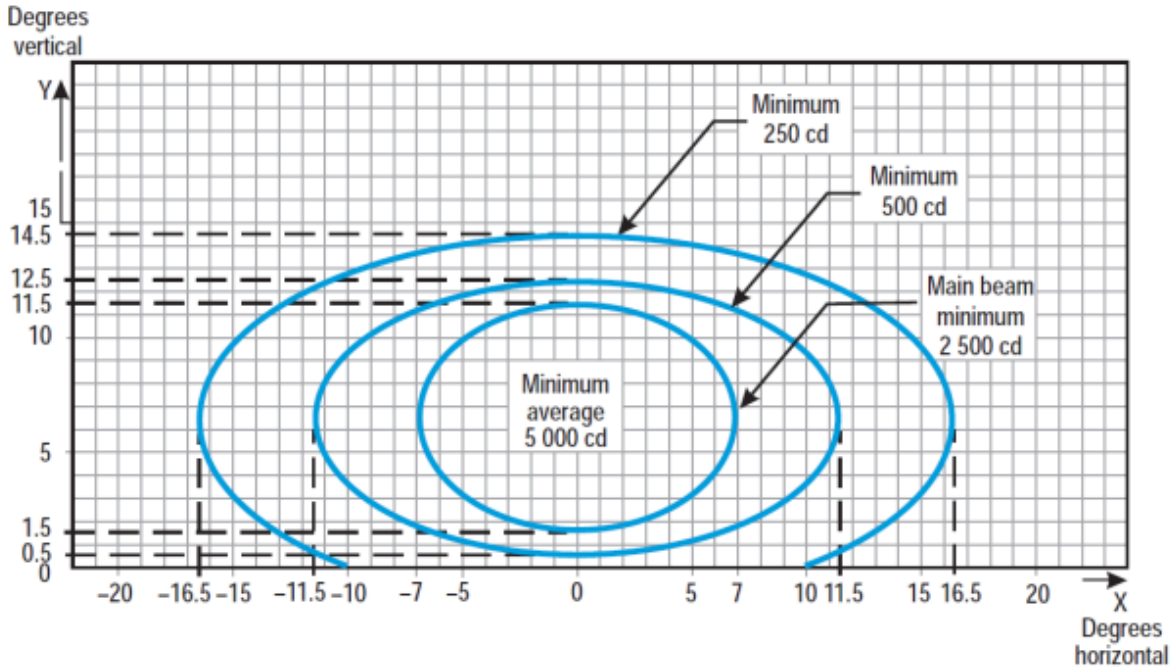


Figure U-6. Isocandela diagram for approach side row light (red light)

Notes:
a) Curves calculated on formula
$x\ 2\ a2 + y\ 2\ b\ 2 = 1$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

b) Toe-in 2 degrees
c) Vertical setting angles of the lights should be such that the following vertical coverage of the main beam should be met:

distance from treshold	vertical main beam coverage
threshold to 115 m	0.5° -10.5°
116 m to 215 m	1° -11°
216 m and beyond	1.5° -11.5° (as illustrated above)

(d) See collective notes for Figures U-5 to U-15.

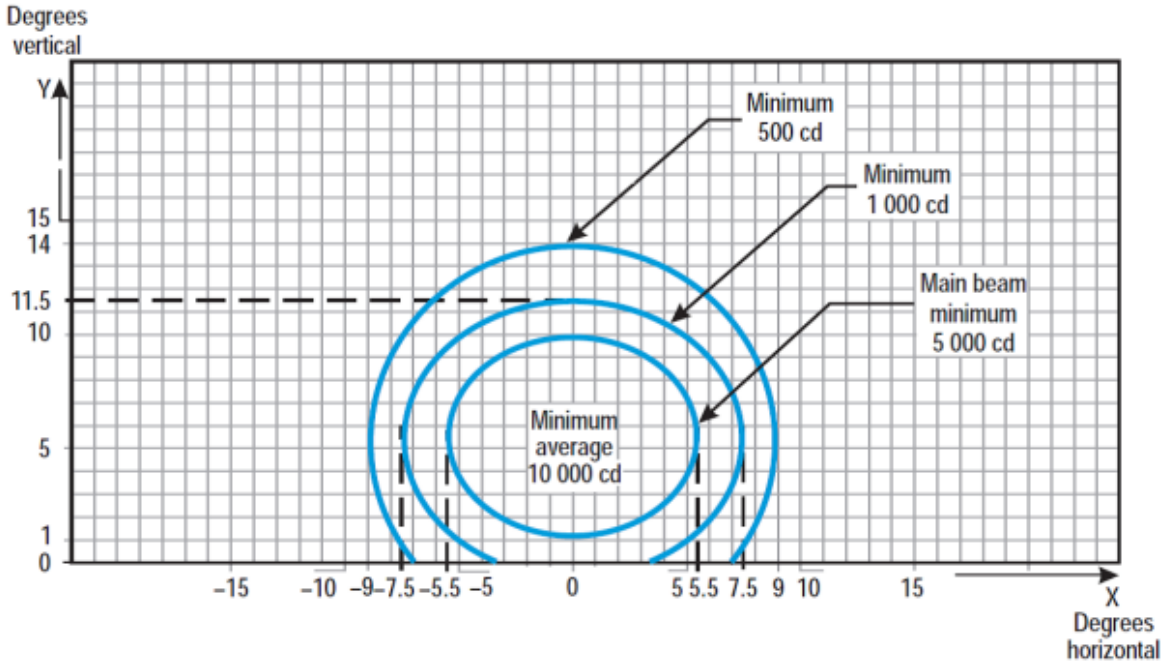


Figure U-7. Isocandela diagram for threshold light (green light)

Notes:
a) Curves calculated on formula
$x^2 a^2 + y^2 b^2 = 1$

a	5.5	7.5	9.0
b	4.5	6.0	8.0

b) Toe-in 3.5 degrees
c) See collective notes for Figures U-5 to U-15.

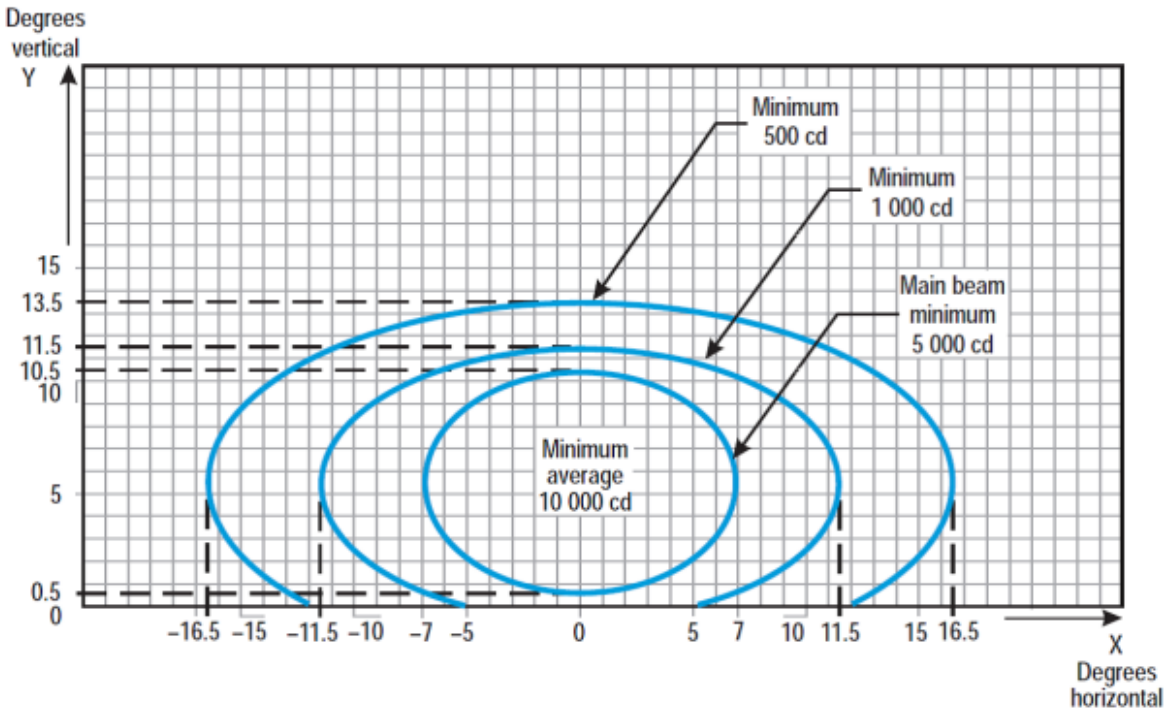


Figure U-8. Isocandela diagram for threshold wing bar light (green light)

Notes:
a) Curves calculated on formula
$x^2 a^2 + y^2 b^2 = 1$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

b) Toe-in 2 degrees
c) See collective notes for Figures U-5 to U-15.

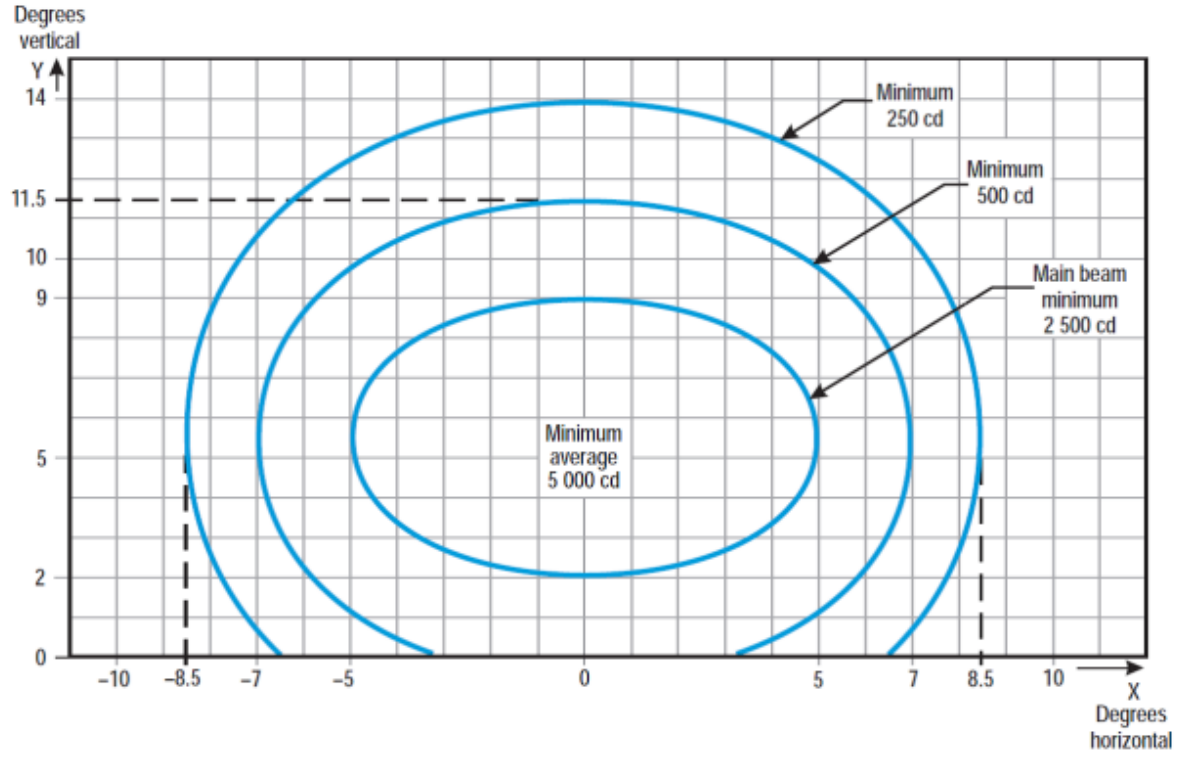


Figure U-9. Isocandela diagram for touchdown zone light (white light)

Notes:
a) Curves calculated on formula
$x\ 2\ a2 + y\ 2\ b\ 2 = 1$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

b) Toe-in 4 degrees
c) See collective notes for Figures U-5 to U-15.

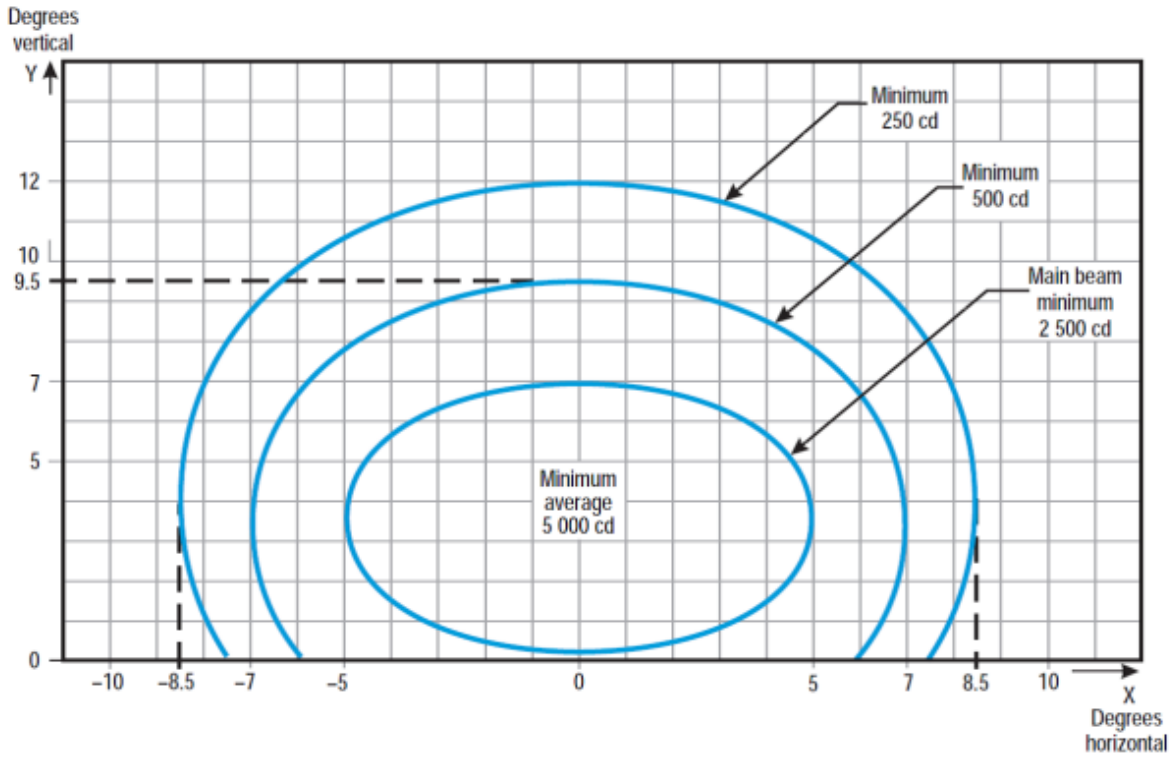


Figure U-10. Isocandela diagram for runway centre line light with 30 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)

Notes:
a) Curves calculated on formula
$x\ 2\ a\ 2 + y\ 2\ b\ 2 = 1$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

b) For red light, multiply values by 0.15.
c) For yellow light, multiply values by 0.40.
d) See collective notes for Figures U-5 to U-15.

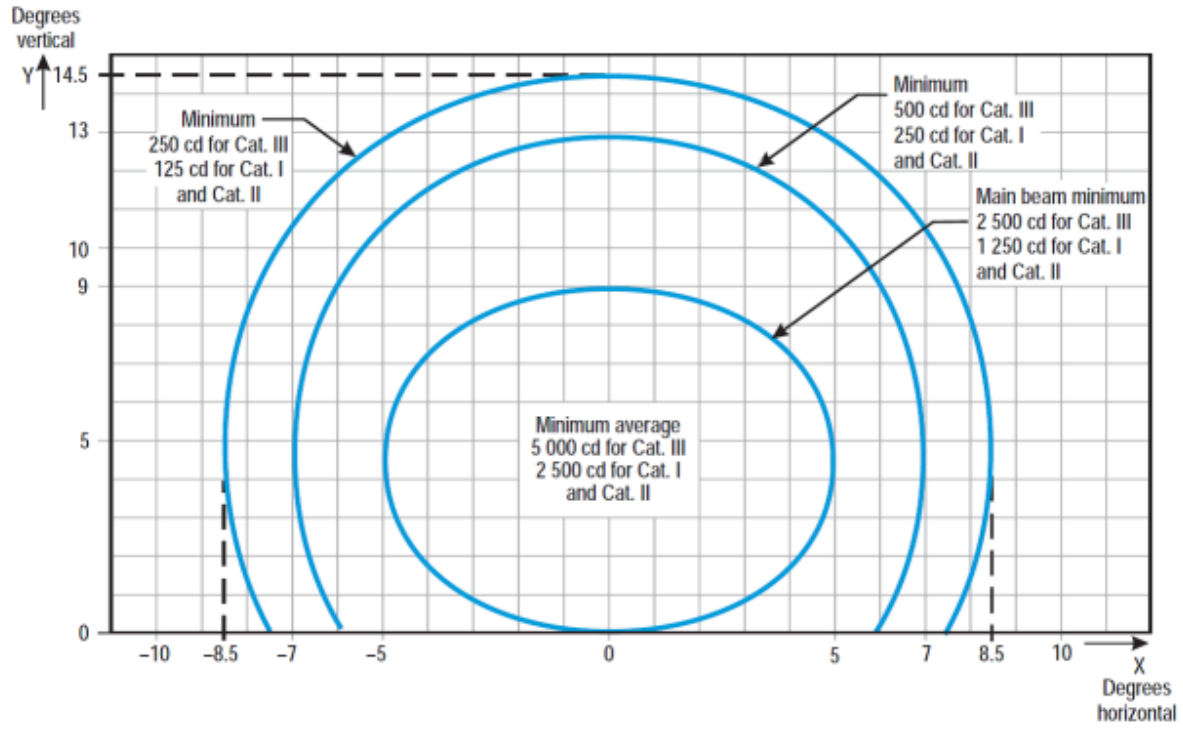


Figure U-11. Isocandela diagram for runway centre line light with 15 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)

Notes:
a) Curves calculated on formula
$x\ 2\ a\ 2 + y\ 2\ b\ 2 = 1$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

b) For red light, multiply values by 0.15.
c) For yellow light, multiply values by 0.40.
d) See collective notes for Figures U-5 to U-15.

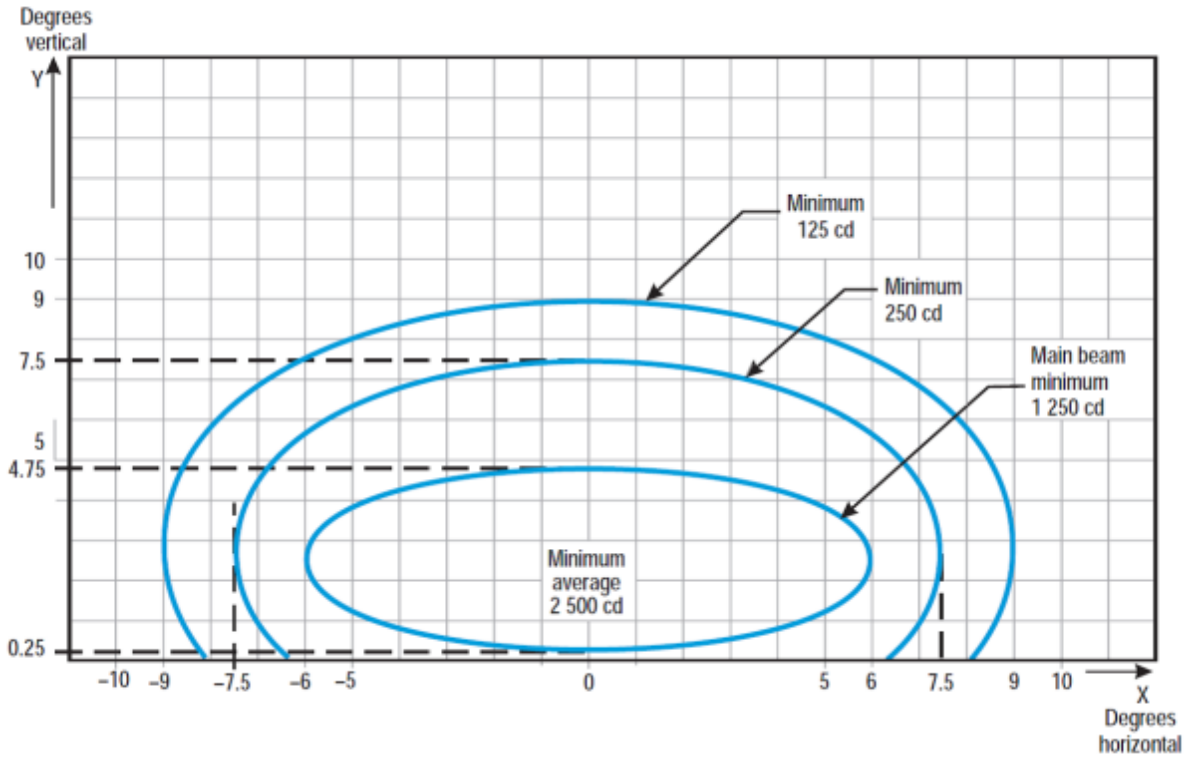


Figure U-12. Isocandela diagram for runway end light (red light)

Notes:
a) Curves calculated on formula
$x^2 a^2 + y^2 b^2 = 1$

a	6.0	7.5	9.0
b	2.25	5.0	6.5

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

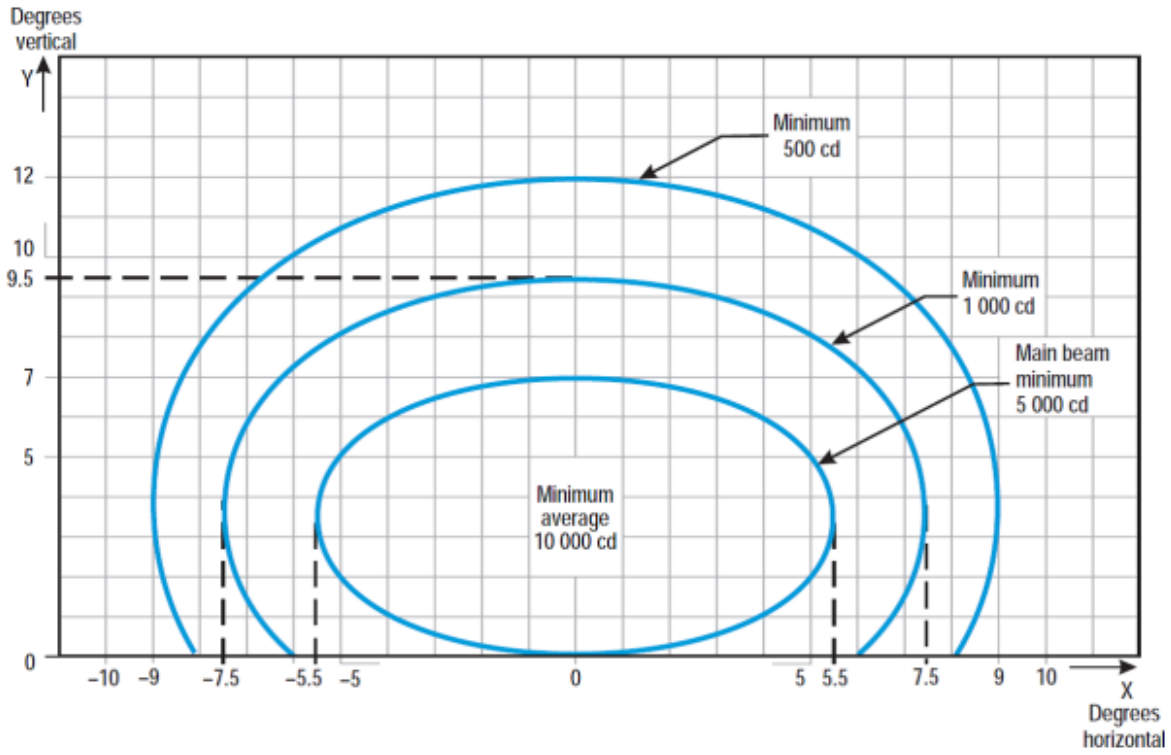


Figure U-13. Isocandela diagram for runway edge light where width of runway is 45 m (white light)

Notes:
a) Curves calculated on formula
$x^2 a^2 + y^2 b^2 = 1$

a	5.5	7.5	9.0
b	3.5	6.0	8.5

b) Toe-in 3.5 degrees
c) For red light, multiply values by 0.15.
d) For yellow light, multiply values by 0.40.
e) See collective notes for Figures U-5 to U-15.

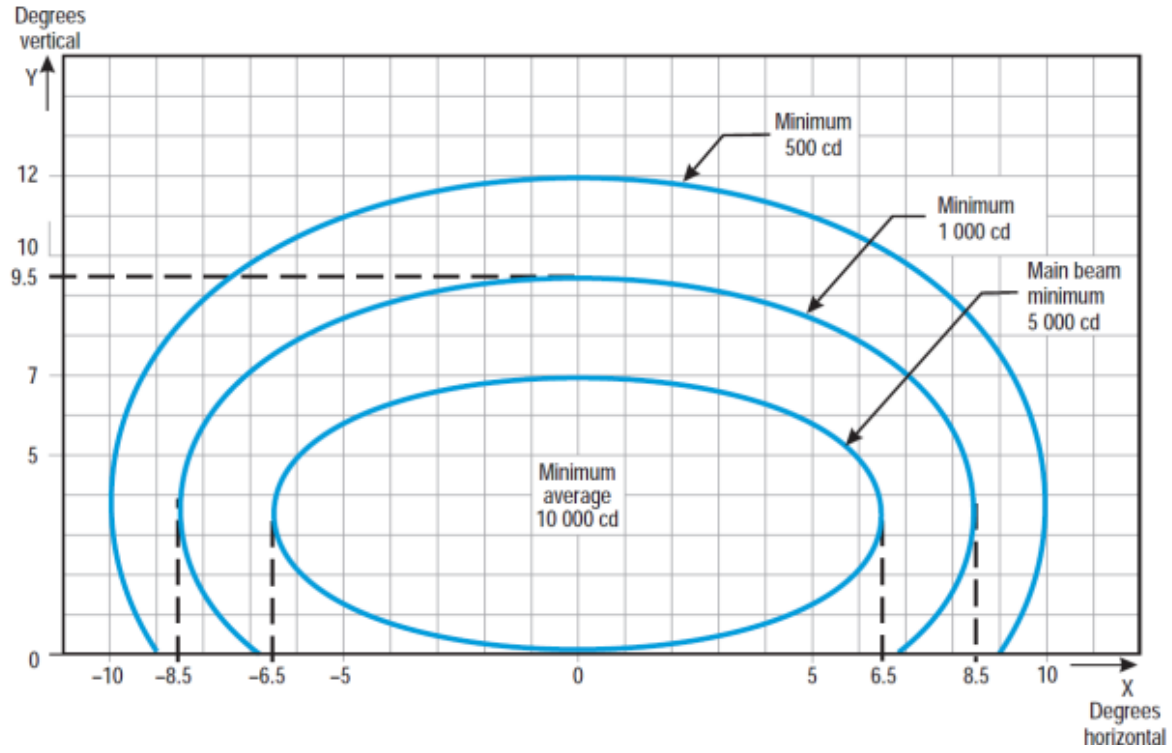


Figure U-14. Isocandela diagram for runway edge light where width of runway is 60 m (white light)

Notes:
a) Curves calculated on formula
$x\ 2\ a\ 2 + y\ 2\ b\ 2 = 1$

a	6.5	8.5	10.0
b	3.5	6.0	8.5

b) Toe-in 4.5 degrees
c) For red light, multiply values by 0.15.
d) For yellow light, multiply values by 0.40.
e) See collective notes for Figures U-5 to U-15.

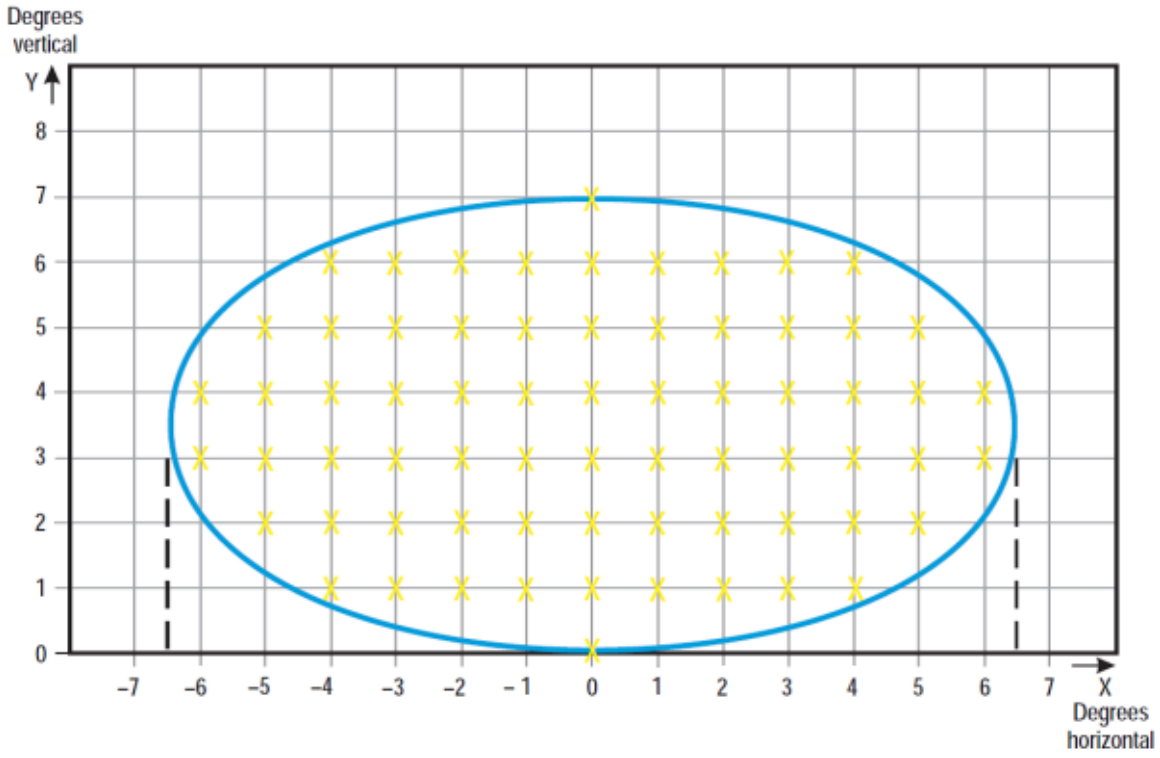


Figure U-15. Grid points to be used for the calculation of average intensity of approach and runway lights

Collective notes to Figures U-5 to U-15

a) The ellipses in each Figure are symmetrical about the common vertical and horizontal axes. b) Figures U-5 to U-14 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure U-15 and using the intensity value measures at all grid points located within and on the perimeter of the ellipse representing the main beam. The average value is the arithmetic average of light intensities measured at all considered grid points.
c) No deviations are acceptable in the main beam pattern when the lighting fixture is properly aimed. d) Average intensity ratio. The ratio between the average intensity within the ellipse defining the main beam of a typical new light and the average light intensity of the main beam of a new runway edge light should be as follows:

Figure U-5	Approach centerline and crossbars	1.5 to 2.0	(white light)
Figure U-6	Approach side row	0.5 to 1.0	(red light)
Figure U-7	Treshold	1.0 to 1.5	(green light)
Figure U-8	Treshold wing bar	1.0 to 1.5	(green light)
Figure U-9	Touchdown zone	0.5 to 1.0	(white light)
Figure U-10	Runway centre line (longitudinal spacing 30 m)	0.5 to 1.0	(white light)
Figure U-11	Runway centre line (longitudinal spacing 15 m)	0.5 to 1.0 for CAT III	(white light)

		0.25 to 0.5 for CAT I, II	(white light)
Figure U-12	Runway end	0.25 to 0.5	(red light)
Figure U-13	Runway edge (45 m runway width)	1.0	(white light)
Figure U-14	Runway edge (60 m runway width)	1.0	(white light)

e) The beam coverages in the Figures provide the necessary guidance for approaches down to an RVR of the order of 150 m and take-offs down to an RVR of the order of 100 m.
f) Horizontal angles are measured with respect to the vertical plane through the runway centre line. For lights other than centre line lights, the direction towards the runway centre line is considered positive. Vertical angles are measured with respect to the horizontal plane.
g) Where, for approach centre line lights and crossbars and for approach side row lights, inset lights are used in lieu of elevated lights, e.g. on a runway with a displaced threshold, the intensity requirements can be met by installing two or three fittings (lower intensity) at each position.
h) The importance of adequate maintenance cannot be overemphasised. The average intensity should never fall to a value less than 50 % of the value shown in the Figures, and it should be the aim of aerodrome operator to maintain a level of light output close to the specified minimum average intensity.
i) The light unit should be installed so that the main beam is aligned within one-half degree of the specified.

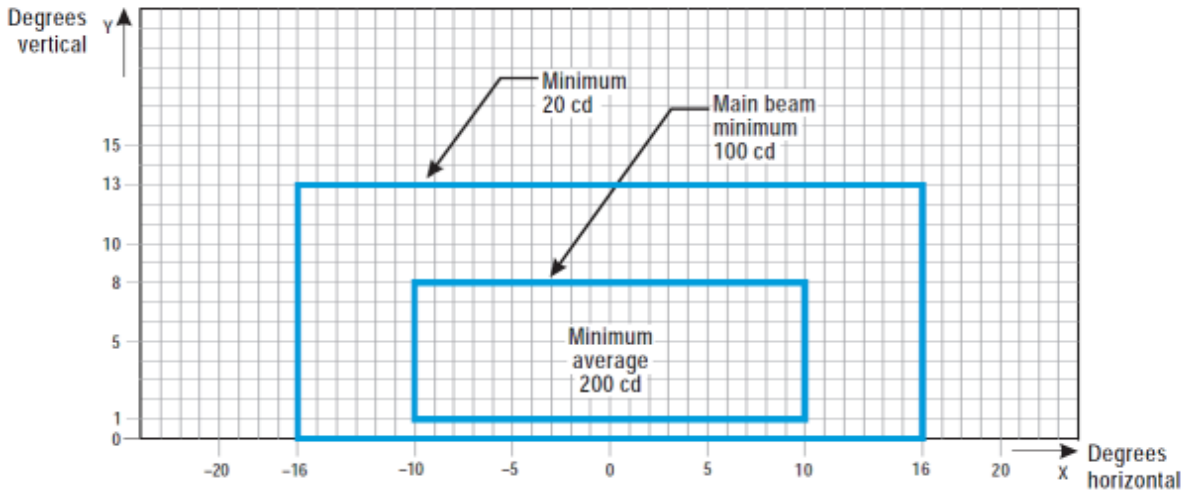


Figure U-16. Isocandela diagram for taxiway centre line (15 m spacing), RELs, no-entry bar, and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m where large offsets can occur and for low-intensity runway guard lights, Configuration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

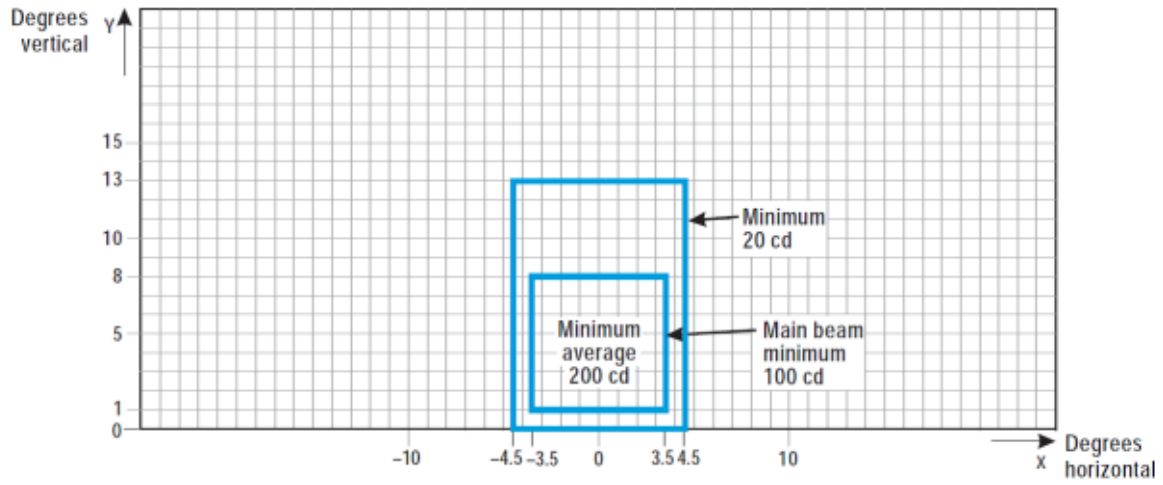


Figure U-17. Isocandela diagram for taxiway centre line (15 m spacing), no-entry bar, and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m

Notes:
a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit from the centre line of approximately 3 m.
b) See collective notes for Figures U-16 to U-25.

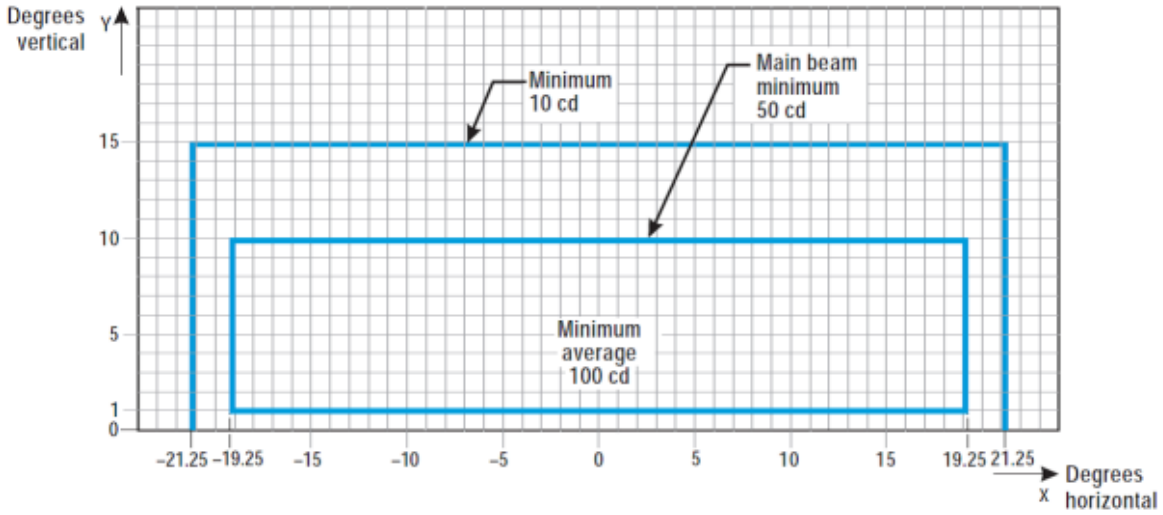


Figure U-18. Isocandela diagram for taxiway centre line (7.5 m spacing), RELs, no-entry bar, and stop bar lights in curved sections intended for use in runway visual range conditions of less than a value of 350 m

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) See collective notes for Figures U-16 to U-25.

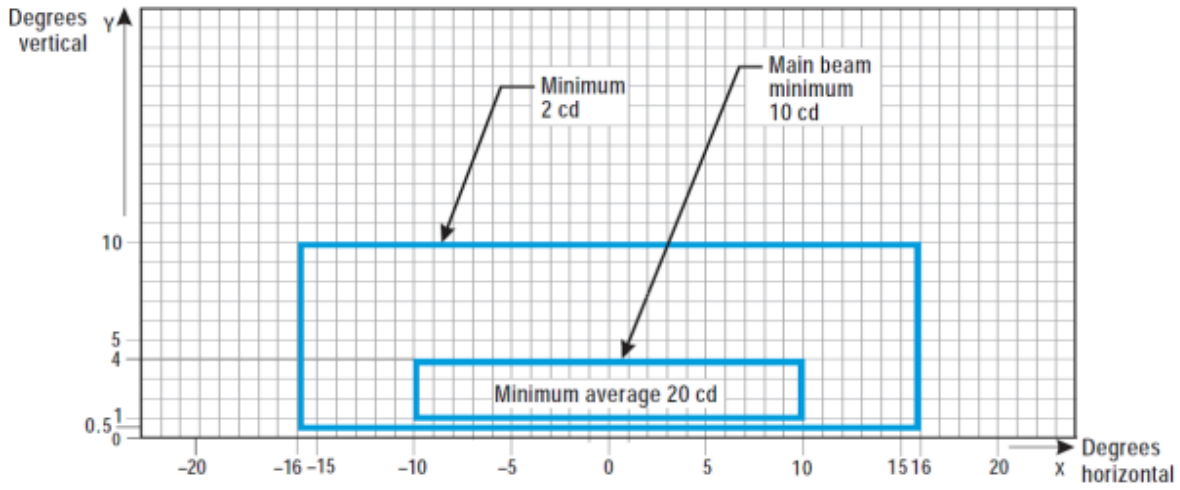


Figure U-19. Isocandela diagram for taxiway centre line (30 m, 60 m spacing), no-entry bar, and stop bar lights in straight sections intended for use in runway visual range conditions of 350 m or greater

Notes:
a) At locations where high background luminance is usual, and where deterioration of light output resulting from dust, snow, and local contamination is a significant factor, the cd-values should be multiplied by 2.5.
b) Where omnidirectional lights are used they should comply with the vertical beam requirements in this Figure.
c) See collective notes for Figures U-16 to U-25.

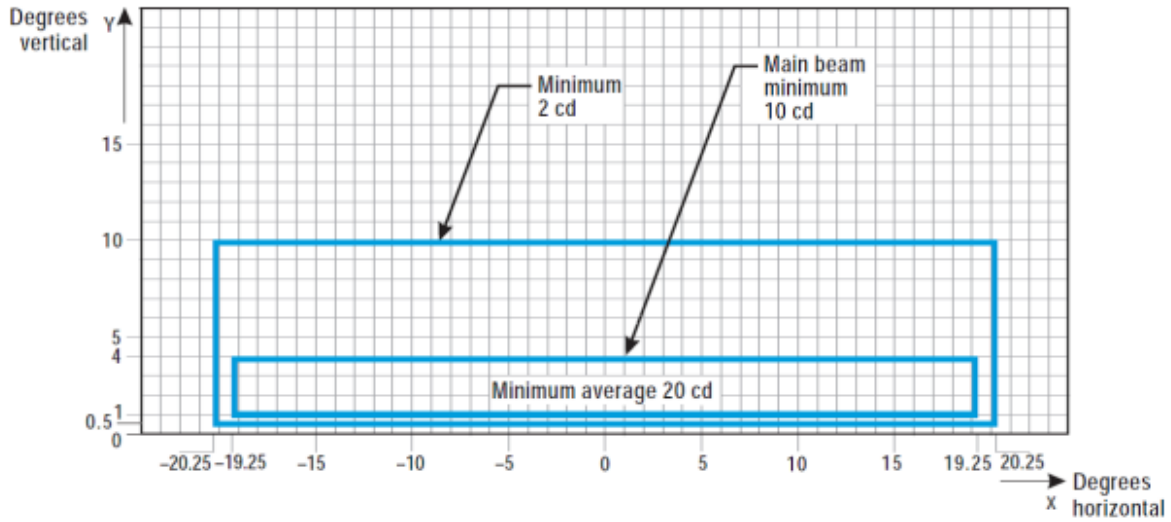
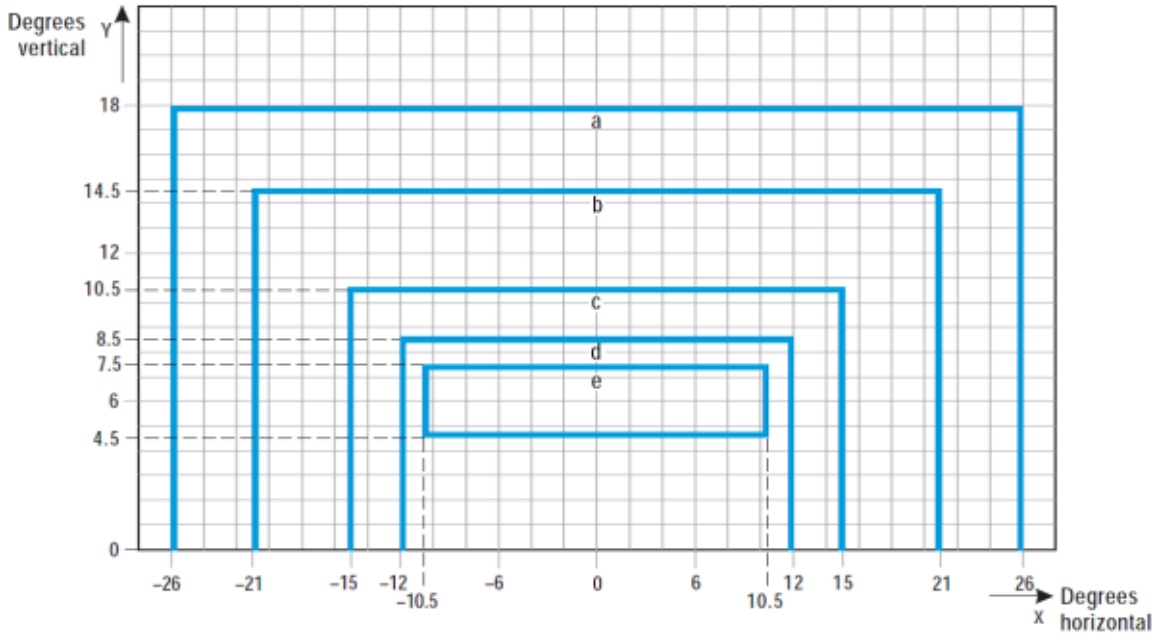


Figure U-20. Isocandela diagram for taxiway centre line (7.5 m, 15 m, 30 m spacing), no-entry bar, and stop bar lights in curved sections intended for use in runway visual range conditions of 350 m or greater

Notes:

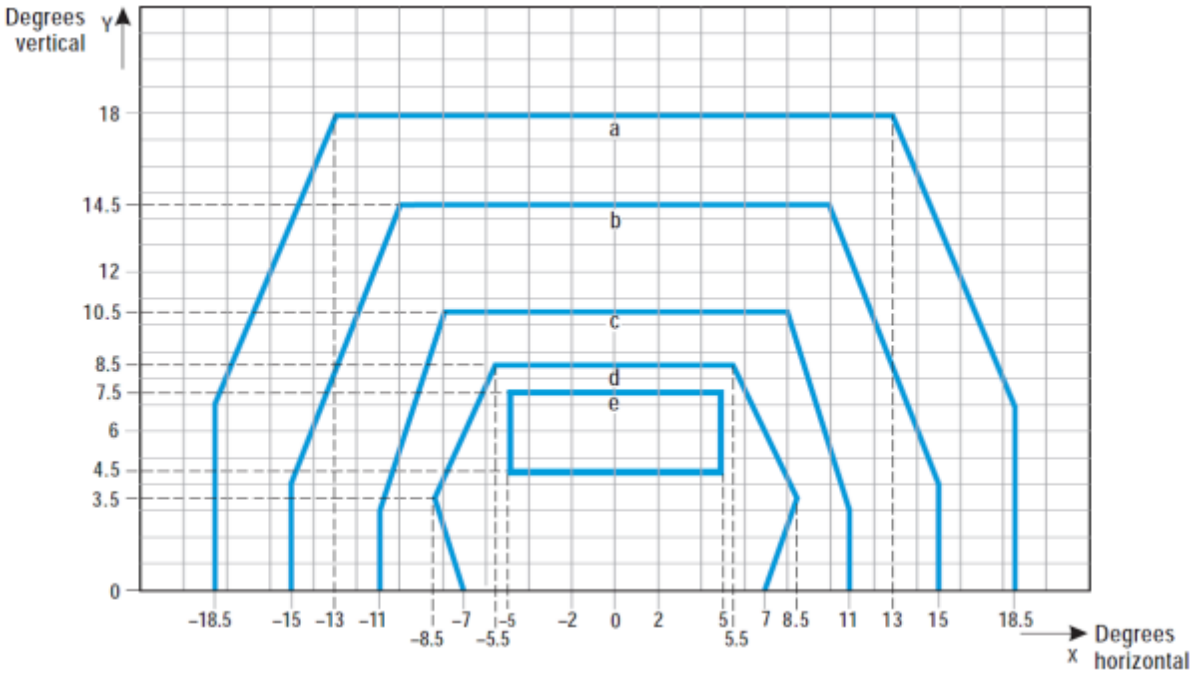
a) Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve.
b) At locations where high background luminance is usual and where deterioration of light output resulting from dust, snow and, local contamination is a significant factor, the cd-values should be multiplied by 2.5.
c) These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m as could occur at the end of curves.
d) See collective notes for Figures U-16 to U-25.



Curve	a	b	c	d	e
Intensity (cd)	8	20	100	450	1800

Figure U-21. Isocandela diagram for high-intensity taxiway centre line (15 m spacing), no-entry bar, and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required and where large offsets can occur.

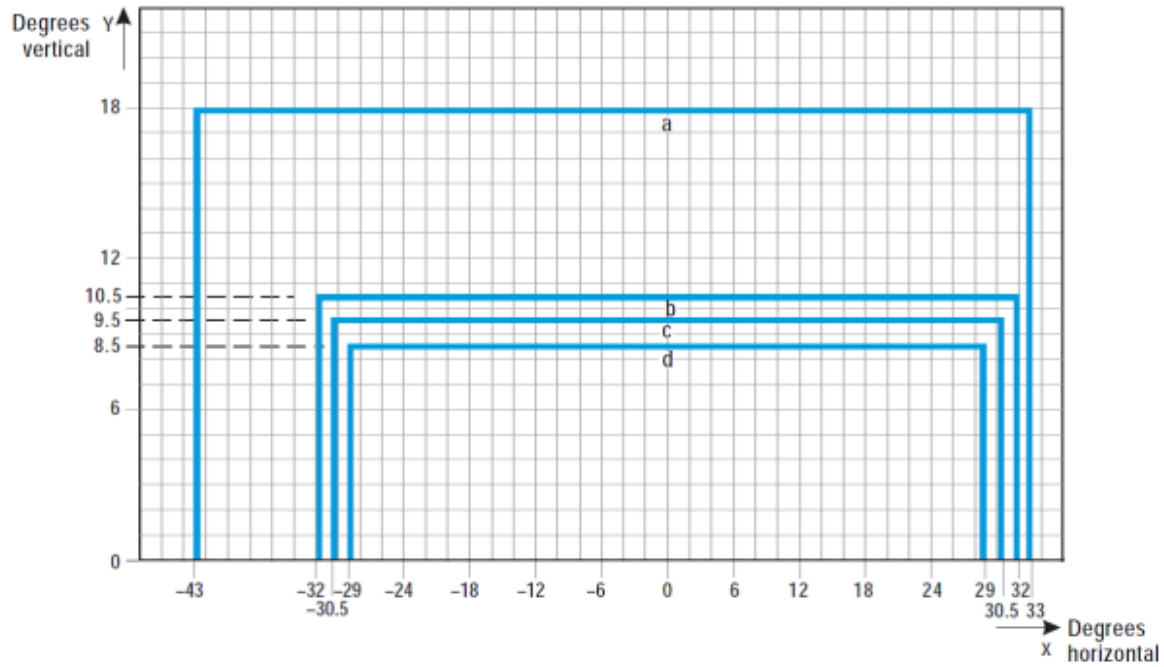
Notes:
a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.
b) See collective notes for Figures U-16 to U-25.



Curve	a	b	c	d	e
Intensity (cd)	8	20	100	450	1800

Figure U-22. Isocandela diagram for high-intensity taxiway centre line (15 m spacing), no-entry bar, and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required

Notes:
a) These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.
b) See collective notes for Figures U-16 to U-25.



Curve	a	b	c	d
Intensity (cd)	8	100	200	400

Figure U-23. Isocandela diagram for high-intensity taxiway centre line (7.5 m spacing), no-entry bar, and stop bar lights in curved sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required

Notes:
a) Lights on curves to be toed-in 17 degrees with respect to the tangent of the curve.
b) See collective notes for Figures U-16 to U-25.

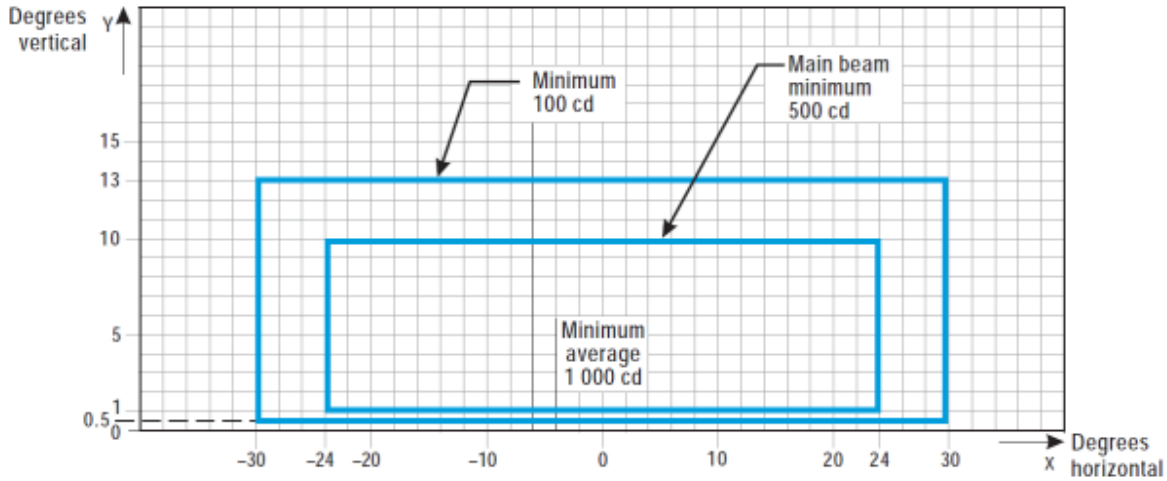


Figure U-24. Isocandela diagram for high-intensity runway guard lights, Configuration B

Notes:
a) Although the lights flash in normal operation, the light intensity is specified as if the lights

were fixed for incandescent lamps.
b) See collective notes for Figures U-16 to U-25.

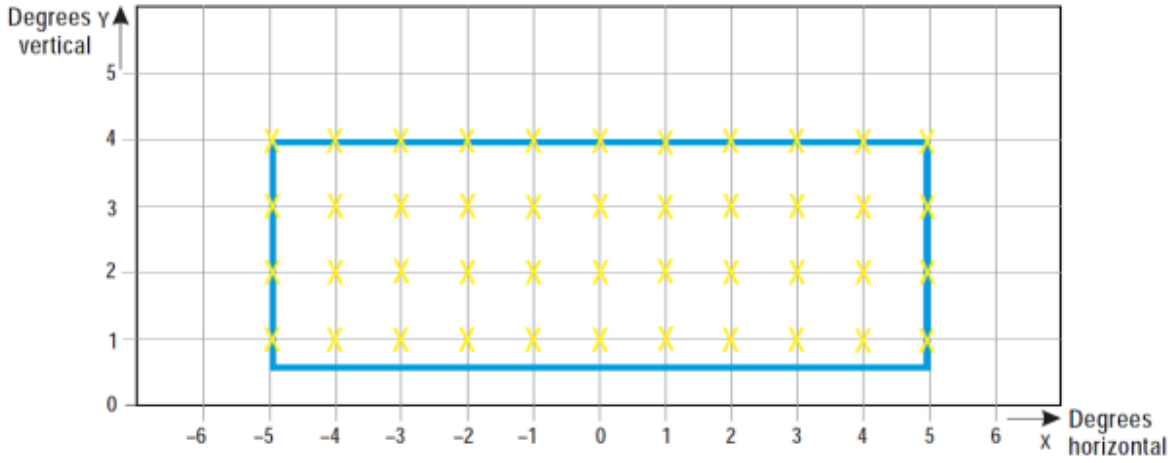


Figure U-25. Grid points to be used for calculation of average intensity of taxiway centre line and stop bar lights

Collective notes to Figures U-16 to U-25:
a) The intensities specified in Figures U-16 to U-24 are in green and yellow light for taxiway centre line lights, yellow light for runway guard lights, and red light for stop bar lights.
b) Figures U-16 to U-24 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure U-25, and using the intensity values measured at all grid points located within and on the perimeter of the rectangle representing the main beam. The average value is the arithmetic average of the light intensities measured at all considered grid points.
c) No deviations are acceptable in the main beam or in the innermost beam as applicable, when the lighting fixture is properly aimed.
d) Horizontal angles are measured with respect to the vertical plane through the taxiway centre line, except on curves where they are measured with respect to the tangent to the curve.
e) Vertical angles are measured from the longitudinal slope of the taxiway surface.
f) The importance of adequate maintenance cannot be overemphasised. The intensity, either average where applicable or as specified on the corresponding isocandela curves, should never fall to a value less than 50 % of the value shown in the figures, and it should be the aim of aerodrome operator to maintain a level of light output close to the specified minimum average intensity. (g) The light unit should be installed so that the main beam or the innermost beam as applicable, is aligned within one-half degree of the specified requirement.

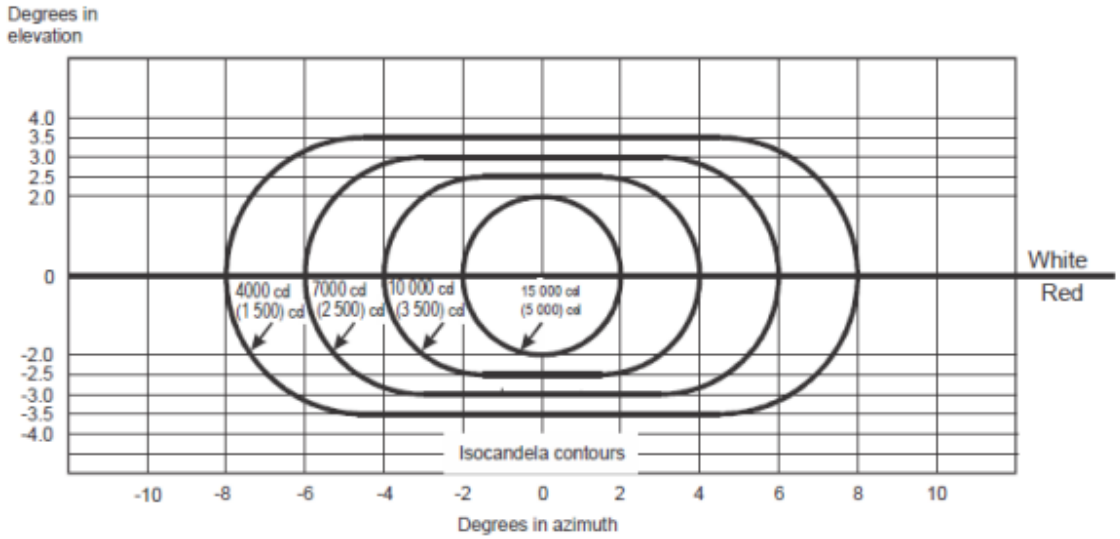


Figure U-26. Light intensity distribution of PAPI and APAPI

Notes:
a) These curves are for minimum intensities in red light.
b) The intensity value in the white sector of the beam is no less than 2 and may be as high as 6.5 times the corresponding intensity in the red sector.
c) The intensity values shown in brackets are for APAPI.

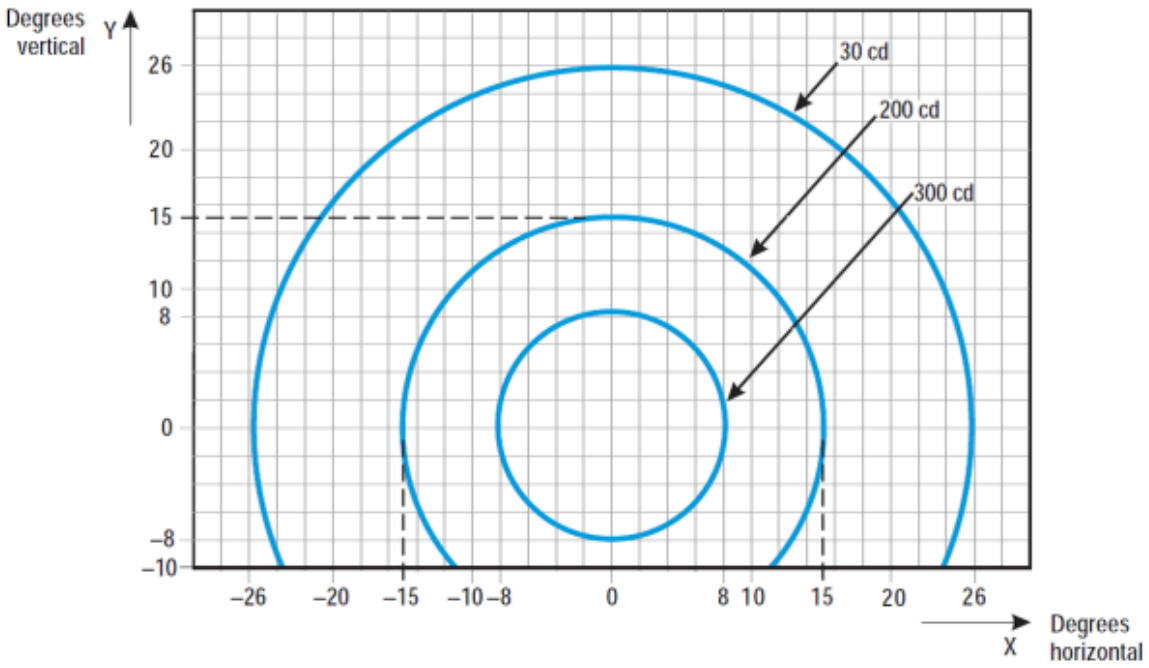


Figure U-27. Isocandela diagram for each light in low-intensity runway guard lights, Configuration A

Notes:
a) Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.
b) The intensities specified are in yellow light

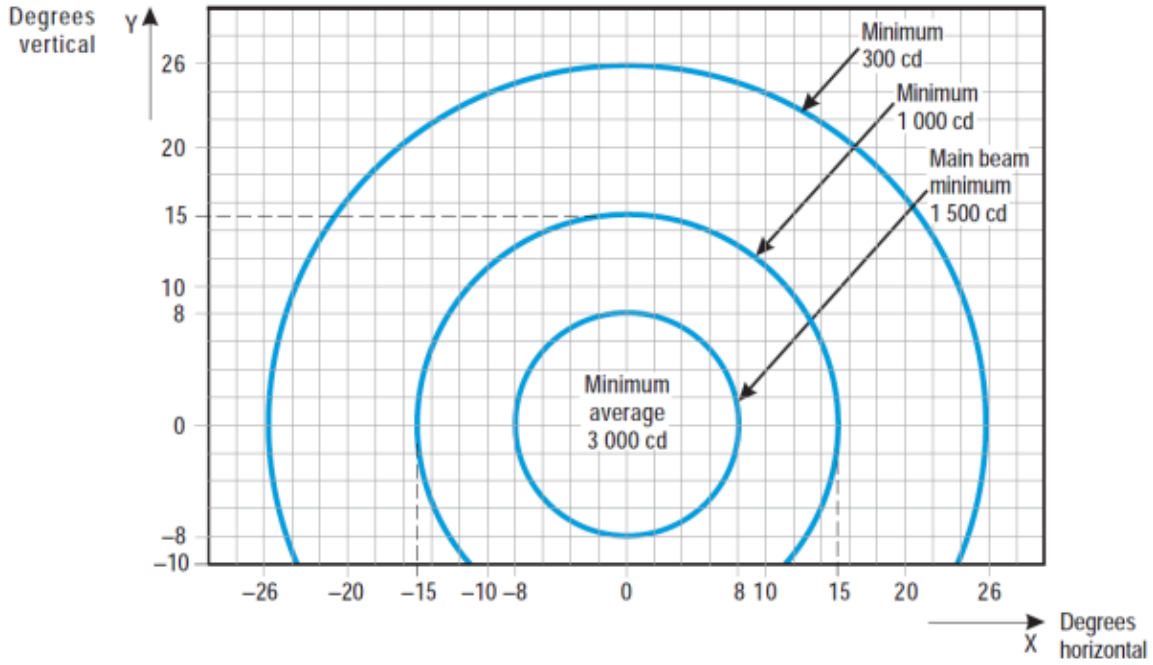


Figure U-28. Isocandela diagram for each light in high-intensity runway guard lights, Configuration A

Notes:
a) Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.
b) The intensities specified are in yellow light.

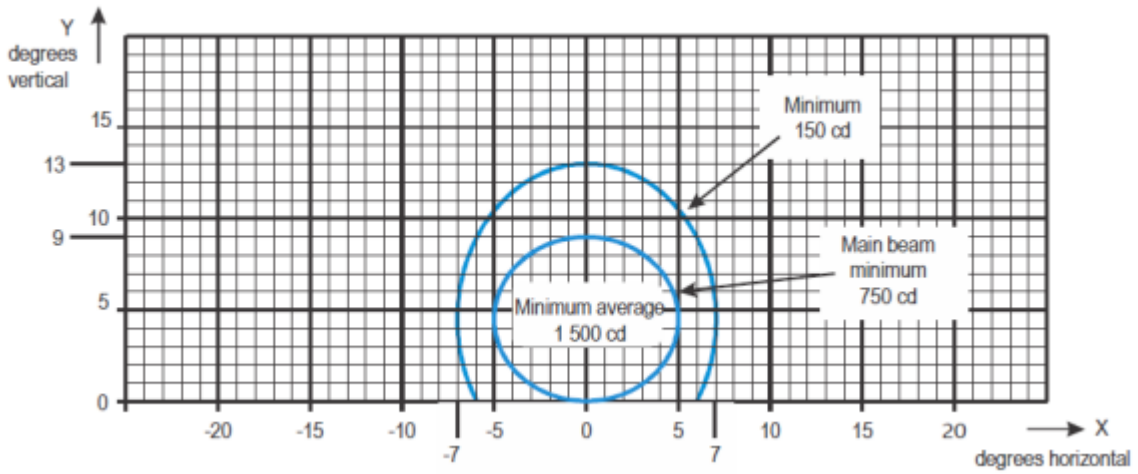


Figure U-29. Isocandela diagram for take-off and hold lights (THL) (red light)

Notes:
a) Curves calculated on formula
$x\ 2\ a2 + y\ 2\ b\ 2 = 1$

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.