Proposed changes to Regulation UK (EU) 139/2014

The changes will be mirrored in CAP 168 as applicable

Change areas
139/2014 CS ADR DSN

Chapter A General
GM1 ADR-DSN.A.005 Aerodrome reference code (ARC)

Chapter B Runways
GM1 ADR-DSN.B.070 Sight distance for slopes of runways
GM1 ADR-DSN.B.085 Runway strength
GM1 ADR-DSN.B.095 Runway turn pads
CS ADR-DSN.B.115 Width of shoulders for runway turn pads
GM1 ADR-DSN.B.115 Width of shoulders for runway turn pads
GM1 ADR-DSN.B.150 Runway strip to be provided
CS ADR-DSN.B 160 Width of runway strips
CS ADR-DSN.B165 Objects on runway strips
GM1 ADR-DSN.B.165 Objects on runway strips
CS ADR-DSN. B 175 Grading of runway strips
GM1 ADR-DSN.B.175 Grading of runway strips
CS ADR-DSN.B 190 Strength of runway strips
CS ADR-DSN.B.200 Stopways
GM1 ADR-DSN.B.200 Stopways

Chapter C Runway End Safety Area
GM1 ADR-DSN.C.210 Runway end safety areas (RESA)
CS ADR-DSN.C.236 Engineered Materials Arresting System (EMAS)
GM1 ADR-DSN.C.236 Engineered Materials Arresting System (EMAS)

Chapter D Taxiways
GM1 ADR-DSN.D.240 Taxiways general

CS ADR-DSN.D 260 Taxiway minimum separations distances
GM1 ADR-DSN.D.285 Strength of taxiways
CS ADR-DSN.D.325 Grading of taxiway strips
CS ADR-DSN.D.335 Holding bays, runway-holding positions, intermediate holding positions, and road-holding positions
CS ADR-DSN.D.340 Location of holding bays, runway-holding positions, intermediate holding positions, and road-holding positions
GM1 ADR-DSN.D.340 Location of holding bays, runway-holding positions, intermediate holding positions, and road-holding positions

Chapter E Aprons
GM1 ADR-DSN. E 345 General
GM1 ADR-DSN.E.360 Slopes on aprons
CS ADR-DSN.E.365 Clearance distances on aircraft stands

Chapter G De-icing /Anti icing Facilities
CS ADR-DSN.G.380 Location
GM1 ADR-DSN.G.380 Location
GM1 ADR-DSN.G.400 Clearance distances on a de-icing/anti-icing pad

Chapter J Obstacle limitation requirements
GM1 ADR DSN J 465 General
CS ADR DSN J 480 Precision approach runways

Chapter L Visual Aids for Navigation (Markings)
CS ADR DSN L 535 Threshold marking
CS ADR-DSN.L.555 Taxiway centre line marking
CS ADR-DSN.L.570 Enhanced taxiway centre line marking
CS ADR-DSN.L.605 Mandatory instruction marking

CS ADR DSN U 940 Aeronautical ground lighting characteristics

139/2014 AMC /GM

Annex III Subpart C Certification
GM1 ADR.OR.B.040(a);(b) Changes

Annex IV Subpart A Aerodrome Data
AMC1 ADR.OPS.A.005(1) Aerodrome Data
GM1 ADR.OPS.A.057(d)(4) Origination of NOTAM
GM2 ADR.OPS.A.057(d)(4) Origination of NOTAM
GM3 ADR.OPS.A.065(a) Reporting of the runway surface condition
AMC1 ADR.OPS.A.065(b);(c) Reporting of the runway surface condition

Annex IV Subpart B - Aerodrome Operations Services, Equipment and Installations
GM2 ADR.OPS.B.010 (a)(4) Rescue and firefighting services
AMC1 ADR OPS B 037(a);(b) Assessment of runway surface condition
GM1 ADR.OPS.B.037(b) Assessment of runway surface condition and assignment of runway condition code
GM2 ADR.OPS.B.037(b) Assessment of runway surface condition and assignment of runway condition code
GM3 ADR.OPS.A.065(a) Reporting of the runway surface condition
AMC1 ADR.OPS.B.090 Use of the aerodrome by higher code letter aircraft
GM1 ADR.OPS.B.090 Use of the aerodrome by higher code aircraft

Annex IV Subpart C - Aerodrome Maintenance
GM2 ADR.OPS.C.010(b)(1) Pavement, other ground services and drainage
AMC1 ADR.OPS.C.010 Pavements, other ground surfaces, and drainage

Acceptable Means of Compliance (AMC) and Guidance Material (GM) and Certification (CS) and Guidance material (GM) documents referenced below.

The text of the amendment is arranged to show deleted text, new or amended text as shown below:
(a) ~~Text to be deleted is shown struck through~~;
(b) New text is highlighted in grey;
(c) ~~Text to be deleted is shown struck through~~ followed by the replacement text which is highlighted in grey.

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

[...]

(e) In the case of an aeroplane equipped with folding wing tips, its reference code letter may change as a result of the folding/extending of the wing tips. Consideration will be given to the wingspan configuration and resultant operations of the aeroplane at an aerodrome.

(f) Procedures on conducting aerodrome compatibility study to accommodate aeroplanes with folding wing tips spanning two code letters are given in the Procedures for Air Navigation Services Aerodromes (PANS-Aerodromes, Doc 9981). Further guidance can be found in the manufacturer's aircraft characteristics for airport planning manual

GM1 ADR-DSN.B.070 Sight distance for slopes of runways

(a) Runway longitudinal slopes and slopes changes are so designed that the pilot in the aircraft has an unobstructed line of sight over all or as much of the runway as possible, thereby enabling him to see aircraft or vehicles on the runway, and to be able to manoeuvre and take avoiding action.

(b) Consideration will have to be given to providing an unobstructed line of sight over the entire length of a single runway where a full-length parallel taxiway is not available. Where an aerodrome has intersecting runways, additional criteria on the line of sight of the intersection area needs to be considered for operational safety. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways

GM1 ADR-DSN.B.085 Runway strength

(a) Additional information on the bearing strength, the design and evaluation of pavements is given in ICAO Doc 9157, Aerodrome Design Manual, Part 3, Pavements.

(b) The method for reporting the bearing strength of the pavement is available in part ADR Ops Sub part A AMC1.OPS A. 005(1) of UK Reg (EU) No 139/2014.

~~Pavement forming part of the movement area needs to be of sufficient strength to allow aircraft to operate without risk of damage either to the pavement or to the aircraft. Pavements subject to overload conditions should deteriorate at an increasing rate depending upon the degree of overload. To control this, it is necessary to classify both pavement and aircraft under a system whereby the load-bearing capacity of the pavement and the loads imposed by the aircraft can be compared. The method used is the Aircraft Classification Number - Pavement Classification Number (ACN/PCN) method. The ACN/PCN method has been developed by ICAO as an international method of reporting the bearing strength of pavements.~~

~~(b) All pavements forming part of the movement area should be of adequate bearing strength for the types of aircraft expected to use the aerodrome. All pavements should be regularly examined by a suitably qualified person. Any pavements which have been subjected to overload conditions should be closely monitored by suitably qualified staff for a period of several weeks or until it is clear that no rapid deterioration of the pavement has been triggered,~~

~~(c) Reporting pavement bearing strength:~~

~~(1) The ACN/PCN method of classifying the bearing strength of pavements considers the load imposed on the pavement by the aircraft. In this respect, the load rating of the aircraft is most significantly affected by the subgrade support strength of the pavement. ACNs are, therefore, numbers giving a relative load rating of the aircraft on pavements for certain specified subgrade strengths. ACN values for most aeroplanes have been calculated by ICAO and are published in Aeronautical Information Publications. The PCN is also a number which represents the load-bearing strength of the pavement in terms of the highest ACN which can be accepted on the pavement for unrestricted use.~~

~~(2) A PCN can also be identified and reported without a technical evaluation of the pavement by means of an assessment of the results of aircraft using the pavement. Providing the type and subgrade support strength of the pavement are known, the ACN of the most demanding aircraft successfully using the pavement can be reported as the PCN.~~

~~(3) A PCN is reported in a five-part format. Apart from the numerical value, notification is also required of the pavement type (rigid or flexible) and the subgrade support category. Additionally, provision is made for the aerodrome operator to limit the maximum allowable tire pressure. A final indication is whether the assessment has been made by a technical evaluation or from past experience of aircraft using the pavement.~~

GM1 ADR-DSN.B.095 Runway turn pads

(b) Such areas, if provided along a runway, may also be useful to reduce taxiing time and distance for aeroplanes which may not require the full length of the runway.

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

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 ~~aircraft~~ aeroplane for which the turn pad is intended and any possible foreign object damage to the aeroplane engines.

GM1 ADR-DSN.B.115 Width of shoulders for runway turn pads

As a minimum, the width of the shoulders would need to cover the outer engine of the most demanding ~~aircraft~~ aeroplane and thus may be wider than the associated runway 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.

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

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

[...]

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

(a) 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) 55 m where the code number is 3
(3) 40 m where the code number is 2; and

CS ADR-DSN.B165 Objects on runway strips

[…]

(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 any part of a runway strip of a precision approach runway delineated by the lower edges of the inner transitional surfaces defined in Chapter H and Chapter J.

(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

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

[…]

(f) The term 'aircraft safety purposes' refers to the installation of arresting systems which are frangible and intended to enhance safety in the event of an aircraft overrun.

CS ADR-DSN.B.175 Grading of strips

[…]

(b) That portion of a strip of a non-instrument runway within a distance of at least:
(1) 75 m where the code number is3 or 4;
(2) 55 m where the code number is 3;
(3) 40 m where the code number is 2; and
(4) 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 aeroplaneswhich the runway is intended to serve in the event of an aeroplane running off the runway.

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

[…]

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

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

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

(de) The area provided adjacent to the end of a runway provided to reduce the erosive effects of jet blast and propeller wash may be referred to as a blast pad

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

CS ADR-DSN.B 190 Strength of runway strips

[…]

(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) 55m where the code number is 3
(3) 40 m where the code number is 2; and
(4) 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.200 Stopways

[...]

(d) 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(cb) of a 0.8 % per cent 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 cent per 30 m (minimum radius of curvature of 10 000 m) for a runway where the code number is 3 or 4.

[...]

GM1 ADR-DSN.B.200 Stopways

(a) The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding:

(1) 0.3 % per 30 m (minimum radius of curvature of 10 000 m) where the code number is 3 or 4; and

(2) 0.4 % per 30 m (minimum radius of curvature of 7 500 m) where the code number is 1 or 2.

(b) The friction characteristics of an unpaved stopway should not be substantially less than that of the runway with which the stopway is associated.

(c) The economy of a stopway can be entirely lost if, after each usage, it should be regraded and compacted. Therefore, it should be designed to withstand at least a certain number of loadings of the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane.

(d) Notwithstanding that a stopway may have a paved surface, it is not intended that PCN Figures bearing strength data need to be developed for a stopway (see Part-ADR.OPS Subpart A AMC1.OPS.A.005(1) of Regulation UK (EU) No 139/2014 for the method on reporting the bearing strength of the pavement). Further guidance is given in ICAO Doc 4444, PANS-OPS.

CHAPTER C — RUNWAY END SAFETY AREA

GM1 ADR-DSN.C.210 Runway end safety areas (RESA)

[…]

(b) Assessment of runway end safety areas

[…]

(2) Combined with this, measures may be considered that would reduce the severity of the consequences should an event occur. Wherever practicable, aerodrome operators should seek to optimise the RESA. This may be achieved through a combination of:

[…]

(v) installing suitably positioned and designed an arresting systems according to CS ADR-DSN.C.236 (EMAS), or another suitably positioned and designed type of an arresting system, to supplement or as an alternative to a RESA where an equivalent level of safety is demonstrated;

[…}

(c) Arresting systems on runway end safety areas

(1) In recent years, recognising the difficulties associated with achieving a standard runway end safety area (RESA) at all aerodromes, research programmes have been undertaken on the use of various materials for arresting systems. Furthermore, research programmes have been undertaken to evaluate and develop arrestor systems using engineered materials. This research was driven by the recognition that many runways where natural obstacles, local development, and/or environmental constraints inhibit the provision of RESA and lead to limited dimension of RESA. Additionally, there had been accidents at some aerodromes where the ability to stop an overrunning aeroplane within the RESA would have prevented major damage to aeroplane and/or injuries to passengers.

(2) The research programmes, as well as evaluation of actual aeroplane overruns into arresting system, have demonstrated that the performance of some aArresting systems can be predictable and effective in arresting aeroplane overruns.

(3) Arresting system designs should be supported by a validated design method that can predict the performance of the system. The design method should be derived from field or laboratory tests. Testing may be based either on passage of an actual aircraft or an equivalent single wheel load through a test bed. The design should consider multiple aircraft parameters, including but not limited to allowable aircraft gear loads, gear configuration, tire contact pressure, aircraft centre of gravity, and aircraft speed. The model should calculate imposed aircraft gear loads, g-forces on aircraft occupants, deceleration rates, and stopping distances within the arresting system. Any rebound of the crushed material that may lessen its effectiveness, should also be considered.

(4) Demonstrated performance of an arresting system can be achieved by a validated design method which can predict the performance of the system. The design and performance should be based on the type of aeroplane anticipated to use the associated runway that imposes the greatest demand upon the arresting system. The design of an arresting system should be based on a critical (or design) aircraft which is defined as aircraft using the associated runway that imposes the greatest demand upon the arresting system. This is usually but not always, the heaviest/largest aircraft that regularly uses the runway. Arresting system performance is dependent not only on aircraft weight but allowable aeroplane gear loads, gear configuration, tire contact pressure, aeroplane centre of gravity and aeroplane speed. Accommodating undershoots should also be addressed. All configurations should be considered in optimising the arresting system design. The aerodrome operator and arresting system manufacturer should consult regarding the selection of the design aeroplane that should optimise the arresting system for a particular aerodrome. Additionally, the design should allow the safe operation of fully loaded rescue and fire fighting vehicles, including their ingress and egress.

(5) Additional information is given in ICAO Doc 9157, Aerodrome Design Manual, Part 1, Runways

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 the front ramp facing the runway should not present a vertical face. Ramps on the side of the EMAS are not required.

(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 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 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 entry 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 RESA available for a standard EMAS, the EMAS must be designed to achieve the maximum deceleration of the design aircraft within the available runway safety end area.

(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 (0.25) 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.

(2) 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.

GM1 ADR-DSN.C.236 Engineered Materials Arresting System (EMAS)

(a) Engineered materials:

If an EMAs is installed it should be promulgated to operators and included in the AIP

(1) The materials are tailored to specific mechanical properties and are referred to as engineered materials.

(2) The engineered materials have to meet a force-deformation profile within limits which have been shown to assure uniform characteristics, and therefore, predictable response to an aircraft entering the EMAS.

(5) The engineered materials will crush under the landing gears of the aeroplane when it engages the EMAS. The crushing is an irreversible or partly irreversible process, and the arresting performance of the system is proportional to the amount of energy that is dissipated.

(b) The compatibility of the EMAS with the specific meteorological and aerodrome conditions is ensured by using materials which:

(1) are water-resistant to the extent that the presence of water does not affect system performance;

(2) do not attract or are physically vulnerable to:

(i) vermin,

(ii) birds,

(iii) wildlife, or

(iv) other creatures to the greatest extent possible;

(v) does not support unintended plant growth with proper application of herbicides;

(4) Exhibit constant strength and density characteristics during all climatic conditions within a temperature range that is appropriate for the local conditions;

(5) Are resistant to deterioration as a result of:

(i) salt;

(ii) aircraft and runway de-icing and anti-icing fluids and solids;

(iii) aircraft fuels, hydraulic fluids, and lubricating oils;

(iv) ultraviolet;

(v) water;

(vi) freezing/thawing;

(vii) blowing sand and snow;

(viii) hail;

(viii) paint;

(ix) herbicides.

(c) Undershoot:

(1) An EMAS is not intended to reduce the risk of damage to an aeroplane undershooting the runway. However, the presence of an EMAS cannot increase the potential for damage in case of undershoot more than the risk that is associated with an undershoot in a RESA.

(2) Compliance with CS ADR-DSN.C.236 (c)(1) could be justified through experience of real cases of undershoot in an EMAS, flight simulator tests, other type of studies, or a combination of the three.

(d) An EMAS is a passive system which does not require any specific action or procedures by the flight crew. However, a basic knowledge of the systems by the crew is considered advantageous to prevent undesired evasive manoeuvres that could cause the aircraft to avoid entering the bed or system. The EMAS is designed to be entered preferably straight ahead with the unrestricted use of wheel brakes and/or thrust reversers. Additionally, the availability of an EMAS cannot be used for flight planning purposes, i.e., it cannot be included in the declared distances.

(e) Mechanical property:

(1) An EMAS is not intended to support vehicular traffic for maintenance or normal operating purposes.

(2) The EMAS needs to be capable of supporting personnel walking on it for the purposes of its own maintenance and co-located air navigation aids without causing any damage to its surface.

(3) Precaution needs to be taken during snow and ice removal to prevent damage to the EMAS bed.

(6) Light equipment for snow removal may be used in accordance with the manufacturer´s specification to avoid any damage to the surface.

(f) Setback distance:

(1) The setback distance is defined as the distance between the runway end or stopway, if provided, and the beginning of the EMAS.

(2) The setback distance will vary depending on the available area and the EMAS design.

(3) The calculation of the setback distance balances the risk objectives of:

(i) providing enough area for arresting purposes;

(ii) providing enough separation to protect the bed from jet blast;

(iii) providing separation from the threshold to reduce the probability of undershoot in the EMAS; and

(iv) decreasing the probability of aircraft overruns passing by one side of the EMAS due to lateral dispersion. The safety assessment determines the relevance of each risk objective, taking into account the operating particularities of the associated runway, including usage of the runway, types of approach, weather conditions, fleet, incidents and accidents, and any other particularity related with runway safety.

(4) To reduce the probability of an aircraft into the EMAS, aerodrome operators might consider setting the EMAS back from the end of the runway.

(g) An EMAS normally includes steps and/or slopes at its end and both sides, but they are not considered functional for arresting purposes. Where possible, the functional width of the EMAS is to be maintained the same throughout the whole length of the system.

(h) Entry speed is defined as the speed of the nose gear of the aeroplane as it passes the runway end or stopway, if provided.

(i) The critical aircraft is defined as the aircraft that regularly uses the associated runway that imposes the greatest demand upon the EMAS.

(j) Design aircraft list refers to the combination of aircraft types which are/will be operating regularly on the runway. The critical aircraft is usually, but not always, the heaviest/largest aircraft that regularly uses the runway. The performance of an EMAS is dependent not only on aeroplane weight, but also on the landing gear configuration, tyre pressure, and centre of gravity. In general, the operational maximum take-off weight (operational MTOW) is used for the critical aircraft. However, there may be instances where less than the MTOW will require a longer EMAS. All parameters are to be considered in optimising the EMAS design. However, to the extent practicable, the EMAS design may consider both the aeroplane that imposes the greatest demand upon the EMAS and the range of aircraft expected to operate regularly on the runway. In some instances, a composite of design aircraft may be preferable to optimising the EMAS for a specific runway than a single critical aircraft. Other factors that are unique to a particular aerodrome, such as available RESA and air cargo operations, should also be considered in the final design.

(k) Testing:

Testing is to be based either on passage of an actual aircraft, or a single wheel bearing an equivalent load through a test bed. The design will need to consider multiple aircraft parameters, including but not limited to allowable aircraft gear loads, gear configuration, tyre contact pressure, weight, centre of gravity, and speed.

GM1 ADR-DSN.D.240 Taxiways general

[…]

(k) CS ADR-DSN.N.785 provides the certification specifications for a standardised scheme for the nomenclature of taxiways to improve situational awareness and as a part of an effective runway incursion prevention measure.

~~(k)~~(l) Additional ~~G~~guidance on layout and standardised nomenclature of taxiways is given in ICAO Doc 9157, Aerodrome Design Manual, Part 2, Taxiways, Aprons and Holding Bays

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

[…]

[…]

	Distance between taxiway centreline and runway centre line (metres)									Taxiway centre line to taxiway centre line (metres)	Taxiway, other than aircraft stand taxilane, centre line to object (metres)	Aircraft stand to taxilane centre line to aircraft stand taxilane centre line (metres)	Aircraft stand taxilane centre line to object (metres)
	Instrument runways Code Number					Non-instrument runways code number							
Code letter	1	2	3	4		1	2	3	4				
(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)

A	77.5	77.5	-	-		37.5	47.5	-	-	23	15.5	19.5	12
B	82	82	152	-		42	52	~~87~~ 67	-	32	20	28.5	16.5
C	88	88	158	158		48	58	~~93~~ 73	93	44	26	40.5	22.5
D	-	-	166	166		-	-	~~101~~ 81	101	63	37	59.5	33.5
E	-	-	172.5	172.5		-	-	~~107.5~~ 87.5	107.5	76	43.5	72.5	40
F	-	-	180	180		-	-	~~115~~ 95	115	91	51	87.5	47.5

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

Note 2: The distances in columns (2) to (9) do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aeroplane on a parallel taxiway

Table D-1. Taxiway minimum separation distances

GM1 ADR-DSN.D.285 Strength of taxiways

Information regarding pavement bearing strength, including the ~~ACN/PCN~~ ACR/PCR classification system may be found in GM1 ADR-DSN.B.085.

(a) Due consideration being is to be given to the fact that a taxiway should be is subjected to a greater density of traffic and as a result of slow moving and stationary aeroplanes, to higher stresses than the runway it serves.

(b) The method for reporting the bearing strength of the pavement is available in Part-ADR.OPS Subpart A AMC1 OPS.A.005(1) of Regulation UK Reg (EU) No 139/2014.

(c) Additional information on the bearing strength, the design, and evaluation of pavements is given in ICAO Doc 9157, Aerodrome Design Manual, Part 3, Pavements.

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

[…]

(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~~ 17 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;

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.335 Holding bays, runway-holding positions, intermediate holding positions, and road-holding positions

[…]

Until 22 November 2028

(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;

As of 23 November 2028,

(b) A runway-holding position or positions should be established:

the location of a runway-holding position shall be such that a holding aircraft or vehicle will not infringe the inner approach surface, inner transitional surfaces, balked landing surface, approach surface, take-off climb surface or ILS/MLS critical/sensitive area or interfere with the operation of radio navigation aids

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.

[…]

Type of runway	**Code number [d]**			
	1	2	3	4
Non-instrument	30 m	40 m	~~75~~ 55 m	75 m
Non-precision approach	40 m	40 m	75 m	75 m
Precision approach Category I	60 m [b]	60 m [b]	90 m [a,b]	90 m [a,b,c]
Precision approach Category II and III	-	-	90 m [a,b]	90 m [a,b,c]
Take off runway	30 m	40 m	~~75~~ 55 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 107.5 m~~

Note 3: For code number 4 where the width of the inner edge of the inner approach surface is more than 120 m, a distance greater than 90 m may be necessary to ensure that a holding aircraft is clear of the obstacle free zone. For example, The distance of 100 ~~107.5~~ m ~~for code number 4 where the code letter is F~~ is based on an aircraft with a tail height of 24 m, a distance from the nose to the highest part of the tail of 62.2 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle free zone.

d. Elevation of taxiway should be taken into account for possible increase of the distances indicated in this table

GM1 ADR-DSN.D.340 Location of holding bays, runway-holding positions, intermediate holding positions, and road-holding positions

[…]

(f) If a holding bay, runway-holding position or road-holding position for a precision approach runway code number 4 is at a greater elevation compared to the threshold, the distance of ~~90 m or 107.5 m, as appropriate~~, specified in Table D-2 could be further increased 5 m for every metre the bay or position is higher than the threshold

CHAPTER E — APRONS

CS ADR-DSN.E. 345 General

(a) 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.

(b) The design of aprons should take into consideration criteria for safe ground handling, including:

(1) sufficient space between aircraft stands to enable personnel and equipment to move safely and efficiently;
(2) adequate apron markings, apron signs and apron floodlighting;
(3) adequate staging and storage areas for ground support equipment (GSE);
(4) positioning of fixed ground services; e) storage areas for unit load devices (ULD);
(5) adequate access and egress routes for fuel, GSE and emergency vehicles;
(6) clearly delineated and visible access and egress routes for passengers;
(7) new technologies (electric charging points, autonomous vehicles, etc.);
(8) avoidance of rear of aircraft stand service roads wherever practicable; and
(9) appropriate protection from jet blast and propeller wash
.

GM 1 ADR-DSN. E. 345 General

~~intentionally left blank~~

Further guidance on apron design and markings is given in the Aerodrome Design Manual (Doc 9157), Part 4 — Visual Aids, and the Airport Planning Manual (Doc 9184), Part 1— Master Planning

GM1 ADR-DSN.E.360 Slopes on aprons

[…]

(b) Slopes on apron have the same purpose as other pavement slopes, meaning to prevent the accumulation of water (or possible fluid contaminant) on the surface and to facilitate rapid drainage of surface water (or possible fluid contaminant). Nevertheless, the design of the apron, especially for the parts containing aircraft ~~airplane~~ stands, should specifically take into account the impact of the slopes on the aircraft ~~airplane~~ during its braking at the stand and during its start for departure (with push-back or with its own engines). The aims are, on the one hand, to avoid that an aircraft ~~airplane~~ passes its stop point and goes on the apron service road or to the closest building and on the other hand, to save fuel and optimise the manoeuvrability of the aircraft ~~airplane~~ or of the push-back device.

CS ADR- DSN.E.365 Clearance distances on aircraft stands

[…]

(c) The minimum When special circumstances so warrant, these clearances may be reduced at a nose-in aircraft stand, where 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 boarding 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.

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, ~~to~~ not cause interference to the radio navigation aids and be clearly visible from the air traffic control tower for clearing the treated aeroplane.

GM1 ADR-DSN.G.380 Location

[…]

(e) The remote de-icing/anti-icing facilities should be so located as to provide for an expeditious traffic flow, perhaps with a bypass configuration, and not require unusual taxiing manoeuvre into and out of the pads

GM1 ADR-DSN.G.400 Clearance distances on a de-icing/anti-icing pad

(a) The separation criteria should take into account the need for individual de-icing/anti-icing pads to provide sufficient manoeuvring area around the aircraft ~~airplane~~ to allow simultaneous treatment by two or more mobile de-icing/anti-icing vehicles and sufficient non-overlapping space.

CHAPTER J — OBSTACLE LIMITATION REQUIREMENTS

GM1 ADR-DSN J 465 General

Applicable until 22 November 2028

The objectives of the specifications are 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 and to prevent the aerodromes from becoming unusable by the growth of obstacles around the aerodromes. This is achieved by establishing a series of obstacle limitation surfaces that define the limits to which objects may project into the airspace

CS ADR-DSN.J.480 Precision approach runways

[…]

Approach Runways			
Runway Classification			
Surface and	Non-instrument Code	Non-precision	Precision approach

dimension [a]	number				approach Code number			category I, 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 threshold	-	-	-	-	-	-	-	60 m	60 m	60 m
Length	-	-	-	-	-	-	-	900 m	900 m	900 m
Slope	-	-	-	-	-	-	-	2.5%	2%	2%
APPROACH										
Length on inner edge	60 m	80 m	~~150~~ 110 m	150 m	140 m	280 m	280 m	140 m	280 m	280m
Distance from threshold	30 m	60 m	60m	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%
[…]										

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

CHAPTER L — VISUAL AIDS FOR NAVIGATION (MARKINGS)

CS ADR-DSN.L.535 Threshold marking

(a) Applicability: A threshold marking should be provided at the threshold of a runway.

(b) A threshold marking should be provided at the threshold of a paved non-instrument runway where the code number is 1 or 2 and additional conspicuity of the beginning of the runway available for landing is necessary

(~~b~~ c) Characteristics:

CS ADR-DSN.L.555 Taxiway centre line marking

[...]

(d) Characteristics:

[…]

(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. […]

CS ADR-DSN.L.570 Enhanced taxiway centre line marking

[...]

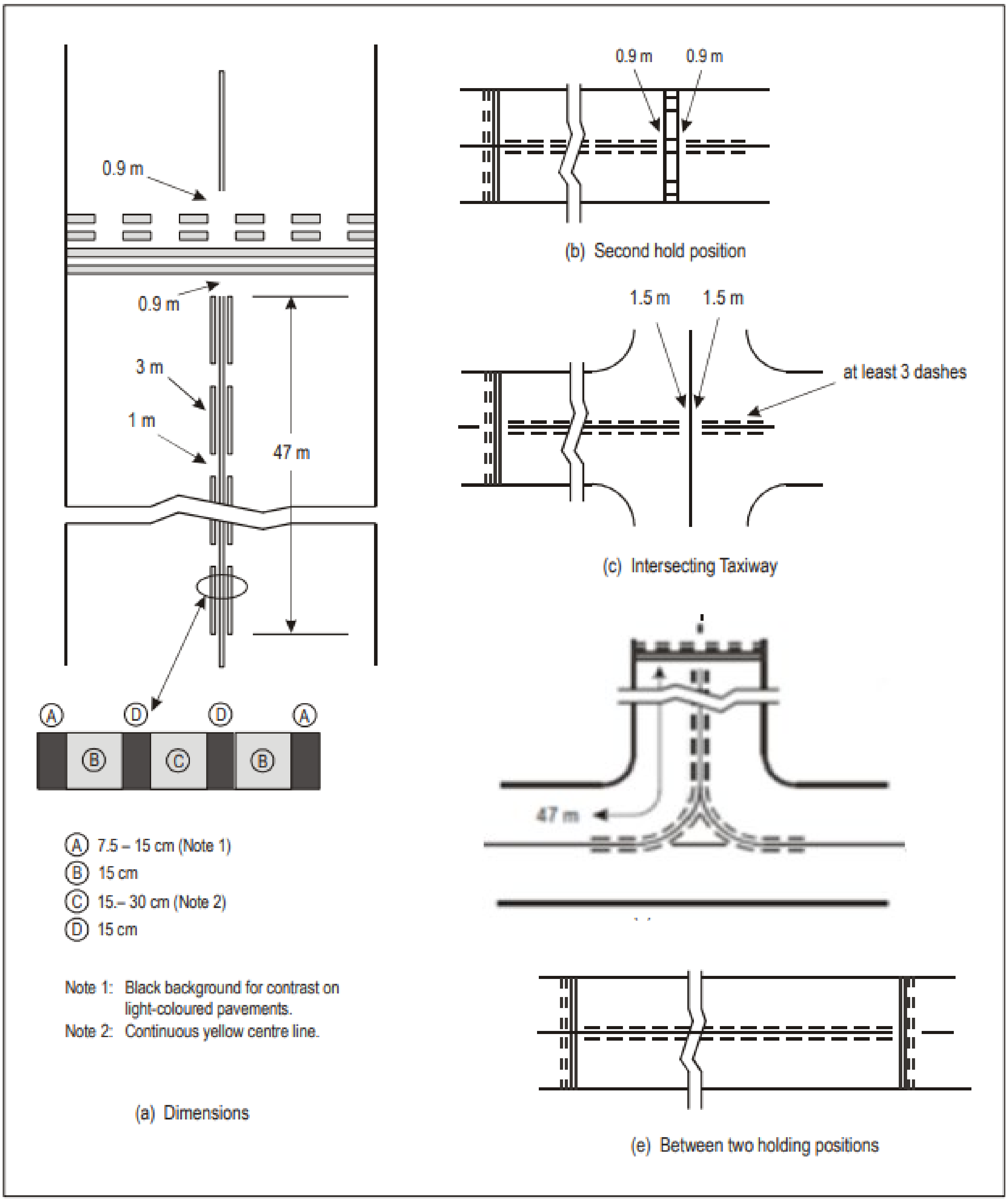


Figure L-6 Enhanced taxiway centre line marking
This figure will be replaced when new figure available

CS ADR-DSN.L.605 Mandatory instruction marking

[…]

(b) Characteristics:

[…]

(1) A mandatory instruction marking should consist of an inscription in white on a red background. Except for a ~~NO ENTRY~~ no-entry marking, the inscription should provide information identical to that of the associated mandatory instruction sign.

(2) A ~~NO ENTRY~~ no-entry marking should consist of an inscription in white reading NO ENTRY on a red background.

[...]

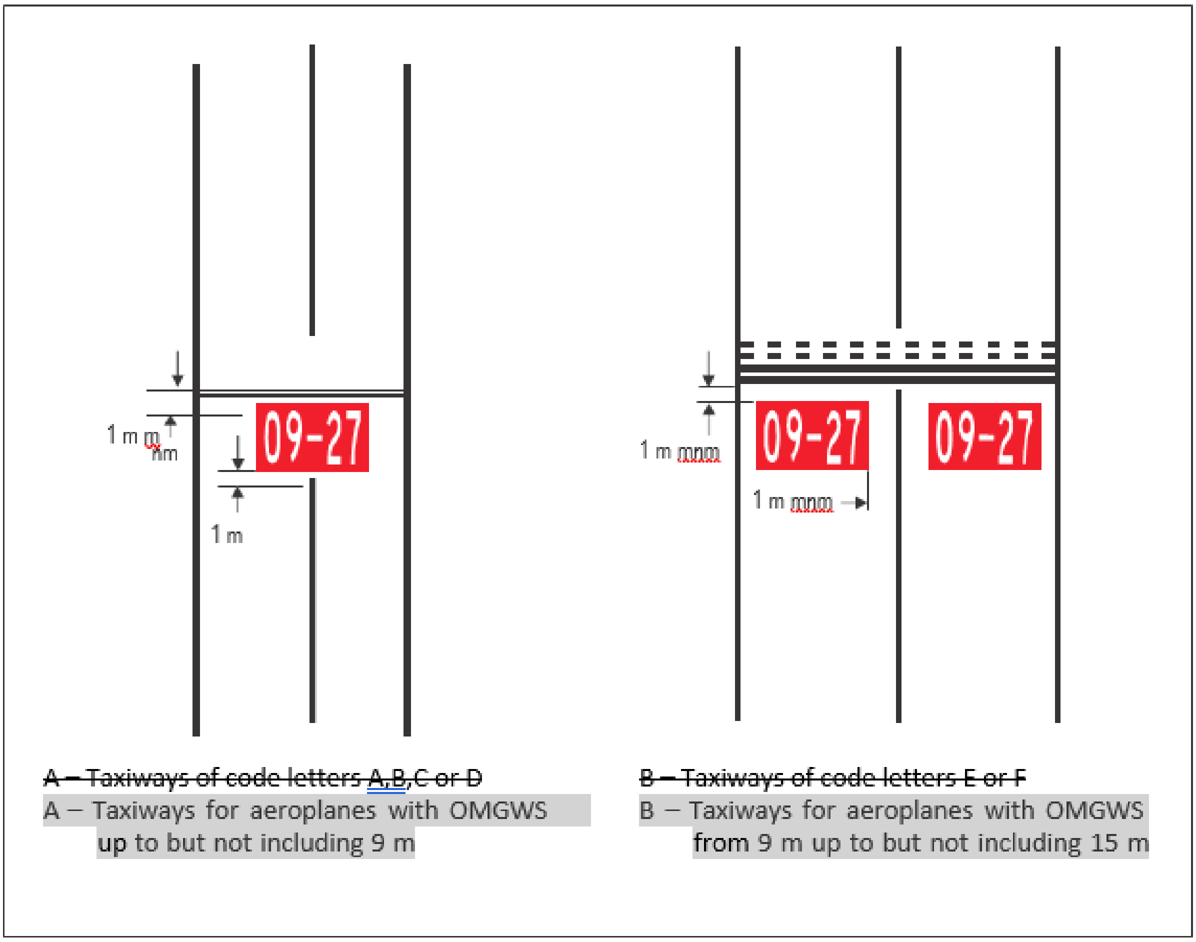


Figure L-9 Mandatory instruction markings

CS ADR-DSN.L.610 Information marking

[...]

(f) Characteristics:

[…]

(1) The character height, spacing, and the form and proportions of the inscription should be as for mandatory instruction markings.

~~(2) The spacing of characters for information marking should be as specified in Table N-3(c).~~

CHAPTER M — VISUAL AIDS FOR NAVIGATION (LIGHTS)

GM1 ADR-DSN.M.615 General

[…]

(b) In dusk or poor visibility conditions by day, lighting can be more effective than marking. For lights to be effective in such conditions or in poor visibility by night, they should be of adequate intensity. To obtain the required intensity, it should usually be necessary to make the light directional, in which case the arcs over which the light shows should be adequate and so orientated as to meet the operational requirements. The runway lighting system should be considered as a whole, to ensure that the relative light intensities are suitably matched to the same end and are maintained over time. Guidance on maintenance criteria for aeronautical ground lights and of the use of a site is contained in the aerodrome design manual (Doc 9157), part 4).

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

[…]

(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 CS ADR.DSN.S.895 can be demonstrated, and the runway is intended for use in runway visual range conditions of ~~350~~ 300 m or greater, the longitudinal spacing may be approximately 30 m.

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

[…]

(b) Rapid exit taxiway indicator lights should be considered on a runway intended for use in runway visual range conditions less than a value of ~~350~~ 300 m where the traffic density is heavy.

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

[...]

(1) Taxiway centre line lights should be provided on an exit taxiway, taxiway, de-icing/anti-icing facility, and apron intended for use in runway visual range conditions less than a value of ~~350~~ 300 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~~ 300 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.

[…]

(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~~ 300 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.

[…]

(c) Characteristics

[…]

(4) Taxiway centre line lights should be in accordance with the specifications in CS ADRDSN.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~~ 300 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~~ 300 m should be in accordance with the specifications in CS ADRDSN.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.

CS ADR-DSN.M.715 Taxiway centre line lights on taxiways, runways, rapid exit taxiways, or on other exit taxiways

[...]

(b) Taxiway centre line lights on taxiways

[…]

(ii) on a taxiway intended for use in RVR conditions of less than a value of ~~350~~ 300 m, the longitudinal spacing should not exceed 15 m.

[...]

RVR	Radius of taxiway curve	Taxiway centre line lights spacing on taxiway curves
< ~~350~~ 300 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~~ 300 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

[…]

(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~~ 300 m should be spaced at longitudinal intervals not exceeding 15 m.

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

[…]

(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~~ 300 m to enable an aeroplane to complete a 180-degree turn and align with the runway centre line.

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

(a) Applicability:

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~~ 300 m

CS ADR-DSN.M.745 Runway guard lights

(a) The purpose of runway guard lights is to warn pilots and drivers of vehicles, ~~when they are~~ operating on taxiways, that they are about to enter an active runway. There are two standard configurations of runway guard lights as illustrated in Figure M-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 on the holding side of the runway-holding position marking ~~and at the same distance as the runway-holding position marking.~~

(2) Runway guard lights, Configuration B, should be located across the taxiway on the holding side of the runway-holding position marking ~~and at the same distance as the runway holding position marking.~~

(d) Characteristics:

(1) Runway guard lights, Configuration A, should consist of two pairs of yellow lights.

(2) 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 ~~aligned so as to be visible to the pilot of an aeroplane taxiing to~~ the runway holding position.

GM1 ADR-DSN.M.745 Runway guard lights

(a) Runway incursions may take place in all visibility or weather conditions. The use of runway guard lights at runway-holding positions can form part of effective runway incursion prevention measures. ~~Some other device or design, e.g. specially designed optics, may be used in lieu of the visor~~.

(b) Where taxiways are substantially wider than those specified in CS ADR-DSN.D.245, such as wide-throat taxiways, the lights in Configuration A, located at each of the sides, are likely to be missed by pilots and may be necessary to be supplemented by a row of lights (inset) located across the taxiway, Configuration B.

(c ~~b~~) Higher light intensities may be required to maintain ground movement at a certain speed in low visibilities.

(d ~~c~~) The optimum flash rate is dependent on the rise and fall times of the lamps used. Runway guard lights, Configuration A, installed on 6.6 ampere series circuits have been found to look best when operated at 45 to 50 flashes per minute per lamp. Runway guard lights, Configuration B, installed on 6.6 ampere series circuits have been found to look best when operated at 30 to 32 flashes per minute per lamp.

(e ~~d~~) Where there is a need to enhance the contrast between the on- and off-state of runway guard lights, Configuration A, intended for use during the day, a visor of sufficient size to prevent sunlight from entering the lens without interfering with the function of the fixture should be located above each lamp. Some other device or design, e.g. special designed optics, may be used in lieu of the visor.

(f e) Active runway is to consider any runway or runways currently being used for take-off or landing. When multiple runways are used, they are all considered active runways.

(g) Additional guidance on runway guard lights is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids

GM1 ADR-DSN.M.755 Visual docking guidance system

(a) The factors to be considered in evaluating the need for a visual docking guidance system are in particular: the number and type(s) of aircraft using the aircraft stand, weather conditions, space available on the apron, and the precision required for manoeuvring into the parking position due to aircraft servicing installation, passenger loading boarding bridges, etc.

(b) The accuracy of the system shall be adequate for the type of loading passenger boarding bridge and fixed aircraft servicing installations with which it is to be used

(b c) Care is required in both the design and on-site installation of the system to ensure that reflection of sunlight, or other light in the vicinity, does not degrade the clarity and conspicuity of the visual cues provided by the system.

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

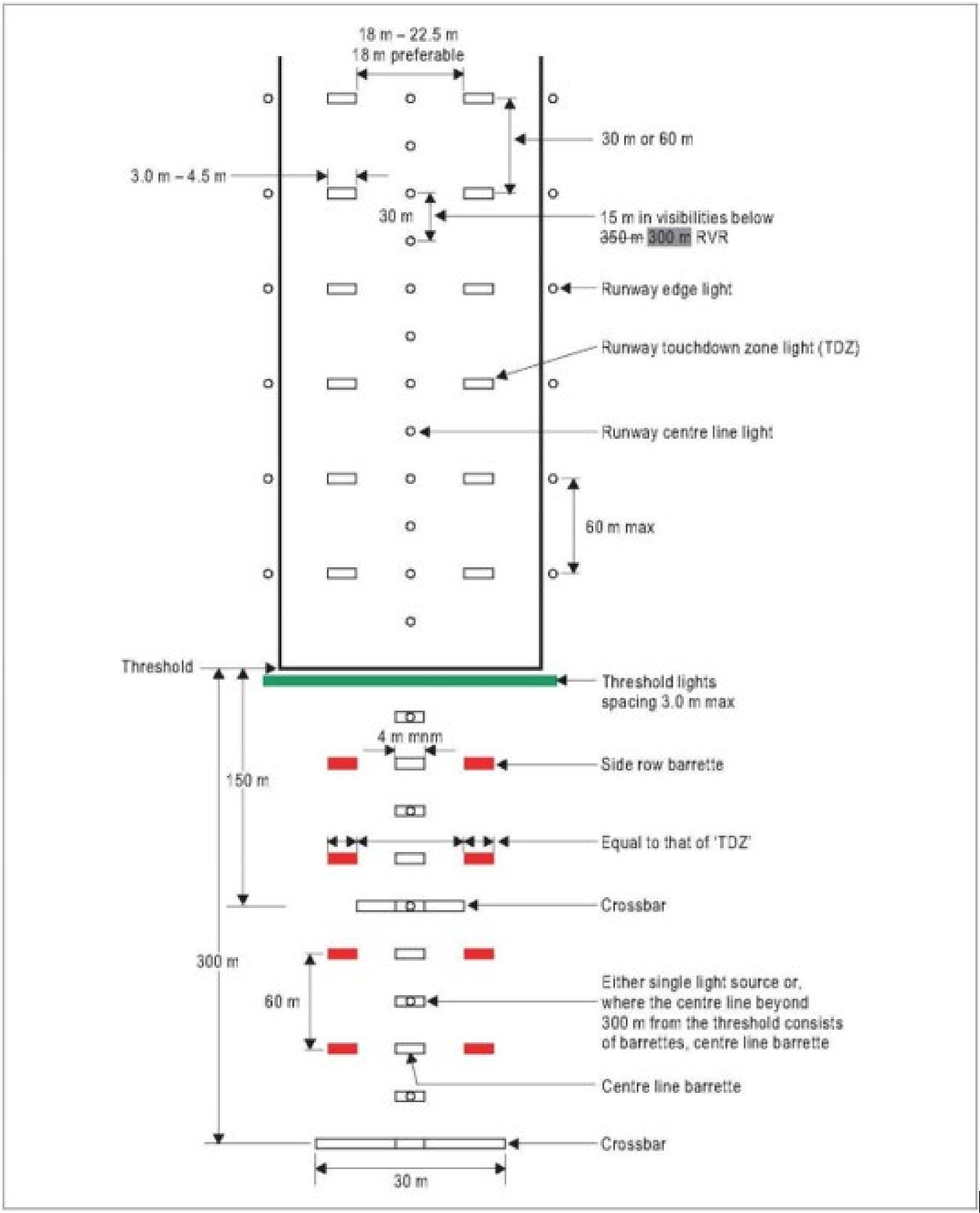


Figure M-3B. Inner 300 m approach and runway lighting for precision approach runways, Categories II and III where the serviceability levels of the lights specified as maintenance objectives in CS ADR-DSN.S.895 can be demonstrated

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) ~~The lighting circuit should be so designed that:~~
~~(i) no-entry bars are switchable selectively or in groups;~~
~~(ii) when a no-entry bar is illuminated, any taxiway centre line lights installed beyond the no-entry bar, when viewed towards the runway, should be extinguished for a distance of at least 90 m; and~~
~~(iii) when a no-entry bar is illuminated, any stop bar installed between the no-entry bar and the runway should be extinguished.~~

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.

(2) 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.

GM1 ADR-DSN.M.771 No-entry bar

~~(a) A no-entry bar is intended to be controlled either manually or automatically by air traffic services.~~

(a~~b~~) Runway incursions may take place in all visibility or weather conditions. The use ~~provision~~ of no-entry bars ~~at taxiway/runway intersections and their use at night and in all visibility conditions~~ can form part of effective runway incursion prevention measures.

(b~~c~~) Where necessary to enhance conspicuity, extra lights should be installed uniformly.

(c~~d~~) A pair of elevated lights should be added to each end of the no-entry bar where the in-pavement no-entry bar lights might be obscured from a pilot's view, for example, by snow or rain, or where a pilot may be required to stop the aircraft in a position so close to the lights that they are blocked from view by the structure of the aircraft.

(d~~e~~) Where no-entry 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 no-entry 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.

(e~~f~~) High-intensity no-entry bars are typically used only in case of an absolute necessity and following a safety assessment.

(~~f~~g) Where a wide beam fixture is required, 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-21 or U-23, as appropriate.

(g~~h~~) Care is required in the design of the electrical system to ensure that all of the lights of a no-entry bar will not fail at the same time. No-entry bar lights should be supplied with power on a separate circuit to other runway lighting so that they may be used when other lighting is switched off.

CHAPTER N — VISUAL AIDS FOR NAVIGATION (SIGNS)

CS ADR-DSN.N.775 General

[...]

(c) Characteristics:

(d) 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 N1-. , except for runways distance remaining signs.

[…]

~~(4) The inscriptions on a sign should be in accordance with the provisions of Figures N-2A to N-2H and N-3.~~

(4~~5~~) Signs should be illuminated when intended for use:

- (i) in runway visual range conditions less than a value of 800 m; or
- (ii) t 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~~6~~) 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~~7~~) 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.
- (iv) 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~~ 300	700	5 – 11 m	3 – 10 m
1 or 2	300	~~600~~ 450	900	5 – 11 m	3 – 10 m
3 or 4	300	~~600~~ 450	900	11 – 21 m	8 – 15 m
3 or 4	400	~~800~~ 600	1000	11 – 21 m	8 – 15 m

Table N-1. Location distances for taxiing guidance signs including runway exit signs

(9~~8~~) 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	Other 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~~9~~) 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 ~~dimensions should be as follows:~~

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

(ii) Stroke ~~width for single letter should be as follows:~~

Legend height	Stroke
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

(12~~0~~) 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)(45)(ii) and (c)(56), average sign luminance should be at least:

Red	10 cd/m2
Yellow	50 cd/m2
White	100 cd/m2

(13~~1~~) The luminance ratio between red and white elements of a mandatory instruction sign should be between 1:5 and 1:10.

(14~~2~~) 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.

(143) The average value is the arithmetic average of the luminance values measured at all considered grid points.

(15~~4~~) 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.

(16~~5~~) 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. (186) The face height of signs should be as follows:

(17~~6~~) 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

(18~~7~~) 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.

(19~~8~~) 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.

(20~~19~~) The colours of signs should be in accordance with the appropriate specifications in CHAPTER U — Colours for aeronautical ground lights, markings, signs and panels.

(21~~0~~) ~~If instruction or information during a certain period of time, and/or there is a need to display variable pre-determined information, a variable information sign should be provided.~~

~~(i) A variable message sign should show a blank face when not in use.~~

~~(ii) In case of failure, a variable message sign should not provide information that could lead to unsafe action from a pilot or a vehicle driver.~~

~~(iii) The time interval to change from one message to another on a variable message sign should be as short as practicable and should not exceed 5 seconds. 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.~~

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.

e) Width of numeral			
Numeral ~~Code No.~~	Numeral height (mm)		
	200	300	400
	Width (mm)		
1	50	74	98
2	137	205	274
3	137	205	274
4	149	224	298
5	137	205	274
6	137	205	274
7	137	205	274
8	137	205	274
9	137	205	274
0	143	214	286

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

GM1 ADR-DSN.N.775 General

(a) Signs may need to be orientated to improve readability.

~~(b) 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.~~

(b~~c~~) Guidance on signs is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, Chapter 11.

(c~~d~~) Guidance on frangibility is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 6, Frangibility.

(d~~e~~) Guidance on measuring the average luminance of a sign is contained in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

A. Sign with two runway designators B. Sign with one runway designator

Figure N-3. Sign dimensions

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~~ no-entry signs.

[…]

(8) A ~~NO ENTRY~~ no-entry sign should be provided when entry into an area is prohibited.

(b) Location:

[…]

(3) A ~~NO ENTRY~~ 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.

(b) Characteristics:

[…]

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

(4) The inscription on a runway-holding position sign at a runway-holding position should consist of the taxiway designation and a number.

CS ADR-DSN.N.785 Information signs

[…]

(c) Characteristics:

[…]

(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 use of~~ the letters I, O, or X, should not be used ~~and the use of words such as 'inner' and 'outer' should be avoided wherever possible~~, 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

GM1 ADR-DSN.N.786 Runway distance remaining signs (RDRSs)

(a) Runway excursions may take place in all visibility or weather conditions. The use of RDRS can form part of effective runway excursion prevention measures. The purpose of RDRSs is to provide pilots with distance-to-go information to the extremity of the runway, to enhance situational awareness and enable pilots to decide whether to commence a go-around and to apply braking action for more efficient roll-out and runway exit speeds. It is essential that pilots operating at aerodromes with RDRS be familiar with the purpose of these signs.

(b) Runway distance remaining signs (RDRSs) do not have to be provided at all aerodromes. An aerodrome considering the installation of such signs may wish to assess their need individually, depending on factors such as runway length, aerodrome elevation, aerodrome geometry, traffic levels, lack of runway end safety area, lack of runway friction and climate.

(c) RDRSs are placed along the full length of the runway at longitudinal spacing of 300 m (±30 m), parallel and equidistant from the runway centre line as in Configurations A, B or C, illustrated in Figure xxx.

(d) RDRSs are arranged by any of three different configurations as shown in Figure N6A

(e) In Configuration A, the RDRSs consist of double-faced signs and are located on both sides of the runway. Where the runway length is not an exact multiple of 300 m, the signs are placed at locations where the runway total length is divided equally.

(f) In Configuration B, the RDRSs consist of double-faced signs and are located on both sides of the runway. Where the runway length is not an exact multiple of 300 m, one-half of the excess distance is added to the distance of each sign from each runway extremity.

(g) To illustrate the case where the distance between the end of the runway and the sign is the maximum, for a runway length of 1 950 m, the excess distance is 150 m and the location of the last sign on each runway end is 300 m plus one-half of 150 m, or 375 m. This configuration allows a maximum of 375 m at the end of the runway, but the other signs are exactly 300 m apart

(h) For Configurations A and B, the signs may be omitted on one side of the runway because of clearance conflict or by design.

(i) In Configuration C, the RDRSs consist of single-faced signs and are located on one side of each runway, viewed in the direction of take-off or landing. The advantage of Configuration C is that the runway distance remaining is more accurately reflected for a runway length that is not an exact multiple of 300 m.

(j) An RDRS may be omitted if the sign cannot be placed within the tolerance of ±30 m.

(k) Location

(1) Where provided, runway distance remaining signs (RDRS) shall be placed along the full length of the runway at longitudinal spacing of approximately 300 m, parallel and equidistant from the runway centre line.

(2) Displaced threshold areas that are used for take-off and/or roll-out are treated as part of the runway for purposes of locating the signs.

(3) Runway distance remaining signs shall be placed outside the edges of the runway at a distanceshown in Table N3

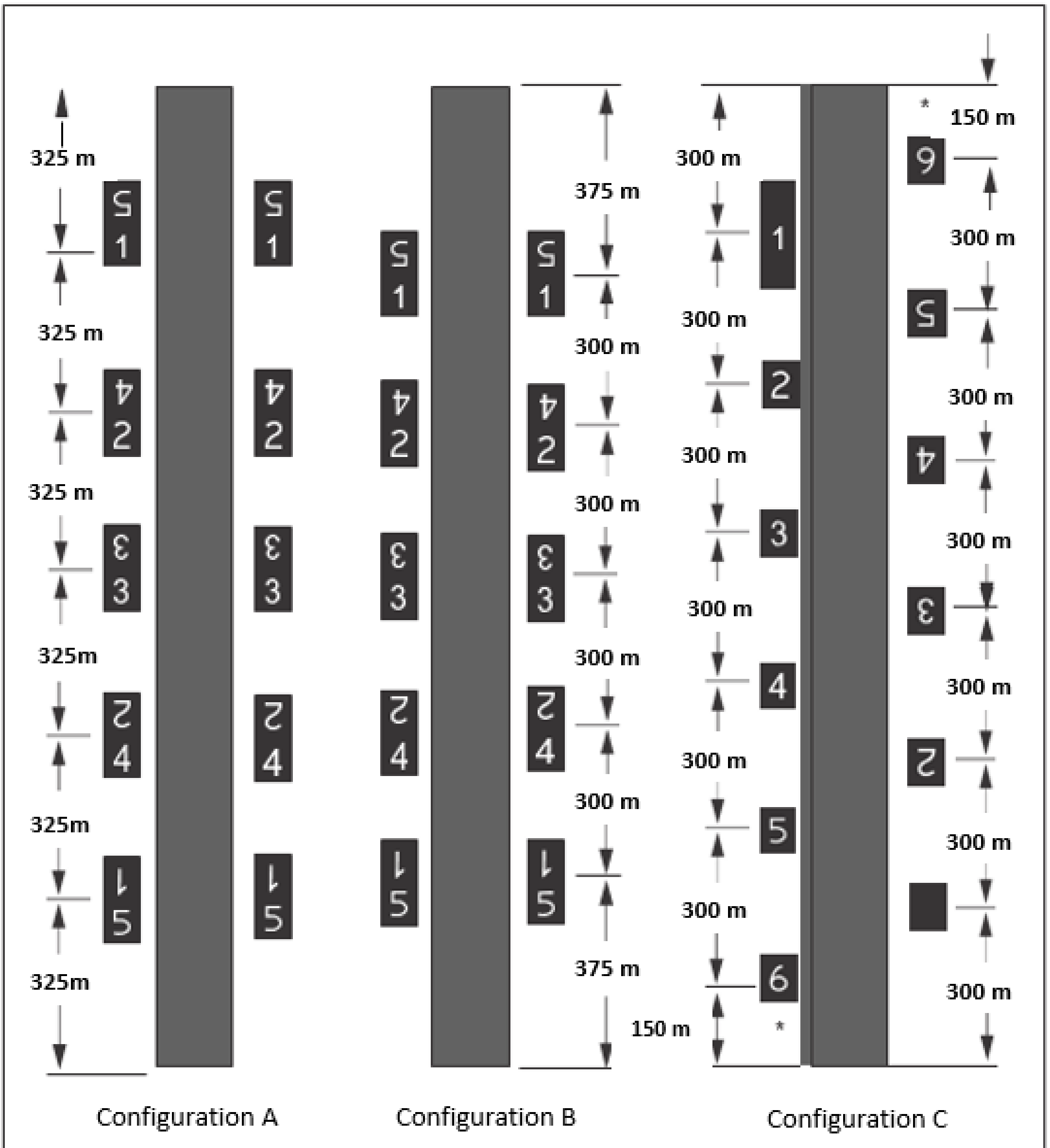
(a) Characteristics

(1) Where provided, an RDRS shall consist of an inscription in white on a black background.

(2) The installed height of the RDRS shall not exceed the dimension shown in the appropriate column in Table N3 below. All RDRSs on one runway shall be the same size.

Sign height (mm)				Perpendicular distance from defined runway pavement edge to near side of sign
Code Number	Legend	Face (min)	Installed (max)	
1 or 2	600	760	1070	6 – 10.5 m
3 or 4	1000	1200	1520	15 – 22.5 m
3 or 4	1200	1500	1600	25 m or more

Table N3 Location distances for runway distance remaining signs



Note 1 - Examples based on 1 950 m runway length
Note 2 - Signs less than 300 m from take of end, as indicated by asterisks (*) may be omitted

Figure N6A Runway distance remaining sign configuration

(a) The inclusion of detailed specifications for runway distance remaining signs (RDRS) is not intended to imply that an RDRS has to be provided. Guidance on installing RDRSs is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

(b) Provisions related to the identification and mitigation of hazards, including the need for safety assessment related to runway safety, is available in PANS-Aerodromes (Doc 9981), Chapter 8.

GM1 ADR-DSN.P.825 Taxiway edge markers

~~(a)~~ At small aerodromes, taxiway edge markers may be used, in lieu of taxiway edge lights, to delineate the edges of taxiways, particularly at night. Additional guidance is given in ~~(~~ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, ~~Chapter 2, paragraph 2.4.1)~~

(b) On a straight section of a taxiway, taxiway edge markers should be spaced at uniform longitudinal intervals of not more than 60 m. On a curve the markers should be spaced at intervals less than 60 m so that a clear indication of the curve is provided. The markers should be located as near as practicable to the edges of the taxiway, or outside the edges at a distance of not more than 3 m. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, ~~Chapter 2, paragraph 2.4.2.~~

(c) The markers commonly used are cylindrical in shape. Ideally, the design of the marker should be such that when installed properly, no portion should exceed 35 cm total height above the mounting surface. However, where significant snow heights are possible, markers exceeding 35 cm in height may be used but their total height should be sufficiently low to preserve clearance for propellers, and for the engine pods of jet aircraft. Additional guidance is given is ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, ~~Chapter 2, paragraph 2.4.4~~.

(d) A taxiway edge marker should be lightweight and frangible. One type of marker meeting these requirements is detailed in Figure GM-P-1. The post is made up of flexible PVC and its colour is blue. The sleeve which is retro-reflective, is also blue. Note that the area of the marked surface is 150 cm2. Additional guidance is given in ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids, ~~Chapter 2, paragraph 2.4.5.~~

CHAPTER Q — VISUAL AIDS FOR DENOTING OBSTACLES

GM1 ADR-DSN.Q.840 Objects to be marked and/or lighted within the lateral boundaries of the obstacle limitation surfaces

[...]

(d) An autonomous aircraft detection system may be installed on or near an obstacle (or group of obstacles such as wind farms) within or outside the lateral boundaries of the obstacle limitation surfaces. This system is designed to operate the lighting only when it detects an aircraft approaching the obstacle, to reduce light exposure to local residents. Additional guidance on the design and installation of an autonomous aircraft detection system is available in the ICAO Doc 9157, Aerodrome Design Manual, Part 4, Visual Aids.

The inclusion of this guidance is not intended to imply that such a system has to be provided.

CS ADR-DSN.Q.845 Marking of fixed objects

[...]

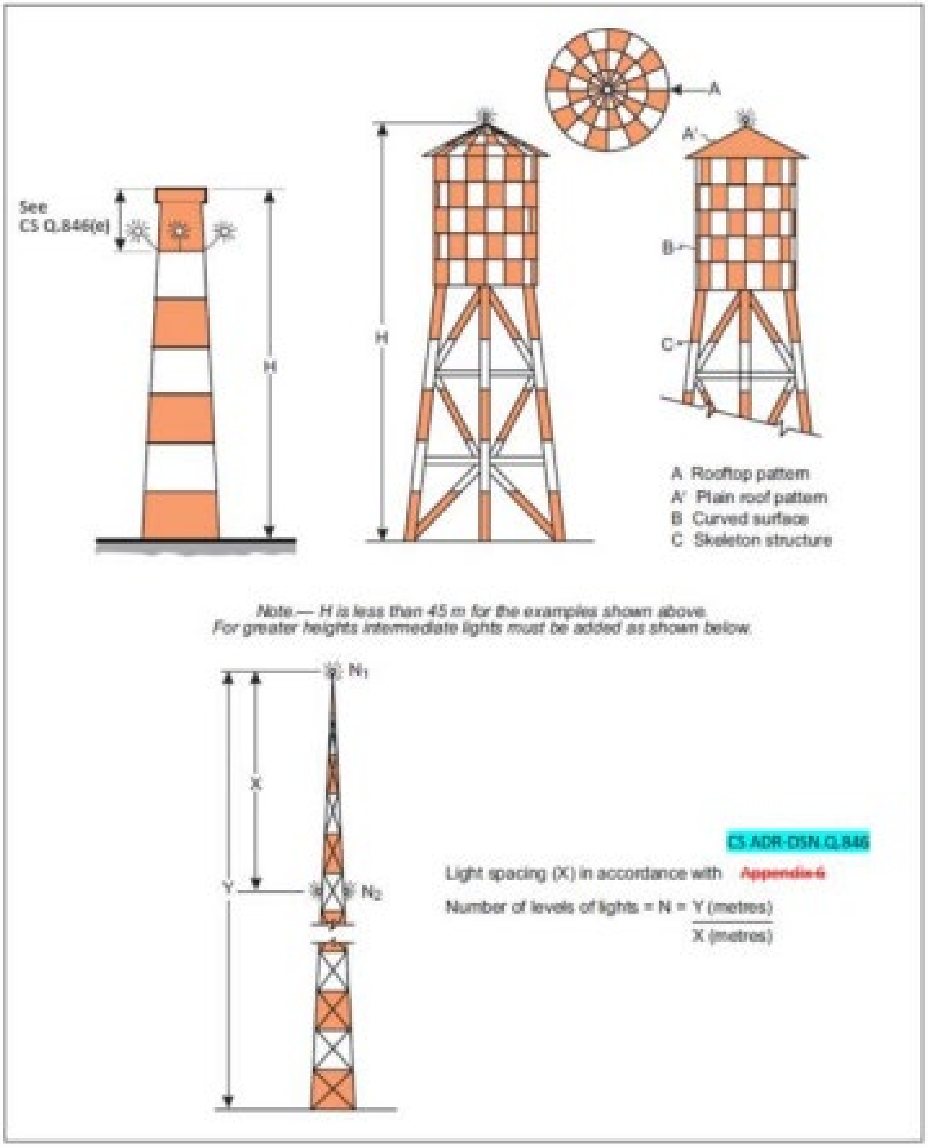


Figure Q-2. Examples of marking and lighting of tall structures

CS ADR-DSN.Q.850 Lighting of other objects

[…]

(e) Low-intensity obstacle lights on objects with limited mobility such as passenger boarding ~~aero~~bridges should be fixed-red, and, as a minimum, be in accordance with the specifications for low-intensity obstacle lights, Type A, in Table Q-1. The intensity of the lights should be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed.

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

[...]

Benchmark 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°		
	Minimum average intensity (a)	Minimum intensity (a)	Minimum intensity (a)	Minimum beam spread	Intensity (a)	Maximum intensity (a)	Maximum intensity (a)	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°	37 500	125 000	56 250	3 750	7°	37 500
20 000	20 000	15 000	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~~n~~ safety assessment~~aeronautical study~~.

Table Q-3. Light distribution for medium- and high-intensity obstacle lights according to benchmark intensities of Table Q-1

CS ADR-DSN.R.855 Closed runways and taxiways, or parts thereof

(a) Applicability:
A closed runway 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 extremity 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) A closed runway marking should be displayed on a temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided.

(~~c~~ d) Characteristics of closed markings: The closed marking should shall be yellow and 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~~ e) When a runway, or taxiway, or portion thereof is permanently closed, all normal runway and taxiway markings should be obliterated.

(~~e~~ f) 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 ADRDSN.R.870(c)(2)).

(g) Lighting on systems provided for a closed runway or taxiway or portion thereof shall not be operated, except as required for maintenance purposes or where operationally required.

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.

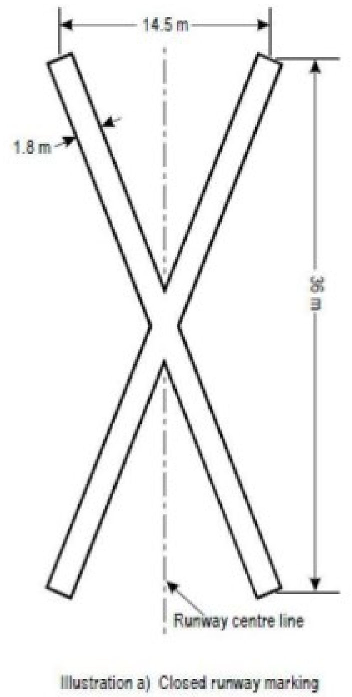
(c) Characteristics of closed markings: The closed marking should be of the form and proportions as detailed in Figure R-1, Illustration (a), when displayed on a runway, and should be of the form and proportions as detailed in Figure R-1, Illustration (b), when displayed on a taxiway. The marking should 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 obliterated.

(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)).

(f) When an area is temporarily closed, frangible barriers or markings utilising materials other than paint or other suitable means may be used to identify the closed area.

(g) Procedures pertaining to the planning, coordination, monitoring and safety management of works in progress on the movement area are specified in the PANS-Aerodromes (Doc 9981).



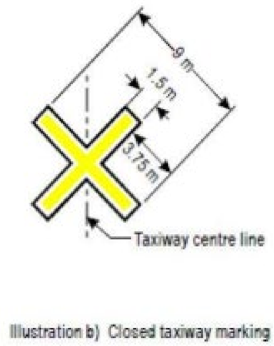


Figure R-1. Runway and taxiway closed markings

CS ADR-DSN.R.857 Closed runway lighting

(a) Application
Where operationally desirable, closed runway lighting should be provided on a temporarily closed runway at an aerodrome provided with runway lighting.

(b) Location
A closed runway lighting shall be placed on the centre line, at each extremity of the runway, declared closed.

(c) Characteristics
The closed runway lighting as viewed by the pilot shall be of the equivalent elevated form and proportions as detailed in Figure R-2, showing a minimum of five lights uniformly spaced on each branch, with a minimum interval as specified by Table R-1.

(d) Closed runway lights shall show flashing variable white in the direction of approach to the runway, at a rate of one second on and one second off.

(e) Closed runway lights shall automatically revert to fixed lights in the event of the flashing system failure.

Number of lights per branch	Minimum interval between light centres
5	1.5 m
7	1.0 m
9	0.8 m

Table R-1. Minimum interval between closed runway lights centres

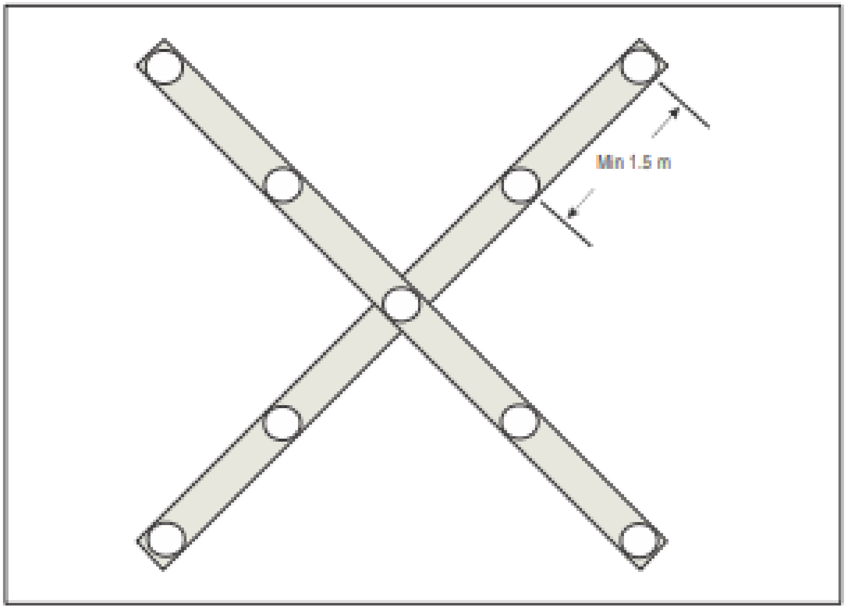


Figure R-2. Example of equivalent elevated closed runway lighting with five lights per branch

GM1 ADR-DSN.R.857 Closed runway lighting

(a) In dusk or poor visibility conditions by day, lighting can be more effective than markings. Placement of a closed runway lighting on the runway designation marking would enhance the situational awareness of the runway closure to the pilot.

(b) The closed runway lighting is intended to be controlled either automatically or manually by air traffic services or by the aerodrome operator.

(c) The closed runway lighting may be either stationary or mobile.

(d) The stationary closed runway lighting may be formed as if shadowed (i.e. stretched) from the equivalent elevated structure.

(e) Guidance on the sizing of a stationary closed runway lighting is given in the Aerodrome Design Manual (Doc 9157), Part 4.

CS ADR-DSN.R.870 Unserviceable areas

(a) Applicability of unserviceability ~~markers and~~ lights:
Unserviceability ~~markers~~ lights shall be ~~displayed~~ provided on a movement area used at night wherever any portion of ~~a taxiway, apron, or holding bay~~ the movement area 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:
~~Unserviceability markers should consist of conspicuous upstanding devices such as flags, cones, or marker boards.~~
- ~~(1)~~ 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~~

GM1 ADR-DSN.R.870 Unserviceable areas

(a) Unserviceability markers and lights are used for such purposes as warning pilots of a hole in a taxiway, or apron pavement, or outlining a portion of pavement, such as on an apron, that is under repair. They are not suitable for use when a portion of a runway becomes unserviceable, nor on a taxiway when a major portion of the width becomes unserviceable. In such instances, the runway or taxiway is normally closed.

(b) The spacing required for marking and lights should take into account visibility conditions, geometric configurations of the area, potential height differences of terrain so that the limits of unserviceable area is readily visible to pilot.

(c) Where a temporarily unserviceable area exists, it may be marked with fixed-red lights. These lights mark the most potentially dangerous extremities of the area.

(d) A minimum of four such lights may be used, except where the area is triangular in shape, in which case a minimum of three lights may be used.

(e) The number of lights may be increased when the area is large or of unusual configuration. At least one light should be installed for each 7.5 m of peripheral distance of the area.

(f) If the lights are directional, they should be orientated so that as far as possible, their beams are aligned in the direction from which aircraft or vehicles should approach.

(g) Where aircraft or vehicles should normally approach from several directions, consideration should be given to adding extra lights or using omnidirectional lights to show the area from these directions.

(h) Unserviceable area lights ~~should be~~ are frangible. Their height ~~should be~~ is sufficiently low to preserve clearance for propellers and for engine pods of jet aircraft

(i) Procedures pertaining to the planning, coordination, monitoring and safety management of works in progress on the movement area are specified in the PANS-Aerodromes (Doc 9981).

CS ADR-DSN.R.871 Unserviceability markings

(a) Application

(1) Where operationally required, unserviceability signs should be supplemented by unserviceability markings on the surface of the pavement.

(2) Where it is impracticable to install an unserviceability sign, an unserviceability marking shall be provided on the surface of the pavement.

(b) Location

(1) Unserviceability markings should be displayed across the surface of the taxiway or apron where necessary and positioned so as to be legible from the cockpit of an approaching aircraft.

(c) Characteristics

(1) Unserviceability markings shall consist of an inscription in black upon an orange background.

(2) The character height should be 4 m. The inscriptions should be in the form and proportions shown in CS.ADR-DSN.L.610 Information marking.

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

(a) Application

(1) Unserviceability signs shall be provided where there is an operational need to indicate temporary changes to runway declared distances.

(2) Where operationally required, unserviceability signs should be supplemented by unserviceability markings on the surface of the pavement. Where it is impracticable to install an unserviceability sign, an unserviceability marking shall be provided on the surface of the pavement.

(3) Existing signs shall be removed or obscured at an aerodrome if they provide inadequate or misleading information regarding unserviceability areas.

(4) The information provided by unserviceability signs shall not be in conflict with the information provided by the appropriate aeronautical information services

(b) Location

(1) Unserviceability signs shall be located where operationally needed on the movement area. The location distances on the manoeuvring area shall be as per taxiing guidance signs in Table N-1.

(2) The location of unserviceability signs shall not visually obscure or provide conflicting information with existing operationally required visual aids.

(c) Characteristics

(1) Unserviceability signs shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of unserviceability signs shall not exceed the dimension for taxiing guidance signs shown in Table N-1.

(2) Unserviceability signs shall be rectangular, as shown in Figure R-3, with the longer side horizontal.

(3) The inscriptions on an unserviceability sign shall be in accordance with the provisions of chapter N.

(4) Unserviceability signs shall consist of an inscription in black on an orange background. Unserviceability signs shall be supplemented by a black outline measuring 10 mm in width for runways where the code number is 1 or 2, and 20 mm in width for runways where the code number is 3 or 4.

(5) The inscription on an unserviceability sign shall consist of a legible, clear and simple message, only providing the useful and necessary information for the safety of the operation.

(6) Unserviceability signs shall be retroreflective in accordance with the provisions of Chapter N.

(7) Where there is a need to enhance the conspicuity of unserviceability signs, they should be supplemented by two red or yellow simultaneously flashing lights. The intensity and the beam spread of these lights should be in accordance with the specifications in Chapter U Figure U -27.

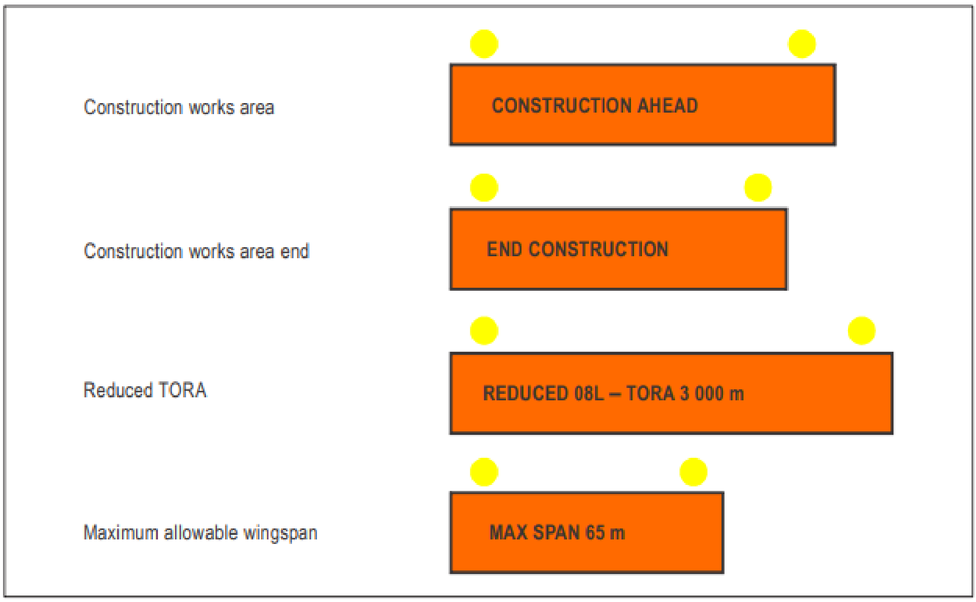


Figure R-3. Examples of unserviceability signs

GM1 ADR-DSN.R.872 Unserviceability signs

(a) Temporary changes to the movement area may include, inter alia, reduction in the runway length, reduction in the maximum allowable wingspan, taxiway closure or any other closure to the movement area. Unserviceability signs provide relevant information to aerodrome users to maintain an acceptable level of safety during aircraft and vehicle operations, by reducing the risk of potential confusion and enhancing the awareness of such temporary changes.

(b) Unserviceability signs can be used to indicate temporary closed or restricted areas, as well as to provide information on operational restrictions to aerodrome users.

(c) The information provided by unserviceability signs supplements that which is provided by the appropriate aeronautical information services unit.

CS ADR-DSN.R.873 Unserviceability markers

(a) Application

(1) Unserviceability markers shall be displayed wherever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely.

(2) Unserviceability markers shall be placed at intervals sufficiently close, so as to delineate the unserviceable area

(b) Characteristics

(1) Unserviceability markers shall consist of conspicuous upstanding devices such as flags, cones or marker boards.

(2) 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.

(3) 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.

(4) 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.880 Electrical power supply systems

Application
[…]

(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) closed runway lighting, if provided in accordance with CS ADR-DSN.R.857 and connected to the primary power supply;

(4 5) meteorological equipment;

(5 6)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 (7) illumination of apron areas over which passengers may walk

(8) Specifications for secondary power supply for radio navigation aids and ground elements of communications systems are given in Annex 10, Volume I, Chapter 2.

CS ADR-DSN.S.885 System design

[…]

(d) The electrical systems for the power supply and the control of the closed runway lighting shall be so designed that the closed runway lighting system is operated independently of runway lighting systems

CS ADR-DSN.S.890 Control and Monitoring

(a) A system of control and monitoring should be employed to indicate the operational status of the lighting systems.

(b) The design of the control and monitoring system should be ergonomically sound, easy to operate, simple to understand, unambiguous and it should be configured so as to prevent accidental mis-selection of the AGL.

(c) 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.

(d) 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.

(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 so as to provide an indication when the serviceability level of any element falls below a minimum serviceability level specified in CS ADR-DSN.S.895(c) to (g). This information should be automatically relayed to the maintenance crew.

(f) 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.

(g) The remote control and monitoring facilities provided for ATC use shall be approved by both the CAA Aerodrome Oversight section and ATM Oversight Section under Article 205 of the Air Navigation Order.

(h) Further guidance on the manner in which serviceability information may be presented in remote control facilities in ATC VCRs can be found in CAP 670, ATS Safety Requirements, Part B, Section 2: ATC 01: ATC Support Systems and Facilities and Part C, Section 5 IAS01: Information and Alerting Systems.

(i) The complexity of the AGL control and monitoring system will depend upon the operational requirements of the aerodrome concerned. The functional requirements of the AGL system should meet the current operational requirements but have due regard for ease of routine maintenance and future modifications or expansion.

(j) The AGL control and monitoring system should:

(1) be suitable for the aerodrome and be adaptable to changes in an aerodrome's physical characteristics (layout, installations, etc.) or operational procedures;

(2) be inspired by safety in such a way that allows for the redundancy of equipment or elements which are critical for failsafe design.

(3) have a high dependability;

(4) be capable of communicating with other related systems, as required.

(5) demonstrate the correct operation of any interfaces and the detection of faults or incorrect operation, (such as regular polling as one method);

(6) ensure component parts should be designed to fail safe and provide an accurate indication of their status under various fault conditions, (for example loss of power to a CCR).

(k) Where software is used for the purpose of control or monitoring of the AGL, the following aspects shall be addressed:

(1) through analysis of the potential hazards introduced by the software to perform system functions, target safety integrity levels shall be specified for each software function. The chosen software design and build tools, and operating system, shall be shown to be appropriate for the production of the software to achieve the target safety integrity levels;

(2) known hazardous software states shall be either removed or mitigated by the total system design; and

(3) documented evidence shall be produced to demonstrate accomplishment of the target safety integrity levels.

(l) The requirements for software in safety related ATS systems are contained in CAP 670, ATS Safety Requirements Part B, Section 3, SW 01: Regulatory Objectives for Software Safety Assurance in ATS Equipment.

GM1 ADR-DSN.S.890 Control and Monitoring

(a) For a runway meant for use in runway visual range conditions less than a value of 550 m, the minimum serviceability level of any element of the lighting system detailed in Table S-1, below which operations should not continue, is set up by the CAA.

(b) Additional guidance on air traffic control interface and visual aids monitoring is given in ICAO Doc 9157, Aerodrome Design Manual, Part 5, Electrical System

CS ADR-DSN.S.890(1)(a) Control and Monitoring

IRVR Interface

(a) The IRVR interface should be designed to meet the integrity requirements required by both the AGL Control System and the IRVR, where installed.

(b) The information used for IRVR interfaces output should be derived from the primary circuit monitoring on the selected runways CCRs (or an independent approved circuit monitoring device if fitted). Only if the runway edge CCRs and runway centreline CCR's where applicable, (see note below) confirm they have the same primary circuit setting, there are no faults (except minor warning such as a lamp out) and these settings match the controller's selection should the information be presented to the IRVR system. The IRVR interface output should not be derived directly from the controller's selection.

(c) The RVR assessments should be based on the lights from which pilots derive their main guidance. Where there are both edge lights and centre line lights, it is normal to use edge lights when RVR assessment is above 550 m; with lower visual range, the use of centre line lights for the lowest RVR values is because of;

(1) inferior directional guidance provided by edge lights; and

(2) edge lights become dimmer than centre line lights when viewed off axis.

(d) Where runway centre line lighting is to be used in the IRVR calculations for CAT II and CAT III operations, it should be identified within the safety assurance documentation for both the AGL and IRVR systems.

(e) If the intensity of the centreline fittings is the same as that of the runway edge fittings, the standard set of intensity levels programmed into the IRVR system can be used.

(f) Should the runway centre line lighting have a different output intensity to the runway edge lights for a given lighting level selection, either;

(1) the lower of the two figures should be used for the IRVR calculation or,

(2) the IRVR software shall be capable of switching to the runway centreline intensity when the reported visibility goes below 550 m at a given lighting intensity selection.

(g) Justification for the selection and information relating to the capability of the IRVR system to address this should be included in the Safety Assurance documentation submitted to the CAA.

CS ADR-DSN.S.890(1)(b) Control and Monitoring

Hardwired IRVR Interfaces

(a) Table S-1(a) provides a typical example of a AGL runway edge, hardwired IRVR interface logic table with the input and standard / expected output for various conditions. The correct operation of the IRVR interface and IRVR system should be defined and tested as part of the site acceptance and commissioning checks for both new installations and system modifications that may have an impact.

(b) The standard runway edge and centreline – IRVR interface will normally consist of a set of 6, volt free contacts or earthed contacts indicating;

(1) 0%,

(2) 1%,

(3) 3%,

(4) 10%,

(5) 30% and

(6) 100%.

(c) Some systems may provide an alarm contact, 80%, 0.3% and 0.1% as additional indications. 0.3% and 0.1% are not used for runway edge and 80% would normally replace 100% and the appropriate intensity programmed into the IRVR system.

(d) The loss of all inputs to the IRVR should result in a fault message, but on older systems this may not be the case and the output of 0% for a fault condition should result in a “Lamps Too Low” output on the IRVR display.

(e) The IRVR interface should be designed to fail safe, in that should the IRVR interface loses connection to the control system, or the system loses power, the output of the interface will either provide an indication of 0%, alarm or no output on any of the six lines, depending on the configuration or input capabilities of the connected IRVR system.

CS ADR-DSN.S.890(1)(c) Control and Monitoring

Networked IRVR Interfaces

(a) A networked IRVR interface should have a handshaking mechanism allowing both the AGL control system and the IRVR system to detect a loss of communication.

(b) The correct operation of the IRVR interface and IRVR system should be defined and tested as part of the site acceptance and commissioning checks for both new installations and system modifications that may have an impact.

(c) The exact configuration will depend on the capabilities of the connected IRVR system and should be defined for the system and included in any safety assurance documentation.

CS ADR-DSN.S.890(1)(d) Control and Monitoring

Audio Visual Alarms

(a) An audio-visual alarm should be provided in order to draw the attention of the AGL operator to any disparity between the AGL selection and the corresponding verification derived from the field / CCR tell-back indication, whenever a selected AGL circuit fails or fails to activate.

(b) Only faults on the runway edge lights (and centreline lights if applicable) or a control system failure should be sent to the IRVR interface).

(c) The audio alarm should be capable of being temporarily suppressed while the visual indication of the fault should remain on both the control panel and monitoring display panel, where these are separately located, until the fault is cleared. Subsequent failures should reactivate the audio alarm even when the fault has not been cleared fully.

Controller Selection	Runway Edge lights CCR 1	Runway Edge lights CCR 2	IRVR Interface Input						IRVR Interface	
			Off / 0%	1%	3%	10%	30%	100%	Alarm*	Output
Off / 0%	Off / 0%	Off / 0%	Active	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Off / 0%
1%	1%	1%	Inactive	Active	Inactive	Inactive	Inactive	Inactive	Inactive	1%
3%	3%	3%	Inactive	Inactive	Active	Inactive	Inactive	Inactive	Inactive	3%
5%	5%	5%	Inactive	Inactive	Inactive	Active	Inactive	Inactive	Inactive	5%
10%	10%	10%	Inactive	Inactive	Inactive	Inactive	Active	Inactive	Inactive	10%
30%	30%	30%	Inactive	Inactive	Inactive	Inactive	Inactive	Active	Inactive	30%
100%	100%	100%	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Active	100%
Any Significant Fault			Any other condition						Active	No Output or Off / 0%
CCR's Disagree										
Controller selection and one / both CCR's Disagree										
Control System Failure										
Corruption			Invalid combination / 2 or more Active							

*Alarm Output if fitted

Note: The same principle to be applied if more than 2 CCRs are used to provide the edge lighting (and centreline if applicable) on the runway.

Table S-1(a) Hardwired IRVR Interface Output Logic

GM1 ADR-DSN.S.890(1)(d) Control and Monitoring

The aspects to consider for a monitoring display are:

1. If the indicator is on, the relevant AGL circuit(s) is on and serviceable;

2. If the indicator is off, the relevant AGL circuit(s) is (are)off;

3. If the indicator is active (i.e., flashing) and accompanied by an audible alert, the AGL serviceability state has changed, or a relevant fault / mismatch has occurred

When reporting to flight crew of the serviceability of the AGL, the AGL operator needs to be able to state whether the AGL is in one of the following states:

1. Serviceable;

2. Downgraded;

3. Or failed;

Where a new system is installed or significant modification is carried out on an existing system, the AGL control and monitoring system should be capable of determining and indicating which of the states above applies.

For existing AGL control and monitoring systems, a method of reporting such states should be implemented. Using existing indications and a look-up table is one method that may be suitable.

The status of the AGL will probably differ according to visibility conditions and other factors; therefore, the status report (or look-up table) should reflect these factors.

Further guidance on the assessment of AGL serviceability and the presentation of this information is provided in CAP 670, ATS Safety Requirements Part B, Section 2: ATC 01.

Consideration should be given to the provision of an intermediate warning level or pre alarm that indicates a degradation of performance of the AGL and the likelihood of further degradation to alarm level. In the event of a warning level being achieved, action may be taken to prevent an alarm state being reached.

Verification of AGL performance should be derived from a device that is designed to monitor the true status of the services selected. Any such device should be proved to be satisfactory to the CAA.

For constant current series circuits, an acceptable means of providing verification of luminous intensity is the detection of the true root mean square (RMS) current within the primary series circuit. Table 6.6 indicates the typical logarithmic current values for a tungsten halogen (or retrofit LED) installation and tolerances for serviceable AGL using such a device.

Direct fit LED fittings with the correct CCR produces different results. When matched correctly they are typically in the low amps range. Until such time as definitive guidance is available, information on the luminance intensity, tolerance and equivalent current ratings and tolerances should be extracted from the manufacturers site acceptance test and commissioning documentation, provided as part of the safety assurance documentation, and included in the associated equipment maintenance schedule as “red” figures.

This type of verification for either system does not however provide an assurance that the AGL meets the photometric requirements outlined in photometric requirements.

The integrity of this verification method should be augmented by the adoption of a maintenance regime that incorporates the measurement of the photometric characteristics of the AGL while in service.

Technical serviceability information about the AGL system other than s tose required to meet the requirements detailed in typical luminosity settings must be displayed and trigger alerts at ATC or other operational positions, warnings should be given to engineering positions and alarms displayed or al trigged at ATC or other operational positions.

All operationally significant events, alarms or failures should be recorded and retained for at least 30 days.

The content of a hard copy record may be restricted to error and principal switching messages if no circumstances occurred that might require an investigation into the AGL system integrity, condition, or state during the period.

Magnetic, optical, or electronic storage should contain all monitored data

CS ADR-DSN.S.890(1)(e) Control and monitoring

Pilot Controlled Lighting (PCL)

(a) The control of an AGL system from beyond the boundary of a cerftifcated aerodrome whether from the ground or in the air is required to be approved subject to a satisfactory proposal by the aerodrome operator to the CAA.

(b) PCL should not be operated until CAA approval has been granted.

(c) Where PCL is intended to be installed, an operational requirement proposed by the aerodrome operator should be submitted to the CAA as part of the proposal.

(d) PCL should only be available when enabled by the ATCO/FISO/AGCS.

(e) A method of clearly showing that PCL is enabled should be provided.

(f) Where PCL interfaces to AGL Control and Monitoring equipment, it shall not interfere with the normal operation of the AGL CMS.

(g) PCL when activated shall only operate the AGL for a pre-set time of 15 minutes after which the AGL shall automatically return to previous setting. This time may be adjusted dependent on the type of operation conducted the aerodrome subject to CAA approval.

(h) PCL Configuration, including;

(1) activation time;

(2) number of Press-to-Talk Clicks (PTT - Microphone Keying);

(3) lighting systems activated; and

(4) lighting intensities,

shall be clearly described in the relevant procedure manuals.

(i) Requirements for ground radio equipment used for PCL are described in CAP 670 IAS01

(j) ICAO Doc 9157 Aerodrome Design Manual Part 5 Chapter 10 'Aircraft radio control of aerodrome lighting (ARCAL)' provides guidance on the configuration of PCL, with examples provided in Table 10-1. Justification for the selection of the lighting controlled by PCL should be included in the operational requirement'

GM1 CS ADR-DSN.S.890(1)(e) Control and monitoring

Pilot Controlled Lighting (PCL)

(a) Where an existing Pilot Controlled Lighting (PCL) system previously approved by the CAA for the sole use of the emergency services is to be made available to others, an appropriate method of operation should be agreed between all users.

(b) The operational requirement proposed by the aerodrome operator should include;

(1) a description of the control equipment;

(2) full details of any AGL to be installed;

(3) the method(s) of switching the system; and demonstration that any additional control equipment will have no detrimental effect;

(4) the extent of AGL to be controlled by PCL;

(5) a comprehensive safety case part of the change management process;

(6) examples of documentary or other control measures to cover out of hours operations;

(7) details of the arrangements between based operators; and

(8) details of the changes to the Aerodrome Manual, associated manuals and ATS manuals;

(9) details of the arrangements for the notification of periods when the PCL is available, and details of periods when the PCL is unavailable.

CS ADR-DSN.S.895 Serviceability levels

(a) A light should be deemed to be unserviceable when the main beam average intensity is less than 50 % of the value specified in the appropriate Figure in CS ADR-DSN.U.940. ~~For light units where the designed main beam average intensity is above the value shown in CS ADR-DSN.U.940, the 50 % value should be related to that design value.~~ Light units where the main beam average intensity is required to be higher than the value specified in the appropriate figure in CS ADR-DSN.U.940, a light will be deemed unserviceable when the main beam average intensity value is less than 50% of the higher value and not the value specified in CS ADR-DSN.U.940.

Note- Guidance on maintenance criteria for aeronautical ground lights, on the use of a site standard and on using a higher main beam average intensity is contained in the Aerodrome Design Manual (Doc9157, Part 4.

[…]

(d) The system of preventive maintenance employed for a stop bar provided at a runway-holding position used in conjunction with a runway intended for operations in runway visual range conditions less than a value of ~~550~~ 300 m should have the following objectives:

(1) no more than two lights should remain unserviceable; and

(2) two adjacent lights should not remain unserviceable unless the light spacing is significantly less than that specified.

(e) The system of preventive maintenance employed for a taxiway intended for use in runway visual range conditions less than a value of ~~550~~ 300 m should have as its objective that no two adjacent taxiway centre line lights be unserviceable.

CS ADR-DSN.T.915 Siting of equipment and installations on operational areas

[...]

(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 on that portion of the strip within 77.5 m of the runway centre line where the code number is 4 and the code letter is F; or~~

(1~~2~~) 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~~3) penetrates the inner approach surface, the inner transitional surface, or the balked landing surface; should be frangible and mounted as low as possible

GM1 ADR-DSN.T.915 Siting of equipment and installations on operational areas

[…].

(e) The term 'aircraft safety purposes' refers to the installation of arresting systems which are frangible and intended to enhance safety in the event of an aircraft overrun.

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

[...]

(c) The chromaticities and luminance factors of ordinary colours, colours of retroreflective materials, and colours of internally illuminated ~~(internally illuminated)~~ signs and panels should be determined under the following standard conditions

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

[…]

Figure U-5. Isocandela diagram for approach centre line light and crossbars (white light)

(d) See collective notes for Figures U-5 to U-15, U29 and U30.

Figure U-6. Isocandela diagram for approach side row light (red light)

[…]

(d) See collective notes for Figures U-5 to U-15, U29 and U30.

Figure U-7. Isocandela diagram for threshold light (green light)

[…]

(c) See collective notes for Figures U-5 to U-15, U29 and U30.

Figure U-8. Isocandela diagram for threshold wing bar light (green light)

[…]

(d) See collective notes for Figures U-5 to U-15, U29 and U30.

Figure U-9. Isocandela diagram for touchdown zone light (white light)

[…]

(c) See collective notes for Figures U-5 to U-15, U29 and U30.

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).

[…]

(d) See collective notes for Figures U-5 to U-15, U29 and U30.

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)

[…]

(d) See collective notes for Figures U-5 to U-15, U29 and U30.

Figure U-5	Approach centre line and crossbars	~~1.5 to 2.0~~ 2.0 to 3.0	(White light)
Figure U-6	Approach side row	0.5 to 1.0	(Red light)
Figure U-7	Threshold	1.0 to 1.5	(Green light)

Figure U-8	Threshold wing bar	1.0 to 1.5	(Green light)
Figure U-9	Touchdown zone	0.5 to 1.0	(White light)
Figure U-10	Runway centre line (longitudinal spacing 30 m)	0.5 to 1.0	(White light)
Figure U-11	Runway centre line (longitudinal spacing 15 m	0.5 to 1.0 for CAT I, II	(White light)
		0.25 to 0.5 for CAT III	(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 to 1.5	(White light)
Figure U-14	Runway edge (60 m runway width)	1.0 to 1.5	(White Light)

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~~ 300 m where large offsets can occur and for low-intensity runway guard lights, Configuration B

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~~ 300 m

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~~ 300 m

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~~ 300 m or greater

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~~ 300 m or greater

[…]

Figure U-27. Isocandela diagram for each light in low-intensity runway guard lights, Configuration A and for flashing lights supplementing unserviceability signs

Figure U-12. Isocandela diagram for runway end light (red light)

[…]

(b) See collective notes for Figures U-5 to U-15, U29 and U30.

Figure U-13. Isocandela diagram for runway edge light where width of runway is 45 m (white light)

[…]

(e) See collective notes for Figures U-5 to U-15, U29 and U30.

Figure U-14. Isocandela diagram for runway edge light where width of runway is 60 m (white light)

[…]

(e) See collective notes for Figures U-5 to U-15, U29 and U30.

[…]

Collective notes to Figures U-5 to U-15, and U29 and U30

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

(c) See collective notes for Figures U-5 to U-15, U29 and U30

(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~~: The average intensity within the ellipse defining the main beam of a new light is established as a ratio of the minimum (1.0) average intensity of a new Runway edge light. The ratios also define the maximum allowed main beam average intensity for the lights in the lighting system supporting runway operations. Guidance on maintenance criteria for aeronautical ground lights and the use of a site standard is contained in the Aerodrome Design Manual (Doc 9157), Part4.

~~(e)~~

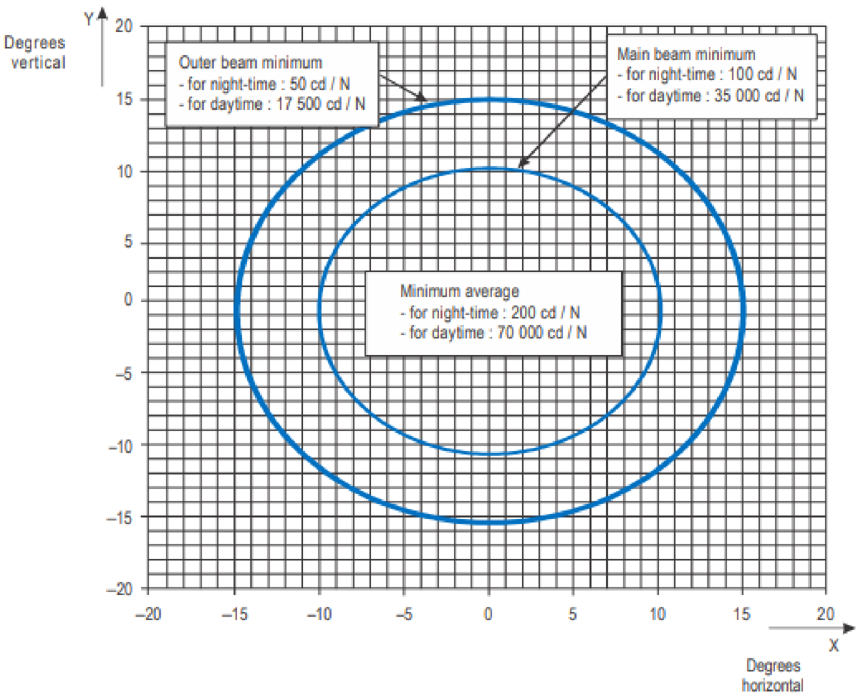


Figure U -30 Isocandela diagram for closed runway lights (white light)

(1) Curves calculated on formula

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

(2) N is the total number of lights of the closed runway lighting.

(3) See collective notes for Figures U-5 to U-15, U29 and U30

Annex III Part Organisation Requirements – Aerodrome Operators (ADR Part- OR)
ADR OR Part E

[…]

6.8 pavement surface type and bearing strength using the Aircraft Classification ~~Number~~ Rating — Pavement Classification ~~Number~~ Rating ~~(ACN-PCN)~~ (ACR PCR) method

Annex IV Part Operations Requirements – Aerodromes (PART ADR OPS)
Subpart A – Aerodrome data (ADR-OPS-A)

GM1 ADR.OPS.A.005 Aerodrome data

[…}

[…]

~~STRENGTH OF PAVEMENTS~~

~~(a) The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5 700 kg should be made available using the aircraft classification — pavement classification number (ACN–PCN) method, by reporting all of the following information:~~

~~(1) the pavement classification number (PCN);~~
~~(2) pavement type for ACN-PCN determination;~~
~~(3) subgrade strength category;~~
~~(4) maximum allowable tire pressure category or maximum allowable tire pressure value; and~~
~~(5) evaluation method~~.

~~(b) For the purposes of determining the ACN, the behaviour of a pavement should be classified as equivalent to a rigid or flexible construction~~

~~(c) Information on pavement type for ACN-PCN determination, subgrade strength category, maximum allowable tire pressure category and evaluation method, should be reported using the following codes:~~

~~(1) Pavement type for ACN-PCN determination:~~
~~(i) Rigid pavement: Code R;~~
~~(ii) Flexible pavement: Code~~ F;

~~(2) Subgrade strength category:~~
~~(i) High strength: characterised by K = 150 MN/m3 and representing all K values above 120 MN/m3 for rigid pavements, and by CBR = 15 and representing all CBR values above 13 for flexible pavements — Code A;~~

~~(ii) Medium strength: characterised by K = 80 MN/m3 and representing a range in K of 60 to 120 MN/m3 for rigid pavements, and by CBR = 10 and representing a range in CBR of 8 to 13 for flexible pavements — Code B;~~

~~(iv) Low strength: characterised by K = 40 MN/m3 and representing a range in K of 25 to 60 MN/m3 for rigid pavements, and by CBR = 6 and representing a range in CBR of 4 to 8 for flexible pavements — Code C;~~

~~(v) (iv) Ultra low strength: characterised by K = 20 MN/m3 and representing all K values below 25 MN/m3 for rigid pavements, and by CBR = 3 and representing all CBR values below 4 for flexible pavements — Code D;~~

~~(1) Maximum allowable tire pressure category:~~

~~(i) Unlimited: no pressure limit — Code W;~~

~~(ii) High: pressure limited to 1.75 MPa — Code X;~~

~~(iii) Medium: pressure limited to 1.25 MPa — Code Y;~~

~~(iv) Low: pressure limited to 0.50 MPa — Code Z;~~

~~(2) Evaluation method:~~

~~(i) Technical evaluation: representing a specific study of the pavement characteristics and application of pavement behaviour technology — Code T;~~

~~(ii) Using aircraft experience: representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use — Code U;~~

~~(d) The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5 700 kg, should be reported by reporting the following information:~~

~~(1) maximum allowable aircraft mass; and~~
~~(2) maximum allowable tire pressure.~~

AMC1 ADR.OPS.A.005(1) Strength of pavements

(a) Pavement classification rating (PCR)' means a number expressing the bearing strength of a pavement. [Applicable as of 28 November 2024

(b) Aircraft classification rating (ACR)' means the number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category. [Applicable as of 28 November 2024];

(c) The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than

a. 5 700 kg should be made available using the aircraft classification rating – pavement classification rating (ACR-PCR) method by reporting all of the following information:

(d) the pavement classification rating (PCR) and numerical value;

(e) pavement type for ACR-PCR determination;

(f) The pavement classification rating (PCR) reported should indicate that an aircraft with an aircraft classification rating (ACR) equal to or less than the reported PCR can operate on the pavement subject to any limitation on the tire pressure, or aircraft all-up mass for specified aircraft type(s).

(g) The ACR of an aircraft shall be determined in accordance with the standard procedures associated with the ACR-PCR method.

(h) For the purpose of determining the ACN- ACR, the behaviour of a pavement shall be classified as equivalent to a rigid or flexible construction.

(i) Information on pavement type for ACR-PCR determination, subgrade strength category, maximum allowable tire pressure category and evaluation method shall be reported using the following codes:

(1) Pavement type for ACR-PCR determination:

Pavement type	Code
Rigid pavement	R
Flexible pavement	F
If the actual construction is composite or non-standard, include a note to that effect (see example 2 below	

(2) Subgrade strength category:

Subgrade	Code
High strength; characterised by E=200 MPa and representing all E values equal to or above 150 MPa for rigid and flexible pavements.	A
Medium strength; characterised by E=120 MPa and representing a range in E values equal to or above 100 MPa and strictly less than 150 MPa, for rigid and flexible pavements.	B
Low strength; characterised by E=80 MPa and representing a range in E values equal to or above 60 MPa and strictly less than 100 MPa, for rigid and flexible pavements	C
Ultra-low strength; characterised by E=50 MPa and representing all E values strictly less than 60 MPa, for rigid and flexible pavements.	D

(a) Maximum allowable tire pressure category:

Tyre pressure	Code
Unlimited; no pressure limit	W
High; pressure limited to 1.75 MPa	X
Medium; pressure limited to 1.25 MPa	Y
Low; pressure limited to 0.50 MPa	Z

(b) Evaluation method:

Evaluation Method	Code
Technical evaluation;	T

representing a specific study of the pavement characteristics the types of aircraft which the pavement is intended to serve.	
Using aircraft experience; representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use	U

(c) The following examples illustrate how pavement strength data are reported under the ACR-PCR method. Further guidance on this topic is contained in the Aerodrome Design Manual (Doc 9157), Part 3.

Example 1

If the bearing strength of a rigid pavement, resting on a medium-strength subgrade, has been assessed by technical evaluation to be PCR 760 and there is no tire pressure limitation, then the reported information would be:

PCR 760 / R / B / W / T

Example 2

If the bearing strength of a composite pavement, behaving like a flexible pavement and resting on a high strength subgrade, has been assessed by using aircraft experience to be PCR 550 and the maximum allowable tire pressure is 1.25 MPa, then the reported information would be:

PCR 550 / F / A / Y / U

Composite construction.

Different PCRs may be reported if the strength of the pavement is subject to significant seasonal variation.

(d) The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5 700 kg should be made available by reporting the following information:

(1) maximum allowable aircraft mass; and

(2) maximum allowable tyre pressure.

(e) Reporting of composite or non-standard pavements

Example: 4 800 kg/0.60 MPa

If the actual construction of the pavement is composite or non-standard, should be noted as required by GM2 ADR.OPS.A.005(1) Aerodrome Data Strength of Pavements.

(f) Dedicated software is available on the ICAO website, for computing any aircraft ACRs at any mass on rigid and flexible pavements for the four standard subgrade strength categories.

GM1 ADR.OPS.A.005(1)Strength of pavements

PUBLICATION OF PCR

If necessary, the PCRs may be published to an accuracy of one-tenth of a whole number. Guidance on reporting and publishing of PCRs is contained in the Aerodrome Design Manual (Doc 9157)

Different PCRs may be reported if the strength of the pavement is subject to significant seasonal variation.

GM2 ADR.OPS.A.005 (1) Strength of pavements

REPORTING OF COMPOSITE OR NON-STANDARD PAVEMENTS

If the actual construction of the pavement is composite or non-standard, include a note as in Example 2 in AMC1 ADR.OPS. A.005(1).

GM3 ADR.OPS.A.005(1) Strength of pavements

Cumulative Damage Factor (CDF)

(1) The (subgrade) cumulative damage factor (CDF) is the amount of the structural fatigue life of the pavement which has been used up. It is expressed as the ratio applied load repetitions to allowable load repetitions to failure, or, for one aeroplane and constant departures;

$$CDF = \frac{\text{Applied coverages}}{\text{Coverages to failure}}$$

Where a coverage is one application of the maximum strain or stress due to load on a given point in the pavement structure

(2) CDF Values

(i) When CDF = 1 the pavement subgrade will have used a lot of its fatigue life.

(ii) When CDF <1 the pavement subgrade will have some remaining life and the value of the CDF will give the fraction of the life used.

(iii) When CDF >1 all of the fatigue life will have been used and the pavement subgrade will have failed.

(3) To calculate multiple aircraft (Miner's rule);
$CDF = CDF_1 + CDF_2 + \ldots CDF_N$ (where CDF_1 is the CDF of each aeroplane in the traffic mix and N is the number of the aeroplane in the mix.

(4) CDF depends on;

(i) Type of aircraft and their number of annual departures, pavement characteristics.

(ii) The contribution of each individual aircraft to the max CDF is identified as the critical offset.

(5) If the pavement CDF is lower than or equal to 1.0 (well or overdesigned) no weight restriction should occur for the aircraft in the evaluated traffic.

(6) If the pavement CDF is higher than 1.0 (under designed) at least one aircraft for the elevated traffic will be weight restricted.

According to the studied manoeuvring area, pavement mechanical characteristics can be adjusted with regards to the aircraft speed and the standard deviation (lateral wandering)

(7) Consequences of PCR inaccuracies

(a) Underestimated PCR (overestimated CDF) may result in aircraft weight/annual departure restrictions or operations not granted.

(b) Overestimate PCR (underestimated CDF) may result in more traffic acceptance (weight/volume) than the pavement is able to withstand over its design life and premature damage, increased maintenance, repairs and costs.

AMC1 ADR OPS B 037(a);(b) Assessment of runway surface condition

ASSIGNMENT OF RUNWAY CONDITION CODE

1. The aerodrome operator should:

a. assign a RWYCC 6, if ~~25~~ 10 per cent or less area of a runway third is wet or covered by contaminant;

b. describe in the plain-language remarks part of the situational awareness section of the RCR the location of the area that is wet or covered by the contaminant, if the distribution of the contaminant is not uniform

[…]

GM1 ADR.OPS.B.037(b) Assessment of runway surface condition and assignment of runway condition code

SINGLE AND MULTIPLE CONTAMINANTS

When single or multiple contaminants are present, the RWYCC for any third of the runway is determined as follows:

1. When the runway third contains a single contaminant, the RWYCC for that third

is based directly on that contaminant in the RCAM as follows:

a. ~~If the contaminant coverage for that third is less than 10 per cent, a RWYCC 6 is to be generated for that third, and no contaminant is to be reported. If all thirds have less than 10 per cent contaminant coverage, no report is generated; or~~

If 10 per cent or less area of a runway third is wet or covered by contaminant, a RWYCC 6 shall be reported.

b. ~~If the contaminant coverage for that third is greater than or equal to 10 percent and less than or equal to 25 per cent, a RWYCC 6 is to be generated for that third and the contaminant reported at 25 per cent coverage; or~~

If more than 10 and up to 25 per cent area of a runway third is wet or covered by contaminant, a RWYCC 5 shall be reported

GM2 ADR.OPS.B.037(b) Assessment of runway surface condition and assignment of runway condition code

DOWNGRADING AND UPGRADING

1. The RCAM allows making an initial assessment based on visual observation of contaminants on the runway surface: their type depth and coverage, as well as the outside air temperature. Downgrading and upgrading is an integral part of the assessment process and essential to developing relevant reports of the prevailing runway surface condition. When all other observations, experience,

local knowledge and judgement of the inspector indicate that the primary assignment of the RWYCC does not reflect the prevailing conditions accurately, a downgrade or upgrade should

be made

[….]

Note: Further details on additional means of assessing runway slipperiness can be found in ASM part 2

GM1 ADR.OPS.A.065(b);(c) Reporting of the runway surface condition

EXAMPLE OF REPORTING DEPTH OF CONTAMINANT WHENEVER THERE IS A

SIGNIFICANT CHANGE

1. ~~After the first assessment of runway condition, a first RCR is generated. The~~

~~initial report is:~~

An initial assessment of runway conditions is made, and it is determined that the entire runway is covered with SLUSH up to 2 mm deep. After the first assessment of runway condition, a **first runway condition report** is generated. The depth of contaminant is reported as 3mm, which is the lowest valid value to be reported. The initial report is:

5/5/5 100/100/100 03/03/03 SLUSH/SLUSH/SLUSH

Note: The full information string is not used in this example.

2. With continuing precipitation, a new RCR is required to be generated as a subsequent assessment reveals that the depth of contamination has increased from 3mm to 5mm along the entire length of the runway and therefore change in the RWYCC is needed. **A second RCR is therefore** created as:

2/2/2 100/100/100 05/05/05 SLUSH/SLUSH/SLUSH

3. With even more precipitation, a further assessment reveals the depth of contamination has increased ~~from 5mm~~ to 7mm along the entire length of the runway. However, a new RCR **is not** required because the RWYCC has not changed (change in depth is less than the significant change threshold of 3mm).

4. A ~~final~~ subsequent assessment of the contamination reveals that the depth has increased to ~~10~~ 9 mm. A new RWYCC is required because the change in depth from the last RCR (second RWYCC), i.e. from 5mm to ~~10~~ 9mm is greater than the significant change threshold of 3 mm. A third RCR is thus created as below:

2/2/2 100/100/100 ~~10~~ 9/~~10~~ 9 /~~10~~ 9 SLUSH/SLUSH/SLUSH

5. Finally, as temperatures rise, the contaminant changes from SLUSH to WET (i.e., water with a depth less than 3mm). A fourth runway condition report is thus:

5/5/5 100/100/100 NR/NR/NR WET/WET/WET

GM2 ADR.OPS.A.057(d)(4) Origination of NOTAM

Below are ~~four~~ examples of completed SNOWTAMs.

~~Example SNOWTAM 1 GG EADBZQZX EADNZQZX EADSZQZX 170100 EADDYNYX SWEA0149 EADD 02170055 (SNOWTAM 0149~~

~~EADD~~

~~02170055 09L 5/5/5 100/100/100 NR/NR/03 WET/WET/WET SNOW)~~

~~Example SNOWTAM 2~~

~~GG EADBZQZX EADNZQZX EADSZQZX 170140 EADDYNYX SWEA0150 EADD 02170135~~

~~(SNOWTAM 0150 EADD~~

~~02170055 09L 5/5/5 100/100/100 NR/NR/03 WET/WET/WET SNOW~~

~~02170135 09R 5/2/2 100/50/75 NR/06/06 WET/SLUSH/SLUSH)~~

~~Example SNOWTAM 3~~

~~GG EADBZQZX EADNZQZX EADSZQZX 170229 EADDYNYX SWEA0151 EADD 02170225 (SNOWTAM 0151~~

~~EADD~~

~~02170055 09L 5/5/5 100/100/100 NR/NR/03 WET/WET/WET SNOW~~

~~02170135 09R 5/2/2 100/50/75 NR/06/06 WET/SLUSH/SLUSH~~

~~02170225 09C 2/3/3 75/100/100 06/12/12 SLUSH/WET SNOW/WET SNOW~~

~~RWY 09L SNOWBANK R20 FM CL. RWY 09R ADJ SNOWBANKS. TWY B POOR. APRON NORTH POOR)~~

~~Example SNOWTAM 4~~

~~GG EADBZQZX EADNZQZX EADSZQZX 170350 EADDYNYX SWEA0152 EADD 02170345 (SNOWTAM 0152~~

~~EADD~~

~~02170345 09L 5/5/5 100/100/100 NR/NR/03 WET/WET/SLUSH~~

~~02170134 09R 5/2/2 100/50/75 NR/06/06 WET/SLUSH/SLUSH~~

~~02170225 09C 2/3/3 75/100/100 06/12/12 SLUSH/WET SNOW/WET SNOW~~

~~DRIFTING SNOW. RWY 09L LOOSE SAND. RWY 09R CHEMICALLY TREATED. RWY 09C CHEMICALLY TREATED.)~~

Example 1

SNOWTAM proposal issued by London Heathrow Tower which includes situational awareness and Plain Text remarks.

GG EUECYIYP

311842 EGLLZTZX

(SNOWTAM PROPOSAL EGGN 0351

EGLL

10311800 09L 2/2/2 100/100/100 04/04/04 SLUSH/SLUSH/SLUSH

10311730 09R 5/2/2 100/50/75 NR/06/06 WET/SLUSH/SLUSH

RWY 09L SNOWBANK R20 FM CL. RWY 09R ADJ SNOWBANKS. TWY B POOR. APRON NORTH POOR. RMK/ APN STANDS CONTAIN GRIT / STAND 12 CLOSED DUE ICE.)

Example 2

SNOWTAM proposal issued by London Heathrow Tower with no situational awareness or plain text remarks.

GG EUECYIYP

311855 EGLLZTZX

(SNOWTAM PROPOSAL EGGN

EGLL

10311800 09L 5/5/5 100/100/100 NR/NR/NR WET/WET/WET

10311730 09R 5/5/5 100/100/100 NR/NR/NR WET/WET/WET)

Example 3

SNOWTAM Proposal issued by London Heathrow Tower with situational awareness but no plain text remarks.

GG EUECYIYP

311855 EGLLZTZX

(SNOWTAM PROPOSAL EGGN

EGLL

10311800 09L 5/5/5 100/100/100 NR/NR/NR WET/WET/WET

10311730 09R 5/5/5 100/100/100 NR/NR/NR WET/WET/WET

RWY 09L CHEMICALLY TREATED. RWY 09R CHEMICALLY TREATED.)

GM1 ADR.OPS.A.057(d)(4) Origination of NOTAM

SNOWTAM FORMAT

SNOWTAM Proposals are to be submitted by AMHS/AFTN to the UK NOTAM Office (UK NOF) address EUECYIYP.

If the incorrect SNOWTAM Format is used, an automatic rejection will be sent to the originating AFTN address, stating the reason for non-compliance

[…]

f. ~~resenting the assessed depth (mm) of the contaminant for each runway third. The depth is reported in a six- to nine-character group separated by a'/' for each runway third as defined in CAP2173 Table 2 of AMC1ADR.OPS.A.065(b);(c). The assessment is based upon an even distribution within the runway thirds following an assessment. If measurements are included as part of the assessment process, the reported values are still reported as assessed depths. This information is conditional. It is reported only for~~

~~DRY SNOW, WET~~

~~SNOW, SLUSH and STANDING WATER.~~

~~Format: [n]nn/[n]nn/[n]nn~~

Depth of loose contaminant: dry snow, wet snow, slush or standing water for each runway third: a two - or three-digit number representing the assessed depth (mm) of the contaminant for each runway third. The depth is reported in a six to nine character group separated by a "/" for each runway third as defined in Table 2. The assessment is based upon an even distribution within the runway thirds as assessed by trained personnel. If measurements are included as part of the assessment process, the reported values are still reported as assessed depths, as the trained personnel have placed their judgment upon the measured depths to be representative for the runway third.

Format: [n]nn/[n]nn/[n]nn

Examples:

04/06/12 [STANDING WATER]

03/04/09 [SLUSH]

03/05/10 [WET SNOW or WET SNOW ON TOP OF ...]

03/20/100 [DRY SNOW or DRY SNOW ON TOP OF]

NR/NR/100 [DRY SNOW in the last third only]

This information is conditional. It is reported only for DRY SNOW, WET SNOW, SLUSH and STANDING WATER

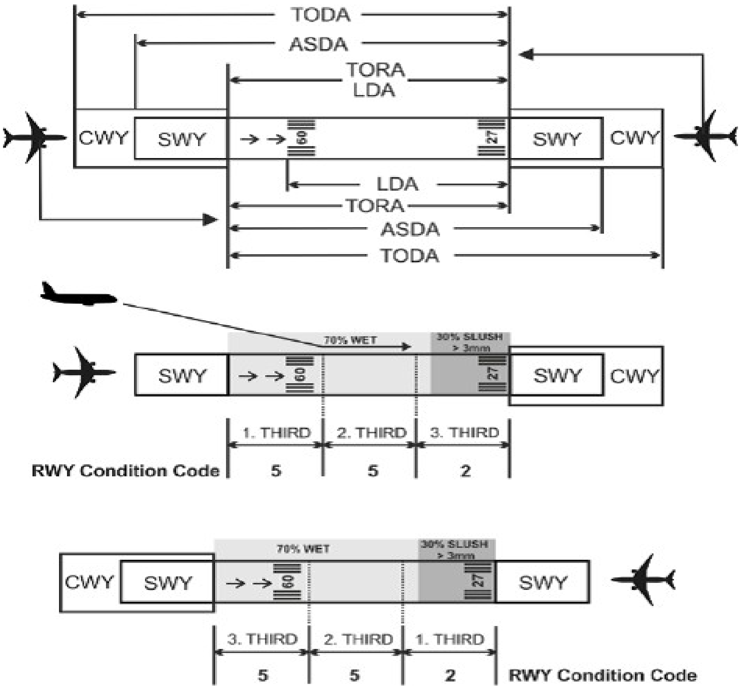
Whenever a contaminant not in this list is reported for a given third, the depth value for that third is replaced by "NR" (not reported).

Note.- When the assessed depth is below the minimum reportable depth shown in Table II-1-2, the reported depth should be equal to the minimum valid value, e.g. 03 for an assessed depth of 2 mm of SLUSH.

GM2 ADR.OPS.A.065(a) Reporting of the runway surface condition

[…]

Figure 1: Reporting of RWYCC from air traffic services to flight crew for runway thirds



Note; ATC report RWYCC differently than aerodrome operations, ATC use the landing/take-off direction type, depth, coverage.

GM3 ADR.OPS.A.065(a) Reporting of the runway surface condition

[…]

COMPLETE INFORMATION STRING

An example of a complete information string prepared for dissemination is as follows:

[COM header and abbreviated header] (Completed by AIS).

GG EADBZQZX EADNZQZX EADSZQZX

070645 EADDYNYX

SWEA0151 EADD 02170055

SNOWTAM 0151

[Aeroplane performance calculation section]

EADD 02170055 09L 5/5/5 100/100/100 NR/NR/NR 03 WET/WET/WET SNOW.

EADD 02170135 09R 5/2/2 100/50/75 NR/06/06 WET/SLUSH/SLUSH.

EADD 02170225 09C 2/3/3 75/100/100 06/12/12 SLUSH/WET SNOW/WET.

SNOW

[Situational awareness section]

RWY 09L SNOWBANK R20 FM CL. RWY 09R ADJ SNOWBANKS. TWY B

POOR. APRON NORTH POOR.

SNOWTAM Issuance

On receipt of a correctly constructed proposal the UK NOTAM OFFICE will issue a SNOWTAM message. In cases where the SNOWTAM proposal is incorrectly addressed, formatted, or constructed, it will be rejected either systematically or manually by EAD or the UK NOTAM OFFICE to the originating AFTN address.

It is the responsibility of the Sponsor to monitor for rejection messages and take appropriate action. Sponsors are also responsible for reviewing the SNOWTAM back copies and raising any potential issues directly with the UK NOF

AMC1 ADR.OPS.A.065(b);(c) Reporting of the runway surface condition

[…]

Table 2: Depth assessments for contaminants

Contaminant	Valid values to be reported	Significant change
STANDING WATER	04, then assessed value	3 mm up to and including 15 mm
SLUSH	03, then assessed value	3 mm up to and including 15 mm
WET SNOW	03, then assessed value	5 mm
DRYSNOW	03, then assessed value	20 mm

Annex IV Part operations Requirements – Aerodromes (Part ADR OPS) Subpart B – Aerodromes Operational Services, Equipment and installations (ADR.OPS.B)

GM2 ADR.OPS.B.010(a)(4) Rescue and firefighting services

MEDICAL CRITERIA FOR RFSS PERSONNEL

[…..]

2. RESPIRATORY SYSTEM

(a) Rescue and firefighting personnel with significant impairment of pulmonary function are assessed as unfit. A fit assessment could be considered once pulmonary function has recovered and is satisfactory.

(b) Rescue and firefighting personnel with any sequelae of disease or surgical intervention in any part of the respiratory tract likely to cause incapacitation, are assessed as unfit. A fit assessment could be considered after a specialist evaluation.

(c) Following significant respiratory illness, physical fitness tests will be performed prior to a return to operational duty.

(d) Examination

(1) A spirometry is required for initial examination. An FEV1/FVC ratio less than 75 % requires an evaluation by a specialist in respiratory disease before a fit assessment can be considered.

(2) Posterior/anterior chest radiography may be required at initial, revalidation or renewal examinations when indicated on clinical or epidemiological grounds.

(e) Chronic obstructive airways disease

Rescue and firefighting personnel with chronic obstructive airways disease are assessed as unfit. Rescue and firefighting personnel with only minor impairment of their pulmonary function may be assessed as fit after a specialist respiratory evaluation. Limitation of duties may be required. Rescue and firefighting personnel with pulmonary emphysema may be assessed as fit for limited duties excluding use of breathing apparatus following a specialist evaluation showing that the condition is stable and not causing significant symptoms.

(f) Asthma

Rescue and firefighting personnel with asthma that requires medication may be assessed as fit if the asthma is considered stable with satisfactory pulmonary function tests and medication is compatible with the safe execution of the duties. Operational limitations may be appropriate.

(g) Inflammatory disease

(1) For rescue and firefighting personnel with active inflammatory disease of the respiratory system, a fit assessment may be considered following a specialist evaluation when the condition has resolved without sequelae and no medication is required.

(2) Rescue and firefighting personnel with chronic inflammatory diseases may be assessed as fit following a specialist evaluation that shows mild disease with no risk of acute worsening with acceptable pulmonary function test, including bronchial challenge test, and medication compatible with the safe execution of duties. Operational limitations may be required.

(h) Sarcoidosis

(1) Rescue and firefighting personnel with active sarcoidosis are assessed as unfit. A specialist evaluation is undertaken with respect to the possibility of systemic, particularly cardiac, involvement. A fit assessment may be considered if minimal medication is required, and the disease is limited to hilar lymphadenopathy and inactive.

(2) Rescue and firefighting personnel with cardiac or neurological sarcoid are assessed as unfit.

(i) Pneumothorax

Rescue and firefighting personnel with a spontaneous pneumothorax are assessed as unfit. A fit assessment may be considered:

(1) 6 weeks after the event provided full recovery from a single event has been confirmed in a full respiratory evaluation including a CT scan or equivalent; and

(2) following surgical intervention in the case of a recurrent pneumothorax provided that there is satisfactory recovery.

(j) Thoracic surgery

(1) Rescue and firefighting personnel that require a thoracic surgery are assessed as unfit until such time as the effects of the operation are no longer likely to interfere with the safe exercise of their duties.

(2) A fit assessment may only be considered after satisfactory recovery and a full respiratory evaluation including a CT scan or equivalent. The underlying pathology which necessitated the surgery is considered in the assessment process.

(k) Sleep apnoea syndrome/sleep disorder

(1) Rescue and firefighting personnel with unsatisfactorily treated sleep apnoea syndrome and suffering from excessive daytime sleepiness are assessed as unfit.

(2) Rescue and firefighting personnel with obstructive sleep apnoea undergo a cardiological and pneumological evaluation.

(3) A fit assessment may be considered subject to the extent of symptoms, and satisfactory treatment.

3. DIGESTIVE SYSTEM

(a) Rescue and firefighting personnel with any sequelae of disease or surgical intervention in any part of the digestive tract or its adnexa likely to cause incapacitation, are assessed as unfit. A fit assessment may be considered after a specialist evaluation.

(b) Oesophageal varices

Rescue and firefighting personnel with oesophageal varices are assessed as unfit.

(c) Pancreatitis

(1) Rescue and firefighting personnel with pancreatitis are assessed as unfit pending an assessment. A fit assessment may be considered if the cause (e.g. gallstone, other obstruction, medication) is removed.

(2) Alcohol may be a cause of dyspepsia and pancreatitis. A full evaluation of its use/abuse is required.

(d) Gallstones

Rescue and firefighting personnel:

(1) with a single large gallstone may be assessed as fit after an evaluation;

(2) with multiple gallstones may be assessed as fit while awaiting assessment or treatment provided that the symptoms are unlikely to interfere with duties.

(e) Inflammatory bowel disease

Rescue and firefighting personnel with an established diagnosis or history of chronic inflammatory bowel disease may be assessed as fit if the disease is in established stable remission, and only minimal, if any, medication is being taken. Regular follow-up is required.

(f) Hernia

Rescue and firefighting personnel will be free of hernia. A fit assessment may be considered subject to the extent of symptoms, satisfactory treatment and after a specialist evaluation. The risk of secondary complications or worsening should be minimal and the rescue and firefighter will be subject to regular follow-up.

(g) Dyspepsia

Rescue and firefighting personnel with recurrent dyspepsia that requires medication needs to be investigated by internal examination including radiologic or endoscopic examination. Laboratory testing includes a haemoglobin assessment. Any demonstrated ulceration or significant inflammation requires evidence of recovery before a fit assessment may be considered.

(h) Abdominal surgery

Rescue and firefighting personnel who have undergone a surgical operation on the digestive tract or its adnexa, including a total or partial excision or a diversion of any of these organs, are assessed as unfit. A fit assessment may be considered after full recovery, the applicant is asymptomatic, and the risk of secondary complications or recurrence is minimal.

4. METABOLIC AND ENDOCRINE SYSTEMS

(a) Rescue and firefighting personnel with metabolic, nutritional or endocrine dysfunction may be assessed as fit if the condition is asymptomatic, clinically compensated and stable with or without replacement therapy, and regularly reviewed by an appropriate specialist.

(b) Obesity

(1) Obese rescue and firefighting personnel (e.g. with a body mass index (BMI) ≥ 35) may be assessed as fit only if the excess weight is not likely to interfere with the safe exercise of duties. A cardiovascular risk factor review and a pneumological examination by a specialist needs to be considered. The presence of sleep apnoea syndrome needs to be ruled out.

(2) Functional testing in the working environment may be necessary before a fit assessment may be considered.

(c) Thyroid dysfunction

Rescue and firefighting personnel with hyperthyroidism or hypothyroidism attain a stable euthyroid state before a fit assessment may be considered. Follow-up includes periodic thyroid function blood tests.

(d) Abnormal glucose metabolism

Glycosuria and abnormal blood glucose levels needs to be investigated. A fit assessment may be considered if normal glucose tolerance is demonstrated (low renal threshold) or impaired glucose tolerance without diabetic pathology is fully controlled by diet and regularly reviewed.

(e) Diabetes mellitus

Subject to an at least annual specialist endocrinological assessment, absence of complications likely to interfere with performance of duties, evidence of control of blood sugar with no significant hypoglycaemic episodes, rescue and firefighting personnel with diabetes mellitus:

(1) that do not require medication or require non-hypoglycaemic antidiabetic medications may be assessed as fit;

(2) that require the use of potentially hypoglycaemic medication(s) including sulphonyl ureas and insulin, may be assessed as fit with an operational limitation (or limitations), including documented testing whilst performing duties. For rescue and firefighting personnel treated with insulin, a review to include the results of operational blood sugar testing will be undertaken every 6 months;

(3) other cardiovascular risk factors including cholesterol will require cardiovascular risk factor management. An exercise ECG will be performed when diagnosed, every 5 years under 40 years of age, and annually thereafter;

(4) undergo HbA1c measurement every 3 months, with the exception of the rescue and firefighting personnel that do not require sulphonyl urea or insulin treatment where an extension of the testing to 6 months is acceptable; and

(5) require annual follow-up by a specialist including demonstrating the absence of diabetic complications such as neuropathy, retinopathy, arteriopathy or nephropathy.

5. HAEMATOLOGY

(a) Rescue and firefighting personnel with any significant haematological condition are assessed as unfit. Following a specialist evaluation, a fit assessment can be considered.

(b) Anaemia

(1) Anaemia demonstrated by a reduced haemoglobin level needs to be investigated. A fit assessment may be considered in cases where the primary cause has been treated (e.g. iron or B12 deficiency) and the haemoglobin or haematocrit has stabilised at a satisfactory level, for the required duties.

(2) Anaemia which is unamenable to treatment is disqualifying.

(c) Haemoglobinopathy and red cell enzyme defects

Rescue and firefighting personnel with a haemoglobinopathy and red cell enzyme defects are assessed as unfit. A fit assessment may be considered where minor thalassaemia, sickle cell disease or other conditions are diagnosed without a history of crises and where full functional capability is demonstrated.

(d) Coagulation disorders

(1) Rescue and firefighting personnel with significant coagulation disorders are assessed as unfit. A fit assessment may be considered if there is no history of significant bleeding or clotting episodes, and the haematological data indicates that there is no interference with the safe performance of duties.

(2) Rescue and firefighting personnel that require anticoagulants are assessed as unfit.

(e) Disorders of the lymphatic system

Lymphatic enlargement requires investigation. A fit assessment may be considered in cases of an acute infectious process which is fully recovered, or Hodgkin's lymphoma, or other lymphoid malignancy which has been treated and is in full remission. Regular follow-up needs to be performed.

(f) Leukaemia

(1) Rescue and firefighting personnel with acute leukaemia are assessed as unfit. Once in established remission, applicants may be assessed as fit.

(2) Rescue and firefighting personnel with chronic leukaemia are assessed as unfit. A fit assessment may be considered after remission and a period of demonstrated stability.

(3) Rescue and firefighting personnel with a history of leukaemia will have no history of central nervous system involvement and no continuing side effects from treatment likely to interfere with the safe performance of duties. Haemoglobin and platelet levels need to be satisfactory.

(4) Regular follow-up is recommended in all cases of leukaemia.

(g) Splenomegaly

Splenomegaly needs to be investigated. A fit assessment may be considered if the enlargement is minimal, stable and no associated pathology is demonstrated, or if the enlargement is minimal and associated with another acceptable condition.

(h) Splenectomy

Following splenectomy, a fit assessment may be considered if there is full recovery and the platelet level is acceptable.

6. GENITOURINARY SYSTEM

(a) The urine will not contain any abnormal element considered to be of pathological significance.

(b) Rescue and firefighting personnel with any sequelae of disease or surgical procedures on the genitourinary system or its adnexa likely to cause incapacitation, in particular any obstruction due to stricture or compression, are assessed as unfit. A fit assessment may be considered following a specialist evaluation.

(c) Abnormal urinalysis

Any abnormal finding including proteinuria, haematuria and glycosuria on urinalysis needs to be investigated.

(d) Renal disease

(1) Rescue and firefighting personnel presenting with any signs of renal disease are assessed as unfit. A fit assessment may be considered if blood pressure is satisfactory and renal function is acceptable and there are no significant lesions.

(2) Rescue and firefighting personnel that require dialysis are assessed as unfit.

(e) Urinary calculi

(1) Rescue and firefighting personnel with an asymptomatic calculus or a history of renal colic need to be investigated. A fit assessment may be considered after successful treatment for a calculus and with appropriate follow-up.

(2) Residual calculi are disqualifying unless they are in a location where they are unlikely to move and give rise to symptoms.

(f) Renal and urological surgery

(1) Rescue and firefighting personnel who have undergone a major surgical operation on the genitourinary system or its adnexa involving a total or partial excision or a diversion of any of its organs are assessed as unfit until recovery is complete, the person is asymptomatic and the risk of secondary complications is minimal.

(2) Rescue and firefighting personnel with compensated nephrectomy without hypertension or uraemia may be assessed as fit.

(3) Rescue and firefighting personnel who have undergone renal transplantation may be considered for a fit assessment after full recovery with evidence that it is fully compensated and tolerated with only minimal immuno-suppressive therapy. Limitation(s) to duties will be considered.

(4) Rescue and firefighting personnel who have undergone total cystectomy may be considered for a fit assessment if there is satisfactory urinary function, no infection and no recurrence of primary pathology.

7. INFECTIOUS DISEASES

(a) Rescue and firefighting personnel diagnosed with or presenting symptoms of an infectious disease will undergo specialist evaluation and may be considered fit when they are asymptomatic and providing that the therapy does not compromise the safe performance of their duties.

(b) In cases of an infectious disease, consideration is given to a history of, or clinical signs indicating, underlying impairment of the immune system.

(c) Tuberculosis

(1) Rescue and firefighting personnel with active tuberculosis are assessed as unfit. A fit assessment may be considered following completion of therapy.

(2) Rescue and firefighting personnel with quiescent or healed lesions may be assessed as fit. A specialist evaluation needs to consider the extent of the disease, the treatment required and possible side effects of medication.

(d) HIV positivity

(1) Rescue and firefighting personnel who are HIV positive may be assessed as fit if a full investigation provides no evidence of HIV-associated diseases that might give rise to incapacitating symptoms. Frequent review of the immunological status and a neurological evaluation by an appropriate specialist needs to be carried out. A cardiological review may also be required depending on medication.

(2) Rescue and firefighting personnel with an AIDS-defining condition are assessed as unfit except in individual cases for limited duties after complete recovery and dependent on the review.

(3) The assessment of cases under (1) and (2) is dependent on the absence of symptoms or signs of the disease and the acceptability of serological markers. Treatment will be evaluated by a specialist on an individual basis for its appropriateness and any side effects.

(e) Syphilis

Rescue and firefighting personnel with acute syphilis are assessed as unfit. A fit assessment may be considered in the case of those fully treated and recovered from the primary and secondary stages.

(f) Infectious hepatitis

Rescue and firefighting personnel with infectious hepatitis are assessed as unfit. A fit assessment may be considered once the person has become asymptomatic after treatment and a specialist evaluation. Regular review of the liver function needs to be carried out.

8. OBSTETRICS AND GYNECOLOGY

(a) Gynaecological surgery

Rescue and firefighting personnel who have undergone a major gynaecological surgery undergo a specialist assessment. A fit assessment can be considered subject to a satisfactory gynaecological evaluation after successful treatment and/or full recovery after a surgery.

(b) Pregnancy

In the case of pregnancy, rescue and firefighting personnel are assessed as unfit. A fit assessment may be considered after the 12th week of gestation provided that obstetric evaluation continuously indicates a normal pregnancy. Such a fit assessment is valid until the 30th week of gestation. Additional operational limitations may be imposed. A fit assessment may be considered following a specialist assessment after full recovery following the end of the pregnancy.

9. MUSCULOSKELETAL SYSTEM

(a) Rescue and firefighting personnel will have satisfactory functional use of the musculoskeletal system to enable them to safely perform their duties.

(b) Rescue and firefighting personnel with static or progressive musculoskeletal or rheumatologic conditions or a surgery likely to interfere with the safe performance of their duties will undergo further assessment. A fit assessment can be considered subject to a satisfactory workplace assessment after successful treatment or full recovery after a surgery.

(c) Rescue and firefighting personnel with a limb prosthesis should have satisfactory functional use as demonstrated by a workplace assessment.

(d) Rescue and firefighting personnel with any significant sequelae from disease, injury or congenital abnormality affecting the bones, joints, muscles or tendons with or without a surgery need to have a full evaluation prior to a fit assessment.

(e) Abnormal physique, including obesity, or muscular weakness may require a medical assessment and particular attention needs to be paid to workplace assessment.

(f) Locomotor dysfunction, amputations, malformations, loss of function and progressive osteoarthritic disorders are assessed on an individual basis in conjunction with the appropriate operational expert with a knowledge of the complexity of the tasks of that need to be performed.

(g) Rescue and firefighting personnel with inflammatory, infiltrative, or degenerative disease of the musculoskeletal system may be assessed as fit provided that the condition is in remission and the medication is acceptable and does not adversely affect the discharge of their duties.

(h) For rescue and firefighting personnel who have undergone a reconstructive surgery or joint replacement procedures, particular attention will be paid to the risks associated with the particular implant or prosthesis and its functional operational range.

(i) Where there is doubt about the operational fitness, rescue and firefighting personnel undergo the operational physical fitness assessment prior to a return to full duties. A limitation (or limitations) may be required.

10. PSYCHIATRY

(a) Rescue and firefighting personnel with a mental or behavioural disorder due to alcohol or other use or misuse of psychoactive substances, including recreational substances with or without dependency, are assessed as unfit until after a period of documented sobriety or freedom from psychoactive substance use or misuse and subject to a satisfactory psychiatric evaluation after successful treatment.

(b) Rescue and firefighting personnel with a psychiatric condition such as:

(1) mood disorder;

(2) neurotic disorder, e.g. claustrophobic or acrophobic symptoms;

(3) personality disorder;

(4) mental or behavioural disorder;

(5) post-traumatic stress disorder;

(6) significant stress-related symptoms; and

(7) single or repeated acts of deliberate self-harm,

will undergo treatment, as necessary, and a satisfactory psychiatric assessment before a fit assessment can be considered. A psychological evaluation may be required as part of, or complementary to, a specialist psychiatric or neurological assessment.

(c) Disorders due to alcohol or other substance use

(1) A fit assessment may be considered after successful treatment, a period of documented sobriety or freedom from substance use, and review by a psychiatric specialist. The OHMP, with the advice of the psychiatric specialist, will determine the duration of the period to be observed before a fit assessment can be made.

(2) Depending on the individual case, treatment may include inpatient treatment of variable duration.

(3) Continuous follow-up, including blood testing and peer reports, may be required indefinitely.

(d) Mood disorder

Rescue and firefighting personnel with an established mood disorder are assessed as unfit. After full recovery and after full consideration of an individual case, a fit assessment may be considered, depending on the characteristics and gravity of the mood disorder. If stability on maintenance psychotropic medication is confirmed, a fit assessment may be considered. In some cases, an operational limitation may be required. If the dosage of the medication is changed, a further period of unfit assessment is required. Regular specialist supervision needs to be considered. Any use of medication needs to be evaluated further by a specialist.

(e) Psychotic disorder

Rescue and firefighting personnel with a history, or the occurrence, of a functional psychotic disorder are assessed as unfit unless it can be confirmed that the original diagnosis was inappropriate or inaccurate or was a result of a single toxic episode.

(f) Deliberate self-harm

A single self-destructive action or repeated overt acts entail unfitness. A fit assessment may be considered after full consideration of an individual case and requires psychiatric or psychological review.

11. NEUROLOGY

(a) Rescue and firefighting personnel with an established history or clinical diagnosis of:

(1) epilepsy except in the cases in (b)(1) and (2) below;

(2) recurring episodes of disturbance of consciousness of uncertain cause; and

(3) conditions with a high propensity for cerebral dysfunction, are assessed as unfit.

(b) Rescue and firefighting personnel with an established history or clinical diagnosis of:

(1) epilepsy without recurrence after the age of 5;

(2) epilepsy without recurrence and off all treatment for more than 5 years;

(3) epileptiform EEG abnormalities and focal slow waves;

(4) progressive or non-progressive disease of the nervous system;

(5) a single episode of disturbances or loss of consciousness;

(6) brain injury, affliction or inflammation;

(7) spinal or peripheral nerve injury, affliction or inflammation;

(8) disorders of the nervous system due to vascular deficiencies including haemorrhagic and ischaemic events; and

(9) vertigo,

need to undergo a specialist evaluation before a fit assessment may be considered.

(c) Electroencephalography (EEG)

EEG will be carried out based on the person's history or on clinical grounds.

(d) Epilepsy

(1) Rescue and firefighting personnel who have experienced one or more convulsive episodes after the age of 5 are assessed as unfit.

(2) A fit assessment may be considered if:

(i) the rescue and firefighting personnel are seizure free and off medication for at least 5 years; and

(ii) a full neurological evaluation shows that a seizure was caused by a specific non-recurrent cause, such as trauma or toxin.

(3) Rescue and firefighting personnel who have experienced an episode of benign Rolandic seizure may be assessed as fit provided that the seizure has been clearly diagnosed including a properly documented history and typical EEG result and the rescue and firefighting personnel have been free of symptoms and off treatment for at least 5 years.

(e) Neurological disease

Rescue and firefighting personnel with any stationary or progressive disease of the nervous system which has caused or is likely to cause a significant disability are assessed as unfit. A fit assessment may be considered in cases of minor functional losses associated with stationary disease after a full neurological evaluation and a workplace assessment. An operational limitation may be required.

(f) Disturbance of consciousness

Rescue and firefighting personnel with a history of one or more episodes of disturbed consciousness may be assessed as fit if the condition can be satisfactorily explained by a non-recurrent cause. Operational limitations may be imposed. A full neurological evaluation is necessary.

(g) Head injury

Rescue and firefighting personnel with a head injury which was severe enough to cause loss of consciousness will be evaluated by a consultant neurologist. A fit assessment may be considered if there has been a full recovery and the risk of post-traumatic epilepsy has fallen to a sufficiently low level. Behavioural and cognitive aspects will be taken into account where there is evidence of significant penetrating brain trauma or contusion.

12. VISUAL SYSTEM

(a) Distant and near visual acuity, with or without optimal correction, will be 6/9 (0.7) or better in each eye separately, and visual acuity with both eyes will be 6/6 (1) or better.

(b) Rescue and firefighting personnel need to have fields of vision and binocular function appropriate to the operational tasks.

(c) Rescue and firefighting personnel at the initial assessment having monocular or functional monocular vision, including eye muscle balance problems, may be assessed as fit provided that an ophthalmological examination and an operational evaluation are satisfactory. Operational limitations may be necessary.

(d) Rescue and firefighting personnel who have undergone an eye surgery are assessed as unfit until full recovery of the visual function. A fit assessment may be considered subject to a satisfactory ophthalmologic evaluation.

(e) Rescue and firefighting personnel with a clinical diagnosis of keratoconus may be assessed as fit subject to a satisfactory examination by an ophthalmologist.

(f) Rescue and firefighting personnel with diplopia are assessed as unfit.

(g) Corrective lenses

If satisfactory visual function for the rescue and firefighting duties is achieved only with the use of correction, the spectacles, inserts or contact lenses must provide optimal visual function, be well tolerated, and suitable for rescue and firefighting duties, including the wearing of breathing apparatus.

(h) Eye examination

STANDARD TESTS FOR VISION

(1) At each medical examination, an assessment of vision will be undertaken and the eyes are examined with regard to possible pathology.

(2) The routine eye examination includes:

(i) history;

(ii) visual acuities — near and distant vision; uncorrected and with best optical correction if needed;

(iii) morphology by ophthalmoscopy; and

(iv) further examination on clinical indication.

(3) Visual acuity is tested using Snellen charts, or equivalent, under appropriate illumination. Where clinical evidence suggests that Snellen may not be appropriate, Landolt ‘C’ may be used.

(4) All abnormal and doubtful cases are referred to an ophthalmologist. Conditions which indicate a comprehensive ophthalmological examination include, but are not limited to, a substantial decrease in the uncorrected visual acuity, any decrease in best corrected visual acuity, and/or the occurrence of eye disease, eye injury, or eye surgery.

(5) In case of multiple pathological conditions of the eye, their effect is evaluated by an ophthalmologist with regard to possible cumulative effects. Functional testing in the working environment may be necessary to consider a fit assessment.

(i) Refractive error

Rescue and firefighting personnel without symptoms with high refractive error in excess of +5.0/-6.0 dioptres, high anisometropia >3D, or high astigmatism >3D may be assessed as fit provided that the visual standards are met in both eyes, optimal correction has been considered and no significant pathology is demonstrated. Risk of visual incapacitation arising from the refractive error or shape of the eye may be acceptable.

(j) Substandard vision

Rescue and firefighting personnel with reduced central vision in one eye may be assessed as fit if the binocular visual field is normal and the underlying pathology is acceptable according to an ophthalmological evaluation. Testing includes functional testing in the appropriate working environment.

(k) Heterophoria

Rescue and firefighting personnel with heterophoria (imbalance of the ocular muscles) will undergo further ophthalmological evaluation before a fit assessment is considered.

(l) Eye surgery

(1) Refractive surgery

After a refractive surgery or a surgery of the cornea including cross linking, a fit assessment may be considered, provided that:

(i) the pre-operative refraction was less than +5 dioptres;

(ii) satisfactory stability of refraction has been achieved (less than 0.75 dioptres variation diurnally);

(iii) the examination of the eye shows no post-operative complications;

(iv) the glare sensitivity is normal;

(v) the mesopic contrast sensitivity is not impaired; and

(vi) the specialist evaluation is undertaken by an ophthalmologist.

(2) Cataract surgery

Rescue and firefighting personnel who have undergone a cataract surgery may be assessed as fit after 6 weeks provided that the visual requirements are met either with corrective lenses, or with intraocular lenses which are non-tinted.

(3) Retinal surgery/retinal laser therapy

(i) After a retinal surgery, rescue and firefighting personnel may be assessed fit 6 months after a successful surgery. Annual ophthalmological follow-up may be necessary. Longer periods may be acceptable after 2 years on recommendation of the ophthalmologist.

(ii) After successful retinal laser therapy, rescue and firefighting personnel may be assessed as fit provided that an ophthalmological evaluation shows stability.

(4) Glaucoma surgery

After a glaucoma surgery, rescue and firefighting personnel may be assessed as fit 6 months after a successful surgery. Ophthalmological examinations undertaken every 6 months to follow-up secondary complications caused by the glaucoma may be necessary.

(5) Extraocular muscle surgery

A fit assessment may be considered not less than 6 months after a surgery and after a satisfactory ophthalmological evaluation.

(6) Visual correction

Spectacles, contact lenses and mask inserts should permit the rescue and firefighting personnel to meet the visual requirements at all distances.

COLOUR VISION

(a) Rescue and firefighting personnel who fail to correctly identify 9 or more of the first 15 plates of the 24-plate edition of Ishihara pseudoisochromatic plates undergo further specialist evaluation. A fit assessment may be considered if the results of the evaluation and/or operational testing demonstrate that the duties can be performed safely.

(b) Advanced or fictional colour vision testing is assessed using means able to demonstrate acceptable colour vision.

13. OTORHINOLARYNGOLOGY

(a) Rescue and firefighting personnel do not have a hearing loss of more than 35 dB at any of the frequencies 500, 1 000 or 2 000 Hz, and 50 dB at 3 000 Hz, in either ear separately.

(b) Rescue and firefighting personnel who do not meet the hearing criteria above will undergo a specialist assessment before a fit assessment may be considered. In these cases, the rescue and firefighting personnel undergo a functional hearing test in the operational environment. Initial candidates who do not meet the hearing criteria above will undergo a speech discrimination test.

(c) Hearing aids

A fit assessment may be considered if the use of a hearing aid (or aids) or of an appropriate prosthetic aid improves the hearing to achieve a normal standard as assessed by fully functional testing in the operational environment.

(d) Rescue and firefighting personnel with:

(1) an active chronic pathological process of the internal or middle ear;

(2) unhealed perforation or dysfunction of the tympanic membrane(s);

(3) disturbance of vestibular function;

(4) significant malformation or significant chronic infection of the oral cavity or upper respiratory tract; and

(5) significant disorder of speech or voice reducing intelligibility,

will undergo further specialist examination and assessment to establish that the condition does not interfere with the safe performance of their duties.

(e) Examination

(1) An otorhinolaryngological examination includes:

(i) history;

(ii) clinical examination including otoscopy, rhinoscopy, and examination of the mouth and throat; and

(iii) clinical assessment of the vestibular system.

(2) ENT specialists involved in the assessment of rescue and firefighting personnel should have an understanding of the functionality required.

(3) Where a full assessment and functional check is needed, due regard is paid to the operating environment in which the operational functions are undertaken.

(f) Hearing

(1) The follow-up of a rescue and firefighting personnel with hypoacusis is decided by the medical staff. If at the next annual test there is no indication of further deterioration, the normal frequency of testing may be resumed.

(2) Full functional and environmental assessments is carried out with the chosen prosthetic equipment in use.

(g) Ear conditions

Rescue and firefighting personnel with perforation is considered unfit. A fit assessment can be made following a specialist evaluation, treatment and full recovery.

(h) Vestibular disturbance

The presence of vestibular disturbance with vertigo (e.g. Meniere's disease) and spontaneous or positional nystagmus requires a complete vestibular evaluation by a specialist and entails unfitness until successful treatment and/or full recovery.

(i) Speech disorder

Rescue and firefighting personnel with a speech disorder are assessed with due regard to the operational environment in which the operational functions are undertaken. Rescue and firefighting personnel with significant disorder of speech or voice are assessed as unfit.

14. DERMATOLOGY

(a) Rescue and firefighting personnel will not have any established dermatological condition likely to interfere with the safe performance of their duties and the wearing of protective equipment. A fit assessment could be considered following a specialist dermatological assessment.

(b) Systemic effects of radiation or pharmacological treatment for a dermatological condition will be evaluated before a fit assessment can be considered.

(c) Rescue and firefighting personnel with a skin condition that causes pain, discomfort, irritation or itching may only be assessed as fit if the condition can be controlled and does not interfere with the safe performance of the duties and with wearing of personal protective equipment.

(d) In cases where a dermatological condition is associated with a systemic illness, full consideration will be given to the underlying illness before a fit assessment may be considered.

15. ONCOLOGY

(a) After diagnosis of primary or secondary malignant disease, rescue and firefighting personnel are assessed as unfit.

(b) After completion of primary treatment and full recovery, the rescue and firefighting personnel will undergo a specialist evaluation before a fit assessment could be considered.

(c) Rescue and firefighting personnel with an established history or clinical diagnosis of a malignant intracerebral or pulmonary tumor are assessed as unfit.

(d) Rescue and firefighting personnel who have been diagnosed with malignant disease may be assessed as fit provided that:

(1) after primary treatment, there is no evidence of residual malignant disease likely to interfere with the performance of duties;

(2) time appropriate to the type of tumour has elapsed since the end of the primary treatment;

(3) the risk of incapacitation from a recurrence or metastasis is sufficiently low;

(4) there is no evidence of short- or long-term sequelae from treatment. Special attention should be paid to cardiac risk in persons who have received anthracycline chemotherapy; and

(5) satisfactory oncology follow-up reports are provided to the medical staff.

(e) Rescue and firefighting personnel receiving ongoing chemotherapy (other than adjuvant preventative therapy) or radiation treatment are assessed as unfit.

(f) Rescue and firefighting personnel with a benign intracerebral tumour may be assessed as fit after a satisfactory specialist and neurological evaluation and provided that the condition does not compromise the safe performance of duties.

(g) Rescue and firefighting personnel with pre-malignant conditions may be assessed as fit if treated or excised as necessary and there is a regular follow-up.

AMC1 ADR OPS B 037(a);(b) Assessment of runway surface condition

ASSIGNMENT OF RUNWAY CONDITION CODE

1. The aerodrome operator should:

a. assign a RWYCC 6, if ~~25~~ 10 per cent or less area of a runway third is wet or covered by contaminant;

b. describe in the plain-language remarks part of the situational awareness section of the RCR the location of the area that is wet or covered by the contaminant, if the distribution of the contaminant is not uniform

[…]

GM1 ADR.OPS.B.037(b) Assessment of runway surface condition and assignment of runway condition code

SINGLE AND MULTIPLE CONTAMINANTS

When single or multiple contaminants are present, the RWYCC for any third of the runway is determined as follows:

1. When the runway third contains a single contaminant, the RWYCC for that third

is based directly on that contaminant in the RCAM as follows:

a. ~~If the contaminant coverage for that third is less than 10 per cent, a RWYCC 6 is to be generated for that third, and no contaminant is to be reported. If all thirds have less than 10 per cent contaminant coverage, no report is generated; or~~

If 10 per cent or less area of a runway third is wet or covered by contaminant, a RWYCC 6 shall be reported.

b. ~~If the contaminant coverage for that third is greater than or equal to 10 percent and less than or equal to 25 per cent, a RWYCC 6 is to be generated for that third and the contaminant reported at 25 per cent coverage; or~~

If more than 10 and up to 25 per cent area of a runway third is wet or covered by contaminant, a RWYCC 5 shall be reported

GM2 ADR.OPS.B.037(b) Assessment of runway surface condition and assignment of runway condition code

DOWNGRADING AND UPGRADING

1. The RCAM allows making an initial assessment based on visual observation of contaminants on the runway surface: their type depth and coverage, as well as the outside air temperature. Downgrading and upgrading is an integral part of the assessment process and essential to developing relevant reports of the prevailing runway surface condition. When all other observations, experience, local knowledge and

judgement of the inspector indicate that the primary assignment of the RWYCC does not reflect the prevailing conditions accurately, a downgrade or upgrade should

be made

[….]

Note: Further details on additional means of assessing runway slipperiness can be found in ASM part 2

EXAMPLE OF REPORTING DEPTH OF CONTAMINANT WHENEVER THERE IS A

SIGNIFICANT CHANGE

1. ~~After the first assessment of runway condition, a first RCR is generated. The~~

~~initial report is:~~

An initial assessment of runway conditions is made, and it is determined that the entire runway is covered with SLUSH up to 2 mm deep. After the first assessment of runway condition, a **first runway condition report** is generated. The depth of contaminant is reported as 3mm, which is the lowest valid value to be reported. The initial report is:

5/5/5 100/100/100 03/03/03 SLUSH/SLUSH/SLUSH

Note: The full information string is not used in this example.

2. With continuing precipitation, a new RCR is required to be generated as a subsequent assessment reveals that the depth of contamination has increased from 3mm to 5mm along the entire length of the runway and therefore change in the RWYCC is needed. **A second RCR is therefore** created as:

2/2/2 100/100/100 05/05/05 SLUSH/SLUSH/SLUSH

3. With even more precipitation, a further assessment reveals the depth of contamination has increased ~~from 5mm~~ to 7mm along the entire length of the runway. However, a new RCR **is not** required because the RWYCC has not changed (change in depth is less than the significant change threshold of 3mm).

4. A ~~final~~ subsequent assessment of the contamination reveals that the depth has increased to ~~10~~ 9 mm. A new RWYCC is required because the change in depth from the last RCR (second RWYCC), i.e. from 5mm to ~~10~~ 9mm is greater than the significant change threshold of 3 mm. A third RCR is thus created as below:

2/2/2 100/100/100 ~~10~~ 9/~~10~~ 9 /~~10~~ 9 SLUSH/SLUSH/SLUSH

5. Finally, as temperatures rise, the contaminant changes from SLUSH to WET (i.e., water with a depth less than 3mm). A fourth runway condition report is thus:

5/5/5 100/100/100 NR/NR/NR WET/WET/WET

AMC1 ADR. OPS.B090 Use of the aerodrome by higher code letter-aircraft

ELEMENTS TO BE ASSESSED

When assessing the possibility of operation of aircraft whose code letter is higher than the code letter of the aerodrome reference code. The aerodrome operator should, amongst other issues, assess the impact of the characteristics of the aircraft that exceed the code letter and/or outer main gear wheel span and their related impact as follows:

Aircraft characteristics to be assessed include, but are not limited to:

(a) fuselage length;
(b) fuselage width;

(c) fuselage height;
(d) tail height;
(e) wingspan
(f) wing tip vertical clearance;
(g) cockpit view;
(h) distance from the pilot's eye position to the nose landing gear and to the main landing gear;
(i) outer main gear wheel span;
(j) wheelbase;
(k) main gear steering system;
(l) landing gear geometry;
(m) engine ~~data~~ characteristics
(n) flight performance; and
(o) technology evolution.
(p) maximum passenger and fuel carrying capacity

GM1 ADR.OPS.B.090 Use of the aerodrome by higher code letter aircraft

CAA ORS9 Decision No. 1

ELEMENTS TO BE ASSESSED

Further guidance on this issue is contained in ICAO Circular 305-AN/177 and ICAO Circular 301-AN/174.

In any case, the elements that have to be taken into account for the safety assessment are, without prejudice to other assessments that may have to be conducted, in accordance with other applicable requirements contained in Part-ADR.OPS.

Such assessments should include, but are not limited to:

(a) the aircraft mass, tire pressure and AC~~N~~R values — with regard to overload operations; and

(b) maximum passenger and fuel carrying capacity — with regard to level of RFFS protection to be provided and the aerodrome emergency planning

(c) the aircraft characteristics elements to be assessed in relation to;

(1) Wingspan;
(i) wake turbulence;
(ii) gate selection;
(iii) aerodrome maintenance services around the aeroplane
(iv) equipment for disabled aeroplane removal; and
(v) de-icing.

(2) Wheelbase;
(i) in terminal areas

(3) Fuselage length;
(i) passenger gates and terminal areas;

(4) Tail height
(i) Fuselage height, in particular door sill height
(ii) the operational limits of the air bridges;
(iii) mobile steps;
(iv) catering trucks;
(v) persons with reduced mobility;
(vi) dimensions of the apron.

(5) Tail height
   (i) the dimensions of aeroplane maintenance services;

(6) Engine characteristics

   (i) design of air bridges; and
   (ii) location of refuelling pits on the aircraft stand.
   (iii) the engine characteristics include engine geometry and engine airflow characteristics, which may affect the aerodrome infrastructure as well as ground handling of the aeroplane and operations in adjacent areas which are likely to become affected by jet blast.

(7) Maximum passenger and fuel carrying capacity
   (i) terminal facilities;
   (ii) fuel storage and distribution;
   (iii) air bridge loading configuration.

(8) Flight performance
   (i) wake turbulence;
   (ii) noise.

(d) Additional elements to be assessed - aircraft ground servicing requirements

The following non-exhaustive list of aircraft ground servicing characteristics and requirements may affect the available aerodrome infrastructure:

(1) ground power;
(2) passengers embarking and disembarking;
(3) cargo loading and unloading
(4) fuelling;
(5) pushback and towing
(6) de-icing;
(7) taxiing and marshalling;
(8) aeroplane maintenance;
(9) RFF;
(10) equipment areas;
(11) stand allocation; and
(12) disabled aircraft removal.

Each assessment is specific to a particular type of aircraft and to a particular operational context. The assessment may require a review of the obstacle limitation surfaces at an aerodrome.

At aerodromes where low visibility operations are implemented, additional procedures may be implemented to safeguard the operation of aircraft. Additional processes that ensure suitable measures are in place to protect the signal produced by the ground-based radio navigation equipment may be necessary at aerodromes with precision instrument approaches.

[...]

Annex IV Part Operations Requirements – Aerodromes (Part- ADR-OPS)
Subpart C Aerodrome Maintenance (ADR-OPS-C)

AMC1 ADR.OPS.C.010 Pavements, other ground surfaces, and drainage
[…].

(e) When available, runway surface friction characteristics should also be monitored considering aeroplane braking performance, such as Aeroplane Braking Action Report.

Note: Guidance on using ABAR to monitor runway friction characteristics is provided in ICAO ASM part 2.

(~~e~~ f) The aerodrome operator should take corrective maintenance action to prevent the runway surface friction characteristics for either the entire runway, or a portion thereof from falling below the minimum friction level specified by the State.

(~~f~~ g) When the friction of a significant portion of a runway is found to be below the minimum friction level value, the aerodrome operator should report such information in order to promulgate it in a NOTAM specifying which portion of the runway is below the minimum friction level and its location on the runway and take immediate corrective action.

(~~g~~ h) The surface of a paved runway should be evaluated when constructed or resurfaced to determine that the surface friction characteristics achieve the design objectives

(1) GM2 ADR.OPS.C.010(b)(1) Pavements, other ground surfaces, and drainage

(2) **CRITERIA FOR OVERLOAD OPERATIONS** *[applicable after 28 November 2024]*

(3)

(a) Overloading of pavements can result either from loads too large, or from a substantially increased application rate, or both. Loads larger than the defined (design or evaluation) load shorten the design life, whilst smaller loads extend it. With the exception of massive overloading, pavements in their structural behaviour are not subject to a particular limiting load above which they suddenly or catastrophically fail. Behaviour is such that a pavement can sustain a definable load for an expected number of repetitions during its design life. As a result, occasional minor overloading is acceptable, when expedient, with only limited loss in pavement life expectancy, and relatively small acceleration of pavement deterioration. For those operations in which magnitude of overload and/or the frequency of use do not justify a detailed analysis, the following criteria are suggested:

~~1) for flexible pavements, occasional movements by aircraft with ACN not exceeding 10 % above the reported PCN should not adversely affect the pavement;~~
~~(2) for rigid or composite pavements, in which a rigid pavement layer provides a primary element of the structure, occasional movements by aircraft with ACN not exceeding 5 % above the reported PCN should not adversely affect the pavement;~~
~~(3) if the pavement structure is unknown, the 5 % limitation should apply; and~~
~~(4) the annual number of overload movements should not exceed approximately 5 % of the total annual aircraft movements~~.

(4) for flexible and rigid pavements, occasional movements by aircraft with ACR not exceeding 10 per cent above the reported PCR may be allowed and should not adversely affect the pavement;

(5) overloads in excess of 10 % should be considered on a case-by-case basis if supported by technical analysis

(6) the annual number of overload movements should not exceed approximately 5 per cent of the total annual aircraft movements, excluding light aircraft.

(7) the annual number of overload movements should not exceed approximately 5 per cent of the total annual movements excluding light aircraft.

(8) overload movements should not be permitted on pavement exhibiting signs of distress or failure.

(6) overloading should be avoided during any periods of thaw following frost penetration, or when the strength of the pavement or its subgrade could be weakened by water.

(7) where overload operations are conducted, the aerodrome operator should review the relevant pavement condition regularly and should also review the criteria for overload operations periodically since excessive repetition of overloads can cause severe shortening of pavement life or require major rehabilitation of pavement

(b) Such overload movements should not normally be permitted on pavements exhibiting signs of distress or failure. Furthermore, overloading should be avoided during any periods of thaw following frost penetration, or when the strength of the pavement or its subgrade could be weakened by water. Where overload operations are conducted, the aerodrome operator should review the relevant pavement condition regularly and should also review the criteria for overload operations periodically since excessive repetition of overloads can cause severe shortening of pavement life or require major rehabilitation of the pavement.

(c) The ACR, when exceeding the reported PCR cannot predict accurately how the overload will affect the pavement damage (hence pavement life) since it is strongly dependent on its offset location of the maximum pavement damage.

(d) Technical analysis should determine how the overload operations contribute to the maximum pavement damage (maximum CDF) when mixed with other traffic. The inputs required to perform such analysis are the same as the PCR technical evaluation;

(1) Pavement structure

(2) Aircraft traffic (including overload operations)

(3) Damage model (consistent with the PCR calculation and pavement design)

(e) With the exception of massive overloading, pavements in their structural behaviour are not subject to a particular limiting load above which they fail.

(f) The ultimate decision to grant overload operations belongs to the aerodrome operator, depending on the impact of such operations on pavement life and its management policy. A cost benefit analysis (loss of pavement life vs additional revenues) can support such a decision.

End of changes