Explanatory Statement

Civil Aviation Safety Regulations 1998

Manual of Standards Part 139 Amendment Instrument (No. 1) 2010

Subsection 98 (1) of the *Civil Aviation Act 1988* (the ***Act***) provides that the Governor-General may make regulations for the Act and in the interests of the safety of air navigation.

Legislation
Some of these regulations are contained in the *Civil Aviation Safety Regulations 1998* (***CASR 1998***). Part 139 of CASR 1998 deals with the operation of aerodromes, including rules about the certification of aerodromes and the requirements that apply to the operators of certified aerodromes.

Under regulation 139.015 of CASR 1998, the standards for aerodromes are those set out in the Manual of Standards Part 139 — Aerodromes (the ***MOS***). The MOS contains mandatory standards for the facilities and equipment that aerodromes must have.

Background
In 2006, the Australian Airports Association (AAA) recommended to CASA that it should review the MOS, commencing with the aerodrome lighting standards set out in Chapter 9 of the MOS. CASA responded positively to this suggestion and closely examined all of the issues arising in Chapter 9 as part of a Post-Implementation Review of CASR Part 139.

At the conclusion of this process, on 3 January 2008, CASA, released for public comment Notice of Proposed Change – ***NPC*** *139/04* titled *Proposed Amendment to Manual of Standards (MOS) Part 139 – Aerodromes.* The objective of the NPC was to seek comments on proposed new and revised standards for *Visual Aids Provided by Aerodrome Lighting*, as published in Chapter 9 of the MOS, and to rectify and clarify several editorial errors throughout Chapter 9.

That extended process of review, consideration, consultation, comment and drafting has now been completed and the outcome is a series of amendments to the MOS, contained in *Manual of Standards Part 139 Amendment Instrument (No. 1) 2010* (the ***MOS amendment***).

Overview of the MOS amendments
The NPC specifically proposed numerous changes to the MOS. Here is a list of matters on which modifications have been made to the MOS by the MOS amendment:

- definitions and drafting clarity
- portable lights
- light fittings
- retention of documents in commissioning of aerodrome lighting
- pilot activated lighting systems

- obstacle lighting
- Illuminated Wind Direction Indicator
- Visual Approach Slope Indicator Systems
- runway lighting
- taxiway lighting
- Isocandela diagrams for taxiway lights
- illustrations of taxiway lighting
- apron floodlighting
- Visual Docking Guidance Systems
- other lights on aerodromes
- monitoring, maintenance and serviceability of aerodrome lighting
- lighting in the vicinity of aerodromes.
- other less significant changes from industry and CASA feedback.

Details of MOS amendments
Details of each MOS amendment are in Schedule 1, including a reason for the amendment.

Legislative Instruments Act
Under section 5 of the *Legislative Instruments Act 2003* (the ***LIA***), the MOS amendment is taken to be a legislative instrument because it is of a legislative character and satisfies the other attributes mentioned in section 5. As a legislative instrument, the MOS amendment is subject to tabling and disallowance in the Parliament under sections 38 and 42 of the LIA.

Consultation
As mentioned at the beginning of this Explanatory Statement, consultation under section 17 of the LIA has taken place. A Notice of Proposed Change (NPC) was issued and 12 external submissions were received in response to it, including from aerodrome operators, airport lighting equipment suppliers, an aviation business owner, and an Air Traffic Service provider. Submissions received were analysed and taken into account when the MOS amendments were prepared.

Office of best Practice Regulation (*OBPR*)
OBPR assessed the MOS amendment and advised that the proposal was likely to have a low impact on business, and impose no or low compliance costs. Therefore, no further analysis (in the form of a Business Cost Calculator Report or Regulation Impact Statement) was required (OBPR ref: 9391).

Making and commencement
The instrument commences on the day after it is registered.

The instrument has been made by the Director of Aviation Safety, on behalf of CASA, in accordance with subsection 84A (2) of the Act.

Appendix 1

Details of MOS amendments

1 Name of instrument

Under this section, the instrument is named the *Manual of Standards Part 139 Amendment Instrument (No. 1) 2010.*

2 Commencement

Under this section, the instrument commences on the day after it is registered.

3 Amendment of the Manual of Standards Part 139

Under this section, Schedule 1 amends Manual of Standards Part 139.

Schedule 1 Amendments

[1] Section 1.2, definition of *Visibility*

This amendment substitutes a new definition of visibility for aeronautical purposes. Visibility is defined as the greater of the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognised against a bright background, and the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.

A Note explains that the 2 distances have different values in air of a given extinction coefficient, and that the second distance ("1 000 candelas") varies with the background illumination. The first distance ("black object") is represented by the meteorological optical range (MOR).

A second Note explains that for international recognition and consistency, the definition of ***Visibility*** is taken from Chapter 1, Part 1, Annex 3, *Meteorological Service for International Air Navigation,* in the Convention on International Civil Aviation. This explains the retention of terms ("suitable dimensions"; "near the ground"; "in the vicinity of") which might not otherwise be used in this way in Australian legislative drafting, but which are considered in this context to have sufficient certainty for operational and safety purposes because of their international recognition and consistency.

REASON: To insert the current ICAO definition.

[2] Sub-subparagraph 9.1.1.2 (c) (i)

Subsection 9.1.1 deals with the application of, and definitions in, Chapter 9 of the MOS, *Visual aids provided by aerodrome lighting*.

Under sub-subparagraph 9.1.1.2 (c) (i) of the MOS, *Upgrade of a facility*, a facility is deemed to be upgraded if the improvement of the facility allows it to accommodate aeroplanes from a higher reference code, such as from code 2 to code 3 runway or code 3 to code 4.

The amendment substitutes a new standard so that a facility is deemed to be upgraded if the improvement of the facility allows it to accommodate larger aeroplanes, for example, an upgrade from a code 2 to a code 3 runway, or from a code C to a code D taxiway, or to accommodate on an apron more aircraft, larger aircraft, or both more aircraft and larger aircraft.

REASON: To clarify intent.

[3] After sub-subparagraph 9.1.1.2 (c) (ii)

This amendment inserts additional triggering for upgrade of facilities. Thus, a facility is deemed to be upgraded if the improvement of the facility allows it to accommodate aircraft take-offs and aerodrome surface movements in runway visual range conditions of less than 550 m; or if existing equipment that is obsolete or does not comply with current standards is replaced with new equipment.

A Note explains that the upgrade of a facility, including an aerodrome lighting system, is the trigger for a non-compliant system to be brought into compliance with the relevant MOS standards. Since the timing and budgeting of an upgrade is usually under the aerodrome operator's control, so too is the timing of works necessary to bring the non-compliant system into compliance with the MOS.

A second Note offers examples of how CASA interprets this standard.

If an approach lighting system requires new light fittings to be installed, for example because the existing fittings can no longer be maintained due to unavailability of spare parts, all aspects of the approach lighting system must be brought into compliance with the MOS, including, for example the photometric characteristics of the new approach lights and the frangibility standards.

If a runway (A) at an aerodrome is lengthened to accommodate larger or heavier aircraft, the runway lights must be extended and threshold and runway end lights relocated. If the existing runway lights, threshold lights or end lights do not comply with the MOS, lengthening runway A is a trigger for bringing all of the lighting on the runway into compliance with the MOS. However, this would not, of itself, trigger the requirement for all of the lighting on runway B at the aerodrome to be brought into compliance with the MOS.

If an apron (A) at an aerodrome is extended to accommodate more or larger aircraft, the changed apron and resultant apron floodlighting must comply with the MOS. However, all of floodlighting on apron A must also comply with the MOS. It would not, of itself, trigger the requirement for non-compliant floodlighting on apron B at the aerodrome to be brought into compliance with the MOS.

Routine maintenance pavement overlays would not, of itself, trigger the replacement of associated non-compliant visual aids.

REASON: to clarify intent.

[4] Subparagraph 9.1.1.2 (d)

Under subparagraph 9.1.1.2 (d), the use of the word "practicable" is explained as allowing CASA to accept some variation to a standard due to insurmountable difficulties in the way of full compliance. If an aerodrome operator believes that compliance with a standard is "impracticable", the onus rests with that operator to demonstrate the impracticability. Previously that demonstration was to be to the satisfaction of "the relevant CASA office". Now, this minor administrative amendment makes it simply to the satisfaction of "CASA".

REASON: To reflect internal CASA responsibilities.

[5] After paragraph 9.1.2.2

Subsection 9.1.2 deals with *Standardisation of aerodrome lighting*.

This is generally to reduce pilot workload, for example by avoiding ragged systems with missing lights.

This amendment seeks further standardisation by providing that, as far as practicable, light fittings with different photometric characteristics must not be mixed in a lighting system.

A Note indicates that it is necessary to ensure, as far as practicable, uniformity in the visual appearance of light in a light system, and further refers to paragraph 9.1.12.6.

REASON: To explicitly state what was previously inferred.

[6] After subparagraph 9.1.4.1 (a)

Subsection 9.1.4 deals with *Minimum lighting system requirements*.

Thus, at an aerodrome opened for night operations a list of facilities must have appropriate lighting.

The amendment adds to the list taxiways used only by aeroplanes of code A or B. For taxiways used only by aeroplanes of code A or B — at least 1 such code A or B taxiway between the runway and the apron must be appropriately lit, with retroreflective markers permitted on the other code A or B taxiways.

This clarifies what was previously in a Note, which is now deleted.

REASON: To delete a Note and restate it as a standard.

[7] Subparagraph 9.1.4.1 (c), the Note

This amendment deletes the Note mentioned above.

[8] After paragraph 9.1.5.3

Subsection 9.1.5 deals with *Primary source of electricity supply* for aerodrome lighting and permits certain stand-alone generators or solar-charged batteries.

A new Note explains, however, that this type of lighting installation is not considered by CASA to be portable lighting. It is considered to be a permanent installation. The lighting system must, therefore, satisfy all of the permanent aerodrome lighting standards, for example light intensity, light colour, frangibility etc.

REASON: Clarification.

[9] After paragraph 9.1.6.1, the Note

Subsection 9.1.6 deals with *Electrical circuitry*.

A new Note explains that some operational credit is available to runways with interleaf circuits. For more information reference is made to Aeronautical Information Publication (AIP) Australia, Part 2 – En Route, ENR 1.1, paragraph “Partial Runway Lighting Failure”.

REASON: Clarification.

[10] After paragraph 9.1.7.3

Subsection 9.1.7 deals with *Secondary power supply*.

This amendment provides that secondary power must be provided to allow the operation of the a list of lighting systems at every runway from which aircraft are intended to take off in runway visual range (***RVR***) conditions less than a value of 800 m. The list of systems is as follows:

(a) runway edge lights;

(b) runway end lights;

(c) runway centreline lights, where provided;

(d) all stop bars, when they are being used;

(e) runway guard lights, when stop bars are not being used;

(f) essential taxiway lights;

(g) essential obstacle lights.

A Note explains "essential" in subparagraph (f). CASA considers taxiway lights essential when their operation is essential to the safety of aircraft operations.

REASON: To specifically deal with secondary power for aircraft taking off.

[11] After paragraph 9.1.8.1

Subsection 9.1.8 deals with *Switch-over time* from 1 power source to another should there be a failure of a normal power source and under paragraph 9.1.8.1, quick switch-over is essential.

The amendment provides that for paragraph 9.1.8.1, alerting of the generators is an acceptable method of achieving very short switch-over times. For this method, before commencement of low visibility, or when weather conditions indicate that the Supply Authority electricity may be susceptible to interruption, the generator(s) are started, and when they come up to speed, the electrical load is connected to them. In the unlikely event that a generator fails, the electrical system must automatically reconnect the load to the Supply Authority power.

A second amendment, paragraph 9.1.8.3, provides that where alerting of the generators is the method adopted for meeting the switch-over times to support Precision Approach CAT II and CAT III approaches, and take-offs in RVR conditions less than a value of 800 m, real time information on the operating status of the generator set(s) and the Supply Authority power must be provided to ATC.

REASON: To specifically deal with switch-overs.

[12] Subsection 9.1.10

Subsection 9.1.10 deals with *Portable lighting*.

This amendment replaces subsection 9.1.10 with a revised version that retains much of the content of the previous subsection 9.1.10 but recasts it and adds some new elements.

Under paragraph 9.1.10.1, portable lights are only for temporary emergency use, and primarily for VFR operations. This is new.

A new Note explains that portable lights may be used at an aerodrome for landings and take-offs. For example, if the aerodrome is intended for regular night operations and, therefore, has a permanent lighting system installed, portable lights may replace unserviceable lights until the permanent lights are urgently repaired. Also, if the aerodrome is not intended for regular night operations and, therefore, does not have a permanent lighting system installed, portable lights may be used for temporary emergencies such as medical emergencies or emergency landings.

Under paragraph 9.1.10.2, portable lights may comprise liquid fuel-burning flares or lamps, battery-powered electric lights or other similar devices. They

must have a substantially omni-directional light output. The later requirement is new.

A new Note explains that because of the variable technology permitted, no light intensity is specified. However, as an indication of adequate light intensity under the weather conditions prevailing at the time of their use, portable runway lights should be visible from a distance of not less than 3 km.

A second new Note explains that the colour of the portable lights should conform to the colour for permanent lights, except that, where the provision of coloured lights at the threshold and the runway end is not practicable, all runway lights may be variable white or as close to variable white as practicable.

Under paragraph 9.1.10.3, if an aerodrome is notified in ERSA as having portable lighting, the portable lights must always be in a serviceable condition and a state of readiness, including clean glasses and either fuel tanks filled or fresh batteries available. In addition, appropriate persons must be trained to deploy the lights and put them into operation without delay when the need arises.

A new Note explains that due to the time required to deploy portable lights, the ERSA entry should include a notation that prior notice of operations is required.

Under paragraph 9.1.10.4, the portable lights must be at the same spacing as permanently installed lights. In addition, they must be level so that the vertical axis is true (this is new), and deployed in such a way that an aircraft can land into the wind.

A Note explains that to allow speedy deployment, the locations of the portable lights should be clearly marked, and the surface appropriately treated and maintained.

Under paragraph 9.1.10.5, for an aircraft arrival, the portable lights must be lit or switched on at least 30 minutes before the estimated time of arrival.

Under paragraph 9.1.10.6, for an aircraft departure, the portable lights must be lit or switched on at least 10 minutes before the time of departure, and retained after take-off for at least 30 minutes or if no air-ground communication exists with the aircraft — for at least 1 hour.

A new Note explains that retention of the portable lights is required for the contingency that an aircraft may need to return to the aerodrome.

REASON: To specifically deal with certain aspects of portable lighting and generally revise the provisions for clarity and updating.

[13] Paragraph 9.1.11.1, the Note

Subsection 9.1.11 deals with *Light fixtures and supporting structures*, including their fitness and frangibility.

A new Note explains that for guidance on frangibility is at ICAO Aerodrome Design Manual, Part 6 – Frangibility, and ICAO Aerodrome Design Manual, Part 4 – Visual Aids, Chapter 15, Frangibility of Visual Aids.

REASON: To update the Note.

[14] After paragraph 9.1.12.5

Subsection 9.1.12 deals with *Elevated and inset lights*.

New paragraph 9.1.12.6 provides that if some inset lights are included in a system of elevated lights, the photometric characteristics of the inset lights must be as close as practicable to those of the elevated lights.

A new Note explains that the standard in this provision is set in terms of "practicability". CASA accepts that some difference in photometric characteristics may be unavoidable as a matter of practicability. In such a case, the resultant non-uniformity of visual appearance of the lighting system would be acceptable to CASA for paragraph 9.1.2.2A.

REASON: Clarification about mixing lights.

[15] Paragraph 9.1.14.9

Subsection 9.1.14 deal with *Light intensity and control*.

Two amendments tighten up the responsibility of certain aerodrome operators where an air traffic service (***ATS***) is in place. Thus, if a lighting system is operated by an ATS provider or a similar responsible person (the ***lighting system operator***), then an automatic monitoring system must provide the lighting system operator with an indication of each lighting system that is on; the intensity of each lighting system that is on; any fault in a lighting system used to control aircraft movement; and the information must be automatically relayed to the lighting system operator position of the operator responsible for the lighting system.

A new provision adds that for subparagraph 9.1.14.9 (b) (automatic relay to the lighting system operator position), the information must be automatically relayed within 2 seconds for a stop bar at a runway-holding position, and 5 seconds for all other types of visual aids.

REASON: To harmonise with ICAO Annex 14.

[16] Subparagraph 9.1.15.1 (a)

Subsection 9.1.15 deals with *Commissioning of lighting systems*.

The amendment clarifies the qualifications of certain persons eligible to do ground checks. Thus, for ground check of compliance with electrical specifications and CASA standards, the person must be an electrical engineer or licensed electrician with such aerodrome lighting knowledge, and experience of aerodrome lighting, as equips him or her to competently perform the compliance checks.

REASON: Clarification and greater specificity.

[17] After paragraph 9.1.15.2

New paragraph 9.1.15.2A provides that for commissioning, evidence that light fitting types, models and versions comply with the standards for photometric and other characteristics as specified in MOS Chapter 9 must be in the form of test reports from a laboratory that is accredited as having the competence to carry out the type of measurement involved, by the National Association of Testing Authorities (***NATA***), or an overseas accrediting authority which has a mutual recognition agreement with NATA.

REASON: Clarification and greater specificity.

[18] Paragraph 9.1.15.8, the Note

This amendment removes a Note and embodies it as a rule in the immediately following amendment.

REASON: A rule is preferred to a Note for this matter.

[19] After paragraph 9.1.15.8

This amendment adds new provisions about night use of runways. Thus, before a runway is opened for night use, the aerodrome operator must assess obstacles within the obstacle limitation surface (***OLS***) area of the aerodrome for obstacle lighting purposes, particularly if the obstacles are within 3 km of the aerodrome.

In addition, copies of all ground check reports, flight check reports, and light fitting laboratory test reports used to support the commissioning of lighting systems must be filed in the aerodrome operator's Aerodrome Manual, kept in the custody, or under the control, of the aerodrome operator for as long as the relevant lighting system remains in service.

REASON: A rule is preferred to a Note for this matter. Retention of documents is formalised.

[20] After subsection 9.3.1, the heading "General"

Subsection 9.3.1 deals with *Pilot activated lighting systems, general.*

A readers' aid is inserted in Note form mentioning subsection 14.3.6 for "AFRU with PAL Features".

REASON: Clarification.

[21] After subparagraph 9.3.1.2 (e)

This amendment adds a new requirement for pilot activated lighting (PAL) systems, namely that intensity must be the following percentage of full intensity, for Day intensity — nominally 100%; for Twilight intensity — nominally 10%; and for Night intensity —nominally 1%.

A Note explains that for guidance in setting up the light sensitive switch, the following values of background luminance are suggested, though other values may be used if they provide a better match to local visibility conditions: Day — background luminance above 500 cd/m^2; Twilight — between 50 and 500 cd/m^2; and Night — below 50 cd/m^2.

REASON: These values were not previously stated in the MOS.

[22] After paragraph 9.4.3.4

Subsection 9.4.3 deals with *Location of obstacle light*s.

The amendment inserts a new paragraph 9.4.3.4A which provides that in the case of a wind farm whose wind turbines must have obstacle lighting, medium intensity lights are to be installed as follows. If any part of the wind turbine, including the rotating blades, penetrates the OLS of an aerodrome, top lights must mark the highest point reached by the rotating blades. (A Note explains that because it is not practicable to install obstacle lights at the tip of the blades, these lights may be located on a separate structure, adjacent to the wind turbine, at a height that corresponds to the highest point of the rotating blade of the turbine.)

If the rotating blades do not penetrate the OLS, the top lights must be placed on top of the generator housing.

Obstacle lights must be provided on a sufficient number of individual wind turbines to indicate the general definition and extent of the wind farm, with intervals between lit turbines not exceeding 900 m.

All of the obstacle lights on a wind farm must be synchronised to flash simultaneously.

The downward component of obstacle lighting may be shielded so that no more than 5% of the nominal light intensity is emitted at or below 5^o below horizontal, and so that no light is emitted at or below 10^o below horizontal.

To prevent obstacle light shielding by the rotating blades, 2 lights must be provided on top of the generator housing in a way that allows at least 1 of the lights to be seen from every angle in azimuth.

REASON: The specific case of wind farms was not previously dealt with by the MOS.

[23] Paragraph 9.4.3.9, Figure 9.4-1

This amendment corrects a typographical error and improves depiction of the differences in the 2 obstacles.

[24] Paragraph 9.4.10.3

Subsection 9.4.10 deals with *Ongoing availability of obstacle lights*.

A revised paragraph 9.4.10.3 provides that for an obstacle located within the OLS area of the aerodrome if there is an obstacle light outage, the aerodrome operator must immediately request the NOTAM office to advise pilots of the details of the outage; and, as soon as practicable, liaise with the owner of the obstacle light so that the outage is repaired as quickly as practicable. If the aerodrome has been notified by CASA that it must close upon the failure of a specified obstacle light considered by CASA to be essential for safety, the aerodrome operator must immediately notify CASA of the failure. A Note indicates that information on requesting NOTAM action is in Chapter 10, Section 10.3.

A new paragraph 9.4.10.3A provides that the aerodrome operator's Aerodrome Manual must include the procedures to be followed when an obstacle light outage occurs; and details of any CASA notification that the aerodrome must close upon the failure of a specified obstacle light considered by CASA to be essential for safety.

REASON: Clarification.

[25] After paragraph 9.6.1.1

Subsection 9.6.1 deals with *Illuminated wind direction indicators, general*. A new Note explains that wind direction indicators must be provided in accordance with Section 8.7

[26] Paragraph 9.6.1.3, including the Note

This amendment expands the requirements for illuminated wind direction indicators.

Under paragraph 9.6.1.3, an illuminated wind direction indicator (***IWDI***) must be illuminated by floodlighting from above.

Under paragraph 9.6.1.3A, an IWDI installed on or after 1 July 2011 must be illuminated by at least 4 lamp units which together provide between 100 and 600 lux illumination on any point of the horizontal plane passing through the top of the IWDI sleeve at the supporting pole end for the 360^o area swept by the fully extended sleeve.

A Note explains that an acceptable method of testing for illumination compliance is to measure illumination levels on the horizontal plane passing through the top of the sleeve at the pole end. Measurements should be taken at 1 m intervals starting at the pole and working outwards on a radial to the pole to a range equal to the length of the fully extended sleeve. The outermost interval on each radial may be less than 1 m to correspond with the actual length of the sleeve. The radials should be at 30^{o} intervals. Each reading should be in the range 100 to 600 lux.

Under paragraph 9.6.1.3B, the lighting must have accurate colour rendering, and no perceptible warm-up or restrike delay.

Under paragraph 9.6.1.3C, an IWDI installed before 1 July 2011 must be illuminated:

(a) in accordance with paragraphs 9.6.1.3A and 9.6.1.3B; or

(b) as follows:

(i) four 200W 240V tungsten filament general purpose lamps in either vertical elliptical industry reflectors, or round deep bowl reflectors, between 1.8 m and 2.2 m above the mid-height of the sleeve mounting, and between 1.7 m and 1.9 m radial distance from the axis of rotation of the wind sleeve; or

(ii) eight 120W 240V PAR 38 flood lamps in reflectorless fittings, between 1.8 m and 2.2 m above the mid-height of the wind sleeve mounting, and between 1.7 m and 1.9 m radial distance from the axis of the rotation of the wind sleeve; or

(iii) some other method of floodlighting which:

(A) produces lighting equivalent to that provided under sub-subparagraph 9.6.1.3C (b) (i) or (ii); and

(B) has accurate colour rendering; and

(C) has no perceptible warm-up or restrike delay.

REASON: New performance based standards are added to the MOS.

[27] Paragraph 9.6.1.4, including the Note

This amendment provides that the floodlighting is to be aimed and shielded to ensure that it causes neither glare nor distraction to pilots.

A Note explains that an acceptable method of testing for compliance is as follows: from an observer's standing position on ground that is level with the base of the pole, there should be no glare at a range of 25 m or more. The assessment need only be made from those directions likely to be viewed from landing, taking-off or taxiing aircraft.

REASON: New performance-based standards are added to the MOS.

[28] Paragraph 9.9.1.10

Subsection 9.9.1 deals with Visual Approach Slope Indicator Systems, general.

Paragraph 9.9.1.10 is deleted because it duplicates the terms of another provision.

[29] Paragraph 9.9.4.8, Figure 9.9-6, the Key

Subsection 9.9.4 deals with *Precision approach path indicator (PAPI) systems*. This amendment corrects a typographical error (METH should be MEHT).

[30] Paragraph 9.10.11.3

Subsection 9.10.11 deals with *Pattern of low intensity and medium intensity runway threshold lights*. Paragraph 9.10.11.3 provides that subject to paragraph 9.10.11.6 (see below), only an aerodrome used predominantly for training and general aviation may use the alternative pattern of low intensity or medium intensity runway threshold lights as described in paragraph 9.10.11.5.

REASON: Clarification and simplification.

[31] After paragraph 9.10.11.5

This amendment inserts a new paragraph 9.10.11.6 so that on and after 1 June 2010, an aerodrome may use the alternative pattern of low intensity or medium intensity runway threshold lights in paragraph 9.10.11.5 only if:

(a) the aerodrome was using, and was entitled to use, the alternative pattern immediately before 1 June 2010; and

(b) the aerodrome operator continues to comply with the alternative pattern on and after that date.

REASON: Clarification and simplification.

[32] Subparagraph 9.10.17.1 (c)

Subsection 9.10.17 deals with *Location of runway end lights*.

This amendment provides that for a taxiway for exiting a runway, a runway turning area, or other similar areas, the runway end lights must be located in such a way that an aircraft using the area will not be required to cross the row of red lights comprising the runway end lights.

REASON: Clarification.

[33] Paragraph 9.10.24.1, including the Note

Subsection 9.10.24 deals with *Runway centreline lights*.

This amendment provides that runway centreline lights must be provided on a CAT II or CAT III precision approach runway, and on a runway intended for take-offs with an operating minimum below an RVR of 350 m.

A Note explains that runway centreline lights are also recommended for CAT I precision approach runways, and runways intended for take-offs with an operating minimum equal to or above an RVR of 350 m, if the distance between the runway edge lights is greater than 50 m.

REASON: The take-off case was not previously specified. The MOS now harmonises with ICAO Annex 14.

[34] Paragraph 9.10.24.2

This amendment inserts 350 m for 300 m to reflect the fact that, consistent with ICAO, Annex 14, 350 m is the minimum RVR.

REASON: To harmonise with ICAO.

[35] Section 9.11, Figure 9.11-8, the Notes, No. 1, the values for "a"

Subsection 9.11.1 deals with *Isocandela diagrams of runway lighting*.

The amendment corrects a value for "a" in a table in the Notes.

REASON: This amendment corrects a typographical error in the values.

[36] Paragraph 9.13.1.1

Subsection 9.13.1 deals with *Provision of taxiway centreline lights*.

This amendment provides that unless the aerodrome has light traffic density, a taxiway intended for use in RVR conditions less than a value of 350 m must have centreline lights that provide continuous guidance between the runway centreline and the apron.

REASON: Changes the existing CAT II and CAT III criteria to RVR criteria to harmonise with ICAO Annex 14.

[37] Paragraph 9.13.1.2

This amendment provides that a taxiway intended for use at night in RVR conditions of between 350 m and 1 200 m must have centreline lights unless the aerodrome has a simple layout, or light traffic density.

REASON: Changes the existing CAT I criteria to RVR criteria to harmonise with ICAO Annex 14.

[38] Subparagraph 9.13.2.2 (c)

Subsection 9.13.2 deals with *Provision of taxiway edge lights*. This amendment corrects a typographical error.

[39] Paragraph 9.13.3.1

Subsection 9.13.3 deals with *Taxiway markers*.

The amendment revises the provisions so that paragraph 9.13.3.1 provides that for code letter A or B taxiways, retroreflective taxiway centreline or edge markers may be used instead of taxiway centreline or edge lights, provided at least 1 taxiway from the runway to the apron has taxiway centreline or edge lights.

Paragraph 9.13.3.2 provides that if taxiway centreline lights are not provided, taxiway centreline markers may be used to improve guidance on the taxiway, or to supplement taxiway centreline marking, or taxiway edge markers or taxiway edge lights.

A Note explains that curves and intersections are examples of where improved guidance or supplementation may be given.

Paragraph 9.13.3.3 provides that if taxiway edge lights are not provided, taxiway edge markers may be used to improve guidance on the taxiway, or to supplement taxiway edge marking, or taxiway centreline markers or taxiway centreline lights.

A Note explains that curves, intersections and apron edges are examples of where improved guidance or supplementation may be given.

REASON: To more accurately reflect the standards in ICAO Annex 14.

[40] Paragraph 9.13.8.1, Table 9.13-1, Type

Subsection 9.13.8 deals with *Spacing of taxiway centreline lights*.

This amendment changes the existing CAT I, CAT II and CAT III criteria to RVR criteria (straight sections of taxiway).

REASON: To harmonise with ICAO Annex 14.

[41] Paragraph 9.13.8.3

This amendment provides that for a taxiway entering a runway the last taxiway centreline light must be not more than 1 m outside the line of runway edge lights. Also, if the taxiway centreline lights continue towards the runway centreline, they must end no closer than 1.2 m from the runway centreline.

REASON: This clarifies the intent of the standard.

[42] Paragraph 9.13.8.5, Table 9.13-2, Type

This amendment changes the existing CAT I, CAT II and CAT III criteria to RVR criteria (curved sections of taxiway).

REASON: To harmonise with ICAO Annex 14.

[43] After paragraph 9.13.11.4

Subsection 9.13.11 deals with *Characteristics of taxiway centreline lights*.

New paragraph 9.13.11.5 more clearly states a standard that where the taxiway centreline lights cross a runway, the colour of the taxiway centreline lights viewed by a pilot of an aircraft entering the runway from the taxiway must be green up to the runway centreline; and alternately green and yellow beyond the runway centreline while exiting on the other side of the runway.

REASON: To more clearly state the standard.

[44] Paragraph 9.13.12.3

Subsection 9.13.12 deals with *Beam dimensions and light distribution of taxiway centreline lights*.

This amendment is a modification to provide that on a taxiway intended for use in RVR conditions of 350 m or greater, taxiway centreline lights must comply with the specifications set out in Section 9.14, Figure 9.14-1 or Figure 9.14-2, whichever is applicable. This amendment changes the existing CAT I, and CAT II criteria to RVR criteria.

REASON: To harmonise with ICAO Annex 14.

[45] Paragraph 9.13.12.4

This amendment provides that on a taxiway intended for use in RVR conditions of less than a value of 350 m, the taxiway centreline lights must comply with the specifications set out in Section 9.14, Figure 9.14-3, Figure 9.14-4 or Figure 9.14-5, whichever is applicable. This amendment changes the existing CAT III criteria to RVR criteria.

REASON: To harmonise with ICAO Annex 14.

[46] Subsection 9.13.16

Subsection 9.13.16 deals with *Provision of runway guard lights*.

The subsection is redrafted for clarity and to change the existing CAT I, CAT II and CAT III criteria to RVR criteria.

REASON: To harmonise with ICAO Annex 14 and to allow aerodromes where runway guard lights are not mandatory to install them if they wish.

For reference, the redrafted subsection provides as follows:

9.13.16 Provision of Runway Guard Lights

Notes:

1. Runway guard lights are sometimes colloquially referred to as "wig wags".
2. The purpose of runway guard lights is to warn pilots and drivers of vehicles operating on taxiways that they are about to enter an active runway.
3. Runway guard light standards became applicable in Australia on and from 1 August 2004.

9.13.16.1 Runway guard lights must be provided at the intersection of a taxiway with a runway intended for use in:

(a) RVR conditions less than a value of 550 m where stop bars are not installed; or

(b) RVR conditions of values between 550 m and 1 200 m where the traffic density is heavy.

9.13.16.2 An aerodrome that is not required to provide runway guard lights may choose to do so as an aid to reducing runway incursions.

Note Paragraph 9.13.16.3 would apply.

9.13.16.3 Subject to paragraph 9.13.16.5, if runway guard lights are introduced for a runway, they must:

(a) be introduced and used at all taxiways which allow access to the runway; and

(b) as far as practicable, be introduced at all taxiways at the same time; and

(c) if introduced in stages — be introduced in a way that removes any risk of confusion.

9.13.16.4 Runway guard lights are not required for a taxiway if:

(a) the taxiway is used only for exiting from the runway; and

(b) the taxiway cannot be used for entry to the runway.

9.13.16.5 Paragraph 9.13.16.3 does not apply if an aerodrome that is not required and has not chosen to be equipped with runway guard lights installs such lights only at an identified runway incursion hot spot.

[47] Paragraph 9.13.23.1

Subsection 9.13.23 deals with *Stop bars*.

A modified paragraph 9.13.23.1 provides that if a runway is intended to be used in RVR conditions less than a value of 550 m, a stop bar must be provided at each runway holding position serving the runway.

9.13.23.1A provides that paragraph 9.13.23.1 does not apply if:

(a) operational procedures ensure that in RVR conditions less than a value of 550 m:

(i) aircraft on the manoeuvring area are limited to 1 at a time; and

(ii) vehicles on the manoeuvring area are limited to the minimum essential for safe aerodrome operations; or

(b) appropriate aids and procedures designed to prevent the inadvertent incursion of aircraft or vehicles on to the runway are:

(i) proposed in writing by the aerodrome operator; and

(ii) approved in writing by CASA, and

(iii) in force for the runway.

Note Stop bars require direct ATC control. Therefore, an aerodrome operator must consult with ATC before planning their introduction.

REASON: This amendment changes the existing CAT II and CAT III criteria to RVR criteria to harmonise with ICAO Annex 14.

[48] Paragraph 9.13.26.1

Subsection 9.13.26 deals with *Taxiway edge markers*.

This amendment modifies paragraph 9.13.26.1 to provide that where taxiway edge markers are used, they must be installed at least in the same locations as taxiway edge lights would have been installed had they been used.

A Note explains that taxiway edge markers must be used in accordance with subsection 9.13.3.

REASON: To achieve greater clarity and consistency with ICAO Annex 14.

[49] Paragraph 9.13.27.1

Subsection 9.13.27 deals with *Characteristics of taxiway edge markers*.

This amendment modifies paragraph 9.13.27.1 to provide that taxiway edge markers must be retroreflective blue.

REASON: Consistency in language.

[50] Paragraph 9.13.28.1

Subsection 9.13.28 deals with *Taxiway centreline markers*.

This amendment modifies paragraph 9.13.28.1 to provide that where taxiway centreline markers are used, they must be installed at least in the same locations as taxiway centreline lights would have been installed had they been used.

A Note explains that taxiway centreline markers must be used in accordance with subsection 9.13.3.

REASON: Clarification and consistency with ICAO Annex 14.

[51] Paragraph 9.13.29.1

Subsection 9.13.29 deals with *Characteristics of taxiway centreline markers*.

This amendment modifies paragraph 9.13.29.1 to provide that taxiway centreline markers must be retroreflective green.

REASON: Consistency in language.

[52] Subsection 9.14.1, Figure 9.14-1, the title

Section 9.14 deals with *Isocandela diagrams for taxiway lights*.

This amendment modifies the title of a figure in the subsection as follows:

Figure 9.14-1: Isocandela Diagram for Taxiway Centreline Lights and Stop Bar Lights on Straight Sections of Taxiways intended for use in RVR conditions of 350 m or greater.

REASON: To reflect changes of CAT I, CAT II and CAT III criteria to RVR to harmonise with previous amendments and with ICAO Annex 14.

[53] Subsection 9.14.1, Figure 9.14-2, the title

This amendment modifies the title of a figure in the subsection as follows:

Figure 9.14-2: Isocandela Diagram for Taxiway Centreline Lights and Stop Bar Lights on Curved Sections of Taxiways intended for use in RVR conditions of 350 m or greater.

REASON: To reflect changes of CAT I, CAT II and CAT III criteria to RVR to harmonise with previous amendments and with ICAO Annex 14.

[54] Subsection 9.14.1, Figure 9.14-3, the title

This amendment modifies the title of a figure in the subsection as follows:

Figure 9.14-3: Isocandela Diagram for Taxiway Centreline Lights and Stop Bar Lights on Taxiways intended for use in RVR conditions of less than a value of 350 m — for use on straight sections of taxiway where large offsets can occur. Also for Runway Guard Lights Configuration B.

REASON: To reflect changes of CAT I, CAT II and CAT III criteria to RVR to harmonise with previous amendments and with ICAO Annex 14.

[55] Subsection 9.14.1, Figure 9.14-3, Notes: 1.

This amendment modifies a Note to explain that the beam coverages of Figure 9.14-3 allow for displacement of the cockpit from the centreline of up to 12 m and are intended for use before and after curves.

REASON: To correct an error in the original Note 1.

[56] Subsection 9.14.1, Figure 9.14-4, the title

This amendment modifies the title of a figure in the subsection as follows:

Figure 9.14-4: Isocandela Diagram for Taxiway Centreline Lights and Stop Bar Lights on Taxiways intended for use in RVR conditions of less than a value of 350 m — for use on straight sections of taxiway where large offsets do not occur.

REASON: To reflect changes of CAT I, CAT II and CAT III criteria to RVR to harmonise with previous amendments and with ICAO Annex 14.

[57] Subsection 9.14.1, Figure 9.14-5, the title

This amendment modifies the title of a figure in the subsection as follows:

Figure 9.14-5: Isocandela Diagram for Taxiway Centreline Lights, and Stop Bar Lights on Taxiways intended for use in RVR conditions of less than a value of 350 m — for use on curved sections of taxiway.

REASON: To reflect changes of CAT I, CAT II and CAT III criteria to RVR to harmonise with previous amendments and with ICAO Annex 14.

[58] Section 9.15, Figure 9.15-1, the title

Section 9.15 deals with *Illustrations of taxiway lighting.*

This amendment modifies the title of a figure in the section as follows:

Figure 9.15-1 (a): Typical Taxiway Centreline Lights Layout.

REASON: Clarification.

[59] Section 9.15, after Figure 9.15-1 (a)

This amendment inserts a clear diagram to illustrate additional aspects of the standard (**Figure 9.15-1b:Typical Taxiway Centreline Lights Layout)**.

REASON: Clarification.

[60] Paragraph 9.16.4.8

Subsection 9.16.4 deals with *Characteristics of apron floodlighting*.

Paragraph 9.16.4.8 is a minor amendment to ensure that both existing floodlights and proposed floodlights are covered by the provisions.

REASON: Clarification.

[61] After paragraph 9.16.4.8

New paragraph 9.16.4.9 provides that each minimum illuminance value mentioned in Section 9.15 is maintained illuminance below which the actual value must not fall.

New paragraph 9.16.4.10 provides that each floodlight design must meet a target value which allows for a depreciation and maintenance factor that is appropriate for the particular floodlighting system.

A Note explains that the floodlight designer may choose the factor provided it is appropriate for the particular floodlighting system.

New paragraph 9.16.4.11 provides that the design, installation, verification and subsequent management of an apron floodlighting system must be in accordance with Australian Standard AS/NZS 3827.1, *Lighting system performance – Accuracies and tolerances. Part 1: Overview and general recommendations.*

REASON: The intent of the standard was not reflected in the previous words. Also, invoking the Australian standard clarifies the intent.

[62] Paragraph 9.17.7.3

Subsection 9.17.7 deals with *Parking position identification sign*.

Modified paragraph 9.17.7.3 provides that a parking position identification sign must consist of a numeric or alphanumeric inscription that is in white on a black background, and illuminated at night by a continuous line of green light outlining the inscription.

A Note explains that green neon tubing illumination is satisfactory.

REASON: Clarification of existing standard.

[63] Paragraph 9.19.1.1

Subsection 9.19.1 deals with *Vehicle warning lights*. This amendment corrects a typographical error by omitting “are” and inserting “must be”.

[64] Paragraph 9.20.2.5, the Note

Subsection 9.20.2 deal with *Reporting of aerodrome lighting outage*.

A modified Note provides that for this section, a lighting system means lights used to illuminate a particular facility, for example:

(a) all of the lights used to mark a threshold; or

(b) all of the lights used to mark a runway end; or

(c) all of the runway edge lights on a runway; or

(d) all of the taxiway centreline lights on a length of taxiway between intersections.

REASON: Clarity.

[65] After paragraph 9.20.2.8

This new amendment 9.20.2.9 provides that for a movement area guidance sign, the sign must be legible at all times and any lamp outage in a sign must be fixed as soon as practicable.

A Note explains that no specific standard is specified for the critical number of lamps on outage in an illuminated movement area guidance sign. The key requirement is the legibility of the sign inscription at all times.

A second Note explains that the failure of movement area guidance sign illumination is not subject to notification by NOTAM.

REASON: Previously, signs were not specifically addressed in this context.

[66] Subsection 9.21.1

Subsection 9.21.1 deals with *Advice to lighting designers*.

Modified paragraph 9.21.1.1 provides that Section 9.21 (*Lighting in the vicinity of aerodromes*) supersedes a paper of the same name dated July 1988 issued by the Civil Aviation Authority and referred to in Australian Standard AS 4282-1997, *Control of the obtrusive effects of outdoor lighting*.

A new subsection 9.21.1A, titled *Purpose of the Section* is added.

New paragraph 9.21.1A.1 provides that Section 9.21 provides advice to those involved in the design or provision of lighting systems for use at or in the vicinity of an aerodrome. The intention is to minimise the potential hazard to aircraft operations from the lighting systems.

New paragraph 9.21.1A.2 provides that if an aerodrome operator becomes aware that a lighting installation is proposed to be or is being installed in the vicinity of the aerodrome, it is in the aerodrome's interest to make sure that the person responsible for the lighting system is made aware of the contents of this section.

REASON: To add reference to the Australian standard and clarification.

[67 and 68] Subsection 9.21.2, the heading

Subsection 9.21.2 is an Introduction for lighting designers.

The amendments modify a heading and replicates regulation 94, Dangerous lights, from the *Civil Aviation Regulations 1988*.

REASON: To show the up-to-date version of regulation 94.

[69] After subsection 14.3.6

Subsection 14.3.6 deals with ARFU with PAL features.

This amendment adds a new Note to refer readers to Section 9.3 for standards for PAL.

REASON: For convenience of readers of the MOS.