Australian Government
Civil Aviation Safety Authority

# ADVISORY CIRCULAR

# AC 139.C-09 v1.0


# Visual Aids, Markings, Signals and Signs

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|---|---|
| **Date** | September 2020 |
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Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

**Advisory Circulars should always be read in conjunction with the relevant regulations.**

# Audience

This advisory circular (AC) applies to:

- aerodrome owners/operators
- aircraft operators
- the Civil Aviation Safety Authority (CASA).

# Purpose

The purpose of this AC is to provide guidance that complements the rules prescribed in the Part 139 Manual of Standards (MOS), as well as promote awareness of the operational significance of each aid. The uniformity of the application of visual aids from one aerodrome to another will enhance safety and improve efficiency.

Regular inspection and maintenance programs are integral to ensure the conspicuity of all visual aids, markings, signals and signs are not degraded.

Visual aids required for the management of works on the aerodrome are outside the scope of this AC and are addressed in AC 139.C-15 'Safe planning and conduct of aerodrome works'.

# For further information

For further information, contact CASA's Personnel Licensing, Aerodromes and Air Navigation Standards (telephone 131 757).

Unless specified otherwise, all subregulations, regulations, divisions, subparts and parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

# Status

This version of the AC is approved by the Branch Manager, Flight Standards.

| Version | Date | Details |
|---|---|---|
| v1.0 | September 2020 | Initial release of this AC. |

# Contents

# 1 Reference material

## 1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

| Acronym | Description |
|---|---|
| AC | advisory circular |
| AIS | Aeronautical Information Service |
| AIP | Aeronautical Information Publication |
| ATC | Air Traffic Control |
| CAR | *Civil Aviation Regulations 1988* |
| CASA | Civil Aviation Safety Authority |
| CASR | *Civil Aviation Safety Regulations 1998* |
| HIRL | high intensity runway lighting |
| IWDI | Illuminated wind direction indicator |
| LAHSO | land and hold short operations |
| LIRL | low intensity runway lighting |
| MAGS | movement area guidance sign |
| MIRL | medium intensity runway lighting |
| MOS | *Part 139 (Aerodromes) Manual of Standards 2019* |
| RV | runway visibility |
| RVR | runway visual range |
| VASIS | visual approach slope indicator system |
| WDI | wind direction indicator |

## 1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below.

| Term | Definition |
|---|---|
| displaced threshold | A threshold not located at the extremity of a runway. |
| ILS critical area | An area about the localizer and glide path antennas where vehicles and aircraft must be excluded during all ILS operations because the presence of vehicles or aircraft inside the area will cause unacceptable disturbance to the ILS signal-in-space. |
| ILS sensitive area | An area extending beyond the ILS critical area:<br>(a) where the parking and movement of vehicles and aircraft is controlled to prevent the possibility of unacceptable interference to the ILS signal during |

| Term | Definition |
|---|---|
| | ILS operations; and<br>(b) which is protected against interference caused by large moving objects outside the ILS critical rea but still normally within the airfield boundary. |
| intermediate holding position | A designated holding position for traffic control at which taxiing aircraft and vehicles:<br>(a) must stop and hold only if so instructed by the aerodrome control tower; and<br>(b) if so stopped, must not proceed until given clearance by the aerodrome control tower. |
| rapid exit taxiway | A taxiway connected to a runway at an acute angle, designed to allow landing aeroplanes to turn off the runway at higher speeds than are achieved on exit taxiways, thereby minimising runway occupancy times. |
| replacement | For an existing aerodrome facility, this means completion of any activity in relation to the facility which, not being merely maintenance, results in the substitution of a new aerodrome facility for the existing aerodrome facility. |
| stopway | A defined area on the ground at the end of the take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off. |
| taxiway | A defined path on an aerodrome on land, established for the taxiing of aircraft from one part of an aerodrome to another. A taxiway includes a taxilane, an apron taxiway, and a rapid exit taxiway. |
| upgrade | For an existing aerodrome facility, this means any change to the facility which, for the first time after commencement of this MOS, enables any of the following changes to aircraft operations using the facility, namely, a change:<br>a. from day VFR operations, to night VFR operations<br>b. from non-instrument approaches, to non-precision instrument approaches<br>c. from non-precision instrument approaches, to precision instrument approaches<br>d. from precision CAT I approaches to precision CAT II, or CAT III approaches<br>e. which enables aircraft take-offs and aerodrome surface movements in runway visibility, or RVR conditions of less than 550 m<br>f. which enables the aerodrome to accommodate aircraft of a higher category specified in the ARC under section 4.01 of the MOS than was the case before the change<br>g. which enables the aerodrome to accommodate aircraft on scheduled international operations. |

## 1.3 References

### Regulations

Regulations are available on the Federal Register of Legislation website https://www.legislation.gov.au/

| Document | Title |
|---|---|
| Part 139 of CASR | Aerodromes |
| Part 139 MOS | Part 139 (Aerodromes) Manual of Standards |

### Advisory material

CASA's advisory circulars are available at http://www.casa.gov.au/AC

CASA's Civil Aviation Advisory Publications are available at http://www.casa.gov.au/CAAP

| Document | Title |
|---|---|
| AC 139.C-10 | Aerodrome lighting |
| AC 139.C-11 | Commissioning of aerodrome lighting systems |
| AC 139.C-15 | Safe planning and conduct of aerodrome works |

# 2 Aerodrome lighting

## 2.1 Introduction

2.1.1 Aerodrome lighting provides guidance to pilots and ground personnel when operating on the aerodrome at night or in reduced visibility.

2.1.2 Lighting systems vary in complexity. The type of lighting required will largely be influenced by the aerodrome's instrument classification. The appearance, uniformity and intensity requirements are described in AC 139.C-10 'Aerodrome lighting'.

2.1.3 With the exception of portable lighting (that is only to be used during an emergency (i.e. a medical emergency or an emergency landing) or, when the permanent lighting system is temporary unavailable), aerodrome lighting is required to be commissioned before being made available for use[1]. Once commissioned, the particulars of each aerodrome lighting system are to be provided to the Aeronautical Information Service (AIS) for publication in the Aeronautical Information Publication (AIP) and on the aerodrome charts. This will occur either at the time of certifying the aerodrome[2], or following an upgrade.[3] A record will also be required in the aerodrome manual.

## 2.2 Aerodrome beacons

2.2.1 An aerodrome beacon assists pilots in locating an aerodrome that may be difficult to identify at night, i.e. due to the surrounding terrain, proximity of other aerodromes, or a lack of navigation aids.

2.2.2 An aerodrome beacon is not mandatory. When provided, it is required to be visible from all angles of the azimuth and situated in an area that has low level background light. It must not interfere with other visual aids or impair the vision of pilots on approach.

2.2.3 The colour and flash rates are to comply with the specifications prescribed in Division 5, Chapter 9 of the MOS.

## 2.3 Illuminated wind direction indicators

2.3.1 An illuminated wind direction indicator (IWDI) is intended to provide pilots at night with a clear indication of the direction of the wind and the wind speed on the ground at the aerodrome.

2.3.2 Unless restricted to day operations only, aerodromes require at least one IWDI. In the absence of wind information being broadcast by ATC or on the AWIS, the WDI provided at the threshold of an instrument runway is to be lit.

2.3.3 Additional guidance on the provision of a wind direction indicator (WDI) is contained in Chapter 4 of this AC.

2.3.4 Illumination and activation requirements are to comply with the specifications prescribed in Division 5, Chapter 9 of the MOS.

[1] Refer AC 139.C-11 'Commissioning of aerodrome lighting systems'.
[2] Refer AC 139.B-01 'Applying for aerodrome certification'
[3] Refer AC 139.C-05 'Aeronautical information reporting and validation'

## 2.4 Approach lighting systems

2.4.1 An approach lighting system enables the transition from instrument flight to visual flight for landing.

2.4.2 Approach lighting systems vary in their configuration and sophistication. Simple approach lighting systems normally commence 420 m prior to the runway threshold, while a full precision approach CAT I, II or III lighting system normally commences up to 900 m prior to the runway threshold.

2.4.3 Where it is not possible to install a full-length system, e.g. due to terrain or water, a reduced length approach lighting system may be considered. It is important to understand that a shortened approach lighting system may impact the landing minima associated with the instrument approach procedure.

2.4.4 The lighting characteristics, intensity, and installation tolerances are to comply with the specifications prescribed in Divisions 6, 7 and 8 of Chapter 9 of the MOS.

## 2.5 Visual approach slope indicator systems

2.5.1 Each light unit of a visual approach slope indicator system (VASIS) projects a beam of light that provides a pilot with the required angle of approach as well as clearance over any obstacles within the approach. The slope of the VASIS needs to be aligned to the approach gradient.

2.5.2 A VASIS is required to be provided at an aerodrome where the runway is used at least once a week for air transport operations by jet aircraft.

2.5.3 The provision of a VASIS should also be provided where the:

- presence of hazards may pose a serious risk:
  - on approach
  - in the event an aircraft undershoots or overruns the runway
- aerodrome is subject to extreme windshear.

2.5.4 The type of VASIS, their characteristics, intensity, positioning, elevation, and approach slope, as well as the provision of an obstacle assessment surface, are to comply with the specifications prescribed in Division 9, Chapter 9 of the MOS.

## 2.6 Runway edge lights

2.6.1 Runway edge lights delineate the area available to pilots for landing and take-off at night or in reduced visibility.

2.6.2 A permanent runway edge lighting system is required to be installed on a:

- runway intended for use at night
- precision approach runway intended for use by day or night
- runway intended for take-off with an operating minimum below 350 m RVR.

2.6.3 Runway edge lights are classified according to their intensity of brightness:

- high intensity runway lights (HIRL)
- medium intensity runway lights (MIRL)

- low intensity runway lights (LIRL).

2.6.4 HIRL and MIRL systems have variable intensity controls, LIRL systems have only one intensity setting.

2.6.5 Runway edge lights consist of two parallel rows of lights equidistant from the runway centreline. They may be elevated or inset and are to be situated along the declared edge of the runway, or outside the declared edge by not more than 3 m. The only exceptions are where:

- there has been a reduction in the declared runway width. In this instance the runway edge lights may be left in situ until the lighting is either replaced or upgraded provided that:
  - the reduced width of the runway has been published in the AIP
  - a record is maintained in the aerodrome manual.
- the runway is less than 30 m wide. In this instance the runway edge lights are to be placed as if the runway is 30 m wide.

2.6.6 Runway edge lights are usually white except on instrument precision runways where the white lights will change to yellow and then red as the aircraft reaches the runway end.

2.6.7 Where a threshold is displaced the lights between the beginning of the runway and the displaced threshold should show red in the approach direction.

2.6.8 The location, interval distances, characteristics, and pattern requirements are to comply with the specifications prescribed in Division 10, Chapter 9 of the MOS.

## 2.7 Runway threshold lights

2.7.1 Runway threshold lights are required on a runway that has runway edge lights.

2.7.2 Runway threshold lights are green and indicate the start of the available landing distance. They are only to be visible on the approach.

2.7.3 Green threshold wing bar lights may also be provided where there is a need to further highlight the threshold location.

2.7.4 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 10, Chapter 9 of the MOS.

## 2.8 Runway end lights

2.8.1 Runway end lights are required on a runway that has runway edge lights.

2.8.2 Runway end lights are red and mark the extremity of the runway that is available for manoeuvring. They should only be seen in the direction of the runway in use.

2.8.3 A gap in runway end lights is permissible where a starter extension is provided. A pilot is not permitted to cross a row of red end lights in any other circumstance.

2.8.4 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 10, Chapter 9 of the MOS.

## 2.9 Stopway lights

2.9.1 A stopway is an area at the end of the take-off run available and provides an additional surface area for an aircraft to stop in the case of an abandoned take-off.

2.9.2 A stopway is not mandatory. Where provided, a stopway that is longer than 180 m and intended for use at night is required to be lit with red edge and end lighting that is not visible to a pilot on approach.

2.9.3 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 10, Chapter 9 of the MOS.

## 2.10 Hold short lights

2.10.1 Hold short lights are used to indicate the hold point on a runway that is intended to accommodate land and hold short operations (LAHSO). When installed the lights should be on at all times LAHSO is in effect.

2.10.2 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 10, Chapter 9 of the MOS.

## 2.11 Runway starter extension lighting

2.11.1 A runway starter extension may be established where additional take off distance, take off run, or accelerate-stop distance is required. A runway starter extension is not to exceed 150 m in length without CASA approval.

2.11.2 If available for night use, the starter extension component of the runway should have edge lighting that shows red on approach (refer 2.6.7) and blue in the opposite direction. Additional blue taxiway edge lighting is also required.

2.11.3 The location, interval distances and lighting characteristics are to comply with the specifications provided in the MOS. As there are no illustrations provided, pictorial lighting and marking guidance showing aircraft access either through the provision of a by-pass pad (Figure 1) or a gap in the runway end lights (Figure 2) is contained below.

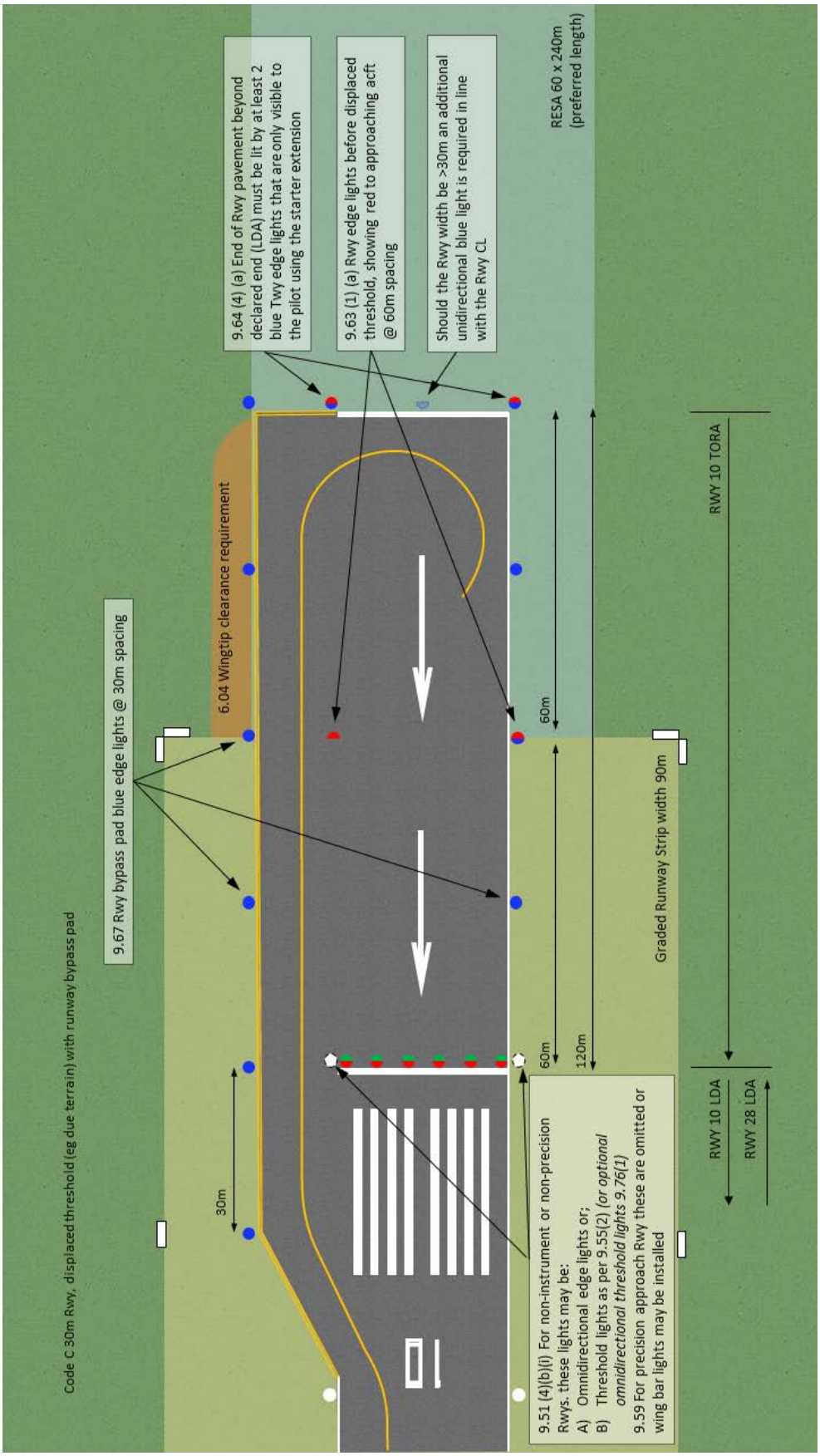


**Figure 1. Runway starter extension bypass pad.**

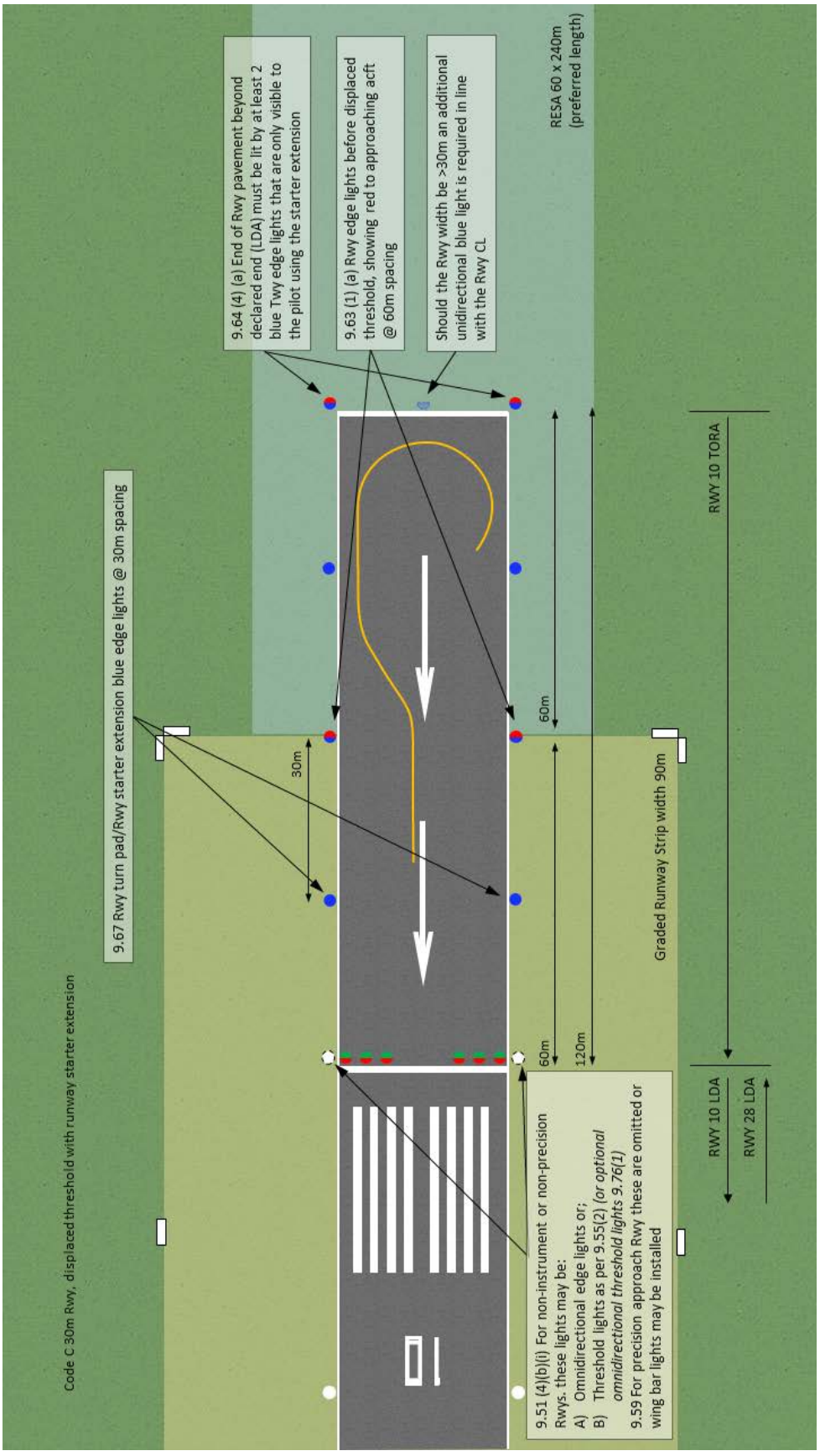


**Figure 2. Runway starter extension gap in runway end lights.**

## 2.12 Runway centreline lights

2.12.1 In addition to runway edge lights, high intensity runway centreline lighting is required to be provided on a:

- precision approach CAT II or III runway
- runway intended for take-off with an operating minimum below 350 m RVR.

2.12.2 CASA also recommends the provision of runway centreline lights where the lateral spacing between the runway edge light intervals are greater than 50 m (i.e. side to side) on a:

- precision approach CAT I runway
- runway intended for take-off with an RVR greater than 350 m.

2.12.3 Runway centreline lighting is colour coded in order to warn a pilot of the approaching end of the runway. White lights will change to alternate white/red (2 x white, 2 x red), and then red only as the aircraft reaches the runway end.

2.12.4 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 10, Chapter 9 of the MOS.

## 2.13 Simple touchdown zone lights

2.13.1 In all visibility conditions simple touchdown zone lights may be provided to enhance a pilot's situational awareness by providing clear guidance on the area in which the aircraft should make initial contact with the runway when performing a landing manoeuvre. They will also assist a pilot in determining when a go-around manoeuvre may be required.

2.13.2 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 10, Chapter 9 of the MOS.

## 2.14 Runway touchdown zone lighting

2.14.1 On runways equipped for Category II and III approaches, touchdown zone lighting consisting of two rows of white barrettes is required to be installed. The touchdown zone lights are to extend from the threshold, either:

- for a distance of 900 m

  or
- to the midpoint of the runway if it is less than 1800 m in length.

2.14.2 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 10, Chapter 9 of the MOS.

## 2.15 Taxiway centreline lights

2.15.1 Green taxiway centreline lights are used to provide centreline guidance to pilots manoeuvring on taxiways, taxilanes and aprons, and when entering or vacating a runway.

2.15.2 Taxiway centreline lights are mandatory on all rapid exit taxiways.

2.15.3 At aerodromes conducting low visibility operations below 350 m, taxiways are required to have centreline lighting unless traffic density is light and taxiway edge lights and centreline markings provide adequate guidance from the centreline of the runway all the way to the aircraft parking position.

2.15.4 An aerodrome that in the mean busy hour has 15 or less movements per runway, or typically less than 20 total aerodrome movements, is considered to have a 'light' traffic density.

2.15.5 On runways equipped with ILS, taxiway centreline lights located within the ILS critical/sensitive area should be colour coded to show alternate green/yellow in both directions. The first light commencing from the runway centreline is to be green, the lights are then to alternate yellow/green before concluding with a yellow light in line with the ILS critical/sensitive area.

2.15.6 Where green centreline lighting is provided, blue taxiway edge lighting may also be installed as additional guidance on sections of taxiway that are difficult to negotiate, or where the edge of the pavement is not clear.

2.15.7 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 11, Chapter 9 of the MOS.

## 2.16 Rapid exit taxiway indicator lights

2.16.1 The purpose of rapid exit taxiway indicator lights is to provide visual guidance to a pilot on the runway of the approaching rapid exit taxiway, and to enhance situational awareness in low visibility.

2.16.2 They are not mandatory and are recommended for use in RVR conditions less than 350 m or where aircraft traffic density is heavy.

2.16.3 An aerodrome that in the mean busy hour has either 26 or more movements per runway, or typically more than 35 aerodrome movements, is considered to have a 'heavy' traffic density

2.16.4 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 11, Chapter 9 of the MOS.

## 2.17 Taxiway edge lights / markers

2.17.1 Blue edge lights are required to indicate the edge of a taxiway or a holding bay intended to be used at night when:

- centreline lights are not provided
- the aerodrome reference code nomination of the taxiway is Code C, D, E or F.

2.17.2 Retroflective edge markers may be used instead of edge lights on a Code A or B taxiway provided at least one other taxiway from the runway to the apron has either:

- taxiway centreline lights

  or
- taxiway edge lights.

2.17.3 The location, interval distances and characteristics are to comply with the specifications prescribed in Division 11, Chapter 9 of the MOS.

## 2.18 Runway guard lights

2.18.1 Runway guard lights enhance the situational awareness for pilots and for ground personnel indicating that they are about to enter a runway.

2.18.2 Category A runway guard lights consist of a pair of elevated alternating flashing yellow lights, commonly referred as 'wig wags', which are situated each side of the taxiway and in line with the runway holding position marking. They are required to be installed at all taxiway and road holding positions that intersect a runway intended for use in visibility conditions:

- less than 550 m and where stop bars are not installed
- between 550 m and 1200 m when aerodrome traffic density is heavy.

2.18.3 An aerodrome that in the mean busy hour has either 26 or more movements per runway, or typically more than 35 aerodrome movements, is considered to have a 'heavy' traffic density. For the purpose of 'mean busy hour' this is to be taken as the highest peak of all operations.

2.18.4 Category B runway guard lights are yellow inset lights installed across the width of the taxiway. They may be used should an additional holding point be provided further from the runway and that already marked with Category A runway guard lights.

2.18.5 The location, interval distances and lighting characteristics for each runway guard type are to comply with the specifications prescribed in Division 11, Chapter 9 of the MOS.

## 2.19 Intermediate holding position lights

2.19.1 At aerodromes where the taxiway layout is complex or involves multiple intersecting taxiways, intermediate holding positions may be necessary in order to protect a priority taxiway route. Where a taxiway intersects with a runway, and the taxiway is lit, elevated intermediate holding position lights on each side of the taxiway are required unless otherwise equipped with runway guard lights or stop bars.

2.19.2 Intermediate holding position lights consist of a row of three steady yellow lights disposed symmetrically about the taxiway centreline. Pilots approaching these lights should give way to crossing traffic unless otherwise instructed by Air Traffic Control (ATC).

2.19.3 The location, interval distances and lighting characteristics are to comply with the specifications prescribed in Division 11, Chapter 9 of the MOS.

## 2.20 No entry bars

2.20.1 Where an aerodrome is available for use at night, a permanently closed taxiway (note: where taxiway lighting is extinguished), or a taxiway that is intended to be used as an exit taxiway only, requires no entry bars to be installed at the entrance to the taxiway as a means to prevent inadvertent entry.

2.20.2 The location, and lighting characteristics are to comply with the specifications prescribed in Division 11, Chapter 9 of the MOS.

## 2.21 Stop bars

2.21.1 Stop bars are prescribed for runways that are intended to facilitate Cat II/III ILS operations or take-off operations during low visibility operations. They provide a distinctive 'stop' signal for aircraft and vehicles approaching the runway in order to prevent inadvertent incursions. They also regulate the movement of aircraft and vehicles.

2.21.2 A stop bar consists of a row of unidirectional red inset lights across the width of the taxiway at right angles to the centreline and accompanied by two pairs of elevated red edge lights each side of the taxiway. They show red towards the approaching aircraft or vehicle when lit. Additional elevated units may be required at complex runway/taxiway intersections to ensure pilot visibility of the stop bar.

2.21.3 The elevated positioning of the pilot and their close proximity when holding to the stop bar may mean that the pilot cannot see the red inset lights. The provision of the elevated red lights each side of the taxiway provide an alternate that the pilot can suitably monitor.

2.21.4 Stop bars must be installed so that they operate in conjunction with the taxiway centreline lighting (lead-on lights) forward of the stop bar. The lighting circuitry (Figure 3) is required to be designed so that when the stop bar is:

- red, the taxiway centre line lights leading up to the stop bar are lit and the taxiway centre line lights, for a distance of 90 m beyond the stop bar are unlit
- extinguished, the interlocked taxiway lights beyond the stop bar showing the taxi route to the runway are illuminated.

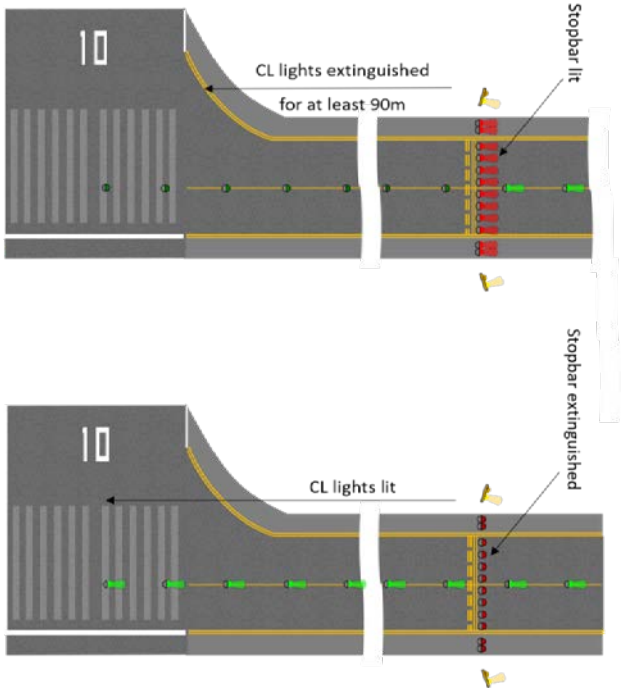


**Figure 3: Operation of stop bar lights**

2.21.5 Stop bars are either controlled by sensor or set on a timer. Where a timer is used it is imperative that the time selected is appropriate so that the stop bar will re-illuminate prior to the next aircraft arriving at the runway holding position. ATC should be made aware of the control system for each stop bar, and the timer setting time.

2.21.6 Stop bars outside of low visibility operations can form part of an effective runway incursion prevention measure and should, therefore, operate at all times.

# 3 Ground markings

## 3.1 Introduction

3.1.1 Ground markings on paved surfaces that cannot be seen either by pilots or ground personnel are ineffective. A contrast colour of either white, grey or black, may be applied to the surface should additional background contrast be required to enhance the visibility of the marking. A dimensional tolerance is also permissible.

3.1.2 In the event a ground marking becomes redundant and whenever possible, the aerodrome operator should avoid painting over the marking as these markings may still appear visible at night or when the surface is wet. To avoid any potential for confusion, it is recommended that obsolete markings be subject to a permanent removal treatment.

3.1.3 Colours to be used for all aerodrome markings, signals and signs must meet the colour standards as prescribed in Chapter 8, Division 1 of the MOS. Paint used on a runway should not, as far as practicable, negatively impact the fiction characteristics of the runway surface.

## 3.2 Pre-threshold area markings

3.2.1 So that a pilot has clear visibility of the area not to be used, a paved surface prior to the runway threshold that exceeds 60 m in length and is not suitable for use by aircraft, is to be marked with yellow chevron markings that point in the direction of the runway threshold.

3.2.2 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.3 Runway threshold markings

3.3.1 A threshold marking identifies the beginning of the runway that is available and suitable for landing and take-off.

3.3.2 All paved runways are required to have threshold markings. They consist of a white line across the width of the runway and a series of white longitudinal stripes of uniform dimensions. The width of the runway determines the number of stripes that are required.

3.3.3 While threshold markings are normally located at the beginning of the paved runway surface, they may be displaced along the runway where for example there are obstructions on the approach, or the first portion of the pavement is unfit for the movement of aircraft.

3.3.4 Where the runway is permanently displaced centred white arrows are required to identify the beginning of the runway and the start of the displaced threshold.

3.3.5 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.4 Runway designation markings

3.4.1 Runways are identified by a two-digit runway number, determined from the approach direction, indicating the magnetic heading of the runway to the nearest 10 degrees.

3.4.2 At those aerodromes with parallel runways, as the same magnetic heading applies to more than one runway, the designation marking is to include a letter 'L' (left runway), 'R' (right runway) or where a third parallel runway is provide a 'C' (centre runway). The letter is to represent the runway configuration as seen from the approach.

3.4.3 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.5 Runway centreline markings

3.5.1 A line of uniformly spaced stripes and gaps that identify the centre of the runway provide the pilot alignment guidance during take-off and landing.

3.5.2 With the exception of an 18 m wide runway that has runway edge markings, all paved runways are required to have white runway centreline markings.

3.5.3 The length and gap of the marking may be adjusted to take into consideration the runway threshold locations. The instrument classification of the runway will influence the width of the markings.

3.5.4 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.6 Runway end markings

3.6.1 A runway end marking is required to identify the end of the paved runway surface.

3.6.2 Where the runway end and runway threshold are co-located, the runway end marking, and the line associated with the commencement of the runway threshold amalgamate as one. Subsequently, if the threshold is displaced, an additional line across the width of the runway is required to mark the runway end. The presence of a starter extension will result in a third runway end marking.

3.6.3 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.7 Runway side stripe markings

3.7.1 Where marked, runway side stripe markings delineate the edges of the runway. They provide a visual contrast between the runway and the adjacent runway shoulders or runway strip.

3.7.2 The marking consists of two stripes that run parallel to, and are equidistant from, the centre of the runway. The side stripe markings are only permitted to be interrupted where:

- the runway crosses another runway
- a taxiway leads into the runway

- a runway turn pad is provided.

3.7.3 At the intersection of a runway with another runway, the runway edge markings for both runways must stop where each marking would otherwise intersect.

3.7.4 At the intersection of a runway with a taxiway, the runway edge marking must stop where the marking would intersect the taxiway edge marking.

3.7.5 At a runway turn pad, the marking must stop at the point where the aircraft is expected to commence the turn.

3.7.6 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.8 Aiming point / touchdown zone markings

3.8.1 Aiming point and touchdown zone markings provide added visual cues to pilots, particularly in conditions of poor visibility. The distance between the aiming point marking and the runway threshold marking is intended to aid a pilot on the final stage of the approach.

3.8.2 These markings are required on all ILS equipped runways and on other runways that are at least 30 m wide and 1500 m long. On all other runways aiming point and touchdown zone markings are optional.

3.8.3 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.9 Land and hold short position markings

3.9.1 Land and hold short markings are used to indicate the hold short point on a runway where that runway intersects with another runway and land and hold short operations (LAHSO) are in effect.

3.9.2 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.10 Runway turn pad markings

3.10.1 A runway turn pad allows a pilot to safely complete a 180-degree turn, realigning the aircraft back on the runway centreline.

3.10.2 The turn pad guidance line must not continue through the threshold markings. The guidance line marking must stop 0.9 m before the first threshold stripe, and only recommence 0.9 m after the threshold marking ceases.

3.10.3 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.11 Runway starter extension markings

3.11.1 A runway starter extension may be established where additional take off distance, take off run, or accelerate-stop distance is required. A runway starter extension is not to exceed 150 m in length without CASA approval.

3.11.2 The pre-threshold area of the runway is required to have runway edge and end markings. As the runway is displaced from the runway end, arrows leading to the approach are also required.

3.11.3 Where a bypass pad is provided, the additional section of pavement to facilitate the aircraft taxiing is to be marked in accordance with the taxiway edge marking requirements. The inner most edge of the runway side stripe is to cease at the point in which the aircraft commences its deviation from the runway centreline. A taxi guideline marking is to be provided to guide the aircraft through the bypass section before realigning with the centre of the runway in preparation for take-off.

3.11.4 The marking characteristics are to comply with the specifications prescribed in the MOS. As there are no illustrations provided, additional lighting and marking guidance is provided in section 2.11 of this AC.

## 3.12 Taxi guideline markings

3.12.1 Taxi guideline markings are provided to ensure safe clearance distances are maintained between the largest aircraft that the taxiway is designed to accommodate and other aircraft or fixed objects.

3.12.2 A taxi guideline marking consists of a single conspicuous yellow line delineating a path for the aircraft to follow. Where a taxiway crosses a runway the guideline marking may continue to indicate the route to be followed however the marking is required to stop 0.9 m before the runway marking and re-commence 0.9 m after the runway marking.

3.12.3 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.13 Enhanced taxi guideline markings

3.13.1 Additional dashed markings may be provided each side of the taxi guideline as it approaches a runway holding point. The purpose of the enhanced taxi guideline marking is to warn the pilot or vehicle operator that they are approaching a runway holding position marking and should prepare to stop.

3.13.2 This marking should only be used at a holding position that provides direct access to a runway.

3.13.3 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.14 Runway holding position markings

3.14.1 Runway holding position markings are required on each taxiway leading to a runway. They indicate to pilots and ground personnel where the aircraft or vehicle must stop

when approaching the runway so that aircraft taking off or landing are protected and ensuring they remain outside the ILS critical/sensitive areas.

3.14.2 When establishing a runway holding position it is important to ensure that when an aircraft is parked at the holding position there is adequate clearance for aircraft passing:

- in front of the holding aircraft
- behind the holding aircraft.

3.14.3 There are two types of runway holding position markings. Pattern A runway holding position markings are always the closest holding position marking prior to entering the runway.

3.14.4 New standards introduced to enhance the visibility of runway holding position markings must be adopted prior to 26 November 2026, or earlier where the runway holding position is being remarked or replaced (other than routine maintenance), or where the holding position is considered a new facility and is being marked for the first time.

## 3.15 Mandatory instruction markings

3.15.1 Painted mandatory instruction markings are recommended as an additional runway incursion mitigation measure. Where used these markings must be supplementary to the movement area guidance sign (MAGS).

3.15.2 The taxiway's aerodrome reference code letter will determine the size, number and placement of markings. Code A and B taxiways require one centred marking, while Code C, D, E and F taxiways require two markings, symmetrically disposed on each side of the centreline.

3.15.3 The marking characteristics are to comply with the specifications prescribed in Division 3, Chapter 8 of the MOS.

## 3.16 Information markings

3.16.1 Surface painted taxiway direction signs have a yellow background with a black inscription and are provided when it is not possible to provide taxiway direction signs at intersections, or when necessary to supplement such signs.

3.16.2 Surface painted location signs have a black background with a yellow inscription. When necessary these markings are used to supplement location signs and will assist the pilot or vehicle operator to confirm the designation of the taxiway on which they are situated.

3.16.3 The marking characteristics are to comply with the specifications provided in Division 3, Chapter 8 of the MOS.

## 3.17 Intermediate holding position markings

3.17.1 At aerodromes where the taxiway layout is complex or involves multiple intersecting taxiways, intermediate holding positions may be necessary in order to protect a priority taxiway route. These holding positions are marked by a single broken line painted across the width of the taxiway and normally at right angles to the taxiway centreline.

3.17.2 These markings must be located such that they provide clearance from aircraft passing in front of the holding aircraft.

3.17.3 The marking characteristics are to comply with the specifications provided in Division 3, Chapter 8 of the MOS.

## 3.18 Taxiway edge markings

3.18.1 The purpose of taxiway edge markings is to enable pilots to identify the edge of the full-strength rated pavement.

3.18.2 Where the edge of the full-strength pavement is not clearly visible, regardless of the taxiways ARC letter, the edges must be marked.

3.18.3 The marking characteristics are to comply with the specifications provided in Division 3, Chapter 8 of the MOS.

# 4 Signals

## 4.1 Wind direction indicators

4.1.1 A wind direction indicator (WDI) is intended to provide pilots with a clear indication of the direction of the wind and the wind speed on the ground at the aerodrome.

4.1.2 At least one WDI is required to be provided at a certified aerodrome.

4.1.3 With the exception of an instrument runway where the surface wind information is communicated by an alternate acceptable means, a WDI must be provided at the threshold of an instrument runway, unless the runway is 1200 m or less then the WDI can be centrally located provided it is visible from the approaches to all runways and the aircraft parking area.

4.1.4 The WDI must be situated such that it is:

- free from the effects of any disturbance caused by objects nearby.
- outside the cleared and graded area of the runways and taxiways
- below the obstacle limitation surface (OLS)
- clear of the OFZ and ILS critical and sensitive areas.

4.1.5 The location, height of the sleeve, sleeve colour and dimensions are to comply with the specifications provided in Division 7, Chapter 8 of the MOS.

## 4.2 Signal areas

4.2.1 An aerodrome operator may elect to provide a signal area that allows for the display of ground signals such as:

- total unserviceability
- restricted operations.

4.2.2 The location, colour, markings and signal size and pattern are to comply with the specifications provided in Division 8, Chapter 8 of the MOS.

# 5 Signs

## 5.1 Introduction

5.1.1 Signs provide surface movement guidance to aircraft and ground personnel. MAGS are either mandatory instruction signs or information only signs.

5.1.2 Mandatory instruction MAGS are required at international aerodromes with scheduled air transport operations, as well as aerodromes that have ATC. Information MAGS are required at those aerodromes that have published taxiway intersection departures.

5.1.3 MAGS are required to be illumined when the aerodrome has:

- scheduled international air transport operations
- RVR / RV operations less than 800 m.

## 5.2 Mandatory instruction movement area guidance signs

### 5.2.1 Introduction

5.2.1.1 Mandatory instruction MAGS have a red background with a white inscription and are used to identify an entrance to a runway or critical area, and other areas where aircraft are prohibited from entering. There are six types of mandatory instruction MAGS, each are described below.

### 5.2.2 Runway designation signs

5.2.2.1 A runway designation sign is required on each side of a runway holding position adjacent to the ground making. These signs identify where the aircraft or ground vehicle is required to stop. A location sign is normally attached to the runway designation sign in order to assist in identifying the position.

5.2.2.2 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.

### 5.2.3 CAT I, II or III runway designation signs

5.2.3.1 At aerodromes equipped for Category I, II or III ILS approaches, runway designation signs are annotated as appropriate.

5.2.3.2 Because of the need to provide greater protection to Category I, II and III ILS systems, the runway holding positions associated with these procedures are set farther back from the runway than those associated with visual operations.

5.2.3.3 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.

### 5.2.4 Runway holding position signs

5.2.4.1 These signs display the taxiway designator accompanied by a number identifying the individual holding position.

### 5.2.5 Aircraft 'No Entry' signs

5.2.5.1 Where part of an aerodrome is restricted to one-way traffic or it is withdrawn from use, 'No Entry' signs are to be located on both sides of the entrance area to the taxiway showing the direction from which entry is prohibited, unless placement is prevented by:

- a physical obstacle
- an unsuitable surface type
- visual obstruction.

5.2.5.2 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.

### 5.2.6 Vehicle 'Stop' signs

5.2.6.1 A vehicle stop sign may be provided to prevent inadvertent vehicle incursions in the movement area.

5.2.6.2 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.

### 5.2.7 Runway/Runway intersection signs

5.2.7.1 A runway/runway MAG sign is intended to protect a runway, an obstacle limitation surface, or ILS critical/sensitive area at which taxiing aircraft and vehicles are required stop and hold until authorised by ATC.

5.2.7.2 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.

## 5.3 Information movement area guidance signs

### 5.3.1 Introduction

5.3.1.1 Information MAGS  are provided where there is an operational need to provide additional guidance to pilots manoeuvring on the ground.

### 5.3.2 Taxiway location sign

5.3.2.1 Taxiway location signs are used to identify individual taxiways.

5.3.2.2 All taxiways should be designated by a letter of the alphabet e.g. 'K' for Kilo, 'R' for Romeo etc. However, the letters 'O', 'I' and 'X' are not used.

5.3.2.3 As far as possible the allocation of designation letters should follow a logical pattern eliminating the possibility for confusion.

5.3.2.4 Characters identifying the taxiway are in yellow lettering on a black background.

5.3.2.5 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.

### 5.3.3 Taxiway direction sign

5.3.3.1 Taxiway direction signs consist of a route taxiway designator accompanied by an arrow that points in the appropriate direction, displayed in black characters on a yellow background.

5.3.3.2 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.

### 5.3.4 Destination sign

5.3.4.1 Destination signs consist of a destination label accompanied by an arrow that points in the appropriate direction, displayed in black characters on a yellow background.

5.3.4.2 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.

### 5.3.5 Take-off run available signs

5.3.5.1 Where intersection departures are published a take-off run available MAG sign is required to convey the physical length of the runway that is available.

5.3.5.2 The characteristics and sign location are to comply with the specifications provided in Division 6, Chapter 8 of the MOS.