



ADVISORY CIRCULAR AC 139.A-02 v1.0

Aerodrome and aircraft compatibility

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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

This purpose of this AC is to provide guidance on the methodology and procedures to be used when assessing aerodrome compatibility between aircraft operations and aerodrome infrastructure when aircraft exceed the design characteristics of an aerodrome.

For further information

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

Status

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

Version	Date	Details
v1.0	August 2020	Initial release of this AC.

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

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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
ARC	aerodrome reference code
CAR	<i>Civil Aviation Regulations 1988</i>
CASA	Civil Aviation Safety Authority
CASR	<i>Civil Aviation Safety Regulations 1998</i>
OEM	original equipment manufacturer
OMGWS	outer main gear wheel span
OFZ	obstacle free zone
PANS- Aerodromes	<i>Procedures for Air Navigation Services - Aerodromes 2016</i>
Part 139 MOS	<i>Part 139 (Aerodromes) Manual of Standards 2019</i>
VASIS	visual approach slope indicator system

1.2 Definitions

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

Term	Definition
compatibility study	A study undertaken by the aerodrome operator to address the impact of introducing an aeroplane type/model new to the aerodrome. A compatibility study may include one or several safety assessments.
critical aeroplane	The type of aeroplane which is the most demanding for the relevant elements of the physical infrastructure and the facilities for which the aerodrome is intended.
safety assessment	An element of the risk management process of an SMS that is used to assess safety concerns arising from, inter alia, deviations from standards and applicable regulations, identified changes at an aerodrome or when any other safety concerns arise.
safety management system (SMS)	A systematic approach to managing safety, including the necessary organisational structures, accountabilities, policies and procedures.
exposition	A safety case prepared by an aircraft operator to ensure operations to a particular aerodrome are conducted safely.

1.3 References

Regulations

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

Document	Title
CASR Part 91	General operating and flight rules
CASR Part 121	Australian air transport operations - larger aeroplanes
CASR Part 135	Australian air transport operations - smaller aeroplanes

International Civil Aviation Organization documents

International Civil Aviation Organization (ICAO) documents are available for purchase from <http://store1.icao.int/>

Document	Title
Doc 9981	Procedures for Air Navigation Services - Aerodromes Second Edition 2016

2 Introduction

2.1 Aerodrome design standards

- 2.1.1 The *Civil Aviation Safety Regulations 1998* (CASR), and the Part 139 (Aerodromes) Manual of Standards (MOS) prescribe the physical characteristics and obstacle limitation surfaces to be provided for at aerodromes.
- 2.1.2 It is not intended that the aerodrome reference code (ARC) limit or regulate the operation of aircraft, rather they provide an aircraft operator with an awareness of the operating limitations of each aerodrome facility.
- 2.1.3 When planning a new aerodrome, or upgrading or replacing an existing aerodrome facility, it is important the aerodrome operator carefully considers the aircraft type(s) that they intend to accommodate at their aerodrome. Not only will this enable the appropriate design of each facility, it will potentially avoid future operational limitations.
- 2.1.4 It is important for an aerodrome and aircraft operator to understand where an aerodrome does not meet the design characteristics for a particular aircraft type, the aircraft operator may still be able to operate at the aerodrome subject to confirmation that they can do so safely. This will require the completion of a compatibility assessment by the aerodrome operator.
- 2.1.5 A compatibility assessment may not be required if evidence is provided that an aircraft can operate to a lesser ARC for runway width in accordance with an aircraft's flight documentation e.g. aircraft certification, aircraft flight manual or supplement or OEM approved documentation.

2.2 Aerodrome reference code (ARC) nomination

- 2.2.1 As stated in Chapter 4 of the Part 139 MOS, the reference coding system contains three elements that correlates with design characteristics for aeroplanes:
- code number
 - code letter
 - OMGWS.
- 2.2.2 While a code number relates to runways only, all applicable elements are to be considered and promulgated concurrently for each aerodrome facility. This will ensure that obstacle clearances are maintained and that there is adequate ground surface to enable the safe operation of the aircraft.

2.3 Aircraft operator obligations

- 2.3.1 Part 91 of CASR requires the operator and pilot of an aeroplane to take off or land only at a place that is a certified aerodrome, or at a place that is suitable for the taking-off and landing of an aeroplane.
- 2.3.2 Part 135 of CASR requires the operator of an aeroplane with a maximum operational passenger seat configuration of not more than 9 and a maximum take-off weight

(MTOW) not exceeding 8618 kg to include in their exposition, information about an aerodrome in accordance with regulation 135.195 of CASR).

- 2.3.3 Part 121 of CASR requires the operator of an aeroplane with a maximum operational passenger seat configuration of more than 9 and exceeding 8,618 kg to take off or land at an aerodrome that is certified under Part 139 of CASR. If the aerodrome is not a certified aerodrome, the operator must include in their exposition, information about the aerodrome in accordance with regulation 121.210 of CASR.

3 Aerodrome compatibility

3.1 Introduction

- 3.1.1 Before a new aircraft type or subtype of aircraft should operate into an aerodrome, aerodrome operators should methodically assess the compatibility between the aircraft and the aerodrome's infrastructure. This is particularly if the aircraft is likely to exceed the standards to which the aerodrome facilities have been designed.

3.2 ICAO recommended practices

- 3.2.1 While Annex 14, Volume 1, Aerodrome Design and Operations, to the Chicago Convention contains specifications for aerodrome facilities, the Procedures for Air Navigation Services - Aerodromes (PANS-Aerodromes), Part 1, Chapter 4, provides a methodology that enables an assessment of the compatibility between the aeroplane's characteristics, the aerodromes infrastructure, and the operation of an aircraft when that aircraft exceeds the nominated ARC.

3.3 Compatibility assessment

- 3.3.1 The potential use of an aerodrome facility by a more demanding aircraft type than that supported by the nominated ARC requires careful evaluation and consideration.
- 3.3.2 An operational assessment in the form of a compatibility study should be undertaken to demonstrate that the aircraft can safely operate at the aerodrome.
- 3.3.3 The operation should not proceed if:
- an acceptable level of safety cannot be established to support that operation
 - the aerodrome operator does not support use of the aerodrome facility by that aircraft type.
- 3.3.4 Special procedures may be required to be implemented by the aerodrome operator. These could include alternative measures such as operational procedures/restrictions being introduced which should be reviewed periodically to assess and assure their continued validity.

3.4 Compatibility study

3.4.1 Introduction

- 3.4.1.1 A compatibility study to ascertain whether an aircraft can operate safely should be performed collaboratively and involve all stakeholders that are likely to be affected. They may include:
- the aerodrome operator
 - the aircraft operator
 - refuellers
 - ground handling agencies
 - Aerodrome Rescue and Fire Fighting Service (ARFFS)

- air navigation service providers.

3.4.2 Process to undertake a compatibility assessment

3.4.2.1 When introducing new aircraft types or subtypes to an aerodrome the following should occur:

- the airline/aircraft operator submits a request to the aerodrome operator to operate a new type of aircraft to the aerodrome.
- the aerodrome operator should do a compatibility study to determine if the new aircraft type can be accommodated. This will include provision for access to the movement areas, and if necessary, consider the feasibility and economic viability of upgrading the aerodrome infrastructure to meet the requirement of the new aircraft type.
- both the aerodrome operator and aircraft operator should discuss the aerodrome operator's assessment. The assessment should identify:
 - o likely resultant consequences that may evolve during operation of the new aircraft type
 - o whether the aerodrome will be able to accommodate the aircraft size, width and operational characteristics
 - o the conditions under which it will operate safely.

3.4.3 Principle matters to be considered

3.4.3.1 The following matters¹ should be identified and considered in the assessment process:

- The aeroplanes physical and operational characteristics, including:
 - o Fuselage length and width which may impact on:
 - (1) Dimensions of the movement area, including aircraft parking positions.
 - (2) ARFFS category, if applicable.
 - (3) Clearance distances when moving behind other aircraft.
 - (4) Clearance distances at aircraft parking positions.
 - o Door sill height, which may impact on:
 - (1) Operational limitations of the aerobridge.
 - (2) Mobile steps.
 - (3) Catering trucks.
 - (4) Persons with reduced mobility.
 - o Aeroplane nose characteristics, which may impact on:
 - (1) The location of the holding position so that the aircraft is clear of the obstacle free zone (OFZ).
 - o Tail height, which may impact on:
 - (1) Transitional surface.
 - (2) Location of the holding position so that the aircraft is clear of the ILS critical and sensitive areas.
 - o Wingspan, which may impact on:
 - (1) Runway / taxiway separation distances.
 - (2) Location of the holding position so that the aircraft is clear of the OFZ.
 - (3) Apron and parking position dimensions.

¹ This list is not exhaustive, and operators may identify other considerations.

- o Wing tip vertical clearance, which may impact on:
 - (1) Taxiway separation distances.
 - (2) Marker and signage clearance distances.
- o Cockpit view, which may impact on:
 - (1) Runway sight distance.
 - (2) Taxiing operations.
 - (3) Marking and signs on runways, turn pads, taxiways, aprons etc.
 - (4) Calibration of VASIS.
- o Distance from the pilot's eye position to the nose landing gear.
- o Landing gear designs, which may impact on:
 - (1) The bearing strength of the runway.
 - (2) Manoeuvrability on the movement area.
- o Outer main gear design, which may impact on:
 - (1) Runway width.
 - (2) Turn pad dimensions.
 - (3) Taxiway width.
 - (4) Apron dimensions.
- o Wheel base, which may impact on:
 - (1) Turn pad dimensions.
 - (2) Apron dimensions.
 - (3) Aircraft parking positions.
- o Gear steering system.
- o Maximum aeroplane mass, which may impact on:
 - (1) Movement area surfaces (strength).
 - (2) Stopping distance.
 - (3) Disabled aircraft removal.
- o Landing gear geometry, tyre pressure and ACN values, which may impact on:
 - (1) Movement area pavements.
- o Engine characteristics, key considerations include:
 - (1) Number and location of engines.
 - (2) Vertical clearance distances.
 - (3) Jet blast.
- o Maximum passenger and fuel carrying capacity, which may impact on:
 - (1) Fuel storage and distribution.
 - (2) Terminal facilities.
 - (3) Aerodrome emergency planning.
- o Flight performance.
- Applicable regulatory requirements.
- Adequacy of the aerodrome infrastructure and facilities, including:
 - o available navigation and visual aids
 - o type of approach
 - o obstacle limitation surfaces
 - o runway characteristics
 - o friction and drainage which may impact on runway susceptibility to surface contamination and aeroplane braking action
 - o operating length required for take-off and landing versus the runway distances available

- o runway strips
- o runway end safety area
- o the location of taxiways and runways
- o Ground servicing requirements:
 - (1) Ground power.
 - (2) Refuelling.
 - (3) Pushback and towing.
 - (4) Maintenance.
 - (5) Aircraft parking.
 - (6) Equipment storage areas.
- o Likelihood of wind shear.
- o Location of any hazard on or in the vicinity of the aerodrome.
- o Topography in the vicinity of the aerodrome.
- Changes required to the aerodrome.

3.4.3.2 When performing an assessment there are also several variables to be considered, such as:

- meteorological conditions
- load factor
- adverse weather conditions
- human factors.

3.4.3.3 For aerodrome operations in low visibility conditions, additional procedures may be implemented in order to safeguard the operation of aeroplanes.

3.4.3.4 Additional processes that ensure suitable measures are in place to protect the signal produced by the ground-based radio navigation equipment may be necessary at aerodromes with precision instrument approaches.

3.4.3.5 Computer aided drafting software packages are available and may assist in designing or tracing turning tracks of aircraft and can model the potential impacts to existing infrastructure due to the proposed introduction of larger aircraft.

3.4.4 Determination

3.4.4.1 The compatibility study should be documented, and all required safety assessments identified during the compatibility study that was performed.

3.4.4.2 The result of the compatibility study should provide the aerodrome operator with the necessary information to make an informed decision on whether:

- to permit the operation of the aeroplane
- changes are required to the aerodrome infrastructure and facilities to ensure safe operations at the aerodrome.

3.4.4.3 The result of the compatibility study will also provide CASA with the information necessary for safety oversight and the continued monitoring of the aerodrome and its operating environment.