

Advisory Circular

USE OF PAVEMENT UNDER OVERLOAD OPERATIONS

GENERAL.....	1
PURPOSE	1
APPLICABILITY	1
RELATED REGULATIONS	1
RELATED ADVISORY CIRCULARS	1
CANCELLATION.....	1
EFFECTIVE DATE	1
OTHER REFERENCES	2
1 INTRODUCTION	2
2 USE OF PAVEMENT UNDER OVERLOAD CONDITIONS	2
3 OVERLOAD OPERATIONS EXCEED THE CRITERIA LIMITS.....	3
4 OTHER CONSIDERATIONS.....	4
5 INSPECTION AND MONITORING REGIME	4

GENERAL

Advisory Circulars (ACs) are issued by the Director-General of Civil Aviation (DGCA) from time to time to provide practical guidance or certainty in respect of the statutory requirements for aviation safety. ACs contain information about standards, practices and procedures acceptable to CAAS. An AC may be used, in accordance with section 11 of the Air Navigation Act 1966 (ANA), to demonstrate compliance with a statutory requirement. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.

PURPOSE

This AC provides the Acceptable Means of Compliance (AMC) and information to guide an aerodrome operator on the criteria to review pavement overload operations.

APPLICABILITY

This AC is applicable to an aerodrome operator who intends to or holds an aerodrome certificate.

RELATED REGULATIONS

This AC relates specifically to Regulations 19, 20 and 22 of the Air Navigation (139 – Aerodromes) Regulations 2023 (“ANR-139”).

RELATED ADVISORY CIRCULARS

- AC 139-2-1 Guidance on aerodrome manual or heliport manual

CANCELLATION

This is the first AC issued on the subject.

EFFECTIVE DATE

This AC is effective from 1 March 2023.

OTHER REFERENCES

- Aviation Specification 5 – Aerodromes
- ICAO Annex 14, Vol. I, Aerodrome design and operations
- ICAO Aerodrome design manual (Doc 9157), Part 3 Pavements
- CASA AC 139.C-07v1.0 Strength rating of aerodrome pavements
- FAA AC 150-5335-5D- Standardised method of reporting airport pavement strength - PCR

1 INTRODUCTION

- 1.1 Regulations 19 and 22 of the ANR-139 require the aerodrome operator to ensure that the design, operations and maintenance of the aerodrome comply with the relevant Aviation Specifications. Regulation 20 of the ANR-139 requires the aerodrome operator to operate and maintain the aerodrome in accordance with the procedures in the aerodrome manual.
- 1.2 The aerodrome operator must comply with paragraph 5.6.8 of Aviation Specification 5 - Aerodromes (AS-5) and put in place an inspection regime to closely monitor the pavement condition under overload operations.

2 USE OF PAVEMENT UNDER OVERLOAD CONDITIONS

- 2.1 Aerodrome pavements are designed and consequently rated to be able to withstand repetitive loadings by the aircraft without needing major pavement maintenance during their design life. However, there may be times when aircraft may impose more severe loading with ACN of the aircraft exceeding PCN of pavement. The consequences of such repeated overloads may lead to the following failure conditions on the pavement:
- (a) excessive roughness caused by general loss of shape after repeated operations by heavy wheel loads;
 - (b) cracking of the seal surface where deflections caused are high or compaction of the pavement material is poor;
 - (c) surface rutting and cracking of the seal surface and stripping of aggregate due to high tyre pressure.
- 2.2 A pavement is not expected to suddenly or catastrophically fail when subjected to minor overloading. Hence, occasional minor overloading is acceptable, when expedient, with only limited loss in pavement life expectancy and relatively small acceleration of pavement deterioration.
- 2.3 It should be noted that overloading movements should not normally be permitted on pavements exhibiting signs of distress or failure. Furthermore, it should be avoided when the strength of the pavement or its subgrade could be weakened by water.
- 2.4 As specified in paragraph 5.6.8 of AS-5, the aerodrome operator needs to adopt an appropriate overload policy and determine the allowable extend of overload operations for the aerodrome. This requires consideration of the pavement strength and condition, aircraft frequency and weight, pavement inspection and maintenance procedures. When the magnitude of overload and/or frequency of use of pavement by aircraft with an ACN higher than the PCN reported for that pavement do not justify a detailed

analysis, the following criteria should be used to determine the allowable extent of overload operations:

- (a) for flexible pavements, occasional movements by aircraft with ACN not exceeding 10 percent above the reported PCN should not adversely affect the pavement;
- (b) for rigid or composite pavements, in which a rigid pavement layer provides a primary element of the structure, occasional movements by aircraft with ACN not exceeding 5 per cent above the reported PCN should not adversely affect the pavement;
- (c) if the pavement structure is unknown, the 5 per cent limitation should apply; and
- (d) the annual number of overload movements should not exceed approximately 5 per cent of the total annual aircraft movements.

3 OVERLOAD OPERATIONS EXCEED THE CRITERIA LIMITS

3.1 For aircraft operations where the magnitude of overload and/or the frequency of use exceed the criteria in paragraph 2.4 above, the aerodrome operator must determine the operations allowable based on a detailed engineering analysis comparing the individual aircraft load to the structural capability of the pavement. The aerodrome operator can consider using software such as FAARFIELD, COMFAA, APSDS to conduct detailed engineering analysis. **Table 1** below shows the actions that should be taken by the aerodrome operator for the different limits of overload operations.

Overload Operations by aircraft	Is overload operations allowable?	Actions by aerodrome operator	
		Before overload operations	After overload operations
ACN > 10% but not > 25% of reported PCN	Yes	(1) Carry out an engineering analysis to determine the extent of overload operations.	(1) Carry out regular inspections of the pavement by competent personnel (2) Stop overload operations immediately as soon as distress becomes evident
ACN > 25% but not > 50% of reported PCN	Yes but subjected to an engineering analysis	(1) Carry out an engineering analysis to determine the extent of overload operations.	(1) Carry out a thorough inspection by a pavement engineer on completion of the movement
ACN > 50% of reported PCN	Only allowed in an emergency*	(2) Include a critical examination of available pavement construction records and test data by a qualified pavement engineer.	

		(3) Carry out a thorough inspection by a pavement engineer to assess any signs of pavement distress.	
--	--	--	--

** The determination of “emergency only” overload limits should be based on ensuring the safety of the aircraft from pavement surface “break-through” during the “emergency” operation.*

Table 1 – Actions by aerodrome operator for the different limits of overload operations

4 OTHER CONSIDERATIONS

4.1 In combination with the overload guidelines, the aerodrome operator should also consider the following when reviewing the overload operations:

- (a) Safety of the operations – the extent of overloading operations resulting in aircraft damage and safety of passengers
- (b) Probability of pavement damage
 - Extent of pavement damage and extend of areas e.g. multiple or localised areas, including reports on damage caused by previous operation, if any
 - Basis of pavement design
 - Report on pavement evaluation and condition
 - Data on aircraft usage
 - Frequency of overload operations e.g. one-off, short term or long term; and
 - Local conditions e.g. recent prolonged rainfall causing loss of subgrade strength.
- (c) Consequence of pavement damage
 - Disruption to operations caused by the damage or repairs
 - Resources available to repair the damage
- (d) Other considerations for instance, if the physical characteristics of the aerodrome movement area suitable for the intended operations of the overloading aircraft, for example, parking and manoeuvrability.

5 INSPECTION AND MONITORING REGIME

5.1 Where overload operations are conducted, the aerodrome operator must put in place a regime to inspect the relevant pavement condition regularly by competent personnel. The aerodrome operator should monitor the pavement condition closely for a period of several weeks or until it is verified that deterioration of the pavement is not occurring. Any significant deterioration of the surface of the pavement may be caused by weakening of the pavement material and/or subgrade, in which case, a technical review of the pavement strength rating may be required. If necessary, increased maintenance and or/rehabilitation earlier than was originally intended should be considered.

5.2 The aerodrome operator should periodically review the criteria for overload operations as excessive repetition of overloads can cause severe shortening of pavement life or require major rehabilitation of pavement.