



Advisory Circular

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GUIDANCE MATERIAL ON CRITERIA TO REGULATE THE USE OF A PAVEMENT BY AN AIRCRAFT WITH ACR HIGHER THAN THE REPORTED PCR (OVERLOAD OPERATIONS)

1. PURPOSE

This Advisory Circular (AC) provides guidance to aerodrome operators on establishing criteria to regulate the use of a pavement by an aircraft with an Aircraft Classification Number (ACR) higher than the Pavement Classification Number (PCR) reported for that pavement in accordance with the Civil Aviation (Aerodromes) Regulations.

2. REFERENCES

- 2.1 Civil Aviation (Aerodromes) Regulations 2022
- 2.2 ICAO Aerodrome Design Manual- Doc 9157 Part 3-Pavements
- 2.3 ICAO Annex 14 – Volume 1
- 2.4 FAA AC 150/5335-5D: Standardized Method of Reporting Airport Pavement Strength-PCR

3. DESCRIPTION OF TERMS

Flexible Pavement: Pavements designed and constructed using asphalt concrete placed on granular base and sub base of aggregate material or alternative composite material.

Rigid Pavement: Pavements designed and constructed using cement concrete material and normally act as slab in load response conditions.

Composite Pavement: Pavements designed and constructed using both cement concrete material and bituminous mixtures and normally assumed to act as a rigid pavement.

4. INTRODUCTION

4.1 Unrestricted Operations

The overload control is not applicable in case where ACR is less than the PCR provided for the pavement

Overloading of pavements can result either from loads too large or from a substantially increased application rate, or both. Loads larger than the defined (design or evaluation) load shorten the

design life while smaller loads extend it. Pavement failures rarely happen due to a single excessive load, but rather due to the repetition of loads exceeding the load rating for which the pavement was designed (cumulative damage principle).

The structural behavior of pavement is such that it can sustain a definable load for an expected number of repetitions during its design life. As a result, occasional minor overloading is acceptable, when expedient, with only limited loss in pavement life expectancy and relatively small acceleration of pavement deterioration.

While the occasional marginal overload operation should not result in catastrophic damage, overload operations can affect the usable lifetime of a pavement. Significant overload operations may severely affect the lifetime of the pavement, and damage can occur, particularly with very new or already much worn pavements.

4.2 Method for Overload Operation Controls (restricted operations)

For those operations in which magnitude of overload and/or the frequency of use do not justify a detailed analysis, the following criteria are suggested:

- a) for flexible and rigid pavements, occasional movements by aircraft with ACR not exceeding 10 per cent above the reported PCR should not adversely affect the pavement; and
- b) the annual number of overload movements should not exceed approximately 5 per cent of the total annual movements, excluding light aircraft.

Such overload movements should not normally be permitted on pavements exhibiting signs of distress or failure. Furthermore, overloading should be avoided during any periods of thaw following frost penetration or when the strength of the pavement or its subgrade could be weakened by water. Where overload operations are conducted, the appropriate authority should review the relevant pavement condition regularly and should also review the criteria for overload operations periodically, since excessive repetition of overloads can cause severe shortening of pavement life or require major rehabilitation of pavement.

4.3 Overload technical analysis

Overloads in excess of 10 per cent may be considered on a case-by-case basis when supported by a more detailed technical analysis. When overload operations exceed allowances described in 3.2, a pavement analysis is required for granting the proposed additional loads, which was not scheduled in the initial pavement design.

In those cases, the pavement analysis should determine how the overload operation contributes to the maximum CDF when it is mixed with the actual aircraft mix. Indeed, the ACR as a relative indicator, even if exceeding the reported PCR, cannot predict how the overload aircraft will affect the pavement structural behaviour and/or its design life, since it will be strongly dependent of its offset to the location of the maximum CDF produced by the aircraft mix (critical offset).

The pavement analysis would then mean determining the number of permitted overload operations so that the CDF of the entire aircraft mix, including the overload aircraft, remains in the tolerances agreed by the relevant authority.

4.4 Other alternative means of compliance


This guidance material draws the attention to some information that can be used by aerodrome operators to aid in establishing such criteria using the ICAO standards and recommended practice despite existence of other methods developed by states.

5. Overload Operations

- 5.1 For those aircraft operations where the magnitude of overload and/or the frequency of use exceed the limits of the criteria given above, it is recommended that the advisability of allowing the operation be determined on the basis of a detailed engineering analysis comparing the individual aircraft load to the structural capability of the pavement.
- 5.2 The airport operator should also have a detailed engineering analysis of the airside pavements carried out to determine the maximum overloads which could safely be allowed in the event that an “emergency only” type of aircraft operation is required on short notice. 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.
- 5.3 Civil Aviation (Aerodromes) Regulations requires the aerodrome operator to seek approval from the Authority before granting permission to an aircraft that exceeds the certified characteristics of aerodromes. The operator is also expected to carry out a compatibility study in collaboration with other stakeholders such as aircraft operators, Air Navigation Service Providers and Ground Handling Agencies,
- 5.4 The operator shall assess the compatibility between the operation of the aero plane and aerodrome infrastructure, develop and implement appropriate measures in order to maintain an acceptable level of safety during operations.
- 5.5 The operating procedures and restrictions shall be published in the Aeronautical Information Publication.

6. SUMMARY

The information contained in these documents should be used as basis for aerodrome operators to establish their system for control of overload operations in correlation with the aerodrome pavement maintenance programme.



Director Safety, Security and Economic Regulation