International Civil Aviation Organization

The Seventh Meeting of the Asia/Pacific Aerodrome Assistance Working Group (AP-AA/WG/7)

Bangkok, Thailand, 27 to 30 May 2025

Agenda Item 3: Aerodrome Certification and Safety Management System

IMPLEMENTATION OF ICAO ACR-PCR METHOD FOR DECLARING PAVEMENT STRENGTH AT THE AIRPORT IN INDIA: A CONSERVATIVE APPROACH OF DGCA INDIA

(Presented by India)

SUMMARY

This paper presents the ICAO requirements on determination of bearing strength of aerodrome pavement by ACR-PCR method effective from 28th November 2024 in place of existing ACN-PCN method and discuss about the procedure followed by airport operator in India for implementation of latest ICAO guidelines including the road maps followed and the key challenges faced by Airport operator for implementing the new method.

1. INTRODUCTION

1.1 In Year 2009, ICAO established a Study Group to investigate updating the international method of reporting pavement strengths. The study group developed and ICAO adopted with its 15th amendment of Annex14 dated 20th July 2020 regarding new methodology of reporting pavement bearing strength in para 2.6 on Strength of pavements (Applicable as of 28 November 2024) as below:

Sub-para 2.6.1 : The bearing strength of a pavement shall be determined.

Sub-para 2.6.2 : The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5700 kg shall be made available using the aircraft classification rating-pavement classification rating (ACR-PCR) method by reporting all of the following information:

a) pavement classification rating (PCR) and numerical value;
b) pavement type for ACR-PCR determination;
c) subgrade strength category;
d) maximum allowable tire pressure category or maximum allowable tire pressure value; and
e) evaluation method.

Sub-para 2.6.3 : The PCR reported shall indicate that aircraft with an aircraft classification rating (ACR) equal to or less than the reported PCR may operate on the pavement subject to any limitation on the tire pressure or aircraft all-up mass for specified aircraft type(s).

Sub-para 2.6.4: The ACR of an aircraft shall be determined in accordance with the standard procedures associated with the ACR-PCR method.

Sub-para 2.6.5 : For the purposes of determining the ACR, the behavior of a pavement shall be classified as equivalent to a rigid or flexible construction.

Sub-para 2.6.6 : Information on pavement type for ACR-PCR determination, subgrade strength category, maximum allowable tire pressure category and evaluation method shall be reported using the following codes:

PCR no / Type of Pavement (R/F) / Sub Grade Strength Category (A/B/C/D) / Max allowable tyre pressure (W/X/Y/Z) / Evaluation Method (T/U)

Sub-para 2.6.7 : Recommendation.— Criteria should be established to regulate the use of a pavement by an aircraft with an ACR higher than the PCR reported for that pavement in accordance with 2.6.2 and 2.6.3.

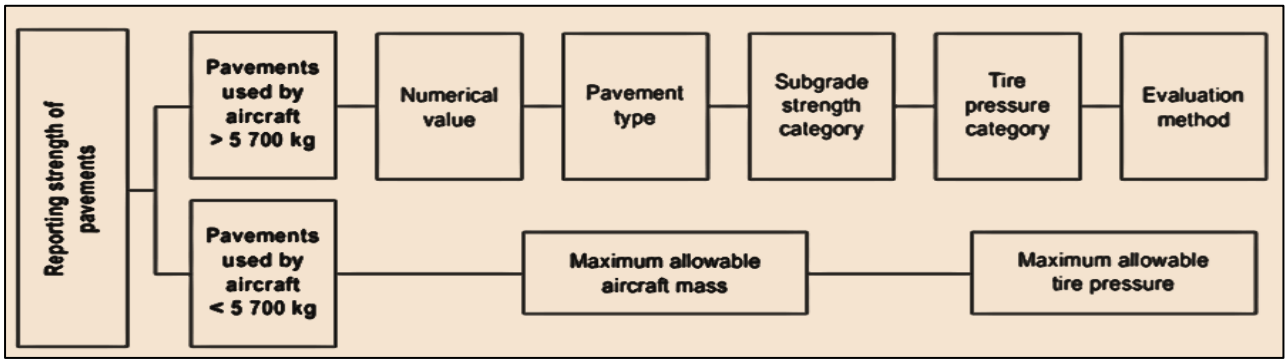
Sub-para 2.6.8 : The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5700 kg shall be made available by reporting the following information:
a) maximum allowable aircraft mass; and
b) maximum allowable tire pressure.

Also necessary guidance for permissible overloading of pavement has been given in para 19 of Attachment, Annex 14.

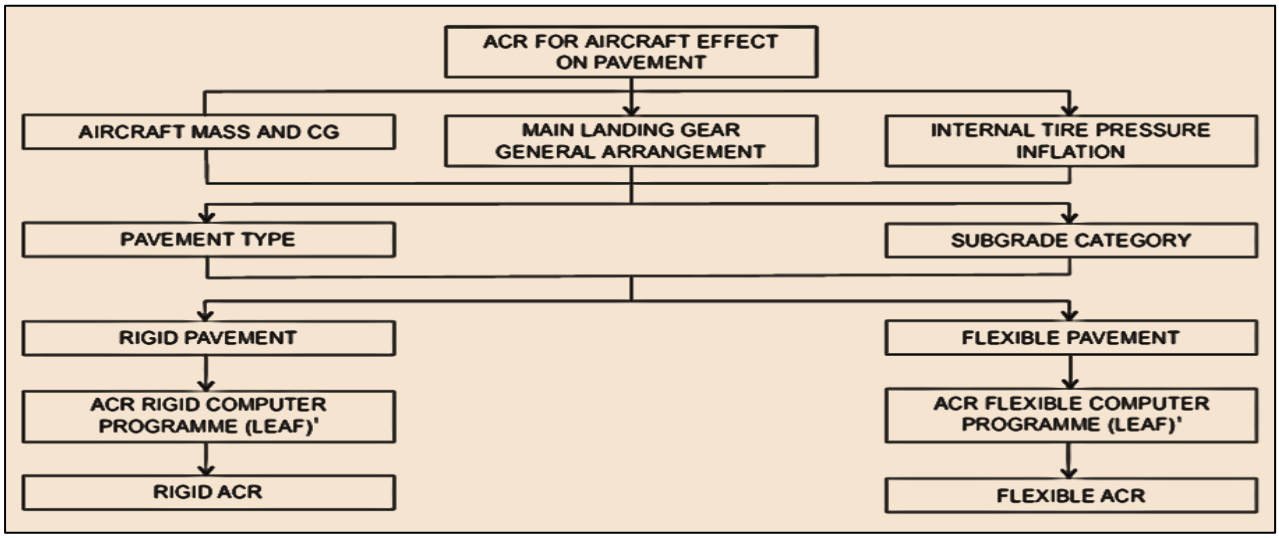
1.2.1 Using this method, it is possible to express the effect of an individual aircraft on different pavements with a single unique number i.e. the Aircraft Classification Rating (ACR). ACR varies according to aircraft weight and configuration (e.g. tire pressure, gear geometry, etc.), pavement type, and subgrade strength. Conversely, the load-carrying capacity of a pavement can be expressed by a single unique number i.e. Pavement Classification Rating (PCR), without specifying a particular aircraft or detailed information about the pavement structure.

1.2.2 ACR is a number basically expresses the relative effect of an aircraft at a given configuration on a pavement structure for a specified standard subgrade strength. PCR is a number that expresses the load-carrying capacity of a pavement for unrestricted operations.

1.3 The key parameters of the determination of the new parameter pavement classification rating (PCR) are summarized in para 1.1.1 of Doc 9157 Part 3 as shown below:



The ACRs of aircraft are computed under the ACR-PCR method are summarized in para 1.1.3 of Doc 9157 Part 3 as shown below:



1.4 India is one of the fastest growing countries with a futuristic view on safe air transport dependency and presently operating 111 Licensed Aerodrome (Domestic and International). As such, necessary amendment / addition of relevant para had been made in the national regulation of India on 31st December 2020 and Aerodrome Operators were advised to prepare and implement the requirements by 28th November 2024.

2. DISCUSSION

Action Plan of DGCA India for implementation of ICAO SARPs effective from 28th November 2024

2.1 DGCA India Vide its state letter dated 20 Sep 2024 reminded all the aerodrome operator to ensure smooth transition from ACN-PCN to ACR-PCR system as per the latest amendment of annex 14 and is to be implemented before 28th November 2024. The guidance on reporting and publishing of PCRs advised to be as contained in the Aerodrome Design Manual (Doc 9157, Part 3).

2.2 DGCA India advised aerodrome operator that, the following shall be taken into account while calculating /determining the pavement strength by ACR-PCR method:

2.2.1 The PCR is the result of balance between the following parameters and should be available with Aerodrome Operator for calculation of pavement strength rating :

- The characteristics of the pavement i.e. modulus of elasticity etc.
- The traffic is intended to serve, and
- The expected pavement design life (or remaining life).

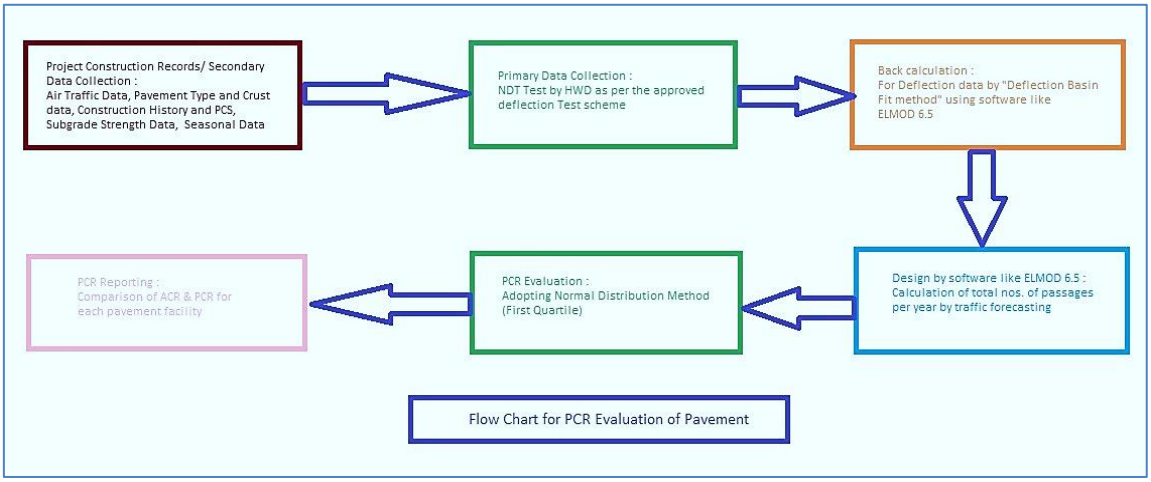
2.2.2 The PCR to be reported is such that the pavement strength is sufficient for the current and future traffic until the end of the pavement life/usage (planned).

2.2.3 The Aerodrome Operator shall ensure adequacy of Technical Methods, computer programs, equipment's and other relevant inputs/details used for calculation of strength rating of pavements.

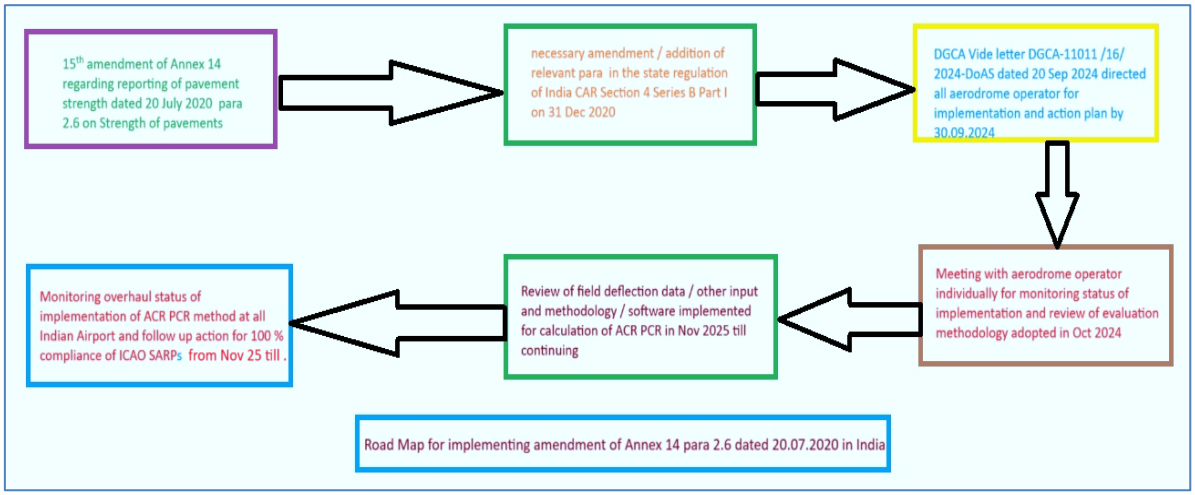
2.2.4 If the parameters mentioned in 2.2.1 are not available, following actions shall be taken by airport operator.

- Carry out field testing to collect the pavement description by approved methods such as non-destructive methods etc.
- Identify the traffic mix (actual and forecast over the evaluation period), propose the design life/remaining design life.
- Determine the PCR for airport maneuvering area (Apron, taxiway & runway).

2.3 The flowchart of methodology for PCR evaluation is shown below:



2.4 The complete Road Map for implementing of ACR-PCR method by DGCA India as follows :



2.5 There are two methods may be adopted for determining the strength of airfield pavements:

a) Using FAARFIELD (Version 2.1.1) software replacing COMFAA 3.0 software.

b) Through Non-Destructive Test (NDT) with the help of Heavy Falling Weight Deflectometer (HFWD) which is a technical evaluation process of defining or quantifying the bearing capacity of a pavement through measurement and study of the characteristics of the pavement and its behavior under load.

2.6 During the implementation phase, an Action Plan for smooth implementations of the ACR-PCR systems at Indian airports were developed. The Action was covering:

- A Focal point was designated to coordinate activities at the airport.
- Resources (human, financial and material) necessary to determine the PCR(s) at the aerodrome.
- Details of training conducted for relevant staff.
- Implementation schedule (consider the need of evaluation of the pavements or the available recent data derived through non-destructive methods)
- PCRs Publication (AIP Update)

2.7 The aerodrome operators carried out NDT Sampling and calculation through software program. The machines such as Sweco, Dynatest, Kuab etc. were used for performing NDT and the corresponding data was processed through the software program such as ELMode, Rosy software etc. for determination ACR-PCR values of the pavement.

2.8 DGCA India also reviewed the methodology, program, data gathering process and the final result of the ACR-PCR determination process of major international aerodromes before publication of the information in AIP.

2.9 India as a member State has initiated timely action plan for implementing ICAO latest SARPs related to ACR-PCR method of pavement bearing strength and implemented at all the International Airports.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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