



| ICAO

# INTERNATIONAL CIVIL AVIATION ORGANIZATION

A UN SPECIALIZED AGENCY



# ICAO REQUIREMENTS FOR REPORTING PAVEMENT STRENGTH

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# PRESENTATION OVERVIEW

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**01** Requirements for reporting pavement strength in Annex 14, Volume I

**02** ACN-PCN method

**03** ACR-PCR method development timeline

**04** Key elements of the ACR-PCR method

**05** References

Requirement  
for reporting  
pavement  
strength in  
Annex 14,  
Vol1



## Applicable until 27 November 2024

2.6.1. The bearing strength of a pavement shall be determined.

## Applicable as of 28 November 2024

2.6.1. The bearing strength of a pavement shall be determined.

## Applicable until 27 November 2024

2.6.2 The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5 700 kg shall be made available using the aircraft classification number-pavement classification number (ACN-PCN) method by reporting all of the following information:

- a) pavement classification number (PCN);
- b) pavement type for ACN-PCN determination;
- c) subgrade strength category;
- d) maximum allowable tire pressure category or maximum allowable tire pressure value; and
- e) evaluation method.

## Applicable as of 28 November 2024

2.6.2. The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5 700 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;
- e) evaluation method.

## Applicable until 27 November 2024

2.6.3 The PCN reported shall indicate that aircraft with an aircraft classification number (ACN) equal to or less than the reported PCN can operate on the pavement subject to any limitation on the tire pressure or aircraft all-up mass for specified aircraft type(s).

## Applicable as of 28 November 2024

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).

## Applicable until 27 November 2024

2.6.4 The ACN of an aircraft shall be determined in accordance with the standard procedures associated with the ACN-PCN method.

## Applicable as of 28 November 2024

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

## Applicable until 27 November 2024

2.6.5 For the purposes of determining the ACN, the behaviour of a pavement shall be classified as equivalent to a rigid or flexible construction.

## Applicable as of 28 November 2024

2.6.5 For the purposes of determining the ACR, the behaviour of a pavement shall be classified as equivalent to a rigid or flexible construction

## Applicable until 27 November 2024

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

### a) Pavement type for ACN-PCN determination:

Code

Rigid pavement                      R

Flexible pavement                      F

## Applicable as of 28 November 2024

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:

### a) Pavement type for ACR-PCR determination:

Code

Rigid pavement                      R

Flexible pavement                      F

## Applicable until 27 November 2024

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

### b) Subgrade strength category:

Code	A	B	C	D
Strength	High	Medium	Low	Ultra low
Rigid (MN/m <sup>3</sup> )	K=150	K=80	K=40	K=20
Flexible	CBR =15	CBR =10	CBR =6	CBR =3

## Applicable as of 28 November 2024

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:

### b) Subgrade strength category:

Code	A	B	C	D
Strength	High	Medium	Low	Ultra low
E (MPA)	E=200	E=120	E= 80	E=50
For rigid and flexible pavements				

## Applicable until 27 November 2024

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

### c) Maximum allowable tire pressure category:

Category	Limit	Code
Unlimited	No pressure limit	W
High	Pressure limited to 1.75 MPa	X
Medium	Pressure limited to 1.25 MPa	Y
Low	Pressure limited to 0.5 MPa	Z

## Applicable as of 28 November 2024

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:

### c) Maximum allowable tire pressure category:

Category	Limit	Code
Unlimited	No pressure limit	W
High	Pressure limited to 1.75 MPa	X
Medium	Pressure limited to 1.25 MPa	Y
Low	Pressure limited to 0.5 MPa	Z

## Applicable until 27 November 2024

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

### d) Evaluation method:

Method	Code
<b>Technical evaluation:</b> representing a specific study of the pavement characteristics and application of pavement behaviour technology	T
<b>Using aircraft experience:</b> representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.	U

## Applicable as of 28 November 2024

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:

### d) Evaluation method:

Method	Code
<b>Technical evaluation:</b> representing a specific study of the pavement characteristics and application of pavement behaviour technology	T
<b>Using aircraft experience:</b> representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.	U

## Applicable until 27 November 2024

2.6.7 Recommendation.— Criteria should be established to regulate the use of a pavement by an aircraft with an ACN higher than the PCN reported for that pavement in accordance with 2.6.2 and 2.6.3.

(Overload operations)

Suggested criteria in Annex 14, Vol 1 Attachment A(Section 19)

## Applicable as of 28 November 2024

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.

(Overload operations)

Suggested criteria in Annex 14, Vol 1, Attachment A (Section 19)

## Applicable until 27 November 2024

2.6.8 The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5 700 kg shall be made available by reporting the following information:

- a) maximum allowable aircraft mass; and
- b) maximum allowable tire pressure.

Example: 4 000 kg/0.50 MPa

## Applicable as of 28 November 2024

2.6.8 The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5 700 kg shall be made available by reporting the following information:

- a) maximum allowable aircraft mass; and
- b) maximum allowable tire pressure.

Example: 4 800 kg/0.60 MPa.

## 02 Key elements of the ACN-PCN method



# ACN-PCN METHOD

## Key definitions

### Aircraft classification number (ACN)

A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

### Pavement classification number (PCN)

A number expressing the bearing strength of a pavement for unrestricted operations.



Promulgated in 1981 to allow aircraft operators to determine the allowable operating weight for their aircraft on a given pavement



Relies on the plain comparison of two components: ACN and PCN.

ACN-PCN is not a pavement design method



Consideration of the critical aircraft operating on the pavement



Based on empirical methods of pavement design:

- Flexible pavements: CBR procedure based on Boussineq's theory
- Rigid pavement: PCA design based on Westergaard's theory

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## Limitations of the ACN-PCN method

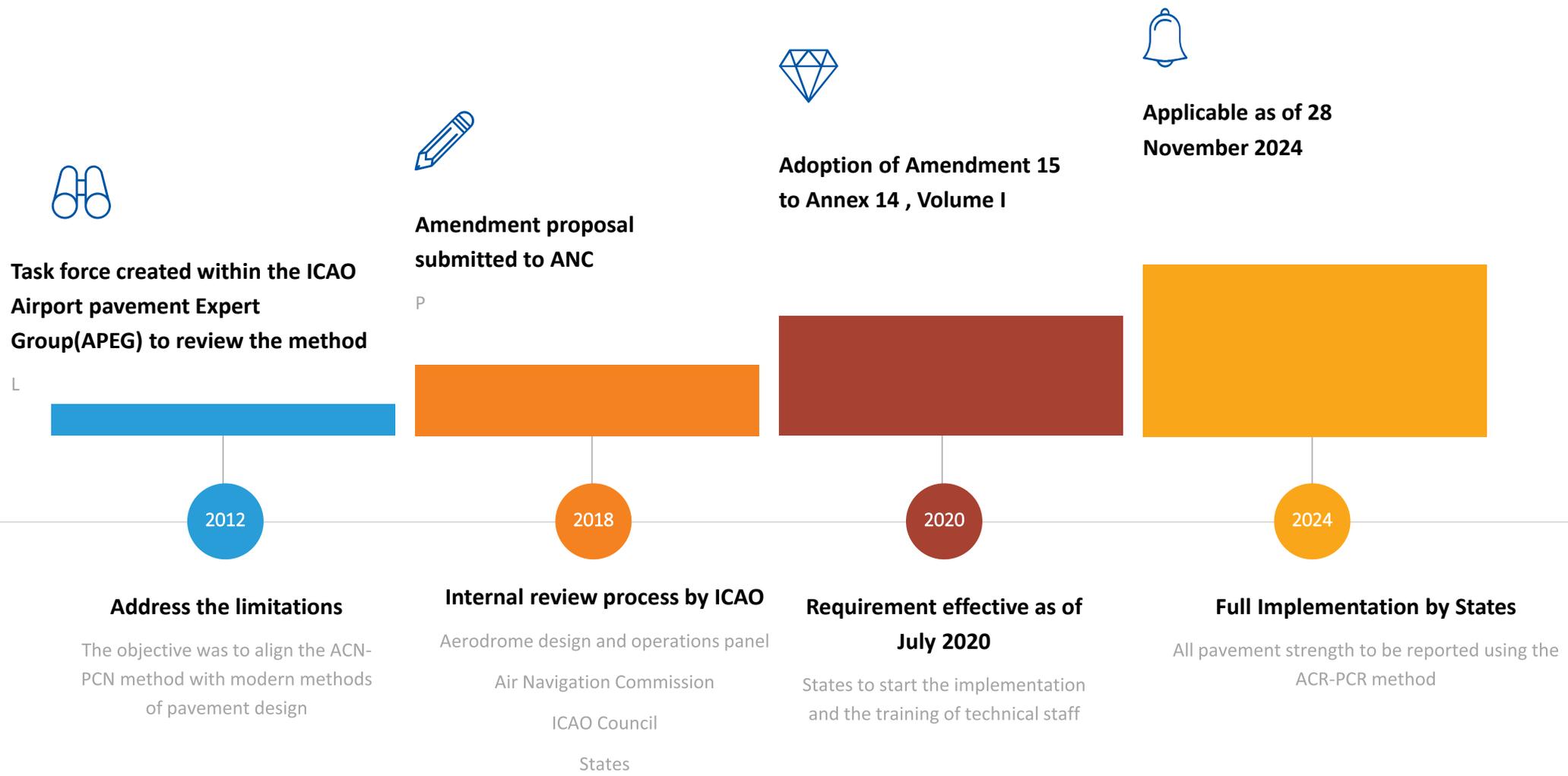
***The ACN-PCN method is based on empirical methods for pavement design initially developed in the 1940s.***

Empirical methods for pavement design are limited :

- Overly conservative
- Unable to account for the improved characteristics of new pavement materials
- Unable to consider the variability and increased complexity of aircraft landing gear configurations
- Inconsistent with modern pavement design methods based on mechanistic-empirical concepts
- Unable to accurately consider the damage induced by the traffic mix on a pavement

03  
ACR-PCR  
method  
development  
timeline





**Task force created within the ICAO Airport pavement Expert Group(APEG) to review the method**

2012

**Address the limitations**  
The objective was to align the ACN-PCN method with modern methods of pavement design

**Amendment proposal submitted to ANC**

2018

**Internal review process by ICAO**  
Aerodrome design and operations panel  
Air Navigation Commission  
ICAO Council  
States

**Adoption of Amendment 15 to Annex 14 , Volume I**

2020

**Requirement effective as of July 2020**  
States to start the implementation and the training of technical staff

**Applicable as of 28 November 2024**

2024

**Full Implementation by States**  
All pavement strength to be reported using the ACR-PCR method

04  
Key elements  
of the  
ACR-PCR  
method



# ACR-PCR METHOD

## Key definitions

### Aircraft classification rating (ACR)

A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

### Pavement classification rating (PCR)

A number expressing the bearing strength of a pavement.



Effective since July 2020 and  
Applicable as of 28 November  
2024



Relies on the plain comparison of  
two components: ACR and PCR.

ACR-PCR is not a pavement design  
method



Consideration of the cumulative  
damage of the aircraft traffic  
operating on a given pavement



Based on mechanistic-empirical methods of  
pavement design allowing the calculation  
of mechanic pavement responses(stresses,  
strains, deflections) induced by traffic loads  
from Linear Elastic Analysis(LEA)

# 05 References



## References

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01

Annex 14, Volume I

02

Aerodrome design manual  
(Doc 9157), Part 3

03

ICAO ACR software

<https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/ICAO-ACR-14>



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Thank You!