



AEROSPACE RECOMMENDED PRACTICE

ARP1821™**REV. C**

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Superseding ARP1821B

(R) Aircraft Ground Flotation Analysis Methods

RATIONALE

ICAO has introduced a new standardized method (ACR/PCR) which will replace the current ACN/PCN method. The document is updated to reflect the latest recommended methods.

1. SCOPE

This SAE Aerospace Recommended Practice (ARP) includes recommended ground flotation analysis methods for both paved and unpaved airfields with application to both commercial and military aircraft.

1.1 Purpose

The purpose of this document is to identify the recommended aircraft ground flotation analysis methods that should be used for aircraft landing gear design and analysis.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AIR1780 Aircraft Flotation Analysis

2.1.2 ICAO Publications

Available from International Civil Aviation Organization, 999 University Street, Montreal, Quebec H3C 5H7, Canada, Tel: +1 514-954-8219, <http://www.icao.int/>.

Aerodrome Design Manual - Part 3 - Pavements - Second Edition - 1983: Procedure for Pavements Meant for Heavy Aircraft (ACN-PCN Method) Section 1.1

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Full document details: SAE ARP1821C

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<https://www.sae.org/standards/content/ARP1821C/>

Documents

Document Sharing Hub

2.1.3 NAS Publications

Available from Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000, www.aia-aerospace.org.

NAS3601 Recommended Standard Data Format of Transport Airplane Characteristics

2.1.4 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

AC 150/5320-6G Airport Pavement Design and Evaluation, 7 June 2021

AC 150/5335-5D Draft AC 150/5335-5D, Standardized Method of Reporting Airport Pavement Strength - PCR, 12 August 2020.

2.1.5 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

UFC 3-260-02 Pavement Design for Airfields

UFC 3-250-09FA Aggregate Surfaced Roads And Airfields Areas

UFC 3-260-03 Airfield Pavement Evaluation

FC 3-260-06F Air Force Design, Construction, Maintenance, and Evaluation of Snow and Ice Airfields in Antarctica

2.1.6 Other Publications

- [1] Schmidt, R.K., "The Design of Aircraft Landing Gear," (Warrendale, SAE International, 2021), doi:10.4271/R-455.
- [2] Gray, D.H. and Williams, D.E. "Evaluation of Aircraft Landing Gear Ground Flotation Characteristics for Operation from Unsurfaced Fields," ASD TR-68-34, Aeronautical Systems Division, USAFSC, September 1968 (AD 843585).
- [3] Planning and Design of Roads, Airfields, and Heliports in the Theater of Operations, FM 5-430/AFJMAN 32-8013 Vol. 2, Department of the Army and the Air Force, September 1994.
- [4] Paving and Surfacing Operations, TM 5-337, Department of the Army, February 1966.
- [5] Airplane Requirements for Operations on Gravel Runways, D6-45222-1, Boeing Commercial Airplane Company, 1980.
- [6] Ice Aerodrome Development – Guidelines and Recommended Practices, Advisory Circular AC 301-002, Transport Canada, 2011.

2.2 Definitions

AIRCRAFT CLASSIFICATION NUMBER (ACN): A number expressing the relative effect of an aircraft on the runway pavement for a specified standard subgrade category.

AIRCRAFT CLASSIFICATION RATING (ACR): ACR is a number that expresses the relative effect of an aircraft at a given configuration on a pavement structure for a specified standard subgrade strength.

AIRCRAFT GROUND FLOTATION: Aircraft ground flotation refers to the ability of an aircraft to operate on existing airfield pavements and is a process of trade-offs between demands for aircraft landing gears with acceptable ground loading pressure and the desirability for light landing gear weight for efficient flight and mission characteristics. The flotation analysis process can relate to the setting of landing gear characteristics for contemplated new aircraft designs, or the identification of limitations of gross weight and tire pressure for existing aircraft mission capability to a particular landing site.