



<b>AEROSPACE RECOMMENDED PRACTICE</b>	<b>ARP1786</b>	<b>REV. C</b>
	Issued 1984-05 Reaffirmed 2010-06 Revised 2013-09	
Superseding ARP1786B		
(R) Wheel Roll on Rim Criteria for Aircraft Applications		

### RATIONALE

This document is intended to provide recommended practice for aircraft wheel roll on rim design criteria and validation test. This revision C is an update to revision B and incorporates an updated reference section.

## 1. SCOPE

### 1.1 Purpose

This SAE Aerospace Recommended Practice (ARP) is to provide a recommended minimum laboratory roll performance for main landing gear aircraft wheels without tires installed and applies to both bolted and lock-ring wheel designs for FAA Part 25 and military aircraft main wheels (not required for any nose wheels or main wheels on FAA Part 23, 27 or 29 applications).

### 1.2 Applicability

This document sets forth minimum roll performance capability for a main landing gear wheel to be rolled without tire installed. The recommended test requirements establish a laboratory dynamometer demonstration level to equate with satisfactory experience on aircraft.

### 1.3 Background

In any case where a flat tire occurs, the tire carcass may or may not become separated from the wheel. Relative to wheel structural capability, the most adverse occurrence is for the tire to be thrown from the wheel rim with the subsequent condition of the wheel flanges rolling in direct contact on the runway. Therefore, demonstration is recommended to verify that the wheel possesses the structural integrity to roll on the rim without the tire carcass under the most adverse loading condition.

Past tire incidents leading to wheel failures prior to the aircraft completing takeoff roll-out have been associated with main gear installations. Consequently, attention is focused toward improving main wheel capability and to minimize hazards should a main gear tire failure occur. It is recommended that the practices of ARP5265 be followed to help minimize the risk of tire failure.

It is recognized that prescribing a roll on rim criterion imposes constraints. Items such as foreign objects and bumps on the runway cannot feasibly be accommodated. Therefore, the subject roll-on-rim criterion does not attempt to simulate an actual on-runway occurrence, but rather establish a simple, but relevant, dynamometer test to verify the general robustness of the wheel when subjected to a roll-on-rim occurrence. The minimum requirements were originally established by running dynamometer tests both on wheels that had successfully completed actual roll-on-rim occurrences in service, and wheels that had not.

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The effect upon wheel weight increase is moderate. However, it is believed that a substantially improved product will be achieved by meeting the minimum requirements established herein. This document may be used for commercial or military aircraft wheel-brake equipment.

NOTE: The primary focus of the roll-on-rim test is to prevent fragmentation of the wheel and associated foreign object damage, but does not address the potential secondary damage to the brake or landing gear.

## 2. 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 SAE Publications

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

- ARP1493 Wheel and Hydraulically Actuated Brake Design and Test Requirements for Military Aircraft
- ARP5265 Minimum Operational and Maintenance Responsibilities for Aircraft Tire Usage
- ARP5381 Minimum Performance Recommendations for Part 23, 27, and 29 Aircraft Wheels, Brakes, and Wheel and Brake Assemblies

### 2.2 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, [www.faa.gov](http://www.faa.gov).

- TSO-C135a Transport Airplane Wheels and Wheel and Brake Assemblies
- TSO-C26d Aircraft Wheels, Brakes and Wheel/Brake Assemblies for Parts 23, 27 and 29 Aircraft (Roll on Rim only required for Part 25 aircraft)

### 2.3 EASA Publications

Available from European Aviation Safety Agency, Postfach 10 12 53, D-50452 Koeln, Germany, Tel: +49-221-8999-000, [www.easa.eu.int](http://www.easa.eu.int).

- ETSO-C135a Large Aeroplane Wheels and Wheel and Brake Assemblies

## 3. REQUIREMENTS

### 3.1 Load and Distance

For single wheel gear and two and four wheel bogies the roll load should be at the wheel maximum static rated load for a distance equivalent to  $0.5 (V_R)^2$  in feet, but not to exceed 15 000 feet (4572 m) where:  $V_R$  = aircraft rotation velocity in knots at the aircraft maximum gross weight.

For more complex aircraft landing gear configurations on which flat or no-tire conditions may result in wheel loads greater than the static rated wheel load then a load as determined by analysis performed on the specific gear configuration should be used.