



AEROSPACE RECOMMENDED PRACTICE

ARP813™

REV. D

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Revised 2024-07

Superseding ARP813C

(R) Maintainability Recommendations for Aircraft Wheel and
Hydraulically Actuated Brake Design

RATIONALE

This revision will incorporate current/best design practices to enhance wheel/brake maintainability.

1. SCOPE

This SAE Aerospace Recommended Practice (ARP) recommends the maintainability features that should be considered in the design of aircraft wheels and brakes. The effect on other factors, such as cost, weight, reliability, and compatibility with other systems, should be weighed before incorporation of any of these maintainability features into the design.

1.1 Purpose

The purpose of this ARP is to identify design features for aircraft wheels and hydraulically actuated brakes that would enhance their maintainability.

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 +1 724-776-4970 (outside USA), www.sae.org.

AIR4403	Selection, Testing, Lubrication, and Sealing of Single Row Tapered Roller Bearings for Aerospace Wheel Applications
AIR4830	Aircraft Tire Pressure Monitoring Systems
AIR5490	Carbon Brake Contamination and Oxidation
AIR5567	Test Method for Catalytic Carbon Brake Disk Oxidation

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Documents
Document Sharing Hub

ARP1322	Overpressurization Release Devices
ARP6137	Tire Pressure Monitoring Systems (TPMS) for Aircraft
AS707	Thermal Sensitive Inflation Pressure Release Devices for Tubeless Aircraft Wheels
AS6817	Valve, Inflation, Aircraft Wheel

2.2 Other Publications

2.2.1 Tire and Rim Association (TRA) Publications

Available from The Tire and Rim Association, 4000 Embassy Parkway, Suite 390, Akron, OH 44333, Tel: 330-666-8121, www.us-tra.org.

Aircraft Year Book

2.2.2 European Union (EU) Council Regulations

Available from <http://data.europa.eu/eli/reg/2007/1354/oj>.

1907/2006 Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

3. RECOMMENDED DESIGN FEATURES

3.1 General

- 3.1.1 Corrosion-resistant aircraft standard materials and hardware should be used wherever possible.
- 3.1.2 Positive fastener retention requirements (safety wire/cable, threadlocker, safety wire bosses, drilled bolts, etc.) should be considered during the design process.
- 3.1.3 Structural fastener torque values, such as wheel tie bolts and brake assembly bolts, should be permanently marked on the assembly unless specifically required otherwise. It should be noted that permanent torque value markings reduce risk as long as torque requirements are never modified during the service life of the assembly. Non-structural fastener torque values should be documented in the maintenance manual only and not permanently marked on the assembly.
- 3.1.4 Thread inserts should be provided in tapped holes or adequate material should be provided to accommodate inserts/slimserts for repair.
- 3.1.5 Assemblies should be designed to prevent improper substitution/assembly of parts.
- 3.1.6 Assemblies should be designed to enable maintenance/overhaul with commercially available tools except as noted herein. The maintenance manual should include manufacturing drawings of all special tools.
- 3.1.7 As an anticorrosion measure, provision should be made for adequate drainage of installed assemblies so that fluids will not be trapped or held in pockets. Adequate material should be provided to permit rework of areas that commonly encounter corrosion. The design should include provisions to inhibit galvanic corrosion.
- 3.1.8 Metallic coatings applied to surfaces normally exposed to elevated temperatures should be governed by the following preferred limits (see Table 1). These limits are for the coatings themselves and not for substrates that may be governed by other factors, such as tempering temperature.

NOTE: Cadmium and chrome surface coatings should not be used. If possible, use low hydrogen embrittlement (LHE) zinc-nickel for corrosion protection in place of cadmium and high-velocity oxygen fuel (HVOF) wear coatings in place of chrome. Refer to EU Council Regulation 1907/2006 for EU-specific guidance.

Table 1 - Preferred Limits

Metallic Coatings	°C	°F
Aluminum	496	925
Zinc	260	500
Cadmium	232	450
Tin	204	400
Chrome*	427/871	800/1600
Nickel	538	1000
Silver	649	1200
Low Hydrogen Embrittlement (LHE) Zinc Nickel (ZnNi)	482	900
Phosphate (Zinc Based)	93	200
Phosphate (Iron Based)	204	400
Phosphate (Magnesium Based)	288	550

*Lower temperature for designs with wear requirements.

3.1.9 Seal materials should be selected for compatibility with the operational environment (e.g., lubricating compounds, greases, hydraulic fluids, deicers, etc.).

3.2 Wheels

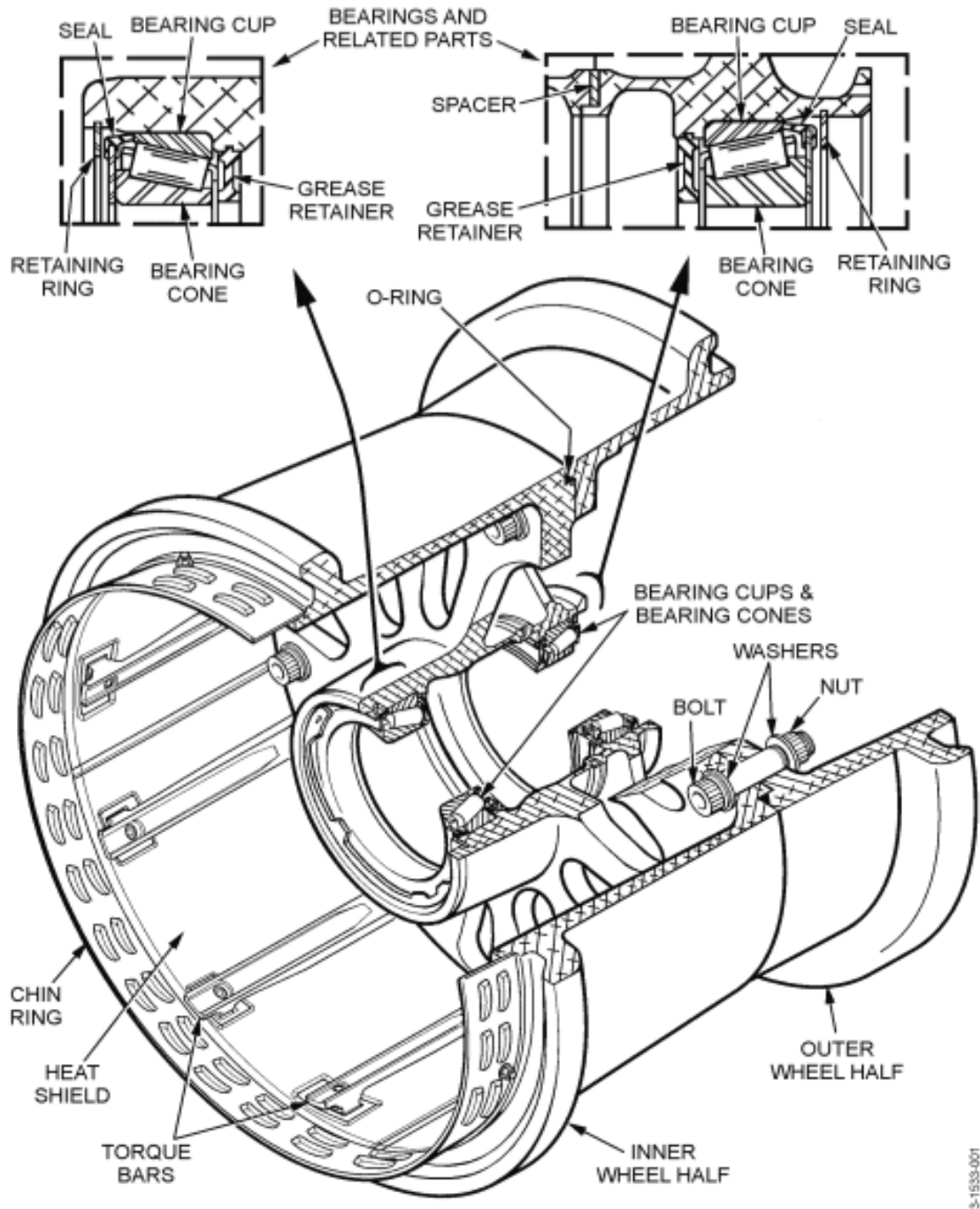


Figure 1 - Aircraft bolted wheel nomenclature