

WHEELS AND BRAKES
MINIMUM REQUIREMENTS FOR CIVIL AIRCRAFT APPLICATIONS

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1. PURPOSE: To specify minimum requirements for aircraft wheels and brakes for civil aircraft applications.
2. SCOPE: This specification covers minimum requirements for wheels and brakes in a range of sizes to accommodate the standard sizes and types of tires.
3. GENERAL REQUIREMENTS:
 - 3.1 Materials and Workmanship:
 - 3.1.1 Materials: Materials shall be suitable for the purpose intended. All metals used in the construction of wheels and brakes shall be corrosion resistant unless suitably plated or treated to resist corrosion during stocking and normal service life. The use of dissimilar metals, especially brass, copper, or steel in contact with aluminum, magnesium, or alloys thereof, shall be avoided where practicable.
 - 3.1.2 Workmanship: The workmanship and finish shall be in accordance with high grade aircraft wheel and brake manufacturing practices.
 - 3.2 Identification: Each wheel and each brake assembly shall be plainly marked as follows, and as applicable, in accordance with the ratings selected:

	<u>Wheel</u>	<u>Brake</u>
(a) Size	x	
(b) Serial number and date of manufacture	x	x
(c) Manufacturer's name and drawing number	x	x

Markings shall be of such character that they will not be obliterated or effaced as a result of service usage.
4. DETAIL REQUIREMENTS:
 - 4.1 Design:
 - 4.1.1 Brake Fluid: All hydraulic brakes shall be designed and tested to operate with hydraulic brake fluid or oil specified for the airplane on which the brakes are used.
 - 4.1.2 Lubricant Retainers: Suitable retainers shall be provided to prevent lubricant from reaching the braking surface and to prevent foreign matter from entering the bearings.
 - 4.1.3 Removable Flanges: All removable flanges shall be assembled onto the wheel in a manner that will prevent the removable flange and its retaining device from leaving the wheel if a tire should deflate while the wheel is rolling.
 - 4.1.4 Adjustment: When necessary to insure safe performance, the brake mechanism shall be equipped with suitable adjustment devices.

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-2-

4.2 Amphibian Applications:

- 4.2.1 Water Seal: Provision shall be made to seal the wheels of amphibious aircraft to prevent entrance of water into the wheel bearings or other portions of the wheel or brake where the presence of water might be detrimental. Unsealed brake assemblies will be permitted if all exposed materials therein are corrosion resistant, or if the design is such that brake action and service life will not be impaired by the presence of sea water or fresh water.

4.3 Construction:

- 4.3.1 Radiographic Control: Castings shall be produced under radiographic control when a new foundry source is established, when new size or shape castings are made, or when a change is made in foundry technique. All subsequent inspection of production castings shall require inspection per AWP 586.
- 4.3.2 Castings: Castings shall be of high quality, clean, sound, and free from blowholes, porosity, or surface defects caused by inclusions, except that loose sand or entrapped gases may be allowed when the serviceability of the casting has not been impaired.
- 4.3.3 Forgings: Forgings shall be of uniform condition, free from blisters, fins, folds, seams, laps, cracks, segregation, and other defects. If strength and serviceability are not impaired, imperfections may be removed.
- 4.3.4 Rim Surfaces: The surface of the rim between bead seats shall be free from defects which will be injurious to the inner tube. Holes which extend through a rim shall be drilled out and filled with a flush plug. Other depressions in rim or bead seats which might injure the tube or casing shall be filled with a hard surface permanent filler before applying the primer coat.
- 4.3.5 Rim Joints: Joints in the rim surface and joints between rim surfaces and demountable flanges shall be smooth, close-fitting, and non-injurious to the inner tube while mounting the tire, or while in service.
- 4.3.6 Rivets and Bolts: When rivets are used, they shall be well headed over, and rivets or bolts coming in contact with the casing or tube shall be smooth enough not to damage the tube or casing during normal operation.
- 4.3.7 Bolts and Studs: When bolts and studs are used for fastening together sections of a wheel, the length of the threads for the nut extending into and bearing against the sections shall be held to a minimum; and there shall be sufficient unthreaded bearing area to carry the required load.

4.4 Protective Treatment:

- 4.4.1 Steel Parts: Wherever possible all steel parts, except braking surfaces and those parts fabricated from corrosion resistant steel, shall be cadmium plated or zinc plated. Where cadmium or zinc plating cannot be applied, the surface shall be thoroughly cleaned and suitably protected from corrosion.

-3-

- 4.4.2 Aluminum Parts: All aluminum alloy parts shall be anodized or have equivalent protection from corrosion.
- 4.4.3 Magnesium Parts: All magnesium alloy parts shall receive a suitable, dichromate treatment or have equivalent protection from corrosion.
- 4.4.4 Bearing and Braking Surface: The bearings and braking surfaces shall be protected during the application of finish to the wheels and brakes.
- 4.4.5 Operating Cylinders: Prior to inspection tests, the cylinders shall be suitably cleaned to remove all metal particles and other foreign matter. The cylinder ports shall be suitably capped to prevent entrance of foreign matter.

5. QUALIFICATION TESTS:

- 5.1 Ratings: Each design of wheel or wheel-brake shall have the following ratings as applicable.

S = Maximum Static Load in lbs.
L = Maximum Limit Load in lbs.
KE = Maximum Kinetic Energy Capacity in ft-lbs at Design Landing Weight.
V_{so} = Minimum Stalling Speed in MPH, (not applicable to Method II analysis per paragraph 5.4.7.1(b)).

- 5.2 Tests Required: Except as qualified by 5.3, the ratings for wheel-brake assemblies shall be substantiated by the following tests as applicable.

- (a) Wheel loads, Table I
- (b) Brake Capacity, Table II

- 5.3 Exceptions - as noted:

- (a) Tail wheels need not be roll tested.

- 5.4 Test Methods:

- 5.4.1 Radial Load Test: This test shall consist of the application of a load equally on both sides of the wheel, to a straight axle passing through the hub, with the tire restrained against a flat non-deflecting surface so that the point of application of the resisting force is centered in the most critical location. In applying this load, the tire may be inflated with water to the specified pressure and the water gradually bled out as the load is increased so that the pressure in the completely deflected tire will equal that of the completely deflected air-inflated tire. A wheel being tested for use with tubeless tire may use conventional tire and tube for test under paragraph (b).