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Aircraft Wheel Inflation Valves Incorporating an Inflation Pressure Gauge

RATIONALE

This document provides design recommendations for aircraft wheel inflation valves which incorporate an inflation pressure gauge. This specific kind of inflation valves with pressure gauges have not changed over the last several years and is not expected to change in the future. Therefore, stabilization has been recommended.

STABILIZED NOTICE

This document has been declared "Stabilized" by the SAE A-5C Aircraft Tires Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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Documents

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1. SCOPE

This specification covers the recommended design, construction, performance and testing requirements for aircraft wheel inflation valves incorporating an inflation pressure gauge which are mounted on the aircraft wheel. These valve/gauge assemblies should be appropriate for use on all aircraft types supported by tubeless tire/wheel assemblies.

2. APPLICABLE DOCUMENTS

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications should apply. The applicable issue of other publications should be the issue in effect on the date of the purchase order. In the event of conflict between the text of the document and references cited herein, the text of this document should take 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.

AS5202 Port or Fitting End, Internal Straight Thread, Design Standard

AS33514 Fitting End, Standard Dimensions for Flareless Tube Connection and Gasket Seal

2.2 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI/NCSL Z540-1 General Requirements for Calibration Laboratories and Measuring and Test Equipment

2.3 U.S. Government Publications

Airworthiness Directive 87-08-09 Nitrogen Inflation Requirements; Available from: www.faa.gov, select "Airworthiness Directives" under Quick Find

Federal Specification A-A-59503, Commercial Item Description Nitrogen, Technical

MIL-STD-810, Environmental Engineering Considerations and Laboratory Tests

RTCA/DO-160, Environmental Conditions and Test Procedures for Airborne Equipment

Unless otherwise indicated, copies of federal and military specifications, standards and handbooks are available from:

Acquisition Streamlining and Standardization Information System (ASSIST) database (<http://assist.daps.dla.mil>), Standardization Documents Order Desk, 700 Robbins Avenue, Building #4, Section D, Philadelphia, PA 19111-5094.

2.4 Other Industry Standards

Tire and Rim Association Standards (Annual Publication)

ETRTO (European Tire & Rim Technical Organization Standards)

3. GENERAL REQUIREMENTS

3.1 Intended Use

The inflation valve/gauge assembly described in this publication is designed for attachment directly to aircraft wheel assemblies. The inflation valve/gauge assembly is intended to be used to inflate and deflate the tire/wheel assembly and measure the difference between the internal tire pressure and the ambient atmospheric pressure. Valve thread details and installation torques should follow Tire & Rim Association Standards. In no case should this product be installed in an overpressure relief valve location.

3.2 Inflation Media

The valve/gauge assembly is intended for use with dry gaseous nitrogen, or dry, clean air, where applicable, on braked/unbraked wheels. Nitrogen should conform to Federal Specification A-A-59503 Commercial Item Description Nitrogen, Technical.

3.3 Valve/Gauge Assembly

The mechanical valve/gauge assembly should include a pressure gauge employing a pointer and background pressure graduation marks, a connector for the gauge to be attached to the wheel valve stem, and an integral inflation/deflation valve which would accept a standard inflation chuck and conforms to the applicable Tire & Rim Association (T&RA) standards.

The digital valve/gauge assembly should include a pressure gauge employing a digital display, a connector for the gauge to be attached to the wheel valve stem, and an integral inflation/deflation valve which would accept a standard inflation chuck and conforms to the applicable Tire & Rim Association (T&RA) standards.

3.4 Installation Envelope

The installation envelope may be established by the wheel manufacturer or the airframe manufacturer, as appropriate. Installation should be such as to protect the valve/gauge assembly and to make it easy to read.

3.5 Finishes

Paint or other material, including shock-absorbing material, may be applied. The exterior material should, in its final condition, resist all climatic and chemical conditions of its usual environment. Requirements are further defined in the testing section of this specification.

3.6 Weight

A maximum weight for the valve/gauge assembly may be established by the wheel manufacturer or the airframe manufacturer, as appropriate. The weight so specified should include the valve cap, valve core and all seals or gaskets required for installation.

3.7 Mechanical Gauge Pointer and Face Markings

- 3.7.1 The gauge should be directly readable with no multiplication factors required.
- 3.7.2 The pointer position, pressure numerals and pressure graduation marks should be legible from not less than 2 feet (0.6 m). Adequate contrast should be provided between the markings, pointer and background to permit easy reading of the gauge with a flashlight during hours of darkness. Red color should not be used for either markings or background unless the customer request specifies it. The distance between the pointer and background should not allow the possibility of significant parallax errors.
- 3.7.3 The mechanical gauge should be designed in a minimum of two different operating ranges. The recommendation for normal operational ranges are 0 to 250 psi (0 to 17.2 bar) and 200 to 500 psi (13.8 to 34.5 bar). The 0 to 250 psi (0 to 17.2 bar) range should be marked in 5-psi (0.3 bar) increments, maximum. The 200 to 500 psi (13.8 to 34.5 bar) range should be marked in 10-psi (0.7 bar) increments, maximum.
- 3.7.4 The pointer tip should overlay the applicable pressure graduation mark at all pressure readings. The pointer tip should be thinner than the mark thickness, if possible. The pointer should also overlay at least half of the length of the shortest dial mark.
- 3.7.5 Pressure zones should NOT be color-coded. Changes in recommended tire pressures over time render color codes ineffective and can be confusing.
- 3.7.6 The dial face should be mechanically attached to the gauge to prevent movement.
- 3.7.7 The gauge should continuously display tire inflation pressure, including those times at which inflation or deflation is being performed.
- 3.7.8 At ambient atmospheric pressure, the gauge pointer should be at the zero marked position within the accuracy requirements listed in 4.2.

3.8 Digital Display

- 3.8.1 An electronic digital readout may be used in place of the mechanical pointer in 3.6.
- 3.8.2 A digital display should be legible from not less than 2 feet (0.6 m) in direct sunlight, if self illuminating, or with a flashlight during hours of darkness.
- 3.8.3 The digital display should display in 1 psi increments, maximum.
- 3.8.4 The batteries which power the digital units should be located in a separate compartment which does not expose other circuitry during battery changes.
- 3.8.5 A low battery or gauge malfunction indicator should be provided.