

# European Aviation Safety Agency

## European Technical Standard Order

Subject: ELECTRICALLY HEATED PITOT AND PITOT-STATIC TUBES

### 1 - Applicability

This ETSO gives the requirements which electrically heated pitot and pitot-static tubes, heated by aircraft electrical power, that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

The standards apply to the following basic types:

- Type I - Pitot pressure, straight and L-shaped, electrically heated.
- Type II - Pitot and static pressures, straight and L-shaped, electrically heated.

### 2 - Procedures

#### 2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

#### 2.2 – Specific

None

### 3 - Technical Conditions

#### 3.1 - Basic

##### 3.1.1 - Minimum Performance Standard

Standards set forth in SAE International's Aerospace Standard AS8006, Minimum Performance Standard for Pitot and Pitot-Static Tubes, dated April 28, 1988, Sections 1, 2, 3, 4, and 5, as amended by appendix 1 of this ETSO.

##### 3.1.2 - Environmental Standard

See CS-ETSO Subpart A paragraph 2.1.

Replace all references of RTCA/DO-160B in AS8006 with the standard revision as provided in CS-ETSO Subpart A paragraph 2.1.

##### 3.1.3 - Computer Software

None

#### 3.2 - Specific

None

### 4 - Marking

#### 4.1 – General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2.

#### 4.2 - Specific

In addition, the following identification information must be permanently and legibly marked:

- identification information required in SAE AS8006,
- "Type I" or "Type II" of the pitot and pitot-static tube,
- mark the following elements with at least the name of the manufacturer, manufacturer's sub-assembly part number, and the ETSO number:
  - (1) Each component that is easily removable (without hand tools),
  - (2) Each interchangeable element, and
  - (3) Each separate sub-assembly of the article that the manufacturer determines may be interchangeable.

#### **5 - Availability of Referenced Document**

See CS-ETSO Subpart A paragraph 3.

In addition, you can order British Standards Institution (BSI) documents from British Standards Institution, 389 Chiswick High Road, London, United Kingdom W4 4AL. Telephone +44-208-9967555, or fax +44 208-9967001. You can also contact BSI online and order documents at [www.bsonline.bsi-global.com](http://www.bsonline.bsi-global.com).

**APPENDIX 1**

**MINIMUM PERFORMANCE STANDARDS FOR ELECTRICALLY HEATED PITOT AND  
PITOT-STATIC TUBES**

1. This ETSO modifies SAE AS8006, Sections 3, 4 and 5 as follows:

| <b>AS8006</b>  | <b>EASA Modification</b>  |
|----------------|---|
| Section 3.3    | <b>Replace</b> "Materials shall be corrosion-resistant and suitably treated to resist corrosion due to atmospheric conditions and salt spray. Non-magnetic materials shall be used for all parts except where magnetic materials are essential. Non-ferrous materials shall be used for all parts except where ferrous materials are essential."<br><br><b>Substitute:</b> "Materials must be shown by experience or tests to be suitable and dependable. Materials must be corrosion-resistant and suitably treated to resist corrosion due to atmospheric conditions and salt spray." |
| Section 3.4.2  | <b>Delete</b> "The minimum drain hole size is 0.029 in (0.74mm)."   |
| Section 3.4.5  | <b>Delete</b> Section 3.4.5 of AS8006, and renumber the remaining paragraphs in section 3 of AS8006 accordingly.  |
| Section 3.4.9  | <b>Delete</b> Section 3.4.9 of AS8006, and renumber the remaining paragraphs in section 3 of AS8006 accordingly.  |
| Section 3.4.10 | <b>Delete</b> "The heater shall be regulated automatically in such a manner that the power dissipation through the heater will be an inverse function of the heating element temperature."  |
| Section 3.5.7  | <b>Delete</b> "Initial power surge shall not exceed four times the rated power under deicing conditions."   |
| Section 3.5.7  | <b>Add</b> at the end of Section 3.5.7 of AS8006: "Provide instructions for installation limitations in component maintenance manual (CMM). Require the use of properly rated circuit breaker for the sensor installation."   |
| Section 3.7    | <b>Replace</b> "Pitot and static pressure tube lines shall be identified by the letters "P" and "S", respectively, which shall be stamped, edged, or engraved on the fittings or couplings."<br><br><b>Substitute:</b> "Identify pitot pressure and static pressure tube lines by the letters "P" and "S" respectively. Stamp, edge or engrave the letters on the lines or fittings."   |
| Section 4.5    | <b>Replace</b> "After the 5 min period, the power shall be measured and shall not exceed 60 % of rated power for operation under deicing conditions specified in 5.4."<br><br><b>Substitute:</b> "After the 5-minute period, measure the power. The heater will operate according to the conditions specified on the probe's specification control drawing."  |

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| Section 5    | <p><b>Replace</b> "Representative samples shall be subjected to whatever tests the manufacturer deems necessary to demonstrating compliance with the requirements of this specification, but as a minimum must include the following tests on at least one sample."</p> <p><b>Substitute:</b> "Manufacturers must subject representative samples to whatever tests they deem necessary to demonstrate compliance with this specification. As a minimum they must include the following tests."</p>   |
| Section 5.4  | <p><b>Replace</b> "At the conclusion of the tests, any moisture accumulating in the pitot connection line shall be removed and measured and shall not exceed 1 gram."</p> <p><b>Substitute:</b> "Any moisture accumulating inside the probe must not freeze or affect the pressure measurements."</p>  |
| Section 5.4  | <p><b>Use the following</b> for the de-icing and anti-icing tests in place of the temperature and liquid water content requirements of Section 5.4 of SAE AS8006:</p> <p>"Use test conditions defined in CS-25, Appendix C, Part I,(b) <i>Intermittent maximum icing</i>, for the icing test conditions. Specifically, three conditions should be accomplished at a drop diameter of 20 micron: a liquid water content of 2.2 grams per cubic meter at an ambient temperature of -10 degrees C or colder, a liquid water content of 1.7 grams per cubic meter at an ambient temperature of -20 degrees C or colder, and a liquid water content of 1.0 grams per cubic meter at an ambient temperature of -30 degrees C or colder. Accomplish the icing test at a voltage 10 % below the nominal rated voltage.</p> <p>In addition, use the liquid water content tests of the supercooled liquid water test No.1 of paragraph 8.7.2(1), and test No.2 of paragraph 8.7.2(2) of the British Standards Institution (BSI) 2G 135, Electrically-Heated Pitot and Pitot-Static Pressure Heads, dated 1 January 1967, Section 8.7, and Amendment 1, dated 31 July 1973 (R 1998). Accomplish this icing test at a voltage 10 % below the nominal rated voltage."</p> |
| Section 5.5  | <p><b>Delete</b> "Initial power surge shall not exceed four times the deicing rated power."</p>  |
| Section 5.11 | <p><b>Add:</b> "Section 5.11 Magnetic Effect: Determine the magnetic effect of the tube in terms of the deflection of a free magnet approximately 1-1/2 inches long in a magnetic field with a horizontal intensity of <math>0.18 \pm 0.01</math> gauss, when the tube is held in various positions and with rated voltage applied on an east-west line with its nearest part 12 inches from the centre of the magnet. (An aircraft compass with the compensating magnets removed may be used as the free magnet for this test.) The maximum deflection for the free magnet must not exceed 5 degrees from any indication or reference position."</p>  |