

# European Aviation Safety Agency

## European Technical Standard Order

**Subject:** Electrically Heated Pitot And Pitot-Static Tubes

### 1 - Applicability

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

### 2 - Procedures

#### 2.1 - General

Applicable procedures are detailed in CS-ETSO Subpart A.

#### 2.2 - Specific

##### 2.2.1 - Test Report

The test report identified in Section 2.4.2 and data identified in Chapter 4 of EUROCAE ED-225, Ice and Rain Minimum Qualification Standards for Pitot and Pitot-Static Probes, shall be provided to the installer to support installation approval.

##### 2.2.2 - Rated Performance Documentation

The rated performance to be declared in the declaration of design and performance (DDP) shall at least contain:

- the probe type and class;
- the passed test conditions;
- the concentration factors used for icing tests; and
- the probe test voltage

### 3 - Technical Conditions

#### 3.1 - Basic

##### 3.1.1 - Minimum Performance Standard

Standards set forth in SAE International's Aerospace Standard AS8006A, Minimum Performance Standard for Pitot and Pitot-Static Tubes, revised August 2015, as modified in Appendix 1 of this ETSO, and EUROCAE ED-225, Ice and Rain Minimum Qualification Standards for Pitot and Pitot-Static Probes, issued February 2016, as modified in Appendix 2 of this ETSO.

Note: The electric heater function is defined as starting with the aircraft interface (connector). The pneumatic pressure function is defined as starting with the pressure transducer interface if it is integrated with the probe or starting with the aircraft interface if the pressure transducer is separated from the probe.

**3.1.2 - Environmental Standard**

EUROCAE ED-14G / RTCA DO-160G, Environmental Conditions and Test Procedures for Airborne Equipment, or later revision as permitted by CS-ETSO, Subpart A, paragraph 2.1 and complemented by the minimum performance standards specified in Section 3.1.1 of this ETSO.

**3.1.3 - Software**

See CS-ETSO, Subpart A, paragraph 2.2.

**3.1.4 - Airborne Electronic Hardware**

See CS-ETSO, Subpart A, paragraph 2.3.

**3.2 - Specific****3.2.1 - Failure Condition Classification**

See CS-ETSO, Subpart A, paragraph 2.4.

**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:

- (1) The TYPE and CLASS designation in accordance with EUROCAE ED-225, paragraph 1)
- (2) All the information in SAE AS8006A, paragraphs 3.5.4 and 3.6.

**5 - Availability of Referenced Document**

See CS-ETSO, Subpart A, paragraph 3.

## APPENDIX 1

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

This ETSO modifies SAE AS8006A, as follows:

AS8006A Section	EASA Modification
2.1	<p>Page 1, Replace Subsection 2.1, with the following text:</p> <p>2.1 Applicable Documents</p> <p>The following publications form a part of this document to the extent specified herein. The applicable issue of <i>cited</i> publications shall be the issue in effect on the date of the publication of this document, unless otherwise specified. In the event of conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific <i>deviation or exemption</i> has been obtained.</p>
3.4.2	<p>Page 3, replace Subsection 3.4.2 with the following text:</p> <p>3.4.2 Particle Separation Features</p> <p>The probe shall be designed with baffling or a pitot settling chamber, or both, to minimise the entry of liquid or solid particles into the tubing connecting the probe to the aircraft instruments. There shall be at least one drain hole to discharge or scavenge entrained liquid, such as rain or melted ice water. The probe design <i>shall</i> consider the effects of ingested solid particles such as ice, sand and dust.</p>
3.4.3	<p>Page 3, replace Subsection 3.4.3 with the following text:</p> <p>3.4.3 Mis-installation</p> <p>The probe <i>shall</i> incorporate design features to minimise the potential for mis-installation on the aircraft. For example, in the case where the probe contains multiple pneumatic or electrical connections these features may include the incorporation of different pneumatic fitting sizes or types, or different electrical connector keying.</p>
3.4.11	<p>Page 4, amend 3.4.11 as follows:</p> <p>Protective coatings and finishes utilised in the construction of the probe <i>shall</i> not crack, chip, or scale to the extent that the probe no longer meets the aerodynamic accuracy requirements when exposed to the qualification test requirements of this standard.</p> <p>Other FAA modification not retained.</p>
4.6	<p>Page 7, amend 4.6 as follows:</p> <p>Other means can be used to demonstrate compliance with this requirement provided there is evidence they are equivalent or better than the specified test. Such alternate means is considered a deviation.</p>
5.26	<p>Page 12, replace Subsection 5.26 with the following text:</p> <p>5.26 Fire, flammability</p> <p>Non-metallic probes shall be tested for compliance with the fire and flammability test</p>

<b>AS8006A Section</b>	<b>EASA Modification</b>
	standards specified in EUROCAE ED-14G / RTCA DO-160G, Section 26, Category C. <i>If ignition occurs</i> inside or outside of the equipment, the probe shall not propagate the flame. Tests are not required for metallic probes.

## APPENDIX 2

## ICE AND RAIN MINIMUM QUALIFICATION STANDARDS FOR PITOT AND PITOT-STATIC PROBES

ED-225 introduces the possibility to use alternate methods. EASA considers the following alternate means as deviations from this ETSO:

ED-225 Section	Alternate method
1.2	Modified test conditions
2.2	Modified test conditions
2.3	Scaling method not listed in section 2.3
Table 5	MMD value outside the specified range
Table 6	MVD value outside the specified range

In addition, this ETSO modifies EUROCAE ED-225, as follows:

ED-225 Section	EASA Modification
1.2	<p>Page 1: Replace the first 'NOTE' with the following:</p> <p>NOTE: Class 2 is divided into two subgroups identified as either Class 2a or Class 2b. Class 2a probe applications typically include aircraft that operate within the mid to lower end of the Class 2 altitude range and that only use probe outputs to display basic airspeed and/or altitude. As such, Class 2a probes do not have to be tested against ice crystals at an altitude-capable icing tunnel. Class 2b applications are for probe installations intended to serve a critical function and <i>shall</i> be tested at an altitude-capable icing tunnel. Probes qualified to Class 2 of this standard shall be identified as either Class 2a or Class 2b.</p>
1.2	<p>Replace the second 'NOTE' with the following:</p> <p>NOTE: This specification, when used in conjunction with AS8006A, provides a comprehensive design and test standard for the devices that fall within the scope of this document.</p>
1.6	<p>Page 3: Add subsection 1.6</p> <p>1.6 General Definitions</p> <p>SHALL: The word 'shall' is used in this document to express an essential requirement where compliance is mandatory.</p> <p>MUST: The word 'must' is used in this document to express an essential requirement where compliance is mandatory.</p>
3.5	<p>Page 8, Paragraph 3.5 add the following note:</p> <p>NOTE: The probe test voltage reported to the installer shall not include any voltage adjustments made per paragraph 3.9 to simulate worst-case heater performance.</p>