# NOTICE OF PROPOSED AMENDMENT (NPA) NO 2009-08

**DRAFT DECISION OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY**

**amending Decision No. 2003/02/RM of the Executive Director of the Agency of 17 October 2003 on Certification Specifications, including Airworthiness Codes and Acceptable Means of Compliance, for Large Aeroplanes (« CS-25 »)**
**And**

**amending the Annex to Decision No 2003/10/RM of the Executive Director of the Agency of 24 October 2003 on Certification Specifications, Including Airworthiness Codes and Acceptable Means of Compliance, for European Technical Standard Orders ("CS-ETSO")**

***"Activation of ice protection system and update of ETSO C16 for electrically heated pitot and pitot-static tubes"***

TABLE OF CONTENTS

**A. EXPLANATORY NOTE ..... 3**

I. GENERAL ..... 3
II. CONSULTATION ..... 3
III. COMMENT RESPONSE DOCUMENT ..... 4
IV. CONTENT OF THE DRAFT OPINION/DECISION ..... 4
V. REGULATORY IMPACT ASSESSMENT ..... 4

**B. DRAFT DECISIONS ..... 8**

I DRAFT DECISION CS-25 ..... 9
II DRAFT DECISION ANNEX TO CS-ETSO ..... 13

## A. Explanatory Note

### I. General

1. The purpose of this Notice of Proposed Amendment (NPA) is to envisage amending Decision No. 2003/02/RM of the Executive Director of the Agency of 17 October 2003 on Certification Specifications, including Airworthiness Codes and Acceptable Means of Compliance, for Large Aeroplanes (« CS-25[1] ») and amending the Annex to Decision No 2003/10/RM of the Executive Director of the Agency of 24 October 2003 on Certification Specifications, Including Airworthiness Codes and Acceptable Means of Compliance, for European Technical Standard Orders ("CS-ETSO[2]").

2. The European Aviation Safety Agency (hereinafter referred to as the Agency) is directly involved in the rule-shaping process. It assists the Commission in its executive tasks by preparing draft regulations, and amendments thereof, for the implementation of the Basic Regulation[3] which are adopted as "Opinions" (Article 19(1)). It also adopts Certification Specifications, including Airworthiness Codes and Acceptable Means of Compliance and Guidance Material to be used in the certification process (Article 19(2)).

3. When developing rules, the Agency is bound to follow a structured process as required by Article 52(1) of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as "The Rulemaking Procedure"[4].

4. This rulemaking activity is included in the Agency's Rulemaking Programme 2010-2013. It implements the rulemaking tasks 25.022 and ETSO.009.

5. The text of this NPA has been developed by the Agency. It is submitted for consultation of all interested parties in accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure. The Agency has decided to reduce the consultation period to 1 month, because the two proposed amendments (CS-25 and Annex to CS-ETSO) are considered a safety priority and they are made by harmonisation with already adopted Federal Aviation Administration (FAA) material (one FAR Part 25 final rule and an already existing FAA TSO (C16a)). See chapter IV for more explanations.

### II. Consultation

6. To achieve optimal consultation, the Agency is publishing the draft decision of the Executive Director on its internet site. Comments should be provided exceptionally within 1 month in accordance with Article 6(5) of the Rulemaking Procedure. Comments on this proposal should be submitted by one of the following methods:

**CRT:** Send your comments using the Comment-Response Tool (CRT) available at **http://hub.easa.europa.eu/crt/**

**E-mail:** In case the use of CRT is prevented by technical problems these should be reported to the CRT webmaster and comments sent by email to NPA@easa.europa.eu.

---

[1] Executive Director Decision No 2003/2/RM of 17 October 2003, as last amended by Executive Director Decision 2009/010/R of 26 June 2009 (CS-25 Amendment 6).

[2] Executive Director Decision No 2003/10/RM of 24 October 2003, as last amended by Executive Director Decision 2008/012/R of 20 November 2008 (CS-ETSO Amendment 3).

[3] Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19.03.2008, p. 1)

[4] Management Board decision concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material (Rulemaking Procedure), EASA MB 08-2007, 13.6.2007

**Correspondence:** If you do not have access to internet or e-mail you can send your comment by mail to:
Process Support
Rulemaking Directorate
EASA
Postfach 10 12 53
D-50452 Cologne
Germany

Comments should be submitted **by 1 October 2009.** If received after this deadline they might not be taken into account.

## III. Comment response document

7. All comments received in time will be responded to and incorporated in a comment response document (CRD). The CRD will be available on the Agency's website and in the Comment-Response Tool (CRT).

## IV. Content of the draft opinion / decision

After considering the worldwide accidents and incidents which occurred in presence of icing conditions, the Agency has decided to launch a priority rulemaking task in order to upgrade Large Aeroplanes certification specifications (CS-25) and to introduce an update of ETSO C16 for electrically heated pitot and pitot static tubes. The goal is to upgrade certification standards to better protect new Large Aeroplanes Types against icing conditions threat. The reason for this prioritisation is explained below.

First, Large Aeroplanes accidents and incidents occurred where the flight crew was either completely unaware of ice accretion on the airframe, or was aware of ice accretion, but judged that it was not significant enough to warrant operation of the airframe ice protection system (IPS). Activation of IPS relying on flight crew observations can be difficult during times of high workload, operations at night, or when clear ice has accumulated.

To improve flight crew response to ice accretion it is proposed to amend CS-25 provisions to ensure that flight crews are provided with a clear means to know when to activate the airframe IPS. This amendment consists in a harmonisation with the recently issued FAA final rule amending FAR Part 25 (ref. Docket N° FAA-2007-27654; Amendment N° 25-129) which will be effective 2 September 2009.

Second, the recent Air France A330 accident (F-GZCP) investigation identified inconsistent measured airspeed which could be attributed to pitot probes faults in icing condition. Without presuming on the potential contribution of this fact on the accident, the Agency, as a precautionary measure, is proposing an update of the European Technical Standard Order (ETSO) for pitot and pitot-static pressure probes. The update of the current ETSO C16 "Airspeed Tubes (Electrically Heated)" is implemented by harmonisation with the existing FAA TSO-C16a ("Electrically heated pitot and pitot-static tubes")[5] which is effective since 6 October 2006; this TSO revision is based on the SAE standard AS8006 which replaces the older SAE standard AS393. This ETSO update is a first step; the Agency will be involved in the preparation of further improvements of this ETSO, which should include a clarification of the requirements wording and the lessons learnt from in-service experience and research studies.

## V. Regulatory Impact Assessment

8. Purpose and Intended Effect

a. Issue which the NPA is intended to address

i. Accidents and incidents occurred on Large Aeroplanes where the flight crew did not operate the airframe ice protection system (IPS) in a timely manner.

[5] Available at http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgTSO.nsf/Frameset?OpenPage

There are also concerns over the flight crew workload required to operate an airframe IPS, in that the flight crew must manually cycle when they observe ice accretions. In particular, the manual operation of the IPS adds a distraction during the approach and landing phases of flight which typically involve higher pilot workloads. During these critical phases of flight, flight crews have less time available for managing the aeroplane ice accretions.

ii. Current EASA ETSO C16 “Airspeed Tubes (Electrically Heated)” was created in harmonisation with FAA TSO C16 in 2003. Since this time FAA has updated their TSO and a new TSO C16a “Electrically heated pitot and pitot-static tubes” entered into force on 6 October 2006. TSO C16a is based on a more recent performance standard (AS8006) compared to TSO C16 (AS393). An update of the EASA ETSO is thus proposed.

b. Scale of the issue (quantified if possible)

i. Large Aeroplanes certified under CS-25, in particular aeroplanes where flight crews are required to operate an airframe IPS which must be manually cycled when they observe ice accretions.

ii. ETSO C16 affects pitot and pitot-static pressure tubes manufacturers which hold an ETSO authorisation.

c. Brief statement of the objectives of the NPA

i. A CS-25 amendment is proposed to address the Large Aeroplanes concerns mentioned in 8.a.i above by ensuring that flight crews are provided with clear means to know when to activate the airframe IPS. This would reduce the workload associated with monitoring ice accretions by requiring a system that operates continuously, or a system that automatically cycles the IPS, or an alert to the flight crew each time the IPS must be cycled. The expected benefit is a reduction of accidents and incidents on new Large Aeroplanes types.

ii. It is also proposed to update ETSO C16 by harmonisation with the existing FAA TSO-C16a (“Electrically heated pitot and pitot-static tubes”); this TSO revision is based on the SAE standard AS8006 which replaces the older SAE standard AS393.

9. Options

a. The options identified

Option 1: Do nothing

Option 2: Amend CS-25 and update ETSO C16

b. The preferred option selected

The preferred option is option 2.

10. Sectors concerned

Large Aeroplanes manufacturers.

Pitot and pitot-static pressure tubes manufacturers which hold an ETSO authorisation.

11. Impacts

a. All identified impacts

i. Safety

The proposed CS-25 amendment would reduce flight crew workload associated with monitoring ice accretions by requiring a system that operates continuously, or a system that automatically cycles the IPS, or an alert to the flight crew each time the IPS must be cycled. The expected benefit is a

decrease in the number of Large Aeroplanes incidents and accidents occurring in icing conditions because of flight crew being unaware of ice accretion on the airframe or being aware of ice accretion but selecting the IPS too late.

The update of ETSO C16 will provide an upgraded standard with more detailed qualification test requirements for de-icing and anti-icing. It will be applicable to new ETSO applications. However, this standard is generally already used by pitot and pitot-static pressure tube manufacturers either because aircraft manufacturers include it in their own specifications, or because FAA TSO C16a already requires this standard for new TSO applications since 6 October 2006. Moreover, compliance with this ETSO standard is voluntary and is not a prerequisite for equipment installation. The expected safety impact is thus a slight benefit.

ii. Economic

Proposed CS-25 amendment: refer to FAA NPRM and Final Rule (Docket N° FAA-2007-27654) which provide an economic analysis. The induced cost for new Large Aeroplane Types is generated by the new CS 25.1419(e) provision for an ice detection system. FAA evaluated the following cost[6]:

- When using a Primary ice detection system (CS 25.1419(e)(1)): 14,500 US dollars (10,118 euros) per aeroplane.
- When using an Advisory ice detection system and visual cues (CS 25.1419(e)(2)): 7,250 US dollars (5,059 euros) per aeroplane.
- When using a definition of conditions conducive to airframe icing, i.e. temperature and moisture (CS 25.1419(e)(3)): no cost.

Proposed update of ETSO C16: The establishment and the application of harmonised standards between ETSO and TSO on subjects of common interest provide the basis for equipment approvals independent from aircraft approvals. This has a positive effect on the market value and applicability of these equipments. The harmonisation of the ETSO and TSO standards will have a positive economic effect. Meanwhile, compliance with this ETSO standard is voluntary and is not a prerequisite for equipment installation.

iii. Environmental

No impact expected.

iv. Social

No impact expected.

v. Other aviation requirements outside EASA scope

No impact expected.

vi. Foreign comparable regulatory requirements

Option 2 provides the possibility to harmonise with FAA FAR Part 25 (Amendment 25-129) and FAA TSO C16a.

b. Equity and fairness in terms of distribution of positive and negative impacts among concerned sectors.

All applicants are equally affected.

12. Summary and Final Assessment

a. Comparison of the positive and negative impacts for each option evaluated

[6] Conversion made using a Euro/US dollar conversion rate of 1.4331

Compared to Option 1 “Do nothing”, Option 2 offers the possibility to harmonise with FAA Part 25 Amendment 25-129 and FAA TSO C16a.

The proposed amendment of CS-25 would bring a safety benefit to new Large Aeroplane designs when operating in icing conditions, for a minimal cost. The proposed update of ETSO C16 would bring a slight safety benefit, and a positive economic effect from the harmonisation.

b. A summary describing who would be affected by these impacts and analysing issues of equity and fairness

No equity and fairness issue were identified.

c. Final assessment and recommendation of a preferred option

Option 2 is the preferred option. This would bring safety benefit for Large Aeroplanes operating in icing conditions for a minimal cost; a positive economic impact is expected for airspeed tubes manufacturers from the harmonisation with FAA TSO.

## B. Draft Decisions

The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

1. deleted text is shown with a strike through: ~~deleted~~
2. new text is highlighted with grey shading: new
3. ….

indicates that remaining text is unchanged in front of or following the reflected amendment.

## I Draft Decision CS-25

**Book 1**

**Subpart B - FLIGHT**

**CONTROLLABILITY AND MANOEUVRABILITY**

**CS 25.143 General**

….

(j) For flight in icing conditions before the ice protection system has been activated and is performing its intended function, ~~the following requirements apply~~ it must be demonstrated in flight with the ice accretion defined in appendix C, part II(e) that:

~~(1) If activating the ice protection system depends on the pilot seeing a specified ice accretion on a reference surface (not just the first indication of icing), the requirements of CS 25.143 apply with the ice accretion defined in appendix C, part II(e).~~

~~(2) For other means of activating the ice protection system, it must be demonstrated in flight with the ice accretion defined in appendix C, part II(e) that:~~
~~(i) The aeroplane is controllable in a pull-up manoeuvre up to 1.5 g load factor; and~~
~~(ii) There is no pitch control force reversal during a pushover manoeuvre down to 0.5 g load factor.~~

(1) The aeroplane is controllable in a pull-up manoeuvre up to 1.5 g load factor; and
(2) There is no pitch control force reversal during a pushover manoeuvre down to 0.5 g load factor.

**CS 25.207 Stall warning**

(b) The warning must be furnished either through the inherent aerodynamic qualities of the aeroplane or by a device that will give clearly distinguishable indications under expected conditions of flight. However, a visual stall warning device that requires the attention of the crew within the cockpit is not acceptable by itself. If a warning device is used, it must provide a warning in each of the aeroplane configurations prescribed in subparagraph (a) of this paragraph at the speed prescribed in subparagraphs (c) and (d) of this paragraph. Except for showing compliance with the stall warning margin prescribed in subparagraph (h)(~~2~~3)(ii) of this ~~section~~ paragraph, the stall warning for flight in icing conditions ~~prescribed in paragraph (e) of this section~~ must be provided by the same means as the stall warning for flight in non-icing conditions. (See AMC 25.207(b))

(h) For flight in icing conditions before the ice protection system has been activated and is performing its intended function, ~~the following requirements apply,~~ with the ice accretion defined in appendix C, part II(e), the stall warning margin in straight and turning flight must be sufficient to allow the pilot to prevent stalling without encountering any adverse flight characteristics when:
~~(1) If activating the ice protection system depends on the pilot seeing a specified ice accretion on a reference surface (not just the first indication of icing), the requirements of this section apply, except for paragraphs (c) and (d).~~
~~(2) For other means of activating the ice protection system, the stall warning margin in straight and turning flight must be sufficient to allow the pilot to prevent stalling without encountering any adverse flight characteristics when the speed is reduced at~~

~~rates not exceeding 0.5 m/sec 2 (one knot per second) and the pilot performs the recovery manoeuvre in the same way as for flight in non-icing conditions.~~

~~(i) If stall warning is provided by the same means as for flight in non-icing conditions, the pilot may not start the recovery manoeuvre earlier than one second after the onset of stall warning.~~

~~(ii) If stall warning is provided by a different means than for flight in non-icing conditions, the pilot may not start the recovery manoeuvre earlier than 3 seconds after the onset of stall warning. Also, compliance must be shown with CS 25.203 using the demonstration prescribed by CS 25.201, except that the deceleration rates of CS 25.201(c)(2) need not be demonstrated.~~

(1) The speed is reduced at rates not exceeding 0.5 m/sec² (one knot per second);

(2) The pilot performs the recovery manoeuvre in the same way as for flight in non-icing conditions; and

(3) The recovery manoeuvre is started no earlier than:

(i) One second after the onset of stall warning if stall warning is provided by the same means as for flight in non-icing conditions; or

(ii) Three seconds after the onset of stall warning if stall warning is provided by a different means than for flight in non-icing conditions.

(i) In showing compliance with subparagraph (h) of this paragraph, if stall warning is provided by a different means in icing conditions than for non-icing conditions, compliance with CS 25.203 must be shown using the accretion defined in appendix C, part II(e). Compliance with this requirement must be shown using the demonstration prescribed by CS 25.201, except that the deceleration rates of CS 25.201(c)(2) need not be demonstrated.

**Book 1**

**Subpart F – EQUIPMENT**

**SAFETY EQUIPMENT**

**CS 25.1419 Ice protection**

….

(e) One of the following methods of icing detection and activation of the airframe ice protection system must be provided:
(1) A primary ice detection system that automatically activates or alerts the flight crew to activate the airframe ice protection system; or
(2) A definition of visual cues for recognition of the first sign of ice accretion on a specified surface combined with an advisory ice detection system that alerts the flight crew to activate the airframe ice protection system; or
(3) Identification of conditions conducive to airframe icing as defined by an appropriate static or total air temperature and visible moisture for use by the flight crew to activate the airframe ice protection system.

(f) Unless the applicant shows that the airframe ice protection system need not be operated during specific phases of flight, the requirements of paragraph (e) of this section are applicable to all phases of flight.

(g) After the initial activation of the airframe ice protection system:
(1) The ice protection system must be designed to operate continuously; or
(2) The aeroplane must be equipped with a system that automatically cycles the ice protection system; or
(3) An ice detection system must be provided to alert the flight crew each time the ice protection system must be cycled.

(h) Procedures for operation of the ice protection system, including activation and deactivation, must be established and documented in the Aeroplane Flight Manual.

**Book 1**

**Appendix C**

**Part II - Airframe Ice Accretions for Showing Compliance with Subpart B**

(e) The ice accretion before the ice protection system has been activated and is performing its intended function is the critical ice accretion formed on the unprotected and normally protected surfaces before activation and effective operation of the ice protection system in continuous maximum atmospheric icing conditions. This ice accretion only applies in showing compliance to CS 25.143(j), ~~and~~ 25.207(h) and 25.207(i).

**II Draft Decision Annex to CS-ETSO**

**ETSO-C16a**

~~**Date: 24.10.03**~~

**Date: XX.XX.09**

# European Aviation Safety Agency

# European Technical Standard Order

Subject: ~~AIRSPEED TUBES (ELECTRICALLY HEATED)~~ ELECTRICALLY HEATED PITOT AND PITOT-STATIC TUBES

## 1 - Applicability

This ETSO gives the requirements which ~~airspeed tubes (electrically heated)~~ 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 the SAE Aerospace Standard (AS) document: AS 393 „Airspeed Tubes (electrically heated)“, dated January 12, 1947.~~

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

~~As indicated in SAE 393~~.

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.

**ETSO-C16a**
Appendix 1

## 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:

| ***AS8006*** | ***EASA Modification*** |
|---|---|
| Section 3.3 | **Replace** "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>**Substitute:** "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 | **Delete** "The minimum drain hole size is 0.029 in (0.74mm)." |
| Section 3.4.5 | **Delete** Section 3.4.5 of AS8006, and renumber the remaining paragraphs in section 3 of AS8006 accordingly. |
| Section 3.4.9 | **Delete** Section 3.4.9 of AS8006, and renumber the remaining paragraphs in section 3 of AS8006 accordingly. |
| Section 3.4.10 | **Delete** "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 | **Delete** "Initial power surge shall not exceed four times the rated power under deicing conditions." |
| Section 3.5.7 | **Add** 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 | **Replace** "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>**Substitute:** "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 | **Replace** "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>**Substitute:** "After the 5-minute period, measure the power. The heater will operate according to the conditions specified on the probe's specification control drawing." |

| | |
|---|---|
| Section 5 | **Replace** "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."<br><br>**Substitute:** "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." |
| Section 5.4 | **Replace** "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."<br><br>**Substitute:** "Any moisture accumulating inside the probe must not freeze or affect the pressure measurements." |
| Section 5.4 | **Use the following** 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:<br><br>"Use test conditions defined in CS-25, Appendix C, Part I,(b) *Intermittent maximum icing*, 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.<br><br>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." |
| Section 5.5 | **Delete** "Initial power surge shall not exceed four times the deicing rated power." |
| Section 5.11 | **Add:** "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 0.18 ± 0.01 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." |