

European Aviation Safety Agency

European Technical Standard Order (ETSO)

Subject: **FUEL FLOWMETERS**

1 - Applicability

This ETSO gives the requirements which fuel flowmeters that are 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

None

3 - Technical Conditions

3.1 - Basic

3.1.1 - Minimum Performance Standard

Standards set forth in **Appendix 1**

3.1.2 - Environmental Standard

The Fuel Flowmeter must be tested in accordance with SAE AS407C "*Fuel Flowmeters*" from July 1, 2001, unless otherwise specified by appendix 1 of this ETSO, SAE AS1055D "*Fire Testing of Flexible Hose, Tube Assemblies, Coils, Fittings, and Similar System Components*" (sections 4 and 5) from June 1997, and EUROCAE ED-14E (RTCA DO-160E) "*Environmental Conditions and Test Procedures for Airborne Equipment*" from March 2005 unless otherwise specified by appendix 1 of this ETSO.

3.1.3 - Computer Software

If the equipment design includes a digital computer, the software must be developed in accordance with EUROCAE ED-12B (RTCA DO-178B) "*Software Considerations in Airborne Systems and Equipment Certification*" from 1992.

3.2 - Specific

None

4 - Marking

4.1 - General

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

4.2 - Specific

None

5 - Availability of Referenced Document

See CS-ETSO Subpart A paragraph 3

APPENDIX 1.

MINIMUM PERFORMANCE STANDARD FOR FUEL FLOWMETERS

1. General Requirements.

The applicable standard is SAE AS407C, *Fuel Flowmeters*, dated July 1, 2001.

Paragraphs 3.1, 3.1.1, 3.1.2, 3.2.b, and 4.2.1 of the SAE AS407C do not apply to this ETSO.

SAE AS407C must be applied as follows (changed text shown framed):

- a. **Temperature.** On Page 2 of SAE AS407C, replace Table 1 with the following table.

TABLE 1		
INSTRUMENT LOCATION	<u>A</u>	<u>B</u>
Heated Areas (Temp. Controlled)	-30 to 50 °C	-65 to 70 °C
Unheated Areas (Temp. Controlled)	-55 to 70 °C	-65 to 100 °C
Power Plant Compartment	-55 to 70 °C	-65 to 100 °C
Power Plant Accessory Compartment	-55 to 70 °C	-65 to 100 °C

- b. **Altitude.** In the first sentence of paragraph 3.3.4, Altitude, (page 3), replace "40.000 feet (12.192 m) standard altitude with 51.000 ft (15.545 m) standard altitude.
- c. **Leak Test.** In the second sentence of paragraph 6.3, Leak Test, (page 6), replace "to an air pressure of 40 psi (275.8 kPa)" with "to an air pressure in accordance with the manufacturer's recommendations."

2. Testing Your Fuel Flowmeter.

In addition to the qualification test requirements described in SAE AS407C, perform the following tests:

- a. **Thermal Shock Test.** This test applies to any hermetically sealed components. Subject the components to four cycles of exposure to water 85° ± 2° C and 5° ± 2° C. There should be no evidence of moisture damage to coating or enclosure. During each cycle of the test, immerse the component in water at 85° ± 2° C for 30 minutes. Within 5 seconds of removal from the bath, immerse the component for 30 minutes in the other bath maintained at 5° ± 2° C. Repeat this cycle continuously, one cycle following the other until four cycles are completed. After this test, subject the component to the sealing test in paragraph 2b. of this appendix. The component must have no leakage resulting from the test.

- b. **Sealing Test.** Apply this performance test to any hermetically sealed components. Immerse the component in a suitable liquid such as water. Then reduce the absolute pressure of the air above the liquid to about 1 inch of mercury (Hg) (3.4 kPa) Maintain this absolute pressure for 1 minute, or until the liquid stops giving off air bubbles, whichever is longer. Increase the absolute pressure by 2½ inches Hg (8.5 kPa) . If any bubbles come from the component case, consider it Leakage and reject the component. Do not consider bubbles, resulting from entrapped air in the exterior parts of the case, as leakage. If other test methods provide evidence equal to the immersion test, they can be used to test the integrity of the instrument's seals. If the component includes non-hermetically sealed appurtenances such as a case extension, these appurtenances can be removed before the sealing test.
- c. **Other Tests.** The following table lists where can be find other tests and conditions:

For:	Use the test conditions in:
Fire-resistant or fireproof test	SAE AS 1055, Rev. D, , dated June 1997, Sections 4 and 5
Explosion proofness test	EUROCAE ED-14E /RTCA/DO-160E Section 9
Power input test	EUROCAE ED-14E /RTCA/DO-160E Section 16
Voltage spike test	EUROCAE ED-14E /RTCA/DO-160E Section 17
Audio frequency conducted susceptibility test	EUROCAE ED-14E /RTCA/DO-160E Section 18
Induced signal susceptibility test	EUROCAE ED-14E /RTCA/DO-160E Section 19
Radio frequency susceptibility test	EUROCAE ED-14E /RTCA/DO-160E Section 20