

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 to 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 the applicable environmental test procedure as specified by paragraph 2.1 of CS-ETSO, Subpart A, unless otherwise specified by Appendix 1 to this ETSO.

3.1.3 – Software

If the equipment design includes a digital computer, -see CS-ETSO, Subpart A, paragraph 2.2, for software development.

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.

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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.

INSTRUMENT LOCATION	A	B
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 °C ± 2 °C and 5 °C ± 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 °C ± 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 °C ± 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(2) 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.

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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 other tests and conditions can be found:

For:	Use the test conditions in:
Fire-resistant or fireproof test	SAE AS 1055, Rev. D, dated June 1997, Sections 4 and 5
	The following sections of the environmental standards mentioned in paragraph 3.1.2 above.
Explosion proofness test	Section 9
Power input test	Section 16
Voltage spike test	Section 17
Audio frequency conducted susceptibility test	Section 18
Induced signal susceptibility test	Section 19
Radio frequency susceptibility test	Section 20