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**Aircraft — Environmental test procedures  
for airborne fluid system components —  
Resistance to fire in designated fire  
zones**

*Aéronefs — Méthodes d'essai en environnement des éléments de  
systèmes de fluides embarqués — Tenue au feu dans les zones  
désignées «zone de feu»*

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## Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 23935 was prepared by Technical Committee ISO/TC 20, Aircraft and space vehicles, Subcommittee SC 10, Aerospace fluid systems and components.



# Aircraft — Environmental test procedures for airborne fluid system components — Resistance to fire in designated fire zones

**CAUTION** — Precautions shall be taken to safeguard the health of personnel conducting tests against the risk of fire, inhalation of smoke and/or toxic products of combustion.

## 1 Scope

This International Standard specifies the requirements for tests which may be applied to all fluid system components located in zones designated as “fire zones” and built to satisfy the minimum level specified for withstanding fire.

This International Standard does not relate to withstanding fire outside designated fire zones, nor to flammability requirements, or to those conditions induced by the flame coming from the combustion chamber.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2685:1998, *Aircraft — Environmental test procedure for airborne equipment — Resistance to fire in designated fire zones*.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **designated fire zone**

region of an aircraft, for example compartments containing main engines and auxiliary power units, designated as such by the aircraft designer in accordance with the requirements of the approving authority

### 3.2

#### **component**

any part of a fluid system which is to convey and/or contain fluid in liquid or gaseous condition

### 3.3

#### **fire resistant**

grade designating components capable of withstanding the application of heat by a standard flame for 5 min

### 3.4

#### **fireproof**

grade designating components capable of withstanding the application of heat by a standard flame for 15 min

## 4 Test equipment

The test rig shall be in accordance with ISO 2685:1998.

The test rig shall withstand the test conditions and simulate, as much as possible, the operating conditions of the real fluid circuit.

## 5 Test requirements

### 5.1 Test procedure

The following procedure applies to all fire tests.

For general requirements concerning the mounting of the specimen, and the choice and calibration of the burner, ISO 2685:1998 applies.

The test conditions may vary during the fire exposure duration. The regulation of all these test conditions shall be stipulated in the test report.

#### 5.1.1 Standard test conditions

##### 5.1.1.1 Test fluid

Table 1 applies.

Table 1 — Test fluid codes

Code	Test fluid
A	Fuel or high-temperature resisting oil
B	Air or nitrogen

##### 5.1.1.2 Fluid temperature

###### 5.1.1.2.1 For liquid application

The fluid temperature inside the component shall be between 93 °C and 110 °C (200 °F and 230 °F).

###### 5.1.1.2.2 For gaseous application

The fluid temperature inside of the component shall be between 18 °C and 22 °C (64,5 °F and 71,5 °F).

##### 5.1.1.3 Pressure

The pressure shall be the nominal pressure of the component as specified in the relevant procurement specification.

#### 5.1.1.4 Flow rate

The flow rate shall be less than or equal to the minimum working flow under normal operating conditions, as specified in Table 2.

**Table 2 — Flow rate**

Code	Flow rate $\pm 10\%$	
	dm <sup>3</sup> /min (l/min) <sup>a</sup>	(US gallon/min) <sup>b</sup>
<b>A</b>	No flow	No flow
<b>B</b>	0,006 $d^2$	1 $d^2$
<b>C</b>	0,03 $d^2$	5 $d^2$

<sup>a</sup>  $d$  is the minimal internal diameter of the hose as specified in the relevant procurement specification, expressed in millimetres.

<sup>b</sup>  $d$  is the minimal internal diameter of the hose as specified in the relevant procurement specification, expressed in inches.

#### 5.1.1.5 Vibration level

Components shall be vibrated along or perpendicular to the axis of the component at a frequency between 30 Hz and 60 Hz and with a minimum amplitude of 1,6 mm (0,063 in) in front of the flame.

#### 5.1.1.6 Flame location

The hose to be tested shall be not less than 600 mm (23,6 in) long. Hoses shall be mounted horizontally and shall include one 90° bend. One end fitting and at least 120 mm (4,7 in) of hose shall be enveloped by the test flame.

#### 5.1.1.7 Test duration

The test duration shall be in accordance with the grade designated for the component to resist fire, i.e. fire resistant or fireproof (see 3.3 and 3.4). See Table 3.

**Table 3 — Test duration**

Code	Duration min
<b>05</b>	5
<b>15</b>	15

### 5.1.2 Specific test conditions

#### 5.1.2.1 Test fluid

The test conditions of the test fluid shall be equivalent to the normal operating conditions of the working fluid. Test fluid codes are identical to those in 5.1.1.1.

**5.1.2.2 Fluid temperature**

The fluid temperature inside the component shall be greater than or equal to the maximum working temperature under normal operating conditions.

When “no flow” or low flow rate is applied, these temperatures are only given at the beginning of the fire test.

The fluid temperature shall not be regulated better than under normal operating conditions.

**5.1.2.3 Pressure**

The pressure shall be greater than or equal to the maximum working pressure under normal operating conditions.

**5.1.2.4 Flow rate**

The flow rate shall be less than or equal to the minimum working flow under normal operating conditions.

**5.1.2.5 Vibration level**

The vibration level shall be in accordance with the worst working vibration level (frequency and amplitude) under normal operating conditions.

**5.1.2.6 Flame location**

The flame shall be located in front of the most critical exposed area of the component in accordance with the working position under normal operating conditions.

**5.1.2.7 Test duration**

The test duration shall be in accordance with the grade designated for the component to resist fire, i.e. fire resistant or fireproof (see 3.3 and 3.4).

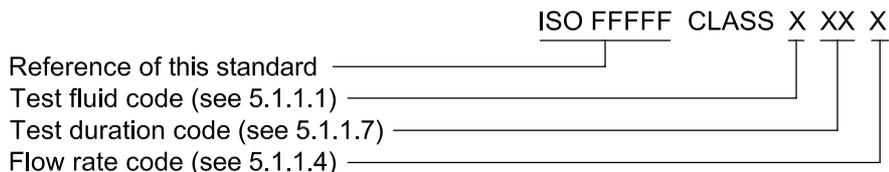
**5.2 Test acceptance conditions**

As conditions of acceptance, the system components shall show no evidence of leakage over the test duration.

**6 Designation**

Reference to this International Standard shall be made in one of two ways: either by using standard codes (when standard test conditions are applied) or by using the real test condition values, as specified in Figures 1 and 2, respectively.

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**Figure 1 — Designation using standard codes**