International Standard 6772

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Aerospace fluid systems — Impulse testing of hydraulic hose, tubing and fittings assemblies

Systèmes hydrauliques pour constructions aérospatiales — Essai sous pression de choc des assemblages de tuyaux flexibles, tubes et raccords

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

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It has been approved by the member bodies of the following countries :

Austria
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United Kingdom

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Aerospace fluid systems — Impulse testing of hydraulic hose, tubing and fittings assemblies

1 Scope and field of application

This International Standard establishes the requirements and the procedures for impulse testing of hose, tubing, and fittings assemblies, for use in aerospace hydraulic systems. Requirements may apply, when appropriate, to components used in other aerospace fluid systems. Other test methods may be used as long as they develop the same data.

2 Required characteristics

2.1 Shape of impulse trace

When observed on an oscilloscope, the impulse traces show as approximate pressure-time cycles. It is mandatory that these pressure-time curves be confined to the shaded area indicated in figure 1, and that the dynamic impulse trace produced by the test machine shall be in conformance with the trace illustrated in figure 1.

2.2 Rate of rise

2.1.1 Definition

The rate of rise is defined as the slope of the pressure-time curve in the straight portion of the pressure increase portion. For purposes of definition, the rate of rise shall be determined between 10 % of the total rise above back pressure and 10 % of the total rise below peak pressure.

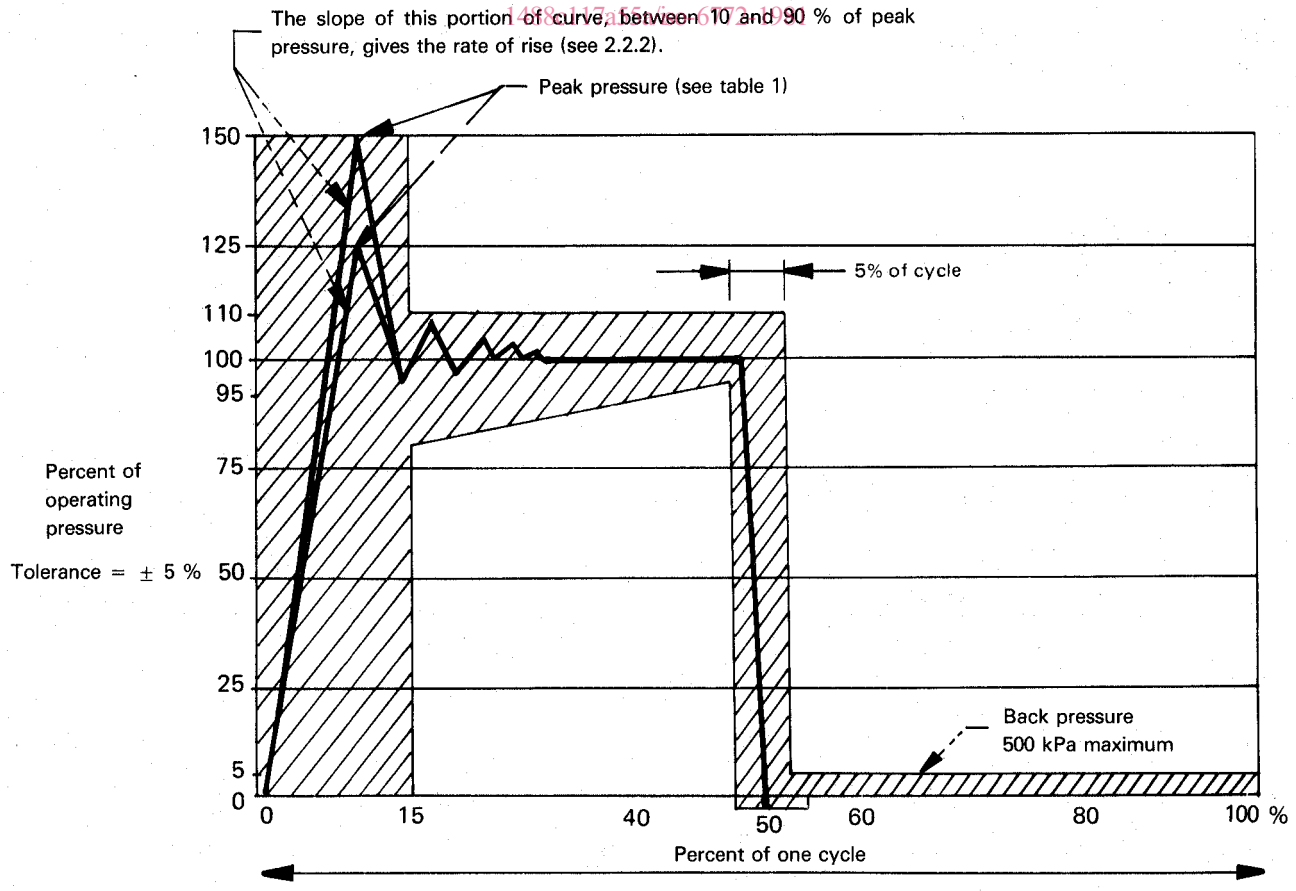

Figure 1 — Impulse trace

2.2.2 Calculation

The rate of rise will be calculated as follows :

$$\text{Rate of pressure rise} = \frac{0{,}9\,p - 0{,}1\,p}{t \text{ at } 0{,}9\,p - t \text{ at } 0{,}1\,p}$$

where :

p = operating pressure in kilopascals;

t = time in seconds.

Sweep rate on the oscilloscope shall be adjusted so that the slope of the pressure rise shall take advantage of the full size of the screen. The trace and photographs of the impulse cycle shall be an accurate record of the impulse cycle and show a grid or other means to permit accurate checking.

2.3 The peak pressure is defined as the maximum pressure reached during the test pressure surge to 125 % or 150 % of the specified operating pressure as appropriate.

2.4 Preparation of specimens

The preparation of test specimens shall be defined in the detail design specification of the component. Specimens shall be subjected to the relevant treatments and production test requirements of the component specification.

2.5 Test fluid

The test fluid shall be the specified aircraft system fluid or other hydraulic fluid which is compatible with the item being tested.

3 Method of test

This method of testing is intended to determine the ability of flexible hose assemblies, tubing and fittings to withstand hydraulic impulse for qualification testing under simulated conditions.

3.1 Hose assemblies

For testing of hose assemblies, the cycle rate shall be 70 ± 5 cpm, and the rate of pressure rise shall be per table 1, unless otherwise specified. The sequence of testing for hose assemblies shall be defined in the relevant detail specification for the hose assembly.

3.2 Tubing and fittings

For testing of tubing and fittings, including boss or port fittings, the cycle rate shall be 70 ± 5 cpm peak pressure the rate of pressure rise shall be per table 1 of this specification. The assembly shall be tested in the sequence shown in table 2 unless otherwise specified.

The total number of cycles shall be 200 000. The balance of the cycles not shown in table 2 (40 000) may be added to any sequence or divided among the sequences.

After the temperature is stabilized at the maximum or minimum per table 2, a minimum soak time of one hour is required before beginning that portion of the test sequence. The temperature shall be measured within 13 mm of the test manifold and shall be maintained within the tolerance limitations defined during the testing.

Table 1 — Pressure rate of increase

Type	Line size[1]	Peak %	Maximum rate pressure increase kPa/sec
High pressure hose, tubing and fittings assemblies (28 000 kPa)	DN14 and smaller	150	2 100 000
	DN16 through DN20		
	DN25 and over		
High pressure hose, tubing and fittings assemblies (20 000 kPa)	DN6 through DN14		
	DN16 through DN20		
	DN25 and over		
Medium pressure hose, tubing and fittings assemblies (10 000 kPa)	DN14 and smaller	125	700 000
	DN16 through DN25		520 000
	DN32		340 000
	DN40 and over		280 000

1) DN6 designates a nominal diameter of 16 mm.

Table 2 — Sequence and duration of impulse testing at temperature

Number of cycles (min.)	Temperature (ambiant and fluid)
100 000	Maximum operating
48 000	Room
2 000	Minimum operating
10 000	Maximum operating

4 Intended use

4.1 Standard

This test is intended to promote standardization of impulse test requirements, procedures and equipment for the standard qualification and evaluation impulse testing of hydraulic hose assemblies, tubing and fittings.

4.2 Reference

When this International Standard is referenced in a specification as part of the requirements, the following additional requirements must be specified :

a) Operating pressure.

b) Peak pressure, % of nominal pressure (when applicable).

c) Operating temperature.

d) Design of specimens.

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(Titre) Aerospace fluid systems - Impulse testing of hydraulic hose, tubing and fittings assemblies

ERRATUM

Cover page

(Texte) In the French title, delete "essai sous pression de choc" and substitute "essai d'impulsion".