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METRIC AEROSPACE STANDARD

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Revised

IMPULSE TESTING OF HYDRAULIC HOSE, TUBING AND FITTING ASSEMBLIES

1. SCOPE

This standard establishes the requirements and the procedures for impulse testing of hose assemblies, tubing, and fittings for use in aerospace metric hydraulic systems.

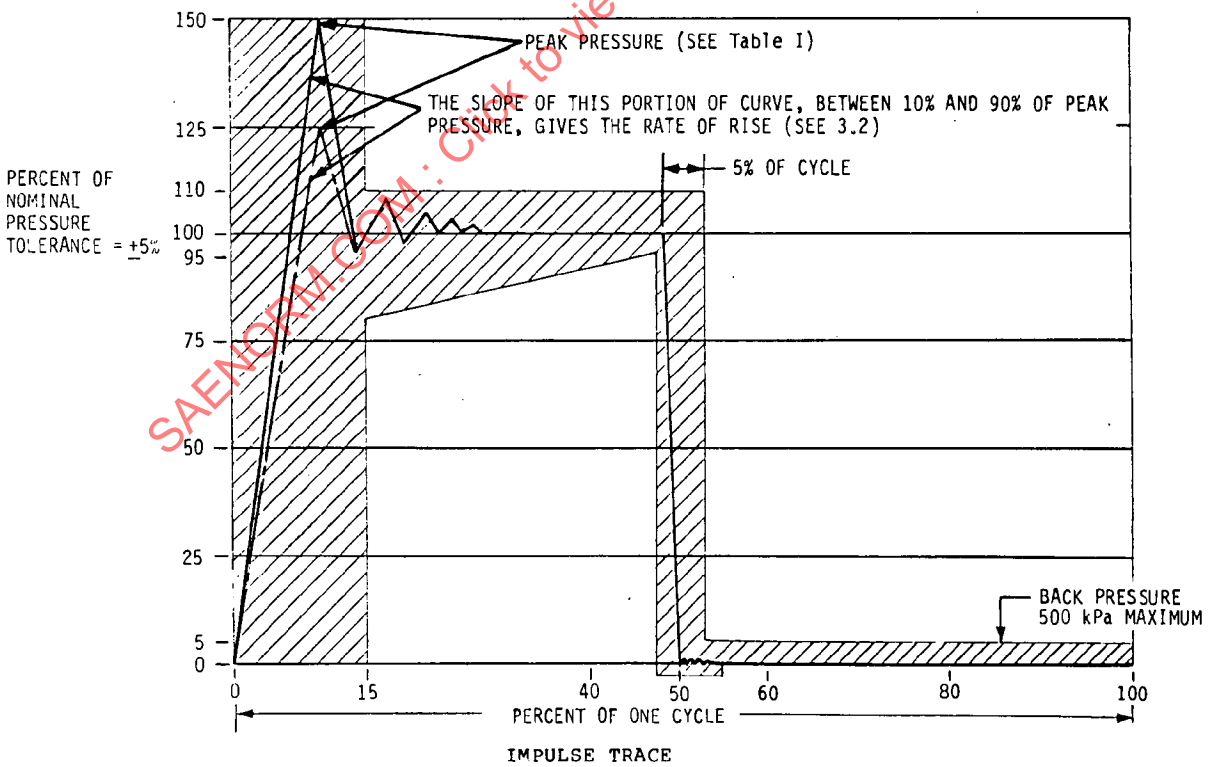
2. REFERENCES

MA 2001 AEROSPACE FLUID SYSTEMS AND COMPONENTS - AEROSPACE HYDRAULIC SYSTEMS

3. REQUIREMENTS

3.1 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.



IMPULSE TRACE

Figure 1

This metric Aerospace Standard is the equivalent of ISO/TC 20/SC 10 DIS 6772. Revisions of this document must be coordinated with ISO/TC 20/SC 10.

3.2 CALCULATIONS

The rate of rise will be calculated as follows:s

$$\text{"Rate of pressure rise"} = \frac{0.9\ p - 0.1\ p}{t \text{ at } 0.9\ p - t \text{ at } 0.1\ p}$$

Where: p = peak pressure in kPa

t = time in seconds

Notes:

(1) The peak pressure is defined as the maximum pressure reached during the test pressure surge to 125 or 150 percent of the specified operating pressure, as appropriate.

(2) 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 or photograph of the impulse cycle shall be an accurate record of the impulse cycle and shall show a grid or other means to permit accurate checking.

3.3 PREPARATION OF SPECIMENS

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

3.4 TEST FLUID

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

4. METHOD OF TEST

4.1 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 I, unless otherwise specified. The sequence of testing for hose assemblies shall be defined in the applicable detail specification for the hose assembly.

4.2 TUBING AND FITTINGS

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

The total number of cycles shall be 200,000. The balance of the cycles not shown in Table II (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 II, a minimum soak time of one hour is required before beginnning 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 I

RATE OF PRESSURE RISE

SYSTEM PRESSURE CLASSES (MA 2001)	HOSE OR TUBING SIZE [1]	PRESSURE PEAK PERCENT	MAXIMUM RATE PRESSURE RISE kPa/sec
HIGH PRESSURE HOSE, TUBING AND FITTING ASSEMBLIES (28 000 kPa) HIGH PRESSURE HOSE TUBING AND FITTING ASSEMBLIES (20 000 kPa)	DN14 AND SMALLER DN16 THROUGH DN20 DN25 AND OVER	150	2100000
MEDIUM PRESSURE HOSE, TUBING AND FITTING ASSEMBLIES (10 000 kPa)	DN14 AND SMALLER DN16 THROUGH DN25 DN32 DN49 AND OVER	125	700000 520000 340000 280000

[1] DN16 designates a nominal diameter of 16mm.

TABLE II

SEQUENCE AND DURATION OF IMPULSE TESTING AT TEMPERATURE

NUMBER OF CYCLES (MIN)	TEMPERATURE (AMBIENT AND FLUID)
100,000	MAXIMUM OPERATING
48,000	ROOM
2,000	MINIMUM OPERATING
10,000	MAXIMUM OPERATING

5. INTENDED USE

5.1 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.

5.2 REFERENCE

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

1. Operating pressure
2. Peak pressure (when applicable)
3. Operating temperature
4. Design of specimens
5. Sequence and duration (hose only)