Society of Automotive Engineers, Inc.
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AEROSPACE RECOMMENDED PRACTICE

ARP 603C

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IMPULSE TESTING OF HYDRAULIC HOSE ASSEMBLIES, TUBING, AND FITTINGS

1. SCOPE

This recommended practice establishes the requirements and the procedures for impulse testing of hose assemblies, tubing, and fittings for use in aerospace hydraulic systems of 3000 psi nominal operating pressure or less. It also refers to standard impulse test equipment to be used in conducting these impulse tests.

2. APPLICABLE DOCUMENTS

AIR 1228 - "Standard" Impulse Machine Equipment and Operation
MIL-L-7808 - Lubrication Oil, Aircraft Turbine Engine, Synthetic Base

3. REQUIREMENTS

3.1 Shape of Trace: The traces shown are the approximate pressure-time cycles when observed on an oscilloscope and instrumented per AIR 1228. It is mandatory that the pressure-time curve be confined to the shaded area indicated. The dynamic impulse trace produced by the test machine shall be in conformance with Figure 1.

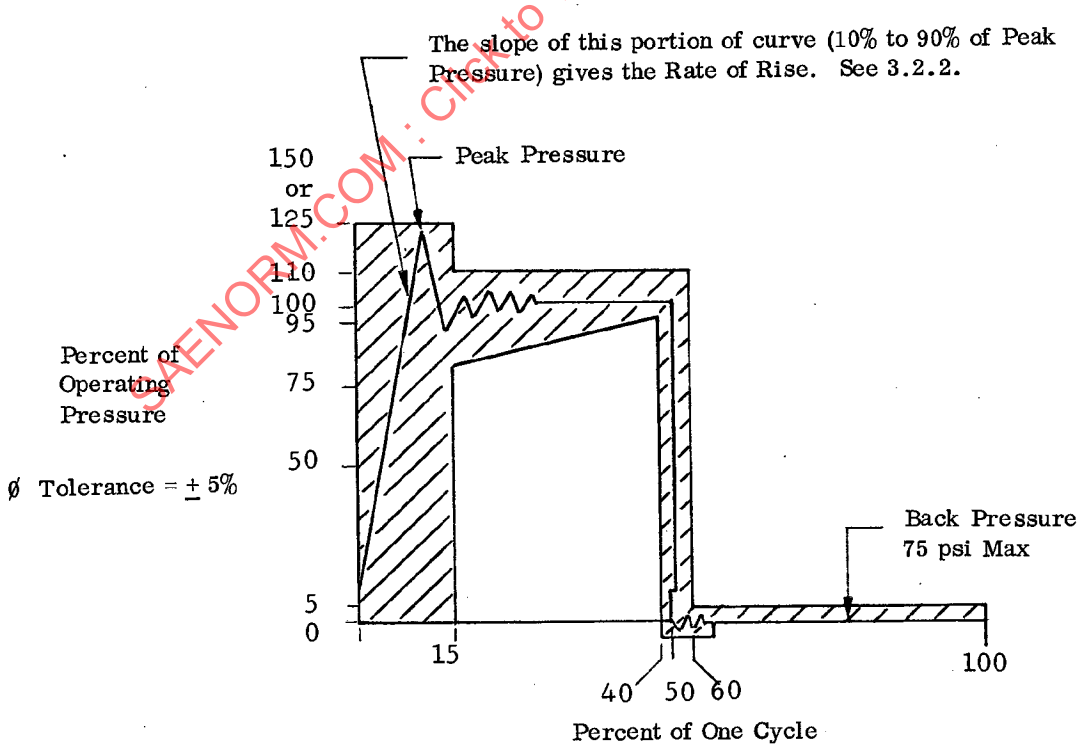

FIGURE 1

3.2 Rate of Rise:

3.2.1 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.

3.2.2 Calculation: The rate of rise will be calculated as follows:

P = Operating Pressure in psi (or bars)

T = Time in secs.

$$\text{Rate of Rise} = \frac{0.9 \text{ Peak Pressure} - 0.1 \text{ Peak Pressure}}{T \text{ at } 0.9 \text{ Peak Pressure} - T \text{ at } 0.1 \text{ Peak Pressure}}$$

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 photos of the impulse cycle should be an accurate record of the impulse cycle and 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 detail design specification of the component.

3.4 Equipment: The testing shall be conducted on equipment in accordance with AIR 1228, or equivalent equipment.

3.5 Test Fluid: Unless the component materials or other considerations prevent it, MIL-L-7808 oil shall be used as the test fluid.

4. TEST PROCEDURE

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.

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:

TABLE I

Type	Size	Maximum No. of Samples (Hose)	Maximum Rate of Pressure Increase psi (sec)	(kPa/sec)
High Pressure Hose Assemblies and Tubing and Fittings (3000 psi operating 150% peak)	-4 thru -8	6	300,000	(2,100,000)
	-10 thru -12	4	300,000	(2,100,000)
	-16	2	300,000	(2,100,000)
Medium Pressure Hose Assemblies (1500 psi operating 125% peak)	-3 thru -8	6	100,000	(700,000)
	-10 thru -16	6	75,000	(520,000)
	-20	4	50,000	(340,000)
	-24	2	40,000	(280,000)