

**IMPULSE TESTING OF HYDRAULIC HOSE, TUBING, AND FITTING ASSEMBLIES**

**RATIONALE**

This document has been reaffirmed to comply with the SAE 5-year Review policy.

**1. SCOPE**

This Aerospace Recommended Practice (ARP) establishes the requirements and procedures for impulse testing of hose, tubing, and fitting assemblies for use in aerospace hydraulic systems of 8000 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
- MA 2002-ISO 6772 - Impulse Testing of Hydraulic Hose, Tubing and Fitting Assemblies
- MIL-H-83282 - Hydraulic Fluid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft, NATO Code H-537
- MIL-L-7808 - Lubrication Oil, Aircraft Turbine Engine, Synthetic Base

**3. REQUIREMENTS**

**3.1 SHAPE OF THE 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.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2007 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

**TO PLACE A DOCUMENT ORDER:** Tel: 877-606-7323 (inside USA and Canada)

Tel: 724-776-4970 (outside USA)

Fax: 724-776-0790

Email: [CustomerService@sae.org](mailto:CustomerService@sae.org)

<http://www.sae.org>

**SAE WEB ADDRESS:**

**ARP 603****3.2 CALCULATIONS**

The rate of rise will be calculated as follows:

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

Where:                    p = peak pressure in psi or kPa (see Table 1)  
                                   t = time in seconds

**Notes:**

- (1) The rate of rise is defined as the slope of the pressure-time curve in the straight portion of the pressure rise. 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.
- (2) The peak pressure is defined as the maximum pressure reached during the test pressure surge to 125, 135 or 150 percent of the specified operating pressure, as appropriate.
- (3) Sweep rate on the oscilloscope or recorder 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 EQUIPMENT**

The testing shall be conducted on equipment in accordance with and instrumented per AIR 1228. Equivalent equipment may be used.

**3.5 TEST FLUID**

Unless the component materials or other considerations prevent it, MIL-H-83282 or MIL-L-7808 oil shall be used as the test fluid.

## ARP 603

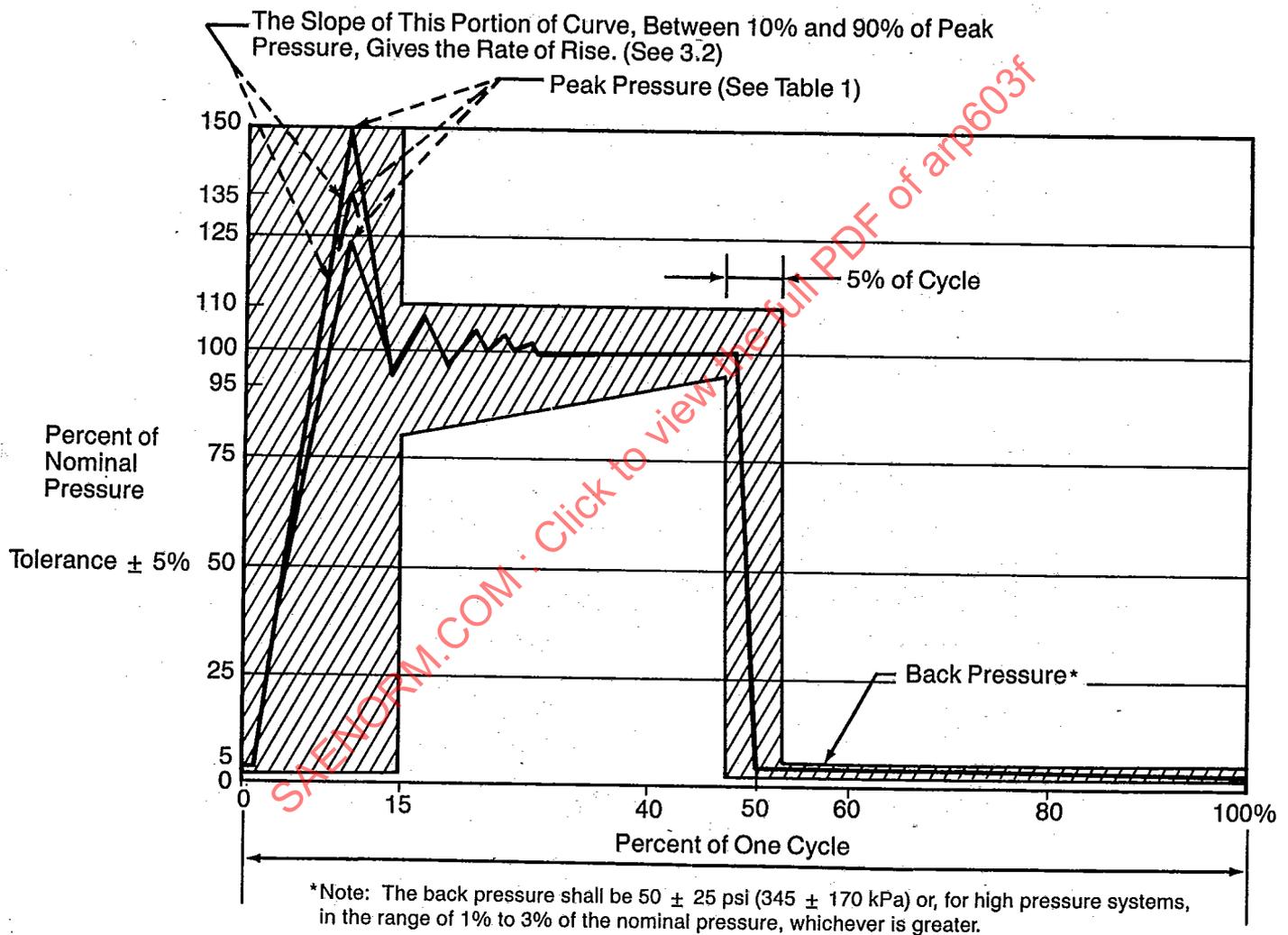


Figure 1. Impulse Trace

**ARP 603****3.6 TEST DURATION AND TEMPERATURE CYCLING**

Testing shall be continuous with as few shutdowns for repair and/or replacement as necessary. Attempts should be made to schedule the testing to minimize downtime, such as over weekends, whether temperature is maintained or not, to provide more nearly uniform conditions of temperature cycling and aging.

**4. METHOD OF TEST****4.1 HOSE, TUBING AND FITTING ASSEMBLIES**

For testing of hose, tubing and fitting assemblies, including boss or port fittings, the cycle rate shall be  $70 \pm 5$  cpm. The 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, unless otherwise specified in the detail specification.

After the temperature is stabilized at the maximum or minimum per Table II, a minimum soak time of one hour is required before beginning that portion of the test sequence. The fluid temperature shall be as measured at the test manifold. The ambient temperature shall be measured at a point within 6 inches (150 mm) from the assemblies. The pressure peak shall be measured at the test manifold.