



**Parker Hannifin Corporation**  
**Stratoflex Products Division**  
220 Roberts Cut-Off Road  
Fort Worth, TX 76114  
Cage No. 98441

# **GENERAL TEST PROCEDURE 01**

## **STRESS DEGRADATION TEST**

### **CONFORMS TO**

**AS1946**

**AS1975**

**AS2078**

**MIL-DTL-25579**

**MIL-H-85800**

<b>Original Issue</b>	<b>September 2001</b>
<b>Revision A</b>	<b>July 2007</b>
<b>Revision B</b>	<b>July 2008</b>
<b>Revision C</b>	<b>August 2010</b>



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**1.0 PURPOSE.** To establish a standard test procedure to be followed when performing a stress degradation test. The stress degradation test is intended to verify that the hose inner tube has been sintered and quenched to the proper crystallinity to eliminate stress cracking or creep with subsequent leakage.

**2.0 SCOPE.** This procedure is compliant with the stress degradation test procedures as given by AS1946, AS1975, AS2078, MIL-DTL-25579, and MIL-H-85800. AS2078 is the default testing procedure specification for PTFE line hose. Hose assemblies built to the requirements of documents listed in [LSL-100](#) may be tested as applicable to this document.

### 3.0 REFERENCES.

AS1946	Hose Assembly, Polytetraflouroethylene Metallic Reinforced, Up to 1500 psi and 450°F, Hydraulic and Pneumatic
AS1975	Hose Assembly, Polytetraflouroethylene, Para-Aramid Reinforced, 3000/4000 psi, 275°F, Standard Duty, Hydraulic, Aircraft Systems
AS2078	Test Methods, Hose Assemblies, Polytetraflouroethylene (PTFE)
MIL-DTL-25579	Hose Assembly, Polytetraflouroethylene, High Temperature, Medium Pressure, General Specification For
MIL-H-85800	Hose Assemblies, Polytetraflouroethylene, Aramid Fiber Reinforced, 5000 and 8000 psi, General Specification For
<a href="#">LSL-100</a> .	Laboratory Specification Library and documents referenced therein

### 4.0 TEST EQUIPMENT.

#### 4.1 Test Equipment.

##### 4.1.1 Requirements

- 4.1.1.1 Oven capable of maintaining  $450^{\circ}\text{F} \pm 10^{\circ}\text{F}$
- 4.1.1.2 Pressure source capable of supplying the nominal proof pressure specified in the test requirement
- 4.1.1.3 Equipment required for pneumatic effusion test per [GTP-02](#)
- 4.1.1.4 Cold Chamber capable of maintaining  $-67^{\circ}\text{F} \pm 2^{\circ}\text{F}$
- 4.1.1.5 Source of hot oil

##### 4.1.2 SPD Equipment

- 4.1.2.1 Any oven
- 4.1.2.2 Fuel Pressure Test Machine
- 4.1.2.3 Pneumatic Pressure Test Cell
- 4.1.2.4 Any cold chamber
- 4.1.2.5 Hot Oil Circulator
- 4.1.2.6 Hand pump



#### **4.2 Test Fluids.**

- 4.2.1 MIL-PRF-7808
- 4.2.2 MIL-PRF-83282
- 4.2.3 MIL-PRF-87257, or equivalent
- 4.2.4 ASTM Reference Fuel B (equivalent to TT-S-735, Type III)
- 4.2.5 MIL-PRF-680

#### **4.3 Tolerances.** Testing tolerances shall be held to the requirements of [LOP-100-13](#).

### **5.0 TEST PROCEDURE.**

#### **5.1 MIL-H-85800 Test Procedure**

- 5.1.1 The test sample shall be filled with a test fluid per **MIL-PRF-83282**, air bled and capped. The test sample shall then be placed in an oven maintained at **275°F** and the nominal operating pressure specified in the test requirement shall be applied. The hose assemblies shall be positioned in a straight position, avoid coiling or bending the hoses inside of the oven. Make sure the monitoring thermocouple is within 6" of a hose assembly.
- 5.1.2 After maintaining the high temperature and nominal operating pressure for 20 hours minimum, the pressure shall gradually be released and the test sample drained and allowed to cool to room temperature.
- 5.1.3 The test sample will then be filled with **MIL-PRF-83282**, bled, and capped. The nominal operating pressure specified in the test requirement will be applied for two hours.
- 5.1.4 Steps 5.1.1 through 5.1.3 shall be repeated for a total of **3 cycles**.
- 5.1.5 Within 4 hours of completing step 5.1.4, the test sample shall be drained and flushed with **MIL-PRF-680**. The sample shall then be placed in an oven maintained at  $160\text{ }^{\circ}\text{F} \pm 10^{\circ}\text{F}$  for 1 hour for drying.
- 5.1.6 The sample shall then be removed from the oven and allowed to cool to room temperature. After cooling to room temperature, the test sample shall be subjected to the Pneumatic Effusion Test as given in GTP-02, except the hose shall be subjected to gas pressure at the nominal operating pressure specified in the test requirement for only a total of 20 minutes. The escaping gas shall be collected over the last 5 minutes of that time. If the average rate of effusion exceeds 2.0/cc/in./min for any size, it shall be cause for rejection and considered a failure to qualify.
  - 5.1.6.1 Fluid to be used for Pneumatic Effusion Test is water that contains no wetting agent.



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## 5.2 AS1946 Test Procedure

- 5.2.1 The test sample shall be filled with a test fluid per **MIL-PRF-83282**, air bled and capped. The test sample shall then be placed in an oven maintained at **450°F ± 10°F** and the nominal operating pressure specified in the test requirement shall be applied. The hose assemblies shall be positioned in a straight position, avoid coiling or bending the hoses inside of the oven. Make sure the monitoring thermocouple is within 6" of a hose assembly.
- 5.2.2 After maintaining the high temperature and nominal operating pressure for 20 hours minimum, the pressure shall be gradually released and the test sample drained and allowed to cool to room temperature.
- 5.2.3 The test sample shall then be flushed with a quantity of new **MIL-PRF-83282** equivalent in volume to at least twice the sample volume and drained.
- 5.2.4 The test sample will then be filled with **MIL-PRF-87257**, bled, and capped. The nominal operating pressure specified in the test requirement will be applied for two hours at room temperature.
- 5.2.5 The test sample shall then be emptied and filled with oil or hydraulic fluid as specified in 5.2.1. The tests specified in steps 5.2.1-5.2.4 shall be repeated.
- 5.2.6 The test sample shall then be emptied and filled with **ASTM Reference Fluid B**, bled, and capped. While at room temperature, the assemblies shall be bent around a mandrel having a radius equal to the minimum bend radius as specified in the test requirement. The test sample shall be bent around the mandrel and straightened for 20 cycles. During the bending, the test sample shall be held by the fitting.
- 5.2.7 The test sample shall then be emptied, and the tests specified in steps 5.2.1-5.2.4 shall be conducted for a third time.
- 5.2.8 Within 4 hours of completing step 5.2.7, the test sample shall be drained and flushed with **MIL-PRF-680**. The samples shall then be placed in an oven maintained at 160 °F ± 10°F for 1 hour for drying.
- 5.2.9 Within 8 hours after drying, the hose assemblies shall be removed from the oven and cooled to room temperature. The sample shall then be subjected to an air-under-water test according to GTP-02, except the hose shall be subjected to gas pressure at the nominal operating pressure specified in the test requirement for only a total of 20 minutes. The escaping gas shall be collected over the last 5 minutes of that time. If the rate of effusion exceeds the values listed in the specified test requirement, it shall be cause for rejection and considered a failure to qualify.



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5.2.10 After completion of the air-under-water test, the sample shall be filled with oil and placed in a cold chamber at  $-67^{\circ}\text{F} \pm 2^{\circ}\text{F}$  for 8 hours. After that time, the sample shall be subjected to a pressure equal to the operating pressure specified the test requirement. The operating pressure shall be held for a minimum of 5 minutes and then released. This shall be repeated a total of 10 times with a minimum of 5 minutes between each pressure cycle and with the sample still in the  $-67^{\circ}\text{F} \pm 2^{\circ}\text{F}$  cold chamber.

5.2.11 At the end of the last pressure cycle from step 5.2.10, hot oil at a temperature of  $450^{\circ}\text{F} \pm 10^{\circ}\text{F}$  shall be circulated through the test sample. Within 15 seconds of the introduction of the hot oil, the pressure shall be increased to the rated proof pressure as specified in the test requirement and held for a minimum of two minutes. There shall be no evidence of leakage from the hose assembly.

NOTE: Steps 5.2.10 & 5.2.11 are normally omitted during Periodic Control Tests.

## 5.3 AS2078/AS1975 Test Procedure

5.3.1 The test sample shall be filled with a test fluid per **MIL-PRF-83282**, air bled and capped. The test sample shall then be placed in an oven maintained at high temperature and the nominal operating pressure specified in the test requirement shall be applied. The hose assemblies shall be positioned in a straight position, avoid coiling or bending the hoses inside of the oven. Make sure the monitoring thermocouple is within 6" of a hose assembly.

5.3.1.1 The high temperature is:

- **AS2078:**

**$400^{\circ}\text{F} \pm 10^{\circ}\text{F}$**  for 3000 psi and above hose  
 **$450^{\circ}\text{F} \pm 10^{\circ}\text{F}$**  for 1500 psi hose

- **AS1975:**

**$275^{\circ}\text{F} \pm 10^{\circ}\text{F}$**

5.3.2 After maintaining the high temperature and nominal operating pressure for 20 hours minimum, the pressure shall be gradually released and the test sample drained and allowed to cool to room temperature.

5.3.3 The test sample shall then be flushed with a quantity of new **MIL-PRF-83282** equivalent in volume to at least twice the sample volume and drained.

5.3.4 The test sample will then be filled with **MIL-PRF-87257**, bled, and capped. The nominal operating pressure specified in the test requirement will be applied for two hours at room temperature.



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- 5.3.5 Steps 5.3.1 through 5.3.4 shall be repeated for a total of 3 cycles.
- 5.3.6 Within 4 hours of completing step 5.3.5, the test sample shall be drained and flushed with **MIL-PRF-680**. The samples shall then be placed in an oven maintained at  $160^{\circ}\text{F} \pm 10^{\circ}\text{F}$  for 1 hour for drying.
- 5.3.7 Within 8 hours after drying, the hose assemblies shall be removed from the oven and cooled to room temperature. The sample shall then be subjected to an air-under-water test according to GTP-02, except the hose shall be subjected to gas pressure at the nominal operating pressure specified in the test requirement for only a total of 20 minutes. The escaping gas shall be collected over the last 5 minutes of that time. If the rate of effusion exceeds the values listed in the specified test requirement, it shall be cause for rejection and considered a failure to qualify.

5.3.7.1 Fluid to be used for air-under-water test is water that has been treated for wetting of the hose by adding 1.5% by volume of water softener or wetting agent.

### 5.4 MIL-DTL-25579 Test Procedure

- 5.4.1 The test sample shall be filled with a test fluid per **MIL-PRF-83282**, air bled and capped. The test sample shall then be placed in an oven maintained at  $450^{\circ}\text{F} \pm 10^{\circ}\text{F}$  and the nominal operating pressure specified in the test requirement shall be applied. The hose assemblies shall be positioned in a straight position, avoid coiling or bending the hoses inside of the oven. Make sure the monitoring thermocouple is within 6" of a hose assembly.
- 5.4.2 After maintaining the high temperature and nominal operating pressure for 20 hours minimum, the pressure shall be gradually released and the test sample drained and allowed to cool to room temperature.
- 5.4.3 The test sample shall then be flushed with a quantity of new **MIL-PRF-83282** equivalent in volume to at least twice the sample volume and drained.
- 5.4.4 The test sample will then be filled with **MIL-PRF-87257**, bled, and capped. The nominal operating pressure specified in the test requirement will be applied for two hours at room temperature.
- 5.4.5 The test sample shall then be emptied and filled with test fluid per **MIL-PRF-83282**. The tests specified in steps 5.4.1-5.4.4 shall be repeated.



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- 5.4.6 The test sample shall then be emptied and filled with **ASTM Reference Fluid B**, bled, and capped. While at room temperature, the assemblies shall be bent around a mandrel having a radius equal to the minimum bend radius as specified in the test requirement. The test sample shall be bent around the mandrel and straightened for 20 cycles. During the bending, the test sample shall be held by the fitting.
- 5.4.7 The test sample shall then be emptied, and the tests specified in steps 5.4.1-5.4.4 shall be conducted for a third time.
- 5.4.8 Within 4 hours of completing step 5.4.7, the test sample shall be drained and flushed with **MIL-PRF-680**. The samples shall then be placed in an oven maintained at  $160^{\circ}\text{F} \pm 10^{\circ}\text{F}$  for 1 hour for drying.
- 5.4.9 Within 8 hours after drying, the hose assemblies shall be removed from the oven and cooled to room temperature. The sample shall then be subjected to an air-under-water test according to GTP-02, except the hose shall be subjected to gas pressure at the nominal operating pressure specified in the test requirement for only a total of 20 minutes. The escaping gas shall be collected over the last 5 minutes of that time. If the rate of effusion exceeds the values listed in the specified test requirement, it shall be cause for rejection and considered a failure to qualify.
- 5.4.9.1 Fluid to be used for air-under-water test is water that contains no wetting agent.
- 5.4.10 After completion of the air-under-water test, the sample shall be filled with oil and placed in a cold chamber at  $-67^{\circ}\text{F} \pm 2^{\circ}\text{F}$  for 8 hours. After that time, the sample shall be subjected to a pressure equal to the operating pressure specified the test requirement. The operating pressure shall be held for a minimum of 5 minutes and then released. This shall be repeated a total of 10 times with a minimum of 5 minutes between each pressure cycle and with the sample still in the  $-67^{\circ}\text{F} \pm 2^{\circ}\text{F}$  cold chamber.
- 5.4.11 At the end of the last pressure cycle from step 5.4.10, hot oil at a temperature of  $450^{\circ}\text{F} \pm 10^{\circ}\text{F}$  shall be circulated through the test sample. Within 15 seconds of the introduction of the hot oil, the pressure shall be increased to the rated proof pressure as specified in the test requirement and held for a minimum of two minutes. There shall be no evidence of leakage from the hose assembly.

NOTE: Sections 5.4.10 & 5.4.11 are not normally tested for Periodic Control Tests.



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- 6.0 SUCCESS CRITERIA.** The test sample shall not show any sign of leakage from either the hose or fittings during any steps where the sample is pressurized, except during the air-under-water or pneumatic effusion test as specified. The effusion of gas from the test sample collected in the air-under-water or pneumatic effusion test shall not exceed that allowed in the test requirement.
- 7.0 DATA SHEET:** The Data sheet for the lab testing is shown in Appendix-A.
- 8.0 FAILURE REPORTING:** Failures shall be reported in accordance with [LOP-100-4](#)





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**STRESS DEGRADATION TEST FORM**

**Test Procedure(s)**

**Test Location:** \_\_\_\_\_

AS1946 (series) ☐ ; AS1975 (series) ☐ ; AS2078 (series) ☐ ; MIL-H-85800 ☐ ; MIL-DTL-25779 (series) ☐

Other ☐ (Describe or attach description)

**Pass/Fail Criteria:** Per above procedure ☐ ; Other (Define) ☐

**Tools Used**

Equipment	Tool ID No.	Last Cal Date	Next Cal Date

**Test Setup Information**

Operating Pressure (psi)	
Proof Pressure (psi)	
Hot Temperature (°F)	
Cold Temperature (°F)	
Max Effusion Rate (cc/in/min)	

**Test Data**

Step	Start Date/Time	Stop Date/Time	Temp	Pressure	Fluid	Comments
Oven Cycle 1						
RT Cycle 1						
Oven Cycle 2						
RT Cycle 2						
*Flex 20x *						
Oven Cycle 3						
RT Cycle 3						
Flush			RT	N/A		
Dry				N/A	N/A	

\*Only required for AS1946 (series) and MIL-DTL-25579 (series)\*

**Cold Soak**				**Pressure Cycle**			
Start Time	Stop Time	Temp	Fluid	Pressure	Time On	Time Off	No. Cycles

\*\*Only required for Hose Qualification to AS1946 & MIL-DTL-25579\*\*

Sample	Pressure	Pressurized Time	Collection Time (min)	Total Gas (CC)	Hose Free Length (in)	Rate (CC/in/Min)	Pass/Fail

**Comments:**



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**REVISION RECORD**

<b>REV.</b>	<b>DESCRIPTION</b>	<b>REQUESTED BY</b>	<b>RELEASE DATE</b>
NR	New Release	B. Lang	09/2001
A	Add MIL-PRF-83282 to 5.1.1.1 Added 5.1.1.2, renumbered remaining paragraphs Revised 5.5 Removed 5.8.1 and 5.8.2 Revise 5.9, 5.10, 5.11 from 67° to 65° Hardcopy signatures are no longer required on the document; refer to electronic signatures on file.	F. Stark	07/2007
B	Revised section 4.2.3, 5.3.1, 5.4.1, 5.12 Added Section 7.0, 8.0 and Appendix –A	N.Ramaswamy	07/2008
C	Added additional reference documents to Section 2.0 and 3.0 Updated entire Section 5.0 Test procedure specification instructions for clarity Updated Stress Degradation form	T. Quillen	08/2010

"The changes made in the most recent release/revision shall be indicated in the body of the document. The preferred method is a vertical bar in the right margin; acceptable alternate is "(R)" in the right margin or immediately behind the paragraph number. IF the change is so extensive as to make the above meaningless, the following statement shall be placed at the top of page 1, "CHANGES OF THE CURRENT REVISION ARE EXTENSIVE AND THROUGHOUT THE DOCUMENT, MARGINAL INDICIA ARE NOT USED".