



## Product Test Report

Swagelok Company  
29500 Solon Road  
Solon, Ohio 44139 U.S.A.

**PTR-1909**  
Ver 02  
November 2022  
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### TITLE

Gas Seal and Hydrostatic Pressure Test of Strain-Hardened 316 Stainless Steel NPT End Connections for Swagelok® Medium-Pressure Fittings

### PRODUCT TESTED

The following male and female NPT end connection sizes were tested.

Male and Female NPT End Connection Size in.
1/16
1/8
1/4
3/8
1/2
3/4
1

Swagelok medium-pressure fittings are manufactured from strain-hardened 316 stainless steel material with minimum mechanical properties of 75 000 psi (517 MPa) 0.2% yield strength and 95 000 psi (655 MPa) tensile strength.

Female and male NPT test samples were manufactured with cut threads. Male NPT test samples were manufactured using the maximum allowable internal thru hole diameter. Female NPT test samples were manufactured using the minimum allowable external boss diameter.

### PURPOSE

The assemblies were tested to observe the gas seal and hydrostatic pressure performance of male and female NPT end connections made from strain-hardened 316 stainless steel material under laboratory conditions.

### TEST CONDITIONS

Original test date: January 2009

Each sample tested consisted of one male NPT end connection and one female NPT end connection. The male and female NPT end connections were assembled together and were sequentially gas seal tested then hydrostatically pressure tested. Testing was conducted at room temperature.



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### TEST METHOD

The test samples were assembled as follows:

1. Two wraps of Swagelok PTFE tape (manufactured according to A-A-58092) were applied in a clockwise direction to each male NPT connection.
2. Male and female NPT end connections were assembled together and tightened to the torque values shown in Table 1.

**Table 1**

End Connection Size in.	Assembly Torque Used for Test Samples in·lb (N·m)	Measured Minimum Threads Engaged After Assembly	Swagelok PTFE Tape Ordering Number
1/16	175 (19.8)	3 1/8	MS-STR-4
1/8	300 (33.9)	3 1/4	
1/4	600 (67.8)	3 1/2	
3/8	950 (107)	3 5/8	
1/2	1600 (180)	4 1/4	MS-STR-8
3/4	2500 (282)	4 1/4	
1	3000 (339)	4 1/2	

3. The assemblies were attached to a positive pressure gas test stand, submerged in water, pressurized to 1.25 x working pressure with helium gas for at least five minutes, and then monitored for leakage for one minute. Acceptable leak rate was less than one bubble per minute.
4. Any connection that displayed leakage was tightened an additional 1/8 to 1/4 turn.
5. Fittings that required additional tightening were retested according to step 3.
6. Any connection that continued to display leakage was disassembled, re-taped, and reassembled according to steps 1 and 2.
7. The reassembled fittings were retested according to step 3.
8. After gas seal testing, each sample was attached to a hydraulic test stand.
9. Pressure was gradually increased and the pressure was recorded when material rupture or leakage that prevented applying higher pressure occurred, whichever came first.
10. Results were compared to the working pressure of the end connection.



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### TEST RESULTS

#### Gas Seal Results

NPT End Connection Size in.	Samples Tested	Working Pressure psig (bar)	1.25 x Working Pressure psig (bar)	Gas Seal Test Result
1/16	22	15 000 (1034)	18 750 (1291)	Pass
1/8	22			Pass
1/4	22			Pass
3/8	22			Pass
1/2	22			Pass
3/4	22	10 000 (689)	12 500 (861)	Pass
1	22			Pass

#### Hydrostatic Pressure Test Results

NPT End Connection Size in.	Samples Tested	Working Pressure (WP) psig (bar)	4 x Working Pressure psig (bar)	Samples Attaining 4 x WP Without Leakage or Rupture
1/16	22	15 000 (1034)	60 000 (4134)	22 / 22
1/8	22			22 / 22
1/4	22			22 / 22
3/8	22			22 / 22
1/2	22			22 / 22
3/4	22	10 000 (689)	40 000 (2756)	22 / 22
1	22			22 / 22

**The tests were conducted beyond the product's recommended operating parameters and do not modify the published product ratings.**

These tests were performed to consider a specific set of conditions and should not be considered valid outside those conditions. Swagelok Company makes no representation or warranties regarding these selected conditions or the results attained. Laboratory tests cannot duplicate the variety of actual operating conditions. Test results are not offered as statistically significant. See the product catalog for technical data.



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### **SAFE PRODUCT SELECTION**

When selecting a product, the total system design must be considered to ensure safe, trouble-free performance. Function, material compatibility, adequate ratings, proper installation, operation, and maintenance are the responsibilities of the system designer and user.

### **Referenced Documents**

A-A-58092, *Commercial Item Description (CID) for Tape, Antiseize, Polytetrafluorethylene*, U.S. General Services Administration, Engineering & Commodity Management Division (9FTE-10), 400 15th St. SW, Auburn, WA 98001

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