



## Product Test Report

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

**PTR-386**  
Ver 06  
November 2022  
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### TITLE

Thermal Cycle Test of 316 Stainless Steel Swagelok® Tube Fittings with Stainless Steel Tubing

### PRODUCT TESTED

The following bar stock and forged body Swagelok tube fittings were tested with 316 stainless steel seamless tubing.

Ordering Number	Part Form	Tubing Size	Tubing Hardness HRB
Fractional, in.			
SS-400-1-4	Bar stock	1/4 × 0.028	84
SS-400-9	Forging		
SS-400-1-4	Bar stock	1/4 × 0.065	82
SS-400-9	Forging		
SS-600-1-4	Bar stock	3/8 × 0.035	85
SS-600-9	Forging		
SS-600-1-4	Bar stock	3/8 × 0.065	83
SS-600-9	Forging		
SS-810-1-4	Bar stock	1/2 × 0.083	85
SS-810-9	Forging		

### PURPOSE

These assemblies were tested to observe the performance of Swagelok tube fittings with advanced geometry back ferrules under nitrogen gas pressure, to the lesser of tubing working pressure or 5000 psig (344 bar), and multiple 1000 to 68°F (537 to 20°C) thermal cycles (air cool).

### TEST CONDITIONS

Original test date: December 2001

#### Tube preparation:

Tubing samples were cut to length using a tube cutter for 1/2 in. diameter and under.

#### Fitting assembly:

The test fittings and tubing were assembled 1 1/4 turns past finger-tight according to Swagelok tube fitting installation instructions.

### TEST METHOD

1. The fitting assemblies were attached to a positive pressure gas test stand, submerged in water, pressurized to the lesser of working pressure or 5000 psig (344 bar) nitrogen gas for at least 10 minutes, and monitored for leakage.
2. The samples were placed into a furnace and elevated to a temperature of 1000°F (537°C).



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3. The samples were allowed to stabilize at temperature.
4. The samples were removed from the furnace and allowed to air cool.
5. The above cycle was repeated for a total of ten thermal cycles.
6. The samples were re-attached to a positive pressure gas test stand, submerged in water, pressurized to the lesser of working pressure or 5000 psig (344 bar) nitrogen gas for at least 10 minutes, and monitored for leakage.

### TEST RESULTS

Size in.	Samples Tested	Test Pressure psig (bar)	Results
1/4 × 0.028	4	4000 (275)	Pass—No Leakage
1/4 × 0.065	4	5000 (344)	Pass—No Leakage
3/8 × 0.035	5	3300 (227)	Pass—No Leakage
3/8 × 0.065	5	5000 (344)	Pass—No Leakage
1/2 × 0.083	5	5000 (344)	Pass—No Leakage

**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.

### 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.

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