



## Product Test Report

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

**PTR-392**  
Ver 05  
December 2022  
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### TITLE

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

### PRODUCT TESTED

The following Swagelok tube fittings were tested with 316 stainless steel seamless tubing.

Ordering Number	Part Form	Tubing Size in.	Tubing Hardness HRB
SS-400-3	Forging	1/4 × 0.028	85
SS-400-6	Bar stock		
SS-400-1-4	Bar stock	1/4 × 0.065	84
SS-400-1-6	Bar stock		
SS-600-6	Bar stock	3/8 × 0.035	85
SS-600-6-4	Bar stock		
SS-600-6	Bar stock	3/8 × 0.065	81
SS-600-6-4	Bar stock		
SS-810-3	Forging	1/2 × 0.049	82
SS-810-6	Bar stock		
SS-810-1-6	Bar stock		
SS-810-1-4	Bar stock	1/2 × 0.083	74
SS-810-6	Bar stock		
SS-810-1-6	Bar stock		

### PURPOSE

These assemblies were tested to evaluate the performance of Swagelok tube fittings with advanced geometry back ferrules when exposed to steam cycles and thermal shock using saturated steam and cool tap water as a test media.

### 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. The samples were a minimum of three diameter lengths between fittings after assembly.

#### Fitting assembly:

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



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### TEST METHOD

1. Each assembled sample was attached in turn to a positive pressure gas test stand.
2. Each sample was pressurized with nitrogen gas to 4000 psig (275 bar) for thin wall tubing and 5100 psig (351 bar) for heavy wall tubing and monitored for leakage.
3. The samples were assembled in series and attached to a thermal shock test stand.
4. The samples were internally pressurized with saturated steam to 175 psig (377°F) and held at pressure for a period of one minute
5. The samples were then rapidly cooled with tap water (55 to 65°F) [12 to 18°C] for a period of one minute.
6. The steam / quench cycles were repeated 1100 times and monitored for leakage.
7. The samples were removed from the thermal shock test stand, attached to a positive pressure nitrogen gas leak test stand, pressurized with nitrogen gas to 4000 psig (275 bar) for thin wall tubing and 5100 psig (351 bar) for heavy wall tubing and monitored for leakage.

### TEST RESULTS

Tubing Size in.	Samples Tested	Results
1/4 x 0.028	12	Pass
1/4 x 0.065	12	Pass
3/8 x 0.035	12	Pass
3/8 x 0.065	12	Pass
1/2 x 0.049	12	Pass
1/2 x 0.083	12	Pass

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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