



## Product Test Report

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

**PTR-385**  
Ver 06  
November 2022  
Page 1 of 3

### TITLE

Hydrostatic Pressure Test of Swagelok® Tube Fittings on Hard to Extra-Hard Tubing with Tubing Bottomed and Not Bottomed

### PRODUCT TESTED

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

Ordering Number	Part Form	Tubing Size OD x wall	Tubing Hardness HRB
<b>Fractional, in.</b>			
SS-400-1-4	Bar stock	1/4 x 0.065	100+
SS-400-9	Forging		
SS-600-1-4	Bar stock	3/8 x 0.065	100+
SS-600-9	Forging		
SS-810-1-4	Bar stock	1/2 x 0.083	100+
SS-810-9	Forging		
<b>Metric, mm</b>			
SS-10M0-1-4	Bar stock	10 x 2.0	90
SS-10M0-9	Forging		
SS-12M0-1-4	Bar stock	12 x 2.0	100+
SS-12M0-9	Forging		

### PURPOSE

These assemblies were tested under laboratory conditions to observe the performance of Swagelok tube fittings with advanced geometry back ferrules when used on hard to extra-hard tubing under hydrostatic pressure when assembled with tubing both bottomed and not bottomed on the tube shoulder of the fitting body.

This testing evaluates the tube gripping ability of assembled tube fittings to sustain hydraulic over pressure, attaining up to 3.5 x working pressure without hydraulic leakage and up to 4.0 x working pressure without fitting material rupture or tube slippage.

### TEST CONDITIONS

Original test date: December 2001

#### Tube preparation:

Tubing lengths were cut using a tube cutter for 1/2 in. diameter and under. Each tube length assured a minimum of three diameter lengths between fittings after assembly.

#### Fitting assembly:

- Each sample tested consisted of one tube length and two test fittings, one bar stock and one forged body, assembled 1 1/4 turns past finger-tight according to Swagelok tube fitting installation instructions.
- Prior to pull up, assemblies with tubing not bottomed had the tubing withdrawn from the tube shoulder by 1/16 to 1/8 in. (1.6 to 3.2 mm).



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Page 2 of 3

### TEST METHOD

The fittings were leak tested using the following controlled laboratory conditions:

1. Each sample was attached to a hydraulic test stand.
2. The tubing was restricted from burst by clamping blocks thereby forcing a failure at the fitting-to-tubing engagement.
3. Pressure was gradually increased and the pressure was recorded when loss of tube grip, material rupture or leakage that prevented applying higher pressure occurred, whichever came first.
4. Results were compared to the tubing working pressure.

### TEST RESULTS

#### Swagelok Tube Fittings, Extra-Hard Tubing, Tubing Bottomed

##### Fractional

Tube Size in.	Tubing Hardness HRB	Samples Tested	Working Pressure (WP) psig (bar)	Samples Attaining 3.0 x WP Without Leakage	Samples Attaining 3.5 x WP Without Leakage	Samples Attaining 4 x WP Without Tube Slip
1/4 x 0.065	100+	48	10 200 (702)	48 / 48	43 / 48	42 / 48
3/8 x 0.065	100+	32	6500 (447)	32 / 32	31 / 32	30 / 32
1/2 x 0.083	100+	76	6700 (461)	76 / 76	73 / 76	67 / 76

##### Metric

Tube Size mm	Tubing Hardness HRB	Samples Tested	Working Pressure (WP) bar (psig)	Samples Attaining 3.0 x WP Without Leakage	Samples Attaining 3.5 x WP Without Leakage	Samples Attaining 4 x WP Without Tube Slip
12 x 2.0	100+	12	470 (6821)	12 / 12	12 / 12	12 / 12



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Page 3 of 3

### Swagelok Tube Fittings, Hard to Extra-Hard Tubing, Tubing Not Bottomed

#### Fractional

Tube Size in.	Tubing Hardness HRB	Samples Tested	Working Pressure (WP) psig (bar)	Samples Attaining 3.0 × WP Without Leakage	Samples Attaining 3.5 × WP Without Leakage	Samples Attaining 4 × WP Without Tube Slip
1/4 × 0.065	100+	16	10 200 (702)	13 <sup>Ⓢ</sup> / 16	12 / 16	12 / 16
3/8 × 0.065	100+	16	6500 (447)	16 / 16	16 / 16	14 / 16
1/2 × 0.083	100+	16	6700 (461)	16 / 16	13 / 16	10 / 16

Ⓢ Lowest observed was 2.7 × WP.

#### Metric

Tube Size mm	Tubing Hardness HRB	Samples Tested	Working Pressure (WP) bar (psig)	Samples Attaining 3.0 × WP Without Leakage	Samples Attaining 3.5 × WP Without Leakage	Samples Attaining 4 × WP Without Tube Slip
10 × 2.0	90	16	580 (8417)	16 / 16	16 / 16	16 / 16
12 × 2.0	100+	8	470 (6821)	8 / 8	6 / 8	5 / 8

**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.