



## Product Test Report

**PTR-3220**

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

Ver 03  
October 2022  
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### TITLE

Hydrostatic Pressure Test of 316 Stainless Steel Swagelok® Tube Fittings with Stainless Steel Heavy-Wall Tubing

### PRODUCT TESTED

The following bar stock and forged body Swagelok tube fittings were tested.

### Fractional

Ordering Number	Form	Tubing Size in.	Tubing Hardness HRB
SS-400-1-4	Bar stock	1/4 × 0.065	76 to 87
SS-400-9	Forging		
SS-600-1-4	Bar stock	3/8 × 0.083	76 to 88
SS-600-9	Forging		
SS-810-1-4	Bar stock	1/2 × 0.083	70 to 88
SS-810-9	Forging		
SS-1010-1-8	Bar stock	5/8 × 0.095	80 to 85
SS-1010-9	Forging		
SS-1210-1-8	Bar stock	3/4 × 0.109	70 to 84
SS-1210-9	Forging		
SS-1410-1-8	Bar stock	7/8 × 0.109	73 to 82
SS-1410-9	Forging		
SS-1610-1-8	Bar stock	1 × 0.120	70 to 74
SS-1610-9	Forging		



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### Metric

Ordering Number	Form	Tubing Size mm	Tubing Hardness HRB
SS-6M0-1-4	Bar stock	6 × 1.5	80 to 94
SS-6M0-9	Forging		
SS-8M0-1-4	Bar stock	8 × 1.5	78 to 86
SS-8M0-9	Forging		
SS-10M0-1-4	Bar stock	10 × 2.0	80 to 87
SS-10M0-9	Forging		
SS-12M0-1-4	Bar stock	12 × 2.0	82 to 88
SS-12M0-9	Forging		
SS-14M0-1-8	Bar stock	14 × 2.2	74 to 85
SS-14M0-9	Forging		
SS-15M0-1-8	Bar stock	15 × 2.2	77 to 78
SS-15M0-9	Forging		
SS-16M0-1-8	Bar stock	16 × 2.5	82 to 88
SS-16M0-9	Forging		
SS-18M0-1-8	Bar stock	18 × 2.5	74 to 78
SS-18M0-9	Forging		
SS-20M0-1-8	Bar stock	20 × 2.8	74 to 80
SS-20M0-9	Forging		
SS-22M0-1-8	Bar stock	22 × 2.8	72 to 80
SS-22M0-9	Forging		
SS-25M0-1-8	Bar stock	25 × 3.0	73 to 81
SS-25M0-9	Forging		

### PURPOSE

The assemblies were tested to observe the tube grip performance of 316 stainless steel Swagelok tube fittings with advanced geometry back ferrules using heavy-wall tubing under laboratory conditions.

### TEST CONDITIONS

Original test date: September 2012

Each sample tested consisted of one heavy-wall tube length and two test fittings. The fitting was assembled according to the Swagelok tube fitting installation instructions. Testing was conducted at ambient room temperature.



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### TEST METHOD

The fittings were tested as follows:

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. The pressure was gradually increased and 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

The following data sets include product tested 2013 through 2015.

#### Fractional

Tubing Size in.	Working Pressure (WP) psig (bar)	Samples Attaining a Minimum of $\eta \times WP$ Without Tube Slip		
		Target Performance Factor, $\eta$ <sup>①</sup>	Samples Tested	Samples Passed
1/4 x 0.065	10 200 (702)	4.0	168	168
3/8 x 0.083	7500 (516)	4.0	144	144
1/2 x 0.083	6700 (461)	4.0	120	120
5/8 x 0.095	6000 (413)	4.0	108	108
3/4 x 0.109	5800 (399)	4.0	120	120
7/8 x 0.109	4800 (330)	4.0	60	60
1 x 0.120	4700 (323)	3.5	144	144

① Target performance factors listed in the table are based on the use of the maximum working pressure tubing wall thickness, according to Swagelok *Tubing Data*, MS-01-107, and annealed body material (e.g. forged shapes) .



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### Metric

Tubing Size mm	Working Pressure (WP) bar (psig)	Samples Attaining a Minimum of $\eta \times WP$ Without Tube Slip		
		Target Performance Factor, $\eta$ <sup>①</sup>	Samples Tested	Samples Passed
6 × 1.5	710 (10 304)	4.0	144	144
8 × 1.5	520 (7547)	4.0	144	144
10 × 2.0	580 (8417)	4.0	120	120
12 × 2.0	470 (6821)	4.0	144	144
14 × 2.2	430 (6240)	4.0	84	84
15 × 2.2	400 (5805)	4.0	72	72
16 × 2.5	400 (5805)	4.0	108	108
18 × 2.5	370 (5370)	4.0	72	72
20 × 2.8	380 (5515)	4.0	84	84
22 × 2.8	340 (4934)	4.0	60	60
25 × 3.0	320 (4644)	3.5	60	60

① Target performance factors listed in the table are based on the use of the maximum working pressure tubing wall thickness, according to Swagelok *Tubing Data*, MS-01-107, and annealed body material (e.g. forged shapes) .

**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.