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

TITLE

Hydrostatic Pressure Test of 316 Stainless Steel Swagelok® Tube Fittings on Extra Heavy-Wall 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 × 0.083	82
SS-400-9	Forging		
SS-400-1-4	Bar stock	1/4 × 0.083	82
SS-400-C	Forging		
SS-500-1-4	Bar stock	5/16 × 0.083	80
SS-500-9	Forging		
SS-500-1-4	Bar stock	5/16 × 0.083	80
SS-500-C	Forging		
SS-810-1-4	Bar stock	1/2 × 0.095	77
SS-810-9	Forging		
SS-810-1-4	Bar stock	1/2 × 0.095	77
SS-810-C	Forging		
Metric, mm			
SS-6M0-1-4	Bar stock	6 × 1.8	85
SS-400-C	Forging		
SS-10M0-1-4	Bar stock	10 × 2.2	72
SS-10M0-9	Forging		
SS-10M0-1-4	Bar stock	10 × 2.2	72
SS-10M0-C	Forging		
SS-12M0-1-4	Bar stock	12 × 2.5	85
SS-12M0-C	Forging		

PURPOSE

These assemblies were tested under laboratory conditions to observe the performance of Swagelok tube fittings with advanced geometry back ferrules when installed on extra heavy-wall under hydrostatic pressure.

This testing evaluates the tube gripping ability of assembled tube fittings to sustain hydraulic over pressure, attaining up to 3.5 × working pressure without hydraulic leakage and up to 4.0 × 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 (except samples with bar stock bodies only), assembled 1 1/4 turns past finger-tight according to Swagelok tube fitting installation instructions.

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 Heavy Wall Tubing

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 × 0.083	82	8	12 000 (826)	8 / 8	8 / 8	8 / 8
1/4 × 0.083①	82	8	12 000 (826)	8 / 8	8 / 8	8 / 8
5/16 × 0.083	80	4	10 500 (723)	4 / 4	4 / 4	0 / 0
5/16 × 0.083①	80	4	10 500 (723)	4 / 4	4 / 4	4 / 4
1/2 × 0.095	77	8	7800 (537)	8 / 8	8 / 8	7 / 7
1/2 × 0.095①	77	8	7800 (537)	8 / 8	8 / 8	8 / 8

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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
6 × 1.8[①]	85	8	830 (12 046)	8 / 8	8 / 8	8 / 8
10 × 2.2	72	4	620 (8998)	4 / 4	4 / 4	0 / 0
10 × 2.2[①]	72	8	620 (8998)	8 / 8	8 / 8	7 / 7
12 × 2.5[①]	85	8	590 (8563)	8 / 8	8 / 8	8 / 8

[①]Bar stock bodies only

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.