Product Test Report

PTR-1192

Swagelok Company
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TITLE

Nitrogen Gas Seal Test with Repeated Reassembly of 316 Stainless Steel Swagelok® Tube Fittings at 1.25 Times the Working Pressure

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-1010-1-4	Bar stock	5/8 × 0.065	81
SS-1010-9	Forging		
SS-1010-1-4	Bar stock	5/8 × 0.095	86
SS-1010-9	Forging		
SS-1210-1-8	Bar stock	3/4 × 0.065	76
SS-1210-9	Forging		
SS-1210-1-8	Bar stock	3/4 × 0.109	81
SS-1210-9	Forging		
SS-1410-6-8	Bar stock	7/8 × 0.083	78
SS-1410-2-8	Forging		
SS-1410-6-8	Bar stock	7/8 × 0.109	81
SS-1410-9	Forging		
SS-1610-1-8	Bar stock	1 × 0.083	78
SS-1610-9	Forging		
SS-1610-1-8	Bar stock	1 × 0.120	81
SS-1610-9	Forging		

Metric

Ordering Number	Form	Tubing Size mm	Tubing Hardness HRB
SS-14M0-1-8	Bar stock	14 × 1.2	78
SS-14M0-9	Forging		
SS-14M0-1-8	Bar stock	14 × 2.2	83
SS-14M0-9	Forging		
SS-15M0-1-8	Bar stock	15 × 1.5	78
SS-15M0-9	Forging		
SS-16M0-1-8	Bar stock	16 × 1.5	79
SS-16M0-9	Forging		
SS-18M0-1-8	Bar stock	18 × 1.5	89
SS-18M0-9	Forging		
SS-20M0-1-8	Bar stock	20 × 1.8	80
SS-20M0-9	Forging		
SS-22M0-1-8	Bar stock	22 × 2.0	79
SS-22M0-9	Forging		
SS-25M0-1-8	Bar stock	25 × 2.2	72
SS-25M0-9	Forging		
SS-25M0-1-8	Bar stock	25 × 3.0	76
SS-25M0-9	Forging		

PURPOSE

The assemblies were tested to observe the performance of 316 stainless steel Swagelok tube fittings with advanced geometry back ferrules during a reassembly gas seal test.

TEST CONDITIONS

Original test date: February 2006

Each sample tested consisted of one thin-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.

TEST METHOD

1. The test samples were attached to a gas test stand, submerged in water, pressurized to 1.25 times working pressure with nitrogen for 10 minutes and monitored for leakage. The judgment criterion was less than 1 bubble per minute at the applied pressure. If necessary, the fittings were tightened slightly (up to 1/8 turn) and re-tested.
2. Pressure was dropped, and the fittings were disassembled. The fittings were reassembled back to at least the previously pulled-up position and to at least the previously pulled-up torque.

3. The fittings were leak tested using nitrogen at 1.25 times the working pressure following the instructions and judgment criteria from step 1 at every fifth reassembly.
4. A total of 25 reassemblies were conducted on each test sample end.

TEST RESULTS

Fractional

Tubing Size in.	Samples Tested	Working Pressure psig (bar)	Test Pressure psig (bar)	Results
5/8 × 0.065	24	4000 (275)	5000 (344)	Pass
5/8 × 0.095	12	6000 (413)	7500 (516)	Pass
3/4 × 0.065	24	3300 (227)	4125 (284)	Pass
3/4 × 0.109	12	5800 (399)	7250 (499)	Pass
7/8 × 0.083	24	3600 (248)	4500 (310)	Pass
7/8 × 0.109	12	4800 (330)	6000 (413)	Pass
1 × 0.083	12	3100 (213)	3900 (269)	Pass
1 × 0.120	12	4700 (324)	5900 (407)	Pass

Metric

Tubing Size mm	Samples Tested	Working Pressure bar (psig)	Test Pressure bar (psig)	Results
14 × 1.2	24	200 (2902)	250 (3625)	Pass
14 × 2.2	12	430 (6240)	537 (7795)	Pass
15 × 1.5	12	250 (3628)	313 (4539)	Pass
16 × 1.5	12	230 (3338)	287 (4170)	Pass
18 × 1.5	12	200 (2902)	250 (3625)	Pass
20 × 1.8	12	230 (3338)	287 (4170)	Pass
22 × 2.0	12	230 (3338)	287 (4170)	Pass
25 × 2.2	22	230 (3338)	287 (4170)	Pass
25 × 3.0	12	320 (4640)	400 (5800)	Pass

The stainless steel Swagelok tube fitting demonstrated both initial assembly gas seal and repeated gas seal through 25 reassemblies at 1.25 times the working pressure, under laboratory conditions.

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.