Product Test Report

Swagelok Company
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TITLE

Hydrostatic Pressure Test of Super Austenitic 6Mo (6-moly) Stainless Steel Tubing With 6Mo Stainless Steel (6-moly) Swagelok® Tube Fittings

PRODUCT TESTED

Samples Tested	6Mo SS Tubing Size OD × Wall in.	Tubing Hardness HRB	Description / Ordering Number	Form
28	1/4 × 0.065	83	Male Connector 6Mo-400-1-4	Bar stock
			Union Elbow 6Mo-400-9	Forging
			Plug 6Mo-400-P	Bar stock
28	1/2 × 0.083	88	Male Connector 6Mo-810-1-4	Bar stock
			Union Elbow 6Mo-810-9	Forging
			Plug 6Mo-810-P	Bar stock

PURPOSE

These assemblies were tested under laboratory conditions to observe the tube grip performance of 6Mo Swagelok tube fittings when installed on 6Mo stainless steel, heavy-wall tubing with hydrostatic pressure.

TEST CONDITIONS

Original test date: October 2012

- Each sample tested consisted of one tube length and two test fittings. The fittings were assembled according to Swagelok assembly procedures.
- Testing was conducted at room temperature in a laboratory environment.

TEST METHOD

Hardness Measurements of Tubing:

1. Performed five measurements equally spaced apart on each tube OD with the United Hardness Tester using the 15-T scale with the 1/16-inch diameter ball penetrator.
2. Reported the average of the five measurements.
3. Added the tubing cylindrical values taken from ASTM E18-*Standard Test Methods for Rockwell Hardness of Metallic Materials.*
4. Used the ASTM E140 Table 6—*Approximate Hardness Conversion Numbers for Austenitic SS* chart to convert the 15-T readings to the HRB values.

Hydrostatic Pressure Test:

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 (WP).

TEST RESULTS

Samples Tested	**6Mo SS Tubing Size OD × Wall** in.	**Working Pressure**① psig (bar)	**4 × Working Pressure** psig (bar)	**Samples Attaining 4 × WP**
28	1/4 × 0.065	13 900 (957)	55 600 (3830)	28 / 28
28	1/2 × 0.083	9000 (620)	36 000 (2480)	28 / 28

① Working pressures were calculated from an S value of 27 100 psig (186.7 MPa) for ASTM A213 tubing at –20 to 100°F (–28 to 37°C), as listed in ASME B31.1.

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.

Referenced Documents

ASTM E18—*Standard Test Methods for Rockwell Hardness of Metallic Materials*, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428

ASTM E140*, Table 6—Approximate Hardness Conversion Numbers for Austenitic SS*, ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2858

ASME B31.1, *Power Piping*, The American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5590.

ASME B31.3, *Process Piping*, The American Society of Mechanical Engineers, Three Park Avenue, New York, NY 10016-5590.

ASTM A312, *Standard Specification for Seamless Ferritic and Austenitic Alloy-Steel Boiler, Superheater, and Heat-Exchanger Tubes*, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2858