



## Product Test Report

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

**PTR-2834**  
Ver 04  
September 2022  
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### TITLE

Tensile Pull Test of Super Austenitic 254 SMO<sup>®</sup> (6-moly) Stainless Steel Tubing with Stainless Steel Swagelok<sup>®</sup> Tube Fittings

### PRODUCT TESTED

Samples Tested	254 SMO SS Tubing Size OD x Wall in.	Tubing Hardness HRB	Part Description Ordering Number
6	1/4 x 0.065	95	Male Connector SS-400-1-4
6	1/2 x 0.083	87	Male Connector SS-810-1-4
6	3/4 x 0.095	90	Male Connector SS-1210-1-4
6	1 x 0.120	86	Male Connector SS-1610-1-4

### PURPOSE

These assemblies were tested under laboratory conditions to observe the tube grip performance of stainless steel Swagelok tube fittings when installed on 254 SMO stainless steel heavy-wall tubing under tensile load.

### TEST CONDITIONS

Original test date: October 2011

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 the Wilson Chart #53 Cylindrical Conversion Table.
4. Used the ASTM E140 Table 6—Austenitic Stainless Steel hardness conversion chart to convert the 15-T readings to the HRB values.



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### Tensile Pull Test:

1. For each sample, assembled one tube length and two male connectors according to Swagelok assembly procedures.
2. Attached non-pressurized samples to a tensile test machine.
3. Tensile pulled samples at a rate of 0.125 in. (3.2 mm) per minute until either the tube pulled out of the fitting or the tube fractured.
4. The acceptance criterion was:  
$$\text{Minimum Load} = \text{Area based on Tubing Outside Diameter} \times \text{Tubing Working Pressure} \times \text{Performance Factor}$$
5. The test result should exceed the calculated minimum load.

## TEST RESULTS

### Tensile Pull Test

254 SMO Tubing Size OD × Wall in.	Performance Factor $\eta^{\text{①}}$	Acceptance Criterion (Minimum Load) lbf (N)	Minimum Load Attained lbf (N)	Results
1/4 × 0.065	4.0	2000 (8896)	2957 (13 152)	Pass
1/2 × 0.083	4.0	5260 (23 396)	8896 (39 569)	Pass
3/4 × 0.095	4.0	8860 (39 409)	10 289 (45 765)	Pass
1 × 0.120	3.5	9800 (43 590)	9865 (43 879)	Pass

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.



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### **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**

*Wilson Cylindrical Correction Chart # 53*, Wilson Instrument Division, 929 Connecticut Avenue, Bridgeport, CT 06602

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

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