



Product Test Report

PTR-3779

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

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September 2025
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TITLE

Low-Temperature Thermal Cycling and Hydrostatic Proof Test of Alloy 825 Tubing with Stainless Steel Swagelok® Tube Fittings

PRODUCT TESTED

| Samples Tested | Alloy 825 Tubing Size OD × Wall in. | Tubing Hardness 15T | Part Description Ordering Number | Part Description Ordering Number |
|----------------|-------------------------------------|---------------------|----------------------------------|----------------------------------|
| 4 | 1/4 × 0.035 | 86 | Union Straight SS-400-6 | Union Elbow SS-400-9 |
| 4 | 1/4 × 0.065 | 83 | Union Straight SS-400-6 | Union Elbow SS-400-9 |
| 4 | 3/8 × 0.035 | 85 | Union Straight SS-600-6 | Union Elbow SS-600-9 |
| 4 | 3/8 × 0.065 | 82 | Union Straight SS-600-6 | Union Elbow SS-600-9 |
| 4 | 1/2 × 0.049 | 86 | Union Straight SS-810-6 | Union Elbow SS-810-9 |
| 4 | 1/2 × 0.065 | 84 | Union Straight SS-810-6 | Union Elbow SS-810-9 |
| 4 | 3/4 × 0.065 | 83 | Union Straight SS-1210-6 | Union Elbow SS-1210-9 |
| 4 | 3/4 × 0.095 | 84 | Union Straight SS-1210-6 | Union Elbow SS-1210-9 |
| 4 | 1 × 0.083 | 82 | Union Straight SS-1610-6 | Union Elbow SS-1610-9 |
| 4 | 1 × 0.109 | 85 | Union Straight SS-1610-6 | Union Elbow SS-1610-9 |

PURPOSE

These assemblies were tested under laboratory test conditions to observe the leakage performance (during and after thermal cycling) of stainless steel Swagelok tube fittings when installed on Alloy 825 tubing.

TEST CONDITIONS

Original test date: November 2014

Laboratory environment

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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.

Low Temperature Thermal Cycling Procedure:

1. Assembled one tube length with one union straight and one union elbow according to the Swagelok tube fitting installation instructions.
2. Placed test samples in an environmental chamber and pressurized to test pressure with nitrogen.
3. Decreased the samples to test temperature of -58°F (-50°C) within a period of one hour. The samples were allowed to stabilize at temperature for a minimum of 2 hours while being monitored for pressure decay.
4. The temperature was then increased to laboratory room temperature (within one hour) while the test pressure was maintained. Samples were then stabilized at room temperature for a minimum of two hours while being monitored for pressure decay.
5. Repeated the above cycle two additional times.
6. Recorded any pressure decay; the pass criterion was no pressure decay.

Hydrostatic Proof Test Procedure:

1. Upon completion of the low-temperature thermal cycling procedure, the samples were subjected to a hydraulic proof test at ambient laboratory temperature.
2. Samples were pressurized to 100 psig (6.8 bar) and held for a period of five minutes.
3. After 5 minutes at 100 psig (6.8 bar), the samples were pressurized to test pressure (1.5 times ambient working pressure) and held for an additional period of 5 minutes.
4. Monitored the samples for leakage throughout the test; the pass criterion was no visible leakage.



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TEST RESULTS

Low-Temperature Thermal Cycle Test

| Alloy 825 Tubing Size OD × Wall in. | Ambient Working Pressure psig (bar) | Test Pressure at Reduced Temperature psig (bar) | Test Results |
|--|--|--|-----------------|
| 1/4 × 0.035 | 6400 (440) | 6400 (440) | Pass |
| 1/4 × 0.065 | 10 200 (702) | 10 200 (702) | Pass |
| 3/8 × 0.035 | 4100 (282) | 4100 (282) | Pass |
| 3/8 × 0.065 | 7500 (516) | 7500 (516) | Pass |
| 1/2 × 0.049 | 4300 (296) | 4300 (296) | Pass |
| 1/2 × 0.065 | 5900 (406) | 5900 (406) | Pass |
| 3/4 × 0.065 | 3800 (261) | 3800 (261) | Pass |
| 3/4 × 0.095 | 5800 (399) | 5800 (399) | Pass |
| 1 × 0.083 | 3600 (248) | 3600 (248) | Pass |
| 1 × 0.109 | 4200 (289) | 4200 (289) | Pass |

Hydrostatic Proof Test

| Alloy 825 Tubing Size OD × Wall in. | Test Pressure psig (bar) | Test Results |
|--|--------------------------------|-----------------|
| 1/4 × 0.035 | 9600 (661) | Pass |
| 1/4 × 0.065 | 15 300 (1054) | Pass |
| 3/8 × 0.035 | 6150 (423) | Pass |
| 3/8 × 0.065 | 11 250 (775) | Pass |
| 1/2 × 0.049 | 6450 (444) | Pass |
| 1/2 × 0.065 | 8850 (609) | Pass |
| 3/4 × 0.065 | 5700 (392) | Pass |
| 3/4 × 0.095 | 8700 (599) | Pass |
| 1 × 0.083 | 5400 (372) | Pass |
| 1 × 0.109 | 6300 (434) | Pass |



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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 representations or warranties regarding these selected conditions or the results attained. Laboratory tests cannot duplicate the variety of actual operating conditions. 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

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

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