Product Test Report

Swagelok Company
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TITLE

Thermal Cycle Test of 6 mm 316 Stainless Steel Swagelok® Medium-Pressure Tube Fittings

PRODUCT TESTED

The following bar stock 6 mm Swagelok medium-pressure tube fittings were tested with the identified stainless steel tubing:

Ordering Number	Quantity Tested	Tubing Size mm	Tubing Hardness
SS-6MFK0-1-4	6	6 × 2.2 annealed	85 Rb
SS-6MFK0-C	6		
SS-6MFK0-1-4	6	6 × 1.5 cold-drawn 1/8 hard	23 Rc
SS-6MFK0-C	6		

PURPOSE

The assemblies were tested to observe the performance of 316 stainless steel Swagelok medium-pressure tube fittings with nitrogen gas at tubing working pressure through three high-temperature thermal cycles followed by three low-temperature thermal cycles under laboratory conditions.

TEST CONDITIONS

Original test date: March 2008

- Each sample tested consisted of one tube length and two test fittings.
- The fitting was assembled by torque according to the Swagelok medium-pressure tube fitting installation instructions.

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 acceptance criterion was less than 1 bubble per minute at the applied pressure.
2. The samples were placed into a furnace and pressurized to working pressure with nitrogen and the temperature was elevated to 1000°F (537ºC). The samples were allowed to stabilize at temperature for at least 2 hours and monitored for leakage.
3. The samples were removed from the furnace and were cooled to room temperature within 1 hour. The samples were allowed to stabilize at room temperature for at least an additional 2 hours.
4. Steps 2 and 3 were repeated for a total of three thermal cycles.
5. 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 acceptance criterion was less than 1 bubble per minute at the applied pressure.
6. The samples were placed into an environmental chamber and pressurized to working pressure with nitrogen and the temperature was lowered to –65°F (–53°C). The samples were allowed to stabilize at temperature for at least 2 hours and monitored for leakage.

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7. The samples were removed from the environmental chamber and heated to room temperature within 1 hour. The samples were allowed to stabilize at room temperature for at least an additional 2 hours.
8. Steps 6 and 7 were repeated for a total of three thermal cycles.
9. The test samples were attached to a gas test stand, submerged in water, pressurized to 1.5 times working pressure with nitrogen for 10 minutes, and monitored for leakage. The acceptance criterion was less than 1 bubble per minute at the applied pressure.

TEST RESULTS

Tubing Size mm	**Samples Tested**	**Working Pressure** psig (bar)	**1.25 × Working Pressure** psig (bar)	**1.5 × Working Pressure** psig (bar)	**Results**
6 × 2.2	12	15 000 (1034)	18 750 (1291)	22 500 (1550)	Pass
6 × 1.5	12	15 000 (1034)	18 750 (1291)	22 500 (1550)	Pass

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.