



Product Test Report

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

PTR-1209
Ver 06
November 2022
Page 1 of 4

TITLE

Hydrostatic Pressure Test of Stainless Steel Swagelok® Medium-Pressure Tube Fittings with the Fitting Nut Tightened to 75% of the Required Installation Torque

PRODUCT TESTED

The following stainless steel Swagelok medium-pressure tube fittings were tested with the identified stainless steel tubing.

Ordering Number	Quantity Tested	Tubing	Tubing Hardness
Fractional			
SS-4FK0-1-4	10	1/4 × 0.095 in. annealed	Rb 80
SS-4FK0-C	10		
SS-4FK0-1-4	10	1/4 × 0.065 in. cold-drawn 1/8-hard	Rc 25
SS-4FK0-C	10		
SS-8FK0-1-4	15	1/2 × 0.188 in. annealed	Rb 89
SS-8FK0-C	15		
SS-8FK0-1-4	17	1/2 × 0.109 in. cold-drawn 1/8-hard	Rc 23
SS-8FK0-C	17		
SS-12FK0-1-44M	3	3/4 × 0.165 in. cold-drawn 1/8-hard	Rc 26
SS-12FK0-C	3		
Metric			
SS-6MFK0-1-4	3	6 × 2.2 mm annealed	Rb 85
SS-6MFK0-C	3		
SS-6MFK0-1-4	3	6 × 1.5 mm cold-drawn 1/8-hard	Rc 23
SS-6MFK0-C	3		
SS-10MFK0-1-44M	3	10 × 3.5 mm annealed	Rb 88
SS-10MFK0-C	3		
SS-10MFK0-1-44M	3	10 × 2.2 mm cold-drawn 1/8-hard	Rc 28
SS-10MFK0-C	3		
SS-12MFK0-1-44M	3	12 × 4.5 mm annealed	Rb 90
SS-12MFK0-C	3		
SS-12MFK0-1-44M	3	12 × 2.8 mm cold-drawn 1/8-hard	Rc 25
SS-12MFK0-C	3		

PURPOSE

These assemblies were tested to observe the tube grip performance of stainless steel Swagelok medium-pressure tube fittings with heavy-wall annealed and cold-drawn 1/8-hard tubing with the fitting nut tightened to 75% of the required installation torque.



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November 2022
Page 2 of 4

TEST CONDITIONS

Original test date: April 2006

Each sample tested consisted of one tube length and two test fittings assembled to 75% of the required installation torque. For 1/4 inch and 6 mm fittings, the nut was tightened to 225 in.-lb (25.4 N·m); for 10 mm fittings, the nut was tightened to 900 in.-lb (102 N·m); for 1/2 inch and 12 mm fittings, the nut was tightened to 1000 in.-lb (113 N·m); for 3/4 inch fittings, the nut was tightened to 2040 in.-lb (230 N·m) after having been preswaged according to Swagelok medium-pressure tube fitting installation instructions.

Proper installation requires 300 in.-lb (33.9 N·m) for 1/4 inch and 6 mm fittings, 1200 in.-lb (136 N·m) for 10 mm fittings, 1320 in.-lb (150 N·m) for 1/2 inch and 12 mm fittings, and 2700 in.-lb (306 N·m) after preswaging for 3/4 inch fittings according to Swagelok medium-pressure tube fitting installation instructions.

TEST METHOD

The fittings were tested as follows:

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.



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November 2022
Page 3 of 4

TEST RESULTS

Tubing	Samples Tested	Working Pressure (WP) psig (bar)	Samples Attaining 3 × WP Without Leakage	Samples Attaining 4 × WP Without Tube Slip
Fractional				
1/4 × 0.095 in. annealed	10	15 000 (1034)	10 / 10	10 / 10
1/4 × 0.065 in. cold-drawn 1/8-hard	10		10 / 10	10 / 10
1/2 × 0.188 in. annealed	15		15 / 15	10 / 10 ^①
1/2 × 0.109 in. cold-drawn 1/8-hard	17		17 / 17	17 / 17
3/4 × 0.165 in. cold-drawn 1/8-hard	3		3 / 3	3 / 3
Metric				
6 × 2.2 mm annealed	3	15 000 (1034)	3 / 3	3 / 3
6 × 1.5 mm cold-drawn 1/8-hard	3		3 / 3	3 / 3
10 × 3.5 mm annealed	3		3 / 3	3 / 3
10 × 2.2 mm cold-drawn 1/8-hard	3		3 / 3	3 / 3
12 × 4.5 mm annealed	3		3 / 3	3 / 3
12 × 2.8 mm cold-drawn 1/8-hard	3		3 / 3	3 / 3

① Five fittings leaked between 3 and 4 times working pressure without tube slip.

Proper installation requires 300 in.-lb (33.9 N-m) for 1/4 inch and 6 mm fittings, 1200 in.-lb (136 N-m) for 10 mm fittings, 1320 in.-lb (150 N-m) for 1/2 inch and 12 mm fittings, and 2700 in.-lb (306 N-m) after preswaging for 3/4 inch fittings according to Swagelok medium-pressure tube fitting installation instructions.



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Page 4 of 4

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.

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