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September 24, 2021

Joel Hanish
Distributor Principal
Swagelok Minnesota
321 Lake Hazeltine Drive
Chaska, MN 55318

Dear Mr. Hanish,

This correspondence addresses the conformance of Swagelok brand tube fittings to the ASME *Code for Process Piping*.

ASME B31.3 2020, *Code for Process Piping*, sets forth engineering requirements deemed necessary for safe design and construction of piping systems. The code is not intended as a design handbook. The code includes:

1. Material specifications and component standards.
2. Requirements for design of component parts and assemblies.
3. Requirements for the evaluation and limitation of stresses, reactions and movements associated with pressure, temperature and external forces.

Swagelok Company manufactures Swagelok brand tube fittings from bar stock and forgings. The design of these tube fittings is proprietary to Swagelok. All pertinent design documents meet our design standards, which include quality standards. These quality standards are established through Swagelok processes. The Swagelok Quality Assurance manual describes the processes, which include: design reviews, laboratory performance testing, and field performance.

The following statements indicate our conformance to the applicable sections of the ASME code:

Material

1. Stainless Steel
 - a. Swagelok type 316 stainless steel bar stock fittings are manufactured from material purchased and certified as being in accordance with ASTM A479. This material is a listed material as noted in ASME B31.3, Table A-1.
 - b. Swagelok type 316 stainless steel forged fittings are manufactured from material purchased and certified as being in accordance with ASTM A182. Representative samples of forgings have successfully passed the corrosion test of ASTM A262. This material is a listed material as noted in ASME B31.3, Table A-1.
 - c. Swagelok type 316-ELT stainless steel fittings, straights and shapes, are manufactured from material purchased and certified as being in accordance with ASTM A479. The 316-ELT meets the ASME B31.3 requirements for service up to 1200 °F.

2. Brass

- a. Swagelok brass bar stock fittings are manufactured from material purchased and certified as being in accordance with ASTM B16 alloy 360 or ASTM B453 alloy 353 or 345. These materials comply with ASME B31.3 as unlisted material according to paragraph 323.1.2. We can furnish case histories of successful applications wherein these materials have been used.
- b. Swagelok brass forged fittings are manufactured from material purchased and certified as being in accordance with ASTM B283 alloy 377. This material is a listed material as noted in ASME B31.3 Table A-1.

3. Carbon Steel

- a. Swagelok steel bar stock fittings are manufactured from material purchased and certified as being in accordance with ASTM A108.
- b. Reforging bars procured to manufacture steel forged fittings are also in accordance with either ASTM A108 or ASTM A105.
- c. ASTM A108 material complies with ASME B31.3 as an unlisted material as found in paragraph 323.1.2. We can furnish case histories of successful applications wherein these materials have been used.

Design

1. As mentioned earlier, Swagelok brand tube fittings are manufactured to a proprietary design that is consistent with ASME B31.3 design criteria. This is acceptable according to paragraph 315.3.
2. The NPT pipe threads on the pipe ends on these fittings are manufactured based on the requirements of ASME B1.20.1 and SAE AS71051. Swagelok pipe fittings have been proven successful in actual performance tests. This is acceptable according to section 304.7. ASME B1.20.1 is a listed specification in Table 326.1.
3. The male pipe weld ends on these fittings are manufactured to meet end preparation requirements of ASME B16.25 (Butt Weld). The tube socket weld ends are manufactured to our own design requirements. All the weld end designs have proven successful in actual performance tests. This is acceptable according to section 304.7. ASME B16.25 is a listed specification in Table 326.1.

Application

Pressure ratings based on the allowable stress mentioned in ASME B31.3, Appendix A, can be found in the Swagelok *Tubing Data Sheet*, MS-01-107. The charts are intended to be used as guidelines. (For some “unlisted” materials, data from ASME Boiler Code is used). It is the responsibility of the customer to interpret the code for the specific application.

Stainless Steel Applications

We suggest the use of fully annealed high quality (type 304, 316, etc., seamless or welded and drawn) stainless steel hydraulic tubing conforming to ASTM A213, A269 or equivalent, with a hardness of 90 HRB or less. Tubing shall be free of scratches and suitable for bending and flaring.

Brass Applications

We suggest the use of fully annealed high quality copper tubing ASTM B75 or equivalent. Tubing shall be free of scratches and suitable for bending and flaring.

Steel Applications

We suggest the use of fully annealed high quality seamless steel hydraulic tubing, ASTM A179 or equivalent, with a hardness of 72 HRB or less. The tubing shall be free of scratches and suitable for bending and flaring.

Swagelok tube fittings, when installed on the suggested tubing and according to catalog instructions, will hold at proof pressure (1.5 times allowable working pressure).

When required, Swagelok Company will perform a burst test on tubing submitted by the customer. Also when required, certification of burst test results may be furnished. Service conditions must be specified by the customer.

We hope this information proves beneficial. Please do not hesitate to contact us if we can be of further assistance.

Sincerely,

A handwritten signature in black ink that reads "Gary Bialek". The script is cursive and fluid.

Gary Bialek
Sr. Technical Service Representative

