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Vancouver, BC V5M 4T5
Toll Free: 1-866-566-7233
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ATTN: TSSA BPV NATIONAL REGISTRATION
TECHNICAL STANDARDS & SAFETY AUTHORITY
345 CARLINGVIEW DRIVE
TORONTO ON M9W 6N9

Date: 09-Aug-2023

TSBC Account #: 061440
TSBC Admin Number: 98460

Canadian Registration Number: 0D21780.51

Re: Application for Design Registration

The design, as detailed in your Design Portal application 0D21780.5ADD1 SWAGELOK for a Pressure Fitting is registered with the following notes and considerations:

Registered To:	SWAGELOK
Project Name:	0D21780.5ADD1 SWAGELOK
Drawing #:	Swagelok FL Series Hoses. See attachment A and B
Drawing Revision:	N/A

Conditions of Registration:

(1)Fitting Registration Expiry Date: 15-Sep-2029(2) The registration is valid until the indicated expiry date only if the Manufacturer maintains a valid quality management system approved by an acceptable third-party agency until that date. Should the approval of quality management system lapse before the expiry date indicated above, this registration shall become void.

Reviewer's Notes:

Any additional conditions and considerations from the initial province of registration shall apply to this BC registration.

Full details of this submission including the scope of registration, design conditions, fabrication details, and calculations pertaining to this design are located in the above Admin Number on the Design Portal. For all other enquiries, please contact eim@technicalsafetybc.ca.

The Engineering Information Management Team

1. SCOPE

The Swagelok FL series hose assembly product complies with the requirements of ASME B31.3-2016 as an unlisted component. Compliance is supported by burst testing witnessed by an ASME Authorized Inspection Agency.

2. DESCRIPTION OF ADDENDUM

This addendum to CRN 0D21780.5 is to fix a typographical error with the hose core EN standard and to also add an extra source for the bulk hose material in which ASTM standards are specified for the hose core and braid instead of the EN standards.

Regarding the typographical error, the hose core material specification is currently noted as 316L per EN 10088-2, number 1.4404. The material standard that should have been referenced is 316L per EN 10028-7, number 1.4404. The analysis section remains unchanged from this correction since the chemical and mechanical properties are the same between the two EN standards for number 1.4404.

Regarding the extra source for the bulk hose material, the materials of construction for pressure-containing components of the Swagelok FL series hose assemblies are listed in the updated Table 2 below. The updated table includes the EN standards and the newly added ASTM standards, which are comparable to the EN standards. Notation numbers are designated by parentheses ().

Since the allowable stresses between the EN standards and the ASTM standards are the same (reference notations 5 with 7 and notations 6 with 8), the analysis and the allowable pressures at maximum temperature remain unchanged from the original submission.

UPDATED Table 2 – Materials

Component (see Figure 1)	Material Type, Form	UNS / Material Standard	ASME B31.3 Code listing	Tensile Strength	
				Max Allowable Stress (psi) @ -325 to 100°F	Max Allowable Stress (psi) @ 850°F
End Connections with Integral Weld Collar	316 SS Strain-Hardened Bar	S31600 ASTM A479	Not Listed (1)	31,667 (1)(2)	28,567 (1)(2)
	316L SS Strain-Hardened Bar	S31603 ASTM A479	Not Listed (1)	31,667 (1)(3)	28,567 (1)(3)
	316L VAR SS Strain-Hardened Bar	S31603	Not Listed (1)	31,667 (1)(4)	28,567 (1)(4)
Core	316L SS, Strip	1.4404 / EN 10028-7	Not Listed (1)	16,667 (1)(5)	9,400 (1)(5)
Core	316L SS, Strip	S31603 ASTM A240	Listed	16,667 (7)	9,400 (7)
Braid	321 SS, Wire	1.4541 / EN 10088-3	Not Listed (1)	20,000 (1)(6)	12,400 (1)(6)
Braid	321 SS, Wire	S32100 ASTM A580	Not Listed (1)	20,000 (1)(8)	12,400 (1)(8)

Notes:

(1) The material is an unlisted material in ASME B31.3. The allowable stresses shown in the above table are the most conservative values based on Code requirements in ASME B31.3-2016 paragraph 323.1.2 “Unlisted Materials,” which allows unlisted materials be used provided they “conform to a published specification covering chemistry, physical and mechanical properties, method and process of manufacture, heat treatment, and quality control…” Paragraph 302.3.2(d) “Basis for design stresses – other materials”: the lesser of one-third of the minimum tensile strength or two-thirds of the specified minimum yield strength.

(2) 316 SS strain-hardened bar (ASTM A479) is an unlisted material in ASME B31.3. A 316 SS Grade B8M2 bolt material was selected from the ASME B&PVC, Section II, Part D, Table U as being the most similar: the minimum tensile strength of 95 ksi in this Code matches the Swagelok’s proprietary material specification. The maximum allowable tensile stresses at (-20 to 100°F) and at maximum rated temperature (850°F, 85.7 ksi) were calculated based on the stress vs. temperature values listed in Table U for this selected material, using the calculation cited in above Note (1) a.

S31600/ASTM A479 material that Swagelok uses has a carbon content < 0.1% and is in the cold-drawn condition after solution annealing. As such, according to ASME B31.3 Table 323.2.2, no additional impact testing is necessary at temperatures above the value in Table A-1. This low temperature rating (MDMT) of this product is -325°F. This value is the Minimum Temperature listed in Table A-1 for this material (-325°F).

(3) The 316L SS strain-hardened bar material is an unlisted material in ASME B31.3. The material is controlled per Swagelok’s proprietary material specification and possesses minimum room temperature tensile and yield strengths equivalent to the 316 SS, strain-hardened bar in the above Note (2). The values used for the 316 SS, strain-hardened bar were used for the 316L SS strain-hardened bar.

(4) The 316L SS VAR strain-hardened bar material is an unlisted material in ASME B31.3. The material is controlled per Swagelok’s proprietary material specification and possesses minimum room temperature tensile and yield strengths equivalent to the 316 SS, strain-hardened bar in the above Note (2). The values used for the 316 SS, strain-hardened bar were used for the 316L SS VAR strain-hardened bar.

(5) The 316L SS strip material per EN 10028-7 grade 1.4404 is an unlisted material in ASME B31.3. The EN 10028-7 grade 1.4404 material has a similar chemistry composition to ASTM A240’s S31603 316L material, but there are some chemistry differences which push it out of specification regarding Silicone and Chromium. The 316L physical properties fall within ASTM A240 and A479 limits. Even though these differences exist, these are the best matches for this material within the ASME B31.3 and ASME BPVC. Furthermore, compared to the strength at elevated temperatures listed within EN 10028-7, the ASME codes are more conservative. Based on this, an ASME SA-240 specification, plate product form, 316L SS, S31603 material was selected for the stresses within the ASME B&PVC, Section II, Part D (min. tensile of 70ksi from Table U and min. yield of 25ksi from Table Y-1, both at room temperature)..

(6) The 321 SS wire material per EN 10088-3 grade 1.4541 is an unlisted material in ASME B31.3. The chemistry for the material is similar to ASTM A320 321 SS, S32100. The condition of the wire is annealed, and the ASTM A320 321 SS, S32100 material condition is solution treated. The room temperature mechanical properties of ASTM A320 321 SS, S32100 based from ASME BPVC are more conservative than the mechanical properties specified through Swagelok’s proprietary material specification for this material. Based on this, an ASME SA-320 specification, B8T/B8TA grades, 321 SS, S32100 material was selected with class 1/1A as the more conservative class for the stresses within the ASME B&PVC, Section II, Part D (min. tensile of 75ksi from Table U and min. yield of 30ksi from Table Y-1, both at room temperature).

(7) The core is made from strip stock using ASTM A240 316L SS, S31603 material, which is listed in ASME B31.3. The allowable stresses are based on ASME B31.3, Table A-1, for 316L ASTM A240 S31603 material for plates and sheets. No assembly-level witness testing occurred for this core material since, per note (5), the ASTM A240 316L SS, S31603 material is comparable to the EN 10028-7 grade, which was tested.

(8) The wire is annealed and meets ASTM A580 321 SS, S32100 material, which is an unlisted material in ASME B31.3. The ASTM A320 321 SS, S32100 material has similar chemistry and mechanical properties to the ASTM A580, B8T/B8TA grades, 321 SS, S32100 material, which is solution treated. Based on this, an ASME SA-320 specification, B8T/B8TA grades, 321 SS, S32100 material was selected with class 1/1A as the more conservative class for the stresses within the ASME B&PVC, Section II, Part D (min. tensile of 75ksi from Table U and min. yield of 30ksi from Table Y-1, both at room temperature). No assembly-level witness testing occurred with this wire material since, per this note and note (6), ASTM A580 321 SS, S32100 is similar to ASTM A320 321 SS, S32100, which is comparable to EN 10088-3 grade 1.4541, which was tested.

Product Engineer: Ben Chan
Date: April 18, 2023

THIS IS PART OF CRN
0D21780.5ADD1
Technical Standards and Safety Authority
Boilers and Pressure Vessels Safety Program

Attachment A. Swagelok Manufacturing Locations

This document lists the Swagelok locations where end item or component level manufacturing activities take place.

Swagelok Company 29500 Solon Road Solon, Ohio 44139 USA	Swagelok Company (Falon 1) 348 Bishop Road Highland Heights, Ohio 44143 USA
Swagelok Company (Highland) 318 Bishop Road Highland Heights, Ohio 44143 USA	Swagelok Company (Falon 2) 358 Bishop Road Highland Heights, Ohio 44143 USA
Swagelok Company (OFC) 29495 F.A. Lennon Drive Solon, Ohio 44139 USA	Swagelok Company (HPF) 6050 Cochran Road Solon, Ohio 44139 USA
Swagelok Company (Atlantic) 26651 Curtiss Wright Parkway Willoughby Hills, Ohio 44092 USA	Swagelok Company (Snow Metal) 6060 Cochran Road Solon, Ohio 44139 USA
Swagelok Company (Micro) 26653 Curtiss Wright Parkway Willoughby Hills, Ohio 44092 USA	Swagelok Company (Alfred) 29500 Ambina Drive Solon, Ohio 44139
Swagelok Hose Services Company (SHSC) 29900 Solon Industrial Parkway Solon, Ohio 44139	Swagelok Company (Strongsville) 15400 Foltz Road Strongsville, Ohio 44119
Swagelok (China) Fluid System Technologies Ltd. Changshu Export Process Zone Changshu Economic Development Zone Changshu, Jiangshu 215513 China	Swagelok Limited Ballafletcher Road Tromode IM4 4RA Isle of Man