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# Attachment B: Scope of Registration for Swagelok FM Series Hose Assemblies (Category D)

The table below represents the scope of Swagelok FM series hose assemblies covered by this submission for CRN approval. These hose assemblies have been evaluated in accordance with ASME B31.3:2016 Process Piping as unlisted components. The referenced port connections and product catalog(s) do not represent the full scope of the submission but rather detail some of the most common options.

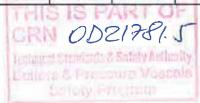
#### **Summary Table**

Product Pressure Retaining	Nom. Hose	End Connections & Sizes	Maximum Working Pressure (psig)		Design Code of		
Series	Material	Size (in)	End Connections & Sizes	Up to 100°F	@ Max. Temp.	Construction	
			Tube Fitting [TA, TM, SL, SM] 1/4" – 1/2" (6mm – 10mm)				
	## Praid   316L SS   STM A580   Series   1/4   End   1/4   1	Male & Female VCR Metal Gasket Face Seal Fittings [RM, RF] 1/4" – 1/2"	3100	1736			
FM			SAE 37° (JIC) Female Swivel [AS] 1/4" – 3/8"		@850°F	ASME B31.3	
Metal Hose		End Connections	Tube Butt Welds [TB] 1/4"			(Unlisted Components)	
	Strain- Hardened 316 SS,		Female VCO O-Ring Face Seal Fittings [VF] 1/4"	3100	2015 @500°F		
	316L SS, or 316LV SS (ASTM A479)	316LV SS	Male & Female Pipe Threads, NPT [PM, PF] 1/4" – 1/2"	3100	2170 @400°F		
			ISO/BSP Tapered (ISO 7) [MT][FT] 1/4" - 1/2"				



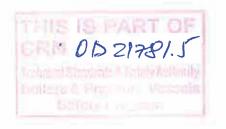


Product Series Pressure Retaining Material	Nom. Hose Size (in)	End Connections & Sizes	Maxlmum Working Pressure (psig)		Design Code of	
		End Connections & Sizes	Up to 100°F	@ Max. Temp.	Construction	
	h-(c)	3/8	Tube Fitting [TA, TM, SL, SM] 1/4" – 1/2" (6mm – 10mm)  Male & Female VCR Metal Gasket Face Seal Fittings [RM, RF] 1/4" – 1/2"  SAE 37° (JIC) Female Swivel [AS] 3/8" – 1/2"  Tube Butt Welds [TB] 3/8" – 1/2"	2000	1120 @850°F	
			Female VCO O-Ring Face Seal Fittings [VF] 3/8"	2000	1300 @500°F	
FM	Core 316L SS (ASTM A240) Braid 316L SS (ASTM A580)		Male & Female Pipe Threads, NPT [PM, PF] 1/4" – 1/2"  ISO/BSP Tapered (ISO 7) [MT][FT] 3/8"	2000	1400 @400°F	
Series Metal Hose	End Connections Strain- Hardened 316 SS, 316L SS, or 316L V SS (ASTM A479)	1/2	Tube Fitting [TA, TM, SL, SM]  1/4" – 3/4" (6mm – 18mm)  Male & Female VCR Metal Gasket Face Seal Fittings [RM, RF]  1/4" – 3/4"  SAE 37° (JIC) Female Swivel [AS]  1/2" – 5/8"  Tube Butt Welds [TB]  1/2"	1800	1008 @850°F	ASME B31.3 (Unlisted Components)
			Female VCO O-Ring Face Seal Fittings [VF] 1/2"	1800	1170 @500°F	
			Male Pipe Threads, NPT [PM]  1/4" – 3/4"  Female Pipe Threads, NPT [PF]  3/8" – 1/2"  ISO/BSP Tapered (ISO 7) [MT][FT]  3/8" – 1/2"	1800	1260 @400°F	





Product Pressure	Nom. Hose Size (in)	Fud Output Aliana 9 Circa	Maximum Working Pressure (psig)		Design Code	
Series Retaining Material		End Connections & Sizes	Up to 100°F	@ Max. Temp.	of Construction	
FM Series Metal Hose	Core 316L SS (ASTM A240)  Braid 316L SS (ASTM A580)  End Connections	3/4	Tube Fitting [TA, TM, SL, SM]  1/2" – 1" (12mm – 25mm)  Male VCR Metal Gasket Face Seal Fittings [RM]  1/2" – 3/4"  Female VCR Metal Gasket Face Seal Fittings [RF]  1/2" – 1"  SAE 37° (JIC) Female Swivel [AS]  3/4"  Tube Butt Welds [TB]  3/4"	1500	840 @850°F	ASME B31.3 (Unlisted Components)
	Strain- Hardened 316 SS,		Female VCO O-Ring Face Seal Fittings [VF] 1/2" – 3/4"	1500	975 @500°F	
	316L SS, or 316LV SS (ASTM A479)		Male Pipe Threads, NPT [PM]  1/2" – 1"  Female Pipe Threads, NPT [PF]  1/2" – 3/4"  ISO/BSP Tapered (ISO 7) [MT][FT]  3/4" – 1"	1500	1050 @400°F	le.





Product Retaining Material	Nom. Hose	F	Maximum Working Pressure (psig)		Design Code	
	es Retaining Size (in)	End Connections & Sizes	Up to 100°F	@ Max. Temp.	of Construction	
FM Series Metai	<u>Core</u> 316L SS (ASTM A240) <u>Braid</u> 316L SS (ASTM A580)	1	Tube Fitting [TA, TM, SL, SM]  1/2" - 1" (16mm - 25mm)  Male & Female VCR Metal Gasket Face Seal Fittings [RM, RF]  1"  SAE 37° (JIC) Female Swivel [AS]  1"  Tube Butt Welds [TB]  3/4" - 1"	1200	672 @850°F	ASME B31.3 (Unlisted Components)
Hose	Connections Strain- Hardened		Female VCO O-Ring Face Seal Fittings [VF] 1"	1200	780 @500°F	, , , , , , , , , , , , , , , , , , , ,
	316 SS, 316L SS, or 316LV SS (ASTM A479)		Male Pipe Threads, NPT [PM]  1/2" – 1"  Female Pipe Threads, NPT [PF]  1"  ISO/BSP Tapered (ISO 7) [MT][FT]	1200	840 @400°F	





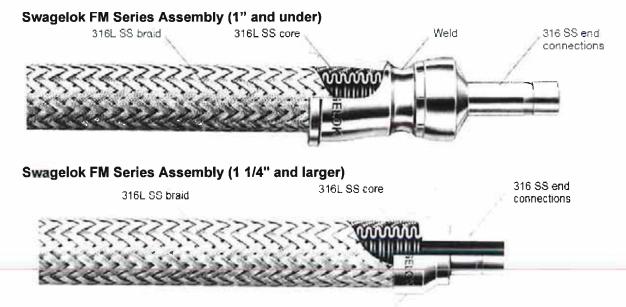
Product Retaining Material	Nom. Hose Size (in)	End Connections & Sizes	Maximum Working Pressure (psig)		Design Code of	
		End Connections & Sizes	Up to 100°F	@ Max. Temp.	Construction	
			Tube Fitting [TA, TM, SL, SM] 1 1/4" (32mm)	950	532 @850°F	
		1 1/4	Male Pipe Threads, NPT [PM] 1" – 1 1/4"			
	Core 316L SS (ASTM A240) Braid 316L SS (ASTM A580)	""	Female Pipe Threads, NPT [PF] 1 1/4"	950	665 @400°F	_
			ISO/BSP Tapered (ISO 7) [MT][FT] 1 1/4"			
		eld Collar Strain- lardened 316 SS 1 1/2 STM A479)	Tube Fitting [TA, TM, SL, SM] 1 1/2" (38mm)	900	504 @850°F	
FM Series Metal	Strain- Hardened		Male Pipe Threads, NPT [PM] 1" – 1 1/2"			ASME B31.3 (Unlisted
Hose	(ASTM A479)		Female Pipe Threads, NPT [PF] 1 1/2"	900	630 @400°F	Components)
End Connections Strain- Hardened	_	ISO/BSP Tapered (ISO 7) [MT][FT] 1 1/2" – 2"				
	316 SS, 316L SS, or 316LV SS (ASTM A479)	316 SS, 316L SS, or 316LV SS	Tube Fitting [TA, TM, SL, SM] 2" (50mm)	500	280 @850°F	
			Male Pipe Threads, NPT [PM] 1 1/2" – 2"			
			Female Pipe Threads, NPT [PF] 2"	500	350 @400°F	
			ISO/BSP Tapered (ISO 7) [MT][FT] 2"			51





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#### **Product Illustration**

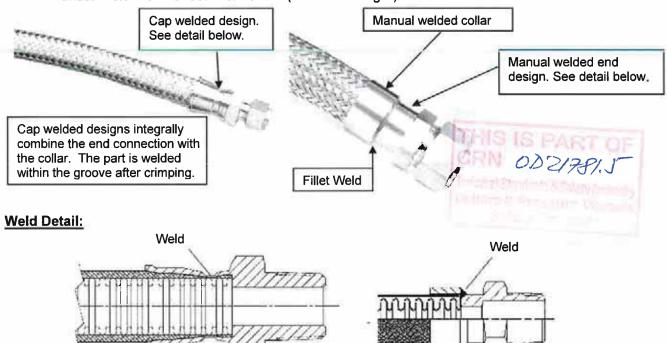


316 SS Manual Weld Collar

### Configuration Example:

FM hoses are available in two styles with many end types, end sizes, and possible overall lengths. There are two ways the hose end connections are attached to the tube and braid depending on the size of the hose:

- Gas Tungsten Arc Weld (GTAW) Cap Weld with Integral Weld Collar (1" and under)
- Manual Weld with Manual Weld Collar (1 1/4" and larger)





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#### **Product Options:**

Additional options and non-pressure boundary alterations that do not affect pressure ratings may be made available within the scope of this approval. Examples of these would include, but are not limited to:

- Cover Options (ex. fire jacket, thermosleeve, spring guard, etc.)
- Tag and Marking Options (ex. tags, lanyards, retaining clamps, etc.)
- Special Testing Options (ex. hydrostatic pressure test, inboard helium leakage test, nitrogen leak test, etc.)
- Other Options (ex. traceable certificates for product)

Additional options that may affect pressure and/or temperature ratings may be made available within the scope of this approval. Examples of these would include the following:

• End Connection Seals or Sealant Options (ex. VCO O-rings, VCR gaskets, pipe thread sealant, etc.)

#### **Quality System**

The Swagelok Company quality system complies with the requirements of ISO 9001:2015. The Swagelok Company maintains BSI Certificate of Registration Number FM 01729, which applies to all locations listed on the Certificate.

#### References

The below product catalog does not represent the full scope of the registration but rather details some of the most common options.

Hose Assemblies, Bulk Hose, and End Connections Product Catalog MS-01-180, Rev. S



# Attachment A. Swagelok Manufacturing Locations

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

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

