

Biopharm Fittings

For the Bioprocessing and Pharmaceutical Industries



TS Series

- Virtually eliminates fluid holdup
- Improves drainability
- Enhances cleanability
- Provides easy assembly
- 1/2 through 4 in. sizes

TS Series Biopharm Fittings

Swagelok® TS series biopharm fittings are designed to solve problems inherent in conventional sanitary clamp fittings: gasket extrusion and the resulting fluid holdup.

Features

- TS series adapter gasket allows an existing sanitary clamp ferrule to mate with a TS series ferrule.
- All wetted components are traceable. Ferrules are heat traceable and gasket materials are lot traceable.
- Electropolished ferrules are passivated.

Technical Data

Design Specifications

- TS series 316L stainless steel ferrules meet ASME-BPE and 3-A requirements.

Internal Surface Finish

- Mechanical finish—20 $\mu\text{in.}$ (0.51 μm) maximum R_a , in accordance with ASME-BPE SF1
- Electropolished finish—15 $\mu\text{in.}$ (0.38 μm) maximum R_a , in accordance with ASME-BPE SF4

External Surface Finish

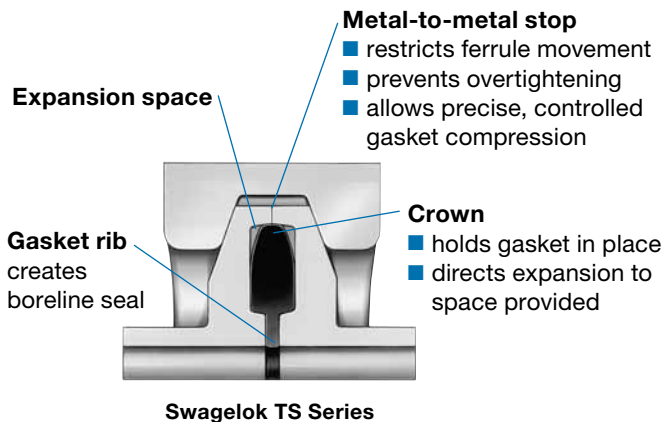
- 64 $\mu\text{in.}$ (1.63 μm) R_a

Materials of Construction

Item	Material	Specification
Ferrules	316L stainless steel	ASME-BPE 3-A STD 63
Gaskets	PTFE (white)	FDA 21CFR Part 177.1550 3-A STD 20 USP <88> Biological Reactivity Class VI USP <87> Cytotoxicity <Grade 2>
	EPDM (black)	FDA 21CFR Part 177.2600 3-A STD 18
	Fluorocarbon FKM (brown)	USP <88> Biological Reactivity Class VI USP <87> Cytotoxicity <Grade 2>

Cleaning

Ferrules are cleaned to ensure components are free of burrs, chips, loose particles, oil, grease, and other contaminants. Electropolished ferrules are passivated.



Pressure-Temperature Ratings

Pressure ratings are based on tests conducted using:

- 2-piece clamps for 1/2 and 3/4 in. fittings
- 3-piece clamps for 1 through 4 in. fittings
- high-pressure, two-bolt clamps for 2 1/2 and 3 in. fittings with PTFE gaskets.

Pressure ratings for connections using an adapter gasket or any other manufacturer's component default to the lowest pressure rating of all the components.

Pressure Ratings

Gasket Material	Tube OD in.	Working Pressure, psig (bar)		
		At 70°F (20°C)	At 275°F (135°C)	At 350°F (176°C)
PTFE	1/2 to 3	200 (13.7)		—
EPDM and fluorocarbon FKM	1/2	3100 (213)	300 (20.6)	300 (20.6) (FKM only)
	3/4	2800 (192)		
	1	1200 (82.6)		
	1 1/2	650 (44.7)		
	2	450 (31.0)		
	2 1/2	350 (24.1)		
	3	200 (13.7)	200 (13.7) (FKM only)	
	4	200 (13.7)	200 (13.7) (FKM only)	

Temperature and Vacuum Ratings

Gasket Material	Temperature Range °F (°C)	Vacuum Rating
PTFE	60 to 275 (15 to 135)	—
EPDM	–50 to 275 (–45 to 135)	10 ^{–3} torr
Fluorocarbon FKM	–10 to 350 (–23 to 176)	

Ordering Information and Dimensions

To order, add an internal surface finish designator to a basic ordering number.

BPE Code	Internal Surface Finish Roughness Average (R_a)	Designator
SF1	20 μ in. (0.51 μ m) max, machined finish	SFF1
SF4	15 μ in. (0.38 μ m) max, electropolished finish	SFF4

Example: 316L-8TS-L-**SFF1**

End Connection Sizes

End connections are available in the sizes and wall thicknesses shown below.

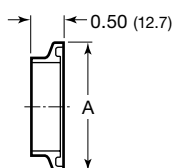
End Connection Size, in.	Tube Wall in.
1/2 to 3	0.065
4	0.083

Dimensions are for reference only and are subject to change.

Short Ferrules

BPE Table DT-22

3-A Compliant

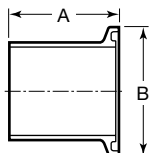


Tube OD in.	Basic Ordering Number	A in. (mm)
1/2	316L-8TS-S-	0.98 (24.9)
3/4	316L-12TS-S-	
1	316L-16TS-S-	1.98 (50.3)
1 1/2	316L-24TS-S-	
2	316L-32TS-S-	2.52 (64.0)

Automatic Tube Weld Ferrules

BPE Table DT-22

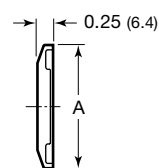
3-A Compliant



Tube OD in.	Basic Ordering Number	Dimensions, in. (mm)	
		A	B
1/2	316L-8TS-L-	1.75 (44.4)	0.98 (24.9)
3/4	316L-12TS-L-		1.98 (50.3)
1	316L-16TS-L-		
1 1/2	316L-24TS-L-	2.25 (57.2)	2.52 (64.0)
2	316L-32TS-L-		3.05 (77.5)
2 1/2	316L-40TS-L-		3.58 (90.9)
3	316L-48TS-L-		4.68 (119)
4	316L-64TS-L-		

Caps

3-A Compliant



Tube OD in.	Basic Ordering Number	A in. (mm)
1/2	316L-8TS-C-	0.98 (24.9)
3/4	316L-12TS-C-	
1	316L-16TS-C-	1.98 (50.3)
1 1/2	316L-24TS-C-	
2	316L-32TS-C-	2.52 (64.0)
2 1/2	316L-40TS-C-	3.05 (77.5)
3	316L-48TS-C-	3.58 (90.9)
4	316L-64TS-C-	4.68 (119)

Options and Accessories

Gaskets

To order, add a gasket material designator to a basic ordering number.

Example: **TM-8TS-G**

Gasket Material	Designator
PTFE	TM
EPDM	EP
Fluorocarbon FKM	VT

Standard Gaskets



Tube OD in.	Basic Ordering Number
1/2	-8TS-G
3/4	-12TS-G
1	-16TS-G
1 1/2	-24TS-G
2	-32TS-G
2 1/2	-40TS-G ^①
3	-48TS-G ^①
4	-64TS-G ^②

^① High-pressure, two-bolt clamp required for fittings with PTFE gaskets.

^② Not available in PTFE.

Adapter Gaskets

Adapter gasket allows an existing ferrule with ASME BPE standard hygienic geometry to mate with a TS series ferrule, with TS series geometry on one face and standard hygienic geometry on the other face.



Tube OD in.	Basic Ordering Number
1/2	-8TS-GA
1	-16TS-GA
1 1/2	-24TS-GA
2	-32TS-GA
2 1/2	-40TS-GA ^①
3	-48TS-GA ^①
4	-64TS-GA ^①

^① Not available in PTFE.

Welding

- Note: Manual welding is not recommended for short ferrules.

Welding caution: Excess heat may alter the ferrule shape and affect seal integrity.

- Contact your authorized Swagelok sales and service representative for additional information on recommended welding practices.

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.

Warranty Information

Swagelok products are backed by The Swagelok Limited Lifetime Warranty. For a copy, visit swagelok.com or contact your authorized Swagelok representative.