

# 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 µin. (0.51 µm) maximum  $R_a$ , in accordance with ASME-BPE SF1
- Electropolished finish—15 µin. (0.38 µm) maximum  $R_a$ , in accordance with ASME-BPE SF4

#### External Surface Finish

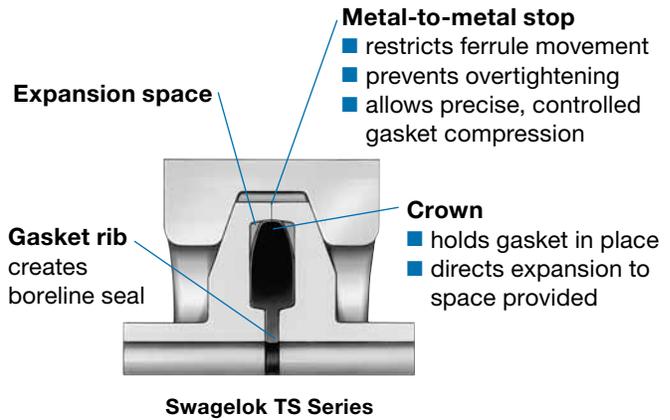
- 64 µin. (1.63 µm)  $R_a$

### 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)	

### 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 <sup>-3</sup> 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 $\mu$ in. (0.51 $\mu$ m) max, machined finish	SFF1
SF4	15 $\mu$ in. (0.38 $\mu$ 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.

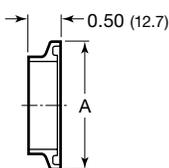
End Connection Size, in.	Tube Wall in.
1/2 to 3	0.065
4	0.083

Dimensions are for reference only and are subject to change.

## Short Ferrules

BPE Table DT-22

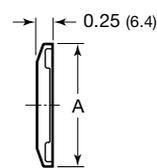
3-A Compliant



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)

## Caps

3-A Compliant

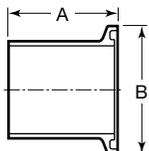


Tube OD in.	Basic Ordering Number	A in. (mm)
1/2	316L-8TS-C-	0.98 (24.9)
3/4	316L-12TS-C-	
1	316L-16TS-C-	1.98 (50.3)
1 1/2	316L-24TS-C-	
2	316L-32TS-C-	2.52 (64.0)
2 1/2	316L-40TS-C-	3.05 (77.5)
3	316L-48TS-C-	3.58 (90.9)
4	316L-64TS-C-	4.68 (119)

## 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	316L-16TS-L-		1.98 (50.3)
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-		

## 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 <sup>①</sup>
3	-48TS-G <sup>①</sup>
4	-64TS-G <sup>②</sup>

<sup>①</sup> High-pressure, two-bolt clamp required for fittings with PTFE gaskets.

<sup>②</sup> 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 <sup>①</sup>
3	-48TS-GA <sup>①</sup>
4	-64TS-GA <sup>①</sup>

<sup>①</sup> 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](http://swagelok.com) or contact your authorized Swagelok representative.