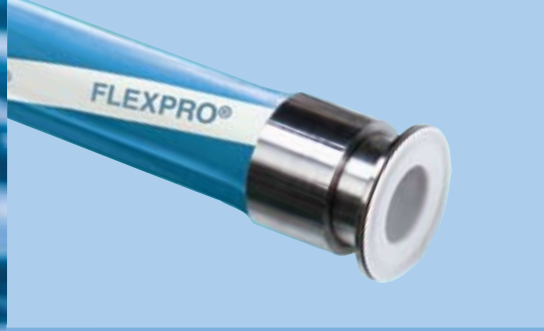
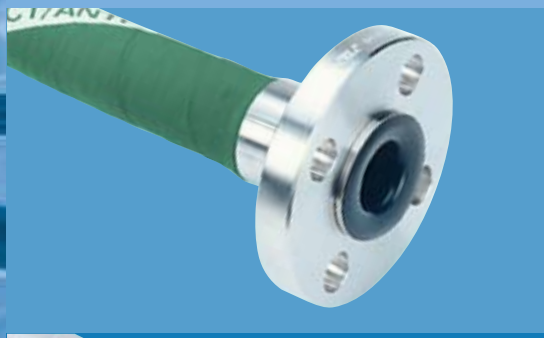
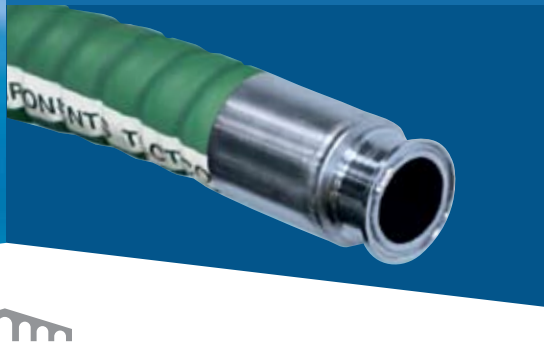
Flexible Components

FLUOROPOLYMER HOSE AND FITTINGS BUYER'S GUIDE







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PROVEN PERFORMANCE

RESPONSIVE SERVICE

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SAINT-GOBAIN
PERFORMANCE PLASTICS

Golden Rules for Hose Selling

STAMPED

SIZE	I.D., O.D. and length
TEMPERATURE	of the material conveyed and the surrounding environment
APPLICATION	conditions of use
MATERIAL	being conveyed, type and concentration
PRESSURE	to which the assembly will be exposed
ENDS	style, type, orientation, attachment methods, etc.
DELIVERY	testing, quality, packaging and delivery requirements

If you have a particular application that requires special attention, please call us at 800-435-3992. Someone from our inside sales or engineering department will be happy to help.

Comments and suggestions for further improving this buyer's guide are welcome. The information it contains supersedes all other previous editions. Please do not refer to previous editions when ordering.

Our products are manufactured under a quality management system registered and complying with 3-A Sanitary Standards where noted and with ISO 9001:2000, which has been independently certified by BVQi.

Certified ISO 9001 by BVQi

3-A®

NAHAD
NATIONAL ASSOCIATION OF HOSE AND ACCESSORIES DISTRIBUTORS

Saint-Gobain Performance Plastics Flexible Components

- Superb quality
- Proven performance
- Responsive service

These characteristics should be a given with any manufacturer of hose assemblies. Flexible Components of Saint-Gobain Performance Plastics meets — indeed, greatly exceeds — these fundamental standards.

As this catalog makes clear, innovative engineering and close attention to the issues facing those who use our products set Flexible Components hose assemblies apart from all others on the market.

Our **Chemfluor®** fluoropolymer extruded tubing — the foundation of all our hose products — sets the industry standard for chemical and corrosion resistance, ease of use, and compliance with all key industry standards.

Our **S.I.B.® (Smooth Inner Bore)** technology provides a totally seamless transition between hose and fitting, virtually eliminating the problems caused by particle entrapment in standard barb assemblies and simplifying maintenance.

Our unique **Flare-Thru** fitting design ensures that the material being conveyed contacts only pure, non-contaminating Chemfluor® fluoropolymer tubing from end to end.

Everything we do at Flexible Components is based on one simple premise: We want our hose and fitting products to be best in class. We believe the many customers who swear by our products are the most compelling proof of the success of this single-minded focus.

Chemfluor® — the Flexible Components Advantage

Saint-Gobain's Chemfluor® fluoropolymer resins offer a number of key performance advantages that extend across the entire line of Flexible Components hose products.

Superior Chemical Resistance
- Chemically inert to all materials

Unsurpassed Corrosion Resistance

Mechanically Tough, Yet Flexible

Approvals
- Complies with major sanitary standards
  - FDA (21CFR177.1550), USDA and U.S. Pharmacopeia Class VI (certain materials vary in terms of meeting one or both standards)
  - Imparts no taste or odor to media being conveyed

Wide Range of Operating Temperatures
- Hose available rated from -100°F (-73°C) to +500°F (+260°C)
- Proven durability in hot and cold steam cycling applications (e.g., plywood manufacture, laundry press)

High Pressure Ratings/Superior Resistance to Volumetric Expansion
- Facilitates use in quick-response hydraulic and pneumatic systems

Zero Maintenance
- Non-stick inner surface prevents material build-up

Good Erosion Resistance
- No significant loss of wall thickness, even after many years of service in corrosive environments

Low Thermal Conductivity
- Hose construction helps insulate conveyed materials from outside environment
- May reduce process costs

IMPORTANT NOTE: Data given is for hose only. Fitting vs. hose pressure limitations must be considered and the lower of the two ratings must be used on assemblies.

A Word about This Buyer's Guide

This comprehensive buyer's guide provides an in-depth view of the full range of products available from the Flexible Components brand of Saint-Gobain Performance Plastics. The guide is divided into three main color-coded sections: Hose (blue), Fittings and Adapters (green) and Engineering Guide (teal).

You will find application information, complete hose specification data, basic dimensional drawings of the many types of fittings we offer, installation instructions and much more. We envision this buyer's guide as the ultimate reference source for those who are responsible for determining exactly what combination of hose and fitting is required to meet their individual application requirements.

⚠ Important:
Dimensional data is for reference only! For manufacturing tolerances, please consult factory.

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Convoluted Hose

fittings

engineering guide

Product Selection Guide

product	description
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FlexPro® (page 7)	Chemfluor® PTFE fluoropolymer smooth inner tube, stainless steel braid, platinum-cured silicone or EPDM rubber cover
TLCTCO (page 8)	Chemfluor® FEP fluoropolymer smooth inner tube, externally convoluted EPDM rubber cover
CTLCT (page 9)	Chemfluor® conductive PFA fluoropolymer smooth inner tube, EPDM rubber cover
TLCT/WTLCT (page 10)	Chemfluor® FEP fluoropolymer smooth inner tube, EPDM rubber cover
WTLCTPFA (page 11)	Chemfluor® unpigmented PFA fluoropolymer smooth inner tube, EPDM rubber cover
W.S.I.B. (page 12)	Chemfluor® FEP fluoropolymer smooth inner tube, EPDM rubber cover, sanitary tube size I.D.
TS/TB (page 13)	Chemfluor® PTFE fluoropolymer smooth inner tube with 304 stainless steel braided reinforcement cover, white or anti-static black tube
TSS (page 14)	Chemfluor® PTFE fluoropolymer smooth inner tube, 304 stainless steel braid with platinum-cured silicone cover
TH (page 15)	Chemfluor® PTFE fluoropolymer conductive inner tube, densely packed high tensile 304 stainless steel braid, high pressure (5000 psi)
MTL (page 16)	Stainless steel braided metal hose, Chemfluor® FEP fluoropolymer inner tube, Flare-Thru fittings
MTLSJ (page 18)	Stainless steel metal hose, stainless steel jacketed (hose in a hose) Chemfluor® FEP fluoropolymer inner tube, Flare-Thru fittings
TWOB/TBOB/ TWOBHV/TBOBHV (page 20)	Chemfluor® PTFE fluoropolymer convoluted inner tube, 316 stainless steel braid, open pitch, white or anti-static black
TWOY/TBOY (page 21)	Chemfluor® PTFE fluoropolymer convoluted inner tube, polypropylene braid, open pitch, white or anti-static black
TWOK/TBOK (page 22)	Chemfluor® PTFE fluoropolymer convoluted inner tube, PVDF (Kynar®) braid, open pitch, white or anti-static black
TWOP/TBOP (page 23)	Chemfluor® PTFE fluoropolymer convoluted inner tube, unbraided, open pitch, white or anti-static black
WCS/BCS (page 24)	Chemfluor® fluoropolymer convoluted inner tube, high tensile 304 stainless steel braid, low profile, white or anti-static black
WCSS (page 25)	Chemfluor® fluoropolymer convoluted inner tube, platinum-cured silicone cover, stainless steel braid, low profile
WCP/BCP (page 26)	Chemfluor® fluoropolymer convoluted inner tube, polypropylene braid, low profile, white or anti-static black
SS Metal Hose (pages 27-28)	304 and 316 stainless steel annular construction inner tube
Sight Flow Indicators (pages 29-30)	Heavy wall Chemfluor® natural FEP. Also available: dip tubes, liquid level indicators and inspection ports, Flare-Thru 150# flanged sight flow indicator, caged Chemfluor® sight gauge
CL (page 31)	Chemfluor® PTFE fluoropolymer convoluted inner tube, PVDF (Kynar®) braid, chlorine transfer
Electrically Heated Hose (page 32)	Available on a “built to order” basis on virtually all hose assemblies in our Flexible Components product line; designed to maintain internal temperature of conveyed materials

Industrial	Chemical	Pharmaceutical & Biotech	Laboratory	Semi Conductor	Food & Beverage
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PharmaSmooth™ Series NEW!

Smooth OD and ID Chemfluor®

FEP Fluoropolymer Smooth Inner Tube • EPDM Rubber Cover

applications

- Load cells
- Skid transfer
- Pumping stations/ portable pumps
- Vessel or tank transfer
- Rail car loading/unloading
- Transfer lines
- CIP
- Chemical process lines

common media

- HF acid
- HCL
- H_2SO_4
- Paint

industry approvals & compliances

- **FDA approved per 21CFR177.1550**
- **US Pharmacopeia Class VI**
- **3-A Sanitary Standard 62-01**

PharmaSmooth™

features & benefits

- ***Ultra smooth OD surface***
- ***Easy to clean***
- ***Smooth ID even when bent***
- ***Imparts no taste or odor***
- ***Excellent bend radius***
- ***Kink resistant***
- ***Sterilizable and autoclavable***
- ***Full vacuum rated***
- ***Super chemical resistant***

engineering specifications

temperature rating

- -40°F to +350°F
- -40˚C to +177˚C

details

colors

- Light gray with white layline in gray lettering
- Special colors available with minimum order quantities

construction

- *Inner Tube:* Chemfluor® FEP
- *Cover:* EPDM rubber
- *Reinforcement:*
  - Multiple polyester plycord and EPDM rubber
  - Double helix, high tensile strength carbon steel wire

fittings

- Flare-Thru Fitting technology available
  - Flange style
  - Locking or non-locking swivel female cam-lock styles
- PermaSeal® crimp style
  - Over 40 styles in a wide range of materials

PharmaSmooth™ Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
8PSTLCT	1/2	12.7	7/8	23.1	500	3.45	2,100	14.48	2.50	63.50	29.9	760	0.35	0.52
12PSTLCT	3/4	19.1	1-1/4	31.8	500	3.45	2,100	14.48	3.25	82.55	29.9	760	0.62	0.92
16PSTLCT	1	25.4	1-1/2	38.1	450	3.10	1,800	12.41	4.75	120.65	29.9	760	0.75	1.12
20PSTLCT	1-1/4	31.8	1-3/4	44.5	320	2.21	1,600	11.03	7.00	177.80	29.9	760	0.98	1.46
24PSTLCT	1-1/2	38.1	2	52.1	300	2.07	1,350	9.31	9.00	228.60	29.9	760	1.20	1.79
32PSTLCT	2	50.8	2-5/8	67.3	250	1.72	1,200	8.27	11.50	292.10	29.9	760	1.50	2.24
40PSTLCT	2-1/2	63.5	3-1/4	81.3	200	1.38	900	6.21	18.00	457.20	29.9	760	2.35	3.50
48PSTLCT	3	76.2	3-3/4	94.0	150	1.03	700	4.83	22.00	558.80	29.9	760	2.50	3.73
64PSTLCT	4	101.6	4-3/4	119.4	150	1.03	600	4.14	34.00	863.60	29.9	760	3.60	5.36

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given @ 70°F; Decrease working pressure 1% for every 2°F above 212°F.

Vacuum Rating is given @ 70°F; Decrease vacuum rating 1% for every 2°F above 212°F. For 1-1/4" and larger sizes, vacuum rating decreases when installed less than 2X min. bend radius.

Flare-Thru fittings are pressure rated only. Not rated for vacuum service.

Extended Service Life Tip: Saint-Gobain suggests using full-length anti-kink armor casing or at least 16" to 24" long anti-kink cuffs (see Hose Cover Options, pages 79–80) at each fitting end to help reduce the strain on the crimp collar and fittings in high load installations. Prolonged service at elevated temperatures will reduce total service life.

FlexPro® Series NEW!

Chemfluor® PTFE Fluoropolymer Smooth Inner Tube
Stainless Steel Braid • Platinum-Cured Silicone or EPDM Rubber Cover

applications

- Skid transfer
- Pumping stations/ portable pumps
- Vessel or tank transfer
- Transfer lines
- Rail car loading/unloading
- WFI use point drops
- Clean steam drops
- Isolation from tanks on load cells
- Bioreactors process and utility
- Process UF and chromo skids
- CIP skids
- Portable skids
- Finish fill process
- Finish fill SIP
- Rotary filling machines
- Fermentation transfer vessels
- Steam applications
- Food and beverage sanitary transfers

common media

- HF acid
- HCL
- Steam
- H_2SO_4
- Paint

industry approvals & compliances

- FDA
- US Pharmacopeia Class VI
- 3-A Sanitary Standard 62-01 (EPDM and silicone cover options only)

features & benefits

- ***Precisely engineered for true smooth bore ID with convoluted hose flexibility***
- ***Extremely smooth ID surface for unimpeded flow with no particle entrapment***
- ***Reduced force to bend for easy handling***
- ***High pressure rating for resilient performance***
- ***Sterilizable for high purity***
- ***Steamable for low TOCs and extractables***
- ***Autoclavable to meet the highest sanitary standards***
- ***Full vacuum rated***
- ***Imparts no taste or odor***
- ***Highly chemical resistant***
- ***Patent pending***

engineering specifications

temperature rating
- -100°F to +450°F
- -73˚C to +232˚C

maximum length

3/4" and 1"	16'
7/8"	10'

details

construction
- *Inner Tube:* Chemfluor® PTFE
- *Reinforcement:*
  - High tensile 304 stainless steel braid
  - 316 stainless steel braid

cover options
- Platinum-cured silicone (standard clear)
- EPDM (standard gray)
- Special colors available: green, blue, red, purple

fittings
- PermaSeal® Crimp style
  - Over 40 styles in a wide range of materials
- Flare-Thru Fitting technology available
  - Call factory for details

FlexPro® with Flare-Thru fitting

FlexPro® with EPDM cover

FlexPro® Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
Nominal ID for Crimp Style (304 stainless steel mechanical braid)														
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
12FLP	3/4	19.1	1-1/8	34.9	1000	6.90	4000	27.60	2	50.8	29.9	760	0.42	0.63
16FLP	1	25.4	1-3/8	34.9	1000	6.90	4000	27.60	2-1/4	57.2	29.9	760	0.63	0.94
Tube Size for Flare-Thru (316 stainless steel braid)														
14FLP	7/8	22.2	1-1/4	31.8	400	2.76	1600	11.03	2-1/4	57.2	29.9	760	0.52	0.77

⚠ Important:

Note: When using Flare-Thru technology, pressure rating is for hose only.

TLCTCO Series Hose Assemblies

Chemfluor® FEP Fluoropolymer Smooth Inner Tube
Externally Convoluted EPDM Rubber Cover

applications

- Load cells
- Skid transfer
- Pumping stations/ portable pumps
- Vessel or tank transfer
- Rail car loading/unloading
- Transfer lines
- Chemical process lines

common media

- HF acid
- HCL
- H_2SO_4
- Paint

industry approvals & compliances

- **FDA approved per 21CFR177.1550**
- **US Pharmacopeia Class VI**
- **3-A Sanitary Standard 62-01**

TLCTCO

features & benefits

- ***Reduced force-to-bend***
- ***Improved bend radius***
- ***Ultra-flexible, easy to handle, kink resistant***
- ***Smooth ID when bent***
- ***High pressure rating***
- ***Sterilizable, autoclavable***
- ***Imparts no taste or odor***
- ***Non-aging liner***
- ***Full vacuum rated***
- ***Resistant to chemicals, ozone and abrasion***

details

colors
- Green cover/white stripe

construction
- *Inner Tube:* Chemfluor® FEP
- *Cover:* Convoluted EPDM rubber
- *Reinforcement:*
  - Multiple polyester plycord and EPDM rubber
  - Double helix, high tensile strength carbon steel wire

fittings
- Over 40 styles of stocked PermaSeal® crimp-style fittings
- A wide range of materials available
- Standard: 316L stainless steel (wetted surfaces)

engineering specifications

temperature rating
- -40°F to +350°F
- -40˚C to +177˚C

maximum length

3/4"	100'
1"	100'
1-1/2"	100'
2"	100'

TLCTCO Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
12TLCTCO	3/4	19.1	1-1/4	31.8	400	2.76	1,600	11.03	2.50	64	29.9	760	0.62	0.92
16TLCTCO	1	25.4	1-1/2	38.1	350	2.41	1,400	9.65	3.75	95	29.9	760	0.75	1.12
24TLCTCO	1-1/2	38.1	2	50.8	300	2.07	1,200	8.27	7.00	178	29.9	760	1.20	1.79
32TLCTCO	2	50.8	2-5/8	67.3	250	1.72	1,000	6.90	8.75	222	29.9	760	1.50	2.24

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given @ 70°F; Decrease working pressure 1% for every 2°F above 212°F.

Vacuum Rating is given @ 70°F; Decrease vacuum rating 1% for every 2°F above 212°F. For 1-1/2" and larger sizes, vacuum rating decreases when installed less than 2X min. bend radius.

Extended Service Life Tip: Saint-Gobain suggests using full-length anti-kink armor casing or at least 16" to 24" long anti-kink cuffs (see Hose Cover Options, pages 79–80) at each fitting end to help reduce the strain on the crimp collar and fittings in high load installations. Prolonged service at elevated temperatures will reduce total service life.

CTLCT Series

Chemfluor® Conductive PFA Fluoropolymer Smooth Inner Tube EPDM Rubber Cover

applications

- Load cells
- Skid transfer
- Pumping stations/ portable pumps
- Vessel or tank transfer
- Rail car loading/ unloading
- Transfer lines
- Chemical process lines

common media

- Solvents
- For a list of chemicals with potential for electrostatic build-up, see page 85; keep in mind that moisture (humidity) and flow rate are important considerations.

industry approvals & compliances

- **US Pharmacopeia Class VI**
- **Complies with industry standards using ISO 8031 testing methods or MIL-H-27267**

features & benefits

- ***Electrostatic dissipating conductive inner tube***
- ***Improved I.D. surface finish***
- ***Excellent bend radius***
- ***Increased maximum lengths up to 100 ft. (through 2")***
- ***CTLCT is manufactured to have a maximum resistance of 10^6 Ω when inducing a charge of 500 volts D.C.***
- ***Autoclavable***
- ***Imparts no taste or odors***

engineering specifications

temperature rating

- -40°F to +350°F
- -40°C to +177°C

details

colors

- Green cover/white stripe

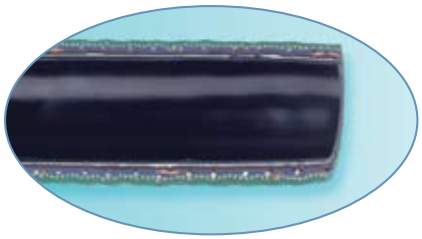
construction

- *Inner Tube:* Chemfluor® black electrostatic dissipating conductive PFA fluoropolymer
- *Cover:* EPDM rubber
- *Reinforcement:*
  - Multiple polyester plycord and EPDM rubber
  - Double helix, high tensile strength carbon steel wire

fittings

- Over 40 styles of stocked PermaSeal® crimp-style fittings
  - A wide range of materials available
  - Standard: 316L stainless steel (wetted surfaces)
- Flare-Thru fitting technology available
  - 150# swivel style flanges
  - Female cam and groove (locking and non-locking swivel style, 316 stainless steel body)
  - See page 36 for more on Flare-Thru fitting technology

CTLCT



CTLCT interior

CTLCT Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
12CTLCT	3/4	19.1	1-1/4	31.8	500	3.45	2,100	14.48	4.50	114.30	29.9	760	0.62	0.92
16CTLCT	1	25.4	1-1/2	38.1	450	3.10	1,800	12.41	6.00	152.40	29.9	760	0.75	1.12
24CTLCT	1-1/2	38.1	2	52.1	300	2.07	1,350	9.31	11.00	279.40	29.9	760	1.20	1.79
32CTLCT	2	50.8	2-5/8	67.3	250	1.72	1,200	8.27	13.50	342.90	29.9	760	1.50	2.24

⚠ Important:

3" and 4" hose can be manufactured on request; consult factory.
Minimum runs required: 3" = 240' | 4" = 120'
Maximum length: 3" = 60' | 4" = 30'

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given @ 70°F; Decrease working pressure 1% for every 2°F above 212°F.

Vacuum Rating is given @ 70°F; Decrease vacuum rating 1% for every 2°F above 212°F. For 1-1/2" and 2" sizes, vacuum rating decreases when installed less than 2X min. bend radius.

Flare-Thru fittings are pressure rated only. Not rated for vacuum service.

Extended Service Life Tip: Saint-Gobain suggests using full-length anti-kink armor casing or at least 16" to 24" long anti-kink cuffs (see Hose Cover Options, pages 79–80) at each fitting end to help reduce the strain on the crimp collar and fittings in high load installations. Prolonged service at elevated temperatures will reduce total service life.

TLCT/WTLCT/SFTL Series

Chemfluor® FEP Fluoropolymer Smooth Inner Tube • EPDM Rubber Cover

applications

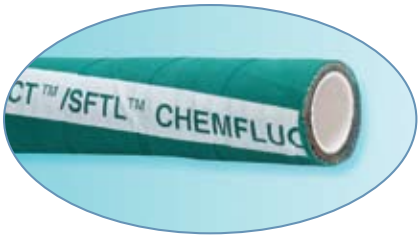
- Rail car unloading
- Chemical trailer loading/ unloading
- Portable pumps
- Isolation dampeners
- CIP
- Food and beverage
- Flavors
- Load cell applicators
- Caustic cleaning

common media

- HF acid
- HCL
- H_2SO_4
- Paint

industry approvals & compliances

- **FDA approved per 21CFR177.1550**
- **US Pharmacopeia Class VI**
- **3-A Sanitary Standard 62-01**



TLCT

WTLCT

features & benefits

- ***Unexcelled chemical resistance***
- ***Full vacuum rated***
- ***Durable, kink resistant, with no external wire reinforcement to potentially fray***
- ***Easy to clean non-stick smooth tube for assured sterility***
- ***Can be cleaned with steam, caustics, solvents or other cleaning agents***
- ***Resistant to chemicals, ozone and abrasion***

engineering specifications

maximum assembly length TLCT/WTLCT

1/2"	100'	1-1/2"	100'
5/8"*	100'	2"	100'
3/4"	100'	2-1/2"	60'
1"	100'	3"	60'
1-1/4"	100'	4"	30'

minimum overall length (OAL) of hose assemblies with anti-kink casing – TLCT

1/2" and 5/8" size – 24" OAL
3/4" and 1" sizes – 36" OAL
1-1/2" size – 36" OAL**
2" size – 48" OAL**
3" and 4" sizes – consult factory

minimum length of Flare-Thru flange x flange assemblies – TLCT Series

Nom. Hose Size	OAL
3/4"	11"
1"	11"
1-1/2"	11"
2"	12"

temperature rating

- -40°F to +350°F
- -40°C to +177°C

** Special order; consult factory.*
*** With same size sanitary clamped ends shorter lengths are possible; consult factory.*

details

color

- Green or white standard (white cover designated WTLCT)
- TLCT covers can be color-coded to identify specific process lines or trace departments
- Special colors available with minimum order quantities (see page 80)

construction

- *Inner Tube:* Chemfluor® FEP
- *Cover:* EPDM rubber
- *Reinforcement:*
  - Multiple polyester plycord and EPDM rubber
  - Double helix, high tensile strength carbon steel wire

fittings

- Over 40 styles of stocked PermaSeal® crimp-style fittings
  - A wide range of materials available
  - Standard: 316L stainless steel (wetted surfaces)
- Flare-Thru fitting technology available
  - 150# swivel style flanges
  - Female cam and groove (swivel style, 316 stainless steel body)
  - Sanitary clamp Flare-Thru not available (see W.S.I.B., page 12)
  - Up to 2" only

TLCT/WTLCT/SFTL Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Working Pressure		Burst Pressure		Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
8TLCT	1/2	12.7	0.95	24.1	500	3.45	2,000	13.78	3.0	76	29.9	760	0.35	0.52
12TLCT	3/4	19.1	1.27	32.2	500	3.45	2,000	13.78	4.5	114	29.9	760	0.62	0.92
16TLCT	1	25.4	1.52	38.6	450	3.10	1,800	12.41	6.0	152	29.9	760	0.75	1.12
20TLCT	1-1/4	31.8	1.75	44.5	320	2.21	1,400	9.65	9.0	228	29.9	760	0.98	1.46
24TLCT	1-1/2	38.1	2.15	54.6	300	2.07	1,200	8.27	11.0	279	29.9	760	1.20	1.79
32TLCT	2	50.8	2.66	67.6	250	1.72	1,000	6.89	13.5	342	29.9	760	1.50	2.24
40TLCT	2-1/2	63.5	3.15	80.0	200	1.38	800	5.51	20.0	508	29.9	760	2.35	3.50
48TLCT	3	76.2	3.67	93.2	150	1.03	600	4.13	22.0	558	29.9	760	2.50	3.73
64TLCT	4	101.6	4.71	119.6	150	1.03	600	4.13	40.0	1016	29.9	760	3.60	5.36

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given @ 70°F; Decrease working pressure 1% for every 2°F above 212°F.

Vacuum Rating is given @ 70°F; Decrease vacuum rating 1% for every 2°F above 212°F. For 1-1/4" and larger sizes, vacuum rating decreases when installed less than 2X min. bend radius.

Flare-Thru fittings are pressure rated only. Not rated for vacuum service.

Extended Service Life Tip: Saint-Gobain suggests using full-length anti-kink armor casing or at least 16" to 24" long anti-kink cuffs (see Hose Cover Options, pages 79–80) at each fitting end to help reduce the strain on the crimp collar and fittings in high load installations. Prolonged service at elevated temperatures will reduce total service life.

WTLCTPFA Series

Chemfluor® Unpigmented PFA Fluoropolymer Smooth Inner Tube EPDM Rubber Cover

applications

- Semiconductor component processing
- Semiconductor wafer carriers
- Semiconductor piping systems

common media

- HCL
- HF
- H_2SO_4
- Sodium hydroxide
- Peroxide

industry approvals & compliances

- **US Pharmacopeia Class VI**

features & benefits

- ***Reduced extractables***
  - ***Lower levels of extractable fluoride ions reduce silicone wafer corrosion***
- ***Superior chemical and heat resistance***
- ***Wide temperature range***
- ***Durable, kink resistant, with no external wire reinforcement to potentially fray***
- ***Easy to clean non-stick smooth tube for assured sterility***
- ***Can be cleaned with steam, caustics, solvents or other cleaning agents***

details

colors

- White with gray layline

construction

- *Inner Tube:* Unpigmented Chemfluor® PFA
- *Cover:* EPDM rubber
- *Reinforcement:*
  - Multiple polyester plycord and EPDM rubber
  - Dual helix, high tensile strength steel wire

fittings

- Over 40 styles of stocked PermaSeal® crimp-style fittings
  - A wide range of materials available
  - Standard: 316L stainless steel (wetted surfaces)
- Flare-Thru fitting technology available
  - 150# swivel style flanges
  - Female cam and groove (swivel style, 316 stainless steel body)
  - Sanitary clamp Flare-Thru not available (see W.S.I.B., page 12)

WTLCTPFA

engineering specifications

maximum length

3/4"	100'
1"	100'
1-1/2"	100'
2"	100'

temperature rating

- -40°F to +350°F
- -40°C to +177°C

minimum overall length of hose assemblies with anti-kink casing

3/4" and 1" sizes – 36" OAL

1-1/2" size – 36" OAL*

2" size – 48" OAL*

**With same size sanitary clamped ends shorter lengths are possible; consult factory.*

WTLCTPFA Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
12WTLCTPFA	3/4	19.1	1.27	31.8	500	3.45	2,000	13.78	4.5	114	29.9	760	0.62	0.92
16WTLCTPFA	1	25.4	1.52	38.1	450	3.10	1,800	12.41	6.0	152	29.9	760	0.75	1.12
24WTLCTPFA	1-1/2	38.1	2.15	52.1	300	2.07	1,200	8.27	11.0	279	29.9	760	1.20	1.79
32WTLCTPFA	2	50.8	2.66	67.3	250	1.72	1,000	6.89	13.5	342	29.9	760	1.50	2.24

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given @ 70°F; Decrease working pressure 1% for every 2°F above 350°F.

Vacuum Rating is given @ 70°F; Decrease vacuum rating 1% for every 2°F above 212°F.

W.S.I.B. Series Hose Assemblies

Chemfluor® FEP Fluoropolymer Smooth Inner Tube
EPDM Rubber Cover • Sanitary Tube Size I.D.

applications

- Pharmaceutical processing
- Chemical transfer
- Acid transfer
- Sensitive product transfer
- Load cells
- Storage vessels

common media

- Ultra-pure water (DI)
- Caustic solutions

industry approvals & compliances

- **FDA approved per 21CFR177.1550**
- **US Pharmacopeia Class VI**
- **3-A Sanitary Standard 62-01**

W.S.I.B

features & benefits

- ***Flexible face-to-face Chemfluor®-lined hose assembly***
- ***Inert and chemically resistant to most chemicals and reagents***
- ***S.I.B.® (Smooth Inner Bore) technology ensures crevice-free fluoropolymer contact surface***
  - ***Ensures smooth transition from stainless steel tubing through hose fitting***
  - ***Optimizes process transfer***
  - ***Full flow characteristics***
  - ***No entrapment***
  - ***Fully self-draining***
  - ***Reduced pressure drop through the fitting compared to crimp-style fitting systems***
- ***Cleanable by CIP, SIP***
- ***Resistant to chemicals, ozone and abrasion***

engineering specifications

minimum recommended assembly length

14WSIB	12"
22WSIB	15"
30WSIB	18"
46WSIB	24"

maximum assembly length

20' OAL

temperature rating

- -40°F to +350°F
- -40°C to +177°C

minimum manufacturing assembly length*

14WSIB	12"
22WSIB	12"
30WSIB	12"
46WSIB	15"

⚠ Important:

* While these short lengths can be manufactured, little "free hose" is included in the assembly and almost no flexibility is present.

details

colors

- White cover with gray layline

construction

- *Inner Tube:* Chemfluor® FEP
  - Tube ID matches stainless steel sanitary tubing
- *Cover:* EPDM rubber
- *Reinforcement:*
  - Multiple polyester plycord and EPDM rubber
  - Dual helix, high tensile strength steel wire

fittings

- Flare-Thru Fitting technology available
  - Clamp style (sanitary only)
  - 316L stainless steel sanitary back-up ends, Flare-Thru Chemfluor® FEP fluoropolymer liner
  - Male and female "I" Line® sanitary fittings also available

⚠ Important:

- W.S.I.B. hose assemblies are not rated for vacuum process conditions.
- Solid PTFE clamp style gaskets must be used with W.S.I.B. assemblies to ensure leak-tight performance.
- W.S.I.B. sold as assembly only.
- Consult factory for additional sizes and cover color options.

W.S.I.B. Series hose specifications (smooth inner bore)

Part Number	Nominal Inside Diameter		Actual Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Bend Radius	
	in.	mm.	in.	mm.	PSI	MPa	PSI	MPa	in.	mm.
14WSIB	7/8	22.1	7/8	22.1	1.50	38.10	450	3.10	4.75	120.65
22WSIB	1-3/8	34.5	1-3/8	34.3	2.10	53.34	300	2.07	9.00	228.60
30WSIB	1-7/8	47.5	1-7/8	47.5	2.63	66.80	250	1.72	11.50	292.10
46WSIB	2-7/8	72.9	2-7/8	72.9	3.70	93.98	150	1.03	22.00	558.80

TS/TB Series

Smooth Chemfluor® PTFE Fluoropolymer Smooth Inner Tube
304 Stainless Steel High Tensile Strength Braid

applications

- Sanitary transfer
- Steam transfer core
- Bottle filling
- Gas analysis
- Hydraulic lines
- Extrusion presses
- Molding/Adhesive conveying

common media

- Chemicals
- Steam
- Solvents
- Inks and dyes
- Paint
- Injectable materials
- Plastisols

industry approvals & compliances

- **FDA approved per 21CFR177.1550 (TS only)**
- **US Pharmacopeia Class VI**

features & benefits

- ***Greater wall thickness of Chemfluor® PTFE tube***
  - ***Up to 33% thicker than most competing products (tube wall .040 minimum)***
  - ***Superior kink resistance***
  - ***Improved vacuum ratings***
  - ***Better damage resistance***
- ***Neutral to taste, color and odor***
- ***Non-stick, non-contaminating***
- ***Cleans easily — steam, detergent or caustic***
- ***Can be autoclaved***
- ***Full ID sizes***
  - ***Greater flow rate per given size***
  - ***Less pressure drop through fitting area than hoses with tube size ID***

engineering specifications

average length

1/8"	50'
1/4"	125'
3/8"	75'
1/2"	125'
3/4"	40'
1"	30'
1-1/2"	30'

minimum overall length of hose assemblies with anti-kink casing

1/4" size – 18" OAL
3/8" and 1/2" sizes – 24" OAL

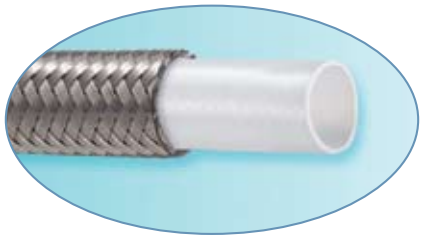
temperature rating

- -100°F to +450°F continuous; 500˚F intermittent
- -73˚C to +232˚C continuous; 260˚C intermittent

details

TS Series construction

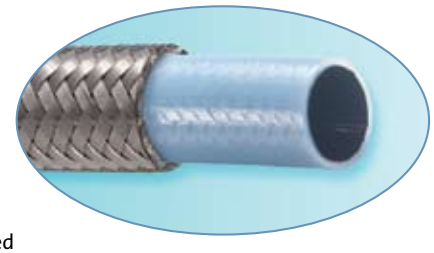
- *Inner Tube:* White Chemfluor® PTFE
- *Reinforcement:*
  - 304 stainless steel braid
  - 1-1/2" ID size double-braided for added kink resistance, higher pressure rating; working pressure based on minimum 4:1 safety factor; burst to suggested maximum working pressure



TS

TB Series construction

- *Inner Tube:* Black Chemfluor® PTFE
  - Electrostatic dissipating conductive version of TS Series
- *Reinforcement:*
  - 304 stainless steel braided
  - 1-1/2" ID size double-braid for added flexibility, higher pressure rating; working pressure based on minimum 4:1 safety factor; burst to suggested maximum working pressure



TB

fittings

- PermaSeal® crimp-style
  - Over 40 styles in a wide range of materials
  - Standard: 316L stainless steel (wetted surfaces)

TS/TB/TD/TDB Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
2TS	1/8	3.2	1/4	6.1	3,000	20.69	15,000	103.43	1.50	38.10	29.9	760	0.05	0.07
4TS/TB	1/4	6.4	3/8	9.7	3,000	20.69	13,500	93.08	2.50	63.50	29.9	760	0.08	0.12
6TS/TB	3/8	9.5	1/2	13.2	2,500	17.24	10,000	68.95	3.50	88.90	29.9	760	0.12	0.18
8TS/TB	1/2	12.4	5/8	16.8	2,000	13.79	8,500	58.61	4.00	101.60	29.9	760	0.15	0.22
12TS/TB	3/4	19.1	7/8	22.4	1,200	8.27	4,800	33.10	7.50	190.50	29.9	760	0.22	0.33
16TS/TB	1	25.4	1-1/8	29.5	800	5.51	3,200	22.06	12.00	304.60	20.0	508	0.31	0.46
24TD/TDB	1-1/2	38.1	1-3/4	44.2	900	6.21	4,000	27.58	15.00	381.00	15.0	381	0.44	0.66

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given @ 70°F; Decrease working pressure 1% for every 2°F above 350°F.

Vacuum Rating is given @ 70°F; Decrease vacuum rating 1% for every 2°F above 350°F. 1-1/2" size (TD, TDB) vacuum rating decreases when installed less than 2X min. bend radius.

Extended Service Life Tip: All 3/4", 1", and 1-1/2" TS/TB/TD/TDB assemblies 36" and longer are strongly recommended to use full-length anti-kink casing (see Hose Cover Options section, pages 79–80) to help prevent potential kinking and/or liner vacuum collapse.

TSS Series

Chemfluor® PTFE Fluoropolymer Smooth Inner Tube
Stainless Steel Braid • Silicone Cover

applications

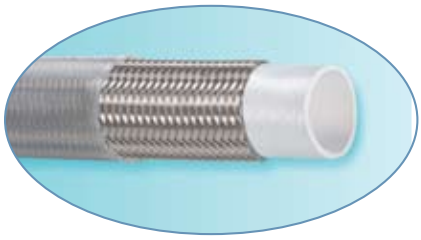
- Wash down hoses
- Transfer and equipment lines
- Filling equipment

common media

- Caustic solutions
- Ultra-pure water (DI)
- Clean steam (low pressure)
- Mascara/creams/lotions

industry approvals & compliances

- **FDA approved per 21CFR177.1550**
- **US Pharmacopeia Class VI**
- **3-A Sanitary Standard 62-01**



TSS

features & benefits

- ***Pure platinum-cured silicone outer cover extruded over TS Series hose***
- ***Permits easy cleaning***
- ***Ultra-smooth outer cover ensures no particle entrapment in stainless steel braids***
- ***Reduces braid fraying***
- ***Helps insulate exterior from "burn" potential***
- ***Single crimp collar locks in hose barb and seals off silicone cover; eliminates bulky secondary ring***
- ***Extruded cover is "locked" onto stainless steel braid, will not move when handled***
- ***Consult factory for special order TB Series (conductive) version with silicone cover***
- ***Can be autoclaved***

details

colors
- Natural silicone

construction
- *Inner Tube:* Chemfluor® white PTFE
- *Cover:* platinum-cured silicone
- *Reinforcement:* 304 stainless steel braid

fittings
- PermaSeal® crimp-style
  - Over 40 styles in a wide range of materials
  - Standard: 316L stainless steel (wetted surfaces)

engineering specifications

average length

1/4"	125'
3/8"	75'
1/2"	125'
3/4"	40'
1"	30'

temperature rating
- -80°F to +500°F for intermittent service
- -62°C to +260°C for intermittent service
- +450°F (+232°C) continuous service

TSS Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
4TSS	1/4	6.4	1/2	11.6	3,000	20.69	13,500	93.08	2.50	63.50	29.9	760	0.12	0.18
6TSS	3/8	9.5	9/16	15.2	2,500	17.24	10,000	68.95	3.50	88.90	29.9	760	0.18	0.27
8TSS	1/2	12.7	3/4	19.2	2,000	13.79	8,500	58.61	4.00	101.60	29.9	760	0.25	0.37
12TSS	3/4	19.1	1	25.0	1,200	8.27	4,800	33.10	7.50	190.50	29.9	760	0.30	0.45
16TSS	1	25.4	1-1/4	31.6	800	5.52	3,200	22.06	12.00	304.80	29.9	760	0.40	0.60

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given @ 70°F; Decrease working pressure 1% for every 2°F above 350°F.

Vacuum Rating is given @ 70°F; Decrease vacuum rating 1% for every 2°F above 350°F.
1" size vacuum rating decreases when installed less than 2 X min. bend radius.

TH Series

Chemfluor® PTFE Fluoropolymer Conductive Smooth Inner Tube
Densely Packed High Tensile 304 Stainless Steel Braid • High Pressure (5000 psi)

applications

- Ground support equipment
- Styrofoam manufacturing
- High pressure machinery
- Tube trailer loading/ unloading
- External aircraft starting
- Fluid transfer

common media

- Hydraulic fluid
- High pressure compressed gases

features & benefits

- ***Non-aging hose for high pressure hydraulic or pneumatic applications***
  - ***Pressure rated to 5000 psi regardless of ID size***
- ***Flexible***
- ***Chemical and moisture resistant***
- ***Low volumetric expansion***
- ***Minimizes pressure drop loss***
- ***Anti-kink stainless steel armor available (recommended)***
- ***Firesleeve also available (see page 79)***

engineering specifications

average length

1/4"	40'
3/8"	40'
1/2"	50'
5/8"	30'
3/4"	20'
1"	20'

temperature rating

- -65°F to +400°F
- -54°C to +204°C

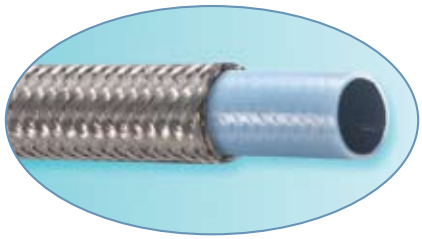
details

construction

- *Inner Tube:* Chemfluor® PTFE black electrostatic dissipating conductive
- *Reinforcement:* Densely packed high tensile 304 stainless steel wire braid
  - Reinforcement design varies by size

fittings

- PermaSeal® crimp-style
- Large selection of standard fittings
- Type 316 stainless steel
  - J.I.C. female swivel (Style 02)
  - Male NPT (Style 03)
  - Female NPT (Style 06)
  - J.I.C. adapter union male (Style 08)
  - O-Ring (Style 33)
- Note: Only those fittings that correspond in nominal size to the six sizes in the TH Series can be used



TH

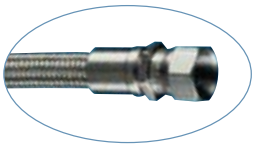
TH Series hose specifications

Part Number	Nominal Inside Diameter		Outside Diameter		Minimum Burst Pressure (room temp)		Minimum Burst Pressure 400°F (204°C)		Max. Operating Pressure (room temp)		Minimum Bend Radius		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
1704TH000	.212	6.4	3/8	9.5	16,000	110.32	12,000	82.74	5,000	34.48	1.50	38.10	0.11	0.16
1706TH000	.308	9.5	1/2	12.1	16,000	110.32	12,000	82.74	5,000	34.48	2.50	63.50	0.18	0.27
1708TH000	.402	12.7	9/16	15.2	16,000	110.32	12,000	82.74	5,000	34.48	2.88	73.15	0.24	0.36
1710TH000	.495	15.9	3/4	18.1	16,000	110.32	12,000	82.74	5,000	34.48	3.25	82.55	0.33	0.49
1712TH000	.618	19.1	1	24.6	16,000	110.32	12,000	82.74	5,000	34.48	4.00	101.60	0.66	0.98
1716TH000	.868	22.0	1-1/4	31.8	16,000	110.32	12,000	82.74	5,000	34.48	5.00	127.00	1.02	1.52

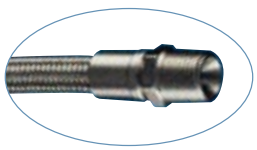
Important:

Burst pressure ratings at ambient 70°F (21°C).

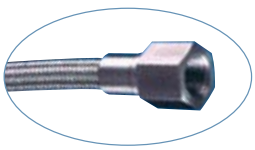
TH Series fitting options



J.I.C Female Swivel Style 02

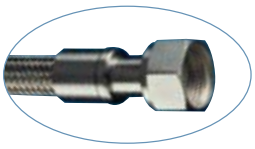


Male NPT Style 03



Female NPT Style 06

J.I.C. Adapter Union Male Style 08



O-Ring Style 33

MTL Series Hose Assemblies

Stainless Steel Braided Metal Hose

Chemfluor® FEP Fluoropolymer Smooth Inner Tube • Flare-Thru Fittings

applications

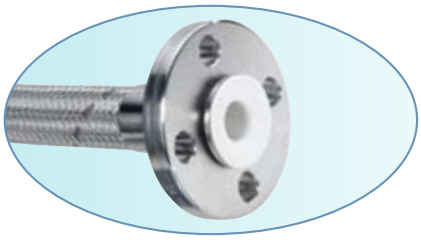
- Tank car and truck loading and unloading
- Weigh cells/tank isolation
- Pump connectors
- Food and beverage
- CIP lines

common media

- Sulfuric acid base chemicals
- Product chemicals
- Syrups/food products
- Caustic

industry approvals & compliances

- **3-A Sanitary Standard 62-01 (EPDM cover option only)**



MTL

features & benefits

- ***Excellent chemical resistance***
- ***High purity, non-contaminating***
- ***Non-stick surface provides maximum flow rate, minimizes potential contamination***
- ***Not subject to corrosion, pinholing or flex cracking***
- ***The most flexible smooth-tube fluoropolymer hose of its type***
- ***All stainless steel construction (except liner)***

engineering specifications

maximum length

1" - 4"	20' max.
6" - 8"	10' max.

temperature rating

- -65°F to +350°F
- -54°C to +177°C

vacuum rating

- 29.9 in. Hg@70°F

minimum length of Flare-Thru flange x flange assemblies

Nom. Hose Size	OAL
1"	11"
1-1/2"	11"
2"	12"
3"	12"
4"	12"
6"	14"
8"	14"

details

construction

- *Inner tube:* Chemfluor® FEP
- *Inner housing:* 304 stainless steel annular inner hose (standard)
  - 316L stainless steel inner hose available
- *Reinforcement:* 304 stainless steel outer braid
- *Vent holes:* 1/8" diameter vent holes
  - One per end (for permeation and leak detection)

cover option NEW!

- Custom EPDM cover (call factory for details)

fittings

- Flare-Thru fitting technology available
- Standard flanges: 150# epoxy-coated carbon steel lap-joint style
  - 300# flanges available for interface connection only
  - 304 and 316L stainless steel flanges available (optional)
- Female cam and groove (swivel style)
  - 316 stainless steel body
  - Chemfluor® PFA encapsulated gaskets installed in assembly (standard)
- 1", 1-1/2" and 2" sanitary clamp style available
- See page 36 for more on Flare-Thru fitting technology

MTL Series hose specifications

Part Number*	Nominal Size		Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F	
	in.	mm	in.	mm	in.	mm	PSI	MPa	in.	mm	in.	mm
16MTLXXXXSCT-"L"	1	25.4	7/8	21.8	1-3/8	34.3	275	1.90	10.00	254.00	29.9	760
24MTLXXXXSCT-"L"	1-1/2	38.1	1-3/8	35.6	2-1/8	53.3	275	1.90	12.00	304.80	29.9	760
32MTLXXXXSCT-"L"	2	50.8	1-3/4	45.7	2-1/2	64.8	275	1.90	18.00	457.20	29.9	760
48MTLXXXXSCT-"L"	3	76.2	2-3/4	71.1	4	102.9	275	1.90	28.00	711.20	29.9	760
64MTLXXXXSCT-"L"	4	101.6	3-3/4	96.5	5	127.0	250	1.72	42.00	1066.80	29.9	760
96MTLXXXXSCT-"L"	6	152.4	5-3/4	147.3	7-1/8	180.3	200	1.38	60.00	1524.00	22.0	559
128MTLXXXXSCT-"L"	8	203.2	7-3/8	198.1	9-3/8	237.5	185	1.28	84.00	2133.60	22.0	559

⚠ Important:

Replace XXXX with 1010 for sanitary clamp fitting (1", 1-1/2", and 2" only).
Replace XXXX with 1212 for 150# swivel flanges (1" to 8").
Replace XXXX with 1616 for female swivel cam and grooves (1" to 3" only)

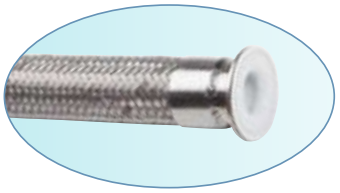
MTL Series Flare-Thru Fitting Styles

details

- For fitting length dimensions, see charts on pages 37-39
- For combination of Flare-Thru fitting styles on MTL Series hose assemblies, please consult factory
- Not all fitting combinations and sizes of hoses can be manufactured
- Crimp style fittings may be installed on certain size MTL hose assemblies for special interface to all-metal or solid plastic piping systems utilizing male or female pipe threads; consult factory for availability and delivery
- Minimum and maximum length of hose assemblies listed on preceding page

MTL Series: Sanitary Clamp Style Assemblies

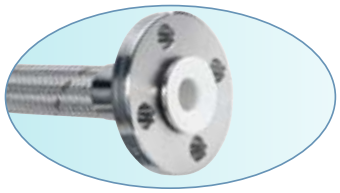
Part Number	Nominal Size		Inside Diameter		Outside Diameter		Working Pressure 70°F		Working Pressure 350°F		Minimum Bend Radius		Vacuum Hg @ 70°F	
	in.	mm	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm
16MTL1010S6FT -"L"	1	25.4	7/8	21.8	1-3/8	34.3	250	1.72	250	1.72	10.00	254.00	29.9	760
24MTL1010S6FT -"L"	1-1/2	38.1	1-3/8	35.6	2-1/8	53.3	250	1.72	250	1.72	12.00	304.80	29.9	760
32MTL1010S6FT -"L"	2	50.8	1-3/4	45.7	2-1/2	64.8	250	1.72	250	1.72	18.00	457.20	29.9	760



Sanitary Clamp Style

MTL Series: 150# Flanged Assemblies

Part Number	Nominal Size		Inside Diameter		Outside Diameter		Working Pressure 70°F		Working Pressure 350°F		Minimum Bend Radius		Vacuum Hg @ 70°F	
	in.	mm	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm
16MTL1212SCT -"L"	1	25.4	7/8	21.8	1-3/8	34.3	275	1.90	200	1.38	10.00	254.00	29.9	760
24MTL1212SCT -"L"	1-1/2	38.1	1-3/8	35.6	2-1/8	53.3	275	1.90	200	1.38	12.00	304.80	29.9	760
32MTL1212SCT -"L"	2	50.8	1-3/4	45.7	2-1/2	64.8	275	1.90	200	1.38	18.00	457.20	29.9	760
48MTL1212SCT -"L"	3	76.2	2-3/4	71.1	4	102.9	275	1.90	200	1.38	28.00	711.20	29.9	760
64MTL1212SCT -"L"	4	101.6	3-3/4	96.5	5	127.0	250	1.72	190	1.31	42.00	1,066.80	29.9	760
96MTL1212SCT -"L"	6	152.4	5-3/4	147.3	7-1/8	180.3	200	1.38	160	1.10	60.00	1,524.00	22.0	559
128MTL1212SCT -"L"	8	203.2	7-3/8	198.1	9-3/8	237.5	185	1.28	160	1.10	84.00	2,133.60	22.0	559



150# Flanged

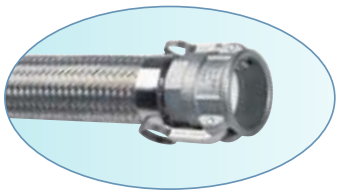
⚠ Important:

Codes for materials:
C = Epoxy coated carbon steel 150# flange.
4 = 304 stainless steel lap-joint flange 150# flange.
6 = 316 stainless steel lap-joint flange 150# flange.

MTL Series: Female Cam and Groove (Swivel) Assemblies

Part Number	Nominal Size		Inside Diameter		Outside Diameter		Working Pressure 70°F		Working Pressure 350°F		Minimum Bend Radius		Vacuum Hg @ 70°F	
	in.	mm	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm
16MTL1616S6FT -"L"	1	25.4	7/8	21.8	1-3/8	34.3	250	1.72	250	1.72	10.00	254.00	29.9	760
24MTL1616S6FT -"L"	1-1/2	38.1	1-3/8	35.6	2-1/8	53.3	250	1.72	250	1.72	12.00	304.80	29.9	760
32MTL1616S6FT -"L"	2	50.8	1-3/4	45.7	2-1/2	64.8	250	1.72	250	1.72	18.00	457.20	29.9	760
48MTL1616S6FT -"L"	3	76.2	2-3/4	71.1	4	102.9	150	1.03	150	1.03	28.00	711.20	29.9	760

Consult factory for these fittings



Female Cam and Groove (Swivel)

For more information on these fittings, see pages 37-39

MTLSJ Series Hose Assemblies

Stainless Steel Metal Hose • Stainless Steel Steam Jacketed Chemfluor® FEP Fluoropolymer Smooth Inner Tube • Flare-Thru Fittings

applications

- Chemical and pharmaceutical
- Heating/Cooling thermal transfer

common media

- Lipstick
- Gel coatings for tablets

features & benefits

- ***"Hose within a hose"***
  - ***Seal-welded secondary stainless steel metal hose encasing MTL Series hose***
- ***High-purity, non-contaminating Chemfluor® FEP fluoropolymer liner***
  - ***Ultra-pure, corrosion resistant***
- ***Flexible, easy to install***
- ***Flare-Thru fitting options provide easy connection with existing piping systems***
  - ***Eliminate entrapment***
  - ***Full flow, no restriction through fitting***
  - ***No pressure drop – same ID through hose and fitting***
- ***Type of inlet/outlet connections and location for heating/cooling media can be customized for your particular requirements***
  - ***Excellent heating/cooling thermal transfer***
  - ***Ideal for maintaining media temperature***

details

construction

- *Inner Tube:* Chemfluor® FEP
- *Inner housing:* 304 stainless steel annular inner hose (standard)
  - 316L stainless steel inner hose available
- *Reinforcement:* 304 stainless steel outer braid
- *Vent holes:* 1/8" diameter vent holes
  - One per end (for permeation and leak detection)
- *Outer jacket:* Seal-welded secondary stainless steel hose

fittings

- Three Flare-Thru fitting options:
  - Standard 150# flanges
  - Female cam and groove (swivel), 1" to 3"
  - Sanitary clamp style, 1", 1-1/2" and 2"

engineering specifications

maximum length
All sizes 20' max.

temperature rating
- -65°F to +350°F
- -54°C to +177°C

vacuum rating
- 29.9 in. Hg@70°F

⚠ Important:

- For combination of fitting styles on MTLSJ Series hoses, consult factory
- Special order construction to exacting customer requirements is standard
- All-stainless steel metal inner and outer jacketed hose without Chemfluor® liner is available for extremes in temperature beyond the MTLSJ rating

MTLSJ Series Flare-Thru Fitting Styles

details

- For fitting length dimensions, see charts on pages 37-39
- For combination of Flare-Thru fitting styles on MTLSJ Series hose assemblies, please consult factory
- Not all fitting combinations and sizes of hoses can be manufactured
- Minimum and maximum length of hose assemblies listed on page 16

MTLSJ Series: Sanitary Clamp Style Assemblies

Part Number	End Type (Flange)		Inner Nominal Size		Inner Hose I.D.		Inner Hose O.D.		Outer Nominal Size		Outer Hose I.D.		Outer Hose O.D.		Minimum Bend Radius	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
16MTLSJ1010S6T	1	25.4	1	25.4	7/8	21.8	1-3/8	34.3	2	50.8	2	50.3	2-1/2	64.8	12	304.8
24MTLSJ1010S6T	1-1/2	38.1	1-1/2	35.6	1-3/8	35.6	2-1/8	53.3	3	76.2	3	75.7	4-1/2	115.6	15	381.0
32MTLSJ1010S6T	2	50.8	2	50.8	1-9/16	40.6	2-1/2	64.8	4	101.6	4	101.1	5	127.0	20	508.0

Sanitary Clamp Style

MTLSJ Series: 150# Flanged Assemblies

Part Number	End Type (Flange)		Inner Nominal Size		Inner Hose I.D.		Inner Hose O.D.		Outer Nominal Size		Outer Hose I.D.		Outer Hose O.D.		Minimum Bend Radius	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
16MTLS1212SX6FT	1	25.4	1	25.4	7/8	21.8	1-3/8	34.3	2	50.8	2	50.3	2-1/2	64.8	12	304.8
24MTLS1212SX6FT	1-1/2	38.1	1-1/2	38.1	1-3/8	35.6	2-1/8	53.3	3	76.2	3	75.7	4-1/2	115.6	15	381.0
32MTLS1212SX6FT	2	50.8	2	50.8	1-9/16	40.6	2-1/2	64.8	4	101.6	4	101.1	5	127.0	20	508.0
48MTLS1212SX6FT	3	76.2	3	76.2	2-9/16	66.0	4	102.9	5	127.0	5	126.0	6-1/8	154.9	30	762.0

150# Flanged (Swivel)

⚠ Important:

Codes for materials:
C = Epoxy coated carbon steel 150# flange.
4 = 304 stainless steel lap-joint flange 150# flange.
6 = 316 stainless steel lap-joint flange 150# flange.

MTLSJ Series: Female Cam and Groove (Swivel) Assemblies

Part Number	End Type (Flange)		Inner Nominal Size		Inner Hose I.D.		Inner Hose O.D.		Outer Nominal Size		Outer Hose I.D.		Outer Hose O.D.		Minimum Bend Radius	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
16MTLSJ1616SFT	1	25.4	1	25.4	7/8	21.8	1-3/8	34.3	2	50.8	2	50.3	2-1/2	64.8	12	304.8
24MTLSJ1616SFT	1-1/2	38.1	1-1/2	38.1	1-3/8	35.6	2-1/8	53.3	3	76.2	3	75.7	4-1/2	115.6	15	381.0
32MTLSJ1616SFT	2	50.8	2	50.8	1-9/16	40.6	2-1/2	64.8	4	101.6	4	101.1	5	127.0	20	508.0
48MTLSJ1616SFT	3	76.2	3	76.2	2-9/16	66.0	4	102.9	5	127.0	5	126.0	6-1/8	154.9	30	762.0

Female Cam and Groove (Swivel)

TWOB/TBOB/TWOBHV/TBOBHV Series

Chemfluor® PTFE Fluoropolymer Helically Convoluted Inner Tube
Stainless Steel Braid • Open Pitch

applications

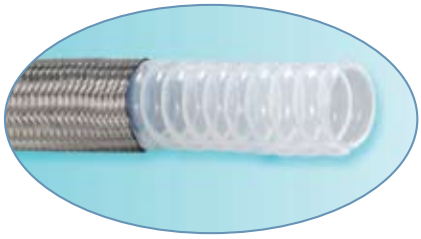
- Sanitary transfer
- Food, flavors and syrups
- Solvent transfer
- Drain and sample lines

common media

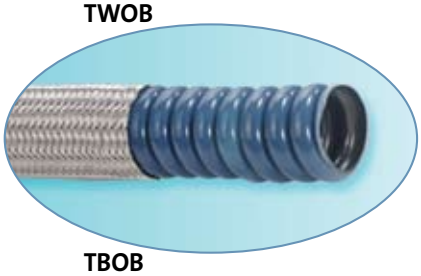
- Base chemicals
- Corn syrup
- Hexane (TBOB)
- Product transfer
- Caustic solutions

industry approvals & compliances

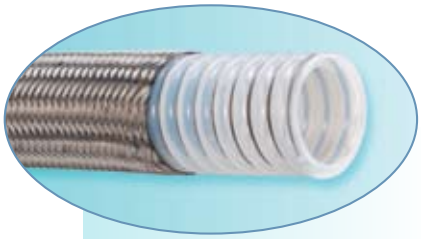
- **USDA**
- **FDA (TWOB only)**
- **US Pharmacopeia Class VI**



TWOB



TBOB



TWOBHV/TBOBHV

TWOBHV/TBOBHV Series

- Fully rated vacuum hose
- Recommended for full vacuum applications
- Should always be used for 2-1/2", 3" and 4" I.D. assemblies

features & benefits

Chemfluor® PTFE inner tube

- ***Excellent chemical resistance***
- ***Compatible with almost all materials***
- ***Rounded, open-pitch helical convolutions shaped to ensure smooth product flow***
- ***Non-stick surface, easy to clean (steam, caustics, solvents or other cleaning agents)***
- ***Assured sterility***
- ***Easy to flex, yet won't flatten when bent***

Chemfluor® black PTFE electrostatic dissipating conductive inner tube

- ***Co-extrusion design with minute amount of carbon added to inner portion of thick-wall construction***
- ***Processed to prevent chemical leaching or friction contamination***
- ***Chemfluor® PTFE properties are completely maintained***

engineering specifications

maximum length

1/2"	100'
3/4"	70'
1"	65'
1-1/4"	45'
1-1/2"	70'
2"	50'
2-1/2"	30'
3"	30'
4"	20'

temperature rating

- -100°F to +450°F
- -73°C to +232°C

details

construction

- *Inner Tube*
  - TWOB: Chemfluor® white PTFE
  - TBOB: Chemfluor® black PTFE electrostatic dissipating conductive
- *Reinforcement:* 316 stainless steel braid
  - Other braid options available:
  - Polypropylene – TWOY/TBOY, see page 21
  - PVDF (Kynar®) – TWOK/TBOK, see page 22

fittings

- PermaSeal® crimp-style
  - Over 40 styles
- Flare-Thru fitting technology available:
  - 150# lap-joint style flanged
  - Female cam and groove
  - Sanitary clamp style
  - 1/2" mini sanitary Flare-Thru available using 3/8" ID open pitch hose
- Fitting details begin on page 33

⚠ Important:

- Hose assemblies may be autoclaved; however, flare faces of Flare-Thru fittings must be clamped down to prevent damage to sealing surface

TWOB/TBOB/TWOBHV/TBOBHV Series hose specifications

Part Number*	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
8TWOB/TBOB	1/2	12.7	3/4	19.1	500	3.45	2,000	13.79	2.00	50.80	25.0	635	0.20	0.30
12TWOB/TBOB	3/4	19.1	1-1/8	28.6	425	2.93	1,700	11.72	2.75	69.85	25.0	635	0.30	0.45
16TWOB/TBOB	1	25.4	1-1/4	31.8	350	2.41	1,400	9.65	4.00	101.60	25.0	635	0.40	0.60
20TWOB/TBOB	1-1/4	31.8	1-5/8	41.3	337	2.32	1,350	9.31	5.50	139.70	25.0	635	0.70	1.04
24TWOB/TBOB/HV	1-1/2	38.1	2	50.8	275	1.90	1,100	7.58	7.00	177.80	29.9	760	0.75	1.12
32TWOB/TBOB/HV	2	50.8	2-1/2	63.5	250	1.72	1,000	6.90	8.50	215.90	29.9	760	1.05	1.56
40TWOB/TBOB/HV	2-1/2	63.5	3-1/8	79.4	212	1.46	850	5.86	13.00	330.20	29.9	760	1.35	2.01
48TWOB/TBOB/HV	3	76.2	3-7/8	98.4	175	1.21	700	4.83	14.00	355.60	29.9	760	1.75	2.61
64TWOB/TBOB/HV	4	101.6	5	127.0	150	1.03	600	4.14	16.00	406.40	29.9	760	2.10	3.13

⚠ Important: *Add HV to indicate Vacuum Rated Series

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given @ 70°F; decrease working pressure 1% for every 2°F above 250°F.

Vacuum Rating is given @ 70°F @ 2X minimum bend radius; decrease vacuum rating 1% for every 2°F above 250°F. Vacuum rating decreases when installed @ less than 2X minimum bend radius. TWOBHV/TBOBHV Series (heavy duty vacuum option) allows full vacuum ratings for 1-1/2", 2" and 2-1/2" sizes up to 350°F; decrease vacuum rating 1% for every 2°F above 350°F. Vacuum rating @ less than 2x minimum bend radius: 1-1/4" = 26" Hg; 1-1/2" = 25" Hg; 2" = 20" Hg; 2-1/2" = 17" Hg; 3" = 20" Hg; 4" = 17" Hg.

Extended Service Life Tip: Saint-Gobain suggests using full-length anti-kink armor casing or at least 16" to 24" long anti-kink cuffs (see Hose Cover Options, pages 79-80) at each fitting end to help reduce the strain on the crimp collar and fittings in high load installations. Prolonged service at elevated temperatures will reduce total service life.

TWOY/TBOY Series

Chemfluor® PTFE Fluoropolymer Helically Convoluted Inner Tube Polypropylene Braid • Open Pitch

applications

- Sanitary transfer
- Food, flavors and syrups
- Solvent transfer
- Drain and sample lines
- Semi-transparent sight gauges
- Corrosive environments

common media

- Base chemicals
- Corn syrup
- Hexane (TBOY)
- Product transfer
- Caustic solutions

industry approvals & compliances

- **USDA**
- **FDA (TWOY only)**
- **US Pharmacopeia Class VI**

features & benefits

Chemfluor® PTFE inner tubes (see page 20)

Polypropylene braid

- ***Ultraviolet stabilized***
- ***Offers good chemical resistance against many types of acids***
- ***Resists abrasion better than stainless steel reinforcements***
- ***Lightweight, with minimum force to bend***
  - ***Easy to transport, connect and disconnect***
  - ***Less strain on adjoining equipment/scales***
- ***Braid fraying minimized, reducing risk of hand injuries from wire braid punctures***
- ***Does not conduct internal heat as readily as stainless steel braided hoses***
- ***Burn potential from incidental contact greatly reduced***

engineering specifications

maximum length

3/4"	70'
1"	65'
1-1/4"	45'
1-1/2"	70'
2"	50'
2-1/2"	30'
3"	30'
4"	20'

temperature rating

- -40°F to +250°F
- -40°C to +121°C

details

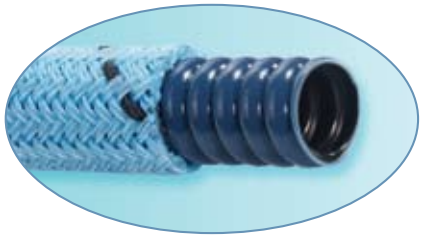
construction

- *Inner Tube:*
  - TWOY: Chemfluor® white PTFE
  - TBOY: Chemfluor® black PTFE electrostatic dissipating conductive
- *Reinforcement:*
  - Polypropylene braid
  - Each strand of large diameter (denier) polypropylene monofilament is twisted and subsequently twined prior to braiding
  - Tested for maximum abrasion and chemical resistance
  - Tightly woven braid offers excellent abrasion resistance

fittings

- PermaSeal® crimp-style
  - Over 40 styles of 316L stainless steel conventional fitting designs
- Flare-Thru fitting technology available:
  - 150# epoxy-coated carbon steel lap-joint style flanged (standard)
  - 304 and 316 stainless steel flanges available (optional)
  - Female cam and groove (swivel style); 316 stainless steel body
  - Sanitary clamp style
- Fitting details begin on page 33

TWOY



TBOY

TWOY/TBOY Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
12TWOY/TBOY	3/4	19.1	1-3/8	33.0	250	1.72	1,000	6.90	2.75	69.85	29.9	760	0.23	0.34
16TWOY/TBOY	1	25.4	1-1/2	36.8	250	1.72	1,000	6.90	4.00	101.60	29.9	760	0.30	0.45
20TWOY/TBOY	1-1/4	31.8	1-7/8	45.7	200	1.38	800	5.52	4.50	114.30	29.9	760	0.50	0.75
24TWOY/TBOY	1-1/2	38.1	2-1/8	54.6	200	1.38	800	5.52	5.00	127.00	29.9	760	0.55	0.82
32TWOY/TBOY	2	50.8	2-5/8	67.3	150	1.03	600	4.14	6.00	152.40	29.9	760	0.80	1.19
40TWOY/TBOY	2-1/2	63.5	3-3/8	85.9	120	0.83	480	3.31	12.00	304.80	29.9	760	1.00	1.49
48TWOY/TBOY	3	76.2	4	101.6	100	0.69	400	2.76	13.00	330.20	29.9	760	1.35	2.01
64TWOY/TBOY	4	101.6	CF*	CF*	CF*	CF*	CF*	CF*	CF*	CF*	29.9	760	CF*	CF*

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given at room temperature. Decrease working pressure to 40 psig all sizes above 175°F.

Vacuum Rating all sizes: 29.9" Hg @ 70°F. Decrease working pressure rating 1% for every 2°F above 150°F. 1-1/4" rated @ 26" Hg; 1-1/2" rated @ 24" Hg; 2" rated @ 20" Hg when installed less than 2x minimum bend radius.

*CF – consult factory

TWOK/TBOK Series

Chemfluor® PTFE Helically Convoluted Inner Tube
PVDF (Kynar®) Braid • Open Pitch

applications

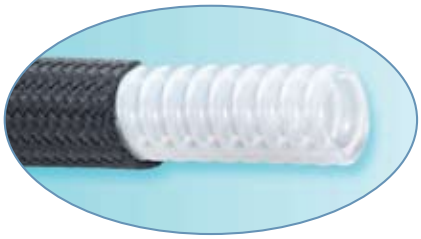
- Sanitary transfer
- Food, flavors and syrups
- Solvent transfer
- Drain and sample lines
- Semi-transparent sight gauges
- Corrosive environments (external)
- Liquid chlorine and bromine transfer
- Chlorinated fluid and gas transfer

common media

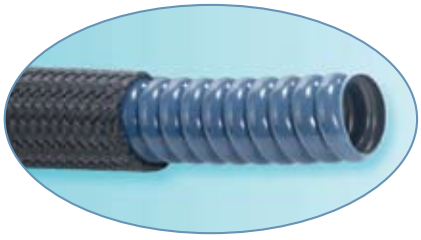
- Base chemicals
- Corn syrup
- Hexane (TBOK)
- Product transfer
- Caustic solutions
- Liquid chlorine
- Bromine

industry approvals & compliances

- **USDA**
- **FDA (TWOK only)**
- **US Pharmacopeia Class VI**



TWOK



TBOK

features & benefits

Chemfluor® PTFE inner tube (see page 20)

PVDF (Kynar®) braid

- ***For severe applications in hostile environments where external corrosion from the presence of strong acids will attack standard stainless steel braid***
- ***Ultraviolet stabilized***

engineering specifications

maximum length

3/4"	70'
1"	65'
1-1/2"	70'
2"	50'
3"	30'

temperature rating

- -40°F to +275°F
- -40°C to +135°C

details

construction

- *Inner Tube:*
  - TWOK: Chemfluor® white PTFE
  - TBOK: Chemfluor® black PTFE electrostatic dissipating conductive
- *Reinforcement:*
  - Heavy duty PVDF monofilament

fittings

- PermaSeal® crimp-style
  - Over 40 styles of 316L stainless steel conventional fitting designs
- Flare-Thru fitting technology available:
  - 150# epoxy-coated carbon steel lap-joint style flanged (standard)
  - 304 and 316 stainless steel flanges available (optional)
  - Female cam and groove (swivel style); 316 stainless steel body
  - Sanitary clamp
- Fitting details begin on page 33

TWOK/TBOK Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
12TWOK/TBOK	3/4	19.1	1-1/8	29.2	200	1.38	800	5.52	3.00	76.20	29.9	760	0.25	0.37
16TWOK/TBOK	1	25.4	1-3/8	35.6	200	1.38	800	5.52	4.00	101.60	29.9	760	0.35	0.52
24TWOK/TBOK	1-1/2	38.1	2-1/8	53.3	175	1.21	700	4.83	5.00	127.00	29.9	760	0.65	0.97
32TWOK/TBOK	2	50.8	2-9/16	66.0	150	1.03	600	4.14	6.00	152.40	29.9	760	0.90	1.34
48TWOK/TBOK	3	76.2	3-7/8	99.1	100	0.69	400	2.76	12.00	304.80	29.9	760	1.50	2.24

Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Working Pressure is given at room temperature. Decrease working pressure to 50 psig all sizes above 175°F.

Vacuum Rating all sizes: 29.9" Hg @ 70°F. Decrease working pressure rating 1% for every 2°F above 175°F. 1-1/2" rated @ 24" Hg; 2" rated @ 20" Hg when installed less than 2X minimum bend radius.

TWOP/TBOP Series

Chemfluor® PTFE Fluoropolymer Helically Convoluted Inner Tube
Unbraided • Open Pitch

applications

- Sanitary transfer
- Food, flavors and syrups
- Solvent transfer
- Drain and sample lines
- Semi-transparent sight gauges
- Ideal for drain lines

common media

- Base chemicals
- Corn syrup
- Product transfer
- Caustic solutions

industry approvals & compliances

- **USDA**
- **FDA (TWOP only)**
- **US Pharmacopeia Class VI**

features & benefits

- ***Can be clamped to sanitary tubing or pipe***
  - ***Specify at time of order entry***
- ***Cuff lengths can be varied to meet customer requirements***
- ***Can be supplied with permanently attached Flexible Components fittings***
- ***Extremely flexible***
- ***Kink resistant***
- ***See page 20 for more on features and benefits of Chemfluor® PTFE tubes***

engineering specifications

maximum length	
1/4"	100'
3/8"	100'
1/2"	100'
3/4"	70'
1"	65'
1-1/2"	70'
2"	50'
2-1/2"	30'
3"	30'
4"	20'

temperature rating

- -100°F to +450°F
- -73°C to +232°C

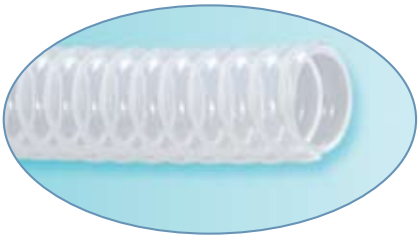
details

construction

- TWOP: Chemfluor® white PTFE hose
- TBOP: Chemfluor® black PTFE electrostatic dissipating conductive hose

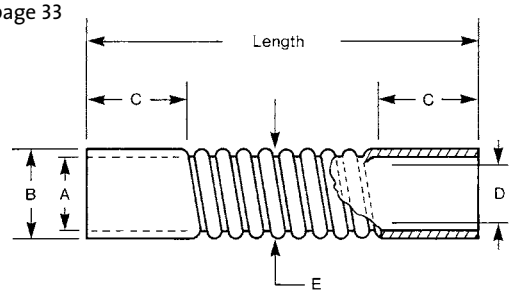
fittings

- PermaSeal® crimp-style
  - Over 40 styles of 316L stainless steel conventional fitting designs
  - Consult factory for optional fitting materials—PVDF (Kynar®), polypropylene, special alloys and carbon steel
- Flare-Thru fitting technology available:
  - Available for hose sizes 3/4" to 4"
  - 150# lap-joint style flanged
  - Female cam and groove (swivel style, 316 stainless steel body)
  - Sanitary clamp
  - Sanitary "I" line male and female
- Fitting details begin on page 33



TWOP

TBOP



TWOP/TBOP Series hose specifications

Part Number	Inside Diameter		Operating Pressure		Minimum Bend Radius		A Cuff I.D.		B Cuff O.D.		D Internal Diameter		E Convolution O.D.		C Standard Cuff Length	
	in.	mm	PSI	MPa	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
4TWOP/TBOP	1/4	6.4	65	0.45	0.75	19.05	0.25	6.35	0.31	7.87	0.24	5.97	0.43	10.80	0.75	19.05
6TWOP/TBOP	3/8	9.5	50	0.34	1.00	25.40	0.38	9.53	0.44	11.05	0.36	9.14	0.55	13.97	0.75	19.05
8TWOP/TBOP	1/2	12.7	50	0.34	2.00	50.80	0.50	12.70	0.57	14.48	0.48	12.07	0.69	17.53	1.00	25.40
12TWOP/TBOP	3/4	19.1	50	0.34	2.75	69.85	0.75	19.05	0.84	21.34	0.72	18.29	1.03	26.04	1.00	25.40
16TWOP/TBOP	1	25.4	50	0.34	4.00	101.60	1.00	25.40	1.10	27.94	0.91	23.11	1.22	30.86	1.50	38.10
24TWOP/TBOP	1-1/2	38.1	40	0.28	6.00	152.40	1.50	38.10	1.63	41.28	1.41	35.81	1.87	47.50	2.00	50.80
32TWOP/TBOP	2	50.8	30	0.21	7.50	190.50	2.00	50.80	2.13	53.98	1.90	48.26	2.43	61.72	2.00	50.80
40TWOP/TBOP	2-1/2	63.5	20	0.14	8.00	203.20	2.38	60.33	2.50	63.50	2.50	63.50	3.60	91.44	2.00	50.80
48TWOP/TBOP	3	76.2	15	0.10	9.00	228.60	2.55	64.77	2.70	68.58	3.00	76.20	3.70	93.98	3.00	76.20
64TWOP/TBOP	4	101.6	10	0.07	10.00	254.00	3.45	87.63	3.68	93.35	4.00	101.60	4.68	118.75	3.00	76.20

Important:
2:1 burst/pressure rating

WCS/BCS Series

Chemfluor® PTFE Fluoropolymer Helically Convoluted Inner Tube
High Tensile 304 Stainless Steel Braid • Low Profile

applications

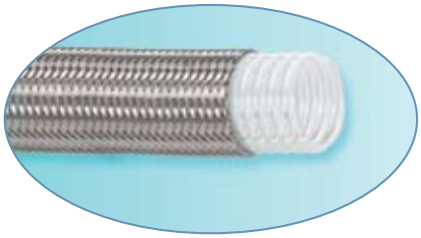
- Chemical transfer
- Steam (tire press) transfer
- Solvent transfer
- Acid lines
- Adhesive transfer
- CIP lines
- Food and beverage transfer

common media

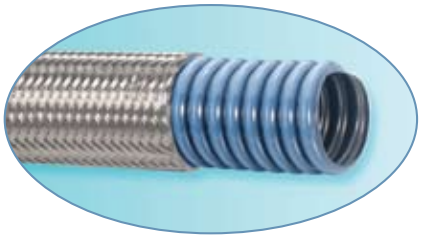
- Sulfuric acid
- High pressure steam
- Hexane/lacquer (BCS)
- Hydrofluoric
- Silicone/hot glues
- Caustic solutions
- Syrups/flavors

industry approvals & compliances

- **FDA (WCS only)**
- **U.S. Pharmacopeia Class VI**
- **Complies with MIL-H-27267 (BCS)**



WCS



BCS

features & benefits

Chemfluor® PTFE fluoropolymer inner tube

- ***Superior flexibility and vacuum resistance***
- ***Convoluted inner tubes are low profile and helical formed to promote drainage***
- ***Neutral to taste***
- ***Does not absorb color or odor***
- ***Non-stick, non-contaminating***
- ***Easy to clean (SIP, CIP, autoclavable)***

engineering specifications

maximum length

3/8"	100'
1/2"	125'
5/8"	125'
3/4"	100'
1"	150'
1-1/4"	100'
1-1/2"	100'
2"	75'

minimum overall length of hose assemblies with anti-kink casing

3/8" - 1/2" size – 24" OAL
5/8" - 3/4" size – 36" OAL*
1" size – 36" OAL
1-1/2" size – 36" OAL**
2" size – 48" OAL**

* *with mini sanitary fitting, shorter lengths are possible*
** *with same size sanitary clamped ends, shorter lengths are possible; consult factory*

⚠ Important:

Maximum length may vary. Length supplied will be based on full coil length in stock ± 25% of the order length.

temperature rating

WCS:

- -65°F to +450°F
- -54°C to +232°C

BCS:

- -100°F to +450°F
- -73°C to +232°C

details

construction

- *Inner Tube:*
  - WCS: Chemfluor® PTFE fluoropolymer
  - BCS: Chemfluor® PTFE black fluoropolymer electrostatic dissipating conductive
- *Reinforcement:*
  - 304 stainless steel braid
  - High tensile strength

fittings

- PermaSeal® crimp-style
  - Over 40 styles of 316L stainless steel conventional fitting designs
  - 316L stainless steel is standard
  - Wide range of other materials available
- Carbon steel:
  - J.I.C. (female)
  - Male NPT
  - Crimp collars (1/2" to 2")
  - Consult factory for fitting dimensions
- Fitting details begin on page 33

hose cover options

- See pages 79–80

WCS/BCS Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
2706WCS/BCS	3/8	9.5	5/8	15.5	2,200	15.17	8,800	60.68	1.75	44.45	29.9	760	0.15	0.22
2708WCS/BCS	1/2	12.7	3/4	19.1	1,750	12.07	7,000	48.27	1.75	44.45	29.9	760	0.19	0.28
2710WCS	5/8	15.9	1	25.4	1,750	12.07	7,000	48.27	2.00	50.80	29.9	760	0.22	0.33
2712WCS/BCS	3/4	19.1	1-1/8	28.6	1,375	9.48	5,500	37.92	2.25	57.15	29.9	760	0.30	0.45
2716WCS/BCS	1	25.4	1-3/8	33.4	1,000	6.90	4,300	29.65	2.75	69.85	29.9	760	0.40	0.60
2720WCS/BCS	1-1/4	31.8	1-5/8	40.6	750	5.17	3,200	22.06	3.50	88.90	29.9	760	0.50	0.75
2724WCS/BCS	1-1/2	38.1	2-1/8	53.2	650	4.48	2,600	17.93	3.75	95.25	29.9	760	0.63	0.94
2732WCS/BCS	2	50.8	2-1/2	63.5	600	4.14	2,400	16.55	6.50	165.10	5.0	12.7	0.89	1.33

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

For styles above 2" ID, refer to page 20 for info on TWOB/TBOB Series hose.

Vacuum Rating @ minimum bend radius (72°F): all sizes up to and including 1-1/2" rated @ 29.9" Hg; 2" rated @ 5.0 Hg.

Data given is for straight hose installation.

WCSS Series

Chemfluor® PTFE Fluoropolymer Helically Convoluted Inner Tube Platinum-Cured Silicone Cover • Stainless Steel Braid • Low Profile

applications

- Wash down hoses
- Transfer lines
- Equipment lines
- Filling equipment

common media

- Caustic solutions
- Ultra pure water (DI)
- Clean steam (low pressure)
- Mascara/creams/lotions

industry approvals & compliances

- **FDA**
- **U.S. Pharmacopeia Class VI**

features & benefits

Chemfluor® PTFE fluoropolymer inner tube (see page 24)

Silicone cover

- ***Durable, extremely flexible, ultra pure platinum-cured silicone***
- ***Extruded directly over WCS Series hose***
- ***Extremely smooth for easy cleaning and assured sterility***
- ***No place for bacteria to accumulate***
- ***Hose assemblies may be autoclaved or SIP cleaned***
- ***Cover is locked to stainless steel braid reinforcement so that hose and cover flex as one unit, with no bulges or creases; tear resistance also improved due to right fit***
- ***Braid fraying minimized, reducing risk of hand injuries from wire braid punctures***
- ***Enhanced thermal insulating properties***
- ***Burn potential from accidental contact greatly reduced***

engineering specifications

maximum length

3/8"	100'
1/2"	125'
3/4"	100'
1"	150'

temperature rating

- -65°F to +450°F
- -54°C to +232°C

⚠ Important:

Maximum length may vary. Length supplied will be based on full coil length in stock ±25% of the order length.

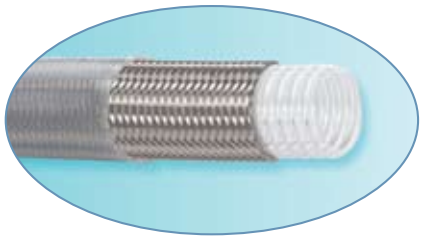
details

construction

- *Inner Tube:*
  - WCSS: Chemfluor® PTFE fluoropolymer inner tube
- *Cover:* Platinum-cured silicone
- *Reinforcement:*
  - 304 stainless steel braid
  - High tensile strength

fittings

- PermaSeal® crimp-style
  - Over 40 styles in a wide range of materials
  - Standard: 316L stainless steel
  - Single stainless steel crimp collar design locks in hose fitting and seals off silicone cover, which prevents cleaning media from seeping under cover
  - This design eliminates the need for a secondary crimp collar or plastic heat shrink tubing
  - Also assures hose pressure rating to rated operating pressure
- Fitting details begin on page 33



WCSS

WCSS Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg @ 70°F		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
2706 WCSS	3/8	9.7	5/8	16.8	2,200	15.17	8,800	60.68	1.75	44.45	29.9	760	0.15	0.22
2708 WCSS	1/2	12.7	7/8	20.3	1,750	12.07	7,000	48.27	1.75	44.45	29.9	760	0.19	0.28
2712 WCSS	3/4	19.1	1-1/8	28.5	1,375	9.48	5,500	37.92	2.25	57.15	29.9	760	0.30	0.45
2716 WCSS	1	25.4	1-3/8	34.5	1,000	6.90	4,300	29.65	2.75	69.85	29.9	760	0.40	0.60

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C).

Vacuum Rating @ minimum bend radius (72°F).

Consult factory on sizes 1-1/4" through 2" and for anti-static BCS Series with silicone cover.

WCP/BCP Series

Chemfluor® PTFE Fluoropolymer Helically Convoluted Inner Tube Polypropylene Braid • Low Profile

applications

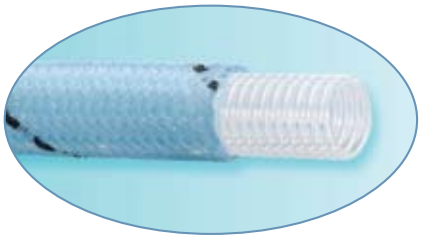
- Chemical transfer
- Solvent transfer
- Acid lines
- CIP lines
- Food and beverage

common media

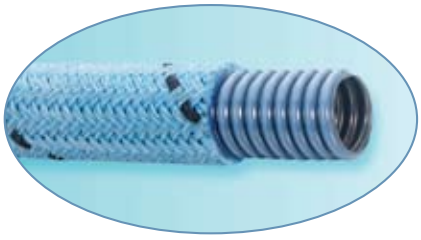
- Sulfuric acid
- Hexane/lacquer (BCP)
- Hydrofluoric
- Caustic solutions
- Hot water cleaning

industry approvals & compliances

- **USDA**
- **FDA (WCP only)**
- **U.S. Pharmacopeia Class VI**



WCP



BCP

features & benefits

Chemfluor® PTFE fluoropolymer inner tube (see page 24)

Polypropylene braid

- ***Ultraviolet (UV) stabilized***
- ***Lightweight***
- ***Does not conduct internal heat as readily as stainless steel braided hoses***
- ***Burn potential from accidental contact greatly reduced***

engineering specifications

maximum length

WCP:

1/2"	100'
3/4"	100'
1"	100'

BCP:

1/2"	100'
3/4"	100'
1"	100'

temperature rating

- -40°F to +250°F
- -40°C to +121°C

details

construction

- *Inner Tube:*
  - WCP: Chemfluor® natural PTFE fluoropolymer
  - BCP: Chemfluor® PTFE fluoropolymer electrostatic dissipating conductive (black)
- *Reinforcement:* Polypropylene braid
  - Each strand of large diameter (denier) polypropylene monofilament is twisted and subsequently twined prior to braiding
  - Tested for maximum abrasion and chemical resistance

fittings

PermaSeal® crimp-style

- Over 40 styles of 316L stainless steel conventional fitting designs
- Standard: 316L stainless steel
- Consult factory for optional fitting materials — carbon steel, PVDF (Kynar®), polypropylene or other alloys
- Fitting details begin on page 33

hose cover options

- See pages 79 -80

WCP/BCP Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius		Vacuum Hg		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
2708WCP/BCP	1/2	12.7	7/8	21.3	250	1.72	1,000	6.90	1.75	44.45	29.9	760	0.10	0.15
2712WCP/BCP	3/4	19.1	1-1/4	32.8	250	1.72	1,000	6.90	2.25	57.15	25.0	635	0.19	0.28
2716WCP/BCP	1	25.4	1-1/2	39.6	250	1.72	1,000	6.90	2.75	69.85	22.0	559	0.24	0.36

⚠ Important:

Burst pressure ratings at ambient 70°F (21°C). See applicable notes below on vacuum/pressure ratings at temperatures other than ambient.

Data given is for straight hose installation through 250°F.

Decrease working pressure to 30 psig for all sizes @ temperatures above 175°F. Consult factory for higher temperature applications. Specifications shown here supercede all previous catalogs.

Stainless Steel Metal Hose

Annular Construction

MSS4/CF04 (304 Series) • MSS6/CF16 (316L Series)

applications

- Steam lines (high pressure applications over +450°F/+232°C)
- Cryogenic transfer
- Conveying lines (cryogenic fluids, chemical transfer of liquids, gases and vapors)

common media

- Steam
- Liquified gas

industry approvals & compliances

- **To industry standards**

features & benefits

- ***Wide temperature range – -460°F (-273°C) to +1500°F (+816°C)***
- ***High quality and excellent workmanship to meet the rigorous demands of extremes in service at competitive prices with quick deliveries***
  - ***Machined bar stock end fittings; designed to mate with hose for proper weld techniques***
  - ***Double-pass welding (TIG)***
  - ***Custom fabrication available to meet customer specifications***
- ***More corrugations per foot***
- ***Greater flexibility than competing products of similar size***
- ***Low force to bend; easier to install and disconnect***
  - ***Flex-life extended***
- ***Compensates for misalignment, facilitates movements/thermal expansion***
  - ***Braid coverage engineered to contain the inner core under pressure and reduce possibility of squirm***
- ***Absorbs vibration and deadens noise in rigid systems***
- ***Vacuum tight***
- ***Handles high pressures***
- ***Corrosion resistant***
- ***Non-aging/non-flammable***

details

construction

- *Inner metal hose:*
  - Annular corrugated close pitch hose
  - Profile: parallel corrugations, omega shape close pitch
  - Made from butt-welded tubing
- *Braid reinforcement:*
  - 304 stainless steel
  - Basket weave full coverage pattern

fittings

- Any style, using butt weld construction (TIG method)
  - NPT, FNTP, flange, J.I.C., compression, union, vacuum, sanitary, O-ring, BSP, metric and DIN

Stainless Steel hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Operating Pressure		Maximum Test Pressure		Minimum Burst Pressure		Static Bend Radius		Dynamic Bend Radius		Weight	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	PSI	MPa	in.	mm	in.	mm	lb./ft.	kg/m
4MDS6	1/4	6.4	0.62	15.8	3,850	26.55	4,875	33.61	13,000	89.63	3.00	76.20	6.00	152.40	0.30	0.45
6CF04/CF16	3/8	9.5	0.70	17.8	1,375	9.48	2,175	15.00	5,800	40.00	1.15	29.21	6.00	152.40	0.23	0.34
8CF04/CF16	1/2	12.7	0.80	20.3	1,000	6.90	2,063	14.22	5,500	37.90	1.75	44.45	5.00	127.00	0.24	0.36
12CF04/CF16	3/4	19.1	1.15	29.2	725	5.00	1,088	7.50	3,500	24.11	2.10	53.34	7.00	177.80	0.36	0.54
16CF04/CF16	1	25.4	1.49	37.9	580	4.00	870	6.00	2,400	16.53	2.50	63.50	7.70	195.58	0.44	0.66
20CF16	1-1/4	31.8	1.80	45.7	580	4.00	870	6.00	2,320	15.98	3.10	78.74	9.00	228.60	0.68	1.01
24MSS4	1-1/2	38.1	2.26	57.4	560	3.86	1,120	7.72	2,240	16.12	3.50	88.90	10.50	266.70	1.80	2.68
24CF16	1-1/2	38.1	2.10	53.3	435	3.00	870	6.00	1,740	11.98	4.75	120.65	9.50	241.30	1.09	1.62
32MSS4	2	50.8	2.72	69.1	525	3.62	1,050	7.24	2,100	14.46	4.50	114.30	12.00	304.80	2.37	3.53
32CF16	2	50.8	2.70	68.6	500	3.45	1,000	6.90	2,000	13.78	6.00	152.40	11.50	292.10	1.55	2.31
40MSS4/MSS6	2-1/2	63.5	3.50	88.9	380	2.62	760	5.24	1,520	10.47	5.00	127.00	13.00	330.20	2.70	4.02
48MSS4	3	76.2	4.00	101.6	285	1.97	570	3.93	1,140	7.85	7.50	190.50	16.00	406.40	2.87	4.28
48CF16	3	76.2	3.90	99.1	350	2.41	750	5.17	1,400	9.64	8.00	203.20	16.00	406.40	2.70	4.02
64MSS4	4	101.6	5.00	127.0	250	1.72	375	2.59	1,000	6.89	10.00	254.00	20.00	508.00	4.00	5.96
64MSS6	4	101.6	5.10	129.5	250	1.72	550	3.79	1,100	7.57	9.00	228.60	20.00	508.00	3.90	5.81
80MSS4/MSS6	5	127.0	6.25	158.8	225	1.55	450	3.10	900	6.20	12.00	304.80	24.00	609.60	6.66	9.92
96MSS4/MSS6	6	152.4	7.30	185.4	200	1.38	400	2.76	800	5.51	15.00	381.00	30.00	762.00	7.80	11.62
128MSS4/MSS6	8	203.2	9.45	240.0	185	1.28	370	2.55	740	5.09	20.00	508.00	40.00	1,016.00	10.80	16.09

⚠ Important:

Pressure Range 3850 psig to 185 psig operating pressure, depending on inside diameter and operating temperature (see temperature correction chart on next page). Operating pressures based on 4:1 safety factor; operating pressure x 4 = rated minimum burst pressure at 70°F (21°C).

Product Designation Codes

MDS6 – 316 stainless steel **double** braid
MSS6 – 316 stainless steel
MSS4 – 304 stainless steel*
CF16 – 316 stainless steel
CF04 – 304 stainless steel*

*All braid reinforcement is 304 stainless steel.

Consult factory for availability of larger sizes and inner cores of other alloys.

Metal hose is rated for full vacuum.

Stainless Steel Metal Hose • Annular Construction (continued)

specifying the proper metal hose

A number of factors should be taken into consideration when specifying 316L/304 Stainless Steel Metal Hose.

Material to be transferred

- Select 316L or 304 stainless steel inner core, depending on the type of medium.

Corrosion potential

- The corrosive nature of both the medium to be conveyed and the outside environment should be taken into account; the corrosive effects of many chemicals can be accelerated by higher temperatures.
- If the material to be transferred is gaseous, flow rates should be specified, especially if velocity is to approach or exceed 180 feet per second.
- Are the fittings to be of the same alloy material?

Inside diameter (ID) of hose

Relationship of pressure rating, temperature and type of service

- Operating pressures listed in the accompanying specifications chart on page 27 reflect a rating based on one braid reinforcement and a minimum safety ratio of 4:1, burst pressure to rated operation pressure.
- Ratings are based on operating at ambient temperature — 70°F (21°C). If your application exceeds this temperature, consult the accompanying temperature correction chart to calculate the adjusted pressure rating at your particular operation temperature.

Maximum service temperature

- 316L stainless steel: +1500°F (+815°C)
- 304 stainless steel: +850°F (+454°C)

temperature correction factor

As the service temperature increases, the maximum pressure a hose assembly can withstand decreases. Use the factors given in the accompanying chart to approximate the safe working pressure at elevated temperatures; this figure will enable you to determine the optimum assembly for your application.

Example

Is 1" 304 Stainless Steel Metal Hose (product designation CF04) suitable for 200 PSI @ 700°F?

Given:

- Maximum operating temperature: 700°F
- Maximum operating pressure: 200 PSIG
- Computations:
  - Check specifications chart for minimum rated burst pressure for 1" CF04 = 2400
  - Check temperature correction factors chart for correction factor for 1" CF04 at 700°F = .70
  - Rated burst pressure: 2400 x .70 = 1680 PSIG (rated burst pressure at 700°F)
  - Safe operating pressure: 1680/4 = 420 PSIG (using 4:1 safety factor)
- Result
  - 1" CF04 is rated at 420 PSIG MAWP, well in excess of the 200 PSI of the example operating environment.

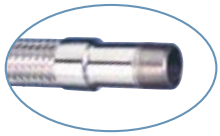
Temperature Correction Factors

Temp. °F	Temp. Correction Number
70	1.00
150	.97
200	.94
250	.92
300	.88
350	.86
400	.84
450	.82
500	.80
600	.75
700	.70
800	.66
900	.62
1000	.60
1100	.58
1200	.55
1300	.50
1400	.44
1500	.40

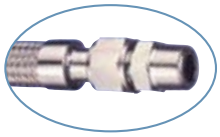
metal hose fitting options

Many different types of fittings can be attached to metal hose. Flexible Components stainless steel fittings are typically fully machined from bar stock and are engineered for a tight fit that allows for proper weld penetration and long service life. Some of the more popular fitting styles are shown below. However, due to the versatility of the welded hose construction, many types of fittings can be welded to meet your needs; consult the factory for availability and fitting dimensions. (More information on the following fittings can be found starting on page 33.)

J.I.C. Female Swivel
Style 02
Machined 37°and 45° seat with J.I.C. swivel nut

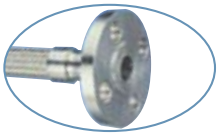


Male Pipe, Plain
Style 04
Pipe thread–Sch 40 standard weight



J.I.C. Adapter Union Male
Style 08

Style 07
Consult factory for female adapter union



Flange Retainer, Lap-Joint Style Style 12
Lap-joint forged flange per ASTM specifications

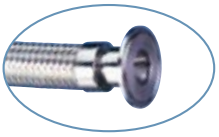
Schedule 10 Type "C" stub ends & 150# epoxy coated carbon steel lap-joint flanges standard. Consult factory for optional stainless steel flanges and alternative stub end types/schedules

Male Cam and Groove
Style 17
316 SS

Male NPT
Style 03
Pipe thread–with integral hex

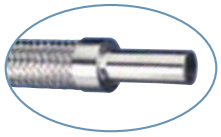
Female NPT Style 06
Pipe thread–hex style supplied standard through 1"

Style 05
Female NPT round with wrench flats



Sanitary Clamp Style 10/Style 11
316L mini (11) or full size clamp style (10). 45° and 90° elbow also available

Female Cam and Groove (Swivel) Style 16
316 stainless steel with or without locking arms



Plain Pipe End /Tube End
Style 01/Style 41

Style 01
Pipe end (Sch 40) or heavy weight (Sch 80)

Style 41
Plain end specified by O.D. and wall thickness

Sight Flow Indicators
Heavy Wall Chemfluor® Natural FEP

applications

- Flow check
- Aeration/Turbulence check
- Cleanliness check

details

construction
- *Tube:* Translucent Chemfluor® FEP fluoropolymer

fittings
- Perma-Seal® crimp style
  - 316 stainless steel, sanitary clamp
  - Consult factory for availability of styles other than sanitary

note:
- For applications over 200˚F, consult factory

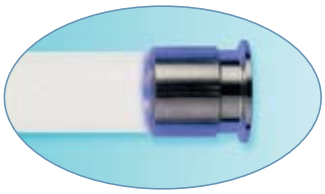
engineering specifications

maximum lengths
1/2" - 4" ID 21' OAL

minimum lengths
1/2" - 3" 6" OAL
4" 8" OAL
Viewing area will be 1" or less

suggested minimum lengths
1/2" - 1-1/2" 10" OAL
2" - 4" 12" OAL

temperature rating
- -100˚F to +400˚F
- -73˚C to +204˚C



Sight Flow Indicator

features & benefits

- *Permits visual inspection of conveyed material*
- *Non-contaminating: won't add taste or color*
- *Smooth, non-stick surface: cleans easily, minimal pressure drop, fitting surface exceeds sanitary design standards*
- *High pressure rating*
- *High and low temperature rated*
- *Will not break in high stress applications*
- *No bulky protective sheaths or supporting rods required*
- *Liquid level indicator*
- *Magnetic detector placement*
- *Saves space, cuts weight*
- *Unaffected by sunlight or ultraviolet radiation*
- *Will not discolor, age or yellow*

Sight Flow Indicator specifications

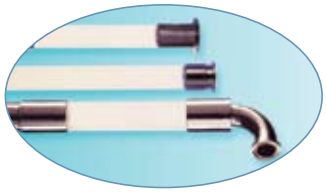
Part Number	Size		Inside Diameter		Outside Diameter		Chemfluor® Wall Thickness		Operating Pressure (@ 70˚F)		Burst Pressure @ 70˚F	
	in.	mm	in.	mm	in.	mm	in.	mm	PSI	MPa	PSI	MPa
8STXXXXS6-L	1/2	12.7	1/2	12.7	0.70	17.8	0.100	2.540	200	1.38	800	5.52
12STXXXXS6-L	3/4	19.1	3/4	19.1	0.95	24.1	0.125	3.175	175	1.21	700	4.83
16STXXXXS6-L	1	25.4	1	25.4	1.25	31.8	0.125	3.175	125	0.86	500	3.45
24STXXXXS6-L	1-1/2	38.1	1-3/8	34.4	1.61	40.9	0.125	3.175	105	0.72	420	2.90
32STXXXXS6-L	2	50.8	1-7/8	47.1	2.10	53.3	0.125	3.175	72	0.50	290	2.00
40STXXXXS6-L	2-1/2	63.5	2-3/8	59.8	2.65	67.3	0.150	3.810	50	0.34	200	1.38
48STXXXXS6-L	3	76.2	2-7/8	72.5	3.23	82.0	0.180	4.572	40	0.28	160	1.10
64STXXXXS6-L	4	101.6	3-7/8	97.9	4.28	108.6	0.210	5.334	30	0.21	120	0.83

Note: 1/2", 3/4" and 1" sight flow indicators are available with 316L stainless steel PermaSeal® connections. 1-1/2"–4" are available with 316L stainless steel sanitary clamp style fittings or with Flare-Thru ANSI Class 150 epoxy carbon steel or 316L stainless steel flanges.

Dip Tubes, Liquid Level Indicators, Inspection Ports

features & benefits

- *Ideal for decanting/filling operations, monitoring suction/discharge from pumping stations*
- *Corrosion and damage resistant, lightweight, non-aging*
- *Many fitting styles are available with various tube lengths (windows) that can be specified*
- *K Series solid tube PVDF (Kynar®) metal detector assemblies available in 1" – 4" ID; consult factory*



Dip Tubes, Liquid Level Indicators, Inspection Ports

pressure correction factors

Pressure correction factors for all non-caged Chemfluor® FEP Sight Flow Indicators

Using operating pressure @ ambient with correction factors for elevated temperatures.				
70˚F	150˚F	200˚F	250˚F	300˚F
100%	65%	50%	35%	25%

Example: 1" Sight Flow Indicator @ 200˚F rated @ 125 P.S.I. ambient X .50 = 62.5 P.S.I. @ 200˚F.

Sight Flow Indicators
Flare-Thru 150# Flanged

applications

- Flow check
- Aeration/Turbulence check
- Cleanliness check

features and benefits

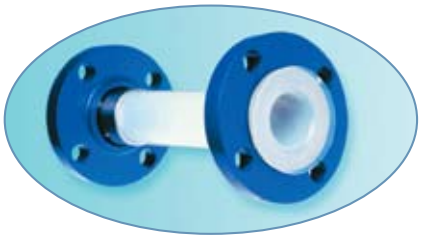
- ***Flare-Thru design eliminates entrapment areas***

engineering specifications

minimum overall length, Flange X Flange (Flare-Thru)

3/4" - 2" – 10" face to face

3" - 4" – 12" face to face



Flare-Thru Flanged Sight Flow Indicator

details

construction

- *Tube:* Heavy gauge, translucent Chemfluor® FEP fluoropolymer

fittings

- Flare-Thru class 150# epoxy coated flanged lap-joint style
- Optional: Flare-Thru class 150# 316L stainless steel flanged lap-joint style

Chemfluor® Flare-Thru Flanged Sight Flow Indicator specifications

Part Number	Size		Tube ID		Operating Pressure @ 70˚F		Burst Pressure @ 70˚F		Fitting Length	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm
12ST1212S6FT-L	3/4	19.1	3/4	19.1	175	1.21	700	4.83	2.00	50.80
16ST1212S6FT-L	1	25.4	7/8	21.7	125	0.86	500	3.45	2.00	50.80
24ST1212S6FT-L	1-1/2	38.1	1-3/8	34.4	105	0.72	420	2.90	2.00	50.80
32ST1212S6FT-L	2	50.8	1-7/8	47.0	72	0.50	290	2.00	2.50	63.50
48ST1212S6FT-L	3	76.2	2-7/8	72.9	40	0.28	160	1.10	2.50	63.50
64ST1212S6FT-L	4	101.6	3-7/8	97.9	30	0.21	120	0.83	3.00	76.20

⚠ Important:
Ratings are given @ ambient temperatures: 70˚F (21˚C). See page 29 for correction factors for pressures at temperatures other than ambient.

Caged Chemfluor® Sight Gauge

applications

- Flow check
- Aeration/Turbulence check
- Cleanliness check

features and benefits

- ***Permits visual inspection of conveyed material***
- ***Reinforcing tube of stainless steel for added safety***
- ***Higher working pressures at elevated temperatures***
- ***Non-contaminating: won't add taste or color***
- ***See page 29 for additional features and benefits***

engineering specifications

minimum overall length, Flange X Flange (Flare-Thru)

1" - 2" – 10" face to face

available lengths

custom lengths up to 4' maximum

Caged Chemfluor® FEP Sight Gauge

details

construction

- *Tube:* Heavy gauge, translucent Chemfluor® FEP fluoropolymer
- *Cage:*
  - 304 or 316 stainless steel heavy wall tube
  - Machined 2" long by 3/8" wide viewing windows, 90˚ apart to allow for easy through-viewing
  - Slight overlap of viewing areas from one window level to the next eliminates dead spots, assures accurate level calculations

fittings

- Standard: Flare-Thru class 150# 316 stainless steel flanged lap-joint style
- PermaSeal® crimp style 316 stainless steel sanitary clamp style

Caged Chemfluor® Sight Gauge specifications (sanitary clamp style or flanged ends)

Part Number	Inside Diameter		Operating Pressure @ 70˚F		Burst Pressure @ 70˚F	
	in.	mm	PSI	MPa	PSI	MPa
16STXXXXS6PG-L	1	25.4	250	1.72	1,000	6.90
24STXXXXS6PG-L	1.5	38.1	200	1.38	800	5.52
32STXXXXS6PG-L	2	50.8	100	0.69	400	2.76

⚠ Important:
For 2-1/2", 3" and 4", consult factory for availability.

CL Series Chlorine Transfer Hose Assemblies

Chemfluor® PTFE Fluoropolymer Helically Convoluted Inner Tube
PVDF (Kynar®) Braids

applications

- Tank car loading/unloading
- Pulp and paper bleaching
- Chemical transfer

common media

- Chlorine
- Bromine
- Sodium hydroxide
- Sodium hypochlorite
- Sulfuric and hydrochloric acids
- Other corrosive materials

industry approvals & compliances

- **Manufactured in accordance with Chlorine Institute Pamphlet 6 piping specifications**

features & benefits

- ***Unexcelled chemical resistance for longer service life***
- ***Not subject to stress corrosion, pinholing or flex cracking***
- ***Convoluted inner tube is low profile and helical formed to promote self-drainage***
- ***Moisture will not affect inner tube***
- ***Does not need to be cleaned and capped after every use***
- ***Minimum pressure drop for faster loading and unloading***
- ***Lightweight and ultra flexible for handling ease***
- ***Low force to bend***
- ***Can be inspected safely***
- ***Less costly than Monel® (metal) hose***
- ***Wide hex flats for easy wrenching***

engineering specifications

maximum length

1/2"	30' OAL
1"	50' OAL
1-1/2"	30' OAL

temperature rating

- -40˚F to +120˚F
- -40˚C to +49˚C

details

construction

- *Inner Tube:* One-piece extruded Chemfluor® PTFE fluoropolymer
  - No seams or voids
- *Cover:* Thick-strand chafe-resistant PVDF (Kynar®)
  - Protects against abrasion
- *Reinforcement:* Two high tensile strength PVDF (Kynar®) braids
  - For high pressure rating

fittings

- Standard: Schedule 80 Monel® stub end 300# epoxy coated carbon steel lap-joint flange
- Schedule 80 Monel® hex male NPT (1" wide wrenching flats)
  - Schedule 80 Monel® R405 male NPT or Schedule 80 stub end available
- Internal Monel® crimp ferrule locks fitting to inner tube and two reinforcement braids
- Special PVDF (Kynar®) fittings available
- Special Hastelloy® fittings for wet chlorine applications

Stainless steel crimp ring secures PVDF (Kynar®) abrasion cover. A permanent stainless steel ID band provides the following information:

- ***"Flexible Components"***
- ***"For Chlorine Service"***
- ***Date of manufacture***
- ***Maximum allowable working pressure***
- ***Usable temperature range***
- ***Minimum bend radius***
- ***Test pressure***

CL

Quality Control and Testing

- *Each hose is material lot traceable*
- *Each hose is subject to stringent QC procedures throughout the manufacturing process*
- *Each hose is permanently identified in accordance with Chlorine Institute specifications*
- *Each hose is thoroughly cleaned before assembly; no oils, solvents or other contaminants are used in the assembly process*
- *Each hose is pressure tested with nitrogen gas at twice the rated operating pressure while fully submerged under water*
- *Each hose is dried and capped for shipment*
- *A unique serial number is applied to each end of the hose for further traceability; permanent log of all hose assemblies maintained at factory*

CL Series hose specifications

Part Number	Inside Diameter		Outside Diameter		Maximum Working Pressure		Minimum Burst Pressure		Minimum Bend Radius	
	in.	mm	in.	mm	PSI	MPa	PSI	MPa	in.	mm
8CLXXXXMKY	1/2	12.7	1	26.0	500	3.45	2,500	17.24	2.50	63.50
16CLXXXXMKY	1	25.4	1-5/8	41.9	375	2.59	1,875	12.93	8.00	203.20
24CLXXXXMKY	1-1/2	38.1	2-1/8	54.0	375	2.59	1,875	12.93	10.00	254.00

⚠ **Important:** XXXX indicate fitting styles. See page 100 for fitting style indicators and assembly part number details.

⚠ **Important:**

Burst pressure ratings at ambient 70°F (21°C).

Important note regarding part numbers: The X's shown in part numbers at left are replaced with 03 (NPT) and/or 12 (Flange Lap Joint Style), depending on the type of fitting specified for the assembly. For example, the part number for a 1/2" assembly featuring NPT fittings at both ends would be 8CL0303MKY. The part number for a 1" assembly with an NPT fitting at one end and a flange fitting at the other would be 16CL0312MKY. When both fittings are flange, add a second "M" to the part number; in this case, the part number for a 1-1/2" assembly would be 24CL1212MMKY.

Choose flange material: C3 = 300lbs. carbon steel 300#; 43 = 304 stainless steel 300#; 63 = 316 stainless steel 300#. See page 100 for ordering information.

These hoses are not metrically sized; metric dimensions provided as a convenience only.

Test Pressure = 2x maximum operating pressure.

Electrically Heated Hose • EHH Series

applications

- Hot glues
- Filling machines
- Food casings
- Food processing machines
- Food lines
- Hot waxes
- Pharmaceutical
- Cosmetics
- Outdoor applications where temperature must be maintained

features & benefits

- *Can be used with flexible stainless steel braided TS/WCS/TWOB Series hose assemblies*
  - *Consult factory for availability of EHH option with other Flexible Components hose assemblies*
- *Small outside diameter eliminates bulky hose*
- *External temperature controller available*
- *Custom fabrication available*
- *Variety of end fittings available*
- *Hose construction materials FDA approved*

description

- Available on a "built to order" basis on virtually all hose assemblies manufactured by Flexible Components
- Electrically heated trace feature, designed to maintain internal temperature of conveyed materials regardless of hose installation
- Up to a maximum temperature of +250°F/+121°C

Consult factory for details on how to order. For a complete six-page catalog on EHH Series products, call customer service and ask for literature #FLS-3028.

details

construction

- Externally controlled heaters
- 115VAC or 220VAC
- J or K thermocouples available
- RTD available
- A wide variety of external protection available
  - Silicone
  - FEP heat shrink
  - Silicone/fiberglass firesleeve
  - Stainless steel anti-kink casing
  - Polypropylene braided
  - PVDF braided chafe guards

Flexible Components Fittings

Flexible Components offers four major categories of fittings. Within each category, a number of options are available. Below is a brief overview of these systems; more details, including specifications, alternative styles and materials, and other information, can be found on the following pages.

PermaSeal®

The two-piece PermaSeal® fitting system features a fitting insert (stem) and crimp ferrule (collar). This unit is 360° radially compression crimped to hose for a positive lock that enables the assembly to be used to the maximum working pressure of the particular hose style and size without fitting pull-off or blow-off.

PermaSeal® fittings are available in the following styles:

- NPT
- Flanged
- Sanitary
- Cam and Groove
- Instrumentation
- Miscellaneous

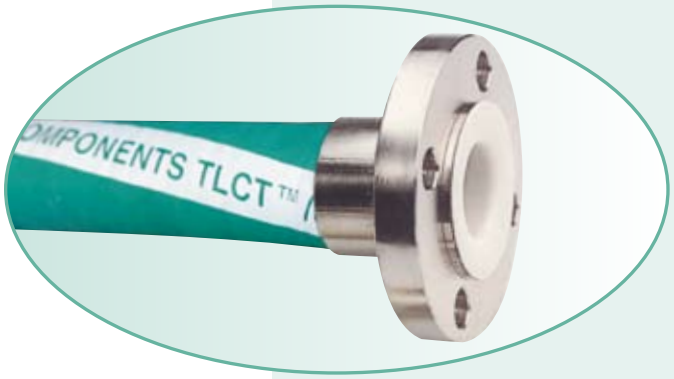
PermaSeal®

Flare-Thru

Flare-Thru fittings feature a one-piece Chemfluor® fluoropolymer tubing liner that extends through the fitting and flares over the sealing surfaces. This innovative design ensures high purity and seamless transfer; the transferred media come into contact only with the ultra-pure, FDA-approved Chemfluor® hose inner tube. The Flare-Thru system also employs separate gaskets to interface with metallic or dissimilar plastic piping systems, an especially useful feature for assemblies that are frequently disconnected.

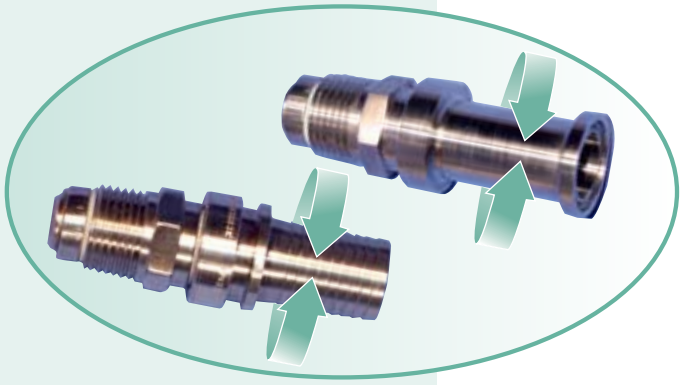
Flare-Thru fittings are available in the following styles:

- Flanged
- Sanitary
- Cam and Groove



Flare-Thru

Flexible Components Fittings (continued)



Swiv-L-Flex®

Swiv-L-Flex®

New Swiv-L-Flex® swivel fittings and adapters from Flexible Components are safe and secure sanitary connections for pharmaceutical, biopharmaceutical, dairy, food and beverage applications. Designed for easy hot water washdown, Swiv-L-Flex®'s innovative, patent-pending design features pre-loaded PTFE and stainless steel thrust rings for smooth operation without end play. The double-seal construction provides a leak-proof seal, while the heavy-duty retainer virtually eliminates clip ring failure and fitting blow-off. Patent number 7,267,374.

Adapters

Adapters

Adapters are designed to provide a seamless transition between Flexible Components and existing pipe or tubing systems. They are available in a number of styles, including Chemfluor® FEP flouropolymer lined, Chemfluor® PFA encapsulated, and stainless steel (316L and 304).

Adapters are available in the following styles:

- Sanitary x 150# Flanged
- Female Cam and Groove x 150# Flanged
- Male "I" Line x 150# Flanged
- Female "I" Line x 150# Flanged
- Female NPT and Male NPT
- Male Spool

Swiv-L-Flex® NEW!

Sanitary Swivel Fittings and Adapters

description

- Innovative, patented design simplifies hot water washdown
- Delivers smooth, easy 360° swivel motion regardless of temperature and pressure
- Designed for use with virtually all brands of spray nozzles
- Double-seal design for leak-free operation
- Easy handling reduces operator fatigue and misdirected spray down
- Compatible with most Saint-Gobain Performance Plastics rubber hoses, silicone hoses and fluoropolymer-lined hoses
- Adapters can be easily and quickly connected using standard “mini” sanitary clamps and gaskets

standards

- **FDA**
- **3-A**

materials

Fitting Materials
- Body: 316L stainless steel
- Seals: PTFE and high performance elastomers

Adapter Materials
- Body: 316L stainless steel
- Seals: PTFE and high performance elastomers

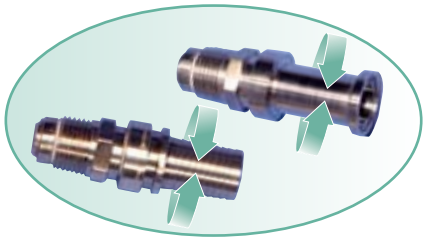
technical data

- *All 316L stainless steel or PTFE construction on wetted surfaces meets critical sanitary standards*
- *Pre-loaded PTFE and stainless steel thrust rings assure smooth operation without end play*
- *Heavy duty retainer virtually eliminates clip ring failure and fitting blow-off*

size
- *Fittings:*
  - 3/4" hose barb x 1/2" male NPT swivel
- *Adapters:*
  - 3/4" mini sanitary x 1/2" male NPT swivel

maximum working pressure
- *Fittings:*
  - 150 PSIG @ 200°F hot water service
- *Adapters:*
  - 150 PSIG @ 200°F hot water service

P/N	Description
69081203X116	3/4" Mini Adapter
69081603X106	1" TC Adaptor
991203DSKS	3/4" Barb for Rubber Hose
381203DSKS	3/4" Barb for Fluoropolymer Hose
991003DSKS	5/8" Barb for Rubber Hose



Swiv-L-Flex®

Chemfluor® Fluoropolymer Flare-Thru Fitting System

One-Piece Chemfluor® Fluoropolymer Tubing Liner

Flexible Components' innovative, industry-leading Flare-Thru fitting system features a one-piece Chemfluor® fluoropolymer tubing liner that offers many advantages in the areas of purity, performance and cleanability.

Because the liner extends through the fitting and flares over the sealing surfaces, conveyed media come into contact with only ultra-pure, FDA-approved Chemfluor® fluoropolymer tubing from end to end, for the ultimate in chemical resistance and assured purity.

Innovative Separate Gaskets

Another Flare-Thru innovation is the use of separate gaskets to interface with metallic or dissimilar plastic piping systems. This feature is especially valuable on assemblies that are frequently connected and disconnected, or that are exposed to potential mechanical damage, since the gaskets are low in cost and can be easily replaced.

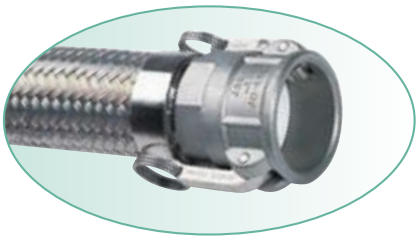
features and benefits

- **Eliminate potential entrapment** — Hose barb to hose ID joint interface is eliminated; no areas for bacteria or product to become entrapped.
- **Higher flow rates with less pressure drop** — The inside diameter of Flare-Thru fittings matches the inside diameter of the hose; lower pump pressures can be used to obtain the same flow rates as conventional barb fitting assemblies, and higher flow rates can be achieved with higher pump pressures.
- **Internal cleanability** — Contamination, build-up of material and bacterial growth are significantly reduced or, in some cases, virtually eliminated.
- **Potential cost savings** — Can be less costly than special alloy fittings or fluoropolymer encapsulated crimp fittings.
- **316 stainless steel back-up fittings** — Standard for TLCT and TWOB series hoses. For MTL and MTLSJ series hose, 304 stainless steel (same material as metal hose inner core) is standard.

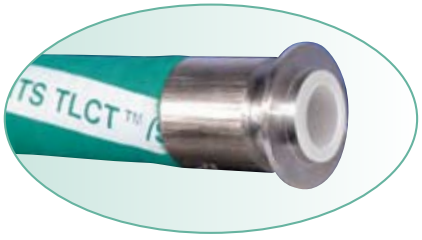
types of Flare-Thru fittings

Sanitary

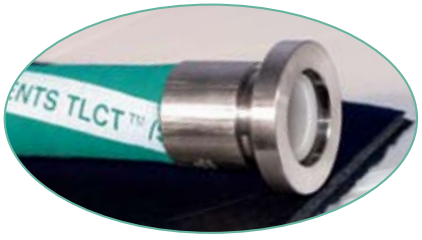
150# Flanged



Cam and Groove



Male "I" Line Sanitary



Female "I" Line Sanitary

Flare-Thru Fittings
Sanitary Clamp Style • Style 10FT

description

- Hose inner core of Chemfluor® fluoropolymer extends through stainless steel fitting and flares behind sealing gasket
- No joint between hose and fitting, no material entrapment
- Temperature rated to exceed hose maximum temperature

standards

- **To industry standards**
- **Gasket face dimensions are standard to industry specifications**

materials

- 316L stainless steel

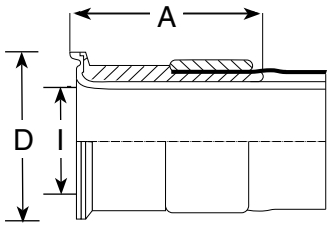
technical data

- Material conveyed touches only Chemfluor® PTFE solid gasket
- Smooth Chemfluor® fluoropolymer interior surface
- Promotes self-draining of entire hose assembly

temperature/pressure ratings

- Pressure and temperature ratings of Flexible Components' sanitary assemblies are dependent on clamp pressure ratings and gasket material temperature ratings
- *Clamps:*
  - Standard weight style: 150 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
  - Heavyweight style: 500 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
  - High pressure bolt style: 1500 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
- *Gaskets:*
  - Above 250°F (121°C), solid PTFE gaskets are required.

Style 10FT



For MTL Series hose • Style 10FT

Sanitary Tube Outside Diameter		A Overall Length		I Inner Dia. at Gasket		D Fitting Outer Diameter	
in.	mm	in.	mm	in.	mm	in.	mm
1.00	25.40	2.50	63.50	0.86	22.10	1.98	50.39
1.50	38.10	3.30	83.82	1.40	35.56	1.98	50.39
2.00	50.80	4.30	109.22	1.86	47.14	2.52	63.91

For FlexPro® Series hose • Style 10FT

Sanitary Tube Outside Diameter		A Overall Length		I Inner Dia. at Gasket		D Fitting Outer Diameter	
in.	mm	in.	mm	in.	mm	in.	mm
1.00	25.40	1.88	47.75	0.87	22.10	1.98	50.39

For W.S.I.B Series hose • Style 10FT

Sanitary Tube Outside Diameter		A Overall Length		I Inner Dia. at Gasket		D Fitting Outer Diameter	
in.	mm	in.	mm	in.	mm	in.	mm
1.00	25.40	1.82	46.23	0.87	22.10	1.98	50.39
1.50	38.10	1.84	46.74	1.36	34.54	1.98	50.39
2.00	50.80	2.10	53.34	1.86	47.14	2.52	63.91
3.00	76.20	2.90	73.66	2.87	72.90	3.58	90.93

⚠ **Important: W.S.I.B. Series hose is not vacuum rated material.**

For TWOB/TBOB, TWOY/TBOY, TWOK/TBOK, and TWOP/TBOP Series hose • Style 10FT

Inside Diameter		A Overall Length		I Inner Dia. at Gasket		D Fitting Outer Diameter	
in.	mm	in.	mm	in.	mm	in.	mm
1.00	25.40	1.88	47.75	0.87	22.10	1.98	50.39
1.50	38.10	1.90	48.26	1.36	34.54	1.98	50.39
2.00	50.80	2.16	54.86	1.86	47.14	2.52	63.91
3.00	76.20	2.63	66.80	2.86	72.54	3.58	90.93

⚠ **Important:**
All dimensions on this page are for components of Flare-Thru specification purpose only. Not sold as individual part.

Flare-Thru Fittings
150# Flanged • Style 12FT

description

- Swivel flange fitting design with integral Chemfluor® fluoropolymer liner and flared-over sealing surface
  - Internal 316 stainless steel stub end mechanically supports liner

standards

- **ANSI B16.5, Class 150# and 300# ratings**
- **DIN P/N 16 and its equal BS4504 table 16**
- **BS 10 table E**
- **J.I.S. 10 K flanges**

Style 12FT

materials

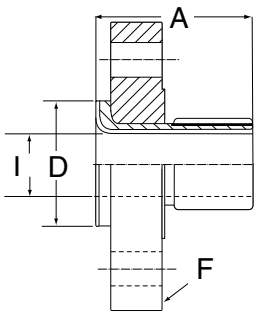
- Support stub end, crimp ring: 304 or 316L stainless steel
- ANSI flanges available in 316L stainless steel or epoxy coated carbon steel
- 304 stainless steel, PVDF (Kynar®) or polypropylene available special order
- DIN or BS specification flanges available 316 or 304 stainless steel or zinc plated mild steel

alternative styles

- Carbon steel
- 304 stainless steel
- 316 stainless steel

technical data

- Ultra pure Chemfluor® fluoropolymer liner assures cleanliness
- Full size ID through the fitting for better flow rates; maximum flow assured
- Smooth internal surface minimizes flow turbulence
- No fitting insertion to entrap material
- Maximum corrosion resistance is assured



For TWOB/TBOB, TWOY/TBOY, TWOK/TBOK, TWOP/TBOP Series hose • Style 12FT

Inside Diameter		A Overall Length		D Flare Diameter		I Inner Diameter		F Flange Outer Dia. Class 150	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
0.50*	12.70	2.40	60.96	1.68	42.67	0.75	19.05	3.50	88.90
0.75	19.05	2.40	60.96	1.68	42.67	0.75	19.05	3.88	98.43
1.00	25.40	2.50	63.50	2.00	50.80	1.00	25.40	4.25	107.95
1.25	31.75	2.50	63.50	2.50	63.50	1.25	31.75	4.63	117.48
1.50	38.10	2.50	63.50	2.88	73.15	1.50	38.10	5.00	127.00
2.00	50.80	2.70	68.58	3.62	91.95	2.00	50.80	6.00	152.40
2.50	63.50	3.50	88.90	4.12	104.65	2.38	60.45	7.00	177.80
3.00	76.20	4.00	101.60	5.00	127.00	2.95	74.93	7.50	190.50

For PharmaSmooth™, TLCT, WTLCT and SFTL Series hose • Style 12FT

Inside Diameter		A Overall Length		D Flare Diameter		I Inner Diameter		F Flange Outer Dia. Class 150	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
0.50*	12.70	2.20	55.88	1.68	42.67	0.75	19.05	3.50	88.90
0.75	19.05	2.20	55.88	1.68	42.67	0.75	19.05	3.88	98.43
1.00	25.40	2.44	61.98	2.00	50.80	1.00	25.40	4.25	107.95
1.50	38.10	2.67	67.82	2.87	72.90	1.50	38.10	5.00	127.00
2.00	50.80	3.50	88.90	3.62	91.95	2.00	50.80	6.00	152.40

*Uses 3/4" TLCT hose with modified class 150 1/2" flange.

For MTL Series hose • Style 12FT

Inside Diameter		A Overall Length		D Flare Diameter		I Inner Diameter		F Flange Outer Dia. Class 150	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
1.00	25.40	3.00	76.20	2.00	50.80	0.86	21.84	4.25	107.95
1.50	38.10	3.00	76.20	2.87	72.90	1.40	35.56	5.00	127.00
2.00	50.80	3.50	88.90	3.62	91.95	1.80	45.72	6.00	152.40
3.00	76.20	3.50	88.90	5.00	127.00	2.80	71.12	7.50	190.50
4.00	101.60	4.00	101.60	6.19	157.15	3.80	96.52	9.00	228.60
6.00	152.40	4.50	114.30	8.50	215.90	5.80	147.32	11.00	279.40
8.00	203.20	5.00	127.00	10.62	269.75	7.80	198.12	13.50	342.90

Note: Please check with factory for MTLSJ dimensions.

⚠ Important:
All dimensions on this page are for components of Flare-Thru specification purpose only. Not sold as individual part.

Flare-Thru Fittings
Female Cam and Groove (Swivel Style) • Style 16FT

description

- Female cam and groove "D" type, swivel style
- Designed to facilitate quick connection and disconnection
- Hose inner core of Chemfluor® fluoroploymer extends through coupler support stem and flares behind sealing gasket

standards

- **Manufactured to MIL-C-27487**
- **Interchangeable with other manufacturers' designs when manufactured to this specification**

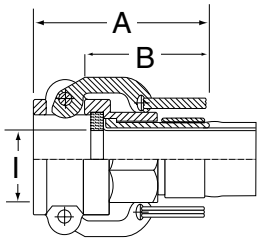
materials

- 316L stainless steel
- Coupler is cast 316 stainless steel; insert is machined 316L stainless steel
- Chemfluor® PFA encapsulated silicone core gaskets standard with 16FT designs
- Flare-Thru Chemfluor® fluoropolymer

technical data

- Temperature rated to exceed hose maximum temperature
- Pressure rating: see Style 16/16T and Style 17/17T, pages 59-62
- Material conveyed touches only Chemfluor® PFA encapsulated gasket
- Smooth Chemfluor® fluoropolymer interior surface
- Promotes self-draining of entire hose assembly
- No joint between hose and fitting, no material entrapment
- Coupler swivels until completely sealed against gasket for easy operator handling

Style 16FT



For TWOB/TBOB, TWOY/TBOY, TWOK/TBOK, and TWOP/TBOP Series hose • Style 16FT

Inside Diameter		A Overall Length		B End to Gasket		I Inner Dia. of Hose	
in.	mm	in.	mm	in.	mm	in.	mm
0.75	19.05	3.25	82.55	2.40	60.96	0.75	19.05
1.00	25.40	3.56	90.42	2.50	63.50	1.00	25.40
1.25	31.75	C/F	C/F	C/F	C/F	1.25	31.75
1.50	38.10	4.00	101.60	2.50	63.50	1.50	38.10
2.00	50.80	4.19	106.35	2.70	68.58	2.00	50.80
3.00	76.20	6.00	152.40	4.50	114.30	2.5	63.50

For PharmaSmooth™ (PSTLCT) and TLCT Series hose • Style 16FT

Inside Diameter		A Overall Length		B End to Gasket		I Inner Dia. of Hose	
in.	mm	in.	mm	in.	mm	in.	mm
0.75	19.05	3.50	88.90	2.43	61.72	0.75	19.05
1.00	25.40	3.90	99.06	2.50	63.50	1.00	25.40
1.50	38.10	4.00	101.60	2.54	64.52	1.25	31.75
2.00	50.80	4.19	106.35	2.95	74.93	2.00	50.80

For MTL Series hose • Style 16FT

Inside Diameter		A Overall Length		B End to Gasket		I Inner Dia. of Hose	
in.	mm	in.	mm	in.	mm	in.	mm
1.00	25.40	4.30	109.22	3.25	82.55	0.86	21.84
1.50	38.10	4.75	120.65	3.25	82.55	1.40	35.56
2.00*	50.80	4.75	120.65	3.25	82.55	1.80	45.72
3.00*	76.20	5.00	127.00	3.50	88.90	2.80	71.12

⚠ **Important:** ***Special order only.**

⚠ **Important:**
All dimensions on this page are for components of Flare-Thru specification purpose only. Not sold as individual part.

Flare-Thru Fittings
Male/Female "I" Line Sanitary • Style 50FT / Style 51FT

description

- Female internal gasket seal provides easy assembly for male connection
- Self-aligning interlocking sanitary fittings
- High pressure

standards

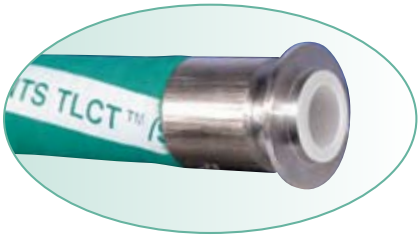
- **To industry standards**

materials

- 316 stainless steel
- Flare-Thru Chemfluor® fluoropolymer

technical data

- Temperature rated to exceed hose maximum temperature



Style 50FT Male

Style 51FT Female

Male/Female "I" Line
Sanitary • Style 50FT/Style 51FT

Style	Inside Diameter		Overall Length		Inner Dia. of Hose		Fitting Outer Diameter	
	in.	mm	in.	mm	in.	mm	in.	mm
50FT Male	0.75	19.05	1.83	46.48	.75	19.05	2	50.80
51FT Female	0.75	19.05	1.89	48.01	.75	19.05	2	50.80
51FT Female	0.875	22.23	1.92	48.77	.875	22.23	2	50.80
51FT Female	1.25	31.75	2.12	53.85	1.25	31.75	2	50.80
51FT Female	1.375	34.93	2.05	52.07	1.375	34.93	2	50.80
51FT Female	1.875	47.63	2.57	65.28	1.875	47.63	2.65	67.31

⚠ **Important:**
All dimensions on this page are for components of Flare-Thru specification purpose only. Not sold as individual part.

PermaSeal® Crimp Style Fitting System

Two-Piece Unit for Maximum Working Pressure

Flexible Components developed the PermaSeal® Crimp Style fitting system to enable a hose assembly to be used to the maximum working pressure of the particular hose style and size. The two-piece unit — fitting insert (stem) and crimp ferrule (collar) — is 360° radially compression crimped to hose for a positive lock.

Fittings are locked to the Chemfluor® fluoropolymer inner tube with fitting stem grooves. The crimp ferrule compresses the reinforcing braid or rubber cover and Chemfluor® tube onto the hose barb, assuring a tight liquid/gas seal. Ferrule and stem are positively locked together with a dog-lock groove.

This carefully engineered design means hose assemblies will exceed hose pressure rating without fitting pull-off or blow-off.

Note: All PermaSeal® crimp ferrules (collars) are manufactured from 304 stainless steel.

⚠ Important:
All pressure ratings given are for fittings only. Consult actual hose pressure rating; use lower of hose/fitting combination to determine MAWP (maximum working pressure).

Sanitary style fittings (not shown) of 316L stainless steel incorporate an internal chamfer for a smooth transitional flow that minimizes pressure drop and the potential for bacteria entrapment.

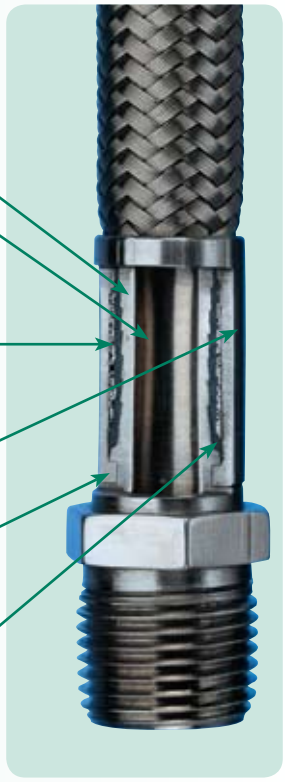
Smooth internal finish.

PermaSeal® Crimp Style fittings assure a total leak-proof seal between the Chemfluor® fluoropolymer inner tube and the fitting insert, even at extreme temperature and pressure variations.

Smooth radial crimp won't snag on equipment or cut workers' hands.

Dog-lock engagement assures that ferrule and stem are totally locked together as an assembly.

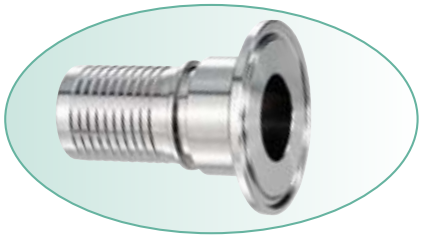
End of hose is fully protected; no foreign material can come into contact. The cover prevents abrasion and won't allow hose to catch on sharp objects.



types of PermaSeal® fittings

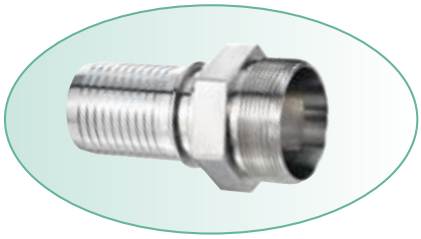
NPT

Flange

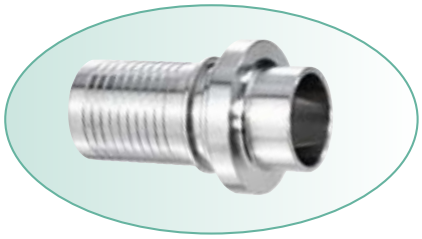


Sanitary

Cam and Groove



Instrumentation



Miscellaneous

PermaSeal® NPT Fittings

All male and female NPT fittings are stocked in type 316 stainless steel. Numerous sizes are available in zinc-plated carbon steel; some are stocked in Monel®. Many have been manufactured of various metal alloys — including brass, Hastelloy® grades, titanium or alloy 20 CB-3 — as well as plastic. Consult factory for more information.

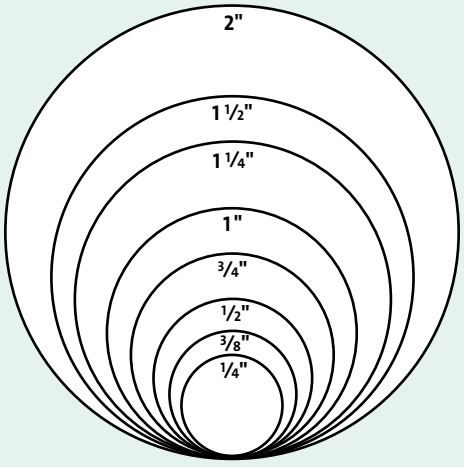
Flexible Components NPT fittings can be manufactured to ISO standards with either a 24° or 60° truncated cone; British BSPT (British Standard Pipe Taper) and BSPP (British Standard Pipe Parallel) are offered. J.I.S. (Japanese Industrial Standard) fittings have also been produced.

pipe thread fittings products

- **J.I.C. Female Swivel, Style 02**
- **Male NPT, Style 03**
- **Female NPT, Style 06 (Hex) / Style 05 (Round with Wrench Flats)**
- **J.I.C. Adapter Union Male, Style 08**

NPT Thread Sizing Guide

To obtain the nominal dimensions of an NPT thread, place the threaded end on the appropriate circle and read the diameter.



PermaSeal® J.I.C.
J.I.C. Female Swivel • Style 02

description

- J.I.C. female
- SAE J514-37° sealing surface
- Swivel fitting

standards

- **Joint Industrial Conference SAE J514**

materials

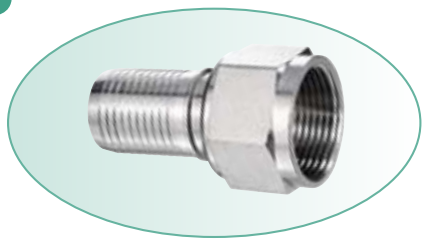
- 316 stainless steel wetted surface
- 304 stainless steel swivel nut
- Standard zinc-plated steel available for WCS/BCS series hose (1/2" - 2")

technical data

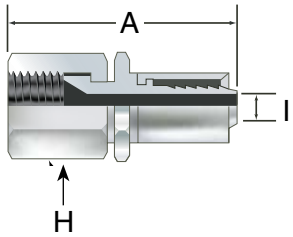
- 37° sealing surface machined to accept SAE taper of 45° in all sizes except 3/8" (-6) and 3/4" (-12), where threads differ
- Utilizing a female J.I.C. swivel style fitting with a J.I.C. by male pipe adapter results in a union fitting, enabling male by male or male by female FNPT connections to be made

alternative styles

- Can be supplied with different materials in the wetted surface area; consult factory for more details



Style 02



J.I.C. Female Swivel fitting specifications • Style 02

Part Number	Inside Diameter		A Fitting Length		H Hex Size		I Inner Dia. at Hose		J.I.C. Thread	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
160202SKN	0.13	3.18	1.29	32.77	0.43	10.92	0.10	2.54	3/8	24
160402SKN	0.25	6.35	1.38	35.05	0.56	14.22	0.19	4.83	7/16	20
160402USKN	0.25	6.35	1.43	36.32	0.63	15.88	0.19	4.83	1/2	20
160602SKN	0.38	9.53	1.68	42.67	0.68	17.27	0.30	7.62	9/16	18
160802SKN	0.50	12.70	2.02	51.31	0.87	22.10	0.40	10.16	3/4	16
160802USKN	0.50	12.70	2.15	54.61	1.00	25.40	0.40	10.16	7/8	14
381202SKN	0.75	19.05	2.59	65.79	1.25	31.75	0.65	16.51	1-1/16	12
381602SKN	1.00	25.40	2.68	68.07	1.50	38.10	0.87	22.10	1-5/16	12
382002SKN	1.25	31.75	3.81	96.77	2.25	57.15	1.10	27.94	1-5/8	12
382402SKN	1.50	38.10	3.81	96.77	2.25	57.15	1.37	34.80	1-7/8	12
383202SKN	2.00	50.80	4.75	120.65	2.88	73.15	1.75	44.45	2-1/2	12

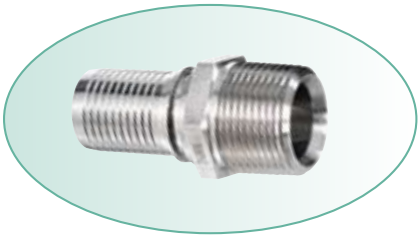
PermaSeal® NPT Fittings
Male NPT • Style 03

description

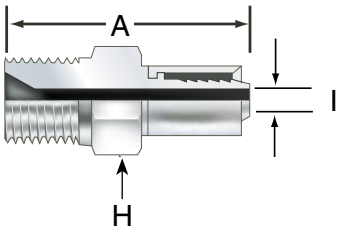
- Fixed male hex style
- Pipe threads: NPTF design

standards

- **American National Standard — NPTF hex style**



Style 03



materials

standard
- 316 stainless steel

non-standard (special order)
- Monel®
- Brass
- Zinc-plated carbon steel (see note accompanying chart)
- Hastelloy®
- Titanium
- Alloy 20 CB-3
- Plastics

alternative styles

- Metric
- BSPT/BSPP
- J.I.S. (special order)

technical data

- 2-1/2" and larger provided with milled wrench flats
- Male pipe threads (MNPT) are manufactured to American National Standard taper pipe thread specifications — ANSI B2.1
- Pipe thread fittings can be manufactured to ISO standards with either a 24° or 60° truncated cone
- British BSPT (British Standard Pipe Taper) and BSPP (British Standard Pipe Parallel) are also offered
- J.I.S. (Japanese Industrial Standard) fittings have also been produced
- NPSH coupling threads are available in specific sizes. It is possible to connect the swivel fitting of the NPSH to a standard NPT tapered thread using a gasket to seal the joint. Consult factory for availability.

Male NPT fitting specifications • Style 03

Part Number	Inside Diameter		A Fitting Length		H Hex Size		I Inner Dia. at Hose	
	in.	mm	in.	mm	in.	mm	in.	mm
160203SK0	0.13	3.18	1.26	32.00	0.43	10.92	0.08	1.93
160403SK0	0.25	6.35	1.72	43.69	0.56	14.27	0.17	4.32
160603SK0	0.38	9.53	1.80	45.64	0.69	17.45	0.28	7.11
160803SK0	0.50	12.70	2.24	56.77	0.88	22.23	0.38	9.53
381203SK0	0.75	19.05	2.51	63.65	1.13	28.58	0.63	16.00
381603SK0	1.00	25.40	2.91	73.91	1.38	34.93	0.87	22.10
382003SK0	1.25	31.75	3.69	93.73	1.75	44.45	1.10	27.94
382403SK0	1.50	38.10	3.92	99.57	2.00	50.80	1.37	34.80
383203SK0	2.00	50.80	4.60	116.84	2.40	60.96	1.75	44.45
384003SK0	2.50	63.50	C.F.	C.F	2.88	73.03	2.20	55.88
384803SK0	3.00	76.20	6.40	162.56	3.59	91.19	2.76	70.10
386403SK0	4.00	101.60	C.F.	C.F	C.F.	C.F.	3.75	95.25

⚠ **Important:** **Zinc plated carbon steel available in stock for 1/2" to 2" WCS/BCS Series Hose only.**

PermaSeal® NPT Fittings

Female NPT • Style 05 (Round with Wrench Flats)/ Style 06 (Hex)

description

- Fixed female hex style
- Pipe threads: NPTF design

standards

- **American National Standard — NPTF hex style**

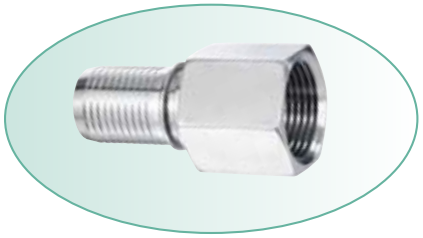
materials

standard
- 316 stainless steel

non-standard (special order)
- Monel®
- Brass
- Zinc-plated carbon steel
- Hastelloy®
- Titanium
- Alloy 20 CB-3
- Plastics: PVDF, polypropylene

alternative styles

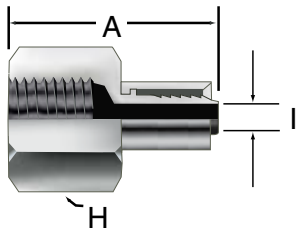
- Metric
- BSPT / BSPP
- J.I.S. (all as special orders)



Style 05/06

technical data

- Optional design may incorporate wrench flats milled on round bar stock in larger sizes; change part no. designation to Style 05 382405SK0 (1-1/2") or 383205SK0 (2")
- NPSH coupling threads are available in specific sizes. It is possible to connect the swivel fitting of the NPSH to a standard NPT tapered thread using a gasket to seal the joint. Consult factory for availability.
- Female pipe threads (FNPT) are manufactured to American National Standard taper pipe thread specifications — ANSI B2.1
- Pipe thread fittings can be manufactured to ISO standards with either a 24° or 60° truncated cone
- British BSPT (British Standard Pipe Taper) and BSPP (British Standard Pipe Parallel) are also offered
- J.I.S. (Japanese Industrial Standard) fittings have also been produced



Female NPT Hex fitting specifications • Style 06

Part Number	Inside Diameter		A Fitting Length		H Hex Size		I Inner Dia. at Hose	
	in.	mm	in.	mm	in.	mm	in.	mm
160406SK0	0.25	6.35	1.66	42.16	0.75	19.05	0.17	4.32
160606SK0	0.38	9.53	1.81	45.97	0.88	22.23	0.28	7.11
160806SK0	0.50	12.70	2.22	56.26	1.13	28.58	0.38	9.53
381206SK0	0.75	19.05	2.65	67.18	1.25	31.75	0.63	16.00
381606SK0	1.00	25.40	3.00	76.20	1.50	38.10	0.85	21.59

Female NPT Round with Wrench Flats fitting specifications • Style 05

Part Number	Inside Diameter		A Fitting Length		H Hex Size		I Inner Dia. at Hose	
	in.	mm	in.	mm	in.	mm	in.	mm
382405SK0	1.50	38.10	4.21	106.93	2.35	59.69	1.37	34.80
383205SK0	2.00	50.80	4.92	124.97	2.75	69.85	1.75	44.45

PermaSeal® J.I.C.

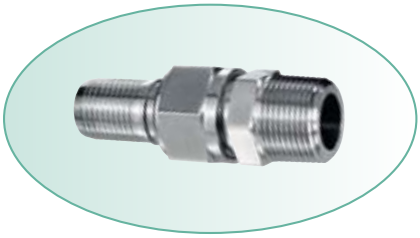
J.I.C. Adapter Union Male • Style 08

description

- Fixed male
- Swivel male/female union style
- Pipe threads: NPTF design

standards

- **American National Standard — NPTF hex style**



Style 08

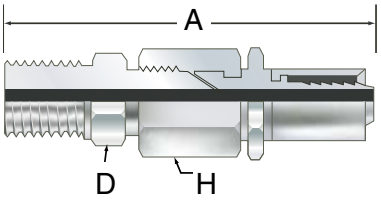
materials

standard
- 316 stainless steel wetted surface
- 304 stainless steel ferrule and nut

optional materials
- Monel®
- Brass
- Zinc-plated carbon steel

alternative styles

- Metric
- BSPT/BSPP
- J.I.S. (special order)



technical data

- Also available Female Adapter Union, Style 07 (1/8" - 1"); consult factory for availability
- Utilizing a female J.I.C. swivel style fitting with a J.I.C. by male adapter results in a union fitting, enabling male by male or male by female FNPT connections to be made

J.I.C. Adapter Union Male fitting specifications • Style 08

Part Number	Hose Size		Fitting Inner Diameter		H Hex 1 Size		D Hex 2 Size		A Fitting Length	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
160208SK0	0.13	3.30	0.10	2.54	0.56	14.22	0.56	14.22	2.35	59.69
160408SK0	0.25	6.35	0.19	4.83	0.62	15.75	0.56	14.22	2.41	61.21
160608SK0	0.38	9.65	0.30	7.62	0.68	17.27	0.75	19.05	2.67	67.82
160808SK0	0.50	12.7	0.40	10.16	0.87	22.10	0.93	23.62	3.27	83.06
381208SK0	0.75	19.05	0.65	16.51	1.25	31.75	1.12	28.45	3.97	100.84
381608SK0	1.00	25.40	0.87	22.10	1.50	38.10	1.37	34.80	4.26	108.20
382408SK0	1.50	38.10	1.37	34.80	2.26	57.40	2.00	50.80	5.57	141.48
383208SK0	2.00	50.80	1.75	44.45	2.88	73.15	2.63	66.68	8.75	222.25

⚠ Important:

Consult factory for Style 07 female NPT union availability and technical information.

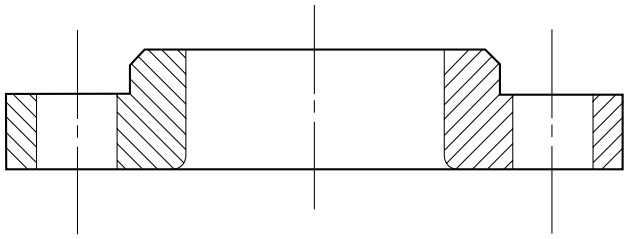
PermaSeal® Flange Fittings

PermaSeal® flange fittings feature a 316L stainless steel machined stub end, which is far more durable and corrosion resistant than industry standard 304 stainless steel. Thanks to the unique swivel design of the stub end and the fact that the flange "backs up" the stub end and is not in direct contact with corrosive media (as is common with fixed flange designs), the user has the option to choose less costly epoxy-coated carbon steel or low cost plastic flanges.

The machined stub end has an extremely smooth internal surface finish that surpasses the quality normally found with some "as cast" or "mill finish" stainless steel stub ends. In fact, Flexible Components stainless steel stub ends are machined to Type A Schedule 40 or thicker standards.

flange fittings products

- **Flange Retainer, Lap-Joint Style, 316L Stainless Steel, Style 12**
- **Flange Retainer, Lap-Joint Style, Chemfluor® PFA Encapsulated, Style 12T**



Nominal Flange Dimensions Applies to Styles 12, 12T, and 12FT.

Size NPS	Class 150								Class 300							
	Outer Diameter		Thickness		No. & Dia. of Bolt Holes		Bolt Circle Diameter		Outer Diameter		Thickness		No. & Dia. of Bolt Holes		Bolt Circle Diameter	
inches	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
1/2	3-1/2	88.9	7/16	11.11	(4) -5/8	15.87	2-3/8	60.32	3-3/4	95.25	9/16	14.28	(4) -5/8	15.87	2-5/8	66.67
3/4	3-7/8	98.41	1/2	12.7	(4) -5/8	15.87	2-3/4	69.85	4-5/8	117.47	5/8	15.87	(4) -3/4	19.05	3-1/4	82.55
1	4-1/4	107.95	9/16	14.28	(4) -5/8	15.87	3-1/8	79.38	4-7/8	123.8	11/16	17.46	(4) -3/4	19.05	3-1/2	88.90
1-1/2	5	127.00	11/16	17.46	(4) -5/8	15.87	3-7/8	98.42	6-1/8	155.57	13/16	20.63	(4) -7/8	22.23	4-1/2	114.30
2	6	152.4	3/4	19.05	(4) -3/4	19.05	4-3/4	120.65	6-1/2	165.1	7/8	22.22	(8) -3/4	19.05	5	127.00
2-1/2	7	177.8	7/8	22.23	(4) -3/4	19.05	5-1/2	139.7	7-1/2	190.5	1	25.4	(8) -7/8	22.23	5-7/8	149.22
3	7-1/2	190.5	15/16	23.81	(4) -3/4	19.05	6	152.4	8-1/4	209.55	1-1/8	28.57	(8) -7/8	22.23	6-5/8	168.27
4	9	228.6	15/16	23.81	(8) -3/4	19.05	7-1/2	190.5	10	254.00	1-1/4	31.75	(8) -7/8	22.23	7-7/8	200.02
6	11	279.4	1	25.4	(8) -7/8	22.23	9-1/2	241.3	12-1/2	317.5	1-7/16	36.51	(12) -7/8	22.23	10-5/8	269.87
8	13-1/2	342.9	1-1/8	28.57	(8) -7/8	22.23	11-3/4	298.45	15	381.00	1-5/8	41.27	(12) -1	25.4	13	330.20

PermaSeal® Flange Fittings

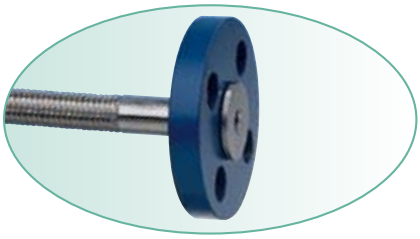
Flange Retainer, Lap-Joint Style • 316L Stainless Steel • Style 12

description

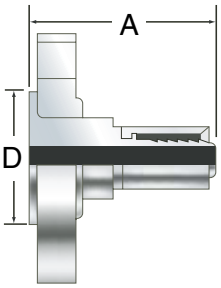
- Swivel flange, lap-joint style

standards

- **ANSI B16.5 150# and 300# ratings**
- **ASTM A.182**
- **Optional:**
  - **DIN P/N 16**
  - **BS 10 table E**
  - **BS 4504**
  - **J.I.S. and other various international specifications**



Style 03



materials

- Flange insert (stub end): 316L stainless steel
  - Polypropylene or PVDF (Kynar®) available on special order
- Flange: epoxy coated steel, 316 or 304 stainless steel, PVDF (Kynar®), polypropylene or PVC; consult factory for availability

alternative styles

- Can be supplied with different materials in the wetted surface area; consult factory

technical data

- Unique swivel design of stub end allows use of less costly epoxy-coated carbon steel or low cost plastic flanges
  - Because the flange "backs up" the stub end and is not in direct contact with corrosive media (as is common with fixed flange designs)
- Machined stub end has an extremely smooth internal surface finish that surpasses the quality normally found with some “as cast” or “mill finish” stainless steel stub ends
  - Flexible Components stainless steel stub ends are machined to Type A Schedule 40 or thicker standards

316L Stainless Steel Flange Retainer fitting specifications • Style 12

Part Number	Hose Size		Fitting Inner Dia.		Flange Outer Dia.		D Flare Dimensions		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
160812SK0	0.50	12.70	0.39	9.91	3.50	88.90	1.38	35.05	2.08	52.71
381212SK0	0.75	19.05	0.63	16.00	3.88	98.55	1.69	42.93	2.39	60.71
381612SK0	1.00	25.40	0.85	21.59	4.25	107.95	2.00	50.80	2.58	65.53
382412SK0	1.50	38.10	1.37	34.80	5.00	127.00	2.88	73.15	3.65	92.71
383212SK0	2.00	50.80	1.75	44.45	6.00	152.40	3.68	93.47	4.32	109.73
384012SK0	2.50	63.50	2.20	55.88	7.00	177.80	4.13	104.90	5.20	132.08
384812SK0	3.00	76.20	2.80	71.12	7.50	190.50	5.00	127.00	5.68	144.15
386412SK0	4.00	101.60	3.75	95.25	9.00	228.60	6.18	156.97	C/F*	C/F*

***C/F – consult factory.**

PermaSeal® Flange Fittings

Flange Retainer, Lap-Joint Style • Chemfluor® PFA Encapsulated • Style 12T

description

- Swivel flange, lap-joint style, Chemfluor® PFA encapsulated
- Constructed of Chemfluor® PFA individually molded around stainless steel base material
- Minimum Chemfluor® PFA thickness on any portion of fitting is .050"
- Chemfluor® PFA is dovetail-locked to flange faces, and secured internally and throughout the serrated areas of the fitting by multiple drillings

standards

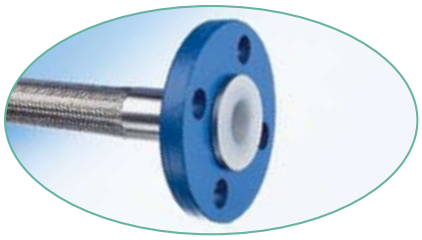
- **ANSI B16.5 150# and 300# rating**

materials

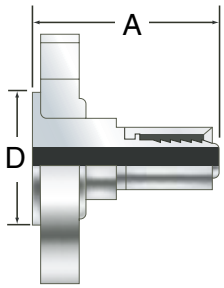
- Flange insert (stub end): PFA encapsulated stainless steel

technical data

- Ideal applications include all-purpose chemical transfer, pharmaceutical preparations, deionized water transfer, and handling of etching solutions
- Precision moldings assure uniformity
- Each style fitting of the same size has identical orifice openings, eliminating potential entrapment at fitting connections
- Generally larger openings than conventional lined fittings, for maximum flow rates
- Because Chemfluor® PFA is locked to stainless steel base, liner "flare-away" on flange faces is eliminated
- Ultimate corrosion and contamination resistance



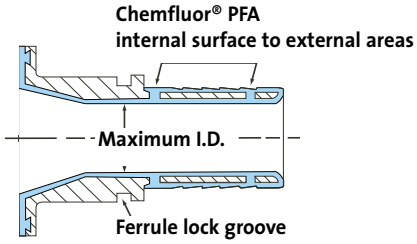
Style 12T



Stainless steel retainer dimensions

Chemfluor® PFA Encapsulated Flange Retainer fitting specifications • Style 12T

Part Number	Hose Size		Fitting Inner Dia.		Flange Outer Dia.		D Flare Dimensions		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
381212TK0	0.75	19.05	0.50	12.70	3.88	98.55	1.69	42.93	3.15	80.01
381612TK0	1.00	25.40	0.66	16.76	4.25	107.95	2.00	50.80	2.61	66.29
382412TK0	1.50	38.10	1.15	29.21	5.00	127.00	2.88	73.15	4.02	102.11
383212TK0	2.00	50.80	1.58	40.13	6.00	152.40	3.68	93.47	4.64	117.86
384012TK0	2.50	63.50	2.10	53.34	7.00	177.80	4.13	104.90	C/F	C/F
384812TK0	3.00	76.20	2.50	63.50	7.50	190.50	5.00	127.00	6.10	154.94



Chemfluor® PFA encapsulated insert

PermaSeal® Sanitary Fittings

Standard material utilized in the manufacture of sanitary hose fittings is 316L stainless steel.

To assure aseptic integrity and guarantee sterility of all hose assemblies, Flexible Components' sanitary fittings are machined internally to a surface finish with a maximum roughness average (Ra) of 15 or better. For applications requiring even smoother material surfaces, fittings electropolished to 8 Ra can be supplied.

The internal surface is also chamfered to prevent material build-up or entrapment at the end-point where the fitting stem contacts the Chemfluor® fluoropolymer inner tube.

sanitary fittings products

- **Sanitary Clamp/Step Up, Style 10/10U**
- **90° Elbow Full Size/Mini, Style 10L/11L**
- **Mini Sanitary Clamp, Style 11**
- **Bevel Seat, Style 20**
- **Male with Threads, Style 40**
- **Butt Weld/Tube Size, Style 41**
- **Male "I" Line, Style 50**
- **Female "I" Line, Style 51**

Benefits of Electropolishing for Sanitary Fittings

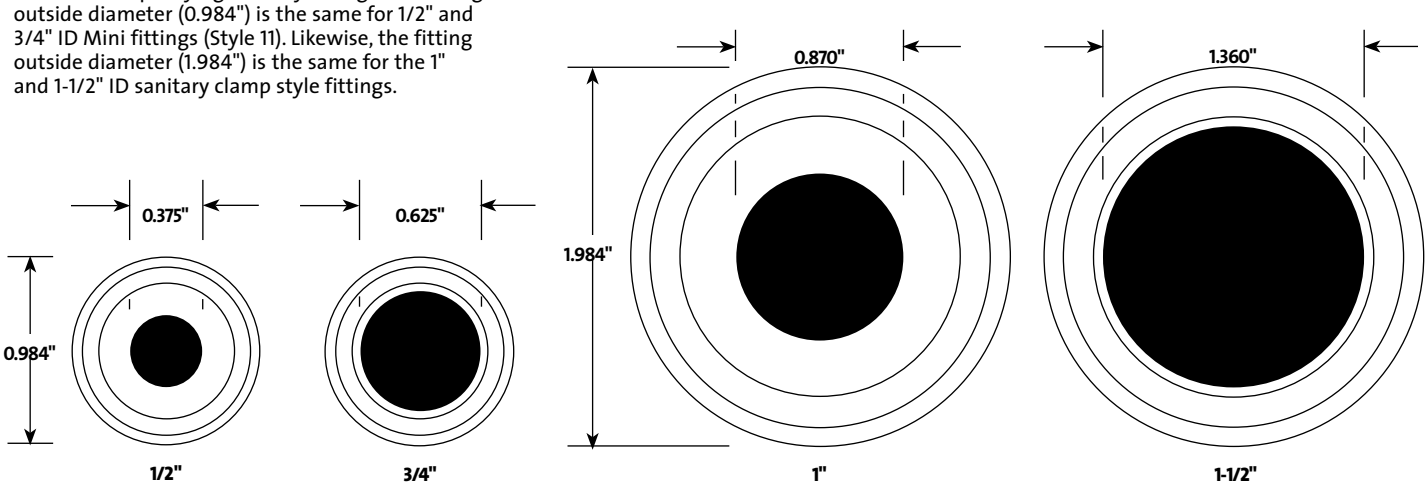
- Smooths surface roughness, lowering the coefficient of friction and minimizing the area exposed to microbial growth or corrosive attack
- Passivates surface, providing additional chemical resistance
- Removes any contamination from the fitting surface
- Helps with fitting inspection by exposing any potential defects in the surface that may have been camouflaged by mechanical polishing

Flexible Components stocks electropolished versions of a number of popular fitting styles and sizes for immediate shipment

Sanitary Fitting Sizing Guide

Applies to Styles 10/10U, 10L/11L, 11.

These schematics are designed to eliminate sizing errors when specifying sanitary fittings. The fitting outside diameter (0.984") is the same for 1/2" and 3/4" ID Mini fittings (Style 11). Likewise, the fitting outside diameter (1.984") is the same for the 1" and 1-1/2" ID sanitary clamp style fittings.



PermaSeal® Sanitary Fittings
Sanitary Clamp/Step Up • Style 10/10U

description

- Jump (or step-up) styles are designed with "blended" internal surfaces to prevent material build-up or entrapment
- Internal surface chamfered to prevent material build-up or entrapment at end-point where fitting stem contacts Chemfluor® fluoropolymer inner tube

standards

- **To industry standards**
- **Gasket face dimensions are standard to industry specifications**
- **BPE compliant fittings available**

materials

- 316L stainless steel

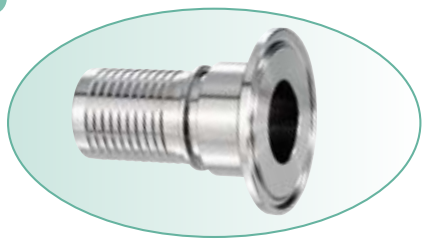
surface finish

- Average 15 Ra or better
- For applications requiring even smoother material surfaces, fittings electropolished to 10 Ra can be supplied

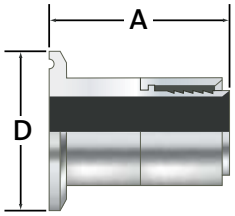
technical data

temperature/pressure ratings

- Pressure and temperature ratings of Flexible Components' sanitary assemblies are dependent on clamp pressure ratings and gasket material temperature ratings
- *Clamps:*
  - Standard weight style: 150 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
  - Heavyweight style: 500 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
  - High pressure bolt style: 1500 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
- *Gaskets:*
  - Above 250°F (121°C), PTFE, Viton® or silicone gaskets are recommended

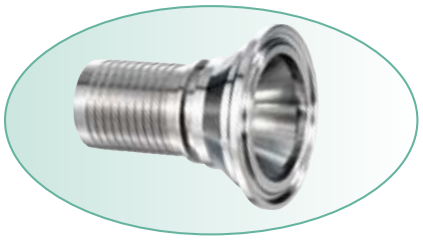


Style 10

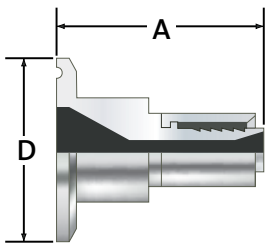


Sanitary Clamp/Step Up fitting specifications • Style 10/10U

Part Number	Hose Size		Fitting Inner Diameter		D Flange Diameter		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
160410SK0	0.25	6.35	0.19	4.83	1.98	50.29	1.46	37.08
160610SK0	0.38	9.53	0.28	7.11	1.98	50.29	1.90	48.26
160810SK0	0.50	12.70	0.38	9.53	1.98	50.29	1.90	48.26
160810USK	0.50	12.70	0.38	9.53	1.98	50.29	1.90	48.26
381210SK0	0.75	19.05	0.65	16.51	1.98	50.29	2.39	60.71
381210USK	0.75	19.05	0.65	16.51	1.98	50.29	2.39	60.71
381610SK0	1.00	25.40	0.87	22.10	1.98	50.29	2.24	56.90
381610USK	1.00	25.40	0.87	22.10	1.98	50.29	2.30	58.29
382410SK0	1.50	38.10	1.37	34.67	2.52	63.91	2.88	73.15
382410USK	1.50	38.10	1.37	34.67	2.51	63.75	2.88	73.15
383210SK0	2.00	50.80	1.75	44.45	2.50	63.50	4.00	101.60
384010SK0	2.50	63.50	2.22	56.39	3.05	77.47	4.02	102.11
384810SK0	3.00	76.20	2.80	71.12	3.58	90.93	4.54	115.19
386410SK0	4.00	101.60	3.75	95.25	4.68	118.75	5.16	130.94



Style 10U



⚠ Important:

Drawings shown are not BPE compliant

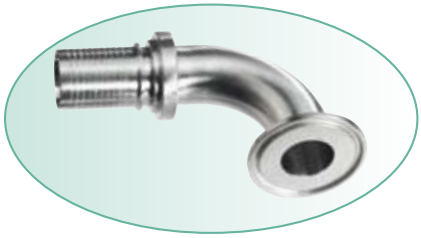
PermaSeal® Sanitary Fittings
90° Elbow Full Size / Mini • Style 10L / 11L

description

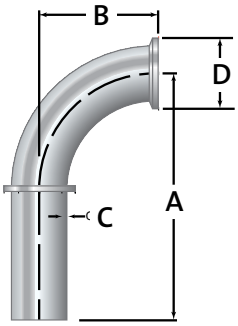
- 90° sanitary elbows in mini and sanitary clamp styles
- Sanitary connection matches hose barb size

standards

- **To industry standards**
- **Gasket face dimensions are standard to industry specifications**
- **BPE compliant fittings available**



Style 10L



Style 11L

materials

- 316L stainless steel

surface finish
- Average 15 Ra or better

alternative styles

- 1/2" and 3/4" are mini style (straight sizes only)
- 1" through 4" sanitary clamp style (straight sizes only, no "step up" sizes available)
- Standard in 90° elbow configurations (45° elbows available by special order)
- Electropolished version available

technical data

- Reduces strain on hoses by eliminating 90° hose configuration
- Eliminates entrapment, reduces connection points and potential bacteria growth areas
- Smaller installed dimensional envelope

temperature/pressure ratings
- Pressure and temperature ratings of Flexible Components' sanitary assemblies are dependent on clamp pressure ratings and gasket material temperature ratings
- *Clamps:*
  - Standard weight style: 150 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
  - Heavyweight style: 500 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
  - High pressure bolt style: 1500 PSIG @ 70°F (21°C); 125 PSIG @ 250°F (121°C)
- *Gaskets:*
  - Above 250°F (121°C), PTFE, Viton® or silicone gaskets are recommended

90° Elbow Full Size / Mini fitting specifications • Style 10L / 11L

Part Number	Hose Size		A Centerline to Fitting End		B Centerline to Face		C Wall Thickness		D Fitting Outer Dia.	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
160811LSK	0.50	12.70	4.47	113.41	1.63	41.28	0.07	1.65	0.98	24.89
161211LSK	0.75	19.05	4.73	120.02	1.63	41.28	0.07	1.65	0.98	24.89
381610LSK	1.00	25.40	4.90	124.33	2.00	50.80	0.07	1.65	1.98	50.29
382410LSK	1.50	38.10	6.36	161.54	2.75	69.85	0.07	1.65	1.98	50.29
383210LSK	2.00	50.80	8.02	203.58	3.50	88.90	0.07	1.65	2.49	63.25
384010LSK	2.50	63.50	C/F	C/F	4.25	107.95	0.07	1.65	3.05	77.47
384810LSK	3.00	76.20	10.16	258.04	5.00	127.00	0.07	1.65	3.58	90.93
386410LSK	4.00	101.60	12.61	320.24	6.63	168.28	0.08	2.11	4.68	118.75

PermaSeal® Sanitary Fittings
Mini Sanitary Clamp • Style 11

description

- Mini/fractional size sanitary fitting

standards

- **To industry standards**
- **Interchangeable with ALL standard manufacturers' designs**
- **BPE compliant fittings available**

materials

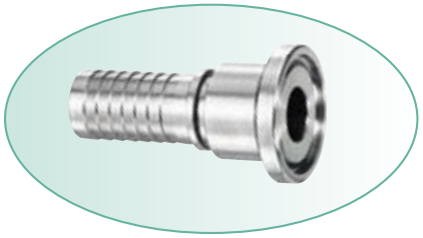
standard
- 316L stainless steel

non-standard (special order)
- Polypropylene
- PVDF
- Titanium
- Other materials

surface finish
- Average 15 Ra or better

alternative styles

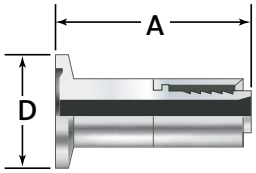
- 1/4", 3/8" and 1/2" hose barbs are 1/2" mini-sized
- Consult factory for "step-up" for 1/4", 3/8" and 1/2" hose barb to 3/4" mini-size sanitary
- 3/4" hose barb is 3/4" mini-sized
- Standard in 90° elbow configurations (45° elbows available by special order)
- Electropolished version available



Style 11

technical data

pressure ratings (mini fitting only)
- 1500 PSIG @ 70°F (21°C); 1200 PSIG @ 250°F (with heavyweight clamp)
- Consult actual hose pressure rating; use lower of hose/fitting combination to determine MAWP (maximum working pressure)



Mini Sanitary Clamp fitting specifications • Style 11

Part Number	Hose Size		Inner Diameter		D Flange Diameter		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
160411SK0	0.25	6.35	0.19	4.83	0.98	24.89	1.41	35.81
160611SK0	0.38	9.53	0.28	7.11	0.98	24.89	1.56	39.62
160811SK0	0.50	12.70	0.37	9.40	0.98	24.89	1.72	43.56
381211SK0	0.75	19.05	0.63	16.00	0.98	24.89	2.10	53.34

⚠ Important:
Drawings shown are not BPE compliant

PermaSeal® Sanitary Fittings
Bevel Seat • Style 20

description

- Sanitary bevel seat fitting with Acme nut provides simple threaded connections and assembly/disassembly

standards

- **To industry standards**
- **BPE compliant fittings available**

materials

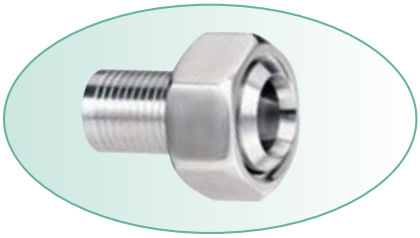
- Insert material: 316L stainless steel
- Acme nut material: 304 stainless steel

surface finish

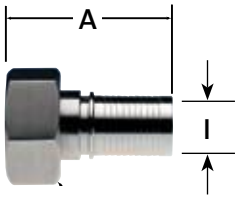
- Average 15 Ra or better

alternative styles

- Consult factory for availability of other sizes



Style 20



Bevel Seat fitting specifications • Style 20

Part Number	Hose Size		I Fitting Inner Dia.		Fitting Outer Dia.		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
381620SKN	1.00	25.40	0.87	22.10	1.80	45.72	2.90	73.66
382420SKN	1.50	38.10	1.37	34.80	2.38	60.33	3.85	97.79

PermaSeal® Sanitary Fittings
Male with Threads • Style 40

description

- Internal surface chamfered to prevent material build-up or entrapment at end-point where fitting stem contacts Chemfluor® fluoropolymer inner tube

standards

- **To industry standards**
- **BPE compliant fittings available**

materials

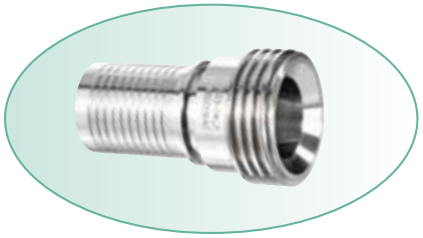
- 316L stainless steel

surface finish

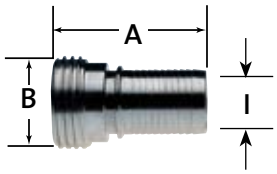
- Average 15 Ra or better
- For applications requiring even smoother material surfaces, fittings electropolished to 10 Ra can be supplied.

alternative styles

- Consult factory for availability of other sizes



Style 40



Male with Threads fitting specifications • Style 40

Part Number	Hose Size		I Fitting Inner Dia.		B Fitting Outer Dia.		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
381640SK0	1.00	25.40	0.85	22.10	1.46	37.08	2.38	60.33
382440SK0	1.50	38.10	1.37	34.80	1.99	50.55	3.40	86.36

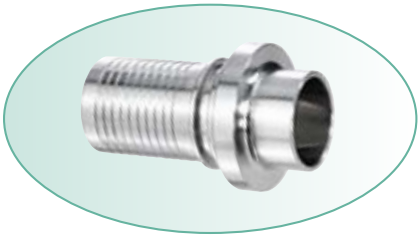
PermaSeal® Sanitary Fittings
Butt Weld / Tube Size • Style 41

description

- Internal surface chamfered to prevent material build-up or entrapment at end-point where fitting stem contacts Chemfluor® fluoropolymer inner tube

standards

- **To industry standards**
- **BPE compliant fittings available**



Style 41

materials

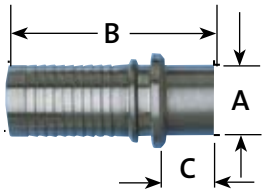
- 316L stainless steel

surface finish

- Average 15 Ra or better
- For applications requiring even smoother material surfaces, fittings electropolished to 10 Ra can be supplied

technical data

- Available for welding to existing systems
- Care should be exercised so weld heat is not conducted to Chemfluor® fluoropolymer tube



Butt Weld / Tube Size fitting specifications • Style 41

Part Number	Hose Size		A Butt Weld Outer Dia.		B Overall Length		C Butt Weld Length	
	in.	mm	in.	mm	in.	mm	in.	mm
160432SK0*	0.25	6.35	0.25	6.35	1.70	43.18	0.19	4.83
160632SK0*	0.38	9.53	0.38	9.58	2.01	51.08	0.28	7.11
160841SK0	0.50	12.70	0.50	12.70	1.87	47.37	0.38	9.53
381241SK0	0.75	19.05	0.75	19.05	2.12	53.85	0.63	16.00
381641SK0	1.00	25.40	1.00	25.40	2.42	61.47	0.87	22.10
382441SK0	1.50	38.10	1.50	38.10	3.26	82.78	1.37	34.67
383241SK0	2.00	50.80	2.00	50.80	4.17	105.79	1.75	44.45
384041SK0	2.50	63.50	2.50	63.50	4.34	110.11	2.20	55.88
384841SK0	3.00	76.20	3.00	76.20	5.81	147.57	2.76	70.10

*1/4" and 3/8" use compression tube adapter.

PermaSeal® Sanitary Fittings
Male/Female "I" Line • Style 50/Style 51

description

- Internal gasket seal design provides easy assembly and alignment with male/female connections

standards

- **To industry standards**
- **BPE compliant fittings available**

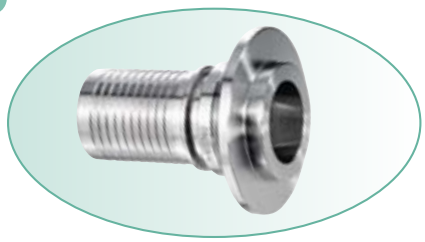
materials

- 316L stainless steel

surface finish
- Average 15 Ra or better

technical data

- Also available in Flare-Thru design with Chemfluor® fluoropolymer hose inner core (see page 40)

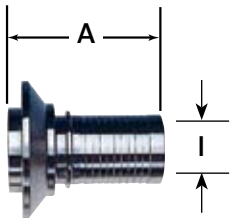


Style 50

Male "I" Line fitting specifications • Style 50*

Part Number	Hose Size		I Fitting Inner Dia.		Fitting Outer Dia.		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
381650SK0	1.00	25.40	0.85	21.59	2.00	50.80	2.21	56.13
382450SK0	1.50	38.10	1.37	34.80	2.00	50.80	3.19	81.03
383250SK0	2.00	50.80	1.75	44.45	2.69	68.33	3.93	99.82
384050SK0	2.50	63.50	2.20	55.88	3.32	84.33	4.32	109.73
384850SK0	3.00	76.20	2.70	68.58	C/F	C/F	C/F	C/F

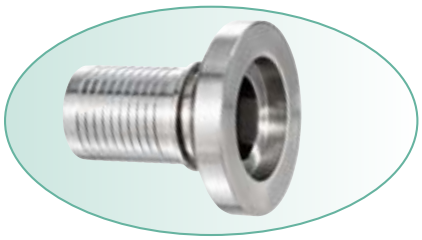
*Special purchase



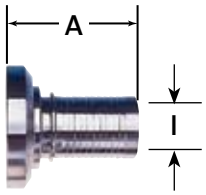
Female "I" Line fitting specifications • Style 51*

Part Number	Hose Size		I Fitting Inner Dia.		Fitting Outer Dia.		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
381651SK0	1.00	25.40	0.87	22.10	2.00	50.80	2.10	53.21
382451SK0	1.50	38.10	1.37	34.80	2.00	50.80	3.15	80.01
383251SK0	2.00	50.80	1.75	44.45	2.65	67.31	3.93	99.82
384051SK0	2.50	63.50	2.22	56.39	3.32	84.25	4.42	112.14
384851SK0	3.00	76.20	2.80	71.12	3.87	C/F**	4.82	C/F**

*Special Purchase
**C/F – consult factory.



Style 51



PermaSeal® Cam and Groove Fittings

Cam and groove fittings feature a full swivel design on the coupler-half, which allows positioning for easy leverage to seal the cam arms. Other advantages of the cam and groove design include the dog-lock groove (found on all Flexible Components fittings), which provides a positive lock to the hose, and machined, rather than cast metal, internal surfaces.

Chemfluor® PFA encapsulated cam and groove fittings will convey almost any material corrosion-free; in addition, a full complement of Chemfluor® fluoropolymer encapsulated adapters and sealing gaskets are offered. The gaskets comprise Chemfluor® PFA over silicone for a resilient seal with no exposed elastomers.

cam and groove fittings products

- Female 316 Stainless Steel Swivel, Style 16
- Female Chemfluor® PFA Encapsulated, Style 16T
- Male 316 Stainless Steel, Style 17
- Male Chemfluor® PFA Encapsulated, Style 17T

PermaSeal® Cam and Groove Fittings
Female 316 Stainless Steel Swivel • Style 16

description

- Female cam and groove "D" type, swivel style
- Full swivel design on the coupler-half
  - Allows positioning for easy leverage advantage to seal cam arms
- Positive lock to the hose
  - Fitting design incorporates the dog-lock groove found in all Flexible Components fittings
  - Prevents fitting pull-off
- Machined internal surfaces
  - Not a cast metal surface
  - Higher purity, larger ID for better flow rate, reduced entrapment

standards

- **Manufactured to specification MIL-C-27487**
- **All styles fully interchangeable with all other manufacturers' designs when made to this specification**

materials

- 316 stainless steel
- Coupler is cast 316 stainless steel; insert is machined 316L stainless steel
- Standard gasket material: Buna N rubber

alternative styles

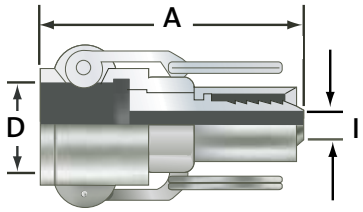
- Locking mechanism available to prevent accidental release of locking cam arms

technical data

recommended operating conditions

- 1/2" - 2" — 250 MAWP (psi)
- 2-1/2" and 3" — 150 MAWP (psi)
  - 212°F with Buna N gaskets
  - 400°F with Chemfluor® PFA encapsulated gaskets
- Pressure ratings are for fittings **only**. When determining hose assembly maximum allowable working pressure, hose pressure ratings at temperature must be considered. Use the lower of the two ratings as the hose assembly MAWP.
- Locking style available; replace SKS with SLKS in part number

Style 16



Style 16LK

Female Cam and Groove (Stainless Steel) fitting specifications • Style 16

Part Number	Hose Size		I Fitting Inner Dia.		D Inside Dimension		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
160816SKS	0.50	12.70	0.39	9.91	1.50	38.10	3.28	83.31
381216SKS	0.75	19.05	0.63	16.00	2.12	53.85	2.52	64.01
381616SKS	1.00	25.40	0.85	21.59	2.38	60.45	4.07	103.38
382416SKS	1.50	38.10	1.37	34.80	3.44	87.38	4.96	125.98
383216SKS	2.00	50.80	1.75	44.45	3.88	98.55	5.90	149.86
384016SKS	2.50	63.50	2.20	55.88	4.38	111.25	C/F*	C/F*
384816SKS	3.00	76.20	2.76	70.10	5.31	134.87	7.15	181.61

*C/F – consult factory.

PermaSeal® Cam and Groove Fittings
Female Chemfluor® PFA Encapsulated Swivel • Style 16T

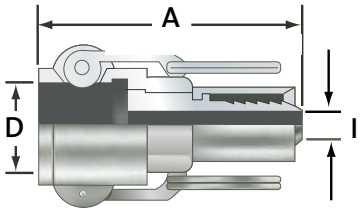
description

- Female cam and groove "D" type, swivel style
- Chemfluor® PFA encapsulated
- Full swivel design on the coupler-half
  - Allows positioning for easy leverage advantage to seal cam arms
- Positive lock to the hose
  - Fitting design incorporates the dog-lock groove found in all Flexible Components fittings
  - Prevents fitting pull-off

standards

- **Manufactured to specification MIL-C-27487**
- **All styles fully interchangeable with all other manufacturers' designs when made to this specification**

Style 16T



Style 16TLK

materials

- Chemfluor® PFA encapsulated with stainless steel base
- Coupler is cast 316 stainless steel; insert is Chemfluor® PFA encapsulated with stainless steel base
- Chemfluor® PFA encapsulated sealing gasket
  - Chemfluor® PFA over silicone

alternative styles

- Female cam and groove swivel style (Style 16TLK), locking arms with Chemfluor® PFA encapsulated insert and 316 stainless steel body

technical data

- Chemfluor® PFA encapsulated designs will convey almost any material corrosion-free
- Chemfluor PFA encapsulated sealing gasket provides resilient seal with no exposed elastomers
- Full complement of Chemfluor® fluoropolymer encapsulated adapters available

recommended operating conditions

- 3/4" - 2" — 250 MAWP (psi)
- 2-1/2" and 3" — 150 MAWP (psi)
  - 212°F with Buna N gaskets
  - 400°F with Chemfluor® PFA encapsulated gaskets
- Pressure ratings are for fittings only. When determining hose assembly maximum allowable working pressure, hose pressure ratings at temperature must be considered. Use the lower of the two ratings as the hose assembly MAWP.
- Locking style available; replace TKS with TLKS

Female Cam and Groove (Chemfluor® PFA Encapsulated) fitting specifications • Style 16T

Part Number	Hose Size		I Fitting Inner Dia.		D Inside Dimension		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
381216TKS	0.75	19.05	0.50	12.70	2.12	53.85	3.55	90.17
381616TKS	1.00	25.40	0.66	16.76	2.38	60.45	4.01	101.85
382416TKS	1.50	38.10	1.15	29.21	3.44	87.38	5.00	127.00
383216TKS	2.00	50.80	1.58	40.13	3.88	98.55	6.02	152.91
384016TKS	2.50	63.50	2.10	53.34	4.38	111.25	C/F*	C/F*
384816TKS	3.00	76.20	2.50	63.50	5.31	134.87	7.19	182.63

*C/F – consult factory.

PermaSeal® Cam and Groove Fittings
Male 316 Stainless Steel • Style 17

description

- Male cam and groove "E" type
- Face sealing surface features dove-tail locking design

standards

- **Manufactured to specification MIL-C-27487**
- **All styles fully interchangeable with all other manufacturers' designs when made to this specification**

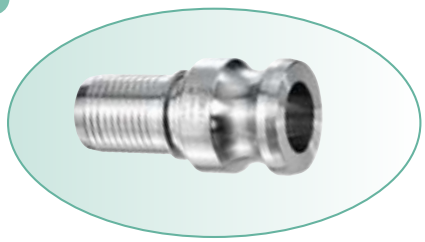
materials

- 316 stainless steel machined surface to √32

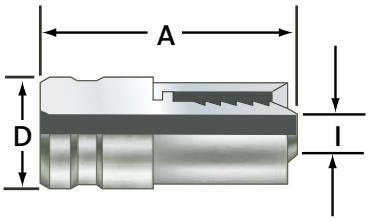
technical data

recommended operating conditions

- 1/2" - 2" — 250 MAWP (psi)
- 2-1/2" and 3" — 150 MAWP (psi)
  - 212°F with Buna N gaskets
  - 400°F with Chemfluor® PFA encapsulated gaskets
- Pressure ratings are for fittings **only**. When determining hose assembly maximum allowable working pressure, hose pressure ratings at temperature must be considered. Use the lower of the two ratings as the hose assembly MAWP.



Style 17



Male Cam and Groove (Stainless Steel) fitting specifications • Style 17

Part Number	Hose Size		I Fitting Inner Dia.		D Inside Dimension		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
160817SK0	0.50	12.70	0.39	9.91	1.18	29.97	2.25	57.15
381217SK0	0.75	19.05	0.63	16.00	1.26	32.00	2.46	62.48
381617SK0	1.00	25.40	0.87	22.10	1.44	36.58	2.98	75.69
382417SK0	1.50	38.10	1.37	34.80	2.09	53.09	4.00	101.60
383217SK0	2.00	50.80	1.75	44.45	2.49	63.25	4.82	122.43
384017SK0	2.50	63.50	2.20	55.88	C/F*	C/F*	C/F*	C/F*
384817SK0	3.00	76.20	2.76	70.10	3.60	91.44	5.53	140.46

***C/F – consult factory.**

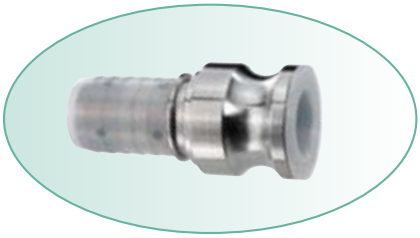
PermaSeal® Cam and Groove Fittings
Male Chemfluor® PFA Encapsulated • Style 17T

description

- Male cam and groove "E" type
- Chemfluor® PFA encapsulated
- Face sealing surface features dove-tail locking design

standards

- **Manufactured to MIL-C-27487**
- **All styles fully interchangeable with all other manufacturers' designs when made to this specification**



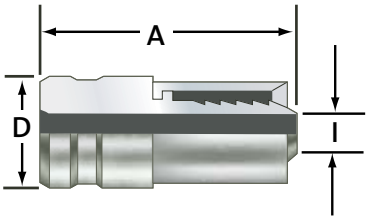
Style 17T

materials

- 316 stainless steel machined to √32 (Style 17) or Chemfluor® PFA encapsulated (Style 17T)

alternative styles

- Available in PVDF (Kynar®), polypropylene
- Other materials (special order)



technical data

- Ultimate corrosion-resistant design
- Vacuum resistant
- Inside diameters match all Chemfluor® PFA encapsulated fitting designs

recommended operating conditions

- 3/4" - 2" — 250 MAWP (psi)
- 2-1/2" — 150 MAWP (psi)
  - 212°F with Buna N gaskets
  - 400°F with Chemfluor® PFA encapsulated gaskets
- Pressure ratings are for fittings **only**. When determining hose assembly maximum allowable working pressure , hose pressure ratings at temperature must be considered. Use the lower of the two ratings as the hose assembly MAWP.
- Consult factory for male cam and groove Flare-Thru availability by hose style

Male Cam and Groove (Chemfluor® PFA Encapsulated) fitting specifications • Style 17T

Part Number	Hose Size		I Fitting Inner Dia.		D Inside Dimension		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
381217TK0	0.75	19.05	0.50	12.70	1.25	31.75	C/F*	C/F*
381617TK0	1.00	25.40	0.66	16.76	1.44	36.58	3.02	76.71
382417TK0	1.50	38.10	1.15	29.21	2.09	53.09	3.95	100.33
383217TK0	2.00	50.80	1.58	40.13	2.49	63.25	5.02	127.51
384017TK0	2.50	63.50	2.10	53.34	C/F*	C/F*	C/F*	C/F*

*C/F – consult factory.

PermaSeal® Instrumentation Fittings

Flexible Components instrumentation fittings include several styles: compression tube fittings, O-ring style fittings and vacuum fittings.

Compression tube fittings are manufactured for complete compatibility with existing tube fitting designs. All wetted surfaces are machined from 316 stainless steel; consult factory for availability of other materials. Because they are designed for full ID hose assemblies, the inside diameter of the compression tube fittings matches identically with the tube ID. The straight-through bore, coupled with the fittings' smooth internal surface finish, eliminates "step" or "dam" effects; this design minimizes pressure drop, offers superior flow rates, eliminates turbulence and subsequent erosive action, and facilitates cleaning/purging. These fittings are rated to the full operating pressure of the hose.

O-ring style fittings are designed for rapid and repeat connect/disconnect applications. They perform superbly in medium and high pressure services. Zero clearance is needed for make-up, and minimal torque is required to seat the fitting. Please note that O-ring gaskets not provided.

Vacuum style fittings allow "no adapter" connection with Chemfluor® fluoropolymer inner core hose. They require no axial clearance for assembly/disassembly. The sealing surfaces feature a mirror finish, and threads are plated to prevent galling and allow repeated connections.

instrumentation fittings products

- Tube Connector, Style 31
- Tube Connector with Ferrules and Nut, Style 31 FN
- Tube Adapter, Style 32
- O-Ring, Style 33
- Vacuum Female, Style 34
- Vacuum Male, Style 35

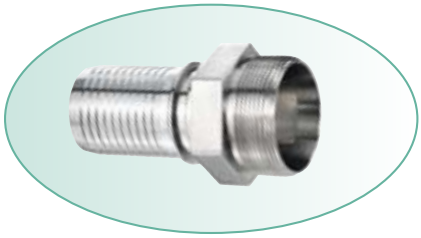
PermaSeal® Instrumentation Fittings
Tube Connector •Style 31

description

- Manufactured for complete compatibility with existing tube fitting designs
- Straight-through bore eliminates “step” or “dam” effects

standards

- **To industry standards**



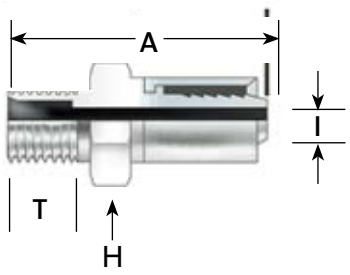
Style 31

materials

- All wetted surfaces machined from 316 stainless steel
  - Consult factory for availability of other materials

alternative styles

- Jump sizes available



technical data

- Designed for full ID hose assemblies
  - When the fitting stem is inserted into Chemfluor® fluoropolymer tube, resulting inside diameter matches identically with tube ID
- Straight-through bore, coupled with smooth internal surface finish:
  - Minimizes pressure drop
  - Offers superior flow rates
  - Eliminates turbulence and subsequent erosive action
  - Facilitates cleaning/purging
  - Rated to full operating pressure of hose
- Furnished without ferrule(s) and nut to facilitate usage with existing inventories

Tube Connector fitting specifications • Style 31

Part Number	Hose Size		I Inner Diameter		H Hex Size		A Overall Length		T Thread
	in.	mm	in.	mm	in.	mm	in.	mm	in.
160431SK0	0.25	6.35	0.19	4.83	0.56	14.22	1.44	36.58	7/16 – 20
160631SK0	0.38	9.53	0.28	7.11	0.68	17.27	1.70	43.18	5/8 – 20
160831SK0	0.50	12.70	0.38	9.53	0.88	22.23	1.95	49.40	3/4 – 20
381231SK0	0.75	19.05	0.65	16.51	1.06	26.92	2.50	63.50	1 – 20
381631SK0	1.00	25.40	0.87	22.10	1.37	34.80	2.61	66.24	1-1/2 – 20

PermaSeal® Instrumentation Fittings
Tube Connector with Ferrules and Nut • Style 31 FN

description

- Compression connector complete with ferrules and nut enables coupling directly to tubing
- Manufactured for complete compatibility with existing tube fitting designs
- Straight-through bore eliminates “step” or “dam” effects

standards

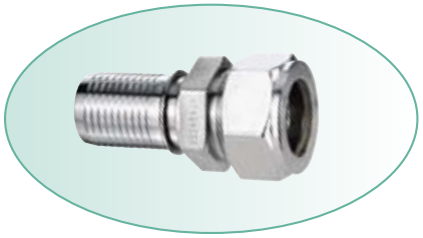
- **To industry standards**

materials

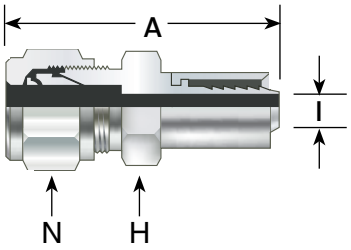
- All wetted surfaces machined from 316 stainless steel
  - Consult factory for availability of other materials

technical data

- Designed for full ID hose assemblies
  - When the fitting stem is inserted into Chemfluor® fluoropolymer tube, resulting inside diameter matches identically with tube ID
- Straight-through bore, coupled with smooth internal surface finish:
  - Minimizes pressure drop
  - Offers superior flow rates
  - Eliminates turbulence and subsequent erosive action
  - Facilitates cleaning/purging
  - Rated to full operating pressure of hose



Style 31 FN



Tube Connector with Ferrules and Nut fitting specifications • Style 31 FN

Part Number	Hose Size		I Inner Diameter		H Hex Size		N Hex Size		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
160431FNS	0.25	6.35	0.19	4.83	0.56	14.22	0.56	14.22	1.73	43.94
160631FNS	0.38	9.53	0.30	7.62	0.68	17.27	0.68	17.27	2.08	52.83
160831FNS	0.50	12.70	0.40	10.16	0.88	22.35	0.88	22.35	2.48	62.99
381231FNS	0.75	19.05	0.65	16.51	1.06	26.92	1.12	28.45	2.81	71.37
381631FNS	1.00	25.40	0.87	22.10	1.37	34.80	1.50	38.10	2.96	75.18

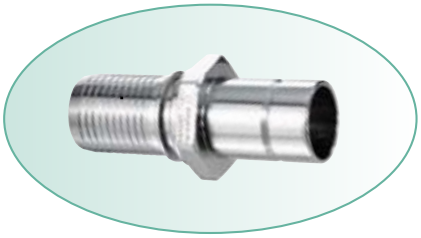
PermaSeal® Instrumentation Fittings
Tube Adapter • Style 32

description

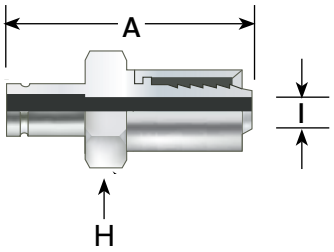
- Readily accommodates other styles of fitting adapter connection
- Manufactured for complete compatibility with existing tube fitting designs
- Straight-through bore eliminates “step” or “dam” effects

standards

- **To industry standards**



Style 32



materials

- All wetted surfaces machined from 316 stainless steel
  - Consult factory for availability of other materials

technical data

- Designed for full ID hose assemblies
  - When the fitting stem is inserted into Chemfluor® fluoropolymer tube, resulting inside diameter matches identically with tube ID
- Straight-through bore, coupled with smooth internal surface finish:
  - Minimizes pressure drop
  - Offers superior flow rates
  - Eliminates turbulence and subsequent erosive action
  - Facilitates cleaning/purging
  - Rated to full operating pressure of hose
- When utilizing Flexible Components hoses with Style 32 fittings, it is recommended that ferrules be pre-swaged to the tubing to eliminate potential torquing of the hose

Tube Adapter fitting specifications • Style 32

Part Number	Hose Size		I Inner Diameter		H Hex Size		Tube End OD Nominal		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
160432FNS	0.25	6.35	0.19	4.83	0.56	14.22	0.25	6.35	1.70	43.18
160632FNS	0.38	9.53	0.30	7.62	0.68	17.27	0.38	9.65	2.00	50.80
160832FNS	0.50	12.70	0.40	10.16	0.88	22.35	0.50	12.70	2.53	64.26
381232FNS	0.75	19.05	0.65	16.51	1.06	26.92	0.75	19.05	3.04	77.22
381632FNS	1.00	25.40	0.87	22.10	1.37	34.80	1.00	25.40	3.28	83.31

PermaSeal® Instrumentation Fittings
O-Ring • Style 33

description

- Designed for rapid and repeat connect/disconnect applications

standards

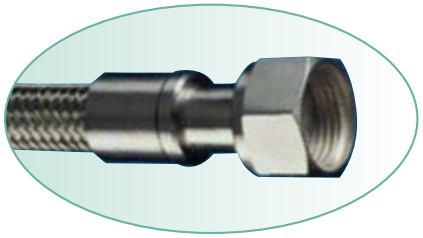
- **To industry standards**

materials

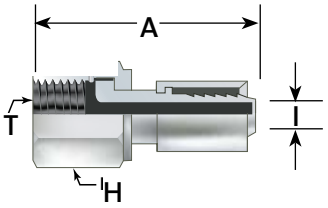
- 316 stainless steel

technical data

- Zero clearance needed for make-up
- Requires minimal torque to seat
- Performs superbly in medium and high pressure services
- Prevents torquing of hose during hook-up
- A number of manufacturers offer O-ring style connections; compare thread sizes of Style 33 fittings before attempting interchange
- Temperature ratings of O-ring assemblies are dependent on the temperature rating of the O-ring gasket material
  - O-ring gaskets not provided



Style 33



O-Ring fitting specifications • Style 33

Part Number	Hose Size		I Inner Diameter		H Hex Size		A Overall Length		T Thread
	in.	mm	in.	mm	in.	mm	in.	mm	in.
160433SKN	0.25	6.35	0.19	4.83	0.68	17.27	1.83	46.48	9/16 –1 8
160633SKN	0.38	9.53	0.30	7.62	1.00	25.40	1.95	49.53	7/8 – 14
160833SKN	0.50	12.70	0.40	10.16	1.12	28.45	1.95	49.53	1 – 14
381233SKN	0.75	19.05	0.65	16.51	1.50	38.10	2.19	55.63	1-1/4 – 18
381633SKN	1.00	25.40	0.87	22.10	1.75	44.45	2.50	63.50	1-1/2 – 20

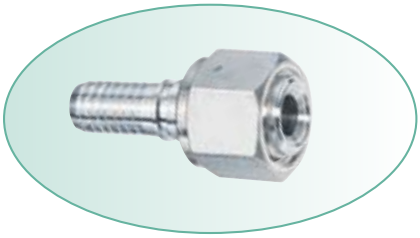
PermaSeal® Instrumentation Fittings
Vacuum Female • Style 34

description

- Sealing surfaces mirror finish
- Threads plated to prevent galling and allow repeated connections

standards

- **To industry standards**



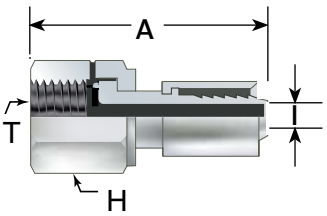
Style 34

materials

- 316 stainless steel

technical data

- Allows "no adapter" connection with Chemfluor® fluoropolymer innercore hose
- Requires no axial clearance for assembly/disassembly
- Consult applicable hose specification tables for vacuum ratings by exact size
- Chemfluor® fluoropolymer hose is suitable for liquid and industrial vacuum
  - Chemfluor® fluoropolymer hose exhibits some permeation and absorption with many gases
  - This characteristic must be considered in full vacuum applications



Vacuum Female fitting specifications • Style 34

Part Number	Hose Size		I Inner Diameter		H Hex Size		A Overall Length'		T Thread
	in.	mm	in.	mm	in.	mm	in.	mm	in.
160434SKN	0.25	6.35	0.19	4.83	0.75	19.05	2.10	53.34	9/16 – 18
160834SKN	0.50	12.70	0.40	10.16	1.06	26.92	2.40	60.96	7/8 – 14

PermaSeal® Instrumentation Fittings
Vacuum Male • Style 35

description

- Sealing surfaces mirror finish
- Threads plated to prevent galling and allow repeated connections

standards

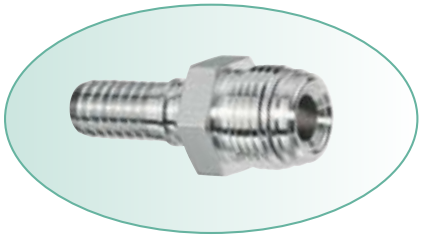
- **To industry standards**

materials

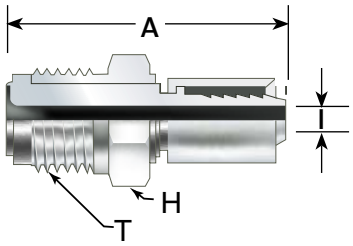
- 316 stainless steel

technical data

- Allows "no adapter" connection with Chemfluor® fluoropolymer innercore hose
- Requires no axial clearance for assembly/disassembly
- Consult applicable hose specification tables for vacuum ratings by exact size
- Chemfluor® fluoropolymer hose is suitable for liquid and industrial vacuum
  - Chemfluor® fluoropolymer hose exhibits some permeation and absorption with many gases
  - This characteristic must be considered in full vacuum applications



Style 35



Vacuum Male fitting specifications • Style 35

Part Number	Hose Size		I Inner Diameter		H Hex Size		A Overall Length		T Thread
	in.	mm	in.	mm	in.	mm	in.	mm	in.
160435SKN	0.25	6.35	0.19	4.83	0.68	17.27	1.61	40.89	9/16 – 18
160835SKN	0.50	12.70	0.40	10.16	0.94	23.88	1.80	45.72	7/8 – 14

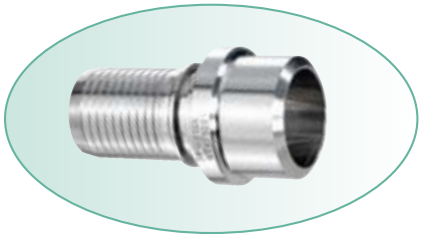
PermaSeal® Miscellaneous Fittings
Butt Weld / Pipe Size • Style 01

description

- Style 01 Schedule 40 (or alternative Schedule 10 or Schedule 80) butt weld fittings allow fabrication flexibility; when special non-standard connections must be made in lieu of standard Flexible Components styles, butt weld fittings provide a connection solution

standards

- **Schedule 40**
- **Other pipe schedules available by special order; consult factory**



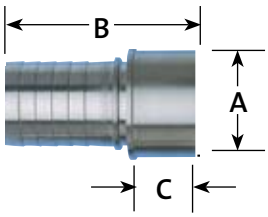
Style 01

materials

- 316 stainless steel
- Consult factory for availability of alternative materials

technical data

- Alternative fitting styles may be welded to butt weld pipe (or tube Style 41—see page 56) prior to PermaSeal attachment to finished hose assemblies
- Available for welding to existing systems when proper "heat sink" methods are employed to prevent hose liner damage



Butt Weld / Pipe Size fitting specifications • Style 01

Part Number	Hose Size		A Butt Weld Outer Dia.		B Overall Length		C Butt Weld Length	
	in.	mm	in.	mm	in.	mm	in.	mm
160801SK0	0.50	12.70	0.84	21.34	1.92	48.64	0.50	12.70
381201SK0	0.75	19.05	1.05	26.67	2.23	56.52	0.75	19.05
381601SK0	1.00	25.40	1.31	33.27	2.67	67.82	0.75	19.05
382001SK0	1.25	31.75	1.66	42.16	3.26	82.80	0.75	19.05
382401SK0	1.50	38.10	1.90	48.26	3.36	85.32	0.75	19.05
383201SK0	2.00	50.80	2.38	60.33	4.30	109.09	1.00	25.40
384001SK0	2.50	63.50	2.88	73.03	3.71	94.23	0.50	12.70
384801SK0	3.00	76.20	3.50	88.90	4.16	105.66	0.60	15.24
386401SK0	4.00	101.60	4.50	114.30	4.28	108.79	0.25	6.35

Flexible Components Pipe Interface Adapters

Flexible Components manufactures an extensive array of transitional pieces designed to interface with Saint-Gobain hose assemblies and existing pipe and tubing systems. These adapters are offered in several materials:

- Stainless steel lined with Chemfluor® FEP fluoropolymer
- Chemfluor® PFA encapsulated stainless steel
- Stainless steel
- Exotic alloys

features and benefits

Adapters

- Highest quality material — 316L stainless steel, compared to the 304 stainless steel used in many competing products.
- Wide range of sizes — 3/4" - 4" ID.
- Common fitting styles — sanitary clamp (including mini) by MNPT or FNPT standard.
- Smooth, highly finished ID — 12 - 15 Ra surface finish standard.
- Easy installation — Hex or "wrenching" flats eliminate pipe wrench surface marring.
- Reduced hose assembly connection labor — Sanitary clamp style connections speed up the process thanks to easy-to-use gasket and clamp Saint-Gobain PermaSeal® or Flare-Thru configured hose assemblies.
- Entrapment problems minimized — Smooth machined ID reduces surface roughness often found on "as cast" adapters.
- Traceability — Material Certifications available with PIN stamped heat trace numbers.
- Leak paths eliminated — Large range of multiple "step" by size transitions eliminate common practice of stacked single-step reducers.
- Specials available — Connection styles other than sanitary by NPT available to meet your unique application requirements.
- Alternative materials — Polypropylene and PVDF (Kynar®) available.

Sanitary End Caps

- Highest quality material — 316L stainless steel standard.
- Sizes — 3/4" - 4" ID.
- Material Certification available.

types of pipe interface adapters

Chemfluor® FEP Fluoropolymer Lined

Chemfluor® PFA Fluoropolymer Encapsulated

Pure-Fit® Stainless Steel

Pipe Interface Adapters

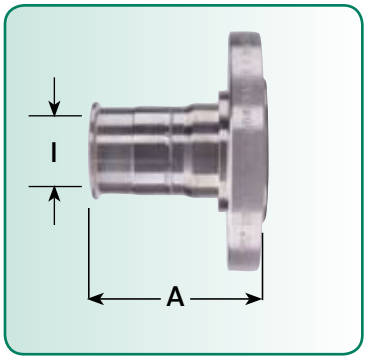
Chemfluor® FEP Fluoropolymer Lined • 10 x 12 Sanitary x 150# Flanged

description

- Flare-Thru liner design
- Transition piece for interface with Flexible Components hose assemblies and existing pipe and tubing systems

standards

- **ANSI B16.5, ASA 150# and 300# ratings**
- **DIN P/N 16**
- **BS 10 table E**
- **J.I.S. 10 K flanges**



materials

- Chemfluor® FEP liner
- 316L stainless steel base material
- Lengths can be varied

technical data

- Corrosion resistant
- Smooth, non-stick inner surface eliminates entrapment
- Swivel style lap-joint flanges
- Less costly than exotic alloy construction
- Temperature rated 350°F/177°C
- Pressure rated 150 psi
- Supplied with standard 316L stainless steel lap-joint flange
- Flange and sanitary connections are the same size; no "jump" sizes are manufactured
- Typical applications include transfer stations for truck unloading, pump connections, and vessel connections

10 x 12 Sanitary x 150# Flanged adapter specifications

Part Number	Hose Size		I Inner Diameter		Inner Dia. at face of Gasket		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
89161012S6FT	1.00	25.40	0.80	20.32	0.87	22.10	3.50	88.90
89241012S6FT	1.50	38.10	1.30	33.02	1.36	34.54	4.50	114.30
89321012S6FT	2.00	50.80	1.75	44.45	1.86	47.14	4.53	115.06
89481012S6FT	3.00	76.20	2.80	71.12	2.86	72.54	5.03	127.76
89641012S6FT	4.00	101.60	3.64	92.33	3.64	92.33	5.50	139.70

Pipe Interface Adapters

Chemfluor® FEP Fluoropolymer Lined • 12 x 16 150# Flanged x Female Cam and Groove

description

- Locking style cam lock arms
- Flare-Thru liner design
- Transition piece for interface with Flexible Components hose assemblies and existing pipe and tubing systems

standards

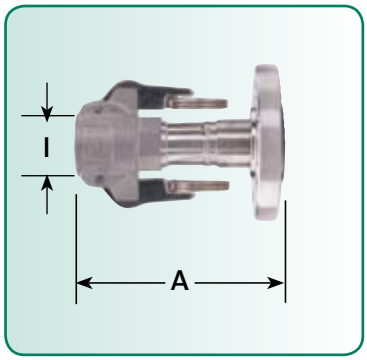
- **ANSI B16.5, ASA 150# and 300# ratings**
- **DIN P/N 16 and its equal BS 4504 table 16**
- **BS 10 table E**
- **J.I.S. 10 K flanges**
- **MIL-C-27487**

materials

- 316 stainless steel exterior bodies
- 316L ANSI Class 150 standard
- Chemfluor® FEP liner
- Epoxy coated carbon steel Class 150 available
- 304 ANSI Class 150 available
- Consult factory for ANSI Class 300 flanges

technical data

- Corrosion resistant
- Smooth, non-stick inner surface eliminates entrapment
- Swivel style lap-joint flanges
- Less costly than exotic alloy construction
- Temperature rated 350°F/177°C
- Pressure rated 150 psi
- Supplied with standard 316L stainless steel lap-joint flange complete with Chemfluor® PFA encapsulated gasket
- Typical applications include transfer stations for truck unloading, pump connections, and vessel connections



12 x 16 150# Flanged x Female Cam and Groove adapter specifications

Part Number	Hose Size		I Inner Diameter		Inner Dia. at face of Gasket		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
89161216LKS6FT	1.00	25.40	0.91	23.11	4.38	111.13	5.50	139.70
89241216LKS6FT	1.50	38.10	1.40	35.56	4.50	114.30	5.75	146.05
89321216LKS6FT	2.00	50.80	1.82	46.23	4.75	120.65	6.38	161.93

Pipe Interface Adapters

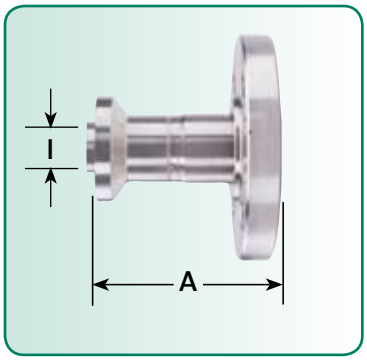
Chemfluor® FEP Fluoropolymer Lined • 12 x 50 150# Flanged x Male "I" Line

description

- Flare-Thru liner design
- Transition piece for interface with Flexible Components hose assemblies and existing pipe and tubing systems

standards

- **ANSI B16.5, ASA 150# and 300# ratings**



materials

- 316 stainless steel
- Lengths can be varied
- 316L ANSI Class 150 standard
- Chemfluor® FEP liner
- Epoxy coated carbon steel Class 150 available
- 304 ANSI Class 150 available
- Consult factory for ANSI Class 300 flanges

technical data

- Corrosion resistant
- Smooth, non-stick inner surface eliminates entrapment
- Swivel style lap-joint flanges
- Less costly than exotic alloy construction
- Temperature rated 350°F/177°C
- Pressure rated 150 psi
- Supplied with standard 316L stainless steel flange
- Typical applications include transfer stations for truck unloading, pump connections, and vessel connections

12 x 50 150# Flanged x Male "I" Line adapter specifications

Part Number	Hose Size		I Inner Diameter		A Overall Length	
	in.	mm	in.	mm	in.	mm
8916125OS6FT	1.00	25.40	1.00	25.40	3.50	88.90
8924125OS6FT	1.50	38.10	1.50	38.10	4.25	107.95

Note: Supplied with standard 316 stainless steel flange.

Pipe Interface Adapters

Chemfluor® FEP Fluoropolymer Lined • 12 x 51 150# Flanged x Female "I" Line

description

- Flare-Thru liner design
- Transition piece for interface with Flexible Components hose assemblies and existing pipe and tubing systems

standards

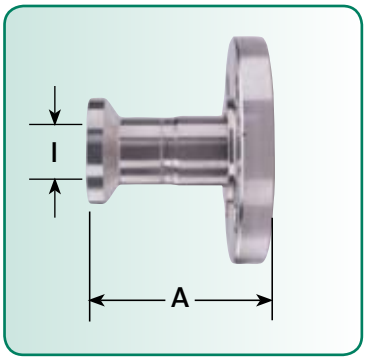
- **ANSI B16.5, ASA 150# and 300# ratings**
- **DIN P/N 16 and its equal BS 4504 table 16**
- **BS 10 table E**
- **J.I.S. 10 K flanges**

materials

- 316 stainless steel exterior bodies
- 316L ANSI Class 150 standard
- Chemfluor® FEP liner
- Epoxy coated carbon steel Class 150 available
- 304 ANSI Class 150 available
- Consult factory for ANSI Class 300 flanges

technical data

- Corrosion resistant
- Smooth, non-stick inner surface eliminates entrapment
- Swivel style lap-joint flanges
- Less costly than exotic alloy construction
- Temperature rated 350°F/177°C
- Pressure rated 150 psi
- Supplied with standard 316L stainless steel flange



12 x 51 150# Flanged x Female "I" Line adapter specifications

Part Number	Hose Size		I Inner Diameter		Flange to Sealing Surface		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
89161251S6FT	1.00	25.40	1.00	25.40	3.33	84.46	3.50	88.90

Note: Supplied with standard 316 stainless steel flange.

Pipe Interface Adapters

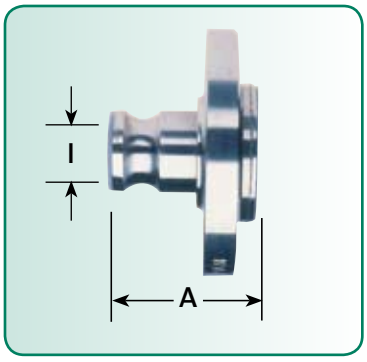
Chemfluor® PFA Fluoropolymer Encapsulated • Male Cam and Groove x 150# Flanged • Style 18T

description

- Flange by cam and groove adapter; flange is 150# lap-joint (swivel) style
- Transition piece for interface with Flexible Components hose assemblies and existing pipe and tubing systems
- Chemfluor® PFA liner "locked in" to stainless steel body

standards

- **ANSI B16.5, ASA 150# and 300# ratings**
- **DIN P/N 16 and its equal BS 4504 table 16**
- **BS 10 table E**
- **J.I.S. 10 K flanges**



Style 18T

materials

- Chemfluor® PFA encapsulated with 316 stainless steel base material
- Standard flange: epoxy-coated carbon steel
- 150#, 304 and 316 stainless steel, and 300# flanges optional

technical data

- Corrosion resistant
- All 316 stainless steel exterior bodies
- Smooth, non-stick inner surface eliminates entrapment
- Less costly than exotic alloy construction
- Vacuum rated

temperature rating

- -100°F to 450°F
- -73°C to 232°C

pressure rating

- Pressure rated to 150# lap-joint flange rating or mating female cam and groove/gasket rating; see page 60
- Consult factory for 300# flanges

Male Cam and Groove x 150# Flanged adapter specifications • Style 18T

Part Number	Hose Size		I Inner Diameter		Outer Diameter		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
381218T00	0.75	19.05	0.70	17.78	1.25	31.75	3.35	85.09
381618T00	1.00	25.40	0.83	20.96	1.44	36.58	3.75	95.25
382418T00	1.50	38.10	1.19	30.23	2.15	54.61	4.13	104.78
383218T00	2.00	50.80	1.75	44.45	2.49	63.25	4.50	114.30
384818T00	3.00	76.20	2.86	72.64	3.60	91.44	5.13	130.18

⚠ Important:

- **For adapter with epoxy-coated carbon steel flange, replace "00" with "C0" in part number.**
- **For adapter with 304 stainless steel flange, replace "00" with "S4" in part number.**
- **For adapter with 316L stainless steel flange, replace "00" with "S6" in part number.**

Pipe Interface Adapters

Chemfluor® PFA Encapsulated • Male Spool • Style 19T

description

- Spool adapter
- Join hose assemblies together
- Convert a female cam and groove fitting to a male fitting
- Chemfluor® PFA liner "locked in" to stainless steel body

standards

- **Manufactured to specification MIL-C-27487**
- **All styles fully interchangeable with all other manufacturers' designs when made to this specification**

materials

- Chemfluor® PFA encapsulated with 316 stainless steel base material

technical data

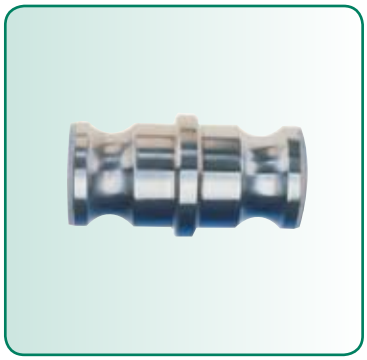
- Corrosion resistant
- All 316 stainless steel exterior bodies
- Smooth, non-stick inner surface eliminates entrapment
- Less costly than exotic alloy construction
- Vacuum rated

temperature rating

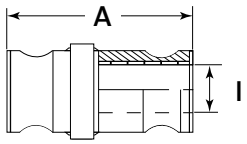
- -100°F to 450°F
- -73°C to 232°C

pressure rating

- Pressure rated to 150# lap-joint flange rating or mating female cam and groove/gasket rating; see page 60



Style 19T



Male Spool adapter specifications • Style 19T

Part Number	Hose Size		I Inner Diameter		Outer Diameter		A Overall Length	
	in.	mm	in.	mm	in.	mm	in.	mm
381619T	1.00	25.40	0.80	20.40	1.44	36.50	3.18	80.80
382419T	1.50	38.10	1.22	30.86	2.11	53.57	3.79	96.16
383219T	2.00	50.80	CF*	CF*	CF*	CF*	CF*	CF*

***C/F – consult factory.**

Pipe Interface Adapters
Pure-Fit® 316 Stainless Steel

description

- Manufactured from the highest quality stainless steel
- Sizes from 1/4" to 4" ID

standards

- **Meet appropriate standards for ends selected**

materials

- 316 and 304 stainless steel

surface finish
- Standard 15 Ra internal surface finish

technical data

- Material test reports (MTRs) and electropolishing available upon request

Clamp and Gasket x Male or Female NPT

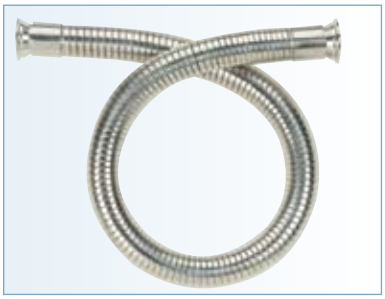
in.
1/2 x 1/4
1/2 x 3/8
1/2 x 1/2
3/4 x 3/4
1 x 1/4
1 x 3/8
1 x 1/2
1 x 3/4
1 x 1
1-1/2 x 1
1-1/2 x 1-1/2
2 x 2
2-1//2 x 2-1/2
3 x 3
4 x 4

Engineering Guide

Additional Product Services

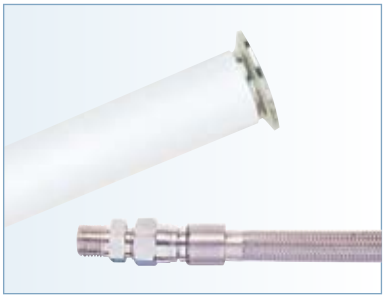
Hose Cover Options

Anti-Kink Casing



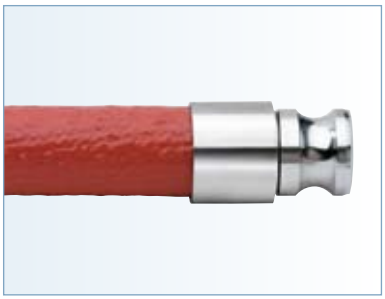
Stainless steel (Type 304) anti-kink armor casing prevents over-bending/kinking of hose and provides chafe protection for the wire braid. Casing provides an added safety feature, allowing hose assembly to weep rather than rupture if for some reason the tube should fail. Armor can be ordered full length (Accessory Code A) or with 16" cuffs at each end to reduce potential stress at the fitting (Accessory Code C). Anti-kink armor casing is strongly recommended for all TS/TB/TD/TBD assemblies 3/4" ID and larger.

Heat Shrink/Rubber Cover



Polyolefin clear (PC) or white (PW) tubing is shrunk tightly to the hose with external heat. Clear (TC) and black (TB) FEP heat shrink sleeves are also available. A heat shrink sleeve generally restricts hose flexibility by a 2:1 factor. Other methods of protecting the external braid from exposure to various materials are blown-on thin wall rubber covers or thin wall PVC tubing. These options can be useful to color code applications. (Accessory Code PC, PF, R or T as applicable.) Polyolefin maximum temperature: 180°F (82°C). FEP maximum temperature: 400°F (204°C). PVC maximum temperature: 160˚F (71°C).

Firesleeve/Insulating Cover



This cover protects the hose from external heat/flame. It also helps insulate hot internal materials from the worker's touch. Material is braided fiberglass tubing impregnated with silicone rubber. Sleeve is normally clamped at the fittings (Accessory Code F). Firesleeve is engineered to withstand continuous temperatures from -65°F (54°C) to +500°F (+260°C); consult specific hose type for actual maximum temperature rating of hose assembly.

Silicone Slip-On Cover

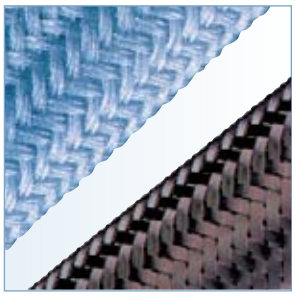
Thin wall, clear silicone tube is slipped over stainless steel or other types of Flexible Components braid reinforcement to produce a tight, easily cleaned cover. Can be autoclaved or SIP cleaned. Assemblies remain at maximum temperature rating. Designed for larger diameter and Flare-Thru hose assemblies. Consult factory for maximum and minimum length of sleeved assemblies.

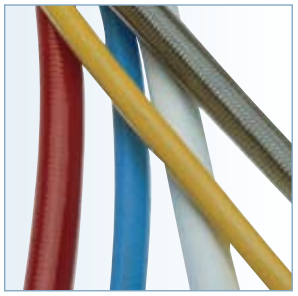
Additional Product Services

Hose Cover Options

Various Covers and Braid Material

Process segregation sometimes requires color hose assemblies to help prevent mismatching. Heat shrink sleeves also enable the hose exterior to be cleaned more easily and prevent material from sticking in the braid interstices. Sometimes a non-metallic braid is required. The blue hose shown near right has a polypropylene braid; Kynar® braid is black.





Color Coding Options

Colors may be special ordered for TLCT/SFTL, TLCTCO and CTLCT rubber covered hose. Consult factory for minimum order requirements.

Hose Options

Custom Hose Tagging

Most Flexible Components hoses can be tagged with a stainless steel Band-it® clamp. We can tag hoses 1/2" ID and larger*. Customers can specify information; otherwise the following default information applies:

- Maximum allowable working pressure
- Date of manufacture
- Flexible Components name or logo

*1/4" ID and 3/8" ID hoses are tagged with a roll stamped aluminum ring.

Stainless Steel Tag Specifications

Dimensions:

- .75" x 1.94" x 0.010" thick
- 0.625" x 1.44" printing area
- Maximum characters—3 lines of 15 characters
- Attachment—one 1/4" wide Band-it® clamp

Large Stainless Steel Tag Specifications

Dimensions:

- 1.5" x 2.5" x 0.015" thick
- 0.94" x 1.75" printing area
- Maximum characters—6 lines of 15 characters
- Attachment—two 1/4" wide Band-it® clamps

SANIseal™ Hose Identification System

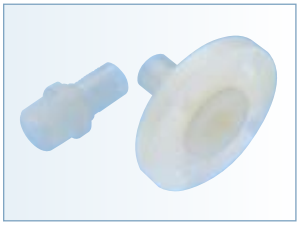
The SANIseal™ silicone label encapsulation system allows key information such as date of manufacture, lot number, approval criteria and re-order phone number to be permanently sealed and bonded to Flexible Components hoses — with no product contact and no areas where entrapment can occur. SANIseal™ meets or exceeds FDA requirements on hose identification, is very durable, and operates at the touch of a single button. It is compatible with the full range of Flexible Components hoses through 3" ID, including those with silicone, stainless steel and EPDM rubber covers. Lightweight SANIseal™ field fabrication equipment is available for convenient on-site use.

Special Alloy and Non-Metallic Fittings

Flexible Components has manufactured many types of special alloy and non-metallic fittings to complement our standard product line (Flare-Thru, PFA encapsulated 316 stainless steel). Materials from which we have fabricated fittings include:

- Brass
- Carbon steel
- Hastelloy® B and Hastelloy® C
- Monel®
- Titanium
- PVC
- Polypropylene
- PVDF (Kynar®)
- Solid PTFE
- FEP-coated stainless steel

This is only a partial list. Please do not hesitate to contact the factory for information on unusual fitting requirements, but bear in mind that cost and delivery schedule are directly related to the size, complexity and quantity of fittings ordered.



Steam Table

Gauge psi	Temp °F	Gauge psi	Temp °F	Gauge psi	Temp °F	Gauge psi	Temp °F	Gauge psi	Temp °F
5	227	45	293	85	328	150	366	230	399
6	230	46	294	86	328	152	367	232	400
7	232	47	295	87	329	154	368	234	400
8	235	48	296	88	330	156	369	235	401
9	237	49	297	89	331	158	370	237	402
10	240	50	298	90	331	160	371	239	402
11	242	51	299	91	332	162	372	241	403
12	244	52	300	92	333	164	372	243	404
13	246	53	301	93	333	166	373	245	404
14	248	54	302	94	334	168	374	247	405
15	250	55	303	95	335	170	375	249	406
16	252	56	304	96	335	172	376	251	406
17	254	57	305	97	336	174	377	253	407
18	255	58	306	98	337	176	378	255	408
19	257	59	306	99	337	178	379	257	408
20	259	60	307	100	338	180	380	259	409
21	261	61	308	102	339	182	380	261	410
22	262	62	309	104	341	184	381	263	410
23	264	63	310	106	342	186	382	265	411
24	265	64	311	108	343	188	383	267	412
25	267	65	312	110	344	190	384	269	412
26	268	66	313	112	345	192	385	271	413
27	270	67	314	114	347	194	385	273	414
28	271	68	314	116	348	196	386	275	414
29	273	69	315	118	349	198	387	277	415
30	274	70	316	120	350	200	388	279	415
32	276	71	317	122	351	202	389	281	416
32	277	72	318	124	352	204	389	283	417
33	278	73	319	126	353	206	390	285	417
34	280	74	319	128	355	208	391	295	420
35	281	75	320	130	356	210	392	305	423
36	282	76	321	132	357	212	392	355	437
37	283	77	322	134	358	214	393	375	442
38	285	78	322	136	359	216	394	385	445
39	286	79	323	138	360	218	395	405	449
40	287	80	324	140	361	220	395	455	461
41	288	81	325	142	362	222	396	510	472
42	289	82	326	144	363	224	397	560	482
43	290	83	326	146	364	226	398	585	486
44	291	84	327	148	365	228	398		

Testing and Measurement

Testing

Traceability

Work orders direct every phase of assembly and testing. Records with details of each operation are individually signed off and retained with the master copy to ensure traceability in the unlikely event of a problem.

100% Pressure Test

Every assembly order is tested in accordance with ASTM requirements. Types of tests include hydrostatic, air under water, helium under water, and nitrogen under water. Each and every hose is pneumatically or hydrostatically pressure tested in accordance with ASTM requirements to ensure against leakage when placed in service.

Periodic Burst Testing

Various fittings and different size hoses are periodically burst tested to verify that:

- Minimum burst pressure exceeds all catalog ratings
- Fitting retention at high pressures
- The assembly ruptures in the hose rather than caused by the fitting design or assembly

Measurement

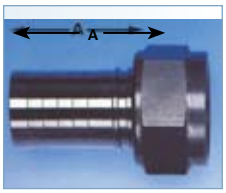
Hose Length Measurements

Flexible Components hose assemblies are generally measured from end to end. The exceptions to this practice are illustrated at left. J.I.C. female swivel (Style 02), female cam and groove (Style 16) and sanitary bevel seat (Style 20) fittings are measured lengthwise from the sealing surface of the fitting.

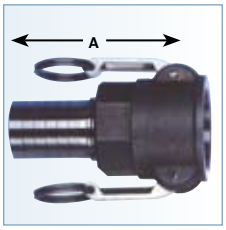
Length Tolerance

Up to 24" OAL assemblies: 1/4" (.250")
Over 24" up to 60": 1/2" (.500")
Over 60": 1%

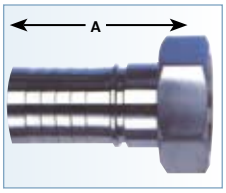
Exceptions:



JIC Female Swivel (Style 02)

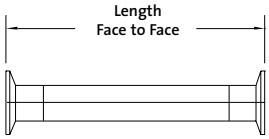


Female Cam and Groove (Style 16)

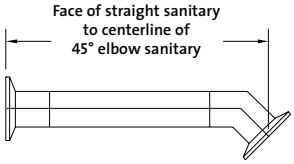


Sanitary Bevel Seat (Style 20)

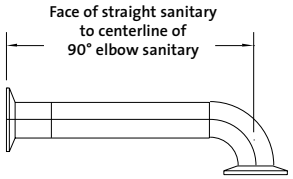
The following illustrations show how to measure the overall length (OAL) of Flexible Components hose assemblies, including 45° and 90° elbow fittings. Examples are shown with clamp style sanitary fittings.



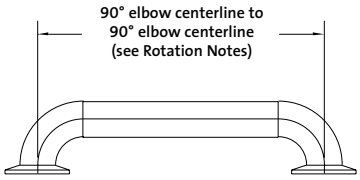
Straight sanitary x straight sanitary



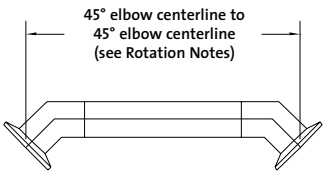
Straight sanitary x 45° elbow sanitary



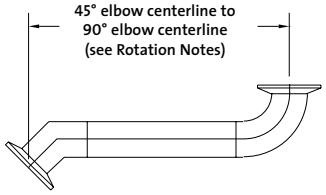
Straight sanitary x 90° elbow



90° sanitary elbow x 90° sanitary elbow

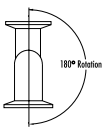


45° sanitary elbow x 45° sanitary elbow

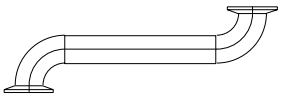


45° sanitary elbow x 90° sanitary elbow

Rotation Notes
When ordering double elbow hose assemblies, angular orientation between the elbows is expressed in degrees. The angle is measured counterclockwise from the centerline of the nearest fitting when the fitting is positioned at 6 o'clock to the centerline of the other fitting, as shown at right.



(Front view)
Angle orientation measured in degrees (counterclockwise)



(Side view)
180° configuration

Live Hose Length for Offset Motion in Metal Hose

For Chemfluor® fluoropolymer hose assemblies, factor the live length shown below by 2.5, then add the fitting lengths to arrive at recommended OAL.

Centerline Bend Radius (in.) | **Intermittent Offset Motion Maximum Distance From Centerline**

	1/8"	1/4"	3/8"	1/2"	3/4"	1"	1 1/2"	2"	3"	4"	5"	6"	8"	10"
5	2	3	3 1/2	4	5	6	7	7 1/4	10 1/4	12 1/4	13 1/2	15	18	20 1/2
6	2 1/4	3 1/4	3 1/4	4 1/2	5 1/4	6 1/4	7 1/4	8 1/4	10 3/4	12 3/4	14 1/4	16	19	21 1/2
7	2 1/8	3 3/8	4	4 3/4	5 3/4	6 3/4	8 1/4	9 1/4	11 1/2	13 1/2	15 1/4	17	19 3/4	23
8	2 1/2	3 1/2	4 1/4	5	6	7	8 1/4	10	12 1/4	14 1/2	16 1/4	18	21 1/2	24 1/4
9	2 1/8	3 1/4	4 1/2	5 1/4	6 1/2	7 1/2	9 1/4	10 3/4	13 1/4	15 1/4	17	19	22 1/2	25 1/2
10	2 3/4	4	4 3/4	5 1/2	6 3/4	8	9 3/4	11 1/4	13 3/4	16	18	20	23 1/2	26 1/2
11	2 7/8	4 1/8	5	5 3/4	7 1/4	8 1/4	10 1/4	11 3/4	14 1/2	16 3/4	18 3/4	20 3/4	24 1/2	27 1/2
12	3	4 1/4	5 1/4	6	7 1/2	8 1/2	10 1/4	12 1/4	15	17 1/2	19 1/2	21 1/2	25 1/2	28 3/4
13	3 1/8	4 1/2	5 1/2	6 1/4	7 3/4	9	10 3/4	12 3/4	15 3/4	18	20 1/4	22 1/2	26 1/4	29 3/4
14	3 1/4	4 3/4	5 3/4	6 1/2	8	9 1/4	11 1/4	13 1/4	16 1/4	18 3/4	21	23 1/2	27 1/4	30 3/4
15	3 3/8	4 7/8	5 7/8	6 3/4	8 1/4	9 3/4	11 3/4	13 1/2	16 3/4	19 1/4	21 3/4	24 1/4	28	31 3/4
16	3 1/2	5	6	7	8 1/2	10	12 1/4	14	17 1/4	20	22 1/2	25	29	33 1/2
17	3 5/8	5 1/8	6 1/4	7 1/4	8 3/4	10 1/4	12 1/2	14 1/2	17 3/4	20 1/2	23 1/4	25 1/2	29 3/4	33 1/2
18	3 3/4	5 1/4	6 1/2	7 1/2	9	10 1/2	13	15	18 1/4	21 1/4	24	26	30 1/2	34
19	3 7/8	5 3/8	6 5/8	7 3/4	9 1/4	10 3/4	13 1/4	15 1/4	18 3/4	21 3/4	24 1/2	26 3/4	31 1/4	35
20	4	5 1/2	6 3/4	8	9 1/2	11	13 1/2	15 3/4	19 1/4	22 1/2	25	27 1/2	32 1/4	36 1/4
22	4 1/8	5 3/4	7	8 1/4	9 3/4	11 1/2	14	16 1/4	20	23 1/4	25 3/4	28 1/2	33 1/2	37 1/2
24	4 1/4	6	7 1/4	8 1/2	10	12	14 1/2	17	20 3/4	24	26 1/2	29 1/2	34 3/4	39
26	4 3/8	6 1/4	7 1/2	8 3/4	10 1/2	12 1/2	15	17 1/2	21 1/2	25	27 3/4	30 3/4	36	40 1/4
28	4 1/2	6 1/2	7 3/4	9	11	13	15 3/4	18 1/4	22 1/2	26	29	32	37 1/2	41 1/2
30	4 3/4	6 3/4	8 1/4	9 1/2	11 3/4	13 1/2	16 1/2	19	23 1/2	27 1/4	30 1/2	33 1/2	39	43 3/4
35	5 1/4	7 1/4	9	10 1/4	12 1/4	14 1/2	18	20 3/4	26 1/4	29 1/2	32 3/4	36	42	47
40	5 1/2	7 3/4	9 1/2	11	13 1/2	15 1/2	19	22	27	31 1/4	35	38 1/2	44 3/4	50
45	6	8 1/4	10	11 3/4	14 1/4	16 1/2	20 3/4	23 1/2	28 1/2	33 1/4	37	41	47 1/2	53
50	6 1/4	8 3/4	10 3/4	12 1/4	15	17 1/2	21 1/2	24 3/4	30	35	39	43	50	56
60	6 3/4	9 1/2	11 3/4	13 1/2	16 1/2	19	23 1/4	27	33	38 1/4	43	47	54 1/2	61
70	7 1/4	10 1/4	12 1/4	14 3/4	17 3/4	20 1/2	25 1/4	29	35 1/2	41 1/2	46	51	58 3/4	65 3/4
80	7 3/4	11	13 1/2	15 1/2	19	22	27	31	38	44	49 1/2	54	62 3/4	70
90	8 1/4	11 3/4	14 1/4	16 1/2	20 1/4	23 1/2	28 1/2	33	40 1/2	46 3/4	52	57 1/4	66 1/4	74 1/4
100	8 3/4	12 1/4	15	17 1/2	21 1/4	24 1/2	30	35	42 1/2	49 1/4	55	60 1/2	69 3/4	78 1/4

Important Note

The values shown in the shaded portion are applicable to static bends only. For intermittent flexing, the offset motion should never be greater than 25% of the centerline bend radius.

Assembly Length (Live and Overall Length)

The live length and overall length of the assembly must be determined to complete the design. The live length is the flexible portion of an assembly. After the live length has been determined, the overall length is determined by adding the dimensions for the end fittings.

Additional Information

See page 47 for lap-joint flange data, and pages 59-62 for cam and groove recommended operating conditions.

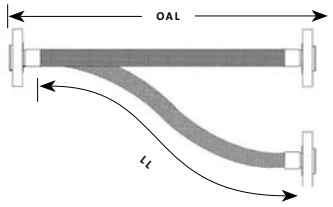
Motion Calculations

Axial Motion: Motion that occurs when a hose is compressed along its longitudinal axis. Axial motion is only applicable in very short lengths of annular hose only. Fluoropolymer lined hose should not be subjected to axial motion.

Offset Motion: Motion that occurs when one end of the hose is deflected in a plane perpendicular to its longitudinal axis with the ends remaining parallel. In offset applications where motion is repeated, the offset should never exceed 25% of the minimum bend radius. To calculate the required live length to achieve a desired offset, use the following calculations:

$LL = \sqrt{6YR + Y^2}$

LL = hose live length, inches
R = min. bend radius, inches
Y = offset, inches
OAL = LL + fitting length + (2x nominal hose diameter)



Note: Where offset motion "Y" occurs on both sides of hose centerline, the hose live length should be based on total travel, or 2Y. The modified calculation will be:
$LL = \sqrt{12YR + (2Y)^2}$

Material Specification References

Specifications

ASTM D1457-87
ASTM D4895-89

Chemfluor® PTFE meets MIL-I-22129C. Assemblies to SAE 100R7. Flexible Components conductive series hose TB, TBOB, BCS, etc. conforms to conductivity specifications of MIL-H-27267.

Flexible Components Chemfluor® fluoropolymer conforms to FDA/USDA Food Contact Title 21CFR177.1550 (PTFE and FEP) and United States Pharmacopeia Class VI (PTFE, FEP and PFA).

Physical properties of a hose assembly produced from a specific fluoropolymer resin will vary depending on its diameter and wall thickness. The following typical physical properties are average values as measured using test methods of the American Society for Testing and Materials. Unless otherwise noted, all tests were conducted at room temperature (73°F). Values shown were determined on 0.075" thick extruded strip or 0.075" thick molded ASTM plaques or molded ASTM durometer buttons.

IMPORTANT It is the users' responsibility to ensure the suitability and safety of Flexible Components fluoropolymer hose for all intended uses, including establishing the compatibility of any fluid with the hose through which it is transmitted. Laboratory, field or clinical tests must be conducted in accordance with applicable requirements in order to determine the safety and effectiveness for use of hose in any particular application.

Chemfluor® Physical Properties

	Durometer** Hardness Shore, A, 15s	Color	Maximum Recommended Operating Temp. °F (°C)	Tensile Strength psi (M Pa)	Ultimate Elongation %	Brittle Temperature	Specific Gravity	Water Absorption %	Chemical Solvent Resistance	Folding Endurance (cycles)
ASTM Method	D2240-91			D1457, D1708, D638	D1457, D1708, D638	D746-79	D792	D570-81		
Chemfluor® FEP	55D	Translucent	400 (204)	3400 (23)	325	-100°F	2.15	<0.01	Excellent	5 - 80 x 10^3
Chemfluor® PFA	60D	Translucent	500 (260)	3600 (25)	300	-320°F (-196°F)	2.15	<0.03	Excellent	50 - 500 x 10^3
Chemfluor® PTFE	58D	Translucent	500 (260)	3000 -5000 (20.7 - 34.5)	300	-450°F	2.13 - 2.22	<0.01	Excellent	10^6

* 1-second reading. ** Durometer measured on outer jacket.

Note: The ratings in the charts DO NOT reflect the extent to which extraction may occur, or the extent to which fluids may undergo any physical changes in properties or composition, as a result of coming into contact with the hose. Flexible Components makes no representation or warranty with respect to the susceptibility of any fluid to become contaminated or undergo changes in properties or composition as a result of possible extraction of hose ingredients by the fluid to be transmitted. Certain corrosives that would be destructive to tubing with prolonged exposure can be satisfactorily handled for short periods of time if flushed with water after use. All ratings are based on room temperature (73°F). Elevated temperatures will adversely affect chemical resistance.

Application References

Electrostatic Discharge

Most applications of Flexible Components Chemfluor® fluoropolymer hoses do not require the use of a conductive inner tube. Under certain applications, however, the potential for static discharge must be considered. Static electricity can be a hazard. Under those conditions where static discharge can occur, the use of conductive Flexible Components Chemfluor® PTFE hose is recommended.

When two different materials contact each other, electrons from one material can move across its boundary and associate with the other. These electrons align themselves with the material contacted. If the two materials are good conductors of electricity, the positive and negative electrons flow back and forth between them, keeping them in balance. If one or both are insulators, the flow will not occur. A charge will then build up on the surface of one of the materials. When the charge exceeds the electric strength of the material, dielectric breakdown results.

In applying this to Chemfluor® PTFE hose, we have to consider fluids and gases, which are poor conductors of electricity, and the flow rates of those fluids and gases. In order for a liquid or gas to be a poor electrical conductor it will generally satisfy one or both of the following conditions:

1. Be nonpolar; that is, an imbalance between protons and electrons, and/or
2. Contain a nonmixable component or a suspended solid; such as water in kerosene.

So when a liquid contacts a PTFE tube that isn't a good conductor (white PTFE innercore), the result is phase separation, and the electric charge starts to build. The rate at which static electricity builds up now becomes a function of the fluid flow rate. When the dielectric strength of the PTFE tube is exceeded, the electric charge will puncture the tube wall and ground itself on the stainless steel braid of the hose. In hydraulics, high pressures generally mean high velocities. Historically, fluids were filtered upstream of the hoses using metallic filter elements. The metallic element helped to ground the charge. But, today, most filtration is done with paper type and glass-fiber elements that have a tendency to inject an electrostatic charge into the fluid they are filtering.

Fuels and steam are two specific areas of concern.

Fuels are, for the most part, "nonconductive" liquids and have a resistivity greater than 108 ohm; i.e., gasoline and white spirits, hydrazine, benzene, diesel oils, etc. These fluids usually are transferred at fairly low velocities, but there still is a potential for an electrostatic discharge due to external factors, such as humidity and, to some extent, temperature. You should take all of these factors into account even at fluid velocities at or below 1 meter per second.

When using PTFE hose, you can offset the potential hazard of electrostatic discharge by using a conductive PTFE hose. Carbon is added to the Chemfluor® PTFE inner wall during manufacture. The carbon layer directs the electrostatic charge down the inner diameter of the hose to the metal end fittings. This prevents the charge from building up on the inner tube wall.

It's important to examine any application where nonconductive fluids are used and any of the above conditions exist. This section is not meant to cover all conditions or situations involving fuels, steam or other media which may cause electrostatic buildup or potential discharge.

Following is a list of some of the chemicals which meet at least one of the criteria necessary to create electrostatic discharge:

Cyclohexane
Decalin
Diacetone
Dibutyl Ether
Dibutyl Phthalate
Dibutyl Sebacate
Dimethyl Phthalate
Dioctyl Phthalate
Dipentene
Freon
Fuel Oil
Gasoline
Hexane
Hezene
Hydraulic Oil
Hydrazine
Kerosene
Lacquer Solvents
Lacquers
Lacquers Decalin
Mineral Oil
n-Octane
Naphtha
Naphthalene
Paint
Petroleum
Phosphate Ester
Pinene
Silicone Oils
Skydrol 500 & 700
Steam
Transformer Oil
Toluene
Turpentine
Varnish
Versilube

Technical Terms Used

Quite often, customers have questions when the subject of hose flexibility is brought up. Many different terms are used to describe this attribute of the Saint-Gobain Performance Plastics Flexible Components product line. Below are some of the formal definitions currently used in the hose industry.

Bend Radius (fluoropolymer hose and all rubber hose) — The radius of a bent section of hose measured to the inner-most surface of the curved portion (R1).

Bend Radius (metal hose) — The radius of a bent section of hose measured to the hose centerline (R2).

Minimum Bend Radius — The smallest radius at which a hose can be used.

For Metal Hose

Dynamic Bend Radius — The radius at which constant or continuous flexing occurs.

Static Bend Radius — The smallest fixed radius to which a hose can be subjected.

Force to Bend — The amount of stress required to induce bending around a specified radius. Hence, a measure of stiffness.

Pressure Definitions

Maximum Rated Working Pressure — The maximum pressure that the hose can be subjected to on a continuous basis.

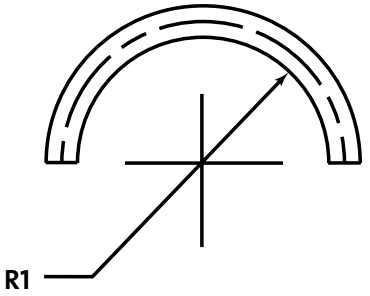
Maximum Rated Test Pressure — The maximum rated pressure is multiplied by 150% to determine the maximum rated test pressure.

Nominal Rated Burst Pressure — The average pressure at which the core or braid will rupture at ambient temperature.

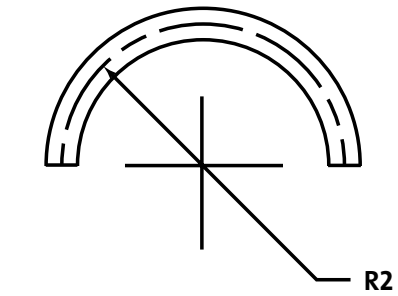
Pulsating or Shock Pressure — The performance of metal hose can be greatly reduced under this type of working pressure. Pressures are normally reduced by 50% in pulsating or shock pressure applications.

Pressure/Temperature Correction — Metal hose pressure capabilities decrease as the temperature increases. Consult the Temperature Correction Factor information (page 28) to determine pressure ratings at elevated temperatures.

Pressure Drop — Pressure drop occurs in long hose runs. The amount of pressure loss in a metal hose is approximately three times that of steel pipe.



Bend Radius (all except metal hose) —
R1 measured to inside radius

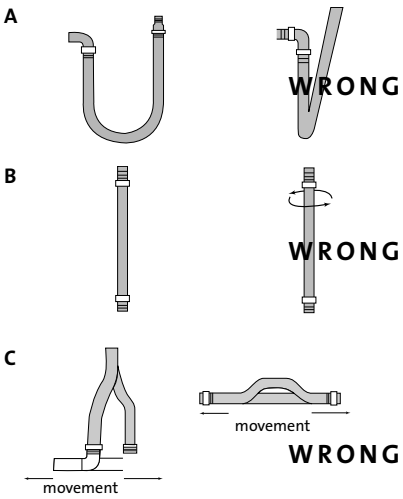


Bend Radius for metal hose —
R2 measured to centerline radius

General Hose Installation Precautions

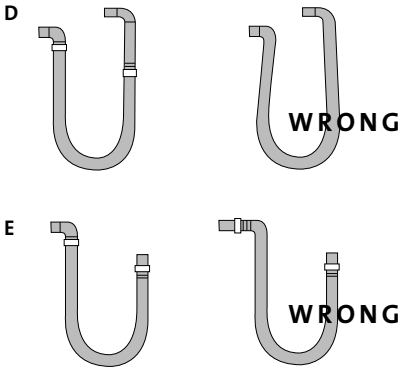
Prior to Installation

1. Examine the hose for any obvious damage. **IF THE HOSE IS DAMAGED, DO NOT USE.** Examples of damage may include slices to the cover, kinks, broken braid, and crushing of the hose (can reduce life and pressure rating).
2. Review application to ensure proper selection of hose has been made by examining materials, pressures, chemical compatibility, temperature and environment.
3. Hose movement should be restricted to a **SINGLE PLANE (Drawing A)** to minimize the resultant twisting (torque). Note: The flexing plane should also be the plane in which the bending occurs. Excessive bending will induce stress fatigue **(Drawing B)**.
4. Axial movement should be eliminated. The hose should not be stretched or compressed along its longitudinal axis when installed in-line **(Drawing C)**.



Installation

- **Never use hose below minimum bend radius (Drawing D)**. Bend radii (measured to inside radius of fluoropolymer-lined hose and centerline for stainless steel metal hose) are given for individual products and sizes (consult factory for specific data). These values represent the minimum bend radius with which the hose can be properly installed. If these values are not maintained, the hose can fail prematurely. Note: In some cases, vacuum and pressure ratings are based on not exceeding 2 times minimum bend radius (consult factory for specific hose ratings).
- **Do not allow severe bends (Drawing E).** Severe bends can cause kinking in a hose or overstress the assembly/material, resulting in damage and ultimate failure. If severe bends cannot be avoided, use elbows designed to accommodate the direction change.
- **Do not twist (torque) assembly along centerline during installation.** The likelihood of leakage/failure increases for hoses that are twisted (torqued) during assembly. The proper use of floating flanges and swivel-type fittings (i.e., J.I.C.) can eliminate improper twisting.



General Hose Installation Precautions (continued)

Hose Assemblies with PTFE, FEP Flare-Thru and PFA Encapsulated Flanged Fittings

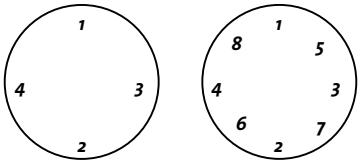
- **Flange covers should not be removed until hose is ready to be bolted into position.** Flange covers should be replaced immediately after disconnecting hose to protect sealing surfaces.
- **Gaskets are not required when hose is connected to a sealing surface made of PTFE, FEP, or PFA.** If the hose is connected to any other surface, such as metal, glass, carbon, reinforced plastic, etc., a gasket should be used.
- **Bolts should be tightened using proper bolt techniques and torque values.** The table below gives torque values for lined hoses using Class 150 flanges. Bolts should be clean and lubricated with flat washers being used to ensure correct torque.
- **For accurate tightening a torque wrench is HIGHLY recommended.** If a flange leak occurs on one side of a properly torqued flange, the bolts should not be over-torqued. Instead, loosen the bolts on the non-leaking side the same amount you tighten the bolts on the leaking side.

Nominal Hose Size

1/2"	3/4"	1"	1-1/2"	2"	3"	4"	6"	8"
10	10	10	15	25	40	30	60	75

Torque (ft.-lbs.)

Bolt Torque Sequence



Installation

Flare-Thru Fittings; Clamp Style Sanitary Ends

- For installation of W.S.I.B, open pitch and MTL/MTLSJ Series hose assemblies, Saint-Gobain Performance Plastics recommends that solid PTFE gaskets **MUST** be used to ensure a leak-tight seal. Use of other types of gaskets may result in leaks, sealing surface damage, or difficultyin installing the sanitary clamps.

Notes on Hose Assemblies with Fluoropolymer Flare-Thru Fittings

The following precautions should to be taken during removal for storage/cleaning/sterilization:

- Assemblies or components with Flare-Thru ends (including Chemfluor®-lined adapters) **MUST NEVER** be removed from the hose/piping system until they have completely cooled down to at least 70°F.
- Flare-Thru ends in assemblies **MUST ALWAYS** be restrained. Recommended methods include:
  - End caps and solid PTFE gaskets (for clamp style sanitary fittings)
  - Flange covers/blind flanges
  - Lap-joint flange with stub end and the appropriate gasketing
  - Bolts or clamps to attach the assembly to the hose/piping system

Also recommended is the use of dust plugs/caps for female and male cam and grooves.

- Assemblies or components with Flare-Thru ends that are to be pressure tested or cleaned (autoclaved) **MUST ALWAYS** have the Flare-Thru ends restrained (by end caps, flange covers, dust plugs/caps or a flange with stub end and appropriate gasketing) prior to start of the process. These devices **MUST** remain in place during heat-up and through complete cool-down to at least 70°F before removing for installation.
- Flange covers, end caps, dust plugs/caps or a flange with stub end and appropriate gasketing **MUST** be replaced immediately after disconnecting hose. Flange covers or end caps **MUST NOT** be removed until hose assembly or component is ready to be bolted or clamped into position.

Installation (continued)

Threaded End Connections (MNPT); Metallic and Plastic Pipe Fittings

- Typically, male pipefitting (MNPT) can be effectively sealed using common PTFE sealing tape. Other types of pipe dope or sealing compounds (usually PTFE paste) should be checked to confirm compatibility with service fluids and temperatures of the application.
- Any welding near the hose assembly should be done in a manner that protects the liner and the hose from damage.

MTL/MTLSJ and Chemfluor® Fluoropolymer Lined Adapters

- Vent holes (found at each end of each hose fitting or in the stainless steel body of adapters) should be unobstructed to allow trapped gas or product between liner and hose to escape. Steadily escaping gas or product could mean possible liner damage and should be inspected.

Service Life Factors

The actual service life of the hose assembly is strongly affected by its environment. Some of the factors that may influence service life include:

- Corrosion
  - General corrosion attack
  - Stress corrosion cracking
  - Intergranular corrosion
  - Pitting corrosion
- Fatigue (including)
  - High cyclic
  - Flexure
  - Pulsation
  - Vibration
  - Torsion
- Vibration
- Movement of attached equipment
  - Proper hose configuration and live length should be used when hose may be exposed to movements from attached piping, tanks or equipment (i.e., thermal growth or mechanically imposed) and/or offset.
- Wear

Temperature Conversion Chart

How to Use this Chart

If the temperature in the center column is Celsius, read Fahrenheit in the column to the right. If the temperature in the center column is Fahrenheit, read Celsius in the column to the left.

°C	GIVEN TEMP. (°C OR °F)	°F
-46	-50	-58
-43	-45	-49
-40	-40	-40
-37	-35	-31
-34	-30	-22
-32	-25	-13
-29	-20	-4
-26	-15	+5
-23	-10	+14
-21	-5	+23
-18	0	+32
-15	+5	+41
-12	+10	+50
-9	+15	+59
-7	+20	+68
-4	+25	+77
-1	+30	+86
+2	+35	+95
+4	+40	+104
+7	+45	+113
+10	+50	+122
+13	+55	+131
+16	+60	+140
+18	+65	+149
+21	+70	+158
+24	+75	+167
+27	+80	+176
+29	+85	+185
+32	+90	+194
+35	+95	+203
+38	+100	+212
+41	+105	+221
+43	+110	+230
+46	+115	+239
+49	+120	+248
+52	+125	+257
+54	+130	+266
+57	+135	+275
+60	+140	+284
+63	+145	+293
+66	+150	+302
+68	+155	+311
+71	+160	+320

°C	GIVEN TEMP. (°C OR °F)	°F
+74	+165	+329
+77	+170	+338
+79	+175	+347
+82	+180	+356
+85	+185	+365
+88	+190	+374
+91	+195	+383
+93	+200	+392
+96	+205	+401
+99	+210	+410
+102	+215	+419
+104	+220	+428
+107	+225	+437
+110	+230	+446
+113	+235	+455
+116	+240	+464
+118	+245	+473
+121	+250	+482
+124	+255	+491
+127	+260	+500
+129	+265	+509
+132	+270	+518
+135	+275	+527
+138	+280	+536
+141	+285	+545
+143	+290	+554
+146	+295	+563
+149	+300	+572
+152	+305	+581
+154	+310	+590
+157	+315	+599
+160	+320	+608
+163	+325	+617
+166	+330	+620
+168	+335	+635
+171	+340	+644
+174	+345	+653
+177	+350	+662
+179	+355	+671
+182	+360	+680
+185	+365	+689
+188	+370	+698
+191	+375	+707

°C	GIVEN TEMP. (°C OR °F)	°F
+193	+380	+716
+196	+385	+725
+199	+390	+734
+202	+395	+743
+204	+400	+752
+207	+405	+761
+210	+410	+770
+213	+415	+779
+216	+420	+788
+218	+425	+797
+221	+430	+806
+224	+435	+815
+227	+440	+824
+229	+445	+833
+232	+450	+842
+235	+455	+851
+238	+460	+860
+241	+465	+869
+243	+470	+878
+246	+475	+887
+249	+480	+896
+252	+485	+905
+254	+490	+914
+257	+495	+923
+260	+500	+932

Chemfluor® References

Chemfluor® Fluoropolymer Resins

Three types are used in Flexible Components hose assemblies:

- **PTFE** (sometimes referred to as TFE) (Polyetrafluoroethylene)
- **FEP** (Copolymer of tetrafluoroethylene and hexafluoropropylene)
- **PFA** (Copolymer of tetrafluoroethylene and perfluoroalkyl)

The various types of fluoropolymer are ideal as hose materials because of the following characteristics:

- Insolubility and inertness to chemical attack
- Purity
- High thermal stability and upper service temperature
- High melting points
- Low coefficient of friction
- Low water absorptivity
- Low dielectric constant and dissipation factor
- Excellent weatherability
- Flame resistance

Purity

Flexible Components Chemfluor® PTFE, PFA and FEP resins are either approved by the Food and Drug Administration or US Pharmacopeia Class VI. See below for specific details.

Chemical Resistance

Special care must be exercised when the following materials are to be conveyed through a Flexible Components Chemfluor® hose. The first three, quite simply, should never be used with Chemfluor® PTFE, FEP or PFA. The remaining 14 can be used, but special consideration should be given when applications require both high temperature and impact resistance or involve high temperature and pressure in combination.

Never

- Elemental Sodium
- Elemental Potassium
- Elemental Lithium

Need Consideration

- Fluorine (F_2) *(Fluorine is absorbed into the Chemfluor® resin)*
- Chlorine Tri-fluoride (ClF_3) *(can be sensitive to impact ignition)*
- Bromine Tri-fluoride
- Iodine Pentafluoride
- Oxygen Difluoride
- Chlorine Difluoride
- 80% Sodium Hydroxide
- 80% Potassium Hydroxide
- Borane (B_2H_6) *(Only at 400°F to 500°F)*
- Aluminum Chloride *(at elevated temperatures)*
- Ammonia (NH_3)
- Amines ($R\text{-}NH_2$) *(at elevated temperatures)*
- Imine (R-NH)
- 70% Nitric Acid – slow oxidative attack only under pressure at 480°F

Industry Approval and Compliance References

Articles Intended for Food Contact

Reference: FDA 21CFR177.1550 Perfluorocarbon Resins

Covers Chemfluor® PTFE and FEP resins, which may be safely used as articles or components of articles intended to contact food in compliance with this regulation.

3-A Sanitary Standards

3-A is a non-profit association that has established comprehensive objectives to develop and maintain uniform standards and practices for sanitary (hygienic) design and fabrication in food and beverage industries.

USDA Acceptance

The Department of Agriculture (USDA) has accepted Chemfluor® PTFE and FEP fluoropolymer resins that comply with 21CFR177.1550 as components of materials in direct contact with meat or poultry food products prepared under federal inspection.

US Pharmacopeia Class VI

Samples of Chemfluor® PTFE, FEP and PFA (white/natural and black anti-static PTFE and PFA) have been tested in accordance with USP protocol, and all meet the requirements for Class VI plastics. USP testing was done to support the use of these fluoropolymers in pharmaceutical processing and food processing applications. While USP Class VI certification is not required for pharmaceutical processing, many pharmaceutical customers seeking ISO-9000 certification have requested it.

Colorants in Polymers

FDA Reference: 21CFR178.3297 Colorants for Polymers

This regulation permits certain colorants for use in polymers intended for food contact. Included are TiO_2, iron oxides, all-gas channel black (carbon black) and ultra marine colorants.

Chemical Resistance Ratings

Three Chemfluor® Fluoropolymer Hose Products in 362 Environments

The ratings in the charts are based on the results of both laboratory and field tests. They reflect the relative capabilities of various Chemfluor® fluoropolymer resins to withstand specific chemicals. All ratings are based on room temperature. Although we believe these ratings to be thoroughly reliable, no guarantee is expressed or should be implied. It is suggested that the user conduct tests using the conditions of the application prior to specifying a particular hose.

28-Day Immersions at 73°

E = Excellent **G = Good** **F = Fair** **U = Not Recommended**

No.	Environmental % Conc. * w = Water alc. = Alcohol Environment, Conc. %	Chemfluor® FEP	Chemfluor® PFA	Chemfluor® PTFE
1	Acetaldehyde	E	E	E
2	Acetamide, 67% in w	E	E	E
3	Acetate Solvents	E	E	E
4	Acetic Acid, 10% in w	E	E	E
5	Acetic Acid, 50-60% in w	E	E	E
6	Acetic Acid, Glacial, 100%	E	E	E
7	Acetic Anhydride	E	E	E
8	Acetone	E	E	E
9	Acetonitrile	E	E	E
10	Acetyl Bromide	E	E	E
11	Acetyl Chloride	E	E	E
12	Acetylene Gas	E	E	E
13	Acrylonitrile	E	E	E
14	Adipic Acid, 100% in alc	E	E	E
15	Air	E	E	E
16	Alcohols General	E	E	E
17	Aliphatic Hydrocarbons	E	E	E
18	Alkyl Alcohol	E	E	E
19	Alum, 5% in w	E	E	E
20	Aluminum Chloride, 53% in w	E	E	E
21	Aluminum Fluoride, 0.1% in w	E	E	E
22	Aluminum Hydroxide, 2% in w	E	E	E
23	Aluminum Nitrate, 39% in w	E	E	E
24	Aluminum Sulfate, 50% in w	E	E	E
25	Aluminum Salts	E	E	E
26	Amines	E	E	E
27	Ammonia Gas	E	E	E
28	Ammonia, Anhydrous Liquid	E	E	E
29	Ammonium Acetate, 45% in w	E	E	E
30	Ammonium Bifluoride, 50% in w	E	E	E
31	Ammonium Carbonate, 50% in w	E	E	E
32	Ammonium Chloride, 23% in w	E	E	E
33	Ammonium Hydroxide, 5-10% in w	E	E	E
34	Ammonium Hydroxide, 30% in w	E	E	E
35	Ammonium Nitrate, 54% in w	E	E	E
36	Ammonium Persulfate, 30% in w	E	E	E
37	Ammonium Phosphate, 21% in w	E	E	E
38	Ammonium Salts	E	E	E
39	Ammonium Sulfate, 30% in w	E	E	E
40	Amyl Acetate	E	E	E
41	Amyl Alcohol	E	E	E
42	Amyl Chloride	E	E	E
43	Aniline	E	E	E
44	Aniline Hydrochloride	E	E	E
45	Antimony Salts	E	E	E
46	Antimony Trichloride	E	E	E
47	Aqua Regia	G	E	E
48	Aromatic Hydrocarbons	E	E	E
49	Arsenic Acid, 20% in w	E	E	E
50	Arsenic Salts	E	E	E
51	ASTM Reference No. 1 Oil	E	E	E
52	ASTM Reference No. 2 Oil	E	E	E
53	ASTM Reference No. 3 Oil	E	E	E
54	Barium Carbonate, 1% in w	E	E	E
55	Barium Chloride, 27% in w	E	E	E
56	Barium Hydroxide, 5% in w	E	E	E
57	Barium Salts	E	E	E
58	Barium Sulfate, <1% in dilute acids	E	E	E
59	Barium Sulfide	E	E	E
60	Beer	E	E	E
61	Benzaldehyde	E	E	E
62	Benzene	E	E	E
63	Benzenesulfonic Acid	E	E	E
64	Benzoic Acid	E	E	E
65	Benzyl Alcohol	E	E	E
66	Bleach Liquor, 22% in w	E	E	E
67	Borax, 6% in w	E	E	E
68	Boric Acid, 4% in w	E	E	E
69	Bromine, Anhydrous Liquid	U	U	U
70	Butadiene	E	E	E
71	Butane	E	E	E
72	Butyl Acetate	E	E	E
73	Butyl Alcohol	E	E	E
74	Butyric Acid	E	E	E
75	Calcium Bisulfite, 1% in w	E	E	E
76	Calcium Carbonate, 25% in dilute acids	E	E	E
77	Calcium Chlorate, 30% in w	E	E	E
78	Calcium Chloride, 30% in w	E	E	E
79	Calcium Hydroxide, 10% in glycerol	E	E	E
80	Calcium Hypochlorite, 20% in w	E	E	E
81	Calcium Nitrate, 55% in w	E	E	E
82	Calcium Oxide, 3% in w	E	E	E
83	Calcium Salts	E	E	E
84	Calcium Sulfate, 1% in w	E	E	E
85	Carbon Dioxide, Wet/Dry	E	E	E
86	Carbon Disulfide	E	E	E
87	Carbonic Acid	E	E	E
88	Carbon Monoxide	E	E	E
89	Carbon Tetrachloride	E	E	E
90	Castor Oil	E	E	E
91	Cellosolve	E	E	E
92	Cellosolve Acetate	E	E	E
93	Chlorine, Dry Gas	E	E	E
94	Chlorine, Wet Gas	E	E	E
95	Chloroacetic Acid, 20% in w	E	E	E
96	Chlorobenzene, Mono, Di, Tri	E	E	E
97	Chloroform	E	E	E
98	Chlorosulfonic Acid	E	E	E
99	Chromic Acid, 10-20% in w	E	E	E
100	Chromic Acid, 50% in w	E	E	E
101	Chromium Salts	E	E	E
102	Citric Acid, 10-20% in w	E	E	E
103	Coconut Oil	E	E	E
104	Copper Salts	E	E	E
105	Corn Syrup	E	E	E
106	Cottonseed Oil	E	E	E
107	Cresol (m, o, or p)	E	E	E
108	Cresylic Acid	E	E	E

28-Day Immersions at 73°

E = Excellent **G = Good** **F = Fair** **U = Not Recommended**

Environmental % Conc. *
w = Water alc. = Alcohol

No.	Environment, Conc. %	Chemfluor® FEP	Chemfluor® PFA	Chemfluor® PTFE
109	Cupric Chloride, 40% in w	E	E	E
110	Cupric Cyanide, 10% in dilute bases	E	E	E
111	Cupric Nitrate, 70% in w	E	E	E
112	Cupric Sulfate, 13% in w	E	E	E
113	Cyclohexane	E	E	E
114	Cyclohexanone	E	E	E
115	Detergent Solutions	E	E	E
116	Diacetone Alcohol	E	E	E
117	Dibutyl Phthalate	E	E	E
118	Dichlorobenzene	E	E	E
119	Diesel Fuel	E	E	E
120	Diethylamine, 2.5% in w	E	E	E
121	Diethylene Glycol	E	E	E
122	Diethyl Ether	E	E	E
123	Dimethylformamide	E	E	E
124	Dimethylsulfoxide	E	E	E
125	Dioctyl Phthalate	E	E	E
126	Dioxane	E	E	E
127	Ether	E	E	E
128	Ethyl Acetate	E	E	E
129	Ethyl Alcohol (Ethanol)	E	E	E
130	Ethyl Benzoate	E	E	E
131	Ethyl Chloride	E	E	E
132	Ethyl Ether	E	E	E
133	Ethylamine, 70% in w	E	E	E
134	Ethylene Bromide	E	E	E
135	Ethylene Chlorohydrin	E	E	E
136	Ethylene Diamine	E	E	E
137	Ethylene Dichloride	E	E	E
138	Ethylene Glycol	E	E	E
139	Ethylene Oxide	E	E	E
140	Fatty Acids	E	E	E
141	Ferric Chloride, 43% in w	E	E	E
142	Ferric Nitrate, 60% in w	E	E	E
143	Ferric Salts	E	E	E
144	Ferric Sulfate, 5% in w	E	E	E
145	Ferrous Chloride, 40% in w	E	E	E
146	Ferrous Salts	E	E	E
147	Ferrous Sulfate, 5% in w	E	E	E
148	Fluoborate Salts	E	E	E
149	Fluoboric Acid, 48% in w	E	E	E
150	Fluorine Gas	G	G	G
151	Fluosilicic Acid, 25% in w	E	E	E
152	Formaldehyde, 37% in w	E	E	E
153	Formic Acid, 25% in w	E	E	E
154	Formic Acid, 40-50% in w	E	E	E
155	Formic Acid, 98% in w	E	E	E
156	Freon 11	F	E	E
157	Freon 12	F	E	E
158	Freon 22	F	E	E
159	Freon 113	F	E	E
160	Fruit Juice	E	E	E
161	Fuel Oil	E	E	E
162	Furfural	E	E	E
163	Gallic Acid, 17% in acetone	E	E	E
164	Gasoline, Automotive	E	E	E
165	Gelatin	E	E	E
166	Glucose, 50% in w	E	E	E
167	Glycerol, (Glycerin)	E	E	E
168	Glycolic Acid, 70% in w	E	E	E
169	Heptane	E	E	E
170	Hexane	E	E	E
171	Hydrazine	E	E	E
172	Hydrobromic Acid, 20-50% in w	E	E	E
173	Hydrobromic Acid, 100% in w	E	E	E
174	Hydrochloric Acid, 10% in w	E	E	E
175	Hydrochloric Acid, 37% in w	E	E	E
176	Hydrocyanic Acid	E	E	E
177	Hydrofluoric Acid, 10% in w	E	E	E
178	Hydrofluoric Acid, 25% in w	E	E	E
179	Hydrofluoric Acid, 40-48% in w	E	E	E
180	Hydriodic Acid, 55-58% in w	E	E	E
181	Hydrogen Gas	E	E	E
182	Hydrogen Peroxide, 3% in w	E	E	E
183	Hydrogen Peroxide, 10% in w	E	E	E
184	Hydrogen Peroxide, 30% in w	E	E	E
185	Hydrogen Peroxide, 90% in w	E	E	E
186	Hydrogen Sulfide	E	E	E
187	Hydroquinone, 7% in w	E	E	E
188	Hypochlorous Acid, 25% in w	E	E	E
189	Iodine, 50 ppm in w	E	E	E
190	Isobutyl Alcohol	E	E	E
191	Isooctane	E	E	E
192	Isopropyl Acetate	E	E	E
193	Isopropyl Alcohol	E	E	E
194	Isopropyl Ether	E	E	E
195	Jet Fuel, JP8	E	E	E
196	Kerosene	E	E	E
197	Ketones	E	E	E
198	Lacquer Solvents	E	E	E
199	Lactic Acid, 3-10% in w	E	E	E
200	Lactic Acid, 85% in w	E	E	E
201	Lard, Animal Fat	E	E	E
202	Lead Acetate, 35% in w	E	E	E
203	Lead Nitrate, 27% in w	E	E	E
204	Lead Salts	E	E	E
205	Lemon Oil	E	E	E
206	Limonene-D	E	E	E
207	Linoleic Acid	E	E	E
208	Linseed Oil	E	E	E
209	Lubricating Oils, Petroleum	E	E	E
210	Magnesium Carbonate, 1% in w	E	E	E
211	Magnesium Chloride, 35% in w	E	E	E
212	Magnesium Hydroxide, 10% in dilute acids	E	E	E
213	Magnesium Nitrate, 50% in w	E	E	E
214	Magnesium Sulfate, 25% in w	E	E	E
215	Maleic Acid, 30% in w	E	E	E
216	Malic Acid, 36% in w	E	E	E
217	Manganese Salts	E	E	E
218	Manganese Sulfate, 34% in w	E	E	E
219	Mercuric Chloride, 6% in w	E	E	E
220	Mercuric Cyanide, 8% in w	E	E	E
221	Mercurous Nitrate, 10% in dilute acids	E	E	E
222	Mercury	E	E	E
223	Mercury Salts	E	E	E
224	Methane Gas	E	E	E
226	Methyl Acetate	E	E	E
225	Methyl Alcohol (Methanol)	E	E	E
227	Methyl Bromide	E	E	E
228	Methyl Chloride	E	E	E
229	Methyl Ethyl Ketone	E	E	E
230	Methyl Isobutyl Ketone	E	E	E
231	Methylene Chloride	E	E	E
232	Methyl Methacrylate	E	E	E
233	Milk	E	E	E
234	Mineral Oil	E	E	E
235	Mineral Spirits	E	E	E
236	Molasses	E	E	E
237	Monoethanolamine	E	E	E
238	Motor Oil	E	E	E
239	Naphtha	E	E	E
240	Naphthalene	E	E	E

Chemical Resistance Ratings (continued)

28-Day Immersions at 73°

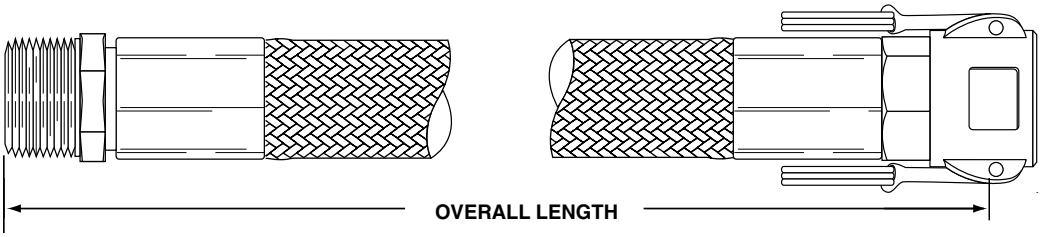
E = Excellent **G = Good** **F = Fair** **U = Not Recommended**

Environmental % Conc.*
w = Water alc. = Alcohol

No.	Environment, Conc. %	Chemfluor® FEP	Chemfluor® PFA	Chemfluor® PTFE
241	Natural Gas	E	E	E
242	Nickel Chloride, 40% in w	E	E	E
243	Nickel Nitrate, 75% in w	E	E	E
244	Nickel Salts	E	E	E
245	Nickel Sulfate, 25% in w	E	E	E
246	Nitric Acid, 10% in w	E	E	E
247	Nitric Acid, 35% in w	E	E	E
248	Nitric Acid, 68-71% in w	G	E	E
249	Nitrobenzene	E	E	E
250	Nitromethane	E	E	E
251	Nitrous Acid, 10% in w	E	E	E
252	Nitrous Oxide	E	E	E
253	Oils, Animal	E	E	E
254	Oils, Essential	E	E	E
255	Oils, Hydraulic (Phosphate Ester)	E	E	E
256	Oils, Hydrocarbon	E	E	E
257	Oils, Vegetable	E	E	E
258	Oleic Acid	E	E	E
259	Oleum, 25% in w	E	E	E
260	Ortho Dichlorobenzene	E	E	E
261	Oxalic Acid, 12% in w	E	E	E
262	Oxygen	E	E	E
263	Ozone, 300pphm	E	E	E
264	Palmitic Acid, 100% in ether	E	E	E
265	Paraffins	E	E	E
266	Perchloric Acid, 67% in w	E	E	E
267	Perchloroethylene	E	E	E
268	Phenol, 5-10% in w	E	E	E
269	Phenol, 91% in w	E	E	E
270	Phosphoric Acid, <10% in w	E	E	E
271	Phosphoric Acid, 25% in w	E	E	E
272	Phosphoric Acid, 85% in w	E	E	E
273	Phosphorous Trichloride Acid	E	E	E
274	Photographic Solutions	E	E	E
275	Phthalic Acid, 9% in alc	E	E	E
276	Phthalic Anhydride, 9% in alc	E	E	E
277	Picric Acid, 1% in w	E	E	E
278	Plating Solutions	E	E	E
279	Potassium Carbonate, 55% in w	E	E	E
280	Potassium Chloride, 20% in w	E	E	E
281	Potassium Cyanide, 33% in w	E	E	E
282	Potassium Dichromate, 5% in w	E	E	E
283	Potassium Hydroxide, <10% in w	E	E	E
284	Potassium Hypochlorite, 70% in w	E	E	E
285	Potassium Iodide, 56% in w	E	E	E
286	Potassium Nitrate, 10% in w	E	E	E
287	Potassium Oxide, 50% in w	E	E	E
288	Potassium Permanganate, 6% in w	E	E	E
289	Potassium Salts	E	E	E
290	Potassium Sulfate, 10% in w	E	E	E
291	Potassium Sulfide, 20% in w	E	E	E
292	Propane Gas	E	E	E
293	Propyl Alcohol (Propanol)	E	E	E
294	Propylene Glycol	E	E	E
295	Propylene Oxide	E	E	E
296	Pyridine	G	G	E
297	Salicylic Acid, 1% in w	E	E	E
298	Silicone Oils	E	E	E
299	Silver Nitrate, 55% in w	E	E	E
300	Skydrol 500A	E	E	E
301	Soap Solutions	E	E	E
302	Sodium Acetate, 55% in w	E	E	E
303	Sodium Benzoate, 22% in w	E	E	E
304	Sodium Bicarbonate, 7% in w	E	E	E
305	Sodium Bisulfate, 3% in w	E	E	E
306	Sodium Carbonate, 7% in w	E	E	E
307	Sodium Chlorate, 45% in w	E	E	E
308	Sodium Chloride, 20% in w	E	E	E
309	Sodium Cyanide, 30% in w	E	E	E
310	Sodium Dichromate, 70% in w	E	E	E
311	Sodium Fluoride, 3% in w	E	E	E
312	Sodium Hydroxide, 10-15% in w	E	E	E
313	Sodium Hydroxide, 30-40% in w	E	E	E
314	Sodium Hypochlorite, 5.5% in w	E	E	E
315	Sodium Hypochlorite, 12.2% in w	E	E	E
316	Sodium Nitrate, 3.5% in w	E	E	E
317	Sodium Perborate, 25% in w	E	E	E
318	Sodium Peroxide, 20% in w	E	E	E
319	Sodium Phosphate, 30% in w	E	E	E
320	Sodium Salts	E	E	E
321	Sodium Sulfate, 5% in w	E	E	E
322	Sodium Sulfide, 45% in w	E	E	E
323	Sodium Sulfite, 10% in w	E	E	E
324	Stannic Chloride, 50% in w	E	E	E
325	Stannous Chloride, 45% in w	E	E	E
326	Stearic Acid, 5% in alc	E	E	E
327	Styrene Monomer	E	E	E
328	Sulfur Chloride	E	E	E
329	Sulfur Dioxide, Gas Dry	E	E	E
330	Sulfur Dioxide, Gas Wet	E	E	E
331	Sulfur Trioxide, Wet	G	G	G
332	Sulfuric Acid, 10% in w	E	E	E
333	Sulfuric Acid, 30% in w	E	E	E
334	Sulfuric Acid, 95-98% in w	E	E	E
335	Sulfurous Acid	E	E	E
336	Tannic Acid, 75% in w	E	E	E
337	Tanning Solutions	E	E	E
338	Tartaric Acid, 56% in w	E	E	E
339	Tetrahydrofuran	E	E	E
340	Thionyl Chloride	E	E	E
341	Tin Salts	E	E	E
342	Titanium Salts	E	E	E
343	Toluene	E	E	E
344	Trichloroacetic Acid, 90% in w	E	E	E
345	Trichloroethane	E	E	E
346	Triethanolamine	E	E	E
347	Trichloroethylene	E	E	E
348	Trichloropropane	E	E	E
349	Tricresyl Phosphate	E	E	E
350	Trisodium Phosphate	E	E	E
351	Turpentine	E	E	E
352	Urea, 20% in w	E	E	E
353	Uric Acid	E	E	E
354	Vinegar	E	E	E
355	Vinyl Acetate	E	E	E
356	Water, Brine	E	E	E
357	Water, De-ionized	E	E	E
358	Water, Distilled	E	E	E
359	Xylene	E	E	E
360	Zinc Chloride, 80% in w	E	E	E
361	Zinc Salts	E	E	E
362	Zinc Sulfate, 30% in w	E	E	E

How to Order an Assembly

Flexible Components Chemfluor® Fluoropolymer Hoses with PermaSeal® Crimp Style Fittings



Part Number Example: 16WCS0316S6

Description: 1" Convoluted, SS braided 316 SS male pipe x 316 SS female cam and groove

16	WCS	03	16	S	6	XX	A – Length
ID Size (in 1/16")	Hose Style	Fitting First End	Fitting Second End	Ferrule Material	Fitting Material	Flange Material*	Accessory Code (Optional)

ID Size (in 1/16")

2 (1/8)
4 (1/4)
6 (3/8)
8 (1/2)
12 (3/4)
16 (1)
20 (1-1/4)
24 (1-1/2)
32 (2)
40 (2-1/2)
48 (3)
64 (4)

Hose Style

TS
TSS
TB
TD
TDB
TSS
TLCT
TLCTCO
WTLCT
WTLCTPFA
CTLCT
WCS
WCSS
BCS
WCP
BCP
TWOB
TWOY
TWOBHV
TBOB
TBOY
TBOBHV
TWOK
TBOK
TWOP
TBOP
ST
FLP (Flexpro)
PSTLCT (PharmaSmooth)
STPG

Fitting First End / Fitting Second End

01 = Butt Weld Adapter, Pipe
02 = J.I.C. Female
03 = Male Pipe, NPT
06 = Female Pipe, FNPT
07 = J.I.C./Female Union
08 = J.I.C./Male Union
10 = Sanitary, Gasket Style
10U = Sanitary, Step-Up
11 = Sanitary, 'Mini' Style
*12 = Flange Retainer, Lap-Joint Style
*16 = Cam and Groove Coupler ('D')
16LK = Cam and Groove Coupler Locking style ('D')
*17 = Cam and Groove Adapter ('E')
20 = Sanitary, Bevel Seat, w/Nut
31 = Compression Connector
31FN = Compression Connector, w/Nut & Ferrules
32 = Compression Adapter
32FN = Compression Adapter w/Nut & Ferrules
33 = O-Ring Female Adapter
38 = J.I.C. Male
40 = Sanitary, Bevel Seat, Exposed Thread
41 = Butt Weld Adapter, Tube
44 = O-Ring Male
50 = I-Line Sanitary Male
51 = I-Line Sanitary Female
61 = NPSH Female Swivel

*Chemfluor® PFA encapsulated style also available

Ferrule Material

S = 304 SS
C = Zinc Plated Carbon Steel**

Fitting Material

C = Steel
M = Monel®
6 = 316 SS
T = Chemfluor® PFA Encapsulated
P = Polypropylene
K = PVDF (Kynar®)

Flange Material*

SC = Carbon Steel
S6 = 316 SS
S4 = 304 SS
CT = Carbon Steel with Chemfluor® PFA Encapsulated
6T = 316 SS with Chemfluor® PFA Encapsulated
4T = 304 SS with Chemfluor® PFA Encapsulated

Accessory Code (Optional)

A = Armor Casing
C = Casing Strain Cuffs
F = Firesleeve
SG = External SS Spring Guard

⚠ Important:

If using flange, drop Fitting Material code and add Flange Material code. All flange codes above are for Class 150#. For 300#, add 300 as suffix, (e.g., SC300 for carbon steel 300# flange).

For WCS, BCS 1/2" up to 2" only, zinc plated crimp collar available.

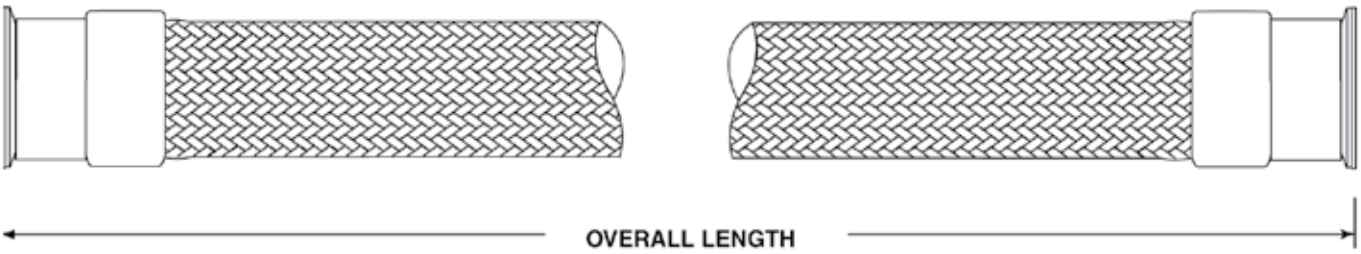
Overall length tolerances for assemblies are:

+/- 1/4"	on assemblies	6-24"
+/- 1/2"	on assemblies	25-60"
not to exceed +/- 1%	on assemblies	Over 60"

- *For Flexible Components Flare-Thru fitting system see section on "How to Order: Flare-Thru Hose Assemblies" pages 96-98.*
- *1/2", 3/4" and 1" sight tubes may be ordered with virtually all fittings shown above. 1-1/2" and larger sight tubes are available with 316L sanitary #10 clamp style fittings. Consult factory for availability of other crimp style fittings. 3/4" through 4" sight tubes are available with Flare-Thru 150# flanged ends.*
- *STPG is P/N for caged sight tube option. 4-foot maximum length. See page 30 for available sizes.*

How to Order an Assembly (continued)

Chemfluor® PTFE Open Pitch Convoluted Hose (Flare-Thru Fittings)



Part Number Example: 16TWOB10FT10FTS6 – Length

Description: 1" TWOB open pitch SS braided convoluted hose with 1" Flare-Thru Chemfluor® PTFE sanitary clamp fittings

Flare-Thru*

16	TWOB	10	FT	10	FT	S	6	XX	A – Length
ID Size (in 1/16")	Hose Style	Fitting First End		Fitting Second End		Ferrule Material	Fitting Material	Flange Material**	Accessory Code (Optional)

ID Size (in 1/16")

12	(3/4)
16	(1)
20	(1-1/4)
24	(1-1/2)
32	(2)
40	(2-1/2)
48	(3)
64	(4)

Hose Style

TWOB
TBOB
TWOBHV
TBOBHV
TWOY
TBOY
TWOK
TBOK
TWOP
TBOP

Fitting First End / Fitting Second End

10 = Sanitary, Clamp Style
12 = Flange Retainer, Lap-Joint Style
16 = Cam and Groove Coupler (D')
50 = I-Line Sanitary Male
51 = I-Line Sanitary Female

Ferrule Material

S = 304 SS

Fitting Material

6 = 316 SS

Flange Material**

SC = Carbon Steel
S6 = 316 SS
S4 = 304 SS

⚠ Important:

**** Not all styles of Flexible Components Flare-Thru fittings are available in all series or all sizes of hose. Consult factory for availability.***

***** If using flange, drop Fitting Material code and add Flange Material code. All flange codes above are for Class 150#. For 300#, add 300 as suffix, (e.g., SC300 for carbon steel 300# flange).***

How to Order an Assembly (continued)

MTL/MTLSJ Series Chemfluor® Fluoropolymer Lined SS Metal Hose Assemblies (Flare-Thru Fittings)

Part Number Example: 16MTL1212S4T – Length

Description: 1" fully lined Chemfluor® fluoropolymer lined metal hose with 150# 304 SS flanged ends and Flare-Thru liner.

Part Number System

16 MTL 12 12 S 4 T – length

ID Size (in 1/16")

16 (1)
24 (1-1/2)
32 (2)
48 (3)
64 (4)+
96 (6)+
128 (8)+

+ MTL only

Hose Style

MTL
MTLSJ

Fitting First End / Fitting Second End

*10 = Sanitary, Gasket Style
1" and 2" only
*12 = Flange Retainer, Lap-Joint Style
1" to 8"
*16 = Cam and Groove Coupler ('D')
1" to 3"
*16LK = Cam and Groove Coupler ('D') Locking style
1" to 3"

Braided Ring Material

Always stainless steel

Flange Material Only

C = Steel
4 = 304 SS
6 = 316 SS

Chemfluor® Fluoropolymer Lined

T

TLCT Series Rubber Covered Chemfluor® Fluoropolymer Lined Hose (Flare-Thru Fittings)

Part Number Example: 24TLCT1616S6

Description: 1-1/2" Chemfluor® fluoropolymer lined rubber hose with 1-1/2" Flare-Thru female cam and grooves at each end.

Part Number System

24 TLCT 16 16 S6 FT ( ) – length

ID Size (in 1/16")

8 (1/2)
12 (3/4)
16 (1)
20 (1-1/4)
24 (1-1/2)
32 (2)
40 (2-1/2)
48 (3)
64 (4)

Hose Style

FLP (Flexpro)
TLCT
WTLCT
CTLCT
PSTLCT (PharmaSmooth)

Fitting First End / Fitting Second End

12 = Flange Retainer, Lap-Joint Style
16 = Cam and Groove Coupler ('D')
16L = Cam and Groove Coupler ('D') Locking Style
*50 = I-Line Sanitary Male
*51 = I-Line Sanitary Female

Fitting Material

1st Letter: Ferrule Material (SS)
2nd Letter: Fitting Material (SS)
3rd Letter: Flange Material

6 = 316 SS
(4) = Flanges Only – 304 SS
(6) = Flanges Only – 316 SS

Flare-Thru Fitting Style

FT

Accessory Code

A = Armor Casing
B = External Braid
C = Casing Strain Cuff
S = External Spring Guard

⚠ Important:

**** Not all styles of Flexible Components Flare-Thru fittings are available in all series or all sizes of hose. Consult factory for availability.***

How to Order an Assembly (continued)

W.S.I.B. Series EPDM Rubber Covered Chemfluor® Fluoropolymer Lined Hose (Flare-Thru Fittings)

Part Number Example: 14WSIB1010S6FT

Description: 1" tube size Chemfluor® fluoropolymer lined rubber hose with 1" sanitary clamp style at each end.

Part Number System

14	W.S.I.B.	10	10	S6	FT	( )	– length (maximum 20')
ID Size (in 1/16")	Hose Style	Fitting First End	Fitting Second End	Fitting Material	Flare-Thru Fitting Material	Accessory Code	

14	(7/8)	W.S.I.B.	*10 = Sanitary, Clamp Style
22	(1-3/8)		
30	(1-7/8)		
46	(2-7/8)		

A = Armor Casing
B = External Braid
C = Casing Strain Cuff
SG = External Spring Guard

⚠ Important:

**** Not all styles of Flexible Components Flare-Thru fittings are available in all series or all sizes of hose. Consult factory for availability.***

High Pressure (5000 PSI) TH Series Hose Assemblies

Part Number Example: 08TH0203S6A

Description: 1/2" high-pressure hose with 316 SS female J.I.C. x 316 SS 1/2" hex male pipe, armor covering with full length armor casing.

Part Number System

8	TH	02	03	S6	(A)	– length
ID Size (in 1/16")	Hose Style	Fitting First End	Fitting Second End	Fitting Material	Accessory Code Optional	

4	(1/4)	TH	02 = J.I.C. Female	316 stainless steel	A = Armor Casing
6	(3/8)		03 = Male Pipe, NPT		C = Casing Strain Cuffs
8	(1/2)		06 = Female Pipe, FNPT		F = Firesleeve
10	(5/8)		08 = J.I.C./Male Union		
12	(3/4)		33 = O-Ring Female Adapter		
16	(1)				

How to Order an Assembly (continued)

Flexible Components All Stainless Steel Construction Metal Hose Assemblies

MSS4/CF04 - MSS6/CF16 Series

Part Number Example: 16CF040312CA

Description: 1" 304 SS single braided metal hose with 304 1" hex male NPT one end x 150# epoxy coated carbon steel lap-joint flange with 304 SS stub end, full length armor casing.

Part Number System

16 **CF04** **03** **12** **C** **(A)** **– length**

ID Size (in 1/16")

4	(1/4)+
6	(3/8)
8	(1/2)
12	(3/4)
16	(1)
20	(1-1/4)
24	(1-1/2)
32	(2)
40	(2-1/2)
48	(3)
64	(4)
96	(6)
128	(8)

Hose Style

MDS6+

MSS4
CF04
MSS6
CF16

+ double braided

Fitting First End / Fitting Second End

01	=	Butt Weld Adapter, Pipe
02	=	J.I.C. Female
03	=	Male Pipe, NPT
04	=	Plain Male NPT
05	=	Female NPT (Round Stock)
06	=	Female Pipe, FNPT
07	=	J.I.C./Female Union
08	=	J.I.C./Male Union
10	=	Sanitary, Gasket Style
11	=	Sanitary, 'Mini' Style
12	=	Flange Retainer, Lap-Joint Style
14	=	Flange, Fixed Weld Neck Style
16	=	Cam and Groove Coupler ('D')
16L	=	Cam and Groove Coupler Locking Style ('D')
17	=	Cam and Groove Adapter ('E')
21	=	1/2" SAE Female Flare
22	=	5/8" SAE Female Flare
26	=	1/2" SAE Female 90° Elbow
27	=	5/8" SAE Female 90° Elbow
28	=	Male NPT Union
29	=	Female Union, 150#
30	=	Female Union, 300#
31FN	=	Compression Connector, w/Nut & Ferrules
32	=	Compression Adapter
33	=	O-Ring Female Adapter
34	=	Vacuum Female
35	=	Vacuum Male
38	=	J.I.C. Male
40	=	Sanitary, Bevel Seat, Exposed Thread
41	=	Butt Weld Adapter, Tube

Fitting Material

C	=	Steel
M	=	Monel®
S4	=	Type 304 Stainless Steel Flanges Only
S6	=	Type 316L Stainless Steel Flanges Only
SS4	=	304 SS Flange and Stub End
S4C	=	304 SS Stub End, Steel Flange
SS6	=	316L SS Flange and Stub End
S6C	=	316 SS Stub End Steel Flange

Accessory Code

A	=	Armor Casing
C	=	Casing Strain Cuffs
F	=	Firesleeve

How to Order an Assembly (continued)

Chlorine Transfer Hose CL Series

Part Number Example: 16CL0303MC3KYA

Description: 1" chlorine transfer hose with 1" Monel® hex male pipe threads at each end.

Part Number System

16 **CL** **03** **03** **M** **( )** **KY** **( )** **– length**

ID Size (in 1/16")

8 (1/2)
16 (1)
24 (1-1/2)

Hose Style

CL

Fitting First End

03 = Male Pipe, NPT
*12 = Flange Retainer, Lap-Joint Style

Fitting Second End

Fitting Material

Ferrule Material
Fitting Material
(Always Monel® M)

Flange Fitting Material

M = Monel®
C3 = Carbon Steel 300# Flanges only
43 = 304 SS 300# Flanges only
63 = 316 SS 300# Flanges only

Kynar® Abrasion Cover

Accessory Code Optional

A = Armor Casing
C = Casing Strain Cuffs

⚠ Important:

Must Specify flange material. Carbon, steel, epoxy coated 300# standard. 1" and 1-1/2" sizes only.

literature request

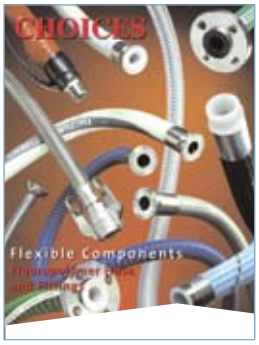
More high performance products for fluid handling from Saint-Gobain Performance Plastics

Flexible Components Fluoropolymer Hose and Fitting Buyer's Guide

An invaluable reference source for customers requiring innovative, performance-tested hose assemblies. Features an extensive selection of products incorporating Chemfluor® fluoropolymers.

Flexible Components Brand Compressed Gas and Cryogenic Hose Catalog

Aids customers in selecting appropriate transfer hoses and related equipment for custom and individual applications with exacting requirements.

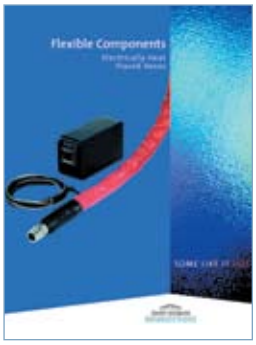


Choices Brochure

Condensed version of the Flexible Components Fluoropolymer Hose and Fitting Buyer's Guide. Useful as a quick reference.

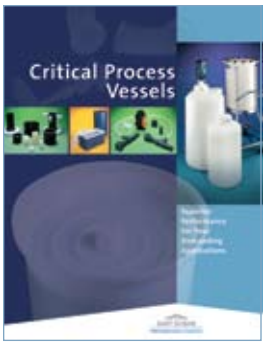
Sanitary Couplers Dairy, Food and Beverage Process Catalog

Featuring ReSeal®, re-usable coupling technology, this catalog provides a full range of hose, tubing and fitting options that comply with the most stringent 3-A, FDA/PMO, and USDA requirements.



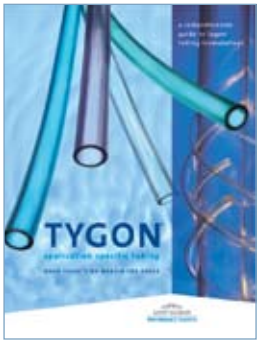
Electrically Heat Traced Hose Assemblies Guide

Flexible Components offers a guide for the selection of the electric heat trace option for corrosive-resistant and ultra pure hoses from Saint-Gobain Performance Plastics.



Molded Products Catalog

Provides complete data on Saint-Gobain Performance Plastics high-performance molded products, including tanks, biosystems, blowers, fittings and accessories.



Tygon® Tubing Catalog

Offers the broadest range of Tygon® tubing formulations to meet such needs as temperature resistance, long service life, autoclavability, biocoMPatibility and abrasion resistance.

Acutech Catalog

Contains a wide range of extruded thermoplastic products, including tubing, pipe, rod and specialty profiles, as well as heat shrink tubing and highly specialized, proprietary custom products and profiles.

Manufacturing Facilities

Saint-Gobain Performance Plastics
2664 Gilchrist Road
Akron, Ohio 44305
Tel: (800) 798-1554, (330) 798-9240
Fax: (330) 798-6968
TYGON® Brand Flexible Tubing, Chemfluor® Tubing
www.tygon.com

Saint-Gobain Performance Plastics
3910 Terry-Diane Street
Beaverton, Michigan 48612
Tel: (888) 387-0067, (989) 435-9533
Fax: (989) 453-2355
TYGON® Brand Extruded Silicone and Molded Components
www.biopharm.saint-gobain.com
www.medical.saint-gobain.com
www.industrialsilicone.com

Saint-Gobain Performance Plastics
460 Milltown Road
Bridgewater, New Jersey 08807
Tel: (800) 435-3992, (908) 218-8888
Fax: (908) 218-9009
Flexible Components, Sanitary Couplers ReSeal® and PermaSeal®, Sani-Tech® Products, Tanks
www.flexiblecomponents.com
www.reseal.com

Saint-Gobain Performance Plastics
I-295 @ Harmony Road
Mickleton, New Jersey 08056
Tel: (800) 543-8823, (856) 423-6630
Fax: (856) 423-8182
Roll Cover, Engineered Extrusions
www.bunnell-plastics.com

Saint-Gobain Performance Plastics
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Wayne, New Jersey 07470-4669
Tel: (973) 696-4700
Fax: (973) 696-4056
Chemware®
www.labpure.com

Saint-Gobain Performance Plastics
700 Warner Blvd.
Taunton, Massachusetts 02780
Tel: (508) 823-7701
Fax: (508) 823-1438
Specialty Extruded and Molded Silicone Products
www.biopharm.saint-gobain.com
www.medical.saint-gobain.com

Saint-Gobain Performance Plastics
La Mothe-aux-Aulnaies
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Fax: (33) 3-86-63-77-77
Silicone Products, Hose Assemblies
www.verneret.com

Saint-Gobain Performance Plastics
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Poestenkill, New York 12140
Tel: (518) 283-5963
Fax: (518) 283-1418
Specialty Closures
www.labpure.com

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2316 West Wisconsin Street
Portage, Wisconsin 53901
Tel: (800) 236-7600, (608) 742-8541
Fax: (608) 742-3179
Specialty Molded Silicone Components
www.medical.saint-gobain.com

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