ResistoPure™

brands you trust.


# Design Manual

CRANE®
ChemPharma Flow Solutions

www.cranechempharma.com

# CRANE® RESISTOFLEX®

## Flanged Plastic-Lined Pipe

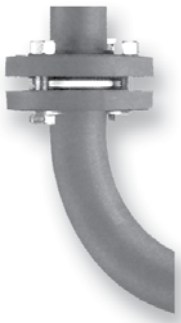
CRANE ChemPharma, Resistoflex plastic-lined pipe is made with a locked-in liner to minimize the adverse effects of differential thermal expansion between the liner and the steel.
Available liners are: PP, Kynar® PVDF, and Teflon® PTFE or PFA.

## Plastic-Lined Fittings

PP, Kynar® PVDF, and Teflon® PFA fittings are all injection or transfer molded. TEFZEL® lined fittings and special shapes are roto-lined in custom housings. Teflon® PTFE liners are made by isostatic molding.

## Special Shapes

- Custom fittings, manifolds, and small vessels
- Lined with TEFZEL® ETFE
- Available through 24” diameter



## Thermalok Pipe

- Stress relieved liner
- Unlimited housing material options
- Sizes ranging from 1” - 24” diameter

## Swaged Pipe

- Used exclusively for CONQUEST® and MULTI-AXIS®
- Sizes ranging from 1” - 8”
- Threaded flanges and threaded rotatable flange assemblies only

## CONQUEST® Connections

- Patented flangeless joint design
- Performance of a welded system
- Available in 1” - 4” for all liner types
- Virtually zero maintenance

ResistoPure™

- High-Purity Silicone Hoses
- High-Purity Teflon® Hoses
- Clean-Room Assembly Packaging
- Virtually zero maintenance

## Expansion Joints of TEFLON®

- 2, 3, or 5 Convolute construction
- Bolt or cable limited
- Teflon® T-62 for maximum flex life
- 1” - 24” Size range
- DI or SS Flanges available

# Table of Contents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# STRATUS™

# *Teflon® PTFE-Lined Silicone Hose**

* Patent Pending

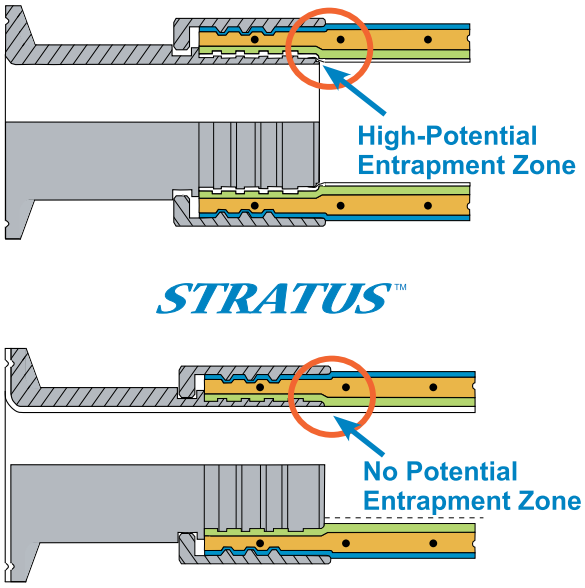
## Approved Materials Throughout —

USP Class VI <88>
USP MEM Elution <87>
21 CFR 177.1550 (Teflon®)
21 CFR 177.2600 (Silicone)
ISO 10993 (Silicone)

## Features —

FLARED THRU Design - Zero Entrapment
Excellent Drainability - Better Product Recovery
Extended Life Cycle - Reduced Ownership cost
One Wetted Part (Teflon®) - Universal SIP, CIP and Product Compatibility

### *Crimped End Hose*




## STRATUS™ General Hose Data

| Size (in.) | Actual I.D. (in.) | O.D. (in.) | Hose Working Pressure (70 °F - 280 °F) | Fitting Working Pressure (70 °F - 280 °F) | Vacuum Rating (70 °F - 280 °F) | Minimum Bend Radius (in.) | Force to Bend (lbs.*) |
|---|---|---|---|---|---|---|---|
| 1/2 | 0.370 | 0.895 | 475 psig | 200 psig | Full | 2.375 | 6.0 |
| 3/4 | 0.620 | 1.145 | 450 psig | 200 psig | Full | 2.937 | 7.0 |
| 1 | 0.870 | 1.410 | 425 psig | 200 psig | Full | 4.156 | 9.5 |
| 1 1/2 | 1.370 | 1.895 | 400 psig | 200 psig | Full | 7.062 | 10.0 |
| 2 | 1.870 | 2.395 | 350 psig | 200 psig | Full | 11.812 | 8.7 |

* Hose bent 90° over a mandrel at the minimum bend radius

# Key Comparisons

## HIDDEN CONTAMINATION

Silicone Hose 1
Crimped End

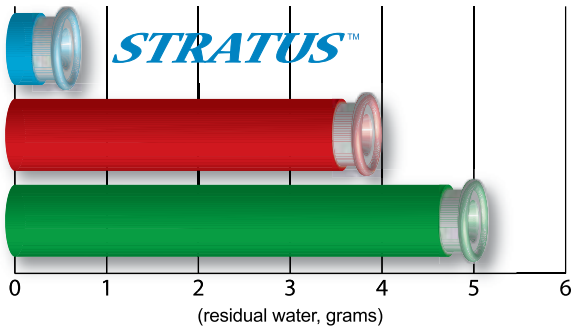
Silicone Hose 2
Crimped End

PTFE-Lined
Rubber-Covered Hose
Crimped End

STRATUS™
***Teflon® PTFE-Lined Silicone Hose***

***Could your crimped fitting hose be a source of contamination?***
1" dia. x 24" long hoses were tested per ASTM F1545 steam/cold water cycling. After the steam/cold water test, the hoses were filled with a riboflavin/water mixture, pressurized, and drained. These photographs, taken under UV light, show the amounts of riboflavin that remained trapped underneath the crimped fitting area that cannot be sterilized.

## RESIDUAL PRODUCT AFTER DRAINING



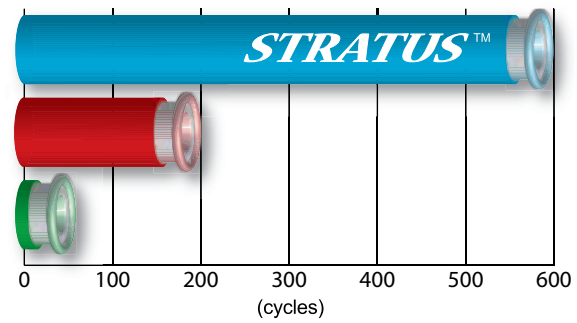

***How much product remains in your crimped fitting hose?***
1" dia. x 24" long hoses with hygienic clamp fittings were filled with water and then drained at a 0.6 degree slope angle. Stratus had the least amount of liquid remaining inside the hose.

STRATUS™

FEP-Lined Rubber Covered Hose w/Sanitary Crimp Fittings

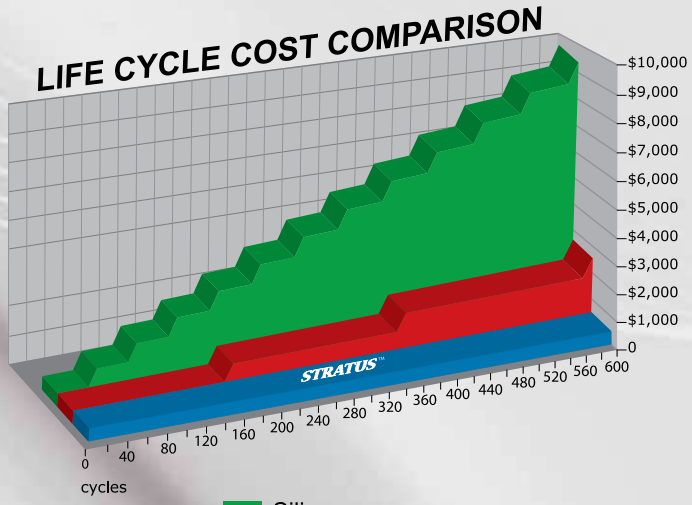
Wire-Reinforced Silicone Hose w/Sanitary Crimp Fittings

## STEAM SANITATION CYCLING




***What life do you expect from your crimped fitting hose?***
1" dia. x 24" long hoses were tested per ASTM F1545 steam/cold water cycling. Stratus hose never leaked under these conditions, and was still performing long after the others failed.

## LIFE CYCLE COST COMPARISON




Silicone
Rubber Covered Teflon Crimp Style
STRATUS™

***How much are your crimped fitting hoses costing you?***

Life cycle data based on steam testing per ASTM F1545 steam/cold water cycling shows Stratus performing with the longest life of the three competing hoses. Each “step” on the graph is a replaced hose. The dollar values were calculated by adding the market price of a representative hose and $500 per changeout for work order and labor costs. At the time this brochure was printed, Stratus reached 600 cycles without failure and was still running.

# Cirrus™ - Teflon® Smooth Bore EPDM Rubber Covered Hose

**Inner core:** Smooth *Teflon*® PTFE
**Reinforcement:** EPDM rubber

## Construction

Natural smooth bore *Teflon*® PTFE liner bonded to a cover reinforced with multiple nylon plycord and gray EPDM rubber. Cover is shiny and cleanable. A double-helix high tensile strength wire embedded in the carcass provides crush, kink, and vacuum resistance.

## Benefits

- *Teflon*® PTFE liner acceptable per FDA CFR 177.1550 and USP 28, NF 23, 2005 for Class VI plastics
- USP Class VI Approval
- USP L929 MEM Elution
- Will not absorb media
- Low minimum bend radius and force-to-bend
- Long service life
- Meets or exceeds common working conditions in BioPharm industries
  - > Steam Cleaning
  - > Autoclaving
  - > CIP
  - > SIP
- Full vacuum-rated
- Lot-traceable documentation

## Fittings

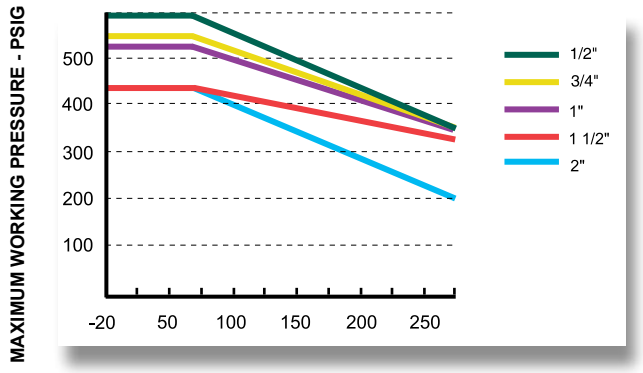

## Fitting Material Availability

316L S.S.
Teflon® Encapsulated

## External Protective Accessories

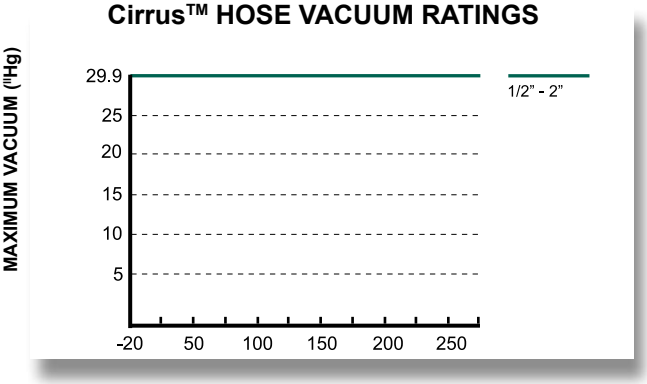
*Spiral guards, kink guards, and shrink sleeves available.*


### Cirrus™ HOSE PRESSURE RATINGS




**NOTE:** For assemblies, pressure ratings of fittings may be less than for the hose.

### Cirrus™ HOSE VACUUM RATINGS



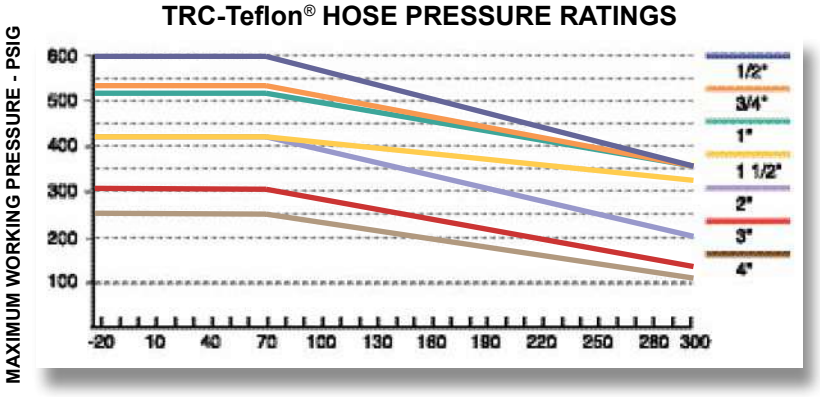

Note: Vacuum ratings are based on testing of straight assemblies. Bent assemblies may have reduced vacuum resistance.

| Size | | Hose I.D. | | Overall Wall Thickness | | Max. Working Pressure at 70°F (21°C) | | Burst Pressure at 70°F (21°C) | | Approximate Weight | | Bend Radius | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INCH | DN | INCH | MM | INCH | MM | PSIG | BAR | PSIG | BAR | LBS./FT. | KG/M | INCH | MM |
| 1/2 | 15 | 0.525 | 14 | 0.213 | 6 | 600 | 42 | 2400 | 166 | 0.39 | 0.59 | 1.75 | 45 |
| 3/4 | 20 | 0.775 | 20 | 0.239 | 7 | 550 | 38 | 2200 | 152 | 0.56 | 0.84 | 2.5 | 64 |
| 1 | 25 | 1.030 | 27 | 0.232 | 6 | 530 | 37 | 2120 | 147 | 0.73 | 1.09 | 3.38 | 86 |
| 1-1/2 | 40 | 1.525 | 39 | 0.310 | 8 | 430 | 30 | 1720 | 119 | 1.32 | 1.97 | 5.5 | 140 |
| 2 | 50 | 2.025 | 52 | 0.326 | 9 | 430 | 30 | 1720 | 119 | 1.81 | 2.7 | 8 | 204 |

# TRC - Teflon® Smooth Bore EPDM Rubber Covered Hose

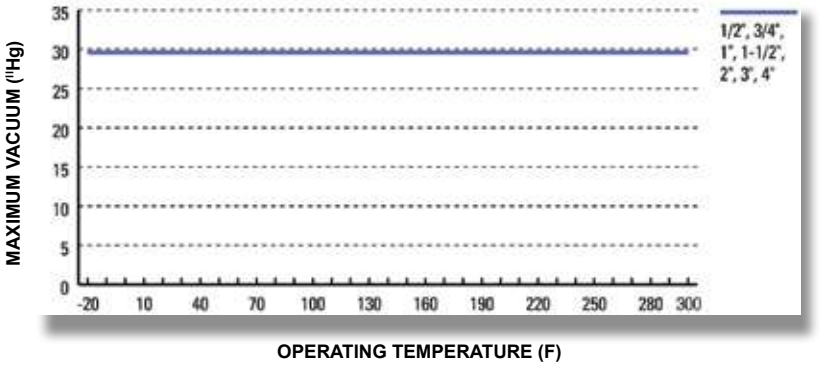

**Inner core:** Smooth *Teflon*® PTFE 1/2" - 2"
Smooth *Teflon*® FEP 3" - 4"
**Reinforcement:** EPDM rubber
**Temperature:** -20 °F to 300 °F

## TRC-Teflon® HOSE PRESSURE RATINGS




**NOTE:** Hose assembly pressure ratings may be limited by the fittings.

## TRC-Teflon® HOSE VACUUM RATINGS




**NOTE:** Custom colors available upon request. Consult factory.

## Construction

Smooth bore Teflon® liner bonded to a cover reinforced with multiple nylon plycord and EPDM rubber. A double-helix high tensile strength wire embedded in the shell provides crush, kink and vacuum resistance.

## Benefits

- Robust construction delivers extended service life, especially in steam cycling situations, compared to hoses of similar construction and appearance
- Smooth, flexible Teflon® liner for use in a wide range of applications and ease of cleaning
- Outstanding flexibility, bend-ability and bend radius
- Durable, kink-resistant EPDM reinforced design for extended life and easy handling
- PTFE available with natural or conductive liner

## Applications

- Chemical, food, beverage, pharmaceutical and other process transfers
- Rail car and trailer loading/unloading
- Load cell applications
- Chemical cleaning and/or steam cleaning/ sterilizing applications

## Fittings: Crimp Style


| | Nominal Size | | Hose ID | | Hose OD | | Bend Radius | | Max. Working Pressure at 70°F (21°C) | | Burst Pressure at 70°F (21°C) | | Weight Lbs / Ft |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | INCH | DN | INCH | MM | INCH | MM | INCH | MM | PSIG | BAR | PSIG | BAR | |
| PTFE | 1/2 | 15 | 0.525 | 13.3 | 0.997 | 25.3 | 1.75 | 44.5 | 600 | 41.3 | 2400 | 165.4 | .46 |
| PTFE | 3/4 | 20 | 0.775 | 19.7 | 1.299 | 33.0 | 2.5 | 63.5 | 550 | 37.9 | 2200 | 151.6 | .56 |
| PTFE | 1 | 25 | 1.03 | 26.2 | 1.54 | 39.1 | 3.38 | 85.9 | 530 | 36.5 | 2120 | 146.1 | .79 |
| PTFE | 1-1/2 | 40 | 1.525 | 38.7 | 2.191 | 55.7 | 5.5 | 139.7 | 430 | 29.6 | 1720 | 118.5 | 1.22 |
| PTFE | 2 | 50 | 2.025 | 51.4 | 2.723 | 69.2 | 8 | 203.2 | 430 | 29.6 | 1720 | 118.5 | 1.84 |
| FEP | 3 | 80 | 3.015 | 76.6 | 3.812 | 96.8 | 24 | 711.2 | 300 | 20.7 | 1200 | 82.7 | 0.80 |
| FEP | 4 | 100 | 4.010 | 101.9 | 4.937 | 125.4 | 42 | 1066.8 | 250 | 17.2 | 1000 | 68.9 | 5.15 |

# TRC FLARED THRU Hose

**Inner core:** Smooth *Teflon*® PTFE
**Reinforcement:** EPDM rubber

## Construction

Extra-thick, natural or conductive smooth bore *Teflon*® PTFE liner secured (without bonding agents) to a reinforced EPDM rubber cover. A carbon steel wire helically wound through the carcass provides crush, kink and vacuum resistance. Liner is flared out over the face of the fitting.

## Benefits

- USP Class VI approval
- USP MEM Elution <87>
- Unique FLARED THRU design (patent pending)
- Unique Thermalok™ process Results in interference fit liner
- No entrapment issues
- True sanitary I.D. dimensions
- Wide variety of fittings available
- Full vacuum-rated
- *Teflon*® PTFE liner acceptable per FDA CFR 177.1550 and USP 28, NSF 23, 2005 for Class VI plastics

## Fittings

Flared Flange | Flared Cam & Groove | Flared Sanitary

## Fitting Materials

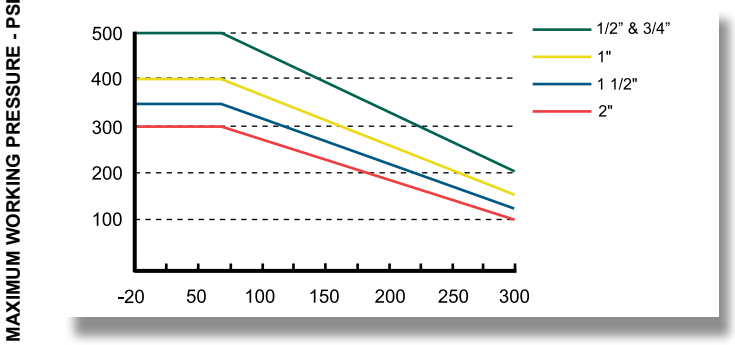
316L S.S.

## External Protective Accessories

*Spiral guards, kink guards, and shrink sleeves available.*

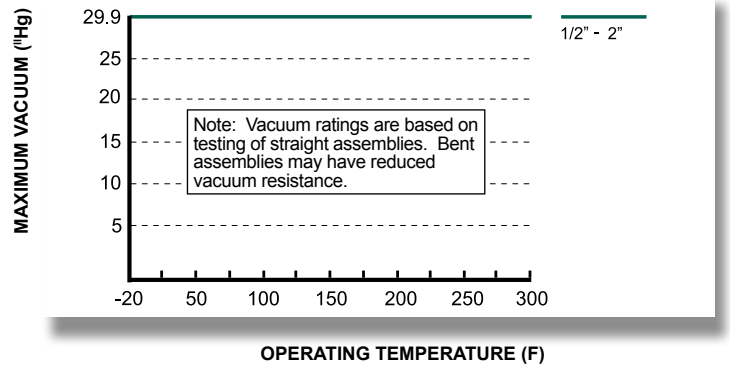
Custom colors available upon request.
Minimum order quantity applies.


### TRC FLARED-THRU HOSE PRESSURE RATINGS




**NOTE:** For assemblies, pressure ratings of fittings may be less than for the hose.

### TRC FLARED-THRU HOSE VACUUM RATINGS




| Size | | Hose I.D. | | Hose O.D. | | Min Bend Radius | | Max. Working Pressure at 70°F (21°C) | | Burst Pressure at 70°F (21°C) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch | DN | Inch | MM | Inch | MM | Inch | MM | PSIG | BAR | PSIG | BAR |
| 1/2 | 15 | 0.750 | 19.05 | 1.30 | 33 | 3 | 76.2 | 500 | 34.5 | 2000 | 137.8 |
| 3/4 | 20 | 0.750 | 19.05 | 1.30 | 33 | 3 | 76.2 | 500 | 34.5 | 2000 | 137.8 |
| 1 | 25 | 1.000 | 25 | 1.56 | 39.6 | 4 | 101.6 | 400 | 27.6 | 1600 | 110.3 |
| 1-1/2 | 40 | 1.500 | 38.1 | 2.05 | 52 | 12 | 304.8 | 350 | 24.1 | 1400 | 96.5 |
| 2 | 50 | 2.000 | 51 | 2.56 | 65 | 12 | 304.8 | 300 | 20.7 | 1200 | 82.8 |

# Si-B HD Reinforced Silicone Hose and Si-B Braid Reinforced Silicone Hose

ResistoPure™ By GORE

- Platinum-Cured Silicone
- Polyester Braid
- High Pressure
- Extremely Flexible

## Benefits

- Suitable for pharmaceutical, biomedical, cosmetic and food applications
- -50 °F – 350 °F temperature range
- Sterilizable/Autoclavable
- 65A Shore hardness
- Documented lot traceable
- Available in custom lengths and color coding
- Factory assembly and packaging in a Class 10,000 Clean Room available

## Approvals

- USP Class VI

## Meets or Exceeds:

- FDA CFR 177.2600
- USDA and 3A Standards
- ISO 10993
- European Pharmacopoeia 3.1.9

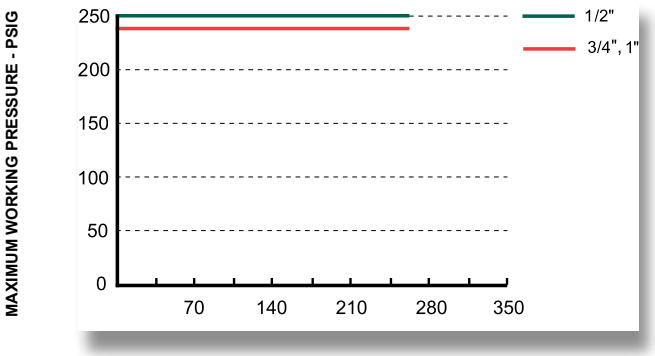
## Fittings

Sanitary | Industrial | Flanged | Cam & Groove | Special

## Fitting Material Availability

316L S.S.
Teflon® Encapsulated

### Si-B HD HOSE PRESSURE RATINGS
OPERATING TEMPERATURE (F)

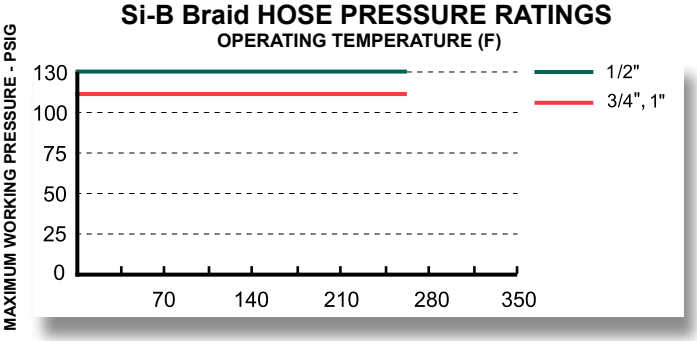



**NOTE:** For assemblies, pressure ratings of fittings may be less than for the hose.

| Nominal I.D. | | Wall Thickness | | Hose O.D. | | Max. Working Pressure at 70°F (21°C) | | Burst Pressure at 70°F (21°C) | | Approximate Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch | DN | Inch | MM | Inch | MM | PSIG | BAR | PSIG | BAR | LBS./FT. | KG/M |
| 1/2 | 15 | .220 | 5.6 | .940 | 23.9 | 250 | 17.2 | 1000 | 68.9 | .19 | .28 |
| 3/4 | 20 | .250 | 6.4 | 1.250 | 31.8 | 250 | 17.2 | 1000 | 68.9 | .41 | .61 |
| 1 | 25 | .230 | 5.8 | 1.470 | 37.3 | 240 | 16.5 | 960 | 66.2 | .88 | 1.31 |

NOTE: Bulk tubing available in 25 ft., 50 ft., or 100 ft. coils.

### Si-B Braid HOSE PRESSURE RATINGS
OPERATING TEMPERATURE (F)




**NOTE:** For assemblies, pressure ratings of fittings may be less than for the hose.

| Nominal I.D. | | Wall Thickness | | Hose O.D. | | Min. Bend Radius | | Max. Working Pressure at 70°F (21°C) | | Burst Pressure at 70°F (21°C) | | Approximate Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch | DN | Inch | MM | Inch | MM | Inch | MM | PSIG | BAR | PSIG | BAR | LBS./FT. | KG/M |
| 1/2 | 15 | .150 | 3.8 | .80 | 20.3 | 2 | 50.8 | 130 | 8.9 | 520 | 35.8 | .16 | .24 |
| 3/4 | 20 | .175 | 4.5 | 1.10 | 27.9 | 3 | 76.2 | 110 | 7.5 | 440 | 30.3 | .26 | .39 |
| 1 | 25 | .180 | 4.6 | 1.36 | 34.5 | 4 | 101.6 | 110 | 7.5 | 440 | 30.3 | .35 | .52 |

NOTE: Bulk tubing available in 25 ft., 50 ft., or 100 ft. coils.
1/8", 1/4", 3/8", and 1 1/4" sizes available - Consult factory

# Si-W Fabric-Reinforced Silicone Hose

- Low Volatile Grade Platinum-Cured Silicone
- Multi-Ply Polyester Fabric Reinforcement
- High Pressure

## Benefits

- Suitable for pharmaceutical, biomedical, cosmetic and food applications
- -50 °F – 350 °F temperature range
- Sterilizable/Autoclavable
- 50A Shore hardness
- Documented lot traceable
- Available in custom lengths (up to 24 feet) and color coding
- Factory assembly and packaging in a Class 10,000 Clean Room available

## Approvals

- USP Class VI

## Meets or Exceeds:

- FDA CFR 177.2600
- USDA and 3A Standards
- ISO 10993
- European Pharmacopoeia 3.1.9

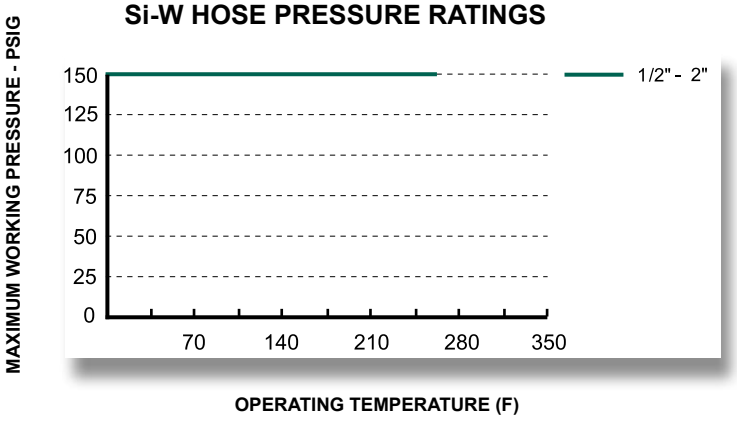
## Fittings


## Fitting Material Availability

316L S.S.
Teflon® Encapsulated

ResistoPure™ By GORE


### Si-W HOSE PRESSURE RATINGS



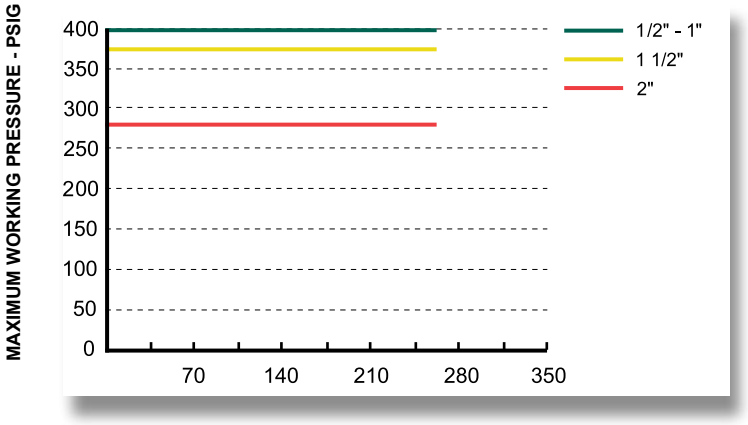

**NOTE:** For assemblies, pressure ratings of fittings may be less than for the hose.

| Nominal I.D. | | Wall Thickness | | Hose O.D. | | Min. Bend Radius | | Max. Working Pressure at 70°F (21°C) | | Burst Pressure at 70°F (21°C) | | Approximate Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch | DN | Inch | MM | Inch | MM | Inch | MM | PSIG | BAR | PSIG | BAR | LBS./FT. | KG/M |
| 1/2 | 15 | .180 | 4.6 | 0.834 | 21.2 | 3 | 76.2 | 150 | 10.3 | 600 | 41.3 | .30 | .45 |
| 3/4 | 20 | .200 | 5.1 | 1.16 | 29.4 | 5 | 127 | 150 | 10.3 | 600 | 41.3 | .39 | .58 |
| 1 | 25 | .200 | 5.1 | 1.39 | 35.3 | 9 | 228.6 | 150 | 10.3 | 600 | 41.3 | .43 | .60 |
| 1-1/2 | 40 | .200 | 5.1 | 1.90 | 48.8 | 12 | 304.8 | 150 | 10.3 | 600 | 41.3 | .72 | 1.07 |
| 2 | 50 | .200 | 5.1 | 2.38 | 60.5 | 30 | 762 | 150 | 10.3 | 600 | 41.3 | 1.08 | 1.61 |

# Si-V Silicone Suction Hose

ResistoPure™ By GORE

## Si-V HOSE PRESSURE RATINGS




**NOTE:** For assemblies, pressure ratings of fittings may be less than for the hose.

- Low Volatile Grade Platinum-Cured Silicone
- 4-Ply Polyester Braid, SS Wire Reinforced
- Rated for Full Vacuum

## Benefits

- Suitable for pharmaceutical, biomedical, cosmetic and food applications
- -50 °F – 350 °F temperature range
- Rated for full vacuum to 300°F
- Sterilizable/Autoclavable
- 50A Shore Hardness
- Documented lot traceable
- Available in custom lengths (up to 24 feet) and color coding
- Factory assembly and packaging in a Class 10,000 Clean Room available

## Approvals

- USP Class VI
- USP MEM Elution <87> on all parts

## Meets or Exceeds:

- FDA CFR 177.2600
- USDA and 3A Standards
- ISO 10993
- European Pharmacopoeia 3.1.9

## Fittings


## Fitting Material Availability

316L S.S.
Teflon® Encapsulated

| Nominal I.D. | | Wall Thickness | | Hose O.D. | | Min. Bend Radius | | Max. Working Pressure at 70°F (21°C) | | Burst Pressure at 70°F (21°C) | | Vacuum Rating at 300°F (149°C) | | Approximate Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inch | MM | Inch | MM | Inch | MM | Inch | MM | PSIG | Bar | PSIG | Bar | Inches Hg | Bar (a) | LBS./FT. | KG/M |
| 1/2 | 15 | .180 | 4.6 | 0.890 | 22.6 | 3 | 76.2 | 400 | 27.6 | 1600 | 110.3 | 29.9 | 0 | .30 | .45 |
| 3/4 | 20 | .200 | 5.1 | 1.19 | 30.3 | 5 | 127 | 400 | 27.6 | 1600 | 110.3 | 29.9 | 0 | .39 | .58 |
| 1 | 25 | .200 | 5.1 | 1.39 | 35.3 | 7 | 177.8 | 400 | 27.6 | 1600 | 110.3 | 29.9 | 0 | .43 | .60 |
| 1-1/2 | 40 | .200 | 5.1 | 1.89 | 48 | 9 | 228.6 | 375 | 25.8 | 1500 | 103.4 | 29.9 | 0 | .72 | 1.07 |
| 2 | 50 | .200 | 5.1 | 2.39 | 60.7 | 11 | 279.4 | 275 | 18.9 | 1100 | 75.8 | 29.9 | 0 | 1.08 | 1.61 |

NOTE: 1 1/4", 2 1/2", 3", and 4" sizes available - Consult factory

# Other Teflon® Hoses

## SBT and SBTF Stainless Steel Braided Hose

**Inner core:** Smooth *Teflon*® PTFE
**Reinforcement:** 300-series stainless steel braid

### Construction
Extra-thick, natural or conductive smooth bore *Teflon*® PTFE liner braided with 300-series stainless steel heavy gauge wire (1" and 1-1/2" are double-braided for extra kink resistance).

### Benefits
- Provides higher working temperatures and full vacuum capabilities
- Heavy gauge stainless steel braid is corrosion resistant against most chemicals
- Flanged assemblies can be "FLARED THRU" providing no bacteria traps
- Available in long lengths
- "True ID," for superior flow characteristics and easy dimensional matchup

### Fittings
- Sanitary
- Cam and Groove
- Std. and flared Flange
- Threaded

## CB and CBF Stainless Steel Braided Hose

**Inner core:** "Seamless" convoluted *Teflon*® PTFE
**Reinforcement:** 316 stainless steel braid (Hastelloy® and custom braids available)

### Construction
Extra-thick natural or conductive "seamless" helical convoluted *Teflon*® PTFE liner braided with 316 stainless steel heavy gauge wire.

### Benefits
- Open-pitched, helical convolutions for easy cleaning
- Rated for both medium pressure and full vacuum applications
- Crush resistant and easy to flex
- Tighter bend radii than smooth bore
- Optional external wire provides increased crush resistance

### Fittings
- Std. and flared sanitary
- Std. and flared Cam and Groove
- Std. and flared Flange
- Threaded

## CPB and CPBF Polypropylene Braided Hose

**Inner core:** "Seamless" convoluted *Teflon*® PTFE
**Reinforcement:** Blue polypropylene, UV-stabilized braid

### Construction
Extra-thick natural or conductive "seamless" helical convoluted *Teflon*® PTFE liner braided with thick, high density, polypropylene braid.

### Benefits
- Open-pitched, helical convolutions for easy cleaning
- Rated for both medium pressure and full vacuum applications
- Crush resistant and easy to flex
- Tighter bend radii than smooth bore alternatives
- Abrasion resistant braid
- Reduced risk of hand injury from metal braids
- Optional external wire provides increased crush resistance.

### Fittings
- Std. and flared sanitary
- Std. and flared Cam and Groove
- Std. and flared Flange
- Threaded

# Other Teflon® Hoses - Design Data

| Hose | Size (NPS) | I.D. (in.) | O.D. (in.) | Bend Radius (in.) | Max. Working Pressure (psig) | | Vacuum Rating (in. Hg.) | |
|---|---|---|---|---|---|---|---|---|
| | | | | | 70 F | 350 F | 70 F | 350 F |
| SBT | 1/4 | 0.250 | .375 | 3 | 3000 | CF | CF | CF |
| | 3/8 | 0.375 | .515 | 5 | 2000 | | | |
| | 1/2 | 0.500 | 0.633 | 6.5 | 1425 | | | |
| | 3/4 | 0.750 | 0.875 | 8.5 | 1000 | | | |
| | 1 | 1.000 | 1.190 | 12 | 1000 | | | |
| | 1 1/2 | 1.500 | 1.762 | 18 | 1000 | | | |
| SBTF | 3/4 | 0.750 | .875 | 8.5 | 275 | 215 | CF | CF |
| | 1 | 1.000 | 1.190 | 12 | 275 | 215 | | |
| | 1 1/2 | 1.500 | 1.762 | 14 | 275 | 215 | | |
| CB | 1/2 | 0.470 | 0.748 | 2 | 1425 | 1050 | Full | Full |
| | 3/4 | 0.720 | 1.048 | 2.75 | 1300 | 1000 | | |
| | 1 | 0.970 | 1.354 | 4 | 1100 | 825 | | -- |
| | 1 1/2 | 1.540 | 2.034 | 6 | 700 | 525 | | |
| | 2 | 1.970 | 2.464 | 7.5 | 525 | 400 | | 10 |
| | 3 | 2.913 | 3.702 | 14 | 175 | CF | | |
| | 4 | 3.937 | 5.000 | 16 | 150 | CF | | 5 |
| CBF | 1/2 | 0.470 | 0.748 | 2 | 500 | 350 | Full | Full |
| | 3/4 | 0.720 | 1.048 | 2.75 | 500 | 350 | Full | 19 |
| | 1 | 0.970 | 1.354 | 4 | 500 | 350 | Full | 14 |
| | 1 1/2 | 1.540 | 2.034 | 6 | 350 | 245 | Full | 11 |
| | 2 | 1.970 | 2.464 | 7.5 | 250 | 175 | 22 | 8 |
| | 3 | 2.913 | 3.702 | 14 | 175 | CF | 20 | 5 |
| | 4 | 3.937 | 5.000 | 16 | 150 | CF | 15 | 2 |
| CPB | 1/2 | 0.470 | 0.855 | 2 | 300 | CF | Full to 250 F | |
| | 3/4 | 0.720 | 1.160 | 2.75 | 250 | CF | Full to 250 F | |
| | 1 | 0.970 | 1.440 | 4 | 250 | CF | Full to 250 F | |
| | 1 1/2 | 1.540 | 2.155 | 6 | 200 | CF | Full to 230 F | |
| | 2 | 1.970 | 2.560 | 7.5 | 200 | CF | Full | 15 |
| | 3 | 2.913 | 3.922 | 14 | 125 | CF | CF | CF |
| | 4 | 3.937 | 5.221 | 16 | 100 | CF | CF | CF |
| CPBF | 1/2 | 0.470 | 0.855 | 2 | 250 | CF | Full to 250 F | |
| | 3/4 | 0.720 | 1.160 | 2.75 | 250 | CF | Full to 250 F | |
| | 1 | 0.970 | 1.440 | 4 | 250 | CF | Full to 250 F | |
| | 1 1/2 | 1.540 | 2.155 | 6 | 200 | CF | Ful | 13 at 250 F |
| | 2 | 1.970 | 2.560 | 7.5 | 200 | CF | Full | 11 at 250 F |
| | 3 | 2.913 | 3.922 | 14 | 125 | CF | 20 | 9 at 250 F |
| | 4 | 3.937 | 5.221 | 16 | 100 | CF | 16 | 5 at 250 F |

(CF = Consult Factory)

# Sanitary Tri-Clamp® and Mini Sanitary

## Tri-Clamp®

Surface finishes meet or exceed FDA, USDA, and 3A standards. 25 Ra to custom electropolishing available

### Standard Step Size Fittings

| Hose Tube Diameter | Connection Tube Diameter | | | | |
|---|---|---|---|---|---|
| | 1/2" | 3/4" | 1"* | 1 1/2" | 2" |
| 1/2" | | X | X | X | |
| 3/4" | | | X | X | |
| 1"* | | | | X | X |
| 1 1/2" | | | | | X |

* ASME BPE Type B, for Type A Consult Factory

Consult factory for step sizes and other size clamp fittings not shown herein.

### Commonly Selected Material

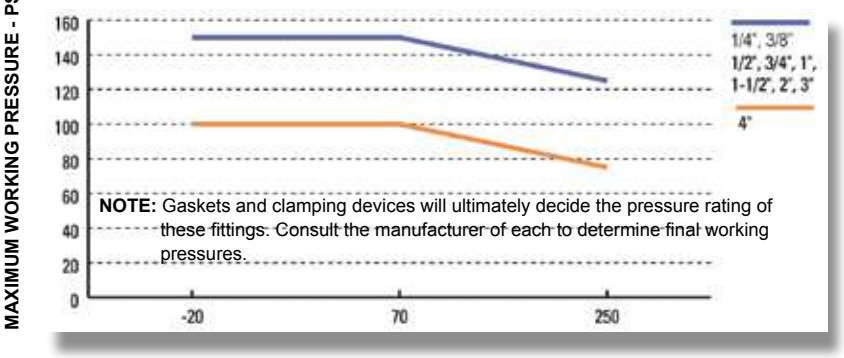
316 Stainless Steel
*Teflon*® PFA Encapsulated
Kynar®


Tri-Clamp®
Style # 50 or 54

*Teflon*® PFA Encapsulated
Style # 50 E

Mini Sanitary
Style # 55 or 56

### TRI-CLAMP® AND MINI SANITARY FITTING PRESSURE RATINGS



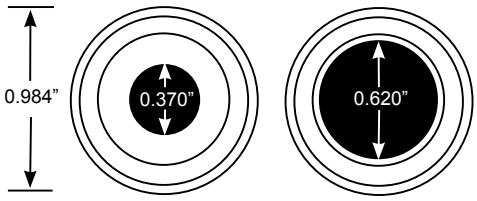

**Resistoflex hygienic clamp fittings are per ASME BPE Standard.**

The Bioprocessing Equipment (BPE) 2005 edition created an industry standard for clamp dimensions and tolerances, defining two types of fittings, Type A and Type B. Type A is designated for all controlled-compression type fittings; Type B is for all free-compression fittings. The 2009 edition recognizes both Types A & B in the 1" Nominal Size Clamp Ferrule, creating a situation where both would be acceptable to meet the current standard. We offer the following diagrams to help minimize confusion when selecting these fitting styles.

| Sanitary Tri-Clamp® | | |
|---|---|---|
| **Size** | **A** | **B** |
| **1"** | 2.694 | 1.718 |
| **1-1/2"** | 3.041 | 1.967 |
| **2"** | 3.328 | 2.250 |
| **3"** | 5.094 | 3.400 |
| **4"** | 4.625 | 3.625 |

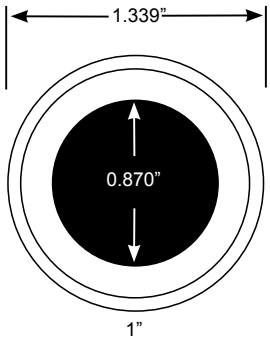
| Mini Sanitary | | |
|---|---|---|
| **Size** | **A** | **B** |
| **1/2"** | 2.500 | 1.618 |
| **3/4"** | 2.500 | 1.618 |

Type A



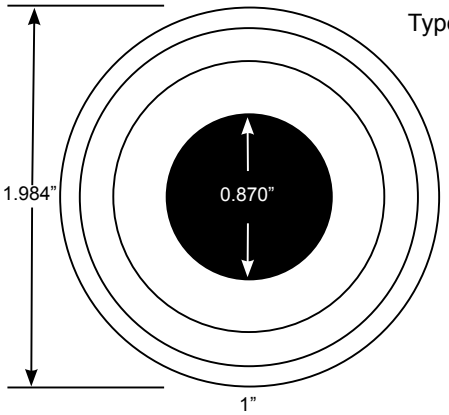

1/2"
Style # 55 or 56

3/4"
Style # 55 or 56

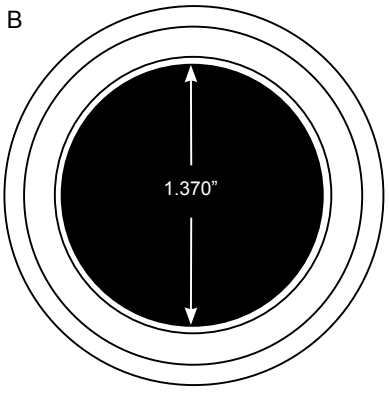



1"
Style # 99

Type B




1"
Style # 50 or 54




1-1/2"
Style # 50 or 54

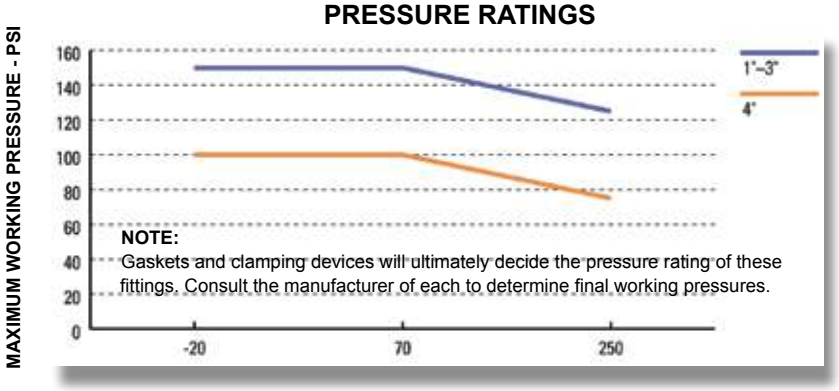
Also available in 2", 3" and 4"

# Sanitary I-Line® and Bevel Seat

Female I-Line®
Style # 61 or 63

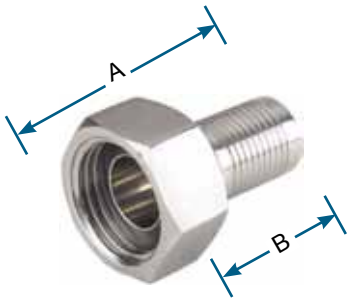
Male I-Line®
Style # 60 or 59

## I-LINE AND BEVEL SEAT FITTING PRESSURE RATINGS

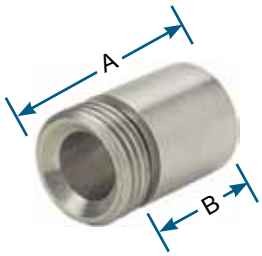



| Female Bevel Seat | | |
|---|---|---|
| Size | A | B |
| 1" | 2.656 | 1.718 |
| 1-1/2" | 4.000 | 1.967 |
| 2" | 4.625 | 2.250 |
| 3" | 4.875 | 3.400 |

| Male Bevel Seat | | |
|---|---|---|
| Size | A | B |
| 1" | 3.218 | 1.718 |
| 1-1/2" | 3.569 | 1.967 |
| 2" | 3.844 | 2.250 |
| 3" | 5.719 | 3.400 |




Female Bevel Seat
Style # 66




Male Bevel Seat
Style # 65

90° Elbow
Style # 5L

45° Elbow
Style # 5K

## I-Line®

**Standard Material**
316 Stainless Steel

**Custom Material**
Monel®
Hastelloy®

## Bevel Seat

**Standard Material**
316 Stainless Steel

**Custom Material**
Monel®
Hastelloy®

## Cam & Groove

### Female/Male Cam Insert

**Standard insert:** Solid metal or plastic

***Teflon*® PFA encapsulated:** Injection molded high purity PFA *Teflon*® over entire hose shank and throughout wetted areas of fitting

***Teflon*® PTFE Flared Thru:** Hose liner extends throughout the insert and is flared over the face under the cam gasket on the female cam only

### Commonly Selected Insert Material

316 Stainless Steel

*Teflon*® PFA Encapsulated

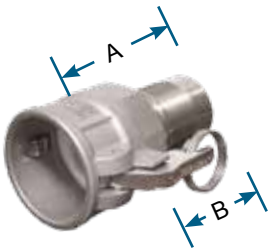
### Rotating Female Cam Body

316 SS is standard. Custom materials are available. Female cams are available with standard or locking handle systems.

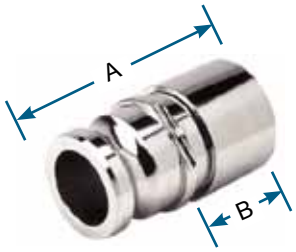
### Female Cam Body Options

316 Stainless Steel

Stainless Steel Cam & Groove
(Locking Handles Standard)




Female Cam & Groove
Style # 78




Male Cam & Groove
Style # 70

| Female Cam & Groove | | |
|---|---|---|
| Size | A | B |
| 1/2" | 2.906 | 1.618 |
| 3/4" | 2.906 | 1.618 |
| 1" | 3.008 | 1.718 |
| 1-1/2" | 3.225 | 1.967 |
| 2" | 3.538 | 2.250 |
| 3" | 5.300 | 3.100 |
| 4" | 6.810 | 3.630 |

| Male Cam & Groove | | |
|---|---|---|
| Size | A | B |
| 1/2" | 3.306 | 1.618 |
| 3/4" | 3.306 | 1.618 |
| 1" | 3.518 | 1.718 |
| 1-1/2" | 4.217 | 1.967 |
| 2" | 4.950 | 2.250 |
| 3" | 5.775 | 3.400 |
| 4" | 7.000 | 3.625 |

*Teflon*® PFA Encapsulated Cam & Groove (Conductive liner available)


Female Encapsulated
Style # 78 E or 78 A


Male Encapsulated
Style # 70 E or 70 A

| Size | C-ID |
|---|---|
| 3/4" | .485 |
| 1" | .550 |
| 1-1/2" | .935 |
| 2" | 1.44 |

### Flange X Cam Adapter PFA Encapsulated

Sizes available: 3/4" through 3", rotating flanges all materials *(see page 38).*

Available Flange X Male Cam and Flange X Female Cam.

Consult factory for information.

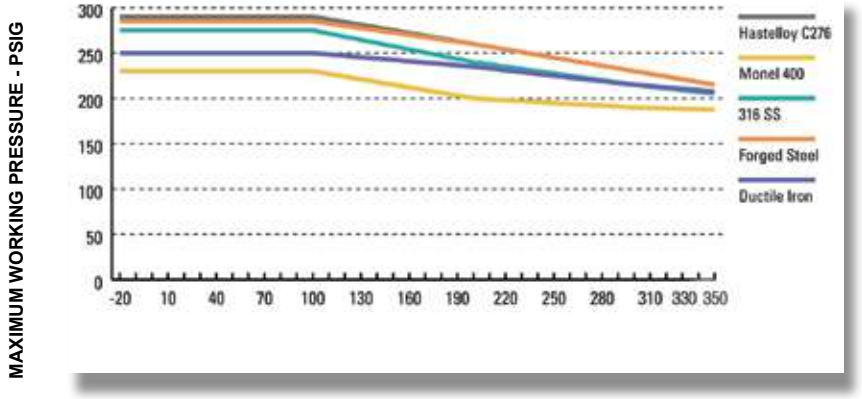
# Flanged (Rotating)

**Standard Retainer**
Style # 30

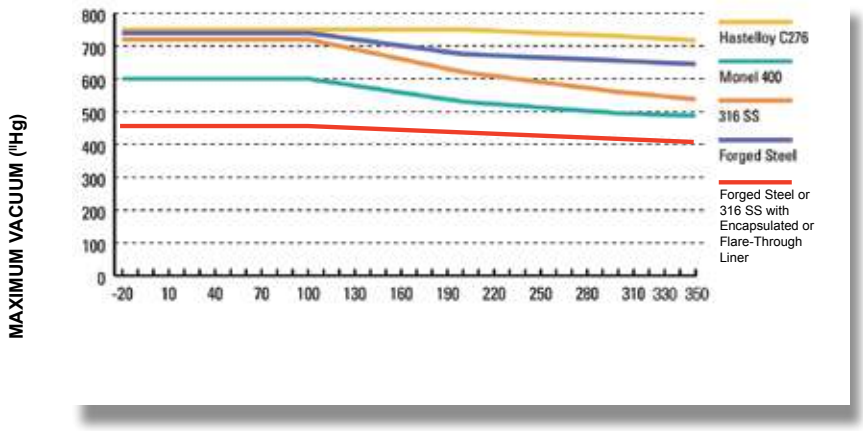
***Teflon*® PFA Encapsulated:**
Style # 30 E or 30 A
Injection molded *Teflon*® PFA over entire hose shank and throughout wetted areas of fitting

***Teflon*® PTFE Flared Thru:**
Style # 35
Hose liner extends through the retainer and is flared over the face

## 150# FLANGE PRESSURE RATINGS




## 300# FLANGE PRESSURE RATINGS




## Rotating Flanges

150# and 300#

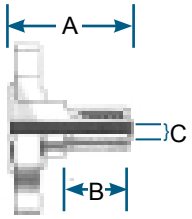
- **Commonly Selected Retainer Choices**
  316 Stainless Steel
  *Teflon*® Encapsulated
  Flared Thru
  Monel®
  Hastelloy®
  and more
- **Flange Option: 150# and 300#**
  *See page 38*


Ductile Iron


Stainless


Plastic


Epoxy Coated Carbon Steel




| Flange & Retainer | | | | |
|---|---|---|---|---|
| **Size** | **A** | **B** | **C** | **C Encapsulated Retainer** |
| **1/2"** | 3.066 | 1.618 | .38 | N/A |
| **3/4"** | 3.186 | 1.618 | .42 | .485 |
| **1"** | 3.346 | 1.718 | .99 | .550 |
| **1-1/2"** | 3.725 | 1.967 | 1.28 | .435 |
| **2"** | 4.128 | 2.250 | 1.75 | 1.44 |
| **3"** | 5.618 | 3.400 | 3.07 | N/A |
| **4"** | 6.218 | 3.625 | 4.03 | |

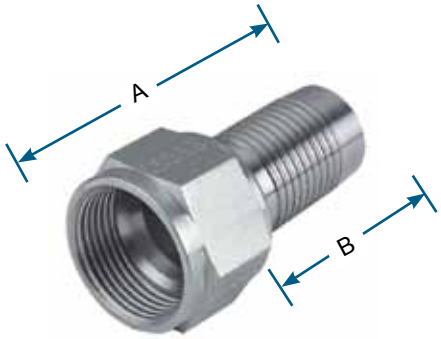
# Female JIC & Male/Female NPT

## Female JIC

- Joint Industrial Conference SAEEJ514 specifications
- 37 (degree symbol) JIC metal-to-metal sealing
- Available on ¼" through 2" hose assemblies
- Wide range of adaptors available

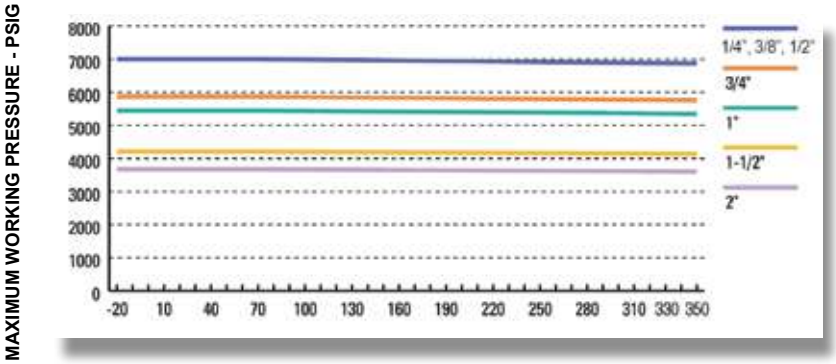
## Male & Female NPT

- NPT – American National Standard
- Also available with British Standard Pipe Taper (BSPT), Japanese Industrial Standard (JIS) and metric threads




Female JIC
Style # 15

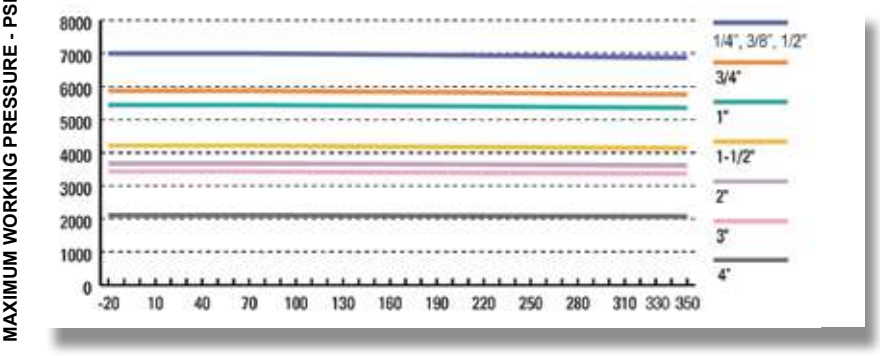
**FEMALE JIC STAINLESS FITTINGS PRESSURE RATINGS**




Female NPT
Style # 11

Male NPT
Style # 10

**316 SS MALE AND FEMALE NPT FITTINGS PRESSURE RATINGS**

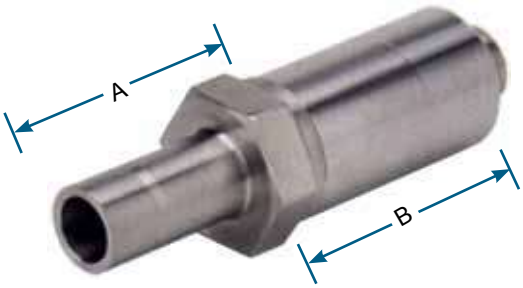



| Female JIC | | |
|---|---|---|
| **Size** | **A** | **B** |
| **1/2"** | 2.162 | 1.618 |
| **3/4"** | 2.197 | 1.618 |
| **1"** | 2.353 | 1.718 |
| **1-1/2"** | 2.774 | 1.967 |
| **2"** | 3.403 | 2.250 |

| Female NPT | | |
|---|---|---|
| **Size** | **A** | **B** |
| **1/2"** | 2.868 | 1.618 |
| **3/4"** | 2.868 | 1.618 |
| **1"** | 3.075 | 1.718 |
| **1-1/2"** | 3.440 | 1.967 |
| **2"** | 4.083 | 2.250 |
| **3"** | 7.199 | 3.400 |
| **4"** | 7.700 | 3.625 |

| Male NPT | | |
|---|---|---|
| **Size** | **A** | **B** |
| **1/2"** | 2.921 | 1.618 |
| **3/4"** | 3.000 | 1.618 |
| **1"** | 3.270 | 1.718 |
| **1-1/2"** | 3.582 | 1.967 |
| **2"** | 3.937 | 2.250 |
| **3"** | 5.861 | 3.400 |
| **4"** | 7.000 | 3.625 |

# Compression Tube



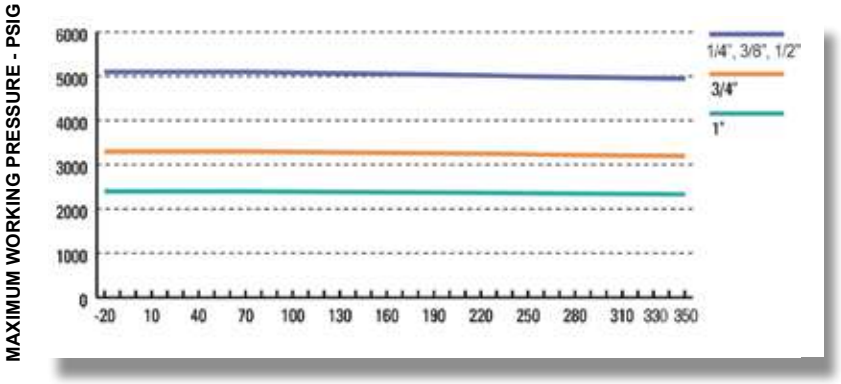

Tube Adapter
Style # 25

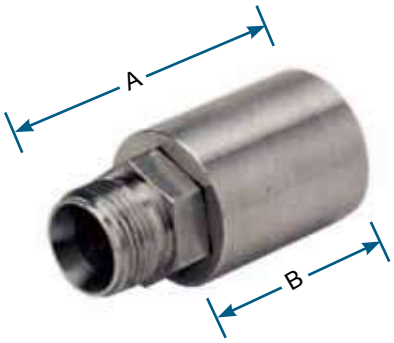
| Tube Adapter | | |
|---|---|---|
| Size | A | B |
| 1/2" | 3.000 | 1.618 |
| 3/4" | 3.055 | 1.618 |
| 1" | 3.610 | 1.718 |

## Compression Tube

- **Compression Tube Adapter/Connector**
  - Tube adapter plain or with nut and ferrule
  - Tube connector plain or with nut and ferrule
- **Commonly Selected Material**
  316 Stainless Steel

**316 SS COMPRESSION FITTINGS PRESSURE RATINGS**




Tube Connector
Style # 20

Tube Connector with Nut and Ferrule
Style # 21

| Tube Connector Male | | |
|---|---|---|
| Size | A | B |
| 1/2" | 2.500 | 1.618 |
| 3/4" | 2.500 | 1.618 |
| 1" | 2.875 | 1.718 |

# Adaptors and Accessories

## Sanitary Adapters

### PTFE and PFA-Lined

- Straight or reducing
- Tri-Clamp, I-Line, Bevel Seat x Flange, Cam-Lock and other connections

PTFE-Lined Female I-Line x Male I-Line Reducer

## Flange Adapters

### PTFE and PFA-Lined

- Available in stainless steel and other alloys
- ANSI, DIN, JIS, and other drillings x sanitary, camlock and other connections.

PFA-Lined Flange x Male Cam Lock

PTFE-Lined Flange x Tri-Clamp

## Tagging/Marking Options

- Paper tag
- SS tag wired on hose
- Encapsulated label for silicone hoses (pictured)
- Pin stamp on collar

# Features Comparison

| Hose | Description | Features | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Clean Packaging of Assemblies | Fitting Lot Traceability (Contact Surface) | Hose Liner Lot Traceability | USP Class VI Certification | Meets or Exceeds FDA CFR: | USDA and 3A Accepted | Meets or Exceeds ISO 10993 | Meets or Exceeds European Pharmacopoeia 3.1.9 |
| STRATUS™ Smooth Teflon® PTFE-Lined Silicone Hose | | Max. 24 Ft. | ✓ | ✓ | ✓ | 177.1550 177.2600 | ✓ | CF | CF |
| Cirrus | Smooth Teflon® PTFE-Lined, Cleanable EPDM Rubber Cover | Max. 75 Ft. | ✓ | ✓ | ✓ | 177.1550 | ✓ | CF | CF |
| TRC FLARED THRU | Smooth Teflon® PTFE-Lined EPDM Rubber Covered Hose | Max. 20 Ft. | Consult Factory | ✓ | ✓ | 177.1550 | ✓ | CF | CF |
| Si-B | Braid Reinforced Silicone Hose | Max. 100 Ft. | ✓ | ✓ | ✓ | 177.2600 | ✓ | ✓ | ✓ |
| Si-B HD | Braid Reinforced Silicone Hose | Max. 100 Ft. | ✓ | ✓ | ✓ | 177.2600 | ✓ | ✓ | ✓ |
| Si-W | High Pressure Silicone Hose | Max. 24 Ft. | ✓ | ✓ | ✓ | 177.2600 | ✓ | ✓ | ✓ |
| Si-V | Silicone Suction Hose | Max. 24 Ft. | ✓ | ✓ | ✓ | 177.2600 | ✓ | ✓ | ✓ |

# Quality Assurance

CRANE ChemPharma, ResistoPure hoses are qualified to an extremely rigorous quality assurance program. The following tests are performed on 100% of our hose designs, ensuring that every unit meets performance specifications.

## ResistoPure Qualification Testing

### 1.0 Test Method

1.1 *Qualification Tests:* Hose designs shall pass qualification tests designed to demonstrate the hose's ability to withstand severe operating conditions. Once a hose design has passed qualification testing, re-testing is not required. If the manufacturer changes the hose design, however, the new design must be re-tested. The hose manufacturer shall make hose qualification test reports available upon request. Qualification testing is as follows:

1.1.1 *Burst Testing:* Subject hose to destructive burst test to determine allowable operating pressure and proof test pressure.

1.) Install hose on test stand, introduce hydraulic fluid into hose, purge all air.
2.) Pressurize at an approximate rate of 100 psi/sec. until hose fails.
3.) Record burst pressure.
4.) Allowable operating pressure is defined as 25% of burst pressure for a 4:1 safety factor.

Note: Allowable operating pressure is also known as "rated working pressure" and "working pressure."

1.1.2 *Steam-Cold Water Cycling:* Subject representative *Teflon*®-lined hose samples to steam-cold water cycling to determine the ability of the lined hoses to withstand rapid temperature changes. Procedure is as follows:

1.) Install hose on closed-loop test stand and circulate saturated steam at 125±5 psig (50 psig for TRC hose) until the skin temperature varies no more than ±2.5°F for 10 minutes. Temperature shall be measured by a thermocouple attached to the crimp collar.
2.) Close off the steam and immediately circulate water at a maximum temperature of 77°F until the skin temperature reaches 122°F.
3.) Vent and introduce air to purge the test hose for a minimum of one minute to completely drain hose of water.
4.) Repeat steps 1-3 for a total of 100 cycles.
5.) During testing, leakage is cause for rejection.

1.1.4 *Vacuum Testing:* Subject representative hose assemblies to vacuum conditions to determine rated vacuum for hose at a given temperature.

1.) Reach the desired vacuum/temperature level and hold for 48 hrs.
2.) Turn off the oven and allow the hose to cool to ambient temperature while still under the same vacuum level.
3.) Remove the hose and inspect for buckling or collapse of the liner. Any buckling or collapse of the liner shall be cause for rejection.
4.) If no collapse or buckling has occurred, the vacuum and temperature shall be considered acceptable.

1.2 *Proof Testing for Customer Orders:* 100% of finished hose assemblies shall be proof tested.

1.2.1 Factory-made assemblies shall be proof-tested hydrostatically at 1.5 times rated working pressure with high-purity deionized water
1.2.2 Hose assemblies made at an Authorized Fabricating Distributor location shall be hydrostatically proof-tested.

# Teflon® Provides Unsurpassed Purity

## *Teflon*® in High Purity Applications

Only *Teflon*® PTFE used in CRANE ChemPharma, ResistoPure hoses offers true protection against all sources of contamination. We've been making our PTFE hose liner for more than 50 years!

CRANE ChemPharma, ResistoPure PTFE liners contain no plasticizers, fillers, or antioxidants that leach out and react with process fluids.

Properly designed sanitary fittings are a given. However, the surface area exposure of fittings is minimal compared to the hose liner.

CRANE chemPharma, ResistoPure hoses feature DuPont *Teflon*® PTFE resin which meets every major high-purity classification:

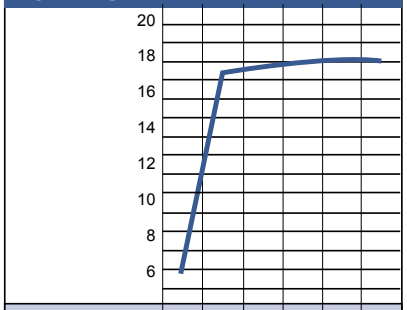
- Meets 3A Sanitary Standards
- Meets FDA 21 CFR 177.1550
- USDA Accepted

The following results illustrate CRANE ChemPharma, ResistoPure's products of unequaled purity.

In the effort to produce water of the highest purity for the semiconductor, pharmaceutical, and biotech industries, engineers are designing fluid handling systems that do more than just last for a short period of time. These fluid handling systems must be designed to prove that they contribute less than parts per billion of extractables to the process water.

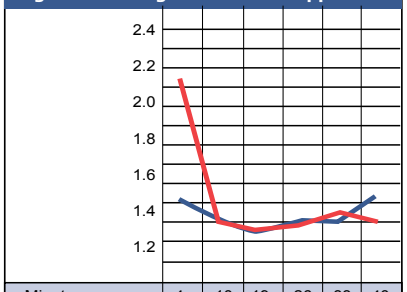
Particulate, ionic, organic, or microbial contaminates in process fluids reduce product yields dramatically, requiring purity levels which are orders of magnitude greater than the past. One of the harshest and most widely publicized agents used for wet processing is deionized 18 megohm-cm water. To determine the effect 18 megohm-cm water has on CRANE ChemPharma, Resistoflex PTFE-lined hoses, an extractable analysis was conducted by AT&T Analytical Services. AT&T's analysis consisted of "dynamic rinsing" of CRANE ChemPharma, ResistoPure PTFE-lined hose samples and subsequent ionic characterization.

**Fig. 1: Megohms – cm**




| Minutes | 4 | 10 | 19 | 26 | 33 | 40 |
|---|---|---|---|---|---|---|
| Filtrate, megohms – cm | 7.0 | 17.6 | 17.8 | 17.9 | 18.0 | 18.1 |

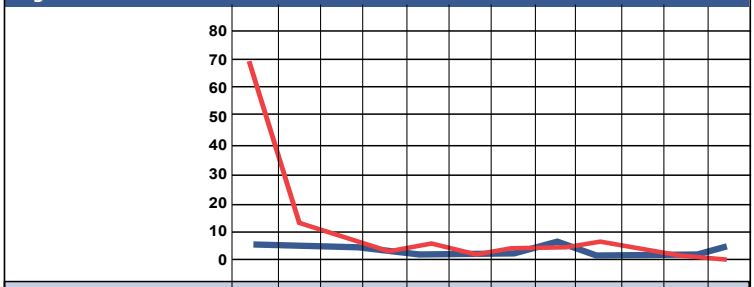
**Fig. 2: Total Organic Content – ppb**




| Minutes | 4 | 10 | 19 | 26 | 33 | 40 |
|---|---|---|---|---|---|---|
| Filtrate, ppb | 2.17 | 1.41 | 1.38 | 1.39 | 1.46 | 1.41 |
| Background, ppb | 1.52 | 1.45 | 1.43 | 1.47 | 1.46 | 1.56 |

As seen in Fig. 1, rinse to background occurred within 5 minutes. Organics were determined by total organic carbon (TOC) analysis, which also can be seen in Fig. 2. TOCs were below background levels within 10 minutes.

**Fig. 3: Particulate Count**




| Minutes | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Filtrate, (.05µ) | 68.8 | 13.3 | 9.6 | 4.4 | 6.2 | 2.7 | 3.4 | 3.4 | 5.8 | 4.3 | 1.7 | 1.4 |
| Background (.05µ) | 5.3 | 4.9 | 4.9 | 3.7 | 3.6 | 3.7 | 4.1 | 4.5 | 2.1 | 3.3 | 2.9 | 4.1 |

Particulate dynamic rinse data is shown if Fig. 3. Particle count rinsed to background levels within 50 minutes, proving that the CRANE ChemPharma, ResistoPure PTFE liner has a very smooth, contamination-free surface that will not support microbe growth.

Finally, Inductively Coupled Plasma-Mass Spectroscopy (ICP-MS) data for 68 metals and anion analysis samples were taken at 24 hours of dynamic rinse exposure with 18 megohm water. In all cases, extractables were below detectable limits for CRANE ChemPharma, ResistoPure PTFE hoses.

The use of ozone in ultrapure water processing has proven to be a quick and reliable method of microbial control. Ozonization of ultrapure water is considered a "clean" process and does not produce any undesirable chemical byproducts. Unlike traditional chemical disinfectants, ozone dissipates from the treated water due to its own natural decay properties. Because of this, ozone is gaining increasing popularity in electronics, pharmaceuticals, and other ultrapure water-dependent industries. However, the same aggressive nature that gives ozone the ability to attack and kill microorganisms also makes it especially tough on the materials with which it comes in contact. As opposed to silicone hoses, CRANE ChemPharma, ResistoPure PTFE hoses are chemically inert and non-reactive with ozone.

Please contact CRANE ChemPharma, ResistoPure for a copy of AT&T's detailed report.

## Related Definitions

**Rated Working Pressure:** Maximum operating pressure at which the hose may operate through the stated bending range.

**Proof Test Pressure:** Not to exceed 1-1/2 times rated working pressure.

**Burst Pressure:** The average pressure at which the hose can be expected to fail at 70°F.

**Minimum Bend Radius:** The bend radius to which a hose may be bent when no further motion is to be imposed.

**Dynamic Bend Radius:** The bend radius used in calculations involving applications where the hose is moving. This bend radius has a direct relation to cycle life. Bending the hose in a smaller radius than rated will adversely affect the life of the hose.

**Live Length:** The length of hose that will bend, or the length of hose between the braid collars (LL).

**Overall Length:** The total face-to-face length of a straight hose (OAL).

| | | |
|---|---|---|
| Length Tolerances*: | Min.-18" assemblies | +/- .250" |
| | 19"-36" assemblies | +/- .500" |
| | 37"-50" assemblies | +/- .750" |
| | 51"-Max. assemblies | +/- 1.5% |

* Standard tolerances. Consult factory if tighter tolerances are required.

## Installation and Motion Considerations

**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. Hoses should not be subjected to axial motion.

**Lateral Offset Motion:** (Fig. 1) 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.

OAL = LL + Fitting Length A + Fitting Length B

**Note:** Where offset motion "Y" occurs on both sides of hose centerline, the hose live length should be based on total travel or 2Y.

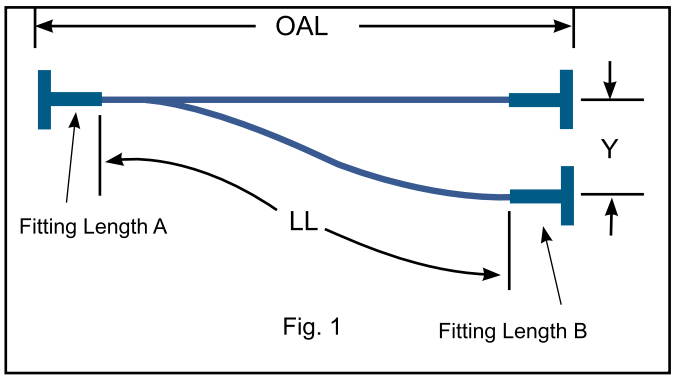


Fig. 1

**Angular Offset Motion:** Angular movement is defined as the bending of the hose so that the ends are no longer parallel. Amount of movement is measured in degrees from centerline of the hose.

**Radial Motion:** This type of movement occurs when the hoses are bent in a 180 degree arc such as in vertical or horizontal loops. In this configuration, two types of movement are possible. One is where the bend radius remains constant and one end of the hose moves parallel to the other end. The other is where the ends move perpendicular to each other so as to enlarge or decrease the width of the loop.

For more consideration on best practices for hose installation and determining the proper length of a hose assembly, please refer to the NAHAD website at www.nahad.org.

# Steam & Temperature Conversion

| Steam Table | | | |
|---|---|---|---|
| Temp (°F) | Pressure (psig) | Temp (°F) | Pressure (psig) |
| 212 | 0.000 | 274 | 29.982 |
| 213 | 0.294 | 276 | 31.451 |
| 214 | 0.593 | 278 | 32.957 |
| 215 | 0.896 | 280 | 34.504 |
| 216 | 1.205 | 282 | 36.090 |
| 217 | 1.518 | 284 | 37.718 |
| 218 | 1.837 | 286 | 39.387 |
| 219 | 2.161 | 288 | 41.099 |
| 220 | 2.490 | 290 | 42.854 |
| 221 | 2.825 | 292 | 44.654 |
| 222 | 3.164 | 294 | 46.498 |
| 223 | 3.510 | 296 | 48.388 |
| 224 | 3.860 | 298 | 50.325 |
| 225 | 4.216 | 300 | 52.309 |
| 226 | 4.578 | 302 | 54.342 |
| 227 | 4.946 | 304 | 56.423 |
| 228 | 5.319 | 306 | 58.555 |
| 229 | 5.698 | 308 | 60.737 |
| 230 | 6.083 | 310 | 62.971 |
| 232 | 6.871 | 312 | 65.257 |
| 234 | 8.683 | 314 | 67.597 |
| 236 | 8.520 | 316 | 69.992 |
| 238 | 9.383 | 318 | 72.441 |
| 240 | 10.272 | 320 | 74.947 |
| 242 | 11.187 | 322 | 77.509 |
| 244 | 12.130 | 324 | 80.130 |
| 246 | 13.101 | 326 | 82.810 |
| 248 | 14.100 | 328 | 85.549 |
| 250 | 15.129 | 330 | 88.349 |
| 252 | 16.187 | 332 | 91.211 |
| 254 | 17.276 | 334 | 94.136 |
| 256 | 18.395 | 336 | 97.124 |
| 258 | 19.547 | 338 | 100.177 |
| 260 | 20.731 | 340 | 103.296 |
| 262 | 21.948 | 342 | 106.481 |
| 264 | 23.198 | 344 | 109.734 |
| 266 | 24.483 | 346 | 113.055 |
| 268 | 25.804 | 348 | 116.446 |
| 270 | 27.160 | 350 | 119.908 |
| 272 | 28.553 | | |

| Temperature Conversion | | | | | |
|---|---|---|---|---|---|
| °C | Given Temp °C or °F | °F | °C | Given Temp °C or °F | °F |
| -34 | -30 | -22 | +63 | +145 | +293 |
| -32 | -25 | -13 | +66 | +150 | +302 |
| -29 | -20 | -4 | +68 | +155 | +311 |
| -25 | -15 | +5 | +71 | +160 | +320 |
| -23 | -10 | +14 | +74 | +165 | +329 |
| -21 | -6 | +23 | +77 | +170 | +338 |
| -18 | 0 | +32 | +79 | +175 | +347 |
| -15 | +5 | +41 | +82 | +180 | +356 |
| -12 | +10 | +50 | +85 | +185 | +365 |
| -9 | +15 | +59 | +88 | +190 | +374 |
| -7 | +20 | +66 | +90 | +195 | +383 |
| -4 | +25 | +77 | +93 | +200 | +392 |
| -1 | +30 | +86 | +96 | +205 | +401 |
| +2 | +35 | +95 | +99 | +210 | +410 |
| +4 | +40 | +104 | +102 | +215 | +419 |
| +7 | +45 | +113 | +104 | +220 | +428 |
| +10 | +50 | +122 | +107 | +225 | +437 |
| +13 | +55 | +131 | +110 | +230 | +446 |
| +16 | +60 | +140 | +113 | +235 | +455 |
| +18 | +65 | +149 | +116 | +240 | +464 |
| +21 | +70 | +158 | +118 | +245 | +473 |
| +24 | +75 | +167 | +121 | +250 | +482 |
| +27 | +80 | +178 | +124 | +255 | +491 |
| +29 | +85 | +185 | +127 | +260 | +500 |
| +32 | +90 | +194 | +129 | +265 | +509 |
| +35 | +95 | +203 | +132 | +270 | +518 |
| +38 | +100 | +212 | +135 | +275 | +527 |
| +41 | +105 | +221 | +138 | +280 | +536 |
| +43 | +110 | +230 | +141 | +285 | +545 |
| +46 | +115 | +239 | +143 | +290 | +554 |
| +49 | +120 | +248 | +146 | +295 | +563 |
| +52 | +125 | +257 | +140 | +300 | +572 |
| +54 | +130 | +266 | +152 | +305 | +581 |
| +57 | +135 | +275 | +154 | +310 | +590 |
| +60 | +140 | +284 | +157 | +315 | +599 |

If the given temperature (in the shaded column) is Celsius, read Fahrenheit in the column to the right. If the given temperature (in the shaded column) is Fahrenheit, read Celsius in the column to the left.

# Assembly Part Numbers

STRATUS Order Section

**Hose Size** — **Hose Style** — **Liner Type** — **First End Fitting FLARED THRU TriClamp®**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | – | 5 | – | | – | | | 6 | 0 | – |

| Hose Size | |
|---|---|
| 1/2" | 08 |
| 3/4" | 12 |
| 1" | 16 |
| 1-1/2" | 24 |
| 2" | 32 |

**Hose Style**

| | |
|---|---|
| Stratus | 5 |

**Liner Type**

| | |
|---|---|
| Natural (White) | W |
| Conductive (Black) | B |

**First End Fitting FLARED THRU TriClamp®**

| | |
|---|---|
| TriClamp® (FLARED THRU) Mini Type A 5560 | |
| TriClamp® (FLARED THRU) Type B 5460 | |

## First End Fitting

**Hose Size** — **Hose Style** — **Liner Type** — **Type** — **Material** — **Flange**

| | | – | | – | | | – | | | – |
|---|---|---|---|---|---|---|---|---|---|---|

**Hose Size**

*FLARED THRU STYLE HOSE*

| | |
|---|---|
| 1/2" | 08 |
| 3/4" | 12 |
| 1" | 16 |
| 1-1/2" | 24 |
| 2" | 32 |

*CRIMP STYLE HOSE*

| | |
|---|---|
| 1/4" | 04 |
| 3/8" | 06 |
| 1/2" | 08 |
| 3/4" | 12 |
| 1" | 16 |
| 1-1/2" | 24 |
| 2" | 32 |
| 3" | 48 |
| 4" | 64 |

**Hose Style**

*FLARED THRU STYLE HOSE*

| | |
|---|---|
| **Rubber Covered Smooth-Bore PTFE *Teflon*®** | |
| **TRC** Blue EPDM w/PTFE Tube | B |
| **Braided Smooth-Bore PTFE *Teflon*®** | |
| **SBT** Stainless Braid | F |
| **Braided Convoluted-Bore PTFE *Teflon*®** | |
| **CB** Stainless Braid | S |
| **CPB** Polypropylene Braid | P |

*CRIMP STYLE HOSE*

| | |
|---|---|
| **Rubber Covered Smooth-Bore PTFE *Teflon*®** | |
| **Cirrus™ PTFE** Gray EPDM wPTFE *Teflon*® | C |
| **TRC** Teflon® Blue EPDM w/PTFE Teflon® | B |
| **TRC** Teflon® Green EPDM w/PTFE Teflon® | G |
| **Braided Smooth-Bore PTFE *Teflon*®** | |
| **SBT** Stainless Braid | F |
| **Braided Convoluted-Bore PTFE *Teflon*®** | |
| **CB** Stainless Braid | S |
| **CPB** Polypropylene Braid | P |
| **Platinum Cured Silicone** | |
| **Si-B** Polyester Braided | 1 |
| **Si-B HD** Polyester Braided | 4 |
| **Si-W** 4-Ply, Polyester Wrapped | 2 |
| **Si-V** 4-Ply, Wire Reinforced | 3 |

**Liner Type**

*FLARED THRU & CRIMP STYLE HOSE*

| | |
|---|---|
| Natural (White) | W |
| Conductive (Black) | B |
| Platinum-Cured Silicone | 0 |

**Type**

**End Fitting Type Selections**

*FLARED THRU STYLE HOSE*

| | |
|---|---|
| **Sanitary** | |
| TriClamp® (FLARED THRU) | 54 |
| Mini Sanitary (FLARED THRU) | 56 |
| I-Line Male (FLARED THRU) | 59 |
| I-Line Female (FLARED THRU) | 63 |
| **Industrial** | |
| Cam & Grove Female (FLARED THRU) | 79 |
| Flange Retainer (FLARED THRU)* | 35 |
| *Must Select Flange Material | |
| **Special Fitting** | |
| Non-Standard Special FLARED THRU | 99 |

*CRIMP STYLE HOSE*

| | |
|---|---|
| **Sanitary** | |
| TriClamp® | 50 |
| TriClamp® (One Step Up) | 51 |
| TriClamp® (Two Steps Up) | 52 |
| TriClamp® 45° Elbow | 57 |
| TriClamp® 90° Elbow | 53 |
| Mini-Sanitary | 55 |
| Mini-Sanitary 45° Elbow | 5K |
| Mini-Sanitary 90° Elbow | 5L |
| Mini-Sanitary Step-Up | 58 |
| I-Line Male | 60 |
| I-Line Female | 61 |
| I-Line Female (One Step Up) | 62 |
| Bevel Seat Male | 65 |
| Bevel Seat Female | 66 |
| Female SMS Swivel | 68 |
| Female DIN Swivel | 69 |
| **Industrial** | |
| Male Pipe (NPT) | 10 |
| Female Pipe (NPT) | 11 |
| Tube Connector (Plain) | 20 |
| Tube Connector (w/Nut & Ferrule) | 21 |
| Tube Adapter (Plain) | 25 |
| Tube Adapter (w/Nut & Ferrule) | 26 |
| Male Cam | 70 |
| Female Cam w/Locking Handle | 78 |
| Flange Retainer* | 30 |
| *Must Select Flange Material | |
| **Special Fitting** | |
| Non-Standard Special | 99 |

NOTE: Not all available fitting listed above. Consult a local distributor or factory for additional options.

**Material**

**End Fitting Material Selections**

*FLARED THRU & CRIMP STYLE HOSE*

| | |
|---|---|
| *316L SS* | 6 |
| 15 Ra EP 316LSS | R |
| Spec EP/Passivation | Q |
| *Teflon® Encapsulated (Natural)* | E |
| *Teflon® Encapsulated (Conductive)* | A |
| Special Material | X |

NOTE: Not all available fitting listed above. Consult a local distributor or factory for additional options.

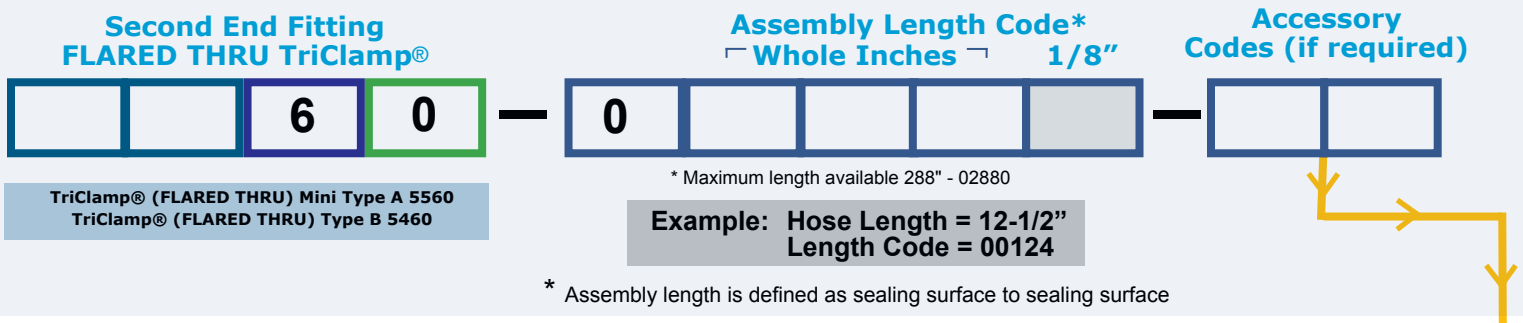
**Flange**

**Flange Material Selections**

*FLARED THRU STYLE HOSE & CRIMP STYLE HOSE*

| | |
|---|---|
| No Flange | 0 |
| 316L Stainless 150# | 6 |
| 316L Stainless 150# (Domestic) | 7 |
| 316L Stainless 300# | G |
| 316L Stainless DIN PN10 | N |
| Carbon Steel (Epoxy Coated) 150# | 0 |

NOTE: Not all available flanges listed above. Consult a local distributor or factory for additional options.

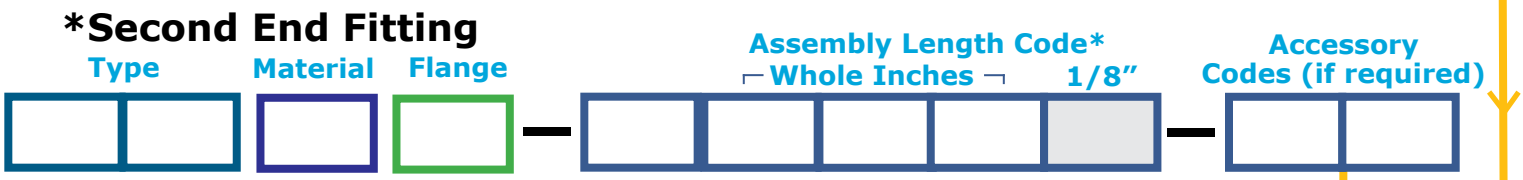



TriClamp® (FLARED THRU) Mini Type A 5560
TriClamp® (FLARED THRU) Type B 5460

* Maximum length available 288" - 02880

**Example: Hose Length = 12-1/2"**
**Length Code = 00124**

* Assembly length is defined as sealing surface to sealing surface




***For Second End Fitting Selection use same selections available on First End Fitting***

**Example: Hose Length = 12-1/2"**
**Length Code = 00124**

* Assembly length is defined as sealing surface to sealing surface

EXAMPLES:

1.5" Diameter Smooth-Bore Teflon® PTFE Natural tube with stainless steel braid reinforcement, TriClamp® fittings with 15Ra electropolished fittings on each end, 36" overall length.

**24 F W 5 0 R 0 5 0 R 0 – 00360**

1" Diameter EPDM Reinforced Teflon® PTFE lined hose, conductive PTFE tube with I-Line Male FLARED THRU on one end, TriClamp® FLARED THRU on one end. Overall Length 6'. Metal Tag "CIP"

**16 B B 5 9 6 0 5 4 6 0 – 00720 - T**

2" Diameter Smooth-Bore PTFE natural tube with a smooth EPDM cover, grey in color. Encapsulated TriClamp® on one end, encapsulated flange retainer with 316 SS 150# Flange on the other end. Overall length 88 feet.

**32 C W 5 0 E 0 3 0 E 6 - 10560**

***STRATUS, FLARED THRU & CRIMP STYLE HOSE***

| Accessories | |
|---|---|
| Metal Tag Attached (see note) | T |
| Paper Tag | TP |
| Pin Stamp on Collar | TC |
| Encapsulated Silicone Label | L |
| Clear Silicone Cover | D |
| Polyolefin Heat Shrink: | |
| Clear | PC |
| Red | PR |
| Black | PB |
| White | PW |
| * Other Colors available, consult factory | |
| * Other accessories available, consult factory | |
| **Note:** Content for tags to be specified in the description | |
| **Special Accessory** | **X** |

NOTE: Not all available Accessories listed above. Consult a local distributor or factory for additional options.

Hastelloy® is the registered trademark name of Haynes International, Inc.
Monel® is a trademark fo Special Metals Corporation.

## Don't See Something You Need?

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## Ask for Hose Customer Service

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One Quality Way, Marion, North Carolina 28752

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Fax: (828) 724-2368

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ELRO · RESISTOFLEX · revo · XOMOX

CP-RESISTOPURE-Design Manual-BU-EN-ON-6/10