

High
Integrity
Flange:



The
Environment
Demands
It

CORROSION RESISTANT PTFE LINED HIF PIPING SYSTEMS BY

CRANE® RESISTOFLEX®

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The information contained herein is provided only as a guide for the use of Resistoflex products and does not constitute an express warranty of any kind. Resistoflex specifically disclaims the implied warranty of merchantability and fitness for a particular purpose.

Piping
Hazardous,
Toxic, or
Flammable
Corrosives?

Consider
the advantages
of Resistoflex
High Integrity
Flanged
Piping Systems:
The best
technology
available

The environment
demands it —
so should you!

Environmentally Sound

Environmental consciousness is a responsibility we all share, and at Resistoflex we take our part seriously. We've been the industry leader in lined piping systems for years, and with development of HIF we're the first to deal with the issues of fugitive emissions, waste disposal and air quality. Through the use of Belleville Washers and a Load Bearing Ring, HIF controls the possibility of fugitive emissions and an entire piping system can be continuously monitored.

The Clean Air Act Amendment of 1990, specifically Title III, requires the EPA to regulate the emissions of more than 180 chemicals. Compliance with these regulations must be met within specific time frames; early, voluntary reductions in emissions, however, may qualify companies for a six year extension on total compliance.

Maintenance Free

The main "working" component of HIF, the Belleville Washer(s), maintain optimum sealing pressure at the PTFE flare faces, independent of the bolt torque. The load bearing ring, providing a metal-to-metal seal at the pipe flare, eliminates the possibility of mechanical damage to the PTFE flares due to over-torquing. After installation, the system is maintenance free.

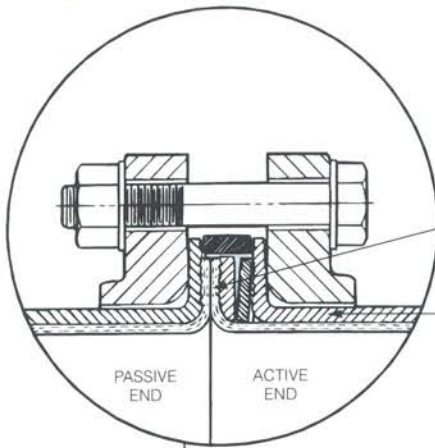
Fire Safe

The metal-to-metal seal provided by the load bearing ring contains the conveyed media in the event of a fire. HIF has been tested and is a Factory Mutual approved PTFE lined pipe system.

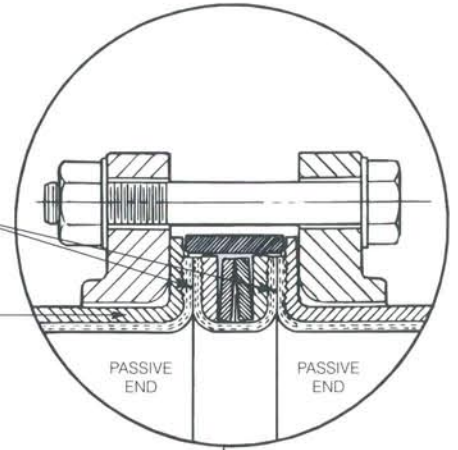
Permanent Flange Protection

Conveying acids and other hazardous materials poses problems unique to the CPI. "Spray-outs" at flange connections can damage equipment or injure employees. The load bearing ring provides secondary containment eliminating "spray-outs." HIF protects personnel, equipment and the environment.

Assembled bolts tightened to high preload



Assembled bolts tightened to high preload

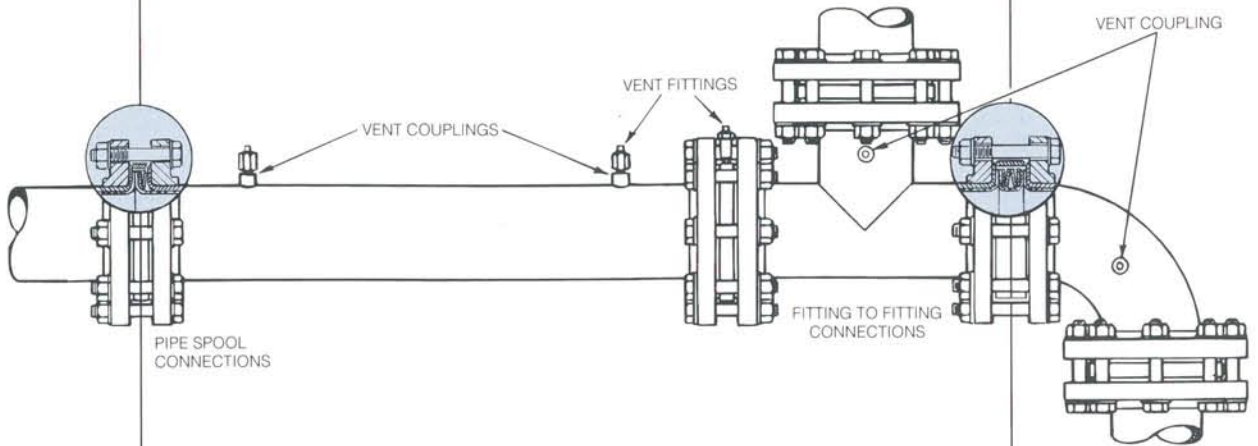


ALL SEALING FACES IN SYSTEM ARE UNIFORMLY SEALED

PERMANENT HIGH STRUCTURAL PRELOAD

PASSIVE END ACTIVE END

PASSIVE END PASSIVE END



PIPE SPOOL CONNECTIONS

VENT COUPLINGS

VENT FITTINGS

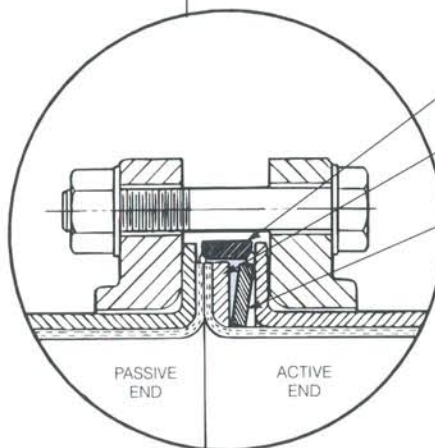
FITTING TO FITTING CONNECTIONS

VENT COUPLING

PASSIVE END ACTIVE END

PASSIVE END PASSIVE END

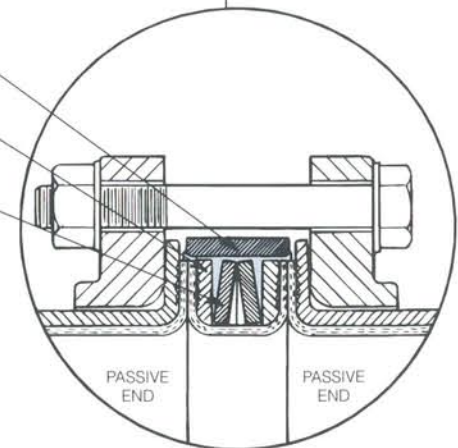
Pre-assembled bolts handtight



LOAD BEARING RING

PLAIN WASHER (FORCE DISTRIBUTION RING)

BELLEVILLE WASHER (CONED DISC SPRING)



Pre-assembled bolts handtight

Details of Design

Pipe Spool Connections

The High Integrity Flange connection used to join plastic lined pipe spool to pipe spool consists of a passive and an active end, joined together through a steel Load Bearing Ring.

The passive end is similar to the end of a standard pipe spool or fitting except that if the end is of lap-joint or raised-face construction, the diameter of the metal flare on the pipe end or of the raised face is slightly larger.

The active end consists of a Belleville Washer(s) (Coned Disc Spring) and a Flat Washer (Force Distribution Ring) assembled behind the flare of the plastic liner.

At installation, the Load Bearing Ring is inserted between the metal faces of the flanges or flared ends of the pipe. The joint is then bolted together in the usual manner, except that the nuts and bolts are secured with high torque values, thus establishing a highly preloaded assembly with metal to metal carry-through of the structural load.

The Belleville Washer deflects during the boltup and, acting through the Flat Washer, applies a predetermined, optimum sealing load to the flared faces of the liners.

Fitting To Fitting Connections

All fittings in the High Integrity Flange system have passive ends. As with the passive ends of pipe spools, if the end of a fitting is of the lap-joint

design, the diameter of the metal flare must be a little larger than with standard piping.

When a fitting is to be connected to a pipe spool, the adjacent face of the pipe should be of the active end design. The fitting and pipe are then joined together as described under Pipe Spool Connections.

In the situation where a fitting is to be connected to another fitting, the adjacent passive ends of the fittings are joined together through an Adapter. The Adapter consists of a Load Bearing Ring, two Belleville Washers (Coned Disc Springs), two Flat Washers (Force Distribution Rings) and a flared plastic liner of TFE.

When the joint is assembled, the adapter with the springs, washers and TFE liner insert is placed between the fitting flanges. As with the active ends on the pipe spools, the Belleville Washers deflect and, acting through the Flat Washers, apply predetermined, optimum sealing loads to the flared liners of the fittings and adapter.

Automatic Load Compensation

Flanged connections in a High Integrity Flange system are all uniformly sealed. Stored energy in the Belleville Washers automatically compensates for any changes, such as deformation of plastic flares, that would affect sealing forces, and stored energy in the highly pre-loaded bolts copes with conditions affecting structural load.

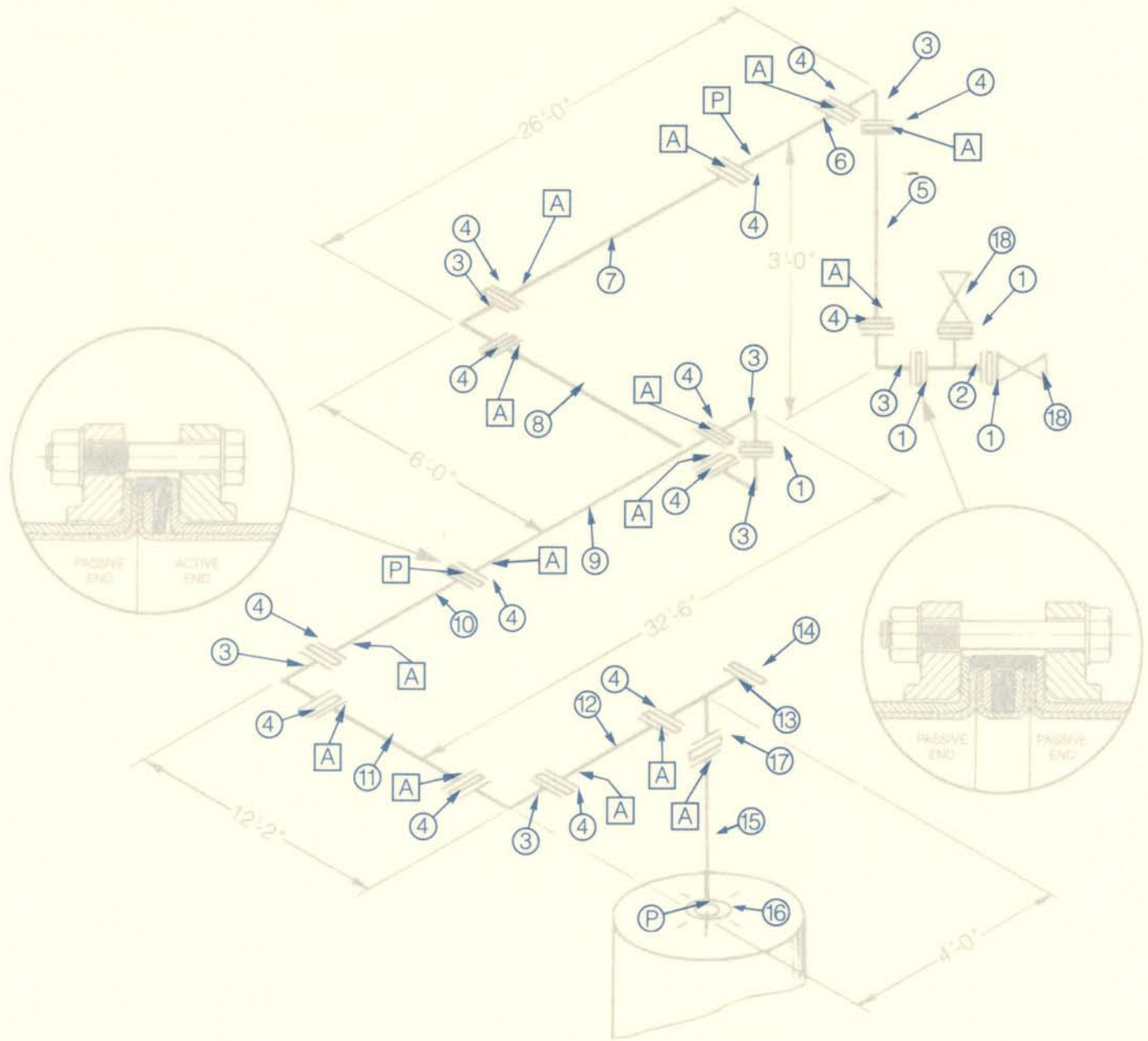
We Prepare a Bill of Material for you

BILL OF MATERIALS				RESISTOFLEX CO.			
CUST. ORD. NO.		CONTRACT NO.		OUR ORDER NO.	CUSTOMER REFERENCE		B/M NO.
RESISTOFLEX DISTRIBUTOR'S PURCHASE ORDER NUMBER		END USER'S REFERENCE NUMBER		RESISTOFLEX SHOP ORDER NUMBER	NAME OF END USER JOB TITLE DRAWING NUMBER REVISION NUMBER		RESISTOFLEX REFERENCE NUMBER
ITEM NO.	NO. REQ'D.	CLASS	RESISTOFLEX PART NO.		MARK NO.		
		FOR FACTORY USE ONLY					
1	2		TG1575-018		3" TFE STD. ADAPTER		
2	1		TG201VV-018		3" TFE TEE		
3	7		TG290VV-018		3" TFE 90° ELL		
4	14		TG1572-018		3" STD. RING		
5	1		TA1VV018-0250		3" C401-5		
6	1		TA1VV018-0610		3" C401-6		
7	1		TA1VV018-2400		3" C401-7		
8	1		TA1VV018-0610		3" C401-8		
9	1		TA1VV018-2400		3" C401-9		
10	1		TA1VV018-1390		3" C401-10		
11	1		TA1VV018-1350		3" C401-11		
12	1		TA1VV018-0370		3" C401-12		
13	1		TG201VV-2032		3x2 TFE RED. TEE		
14	1		TG201DI-018		3" TFE BLIND FLANGE		
15	1		TA1VV032-1200		2" B300-15		
16	1		TG755032-XXX-1		2" TFE SPECIAL ADAPTER		
17	1		TG1572-032		2" STD. RING		
18	1		TG1712DI-018H		TFE CLAMP VALVE		

DRAWN BY: _____ DATE: _____
 CHECKED BY: _____ DATE: _____
 SHEET _____ OF _____

Here's how it works. When your system design is completed, you send copies of isometric drawings to Resistoflex. Based on these drawings, we prepare bills of material from which pipe spools to your required lengths will be fabricated, together with the fittings needed.

To your isometric we add item numbers which tie in to our bill of material, along with our part number and your coded mark number for each pipe spool. This number is repeated on the pipe itself to eliminate any guesswork on installation. Since we supply you a copy of the marked up "iso" and bills of material, you'll know exactly how and where the parts are to be installed.



Surface Preparation, External Protection, Product Testing and Identification

Surface Preparation

Housings are immersed in 160°F alkaline base cleaning solution to remove rust, loose scale, film, etc. (minimum soak is 10 minutes). They are then rinsed in clear water. Surfaces are dry, clean and free of oil, grease, rust, scale, dirt, etc. before the primer is applied.

Resistoflex Standard Protection

All pipe, fittings and accessory items are coated with a corrosion resistant epoxy primer.

Painting, Coating and Tape Cover

In addition to the primers and enamels used for atmospheric protection above ground, underground installations should be protected with tape wrapping. The tape should be wrapped from end to end of the pipe with 0.5" overlay, reversed and wrapped back over the first layer affording a total minimum thickness of .020". "Scotchrap" PVC pressure-sensitive tape #50 (.010 wall) manufactured by the 3M Company works well for this application. Vent Plugs are made of stainless steel and are not to be painted. Care should be taken not to obstruct the porous metal portion of the plug.

Sandblasting

In instances where customers wish to sandblast Resistoflex lined pipe in the field, either before or after erection, laboratory tests and field experience clearly indicate that lined pipe and fittings can be sandblasted with no special precautions taken to protect the liner at the vent holes. End protection covers must remain in place if the units are sandblasted before installation.

Liner Identification and Marking of Pipe and Fittings

Liner identification for High Integrity Flanged Pipe and Fittings is accomplished by foil "TFE" labels attached to the housings. In addition, all HIF Pipe and fittings are identified by one yellow "HIF" cable tie attached to each piece. Factory Mutual labels are placed on each piece.

For an additional charge, mark numbers and/or letters specified by the customer to identify each piece spool will be painted with waterproof paint on the run of the pipe. As an alternative, stainless steel tags embossed with the mark numbers can be placed on the O.D. of the pipe and/or color coding of the plywood end covers can be used to identify sections of a piping job.

Product Testing

a. Hydrostatic Test

Pipe assemblies and fittings are subjected to a 425 psi room temperature, hydrostatic pressure test. The assemblies are completely filled with clean water and the system bled free of all air prior to application of pressure. Full test pressure is reached within one minute and is maintained for 3 minutes. The pressure gauge and vent holes in the pipe and fitting housing are observed throughout the pressure test for any evidence of leakage which is cause for rejection.

b. Welded Fitting Pressure Test

With gasketed end covers in place, the lined fitting is pressurized using either air or nitrogen. A lower pressure (approximately 50 psig less than the internal pressure) is applied through the vent fitting. The space between the housing and liner, essen-

tially the welds, are pressurized and tested for leaks. This test is conducted under water.

c. Electrostatic Test

The liner of all completed assemblies is subjected to a 10,000 DC volt non-destructive electrostatic test to detect any flaws in the liner, which are cause for rejection.

A bronze scanning brush is moved through the interior of the component. Any leakage to ground is noted by the lighting of the neon indicator in the handle of the probe. A visible and audible spark also occurs at the probe section if a defect exists in the liner.

Note: The method of testing is at the discretion of Resistoflex Company in accordance with ASTM specifications.

Materials of Fabrication

Pipe and Fitting Liner

Fluoroflex®-T (PTFE*/polytetrafluoroethylene) unmatched chemical resistance at temperatures to 572° (300°C). Because its carbon chains are completely fluorinated, PTFE is chemically inert to the following broad range of commercial chemicals:

- All acids including: hydrofluoric, hydrochloric, sulfuric, and aqua regia
- All chlorides
- All sulfates
- All bleach solutions
- All solvents
- All phenols
- All caustics
- All peroxides

Combined with the chemical inertness of Fluoroflex® - T are its unusual non-stick properties. Thus, a Fluoroflex®-T lined pipe system eliminates and/or minimizes buildup of deposits on the pipe walls which otherwise would reduce flow and possibly affect processing operations.

Because of mechanical and thermal expansion factors, Fluoroflex®-T Lined Pipe and Fittings are not recommended above 500°F (260°C) although there are cases where they have given satisfactory service above this temperature.

***PTFE (sometimes referred to as TFE), is manufactured by DuPont under the trade name Teflon®. PTFE is manufactured by ICI under the trade name Fluon®.**

Housing and Flange Materials

Pipe is electric-resistance welded carbon steel, Schedule 40.

In sizes 1 inch and 1½ inch, the pipe conforms to ASTM A587 requirements; 2 inch and larger conform to ASTM A53 or A587.

Flanges conform to the following specifications: Ductile Iron ASTM A395 (60-40-18)

Cast fitting housings are ductile iron, meeting ASTM A395 (60-40-18) requirements.

Housings for PTFE lined standard crosses, tees, reducing tees and some elbows are fabricated from Schedule 40 pipe conforming to the requirements of ASTM A587 or A53.

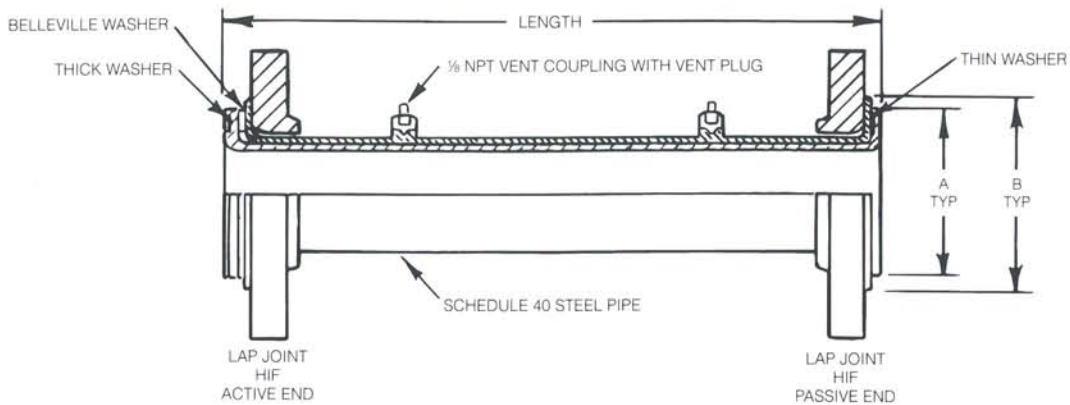
Miscellaneous HIF Components

- HIF Vent Plug: T61716, 316SS
Porous Disc: Hastelloy "C"-276
- Thick (Plain) Washer: T61571-XXX
016-064, Powder Metal F0008-R
- Thin Washer: T61580-XXX
016-032, 304SS
048-064, Carbon Steel Painted
- Belleville Washer: T61573-XXX
SAE 6150 Austempered to RC 42-48
- Optional Vent Connector: T61717
To be used with monitoring systems. (316SS)

Resistoflex Liner Colors	
TFE All Items	White
Except TFE Clamp Valves	Black

HIF
BOLT FORCE IS
MAINTAINED
PERMANENTLY

Pressure and Vacuum Data



Maximum Pressure Ratings

Temperature	ANSI class 150	ANSI class 300
100°F (38°C)	250 psig	450 psig*
150°F (68°C)	242 psig	415 psig*
200°F (93°C)	235 psig	390 psig*
300°F (149°C)	215 psig	345 psig*
400°F (240°C)	200 psig	295 psig*
500°F (260°C)	170 psig	245 psig*

* Actual ANSI B16.42 ratings are higher, i.e. 640 psig at 100°F which is beyond the recommended temperature/pressure for sealing plastic faces.

The tabulation above indicates the maximum pressure ratings for plastic lined carbon steel pipe with ductile iron flanges and for plastic lined carbon steel or ductile iron fittings at various temperatures.

All HIF piping is rated for full vacuum (29.9Hg) service to 450°F

Dimensions and Weights

HIF Pipe Spools With Van Stone Flanges

Size Code	Nominal size (inches)	Nom. ID lined pipe	Flare dia. A	Flare dia. B	Heavy duty PTFE	Bellevalle washer per active end	For 12" spool lbs*	Add'l pipe lbs/ft*
016	1	.8125	1.906	2.375	.130	2	7.3	1.9
024	1½	1.375	2.719	3.188	.130	2	9.5	3.1
032	2	1.812	3.469	3.938	.130	1	14.5	4.1
048	3	2.812	4.656	5.125	.130	1	25.1	8.3
064	4	3.812	6.025	6.500	.130	1	38.8	11.8

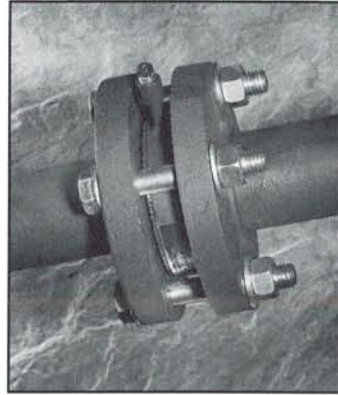
* Approximate Weight
See page 10 for flange dimensions

HIF
PREVENTS
OVERTORQUING
OF PTFE
FLARES

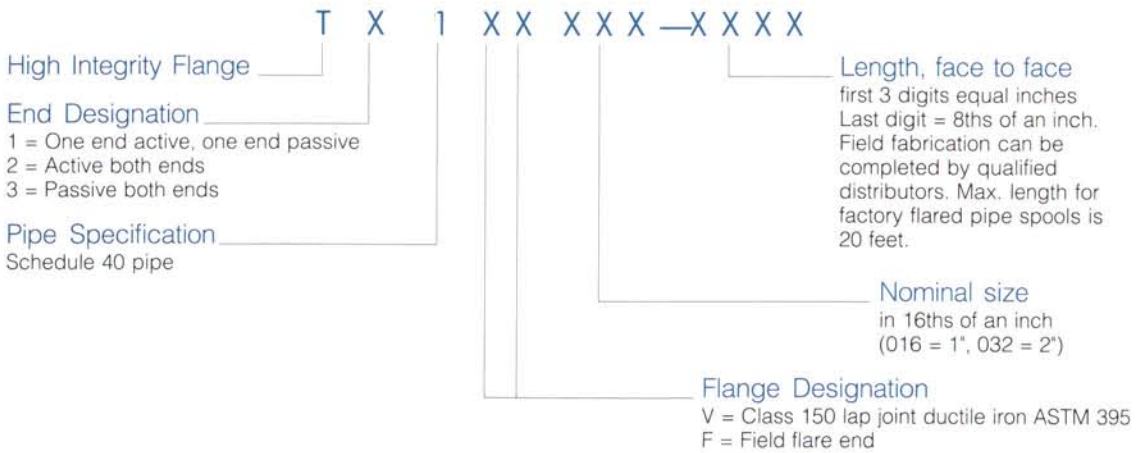
Lined Pipe Identification Code

All Standard Resistoflex High Integrity Flange Pipe Spools have Ductile Iron Van Stone (Lap Joint) Flanges at each end

- Simplifies Installation
- Extremely easy to align bolt holes
- Much stronger flange connection
- Flanges on both ends of pipe rotate
- No gaskets required when bolting to other Resistoflex products
- Positioning of accessories is easily accomplished



Pipe Part Number Code System



Pipe Part Number Code System



Flange and Pipe Dimensional Data

ANSI Class 150 B16.42 and B16.5 Flange Dimensions

Nominal size (inches)	Outside diameter	Thickness	Dia. of sealing surface	# of holes	Dia. of bolts	Dia. of bolt circle
1	4¼	9/16	2	4	½	3⅜
1½	5	1¼	2⅞	4	½	3⅜
2	6	¾	3⅝	4	⅝	4¾
3	7½	1⅝	5	4	⅝	6
4	9	1⅝	6⅜	8	⅝	7½

Dimensions of Welded and Seamless Pipe Carbon and Alloy Steel Pipe ANSI B36.10

Nominal size (inches)	Outside dia.	Nominal wall thickness sched. 40
1	1.315	.133
1½	1.900	.145
2	2.375	.154
3	3.500	.216
4	4.500	.237

Technical Data

	Tensile minimum	Yield minimum	Elongation minimum
Ductile Iron - ASTM - A395 (60 - 40 - 18)	60,000 PSI	40,000 PSI	18%
Cast Steel - ASTM - A216 (Grade WCB)	70,000 PSI	36,000 PSI	22%
Cast Iron - ASTM - A126 (Class A)	21,000 PSI	21,000 PSI	0%

The above tabulation provides comparative pertinent data with respect to physical properties of ductile iron, carbon steel and cast iron.

NOTE: The yield strength of ductile iron is 10% greater than that of cast steel and almost double that of cast iron; while the elongation of ductile iron approaches that of cast steel. The poor impact or shock strength of cast iron is well known, and for this reason it is not generally recommended for use in handling flammable or otherwise hazardous material, particularly in above-ground installations.

Studs, Bolts, and Tightening

Bolt and Stud Requirements:

Use bolts or studs of SAE Grade 5 or better steel with rolled threads. Flat washers are to be used under bolt heads and nuts. To achieve maximum torque loads, it is recommended that a high temperature anti-seize lubricant be applied to the bolt/studs before torquing.

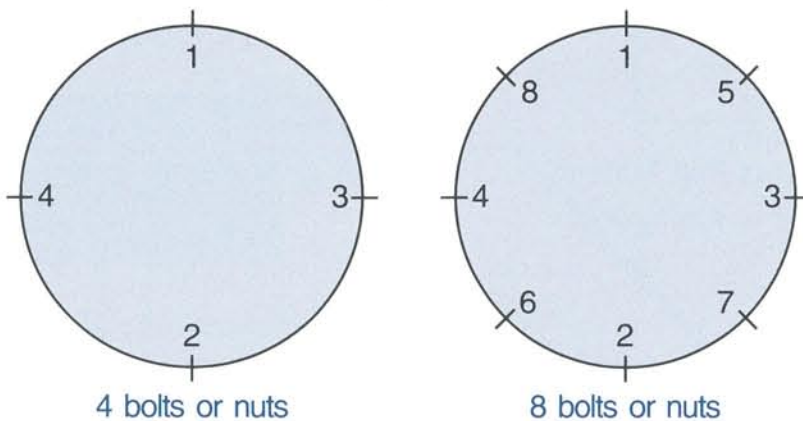
Bolt Torquing Procedures:

- Tighten initially to approximately 2/3 of final torque using the alternate and opposite method.
- Tighten to the final torque shown in the table, again, using the alternate and opposite method.
- Repeat tightening to the final torque shown at least twice to ensure that flanges are permanently set.

The final torque values should not be exceeded by more than 50%

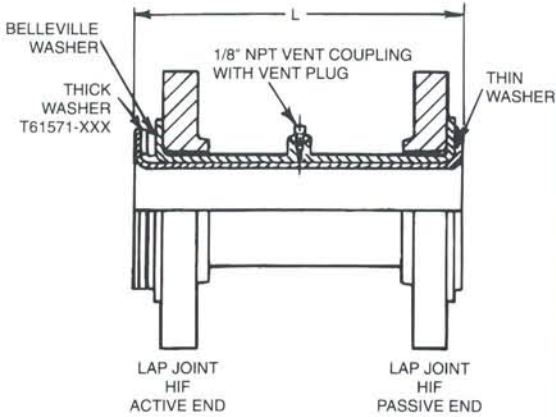
Nominal size (inches)	# of bolts	Bolt dia. (inches)	Bolt length pipe to pipe (passive to active)	Bolt length fitting to fitting (passive to passive)	Initial torque (approximate) (ft / lbs)	Final torque (mimum) (ft. / lbs)
1	4	1/2	2 3/4	3 1/2	25	40
1 1/2	4	1/2	3 1/4	4	35	50
2	4	5/8	3 1/2	4 1/2	50	80
3	4	5/8	4	4 3/4	70	110
4	8	5/8	4 1/2	5 1/4	60	90

Tightening Sequence



NOTE: When using studs rather than bolts, increase the length sufficiently to allow for the additional length of a nut

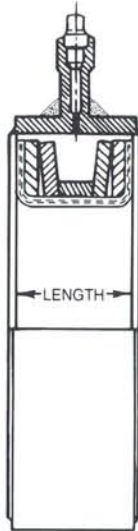
Minimum Pipe Spool Lengths



Size Code	Nominal size (inches)	one active one passive end (T1XXXXXX)	two ends active (T2XXXXXX)	two passive ends (T3XXXXXX)
016	1	3½	3 ¹⁵ / ₁₆	3 ¹ / ₁₆
024	1½	3 ¹⁵ / ₁₆	4 ⁷ / ₁₆	3 ⁷ / ₁₆
032	2	4 ¹ / ₈	4 ⁹ / ₁₆	3 ¹¹ / ₁₆
048	3	4 ¹¹ / ₁₆	5 ³ / ₁₆	4 ³ / ₁₆
064	4	5 ¹ / ₈	5 ³ / ₄	4 ¹ / ₂

Spacer

A Spacer is required when the distance to complete a run of pipe is less than the minimum pipe spool length.



Example of Part Number

T6203 —XXX —XXX

Base #

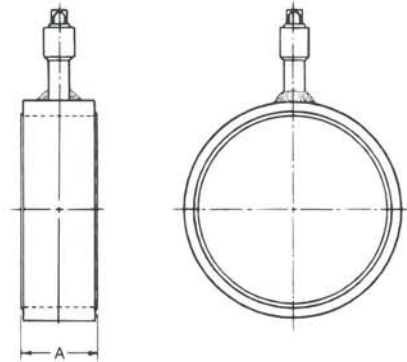
Nominal size
in 16ths of an inch
(016 = 1" pipe)

Length

(installed length is PTFE flare face-to-face. Metal ring width is greater).
First digit equals inches.
Last 2 digits equal 32nds
(105 = 1-5/32)

Load Bearing Ring

Load Bearing Rings are used with HIF pipe spools to connect Active to Passive ends.



Example of Part Number

T61572 —XXX

Base #

Nominal size
in 16ths of an inch
(016 = 1" pipe)

Part #	Nominal Size (inches)	A
T61572 - 016	1	.643
T61572 - 024	1½	.742
T61572 - 032	2	.677
T61572 - 048	3	.746
T61572 - 064	4	.876

Adapter

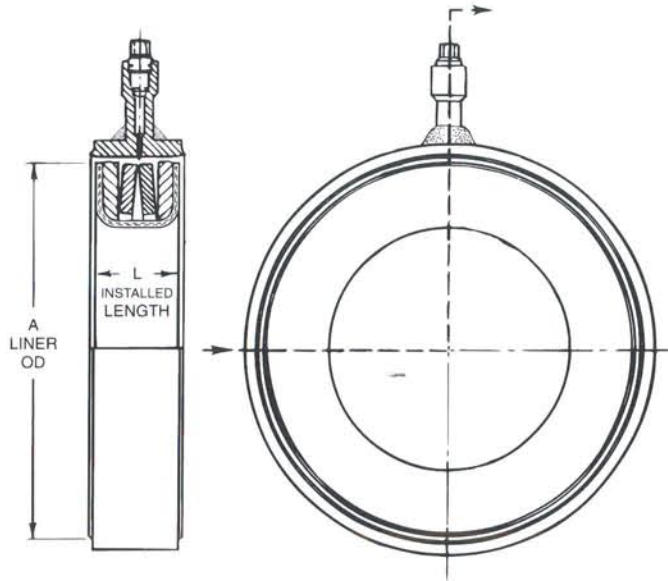
Example of Part Number

T61575 —XXX

Base #

Nominal size
in 16ths of an inch
(016 = 1" pipe)

Part #	Nominal size (inches)	A	Installed L
T61575 - 016	1	1.906	.812
T61575 - 024	1½	2.719	.906
T61575 - 032	2	3.469	1.062
T61575 - 048	3	4.656	1.250
T61575 - 064	4	6.025	1.438



When a fitting is connected to another fitting, the Passive Ends of these fittings are joined through an Adapter

45° Elbow

Example of Part Number

T6245XX —XXX

Base #

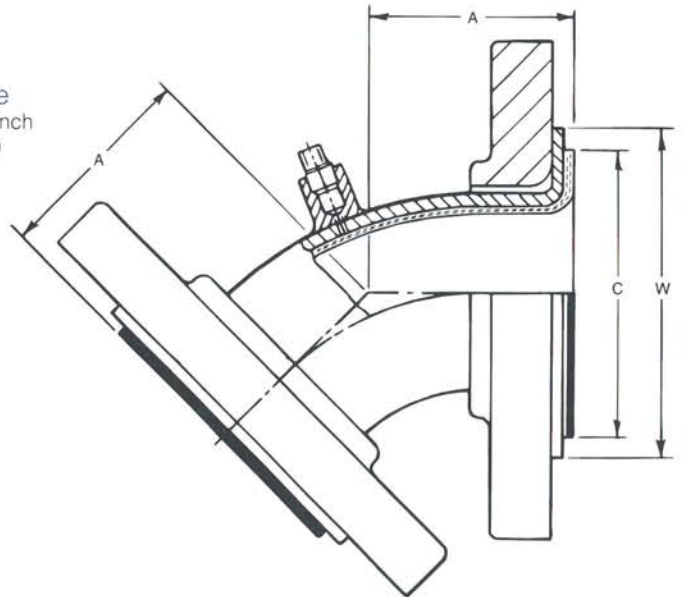
Fitting type

VV = Fabricated steel housing with Class 150 lap joint ductile iron flanges

DI = Class 150 ductile iron cast fitting (sizes 1" & 1½" only)

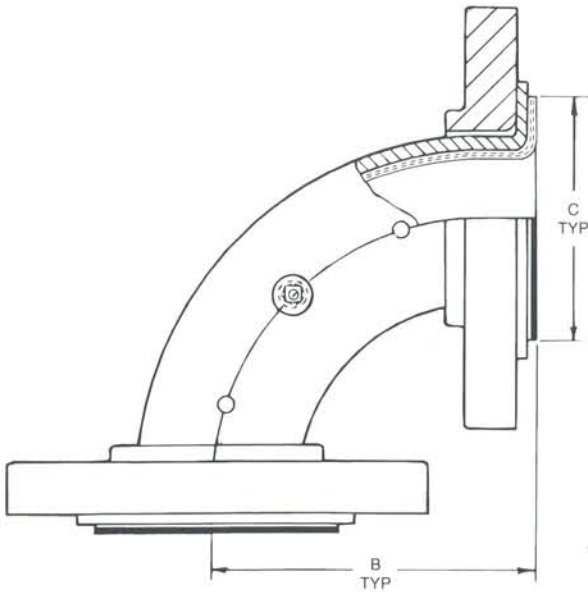
Nominal size
in 16ths of an inch
(016 = 1" pipe)

Part #	Nominal size (inches)	A	C	W
T6245DI - 016	1	1¾	1.906	-
T6245DI - 024	1½	2¼	1.719	-
T6245VV - 032	2	2½	3.469	3.938
T6245VV - 048	3	3	4.656	5.125
T6245VV - 064	4	4	6.025	6.500



HIF
PREVENTS
LOSS OF
PRODUCT &
EQUIPMENT

90° Elbow



Example of Part Number

T6290VV —XXX

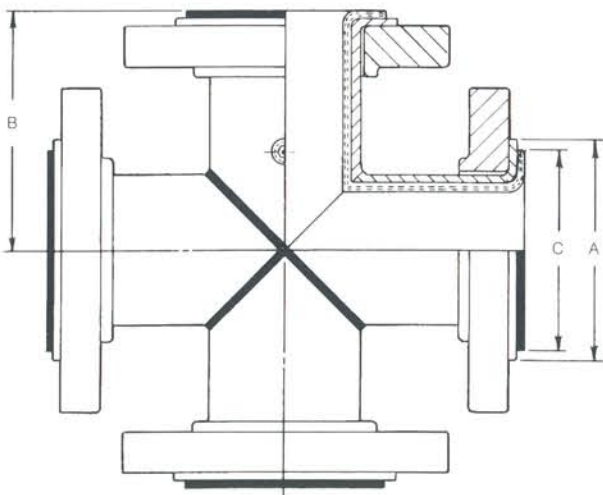
Base # _____

Fabricated _____
steel housing with
Class 150 lap joint
ductile iron flanges

Nominal size
in 16ths of an inch
(016 = 1" pipe)

Part #	Nominal size (inches)	B	C
T6290VV - 016	1	3½	1.906
T6290VV - 024	1½	4	2.719
T6290VV - 032	2	4½	3.469
T6290VV - 048	3	5½	4.656
T6290VV - 064	4	6½	6.025

Cross



Example of Part Number

T6202VV —XXX

Base # _____

Fabricated _____
steel housing with
Class 150 lap joint
ductile iron flanges

Nominal size
in 16ths of an inch
(016 = 1" pipe)

Part #	Nominal size (inches)	A	B	C
T6202VV - 016	1	2.375	3½	1.906
T6202VV - 024	1½	3.188	4	2.719
T6202VV - 032	2	3.938	4½	3.469
T6202VV - 048	3	5.125	5½	4.656
T6202VV - 064	4	6.500	6½	6.025

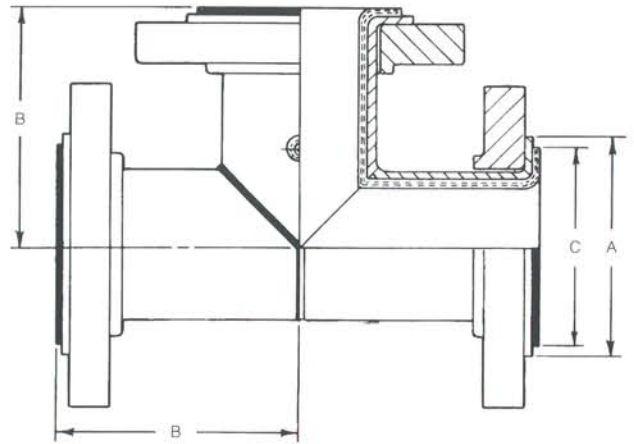
Standard TEE

Example of Part Number

T6201VV —XXX

Base # _____
 Fabricated steel housing with Class 150 lap joint ductile iron flanges

Nominal size in 16ths of an inch (016 = 1" pipe)



Part #	Nominal size (inches)	A	B	C
T6201VV - 016	1	2.375	3½	1.906
T6201VV - 024	1½	3.188	4	2.719
T6201VV - 032	2	3.938	4½	3.469
T6201VV - 048	3	5.125	5½	4.656
T6201VV - 064	4	6.500	6½	6.025

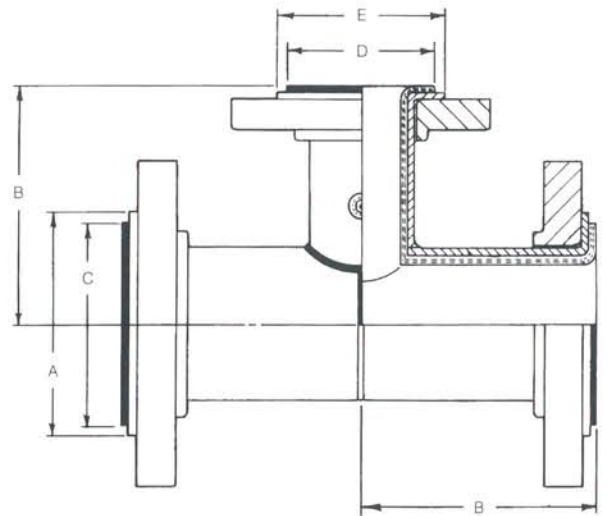
Reducing TEE

Example of Part Number

T6201VV —XXXX

Base # _____
 Fabricated steel housing with Class 150 lap joint ductile iron flanges

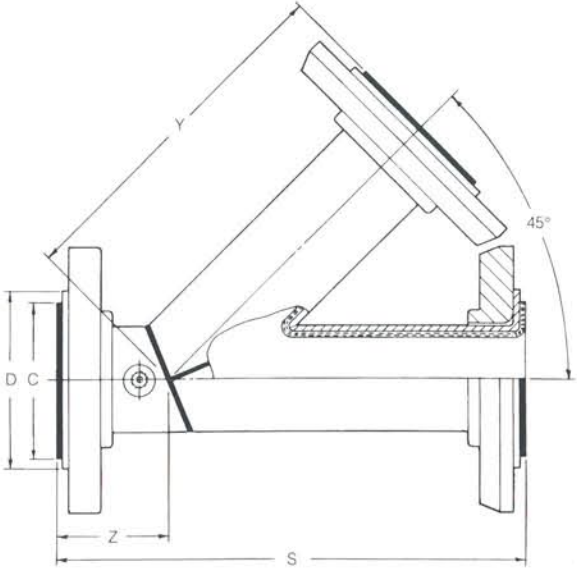
Nominal size in 16ths of an inch (2416 = 1½ x 1")



Part #	Nominal size (inches)	A	B	C	D	E
T6201VV - 2416	1½x1	3.188	4	2.719	1.906	2.375
T6201VV - 3216	2x1	3.938	4½	3.469	1.906	2.375
T6201VV - 3224	2x1½				2.719	3.188
T6201VV - 4816	3x1				1.906	2.375
T6201VV - 4824	3x1½	5.125	5½	4.656	2.719	3.188
T6201VV - 4832	3x2				3.469	3.938
T6201VV - 6424	4x1½				2.719	3.188
T6201VV - 6432	4x2	6.500	6½	6.025	3.469	3.938
T6201VV - 6448	4x3				4.656	5.125

HIF
 WELDED
 HOUSINGS
 ARE PRESSURE
 TESTED

Lateral



Example of Part Number

T6207VV —XXX

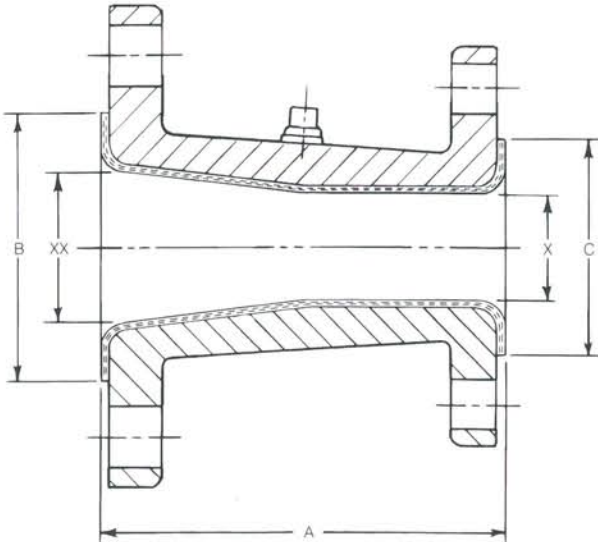
Base # _____

Nominal size
in 16ths of an inch
(016 = 1" pipe)

Fabricated
steel housing with
Class 150 lap joint
ductile iron flanges

Part #	Nominal size (inches)	C	Y	Z	S	D
T6207VV - 016	1	1.906	5¾	1¼	7½	2.375
T6207VV - 024	1½	2.719	7	2	9	3.188
T6207VV - 032	2	3.469	8	2½	10½	3.938
T6207VV - 048	3	4.656	10	3	13	5.125
T6207VV - 064	4	6.025	12	3	15	6.500

Concentric Reducer



Example of Part Number

T6206DI —XXXX

Base # _____

Nominal size
in 16ths of an inch
(2416 = 1½ x 1")

Cast ductile iron
housing material

Part #	NOMINAL SIZE				
	XX	X	A	B	C
T6206DI - 2416	1½	1	4½	2.719	1.960
T6206DI - 3216	2	1	5	3.469	1.906
T6206DI - 3224	2	1½	5	3.469	2.719
T6206DI - 4824	3	1½	6	4.656	2.719
T6206DI - 4832	3	2	6	4.656	3.469
T6206DI - 6432	4	2	7	6.025	3.469
T6206DI - 6448	4	3	7	6.025	4.656

HIF PIPING
CAN WITHSTAND
DEFLECTION
UP TO 14°
OFFSET

Instrument TEE

Example of Part Number

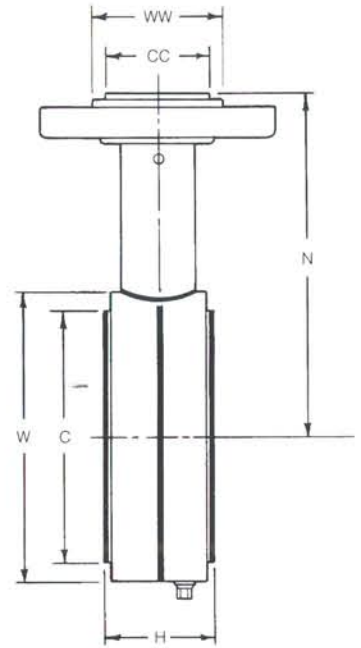
T6209V —XXXX

Base # _____

Flange designation _____

V = class 150 ductile
iron lap joint

Nominal size
in 16ths of an inch
(2416 = 1½ x 1")



Part #	Nominal size (inches)	N	C	W	CC	WW	H
T6209V - 1616	1 x 1	3½	1.906	2.595			
T6209V - 2416	1½ x 1	4	2.719	3.345			
T6209V - 3216	2 x 1	5⅞	3.469	4.093	1.906	2.375	2.000
T6209V - 4816	3 x 1	6⅝	4.656	5.343			
T6209V - 6416	4 x 1	7⅞	6.025	6.843			

Blind Flange

Example of Part Number

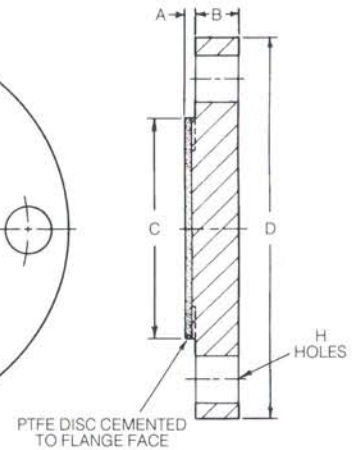
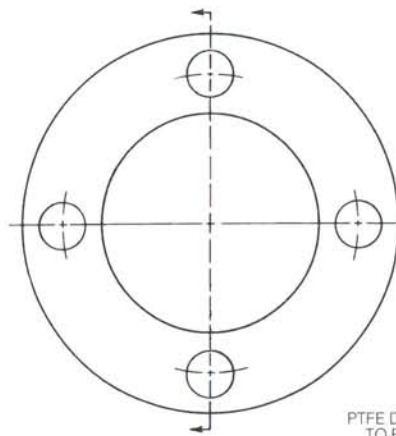
T6204DI —XXXX

Base # _____

Flange material _____

DI = ductile iron

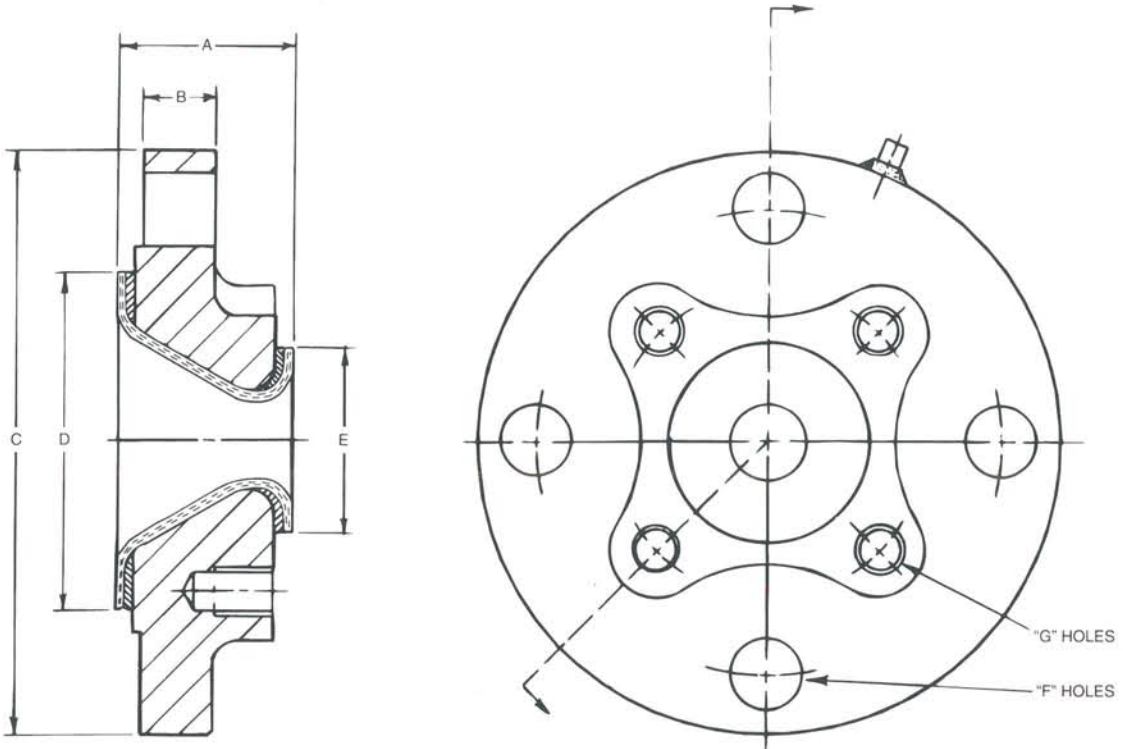
Nominal size
in 16ths of an inch
(2416 = 1½ x 1")



Part #	Nominal size (inches)	Ref A	B	C	D	# of holes	Hole dia.	Bolt circle
T6204DI - 016	1	.127	½	1.906	4¼	4	⅝	3⅞
T6204DI - 024	1½	.142	⅝	2.719	5	4	⅝	3⅞
T6204DI - 032	2	.142	1⅞	3.469	6	4	¾	4¾
T6204DI - 048	3	.152	⅞	4.656	7½	4	¾	6
T6204DI - 064	4	.162	⅞	6.025	9	8	¾	7½

HIF PIPING
CAN BE
MONITORED
FOR LEAK
DETECTION

Reducing Flange



Example of Part Number

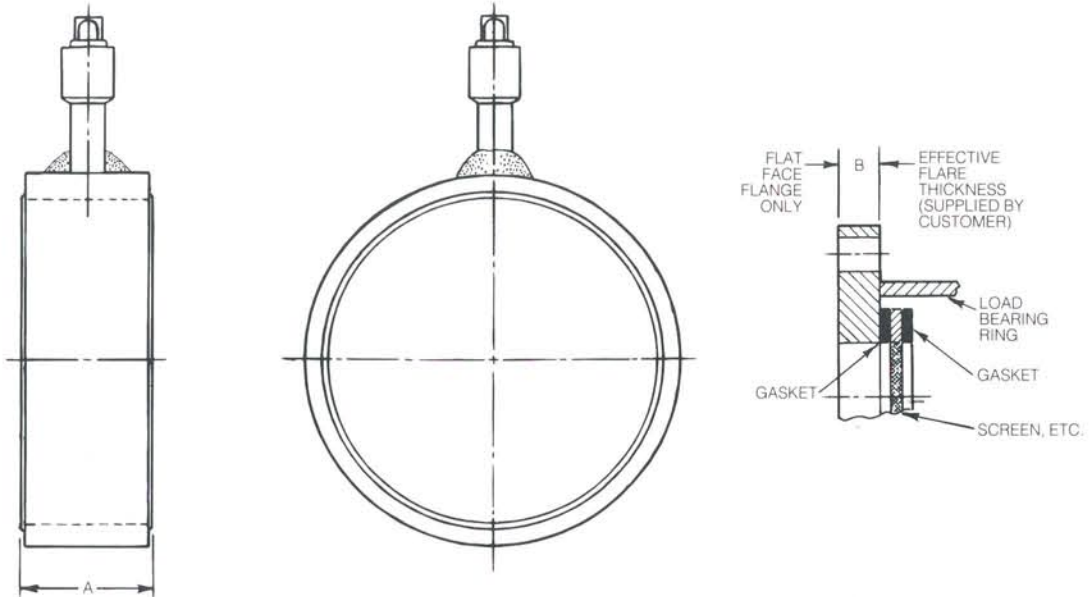
T6200DI —XXXX

Base #
Ductile iron
flange material

Nominal size
in 16ths of an inch
(2416 = 1½ x 1")

Part #	Nominal size (inches)						F			G			Bolt Hole Rotation	
		A	B	C	D	E	# of Holes	Dia.	B.C.	# of Holes	Thread	B.C.		Depth
T6200DI - 2416	1½ x 1		.688	5	2.719	1.906		5/8	3 7/8			3 3/8		45°
T6200DI - 3216	2 x 1	1 1/16				1.906						3 3/8		
T6200DI - 3224	2 x 1½		.750	6	3.469	2.719	4		4 3/4		1/2-13		.625	
T6200DI - 4824	3 x 1½	1 5/8		7 1/2	4.656	2.719		3/4	6	4		3 3/8		
T6200DI - 4832	3 x 2	1 3/4				3.469						4 3/4		
T6200DI - 6432	4 x 2	2	.938	9	6.025	3.469	8				5/8 - 11	4 3/4	.875	
T6200DI - 6448	4 x 3	1 3/4				4.656			7 1/2			6		

Special Load Bearing Ring



Special Load Bearing Rings are required to mate with non-HIF flat faced Flanges having gasket thicknesses differing from regular HIF Fittings

RING LENGTH CALCULATION FORMULA

Ring length = A + B

Load bearing ring length _____ Effective flare thickness (supplied by customer)
See example of part number (round to nearest .005")

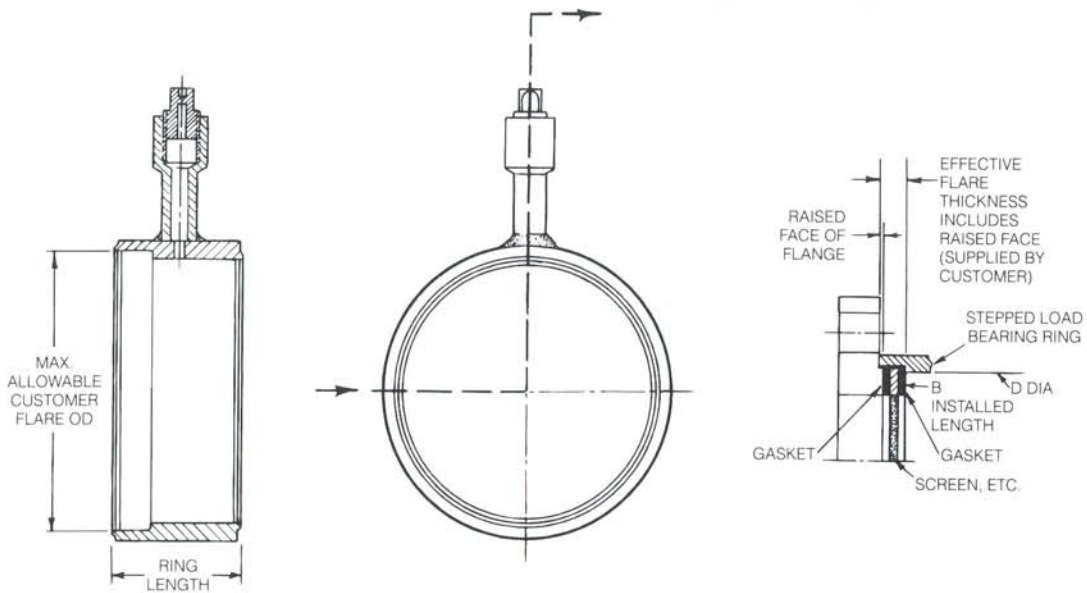
Example of Part Number

T572 —XXX —XXXX

Base # _____ Effective flare thickness of mating system
Nominal size _____ 1st digit = inches, next 3 digits = fractions of an inch in decimals
(016 = 1" pipe) (example: 1250 = 1¼ 0250 = ¼)

Part #	Nominal size (inches)	A	B	Max. allowable customer flare dia.
T572 - 016 - XXXX	1	.528		1.906
T572 - 024 - XXXX	1½	.612	Effective flare thickness (see sketch)	2.719
T572 - 032 - XXXX	2	.574		3.469
T572 - 048 - XXXX	3	.616		4.656
T572 - 064 - XXXX	4	.726		6.025

Stepped Load Bearing Ring



To mate HIF systems to components having a raised face flange or gaskets, screens or other inline devices which exceed the "C" diameter, a stepped load bearing ring, P/N T572S XXX – XXXX must be used

RING LENGTH CALCULATION FORMULA

$$\text{Ring length} = A + B$$

Load bearing ring length

Effective flare thickness
(supplied by customer)

See example of part number
(round to nearest .005")

Example of Part Number

T572SXXX —XXXX

Base #

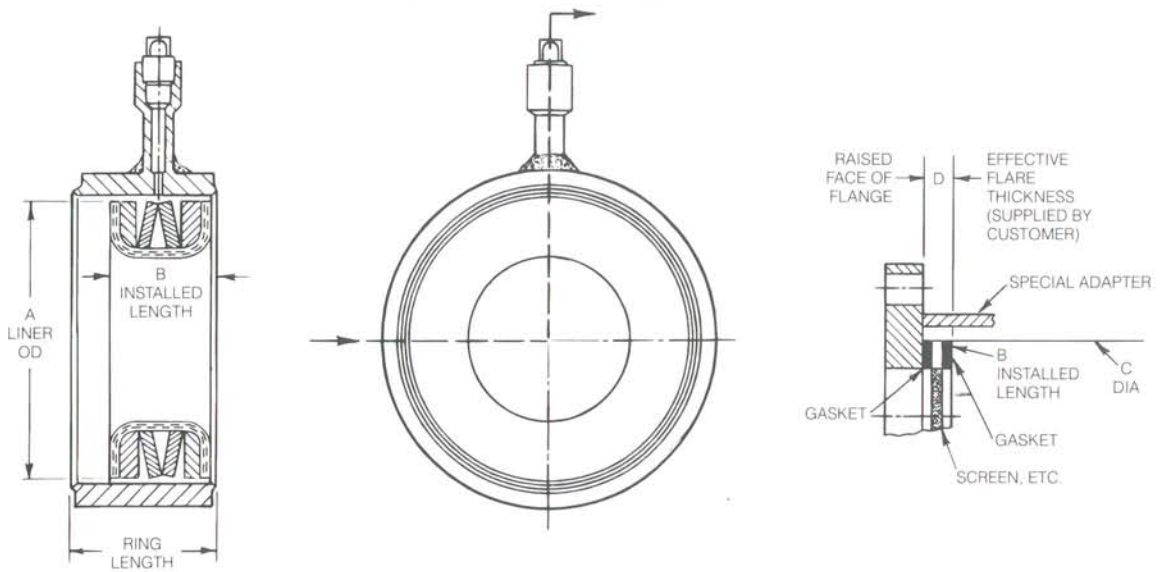
Nominal size
in 16ths of an inch
(016 = 1" pipe)

Effective flare thickness
of mating system

1st digit = inches, next 3 digits =
fractions of an inch in decimals
(example: 1250 = 1¼ 0500 = ½)

Part #	Nominal size (inches)	A	B	C dia.	Max. allowable customer flare OD
T572S016 - XXXX	1	.528		1.936	2 ⁷ / ₈
T572S024 - XXXX	1½	.612	Effective Flare	2.749	3
T572S032 - XXXX	2	.547	Thickness (see sketch)	3.499	3¾
T572S048 - XXXX	3	.616		4.686	5 ¹ / ₈
T572S064 - XXXX	4	.726		6.055	6 ⁵ / ₁₆

Special Adapter



T575 – XXX – XXX Adapters allow for mating HIF systems to flat-faced flanged components having permanent gasket faces. The gasket OD must not exceed the maximum allowable customer diameter. The length of the adapter is determined from the “effective flare thickness”.

RING LENGTH CALCULATION FORMULA

$$\text{Ring length} = A + B$$

Load bearing ring length Effective flare thickness (supplied by customer)
 See example of part number (round to nearest .005")

Example of Part Number

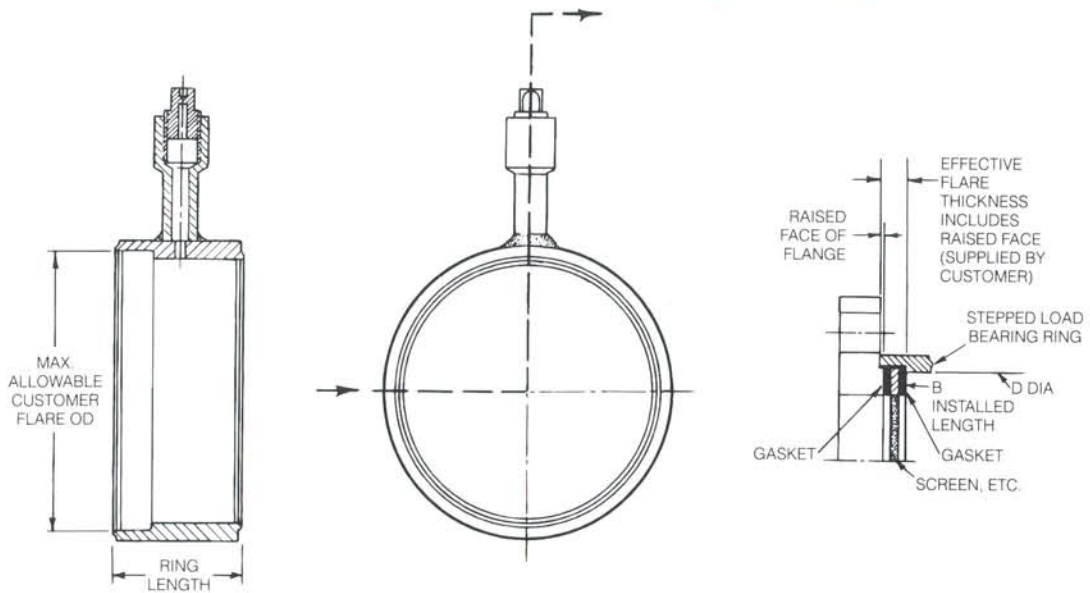
T575°—°XXX —XXXX

Base # _____ Effective flare thickness of mating system
 Nominal size _____
 in 16ths of an inch (016 = 1" pipe)
 1st digit = inches, next 3 digits = fractions of an inch in decimals (example: 1250 = 1¼ 0500 = ½)

Part #	Nominal size (inches)	A	B	Max. allowable customer flare dia.
T575 - 016 - XXXX	1	0.919		1.906
T575 - 024 - XXXX	1½	1.064	Effective flare thickness (see sketch)	2.719
T575 - 032 - XXXX	2	1.212		3.469
T575 - 048 - XXXX	3	1.372		4.656
T575 - 064 - XXXX	4	1.592		6.025

HIF
 COMPONENTS
 ACCOMMODATE
 SPECIAL
 APPLICATIONS

Stepped Load Bearing Ring



To mate HIF systems to components having a raised face flange or gaskets, screens or other inline devices which exceed the "C" diameter, a stepped load bearing ring, P/N T572S XXX – XXXX must be used

RING LENGTH CALCULATION FORMULA

$$\text{Ring length} = A + B$$

Load bearing ring length _____

Effective flare thickness
(supplied by customer)
See example of part number
(round to nearest .005")

Example of Part Number

T572SXXX —XXXX

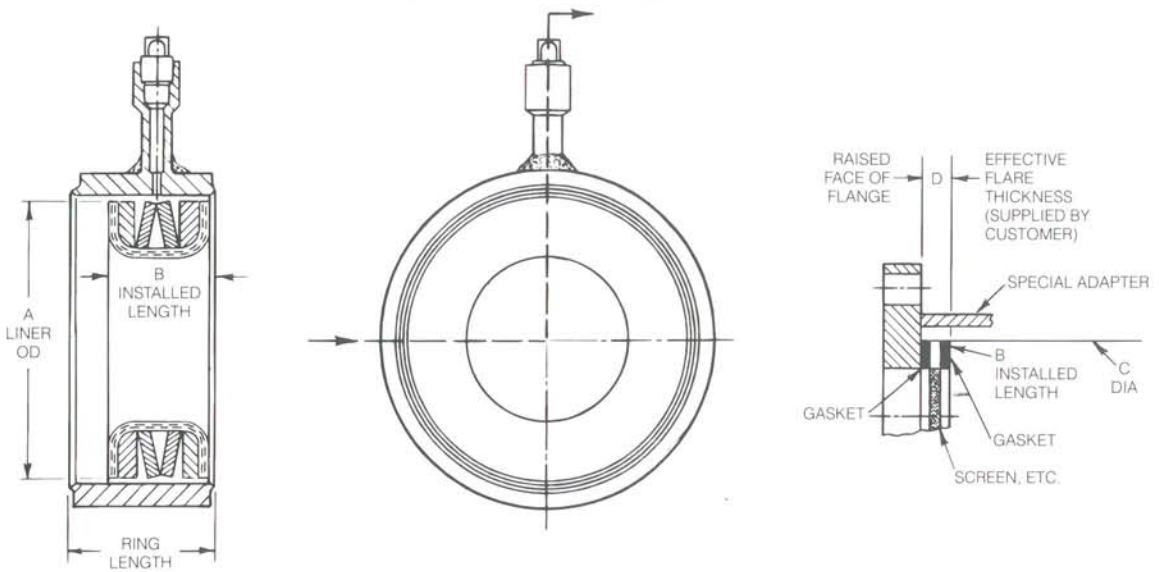
Base # _____

Nominal size _____
in 16ths of an inch
(016 = 1" pipe)

Effective flare thickness
of mating system
1st digit = inches, next 3 digits =
fractions of an inch in decimals
(example: 1250 = 1¼ 0500 = ½)

Part #	Nominal size (inches)	A	B	C dia.	Max. allowable customer flare OD
T572S016 - XXXX	1	.528		1.936	2⅞
T572S024 - XXXX	1½	.612	Effective Flare	2.749	3
T572S032 - XXXX	2	.547	Thickness	3.499	3¾
T572S048 - XXXX	3	.616	(see sketch)	4.686	5⅞
T572S064 - XXXX	4	.726		6.055	6⅝

Special Adapter



T575-XXX-XXX Adapters allow for mating HIF systems to flat-faced flanged components having permanent gasket faces. The gasket OD must not exceed the maximum allowable customer diameter. The length of the adapter is determined from the "effective flare thickness".

RING LENGTH CALCULATION FORMULA

Ring length = A + B

Load bearing ring length Effective flare thickness (supplied by customer)

See example of part number (round to nearest .005")

Example of Part Number

T575°-°XXX -XXXX

Base # _____ Effective flare thickness of mating system

Nominal size _____ 1st digit = inches, next 3 digits = fractions of an inch in decimals (example: 1250 = 1/4 0500 = 1/2)

in 16ths of an inch (016 = 1" pipe)

Part #	Nominal size (inches)	A	B	Max. allowable customer flare dia.
T575 - 016 - XXXX	1	0.919		1.906
T575 - 024 - XXXX	1½	1.064	Effective flare thickness (see sketch)	2.719
T575 - 032 - XXXX	2	1.212		3.469
T575 - 048 - XXXX	3	1.372		4.656
T575 - 064 - XXXX	4	1.592		6.025

**HIF
COMPONENTS
ACCOMMODATE
SPECIAL
APPLICATIONS**

Temperature Conversions

- 460° to 0°			1° to 60°			61° to 290°			300° to 890°			900° to 3000°		
C	F/C	F	C	F/C	F	C	F/C	F	C	F/C	F	C	F/C	F
-273	-460		-17.2	1	33.8	16.1	61	141.8	149	300	572	482	900	1652
-268	-450		-16.7	2	35.6	16.7	62	143.6	154	310	590	488	910	1670
-262	-440		-16.1	3	37.4	17.2	63	145.4	160	320	608	493	920	1688
-257	-430		-15.6	4	39.2	17.8	64	147.2	166	330	626	499	930	1706
-251	-420		-15.0	5	41.0	18.3	65	149.0	171	340	644	504	940	1724
-246	-410		-14.4	6	42.8	18.9	66	150.8	177	350	662	510	950	1742
-240	-400		-13.9	7	44.6	19.4	67	152.6	182	360	680	516	960	1760
-234	-390		-13.3	8	46.4	20.0	68	154.4	188	370	698	521	970	1778
-229	-380		-12.8	9	48.2	20.6	69	156.2	193	380	716	527	980	1796
-223	-370		-12.2	10	50.0	21.1	70	158.0	199	390	734	532	990	1814
-218	-360		-11.7	11	51.8	21.7	71	159.8	204	400	752	538	1000	1832
-212	-350		-11.1	12	53.6	22.2	72	161.6	210	410	770	549	1020	1868
-207	-340		-10.6	13	55.4	22.8	73	163.4	216	420	788	560	1040	1904
-201	-330		-10.0	14	57.2	23.3	74	165.2	221	430	806	571	1060	1940
-196	-320		-9.4	15	59.0	23.9	75	167.0	227	440	824	582	1080	1976
-190	-310		-8.9	16	60.8	24.4	76	168.8	232	450	842	593	1100	2012
-184	-300		-8.3	17	62.6	25.0	77	170.6	238	460	860	604	1120	2048
-179	-290		-7.8	18	64.4	25.6	78	172.4	243	470	878	616	1140	2084
-173	-280		-7.2	19	66.2	26.1	79	174.2	249	480	896	627	1160	2120
-169	-273	-460	-6.7	20	68.0	26.7	80	176.0	254	490	914	638	1180	2156
-168	-270	-454	-6.1	21	69.8	27.2	81	177.8	260	500	932	649	1200	2192
-162	-260	-436	-5.6	22	71.6	27.8	82	179.6	266	510	950	660	1220	2228
-157	-250	-418	-5.0	23	73.4	28.3	83	181.4	271	520	968	671	1240	2264
-151	-240	-400	-4.4	24	75.2	28.9	84	183.2	277	530	986	682	1260	2300
-146	-230	-382	-3.9	25	77.0	29.4	85	185.0	282	540	1004	693	1280	2336
-140	-220	-364	-3.3	26	78.8	30.0	86	186.8	288	550	1022	704	1300	2372
-134	-210	-346	-2.8	27	80.6	30.6	87	188.6	293	560	1040	732	1350	2462
-129	-200	-328	-2.2	28	82.4	31.1	88	190.4	299	570	1058	760	1400	2552
-123	-190	-310	-1.7	29	84.2	31.7	89	192.2	304	580	1076	788	1450	2642
-118	-180	-292	-1.1	30	86.0	32.2	90	194.0	310	590	1094	816	1500	2732
-112	-170	-274	-0.6	31	87.8	32.8	91	195.8	316	600	1112	843	1550	2822
-107	-160	-256	0.0	32	89.6	33.3	92	197.6	321	610	1130	871	1600	2912
-101	-150	-238	0.6	33	91.4	33.9	93	199.4	327	620	1148	899	1650	3002
-96	-140	-220	1.1	34	93.2	34.4	94	201.2	332	630	1166	927	1700	3092
-90	-130	-202	1.7	35	95.0	35.0	95	203.0	338	640	1184	954	1750	3182
-84	-120	-184	2.2	36	96.8	35.6	96	204.8	343	650	1202	982	1800	3272
-79	-110	-166	2.8	37	98.6	36.1	97	206.6	349	660	1220	1010	1850	3362
-73	-100	-148	3.3	38	100.4	36.7	98	208.4	354	670	1238	1038	1900	3452
-68	-90	-130	3.9	39	102.2	37.2	99	210.2	360	680	1256	1066	1950	3542
-62	-80	-112	4.4	40	104.0	37.8	100	212.0	366	690	1274	1093	2000	3632
-57	-70	-94	5.0	41	105.8	43	110	230	371	700	1292	1121	2050	3722
-51	-60	-76	5.6	42	107.6	49	120	248	377	710	1310	1149	2100	3812
-46	-50	-58	6.1	43	109.4	54	130	266	382	720	1328	1177	2150	3902
-40	-40	-40	6.7	44	111.2	60	140	284	388	730	1346	1204	2200	3992
-34	-30	-22	7.2	45	113.0	66	150	302	393	740	1364	1232	2250	4082
-29	-20	-4	7.8	46	114.8	71	160	320	399	750	1382	1260	2300	4172
-23	-10	14	8.3	47	116.6	77	170	338	404	760	1400	1288	2350	4262
-17.8	0	32	8.9	48	118.4	82	180	356	410	770	1418	1316	2400	4352
			9.4	49	120.2	88	190	374	416	780	1436	1343	2450	4442
			10.0	50	122.0	93	200	392	421	790	1454	1371	2500	4532
			10.6	51	123.8	99	210	410	427	800	1472	1399	2550	4622
			11.1	52	125.6	100	212	413.6	432	810	1490	1427	2600	4712
			11.7	53	127.4	104	220	428	438	820	1508	1454	2650	4802
			12.2	54	129.2	110	230	446	443	830	1526	1482	2700	4892
			12.8	55	131.0	116	240	464	449	840	1544	1510	2750	4982
			13.3	56	132.8	121	250	482	454	850	1562	1538	2800	5072
			13.9	57	134.6	127	260	500	460	860	1580	1566	2850	5162
			14.4	58	136.4	132	270	518	466	870	1598	1593	2900	5252
			15.0	59	138.2	138	280	536	471	880	1616	1621	2950	5342
			15.6	60	140.0	143	290	554	477	890	1634	1649	3000	5432

Locate temperature in middle column. If degrees Celsius, read Fahrenheit equivalent in right column; if degrees Fahrenheit, read Celsius equivalent in left hand column.

Definitions

Active end	The end of an HIF pipe spool incorporating Belleville washer(s) and force distribution ring
Adapter	A PTFE lined HIF component containing Belleville washers and force distribution rings used to connect passive ends to passive ends
Anti-seize Lubricant	A high temperature lubricant applied to bolts and studs prior to torquing
Belleville Washer	Coned disc springs manufactured from SAE 6150 steel, austempered to RC 42-48
Dual Load Path	Independent forces extended on (1) PTFE flare faces through Belleville washers and (2) torque applied to load bearing rings
Factory Mutual Approval	Satisfactory completion of HIF testing performed by the Factory Mutual Research Corporation
Force Distribution Ring	A thick washer manufactured from powder metal F0008-R that distributes linear force equally around the circumference of HIF PTFE flares
HIF	High Integrity Flange
Load Bearing Ring	The HIF component that makes the metal to metal seal between passive and active end HIF pipe spools
Passive End	The end of an HIF pipe spool containing a PTFE flare with thin washer
Primary Seal	The PTFE to PTFE seal, pre-loaded by Belleville washers
Secondary Seal	The metal to metal seal; metal pipe/fitting flares to load bearing ring adapter
Special Adapter	An adapter used for passive end connections, sized to accommodate special customer gasket thickness requirements
Special Load Bearing Ring	A load bearing ring used to mate with non-HIF flat faced flanges, sized to accommodate special customer gasket thickness requirements
Stepped Adapter	An adapter used for passive end connections, sized to accommodate customer gasket diameters greater than standard HIF gasket diameters
Stepped Load Bearing Ring	A load bearing ring used to mate with non HIF raised faced flanges, sized to accommodate customer gasket diameters greater than HIF standard gasket diameters
Vent Coupling	A coupling welded over the vent holes of HIF components, internally threaded to allow the attachment of monitoring devices
Vent plug	A porous metal disc in each vent coupling that allows gas or vapor to escape, and restricts liquid to drops only