

Operation & Maintenance Manual



Grooved Fittings

Description:

The SHIELD Grooved System provides an economical and efficient piping system solution and offers significant benefits when compared to conventional types of pipe connections including:

- Faster Installation
- Because there is no need for welding or heating, the SHIELD System ensures a safer and reliable working environment
- Ensures easy alignment
- Reduces noise and vibration
- Easy to install and remove in case of any maintenance requirements

SHIELD Grooved Systems

Wide range of coupling and fittings for piping applications in Air Conditioning, Fire Fighting Systems and water pipelines etc.

SHIELD Grooved Systems offer 3 types of couplings:

- High Pressure Couplings (Flexible)
- Medium Pressure Couplings (Rigid, Flexible)
- Light Pressure Couplings (Rigid, Flexible)

Material

SHIELD Grooved Coupling housing and other grooved fittings are cast from Ductile Iron to ASTM A536 Grade 65-45-12 in red paint or hot dipped galvanized, bolts are carbon steel to ISO 898-1 class 8.8 heat treated, hot dipped galvanized nuts and bolt can also be supplied upon request.



Gasket (C shaped)

Shield Grooved Coupling are available in various types of gasket.

Coupling with EPDM rubber gasket are widely used around the world and it conforms to ASTM D2000-1, Grade A.

It is important to use the gasket that suits your application, use the table below to select the optimum gasket.

Material	Temperature Range	Colour	General Recommended Application
EPDM	-34°C to +110°C	Green Strip	Hot water service, variety of diluted acid, oil free air, chemical. <i>This is NOT recommended for Petroleum services.</i>
Nitrile	-29°C to +82°C	Orange Strip	Petroleum products, vegetable and mineral oils, air with oil vapours.
Silicone	-34°C to +177°C	Red Gasket	<i>This is NOT recommended for hot water, +66°C or for hot dry air over +60°C.</i> Dry heat and air without hydrocarbons up to +177°C and certain chemicals.

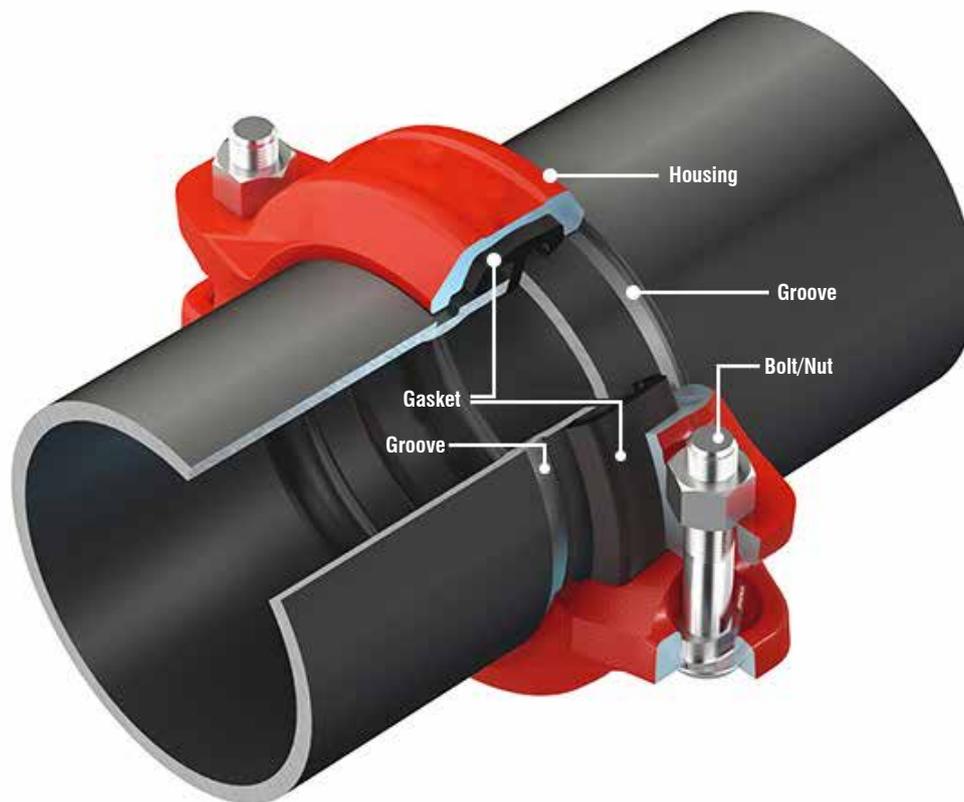
SHIELD Grooved Coupling EPDM Gaskets must be lubricated on the lips and outside back prior to assembly using silicon based non-petroleum lubricant. For more details about lubricant for other types of gasket, please contact us.

Grooved Fittings

Mechanical Jointing of Grooved Fitting:

A grooved mechanical pipe joint consists of four elements: grooved-end pipe, a gasket, coupling housing, and fasteners. The pipe groove is made by cold forming or machining a groove into the end of a pipe. A gasket enclosed in the coupling housing is placed around two adjoining grooved pipe ends, and the key section of the housing engages the grooves. The bolts and nuts are tightened with a socket wrench, or impact wrench, holding the housing segments together.

In the installed state, the coupling housing encases the gasket and engages the grooves around the circumference of the pipe to create a leak-tight seal in a self-restrained pipe joint. In addition to pipe-to-pipe joints, grooved couplings can be used to join pipe to grooved-end valves, fittings, and accessories to create a complete piping system.



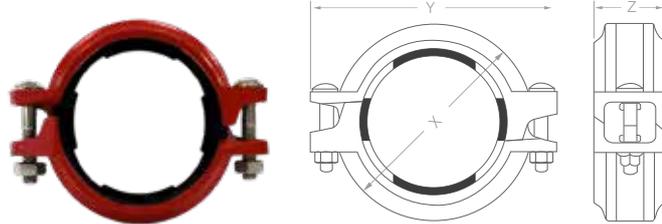
Grooved Fittings



Rigid Quick Coupling:

SDG-18:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			Bolt/Nut No. - Size
			X mm	Y mm	Z mm	
1/4	42.4	300	64.8	108	46.6	2-M10 x 57
1/2	48.3	300	71.8	115	46.6	2-M10 x 57
2	60.3	300	85	125.8	48	2-M10 x 57
2 1/2	73.0	300	97	140	48	2-M10 x 57
3 O.D.	76.1	300	100	140	48	2-M10 x 57
3	88.9	300	112.3	160	48	2-M10 x 63
4	114.3	300	138	194	49.5	2-M12 x 70
5 1/2 O.D.	139.7	300	168.4	226	50	2-M12 x 70
5	141.3	300	170	228	50	2-M12 x 70
6 1/2 O.D.	165.1	300	191	249	51	2-M12 x 82
6	168.3	300	198.3	257	51	2-M12 x 82
8	216.3	300	249.8	320	60.5	2-M16 x 85
8	219.1	300	252.9	323	61	2-M16 x 89



SDG-18
Rigid Quick Coupling

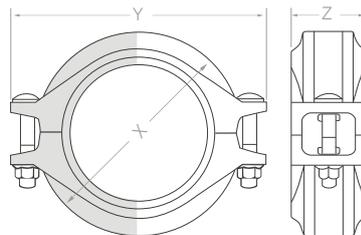


Grooved Fittings

Rigid Coupling - Standard:

SDG-22:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			Bolt/Nut No. - Size
			X	Y	Z	
Inch	mm	psi	mm	mm	mm	mm
1	33.7	500	59	100.0	44	2-3/8 x 55
1¼	42.2	500	66	109.5	45	2-3/8 x 55
1½	48.3	500	72	115.0	45	2-3/8 x 55
2	60.3	500	85	131.0	45	2-3/8 x 55
2½	73.0	500	98	145.0	45	2-3/8 x 55
3 O.D.	76.1	500	101	147.0	45	2-3/8 x 55
3	88.9	500	115	170.0	46	2½ x 70
4	114.3	500	146	200.0	52	2½ x 70
5½ O.D.	139.7	500	170	238.0	52	2-5/8 x 85
5	141.3	500	172	236.5	52	2-5/8 x 85
6½ O.D.	165.1	500	198	266.0	52	2-5/8 x 85
6	168.3	500	202	270.0	52	2-5/8 x 85
8	219.1	450	260	346.0	62	2-3/4 x 115
10	273.0	400	327	420.0	63	2-7/8 x 125
12	323.9	400	378	466.0	63	2-7/8 x 140
14	355.6	300	415	510.0	72	3-7/8 x 140
16	406.4	300	468	575.0	72	3-7/8 x 140
18	457.2	225	508	608.0	78	3-7/8 x 140
20	508.0	225	563	660.0	78	4-7/8 x 140
24	609.6	225	668	772.0	78	4-1 x 140



SDG-22
Rigid Coupling - Standard



“ SHIELD Rigid Coupling provides rigid joints to prevent liner movement of pipe assembly. With a unique ends locked design, SDG22 coupling can be used when the application or design calls for rigid installations. ”

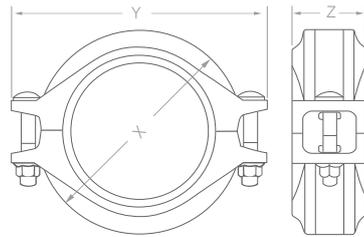
NOTE: Refer to UL/FM certificates for more details.

Grooved Fittings

Rigid Coupling - Light:

SDG-20:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			Bolt/Nut No. - Size
			X	Y	Z	
Inch	mm	psi	mm	mm	mm	mm
3	88.9	350	114	160	45.0	2-3/8 x 55
4	114.3	350	140	192	46.5	2-1/2 x 70
5 1/2 O.D.	139.7	350	168	225	50.0	2-1/2 x 75
5	141.3	350	170	225	50.0	2-1/2 x 75
6 1/2 O.D.	165.1	350	195	250	50.0	2-1/2 x 75
6	168.3	350	200	255	50.0	2-1/2 x 75
8	219.1	350	255	324	58.0	2-3/8 x 85
10	273.0	300	318	410	63.0	2-3/4 x 120



SDG-20
Rigid Coupling - Light



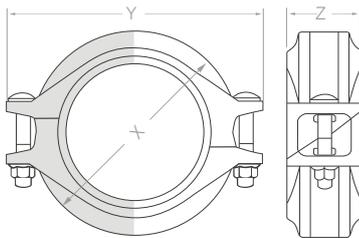
NOTE: Refer to UL/FM certificates for more details.

Grooved Fittings

Angle Pad:

SDG-24:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			Bolt/Nut No. - Size
			X	Y	Z	
Inch	mm	psi	mm	mm	mm	mm
1¼	42.4	500	64	99	46.5	2-¾ x 55
1½	48.3	500	70	105	46.5	2-¾ x 55
2	60.3	500	85	121	46.5	2-¾ x 55
2½	73.0	300	99	134	47.5	2-¾ x 63
3 O.D.	76.1	500	102	137	47.5	2-¾ x 63
3	88.9	500	115	150	47.5	2-¾ x 60
4	114.3	500	142	180	50.0	2-¾ x 65
5½ O.D.	139.7	300	171	214	52.5	2-½ x 75
6½ O.D.	165.1	300	198	242	52.5	2-½ x 75
6	168.3	300	201	245	52.5	2-½ x 75
8	219.1	300	258	331	63.5	2-¾ x 110
10	273.0	300	321	406	64.5	2-¾ x 140



SDG-24
Angle Pad



NOTE: Refer to UL/FM certificates for more details.

SHIELD reserves the right to change the contents without notice.

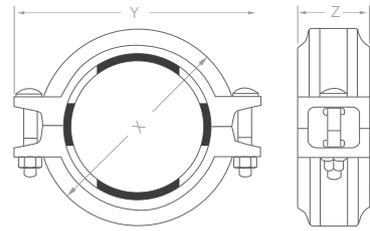
Grooved Fittings



Flexible Quick Coupling:

SDG-19:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			Bolt/Nut No. - Size
			X mm	Y mm	Z mm	
1/4	42.4	300	64.8	108	47.1	2-M10 x 57
1/2	48.3	300	71.8	115	47.1	2-M10 x 57
2	60.3	300	85	125.8	48.5	2-M10 x 57
2 1/2	73.0	300	97	140	48.5	2-M10 x 57
3 O.D.	76.1	300	100	140	48.5	2-M10 x 57
3	88.9	300	112.3	160	48.5	2-M10 x 63
4	114.3	300	138	194	50	2-M12 x 70
5 1/2 O.D.	139.7	300	168.4	226	50.5	2-M12 x 70
5	141.3	300	170	228	50.5	2-M12 x 70
6 1/2 O.D.	165.1	300	191	249	51.5	2-M12 x 82
6	168.3	300	198.3	257	51	2-M12 x 82
8	216.3	300	249.8	320	61	2-M16 x 85
8	219.1	300	252.9	323	61	2-M16 x 89



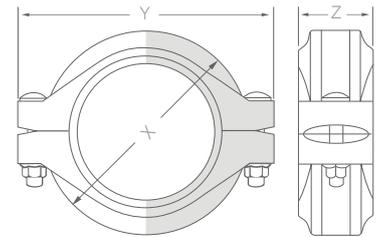
SDG-19
Flexible Quick Coupling

Grooved Fittings

Flexible Coupling - Heavy Duty:

SDG-27:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			Bolt/Nut No. - Size
			X	Y	Z	
Inch	mm	psi	mm	mm	mm	mm
2	60.3	750	90	134	45	2-1/2 x 75
2½	73.0	750	100	150	45	2-1/2 x 75
3 O.D.	76.1	750	102	154	45	2-1/2 x 75
3	88.9	750	121	172	45	2-1/2 x 75
4	114.3	750	151	214	50	2-5/8 x 85
5	141.3	750	180	248	51	2-3/4 x 115
6½ O.D.	165.1	750	205	278	51	2-3/4 x 115
6	168.3	750	208	284	51	2-3/4 x 115
8	219.1	750	268	354	61	2-7/8 x 140



SDG-27
Flexible Coupling - Heavy Duty

“ SHIELD Flexible Coupling SDG-27 is a high pressure flexible coupling can be used in different applications where high pressure service is required. ”

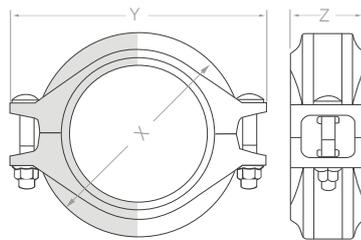
NOTE: Refer to UL/FM certificates for more details.

Grooved Fittings

Flexible Coupling - Standard:

SDG-25:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			Bolt/Nut No. - Size
			X	Y	Z	
Inch	mm	psi	mm	mm	mm	mm
1	33.7	500	55	92	42	2-3/8 x 55
1¼	42.2	500	65	104	44	2-3/8 x 55
1½	48.3	500	70	110	44	2-3/8 x 55
2	60.3	500	83	125	44	2-3/8 x 55
2½	73.0	500	96	143	45	2-3/8 x 55
3 O.D.	76.1	500	100	145	45	2-3/8 x 55
3	88.9	500	115	160	45	2-1/2 x 70
4	114.3	500	145	198	50	2-1/2 x 70
5½ O.D.	139.7	500	169	230	52	2-5/8 x 80
5	141.3	500	170	232	51	2-5/8 x 80
6½ O.D.	165.1	500	196	260	52	2-5/8 x 85
6	168.3	500	200	265	52	2-5/8 x 85
8	219.1	450	258	342	60	2-3/4 x 115
10	273.0	300	337	406	65	2-7/8 x 140
12	323.9	300	378	465	65	2-7/8 x 140
14	355.6	300	402	493	72	3-7/8 x 140
16	406.4	300	458	547	72	3-7/8 x 140
18	426.0	300	505	598	78	3-7/8 x 140
20	529.0	300	550	648	78	4-7/8 x 140
24	609.6	300	662	774	78	4-1 x 140



SDG-25
Flexible Coupling - Standard



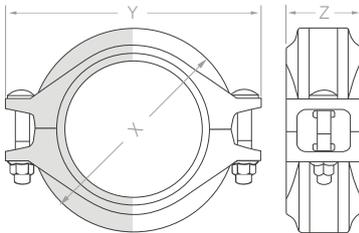
“
SHIELD Flexible Couplings allow controlled angular movement of the pipe to assist alignment and installation. The advantage of flexibility must be considered in the design or hanger and support spacing.
 ”

Grooved Fittings

Flexible Coupling - Light:

SDG-21:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			Bolt/Nut No. - Size
			X	Y	Z	
Inch	mm	psi	mm	mm	mm	mm
4	114.3	300	139	182	50	2-3/8 x 58
5½ O.D.	139.7	450	168	228	51	2-5/8 x 80
6½ O.D.	165.1	300	192	244	51	2-½ x 75
6	168.3	300	200	266	52	2-5/8 x 85
10	273.0	300	320	398	64	2-¾ x 120



SDG-21
Flexible Coupling - Light



“
SHIELD SDG-21 is designed for a maximum working pressure of 300psi. The flexibility benefits of this coupling can be used in applications where high pressure is not required.
”

NOTE: Refer to UL/FM certificates for more details.

SHIELD reserves the right to change the contents without notice.

Installation Instruction

Coupling (Rigid & Flexible):



Pipe Preparation

- ▶ Check pipe end for proper groove dimensions and to assure that pipe end is free of indentations and projections that would prevent proper sealing.



Lubricate Gasket

- ▶ Check gasket to be sure it's compatible for the intended service.
- ▶ Apply thin lubricant to the outside and sealing lips of the gasket.



Gasket Installation

- ▶ Slip the gasket over one pipe, making sure the gasket lip does not over-hang the pipe end.



Alignment

- ▶ After aligning two pipe ends together, pull the gasket into position, centring between the grooves on each pipe.
- ▶ The gasket should not extend into the groove on either pipe.



Housing Installation

- ▶ Remove one bolt & nut and loosen the other nut. Place one housing over the gasket, making sure the housing keys fit into the pipe grooves.
- ▶ Swing the other housing over the gasket and into the grooves on both pipes.
- ▶ Re-insert the bolt and connect two housings.



Tighten Nuts

- ▶ Firstly hand tighten nuts and make sure oval neck bolt completely fits into bolt hole.
- ▶ Then securely tighten nuts alternatively and equally to the specified bolt torque by using spanner.

Installation Instruction

Coupling (Rigid & Flexible):



Assembly Completed - Rigid Coupling

- ▶ For Rigid Coupling, keep the gaps at bolt pads evenly spaced. Gaskets can't be seen visually.



Assembly Completed - Flexible Coupling

- ▶ For Flexible Coupling, two housings should be iron to iron connected. Gaskets can't be seen visually.

Specified Bolt Torque:

ANSI Bolts

Bolt Size	Dimensions	
	Inch	Lbs/ft.
3/8	30/45	40-60
1/2	80/100	110-135
5/8	100/130	135-175
3/4	130/180	175-245
7/8	180/240	245-325

CAUTION

- ▶ Proper torquing of bolts is required to obtain specified performance.
- ▶ Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation.
- ▶ Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

NOTE: Refer to UL/FM certificates for more details.

Installation Instruction

Angle Pad:



Pipe Preparation

- ▶ Check pipe end for proper groove dimensions and to assure that pipe end is free of indentations and projections that would prevent proper sealing.



Lubricate Gasket

- ▶ Check gasket to be sure it's compatible for the intended service.
- ▶ Apply thin lubricant to the outside and sealing lips of the gasket.



Gasket Installation

- ▶ Slip the gasket over one pipe, making sure the gasket lip does not over-hang the pipe end.



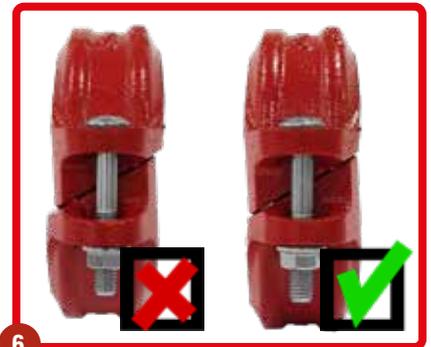
Alignment

- ▶ Bring together and align the two pipe ends to be joined. Ensure proper alignment and slide the gasket into position, properly centring it between the grooved portions of each pipe.. No part of the gasket should protrude into the groove of either pipe.



Insert Bolts and Nuts

- ▶ Insert the bolts and nuts and tighten the nuts evenly by alternating sides until metal-to metal contact to ensure a better joint.



Contact

- ▶ Firstly hand tighten nuts and make sure oval neck bolt completely fits into bolt hole.
- ▶ Then securely tighten nuts alternatively and equally to the specified bolt torque by using spanner.

Note:

- ▶ It is important to keep hands away from coupling openings during tightening.
- ▶ No partially assembling for coupling is allowed which might cause drop hazards.
- ▶ Visual inspection of each joint is critical. Improperly assembled joints must be correct. Tighten the nuts by another one quarter to one half turn to make sure the bolts and nuts are snug and secure.
- ▶ Never exceed torque. Excessive tightening of nuts may cause a bolt or joint failure.
- ▶ Refer to UL/FM certificates for more details.

Installation Instruction

Quick Coupling (Rigid & Flexible):



Pipe Preparation

- ▶ The pipe's outside surface must be clean and smooth from the pipe end to the groove, free of burrs, no sinking or protrusions (including welds), no peeling paint and rolling impressions, etc. It must be verified before installation to assure that there are no defects that would compromise the rubber gasket's potential to seal.



Rubber Gasket Preparation

- ▶ The rubber gasket must be examined to ensure that it is suitable for the working condition.



Installation Joint One Side

- ▶ Push the grooved pipe or component into the couplings, then insert the grooved end into the pipe clamp and make sure it meets the sealing gasket's center positioning rib. (No need to remove Bolts and nuts)



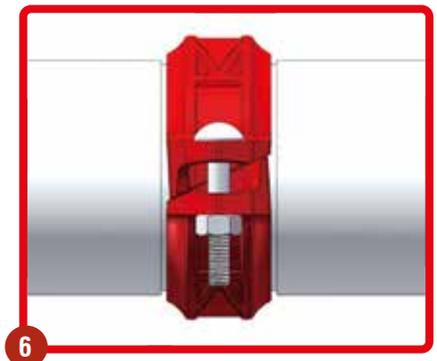
Installation Joint another Side

- ▶ Insert another pipe end or component from the opposite end until it reaches the sealing gasket's center positioning rib. To ensure that all sides of the couplings are aligned with the grooves on the connecting pieces, a visual inspection is required. The coupling can be rotated to ensure that the sealing gasket is properly seated.



Tighten Nuts

- ▶ Manually tighten the nuts first. Then use a torque wrench, tighten the nuts at both ends of the couplings in turns until the rated bolt torque is obtained and the oval necks of the two bolts are entirely seated in the bolt holes.



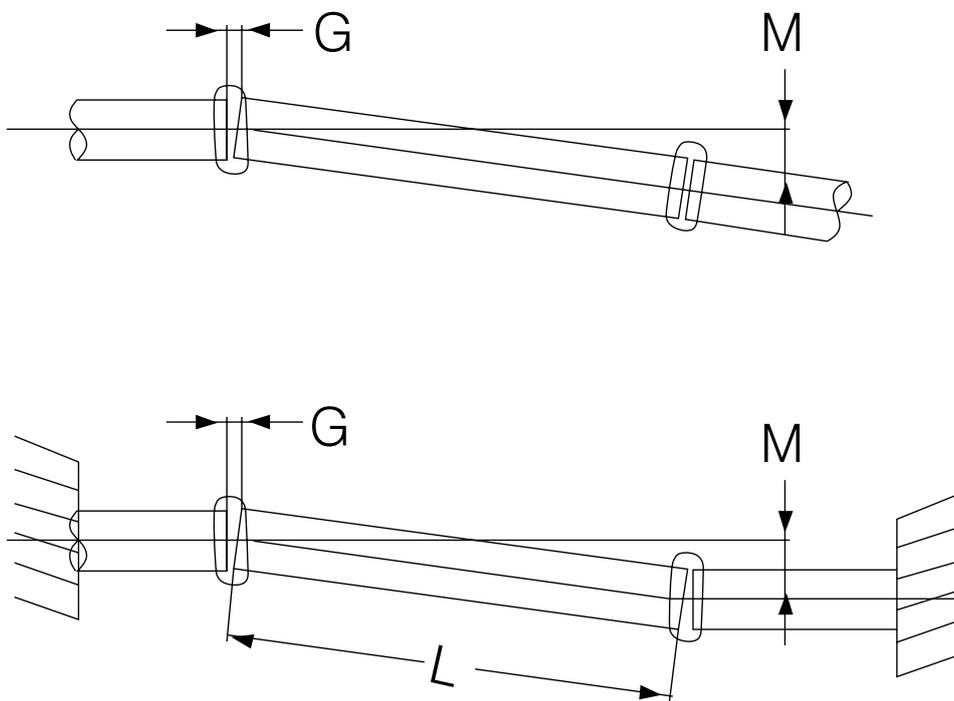
Installation Completed

- ▶ Inspect the joints of the pipes to ensure that both sides of the couplings are completely stuck in the pipe grooves, there is no gap on both sides of the joints of the two couplings, and no squeezing situation of rubber gasket.

Misalignment & Deflections

The angular movement capability of the flexible coupling permits the assembly of pipe joints where the piping is not properly aligned. At least two couplings are required to provide for lateral pipe misalignment. Deflection (longitudinal misalignment) may be accommodated within a single coupling as long as the angle of deflection does not exceed the value shown in the coupling performance data for the particular size and coupling type.

A pipe joint that utilizes the angular deflection capability of the coupling will react to pressure and thermal forces dependent upon the manner in which it is restrained. An unrestrained joint will react to these forces by straightening, thus reducing, if not eliminating, the deflection at the joint. If joint deflection has been designed into the pipe layout and must be maintained, then sufficient anchors must be provided to resist the lateral forces and hold the joint in the deflected condition.



The amount of deflection from pipe run centreline can be calculated utilizing the following equations:

$$M=L \text{ Sin } \Theta$$

$$\Theta = \text{Sin}^{-1} (G \div D)$$

$$M= (G \div D) \times L$$

Where:

M = Misalignment (inches)

G = Maximum Allowable Pipe End Movement (Inches)

Θ = Maximum Deflection (Degrees) from centreline

D = Pipe Outside Diameter (Inches)

L = Pipe Length (Inches)

Anchoring & Support

When designing the hangers, supports and anchors for a grooved end pipe system, the piping designer must consider certain unique characteristics of the grooved type coupling in addition to many universal pipe hanger and support design factors. As with any pipe system, the hanger or support system must provide for

- 1) the weight of the pipe, couplings, fluid and pipe system components;
- 2) reduce stresses at pipe joints; and
- 3) permit required pipe system movement to relieve stress.

The following chart shows the maximum span between pipe hangers, supports and anchors.

Max. Span between Supports (steel pipe)

Nominal Size mm	Maximum Span Between Supports	
	Insulating Pipe mm	Non-Insulating Pipe mm
15	2.5	2.0
20	3.0	2.5
25	3.5	2.5
35	4.0	2.5
40	4.5	3.0
50	5.0	3.0
70	6.0	4.0
80	6.0	4.0
100	6.5	4.5
125	7.0	6.0
150	8.0	7.0
200	9.5	7.0
250	11.0	8.0
300	12.0	8.5

Curve Layout

Utilizing the angular deflection at each coupling joint curves may be laid out using straight pipe lengths and Couplings.

This example shows how to calculate the curve radius, required pipe lengths, and number of required couplings.

$$R = L / (2 \times \sin(\Theta/2))$$

$$L = 2 \times R \times \sin(\Theta/2)$$

$$N = T / \Theta$$

WHERE:

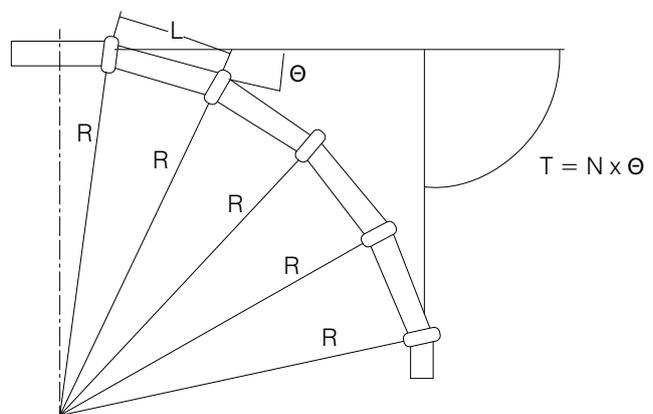
N = Number of Couplings

R = Radius of Curve (feet)

L = Pipe Length (feet)

Θ = Deflection from centreline (Degrees) of each Coupling

T = Total Angular Deflection of all Couplings.



Movements

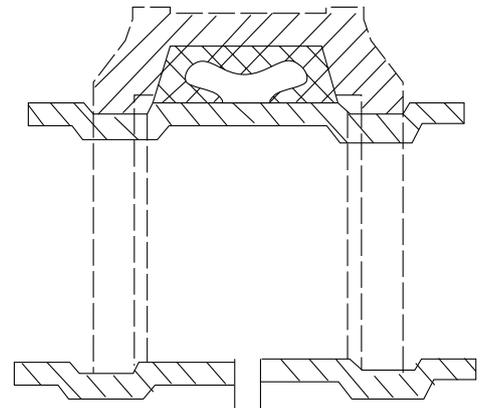
Each flexible design coupling can provide for pipe system movement up to the design maximum for the specific size and type coupling being utilized. Movement is possible in the coupling due to two factors:

- (1) designed-in clearance between the key of the coupling and the groove diameter and groove width, and
- (2) the gap between pipe ends joined by the coupling.

Linear Movement

Linear movement is accommodated within the coupling by allowing the pipe ends to move together or apart in response to pressure thrusts and temperature changes. The available linear movement provided by couplings is shown below:

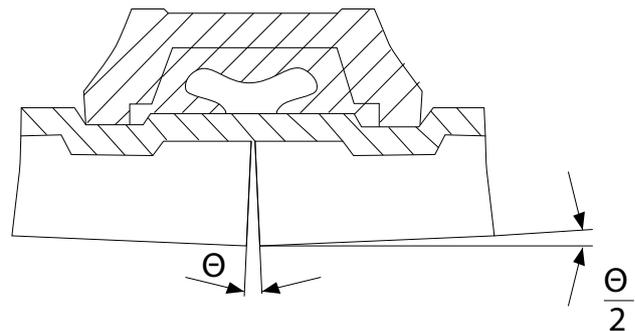
Size		Movement (Cut)	Movement (Roll)
Inch	mm	mm	mm
1 - 1¼	25 - 32	0 - 4.0	0 - 3.0
1½ - 12	40 - 300	0 - 6.4	0 - 5.0



Angular Movement

Designed-in clearances allow limited deflection of the pipe joint within the coupling, without introducing eccentric loads into the coupling joint.

The maximum available angular movement of coupling joints is shown in the performance data for each coupling type. The amount of angular flexibility varies for each coupling size and type. For design purposes the published figures should be reduced by the below listed factors to account for pipe, groove and coupling tolerances.

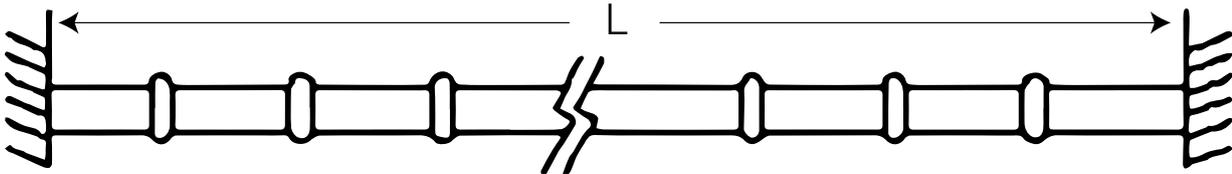


Size	Design Factor
Inch	Inch
1 - 3	Reduce to 50%
4 - 12	Reduce to 75%

Movement Applications

Thermal Stress

Thermal stress is caused by changes in temperature, resulting in either expansion or contraction. When designing a system you must allow for this thermal movement. To determine the appropriate number of flexible couplings to allow for this thermal movement please refer to the following.



Example:

- 4" straight steel pipe, 30m long
- Anchored on both ends
- Minimum temperature (during installation) = 5°C
- Maximum working temperature = 55°C

From the thermal expansion table, we know the overall pipeline length will increase by 18mm (0.71"). You can also use Formula 1 or Table 3 to find the amount of thermal expansion. We want to know the number of couplings that are required to address this thermal movement problem.

The allowed movement of a 4" flexible coupling is :
 Movement range x Adjustment = Allowed movement
 4.3mm x 75% = 3.2mm

The appropriate number of coupling is:
 Thermal expansion / Allowed movement = Number of couplings
 18mm / 3.2mm = 5.6

Conclusion:

The appropriate number of coupling is 6.

Movement Applications

Thermal Expansion

Temperature Difference (°C)	Pipe Length (m)					
	1	5	10	20	30	40
	Thermal Expansion (mm)					
1	0.012	0.060	0.120	0.240	0.360	0.480
5	0.060	0.300	0.600	1.200	1.800	2.400
10	0.120	0.600	1.200	2.400	3.600	4.800
20	0.240	1.200	2.400	4.800	7.200	9.600
30	0.360	1.800	3.600	7.200	11.000	15.000
40	0.480	2.400	4.800	9.600	14.000	20.000
50	0.600	3.000	6.000	12.000	18.000	24.000
60	0.720	3.600	7.200	14.000	22.000	29.000
70	0.840	4.200	8.400	17.000	25.000	34.000
80	0.960	4.800	9.600	19.000	29.000	39.000

Thermal Expansion Formula 1

$$\lambda = \alpha \times L \times T$$

λ : Thermal Expansion

α : Linear Expansion

Coefficient for steel

L: Pipe length

T: Temperature difference

Allowance for Pipe Movement

Flexible Coupling - SDG-25:

Size		Nominal Pipe Size	Working Pressure	Maximum Movement Allowed					
				Roll Groove			Cut Groove		
				Angular Movement		Linear Movement	Angular Movement		Linear Movement
Inch	mm	mm	Psi	Degree	mm/m	mm	Degree	mm/m	mm
1	33.7	25	500	2°-45'	48	2	2°-45'	48	2
1¼	42.4	32	500	2°-10'	38	2	2°-10'	38	2
1½	48.3	40	500	1°-54'	33	3.2	1°-54'	33	3.2
2	60.3	50	500	1°-31'	26	3.2	1°-31'	26	3.2
2½	73.0	65	500	1°-27'	25	3.2	1°-27'	25	3.2
3 O.D.	76.1	65	500	1°-12'	21	3.2	1°-12'	21	3.2
3	88.9	80	500	1°-02'	18	3.2	1°-02'	18	3.2
4	108	100	500	1°-51'	32	3.2	1°-51'	32	3.2
4	114.3	100	500	1°-36'	28	3.2	1°-36'	28	3.2
5	133	125	500	1°-41'	30	3.2	1°-41'	30	3.2
5½ O.D.	139.7	125	500	1°-19'	23	3.2	1°-19'	23	3.2
5	141.3	125	500	1°-03'	18	3.2	1°-03'	18	3.2
6	159	150	500	1°-18'	23	3.2	1°-18'	23	3.2
6½ O.D.	165.1	150	500	1°-05'	20	3.2	1°-05'	20	3.2
6	168.3	150	500	1°-05'	19	3.2	1°-05'	19	3.2
8	219.1	200	450	0°-50'	15	3.2	0°-50'	15	3.2
10	273	250	450	0°-40'	12	3.2	0°-40'	12	3.2
12	323.9	300	450	0°-34'	10	3.2	0°-34'	10	3.2

Size		Nominal Pipe Size	Working Pressure	Maximum Movement Allowed					
				Roll Groove			Cut Groove		
				Angular Movement		Linear Movement	Angular Movement		Linear Movement
Inch	mm	mm	Psi	Degree	mm/m	mm	Degree	mm/m	mm
1	33.7	25	300	1°-22'	24.0	1.5	2°-45'	48.0	2.0
1¼	42.4	32	300	1°-05'	19.0	1.5	2°-10'	38.0	2.5
1½	48.3	40	300	0°-57'	16.5	2.0	1°-54'	33.0	3.0
2	60.3	50	300	0°-45'	13.0	2.0	1°-31'	26.0	3.0
2½	73.0	65	300	0°-43'	12.5	2.0	1°-27'	25.0	3.0
3 O.D.	76.1	65	300	0°-36'	10.5	2.0	1°-12'	21.0	3.0
3	88.9	80	300	0°-31'	9.0	2.0	1°-02'	18.0	3.0
4	114.3	100	300	0°-48'	14.0	3.0	1°-36'	28.0	4.5
5½ O.D.	139.7	125	300	0°-37'	11.5	3.0	1°-19'	23.0	4.5
5	141.3	125	300	0°-30'	9.0	3.0	1°-03'	18.0	4.5
6½ O.D.	165.1	150	300	0°-35'	10.0	3.0	1°-05'	20.0	4.5
6	168.3	150	300	0°-32'	9.5	3.0	1°-05'	19.0	4.5
8	219.1	200	300	0°-25'	7.5	3.0	0°-50'	15.0	4.5
10	273.0	250	300	0°-20'	6.0	3.5	0°-40'	12.0	5.0
12	323.9	300	300	0°-18'	5.0	3.5	0°-34'	10.0	5.0

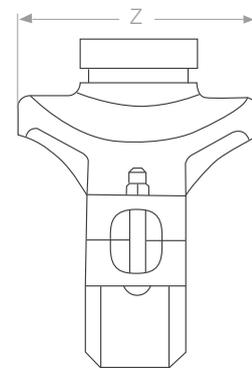
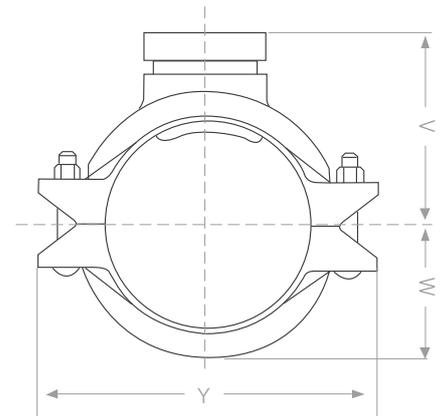


Grooved Fittings

Mechanical Tee - Grooved Outlet:

SDG-44:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Hole Diameter +1.6	Dimensions				Bolt/Nut No - Size
				Y mm	Z mm	V mm	W mm	
Inch	mm	psi	mm					mm
2 x 1¼	60.3 x 42.4	300	45	116.0	76.0	69.5	39.0	¾ x 55
2 x 1½	60.3 x 48.3	300	45	116.0	76.0	69.5	39.0	¾ x 55
2½ x 1	73.0 x 33.7	300	38	137.0	71.0	78.0	49.0	½ x 70
2½ x 1¼	73.0 x 42.2	300	51	137.0	84.5	75.0	49.0	½ x 70
2½ x 1½	73.0 x 48.3	300	51	137.0	84.5	78.0	49.0	½ x 70
3 O.D. x 1	76.1 x 33.7	300	38	137.0	71.0	78.0	49.5	½ x 70
3 O.D. x 1¼	76.1 x 42.4	300	51	137.0	84.5	78.0	49.5	½ x 70
3 O.D. x 1½	76.1 x 48.3	300	51	137.0	84.5	78.0	49.5	½ x 70
3 x 1	88.9 x 33.7	300	38	152.0	72.5	84.5	56.5	½ x 75
3 x 1¼	88.9 x 42.4	300	51	152.0	85.5	84.5	56.5	½ x 75
3 x 1½	88.9 x 48.3	300	51	152.0	85.5	84.5	56.5	½ x 75
3 x 2	88.9 x 60.3	300	64	152.0	98.0	84.5	56.5	½ x 75
4 x 1	114.3 x 33.7	300	38	188.0	78.4	102.0	70.0	½ x 75
4 x 1¼	114.3 x 42.4	300	51	188.0	89.0	102.0	70.0	½ x 75
4 x 1½	114.3 x 48.3	300	51	188.0	89.0	102.0	70.0	½ x 75
4 x 2	114.3 x 60.3	300	64	188.0	104.4	102.0	70.0	½ x 75
4 x 2½	114.3 x 73.0	300	70	188.0	104.4	102.0	70.0	½ x 75
4 x 3 O.D.	114.3 x 76.1	300	70	188.0	104.4	102.0	70.0	½ x 75
4 x 3	114.3 x 88.9	300	89	188.0	128.0	102.0	70.0	½ x 75
5½ O.D. x 1¼	139.7 x 42.4	300	51	221.5	95.0	118.0	84.0	¾ x 85
5½ O.D. x 1½	139.7 x 48.3	300	51	221.5	95.0	118.0	84.0	¾ x 85
5½ O.D. x 2	139.7 x 60.3	300	64	221.5	112.5	118.0	84.0	¾ x 85
5½ O.D. x 3 O.D.	139.7 x 76.1	300	70	221.5	112.5	118.0	84.0	¾ x 85
5½ O.D. x 3	139.7 x 88.9	300	89	221.5	132.0	118.0	84.0	¾ x 85
5½ O.D. x 3	139.7 x 114.3	300	114	221.5	160.0	125.0	84.0	¾ x 85
6½ O.D. x 2	165.1 x 60.3	300	64	244.0	112.5	127.0	97.5	¾ x 105
6½ O.D. x 3 O.D.	165.1 x 76.1	300	244	242.0	112.5	130.0	97.5	¾ x 105
6½ O.D. x 3	165.1 x 88.9	300	89	244.0	132.0	130.0	97.5	¾ x 105
6½ O.D. x 4	165.1 x 114.3	300	114	244.0	154.0	135.0	97.5	¾ x 105
6 x 1½	168.3 x 48.3	300	51	247.0	95.0	128.0	98.5	¾ x 105
6 x 2	168.3 x 60.3	300	64	247.0	114.0	134.0	98.5	¾ x 105
6 x 2½	168.3 x 73.0	300	70	247.0	112.5	135.0	98.5	¾ x 105
6 x 3 O.D.	168.3 x 76.1	300	70	247.0	112.5	135.0	98.5	¾ x 105
6 x 3	168.3 x 88.9	300	89	247.0	132.0	136.5	98.5	¾ x 105
6 x 4	168.3 x 114.3	300	114	247.0	160.0	138.0	98.5	¾ x 105
8 x 2	219.1 x 60.3	300	64	320.0	118.0	158.0	125.0	¾ x 115
8 x 2½	219.1 x 73.0	300	70	320.0	118.0	158.0	125.0	¾ x 115
8 x 3 O.D.	219.1 x 76.1	300	70	320.0	118.0	158.0	125.0	¾ x 115
8 x 3	219.1 x 88.9	300	89	320.0	136.5	161.0	125.0	¾ x 115
8 x 4	219.1 x 114.3	300	114	320.0	162.0	161.0	125.0	¾ x 115
10 x 3 O.D.	273.0 x 76.1	300	70	376.0	118.0	189.0	155.0	¾ x 120
10 x 3	273.0 x 88.9	300	89	376.0	136.5	189.0	155.0	¾ x 120
10 x 4	273.0 x 114.3	300	114	376.0	164.0	189.0	155.0	¾ x 120



SDG-44

Mechanical Tee - Grooved Outlet



NOTE: Refer to UL/FM certificates for more details.

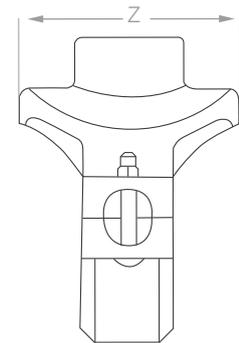
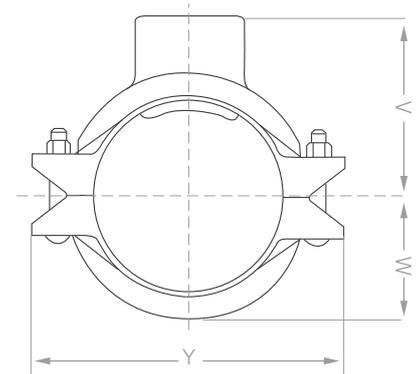
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Grooved Fittings

Mechanical Tee - Threaded Outlet:

SDG-42:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Hole Diameter +1.6	Dimensions				Bolt/Nut No - Size
				Y	Z	V	W	
Inch	mm	psi	mm	mm	mm	mm	mm	mm
1 x 3/8	33.7 x 17.2	300	23.5	86.0	46.0	26.0	24.5	5/16 x 30
1 x 1/2	33.7 x 21.3	300	23.5	86.0	46.0	26.0	24.5	5/16 x 30
1 x 3/4	33.7 x 26.9	300	23.5	86.0	52.0	41.0	24.5	5/16 x 30
1 x 1	33.7 x 33.7	300	23.5	86.0	57.0	45.0	24.5	5/16 x 30
1 1/4 x 3/4	42.4 x 26.9	300	30.0	95.5	53.0	32.0	29.0	3/8 x 35
1 1/4 x 1/2	42.4 x 21.3	300	30.0	95.5	57.0	32.0	29.0	3/8 x 35
1 1/4 x 3/4	42.4 x 26.9	300	30.0	95.5	57.0	44.0	29.0	3/8 x 35
1 1/4 x 1	42.4 x 33.7	300	30.0	95.5	57.0	53.0	29.0	3/8 x 35
1 1/2 x 3/8	48.3 x 17.2	300	30.0	101.5	53.0	34.0	32.5	3/8 x 35
1 1/2 x 1/2	48.3 x 21.3	300	30.0	101.5	57.0	35.5	32.5	3/8 x 35
1 1/2 x 3/4	48.3 x 26.9	300	30.0	101.5	57.0	47.5	32.5	3/8 x 35
1 1/2 x 1	48.3 x 33.7	300	30.0	101.5	57.0	56.0	32.5	3/8 x 35
2 x 3/8	60.3 x 17.2	300	38.0	116.0	68.0	44.0	39.0	3/8 x 55
2 x 1/2	60.3 x 21.3	300	38.0	116.0	68.0	60.0	39.0	3/8 x 55
2 x 3/4	60.3 x 26.9	300	38.0	116.0	68.0	60.0	39.0	3/8 x 55
2 x 1	60.3 x 33.7	300	38.0	116.0	68.0	60.0	39.0	3/8 x 55
2 x 1 1/4	60.3 x 42.2	300	45.0	116.0	76.0	65.0	39.0	3/8 x 55
2 x 1 1/2	60.3 x 48.3	300	45.0	116.0	76.0	65.0	39.0	3/8 x 55
2 1/2 x 1/2	73.0 x 21.3	300	38.0	137.0	71.0	68.0	49.0	1/2 x 70
2 1/2 x 3/4	73.0 x 26.9	300	38.0	137.0	71.0	68.0	49.0	1/2 x 70
2 1/2 x 1	73.0 x 33.7	300	38.0	137.0	71.0	70.0	49.0	1/2 x 70
2 1/2 x 1 1/4	73.0 x 42.4	300	51.0	137.0	84.5	73.0	49.0	1/2 x 70
2 1/2 x 1 1/2	73.0 x 48.3	300	51.0	137.0	84.5	73.0	49.0	1/2 x 70
3 O.D. x 1/2	76.1 x 21.3	300	38.0	137.0	71.0	61.5	49.5	1/2 x 70
3 O.D. x 3/4	76.1 x 26.9	300	38.0	137.0	71.0	68.0	49.5	1/2 x 70
3 O.D. x 1	76.1 x 33.7	300	38.0	137.0	71.0	75.0	49.5	1/2 x 70
3 O.D. x 1 1/4	76.1 x 42.4	300	51.0	137.0	84.5	75.0	49.5	1/2 x 70
3 O.D. x 1 1/2	76.1 x 48.3	300	51.0	137.0	84.5	75.0	49.5	1/2 x 70
3 x 1/2	88.9 x 21.3	300	38.0	152.0	72.5	71.5	56.5	1/2 x 75
3 x 3/4	88.9 x 26.9	300	38.0	152.0	72.5	71.5	56.5	1/2 x 75
3 x 1	88.9 x 33.7	300	38.0	152.0	72.5	80.0	56.5	1/2 x 75
3 x 1 1/4	88.9 x 42.4	300	51.0	152.0	85.5	80.0	56.5	1/2 x 75
3 x 1 1/2	88.9 x 48.3	300	51.0	152.0	85.5	80.0	56.5	1/2 x 75
3 x 2	88.9 x 60.3	300	64.0	152.0	98.0	80.0	56.5	1/2 x 75
4 x 1/2	114.3 x 21.3	300	38.0	188.0	78.5	90.0	70.0	1/2 x 75
4 x 3/4	114.3 x 26.9	300	38.0	188.0	78.5	90.0	70.0	1/2 x 75
4 x 1	114.3 x 33.7	300	38.0	188.0	78.5	93.0	70.0	1/2 x 75
4 x 1 1/4	114.3 x 42.4	300	51.0	188.0	89.0	95.0	70.0	1/2 x 75
4 x 1 1/2	114.3 x 48.3	300	51.0	188.0	89.0	97.0	70.0	1/2 x 75
4 x 2	114.3 x 60.3	300	64.0	188.0	104.5	100.0	70.0	1/2 x 75
4 x 2 1/2	114.3 x 73.0	300	70.0	188.0	104.5	102.0	70.0	1/2 x 75



SDG-42

Mechanical Tee - Threaded

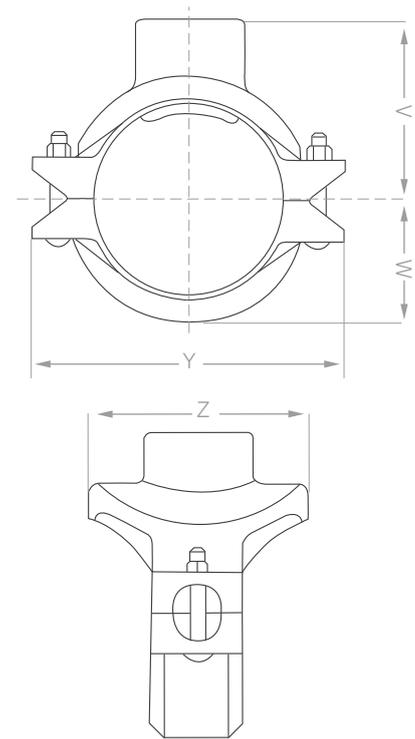
NOTE: Refer to UL/FM certificates for more details.

Grooved Fittings

Mechanical Tee - Threaded Outlet:

SDG-42:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Hole Diameter +1.6	Dimensions				Bolt/Nut No - Size
				Y	Z	V	W	
Inch	mm	psi	mm	mm	mm	mm	mm	mm
4 x 3 O.D.	114.3 x 76.1	300	70.0	178.0	103.5	98.0	67.5	½ x 75
4 x 3	114.3 x 88.9	300	89.0	178.0	124.0	98.0	67.5	½ x 75
5½ O.D. x 1	139.7 x 33.7	300	38.0	210.0	77.0	100	82.0	¾ x 85
5½ O.D. x 1¼	139.7 x 42.4	300	51.0	210.0	91.0	105	82.0	¾ x 85
5½ O.D. x 1½	139.7 x 48.3	300	51.0	210.0	91.0	105	82.0	¾ x 85
5½ O.D. x 2	139.7 x 60.3	300	64.0	210.0	110.0	108	82.0	¾ x 85
5½ O.D. x 3 O.D.	139.7 x 76.1	300	70.0	210.0	110.0	115	82.0	¾ x 85
5½ O.D. x 3	139.7 x 88.9	300	89.0	210.0	130.0	115	82.0	¾ x 85
5½ O.D. x 4	139.7 x 114.3	300	114.0	210.0	153.0	118	82.0	¾ x 85
5 x 1¼	141.3 x 42.4	300	51.0	210.0	91.0	105	82.0	¾ x 85
6½ O.D. x ½	165.1 x 21.3	300	38.0	235.0	77.0	115	94.5	¾ x 105
6½ O.D. x ¾	165.1 x 26.9	300	38.0	235.0	77.0	115	94.5	¾ x 105
6½ O.D. x 1	165.1 x 33.7	300	38.0	235.0	77.0	115	94.5	¾ x 105
6½ O.D. x 1¼	165.1 x 42.4	300	51.0	235.0	92.5	115	94.5	¾ x 105
6½ O.D. x 1½	165.1 x 48.3	300	51.0	235.0	92.5	115	94.5	¾ x 105
6½ O.D. x 2	165.1 x 60.3	300	64.0	235.0	110.0	120	94.5	¾ x 105
6½ O.D. x 3 O.D.	165.1 x 76.1	300	70.0	235.0	110.0	125	94.5	¾ x 105
6½ O.D. x 3	165.1 x 88.9	300	89.0	235.0	130.0	125	94.5	¾ x 105
6½ O.D. x 4	165.1 x 114.3	225	114.0	240.0	155.0	130	94.5	¾ x 105
6 x 1¼	168.3 x 42.4	300	51.0	247.0	95.0	122.0	98.5	¾ x 105
6 x 1½	168.3 x 48.3	300	51.0	247.0	95.0	122.0	98.5	¾ x 105
6 x 2	168.3 x 60.3	300	64.0	247.0	112.5	132.0	98.5	¾ x 105
6 x 2½	168.3 x 73.0	300	70.0	247.0	112.5	132.0	98.5	¾ x 105
6 x 3 O.D.	168.3 x 76.1	300	70.0	247.0	112.5	132.0	98.5	¾ x 105
6 x 3	168.3 x 88.9	300	89.0	247.0	132.0	140.0	98.5	¾ x 105
6 x 4	168.3 x 114.3	300	114.0	247.0	160.0	140.0	98.5	¾ x 105
8 x 1	219.1 x 33.7	300	38.0	320.0	79.5	150.0	125.0	¾ x 115
8 x 1¼	219.1 x 42.4	300	51.0	320.0	98.5	150.0	125.0	¾ x 115
8 x 1½	219.1 x 48.3	300	51.0	320.0	98.5	150.0	125.0	¾ x 115
8 x 2	219.1 x 60.3	300	64.0	320.0	117.0	160.0	125.0	¾ x 115
8 x 2½	219.1 x 73.0	300	70.0	320.0	118.0	160.0	125.0	¾ x 115
8 x 3 O.D.	219.1 x 76.1	300	70.0	320.0	118.0	160.0	125.0	¾ x 115
8 x 3	219.1 x 88.9	300	89.0	320.0	136.5	160.0	125.0	¾ x 115
8 x 4	219.1 x 114.3	300	114.0	320.0	164.0	160.0	125.0	¾ x 115



SDG-42
Mechanical Tee - Threaded

Bolt Size	Recommended Bolt Torque N - m
⅜	40 ~ 60
½	110 ~ 135
⅝	135 ~ 175
¾	175 ~ 245
7/8	245 ~ 325

The mechanical tee and cross features a gap between the bolt pads. Do not attempt to bring bolt pads together, which would result in metal to metal when tightening bolts and nuts. Note that excessive torque may cause joint failure - the following table provides recommended bolt fastening torque.

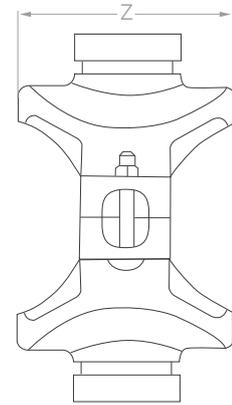
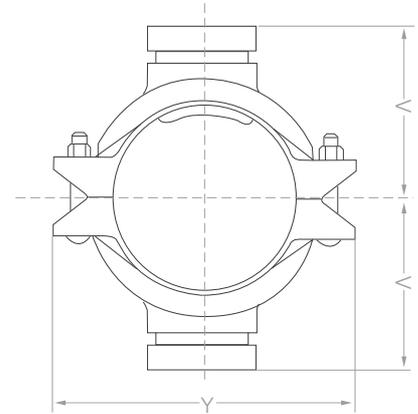
NOTE: Refer to UL/FM certificates for more details.

Grooved Fittings

Mechanical Cross - Grooved:

SDG-49:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Hole Diameter +1.6	Dimensions			Bolt/Nut No - Size
				Y	Z	V	
Inch	mm	psi/Mpa	mm	mm	mm	mm	Inch
2½ x 1¼	73.0 x 42.4	300	51	144.0	84.5	75.0	½ x 70
3 O.D. x 1	76.1 x 33.7	300	38	137.0	71.0	78.0	½ x 70
3 O.D. x 1¼	76.1 x 42.4	300	51	137.0	84.5	78.0	½ x 70
3 x 1	88.9 x 33.7	300	38	152.0	72.5	84.5	½ x 75
3 x 1¼	88.9 x 42.4	300	51	152.0	85.5	84.5	½ x 75
3 x 1½	88.9 x 48.3	300	51	152.0	85.5	84.5	½ x 75
4 x 1	114.3 x 33.7	300	38	188.0	78.4	102.0	½ x 75
4 x 1½	114.3 x 48.3	300	51	188.0	89.0	102.0	½ x 75
4 x 2	114.3 x 60.3	300	64	188.0	104.5	102.0	½ x 75
5½ O.D. x 2	139.7 x 60.3	300	64	221.5	112.5	118.0	⅝ x 85
5½ O.D. x 3 O.D.	139.7 x 76.1	300	70	221.5	112.5	118.0	⅝ x 85
6½ O.D. x 2	165.1 x 60.3	300	64	244.0	112.5	127.0	⅝ x 105
6½ O.D. x 3 O.D.	165.1 x 76.1	300	70	244.0	112.5	127.0	⅝ x 105
6½ O.D. x 3	165.1 x 88.9	300	89	244.0	132.0	141.0	⅝ x 105
6 x 1½	168.3 x 48.3	300	51	247.0	95.0	128.0	⅝ x 105
6 x 2	168.3 x 60.3	300	64	247.0	114.0	134.0	⅝ x 105
6 x 2½	168.3 x 73.0	300	70	247.0	115.0	134.0	⅝ x 105
6 x 3	168.3 x 88.9	300	89	247.0	132.0	141.0	⅝ x 105
8 x 2	219.1 x 60.3	300	64	320.0	118.0	158.0	¾ x 115
8 x 3 O.D.	219.1 x 76.1	300	70	320.0	118.0	158.0	¾ x 115
8 x 3	219.1 x 88.9	300	89	320.0	136.5	161.0	¾ x 115
8 x 4	219.1 x 114.3	300	114	320.0	162.0	161.0	¾ x 115
10 x 3 O.D.	273.0 x 76.1	300	70	376.0	118.0	189.0	¾ x 120
10 x 3	273.0 x 88.9	300	89	376.0	136.5	189.0	¾ x 120
10 x 4	273.0 x 114.3	300	114	376.0	164.0	189.0	¾ x 120



SDG-49

Mechanical Cross - Grooved



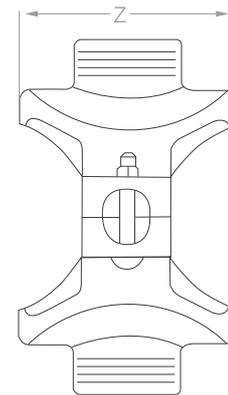
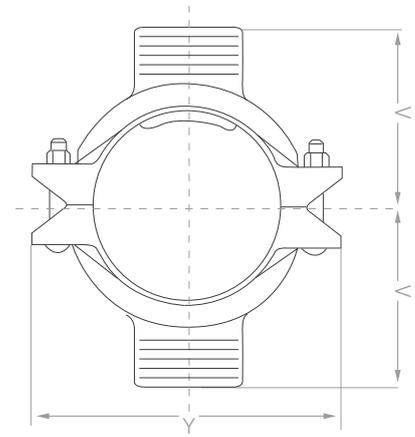
NOTE: Refer to UL/FM certificates for more details.

Grooved Fittings

Mechanical Cross - Threaded:

SDG-47:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Hole Diameter +1.6	Dimensions			Bolt/Nut No - Size
				Y	Z	V	
Inch	mm	psi/Mpa	mm	mm	mm	mm	Inch
3 x 1/2	88.9 x 21.3	300	38	150.0	71.0	78.0	1/2 x 75
3 x 3/4	88.9 x 26.9	300	38	150.0	71.0	78.0	1/2 x 75
3 x 1	88.9 x 33.7	300	38	150.0	71.0	71.0	1/2 x 75
3 x 1 1/4	88.9 x 42.2	300	51	150.0	84.5	74.0	1/2 x 75
3 x 1 1/2	88.9 x 48.3	300	51	150.0	84.5	74.0	1/2 x 75
4 x 1/2	114.3 x 21.3	300	38	178.0	77.5	82.0	1/2 x 75
4 x 3/4	114.3 x 26.9	300	38	178.0	77.5	82.0	1/2 x 75
4 x 1	114.3 x 33.7	300	38	178.0	77.5	82.0	1/2 x 75
4 x 1 1/4	114.3 x 42.2	300	51	178.0	88.0	89.5	1/2 x 75
4 x 1 1/2	114.3 x 48.3	300	51	178.0	88.0	89.5	1/2 x 75
4 x 2	114.3 x 60.3	300	64	178.0	103.5	92.0	1/2 x 75
5 1/2 O.D. x 1	139.7 x 33.7	300	38	210.0	77.0	100	5/8 x 85
5 1/2 O.D. x 1 1/4	139.7 x 42.4	300	51	210.0	91.0	105	5/8 x 85
5 1/2 O.D. x 1 1/2	139.7 x 48.3	300	51	210.0	91.0	105	5/8 x 85
5 1/2 O.D. x 2	139.7 x 60.3	300	64	210.0	110.0	108	5/8 x 85
5 1/2 O.D. x 3 O.D.	139.7 x 76.1	300	70	210.0	110.0	115	5/8 x 85
6 1/2 O.D. x 1/2	165.1 x 21.3	300	38	244	78.0	110	5/8 x 105
6 1/2 O.D. x 3/4	165.1 x 26.9	300	38	244	78.0	110	5/8 x 105
6 1/2 O.D. x 1	165.1 x 33.7	300	38	244	78.0	118	5/8 x 105
6 1/2 O.D. x 1 1/4	165.1 x 42.4	300	51	244	93.0	118	5/8 x 105
6 1/2 O.D. x 1 1/2	165.1 x 48.3	300	51	244	93.0	118	5/8 x 105
6 1/2 O.D. x 2	165.1 x 60.3	300	64	244	112.5	128.5	5/8 x 105
6 1/2 O.D. x 3 O.D.	165.1 x 76.1	300	70	244	112.5	128.5	5/8 x 105
6 x 2	168.3 x 60.3	300	64	246	114.0	135	5/8 x 105
6 x 2 1/2	168.3 x 73.0	300	70	246	115.0	134	5/8 x 105
6 x 3	165.1 x 88.9	300	89	244	132.0	128.5	5/8 x 105
6 x 1 1/4	168.3 x 42.4	300	51	247	95.0	130	5/8 x 105
6 x 1 1/2	168.3 x 48.3	300	51	247	95.0	122	5/8 x 105
6 x 2	168.3 x 60.3	300	64	247	112.5	132	5/8 x 105
6 x 2 1/2	168.3 x 73.0	300	70	247	112.5	132	5/8 x 105
6 x 3	168.3 x 88.9	300	89	247	132.0	140	5/8 x 105
8 x 1	219.1 x 33.7	300	38	320	79.5	150	3/4 x 115
8 x 1 1/4	219.0 x 42.4	300	51	320	96.5	150	3/4 x 115
8 x 1 1/2	219.1 x 48.3	300	51	320	96.5	150	3/4 x 115
8 x 2	219.1 x 60.3	300	64	320	117.0	160	3/4 x 115
8 x 3 O.D.	219.1 x 76.1	300	70	320	118.0	158.5	3/4 x 115
8 x 3	219.1 x 88.9	300	89	320	136.5	160	3/4 x 115
8 x 4	219.1 x 114.3	300	114	320	164.0	160	3/4 x 115
10 x 1 1/2	273.0 x 48.3	300	51	376	95.5	180	3/4 x 120
10 x 2	273.0 x 60.3	300	64	376	118.0	185	3/4 x 120
10 x 3 O.D.	273.0 x 76.1	300	70	376	118.0	190	3/4 x 120
10 x 3	273.0 x 88.9	300	89	376	136.5	190	3/4 x 120
10 x 4	273.0 x 114.3	300	114	376	164.0	190	3/4 x 120



SDG-47

Mechanical Cross - Threaded

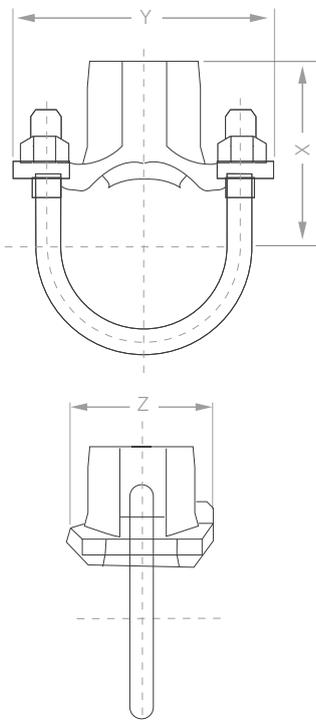


Grooved Fittings

Mechanical Tee - Threaded U-Bolt:

SDG-40:

Nominal Size	Pipe O.D.	Maximum Working Pressure	Dimensions			U-Bolt Size
			X	Y	Z	
Inch	mm	psi	mm	mm	mm	mm
1¼ x ½	30	300	54.4	88.9	57.2	¾ x 73
1¼ x ¾	30	300	54.4	88.9	57.2	¾ x 73
1¼ x 1	30	300	57.7	88.9	57.2	¾ x 73
1½ x ½	30	300	57.7	88.9	57.2	¾ x 73
1½ x ¾	30	300	57.7	88.9	57.2	¾ x 73
1½ x 1	30	300	60.8	88.9	57.2	¾ x 73
2 x ½	30	300	63.3	95.3	57.2	¾ x 90
2 x ¾	30	300	63.3	95.3	57.2	¾ x 90
2 x 1	30	300	66.6	95.3	57.2	¾ x 90
2½ x ½	30	300	69.9	108.0	57.2	¾ x 105
2½ x ¾	30	300	69.9	108.0	57.2	¾ x 105
2½ x 1	30	300	73.2	108.0	57.2	¾ x 105



SDG-40

U Bolt Mechanical Tee - Threaded



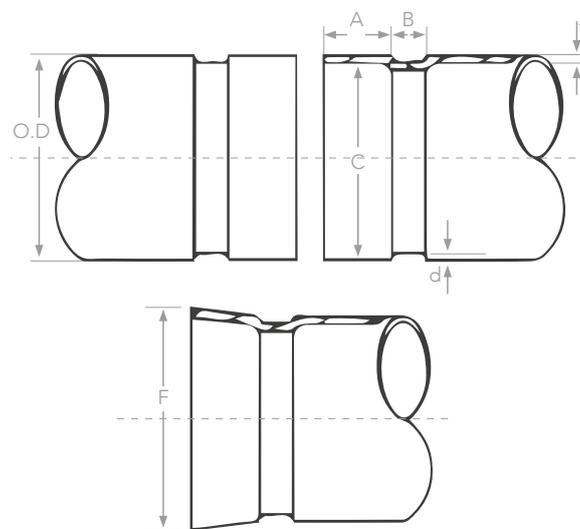
NOTE: Refer to UL/FM certificates for more details.

Grooved Fittings

Groove Specifications - Technical Data:

Groove Dimensions:

Nominal Size	Pipe O.D.			Gasket Seat 'A' (±) 0.030	Groove Diameter 'C'		Grooved Width 'B'		Grooved Depth 'D'	Minimum Pipe Wall Thickness 'T'		Max. 'F' Flare Diameter
	Inch	Actual	Tolerance		Max.	Tolerance (±) 0.000	Roll Groove (±) 0.030	Cut Groove (±) 0.031		Roll Groove	Cut Groove	
¾	1.050	0.010	0.010	0.625	0.938	-0.015	0.281	0.313	0.056	0.065	0.113	1.15
1	1.315	0.013	0.013	0.625	1.190	-0.015	0.281	0.313	0.065	0.065	0.133	1.43
1¼	1.660	0.016	0.016	0.625	1.535	-0.015	0.281	0.312	0.063	0.065	0.140	1.77
1½	1.900	0.019	0.019	0.625	1.775	-0.015	0.281	0.312	0.063	0.065	0.140	2.01
2	2.375	0.024	0.024	0.625	2.250	-0.015	0.344	0.312	0.063	0.065	0.154	2.48
2½	2.875	0.029	0.029	0.625	2.720	-0.018	0.344	0.312	0.078	0.083	0.187	2.98
3 O.D.	3.000	0.030	0.030	0.625	2.845	-0.018	0.344	0.312	0.078	0.083	0.188	3.10
3	3.500	0.035	0.031	0.625	3.344	-0.018	0.344	0.312	0.078	0.083	0.188	3.60
4	4.500	0.045	0.031	0.625	4.334	-0.020	0.344	0.375	0.083	0.083	0.203	4.60
5½	5.500	0.056	0.031	0.625	5.334	-0.020	0.344	0.375	0.083	0.109	0.203	5.60
5	5.563	0.056	0.031	0.625	5.395	-0.022	0.344	0.375	0.084	0.109	0.203	5.66
6	6.625	0.063	0.031	0.625	6.445	-0.022	0.344	0.375	0.085	0.109	0.219	6.73
8	8.625	0.063	0.031	0.750	8.441	-0.025	0.469	0.375	0.092	0.109	0.238	8.80
10	10.750	0.063	0.031	0.750	10.562	-0.027	0.469	0.500	0.094	0.134	0.250	10.92
12	12.750	0.063	0.031	0.750	12.531	-0.030	0.469	0.500	0.109	0.156	0.279	12.17
14	14.000	0.063	0.031	0.938	13.781	-0.030	0.469	0.500	0.109	0.156	0.281	14.10
16	16.000	0.063	0.031	0.938	15.781	-0.030	0.469	0.500	0.109	0.165	0.312	16.10
18	18.000	0.060	0.030	1.000	17.781	-0.025	0.469	0.500	0.109	0.165	0.312	18.16
20	20.000	0.060	0.030	1.000	19.781	-0.025	0.469	0.500	0.109	0.188	0.312	20.16



Groove Specifications

Installation Instruction

Threaded & Grooved Mechanical Tee:



1 Pipe Preparation

- ▶ Clean the gasket sealing surface within 16mm of the hole.
- ▶ Visually inspect the sealing surface for defects that may prevent proper sealing of the gasket.
- ▶ Don't drill the hole on weld line.



2 Remove Burrs

- ▶ If any burrs or slug exists at the pipe hole, please remove them before assembly, to protect the gasket and avoid leakage.



3 Gasket Installation

- ▶ Insert the gasket into outlet housing making sure the tab in the gasket line up with the tab recesses in the housing.
- ▶ Align outlet housing over the pipe hole making sure that the locating collar is in the pipe hole.



4 Alignment

- ▶ Align the strap around the pipe, insert the bolts and tighten the nuts finger tight.



5 Tighten Nuts

- ▶ Alternatively and evenly tighten the nuts to the specified bolt torque.



6 Assembly Completed

- ▶ There should be even gaps on two sides between upper and lower housings.

ANSI Bolts

Bolt Size	Dimensions	
	Inch	Lbs/ft.
3/8"	30/45	40-60
1/2"	80/100	110-135
5/8"	100/130	135-175
3/4"	130/180	175-245
7/8"	180/240	245-325

NOTE: Refer to UL/FM certificates for more details.

CAUTION

- ▶ Proper torquing of bolts is required to obtain specified performance.
- ▶ Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation.
- ▶ Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

Installation Instruction

Grooved Flange:



Pipe Preparation

- ▶ Check pipe end for proper groove dimensions and to assure that pipe end is free of indentations and projections that would prevent proper sealing.



Lubricate Gasket

- ▶ Check gasket to be sure it's compatible for the intended service.
- ▶ Apply thin lubricant to the outside and sealing lips of the gasket.



Gasket Installation

- ▶ Slip the gasket over one pipe, making sure the gasket lip does not over-hang the pipe end.



Housing Installation

- ▶ Remove bolts and nuts, place two housings over the gasket, making sure the housing keys fit into the pipe grooves.
- ▶ Re-insert the bolts and hand tighten the nuts.



Tighten Nuts

- ▶ Securely tighten nuts alternately and equally to the specified bolt torque by using spanner.



Connect Mating Flange

- ▶ Align flange bolt holes with mating flange (or valve) bolt holes.
- ▶ Insert a standard flange bolt through bolt hole and hand tighten a nut.
- ▶ Insert another bolt opposite the first and hand tighten a nut. Continue this until all bolt holes are fitted.
- ▶ Tighten nuts evenly to specified bolt torque, so flange faces remain parallel. Assembly completed.

NOTE: Refer to UL/FM certificates for more details.

SHIELD reserves the right to change the contents without notice.

Grooved Fittings

Specified Bolt Torque:

Metric Bolts

Bolt Size	Dimensions	
	Lbs/ft.	N.m
M10	30/45	40-60
M12	80/100	110-135
M16	-	-
M20	-	-
M22	-	-
M24	-	-

Factory Mutual System



CAUTION

- ▶ Proper torquing of bolts is required to obtain specified performance.
- ▶ Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation.
- ▶ Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

NOTE: Refer to UL/FM certificates for more details.

Safety Datasheet

1 - Chemical Composition

Elements	Weight %
Iron	92 - 93
Carbon	3.4 - 3.9
Silicon	2.7 - 3.2
Manganese	0.25 Max
Phosphorus	0.06 Max
Sulphur	0.035 Max
Zinc*	0.05 - 0.35
*For Galvanised product only.	

NOTE: All commercial metals contain trace elements or residual elements, in addition to above specified.

2 - PHYSICAL & CHEMICAL CHARACTERISTICS

Melting Point: Base Metal 1510°C, Zinc Coating 420°C

Appearance & Odour: Metallic Gray, No Odour

3 - FIRE AND EXPLOSION DATA

Castings in solid state present no fire or explosion hazard.

4 - HEALTH HAZARD INFORMATION

Eyes: Metal particles in the eyes may cause irritation if not removed.

Breathing: Overexposure to dust or fumes from these castings may cause lung diseases.

First Aid: If in Eyes, Metal particle should be removed by a trained individual such as a nurse or physician. If breathed, move to fresh air.

5 - REACTIVITY DATA

Hazardous Polymerization: Will not occur. Stability: Stable

Incompatibility: Iron may cause violent decomposition of hydrogen peroxide (52% or more)

6 - SPILL OR LEAK PROCEDURES

If spilled, return castings to vendor or send to scrap recycler.

7 - SPECIAL PROTECTION INFORMATION

Respiratory: Approved dust and fume respirators should be used to avoid excessive inhalation of particulates

Skin: Protective gloves should be worn as required for welding, burning, or handling operations.

Eye: Use safety glasses or goggles for welding, burning, sawing, brazing, grinding, or machining operations.

Ventilation: Local exhaust ventilation should be provided when welding, burning sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.

Other Protective Equipment: Depending on the conditions of use and specific work situations, additional protective equipment and/or clothing may be required.

8 - SPECIAL PRECAUTIONS

Storage: Keep dry to reduce rusting.

Maintenance Instructions

Safety

The importance of safe work operations cannot be avoided.

Every workers has to follow the safe work practices, hazard and risk identification has to be carried out prior to the maintenance and to be followed.

Work permit form safety to be obtained(if such system exist) prior to the maintenance.

Maintenance Checklist to be followed.

Proper and adequate PPEs to be used.

Use harness and Fall protection mechanism in case of working at height.

In an emergency situation the emergency action plan of the site to be followed.

General

Physical Isolation or disconnection of supply to the live line to be carried out prior to removal of the fittings.

In case of wet riser the water should be drained.

Ensure that proper working tools with recommended torque are selected.

Unscrew the bolts evenly from the both sides of the Couplings/Mechanical Tee using the appropriate torque.

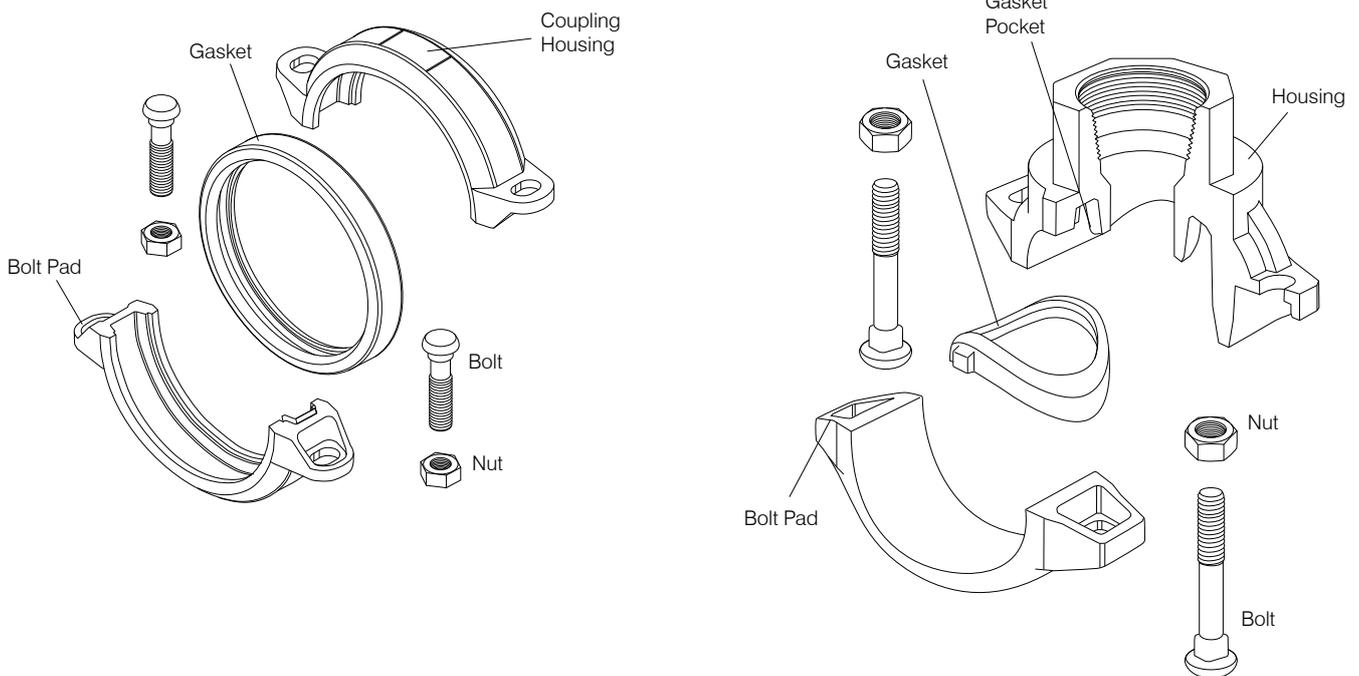
Remove the gasket from the pipes carefully.

Prevent the fall of the fittings while detaching from the pipe line by giving proper support.

Clean the fittings, gasket, nut & bolts to be free from the dust.

Store the fittings in a proper storage , do not keep it under direct sunlight or close to the hot surface.

While re-installation of the fittings the same installation instructions has to be strictly followed.



Note: Drawings are for illustration purpose only. Shield reserves the right to change the content without prior notice.

SHIELDTM
Trusted Worldwide



For further information on any aspect of the SHIELD range of Pipes & Fittings please contact your nearest office.

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