PLIANT BELLOWS™

Expansion Joints

ENRICHED FOR FLEXIBILITY

by

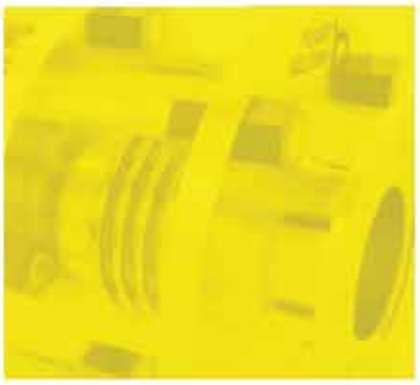
Flexoresist Technologies Pvt. Ltd.

ENRICHED FOR

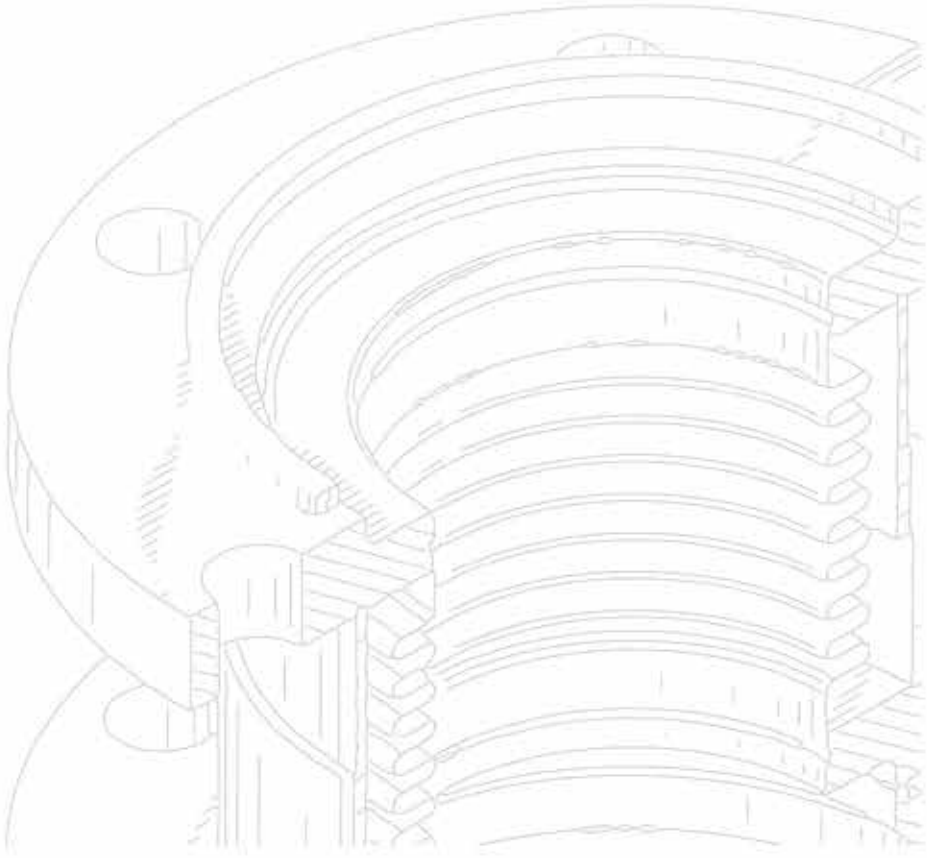
FLEXIBILITY

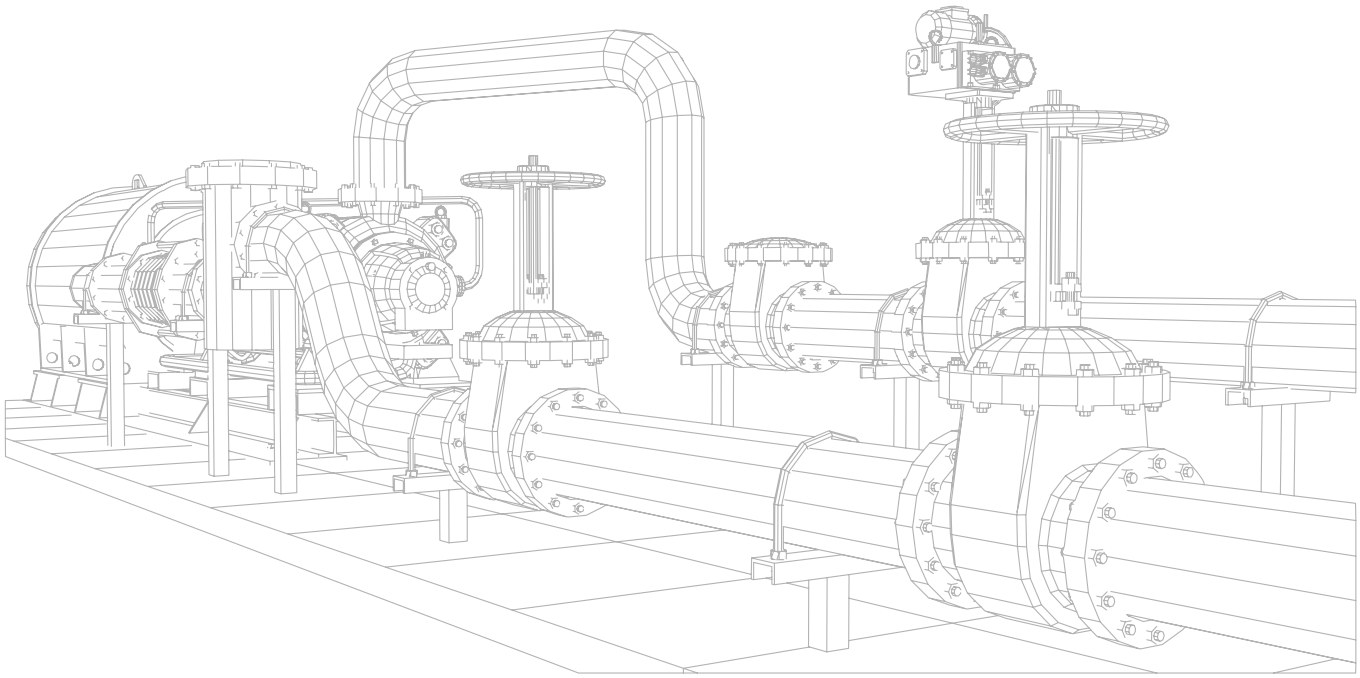
METAL BELLOW COUPLINGS


PLIANT
BELLOWS




PLIANT
BELLOWS





About Company

Flexoresist Technologies Pvt. Ltd. is a pioneering entity in the Indian market, specializing in the design and manufacturing of innovative products. Founded with the vision to fill the gap in the Indian market, Flexoresist embarked on its journey under the leadership of Mr. Anand Uttarkar, Industrial engineer with a Master's degree from Texas, USA.

Mission and Vision:

At Flexoresist, our mission is to revolutionize the Indian engineering landscape by introducing cutting-edge products that cater to the evolving needs of various industries. We envision a future where indigenous innovation drives technological advancement and economic growth.

Technical Excellence:

With a culture deeply rooted in technical proficiency, Flexoresist prioritizes excellence in design, engineering, and manufacturing processes

Customer Satisfaction:

We are committed to exceeding customer expectations by delivering superior quality products and unparalleled service.

Innovation:

We are committed to exceeding customer expectations by delivering superior quality products and unparalleled service.

Products:

Flexoresist stands as a leading authority in the design and manufacturing of the following products:

1. Metal Bellows and Expansion Joints
2. Metal O rings, C Rings, Spring Energized C Rings

Business Philosophy & Strengths

- As the CEO and GM are technically qualified, the general orientation of the company is towards technical excellence .The work culture has also been developed accordingly.

- The company implements, Kaizen (Continuous Improvement) and 5 S techniques to keep the entire system up to mark.

- To facilitate all the above at operational level, experienced and qualified manpower has been employed.

- The company has endeavoured to meet and achieve the quality standards set by the customers.

Systems And Certifications

Flexoresist Technologies Pvt. Ltd. is an ISO 9001:2015 certified company and is well supported by ERP software to maintain documentation. The entire tracking process, from incoming raw materials to dispatch is maintained.

Leadership

Mr. Anand Uttarkar

Mr. Anand Uttarkar, the CEO, is a highly qualified engineer holding an M.S. degree in Industrial Engineering from Texas, USA. With over 23 years of experience in the industry, he has been instrumental in driving the organization toward excellence. His extensive expertise has contributed significantly to achieving the highest quality standards while implementing cost-effective solutions. Under his strategic leadership and vision, the organization has not only enhanced its operational efficiency but has also received numerous prestigious accolades and certifications, reinforcing its commitment to quality and innovation.

Technology

Hydro Forming Machine

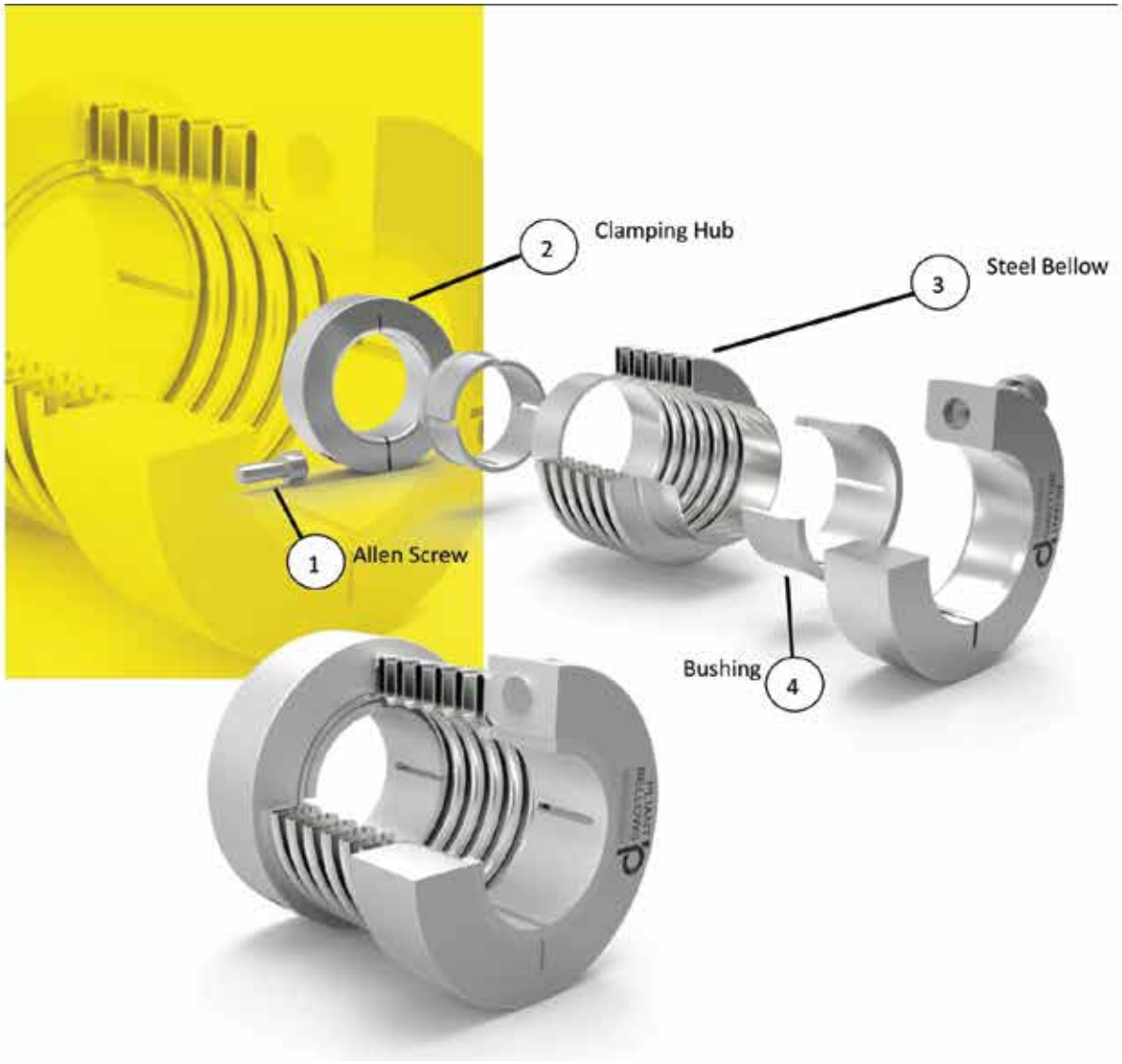
The hydroforming machine is designed by US Designers and has been manufactured to international quality standards. Bellows formed by hydroforming process are uniform in structure with adequate dimensional accuracy. In a single step, corrugations are formed on an entire metal bellow, which increases the productivity considerably. The properties achieved by the hydroforming process are far superior as compared to mechanically drawn bellows. Metal bellows can be manufactured with a single ply or multiple plies with excellent flexibility, pressure tightness, and little wall thickness reduction.

Diameter range	[mm]	6 mm - 250 mm
Ply thickness	[mm]	0.12 mm – 1.0 mm
Tube length	[mm]	up to 1000
Internal pressure	[bar]	up to 340
Total Power	[HP]	25
Forming Time	[sec]	<60

Punch Forming Machine

Metal bellows with diameters ranging from 65 mm to 3000 mm can be processed on our Mechanical punch forming machine (also known as Mechanical Expander) which is also designed by US Designers. Single corrugation on the bellow is being formed mechanically. It's a two-step forming process, the first step is to form the tube into convoluted shape and the second step is the re-rolling process. The convolutions are punched individually. Metal bellows can be manufactured with a single ply or multiple plies. Internal and external diameters can be aligned as per customer's requirement.

Diameter range	[mm]	65 - 3000
Ply thickness	[mm]	0.15 to 1.5mm (max 5 Ply)
Tube length	[mm]	1200 mm
Total power	[HP]	7.5
Forming Time/ convolution	[sec]	<60



Coupling Size Selection:

When specifying flexible shaft couplings, the following key factors should always be considered:

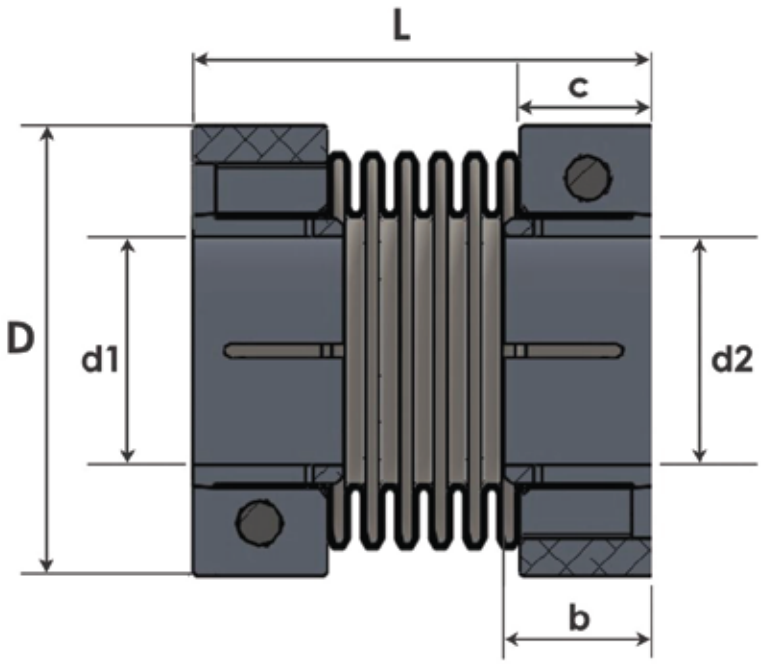
Torque

Although couplings are typically sized for the highest torque to be regularly transmitted, the peak torque of the application should not exceed the rated torque of the coupling. The following calculation provides an approximation of the minimum required coupling size for the application:

T ×1.5×T ×T = Rated Torque of the coupling (Nm) T = Peak torque of the drive system (e.g. Breakdown Torque of the Electric motor)

Misalignment Requirements:

The maximum misalignment of shafts is the largest allowed displacement between the drive and output shafts, which results from the calculation of the prolonged alternating-stress strength for compensating elements. Determine the individual shaft misalignments, and by using the "Permitted Shaft Misalignments" mentioned in the table, find the intended coupling size.



Part Number : BC1 - d1 - d2 - L - T - S

BC1	d1	d2	L	T	S
Bellow Coupling Series1	Shaft diameter Side 1 (mm)	Shaft diameter Side 2 (mm)	Length (mm)	Torque (Nm)	Speed (rpm)

Eg. : BC1 - 14 - 18 - 58 - 10 - 8000

Metal Bellow Couplings:

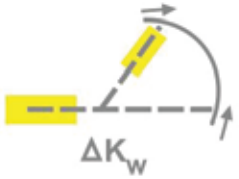
The metal bellow coupling is designed to be used in various torque transmission applications. The metal bellow perfectly compensates for axial, radial, and angular misalignments. The designed geometric shape of the steel bellow allows high torsional stiffness and a low mass moment of inertia. The Bellow Coupling is manufactured in five sizes for maximum torques up to 400 Nm.

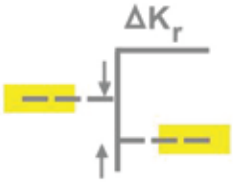
The coupling steel bellows and clamping rings are the same for all the designs within a construction size. They are adapted via reducing bushings to the required shaft diameter.

Technical Data

TECHNICAL DATA												
Size	Torque of Bellow, T (Nm)	Maximum Speed, N (rpm)	Mass Moment of Inertia, I (10^{-6} kgm^2)	Torsion Spring Stiffness, C_t (Nm/rad)	Axial Spring Stiffness, C_a (N/mm)	Radial Spring Stiffness, C_r (N/mm)	Clamping Screws		Weight, W (kg)	Permitted Displacement		
							Screw Size	Tightening Torque, T_s (Nm)		Axial, ΔK_a (mm)	Radial, ΔK_r (mm)	Angular, ΔK_w (deg)
BC 1	16	10000	36	4000	50	470	M5	10	0.132	0.5	0.3	2.5
BC 2	40	8000	104	9000	70	850	M6	14	0.245	0.6	0.4	2.5
BC 3	100	6500	417	21000	82	920	M8	17	0..467	0.8	0.5	2.5
BC 4	200	5000	1210	50000	120	2040	M8	35	1.00	1	0.5	2.5
BC 5	400	3000	3420	125000	172	2250	M12	120	1.80	0.8	0.5	1.5

Dimension[mm]		Size				
		BC 1	BC 2	BC 3	BC 4	BC 5
Minimum Bore	$Ød_{min}$	8	10	14	20	25
Maximum Bore	$Ød_{max}$	20	30	42	55	65
General Dimension	D	48	59	74	92	116
	L	58	61	72	83	116
	b	18	20	22	27	31
	c	16	18	20	25	27





TORQUE TRANSMISSION FOR VARIOUS DIAMETERS										
Diameter	BC-1		BC-2		BC-3		BC-4		BC-5	
	Rated Torque	Test Torque	Rated Torque	Test Torque	Rated Torque	Test Torque	Rated Torque	Test Torque	Rated Torque	Test Torque
(mm)	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm	Nm
8	9	14	-	-	-	-	-	-	-	-
9	11	17	-	-	-	-	-	-	-	-
10	13	20	20	32	-	-	-	-	-	-
11	14	21	24	36	-	-	-	-	-	-
12	16	24	26	39	-	-	-	-	-	-
14	16	24	31	47	35	51	-	-	-	-
15	16	24	33	50	42	63	-	-	-	-
16	16	24	35	52	51	77	-	-	-	-
18	16	24	39	59	58	87	-	-	-	-
19	16	24	40	60	61	91	-	-	-	-
20	16	24	40	60	67	100	133	199	-	-
24	-	-	40	60	74	110	147	220	-	-
25	-	-	40	60	85	128	167	250	205	301
28	-	-	40	60	85	128	187	280	225	323
30	-	-	40	60	85	128	200	300	240	360
32	-	-	-	-	85	128	200	300	256	384
35	-	-	-	-	85	128	200	300	280	420
38	-	-	-	-	85	128	200	300	305	457
40	-	-	-	-	85	128	200	300	320	480
42	-	-	-	-	85	128	200	300	340	510
45	-	-	-	-	-	-	200	300	360	540
50	-	-	-	-	-	-	200	300	400	600
55	-	-	-	-	-	-	200	300	400	600
60	-	-	-	-	-	-	-	-	400	600
65	-	-	-	-	-	-	-	-	400	600

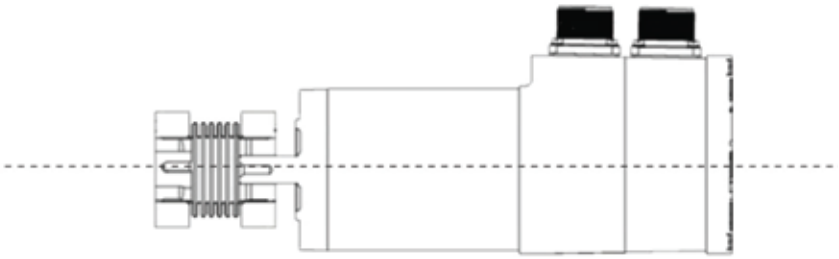
Installing Couplings

General Instructions-

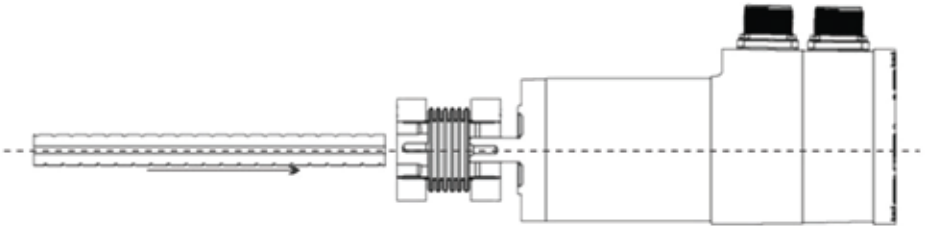
1. Ensure that both shafts are free of burrs, damage, or foreign matter and can penetrate the bores
2. Install the coupling by holding the shaft and the related hub, rotating it back and forth as you progress it along the shaft
3. Do not apply any forces that cause extension, compression, or lateral displacement of the coupling.

Installation Guidelines

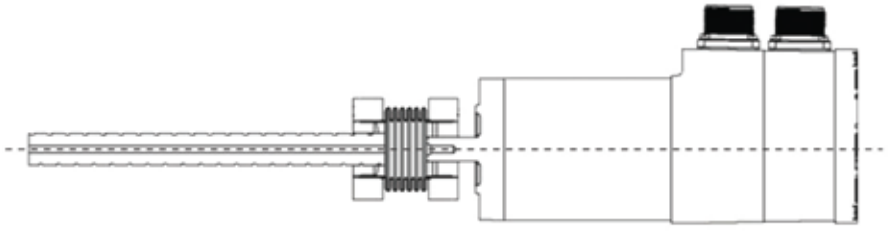
1. Position and secure the larger of the two shafts (if different) and progress the coupling onto it



2. Progress the second shaft into the bore, taking care not to lever either shaft against the inner wall of the spacer.



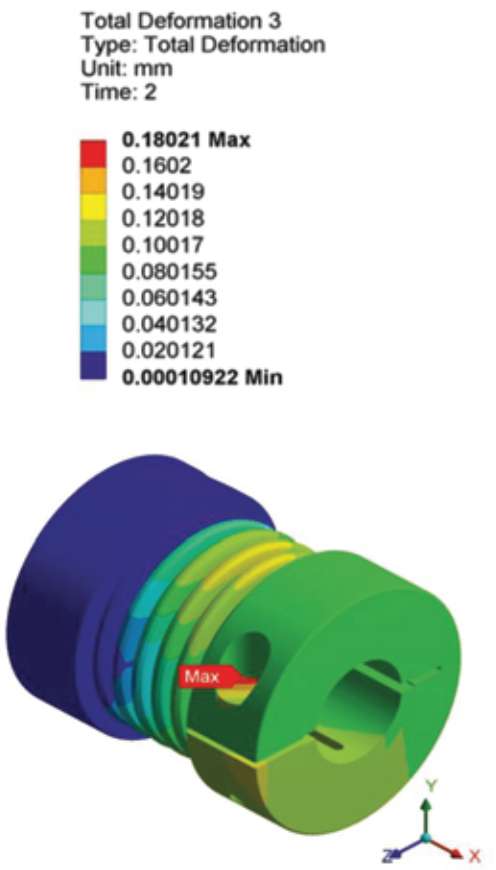
3. Progress the coupling along the shafts to a position midway between the shaft terminations. Rotate the coupling to ensure it is not binding and is in its natural state, i.e., neither extended nor compressed



1. Align the second shaft with the first using a straight edge and feeler gauges or a dial indicator
2. Secure the second shaft and recheck alignment. Final alignment must be within the permissible offsets
3. Secure one hub, tightening each screw alternately. Repeat for the second hub

Design and Manufacturing

The company has excellent capabilities in design and manufacturing of metal bellow couplings. The bellow design calculations are done by using competent software like EJMA and backed by rich experience of our designers. Renowned software's like SolidWorks and ANSYS are used to design and validate the concept. Apart from software's the couplings are physically tested for the performance characteristics.
The company understands the importance of having a well equipped tool room and inspection facility to support its production activities. Hence the company has invested in conventional and CNC machines from lathes, grinding to vertical machining centres. For the production activity the organisation has focused on developing SPM's as it believes that SPM's will help in achieving consistency & reliability.



Applications

- Power Generation
- Sugar Mill
- Infrastructure
- HVAC
- Cryogenic
- Steel Industries
- Measurement & Control System
- Oil & Gas
- Engine Exhaust
- Solar Technology
- Chemical Industries
- Instrument & Valve Industries
- Water/ Waste Water
- Nuclear Plant

Testing Capabilities

- Hydrostatic Pressure and Leak Test
- Pneumatic Bubble Soap Leak Test
- Vacuum Test
- Dye Penetrant Test
- Visual Test
- Fatigue Test
- Squirm Test
- Spring Rate Test
- Radiography Test
- X- Ray Test
- Ultrasonic Test
- Helium Leak Detection

Other Products

Axial Expansion Joints

These joints are the simplest form of bellows manufactured. Pliant Bellows can manufacture them in single and multiple ply.

Pressure Switch Bellows

Pressure switches are designed to make electrical contact when a set pressure is reached. These switches can be designed to close or open, based on the pressure rising or falling

Lateral Expansion Joints

Lateral expansion joints refer to the direction perpendicular to the centerline of the pipe expansion joint. Lateral deflection is also called Parallel Offset and Transverse. The lateral expansion joints are also known as tied lateral expansion joints.

Hinged Expansion Joints

When the angular movement is only in one plane, hinge or angular expansion joints are used. An angular expansion can be expressed when an expansion joint experiences bending about its center, which is the centerline and halfway between the ends of the metal bellows

Inline Pressure Balanced Expansion Joints

An inline pressure balanced expansion joint accommodates axial and lateral movements and counteracts the bellows' pressure thrust.

Pressure Balanced (Elbow) Expansion Joints

An elbow pressure balanced expansion joint is designed to absorb externally imposed axial movement without imposing pressure loading on the system.

Universal Expansion Joints

Universal expansion joints are made up of two elements of bellows joined together by a common spool piece, so they are also called Double Bellows Expansion Joints or Universal Bellows.

Gimbal Expansion Joints

Gimbal expansion joints are the most reliable expansion joints since they are capable of absorbing angular motion in all directions.

Other Products

Metal Seals

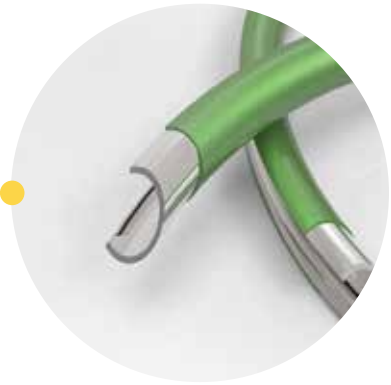
Metal seals are used in a wide variety of applications like Aerospace, Nuclear, Vacuum, Crygonegenic, etc. Metal seals are used where elastomeric seals cannot perform e.g. temperature greater than 300 deg. C., pressure above 500 bar and cryogenic applications. These seals are fire safe and made from exotic material like Hastealloy, Haynes, Inconel and high grade Nickel alloys.

Metal O-Ring

- Shaped as well as circular seals.

C-RING

- Shaped as well ias circular seals.

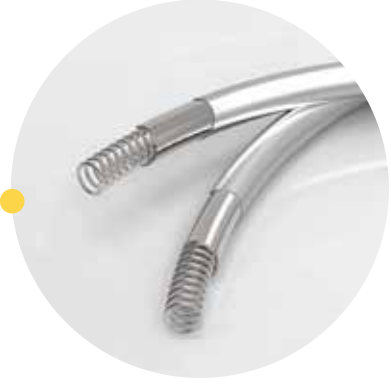


Gas Filled Metal O- Ring

- Shaped as well as circular seals.

Spring Energized C- Rings

- Shaped as well as circular seals.



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PLIANT BELLOWS DATASHEET

Website: www.pliantbellows.com|
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Customer : _____ Sr.No: _____ Date: _____

Email ID: _____ Mob. No.: _____ PO. No.: _____

Type of Bellow	Circular :_____ Rectangular : _____ Other : _____ Quantity : _____ Size (NB/DN): _____ Overall Length : _____
Installation	Vertical : _____ Horizontal : Universal :
Bellow Material	Material : _____ No. of Ply : _____ Ply Thickness : _____
Liner / Sleeve	Yes : _____ No.: _____ Ply Thk : _____ Material : _____ Length :_____

End Fitting		1st	2nd	Hole Dia.	No.of Holes
	Fix Flange				
	Rotating Flange				
	Weld End				
	Material				
	ID(I/S)				
	OD(O/S)				
	PCD (CD)				
	Thk.				
	RF				
	RF Depth				

Movements	Axial (+/-) : _____ Lateral (+/-) : _____ Angular (+/-) : _____
Spring Rates	Axial : _____ Lateral : _____ Angular:_____
Temperature	Operating : _____ Design : _____
Pressure	Operating : _____ Design : _____
Media	Media : _____ Flow Velocity: _____ Flow Direction: _____
No. of Tie / Limit Rod	Yes : _____ No: _____ Material : _____ Size : _____ _____ Quantity : _____
Notes :	

(Add Units)

Email ID - mktg@pliantbellows.com

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Expansion Joints
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FLEXORESIST TECHNOLOGIES PVT. LTD.

ISO 9001:2015

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