PLIANT BELLOWS™

Expansion Joints

ENRICHED FOR FLEXIBILITY

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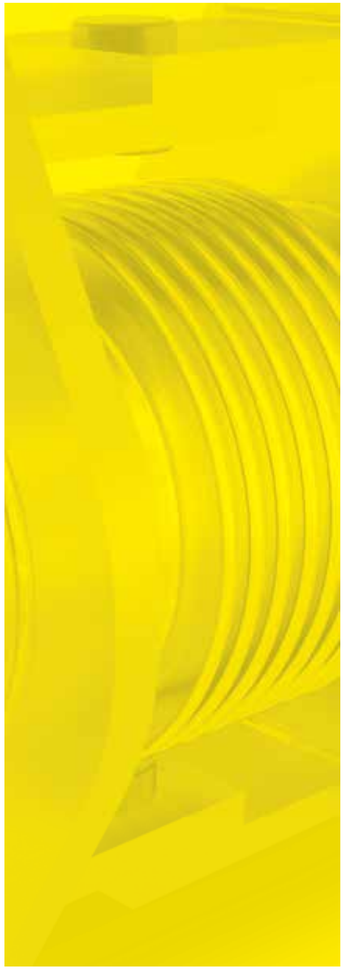
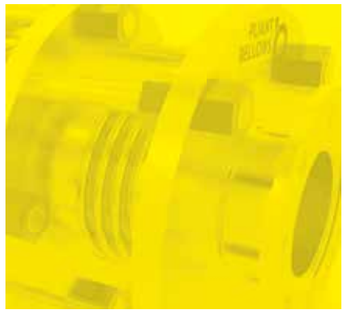
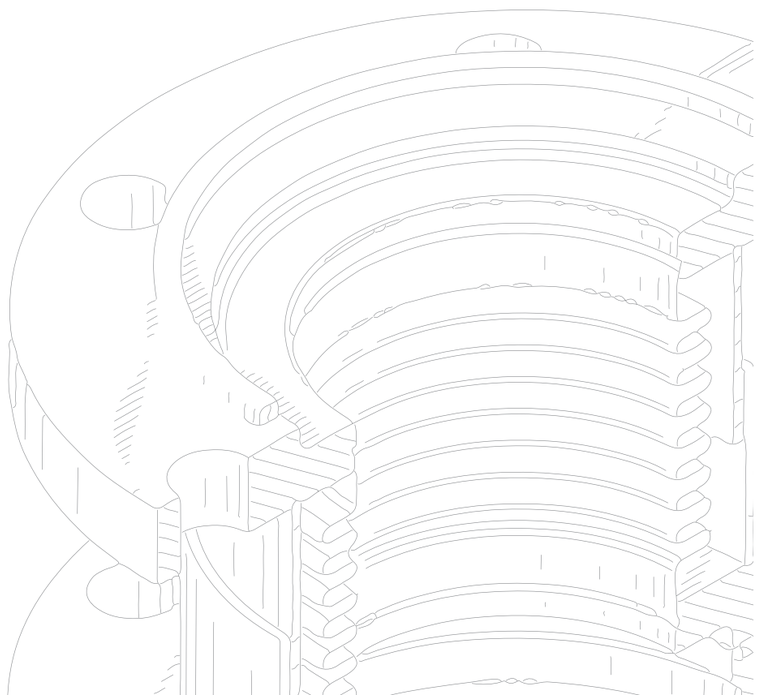
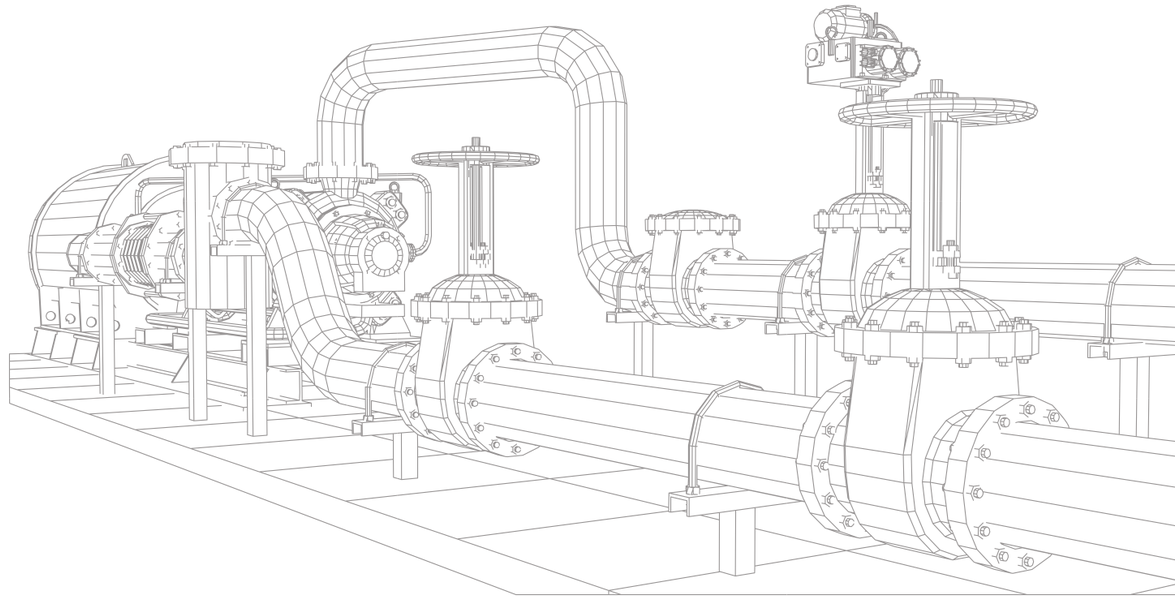








About Company

Pliant Bellows is the brand name of bellows manufactured by Kwality Products. The company is in the business since 1975 and has evolved to be one of the best manufacturing SME's in and around Pune. Kwality Products was started as a job working unit to cater the needs of automotive industry. As time passed the organisation got involved in the development of import substitute products. With its commitment and hard work it was rewarded by the Indian defence research organisation for its excellent performance.

In year 2005 the company got involved in the manufacturing of aerospace components. Today it is among the very few industries in India approved by Rolls Royce, USA for its helicopter engine division. In year 2011 the organisation branched out to form a joint venture with a Belgian company to manufacture metal seals in India.

While its journey in serving varied organisations the company realised that there was a need of quality supplier in the field of metal bellows. With its rich experience in manufacturing high quality products catering from nuclear, oil and gas to ultra high vacuum, the company launched its product, "Metal Bellows", under the brand name, "Pliant Bellows".

With the reputation of manufacturing high quality products the company decided to go for machines with world class standards. Today all the Bellow forming machines which we use are designed by the US based designers and are manufactured to international quality standards. Now the company is ready to serve its customers with its high quality products.

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

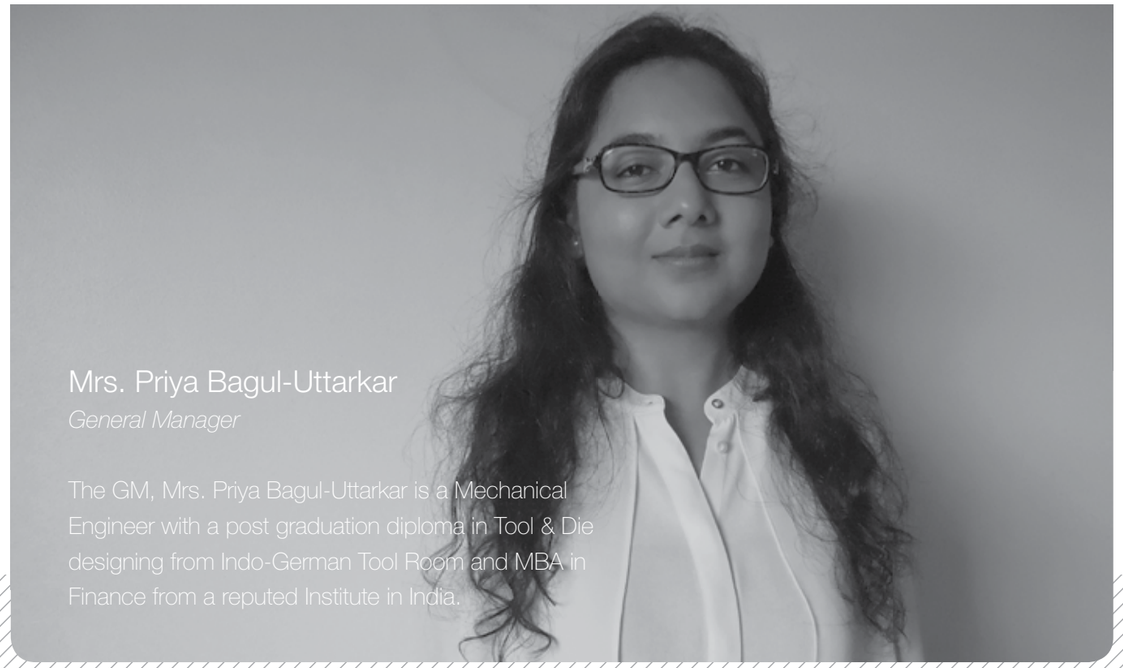
Kwality Products is an **ISO 9001:2008 certified** company and is well supported by ERP Software to maintain the documentation and the entire tracking from incoming raw material to dispatch. The company has been approved by Rolls Royce for precision machining, press parts and fabrication as tier 2 supplier.

Leadership Team

Mr. Anand Uttarkar

CEO

The CEO, Mr. Anand Uttarkar is a qualified engineer with a M.S. Degree in Industrial Engineering from Texas, USA and has rich experience in the current line of activity.



Mrs. Priya Bagul-Uttarkar

General Manager

The GM, Mrs. Priya Bagul-Uttarkar is a Mechanical Engineer with a post graduation diploma in Tool & Die designing from Indo-German Tool Room and MBA in Finance from a reputed Institute in India.

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]	15 – 600
Ply thickness	[mm]	0.2 – 4
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 90 mm to 1500 mm (New Machine is in development for bellows up to 6000 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 thus eliminating thinning of bellow material. 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]	90 - 1500
Ply thickness	[mm]	<3 (single Ply), 5 Plies (1mm/ply)
Tube length	[mm]	<1500
Total power	[HP]	7.5
Forming Time/ convolution	[sec]	<60

Products

Axial Expansion Joints

These Joints are the simplest form of bellows manufactured. Pliant Bellows can manufacture them in single and multiple ply. Axial Expansion Joints can be provided with either flanges or pipe end connections. They are mostly used for axial movements. The advantage of axial expansion joints is the fact that they take up relatively little space and no directional changes in the piping are required. When installing axial expansion joints, proper fix points and guidance are required. Please consult our engineers for more information.

Universal Expansion Joints

Universal expansion joints are made up of 2 elements of bellows joined together by a common spool piece so it is also called as Double Bellows Expansion Joint or Universal Bellows.

A Universal Expansion Joint is generally used where more lateral movement is to be absorbed which is beyond the capacity of a single Axial Expansion Joint and when there is a limitation on the amount of lateral forces allowed by the connecting pipe system. Universal expansion joints can take deflection in lateral, axial or angular movements.

Lateral Expansion Joints

Lateral expansion joints refers to the direction perpendicular to the centre line of the pipe expansion joint. Lateral deflection is also called as Parallel Offset and Transverse. The lateral expansion joints are also known as tied lateral expansion joints or tied universal expansion joints.

In case of absorbing large amount of lateral deflections the universal expansion joints having two bellows are connected by a centre spool (piece of pipe) and the tie rods are then attached on the outer ends for maximum deflection absorption. In this type of expansion joints the length of centre spool (centre piece) plays a major role.

Gimbal Expansion Joints

The gimbal expansion joints are the most reliable expansion joint since it is capable of absorbing angular motion in all the planes. Although single gimbal expansion joint can be used in isolation the most common applications use a pair of gimbal expansion joints to absorb a complex multi-plane motion in a piping system. Gimbal Expansion Joints are utilized in a pair to absorb the thermal expansion from two horizontal piping arms.

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 experience bending about its centre which is the centre line and half way between the ends of metal bellows.

These types of bellows are used mostly in sets wherever piping direction changes. So you will find hinged joints used at the locations where pipe bending occurs. Due to the hinged nature of this bellow only angular movement is allowed around the hinges.

Inline Pressure Balanced Expansion Joints

A inline pressure balanced expansion joint accommodates axial and lateral movements and counteracts the bellows pressure thrust. An additional bellow is incorporated into the unit and is subjected to the line pressure to generate a force equal and opposite to that on the main bellows. Tying these bellows together neutralizes the pressure load on the unit.

Features:

- Does not transfer the thrust caused by the internal pressure to the pipes or adjacent equipment.
- Absorbs axial and lateral movements.
- Eliminates change in pressure.
- Pressure forces remain in balance.

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. This is accomplished by using two bellows both at line pressure tied together and acting in opposite directions. It is used where pressure loading on piping or equipment is not acceptable. These expansion joints are usually installed at change of direction.

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. Many industries use these types of switches to maintain optimum system operation.

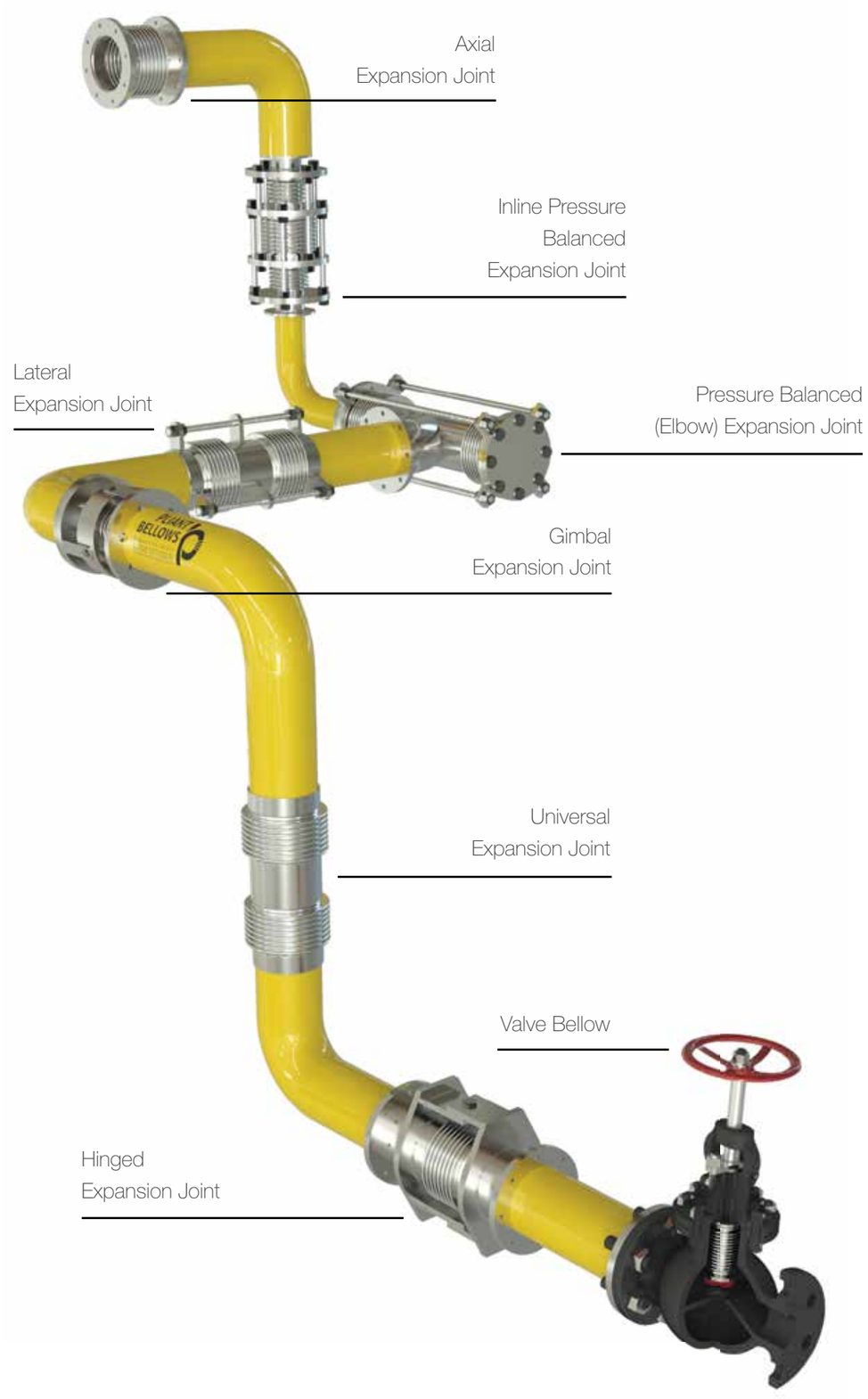
Valve Bellows

Bellow sealed valves are a new type of Industrial Process valves. These valves are popular due to the leakage free performance hence, called “Zero Leak Valves” or “Emission Free Valves”.

With the application of Bellow seals the gland packing is supplemented by a metallic Bellow cartridge. One end of the Bellow is connected to the valve bonnet and the other end to the stem. The bellow movement is in one plane as the stroke in the valve takes place. With no rotational movements involved the fluid gets sealed to a very high degree. The fluid flows through the bottom part of the valve as per the stem movement takes place. Due to the bellow covering the stem the seal does not contact the stem at all. Hence, providing a leak free zone.

The life cycle of the metal Bellow is largely dependent on the process of bellow manufacturing. At Pliant Bellows we manufacture them by hydro forming process. The properties achieved by the hydro forming process are far superior as compared to mechanically drawn bellows. It is extremely important that the bellows have the mechanical and metallurgical properties for long cycle life of a bellow.

Salient Features	
Material	Stainless steel series, Brass, Bronze, Beryllium copper and Nickel based alloys like, Inconel, Hastelloy etc.
Size Range	10 NB – 1500 NB (Bigger size on special request)
Pressure Range	Up to 90 Bar (Higher pressure on special request)
Temperature Range	Cryogenic to 1200 °C
Shapes	Circular, Rectangular or other shapes on special request
No. of Ply	Single Ply, Heavy wall Single Ply, Multiply



Design And Manufacturing

The company has excellent capabilities in design and manufacturing of Expansion joints based on **EJMA 9th Edition.** The bellow design calculations are done by using competent software backed by rich experience of our designers. The designers use Autodesk fusion 360 CAD/CAM and have access to high end software's like SolidWorks.

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 and speed of manufacturing. Considering the future growth the company is planning to setup a new state of the art facility in the close vicinity.

Applications

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

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 (Through third party approved vendors)
- X-Ray Test (Through third party approved vendors)
- Ultrasonic Test (Through third party approved vendors)
- Helium Leak Detection Test (Through third party approved vendors)

PLIANT BELLOWS DATASHEET

Website: www.pliantbellows.com | Tele: +91-20-26814175

Customer: ..... **Sr. No.:** ..... **Date:** .....

Email id: ..... **Mob. No.:** ..... **PO No.:** .....

Types 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 Side	2nd Side	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)

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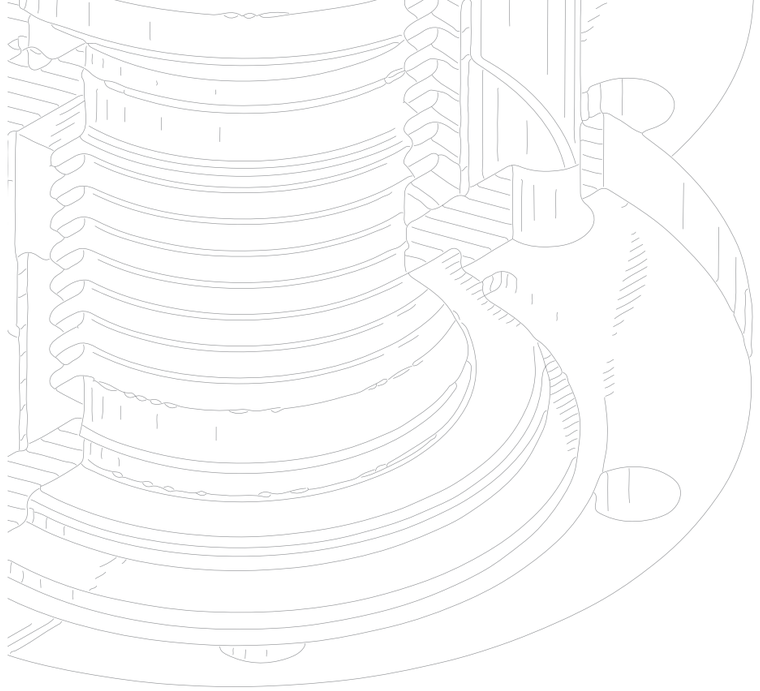

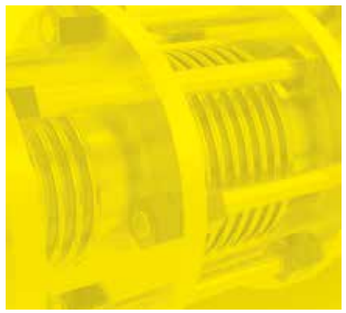

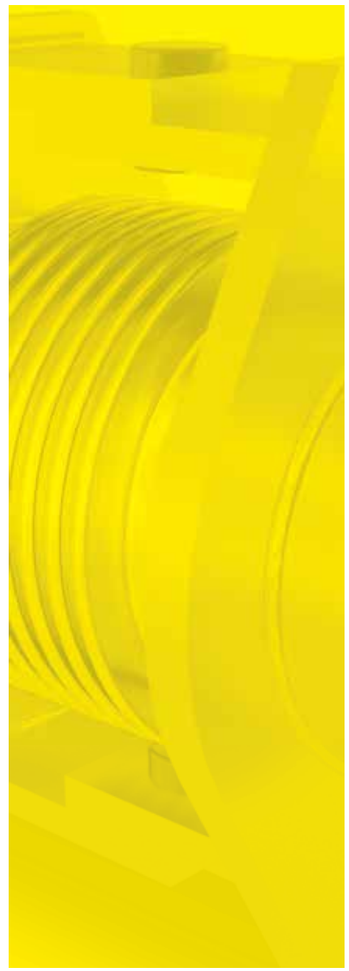

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