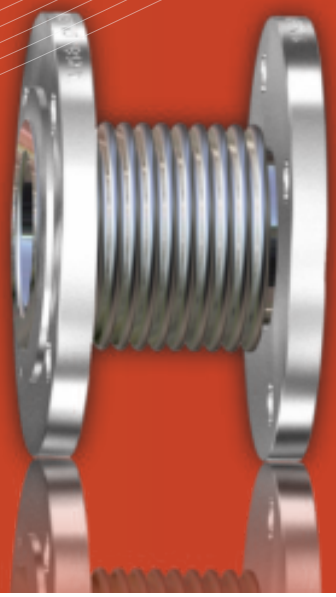
ARSEN®

EXPANSION JOINTS

AXIAL EXPANSION JOINTS
EXTERNALLY PRESSURIZED EXPANSION JOINTS
UNIVERSAL TIED EXPANSION JOINTS
GIMBAL TYPE SEISMIC EXPANSION JOINTS
RUBBER EXPANSION JOINTS



CONTENT

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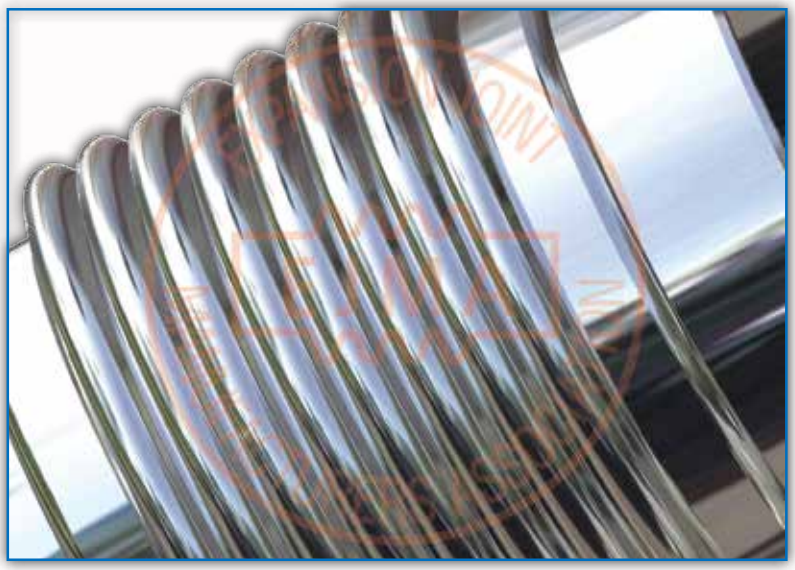
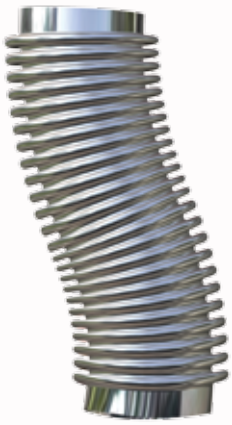


Expansion Joints are bellows flexible connection accessories used for absorbing thermal motions caused by ambient or transferring fluid temperature, angular motions originated from seismic events or land subsidence and any vibrations occurs in installations.

Expansion Joints have stainless steel bellows (undulation) formed hydraulically as a main part and are used in many applications such as industry and buildings with addition of limit rods, cranks and liners.

AXIAL MOVEMENT

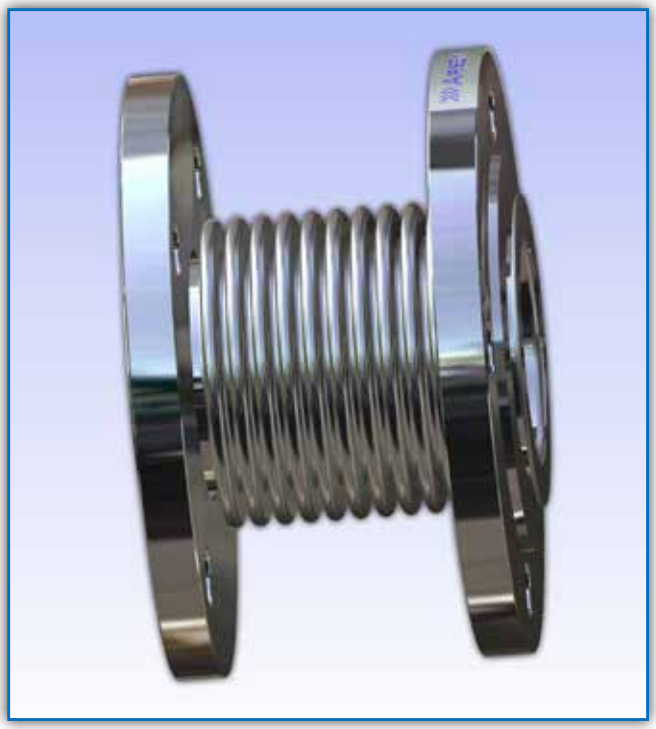
ANGULAR MOVEMENT



LATERAL MOVEMENT

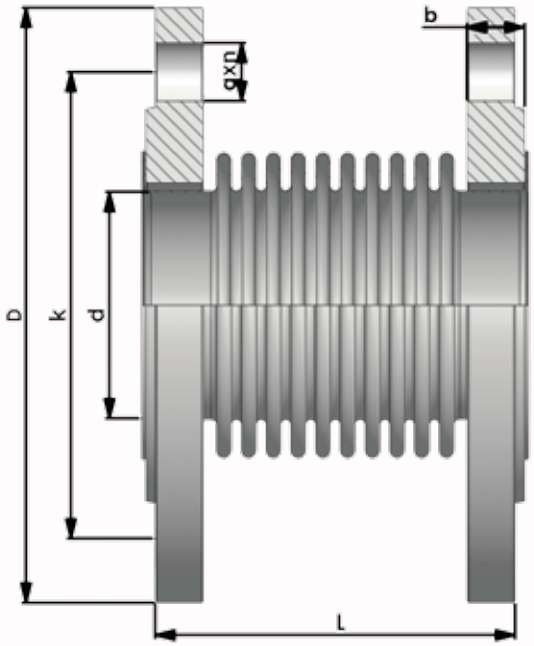
Metal Bellows Expansion Joint Product Specifications	
Bellows and Liner Materials	*AISI 304 Stainless Steel (Optional: 316L, 316Ti, 309)*
Connections	*Carbon Steel (Optional: Stainless Steel)*
Nominal Diameter	*DN25 (1") - DN1200 (48")*
Operating Pressure	*2,5 Bar - 64 Bar*
Operating Temperature	*-80 ºC - +550 ºC*
Connection Types	*Floating Flanged, Fixed Flanged, Welding Neck*
Design	*According to the EJMA Standards*

EXPANSION JOINTS WITH FLOATING AND FIXED FLANGES



Axial Expansion Joints are flexible accessories designed for absorbing dimension changes occurred due to temperature differences or existing vibrations in pipelines.

With the option of liner installation, vibrations that may result from high fluid flows and material erosion that erosive fluids may cause on surface of bellows is prevented from happening.

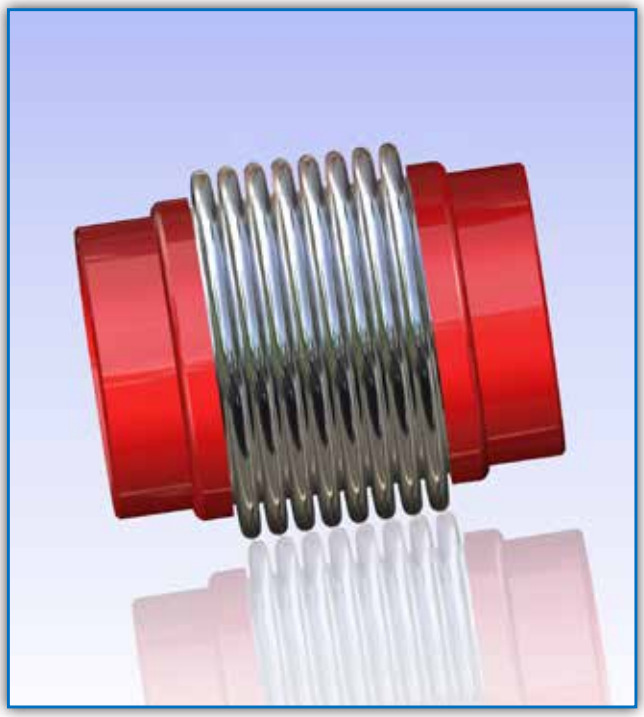


Material Specifications	
Bellow	*AISI 304 Stainless Steel*
Flanges	*St37 Carbon Steel*
Liner (Op.)	*AISI 304 Stainless Steel*

Expansion Joints With Floating and Fixed Flanges Dimensions And Movements

DIAMETER		L(mm) Expansion (mm)			D	d	k	b	n	q	Effective Area (cm^2)	Operating Pressure
DN	Inch	**30**	**45**	**60**								
25	1"	110	-	-	115	43	85	18	4	14	18	16 Bar
32	11/4"	110	-	-	140	43	100	18	4	18	18	
40	11/2"	120	150	-	150	49	110	18	4	18	22	
50	2"	120	150	-	165	61	125	18	4	18	36	
65	21/2"	120	150	180	185	77	145	18	4	18	58	
80	3"	120	150	180	200	89	160	20	8	18	78	
100	4"	120	150	185	220	115	180	20	8	18	124	
125	5"	125	155	190	250	140	210	22	8	18	180	
150	6"	130	155	200	285	169	240	22	8	22	252	
200	8"	150	190	230	340	220	295	24	12	22	430	
250	10"	165	205	245	405	274	355	26	12	26	660	

EXPANSION JOINTS WITH WELDING NECKS



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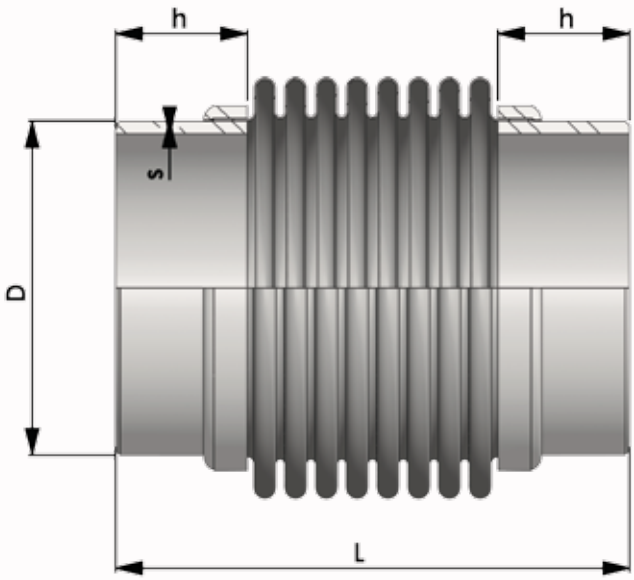
With the option of liner installation, vibrations that may result from high fluid flows and material erosion that erosive fluids may cause on surface of bellows is prevented from happening.



Material Specifications	
Bellows	*AISI 304 Stainless Steel*
Pipes	*St37 Carbon Steel*
Liner (Op.)	*AISI 304 Stainless Steel*

Expansion Joint With Welding Necks Dimensions And Movements

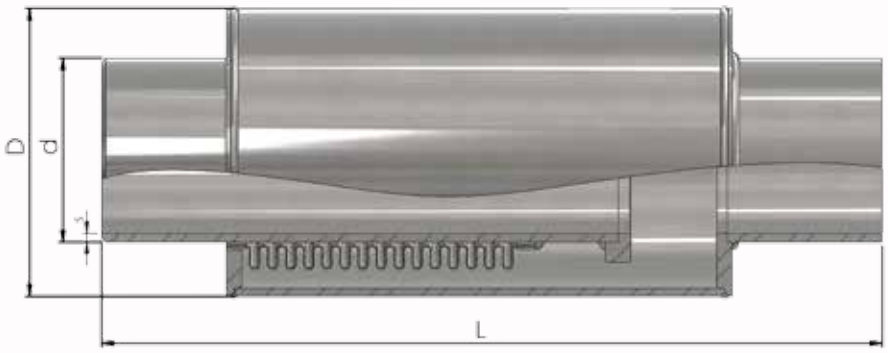
DIAMETER		L(mm) Expansion (mm)			D	s	h	Effective Area (cm^2)	Operating Pressure
DN	Inch	**30**	**45**	**60**					
25	1"	180	-	-	33.7	2.6	50	18	16 Bar
32	11/4"	180	-	-	42.4	3.2	50	18	
40	11/2"	190	220	-	48.3	3.2	50	22	
50	2"	185	215	-	60.3	3.6	50	36	
65	21/2"	185	215	240	76.1	3.6	50	58	
80	3"	185	215	245	88.9	4.0	50	78	
100	4"	200	230	265	114.3	4.5	60	124	
125	5"	200	230	265	139.7	5.0	60	180	
150	6"	245	270	315	165.0	5.0	80	252	
200	8"	265	305	340	219.1	4.5	80	430	
250	10"	310	360	395	273.0	5.6	100	660	

EXTERNALLY PRESSURIZED EXPANSION JOINTS WITH WELDING NECKS

Externally Pressurized Expansion Joints are preferred in long pipelines in order to use less number of expansion joints used and to reduce number of fixed points and roller bearing that increase installation costs. Resulted from the design of bellows part that protect the axis and increase pressure resistance, risk of twisting effect is minimized and working opportunity in high pressure environments is obtained.

Material Specifications

Below: AISI 304 Stainless Steel
Pipes St37 Carbon Steel
Optional: Completely Stainless Steel



Externally Pressurized Expansion Joint With W.Necks Dimensons And Movements

DIAMETER		L(mm) Expansion (mm)				D	d	s	Effective Area (cm²)	Operating Pressure
DN	Inch	**30**	**60**	**90**	**120**					
25	1"	275	395	520	-	88.9	33.7	3.2	54	40 Bar
32	11/4"	285	405	530	-	88.9	42.4	3.2	54	
40	11/2"	295	415	535	-	88.9	48.3	3.2	54	
50	2"	300	420	555	710	114.3	60.3	3.6	89	
65	21/2"	315	430	560	715	114.3	76.1	3.6	91	
80	3"	315	435	585	725	139.7	88.9	4.0	141	25 Bar
100	4"	320	450	585	750	165.0	114.3	4.5	196	
125	5"	335	465	595	765	219.1	139.7	5.0	272	
150	6"	345	475	615	790	219.1	165.0	5.0	346	
200	8"	395	520	685	860	323.9	219.1	4.5	572	
250	10"	420	585	760	950	355.6	273.0	5.6	829	

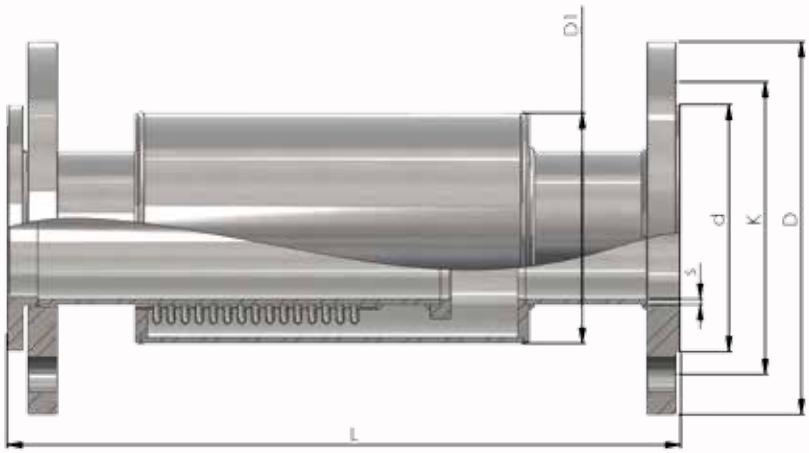
EXTERNALLY PRESSURIZED EXPANSION JOINTS WITH FLANGES

Externally Pressurized Expansion Joints are used for absorbing expansions and contractions that occur in underground applications. Additionally they are favourable to be used for fluids like boiling oil in which high safety factors are preferred.

Material Specifications

Below: AISI 304 Stainless Steel
Pipes St37 Carbon Steel
Flanges: St37 Carbon Steel

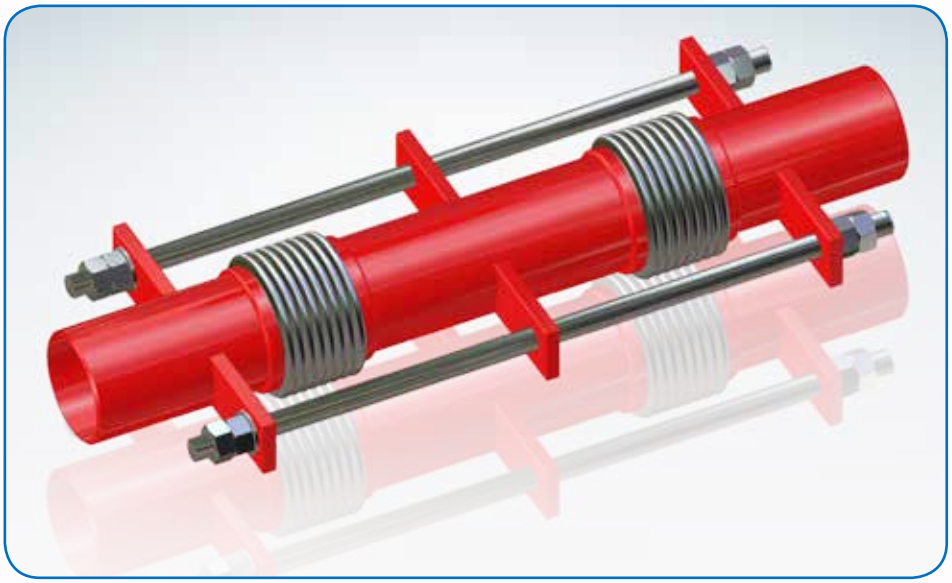
Optional: Completly Stainless Steel



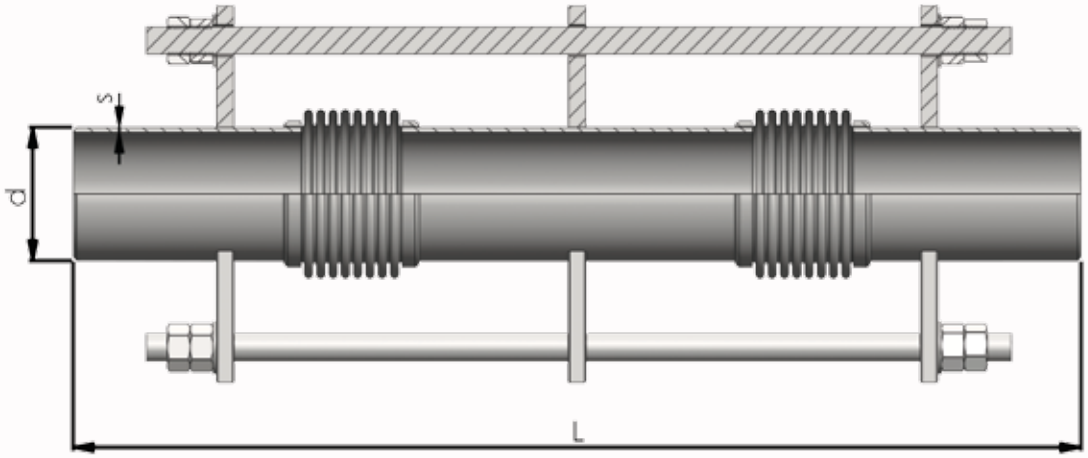
Externally Pressurized Expansion Joint With Flanges Dimensons And Movements

DIAMETER		L(mm) Expansion (mm)				D	K	d	D1	s	Effective Area (cm²)	Operating Pressure
DN	Inch	**30**	**60**	**90**	**120**							
25	1"	275	395	520	-	115	85	68	88.9	3.2	54	40 Bar
32	11/4"	285	405	530	-	140	100	78	88.9	3.2	54	
40	11/2"	295	415	535	-	150	110	88	88.9	3.2	54	
50	2"	300	420	555	710	165	125	102	114.3	3.6	89	
65	21/2"	315	430	560	715	185	145	122	114.3	3.6	91	
80	3"	315	435	585	725	200	160	138	139.7	4.0	141	25 Bar
100	4"	320	450	585	750	235	190	162	165.0	4.5	196	
125	5"	335	465	595	765	270	220	188	219.1	5.0	272	
150	6"	345	475	615	790	300	250	218	219.1	5.0	346	
200	8"	395	520	685	860	360	310	285	323.9	4.5	572	
250	10"	420	585	760	950	425	370	345	355.6	5.6	829	

UNIVERSAL TIED EXPANSION JOINTS WITH WELDING NECKS



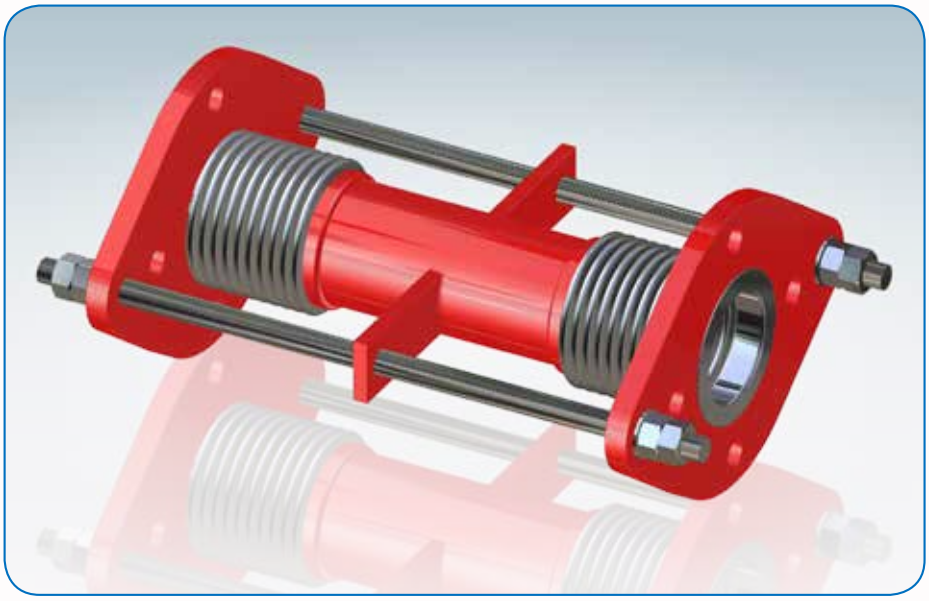
Universal Tied Expansion Joints are used in buildings with different construction foundations. They are installation accessories in order to absorb large lateral motions resulted from subsidence and ground motion. Thus, pipelines are prevented from damage after possible motions.



Universal Tied Expansion Joint With Welding Necks Dimensions And Movements

DIAMETER		L(mm)					d	s	Operating Pressure
		Movements (mm)							
DN	Inch	X	Y: ±25	Y: ±50	Y: ±75	Y: ±100			
25	1"	30	550	650	750	850	33.7	3.2	16 Bar
32	11/4"	30	550	650	750	850	42.4	3.2	
40	11/2"	30	550	650	750	850	48.3	3.2	
50	2"	30	620	720	820	920	60.3	3.6	
65	21/2"	60	620	720	820	920	76.1	3.6	
80	3"	60	670	770	870	970	88.9	4.0	
100	4"	60	670	770	870	970	114.3	4.5	
125	5"	60	710	910	1010	1110	139.7	5.0	
150	6"	60	710	910	1010	1110	165.0	5.0	
200	8"	60	760	960	1050	1160	219.1	4.5	
250	10"	60	860	1060	1150	1260	273.0	5.6	

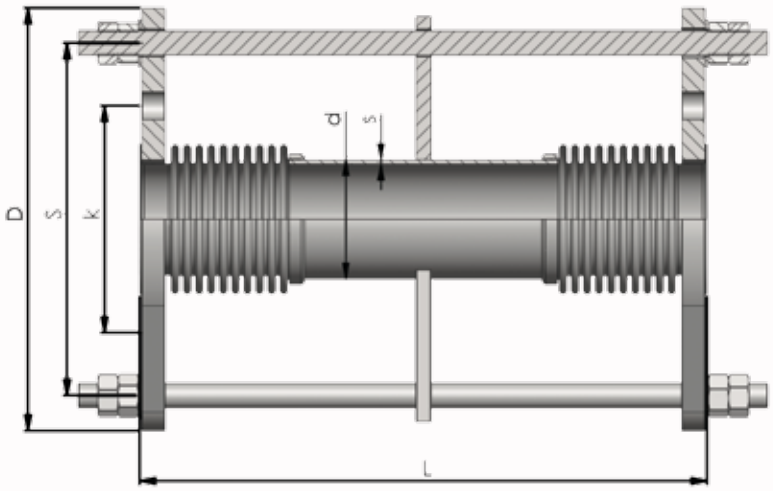
UNIVERSAL TIED EXPANSION JOINTS WITH FLANGES



Universal Tied Expansion Joints are used in buildings with different construction foundations. They are installation accessories in order to absorb large lateral motions resulted from subsidence and ground motion. Thus, pipelines are prevented from damage after possible motions.

Material Specifications

1	Below	AISI 304 Stainless Steel
2	Welding Ferrule	AISI 304 Stainless Steel
3	Connection Pipe	Carbon Steel
4	Flange	Carbon Steel
5	Limit Rod	Carbon Steel
6	Rove-Nut	Carbon Steel



Universal Tied Expansion Joint With Flanges Dimensions And Movements

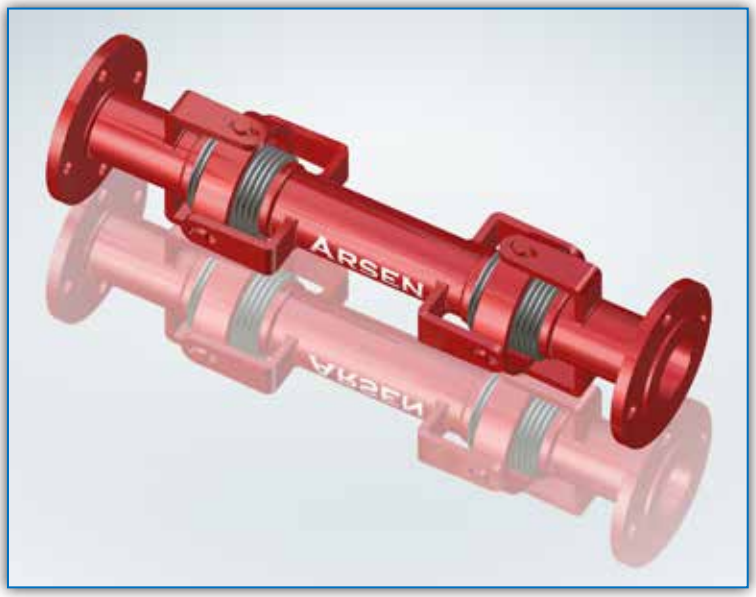
DIAMETER		L(mm)					D	S	k	d	s	Op. Pressure
		Movements (mm)										
DN	Inch	X	Y: ±25	Y: ±50	Y: ±75	Y: ±100						
25	1"	30	260	360	460	560	185	150	85	33.7	3.2	16 Bar
32	11/4"	30	260	360	460	560	210	180	100	42.4	3.2	
40	11/2"	30	260	360	460	560	220	185	110	48.3	3.2	
50	2"	30	360	460	560	660	250	205	125	60.3	3.6	
65	21/2"	60	360	460	560	660	270	225	145	76.1	3.6	
80	3"	60	410	510	610	710	310	250	160	88.9	4.0	
100	4"	60	410	510	610	710	330	270	180	114.3	4.5	
125	5"	60	460	660	760	860	366	305	210	139.7	5.0	
150	6"	60	460	660	760	860	420	350	240	165.0	5.0	
200	8"	60	510	700	800	900	510	410	295	219.1	4.5	
250	10"	60	600	800	900	1000	573	485	355	273.0	5.6	

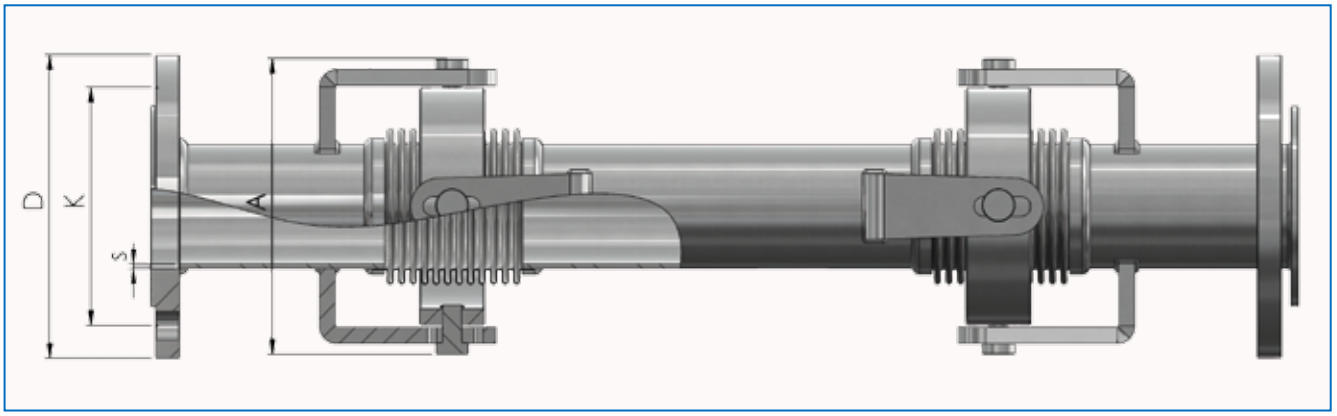
GIMBAL TYPE (SEISMIC) EXPANSION JOINTS WITH FLANGES

Seismic Expansion Joints are expansion joints with cranks used for absorbing axial, lateral and angular motions resulted from seismic motions (earthquakes) that occur in points with a risk of breaking.

When requested absorbing capability is higher than standard values, according to application they are used, they can be designed specifically for motion values calculated by project engineer.

Gimbal Type Seismic Expansion Joints are for protecting pipeline installation points and prevents them from damages resulted from seismic motions or subsidence.

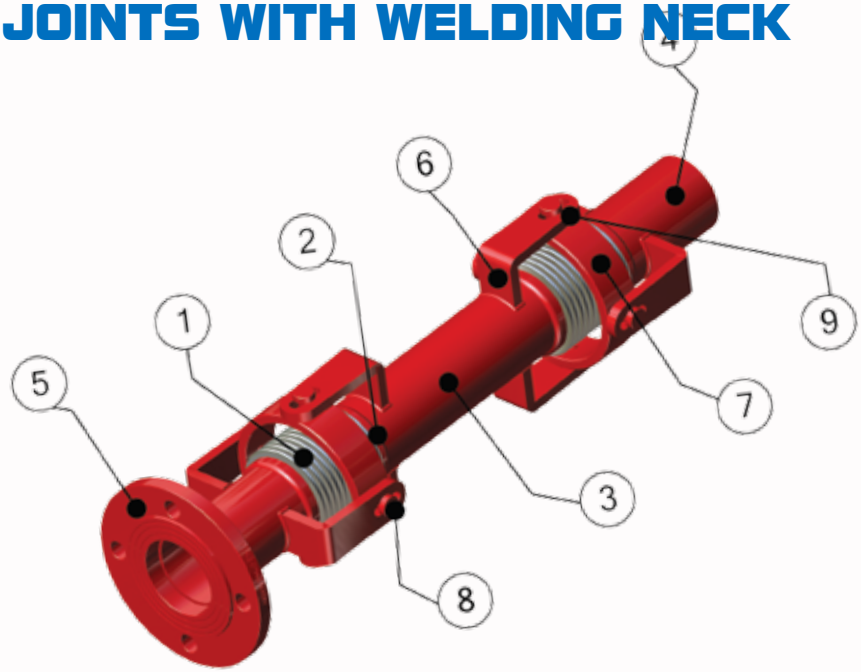




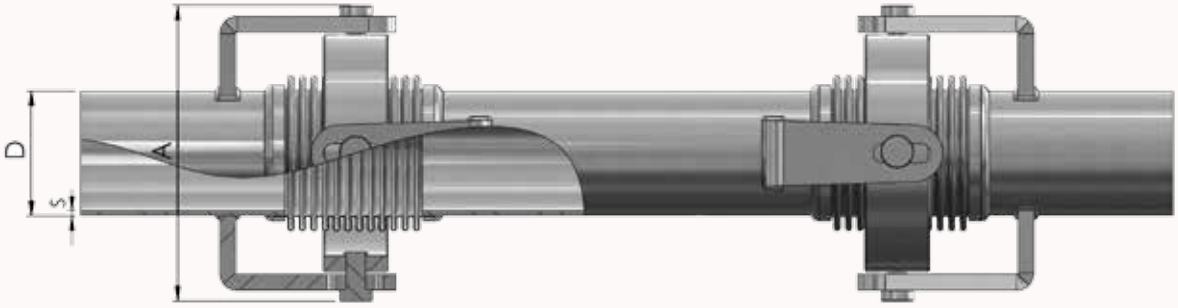
Gimbal Type (Seismic) Expansion Joint With Flanges Dimensions And Movements

DIAMETER		L(mm) Movements (mm)					D	K	s	A	Operating Pressure
DN	Inch	X	Y: ±50	Y: ±100	Y: ±150	Y: ±200					
25	1"	100	710	910	1110	1310	115	85	3.2	90	16 Bar
32	11/4"	100	710	910	1110	1310	140	100	3.2	105	
40	11/2"	100	710	910	1110	1310	150	110	3.2	115	
50	2"	100	770	970	1170	1380	165	125	3.6	140	
65	21/2"	100	770	970	1220	1480	185	145	3.6	160	
80	3"	100	820	1020	1250	1480	200	160	4.0	190	
100	4"	100	820	1020	1280	1530	220	180	4.5	250	
125	5"	100	950	1150	1460	1750	250	210	5.0	285	
150	6"	100	950	1150	1460	1750	285	240	5.0	350	
200	8"	100	1120	1340	1690	2040	340	295	4.5	420	
250	10"	100	1120	1340	1690	2040	405	355	5.6	540	

GIMBAL TYPE (SEISMIC) EXPANSION JOINTS WITH WELDING NECK



Material Specifications		
1	Below	AISI 304 Stainless Steel
2	Welding Ferrule	AISI 304 Stainless Steel
3	Connection Pipe	Carbon Steel
4	Welding Neck	Carbon Steel
5	Flange Collar	Carbon Steel
6	Joint	Carbon Steel
7	Joint Ferrule	Carbon Steel
8	Pin	Carbon Steel
9	Ring	Steel



Gimbal Type (Seismic) Exp. Joint With Welding Neck Dimensions And Movements

DIAMETER		L(mm) Movements (mm)					D	s	A	Operating Pressure
DN	Inch	X	Y: ±50	Y: ±100	Y: ±150	Y: ±200				
25	1"	100	730	930	1130	1330	33.7	3.2	90	16 Bar
32	11/4"	100	730	930	1130	1330	42.4	3.2	105	
40	11/2"	100	730	930	1130	1330	48.3	3.2	115	
50	2"	100	790	990	1190	1400	60.3	3.6	140	
65	21/2"	100	790	990	1240	1500	76.1	3.6	160	
80	3"	100	840	1040	1270	1500	88.9	4.0	190	
100	4"	100	840	1040	1300	1550	114.3	4.5	250	
125	5"	100	970	1170	1480	1770	139.7	5.0	285	
150	6"	100	970	1170	1480	1770	165.0	5.0	350	
200	8"	100	1140	1360	1710	2060	219.1	4.5	420	
250	10"	100	1140	1360	1710	2060	273.0	5.6	540	

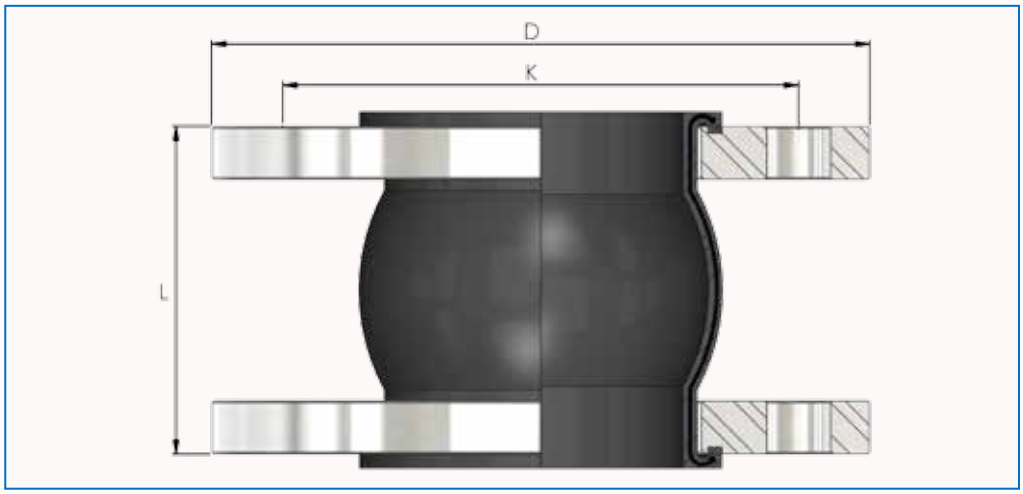
RUBBER EXPANSION JOINTS

Rubber Expansion Joints are installation accessories that can absorb axial, lateral and angular motions.

Rubber Expansion Joints are consist of rubber main body, steel wire and nylon cord reinforced special synthetic rubber.

Main advantages are easiness of installation with floating flanges, vibration and sound absorption, installation without additional need for seals.

Material and Use Specifications	
Bellow	EPDM (Optional: NBR, NR, Viton)
Flanges	GGG40.3 Cast Iron St37 Carbon Steel (Optional: Stainless Steel)
Diameter	DN32 / DN700
Temperature	100 °C



Rubber Expansion Joint Dimensions

		Movements			L (mm)	D	K	Operating Pressure
DN	Inch	Axial (mm)	Lateral (mm)	Angular (°)				
32	11/4"	-10/+7	10	10	100	140	100	16 Bar
40	11/2"	-10/+7	10	10	100	150	110	
50	2"	-10/+7	10	10	100	165	125	
65	21/2"	-13/+7	12	10	100	185	145	
80	3"	-16/+9	13	10	100	200	160	
100	4"	-20/+10	14	10	100	220	180	
125	5"	-20/+12	15	10	120	250	210	
150	6"	-20/+12	15	10	120	285	240	
200	8"	-25/+15	20	10	120	340	295	
250	10"	-25/+15	20	10	130	405	355	
300	12”	-25/+15	20	10	210	460	410	

TECHNICAL INFORMATION

The bellows parts of expansion joints are made of comparatively thin materials. Especially before welding around, product should be protected by means of wrapping the bellows part by a fireproof material in order to prevent it from clinkers or unintended impacts.

Axial expansion joints are produced only to absorb axial motions. Because of this, rolling bearings over the pipelines should be placed only to allow axial movements. On turning points, only fixed bearings should be used.

In order not to twist expansion joints, pipelines to be connected should necessarily be parallel during installation.

Calculated expansion and contraction points should be between two fixed points. One expansion joint should be placed between two anchored points and pretensioning should be applied as described below:

Waste materials that are potentially going to block movement by going into convolutions of bellows should be removed. Fluids that cause erosion on stainless steel like chlorine should not be used in cleaning.

Expansion joints are tested 1.5 times of rated pressure. While testing pipeline, maximum test pressure should not exceed this value.

Expansion joints should be protected from thermal shocks. Thermal shocks reduce expansion joint's life cycle.

Expansion lengths vary according to the temperature at the time of installation. In the table below, expansion lengths of carbon steel and stainless steel materials. If temperature at the time of installation is below or above 20 °C, difference from operating temperature either added or subtracted from the value using the values within table.

Example :

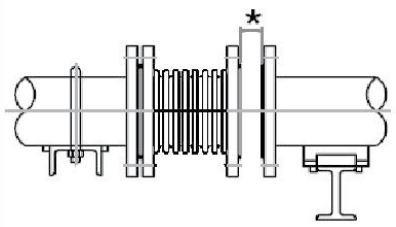
Let us assume a pipeline installation made of carbon steel in 100 meters length carrying steam at a temperature of 125 °C. In this case axial expansion is:

1. If installation temperature is 20°C : 1.26x100=126mm

2. If installation temperature is 0°C :1.48x100=148mm

3. If installation temperature is 35°C : 1.09x100=109mm

Proper pretensioning should be applied to expansion joints according to the examples below. For expansion joints with large diameters or with welded necks, this process can be done easily by placing puller or stretchers on welded necks.



Formula :

Pretensioning Value (*) = 0,5 [ΔLTmax – ΔLTmin – 0,5(-ΔL)]

Example :

Material: Carbon Steel

Dia. of Carbon Steel Pipe: DN100 / Pipe Length: 50m

Min. Op. Temperature: 0 °C / Max. Op. Temperature : 100 °C

0 °C Expansion Length = - 0.22 mm/mt x 50 mt = -11.00 mm

100 °C Expansion Length = +0.96 mm/mt x 50 mt = +48.00 mm

Total Expansion = 48.00 +11.00 = 59.00 mm

By selecting a moving 60mm (-40/+20mm) expansion joint :

Pretensioning Value (*) = 0.5 [ΔLTmax – ΔLTmin – 0.5(-ΔL)]

Pretensioning Value (*) = 0.5 [48.00 – 11.00 – 0.5x37] = 9.25 mm

Temperature		Thermal Expansion	
C°	F°	Carbon Steel	Stainless Steel
		(mm/m)	
-50	-58	-0.75	-1.13
-25	-13	-0.49	-0.74
0	32	-0.22	-0.33
25	77	0.05	0.08
50	122	0.34	0.50
75	167	0.64	0.93
100	212	0.95	1.36
125	257	1.26	1.80
150	302	1.58	2.24
175	347	1.91	2.69
200	392	2.25	3.14
225	437	2.60	3.59
250	482	2.95	4.05
275	527	3.32	4.51
300	572	3.69	4.98
325	617	4.07	5.45
350	662	4.46	5.92
375	707	4.86	6.40
400	752	5.26	6.90
425	797	5.68	7.39
450	842	6.10	7.89
475	887	6.52	8.38
500	932	6.94	8.89

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