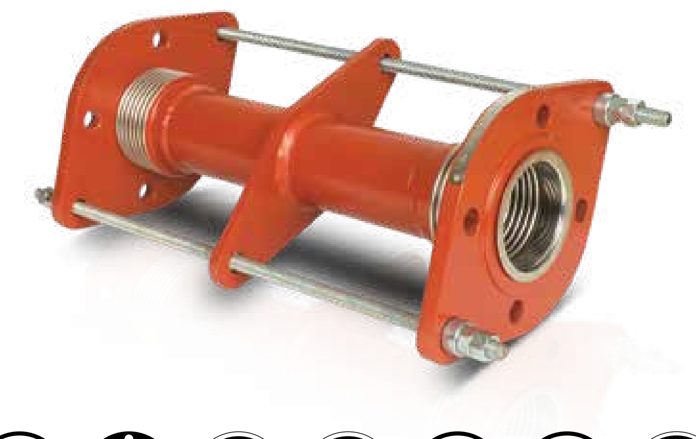
UNIVERSAL TIED EXPANSION JOINTS



Lateral movement is movement perpendicular to the bellow's longitudinal axis. Thermal movement in pipeline occured in two directions can be absorbed by using Lateral Epansion Joints. Universal tied expansion joints are made up of two bellows connected each other by an intermediate pipe and a system of tie rods able to withstand the thrust resulted of the internal pressure (restrained).

Movement Absorption

This type of expansion joints are used to absorb lateral deflections in all planes. Also, with a special
positioning of two tie rods at 180 degrees, the expansion becomes able to absorb lateral deflections and angular movements on single plane (2 rods max.) at the same time.

The absorption capacity of lateral expansion joints depend on the convolution number of the bellows on each side of the expansion joint. This amount can also be increased by changing the length of the intermediate pipe. The tie rods are also effective to prevent possible torsion forces.

Restrained Expansion Joints

Thrust force caused by the internal pressure is needed to be absorbed in order to keep the achors free from this force is some cases. Restraining parts like tie rods, higes or gimbals are designed (number & dimensions etc…) according to the pressure thrust. Expansion joints produced with these restraining parts are called restrained expansion joints.
Restrained lateral expansion joints must be free from axial movements and to be adjusted only for lateral movements.

Advantages of Universal Tied Expansion Joints

- Bellows design according to EJMA coding system.
- Construction according to EN14917 standard.
- Simple Design
- Relatively small load on anchors
- Large lateral movements by single expansion joint

Application Areas

- HVAC piping lines
- Exhaust Systems
- Vibration absorption
- Industrial process & applications
- Power generation & Energy plants

DESIGN (EN 14917&EJMA)

Bellow Material	Stainless Steel AISI 321 (Opt.304,316L,316TI,309)
Connection Types	Fixed and Floating Flanged, Welded Ended & Grooved
Flange Material	PN 16, St.37.2 as standard, the material can be customised on request
Inner Sleeve	Available in stainless steel AISI 321 (Opt. 304,316L,316TI,309) on request
Accessories	Inner sleeve, cover, counter flange, gaskets, insulation etc. are available on request.
Certificates	Material certificate 3.1 according to EN 10204 and /or ASME PED 2014/68/EU Cat.III Mod.H

Operation Conditions

Operating Temperature	10°C/+550°C
Operating Pressure	Standard pressure rating is PN16 Can be produced with different pressure rates PN 2,5-63 PN corresponds to the allowable operating pressure at room temperature

Important

We strongly advise against the use of expansion joints and bellows for misalignment.
Torsion on bellow parts are not desirable and should be eliminated.

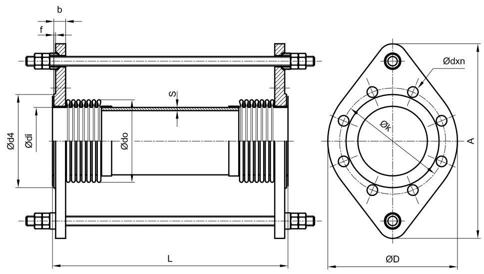
UNIVERSAL TIED EXPANSION JOINTS

Universal Tied Lateral Expansion Joints, Flanged					
Type	Lateral Movement		Axial Movement	Available Sizes (DN)	Pressure Class (PN)
DLTKF-25	±25mm	or	±15/±30mm	25-5000	16
DLTKF-50	±50mm		±15/±30mm	25-5000	16

*Given axial movement is only to define the bellows axial capacity, lateral expansion joints should not be used for absorbing axial movements.

**Lateral expansion joints can be converted to axial expansion joints by loosing the tie rods, which is not suggested as they loose the restraining features and become risky against squirm.

*** Special designed Universal Tied Expansion Joints with customized features are available on request.



Pressure reduction factor

The reduction factor is used to define the design pressure [PS] where temperatures exceed 20 °C. It compensates for the decay in material mechanical properties at elevated temperatures. The calculated pressure is lower than the nominal pressure of the standard item.
Calculation: PS ≤ PN x Kp

Reduction Factors for Pressure			
Temperature °C	Reduction Factor Kp	Temperature °C	Reduction Factor Kp
20	1,00	350	0,64
100	0,85	400	0,63
150	0,81	450	0,62
200	0,77	500	0,60
250	0,71	550	0,59
300	0,68	600	0,57

Flange (DIN EN 1092/1) PN 16						
DN	ØD	Øk	Ød4	f	b	Ødxn
DN25	115	85	68	2	16	Ø 14x4
DN32	140	100	78	2	18	Ø 18x4
DN40	150	110	88	3	18	Ø 18x4
DN50	165	125	102	3	20	Ø 18x4
DN65	185	145	122	3	20	Ø 18x4
DN80	200	160	138	3	20	Ø 18x8
DN100	220	180	158	3	22	Ø 18x8
DN125	250	210	188	3	22	Ø 18x8
DN150	285	240	212	3	24	Ø 23x8
DN200	340	295	268	3	26	Ø 23x12
DN250	405	355	320	3	29	Ø 27x12
DN300	460	410	378	4	32	Ø 27x12

Alternative flange dimensions are also possible e.g. according to US standards (ANSI), JIS etc.

Bellow				DLTKF-25			DLTKF-50		
DN	Ødi	Ødo	Effective Bellow Area cm²	Lateral Spring Rate N/mm	L	Code	Lateral Spring Rate N/mm	L	Code
DN25	38	48,2	14,58	4,0	250	702.070.201.002	2,0	350	702.070.202.002
DN32	42,4	55	18,62	3,0	250	702.070.201.004	1,0	350	702.070.202.004
DN40	48,3	61	23,44	5,0	250	702.070.201.006	2,0	350	702.070.202.006
DN50	60,3	76	36,46	5,0	350	702.070.201.008	3,0	450	702.070.202.008
DN65	76,1	95	57,45	7,0	350	702.070.201.010	4,0	450	702.070.202.010
DN80	88,9	111	78,42	11,0	400	702.070.201.012	6,0	500	702.070.202.012
DN100	114,3	140	137,09	14,0	400	702.070.201.014	8,0	500	702.070.202.014
DN125	139,7	164	181,01	20,0	450	702.070.201.016	9,0	650	702.070.202.016
DN150	168,3	200	266,20	30,0	450	702.070.201.018	12,0	650	702.070.202.018
DN200	219,1	250	431,86	117,0	500	702.070.201.020	53,0	700	702.070.202.020
DN250	273	323	697,11	53,0	600	702.070.201.022	27,0	800	702.070.202.022
DN300	323,9	380	972,37	74,0	750	702.070.201.024	43,0	950	702.070.202.024

*All dimensions given in the tables are in "mm".
** Subject to technical alterations and deviations resulting from production process without giving any notification.

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UNIVERSAL TIED EXPANSION JOINTS

Universal Tied Lateral Expansion Joints, Flanged					
Type	Lateral Movement		Axial Movement	Available Sizes (DN)	Pressure Class (PN)
DLTKF-75	±75mm	or	±15/±30mm	25-5000	16
DLTKF-100	±100mm		±15/±30mm	25-5000	16

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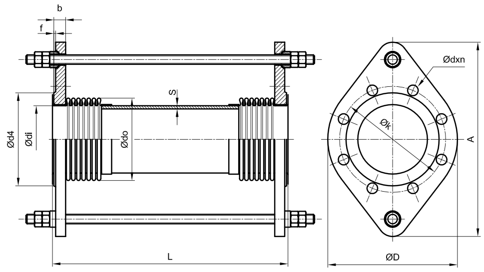
**Lateral expansion joints can be converted to axial expansion joints by loosing the tie rods, which is not suggested as they loose the restraining features and become risky against squirm.

*** Special designed Universal Tied Expansion Joints with customized features are available on request.



Pressure reduction factor

The reduction factor is used to define the design pressure [PS] where temperatures exceed 20 °C. It compensates for the decay in material mechanical properties at elevated temperatures. The calculated pressure is lower than the nominal pressure of the standard item.
Calculation: PS ≤ PN x Kp

Reduction Factors for Pressure			
Temperature °C	Reduction Factor Kp	Temperature °C	Reduction Factor Kp
20	1,00	350	0,64
100	0,85	400	0,63
150	0,81	450	0,62
200	0,77	500	0,60
250	0,71	550	0,59
300	0,68	600	0,57

Flange (DIN EN 1092/1) PN 16						
DN	ØD	Øk	Ød4	f	b	Ødxn
DN25	115	85	68	2	16	Ø 14x4
DN32	140	100	78	2	18	Ø 18x4
DN40	150	110	88	3	18	Ø 18x4
DN50	165	125	102	3	20	Ø 18x4
DN65	185	145	122	3	20	Ø 18x4
DN80	200	160	138	3	20	Ø 18x8
DN100	220	180	158	3	22	Ø 18x8
DN125	250	210	188	3	22	Ø 18x8
DN150	285	240	212	3	24	Ø 23x8
DN200	340	295	268	3	26	Ø 23x12
DN250	405	355	320	3	29	Ø 27x12
DN300	460	410	378	4	32	Ø 27x12

Alternative flange dimensions are also possible e.g. according to US standards (ANSI), JIS etc.

Bellow				DLTKF-75			DLTKF-100		
DN	Ødi	Ødo	Effective Bellow Area cm²	Lateral Spring Rate N/mm	L	Code	Lateral Spring Rate N/mm	L	Code
DN25	38	48,2	14,58	1,0	450	702.070.203.002	1,0	550	702.070.204.002
DN32	42,4	55	18,62	1,0	450	702.070.203.004	1,0	550	702.070.204.004
DN40	48,3	61	23,44	1,0	450	702.070.203.006	1,0	550	702.070.204.006
DN50	60,3	76	36,46	2,0	550	702.070.203.008	1,0	650	702.070.204.008
DN65	76,1	95	57,45	2,0	550	702.070.203.010	2,0	650	702.070.204.010
DN80	88,9	111	78,42	4,0	600	702.070.203.012	3,0	700	702.070.204.012
DN100	114,3	140	137,09	5,0	600	702.070.203.014	8,0	700	702.070.204.014
DN125	139,7	164	181,01	6,0	750	702.070.203.016	5,0	850	702.070.204.016
DN150	168,3	200	266,20	9,0	750	702.070.203.018	9,0	850	702.070.204.018
DN200	219,1	250	431,86	39,0	700	702.070.203.020	30,0	900	702.070.204.020
DN250	273	323	697,11	21,0	800	702.070.203.022	17,0	1000	702.070.204.022
DN300	323,9	380	972,37	35,0	1050	702.070.203.024	35,0	1150	702.070.204.024

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UNIVERSAL TIED EXPANSION JOINTS

Universal Tied Lateral Expansion Joints, Welded End					
Type	Lateral Movement		Axial Movement	Available Sizes (DN)	Pressure Class (PN)
DLTKKB-25	±25mm	or	±15/±30mm	25-5000	16
DLTKKB-50	±50mm		±15/±30mm	25-5000	16

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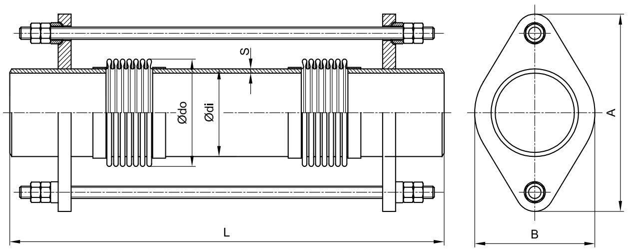

Bellow				DLTKKB-25			DLTKKB-50		
DN	Ødi	Ødo	Effective Bellow Area cm²	Lateral Spring Rate N/mm	L	Code	Lateral Spring Rate N/mm	L	Code
DN25	38	48,2	14,58	4,0	540	702.070.101.002	2,0	640	702.070.102.002
DN32	42,4	55	18,62	3,0	540	702.070.101.004	1,0	640	702.070.102.004
DN40	48,3	61	23,44	5,0	540	702.070.101.006	2,0	640	702.070.102.006
DN50	60,3	76	36,46	5,0	610	702.070.101.008	3,0	710	702.070.102.008
DN65	76,1	95	57,45	7,0	610	702.070.101.010	4,0	710	702.070.102.010
DN80	88,9	111	78,42	11,0	660	702.070.101.012	6,0	760	702.070.102.012
DN100	114,3	140	137,09	14,0	660	702.070.101.014	8,0	760	702.070.102.014
DN125	139,7	164	181,01	20,0	700	702.070.101.016	9,0	900	702.070.102.016
DN150	168,3	200	266,20	30,0	700	702.070.101.018	12,0	900	702.070.102.018
DN200	219,1	250	431,86	117,0	750	702.070.101.020	53,0	950	702.070.102.020
DN250	273	323	697,11	53,0	850	702.070.101.022	27,0	1050	702.070.102.022
DN300	323,9	380	972,37	74,0	1000	702.070.101.024	43,0	1200	702.070.102.024

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Reduction Factors for Pressure			
Temperature °C	Reduction Factor Kp	Temperature °C	Reduction Factor Kp
20	1,00	350	0,64
100	0,85	400	0,63
150	0,81	450	0,62
200	0,77	500	0,60
250	0,71	550	0,59
300	0,68	600	0,57

Pressure reduction factor

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Calculation: PS ≤ PN x Kp

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Universal Tied Lateral Expansion Joints, Welded End					
Type	Lateral Movement		Axial Movement	Available Sizes (DN)	Pressure Class (PN)
DLTKKB-75	±75mm	or	±15/±30mm	25-5000	16
DLTKKB-100	±100mm		±15/±30mm	25-5000	16

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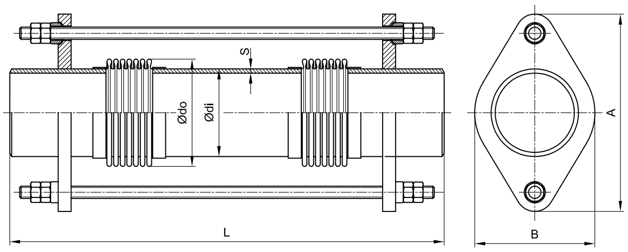

Bellow				DLTKKB-75			DLTKKB-100		
DN	Ødi	Ødo	Effective Bellow Area cm²	Lateral Spring Rate N/mm	L	Code	Lateral Spring Rate N/mm	L	Code
DN25	38	48,2	14,58	1,0	740	702.070.103.002	1,0	840	702.070.104.002
DN32	42,4	55	18,62	1,0	740	702.070.103.004	1,0	840	702.070.104.004
DN40	48,3	61	23,44	1,0	740	702.070.103.006	1,0	840	702.070.104.006
DN50	60,3	76	36,46	2,0	810	702.070.103.008	1,0	910	702.070.104.008
DN65	76,1	95	57,45	2,0	810	702.070.103.010	2,0	910	702.070.104.010
DN80	88,9	111	78,42	4,0	860	702.070.103.012	3,0	960	702.070.104.012
DN100	114,3	140	137,09	5,0	860	702.070.103.014	8,0	960	702.070.104.014
DN125	139,7	164	181,01	6,0	1000	702.070.103.016	5,0	1100	702.070.104.016
DN150	168,3	200	266,20	9,0	1000	702.070.103.018	9,0	1100	702.070.104.018
DN200	219,1	250	431,86	39,0	1050	702.070.103.020	30,0	1150	702.070.104.020
DN250	273	323	697,11	21,0	1150	702.070.103.022	17,0	1250	702.070.104.022
DN300	323,9	380	972,37	35,0	1300	702.070.103.024	35,0	1400	702.070.104.024

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Calculation: PS ≤ PN x Kp

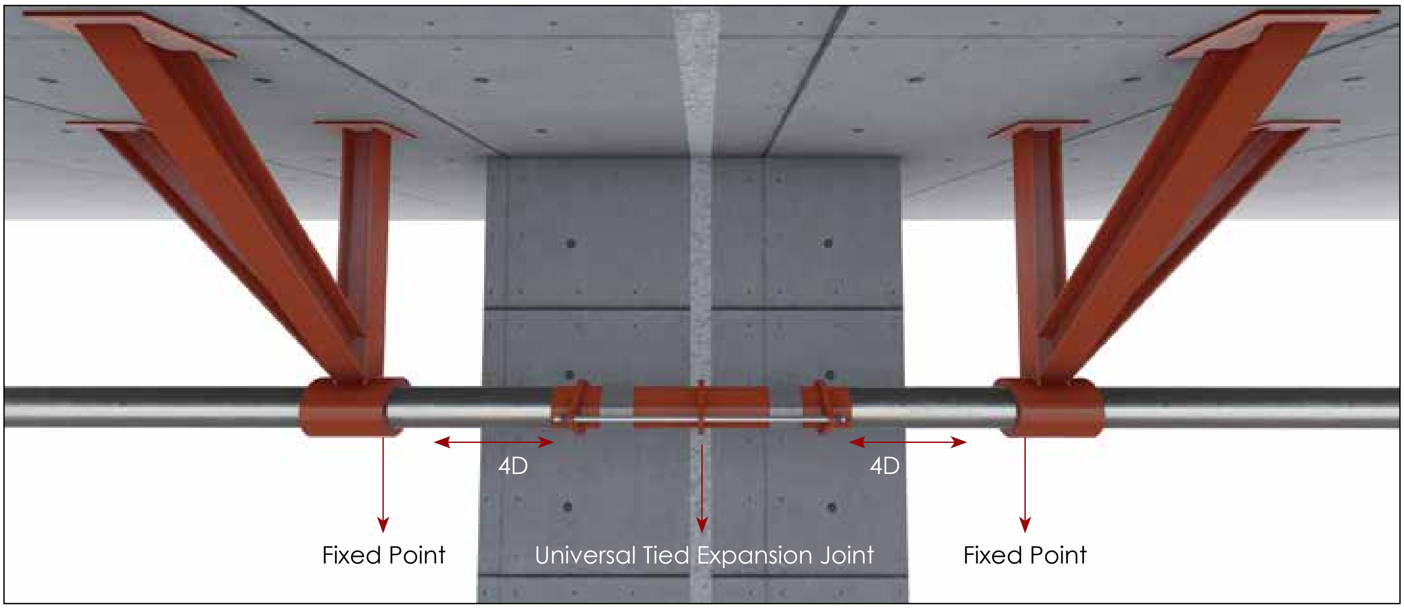
INSTALLATION OF DILATATION EXPANSION JOINT WITH LIMIT RODS

During a seismic motion, the pipelines are affected from the unforecasted movements just like the buildings. The most important points to be protected during such an event is the dilatation points.

What is Dilatation Point?
Modern buildings are consisted of multiple independent sections the areas between two building is called dilatation point. The pipelines are goes through from one building to another should be protected with seismic motion absorption joints.

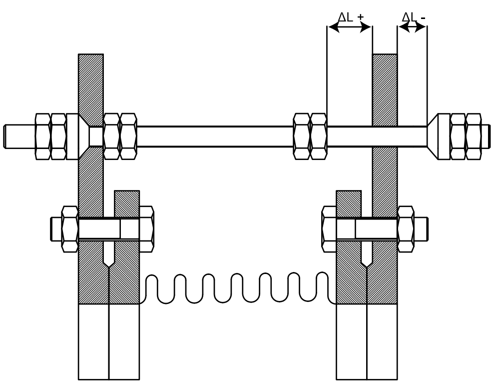
Why are the dilatation ponts so important?
Because of the different arcitectural and constructional features as well as the geological characteristics of the bases, the movements of buildings may differ. So, pipeline costructors should use 3D motion absorber at these areas. Appropriate expansion joints must be installed to the pipelines underneath the dilatation points.

Purpose of Dilatation Expansion Joints
• This type of expansion are able to make movement in all three axis.
• The movement amount must be selected according to building displacement amount.
• Rods on the expansion joints are not used for making the joints restrained againts the pressure thrust, only for limiting the axial movement capacity.
• Axial movement of the expansion joint could be adjsuted by the road openings.



A gap which is equal to the movement amount of the expansion joint should be left between the joint and the construction elements like walls and ceiling. Both ends of the expansion joint should be fixed to each building with the distance of 4D

Example
In case of a dilatation expansion joint with 100mm lateral deflection capacity to be installed at the dilatation point of 2 buildings, the expansion joint shoıld be placed in minimum 100mm distance from the ceiling, each ends should be fixed within 400mm.



Limit rod gaps are calculated through following formula

$$\Delta L_1 = a \cdot (T_{montaj} - T_{min.}) \cdot L$$
$$\Delta L_2 = a \cdot (T_{max.} - T_{montaj}) \cdot L$$

$T_{max.}$= Maximum temperature
T_{in} = Installation temperature
$T_{min.}$ = Minimum temperature

L = Length of pipe section
a = Thermal expansion coefficient