

DOUBLE GIMBAL EXPANSION JOINTS



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Gimbal type expansion joints are designed to permit angular rotation in any plane by the use of two pairs of hinges affixed to a common floating gimbal ring. Simply, a double gimbal expansion joint is consisted of two single gimbal expansion joints and an intermediate pipe connects them each other. The advantage of this arrangement is the ability to absorb a large lateral movement in any plane at each end.

Movement Absorption & Seismic Movement

Classical double gimbal expansion joints are used to absorb lateral & angular deflections in all planes. The gimbals of this expansion joints are designed as to withstand against pressure thrust and they are called restrained type expansion joints. The amount of lateral deflection depends on the convolution number of the bellows on each side and the length of the intermediate pipe.

Standard range of Ayvaz double gimbal expansion joints are designed mostly for fire protection lines where the deflections are not caused by thermal movements but seismic movements. In order to absorb the axial movements caused by the seismic movements, Ayvaz standard range expansion joints are finished with an axial movement capacity which is limited by the slot gap on the gimbals.

Advantages of Double Gimbal Seismic Expansion Joints

- Protects the pipeline systems against collapse and breakages by compensating seismic motions (earthquake) and large lateral and angular movements.
- FM approval for the safety features to be used at fire protection pipelines.
- Bellows design according to EJMA coding system.
- Construction according to EN14917 standard.
- Large lateral movements by single expansion joint.

Application Areas

- Fire Protection | HVAC piping lines

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	FM approval, Class 1920 PED 2014/68/EU Cat.III Mod.H Material certificate 3.1 according to EN 10204 and /or ASME

Operation Conditions

Operating Temperature	-10°C/+550°C
Operating Pressure	175 psi & 250 psi Can be produced with different pressure rates PN 2,5-64

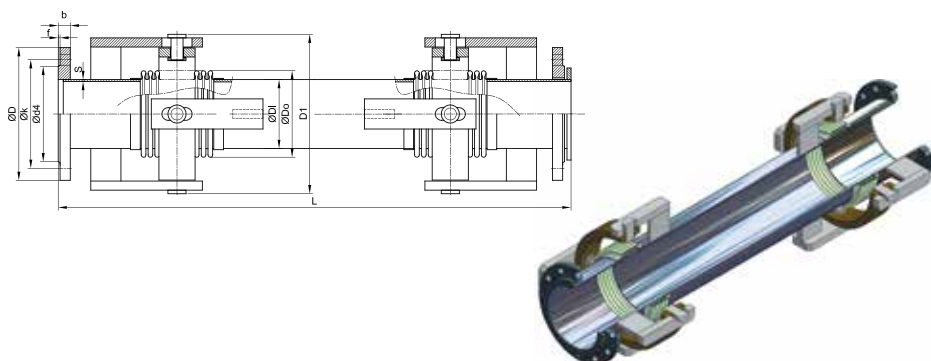
Important

For detailed information, get in contact with Ayvaz's expert sales team. We strongly advise against the use of expansion joints and bellows for misalignment. Torsion on bellow parts are not desirable and should be eliminated.

DOUBLE GIMBAL EXPANSION JOINTS

Double Gimbal Expansion Joints, Flanged				
Type	Lateral Movement	Axial Movement	Pressure Class	Available Sizes (DN)
SISKF-50	±50mm	±50mm	175 psi 250 psi	DN25-DN300 (FM approved) DN350-DN5000 (on request)
SISKF-100	±100mm	±50mm		
SISKF-150	±150mm	±50mm		
SISKF-200	±200mm	±50mm		

* Special designed Double Gimbal type Expansion Joints with customized features are available on request.



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.

DN	Bellow			D1	s	SISKKF-50					SISKKF-100				
	ØDi	ØD0	Effective Bellow Area cm ²			Movement			L	Code 175psi	Movement			L	Code 175psi
						± X	± Y	± Z			175psi 250psi	± X	± Y		
DN25	38	48,2	14,58	90	2,6	50	50	50	720	702.070.301.002	50	100	100	920	702.070.302.002
DN32	42,2	55	18,62	105	2,6	50	50	50	720	702.070.301.004	50	100	100	920	702.070.302.004
DN40	48,3	61	23,44	115	2,6	50	50	50	720	702.070.301.006	50	100	100	920	702.070.302.006
DN50	60,3	76	36,46	140	2,9	50	50	50	800	702.070.301.008	50	100	100	1000	702.070.302.008
DN65	76,1	95	57,45	160	2,9	50	50	50	800	702.070.301.010	50	100	100	1000	702.070.302.010
DN80	88,9	111	78,42	190	3,2	50	50	50	830	702.070.301.012	50	100	100	1030	702.070.302.012
DN100	114,3	140	137,09	250	3,6	50	50	50	850	702.070.301.014	50	100	100	1050	702.070.302.014
DN125	139,7	164	181,01	285	4	50	50	50	980	702.070.301.016	50	100	100	1180	702.070.302.016
DN150	168,3	200	266,20	350	4,5	50	50	50	980	702.070.301.018	50	100	100	1180	702.070.302.018
DN200	219,1	250	431,86	420	6,3	50	50	50	1140	702.070.301.020	50	100	100	1340	702.070.302.020
DN250	273	323	697,11	480	6,3	50	50	50	1140	702.070.301.022	50	100	100	1340	702.070.302.022
DN300	323,9	380	972,37	540	7,1	50	50	50	1200	702.070.301.024	50	100	100	1400	702.070.302.024

* All dimensions given in the tables are in "mm"

** Subject to technical alterations and deviations resulting from production process without giving any notification.

*** Contact Ayvaz sales team for the articles of 250psi version.

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

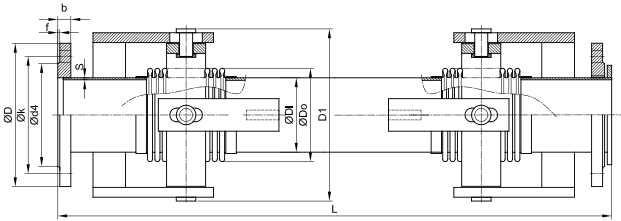
Pressure reduction factor

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: $PS \leq PN \times Kp$

DOUBLE GIMBAL EXPANSION JOINTS

Double Gimbal Expansion Joints, Flanged



DN	Bellow			D1	s	SISKF-150					SISKF-200				
	ØDi	ØD0	Effective Bellow Area cm ²			Expansion			L	Code 175psi	Expansion			L	Code 175psi
						± X	± Y	± Z	175psi 250psi		± X	± Y	± Z	175psi 250psi	
DN25	38	48,2	14,58	145	2,6	50	150	150	1120	702.070.303.002	50	200	200	1320	702.070.304.002
DN32	42,4	55	18,62	145	2,6	50	150	150	1120	702.070.303.004	50	200	200	1320	702.070.304.004
DN40	48,3	61	23,44	145	2,6	50	150	150	1120	702.070.303.006	50	200	200	1320	702.070.304.006
DN50	60,3	76	36,46	170	2,9	50	150	150	1200	702.070.303.008	50	200	200	1420	702.070.304.008
DN65	76,1	95	57,45	200	2,9	50	150	150	1250	702.070.303.010	50	200	200	1500	702.070.304.010
DN80	88,9	111	78,42	215	3,2	50	150	150	1270	702.070.303.012	50	200	200	1500	702.070.304.012
DN100	114,3	140	137,09	260	3,6	50	150	150	1300	702.070.303.014	50	200	200	1550	702.070.304.014
DN125	139,7	164	181,01	285	4	50	150	150	1480	702.070.303.016	50	200	200	1780	702.070.304.016
DN150	168,3	200	266,20	350	4,5	50	150	150	1480	702.070.303.018	50	200	200	1780	702.070.304.018
DN200	219,1	250	431,86	440	6,3	50	150	150	1700	702.070.303.020	50	200	200	2050	702.070.304.020
DN250	273	323	697,11	560	6,3	50	150	150	1700	702.070.303.022	50	200	200	2100	702.070.304.022
DN300	323,9	380	972,37	620	7,1	50	150	150	1750	702.070.303.024	50	200	200	2150	702.070.304.024

* All dimensions given in the tables are in "mm"

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Double Gimbal Expansion Joints, Welded End

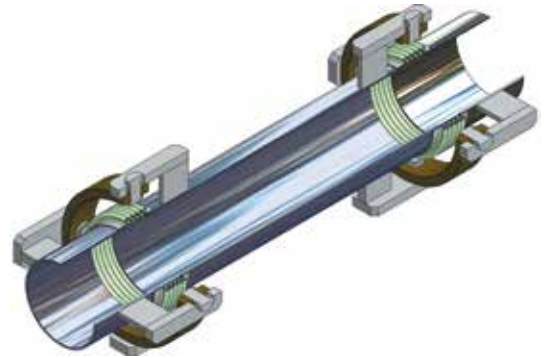
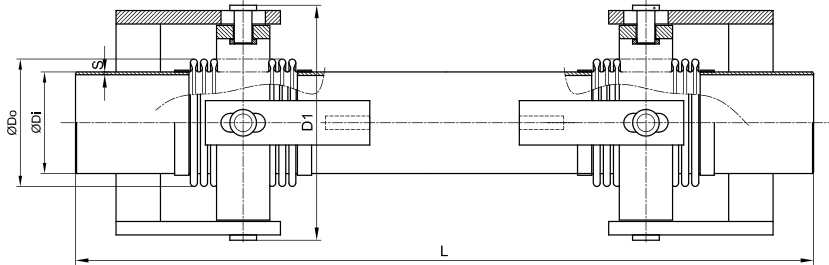
Available Types (Standard Versions)

Double Gimbal Expansion Joints, Welded End				
Type	Lateral Movement	Axial Movement	Pressure Class	Available Sizes (DN)
SISKB-50	±50mm	±50mm	175 psi 250 psi	DN25-DN300 (FM approved) DN350-DN5000 (on request)
SISKB-100	±100mm	±50mm		
SISKB-150	±150mm	±50mm		
SISKB-200	±200mm	±50mm		

* Special designed Double Gimbal type Expansion Joints with customized features are available on request.

DOUBLE GIMBAL EXPANSION JOINTS

Double Gimbal Expansion Joints, Welded End



DN	Bellow			D1	s	SISKB-50					SISKB-100				
	ØDi	ØD0	Effective Bellow Area cm ²			Expansion			L	Code 175psi	Expansion			L	Code 175psi
						± X	± Y	± Z			175psi	250psi	± X		
DN25	38	48,2	14,58	145	2,6	50	50	50	707	702.070.401.002	50	100	100	907	702.070.402.002
DN32	42,4	55	18,62	145	2,6	50	50	50	707	702.070.401.004	50	100	100	907	702.070.402.004
DN40	48,3	61	23,44	145	2,6	50	50	50	707	702.070.401.006	50	100	100	907	702.070.402.006
DN50	60,3	76	36,46	170	2,9	50	50	50	785	702.070.401.008	50	100	100	985	702.070.402.008
DN65	76,1	95	57,45	200	2,9	50	50	50	785	702.070.401.010	50	100	100	985	702.070.402.010
DN80	88,9	111	78,42	215	3,2	50	50	50	815	702.070.401.012	50	100	100	1015	702.070.402.012
DN100	114,3	140	137,09	260	3,6	50	50	50	835	702.070.401.014	50	100	100	1035	702.070.402.014
DN125	139,7	164	181,01	285	4	50	50	50	963	702.070.401.016	50	100	100	1163	702.070.402.016
DN150	168,3	200	266,20	350	4,5	50	50	50	963	702.070.401.018	50	100	100	1163	702.070.402.018
DN200	219,1	250	431,86	440	6,3	50	50	50	1120	702.070.401.020	50	100	100	1320	702.070.402.020
DN250	273	323	697,11	560	6,3	50	50	50	1120	702.070.401.022	50	100	100	1320	702.070.402.022
DN300	323,9	380	972,37	620	7,1	50	50	50	1177	702.070.401.024	50	100	100	1377	702.070.402.024

DN	Bellow			D1	s	SISKB-150					SISKB-200				
	ØDi	ØD0	Effective Bellow Area cm ²			Expansion			L	Code	Expansion			L	Code
						± X	± Y	± Z			175psi	250psi	± X		
DN25	38	48,2	14,58	145	2,6	50	150	150	1107	702.070.403.002	50	200	200	1307	702.070.404.002
DN32	42,4	55	18,62	145	2,6	50	150	150	1107	702.070.403.004	50	200	200	1307	702.070.404.004
DN40	48,3	61	23,44	145	2,6	50	150	150	1107	702.070.403.006	50	200	200	1307	702.070.404.006
DN50	60,3	76	36,46	170	2,9	50	150	150	1185	702.070.403.008	50	200	200	1405	702.070.404.008
DN65	76,1	95	57,45	200	2,9	50	150	150	1235	702.070.403.010	50	200	200	1485	702.070.404.010
DN80	88,9	111	78,42	215	3,2	50	150	150	1255	702.070.403.012	50	200	200	1485	702.070.404.012
DN100	114,3	140	137,09	260	3,6	50	150	150	1285	702.070.403.014	50	200	200	1535	702.070.404.014
DN125	139,7	164	181,01	285	4	50	150	150	1463	702.070.403.016	50	200	200	1763	702.070.404.016
DN150	168,3	200	266,20	350	4,5	50	150	150	1463	702.070.403.018	50	200	200	1763	702.070.404.018
DN200	219,1	250	431,86	440	6,3	50	150	150	1680	702.070.403.020	50	200	200	2030	702.070.404.020
DN250	273	323	697,11	560	6,3	50	150	150	1680	702.070.403.022	50	200	200	2080	702.070.404.022
DN300	323,9	380	972,37	620	7,1	50	150	150	1727	702.070.403.024	50	200	200	2127	702.070.404.024

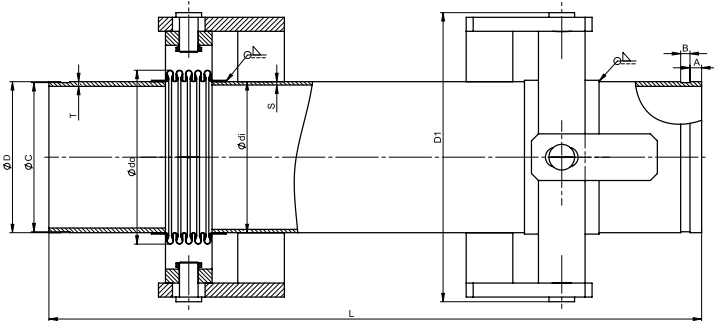
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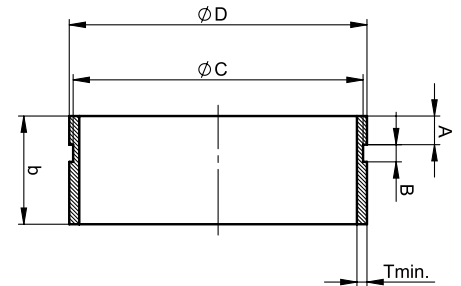
Double Gimbal Expansion Joints, Grooved End



Double Gimbal Expansion Joints, Grooved End				
Type	Lateral Movement	Axial Movement	Pressure Class	Available Sizes (DN)
SISKY-50	±50mm	±50mm	175 psi 250 psi	DN25-DN300 (FM approved) DN350-DN5000 (on request)
SISKY-100	±100mm	±50mm		
SISKY-150	±150mm	±50mm		
SISKY-200	±200mm	±50mm		

*Special designed Double Gimbal type Expansion Joints with customized features are available on request.

Groove Dimensions					
DN	A ±0,76	B ±0,76	T min	∅D	∅C
DN25	15,88	7,95	3,38	33,4	30,23
DN32	15,88	7,95	3,56	42,2	38,99
DN40	15,88	7,95	3,68	48,3	45,09
DN50	15,88	7,95	3,91	60,3	57,15
DN65	15,88	7,95	4,78	76,1	72,26
DN80	15,88	7,95	4,78	88,9	84,94
DN100	15,88	9,53	5,16	114,3	110,08
DN125	15,88	9,53	5,16	139,7	135,48
DN150	15,88	9,53	5,56	165,1	160,78
DN200	19,05	11,13	6,05	219,1	214,4
DN250	19,05	12,7	6,35	273	268,28
DN300	19,05	12,7	7,09	323,9	318,29



Alternative groove dimensions are also possible.

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

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: $PS \leq PN \times Kp$



DOUBLE GIMBAL EXPANSION JOINTS

DN	Bellow			D1	s	SISKBY-50					SISKBY-100				
	ØDi	ØD0	Effective Bellow Area cm ²			Expansion			L	Code 175psi	Expansion			L	Code 175psi
						± X	± Y	± Z	175psi 250psi		± X	± Y	± Z	175psi 250psi	
DN25	38	48,2	14,58	145	2,6	50	50	50	707	702.070.431.002	50	100	100	907	702.070.432.002
DN32	42,4	55	18,62	145	2,6	50	50	50	707	702.070.431.004	50	100	100	907	702.070.432.004
DN40	48,3	61	23,44	145	2,6	50	50	50	707	702.070.431.006	50	100	100	907	702.070.432.006
DN50	60,3	76	36,46	170	2,9	50	50	50	785	702.070.431.008	50	100	100	985	702.070.432.008
DN65	76,1	95	57,45	200	2,9	50	50	50	785	702.070.431.010	50	100	100	985	702.070.432.010
DN80	88,9	111	78,42	215	3,2	50	50	50	815	702.070.431.012	50	100	100	1015	702.070.432.012
DN100	114,3	140	137,09	260	3,6	50	50	50	835	702.070.431.014	50	100	100	1035	702.070.432.014
DN125	139,7	164	181,01	285	4	50	50	50	963	702.070.431.016	50	100	100	1163	702.070.432.016
DN150	168,3	200	266,20	350	4,5	50	50	50	963	702.070.431.018	50	100	100	1163	702.070.432.018
DN200	219,1	250	431,86	440	6,3	50	50	50	1120	702.070.431.020	50	100	100	1320	702.070.432.020
DN250	273	323	697,11	560	6,3	50	50	50	1120	702.070.431.022	50	100	100	1320	702.070.432.022
DN300	323,9	380	972,37	620	7,1	50	50	50	1177	702.070.431.024	50	100	100	1377	702.070.432.024

DN	Bellow			D1	s	SISKBY-150					SISKBY-200				
	ØDi	ØD0	Effective Bellow Area cm ²			Expansion			L	Code	Expansion			L	Code
						± X	± Y	± Z	175psi 250psi		± X	± Y	± Z	175psi 250psi	
DN25	38	48,2	14,58	145	2,6	50	150	150	1107	702.070.433.002	50	200	200	1307	702.070.434.002
DN32	42,4	55	18,62	145	2,6	50	150	150	1107	702.070.433.004	50	200	200	1307	702.070.434.004
DN40	48,3	61	23,44	145	2,6	50	150	150	1107	702.070.433.006	50	200	200	1307	702.070.434.006
DN50	60,3	76	36,46	170	2,9	50	150	150	1185	702.070.433.008	50	200	200	1405	702.070.434.008
DN65	76,1	95	57,45	200	2,9	50	150	150	1235	702.070.433.010	50	200	200	1485	702.070.434.010
DN80	88,9	111	78,42	215	3,2	50	150	150	1255	702.070.433.012	50	200	200	1485	702.070.434.012
DN100	114,3	140	137,09	260	3,6	50	150	150	1285	702.070.433.014	50	200	200	1535	702.070.434.014
DN125	139,7	164	181,01	285	4	50	150	150	1463	702.070.433.016	50	200	200	1763	702.070.434.016
DN150	168,3	200	266,20	350	4,5	50	150	150	1463	702.070.433.018	50	200	200	1763	702.070.434.018
DN200	219,1	250	431,86	440	6,3	50	150	150	1680	702.070.433.020	50	200	200	2030	702.070.434.020
DN250	273	323	697,11	560	6,3	50	150	150	1680	702.070.433.022	50	200	200	2080	702.070.434.022
DN300	323,9	380	972,37	620	7,1	50	150	150	1727	702.070.433.024	50	200	200	2127	702.070.434.024

* All dimensions given in the tables are in "mm"

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INSTALLATION OF GIMBAL TYPE SEISMIC DILATATION EXPANSION JOINTS

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 pounts so important?

Because of the different arcitectoral 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 Seismic 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.
- Gimbals on the expansion joints are not used for making the joints restrained against the pressure thrust, only for limiting the axial movement capacity.

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 should be placed in minimum 100mm distance from the ceiling, each ends should be fixed within 400mm.

