Belman

TYPE 49
WILLBRANDT RUBBER EXPANSION JOINT

Type 49 is a high-corrugated, highly elastic rubber expansion joint. Its high corrugation means that it has very low inherent resistance. It reduces up to 98 % of structure-borne noise. It is also characterised by very high movement absorption for a short installation length and variety of rubber qualities, which means that a suitable rubber compound is available for every application (see material descriptions).

Type 49 is primarily used in building technology, where it is used to absorb expansion, vibration and to insulate sound. It is also used in industrial applications, particularly in the field of weighing technology. Its very low inherent resistance makes it very suitable for decoupling scales / load cells.

Bellow design
High-corrugated rubber bellow with reinforcement and shaped sealing bead with core ring, self-sealing (no additional seals required). Suitable for swiveling flanges.

Vacuum resistance
Can be used up to -200 mbar without additional accories, full vacuum possible with vacuum supporting spiral/ring.

Flange version
Both sides with swiveling flange made of galvanized steel with threaded holes, drilled according to DIN PN 10 (standard). Other materials and dimensions are possible.

Approvals/Conformity
Similar to DIN 4809 / TÜV approved, drinking water and shipbuilding approval, FDA and EG 1935/2004 conform

SPECIFICATIONS FOR DN 32 - DN 80

Bellow		Bellow design			Permissible operating data								Short-	Surface
Colour code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)	°C	bar	°C	bar	°C	bar	°C	bar	term °C	resistance Ro [Ohm x cm]
Red		EPDM	PEEK	EPDM	-40	16	70	20	100	16	120	10	150	3×10^{3}
Blue		IIR	Polyamide	EPDM	-40	16	50	20	70	16	100	10	120	7×10^{6}
Yellow		NBR	Polyamide	CR	-20	16	50	20	70	16	90	10	100	1×10^{2}
White		NBR	Polyamide	CR	-20	16	50	20	70	16	90	10	100	1×10^{9}
Green		CSM	Polyamide	CSM	-20	16	50	20	70	16	100	10	110	3×10^{11}
Black-EPDM*		IIR	Polyamide	EPDM	-45	10	50	10	70	8	100	6	110	7×10^{6}

Bursting pressure: 75 bar
*Black EPDM 30 bar

Important information
For aggressive media, please see the resistance table (can be requested separately).

The bellows should not be painted or insulated. Please refer to the installation instructions.

We will be happy to send you further information on the individual types and designs.

APPLICATION

Type 49 A-red
For heating installations according to DIN 4809. For many years of operation under constant loading with hot water and heating water at 100 °C/110 °C at 10 bar/6 bar operating pressure. Electrically conductive surface. Not suitable for media with additives containing oil.

Type 49 blue
For drinking water, hot water, sea water, cooling water with chemical additives for treating water, saline solutions, weak acids and weak alkaline solutions. Not suitable for oil products or cooling water with additives containing oil. Electrially dissipative inner surface and electrically conductive outer surface.

Type 49 yellow
For oils, lubricants, fuels, gases, city and natural gas (not liquefied). Electrically conductive surface.

Type 49 white
For foodstuffs containing oil and fat (rubber in food-grade).
Electrically insulating inner surface, electrically conductive outer surface. Not suitable for drinking water.

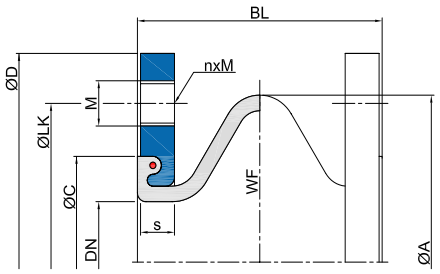
Type 49 green
For chemicals, aggressive chemical wastewater and compressor air containing oil. Electrically insulating sufrace.

Typ 49 schwarz, EPDM
For hot and cold water, sea water, cooling water, weak acids and alkali solutions, technical alcohols, esters and ketones. Electrically dissipative inner surface, conductive outer surface.
Max. pressure 10 bar.

DESIGN A - WITHOUT TIE RODS

Can be used for movement absorption in any direction (for combined movements, see the movement diagram in the technical appendix), noise and vibration insulation.

The expansion joint's reaction force must be absorbed via suitable piping.



DIMENSIONS FOR DESIGN A

DN	Length BL	Bellow		Flange PN 10*2					Movement absorption AX		LA	AN	CØ	Weight
		ØA	WF*1	ØD	ØPCD	M	n	s	+	-	+/-	∠°		
	mm	mm	mm²	mm	mm			mm	mm	mm	mm	+/-	mm	kg
32	100	110	1800	140	100	M16	4	16	20	30	30	7	79	3.0
40	100	110	1800	150	110	M16	4	16	20	30	30	7	79	3.6
50	100	120	3500	165	125	M16	4	16	20	30	30	7	89	4.4
65	100	135	5600	185	145	M16	8	16	20	30	30	7	104	5.3
80	100	150	8700	200	160	M16	8	18	20	30	30	7	119	6.5
100	100	170	13000	220	180	M16	8	18	20	30	30	7	142	7.3
125	100	195	19000	250	210	M16	8	18	20	30	30	7	169	8.9
150	100	260	26300	285	240	M20	8	20	20	30	30	7	195	12.3
175	100	310	41600	315	270	M20	8	20	20	30	30	7	245	16.2
200	100	310	41600	340	295	M20	8	20	20	30	30	7	245	16.2
250	100	360	60700	395	350	M20	12	20	20	30	30	7	295	20.3
300	100	410	83000	445	400	M20	12	20	20	30	30	7	345	23.1
350	100	460	110000	505	460	M20	16	20	20	30	30	7	396	30.1
400	110	515	138500	565	515	M24	16	25	20	30	30	7	450	43.2
500	110	615	209100	670	620	M24	20	25	20	30	30	7	550	53.8

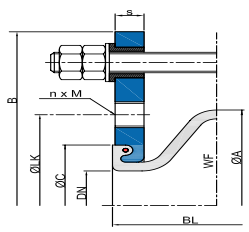
Permissible degree of utilisation for movement areas:
- up to 50 °C: Utilisation ~ 100 %
- up to 70 °C: Utilisation ~ 75 %
- up to 90 °C: Utilisation ~ 60 %

*1 WF = effective area
*2 Other standards/dimensions possible.

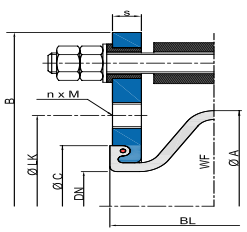
LENGTH LIMITERS

There is a selection of various length limiters / tie rods to absorb the reaction force and to protect the bellow from overstretching or collapsing:

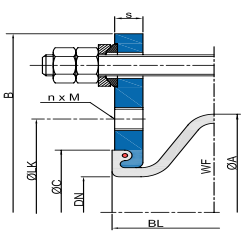
Design B*
with tie rods



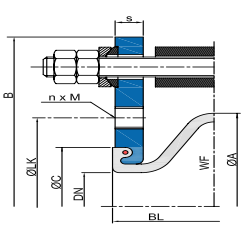
Design C*
with tie rods/thrust limiters



Design E
with tie rods and spherical washers/conical sockets



Design S
with tie rods/thrust limiters and spherical washers/conical sockets



*Note: In Designs B and C the lateral movement absorption is reduced by around 50 %.

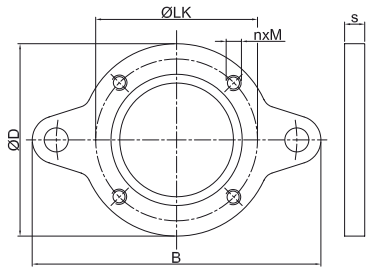
Accessories

- Vacuum supporting spirals / rings
- Guide sleeves
- Potential equalisation
- Flame-resistant protective covers
- Dust and splash protection covers
- Earth cover hoods

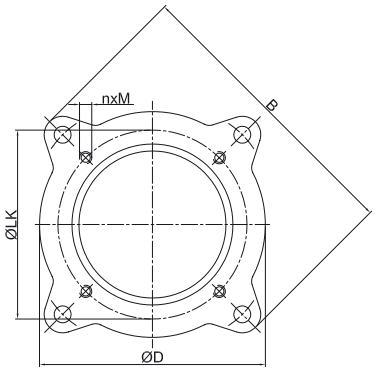
FLANGE DIMENSIONS FOR DESIGNS WITH TIE RODS

DN	Length	Flange PN 10 (example dimensions)				S	
	BL mm	B mm	ØD mm	ØPCD mm	M	n	ØC
32	100	230	140	100	M16		
40	100	240	150	110	M16		
50	100	255	165	125	M16		
65	100	275	185	145	M16		
80	100	290	200	160	M16	4	16	79
100	100	310	220	180	M16	4	16	79
125	100	340	250	210	M16	4	16	89
150	100	375	285	240	M20	8	16	104
175	100	415	315	270	M20	8	18	119
200	100	440	340	295	M20	8	18	142
250	100	509	395	350	M20	8	18	169
300	100	559	445	400	M20	8	20	195

DN 32 - DN 200



DN 250 - DN 500



Important information
Various bolt packs (SU) are available for the standard design.
Please note the appropriate fixed point constructions and plain bearings in your piping system! For more information please refer to our installation instructions.
We will be happy to send you further information on the individual types and designs.

AXIAL STIFFNESS RATES

DN	Length BL	Stiffness rates (average value form full way)								
	mm	0 bar N/mm	1 bar N/mm	2,5 bar N/mm	3 bar N/mm	6 bar N/mm	10 bar N/mm	12 bar N/mm	16 bar N/mm	25 bar N/mm
32	100	14	30	56	62	116	180	163	264	186
40	100	14	30	56	62	116	180	163	264	186
50	100	12	30	66	76	142	220	161	332	184
65	100	14	45	87	99	189	286	187	414	214
80	100	33	75	135	150	258	396	172	555	196
100	100	28	80	156	176	320	480	243	684	278
125	100	30	95	186	218	374	580	267	819	305
150	100	8,0	68	144	248	320	528	292	792	333
200	100	42	90	178	204	370	594	381	808	435
250	100	20	112	224	256	480	768	422	1136	482
300	100	22	108	236	277	520	854	447	1338	510
350	100	28	128	270	310	570	940	595	1510	679
400	110	44	140	296	342	646	1052	734	1660	838
500	110	46	172	354	416	792	1264	866	2000	988

Warning: Deviations (+/-25 %) in the stiffness rates may occur due to use of different materials and manufacturing processes.

LATERAL STIFFNESS RATES

DN	Length BL	Stiffness rates (average value form full way)								
	mm	0 bar N/mm	1 bar N/mm	2,5 bar N/mm	3 bar N/mm	6 bar N/mm	10 bar N/mm	12 bar N/mm	16 bar N/mm	25 bar N/mm
32	100	11	17	27	30	45	63	68	79	109
40	100	11	17	27	30	45	63	68	79	109
50	100	17	35	47	54	79	107	117	138	191
65	100	21	37	61	61	96	136	150	177	250
80	100	32	56	92	94	144	204	225	266	376
100	100	38	77	112	123	180	243	266	312	430
125	100	45	88	133	150	225	315	348	415	586
150	100	48	80	116	123	188	265	292	347	489
200	100	103	155	221	238	343	473	526	633	894
250	100	126	208	179	308	442	603	659	771	1067
300	100	167	267	337	400	550	750	836	1008	1421
350	100	137	263	385	418	587	833	922	1100	1562
400	110	187	293	423	457	633	900	996	1187	1686
500	110	203	380	536	573	840	1140	1249	1466	2029

Warning: Deviations (+/-25 %) in the stiffness rates may occur due to use of different materials and manufacturing processes.

ANGULAR STIFFNESS TORQUE

DN	Length BL mm	Stiffness torque (averages value from full way)								
		0 bar Nm/°	1 bar Nm/°	2,5 bar Nm/°	3 bar Nm/°	6 bar Nm/°	10 bar Nm/°	12 bar Nm/°	16 bar Nm/°	25 bar Nm/°
32	100	0,1	0,3	0,6	0,6	1,2	1,8	1,6	2,6	1,8
40	100	0,1	0,3	0,6	0,6	1,2	1,8	1,6	2,6	1,8
50	100	0,2	0,4	0,9	1,0	1,9	2,9	2,1	4,4	2,4
65	100	0,3	0,8	1,6	1,8	3,5	5,3	3,5	7,6	3,9
80	100	0,8	1,9	3,4	3,8	6,5	10,0	4,3	14,0	4,9
100	100	1,0	2,9	5,7	6,4	11,6	17,4	8,8	24,8	10,1
125	100	1,6	5,0	9,8	11,4	19,6	30,4	14,0	42,9	16,0
150	100	0,7	5,9	12,5	21,5	27,8	45,9	25,3	68,8	28,9
200	100	5,7	12,1	24,0	27,5	49,9	80,0	51,3	108,9	58,6
250	100	4,0	22,1	44,3	50,6	94,9	151,8	83,5	224,6	95,3
300	100	5,9	28,8	62,9	73,8	138,6	227,6	119,0	356,6	135,8
350	100	9,9	45,1	95,2	109,3	201,0	331,4	209,7	532,4	239,4
400	110	19,7	62,8	132,8	153,5	289,9	472,1	329,3	744,9	375,8
500	110	30,9	115,4	237,5	279,1	531,3	848,0	580,8	1341,7	662,9

Warning: Deviations (+/-25 %) in the stiffness torque may occur due to use of different materials and manufacturing processes.