WILLBRANDT **Rubber Expansion Joint Type 51**

DN 32 - DN 600

Type 51 is a low-corrugated rubber expansion joint. Its low corrugation helps to achieve very low flow resistance. It reduces up to 70 % incoming energy. It is also characterised by its high level of pressure resistance. Type 51 is produced in four rubber qualities, which means that a suitable rubber compound is available for almost every application (see material descriptions on the following pages).

Type 51 is primarily used in industrial plants to absorb expansion, vibration and to insulate sound.

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

Vacuum resistance
- DN 32 to 50 vacuum-resistant without additional accessories
- DN 65 to 250 up to -200 mbar without additional accessories
- DN 300 to 1000 not vacuum-resistant without additional accessories
- DN 65 to 1000 vacuum-resistant with vacuum supporting spiral/ring

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

Accessories
- Guide sleeves
- Potential equalisation
- Flame-resistant protective covers
- Dust and splash protection covers
- Earth cover / sun protection hoods
- Segment tie rods

Specifications for DN 32 - DN 600

Bellow		Bellow design			Permissible operating data						
Colour code	Colour marking	Core (inner)	Reinforcement	Cover (outer)	°C	bar	°C	bar	°C	bar	Short-term °C
red-blue		IIR-D	Aramid	EPDM	80	25	120	16	130	10	140
green-blue		CSM	Aramid	CSM	50	25	90	16	120	10	130
lilac		FPM	Aramid	ECO	50	25	120	16	150	4	160
yellow-blue		NBR	Aramid	CR	50	25	90	16	120	10	130

Bursting pressure: 75 bar

Application

Type 51 red-blue
For hot water, sea water, cooling water with chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Not suitable for oil products or cooling water with additives containing oil, hot air or steam.

Type 51 green-blue
For chemicals, aggressive chemical wastewater and compressor air containing oil.

Type 51 lilac
For flue gas desulphurisation systems and bio-diesel. Good resistance to benzene, xylene, toluene, fuels with an aromatic content of more than 50 %, aromatic/chlorinated hydrocarbons and mineral acids. Not suitable for water or steam.

Type 51 yellow-blue
For oils, lubricants, fuels, gases, city and natural gas (not liquefied).

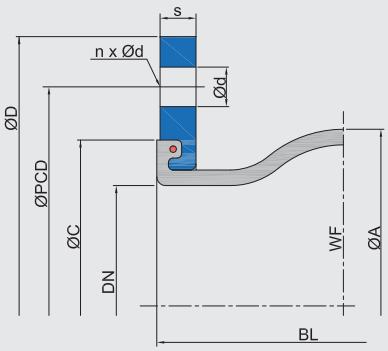
Note!
Detailed material descriptions on pages 5 - 7.

WILLBRANDT **Rubber Expansion Joint Type 51**

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.

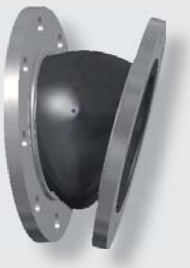
The expansion joints reaction force must be absorbed via suitable piping.



axial -

axial +

lateral ±



angular ±

Dimensions for Design A

DN	Length	Bellow		Flange PN 10*2						Movement absorption				Weight
	BL	ØA	WF*1	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral ±	angular ±	
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	∠°	kg
32	**130**	81	2700	140	100	18	4	15	79	10	20	15	20	3.2
40	**130**	86	2700	150	110	18	4	15	79	10	20	15	20	3.6
50	**130**	96	3200	165	125	18	4	15	88	10	20	15	20	3.8
65	**130**	110	5300	185	145	18	8	15	104	10	20	15	20	5.4
80	**130**	122	8500	200	160	18	8	15	119	15	20	15	20	7.0
100	**130**	142	12800	220	180	18	8	15	142	15	20	15	20	8.0
125	**130**	170	18700	250	210	18	8	18	169	15	20	15	20	9.7
150	**130**	196	25900	285	240	23	8	18	195	15	20	15	20	13.0
200	**130**	256	40900	340	295	23	8	20	244	15	20	15	15	16.6
250	**130**	306	59900	395	350	23	12	20	295	15	20	15	10	21.9
300	**130**	356	82200	445	400	23	12	22	351	15	20	15	10	25.2
350	**200**	442	117600	505	460	22	16	24	400	15	20	15	10	39.2
400	**200**	495	154700	565	515	26	16	25	450	20	25	20	8	38.8
450	**250**	545	227900	615	565	26	20	25	512	20	25	20	6	54.0
500	**250**	595	227900	670	620	26	20	30	563	20	25	20	6	57.3
600	**250**	695	311500	780	725	30	20	30	675	20	25	20	6	77.1

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

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 %

Important information

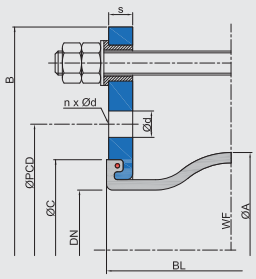
Please note the appropriate fixed point constructions and plain bearings in your piping system! For more information please refer to our installation instructions.
For information on the tie rods, please see the technical appendix (p. 89 - 92)!
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 51**

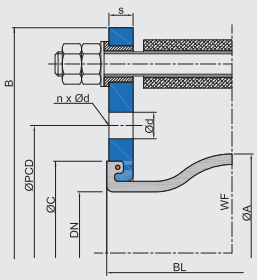
Length limiters

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

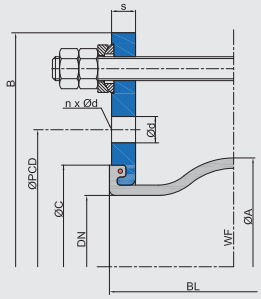
Design B*
with tie rods



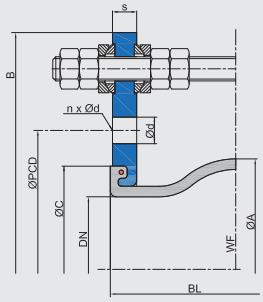
Design C*
with tie rods/thrust limiters



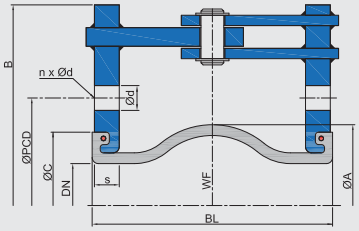
Design E
with tie rods and spherical washers/conical sockets



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



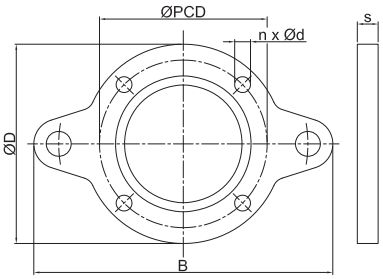
Design F
with hinge



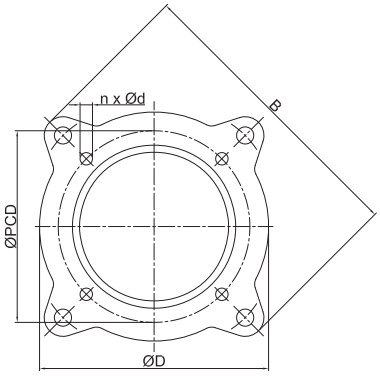
*Note: For Designs B and C
the lateral movement absorption is reduced by around 50 %.

Flange dimensions for designs with tie rods

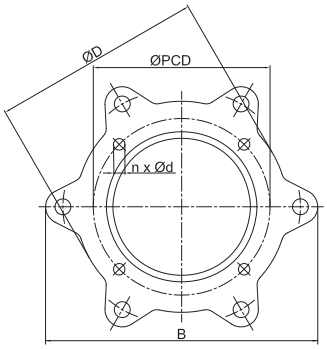
DN	Length	Flange PN 10 (example dimensions)						
	BL	B	ØD	ØPCD	Ød	n	s	ØC
	mm	mm	mm	mm	mm		mm	mm
32	**130**	230	140	100	18	4	15	79
40	**130**	240	150	110	18	4	15	79
50	**130**	255	165	125	18	4	16	88
65	**130**	275	185	145	18	8	16	104
80	**130**	290	200	160	18	8	18	119
100	**130**	310	220	180	18	8	18	142
125	**130**	340	250	210	18	8	18	169
150	**130**	375	285	240	23	8	18	195
200	**130**	440	340	295	23	8	20	244
250	**130**	509	395	350	23	12	20	295
300	**130**	559	445	400	23	12	22	351
350	**200**	619	505	460	22	16	24	400
400	**200**	700	565	515	26	16	25	450
450	**250**	760	615	565	26	20	30	512
500	**250**	810	670	620	26	20	30	563
600	**250**	930	780	725	30	20	30	675



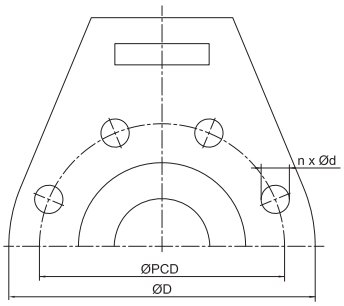
DN 32 - 200



DN 250 - 900



DN 1000



DN 50 - 1000 (Design F)

WILLBRANDT **Rubber Expansion Joint Type 51**

Axial stiffness rates

DN	Overall length BL mm	Stiffness rates (averages value from full way) 0 bar N/mm	2.5 bar N/mm	4 bar N/mm	6 bar N/mm	10 bar N/mm	16 bar N/mm	25 bar N/mm
50	**130**	47	97	187	256	330	430	558
65	**130**	61	134	252	379	480	624	811
80	**130**	82	170	305	434	543	706	918
100	**130**	95	191	315	559	743	966	1256
125	**130**	111	216	419	655	863	1122	1459
150	**130**	127	268	496	770	1024	1332	1731
200	**130**	148	267	541	842	1089	1416	1841
250	**130**	160	315	591	927	1185	1540	2002
300	**130**	182	367	663	974	1307	1699	2208
350	**200**	189	318	627	1018	1352	1757	2285
400	**200**	200	339	671	696	1417	1842	2395
450	**250**	217	416	755	1174	1511	1964	2553
500	**250**	255	489	892	1378	1773	2305	2997
600	**250**	270	380	900	1460	1873	2435	3166

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

Lateral stiffness rates

DN	Overall length BL mm	Stiffness rates (averages value from full way) 0 bar N/mm	2.5 bar N/mm	4 bar N/mm	6 bar N/mm	10 bar N/mm	16 bar N/mm	25 bar N/mm
50	**130**	65	85	104	137	189	245	319
65	**130**	52	101	150	195	215	279	363
80	**130**	46	96	177	202	225	292	380
100	**130**	72	114	186	218	250	324	422
125	**130**	130	260	339	381	498	647	841
150	**130**	156	338	402	476	606	788	1024
200	**130**	420	940	1087	1234	1585	2060	2678
250	**130**	492	1048	1329	1525	1923	2500	3249
300	**130**	510	1088	1388	1581	2005	2606	3388
350	**200**	397	793	991	1138	1427	1856	2412
400	**200**	439	835	1062	1230	1559	2026	2634
450	**250**	445	831	1067	1262	1560	2028	2636
500	**250**	554	1063	1362	1565	1944	2527	3285
600	**250**	593	1084	1381	1684	2062	2680	3484

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

Important information

Please note the appropriate fixed point constructions and plain bearings in your piping system! For more information please refer to our installation instructions.
For information on the tie rods, please see the technical appendix (p. 89 - 92)!
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 51**

Angular stiffness torque

DN	Overall length BL mm	Stiffness torque (averages value from full way) 0 bar Nm/°	2.5 bar Nm/°	4 bar Nm/°	6 bar Nm/°	10 bar N/mm	16 bar Nm/°	25 bar Nm/°
50	**130**	1	1	2	3	4	5	6
65	**130**	1	2	4	6	7	9	12
80	**130**	2	4	6	9	11	15	19
100	**130**	3	6	10	17	23	30	38
125	**130**	5	10	19	30	39	51	66
150	**130**	8	17	31	48	63	83	107
200	**130**	16	29	59	92	119	154	201
250	**130**	26	51	96	151	193	251	327
300	**130**	42	84	152	224	300	390	507
350	**200**	60	101	200	325	432	561	729
400	**200**	85	143	283	294	599	778	1012
450	**250**	114	218	396	615	791	1029	1337
500	**250**	162	311	567	877	1128	1467	1907
600	**250**	242	339	804	1305	1674	2176	2829

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

Frictional force

DN	Overall length BL mm	for Designs E and M Frictional force N/bar	for Design F Frictional moment Nm/bar
32	**130**	7	0.3
40	**130**	7	0.3
50	**130**	12	0.3
65	**130**	20	0.5
80	**130**	35	1.0
100	**130**	51	1.4
125	**130**	75	2.1
150	**130**	118	4.4
200	**130**	167	6.2
250	**130**	243	11.2
300	**130**	335	15.4
350	**200**	120	17.0
400	**200**	160	22.9
450	**250**	226	40.5
500	**250**	266	63.5
600	**250**	634	138.5

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

Important information

Please note the appropriate fixed point constructions and plain bearings in your piping system!
For more information please refer to our installation instructions.
For information on the tie rods, please see the technical appendix (p. 89 - 92)!
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 51 PTFE**

DN 32 - DN 300

Type 51 PTFE is a low-corrugated, PTFE-lined rubber expansion joint. Its low corrugation helps it to achieve very low flow resistance. The PTFE lining gives the expansion joint high chemical resistance or an anti-adhesive property.

The PTFE lining can be used for any rubber compound on Type 51. It is however necessary to ensure that the selected rubber compound achieves the highest possible media resistance, as this is the only way to achieve optimum service life.

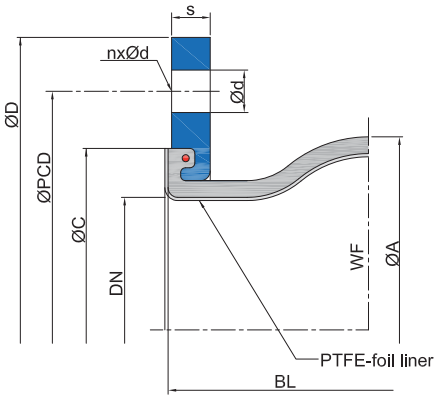
Dimensions

DN	Length	Bellow		Flange PN 10*2						Movement absorption			
	BL	ØA	WF*1	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral ±	angular ±
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	∠°
32	**130**	81	2700	140	100	18	4	15	79	15	15	15	10
40	**130**	86	2700	150	110	18	4	15	79	15	15	15	10
50	**130**	96	3200	165	125	18	4	15	88	15	15	15	10
65	**130**	110	5300	185	145	18	8	15	104	15	15	15	10
80	**130**	122	8500	200	160	18	8	15	119	15	15	15	10
100	**130**	142	12800	220	180	18	8	15	142	15	15	15	10
125	**130**	170	18700	250	210	18	8	18	169	15	15	15	10
150	**130**	196	25900	285	240	23	8	18	195	15	15	15	10
200	**130**	256	40900	340	295	23	8	20	244	15	15	15	4
250	**130**	306	59900	395	350	23	12	20	295	15	15	15	4
300	**130**	356	82200	445	400	23	12	22	351	15	15	15	4

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

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 %

Pressure resistance	Max. 9 bar operating pressure
Conformity	FDA and EG 1935/2004
Vacuum resistance	Only limited suitable for vacuum operation. A PTFE vacuum supporting ring, which allows full vacuum for small nominal diameters, can be used from DN 50. The PTFE supporting ring can only be used up to 50 °C. DN 32 and DN 40 expansion joints are not suitable for vacuum operation.



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. ++++