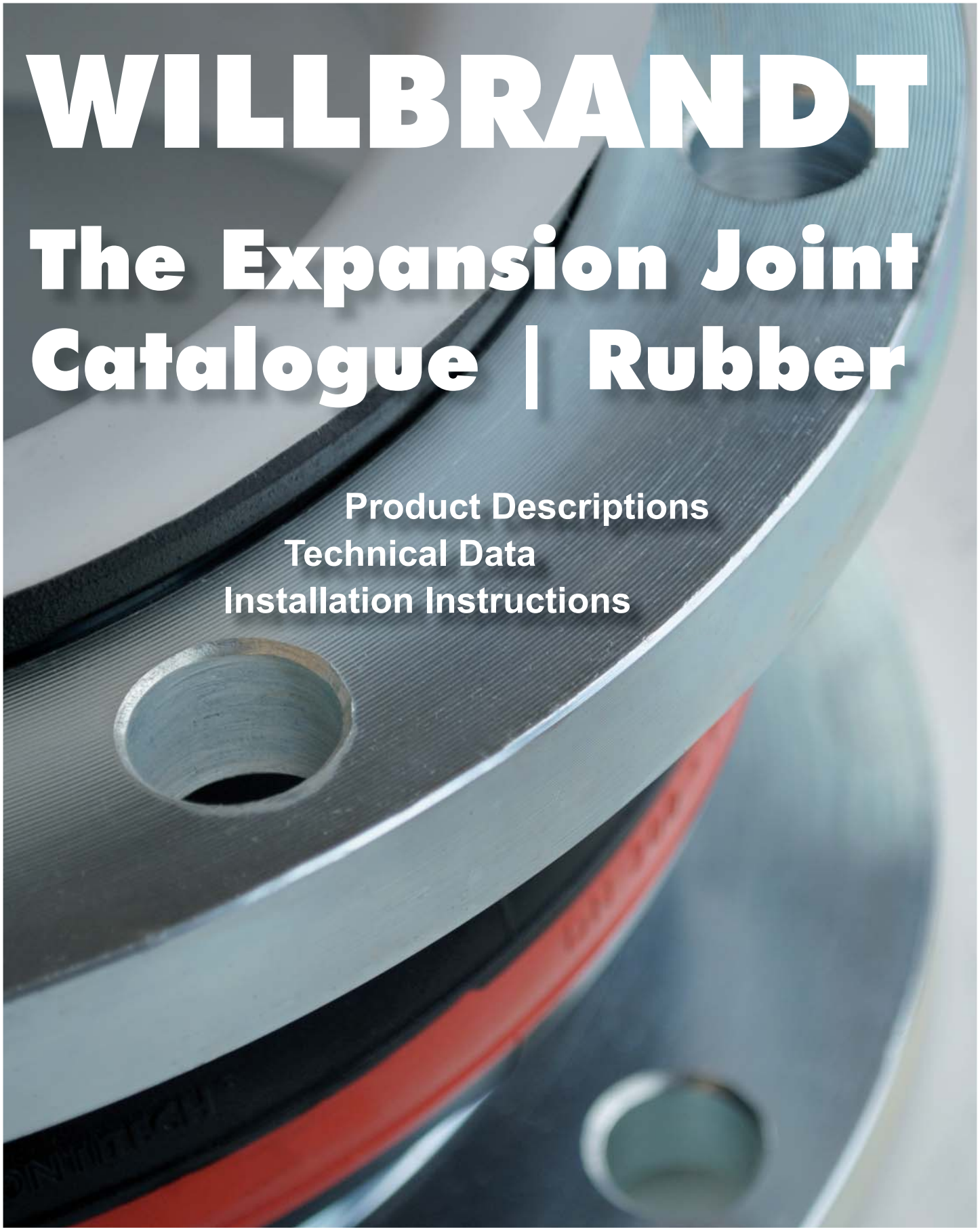
WILLBRANDT

The Expansion Joint Catalogue | Rubber

Product Descriptions
Technical Data
Installation Instructions



WILLBRANDT GUMMITECHNIK

WILLBRANDT Gummitechnik is specialised in shock and vibration isolation systems for decades and is recognised as an efficient problem solver and reliable partner in many areas of industry throughout the world.

Some of the reasons for the exceptional reputation of WILLBRANDT Gummitechnik are quick and prompt delivery from a fully stocked warehouse, professional on-site advice, application-orientated solutions from a team of experienced engineers, proprietary developments and patents, and a modern testing laboratory.

Information about this publication

The contents of this publication are the result of extensive development and application experience. All information and instructions are provided to the best of our knowledge; they do not constitute a guarantee with respect to characteristics and do not exempt the user from testing the suitability of products or from ensuring that the industrial property rights of third parties are not violated. No liability whatsoever shall be accepted for damage arising from advice given in this publication regardless of its nature or legal basis. We reserve the right to make technical modifications to the products.

WILLBRANDT KG

WILLBRANDT **Expansion Joints**

Expansion joints are used in pipelines, on armatures and on pumps to compensate:

- thermal expansion
- mechanical vibrations
- acoustic oscillations
- tensions

They are also used:

- for sound insulation
- as dismantling joints on pipeline armatures
- to assimilate assembly tolerances
- to seal pipeline wall penetrations

Typical applications are heating systems, water pipes, pipes in power stations and the chemical industry. Available are various qualities that are suitable for specific media (e.g. drinking water, oil, food).

Our qualified engineers design a suitable expansion joint according to your technical data. A wide range of different types are carried in stock. Special types can be manufactured at short notice.

A tight network of sales partners worldwide ensures that competent advice and servicing is provided to our customers over a wide area locally.

We offer expansion joints for various applications. Nominal sizes from DN 20 to DN 5000 are available.

In addition to a comprehensive standard range of products, additional expansion joints can be manufactured according to customers' specifications - with and without tie rods.

It is also possible to provide expansion joints with special accessories in order to fully exploit the advantages of the expansion joints for almost all applications.

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WILLBRANDT **Expansion Joints - Overview**

Type 39 DN range 50 - 1000
Overall length (mm) variable

Applications
Industrial plants, repairs/replacements
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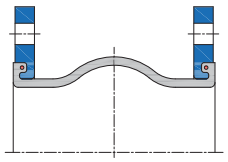

Type 39 PTFE DN range 50 - 500
Overall length (mm) variable

Applications
Chemical plants
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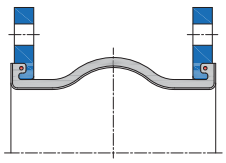
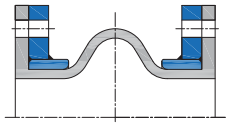


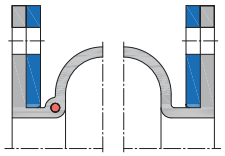
Type 40 DN range 200 - 5000
Overall length (mm) 250 - 800

Applications
Power stations, large-scale plants, treatment plants, pipelines
Page 14 onwards



Type 42 DN range 50 - 3000
Overall length (mm) 150 - 450

Applications
Paper industry, power stations, repairs/replacements up to 100 bar
Page 21 onwards



Type 46 DN range 20 - 50
Overall length (mm) 130

Applications
Building technology, engine technology
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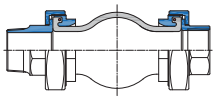

Type 48 DN range 50 - 250
Overall length (mm) 150 - 160

Applications
Steelworks, plant engineering
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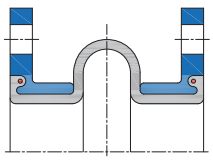

Type 49 DN range 32 - 500
Overall length (mm) 100 - 110

Applications
Building technology, shipbuilding, plant engineering, weighing technology, gas plants
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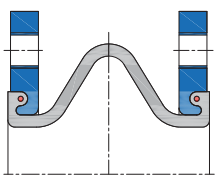

Type 50 DN range 20 - 1000
Overall length (mm) 130 - 300

Applications
Building technology, gas plants, plant construction, power stations
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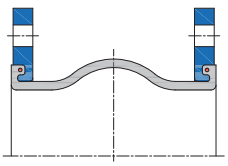

Type 50 PTFE DN range 25 - 500
Overall length (mm) 130 - 200

Applications
Chemical plants
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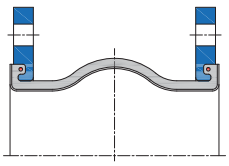

Type 51 DN range 32 - 600
Overall length (mm) 130 - 250

Applications
Chemical plants, plant engineering, pressure pipes (25 bar)
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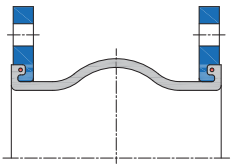

Type 51 PTFE DN range 32 - 300
Overall length (mm) 130

Applications
Chemical plants, plant engineering, pressure pipes (10 bar)
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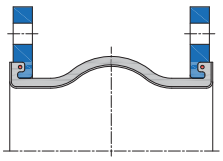

Type 54 DN range 25 - 100
Overall length (mm) 65 - 100

Applications
Hydraulic systems (SAE flanges)
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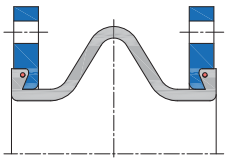

Type 55 DN range 20 - 1000
Overall length (mm) 125 - 300

Applications
Shipbuilding, building technology, water plants, plant engineering, treatment plants
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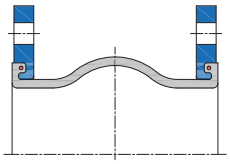

Type 55 PTFE DN range 25 - 500
Overall length (mm) 125 - 250

Applications
Chemical plants
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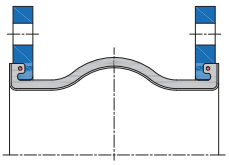

Type 55 SO DN range 20 - 300
Overall length (mm) 160 - 200

Applications
Shipbuilding, building technology, water plants, treatment plants
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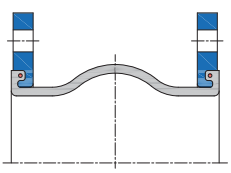

Type 56 DN range 50 - 1000
Overall length (mm) 150 - 1000

Applications
Paper industry, conveyor technology, media containing solids
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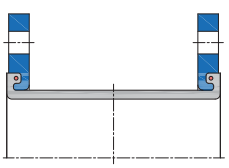
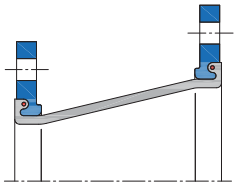


WILLBRANDT **Expansion Joints - Overview**

Type 57 DN range 50 - 300
Overall length (mm) 250 - 400

Applications
Paper industry, conveyor technology, media containing solids
Page 61 onwards



Type 58 DN range 50 - 3000
Overall length (mm) 200 - 1000

Applications
Paper industry, conveyor technology, media containing solids
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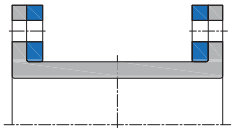

Type 59 DN range 350 - 1500
Overall length (mm) variable

Applications
Paper industry, conveyor technology, media containing solids
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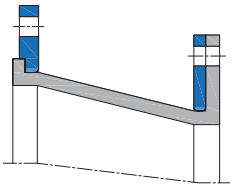

Type 60 DN range 20 - 200
Overall length (mm) 70 - 90

Applications
Building technology, industrial plants
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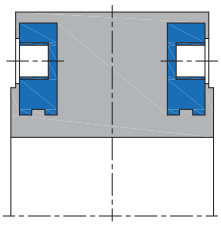

Type 61 DN range 50 - 1500
Overall length (mm) 250 - 730

Applications
Industrial plants, wastewater technology, engine technology
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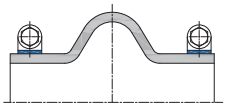
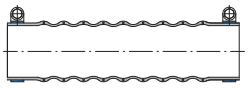


Type 62 DN range 50 - 600
Overall length (mm) variable

Applications
Drainage systems for bridges, halls, buildings
Page 75 onwards



Type 63 DN range all
Overall length (mm) variable

Applications
Plant engineering, production based on customer drawings
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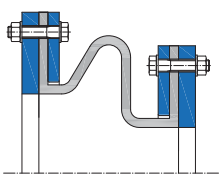

Type 64 DN range all
Overall length max. 500 mm

Applications
Duct sealing, building technology, power station construction;
low pressure range: max. 0.5 bar
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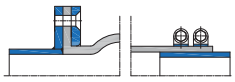

Type 65 DN range 80 - 5000
Overall length (mm) variable

Applications
Wall sealing, ground water sealing
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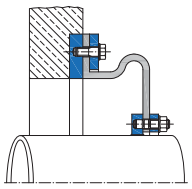

Type 80 DN range 20 - 1200
Overall length (mm) 45 - 250

Applications
Chemical plants
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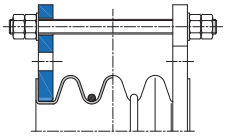

Type 80 HD DN range 25 - 600
Overall length (mm) 55 - 322

Applications
Chemical plants
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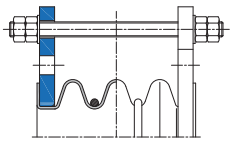


We will be happy to send you further information on

- Stainless steel expansion joints
- Stainless steel corrugated hoses
- Fabric expansion joints

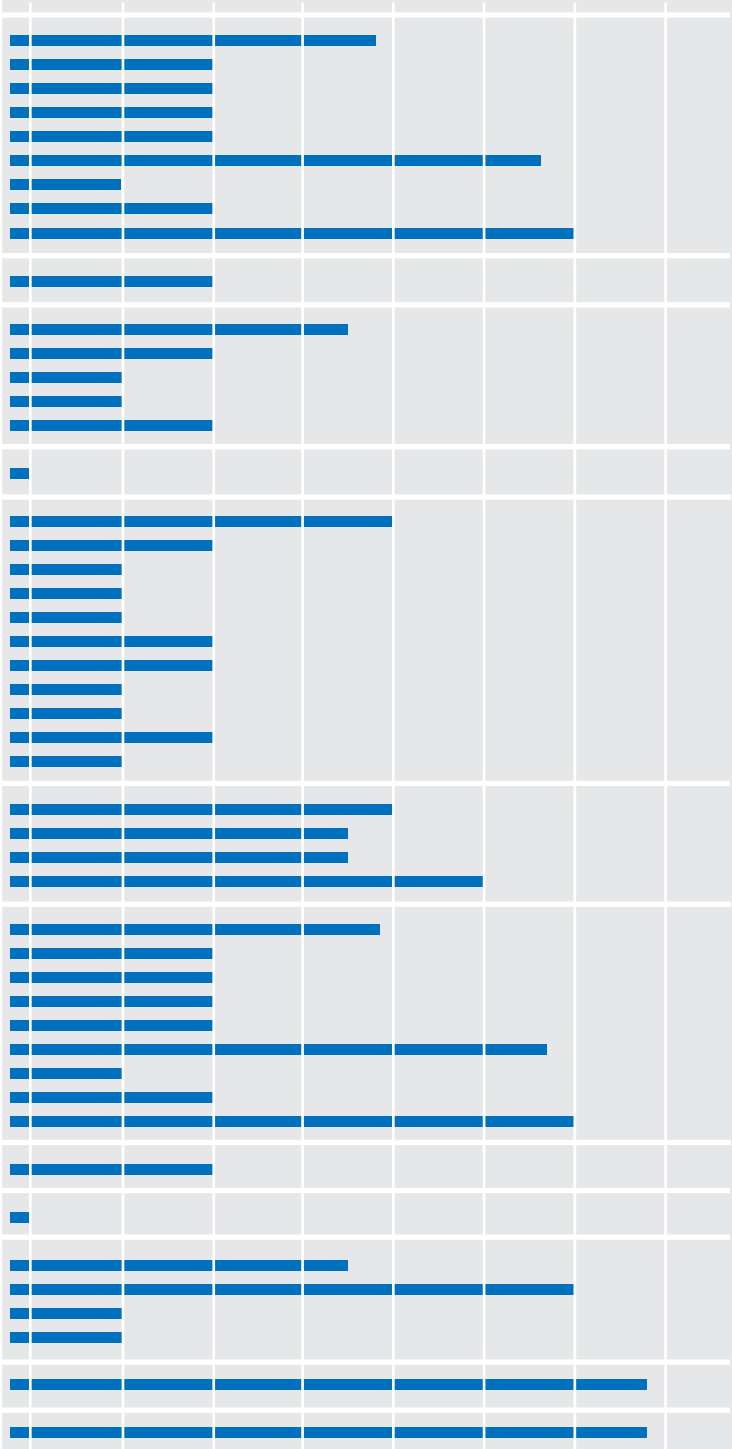
You can find PDF files at
www.willbrandt.com/Catalogue.

WILLBRANDT **Max. Operating Temperature**

During continuous operation, the maximum temperatures stipulated in the table may be exceeded by 10 % in the short term.

Because the permissible operating pressure falls when the temperature rises, please pay attention to the pressure/temperature specifications for the respective expansion joint type.

Type	Bellow Colour code	Core	Rein-forcement
39 40 42	orange blue orange	EPDM ht	Aramid
39 40 42	red blue red	EPDM	Aramid
39 40 42	red	EPDM	Polyamide
39 40 42	yellow grey	NBR	Polyamide
39 40 42	green	CSM	Polyamide
39 40 42	lilac blue lilac	FPM	Aramid
39 40 42	grey	CR	Polyamide
39 40 42	white grey	NBR (beige)	Polyamide
39 40 42	-	Si	Glass fabric
48	red	EPDM	Polyamide
49	red	EPDM	Aramid
49	blue	IIR	Polyamide
49	yellow	NBR	Polyamide
49	white	NBR	Polyamide
49	green	CSM	Polyamide
54	yellow	NBR	Polyamide
46 50 55	red red	EPDM	Aramid
46 50 55	red	IIR	Polyamide
46 50 55	yellow	NBR	Polyamide
46 50 55	orange	NBR	Polyamide
46 50 55	white	NBR	Polyamide
46 50 55	green	CSM	Polyamide
46 50 55	lilac	FPM	Polyamide
46 50 55	yellow yellow	NBR	Steel cord
46 50 55	yellow LT	NBR	Steel cord
46 50 55	yellow blue yellow	HNBR	Steel cord
46 50 55	black	CR	Polyamide
42 51	red blue	IIR	Aramid
42 51	yellow blue	NBR	Aramid
42 51	green blue	CSM	Aramid
42 51	lilac	FPM	Aramid
56 to 59 61 63 65	orange blue orange	EPDM ht	Aramid
56 to 59 61 63 65	red blue red	EPDM	Aramid
56 to 59 61 63 65	red	EPDM	Polyamide
56 to 59 61 63 65	yellow grey	NBR	Polyamide
56 to 59 61 63 65	green	CSM	Polyamide
56 to 59 61 63 65	lilac blue lilac	FPM	Aramid
56 to 59 61 63 65	grey	CR	Polyamide
56 to 59 61 63 65	white grey	NBR (beige)	Polyamide
56 to 59 61 63 65		Si	Glass fabric
60	-	EPDM	-
62	-	CR	Polyamide
64	rot	EPDM	Polyamide
64	lilac	FPM	Glasfabric
64	yellow	NBR	Polyamide
64	-	CR	Polyamide
80	PTFE	PTFE	-
80 HD	PTFE	PTFE	-



WILLBRANDT **Rubber Expansion Joint Type 39**

DN 50 - DN 1000

Type 39 is a handmade, low-corrugated rubber expansion joint. Its low corrugation helps to achieve very low flow resistance. It is characterised by its flexible installation length and variety of rubber qualities, which means that a suitable rubber compound is available for every application (see material descriptions on the following pages).

Type 39 is used in plant engineering, water technology and wastewater technology , where it is mainly used in the event of repairs if the existing gap does not correspond to any standard installation length. This avoids expensive full renovation on the piping system. It absorbs noise and vibrations.

Bellow design	Low-corrugated rubber bellow with reinforcement and shaped sealing bead with core ring, self-sealing (no additional seals required). Suitable for accommodating swiveling flanges.
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.
Pressure resistance	Design according to customer specification, max. 16 bar operating pressure.
Vacuum resistance	- DN 20 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
Accessories	- Guide sleeves - Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover / sun protection hoods - Segment tie rods - PTFE lining
Conformity	FDA and EG 1935/2004

Specifications

Bellow		Bellow design			Permissible operating data									
Colour code	Colour marking	Core (inner)	Reinforce-ment	Cover (outer)	Max. temperature °C	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

WILLBRANDT **Rubber Expansion Joint Type 39**

Application

Type 39 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkaline solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 39 blue (EPDM TW)
Like Type 39 red, but approved for drinking water.

Type 39 white-red (EPDM beige)
Like Type 39 red, but with light-coloured internal rubber in food-grade.

Type 39 red AF (EPDM AF)
Like Type 39 red, but with abrasion-resistant EPDM rubber compound.

Type 39 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 39 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 39 white-grey (NBR white)
Like Type 39 yellow-grey, but with light-coloured internal rubber in food-grade. Not approved for drinking water!

Type 39 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 39 red-blue-red (EPDM/aramid)
Like Type 39 red, but with aramid fabric.

Type 39 blue-blue-blue (EPDM TW/aramid)
Like Type 39 blue, but with aramid fabric.

Type 39 white-blue-red (EPDM beige/aramid)
Like Type 39 white-red, but with aramid fabric.

Type 39 orange-blue-orange (EPDM HT/aramid)
Like Type 39 red, but with aramid fabric and for temperatures up to +125 °C.

Type 39 red-blue-red AF (EPDM AF/aramid)
Like Type 39 red AF, but but with aramid fabric.

Type 39 green-blue-green (CSM/aramid)
Like Type 39 green, but with aramid fabric.

Type 39 yellow-blue-grey (NBR/aramid)
Like Type 39 yellow-grey, but with aramid fabric.

Type 39 white-blue-grey (NBR white/aramid)
Like Type 39 white-grey, but with aramid fabric.

Type 39 grey-blue-grey (CR/aramid)
Like Type 39 grey, but with aramid fabric.

Type 39 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. Temperatures of up to +180 °C.

Type 39 silicone (Silicone/glass fabric or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good resistance to radiation. No resistance for steam above 120 °C.
No resistance to fuels.

Note!
Detailed material descriptions on pages 5 - 7.

Important information

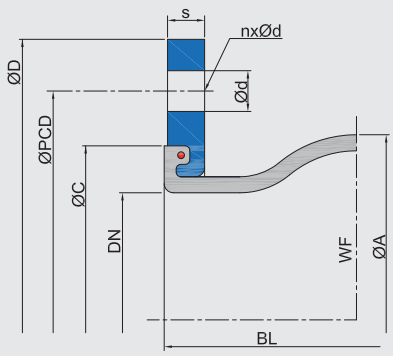
For aggressive media, please see the resistance table (can be requested separately).
The bellow should not be painted or insulated. Please refer to the installation instructions.
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 39**

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 absorption.

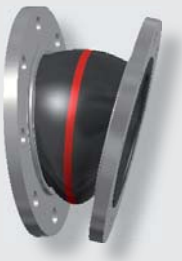
The expansion joint's reaction force must be absorbed via suitable piping (see f tting instructions in the appendix).




axial -


axial +


lateral ±


angular ±

Dimensions - Design A

DN	Overall length	Bellow		Flange PN 10*3						Movement absorption				Weight*5
	BL*1	ØA	WF*2	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral*4 ±	angular ±	
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	∠°	kg
50	**200 - 500**	96	3200	165	125.0	18.0	4	16	86	10	20	15	35	4.1
65	**200 - 500**	110	5300	185	145.0	18.0	8	16	106	10	20	15	30	5.7
80	**200 - 500**	122	8500	200	160.0	18.0	8	18	118	15	20	15	30	7.2
100	**200 - 500**	142	12800	220	180.0	18.0	8	18	138	15	20	15	25	8.3
125	**200 - 500**	170	18700	250	210.0	18.0	8	18	166	15	20	15	25	10.0
150	**200 - 500**	196	25900	285	240.0	23.0	8	20	192	15	20	15	20	13.4
200	**200 - 500**	256	40900	340	295.0	23.0	8	20	252	15	20	15	15	16.7
250	**200 - 500**	306	59900	395	350.0	23.0	12	20	304	15	20	15	10	21.9
300	**200 - 500**	352	82200	445	400.0	23.0	12	20	354	15	20	15	10	25.0
350	**200 - 500**	442	108000	505	460.0	22.0	16	20	412	15	20	15	10	38.8
400	**200 - 500**	495	137900	565	515.0	26.0	16	25	470	20	25	20	8	38.5
450	**200 - 500**	545	180100	615	565.0	26.0	20	25	512	20	25	20	8	47.7
500	**200 - 500**	595	203800	670	620.0	26.0	20	30	570	20	25	20	6	57.2
600	**200 - 500**	695	328600	780	725.0	30.0	20	30	675	20	25	20	6	75.9
700	**200 - 500**	832	418300	895	840.0	30.0	24	35	780	20	25	20	5	128.6
750*6	**200 - 500**	882	475100	927	914.4	34.4	28	35	830	20	25	20	4	154.0
800	**200 - 500**	932	540700	1015	950.0	33.0	24	40	887	20	25	20	4	163.7
900	**200 - 500**	1032	670600	1115	1050.0	33.0	28	40	985	20	25	20	4	198.7
1000	**200 - 500**	1134	823100	1230	1160.0	36.0	28	40	1085	20	25	20	4	236.0

*1 For shorter installation lengths, please refer to types 49, 50 and 55.
*2 WF = effective area
*3 Other standards/dimensions possible.
*4 The greater the installation length, the greater the movement absorption.
*5 For the shortest installation length.
*6 Dimensions according to ANSI B16.47 Class 150 lbs

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

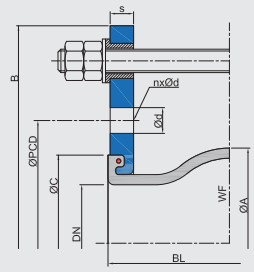
Please note the appropriate f xed point constructions and plain bearings in your piping system, as well as the tolerances as per the FSA Handbook (see the technical appendix on page 118)!
For more information please refer to our installation instructions (p. 97 - 116).
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 39**

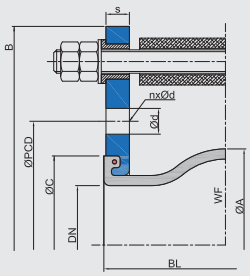
Length limiters

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

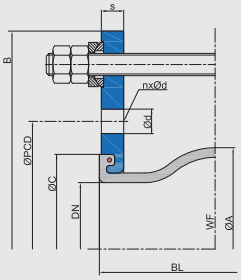
Design B*
with tie rods



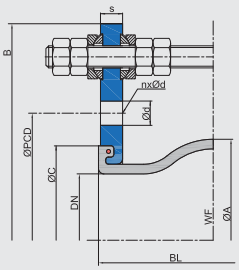
Design C*
with tie rods/thrust limiters



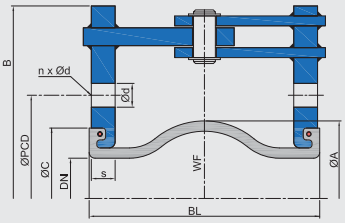
Design E
with tie rods and spherical washers/conical sockets



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



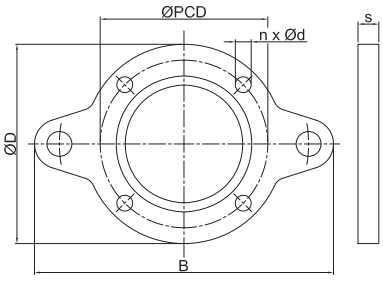
Design F
with hinge



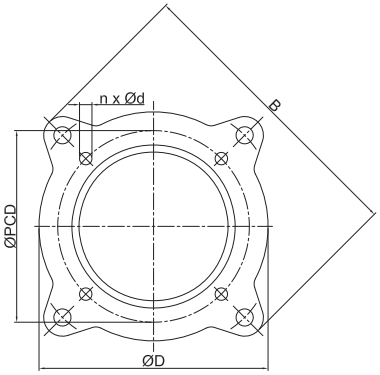
*Note: for design B and C
the lateral movement absorption is reduced by around 50 %.

Flange dimensions for designs with tie rods

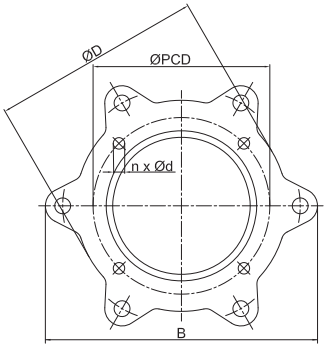
DN	Length	Flange PN 10 (example dimensions)						
	BL	B	ØD	ØPCD	Ød	n	s	ØC
	mm	mm	mm	mm	mm		mm	mm
50	**200 - 500**	255	165	125	18	4	16	86
65	**200 - 500**	275	185	145	18	8	16	106
80	**200 - 500**	290	200	160	18	8	18	118
100	**200 - 500**	310	220	180	18	8	18	138
125	**200 - 500**	340	250	210	18	8	18	166
150	**200 - 500**	375	285	240	23	8	20	192
200	**200 - 500**	440	340	295	23	8	20	252
250	**200 - 500**	509	395	350	23	12	20	304
300	**200 - 500**	559	445	400	23	12	20	354
350	**200 - 500**	619	505	460	22	16	20	412
400	**200 - 500**	700	565	515	26	16	25	470
450	**200 - 500**	760	615	565	26	20	25	512
500	**200 - 500**	810	670	620	26	20	30	570
600	**200 - 500**	930	780	725	30	20	30	675
700	**200 - 500**	1045	895	840	30	24	35	780
800	**200 - 500**	1175	1015	950	33	24	40	887
900	**200 - 500**	1285	1115	1050	33	28	40	985
1000	**200 - 500**	1400	1230	1160	36	28	40	1085



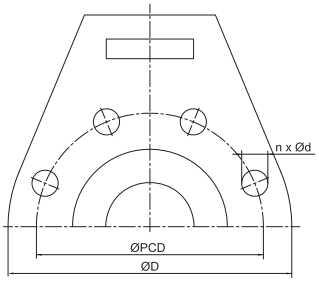
DN 32 - 200



DN 250 - 900



DN 1000



DN 50 - 1000 (Design F)

Important information

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 **Chemical Expansion Joint Type 39 PTFE**

DN 50 - DN 500

Type 39 PTFE is a low-corrugated, PTFE-lined rubber expansion joint. Its low corrugation helps to achieve very low flow resistance. The PTFE lining gives the expansion joint high chemical resistance or an anti-adhesive poperty.

The PTFE lining can be used for any rubber compound on Type 39. 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.

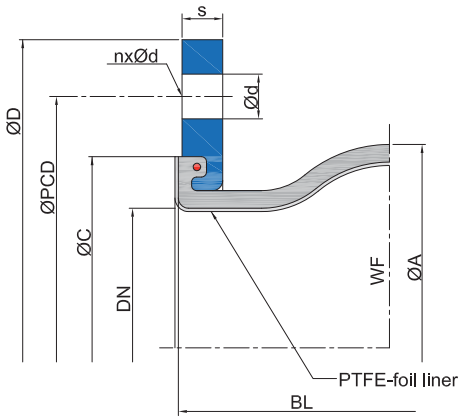
Dimensions - Design A

DN	Length	Bellow		Flange PN 10						Movement absorption			
	BL	ØA	WF*	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral ±	angular ±
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	∠°
50	**200 - 500**	96	3200	165	125.0	18.0	4	16	86	15	15	15	15.0
65	**200 - 500**	110	5300	185	145.0	18.0	8	16	106	15	15	15	15.0
80	**200 - 500**	122	8500	200	160.0	18.0	8	18	118	15	15	15	15.0
100	**200 - 500**	142	12800	220	180.0	18.0	8	18	138	15	15	15	10.0
125	**200 - 500**	170	18700	250	210.0	18.0	8	18	166	15	15	15	10.0
150	**200 - 500**	196	25900	285	240.0	23.0	8	20	192	15	15	15	10.0
200	**200 - 500**	256	40900	340	295.0	23.0	8	20	252	15	15	15	6.0
250	**200 - 500**	306	59900	395	350.0	23.0	12	20	304	15	15	15	6.0
300	**200 - 500**	352	82200	445	400.0	23.0	12	20	354	15	15	15	6.0
350	**200 - 500**	442	108000	505	460.0	22.0	16	20	412	15	15	15	4.0
400	**200 - 500**	495	137900	565	515.0	26.0	16	25	470	15	15	15	4.0
450	**200 - 500**	545	180100	615	565.0	26.0	20	25	512	15	15	15	4.0
500	**200 - 500**	595	203800	670	620.0	26.0	20	30	570	15	15	15	4.0

* WF = effective area

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. 6 bar operating pressure with polyamide cord reinforcement, max. 9 bar operating pressure with aramid or steel cord reinforcement.
Conformity	FDA and EG 1935/2004
Vacuum resistance	Only limited suitability 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 350 expansion joints are not suitable for vacuum operation.



Important information

For aggressive media, please see the resistance table (can be requested separately).
The bellow should not be painted or insulated. Please note the installation instructions and tolerances as per the FSA Handbook (page 118) in the technical appendix!
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 40**

DN 200 - DN 5000

Type 40 is a high-corrugated, highly elastic rubber expansion joint. Due to its corrugation it has very low inherent resistance. It is characterised by its ability to absorb a large amount of movement in any direction. The type and amount of corrugation, installation length and material strength of this type can all be tailored to your requirements. There are also a large number of rubber qualities available, which means that you can select a suitable rubber compound for any application (see the material descriptions on the following pages).

Type 40 is mainly used in large industrial plants and power plants, where it compensates of fsetting and compression, insulates vibration and absorbs pipe movement.

Bellow design	High corrugated rubber bellow with reinforcement and shaped solid rubber flanges, self-sealing (no additional seals required). Suitable for backing flanges with a supporting shoulder.
Flange version	Both sides with backing flange made of galvanized steel with clearance holes, drilled according to DIN PN 10 (standard). Other materials and dimensions are possible.
Pressure resistance	Design according to customer specification, max 40 bar operating pressure.
Vacuum resistance	Only vacuum-resistant with a vacuum supporting ring.

Accessories	- Guide sleeves - Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover / sun protection hoods - Segment tie rods - PTFE lining
Movement absorption	Very large axial, lateral and angular movement absorption possible. Different corrugation geometries and bellow designs (single- and multi-corrugated) available.
Approvals/conformity	Approved for drinking water, FDA and EG 1935/2004 conform

Specifications

Bellow		**Bellow design**				**Permissible operating data**									
Colour code	**Colour marking**	**Core (inner)**	**Reinforce-ment**	**Cover (outer)**	**Max. temperature °C**	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

WILLBRANDT **Rubber Expansion Joint Type 40**

Application

Type 40 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkaline solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 40 blue (EPDM TW)
Like Type 40 red, but approved for drinking water.

Type 40 white-red (EPDM beige)
Like Type 40 red, but with light-coloured internal rubber in food-grade.

Type 40 red AF (EPDM AF)
Like Type 40 red, but with abrasion-resistant EPDM rubber compound.

Type 40 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 40 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 40 white-grey (NBR beige)
Like Type 40 yellow-grey, but with light-coloured internal rubber in food-grade. Not approved for drinking water!

Type 40 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 40 red-blue-red (EPDM/aramid)
Like Type 40 red, but with aramid fabric.

Type 40 blue-blue-blue AF (EPDM TW/aramid)
Like Type 40 blue, but with aramid fabric.

Type 40 white-blue-red AF (EPDM beige/aramid)
Like Type 40 white-red, but with aramid fabric.

Type 40 orange-blue-orange AF (EPDM H/aramid)
Like Type 40 red, but with aramid fabric for temperatures up to +125 °C.

Type 40 red-blue-red AF (EPDM AF/aramid)
Like Type 40 red AF, but with aramid fabric.

Type 40 green-blue-green (CSM/aramid)
Like Type 40 green, but with aramid fabric.

Type 40 yellow-blue-grey (NBR/aramid)
Like Type 40 yellow-grey, but with aramid fabric.

Type 40 white-blue-grey (NBR white/aramid)
Like Type 40 white-grey, but with aramid fabric.

Type 40 grey-blue-grey (CR/aramid)
Like Type 40 grey, but with aramid fabric.

Type 40 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. Temperatures of up to +180 °C.

Type 40 silicone (silicone/glass fabric or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good radiation resistance. Not for use with steam above 120 °C. No resistance to fuels.

Note!
Detailed material descriptions on pages 5 - 7.

Important information

For aggressive media, please see the resistance table (can be requested separately).
The bellow 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. ++++

WILLBRANDT **Rubber Expansion Joint Type 40**

Vacuum resistance

Type 40 is a rubber expansion joint that is only vacuum-resistant to a small degree, so a suitable vacuum supporting ring should be used on underpressure.

Standard material: 1.4571

An alternative design with a vulcanised vacuum supporting ring is also available. Please note that greater stiffness rates must be taken into account and that the axial and lateral movement will be reduced.

Further information on vacuum supporting spirals/rings can be found on page 93 of the Technical Appendix.

Expansion joint with supporting ring

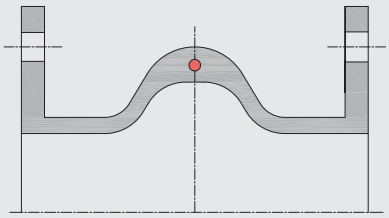
Supporting ring versions

Supporting ring with baff e

DN 200 - DN 350

Supporting ring with lock/double lock

DN 200 - DN 450 / DN 500 - DN 5000



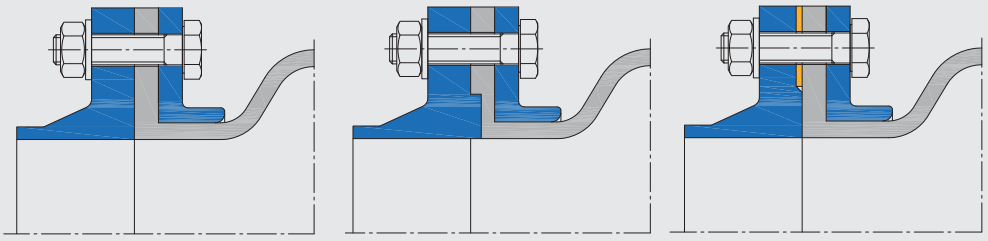
Vulcanised supporting ring (example)

Please take the limited movement into account.

Flange versions

Type 40 is produced with pressure-resistant solid rubber f anges. In order to ensure a tight connection to the pipe/fan, the counter f ange should be f at and have no seal. If this is not possible, the expansion joint f ange can be produced with a negative recess (see Version 2) in order to accommodate the raised face of the counter f ange and ensure a f at connection.

Alternatively, spacer rings can be used (Version 3).



Version 1

Standard version

Version 2

with recess compensation

Version 3

with recess spacer ring

Basic forms

There is an extensive package of forms with various corrugation profiles available for Type 40.
The following basic forms are available:

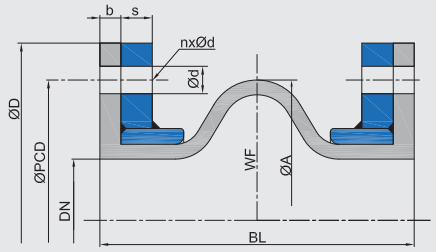
DN 200	DN 500	DN 850	DN 1150	DN 1450	DN 1900	DN 2300	DN 2800	DN 3200	DN 4000
DN 250	DN 550	DN 900	DN 1200	DN 1500	DN 1950	DN 2400	DN 2850	DN 3300	DN 4200
DN 300	DN 600	DN 950	DN 1250	DN 1600	DN 2000	DN 2500	DN 2900	DN 3400	DN 4500
DN 350	DN 650	DN 1000	DN 1300	DN 1650	DN 2100	DN 2550	DN 3000	DN 3450	DN 4600
DN 400	DN 700	DN 1050	DN 1350	DN 1700	DN 2200	DN 2600	DN 3100	DN 3600	DN 4800
DN 450	DN 800	DN 1100	DN 1400	DN 1800	DN 2250	DN 2700	DN 3150	DN 3800	DN 5000

WILLBRANDT **Rubber Expansion Joint Type 40**

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.

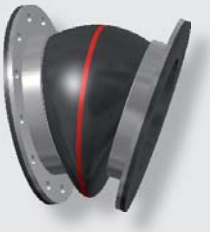
The expansion joint's reaction force must be absorbed via suitable piping (see f tting instructions in the appendix).




axial -


axial +


lateral ±


angular ±

Dimensions for Design A

DN	Length	Bellow			Flange PN 10*4					Movement absorption*5				Weight
	BL*1	ØA*2	b	WF*3	ØD	ØPCD	Ød	n	s	axial +	axial -	lateral ±	angular ±	
	mm	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	∠°	kg
200	**250**	280	10	53066	340	295	22	8	20	20	40	26	11.3	19.0
250	**250**	330	10	75439	395	350	22	12	20	20	40	26	9.1	22.5
300	**250**	384	10	104009	445	400	22	12	20	20	40	28	7.6	25.0
350	**250**	432	10	133249	505	460	22	16	20	20	44	27	6.5	31.5
400	**250**	484	10	169007	565	515	26	16	20	20	44	27	5.7	39.5
450	**250**	532	10	197823	615	565	26	20	28	20	44	27	5.1	51.0
500	**250**	585	10	241800	670	620	26	20	28	20	44	27	4.6	57.5
600	**250**	685	10	336785	780	725	30	20	28	20	44	27	3.8	72.5
700	**250**	786	10	448656	895	840	30	24	28	20	44	26	3.3	88.5
800	**300**	917	13	617614	1015	950	33	24	28	31	53	34	4.4	115.0
900	**300**	1017	13	764723	1115	1050	33	28	28	31	53	33	3.9	128.0
1000	**300**	1117	13	927532	1230	1160	36	28	28	31	53	33	3.5	146.0
1100	**300**	1217	13	1106041	1345	1270	36	32	28	31	53	33	3.2	168.0
1200	**300**	1317	13	1300250	1455	1380	39	32	28	41	43	32	3.9	196.0
1300	**300**	1417	13	1510159	1565	1485	42	32	28	31	53	32	2.7	219.0
1400	**300**	1517	13	1735768	1675	1590	42	36	28	31	53	31	2.5	241.0
1500	**300**	1617	13	1977077	1795	1705	48	36	28	31	53	31	2.4	261.0
1600	**300**	1717	13	2234086	1915	1820	48	40	28	31	53	31	2.2	291.0
1700	**300**	1817	13	2478817	2015	1920	48	44	33	31	53	30	2.1	380.0
1800	**300**	1917	13	2765656	2115	2020	48	44	33	31	53	30	2.0	401.0
1900	**300**	2017	13	3068195	2220	2125	48	48	33	31	53	29	1.9	428.0
2000	**300**	2117	13	3386434	2325	2230	48	48	33	31	53	29	1.8	455.0
2100	**350**	2255	15	3851387	2440	2335	56	48	33	43	69	38	2.3	505.0
2200	**350**	2355	15	4206992	2550	2440	56	52	33	43	69	37	2.2	539.0
2400	**350**	2555	15	4965302	2760	2650	56	56	33	43	69	36	2.1	600.0
2500	**350**	2655	15	5368007	2860	2750	56	56	33	43	69	36	2.0	624.0
2600	**350**	2755	15	5786412	2960	2850	56	60	33	43	69	35	1.9	646.0
2800	**350**	2955	15	6670322	3180	3070	56	64	33	43	69	34	1.8	726.0
3000	**350**	3155	15	7617032	3405	3290	62	68	33	43	69	33	1.6	807.0

*1 Overall lengths available from 150 mm to 500 mm.
*2 Outer diameter of corrugation
*3 WF = effective area
*4 Other standards/dimensions possible.
*5 Movement absorption be increased by changing the the corrugation and overall length.

- Maximum size: DN 5000.
- Movement absorption is for a bellow design with 6 bar operating pressure.

Important information

Please note the appropriate f xed point constructions and plain bearings in your piping system, as well as the tolerances as per the FSA Handbook (see technical appendix on p. 118)!
For more information please refer to our installation instructions in the technical appendix.
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 40**

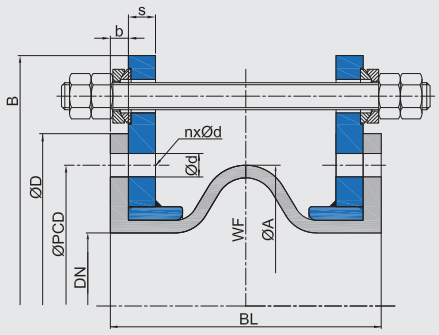
Other designs

Design E - with tie rods

For absorbing the expansion joint's reaction force in the direction of expansion while also absorbing great lateral movement.

The use of PTFE-coated spherical washers and conical sockets reduces the frictional force considerably during lateral movement. Can be used for vibration insulation and absorbing lateral movement.

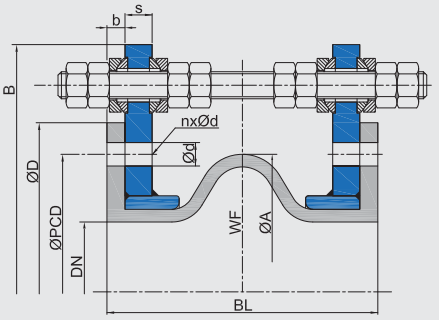
Note: The number of tie rods is calculated corresponding to the available design data.



Design M - with tie rods/thrust limiters

For absorbing the expansion joint's reaction force in the direction of expansion while also absorbing high lateral movement and preventing the bellow from strong compression. The use of PTFE-coated spherical washers and conical sockets reduces the frictional force considerably during lateral movement. Can be used for vibration insulation and absorbing lateral movement.

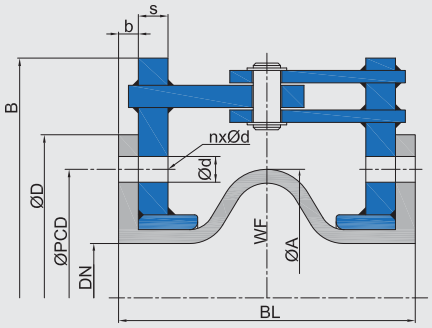
Note: The number of tie rods is calculated corresponding to the available design data.



Design F - with hinge

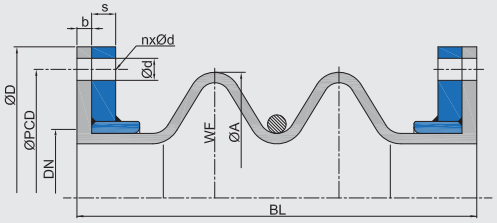
For absorbing angular movement in a single plane while guiding pipes. The hinge absorb the reaction forces so that the f xed point only needs to absorb the adjusting movement.

Usually two hinge expansion joints are f tted with an intermediate pipe to achieve a high level of lateral movement (see the example in the technical appendix).



Multi-corrugated bellow designs

Different corrugation geometries and bellow forms (single and multi-corrugated) are available, in order to absorb high axial, lateral and angular movement.



Example - double corrugation, Design A - without tie rods

Important information

Please note the appropriate f xed point constructions and plain bearings in your piping system!
You can f nd information on this in our installation instructions.
For information on the tie rods, please refer to 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 40**

Axial stiffness rates* (single-corrugation)

DN	Length BL mm	Stiffness rates (averages value from full way) 0 bar N/mm	1 bar N/mm	1.5 bar N/mm	2.5 bar N/mm	3 bar N/mm	4 bar N/mm	5 bar N/mm	6 bar N/mm	10 bar N/mm	16 bar N/mm
200	**200**	45	79	83	90	108	144	180	216	360	576
250	**200**	51	88	95	107	127	166	206	246	405	645
300	**200**	56	98	105	118	139	180	225	269	454	727
350	**200**	66	117	124	138	164	216	266	317	541	866
400	**250**	40	70	75	83	99	131	161	190	322	513
450	**250**	48	85	91	102	119	152	193	235	389	626
500	**250**	55	99	105	118	135	171	218	265	457	743
600	**250**	68	119	125	136	163	218	272	326	544	870
700	**250**	70	121	130	147	174	228	283	338	557	886
750	**250**	72	126	134	151	178	232	289	346	583	935
800	**250**	73	129	137	153	182	239	295	350	599	958
850	**250**	80	141	149	166	198	262	321	380	644	1026
900	**300**	95	169	180	202	235	300	383	466	770	1239
1000	**300**	136	245	260	291	335	422	539	656	1129	1836
1050	**350**	132	251	264	290	352	475	592	710	1171	1867
1100	**350**	173	328	345	380	461	622	775	929	1534	2445
1200	**350**	188	360	381	422	511	688	845	1002	1677	2666
1300	**350**	204	386	405	443	546	751	924	1096	1827	2902
1400	**350**	220	415	436	477	588	809	995	1180	1967	3126
1500	**350**	236	455	484	542	652	871	1083	1295	2120	3368
1600	**350**	310	597	626	685	836	1138	1403	1668	2821	4504
1700	**350**	374	721	754	818	1018	1416	1726	2036	3438	5459
1800	**350**	452	873	912	990	1231	1714	2089	2464	4160	6606
2000	**350**	690	1339	1408	1546	1868	2512	3171	3830	6314	10115
2100	**350**	791	1523	1609	1780	2134	2841	3636	4431	7288	11735
2200	**350**	910	1747	1841	2029	2475	3367	4168	4969	8099	12831
2400	**350**	1050	1995	2118	2363	2846	3812	4751	5691	9450	15089
2500	**400**	1210	2142	2275	2541	3013	3957	4882	5808	9922	15887
2600	**400**	1290	2270	2408	2683	3199	4231	5179	6128	10385	16538
2800	**400**	1420	2528	2693	3025	3512	4487	5723	6958	11502	18517

Lateral stiffness rates* (single-corrugation)

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

DN	Length BL mm	Stiffness rates (averages value from full way) 0 bar N/mm	1 bar N/mm	1.5 bar N/mm	2.5 bar N/mm	3 bar N/mm	4 bar N/mm	5 bar N/mm	6 bar N/mm	10 bar N/mm	16 bar N/mm
200	**200**	200	330	342	366	387	428	484	540	616	804
250	**200**	220	370	382	407	430	475	540	605	686	898
300	**200**	250	425	440	470	495	545	620	695	783	1020
350	**200**	280	482	497	529	556	610	696	781	882	1154
400	**250**	180	315	326	347	365	400	456	513	576	752
450	**250**	190	338	349	371	387	420	478	536	604	789
500	**250**	200	330	342	366	387	428	484	540	616	804
600	**250**	235	388	402	430	454	503	569	635	724	945
700	**250**	310	521	538	574	606	670	761	853	967	1265
750	**250**	310	527	546	583	614	676	769	862	970	1265
800	**250**	340	585	604	643	675	741	845	949	1071	1401
850	**250**	340	595	615	656	689	755	862	969	1088	1421
900	**300**	360	641	661	702	733	796	905	1015	1145	1494
1000	**300**	380	673	698	749	818	956	1020	1083	1216	1539
1050	**350**	390	605	628	675	746	889	971	1053	1201	1513
1100	**350**	395	612	636	683	756	901	984	1067	1217	1533
1200	**350**	440	724	744	783	864	1025	1111	1197	1390	1756
1300	**350**	460	724	763	842	923	1086	1180	1274	1463	1840
1400	**350**	480	724	775	878	963	1133	1231	1330	1526	1920
1500	**350**	530	885	924	1002	1088	1261	1370	1479	1707	2152
1600	**350**	645	1109	1152	1238	1342	1548	1683	1819	2090	2632
1700	**350**	710	1299	1330	1392	1508	1740	1885	2031	2308	2876
1800	**350**	445	814	834	872	945	1090	1181	1273	1446	1802
2000	**350**	890	1682	1727	1816	1952	2225	2394	2563	2919	3613
2100	**350**	886	1692	1745	1852	2002	2304	2450	2596	2835	3367
2200	**350**	1050	2016	2086	2226	2464	2940	3045	3150	3465	3990
2400	**350**	1360	2638	2802	3128	3400	3944	4114	4284	4529	5114
2500	**400**	1680	2856	2957	3158	3326	3662	4166	4670	5258	6854
2600	**400**	2035	3500	3616	3846	4043	4436	5057	5678	6410	8384
2800	**400**	2760	4830	4996	5327	5594	6127	6997	7866	8832	11537

* Example values, depending on bellows structure

WILLBRANDT **Rubber Expansion Joint Type 40**

Angular stiffness torque* (single-corrugation)

DN	Length BL mm	Stiffness torque (averages value from full way) 0 bar Nm/°	1 bar Nm/°	1.5 bar Nm/°	2.5 bar Nm/°	3 bar Nm/°	4 bar Nm/°	5 bar Nm/°	6 bar Nm/°	10 bar Nm/°	16 bar Nm/°
200	**200**	6	10	11	12	14	18	23	28	46	74
250	**200**	10	16	18	20	24	31	38	46	76	120
300	**200**	15	25	27	30	36	47	58	70	117	188
350	**200**	22	39	42	47	55	73	90	107	183	293
400	**250**	17	30	32	36	43	57	69	82	139	221
450	**250**	26	45	48	54	63	81	103	125	207	333
500	**250**	36	64	68	76	88	110	141	172	296	481
600	**250**	62	108	113	123	148	198	247	296	494	790
700	**250**	85	147	157	179	211	276	343	410	675	1074
750	**250**	99	174	186	209	246	320	399	478	805	1290
800	**250**	118	209	222	248	294	386	476	567	968	1550
850	**250**	145	255	270	301	359	475	582	688	1166	1857
900	**300**	191	341	363	408	473	605	771	938	1551	2496
1000	**300**	334	601	639	715	822	1036	1323	1610	2773	4510
1050	**350**	355	675	710	781	947	1279	1595	1911	3154	5029
1100	**350**	508	965	1016	1117	1354	1828	2281	2733	4510	7192
1200	**350**	654	1248	1320	1464	1771	2386	2932	3477	5817	9249
1300	**350**	825	1559	1636	1790	2205	3036	3733	4430	7383	11730
1400	**350**	1024	1935	2030	2221	2737	3767	4632	5497	9162	14557
1500	**350**	1252	2416	2571	2880	3464	4633	5759	6886	11269	17905
1600	**350**	1866	3592	3769	4124	5032	6849	8444	10040	16981	27114
1700	**350**	2528	4880	5099	5537	6885	9582	11681	13779	23260	36938
1800	**350**	3417	6594	6890	7483	9305	12950	15785	18621	31434	49919
2000	**350**	6395	12406	13046	14325	17309	23277	29385	35492	58513	93749
2100	**350**	8062	15520	16394	18141	21742	28944	37047	45150	74256	119567
2200	**350**	10150	19488	20537	22635	27608	37556	46488	55420	90336	143117
2400	**350**	13875	26363	27982	31219	37602	50367	62786	75204	124878	199388
2500	**400**	17315	30648	32553	36362	43116	56622	69868	83114	141987	227352
2600	**400**	19930	35077	37203	41455	49427	65371	80019	94668	160437	255504
2800	**400**	25360	45141	48100	54017	62724	80138	102202	124265	205418	330698

* Example values, depending on bellows structure

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

WILLBRANDT **Rubber Expansion Joint Type 42**

DN 50 - DN 3000

Type 42 is a handmade, high-corrugated rubber expansion joint. Its high corrugation helps to achieve very low inherent resistance. It is characterised by its flexible installation length and variety of rubber qualities, which means that a suitable rubber compound is available for every application (see material descriptions). The expansion joint can also be produced in high-pressure versions up to 100 bar .

Type 42 is used in plant engineering, water technology and wastewater technology , where it is mainly used in the event of repairs if the existing gap does not correspond to any standard installation length. This avoids expensive full renovation on the piping system. It absorbs noise, vibration and pipe movement.

Bellow design	High corrugated rubber bellow with reinforcement and pressure-resistant shaped solid rubber flanges, self-sealing (no additional seals required). Suitable for backing flanges or vulcanised steel flanges (for high-pressure applications).
Flange version	Both sides with backing or vulcanised flange made of galvanized steel with clearance holes, drilled according to DIN PN 10 (standard). Other materials and dimensions are possible.
Pressure resistance	Design according to customer specification, max 100 bar operating pressure.
Vacuum resistance	Only vacuum-resistant with a vacuum supporting ring. Also available as a special version with a vulcanised vacuum supporting ring on the corrugation foot.
Accessories	- Guide sleeves - Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover / sun protection hoods - Segment tie rods

Specifications

Bellow		Bellow design				Permissible operating data									
Colour code	Colour marking	Core (inner)	Reinforce-ment	Cover (outer)	Max. temperature °C	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

Important information

For aggressive media, please see the resistance table (can be requested separately).
The bellow 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.++++

WILLBRANDT **Rubber Expansion Joint Type 42**

Application

Type 42 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkaline solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 42 blue (EPDM TW)
Like Type 42 red, but approved for drinking water.

Type 42 white-red (EPDM beige)
Like Type 42 red, but with light-coloured rubber in food-grade.

Type 42 red AF (EPDM AF)
Like Type 42 red, but with abrasion-resistant EPDM rubber compound.

Type 42 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 42 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 42 white-grey (NBR beige)
Like Type 42 yellow-grey, but with light-coloured internal rubber in food-grade. Not approved for drinking water!

Type 42 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 42 red-blue-red (EPDM/aramid)
Like Type 42 red, but with aramid fabric.

Type 42 blue-blue-blue AF (EPDM TW/aramid)
Like Type 42 blue, but with aramid fabric.

Type 42 white-blue-red AF (EPDM beige/aramid)
Like Type 42 white-red, but with aramid fabric.

Type 42 orange-blue-orange AF (EPDM HT/aramid)
Like Type 42 red, but with aramid fabric and for temperatures up to +125 °C.

Type 42 red-blue-red AF (EPDM AF/aramid)
Like Type 42 red AF, but with aramid fabric.

Type 42 red-blue-red AF (EPDM AF/aramid)
Like Type 42 red AF, with aramid fabric.

Type 42 green-blue-green (CSM/aramid)
Like Type 42 green, but with aramid fabric.

Type 42 yellow-blue-grey (NBR/aramid)
Like Type 42 yellow-grey, but with aramid fabric.

Type 42 white-blue-grey (NBR white/aramid)
Like Type 42 white-grey, but with aramid fabric.

Type 42 grey-blue-grey (CR/aramid)
Like Type 42 grey, but with aramid fabric.

Type 42 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. Temperatures of up to +180 °C.

Type 42 silicone (silicone/glass fabric or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good radiation resistance. Not for use with steam above 120 °C.
No resistance to fuels.

Note!
Detailed material descriptions on pages 5 - 7.

WILLBRANDT **Rubber Expansion Joint Type 42**

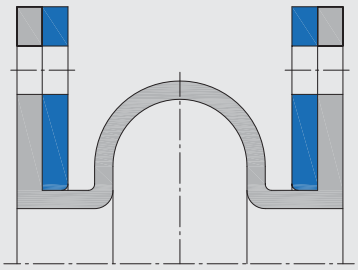
Versions

Type 42 is produced with pressure-resistant solid rubber f anges. In order to ensure a tight connection to the pipe/fan, the counter f ange should be f at and have no raised face. If this is not possible, the expansion joint f ange can be produced with a negative recess (see Versions 2 and 4) in order to accommodate the raised face of the counter f ange and ensure a f at connection.

Alternatively, spacer rings can be used.

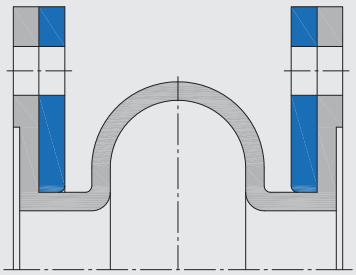
Version 1

Both sides with pressure-resistant solid rubber f anges for f at counter f anges.



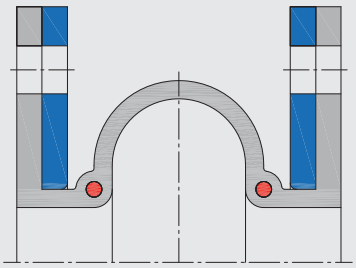
Version 2

Both sides with pressure-resistant solid rubber f anges and negative recess for counter f anges with raised face.



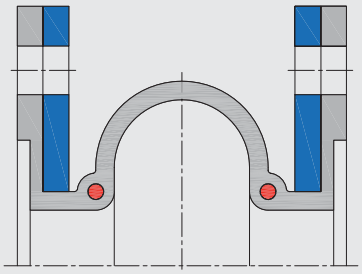
Version 3

Both sides with pressure-resistant solid rubber f anges and vulcanised supporting rings at the corrugation foot.



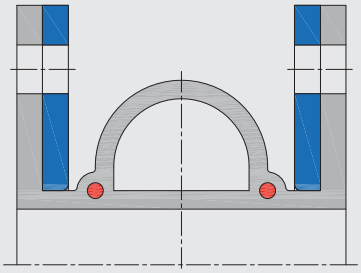
Version 4

Both sides with pressure-resistant solid rubber f anges and negative recess for counter f anges with raised face and vulcanised supporting rings at the corrugation foot.



Version 5

Both sides with pressure-resistant solid rubber f anges, vulcanised corrugated supporting rings at the corrugation foot and f lled corrugation.



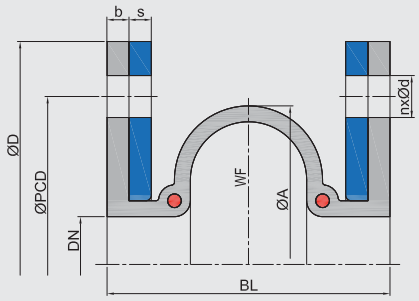
WILLBRANDT **Rubber Expansion Joint Type 42**

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 (see f tting instructions in the appendix).

(Example illustration - Version 3)



Dimensions for Design A

DN	Overall length	Bellow			Flange PN 10*3					Movement absorption*4			
	BL*1	ØA	b	WF*2	ØD	ØPCD	Ød	n	s	axial +	axial -	lateral ±	angular ±
	mm	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	∠°
50	**200**	110	10	6360	165	125	18	4	20	10	20	15	10.0
65	**200**	125	10	8650	185	145	18	8	20	10	20	15	10.0
80	**200**	140	10	11300	200	160	18	8	20	10	20	15	10.0
100	**200**	160	10	15400	220	180	18	8	20	14	34	15	15.6
125	**200**	185	10	21370	250	210	18	8	20	10	34	15	12.6
150	**200**	210	10	28830	285	240	22	8	20	10	34	15	10.6
200	**250**	280	10	53066	340	295	22	8	25	20	34	26	8.0
250	**250**	330	10	75439	395	350	22	12	25	20	34	26	6.4
300	**250**	384	10	104009	445	400	22	12	25	20	34	28	5.3
350	**250**	432	10	133249	505	460	22	16	25	20	34	27	4.6
400	**250**	484	13	169007	565	515	26	16	25	20	34	27	4.0
450	**250**	532	13	197823	615	565	26	20	30	20	34	27	3.6
500	**250**	585	13	241800	670	620	26	20	30	20	34	27	3.2
600	**250**	685	13	336785	780	725	30	20	30	20	34	27	2.9
700	**250**	786	13	448656	895	840	30	24	30	20	34	26	2.7
800	**300**	917	13	617614	1015	950	33	24	30	22	41	34	3.1
900	**300**	1017	13	764723	1115	1050	33	28	30	22	41	33	2.8
1000	**300**	1117	13	927532	1230	1160	36	28	30	22	41	33	2.5
1100	**300**	1217	13	1106041	1345	1270	36	32	30	22	41	33	2.3
1200	**300**	1317	13	1300250	1455	1380	39	32	30	22	41	32	2.1
1300	**300**	1417	13	1510159	1565	1485	42	32	30	22	41	32	1.9
1400	**300**	1517	13	1735768	1675	1590	42	36	30	22	41	31	1.8
1500	**300**	1617	13	1977077	1795	1705	48	36	30	22	41	31	1.7
1600	**300**	1717	13	2234086	1915	1820	48	40	30	22	41	31	1.6
1700	**300**	1817	13	2478817	2015	1920	48	44	35	22	41	30	1.5
1800	**300**	1917	13	2765656	2115	2020	48	44	35	22	41	30	1.4
1900	**300**	2017	13	3068195	2220	2125	48	48	35	22	41	29	1.3
2000	**300**	2117	13	3386434	2325	2230	48	48	35	22	41	29	1.3
2100	**350**	2255	13	3851387	2440	2335	56	48	35	24	47	38	1.4
2200	**350**	2355	13	4206992	2550	2440	56	52	35	24	47	37	1.3
2400	**350**	2555	13	4965302	2760	2650	56	56	35	24	47	36	1.1
2500	**350**	2655	13	5368007	2860	2750	56	56	35	24	47	36	1.1
2600	**350**	2755	13	5786412	2960	2850	56	60	35	24	47	35	1.1
2800	**350**	2955	13	6670322	3180	3070	56	64	35	24	47	34	1.0
3000	**350**	3155	13	7617032	3405	3290	62	68	35	24	47	33	0.9

*1 Overall lengths available from 150 mm to 450 mm.
*2 WF = effective area
*3 Other standards/dimensions possible.
*4 Movement absorption be increased by changing the the corrugation and overall length.

- Maximum size: DN 3000.
- Movement absorption is for a bellow design with 6 bar operating pressure.

Important information

Please note the appropriate f xed point constructions and plain bearings in your piping system, as well as the tolerances as per the FSA Handbook (page 118)!
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 desings. ++++

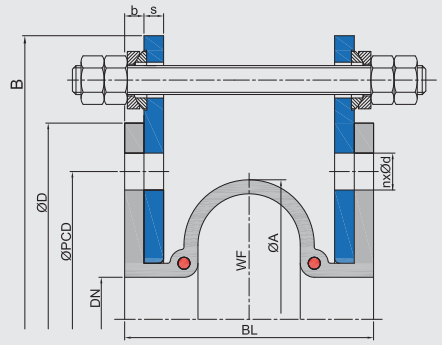
WILLBRANDT **Rubber Expansion Joint Type 42**

Design E - with tie rods

For absorbing the expansion joint's reaction force in the direction of expansion while also absorbing high lateral movement.

The use of PTFE-coated spherical washers and conical sockets reduces the frictional force considerably during lateral movement. Can be used for vibration insulation and absorbing lateral movement.

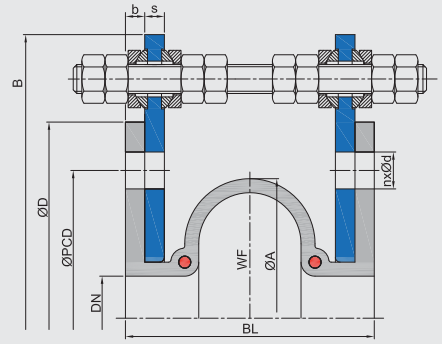
Note: The number of tie rods is calculated from the available design data.



Design M - with tie rods/thrust limiters

For absorbing the expansion joint's reaction force in the direction of expansion while also absorbing high lateral movement and preventing the bellow from strong compression. The use of PTFE-coated spherical washers and conical sockets reduces the frictional force considerably during lateral movement. Can be used for vibration insulation and absorbing lateral movement. This design can also be used without spherical washers and conical sockets for dismantling (Design T).

Note: The number of tie rods is calculated from the available design data.

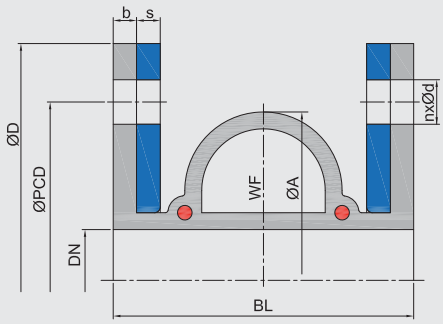


Design A - without tie rods, with f lled corrugation

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 (see f tting instructions in the appendix).

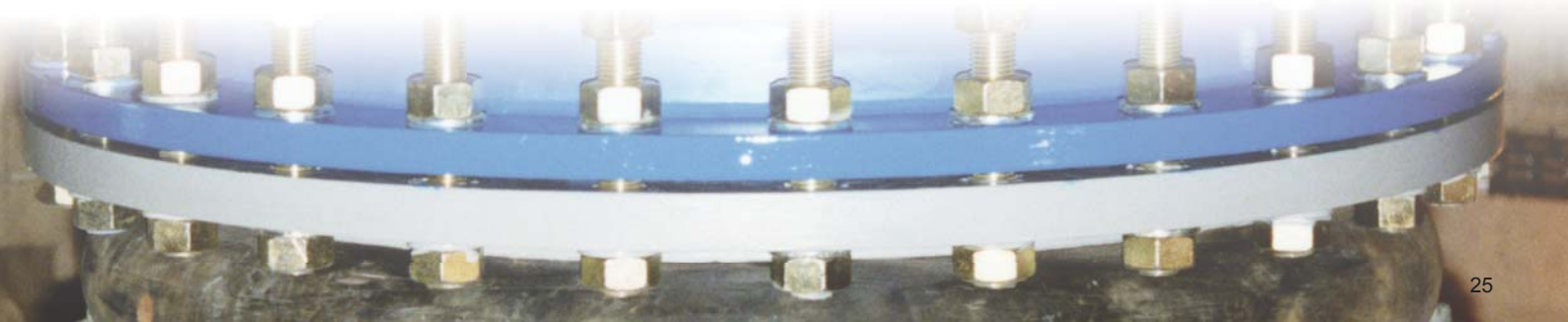
Note: Limited movement absorption



Important information

Please note the appropriate f xed 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. ++++

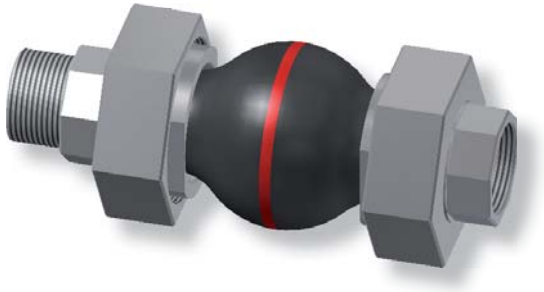


WILLBRANDT **Rubber Expansion Joint Type 46**

DN 20 (3/4") to DN 50 (2")

Type 46 is a low-corrugated rubber expansion joint. Its low corrugation helps to achieve very low flow resistance. It is also characterised by its considerable axial movement absorption and variety of rubber qualities, which means that a suitable rubber compound is available for every application (see material descriptions).

Type 46 is used in building technology, plant engineering, water management, engine construction and in solar and wind plant engineering, where it is specifically used to absorb expansion and vibration and to insulate noise.



Bellow design	Low-corrugated rubber bellow with reinforcement and shaped sealing bead with core ring, self-sealing (no additional seals required). Suitable for 3-piece screw connection.	**Vacuum resistance**	Can be used for full vacuums without additional measures.
Screw connection	Galvanized steel with female or male threads according to DIN EN 10226. Other standards and materials are possible.	**Accessories**	- Flame-resistant protective covers - Dust and splash protection covers
		Approvals/Conformity	Similar to DIN 4809 / TÜV approved, approved for drinking water, FDA and EG 1935/2004 confirm

Specifications for DN 20 - DN 50

Bellow		Bellow design			Permissible operating data									Surface resistance Ro	
Colour code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)	°C	bar	°C	bar	°C	bar	°C	bar	Short-term °C	Core Ohm x cm	Cover Ohm x cm
red Sp	■■	EPDM	PEEK	EPDM	-40	10	70	16	100	10	130	8	150	4 x 10^3	4 x 10^3
red	■	IIR	Polyamide	EPDM	-40	10	50	16	70	12	100	10	120	7 x 10^6	1 x 10^3
red EPDM	■	EPDM	Polyamide	EPDM	-30	10	50	16	70	12	90	10	100	-	-
yellow	■	NBR	Polyamide	CR	-20	10	50	16	70	12	90	10	100	2 x 10^2	1 x 10^3
white	□	NBR	Polyamide	CR	-20	10	50	16	70	12	90	10	100	7 x 10^9	1 x 10^3
green	■	CSM	Polyamide	CSM	-20	10	50	16	70	12	100	10	110	7 x 10^9	7 x 10^9
black EPDM	◆	IIR	Polyamide	EPDM	-40	10	50	10	70	8	90	6	120	7 x 10^6	1 x 10^3
black CR	–	CR	Polyamide	CR	-25	10	50	16	70	12	90	10	100	7 x 10^9	5 x 10^{10}
yellow LT	■ LT	NBR LT	Polyamide	CR	-40	10	50	16	70	12	90	10	100	1 x 10^4	1 x 10^3
yellow St	■■	NBR	Steel cord	CR	-20	10	60	16	70	12	90	10	100	2 x 10^2	5 x 10^{10}
yellow HNBR	■■■	HNBR	Steel cord	CR	-35	10	60	16	70	12	100	10	120	1,5 x 10^5	5 x 10^{10}

Important information

For aggressive media, please see the resistance table (can be requested separately).
Please note the appropriate f xed point constructions and plain bearings in your piping system!
For more information please refer to our installation instructions.
The bellow must be installed torsion-free and 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. ++++

WILLBRANDT **Rubber Expansion Joint Type 46**

Application

Type 46 red Sp
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 46 red
For drinking water, hot water, sea water, cooling water with chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Electrically dissipative inner surface and electrically conductive outer surface. Not suitable for oil products or cooling water with additives containing oil.

Type 46 red EPDM
Like Type 46 red, but not for drinking water, shipbuilding and offshore applications. Temperature range max. 90 °C at 10 bar.

Type 46 yellow
For oils, lubricants, fuels, gases, city and natural gas (not liquefied) and DIN EN fuels with an aromatic content up to 50 %.
Electrically conductive.

Type 46 white
For foodstuffs containing oil and fat rubber in food-grade. Electrically insulating inner surface and electrically conductive outer surface. Not suitable for drinking water.

Type 46 green
For chemicals, aggressive chemical wastewater and compressor air containing oil. Electrically insulating.

Type 46 black EPDM
For drinking water, sea water, cooling water, weak acids and alkali solutions, technical alcohols, esters and ketones. Electrically dissipative inner surface and electrically conductive outer surface. Max. pressure 10 bar.

Type 46 black CR
For hot and cold water, wastewater, swimming pool water, salt water, wastewater, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil. Electrically insulating.

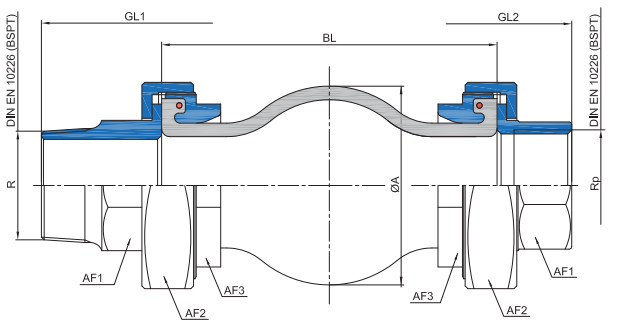
Type 46 yellow LT
Like Type 46 yellow. Also for liquid gas. Electrically dissipative.

Type 46 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. Electrically insulating inner surface, electrically conductive outer surface.

Type 46 yellow St
Like Type 46 yellow with additional flame-resistance for up to 30 minutes at 800 °C. Electrically conductive inner surface, electrically insulating outer surface.

Type 46 yellow HNBR
Like Type 46 yellow St, but for temperatures up to +100 °C. Electrically dissipative inner surface, electrically insulating outer surface.

Note!
Detailed material descriptions on pages 5 - 7.



model 1
male thread

model 2
female thread

Dimensions - polyamide reinforcement

DN	Length	Bellow			Total length		Wrench size			Movement absorption				Weight	
	BL	ØA	WF*	R / RP	GL1	GL2	AF1	AF2	AF3	axial +	axial -	lateral +	angular ±	Design 1	Design 2
	mm	mm	mm²	Inches	mm	mm	mm	mm	mm	mm	mm	mm	∠°	kg	kg
20	**130**	81	1700	3/4	214	190	36	80	54	15	30	10	30	2.3	2.5
25	**130**	81	1700	1	214	182	40	80	54	15	30	10	30	2.4	2.4
32	**130**	81	1700	1 1/4	240	190	48	80	54	15	30	10	30	2.6	2.1
40	**130**	86	1800	1 1/2	250	198	53	90	74	15	30	10	30	2.9	2.6
50	**130**	96	3200	2	260	198	66	110	90	15	30	10	30	4.4	3.9

***** WF = effective area

Note: Reduced expansion for steel cord reinforcement (Type 46 yellow ST and yellow HNBR). Weighs slightly more.

WILLBRANDT **Rubber Expansion Joint Type 48**

DN 50 - DN 250

Type 48 is a high-corrugated rubber expansion joint. Its high corrugation means that it has very low inherent resistance. It reduces up to 90 % incoming energy . It continues to be characterised by its considerably movement absorption in all directions.

Type 48 is primarily used in industrial applications to absorb expansion and vibration.

Bellow design	High-corrugated rubber bellow with reinforcement and shaped sealing bead, self-sealing (no additional seals required). Suitable for swiveling flanges.
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 - Segment tie rods
Vacuum resistance	Can be used up to -200 mbar without additional measures, full vacuum possible with vacuum supporting spiral/ring.
Approvals	There are no approvals available.

Specifications

Bellow		Bellow design			Permissible operating data							
Colour code	Colour marking	Core (inner)	Reinforcement	Cover (outer)	°C	bar	°C	bar	°C	bar	Short-term °C	Surface resistance Ro Ohm x cm
red		EPDM	Sp. Cord	EPDM	50	16	70	10	100	6	110	7 x 10^4

Bursting pressure DN 50 - 250 > 48 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. ++++

WILLBRANDT **Rubber Expansion Joint Type 48**

Application

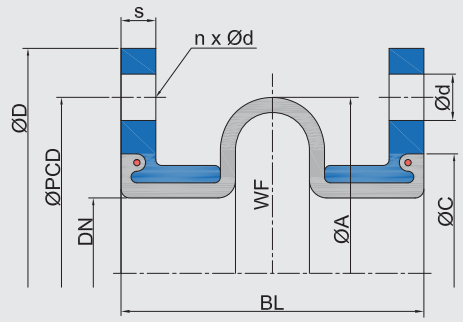
Type 48 red
For hot water, sea water, cooling water with chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Very good resistance to steam, excellent resistance to swelling and chemicals (diluted acids, alkalis, acetone and alcohol). Not suitable for oil products or cooling water with additives containing oil.

Note!
Detailed material descriptions on pages 5 - 7.

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

DN	Length BL	Bellow ØA	Bellow WF*1	Flange PN 10*2 ØD	Flange PN 10*2 ØPCD	Flange PN 10*2 Ød	Flange PN 10*2 n	Flange PN 10*2 s	Flange PN 10*2 ØC	Movement absorption axial +	Movement absorption axial -	Movement absorption lateral ±	Movement absorption angular ±	Weight
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	∠°	kg
50	**150**	133	11900	165	125	18	4	16	96	25	25	20	30	5.4
65	**150**	147	14700	185	145	18	8	16	116	25	25	20	30	6.7
80	**150**	167	19400	200	160	18	8	18	133	25	25	20	30	7.5
100	**155**	197	27500	220	180	18	8	18	153	40	30	25	30	8.9
150	**155**	248	44500	285	240	23	8	20	203	45	35	25	20	15.9
200	**160**	292	62400	340	295	23	8	20	261	45	35	25	20	20.7
250	**160**	340	85500	395	350	23	12	20	310	45	35	25	20	27.8

*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 f xed 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 49**

DN 32 - DN 500

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.	**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.
Vacuum resistance	Can be used up to -200 mbar without additional accories, full vacuum possible with vacuum supporting spiral/ring.	**Approvals/Conformity**	Similar to DIN 4809 / TÜV approved, drinking water and shipbuilding approval, FDA and EG 1935/2004 conform

Specifications for DN 32 - DN 500

Bellow		Bellow design			Permissible operating data									Surface resistance Ro	
Colour code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)	°C	bar	°C	bar	°C	bar	°C	bar	Short-term °C	Core Ohm x cm	Cover Ohm x cm
A-red		EPDM	PEEK	EPDM	-40	16	70	25	100	18	130	12	150	4×10^3	4×10^3
blue		IIR	Polyamide	EPDM	-40	16	50	25	70	18	100	12	120	7×10^6	1×10^3
yellow		NBR	Polyamide	CR	-20	16	50	25	70	18	90	12	100	2×10^2	1×10^3
white		NBR	Polyamide	CR	-20	16	50	25	70	18	90	12	100	7×10^9	1×10^3
green		CSM	Polyamide	CSM	-20	16	50	25	70	18	100	12	110	7×10^9	7×10^9
black EPDM*		IIR	Polyamide	EPDM	-40	10	50	10	70	8	90	6	120	7×10^6	1×10^3

*black EPDM max. DN 200

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 49**

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.

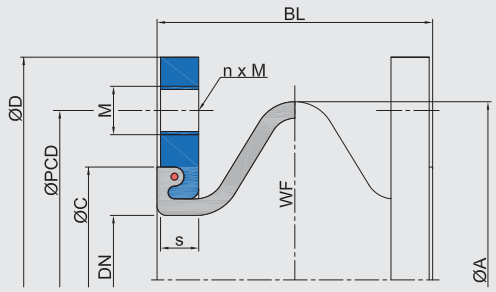
Type 49 black EPDM
For hot and cold water, sea water, cooling water, weak acids and alkali solutions, technical alcohols, esters and ketones. Electrically dissipative inner surface, conductive outer surface.
Max. pressure 10 bar.

Note!
Detailed material descriptions on pages 5 - 7.

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

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

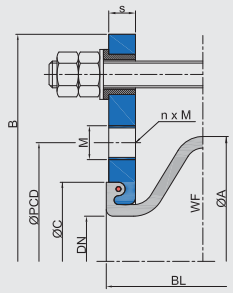
Permissible degree of utilisation for movement areas:
- up to 50 °C: Utilisation ~ 100 %
- up to 70 °C: Utilisation ~ 75 %
- up to 90 °C: Utilisation ~ 60 %

WILLBRANDT **Rubber Expansion Joint Type 49**

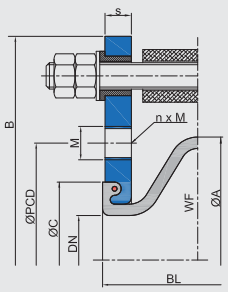
Length limiters

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

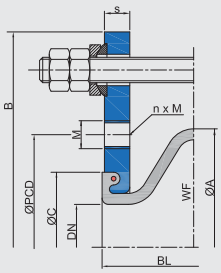
Design B*
with tie rods



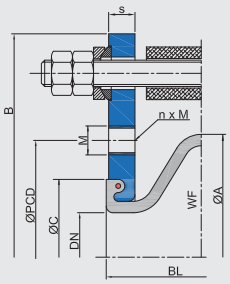
Design C*
with tie rods/thrust limiters



Design E
with tie rods and spherical washers/conical sockets



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



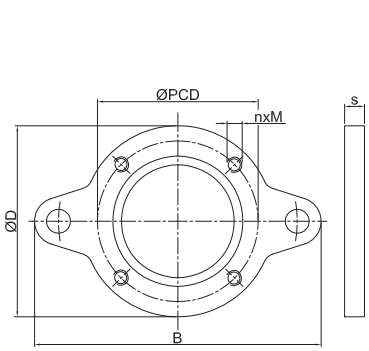
*Note: In Designs B and C the lateral movement absorption is reduced by around 50 %.

Accessories

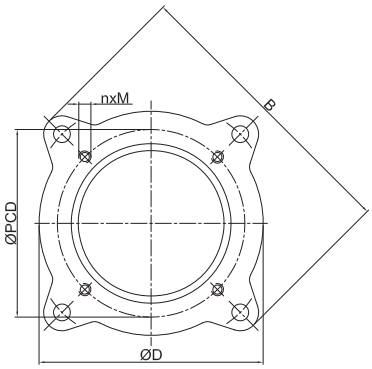
- Vacuum supporting spirals / rings
- Guide sleeves
- Potential equalisation
- Flame-resistant protective covers
- Dust and splash protection covers
- Earth cover hoods

Flange dimensions for designs with tie rods

DN	Length	Flange PN 10 (example dimensions)						
	BL	B	ØD	ØPCD	M	n	s	ØC
	mm	mm	mm	mm			mm	mm
32	**100**	230	140	100	M16	4	16	79
40	**100**	240	150	110	M16	4	16	79
50	**100**	255	165	125	M16	4	16	89
65	**100**	275	185	145	M16	8	16	104
80	**100**	290	200	160	M16	8	18	119
100	**100**	310	220	180	M16	8	18	142
125	**100**	340	250	210	M16	8	18	169
150	**100**	375	285	240	M20	8	20	195
200	**100**	440	340	295	M20	8	20	245
250	**100**	509	395	350	M20	12	20	295
300	**100**	559	445	400	M20	12	20	345
350	**100**	619	505	460	M20	16	20	396
400	**110**	700	565	515	M24	16	25	450
500	**110**	810	670	620	M24	20	25	550



DN 32 - 200



DN 250 - 500

Important information

Various bolt packs (SU) are available for the standard design.
Please note the appropriate f xed 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 49**

Axial stiffness rates

DN	Length	Stiffness rates (average value form full way)								
	BL 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	210	264	390
40	**100**	14	30	56	62	116	180	210	264	390
50	**100**	12	30	66	76	142	220	260	332	512
65	**100**	14	45	87	99	189	286	346	414	621
80	**100**	33	75	135	150	258	396	460	555	796
100	**100**	28	80	156	176	320	480	563	684	998
125	**100**	30	95	186	218	374	580	672	819	1216
150	**100**	35	68	144	248	320	528	626	792	1192
200	**100**	42	90	178	204	370	594	702	908	1385
250	**100**	20	112	224	256	480	768	906	1136	1680
300	**100**	22	108	236	277	520	854	1019	1338	2071
350	**100**	28	128	270	310	570	940	1136	1510	2369
400	**110**	44	140	296	342	646	1052	1296	1660	2587
500	**110**	46	172	354	416	792	1264	1524	2000	3116

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

Lateral stiffness rates

DN	Length	Stiffness rates (average value form full way)								
	BL 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

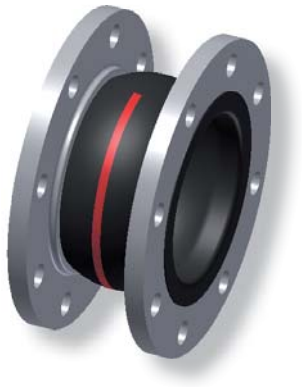
Warning: Deviations (+/-25 %) in the stiffness rates may occur due to use of different materials and manufacturing processes.

Angular stiffness torque

DN	Length	Stiffness torque (averages value from full way)								
	0 bar mm	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	1.7	1.8
40	**100**	0.1	0.3	0.6	0.6	1.2	1.8	1.6	1.7	1.8
50	**100**	0.2	0.4	0.9	1.0	1.9	2.9	2.1	2.3	2.4
65	**100**	0.3	0.8	1.6	1.8	3.5	5.3	3.5	3.7	3.9
80	**100**	0.8	1.9	3.4	3.8	6.5	10.0	4.3	4.6	4.9
100	**100**	1.0	2.9	5.7	6.4	11.6	17.4	8.8	9.5	10.1
125	**100**	1.6	5.0	9.8	11.4	19.6	30.4	14.0	15.0	16.0
150	**100**	0.7	5.9	12.5	21.5	27.8	45.9	25.3	27.1	28.9
200	**100**	5.7	12.1	24.0	27.5	49.9	80.0	51.3	55.0	58.6
250	**100**	4.0	22.1	44.3	50.6	94.9	151.8	83.5	89.4	95.3
300	**100**	5.9	28.8	62.9	73.8	138.6	227.6	119.0	127.4	135.8
350	**100**	9.9	45.1	95.2	109.3	201.0	331.4	209.7	224.5	239.4
400	**110**	19.7	62.8	132.8	153.5	289.9	472.1	329.3	352.5	375.8
500	**110**	30.9	115.4	237.5	279.1	531.3	848.0	580.8	624.9	662.9

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

WILLBRANDT **Rubber Expansion Joint Type 50**



DN 20 - DN 1000

Type 50 is a low-corrugated, highly elastic rubber expansion joint. Its low corrugation helps to achieve very low flow resistance. It reduces up to 70 % of the incoming energy . It is also characterise by very high movement absorption in all directions and variety of rubber qualities, which means that a suitable rubber compound is available for every application.

Type 50 is used in building technology, plant engineering, water and wastewater technology, engine construction, shipbuilding and in solar and and wind plant engineering. It especially used where it is specifically used to absorb expansion and 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 accommodating swiveling flanges.

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.

Approvals/Conformity

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

Specifications for DN 20 - DN 400

Bellow		Bellow design			up to DN	Permissible operating data								Surface resistance Ro	
Colour code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)		°C	bar	°C	bar	°C	bar	°C	bar	Short-term °C	Core Ohm x cm	Cover Ohm x cm
red Sp	■■	EPDM	PEEK	EPDM	400	-40	10	70	16	100	10	130	8	150	4 x 10^3	4 x 10^3
red	■	IIR	Polyamide	EPDM	400	-40	10	50	16	70	12	100	10	120	7 x 10^6	1 x 10^3
red EPDM	■	EPDM	Polyamide	EPDM	400	-30	10	50	16	70	12	90	10	100	- -	- -
yellow	■	NBR	Polyamide	CR	400	-20	10	50	16	70	12	90	10	100	2 x 10^2	1 x 10^3
white	□	NBR	Polyamide	CR	400	-20	10	50	16	70	12	90	10	100	7 x 10^9	1 x 10^3
green	■	CSM	Polyamide	CSM	400	-20	10	50	16	70	12	100	10	110	7 x 10^9	7 x 10^9
orange	■	NBR	Polyamide	CR	200	-20	10	50	25	70	20	90	15	100	3 x 10^3	1 x 10^3
black EPDM*	◆	IIR	Polyamide	EPDM	150	-40	10	50	10	70	8	90	6	120	7 x 10^6	1 x 10^3
black CR	–	CR	Polyamide	CR	400	-25	10	50	16	70	12	90	10	100	7 x 10^9	5 x 10^{10}
yellow LT	■ LT	NBR-LT	Polyamide	CR	300	-40	10	50	16	70	12	90	10	100	1 x 10^4	4 x 10^3
yellow St	■■	NBR	Steel cord	CR	400	-20	10	60	16	70	12	90	10	100	2 x 10^2	5 x 10^{10}
yellow HNBR	■■■	HNBR	Steel cord	CR	300	-35	10	60	16	70	12	100	10	120	1,5 x 10^5	- 10^{10}
BR	●	BR/NR	Polyester cord	BR/NR	300	-50	10	50	16	70	12	-	-	90	- -	-

Bursting pressure DN 20 - 400 > 48 bar
* Bursting pressure max. 30 bar, max. DN 150

For pressure loss see technical appendix.

Specifications for DN 450 - DN 1000

Bellow		Bellow design			up to DN	Permissible operating data								Surface resistance Ro	
Colour code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)		°C	bar	°C	bar	°C	bar	°C	bar	Short-term °C	Core Ohm x cm	Cover Ohm x cm
red Sp	■■	EPDM	PEEK	EPDM	1000	-40	8	70	10	100	7,5	130	6	150	4 x 10^3	4 x 10^3
red	■	IIR	Polyamide	EPDM	1000	-40	8	50	10	70	8	100	6	120	7 x 10^6	1 x 10^3
red EPDM	■	EPDM	Polyamide	EPDM	600	-30	8	50	10	70	8	90	6	100	- -	- -
yellow	■	NBR	Polyamide	CR	1000	-20	8	50	10	70	8	90	6	100	2 x 10^2	1 x 10^3
white	□	NBR	Polyamide	CR	600	-20	8	50	10	70	8	90	6	100	7 x 10^9	1 x 10^3
green	■	CSM	Polyamide	CSM	1000	-20	8	50	10	70	8	100	6	110	7 x 10^9	7 x 10^9
black CR	–	CRN	Polyamide	CR	1000	-25	8	50	10	70	8	90	6	100	7 x 10^9	5 x 10^{10}
yellow St	■■	NBR	Steel cord	CR	600	-20	8	60	10	70	8	90	6	100	2 x 10^2	5 x 10^{10}

Bursting pressure DN 450 - 1000 > 30 bar

For pressure loss see technical appendix.

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 50**

Vacuum resistance

- DN 20 to 50 vacuum-resistant without additional accessories
- DN 65 to 250 without additional accessories to -300 mbar and with vacuum supporting spiral for full vacuum
- DN 300 to DN 1000 only vacuum-resistant with vacuum supporting ring
- Type 50 black EPDM DN 20 to DN 40 without additional accessories

Accessories

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

Application

Type 50 red Sp
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 50 red
For drinking water, hot water, sea water, cooling water with chemical additives for treating water, saline solutions, weak acids and weak alkaline solutions. Electrically dissipative inner surface and electrically conductive outer surface. Not suitable for oil products or cooling water with additives containing oil.

Type 50 red EPDM
Like Type 50 red, but not for drinking water, shipbuilding and offshore applications. Temperature range max. 90 °C at 10 bar.

Type 50 yellow
For oils, lubricants, fuels, gases, city and natural gas (not liquefied) and DIN EN fuels with an aromatic content up to 50 %. Electrically conductive.

Type 50 white
For foodstuffs containing oil and fat (rubber in food-grade). Not approved for drinking water. Electrically insulating inner surface and electrically conductive outer surface.

Type 50 green
For chemicals, aggressive chemical wastewater and compressor air containing oil. Electrically insulating.

Type 50 orange
Like Type 50 yellow, but also for liquid petroleum gas acc. to DIN EN 589. Electrically dissipative.

Type 50 black EPDM
For drinking water, sea water, cooling water, weak acids and alkali solutions, technical alcohols, esters and ketones. Max. pressure 10 bar. Electrically dissipative inner surface and electrically conductive outer surface.

Type 50 black CR
For hot and cold water, wastewater, swimming pool water, salt water, wastewater, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil. Electrically insulating.

Type 50 yellow LT
Like Type 50 yellow, but also for liquid gas. Electrically dissipative.

Type 50 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. Electrically insulating inner surface and electrically conductive outer surface.

Type 50 yellow St
Like Type 50 yellow with additional flame-resistance for up to 30 minutes at 800 °C. Electrically conductive inner surface, electrically insulating outer surface.

Type 50 yellow HNBR
Like Type 50 yellow St, but for temperatures up to +100 °C. Electrically dissipative inner surface, electrically insulating outer surface.

Type 50 BR
Especially for abrasive media such as sludges, dustlike and powdery media, liquids with solids and emulsions. Also suitable for all kinds of water, as well as various chemicals. Not suitable for oil based products and cooling water with oily additives. Electrically dissipative.

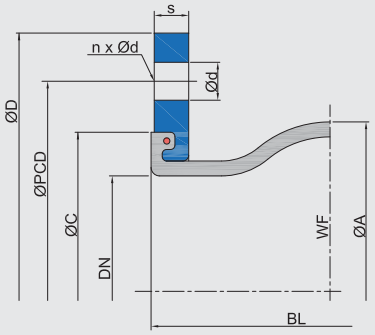
Note!
Detailed material descriptions on pages 5 - 7.

WILLBRANDT **Rubber Expansion Joint Type 50**

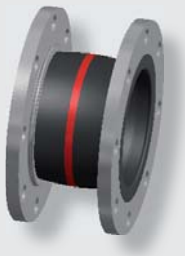
Design A - without tie rods

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.

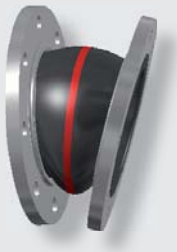


axial -



axial +

lateral ±



angular ±

Dimensions for Design A

DN	Length	Bellow		Flange PN 10*2						Movement absorption (polyamide cord)				Movement absorption (steel cord)				Weight
	BL	ØA	WF*1	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral ±	angular ±	axial +	axial -	lateral ±	angular ±	
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	∠°	mm	mm	mm	∠°	kg
20	**130**	81	1700	105	75	12	4	14	66	30	30	30	30	15	30	15	20	1.5
25	**130**	81	1700	115	85	14	4	14	66	30	30	30	30	15	30	15	20	1.9
32	**130**	81	1700	140	100	18	4	15	66	30	30	30	30	15	30	15	20	3.1
40	**130**	86	1800	150	110	18	4	15	74	30	30	30	30	15	30	15	20	3.5
50	**130**	96	3200	165	125	18	4	16	86	30	30	30	30	15	30	15	20	3.7
65	**130**	111	5300	185	145	18	8	16	106	30	30	30	30	15	30	15	20	5.3
80	**130**	122	8500	200	160	18	8	18	118	30	30	30	30	15	30	15	20	6.8
100	**130**	142	12800	220	180	18	8	18	138	30	30	30	20	15	30	15	15	7.9
125	**130**	168	18700	250	210	18	8	18	166	30	30	30	20	15	30	15	15	9.6
150	**130**	192	25900	285	240	22	8	18	192	30	30	30	20	15	30	15	15	12.9
200	**130**	252	41000	340	295	22	8	20	252	30	30	30	12	20	15	10	5	16.2
250	**130**	302	59600	395	350	22	12	20	304	30	30	30	12	20	15	10	5	21.5
300	**130**	354	82200	445	400	22	12	22	354	30	30	30	12	20	15	10	5	24.5
350	**200**	420	117600	505	460	22	16	24	412	30	50	30	8	30	30	25	10	38.3
400	**200**	480	154700	565	515	26	16	25	470	30	50	30	8	30	40	25	5	38.0
450	**200**	530	204200	615	565	26	20	28	520	30	50	30	8	-	-	-	-	47.2
500	**200**	580	227900	670	620	26	20	30	570	30	50	30	8	-	-	-	-	56.5
600	**200**	680	311500	780	725	30	20	30	675	30	50	30	8	-	-	-	-	75.2
700	***3250**	800	434200	895	840	30	24	35	780	30	50	30	8	-	-	-	-	127.8
800	**250**	880	527400	1015	950	33	24	40	887	30	50	30	6	-	-	-	-	161.0
900	**300**	1038	737900	1115	1050	33	28	40	987	30	50	30	5	-	-	-	-	196.7
1000	**300**	1138	889400	1230	1160	36	28	40	1087	30	50	30	5	-	-	-	-	234.5

*1 WF = effective area
*2 Other standards/dimensions possible.
*3 Building length 260 mm

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

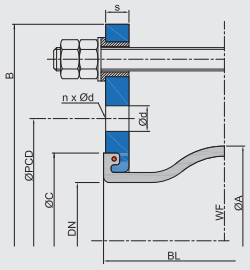
Please note the appropriate f xed point constructions and plain bearings in your piping system!
For more information please refer to our installation instructions.
For information on the tie rods, please see the technical appendix (p. 89 - 92)!
++++ We will be happy to send you further information on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

WILLBRANDT **Rubber Expansion Joint Type 50**

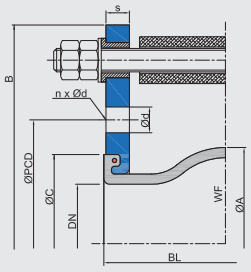
Length limiters

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

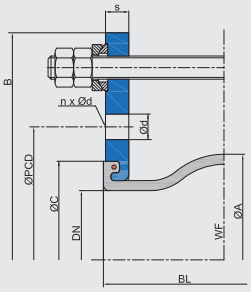
Design B*
with tie rods



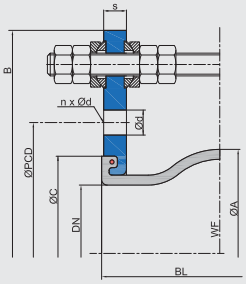
Design C*
with tie rods/thrust limiters



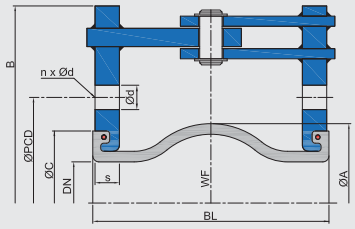
Design E
with tie rods and spherical washers/conical sockets



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



Design F
with hinge

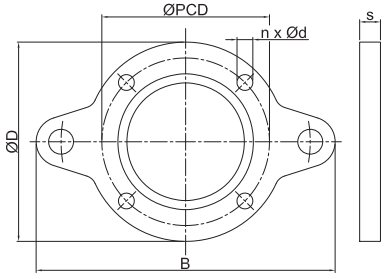


*Note: For Designs B and C
the lateral movement absorption is reduced by around 50 %.

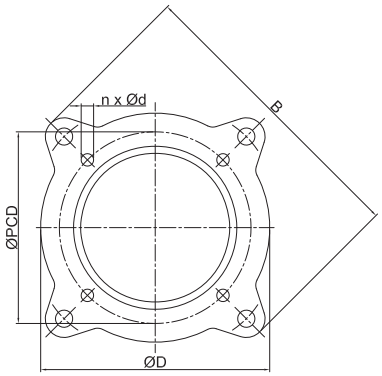
Flange dimensions for Designs with tie rods

DN	Length BL	Flange PN 10 (example dimensions) B	ØD	ØPCD	Ød	n	s	ØC
	mm	mm	mm	mm	mm		mm	mm
20	**130**	189	105	75	12	4	14	66
25	**130**	205	115	85	14	4	14	66
32	**130**	230	140	100	18	4	15	66
40	**130**	240	150	110	18	4	15	74
50	**130**	255	165	125	18	4	16	86
65	**130**	275	185	145	18	8	16	106
80	**130**	290	200	160	18	8	18	118
100	**130**	310	220	180	18	8	18	138
125	**130**	340	250	210	18	8	18	166
150	**130**	375	285	240	22	8	18	192
200	**130**	440	340	295	22	8	20	252
250	**130**	509	395	350	22	12	20	304
300	**130**	559	445	400	22	12	22	354
350	**200**	619	505	460	22	16	24	412
400	**200**	700	565	515	26	16	25	470
450	**200**	760	615	565	26	20	30	520
500	**200**	810	670	620	26	20	30	570
600	**200**	930	780	725	30	20	30	675
700	***250**	1045	895	840	30	24	35	780
800	**250**	1175	1015	950	33	24	40	887
900	**300**	1285	1115	1050	33	28	40	987
1000	**300**	1400	1230	1160	36	28	40	1087

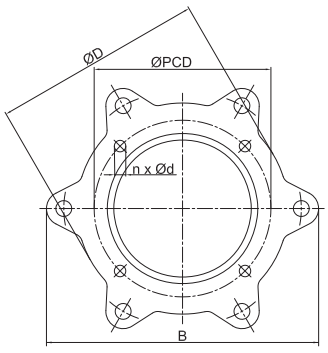
* Building length 260 mm



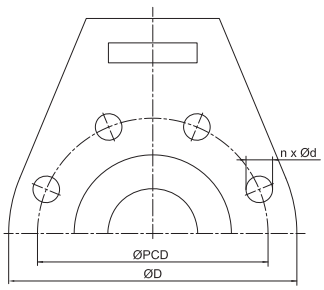
DN 32 - 200



DN 250 - 900



DN 1000



DN 50 - 1000 (Design F)

WILLBRANDT **Rubber Expansion Joint Type 50**

Axial stiffness rates

DN	Overall length BL mm	Stiffness rates (averages value from full way) 0 bar Nm/mm	2,5 bar Nm/mm	4 bar Nm/mm	6 bar Nm/mm	10 bar Nm/mm	16 bar Nm/mm
20	**130**	31	68	128	192	243	270
25	**130**	31	68	128	192	243	270
32	**130**	31	68	128	192	243	270
40	**130**	30	66	124	186	236	261
50	**130**	25	51	98	134	173	192
65	**130**	24	53	100	150	190	211
80	**130**	28	58	104	148	185	205
100	**130**	35	71	116	206	274	304
125	**130**	36	71	137	214	282	313
150	**130**	49	102	189	293	390	433
200	**130**	100	180	365	568	735	816
250	**130**	105	207	388	609	778	864
300	**130**	123	248	448	658	883	980
350	**200**	105	177	349	567	753	836
400	**200**	154	261	516	535	1090	1210
450	**250**	167	320	581	903	1162	1290
500	**200**	196	376	686	1060	1364	1514
600	**200**	208	292	692	1123	1441	1600
700	***250**	140	198	521	714	954	-
800	**250**	180	270	594	975	1258	-
900	**300**	200	380	690	1080	1395	-
1000	**300**	225	420	742	1248	1568	-

* Building length 260 mm

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 Nm/mm	2,5 bar Nm/mm	4 bar Nm/mm	6 bar Nm/mm	10 bar Nm/mm	16 bar Nm/mm
20	**130**	64	125	184	240	240	300
25	**130**	64	125	184	240	240	300
32	**130**	64	125	184	240	240	300
40	**130**	62	121	178	233	256	291
50	**130**	50	65	80	105	145	205
65	**130**	40	78	115	150	165	188
80	**130**	35	74	136	155	173	200
100	**130**	55	88	143	168	192	228
125	**130**	100	200	261	293	383	518
150	**130**	120	260	309	366	466	616
200	**130**	323	723	836	949	1219	1624
250	**130**	379	806	1022	1173	1479	1938
300	**130**	392	837	1068	1216	1542	2031
350	**200**	305	610	762	875	1098	1433
400	**200**	338	642	817	946	1199	1579
450	**250**	342	639	821	971	1200	1544
500	**200**	426	818	1048	1204	1495	1932
600	**200**	456	834	1062	1295	1586	2023
700	***250**	516	939	1191	1449	1775	-
800	**250**	558	960	1055	1557	1758	-
900	**300**	800	1480	1984	2248	2560	-
1000	**300**	960	1824	2361	2736	2976	-

* Building length 260 mm

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

WILLBRANDT **Rubber Expansion Joint Type 50**

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 Nm/°	16 bar Nm/°
20	**130**	0.2	0.5	0.9	1.3	1.7	1.9
25	**130**	0.2	0.5	0.9	1.3	1.7	1.9
32	**130**	0.2	0.5	0.9	1.3	1.7	1.9
40	**130**	0.3	0.6	1.1	1.6	2.0	2.3
50	**130**	0.3	0.6	1.1	1.6	2.0	2.2
65	**130**	0.4	0.9	1.7	2.5	3.2	3.6
80	**130**	1.0	1.0	2.0	3.0	4.0	5.0
100	**130**	1.0	2.0	4.0	7.0	9.0	10.0
125	**130**	2.0	3.0	6.0	10.0	13.0	15.0
150	**130**	3.0	7.0	12.0	19.0	25.0	28.0
200	**130**	11.0	20.0	41.0	63.0	82.0	91.0
250	**130**	18.0	35.0	65.0	102.0	130.0	144.0
300	**130**	29.0	58.0	105.0	154.0	206.0	229.0
350	**200**	34.0	57.0	113.0	183.0	244.0	270.0
400	**200**	65.0	110.0	218.0	226.0	460.0	511.0
450	**250**	87.0	168.0	304.0	473.0	609.0	676.0
500	**200**	125.0	239.0	436.0	674.0	868.0	963.0
600	**200**	186.0	261.0	618.0	1004.0	1288.0	1429.0
700	***250**	167.0	237.0	861.0	853.0	1140.0	-
800	**250**	277.0	416.0	914.0	1501.0	1937.0	-
900	**300**	386.0	733.0	1330.0	2082.0	2689.0	-
1000	**300**	531.0	991.0	1751.0	2945.0	3700.0	-

* Building length 260 m

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
20	**130**	7	0.2
25	**130**	7	0.2
32	**130**	7	0.2
40	**130**	7	0.2
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**	171	40.5
500	**200**	266	63.5
600	**200**	634	138.5
700	***250**	662	180.9
800	**250**	896	326.2
900	**250**	1105	402.4
1000	**250**	1357	617.3

* Building length 260 m

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

WILLBRANDT **Chemical Expansion Joint Type 50 PTFE**

DN 25 - DN 500

Type 50 PTFE is a low-corrugated, PTFE-lined rubber expansion joint. Its low corrugation helps 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 50. 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.

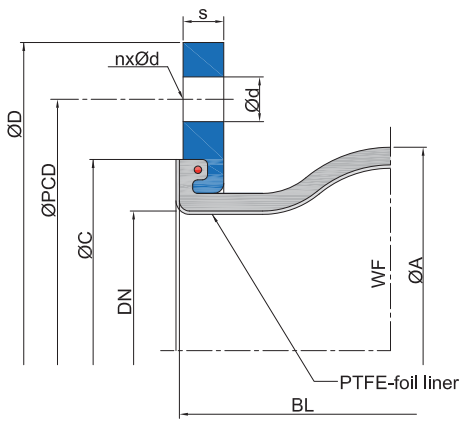
Dimensions for Design A

DN	Length	Bellow		Flange PN 10						Movement absorption				Weight
	BL	ØA	WF*	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral ±	angular ±	
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	∠°	kg
25	**130**	81	1700	115	85	14	4	14	66	15	15	15	15.0	1.9
32	**130**	81	1700	140	100	18	4	15	66	15	15	15	15.0	3.1
40	**130**	86	1800	150	110	18	4	15	74	15	15	15	15.0	3.5
50	**130**	96	3200	165	125	18	4	16	86	15	15	15	15.0	3.8
65	**130**	111	5300	185	145	18	8	16	106	15	15	15	15.0	5.4
80	**130**	122	8500	200	160	18	8	18	118	15	15	15	15.0	6.9
100	**130**	142	12800	220	180	18	8	18	138	15	15	15	10.0	8.0
125	**130**	168	18700	250	210	18	8	18	166	15	15	15	10.0	9.7
150	**130**	192	25900	285	240	22	8	20	192	15	15	15	10.0	13.1
200	**130**	252	41000	340	295	22	8	20	252	15	15	15	6.0	16.4
250	**130**	302	59600	395	350	22	12	20	304	15	15	15	6.0	21.7
300	**130**	354	82200	445	400	22	12	20	354	15	15	15	6.0	24.8
350	**200**	420	117600	505	460	22	16	24	412	15	15	15	4.0	38.8
400	**200**	480	154700	565	515	26	16	25	470	15	15	15	4.0	38.6
450	**200**	530	204200	615	565	26	20	28	520	15	15	15	4.0	49.3
500	**200**	580	227900	670	620	26	20	30	570	15	15	15	4.0	57.2

* WF = effective area

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. 6 bar operating pressure with polyamide cord reinforcement, max. 9 bar operating pressure with aramid or steel cord reinforcement.
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 25, DN 32, DN 40 and DN 350 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. ++++

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).

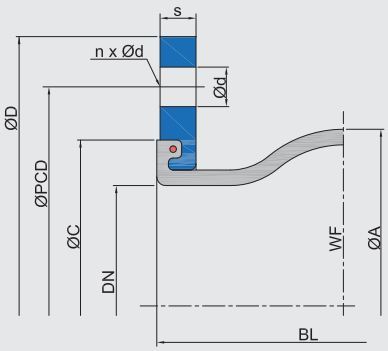
Note!
Detailed material descriptions on pages 5 - 7.

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.

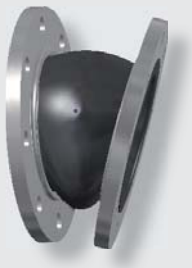
The expansion joints reaction force must be absorbed via suitable piping.



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

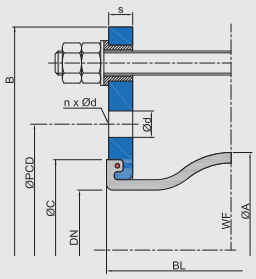
Please note the appropriate f xed point constructions and plain bearings in your piping system! For more information please refer to our installation instructions.
For information on the tie rods, please see the technical appendix (p. 89 - 92)!
++++ We will be happy to send you further information on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

WILLBRANDT **Rubber Expansion Joint Type 51**

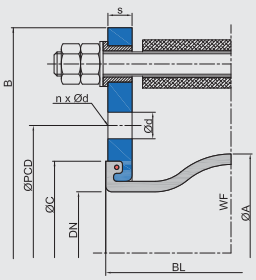
Length limiters

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

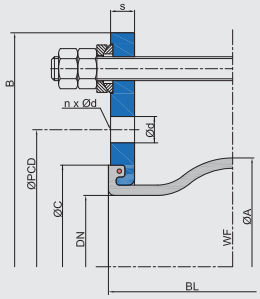
Design B*
with tie rods



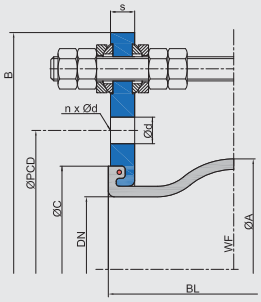
Design C*
with tie rods/thrust limiters



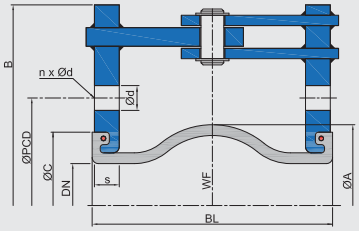
Design E
with tie rods and spherical washers/conical sockets



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



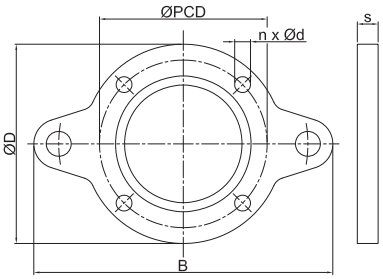
Design F
with hinge



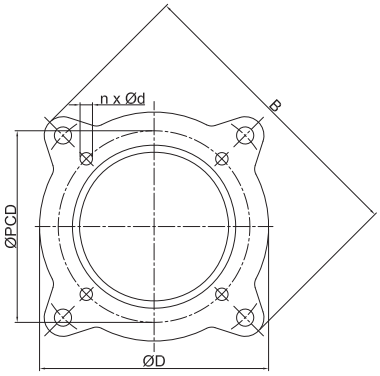
*Note: For Designs B and C
the lateral movement absorption is reduced by around 50 %.

Flange dimensions for designs with tie rods

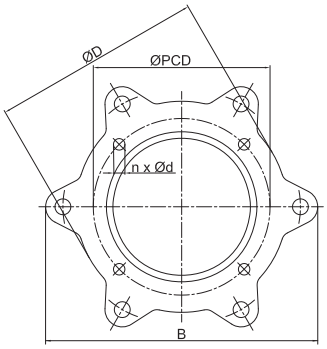
DN	Length BL	Flange PN 10 (example dimensions) B	ØD	ØPCD	Ød	n	s	ØC
	mm	mm	mm	mm	mm		mm	mm
32	**130**	230	140	100	18	4	15	79
40	**130**	240	150	110	18	4	15	79
50	**130**	255	165	125	18	4	16	88
65	**130**	275	185	145	18	8	16	104
80	**130**	290	200	160	18	8	18	119
100	**130**	310	220	180	18	8	18	142
125	**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



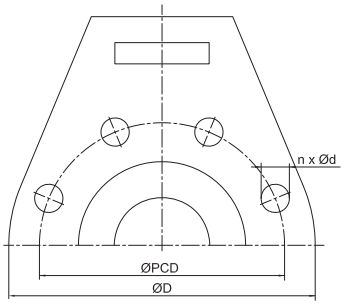
DN 32 - 200



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 f xed 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 f xed 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.

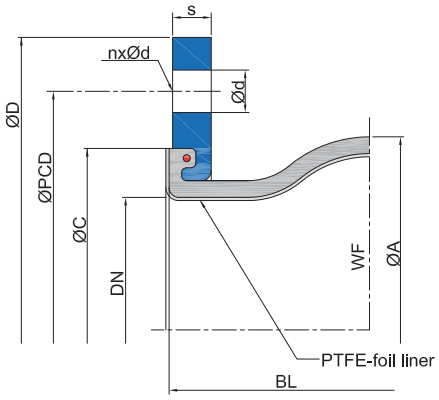
Dimensions

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

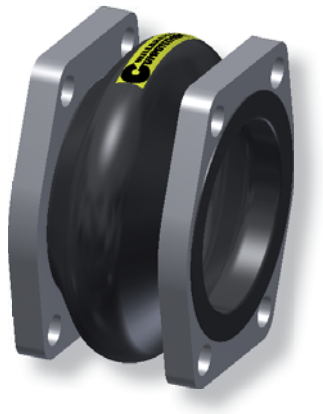
For aggressive media, please see the resistance table (can be requested separately).
The bellows should not be painted or insulated. Please refer to the installation instructions.
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 54**

DN 25 - DN 100

Type 54 is a high-corrugated rubber expansion joint for hydraulic systems. In combination with flanges according to SAE 3000 it is characterised by its large opening and considerable movement absorption. It is only available in an oil-resistable rubber compund.

Type 54 is almost exclusively used in the hydraulics and oil industries to absorb expansion and vibration, and to insulate sound.



Bellow design	High-corrugated rubber bellow with reinforcement and shaped sealing bead with core ring, self-sealing (no additional seals required). Suitable for accommodating swiveling flanges.
Vacuum resistance	- DN 25 to 40 up to -200 mbar without additional accessories - DN 50 to DN 100 vacuum-resistant with vacuum supporting spiral/ring - To reach higher vacuum for diameter DN 25 to DN 40, Type 50 yellow has to be used (installation length 130 mm)
Flange version	Both sides with swiveling flange made of galvanized steel, with clearance holes (drilled according to SAE 3000).
Accessories	- Guide sleeves - Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover / sun protection hoods

Specifications

Bellow		Bellow design			Permissible operating data	
Colour code	Colour marking	Core (inner)	Reinforcement	Cover (outer)	°C	bar
yellow		NBR	Polyamide	CR	80	2

Application

Type 54 yellow NBR
Good resistance to heat and ageing, particularly in the absence of air (e.g. in oil). Excellent resistance to swelling (weak- and non-polar media, e.g. mineral oils, lubricating greases, animal and vegetable fats or oils). No resistance to esters, ketones, aromatic or chlorinated hydrocarbons or lead-free fuels.

Note!
Detailed material descriptions on pages 5 - 7.

Important information

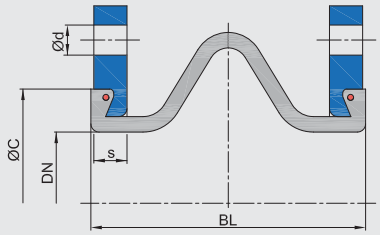
Use only flat head DIN 7984 hexagon head screws to screw the expansion joints into place.
The bellows should not be painted or insulated.
Please refer to the installation instructions.
++++ We will be happy to send you further information on the individual types and designs. ++++

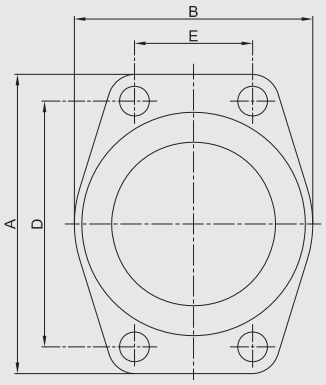
WILLBRANDT **Rubber Expansion Joint Type 54**

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	Bellow		Flange SAE 3000							Movement absorption				Weight
	BL	Ødi	ØC	A	B	D	E	Ød	n	s	axial +	axial -	lateral ±	angular ±	
	mm	mm	mm	mm	mm	mm	mm	mm		mm	mm	mm	mm	∠°	kg
25	**65**	25	43	70	59	52.4	26.2	11	4	11	5	5	5	7.5	0.4
32	**65**	32	50	81	73	58.7	30.2	13	4	11	5	5	5	7.5	0.5
40	**100**	40	62	95	83	70.0	35.7	13	4	13	10	10	10	10.0	0.8
50	**100**	48	72	103	97	77.8	42.9	13	4	13	10	10	10	10.0	1.0
65	**100**	63	87	115	109	89.0	50.8	13	4	14	10	10	10	10.0	1.2
80	**100**	80	104	136	131	106.4	62.0	17	4	14	10	10	10	10.0	1.8
90	**100**	80	104	152	140	120.6	70.0	17	4	14	10	10	10	10.0	1.9
100	**100**	100	130	162	152	130.2	77.8	17	4	16	10	10	10	10.0	2.5

Important information

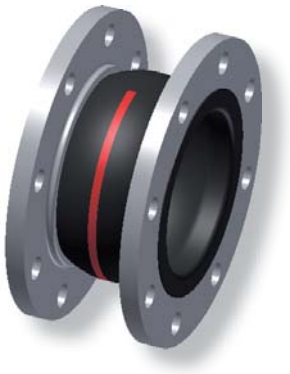
Use only flat head DIN 7984 hexagon head screws to screw the expansion joints into place.
Please note the appropriate f xed point constructions and plain bearings in your piping system! You can f nd information on this in our installation instructions.
For information on the tie rods, please see the 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 55**

DN 20 - DN 1000

Type 55 is a low-corrugated, highly elastic rubber expansion joint. Its low corrugation helps to achieve very low flow resistance. It reduces up to 70 % of the incoming energy . It is also characterised by very high movement absorption in all directions and its variety of rubber qualities, which means that a suitable rubber compound is available for almost every application (see material descriptions on the following pages).

Type 55 is used in building technology, plant engineering, water and wastewater technology, engine construction, shipbuilding and in solar and wind plant engineering. It is especially used to absorb expansion and 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 accommodating swiveling flanges.	**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.
Approvals/Conformity	Similar to DIN 4809 / TÜV approved, drinking water, shipbuilding approval FDA and EG 1935/2004 conform		

Specifications for DN 20 - DN 400

Bellow		Bellow design			Permissible operating data									Surface resistance Ro	
Colour-code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)	°C	bar	°C	bar	°C	bar	°C	bar	Short-term °C	Core Ohm x cm	Cover Ohm x cm
red Sp		EPDM	PEEK	EPDM	-40	10	70	16	100	10	130	8	150	4×10^3	4×10^3
red		IIR	Polyamide	EPDM	-40	10	50	16	70	12	100	10	120	7×10^6	1×10^3
yellow		NBR	Polyamide	CR	-20	10	50	16	70	12	90	10	100	2×10^2	1×10^3
green		CSM	Polyamide	CSM	-20	10	50	16	70	12	100	10	110	7×10^9	7×10^9
yellow St		NBR	Steel cord	CR	-20	10	60	16	70	12	90	10	100	2×10^2	5×10^{10}

- Bursting pressure for DN 20 - 400: > 48 bar
- DN 300 max. 10 bar working pressure / Bursting pressure >30 bar

Specifications for DN 450 - DN 1000

Bellow		Bellow design			Permissible operating data									Surface resistance Ro	
Colour-code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)	°C	bar	°C	bar	°C	bar	°C	bar	Short-term °C	Core Ohm x cm	Cover Ohm x cm
red Sp		EPDM	PEEK	EPDM	-40	8	70	10	100	7.5	130	6	150	4×10^3	4×10^3
red		IIR	Polyamide	EPDM	-40	8	50	10	70	8.0	100	6	120	7×10^6	1×10^3
yellow		NBR	Polyamide	CR	-20	8	50	10	70	8.0	90	6	100	2×10^2	1×10^3
green		CSM	Polyamide	CSM	-20	8	50	10	70	8.0	100	6	110	7×10^9	7×10^9

- Bursting pressure for DN 450 - 1000: > 30 bar
- The inner core of type 55 red DN 500 and DN 600 is made of EPDM

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 55**

Vacuum resistance

- DN 20 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

Accessories

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

Application

Type 55 red Sp
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.

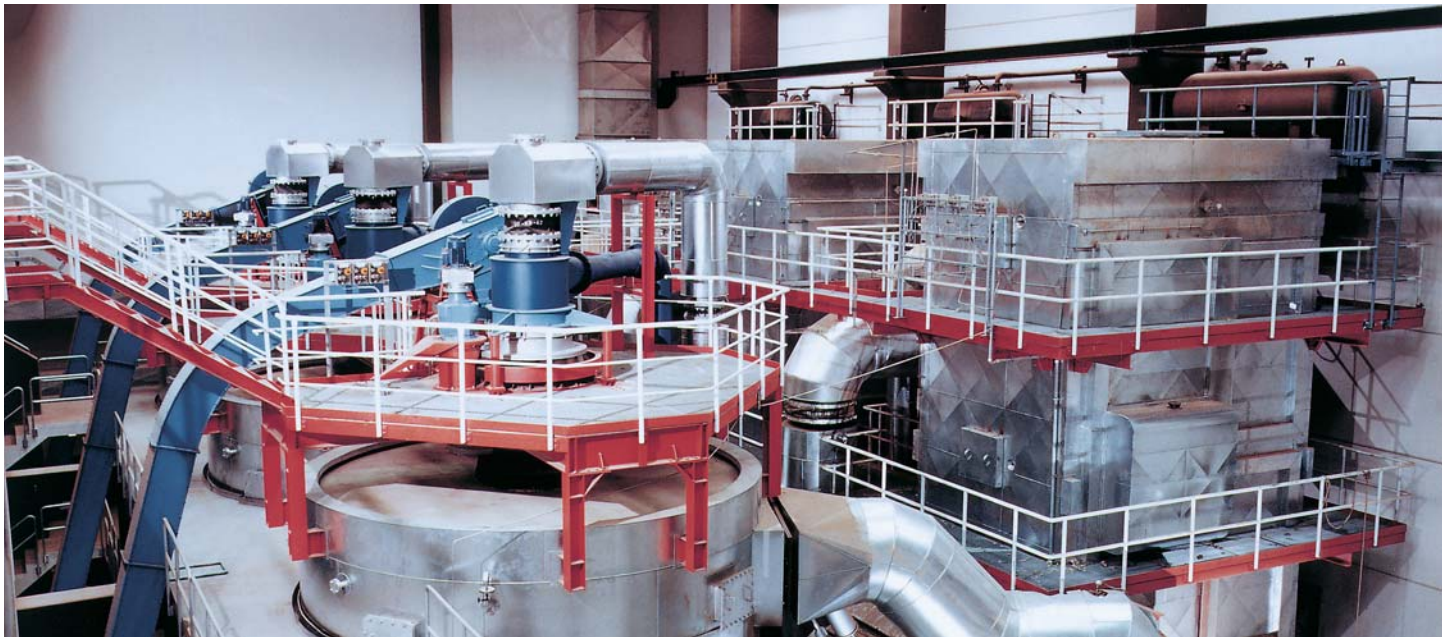
Type 55 red
For drinking water, hot water, sea water, cooling water with chemical additives for treating water, saline solutions, weak acids and weak alkaline solutions. Electrically dissipative inner surface and electrically conductive outer surface. Not suitable for oil products or cooling water with additives containing oil.

Type 55 yellow
For oils, lubricants, fuels, gases, city and natural gas (not liquefied) and DIN EN fuels with an aromatic content up to 50 %. Electrically conductive.

Type 55 green
For chemicals, aggressive chemical wastewater and compressor air containing oil. Electrically insulating.

Type 55 yellow St
Like Type 50 yellow with additional flame-resistance for up to 30 minutes at 800 °C. Electrically conductive inner surface, electrically insulating outer surface.

Note!
Detailed material descriptions on pages 5 - 7.

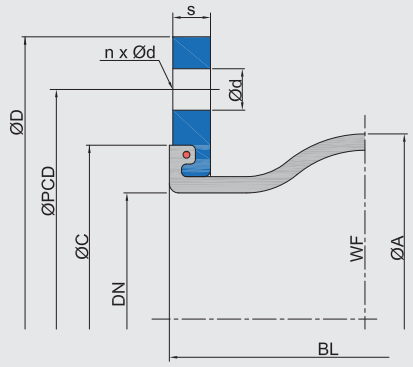


WILLBRANDT **Rubber Expansion Joint Type 55**

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.




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
20	*3**125**	81	1700	105	75	12	4	14	66	30	30	30	30	1.5
25	*3**125**	81	1700	115	85	14	4	14	66	30	30	30	30	1.9
32	*3**125**	81	1700	140	100	18	4	15	66	30	30	30	30	3.1
40	*3**125**	86	1800	150	110	18	4	15	74	30	30	30	30	3.5
50	*3**125**	96	3200	165	125	18	4	16	86	30	30	30	30	3.7
65	*3**125**	111	5300	185	145	18	8	16	106	30	30	30	30	5.3
80	**150**	122	8500	200	160	18	8	18	118	30	30	30	30	6.9
100	**150**	142	12800	220	180	18	8	18	138	30	30	30	20	8.0
125	**150**	168	18700	250	210	18	8	18	166	30	30	30	20	9.8
150	**150**	192	25900	285	240	22	8	18	192	30	30	30	20	13.2
200	**175**	252	41000	340	295	22	8	20	252	30	30	30	12	17.9
250	**175**	302	59600	395	350	22	12	20	304	30	30	30	12	23.8
300	**200**	354	82200	445	400	22	12	22	354	30	30	30	12	25.0
350	**200**	420	117600	505	460	22	16	24	412	30	50	30	8	38.3
400	**200**	480	154700	565	515	26	16	25	470	30	50	30	8	38.0
450	**250**	530	204200	615	565	26	20	25	520	30	50	30	8	53.7
500	**250**	580	227900	670	620	26	20	30	570	20	40	30	6	61.0
600	**250**	680	311500	780	725	30	20	30	675	20	40	30	6	79.3
700	*4**275**	800	434200	895	840	30	24	35	780	30	50	30	8	127.3
800	**250**	880	527400	1015	950	33	24	40	887	30	50	30	6	161.0
900	**300**	1038	737900	1115	1050	33	28	40	987	30	50	30	5	196.7
1000	**300**	1138	889400	1230	1160	36	28	40	1087	30	50	30	5	234.5

*1 WF = effective area
*2 Other standards/dimensions possible.
*3 Building length 130 mm
*4 Building length 260 mm

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

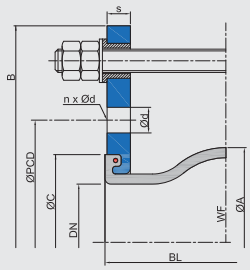
Please note the appropriate f xed point constructions and plain bearings in your piping system! You can f nd information on this in our installation instructions.
For information on the tie rods, please see the technical appendix (p. 89 - 92)!
++++ We will be happy to send you further information on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

WILLBRANDT **Rubber Expansion Joint Type 55**

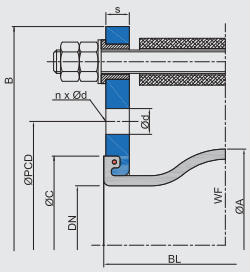
Length limiters

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

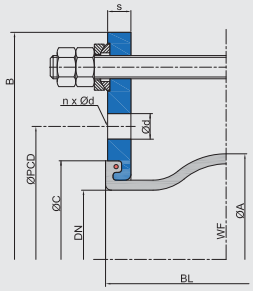
Design B*
with tie rods



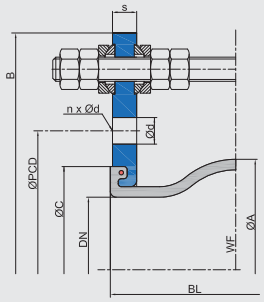
Design C*
with tie rod/thrust limiters



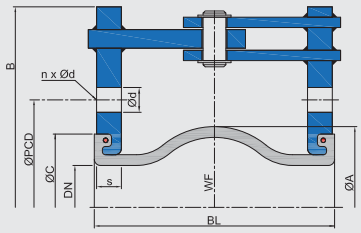
Design E
with tie rods and spherical washers/conical sockets



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



Design F
with hinge

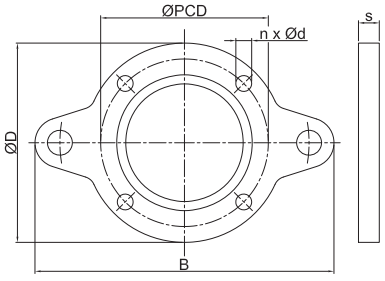


*Note: For Designs B and C
the lateral movement absorption is reduced by around 50 %.

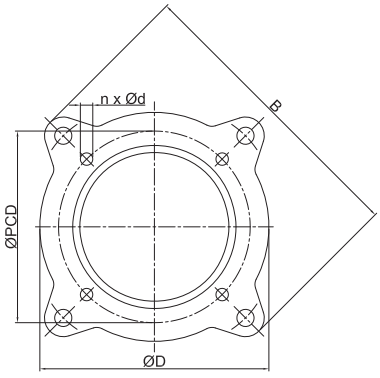
Flange dimensions for designs with tie rods

DN	Length BL	Flange PN 10 (example dimensions) B	ØD	ØPCD	Ød	n	s	ØC
	mm	mm	mm	mm	mm		mm	mm
20	*1**125**	189	105	75	12	4	14	66
25	*1**125**	205	115	85	14	4	14	66
32	*1**125**	230	140	100	18	4	15	66
40	*1**125**	240	150	110	18	4	15	74
50	*1**125**	255	165	125	18	4	16	86
65	*1**125**	275	185	145	18	8	16	106
80	**150**	290	200	160	18	8	18	118
100	**150**	310	220	180	18	8	18	138
125	**150**	340	250	210	18	8	18	166
150	**150**	375	285	240	22	8	18	192
200	**175**	440	340	295	22	8	20	252
250	**175**	509	395	350	22	12	20	304
300	**200**	559	445	400	22	12	22	354
350	**200**	619	505	460	22	16	24	412
400	**200**	700	565	515	26	16	25	470
450	**250**	760	615	565	26	20	30	520
500	**250**	810	670	620	26	20	30	570
600	**250**	930	780	725	30	20	30	675
700	*2**275**	1045	895	840	30	24	35	780
800	**250**	1175	1015	950	33	24	40	887
900	**300**	1285	1115	1050	33	28	40	987
1000	**300**	1400	1230	1160	36	28	40	1087

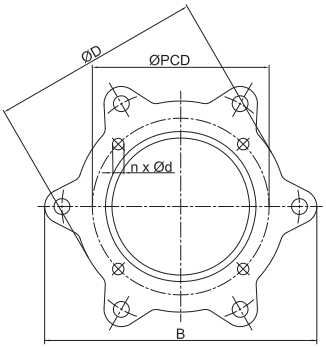
*1 Building length 130 mm
*2 Building length 260 mm



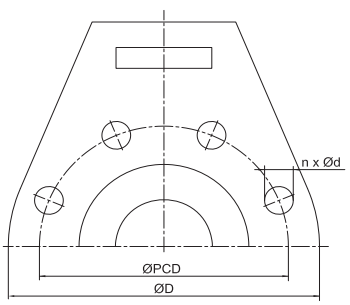
DN 32 - 200



DN 250 - 900



DN 1000



DN 50 - 1000 (Design F)

WILLBRANDT **Rubber Expansion Joint Type 55**

Axial stiffness rates

DN	Length BL mm	Stiffness rates (average value from full way) 0 bar N/mm	1 bar N/mm	2.5 bar N/mm	3 bar N/mm	4 bar N/mm	5 bar N/mm	6 bar N/mm	8 bar N/mm	10 bar N/mm	12 bar N/mm	16 bar N/mm
20	*1**125**	31	56	68	88	128	160	192	192	243	252	270
25	*1**125**	31	56	68	88	128	160	192	192	243	252	270
32	*1**125**	31	56	68	88	128	160	192	192	243	252	270
40	*1**125**	30	54	66	85	124	155	186	186	236	244	261
50	*1**125**	25	42	51	67	98	116	134	134	173	179	192
65	*1**125**	24	43	53	69	100	125	150	150	190	197	211
80	**150**	28	48	58	73	104	126	148	148	185	192	205
100	**150**	35	59	71	86	116	161	206	206	274	284	304
125	**150**	36	59	71	93	137	176	214	214	282	292	313
150	**150**	49	84	102	131	189	241	293	293	390	404	433
200	**175**	100	153	180	242	365	467	568	568	735	762	816
250	**175**	105	173	207	267	388	499	609	609	778	807	864
300	**200**	123	206	248	315	448	553	658	659	883	915	980
350	**200**	105	153	177	234	349	458	567	567	753	781	836
400	**200**	154	225	261	346	516	526	535	536	1,090	1,130	1,210
450	**250**	167	269	320	407	581	742	903	904	1,162	1,205	1,290
500	**250**	196	316	376	479	686	873	1,060	1,061	1,364	1,414	1,514
600	**250**	208	264	292	425	692	908	1,123	1,124	1,441	1,494	1,600
700	*2**275**	140	179	198	372	721	718	714	715	954	636	-
800	**250**	180	240	270	378	594	785	975	976	1,258	839	-
900	**300**	200	320	380	483	690	885	1,080	1,081	1,395	930	-
1000	**300**	225	355	420	527	742	995	1,248	1,249	1,568	1,045	-

*1 Building length 130 mm
*2 Building length 260 mm

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

Lateral stiffness rates

DN	Length BL mm	Stiffness rates (average value from full way) 0 bar N/mm	1 bar N/mm	2.5 bar N/mm	3 bar N/mm	4 bar N/mm	5 bar N/mm	6 bar N/mm	8 bar N/mm	10 bar N/mm	12 bar N/mm	16 bar N/mm
20	*1**125**	64	105	125	145	184	212	240	249	259	260	264
25	*1**125**	64	105	125	145	184	212	240	249	259	260	264
32	*1**125**	64	105	125	145	184	212	240	249	259	260	264
40	*1**125**	62	101	121	140	178	205	233	242	251	252	256
50	*1**125**	50	60	65	70	80	93	105	124	142	143	145
65	*1**125**	40	65	78	90	115	133	150	156	162	163	165
80	**150**	34	59	72	92	132	141	151	158	165	166	168
100	**150**	53	74	85	102	138	150	162	172	181	183	185
125	**150**	97	162	194	214	253	269	284	324	364	367	372
150	**150**	116	206	251	267	299	326	354	398	441	444	450
200	**175**	304	555	680	716	787	840	893	1,009	1,124	1,132	1,147
250	**175**	356	624	758	826	961	1,032	1,103	1,233	1,363	1,373	1,391
300	**200**	368	647	786	858	1,003	1,072	1,142	1,280	1,419	1,428	1,448
350	**200**	305	508	610	661	762	819	875	976	1,076	1,083	1,098
400	**200**	338	541	642	700	817	882	946	1,061	1,175	1,183	1,199
450	**250**	342	540	639	700	821	896	971	1,074	1,176	1,184	1,200
500	**250**	426	687	818	895	1,048	1,126	1,204	1,335	1,465	1,475	1,495
600	**250**	456	708	834	910	1,062	1,179	1,295	1,425	1,554	1,565	1,586
700	*2**275**	516	798	939	1,023	1,191	1,320	1,449	1,594	1,740	1,160	-
800	**250**	558	826	960	992	1,055	1,306	1,557	1,640	1,723	1,149	-
900	**300**	800	1,253	1,480	1,648	1,984	2,116	2,248	2,378	2,509	1,673	-
1000	**300**	960	1,536	1,824	2,003	2,361	2,549	2,736	2,826	2,916	1,944	-

*1 Building length 130 mm
*2 Building length 260 mm

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

WILLBRANDT **Rubber Expansion Joint Type 55**

Angular stiffness torque

DN	Overall length BL mm	Stiffness torque (average value from full way) 0 bar Nm/°	2.5 bar Nm/°	4 bar Nm/°	6 bar Nm/°	10 bar Nm/°	16 bar Nm/°
20	*1**125**	0.2	0.5	0.9	1.3	1.7	1.9
25	*1**125**	0.2	0.5	0.9	1.3	1.7	1.9
32	*1**125**	0.2	0.5	0.9	1.3	1.7	1.9
40	*1**125**	0.3	0.6	1.1	1.6	2.0	2.3
50	*1**125**	0.3	0.6	1.1	1.6	2.0	2.2
65	*1**125**	0.4	0.9	1.7	2.5	3.2	3.6
80	**150**	0.6	1.3	2.3	3.3	4.1	4.6
100	**150**	1.0	2.0	4.0	7.0	9.0	10.0
125	**150**	2.0	3.0	6.0	10.0	13.0	15.0
150	**150**	3.0	7.0	12.0	19.0	25.0	28.0
200	**175**	11.0	20.0	41.0	63.0	82.0	91.0
250	**175**	18.0	35.0	65.0	102.0	130.0	144.0
300	**200**	29.0	58.0	105.0	154.0	206.0	229.0
350	**200**	34.0	57.0	113.0	183.0	244.0	270.0
400	**200**	65.0	110.0	218.0	226.0	460.0	511.0
450	**250**	114.0	218.0	396.0	615.0	792.0	676.0
500	**250**	162.0	311.0	568.0	877.0	1128.0	1069.0
600	**250**	241.0	340.0	804.0	1305.0	1674.0	1588.0
700	*2**275**	167.0	237.0	861.0	853.0	1140.0	1265.0
800	**250**	277.0	416.0	914.0	1501.0	1937.0	2150.0
900	**300**	386.0	733.0	1330.0	2082.0	2689.0	2985.0
1000	**300**	531.0	991.0	1751.0	2945.0	3700.0	4107.0

*1 Building length 130 mm
*2 Building length 260 mm

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

Frictional force

DN	Overall length mm	for Designs E and M Frictional force N/bar	for Design F Frictional moment Nm/bar
20	*1**125**	7	0.2
25	*1**125**	7	0.2
32	*1**125**	7	0.2
40	*1**125**	8	0.2
50	*1**125**	12	0.3
65	*1**125**	20	0.5
80	**150**	30	1.0
100	**150**	44	1.4
125	**150**	65	2.1
150	**150**	102	4.4
200	**175**	124	6.2
250	**175**	180	11.2
300	**200**	218	15.4
350	**200**	120	17.0
400	**200**	160	22.9
450	**250**	226	40.5
500	**250**	212	63.5
600	**250**	507	138.5
700	*2**275**	602	180.9
800	**250**	814	326.2
900	**300**	921	402.4
1000	**300**	1130	617.3

*1 Building length 130 mm
*2 Building length 260 mm

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

WILLBRANDT **Rubber Expansion Joint Type 55 PTFE**

DN 25 - DN 500

Type 55 PTFE is a low-corrugated, PTFE-lined rubber expansion joint. Its shallow corrugation helps 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 55. 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.

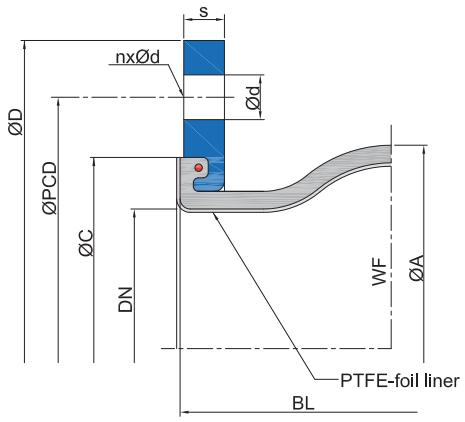
Dimensions for Design A

DN	Overall length BL	Bellow		Flange PN 10*2						Movement absorption			
		ØA	WF*1	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral ±	angular ±
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	
25	*3**125**	81	1700	115	85	14	4	14	65	15	15	15	15.0
32	*3**125**	81	1700	140	100	18	4	15	65	15	15	15	15.0
40	*3**125**	86	1800	150	110	18	4	15	74	15	15	15	15.0
50	*3**125**	96	3200	165	125	18	4	16	86	15	15	15	15.0
65	*3**125**	111	5300	185	145	18	8	16	105	15	15	15	15.0
80	**150**	122	8500	200	160	18	8	18	118	15	15	15	15.0
100	**150**	142	12800	220	180	18	8	18	137	15	15	15	10.0
125	**150**	168	18700	250	210	18	8	18	166	15	15	15	10.0
150	**150**	192	25900	285	240	22	8	20	192	15	15	15	10.0
200	**175**	252	41000	340	295	22	8	20	252	15	15	15	6.0
250	**175**	302	59600	395	350	22	12	20	304	15	15	15	6.0
300	**200**	354	82200	445	400	22	12	20	354	15	15	15	6.0
350	**200**	420	117600	505	460	22	16	24	412	15	15	15	4.0
400	**200**	480	154700	565	515	26	16	25	470	15	15	15	4.0
450	**250**	530	204200	615	565	26	20	25	520	15	15	15	4.0
500	**250**	580	227900	670	620	26	20	30	570	15	15	15	4.0

*1 WF = Building length 130 mm
*2 WF = effective area
*3 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. 6 bar operating pressure with polyamide cord reinforcement, max. 9 bar operating pressure with aramid or steel cord reinforcement.
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 25, DN 32, DN 40 and DN 350 expansion joints are not suitable for vacuum operation.



Important information

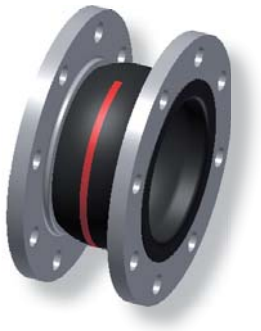
For aggressive media, please see the resistance table (can be requested separately).
The bellows should not be painted or insulated. Please refer to the installation instructions.
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint for Shock Design Type 55 SO**

DN 20 - DN 300

Type 55 SO is a low-corrugated, highly elastic rubber expansion joint. Its low corrugation helps to achieve very low flow resistance. It has been specially designed for the shipbuilding industry and is characterised by its high level of shock absorption.

Type 55 SO is primarily used in marine shipbuilding to absorb expansion and vibration as well as to insulate sound and protect the connected fans in the event of shock.



Bellow design	Low-corrugated rubber bellow with reinforcement and shaped sealing bead with core ring, self-sealing (no additional seals required). Suitable for accommodating swiveling flanges.	**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.
Vacuum resistance	- DN 20 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 with vacuum supporting spiral/ring vacuum-resistant	**Approvals**	Drinking water and shipbuilding approval
		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 20 - DN 300

Bellow		Bellow design			Permissible operating data									Surface resistance Ro	
Colour code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)	°C	bar	°C	bar	°C	bar	°C	bar	Short-term °C	Core Ohm x cm	Cover Ohm x cm
red		IIR	Polyamide	EPDM	-40	10	50	16	70	12	100	10	120	7 x 10^6	1 x 10^3
yellow		NBR	Polyamide	CR	-20	10	50	16	70	12	90	10	100	2 x 10^2	1 x 10^3

- Bursting pressure for DN 20 - DN 300: > 48 bar
- DN 250 and DN 300 max. 10 bar working pressure

Use

Type 55 SO red
For drinking water, hot water, sea water, cooling water with chemical additives for treating water, saline solutions, weak acids and weak alkaline solutions. Electrically dissipative inner surface and electrically conductive outer surface. Not suitable for oil products or cooling water with additives containing oil.

Type 55 SO yellow
For oils, lubricants, fuels, gases, city and natural gas (not liquefied) and DIN EN fuels with an aromatic content up to 50 %. Electrically conductive.

Note!
Detailed material descriptions on pages 5 - 7.

Important information

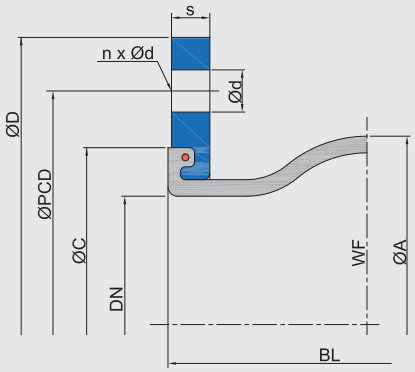
For aggressive media, please see the resistance table (can be requested separately).
The bellows should not be painted or insulated. Please refer to the installation instructions.
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint for Shock Design Type 55 SO**

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.

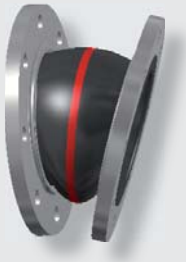
The expansion joints reaction force must be absorbed via suitable piping.



axial -

axial +

lateral ±



angular ±

Dimensions

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
20	**160**	81	1700	105	75	12	4	14	66	30	30	30	30	1.5
25	**160**	81	1700	115	85	14	4	14	66	30	30	30	30	1.9
32	**160**	81	1700	140	100	18	4	15	66	30	30	30	30	3.1
40	**160**	86	1800	150	110	18	4	15	74	30	30	30	30	3.5
50	**160**	96	3200	165	125	18	4	16	86	30	30	30	30	3.7
65	**160**	111	5300	185	145	18	8	16	106	30	30	30	30	5.3
80	**160**	122	8500	200	160	18	8	18	118	30	30	30	30	6.8
100	**160**	142	12800	220	180	18	8	18	138	30	30	30	20	7.9
125	**160**	168	18700	250	210	18	8	18	166	30	30	30	20	9.6
150	**160**	192	25900	285	240	22	8	18	192	30	30	30	20	12.9
200	**160**	252	41000	340	295	22	8	20	252	30	30	30	12	16.2
250	**200**	302	59600	395	350	22	12	20	304	30	30	30	12	21.5
300	**200**	354	82200	445	400	22	12	22	354	30	30	30	12	24.5

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

Shock absorption in any direction ±50 mm.

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 f xed 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 56**

DN 50 - DN 1000

Type 56 is a cylindrical rubber expansion joint that achieves very low flow resistance because of its uncorrugated bellow geometry. It is suitable for conveying media that contain solids, even at high flow rates. It is also characterised by its flexible installation length and variety of rubber qualities, which means that a suitable rubber compound is available for every application (see material descriptions on the following pages). Depending on its design, it may only be able to absorb minimal axial movement!

Type 56 is used in plant engineering, water technology and wastewater technology absorb lateral movement and vibration and to insulate sound.

Bellow design	Smooth cylindrical rubber bellow with reinforcement and shaped sealing bead with core ring, self-sealing (no additional seals required). Suitable for accommodating swiveling flanges.
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.
Vacuum resistance	Vaccum resistance only for short installation lengths, longer versions should be fitted with a vulcanized vacuum supporting spiral.
Approvals/Conformity	Drinking water approval, FDA and EG 1935/2004 conform
Accessories	- Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover/sun protection hoods - Segment tie rods

Specifications

Bellow		Bellow design			Permissible operating data									
Colour code	Colour marking	Core (inner)	Reinforcement	Cover (outer)	Max. temperature °C	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 56**

Application

Type 56 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 56 blue (EPDM TW)
Like Type 56 red, but approved for drinking water.

Type 56 white-red (EPDM beige)
Like Type 56 red, but with light-coloured rubber in food-grade.

Type 56 red AF (EPDM AF)
Like Type 56 red, but with abrasion-resistant EPDM rubber compound.

Type 56 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 56 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 56 white-grey (NBR beige)
Like Type 56 yellow-grey, but with light-coloured internal rubber in food-grade. Not approved for drinking water!

Type 56 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 56 red-blue-red (EPDM/aramid)
Like Type 56 red, but with aramid fabric.

Type 56 blue-blue-blue AF (EPDM TW/aramid)
Like Type 56 blue, but with aramid fabric.

Type 56 white-blue-red AF (EPDM beige/aramid)
Like Type 56 white-red, but with aramid fabric.

Type 56 orange-blue-orange AF (EPDM HT/aramid)
Like Type 56 red, but with aramid fabric and for temperatures up to +125 °C.

Type 56 red-blue-red AF (EPDM AF/aramid)
Like Type 56 red AF, but with aramid fabric.

Type 56 green-blue-green (CSM/aramid)
Like Type 56 green, but with aramid fabric.

Type 56 yellow-blue-grey (NBR/aramid)
Like Type 56 yellow-grey, but with aramid fabric.

Type 56 white-blue-grey (NBR white/aramid)
Like Type 56 white-grey, but with aramid fabric.

Type 56 grey-blue-grey (CR/aramid)
Like Type 56 grey, but with aramid fabric.

Type 56 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. For temperatures of up to +180 °C.

Type 56 silicone (silicone/glass fibre or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good radiation resistance. Not for use with steam above 120 °C. No resistance to fuels.

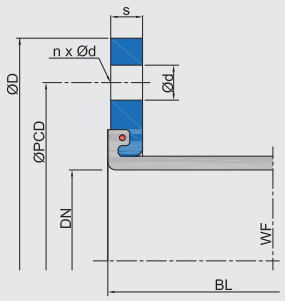
Note!
Detailed material descriptions on pages 5 - 7.

WILLBRANDT **Rubber Expansion Joint Type 56**

Design A - without tie rods

Can be used to absorb compression and lateral movement, as well as to insulate vibration and sound.

Can only absorb minimal expansion.



Dimensions for Design A

DN*1	Overall length BL*2	Bellow WF*3	Flange PN 10*4						Movement absorption			Weight*6
			B	ØD	ØPCD	Ød	n	s	axial +	axial -	lateral*5 ±	
	mm	mm²	mm	mm	mm	mm		mm	mm	mm	mm	kg
50	**150 - 1000**	1963	255	165	125	18	4	16	3	5	12	4.3
65	**150 - 1000**	3317	275	185	145	18	8	16	3	5	11	5.2
80	**150 - 1000**	5024	290	200	160	18	8	18	3	5	10	7.0
100	**150 - 1000**	7850	310	220	180	18	8	18	3	5	10	7.9
125	**150 - 1000**	12266	340	250	210	18	8	18	3	5	9	10.0
150	**150 - 1000**	17663	375	285	240	22	8	18	3	5	12	12.0
200	**200 - 1000**	31400	440	340	295	22	8	20	6	10	11	17.0
250	**200 - 1000**	49063	509	395	350	22	12	20	6	10	11	20.0
300	**200 - 1000**	70650	559	445	400	22	12	20	6	10	10	25.0
350	**200 - 1000**	96163	619	505	460	22	16	25	6	10	10	38.0
400	**200 - 1000**	125600	700	565	515	26	16	25	6	10	10	38.0
450	**200 - 1000**	158963	760	615	565	26	20	30	6	10	10	52.0
500	**200 - 1000**	196250	810	670	620	26	20	30	6	10	10	57.0
600	**200 - 1000**	282600	930	780	725	30	20	30	6	10	9	75.0
700	**200 - 1000**	384650	1045	895	840	30	24	35	6	10	9	128.0
800	**200 - 1000**	502400	1175	1015	950	33	24	40	6	10	9	161.0
900	**200 - 1000**	635850	1285	1115	1050	33	28	40	6	10	9	197.0
1000	**200 - 1000**	785000	1400	1230	1160	36	28	40	6	10	8	235.0

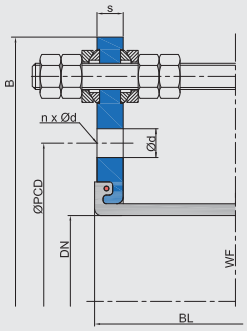
*1 Intermediate diameters for other standards (e.g. ANSI) are also possible.
*2 Overall lengths available from 150/200 mm to 1000 mm.
*3 WF = effective area
*4 Other standards/dimensions possible.
*5 The lateral movement absorption applies to short overall length. The lateral movement absorption increases by 6 mm every 100 mm.
*6 For short installation lengths.

Movement absorption is for a bellow design with 6 bar operating pressure.

Design M - with tie rods/shear limiters

For absorbing compression while also absorbing lateral movement.

The use of PTFE-coated spherical washers and conical sockets reduces the frictional force considerably during lateral movement. Can be used for vibration insulation and absorbing lateral movement.



Important information

Please note the appropriate f xed point constructions and plain bearings in your piping system, as well as the tolerances as per the FSA Handbook (see the technical appendix on page 1 18)!
For more information please refer to our installation instructions (p. 97 - 116).
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 57**

DN 50 - DN 300

Type 57 is a conical or eccentric rubber expansion joint that achieves very low flow resistance because of its uncorrugated bellow geometry. It is suitable for conveying media that contain solids, even at high flow rates. It is also characterised by its variety of rubber qualities, which means that a suitable rubber compound is available for every application (see material descriptions on the following pages). Its design means that it can only absorb minimal (axial) compression! Alternative production lengths are possible in individual cases and subject to agreement.

Type 57 is used in plant engineering, water technology and wastewater technology to absorb lateral movement, as well as to absorb vibration and insulate sound.

Bellow design	Smooth conical/eccentric rubber bellow with reinforcement and moulded sealing bead with core ring (self-sealing - no additional seals required). Suitable for accommodating swiveling flanges.	**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.
Vacuum resistance	Only vacuum-resistant with a vulcanised vacuum supporting spiral.	**Accessories**	- Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover / sun protection hoods - Segment tie rods
Approvals/Conformity	Drinking water approval, FDA and EG 1935/2004 conform		

Specifications

Bellow		Bellow design				Permissible operating data									
Colour code	Colour marking	Core (inner)	Reinforce-ment	Cover (outer)	Max. temperature °C	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 57**

Application

Type 57 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 57 blue (EPDM TW)
Like Type 57 red, but approved for drinking water.

Type 57 white-red (EPDM beige)
Like Type 57 red, but with light-coloured rubber in food-grade.

Type 57 red AF (EPDM AF)
Like Type 57 red, but with abrasion-resistant EPDM rubber compound.

Type 57 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 57 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 57 white-grey (NBR beige)
Like Type 57 yellow-grey, but with light-coloured internal rubber in food-grade. Not approval for drinking water!

Type 57 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 57 red-blue-red (EPDM/aramid)
Like Type 57 red, but with aramid fabric.

Type 57 blue-blue-blue AF (EPDM TW/aramid)
Like Type 57 blue, but with aramid fabric.

Type 57 white-blue-red AF (EPDM beige/aramid)
Like Type 57 white-red, but with aramid fabric.

Type 57 orange-blue-orange AF (EPDM HT/aramid)
Like Type 57 red, but with aramid fabric and for temperatures up to +125 °C

Type 57 red-blue-red AF (EPDM AF/aramid)
Like Type 57 red AF, but with aramid fabric.

Type 57 green-blue-green (CSM/aramid)
Like Type 57 green, but with aramid fabric.

Type 57 yellow-blue-grey (NBR/aramid)
Like Type 57 yellow-grey, but with aramid fabric.

Type 57 white-blue-grey (NBR white/aramid)
Like Type 57 white-grey, but with aramid fabric.

Type 57 grey-blue-grey (CR/aramid)
Like Type 57 grey, but with aramid fabric.

Type 57 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. For temperatures of up to 180 °C.

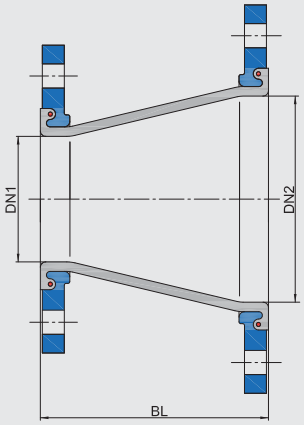
Type 57 silicone (silicone/glass fibre or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good radiation resistance. Not for use with steam above 120 °C.
No resistance to fuels.

Note!
Detailed material descriptions on pages 5 - 7.

WILLBRANDT **Rubber Expansion Joint Type 57**

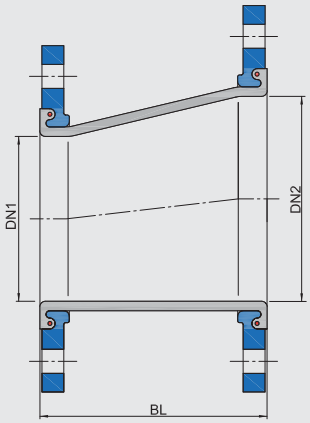
Design A - concentric, without tie rods

Can be used to absorb compression and lateral movement, as well as to insulate vibration and sound. Can only absorb minimal expansion.



Design A - eccentric, without tie rods

Can be used to absorb compression and lateral movement, as well as to insulate vibration and sound. Can only absorb minimal expansion.



Dimensions for Design A Concentric/eccentric

DN1	DN2	Length BL mm	Bellow WF* mm²	Movement absorption axial - mm	Movement absorption lateral ± mm
50	**80**	**250**	5000	3	8
50	**100**	**250**	7900	3	8
65	**80**	**300**	5000	3	8
65	**100**	**300**	7900	3	8
80	**100**	**250**	7900	3	8
80	**125**	**250**	12300	3	7
100	**125**	**250**	12300	3	7
100	**150**	**250**	17700	3	7
100	**200**	**300**	31400	3	7
125	**150**	**250**	17700	3	7
125	**200**	**300**	31400	4	8
150	**200**	**300**	31400	4	8
150	**250**	**250**	49100	5	8
200	**250**	**250**	49100	4	8
200	**300**	**300**	70700	6	8
200	**350**	**300**	96200	9	12
250	**300**	**300**	70700	4	7
250	**350**	**300**	96200	6	9
300	**350**	**300**	96200	4	7
300	**400**	**400**	125600	7	9

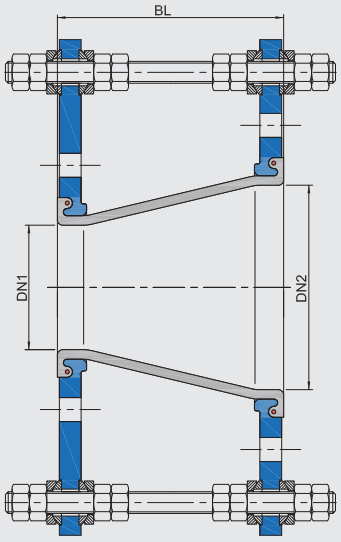
* WF = effective area

- Movement absorption is for a bellow design with 6 bar operating pressure.
- Free choice of f ange connection dimension (DIN, ASTM, JIS, etc.)
- Special overall lengths and nominal diameters are possible in individual cases.

Length limiters/Tie rods

It is advisable to use tie rods/shear limiters on these expansion joints (Design M - see illustration). The conical bellow is inflated by the rise in pressure, which shortens the expansion joint and applies high tensile force to the connections.

It is also available with tie rods only (Design E).



Important information

Please note the appropriate f xed point constructions and plain bearings in your piping system, as well as the tolerances as per the FSA Handbook (see the technical appendix on page 118)!
For more information please refer to our installation instructions (p. 97 - 116).
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 58**

DN 50 - DN 3000

Type 58 is a cylindrical rubber expansion joint that achieves very low flow resistance because of its uncorrugated bellow geometry. It is suitable for conveying media that contain solids, even at high flow rates. It is also characterised by its flexible installation length and variety of rubber qualities, which means that a suitable rubber compound is available for every application (see material descriptions on the following pages). Its design means that it can only absorb minimal axial movement!

Type 58 is used in plant engineering, water technology and wastewater technology to absorb lateral movement and vibration and to insulate sound.

Bellow design	Smooth cylindrical rubber bellow with reinforcement and moulded, pressure-resistant solid rubber flanges (self-sealing - no additional seals required). Suitable for accommodating backing flanges.	**Flange version**	Both sides with backing flange made of galvanized steel, with clearance holes, drilled according to DIN PN 10 (standard). Other materials and dimensions are possible.
Vacuum resistance	Vaccum resistance only short installation lengths. Longer versions should be fitted with a vulcanised vacuum supporting spiral.	**Accessories**	- Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover / sun protection hoods - Segment tie rods
Approvals/Conformity	Drinking water approval, FDA and EG 1935/2004 conform		

Specifications

Bellow		Bellow design			Permissible operating data									
Colour code	Colour marking	Core (inner)	Reinforce-ment	Cover (outer)	Max. temperature °C	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 58**

Application

Type 58 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 58 blue (EPDM TW)
Like Type 58 red, but approved for drinking water.

Type 58 white-red (EPDM beige)
Like Type 58 red, but with light-coloured rubber in food-grade.

Type 58 red AF (EPDM AF)
Like Type 58 red, but with abrasion-resistant EPDM rubber compound.

Type 58 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil. Electrically insulating.

Type 58 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 58 white-grey (NBR beige)
Like Type 58 yellow-grey, but with light-coloured internal rubber in food-grade. Not approval for drinking water!

Type 58 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 58 red-blue-red (EPDM/aramid)
Like Type 58 red, but with aramid fabric.

Type 58 blue-blue-blue AF (EPDM TW/aramid)
Like Type 58 blue, but with aramid fabric.

Type 58 white-blue-red AF (EPDM beige/aramid)
Like Type 58 white-red, but with aramid fabric.

Type 58 orange-blue-orange AF (EPDM HT/aramid)
Like Type 58 red,but with aramid fabric and for temperatures up to +125 °C.

Type 58 red-blue-red AF (EPDM AF/aramid)
Like Type 58 red AF, but with aramid fabric.

Type 58 green-blue-green (CSM/aramid)
Like Type 58 green, but with aramid fabric.

Type 58 yellow-blue-grey (NBR/aramid)
Like Type 58 yellow-grey, but with aramid fabric.

Type 58 white-blue-grey (NBR white/aramid)
Like Type 58 white-grey, but with aramid fabric.

Type 58 grey-blue-grey (CR/aramid)
Like Type 58 grey, but with aramid fabric.

Type 58 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. For temperatures of up to +180 °C.

Type 58 silicone (silicone/glass fibre or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good radiation resistance. Not for use with steam above 120 °C. No resistance to fuels.

Note!
Detailed material descriptions on pages 5 - 7.

Important information

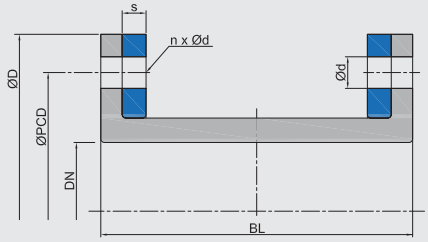
Please note the appropriate f xed point constructions and plain bearings in your piping system, as well as the tolerances as per the FSA Handbook (see the technical appendix on page 118)!
For more information please refer to our installation instructions (p. 97 - 116).
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 58**

Design A - without tie rods

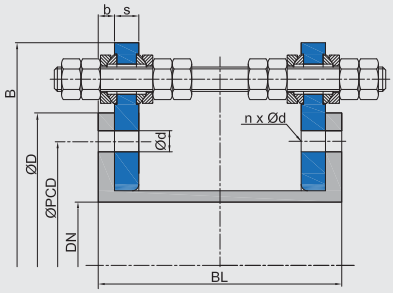
Can be used to absorb compression and lateral movement, as well as to absorb vibration and insulate sound.

Can only absorb minimal expansion.



Design M - with tie rods / shear limiters

For absorbing compression while also absorbing lateral movement. The use of PTFE-coated spherical washers and conical sockets reduces the frictional force considerably during lateral movement. Can be used to absorb vibration and lateral movement.



Note: Can only absorb lateral movement!

Dimensions for Design A / Design M

DN	Overall length BL*1	Bellow b	Bellow WF*2	Flange PN 10*3 ØD	ØPCD	Ød	n	s	B	Movement absorption axial -	Movement absorption lateral*4 ±	Weight
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	kg
50	200 - 1000		1963	165	125	18	4		255	5	10	4
65	200 - 1000		3317	185	145	18	8		275	5	10	5
80	200 - 1000		5024	200	160	18	8		290	5	10	5
100	200 - 1000		7850	220	180	18	8		310	5	10	6
125	200 - 1000		12266	250	210	18	8		340	5	10	7
150	200 - 1000		17663	285	240	22	8		375	5	10	9
200	200 - 1000		31400	340	295	22	8		462	13	14	11
250	200 - 1000		49063	395	350	22	12		517	13	14	13
300	200 - 1000		70650	445	400	22	12		567	13	13	12
350	200 - 1000		96163	505	460	22	16		627	13	13	14
400	200 - 1000	Dependent on operating presre	125600	565	515	26	16	Dependent on operating presre	703	13	13	18
450	200 - 1000		158963	615	565	26	20		753	13	12	25
500	200 - 1000		196250	670	620	26	20		808	13	12	17
600	200 - 1000		282600	780	725	30	20		942	13	12	22
700	200 - 1000		384650	895	840	30	24		1057	13	11	29
800	200 - 1000		502400	1015	950	33	24		1117	15	13	81
900	200 - 1000		635850	1115	1050	33	28		1277	15	13	90
1000	200 - 1000		785000	1230	1160	36	28		1392	15	13	106
1100	200 - 1000		949850	1345	1270	36	32		1507	15	12	123
1200	200 - 1000		1130400	1455	1380	39	32		1617	15	12	139
1300	200 - 1000		1326650	1565	1485	42	32		1727	15	12	155
1400	200 - 1000		1538600	1675	1590	42	36		1837	15	12	172
1500	200 - 1000	Dependent on operating pressure	1766250	1795	1705	48	36	Dependent on operating pressure	1957	15	12	195
1600	200 - 1000		2009600	1915	1820	48	40		2100	15	11	222
1700	200 - 1000		2268650	2015	1920	48	44		2200	15	11	290
1800	200 - 1000		2543400	2115	2020	48	44		2300	15	11	306
1900	200 - 1000		2833850	2220	2125	48	48		2406	15	11	327
2000	200 - 1000		3140000	2325	2230	48	48		2511	15	11	350
2100	200 - 1000		3461850	2440	2335	56	48		2626	18	13	386
2200	200 - 1000		3799400	2550	2440	56	52		2736	18	13	416
2400	200 - 1000		4521600	2760	2650	56	56		2946	18	12	465
2500	200 - 1000		4906250	2860	2750	56	56		3046	18	12	485
2600	200 - 1000		5306600	2960	2850	56	60		3146	18	12	501
2800	200 - 1000		6154400	3180	3070	56	64		3366	18	12	572
3000	200 - 1000		7065000	3405	3290	62	68		3591	18	12	644

*1 Overall lengths available from 200 mm to 1000 mm.
*2 WF = effective area
*3 Other standards/dimensions possible.
*4 The lateral movement absorption applies to short installation lengths. The lateral movement absorption increases by 6 mm every 100 mm.

- Maximum size: DN 4000.
- Movement absorption corresponds to bellow design with max. 6 bar operating pressure.

WILLBRANDT **Rubber Expansion Joint Type 59**

DN 350 - DN 1500

Type 59 is a conical or eccentric-conical rubber expansion joint that achieves very low flow resistance because of its uncorrugated bellow geometry. It is suitable for conveying media that contain solids, even at high flow rates. It is also characterised by its variety of rubber qualities, which means that a suitable rubber compound is available for every application (see material descriptions on the following pages). Its design means that it can only absorb minimal expansion! Alternate installation lengths are possible in individual cases after prior examination.

Type 59 is used in plant engineering, water technology and wastewater technology , where it is used to absorb lateral movement and vibration and to insulate sound.

Bellow design	Smooth conical or eccentric rubber bellow with reinforcement with a moulded, pressure-resistant solid rubber flange on the small side and moulded sealing bead with a core ring on the other side (self-sealing - no additional seals required). Can also be constructed with both sides full faced rubber flange depending on the size and pressure. Suitable for backing/swiveling flanges.
Accessories	- Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover / sun protection hoods - Segment tie rods
Flange version	On one side a galvanized steel backing flange, on the other, a swiveling galvanized steel flange with clearance holes, drilled according to DIN PN 10 (standard) or with both sides galvanized steel backing flange. Other materials and dimensions are possible.
Vacuum resistance	Only vacuum-resistant with a vulcanised vacuum supporting spiral.
Approvals/Conformity	Drinking water approval, FDA and EG 1935/2004 conform

Specifications

Bellow		Bellow design			Permissible operating data									
Colour code	Colour marking	Core (inner)	Reinforce-ment	Cover (outer)	Max. temperature °C	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 59**

Application

Type 59 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 59 blue (EPDM TW)
Like Type 59 red, but approved for drinking water.

Type 59 white-red (EPDM beige)
Like Type 59 red, but with light-coloured rubber in food-grade.

Type 59 red AF (EPDM AF)
Like Type 59 red, but with abrasion-resistant EPDM rubber compound.

Type 59 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 59 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Electrically dissipative. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 59 white-grey (NBR beige)
Like Type 59 yellow-grey, but with light-coloured internal rubber in food-grade. Not approval for drinking water!

Type 59 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 59 red-blue-red (EPDM/aramid)
Like Type 59 red, but with aramid fabric.

Type 59 blue-blue-blue AF (EPDM TW/aramid)
Like Type 59 blue, but with aramid fabric.

Type 59 white-blue-red AF (EPDM beige/aramid)
Like Type 59 white-red, but with aramid fabric

Type 59 orange-blue-orange AF (EPDM HT/aramid)
Like Type 59 red, but with aramid fabric and for temperatures up to +125 °C.

Type 59 red-blue-red AF (EPDM AF/aramid)
Like Type 59 red AF, but with aramid fabric.

Type 59 green-blue-green (CSM/aramid)
Like Type 59 green, but with aramid fabric.

Type 59 yellow-blue-grey (NBR/aramid)
Like Type 59 yellow-grey, but with aramid.

Type 59 white-blue-grey (NBR white/aramid)
Like Type 59 white-grey, but with aramid fabric.

Type 59 grey-blue-grey (CR/aramid)
Like Type 59 grey, but with aramid fabric.

Type 59 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. For temperatures of up to +180 °C.

Type 59 silicone (silicone/glass fibre or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good radiation resistance. Not for use with steam above 120 °C. No resistance to fuels.

Note!
Detailed material descriptions on pages 5 - 7.

Important information

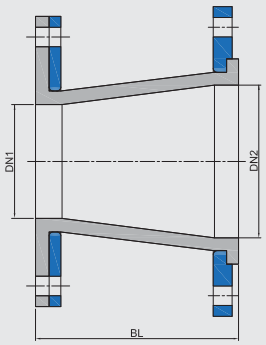
Please note the appropriate f xed point constructions and plain bearings in your piping system, as well as the tolerances as per the FSA Handbook (see the technical appendix on page 118)! You can f nd information on this in our installation instructions (p. 97 - 116).
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 59**

Design A - concentric, without tie rods

Can be used to absorb compression and lateral movement, as well as to absorb vibration and insulate sound.

Can only absorb minimal expansion.



Dimensions - Design A, concentric

DN1	DN2	Length BL	Bellow WF*	Movement absorption axial -	Movement absorption lateral ±
		mm	mm²	mm	mm
350	**400**	**300**	125600	4	7
350	**500**	**350**	196250	10	12
400	**500**	**400**	196250	7	8
400	**600**	**650**	282600	13	13
500	**600**	**340**	282600	7	8
500	**700**	**650**	384650	13	13
500	**800**	**900**	502400	20	17
500	**900**	**1150**	635850	26	21
500	**1000**	**1400**	785000	33	25
500	**1100**	**1650**	949850	41	29
500	**1200**	**1900**	1130400	48	32
600	**700**	**400**	384650	8	8
600	**800**	**650**	502400	14	12
600	**900**	**900**	635850	21	16
600	**1000**	**1150**	785000	28	20
600	**1100**	**1400**	949850	35	24
600	**1200**	**1650**	1130400	42	28
700	**800**	**400**	502400	8	8
700	**900**	**650**	635850	15	12
700	**1000**	**900**	785000	21	16
700	**1100**	**1150**	949850	28	20
700	**1200**	**1400**	1130400	36	24
700	**1300**	**1650**	1326650	43	27
800	**900**	**400**	635850	8	7
800	**1000**	**650**	785000	15	12
800	**1100**	**900**	949850	22	16
800	**1200**	**1150**	1130400	29	20
800	**1300**	**1400**	1326650	37	23

DN1	DN2	Length BL	Bellow WF*	Movement absorption axial -	Movement absorption lateral ±
		mm	mm²	mm	mm
800	**1400**	**1650**	1538600	45	27
900	**1000**	**400**	785000	8	7
900	**1100**	**650**	949850	15	11
900	**1200**	**900**	1130400	23	15
900	**1300**	**1150**	1326650	30	19
900	**1400**	**1400**	1538600	38	23
900	**1500**	**1650**	1766250	46	27
1000	**1100**	**400**	949850	9	7
1000	**1200**	**650**	1130400	16	11
1000	**1300**	**900**	1326650	23	15
1000	**1400**	**1150**	1538600	31	19
1000	**1500**	**1400**	1766250	39	22
1000	**1600**	**1650**	2009600	47	26
1100	**1200**	**400**	1130400	9	7
1100	**1300**	**650**	1326650	16	11
1100	**1400**	**900**	1538600	24	15
1100	**1500**	**1150**	1766250	32	18
1100	**1600**	**1400**	2009600	40	22
1200	**1300**	**400**	1326650	9	7
1200	**1400**	**650**	1538600	17	11
1200	**1500**	**900**	1766250	25	14
1200	**1600**	**1150**	2009600	33	18
1300	**1400**	**400**	1538600	9	7
1300	**1500**	**650**	1766250	17	10
1300	**1600**	**900**	2009600	25	14
1400	**1500**	**400**	1766250	9	6
1400	**1600**	**650**	2009600	17	10
1500	**1600**	**400**	2009600	10	6

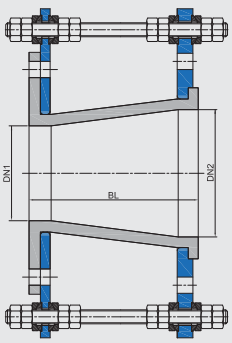
* WF = effective area

- Movement absorption is for a bellow design with 6 bar operating pressure.
- Other f ange connection dimensions available on request.
- Special overall lengths and nominal diameter are possible in individual cases.

Length limiters / Tie rods

It is advisable to use tie rods / shear limiters on these expansion joints (Design M - see illustration). The conical bellow is inflated by the rise in pressure, which shortens the expansion joint and applies high tensile force to the connections.

It is also available with tie rods only (Design E).

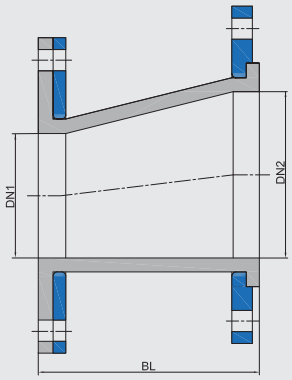


WILLBRANDT **Rubber Expansion Joint Type 59**

Design A - eccentric, without tie rods

Can be used to absorb compression and lateral movement, as well as to absorb vibration and insulate sound.

Can only absorb minimal expansion.



Dimensions - Design A, eccentric

DN1	DN2	Length BL	Bellow WF*	Movement absorption axial -	Movement absorption lateral ±
		mm	mm²	mm	mm
350	**400**	***350***	1125600	5	8
350	**500**	***650***	196250	11	14
400	**500**	***500***	196250	8	11
400	**600**	***750***	282600	14	15
500	**600**	***500***	282600	8	10
500	**700**	***750***	384650	14	15
500	**800**	***1050***	502400	21	20
500	**900**	***1300***	635850	28	24
500	**1000**	***1550***	785000	35	28
500	**1100**	***1850***	949850	43	32
500	**1200**	***2100***	1130400	50	36
600	**700**	***500***	384650	9	10
600	**800**	***800***	502400	15	15
600	**900**	***1050***	635850	22	19
600	**1000**	***1300***	785000	29	23
600	**1100**	***1600***	949850	37	28
600	**1200**	***1850***	1130400	44	31
600	**1300**	***2100***	1326650	52	35
700	**800**	***550***	502400	9	10
700	**900**	***800***	635850	16	15
700	**1000**	***1050***	785000	23	19
700	**1100**	***1350***	949850	30	23
700	**1200**	***1600***	1130400	38	27
700	**1300**	***1850***	1326650	45	31
700	**1400**	***2150***	1538600	54	35
800	**900**	***550***	635850	10	10
800	**1000**	***800***	785000	16	14
800	**1100**	***1100***	949850	24	19
800	**1200**	**1350**	1130400	31	23
800	**1300**	**1600**	1326650	38	27
800	**1400**	**1900**	1538600	47	31
800	**1500**	**2150**	1766250	55	35
900	**1000**	**550**	785000	10	10
900	**1100**	**850**	949850	17	15
900	**1200**	**1100**	1130400	25	19
900	**1300**	**1150**	1326650	32	22
900	**1400**	**1650**	1538600	40	27
900	**1500**	**1900**	1766250	48	31
900	**1600**	**2150**	2009600	57	34
1000	**1100**	**600**	949850	11	10
1000	**1200**	**850**	1130400	18	14
1100	**1200**	**600**	1130400	11	10
1100	**1300**	**850**	1326650	18	14
1100	**1400**	**1150**	1538600	27	19
1100	**1500**	**1400**	1766250	34	22
1100	**1600**	**16500**	2009600	42	26
1200	**1300**	**600**	1326650	11	10
1200	**1400**	**900**	1538600	19	15
1200	**1500**	**1150**	1766250	27	18
1200	**1600**	**1400**	2009600	35	22
1300	**1400**	**650**	1538600	12	11
1300	**1500**	**900**	1766250	20	14
1300	**1600**	**1150**	2009600	28	18
1400	**1500**	**650**	1766250	12	10
1400	**1600**	**900**	2009600	20	14
1500	**1600**	**650**	2009600	12	10

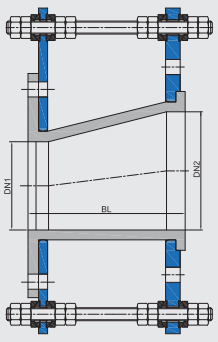
* WF = effective area

- Movement absorption is for a bellow design with 6 bar operating pressure.
- Other f ange connection dimensions available on request.
- Special overall lengths and nominal diameter are possible in individual cases.

Length limiters / Tie rods

It is advisable to use tie rods/shear limiters on these expansion joints (Design M - see illustration), as the conical bellow is inflated by the rise in pressure, which shortens the expansion joint and applies high tensile force to the connections.

It is also available with tie rods only (Design E).



WILLBRANDT **Pipe Connector WRG Type 60**

DN 20 - DN 200

Type 60 is an uncorrugated solid rubber pipe connector with vulcanised steel flanges. Its straight, uncorrugated passage means that it achieves very low flow resistance. Due to its design, it can only absorb slight surface vibration and insulate sound, but cannot be used as a expansion joint to absorb movement. It is made from EPDM rubber.

Type 60 is mainly used on pumps, machines and apparaturs in building technology in order to absorb surface vibration and insulate sound. It can also be used to for a galvanic separation and to prevent damage to pipes made from different materials.

Bellow design	Smooth, cylindrical rubber body with vulcanised flange rings. The rubber-metal pipe connector is self-sealing (no additional seals required).	**Flange version**	Vulcanised steel flanges with threaded blind holes (drilled according to DIN PN 6 or PN 10).
Temperature/Pressure	100/110 °C at 10/6 bar	**Approvals**	TÜV certification according to DIN 4809 standard for heating systems.

Dimensions

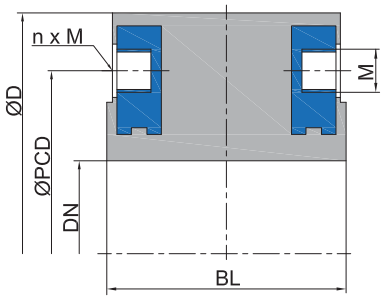
DN	Length	Bellow	Flange PN 6				Flange PN 10			
		WF*	ØD	ØPCD	Screw dimensions	Weight	ØD	ØPCD	Screw dimensions	Weight
	mm	mm²	mm	mm		kg	mm	mm		kg
20	**70**	300	90	65	4 x M10 x 25	1.0	105	75	4 x M12 x 30	1.8
25	**70**	300	100	75	4 x M10 x 25	1.5	115	85	4 x M12 x 30	2.2
32	**70**	800	120	90	4 x M12 x 30	2.2	140	100	4 x M16 x 30	3.3
40	**70**	1300	130	100	4 x M12 x 30	2.6	150	110	4 x M16 x 30	3.7
50	**70**	2000	140	110	4 x M12 x 30	2.8	165	125	4 x M16 x 30	4.2
65	**70**	3300	160	130	4 x M12 x 30	3.7	185	145	4 x M16 x 30	5.2
80	**70**	5000	190	150	4 x M16 x 35	5.2	200	160	8 x M16 x 35	5.7
100	**70**	7900	210	170	4 x M16 x 35	5.8	220	180	8 x M16 x 35	6.5
125	**70**	12300	240	200	8 x M16 x 35	6.9	250	210	8 x M20 x 40	8.1
150	**70**	17700	265	225	8 x M16 x 35	8.3	295	240	8 x M20 x 40	10.0
200	**70 / 90**	31400	-	-	-	-	340	295	8 x M20 x 45	14.7

* WF = effective area

Important planning and installation instructions

Type 60 CANNOT absorb any axial, lateral or angular movement. It is only suitable for insulating against high-frequency vibration and for a galvanic separation of two pipes.

It must be installed completely stress-free in the pipe. To do this, it is necessary to include the appropriate fixed points and plain bearings. When tightening the flange bolts, ensure that you use the criss-cross tightening sequence. The maximum tightening torque is 30 N/m. It should only be fitted using hexagon head bolts according to ISO 4017 and a washer. The correct bolt length must be used (see installation instructions).



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.
Please note the appropriate f xed 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. ++++

WILLBRANDT **Rubber Expansion Joint Type 61**

DN 50 - DN 1500

Type 61 is a handmade low-corrugated rubber expansion joint that achieves very low flow resistance because of its low-corrugated bellow geometry. Both ends of the bellow are cylindrical for fixing clamps. It is also characterised by very high movement absorption in all directions and its variety of rubber qualities, which means that a suitable rubber compound is available for almost every application (see material descriptions on the following pages).

Type 61 is used in plant engineering, engine construction, ventilation technology and waste-water technology, where it is specifically used to absorb movement and vibration and to insulate sound.

Bellow design	Low-corrugated rubber bellow with reinforcement. Both ends cylindrical for fixing clamps. The standard bellow is corrugated. Uncorrugated and multi-corrugated versions for greater movement absorption are possible.
Vacuum resistance	Can only be used for vacuum applications with a vacuum supporting spiral/ring.
Connections	Sleeve ends for ISO pipes (standard) for fixing clamps. The clamp width should be at least 20 mm (up to 3 bar: one clamp per side; above 3 bar: two clamps per side).
Approvals/Conformity	Drinking water, FDA and EG 1935/2004 conform
Accessories	- Fixing clamps - Potential equalisation (vulcanised braid) - Flame-resistant protective covers - Dust and splash protection covers

Specifications

Bellow		Bellow design				Permissible operating data									
Colour code	Colour marking	Core (inner)	Reinforce-ment	Cover (outer)	Max. temperature °C	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 61**

Application

Type 61 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 61 blue (EPDM TW)
Like Type 61 red, but approved for drinking water.

Type 61 white-red (EPDM beige)
Like Type 61 red, but with light-coloured rubber in food-grade.

Type 61 red AF (EPDM AF)
Like Type 61 red, but with abrasion-resistant EPDM rubber compound.

Type 61 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 61 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 61 white-grey (NBR beige)
Like Type 61 yellow-grey, but with light-coloured internal rubber in food-grade. Not approved for drinking water!

Type 61 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 61 red-blue-red (EPDM/aramid)
Like Type 61 red, but with aramid fabric.

Type 61 blue-blue-blue AF (EPDM TW/aramid)
Like Type 61 blue, but with aramid fabric.

Type 61 white-blue-red AF (EPDM beige/aramid)
Like Type 61 white-red, but with aramid fabric.

Type 61 orange-blue-orange AF (EPDM HT/aramid)
Like Type 61 red, but with aramid fabric and for temperatures up to +125 °C.

Type 61 red-blue-red AF (EPDM AF/aramid)
Like Type 61 red AF, but with aramid fabric.

Type 61 green-blue-green (CSM/aramid)
Like Type 61 green, but with aramid fabric.

Type 61 yellow-blue-grey (NBR/aramid)
Like Type 61 yellow-grey, but with aramid fabric.

Type 61 white-blue-grey (NBR white/aramid)
Like Type 61 white-grey, but with aramid fabric.

Type 61 grey-blue-grey (CR/aramid)
Like Type 61 grey, but with aramid fabric.

Type 61 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. For temperatures of up to +180 °C.

Type 61 silicone (silicone/glass fibre or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good radiation resistance. Not for use with steam above 120 °C. No resistance to fuels.

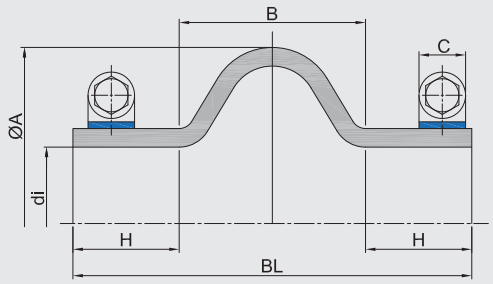
Note!
Detailed material descriptions on pages 5 - 7.

WILLBRANDT **Rubber Expansion Joint Type 61**

Type 61-1 - single-corrugated

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 using suitable pipes with corresponding fixed, floating and plain bearings.



Dimensions - Type 61-1

DN	Length	Bellow		Flange PN 10			Movement absorption				Pressure
	BL	di	WF*	Cylinder end H	Installation gap B	Clamp C	axial +	axial -	lateral ±	angular ±	Max.
	mm	mm	cm²	mm	mm	mm	mm	mm	mm	∠°	bar
50	**250**	60.3	155	55	140	20	15	30	25	21.8	6
65	**250**	76.1	191	55	140	20	15	30	25	17.1	6
80	**250**	88.9	224	55	140	20	15	30	25	14.0	6
100	**250**	114.1	297	55	140	20	15	30	25	11.3	6
125	**250**	139.7	379	55	140	20	15	30	25	9.1	6
150	**250**	168.3	484	55	140	20	15	30	25	7.6	6
200	**250**	219.1	703	55	140	20	15	30	25	5.7	6
250	**250**	273.0	979	55	140	20	15	30	25	4.6	6
300	**250**	323.9	1281	55	140	20	15	30	25	3.8	6
350	**250**	355.6	1292	65	120	25	15	30	15	3.3	6
400	**250**	406.4	1636	65	120	25	10	30	15	2.9	6
450	**250**	457.0	2020	65	120	25	10	30	15	2.5	6
500	**250**	508.0	2445	65	120	25	10	30	15	2.3	6
600	**250**	610.0	3417	65	120	25	10	30	15	1.9	4
650	**250**	660.4	3964	65	120	25	10	30	15	1.8	4
700	**250**	711.0	4551	65	120	25	10	30	15	1.6	4
750	**250**	762.0	5178	65	120	25	10	30	15	1.5	4
800	**250**	813.0	5847	65	120	25	10	30	15	1.4	4
900	**250**	914.0	7305	65	120	25	10	30	15	1.3	4
1000	**250**	1016.0	8925	65	120	25	10	30	15	1.3	4
1100	**250**	1117.6	10496	65	120	25	10	30	15	1.1	3
1200	**250**	1219.0	12370	65	120	25	10	30	15	1.0	3
1300	**250**	1320.8	14420	65	120	25	10	30	15	0.9	2
1400	**250**	1422.0	16627	65	120	25	10	30	15	0.8	2
1500	**250**	1524.0	18991	65	120	25	10	30	15	0.8	2

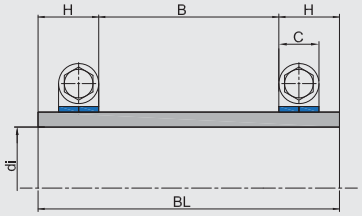
* WF = effective area

- Intermediate sizes and alterations to the overall length are available upon request.
- Greater movement absorption is possible by altering the overall length / corrugation profile and switching to a multi-corrugated type (up to 5 corrugations).
- The use of a vacuum supporting ring (Type 61-...V) reduces the movement absorption by 60 % (axial: +; angular: +/-).

Designs

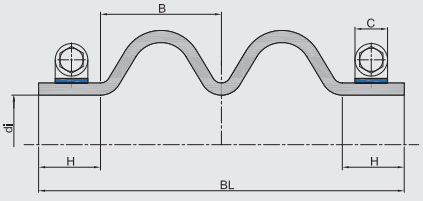
Type 61-0 - uncorrugated

Can be used to absorb vibration and insulate sound. Cannot be used to absorb axial movement.



Type 61-2 - double-corrugated

Can be used to absorb movement in any direction (for combined movements, see the movement diagram in the technical appendix), to absorb vibration and to insulate sound.



Important information

Please note the appropriate f xed point constructions and plain bearings in your piping system, as well as the tolerances as per the FSA Handbook (see the technical appendix on page 118)!
For more information please refer to our installation instructions (p. 97 - 116).
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Drainage Hose Type 62**

DN 50 - DN 600

Type 62 is a handmade, low multi-corrugated rubber hose. Its multiple corrugation makes it very flexible and results in very low inherent resistance. Its installation length is also very flexible. Both ends of the hose are cylindrical for fixing clamps.

Type 62 is used to absorb movement and vibration in bridge and building drainage. It is designed for the high temperature fluctuations and wide variety of media in these applications.

Construction	Continuous low-corrugated rubber hose with reinforcement; integrated, covered steel wire spiral and spiral-free cylindrical sleeve ends for fixing clamps.	**Pressure resistance**	Max. operating pressure: 0.5 bar; or: 0.3 bar vacuum.
Material	Chloroprene (CR) with polyamide cord reinforcement	**Connections**	Sleeve ends for ISO pipes (standard) for fixing clamps. Other connection standards (e.g. SML pipe or special dimensions) are possible.
Temperature	Max. 70 °C (depressurized), or max. 50 °C (0,5 bar)	**Accessories**	- Fixing clamps - Potential equalisation (vulcanised braid)

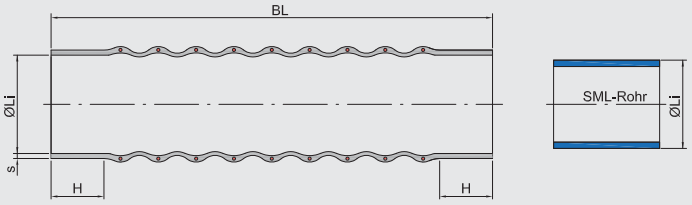
Dimensions

DN	Bellow Li ISO pipe mm	Li SML pipe mm	Dimensions H mm	S mm	Installation length
50	60.3	58	50	5 - 6	300 - 3000
65	76.1	-	50	5 - 6	300 - 3000
70	-	78	50	5 - 6	300 - 3000
80	88.9	83	50	5 - 6	300 - 3000
100	114.3	110	50	5 - 6	300 - 3000
125	139.7	135	50	5 - 6	300 - 3000
150	168.3	160	50	5 - 6	300 - 3000
200	219.1	210	50	5 - 6	300 - 3000
250	273.0	274	50	5 - 6	300 - 3000
300	323.9	326	75	5 - 6	300 - 3000
350	355.6	429	75	5 - 6	300 - 3000
400	406.4	-	75	5 - 6	300 - 3000
500	508.0	532	100	5 - 6	300 - 3000
600	610.0	635	100	5 - 6	300 - 3000

Permissible movement absorption (not in combination):

Max. axial - = (installation length - 2 x H) x 0.3 [mm]
Max axial + = only possible with pre-compressed installation length
lateral +/- = (installation length - 2 x H) x 0.15 [mm] = perm. lateral +/-

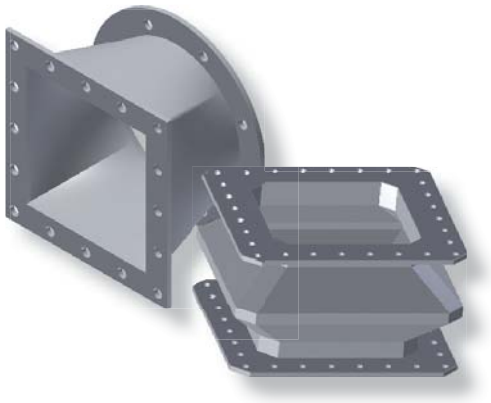
Special connection dimensions available upon request.



Important information

During installation, make a note of the existing temperatures and pre-stress accordingly .
Clamp torque for GBS clamps: 25 Nm. When ordering, specify the pipe diameter for the sleeve extension.
The bellows should not be painted or insulated.
Please note the installation instructions and tolerances as per the FSA Handbook (page 118) in the technical appendix!
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 63**



Type 63 is a freely moulded rubber expansion joint that is designed and manufactured according to your specifications and construction dimensions. The cross-section can be round, square, oval or a combination of these. The multi-corrugated bellow option allows greater movement absorption. There are also a large number of rubber qualities available, which means that you can select a suitable rubber compound for almost any application (see the material descriptions on the following pages).

Type 63 is used to compensate movement, offsets and vibration in air, water and chemical plants.

Bellow design	Reinforced rubber bellow. Choice of cylindrical ends for fixing clamps/tension bands, clamping bars, or a moulded, pressure-resistant solid rubber flange, self-sealing (no additional seal necessary), suitable for backing flanges. The bellow can be uncorrugated, single-/multi-corrugated or pleated.
Pressure resistance	Max. operating pressure: 10 bar → As this is a free-form item, the max. permissible pressure is very dependent on the precise form!
Vacuum resistance	Only vacuum-resistant with a vacuum supporting ring.
Fixing	The type of clamp / tension bands and the type of holes for the backing flange can be freely selected.
Approvals/Conformity	Drinking water approval FDA and EG 1935/2004 conform
Accessories	- Potential equalisation (vulcanised braid) - Guided sleeves - Flame-resistant protective covers - Dust and splash protection covers - Earth cover / sun protection hoods - Tie rods

Specifications

Bellow		Bellow design			Permissible operating data									
Colour code	Colour marking	Core (inner)	Reinforce-ment	Cover (outer)	Max. temperature °C	°C	bar	°C	bar	°C	bar	°C	bar	°C	bar
red		EPDM	Polyamide	EPDM	100										
blue		EPDM TW	Polyamide	EPDM	100										
white/red		EPDM beige	Polyamide	EPDM	100										
red		EPDM AF	Polyamide	EPDM	100										
green		CSM	Polyamide	CSM	100										
yellow-grey		NBR	Polyamide	CR	100										
white-grey		NBR beige	Polyamide	CR	100										
grey		CR	Polyamide	CR	90										
red-blue-red		EPDM	Aramid	EPDM	100	Expansion joints will designed according to your operating parameters.									
blue-blue-blue		EPDM TW	Aramid	EPDM	100										
white-blue-red		EPDM beige	Aramid	EPDM	100										
orange-blue-orange		EPDM HT	Aramid	EPDM HT	125										
red-blue-red		EPDM AF	Aramid	EPDM	100										
green-blue-green		CSM	Aramid	CSM	100										
yellow-blue-grey		NBR	Aramid	CR	100										
white-blue-grey		NBR beige	Aramid	CR	100										
grey-blue-grey		CR	Aramid	CR	90										
lilac-blue-lilac		FPM	Aramid	FPM	180										
-	-	Silicone	Aramid	Silicone	180										
-	-	Silicone	Glass fabric	Silicone	200										

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. ++++

WILLBRANDT **Rubber Expansion Joint Type 63**

Application

Type 63 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 63 blue (EPDM TW)
Like Type 63 red, but approved for drinking water.

Type 63 white-red (EPDM beige)
Like Type 63 red, but with light-coloured rubber in food-grade.

Type 63 red AF (EPDM AF)
Like Type 63 red, but with abrasion-resistant EPDM rubber compound.

Type 63 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 63 yellow-grey (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

Type 63 white-grey (NBR beige)
Like Type 63 yellow-grey, but with light-coloured internal rubber in food-grade. Not approved for drinking water!

Type 63 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

Type 63 red-blue-red (EPDM/aramid)
Like Type 63 red, but with aramid fabric.

Type 63 blue-blue-blue AF (EPDM TW/aramid)
Like Type 63 blue, but with aramid fabric.

Type 63 white-blue-red AF (EPDM beige/aramid)
Like Type 63 white-red, but with aramid fabric.

Type 63 orange-blue-orange AF (EPDM HT/aramid)
Like Type 63 red, but with aramid fabric and for temperatures up to +125 °C.

Type 63 red-blue-red AF (EPDM AF/aramid)
Like Type 63 red AF, but with aramid fabric.

Type 63 green-blue-green (CSM/aramid)
Like Type 63 green, but with aramid fabric.

Type 63 yellow-blue-grey (NBR/aramid)
Like Type 63 yellow-grey, but with aramid fabric.

Type 63 white-blue-grey (NBR white/aramid)
Like Type 63 white-grey, but with aramid fabric.

Type 63 grey-blue-grey (CR/aramid)
Like Type 63 grey, but with aramid fabric.

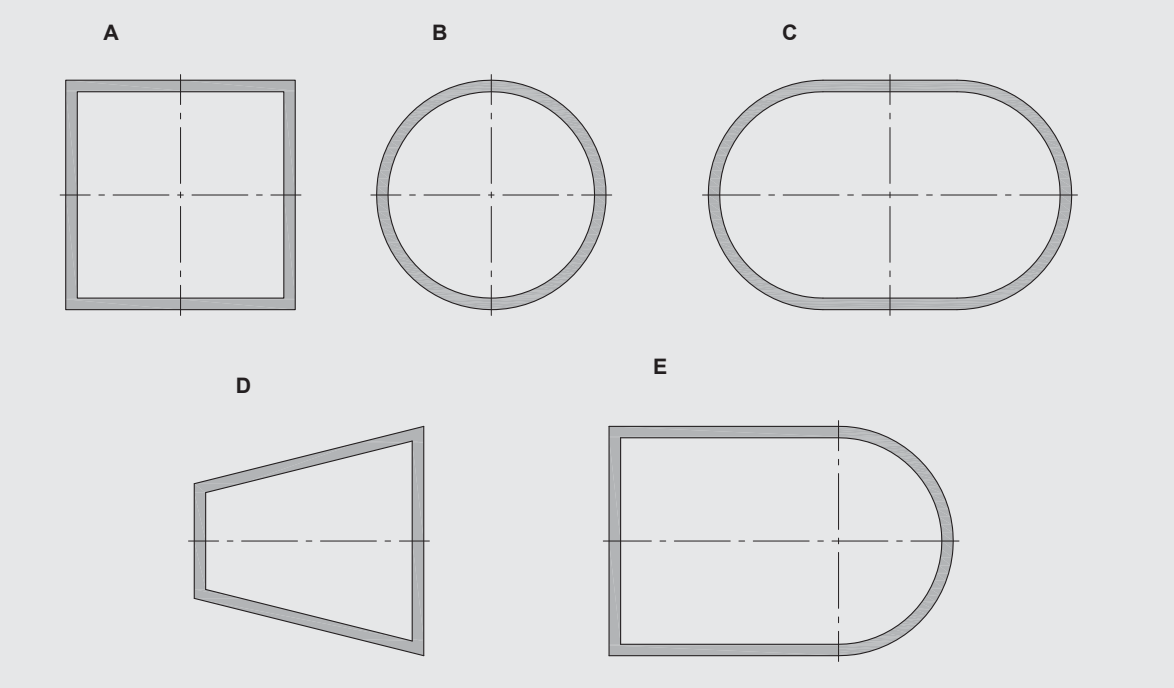
Type 63 lilac-blue-lilac (FPM/aramid)
For flue gas desulphurisation systems and bio-diesel. High chemical resistance to benzene, xylene, toluene, aromatic, chlorinated hydrocarbons, mineral acids and fuels with an aromatic content of more than 50 %. For temperatures of up to +180 °C.

Type 63 silicone (silicone/glass fibre or aramid)
Suitable for hot air, acetic acid. Satisfactory resistance to aliphatic engine and gear oils. Also available in foodstuff quality. Excellent resistance to ageing, UV, ozone and weather. Very good radiation resistance. Not for use with steam above 120 °C. No resistance to fuels.

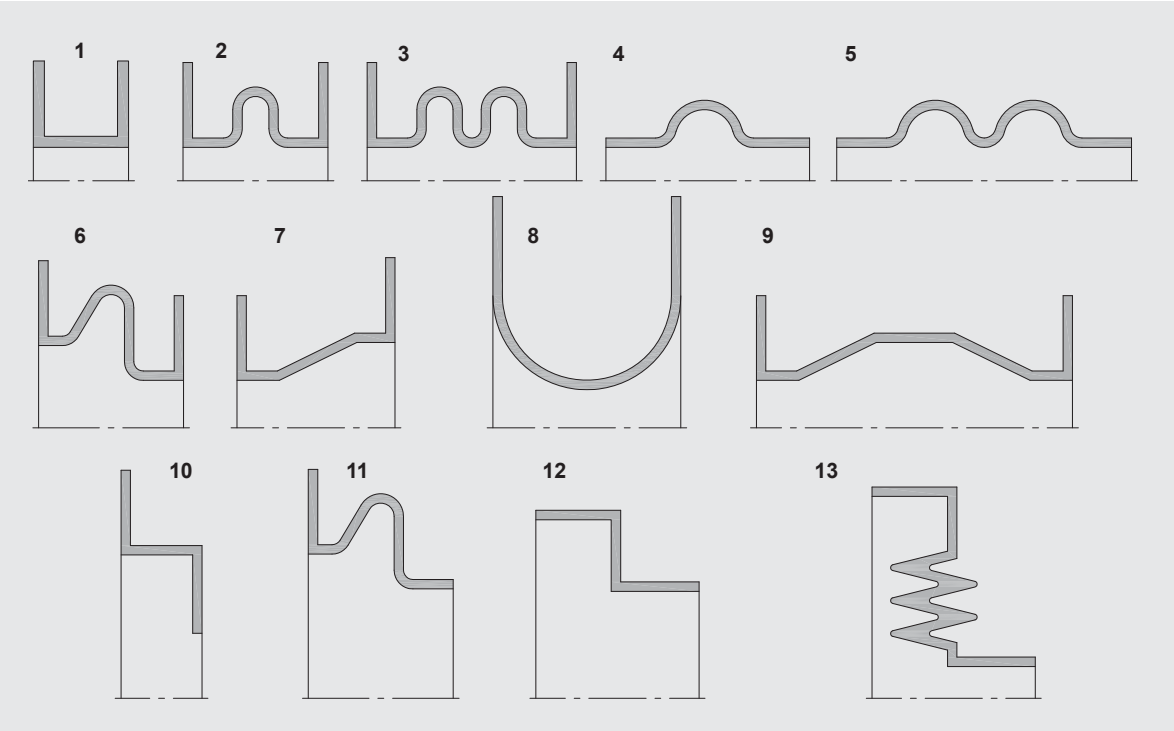
Note!
Detailed material descriptions on pages 5 - 7.

WILLBRANDT **Rubber Expansion Joint Type 63**

Examples of cross-sections



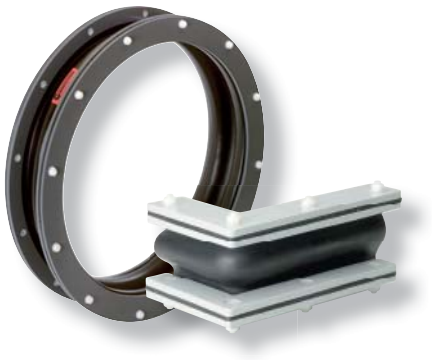
Examples of bellow designs



Important information

Please note the appropriate f xed point constructions and plain bearings in your pipe system, as well as the tolerances as per the FSA Handbook (see the technical appendix on page 118)!
For more information please refer to our installation instructions (p. 97 - 116).
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Rubber Expansion Joint Type 64**



The type 64 expansion joint is a flexible expansion joint made from pre-formed sheets and is vulcanised or heated into its final form, depending on the material. The dimensions of the expansion joint are based on the construction dimensions and the required movement absorption. There are no standard dimensions for this particular type.

Application areas include stress-free installation of fans and blowers, the bulk handling and materials handling.

Bellow design
The expansion joint bellows comprise a layer of rubber sheeting with a fabric section that overlaps in the area of impact and is vulcanised or heated. There are corrugated and uncorrugated versions in order to absorb the prescribed movements.

Pressure resistance
Max. +/-0.4 bar (also dependent on the free installation length)

Fixing
Both flange connection and cylindrical ends for fixing clamps possible.

Accessories
- Potential equalisation
- Guide sleeves
- Dust and splash protection covers
- Earth cover / sun protection hoods

Specifications

Bellow		Bellow design			Thickness	max. temperature	max. pressure		Version
Colour code	Colour marking	Core (inner)	Rein-forcement	Cover (outer)	mm	°C	bar	bar	
red		EPDM	Polyamide	EPDM	3.0	120	-0.4	+0.4	Soft
red		EPDM	Polyamide	EPDM	4.0	120	-0.4	+0.4	Standard
lilac*		FPM	Polyamide	FPM	4.0	200	-0.4	+0.4	Standard
yellow		NBR	Polyamide	NBR	4.0	90	-0.4	+0.4	Standard
grey		CR		CR	3.0	90	-0.4	+0.4	Standard

* Only without convolution (bellow profiles type 64-2 and type 64-4).

Application

Type 64 red
For hot and cold air and bulk materials. Good resistance to weather, ageing and ozone. Not suitable for oil products of any kind or cooling water with additives containing oil.

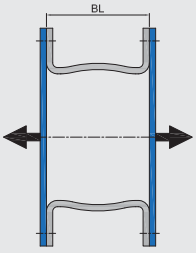
Type 64 lilac
For aggressive exhaust air, flue gas and bulk materials.

Type 64 yellow
For air containing oils/fats, gases and bulk materials.

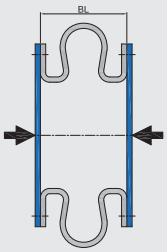
Type 64 grey (CR)
For air containing oils/fats, flue gases from treatment plants and bulk materials.

Note!
Detailed material descriptions on pages 5 - 7.

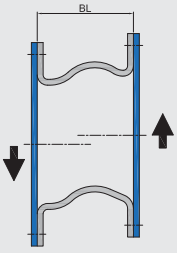
axial +
$\Delta \approx 0.3 \times BL$



axial -
$\Delta \approx 0.5 \times BL$



lateral ±
$\Delta \approx 0.1 \times BL$

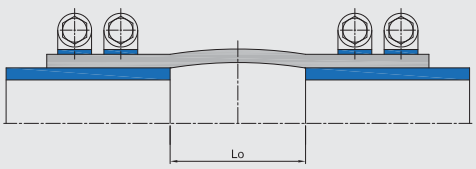


WILLBRANDT **Rubber Expansion Joint Type 64**

Bellows profiles

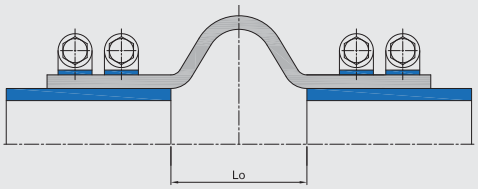
Type 64-1

Uncorrugated with straight ends for round or square versions



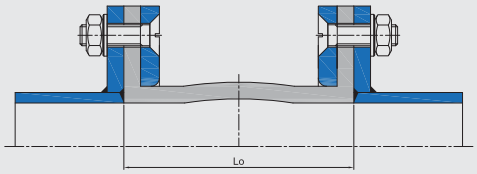
Type 64-2

Corrugated with straight ends for round or square versions



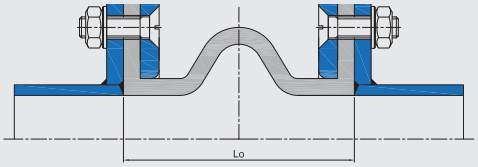
Type 64-3

Uncorrugated with flange connection for round or square versions



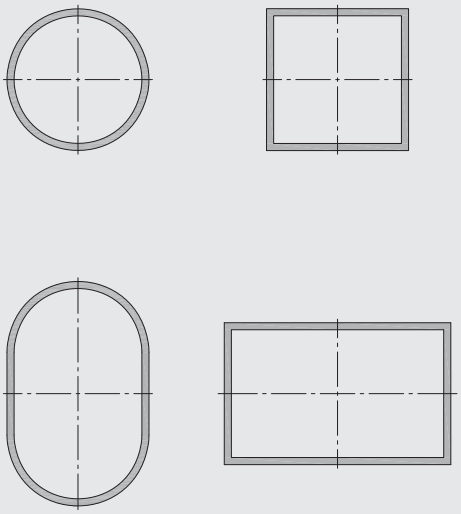
Type 64-4

Corrugated with flange connection for round or square versions

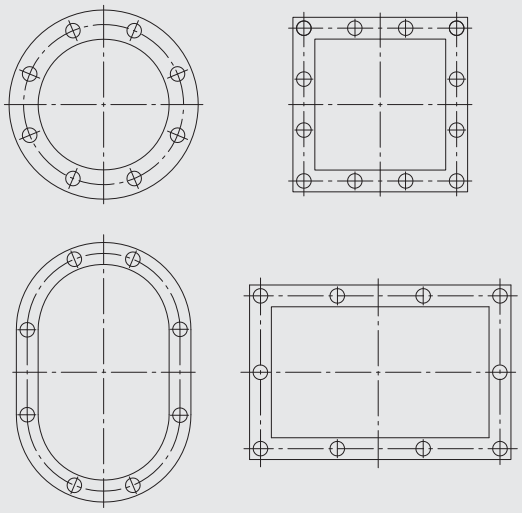


Cross-sections

Cross-sections with straight ends for f xing clamps and mounting bars



Cross-sections for f ange mounting



Important information

For aggressive media, please see the resistance table (can be requested separately).
The bellows should not be painted or insulated. Please note the installation instructions and tolerances as per the FSA Handbook (page 118) in the technical appendix!
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **Wall Seal Type 65**

DN 80 - DN 5000

Type 65 is a freely moulded rubber wall seal that is designed and manufactured according to your specifications and construction dimensions. The connection can be via clamp, flange or a combination of these. There are also a large number of rubber qualities available, which means that you can select a suitable rubber compound for almost any application (see the material descriptions on the following pages).

Type 65 is used in power stations, plant engineering, valve shafts, power houses and pumping stations, where it is used to seal pipes from groundwater, and to compensate building settlement and shear forces.

Bellow design	Reinforced rubber bellow available in corrugated and uncorrugated versions. There is a choice of connection: cylindrical ends for fixing clamps and/or internal or external solid rubber flanges to accommodate backing/clamping flanges.	**Fixing**	Both flange connection and cylindrical ends for fixing clamps possible.
Pressure resistance	Max. internal pressure: 2.5 bar. In the case of external pressure (e.g. groundwater) please use a supporting ring.	**Supporting ring**	In the case of external pressure (e.g. groundwater) please use a supporting ring.
		Accessories	- Supporting ring - Potential equalisation - Drainage hose - Earth cover/sun protection hoods

Specifications

Bellow		Bellow design			
Colour-code	Colour marking	Core (inner)	Reinforcement	Cover (outer)	Max. temperature °C
red		EPDM	Polyamide	EPDM	100
blue		EPDM TW	Polyamide	EPDM	100
white-red		EPDM beige	Polyamide	EPDM	100
green		CSM	Polyamide	CSM	100
yellow		NBR	Polyamide	CR	90
grey		CR	Polyamide	CR	80

Appliction

Type 65 red (EPDM)
For water, sea water, cooling water with glycol or other chemical additives for treating water, saline solutions, weak acids and weak alkali solutions. Unsuitable for aliphatic, aromatic and chlorinated hydrocarbons, oil or oily media.

Type 65 blue (EPDM TW)
Like Type 65 red, but approved for drinking water.

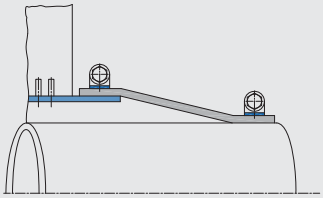
Type 65 white-red (EPDM beige)
Like Type 65 red, but with rubber in food-grade.

Type 65 green (CSM)
For chemicals, aggressive, chemical wastewater and compressor air containing oil.

Type 65 yellow (NBR)
For oils, fats, gases, diesel fuels, kerosene and crude oil. Not suitable for aromatic and chlorinated hydrocarbons, esters and ketones.

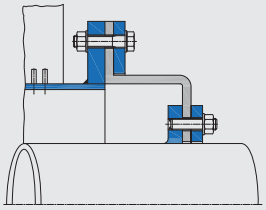
Type 65 grey (CR)
For water, wastewater, swimming pool water, salt water, cooling water with anti-corrosive products containing oil, oil mixtures and compressed air containing oil.

WILLBRANDT **Wall Seal Type 65**



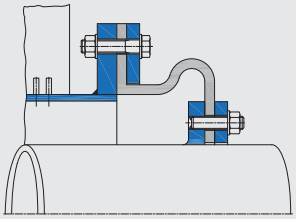
Type 65-0

with cylindrical ends on both sides for fixing clamps, pressure: 1 bar, up to DIN 1000



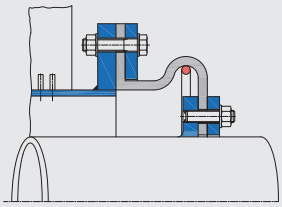
Type 65-1

Flange connection on both sides, freely selectable flange standard, pressure: -0.5 to +2.5 bar, up to DN 4000



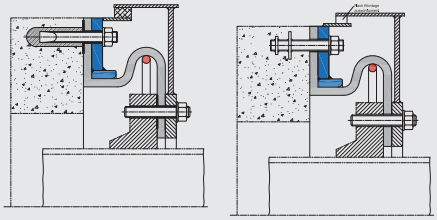
Type 65-2

Flange connection on both sides, corrugated, freely selectable flange standard, pressure: 2.5 bar, without supporting ring, up to DN 4000



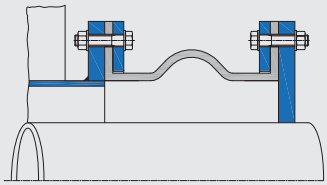
Type 65-2S

Flange connection on both sides, corrugated, with supporting ring, freely selectable flange standard, pressure: -1 to +2.5 bar, up to DN 4000



Example of installation - Earth protection cover

in ground with earth protection cover and bellow with inner supporting ring, up to DN 4000



Recommended installation

for wall seals with pressures greater than 2.5 bar, we recommend a rubber expansion joint solution up to DN 4000, this makes pressures up to 30 bar possible.

Example of dimensions - Type 65-2

Wall pipe*1	Medium pipe*1		Overall length*2	Bellow	Movement absorption*4			
DN 1 min.	DN 2	PN	BL	WF*3	axial -	axial*5 +	lateral ±	angular ±
			mm	mm²	mm	mm	mm	∠°
200	80	PN 10	**200**	1057	45	17	26	7.7
250	100	PN 10	**200**	1057	45	26	26	7.7
300	125	PN 10	**200**	1365	45	26	36	9.8
350	150	PN 10	**200**	1712	45	26	35	7.4
400	200	PN 10	**200**	2098	45	26	35	7.4
450	250	PN 10	**200**	2524	45	26	34	5.9
500	300	PN 10	**200**	2988	45	26	34	5.9
600	350	PN 10	**200**	4036	45	26	33	5.0
700	450	PN 10	**200**	5240	45	26	33	4.2
700	500	PN 10	**200**	5240	45	26	33	4.2
800	600	PN 10	**200**	6601	45	26	33	3.7
1000	700	PN 10	**200**	9794	45	26	32	3.0
1000	750	PN 10	**200**	9794	45	26	32	3.0
1050	800	PN 10	**200**	10691	45	26	31	2.5
1200	900	PN 10	**200**	13616	45	26	31	2.5
1300	1000	PN 10	**200**	15762	45	26	31	2.1
1500	1100	ANSI B16 150 lbs	**200**	20525	45	26	31	1.9
1500	1200	PN 6	**200**	20525	45	26	31	1.9
1700	1300	ANSI B16 150 lbs	**200**	25917	45	26	30	1.7
1700	1400	PN 6	**200**	25917	45	26	30	1.7
2000	1500	ANSI B16 150 lbs	**200**	35181	45	26	30	1.5

*1 Catalogue example for a medium pipe according to DIN standards. Other standards (e.g. ANSI, BS, JIS) are also available.
*2 Other overall lengths possible.
*3 WF = effective area
*4 It is also possible to provide the wall seal with greater movement by altering the overall length.
*5 If an internal supporting ring (Type 65-2S) is used, the axial+ movement is reduced to 9 mm.

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. ++++

WILLBRANDT **PTFE Expansion Joint Type 80**

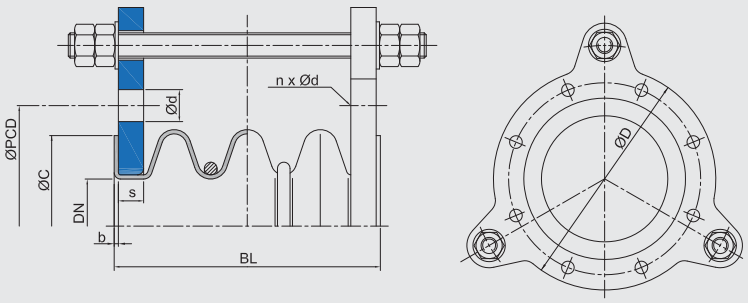
DN 25 - DN 600

Type 80 is a 3- or 5-corrugated PTFE expansion joint that is hot-formed under pressure from extruded PTFE tubing. The fibers are executed without interruption. It is characterised by its high level of media resistance and movement absorption.

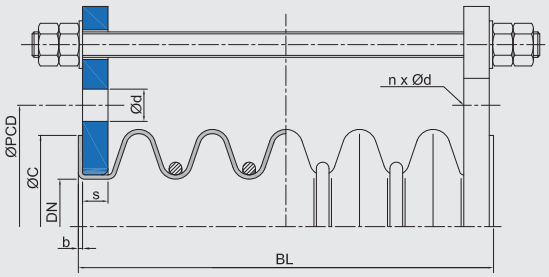
Type 80 is primarily used in chemical plants to absorb movement, insulate sound and compensate offsets. Its high level of elasticity and low stiffness rates means that it can also be used in pipes made from fragile materials such as glass, graphite or enamel.

Bellow design	Multi-corrugated, pure PTFE bellow with external stainless steel supporting rings from 1.4301. PTFE bead on both sides for steel flanges with integrated tie rods. Standard version: white PTFE, electrically insulating. Special version: black PTFE, electrically conductive.
Pressure resistance	Max. operating pressure: 10 bar, depending on the temperature → see tables
Flange version	Steel S235JRG2, primed. Standard version delivered with flange with tie rods and clearance holes (drilled according to DIN PN 10). Other flange versions and materials are possible.
Special accessories	- PTFE guide sleeves - Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover/sun protection hoods
Conformity	FDA and EG 1935/2004

Standard version, 3-corrugated - with tie rods



Standard version, 5-corrugated - with tie rods



Important information

No additional seals are required for normal, flat flange connections up to DN 300.
From DN 350 and in the case of glass components or other connecting parts it is necessary to use elastic seals made of TFM with reinforcement (please refer to the required surface pressure).
PTFE expansion joints may not be subject to torsion or vibration.
The bellows should not be painted. Please refer to the installation instructions.
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **PTFE Expansion Joint Type 80**

Permissible pressure loading at temperature (3-corrugated)

DN	Temperature / Pressure										
	20 °C	40 °C	60 °C	80 °C	100 °C	120 °C	140 °C	160 °C	180 °C	200 °C	220 °C
20 - 40	10.00 bar	10.00 bar	10.00 bar	10.00 bar	10.00 bar	9.50 bar	8.00 bar	7.50 bar	5.50 bar	5.00 bar	4.50 bar
50	10.00 bar	8.70 bar	7.70 bar	6.70 bar	5.80 bar	5.20 bar	4.30 bar	4.00 bar	3.50 bar	3.20 bar	3.00 bar
65 - 80	10.00 bar	8.70 bar	7.50 bar	6.50 bar	5.60 bar	4.80 bar	4.10 bar	3.50 bar	2.80 bar	2.50 bar	2.20 bar
100 - 150	8.50 bar	7.50 bar	6.50 bar	5.60 bar	4.80 bar	4.30 bar	3.50 bar	2.80 bar	2.40 bar	2.00 bar	1.60 bar
200 - 250	7.00 bar	6.10 bar	5.30 bar	4.50 bar	3.80 bar	3.30 bar	2.70 bar	2.30 bar	1.70 bar	1.40 bar	1.20 bar
300 - 350	6.00 bar	4.90 bar	4.20 bar	3.40 bar	2.80 bar	2.50 bar	2.10 bar	1.70 bar	1.40 bar	1.20 bar	0.90 bar
400 - 450	4.50 bar	3.60 bar	3.00 bar	2.50 bar	2.20 bar	1.80 bar	1.50 bar	1.30 bar	1.00 bar	0.80 bar	0.80 bar
500 - 600	3.00 bar	2.50 bar	2.00 bar	1.60 bar	2.30 bar	1.10 bar	0.80 bar	0.60 bar	0.50 bar	0.40 bar	0.40 bar
700	1.80 bar	1.70 bar	1.60 bar	1.50 bar	1.30 bar	1.20 bar	1.10 bar	0.90 bar	0.80 bar	0.70 bar	0.60 bar
800 - 900	1.50 bar	1.40 bar	1.30 bar	1.20 bar	1.10 bar	1.00 bar	0.90 bar	0.80 bar	0.60 bar	0.50 bar	0.40 bar
1000 - 1200	1.00 bar	0.90 bar	0.80 bar	0.70 bar	0.65 bar	0.60 bar	0.55 bar	0.50 bar	0.40 bar	0.30 bar	0.20 bar

Permissible pressure loading at temperature (5-corrugated)

DN	Temperature / Pressure										
	20 °C	40 °C	60 °C	80 °C	100 °C	120 °C	140 °C	160 °C	180 °C	200 °C	220 °C
20 - 40	7.00 bar	6.00 bar	5.50 bar	5.00 bar	4.50 bar	4.00 bar	3.80 bar	3.10 bar	2.90 bar	2.60 bar	2.30 bar
50	7.00 bar	6.20 bar	5.60 bar	5.10 bar	4.80 bar	4.30 bar	4.00 bar	3.70 bar	3.40 bar	3.00 bar	2.80 bar
65 - 80	4.25 bar	3.75 bar	3.25 bar	2.80 bar	2.40 bar	2.15 bar	1.75 bar	1.40 bar	1.20 bar	1.00 bar	0.80 bar
100 - 150	4.25 bar	3.75 bar	3.25 bar	2.80 bar	2.40 bar	2.15 bar	1.75 bar	1.40 bar	1.20 bar	1.00 bar	0.80 bar
200 - 250	3.50 bar	3.05 bar	2.65 bar	2.25 bar	1.90 bar	1.65 bar	1.35 bar	1.15 bar	0.85 bar	0.70 bar	0.60 bar
300 - 350	3.00 bar	2.45 bar	2.10 bar	1.70 bar	1.40 bar	1.25 bar	1.05 bar	0.85 bar	0.70 bar	0.60 bar	0.45 bar
400 - 450	2.25 bar	1.80 bar	1.50 bar	1.25 bar	1.10 bar	0.90 bar	0.75 bar	0.65 bar	0.50 bar	0.40 bar	0.40 bar
500 - 600	1.50 bar	1.25 bar	1.00 bar	0.80 bar	1.15 bar	0.55 bar	0.40 bar	0.30 bar	0.25 bar	0.20 bar	0.20 bar

Permissible vacuum loading at temperature (3-corrugated)

DN	Temperature / Pressure										
	20 °C	40 °C	60 °C	80 °C	100 °C	120 °C	140 °C	160 °C	180 °C	200 °C	220 °C
20 - 40	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-0.96 bar
25 - 50	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-0.96 bar	-0.91 bar	-0.85 bar	-0.79 bar	-0.70 bar	-0.63 bar	-
65 - 80	-1.00 bar	-1.00 bar	-1.00 bar	-1.00 bar	-0.96 bar	-0.91 bar	-0.85 bar	-0.79 bar	-0.70 bar	-0.63 bar	-
100 - 150	-1.00 bar	-1.00 bar	-0.96 bar	-0.90 bar	-0.81 bar	-0.74 bar	-0.66 bar	-0.58 bar	-0.46 bar	-0.35 bar	-
200 - 250	-1.00 bar	-0.91 bar	-0.85 bar	-0.79 bar	-0.70 bar	-0.62 bar	-0.53 bar	-0.43 bar	-0.30 bar	-0.20 bar	-
300 - 350	-0.80 bar	-0.74 bar	-0.66 bar	-0.59 bar	-0.49 bar	-0.40 bar	-0.28 bar	-0.18 bar	-	-	-
400 - 450	-0.75 bar	-0.69 bar	-0.61 bar	-0.55 bar	-0.45 bar	-0.32 bar	-0.22 bar	-0.13 bar	-	-	-
500 - 600	-0.69 bar	-0.64 bar	-0.56 bar	-0.49 bar	-0.39 bar	-0.29 bar	-0.18 bar	-	-	-	-
700	-	-	-	-	-	-	-	-	-	-	-
800 - 900	-	-	-	-	-	-	-	-	-	-	-
1000 - 1200	-	-	-	-	-	-	-	-	-	-	-

Note: Type 80 (5-corrugated) is not suitable for vacuum loading.

Important information

Type 80 (5-corrugated) is not suitable for vacuum loading.
For higher pressures, please refer to Type 80 HD.
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **PTFE Expansion Joint Type 80**

Dimensions - Type 80 (3-corrugated)

DN	Length	Bellow		Flange PN 10*2						Movement absorption*3			Stiffness rates*4		Weight
	BL	b	WF*1	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral ±	axial	lateral	
	mm	mm	mm²	mm	mm			mm	mm	mm	mm	mm	N/mm	N/mm	kg
20	**45**	3.0	2400	105	75	M12	4	10	58	10	10	6	18	20	1.9
25	**45**	3.0	2400	115	85	M12	4	10	68	10	10	6	18	20	1.9
32	**50**	3.0	3300	140	100	M16	4	10	78	10	10	6	38	25	2.3
40	**50**	3.0	4000	150	110	M16	4	12	88	15	15	6	44	28	2.9
50	**75**	3.5	4200	165	125	18	4	15	98	15	15	15	50	45	6.0
65	**75**	3.0	5500	185	145	18	8	15	118	22	22	17	40	50	7.0
80	**100**	3.0	9000	200	160	18	8	15	122	25	25	17	40	60	8.0
100	**100**	3.5	13500	220	180	18	8	15	148	25	25	18	50	90	10.0
125	**125**	4.0	19000	250	210	18	8	18	174	28	28	18	60	110	12.0
150	**150**	4.0	29500	285	240	22	8	18	200	28	28	20	100	150	15.0
200	**150**	4.0	46000	340	295	22	8	20	256	28	28	10	150	180	20.0
250	**150**	4.0	67000	395	350	22	12	25	303	28	28	8	150	200	35.0
300	**150**	4.0	94000	445	400	22	12	25	360	30	30	6	150	200	48.0
350	**150**	4.5	108000	505	460	22	16	25	402	30	30	6	200	270	57.0
400	**150**	4.0	140000	565	515	26	16	25	453	30	30	5	200	270	70.0
450	**150**	3.5	180000	615	565	26	20	25	513	30	30	5	250	290	78.0
500	**150**	4.0	210000	670	620	26	20	25	564	30	30	4	300	350	86.0
600	**175**	4.0	310000	780	725	30	20	30	658	30	30	2	300	350	125.0
700	**190**	3.0	441500	895	840	30	24	35	800	35	35	2	350	410	136.0
800	**190**	3.0	570000	1015	950	33	24	35	905	35	35	2	380	490	146.0
900	**215**	3.0	712000	1115	1050	33	28	35	1005	35	35	2	400	530	184.0
1000	**240**	3.0	874000	1230	1160	36	28	35	1110	35	35	2	425	570	214.0
1200	**190**	3.0	1256100	1455	1380	39	32	35	1330	35	35	2	460	620	275.0

*1 WF = effective area
*2 Other dimensions (e.g. according to DIN PN 6, 16, ANSI b16,5 150 lbs) are available upon request.
*3 The movement absorption values are maximum values and must not occur in combination. Please refer to the movement diagram in the technical appendix.
*4The stiffness rates are valid for 20 °C +/- 25 %. At higher temperatures the stiffness rate can fall by up to 50 %.

Dimensions - Type 80 (5-corrugated)

DN	Overall length BL	Bellow		Flange PN 10*2						Movement absorption*3			Stiffness rates*4		Weight
		b	WF*1	ØD	ØPCD	Ød	n	s	ØC	axial +	axial -	lateral ±	axial	lateral	
	mm	mm	mm²	mm	mm			mm	mm	mm	mm	mm	N/mm	N/mm	kg
20	**70**	3.0	2400	105	75	M12	4	10	58	15	15	8	11	18	1.9
25	**70**	3.0	2400	115	85	M12	4	10	68	15	15	8	11	18	1.9
32	**75**	3.0	3300	140	100	M16	4	10	78	15	15	8	23	25	2.3
40	**75**	3.0	4000	150	110	M16	4	12	88	20	20	8	27	32	2.9
50	**100**	3.5	4200	165	125	18	4	15	98	20	20	25	30	35	6.5
65	**100**	3.0	5500	185	145	18	8	15	118	35	35	30	35	40	7.5
80	**125**	3.0	9000	200	160	18	8	15	122	40	40	30	35	45	9.0
100	**150**	3.5	13500	220	180	18	8	15	148	40	40	30	35	60	11.0
125	**175**	4.0	19000	250	210	18	8	18	174	45	45	32	40	80	13.0
150	**225**	4.0	29500	285	240	22	8	18	200	45	45	32	80	120	17.0
200	**225**	4.0	46000	340	295	22	8	20	256	45	45	32	100	150	22.0
250	**225**	4.0	67000	395	350	22	12	25	303	45	45	15	100	170	37.0
300	**225**	4.0	94000	445	400	22	12	25	360	50	50	10	120	170	50.0
350	**225**	4.5	108000	505	460	22	16	25	402	50	50	8	160	250	59.0
400	**225**	4.0	140000	565	515	26	16	25	453	50	50	8	200	230	72.0
450	**225**	3.5	180000	615	565	26	20	25	513	50	50	7	200	240	80.0
500	**225**	4.0	210000	670	620	26	20	25	564	50	50	7	250	300	89.0
600	**250**	4.0	310000	780	725	30	20	30	658	50	50	6	250	300	130.0

*1 WF = effective area
*2 Other dimensions (e.g. according to DIN PN 6, 16, ANSI b16,5 150 lbs) are available upon request.
*3 The movement absorption values are maximum values and must not occur in combination. Please refer to the movement diagram in the technical appendix.
*4The stiffness rate are valid for 20 °C +/- 25 %. At higher temperatures the stiffness rate can fall by up to 50 %.

Important information

Please note the appropriate f xed 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. ++++

WILLBRANDT **PTFE Expansion Joint Type 80 HD**

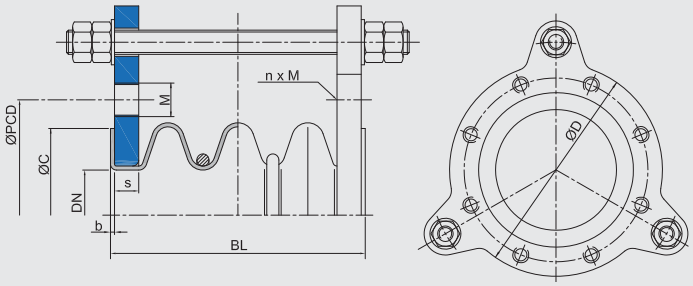
DN 25 - DN 600

Type 80 is a 2- to 10-corrugated PTFE expansion joint that is hot-formed from wound foil piping under pressure. The material is homogeneous, has no pores and the forming process ensures a redirection of the material fibers without interuption. It is characterised by its high level of pressure resistance, media resistance and movement absorption.

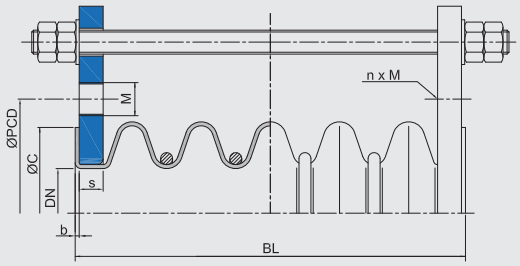
Type 80 HD is primarily used in chemical plants to absorb movement, insulate sound and compensate offsets. Its high level of elasticity and low stiffness rates means that it can also be used in pipes made from fragile materials such as glass, graphite or enamel.

Bellow design	Multi-corrugated, pure PTFE bellow with stainless-steel external stainless-steel supporting rings from 1.4301. PTFE bead on both sides for steel flanges with integrated tie rods. Standard version: white PTFE, electrically insulating. Special version: black PTFE, electrically conductive.
Flange version	Spheroidal graphite iron GGG40, primed. Standard version delivered with flange and tie rods and threaded bolt holes (drilled according to DIN PN 10). Other flange versions and materials are possible.
Pressure resistance	Max. operating pressure: 16 bar (depending on the temperature → see tables)
Special accessories	- PTFE guide sleeves - Potential equalisation - Flame-resistant protective covers - Dust and splash protection covers - Earth cover/sun protection hoods
Conformity	FDA and EG 1935/2004

Standard version, 3-corrugated - with tie rods



Standard version, 5-corrugated - with tie rods



Important information

No additional seals are required for normal, flat flange connections up to DN 300.
From DN 350 and in the case of glass components or other connecting parts it is necessary to use elastic seals made of TFM with reinforcement (please refer to the required surface pressure).
PTFE expansion joints may not be subject to torsion or vibration. Please refer to the installation instructions.
++++ We will be happy to send you further information on the individual types and designs. ++++

WILLBRANDT **PTFE Expansion Joint Type 80 HD**

Permissible pressure loading at temperature

Quantity Waves	Temperature / Pressure												
	-40 °C	-20 °C	20 °C	40 °C	60 °C	80 °C	100 °C	120 °C	140 °C	160 °C	180 °C	200 °C	220 °C
2	12.0 bar	14.0 bar	16.0 bar	16.0 bar	15.0 bar	14.1 bar	12.5 bar	10.7 bar	10.0 bar	8.8 bar	7.1 bar	5.5 bar	3.0 bar
3	12.0 bar	14.0 bar	16.0 bar	16.0 bar	15.0 bar	14.1 bar	12.5 bar	10.7 bar	10.0 bar	8.8 bar	7.1 bar	5.5 bar	3.0 bar
4	6.0 bar	8.0 bar	10.0 bar	10.0 bar	9.5 bar	9.0 bar	8.0 bar	6.8 bar	6.1 bar	5.2 bar	4.7 bar	3.5 bar	2.0 bar
5	6.0 bar	8.0 bar	10.0 bar	10.0 bar	9.5 bar	9.0 bar	8.0 bar	6.8 bar	6.1 bar	5.2 bar	4.7 bar	3.5 bar	2.0 bar
6	6.0 bar	8.0 bar	10.0 bar	10.0 bar	9.5 bar	9.0 bar	8.0 bar	6.8 bar	6.1 bar	5.2 bar	4.7 bar	3.5 bar	2.0 bar
7	2.0 bar	4.0 bar	6.0 bar	6.0 bar	5.8 bar	5.3 bar	4.8 bar	4.0 bar	3.7 bar	3.0 bar	2.7 bar	2.0 bar	1.0 bar
8	2.0 bar	4.0 bar	6.0 bar	6.0 bar	5.8 bar	5.3 bar	4.8 bar	4.0 bar	3.7 bar	3.0 bar	2.7 bar	2.0 bar	1.0 bar
9	2.0 bar	4.0 bar	6.0 bar	6.0 bar	5.8 bar	5.3 bar	4.8 bar	4.0 bar	3.7 bar	3.0 bar	2.7 bar	2.0 bar	1.0 bar
10	2.0 bar	4.0 bar	6.0 bar	6.0 bar	5.8 bar	5.3 bar	4.8 bar	4.0 bar	3.7 bar	3.0 bar	2.7 bar	2.0 bar	1.0 bar

A guide sleeve should be used for flow rates of over 3 m/s. This can be made from PTFE for rates of up to 5 m/s.
A stainless steel guide sleeve should be used for flow rates of over 5 m/s.

Permissible vacuum loading at temperature

Quantity Waves	Temperature / Pressure												
	-40 °C	-20 °C	20 °C	40 °C	60 °C	80 °C	100 °C	120 °C	140 °C	160 °C	180 °C	200 °C	220 °C
2	-0.5 bar	-0.8 bar	-1.0 bar	-1.0 bar	-1.0 bar	-1.00 bar	-1.00 bar	-1.0 bar	-0.9 bar	-0.7 bar	-0.4 bar	-0.1 bar	-
3	-0.5 bar	-0.8 bar	-1.0 bar	-1.0 bar	-1.0 bar	-1.00 bar	-1.00 bar	-0.9 bar	-0.7 bar	-0.4 bar	-0.1 bar	-	-
4	-0.5 bar	-0.8 bar	-1.0 bar	-1.0 bar	-0.9 bar	-0.72 bar	-0.65 bar	-0.5 bar	-0.3 bar	-	-	-	-
5	-0.5 bar	-0.8 bar	-1.0 bar	-0.9 bar	-0.8 bar	-0.65 bar	-0.50 bar	-0.3 bar	-	-	-	-	-
6	-	-0.3 bar	-0.3 bar	-0.2 bar	-	-	-	-	-	-	-	-	-
7	-	-0.3 bar	-0.3 bar	-0.2 bar	-	-	-	-	-	-	-	-	-
8	-	-0.3 bar	-0.3 bar	-0.2 bar	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-

A guide sleeve should be used for flow rates of over 3 m/s. This can be made from PTFE for rates of up to 5 m/s.
A stainless steel guide sleeve should be used for flow rates of over 5 m/s.

Stiffness rates

Direction of movement		DN / Stiffness rates																
		25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
axial	(N/mm)	21	32	42	58	84	111	147	189	235	286	347	413	576	546	597	658	791
lateral	(N/mm)	45	68	90	124	124	237	315	405	782	952	1156	1377	1581	1819	1989	2193	2635

The stiffness rates are valid for 20 °C +/-50 %. At higher temperatures the stiffness rates can fall by up to 50 %

Factor for wave number

Number of waves	2	3	4	5	6	7	8	9	10
Factor	1,4	1,0	0,8	0,65	0,55	0,45	0,4	0,35	0,3

Factor for temperatures

Temperature	25 °C	80 °C	120 °C	150 °C
Factor	1,0	0,65	0,5	0,4

Important information

Type 80 (5-corrugated) is not suitable for vacuum loading.

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

WILLBRANDT **PTFE Expansion Joint Type 80 HD**

Dimensions - Type 80 HD **(2-corrugated / 3-corrugated)**

DN	Overall length		Bellow		Flange PN 10*2						Movement absorption*3						Weight
											2 corrugations			3 corrugations			3 corrugations
	2 corrugations	3 corrugations	b	WF*1	ØD	ØPCD	Ød	n	s	ØC	axial ±	lateral ±	angular*4 ±°	axial ±	lateral ±	angular*4 ±°	
	mm	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	∠°	mm	mm	∠°	kg
25	**45**	**55**	3.7	1000	115	85	14	4	12	68	9.0	6.0	13.5	9.0	6.0	13.5	2.5
32	**55**	**65**	3.8	1430	140	100	18	4	16	78	9.0	6.0	12.0	9.0	6.0	12.0	3.0
40	**55**	**70**	4.0	2500	150	110	18	4	16	88	10.5	7.5	12.0	10.5	7.5	12.0	4.0
50	**60**	**70**	4.2	3500	165	125	18	4	16	102	10.5	7.5	10.5	10.5	7.5	10.5	6.0
65	**60**	**80**	4.4	6000	185	145	18	8	16	118	12.0	9.0	10.5	12.0	9.0	10.5	7.0
80	**65**	**90**	4.7	9000	200	160	18	8	17	122	12.0	9.0	10.5	12.0	9.0	10.5	8.0
100	**70**	**95**	5.0	12000	220	180	18	8	18	148	13.5	9.0	9.0	13.5	9.0	9.0	10.0
125	**75**	**100**	5.2	19500	250	210	18	8	19	174	13.5	9.0	9.0	13.5	9.0	9.0	12.0
150	**75**	**105**	5.5	25500	285	240	22	8	20	200	15.0	9.0	7.5	15.0	9.0	7.5	15.0
200	**80**	**110**	5.7	42500	340	295	22	8	20	256	15.0	10.5	6.0	15.0	10.5	6.0	20.0
250	**90**	**120**	6.0	63000	395	350	22	12	21	303	16.5	10.5	6.0	16.5	10.5	6.0	35.0
300	**95**	**125**	6.3	79000	445	400	22	12	22	360	16.5	10.5	4.5	16.5	10.5	4.5	48.0
350	**100**	**125**	6.5	116500	505	460	22	16	22	402	18.0	10.5	4.5	18.0	10.5	4.5	57.0
400	**100**	**135**	6.8	145000	565	515	26	16	24	453	18.0	10.5	4.5	18.0	10.5	4.5	70.0
450	**100**	**135**	7.0	193200	615	565	26	20	27	533	18.0	10.5	4.5	18.0	10.5	4.5	78.0
500	**105**	**140**	7.3	222000	670	620	26	20	27	564	19.5	12.0	4.5	19.5	12.0	4.5	86.0
600	**105**	**140**	7.6	312000	780	725	30	20	30	658	19.5	12.0	3.0	19.5	12.0	3.0	125.0

*1 WF = effective area
*2 Other dimensions (e.g. according to DIN PN 6, 16, ANSI b16,5 150 lbs) are available upon request.
*3 The movement absorption values are maximum values and must not occur in combination.
Please refer to the movement diagram in the technical appendix.
*4 Angular movement absorption only possible without tie rods.

Dimensions for Type 80 HD **(basic and expansion values 4 to 10 corrugations [max. 10 corrugations])**

DN	Overall length	Bellow		Flange PN 10*2							Movement absorption per corrugation*3		
	4 corrugations	b	WF*1	ØD	ØPCD	Ød	n	s	ØC	BL per corrugation	axial ±	lateral ±	angular*4 ±°
	mm	mm	mm²	mm	mm	mm		mm	mm	mm	mm	mm	∠°
25	**67**	3.7	1000	115	85	14	4.0	12	62	12	3.0	2.0	4.5
32	**78**	3.8	1430	140	100	18	4.0	16	72	13	3.0	2.0	4.0
40	**85**	4.0	2500	150	110	18	4.0	16	80	15	3.5	2.5	4.0
50	**86**	4.2	3500	165	125	18	4.0	16	98	16	3.5	2.5	3.5
65	**100**	4.4	6000	185	145	18	8.0	16	118	20	4.0	3.0	3.5
80	**114**	4.7	9000	200	160	18	8.0	17	122	24	4.0	3.0	3.5
100	**120**	5.0	12000	220	180	18	8.0	18	148	25	4.5	3.0	3.0
125	**125**	5.2	19500	250	210	18	8.0	19	174	25	4.5	3.0	3.0
150	**130**	5.5	25500	285	240	22	8.0	20	200	25	5.0	3.0	2.5
200	**135**	5.7	42500	340	295	22	8.0	20	256	25	5.0	3.5	2.0
250	**146**	6.0	63000	395	350	22	12.0	21	303	26	5.5	3.5	2.0
300	**151**	6.3	79000	445	400	22	12.0	22	360	26	5.5	3.5	1.5
350	**151**	6.5	116500	505	460	22	16.0	22	402	26	6.0	3.5	1.5
400	**161**	6.8	145000	565	515	26	16.0	24	453	26	6.0	3.5	1.5
450	**161**	7.0	193200	615	565	26	20.0	27	533	26	6.0	3.5	1.5
500	**166**	7.3	222000	670	620	26	20.0	27	564	26	5.5	3.0	1.3
600	**166**	7.6	312000	780	725	30	20.0	30	658	26	5.5	3.0	1.0

*1 WF = effective area
*2 Other dimensions (e.g. according to DIN PN 6, 16, ANSI b16,5 150 lbs) are available upon request.
*3 The movement absorption values are maximum values and must not occur in combination.
Please refer to the movement diagram in the technical appendix.
*4 Angular movement absorption only possible without tie rods.

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

WILLBRANDT **Length Limiters / Tie Rods**

Rubber expansion joints should be considered as elastic elements in the pipelines Design A (without tie rods), the rubber expansion joint creates reaction forces in the direction of expansion when subject to pressure (effective area x operating pressure), and reaction forces in the direction of compression when subject to negative pressure. These forces must be absorbed by the closest fixed points, radial plain bearings or the valve flange.

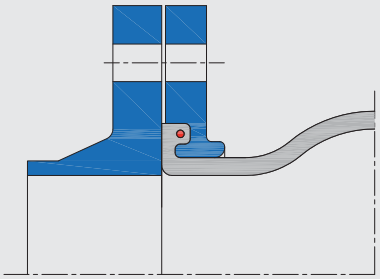
If this is not possible, there are a number of different length limiters that absorb the corresponding reaction forces but do not limit the expansion joint's freedom of movement (with the exception of axial movement absorption). In the case of a design with tie rods, only the stiffness rates from the rubber bellow and the frictional force from the bearings need to be taken into account for the fixed points.

Please refer the following rod examples:

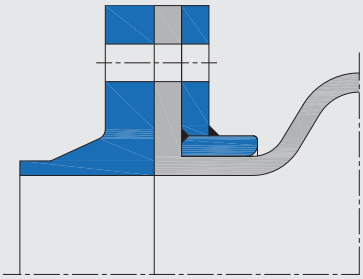
Design A

Rubber expansion joints without tie rods, with swivel flanges or solid rubber flanges, suitable for movement absorption in any direction.

Fixed point load: Reaction force plus stiffness rates
Production: 1. DN 20 - DN 1000
2. DN 50 - DN 5000



Swivel flange (1.)

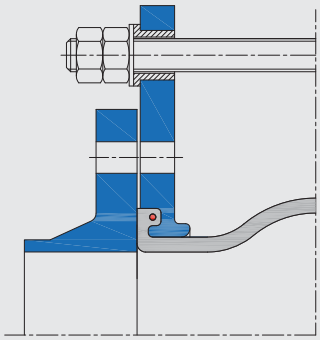


Solid rubber flange (2.)

Design B

Rubber expansion joint with length limiter to absorb reaction force. Tie rods in rubber bushings, suitable for sound and vibration absorption and for lateral movement absorption.

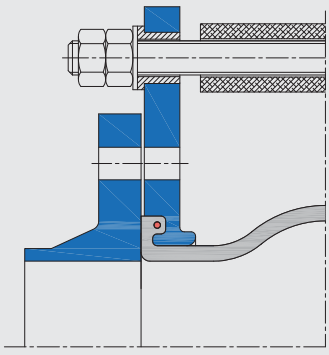
Fixed point load: Lateral stiffness rate plus bearing stiffness rate
Production: DN 20 - DN 200
Permissible pressure: DN 20 - DN 150: 16 bar
DN 200: 10 bar



Design C

Rubber expansion joint with length limiter for absorbing reaction force, tie rods in rubber bushings, includes thrust limiters for securing bellow. Suitable for sound and vibration absorption and for lateral movement absorption.

Fixed point load: Lateral stiffness rate plus bearing stiffness rate
Production: DN 20 - DN 200
Permissible pressure: DN 20 - DN 150: 16 bar
DN 200: 10 bar



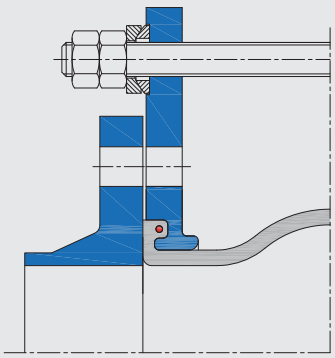
WILLBRANDT **Length Limiters / Tie Rods**

Design E

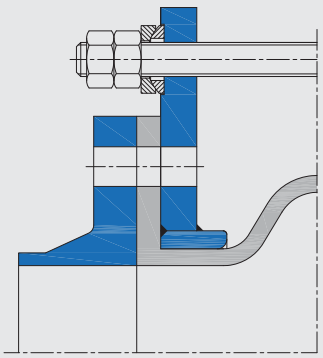
Rubber expansion joint with length limiter for absorbing reaction force, tie rods in PTFE-coated spherical washers and conical sockets, for reduction of frictional force, external. Suitable for lateral movement absorption.

Fixed point load: Lateral stiffness rate plus bearing stiffness rate

Production: 1. DN 200 - DN 1000
2. DN 50 - DN 5000



Swivel flange (1.)



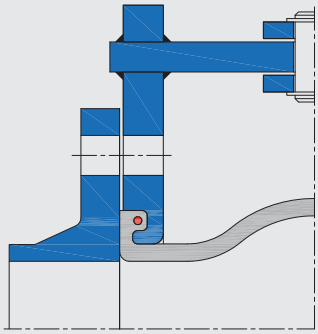
Solid rubber flange (2.)

Design F

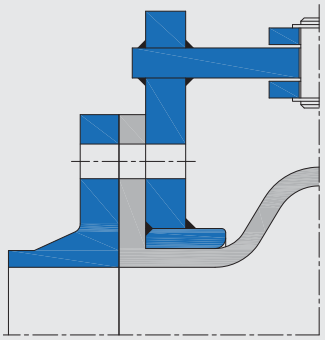
Rubber expansion joint with hinge for absorbing reaction force, suitable for angular movement absorption in a single plane. Two hinge expansion joints with an intermediate pipe can absorb a large amount of lateral movement. A combination of three (see fitting examples) can create soft corners in order to absorb movement in two planes.

Fixed point load: Angular stiffness torque and frictional torque from bearings

Production: 1. DN 32 - DN 1000
2. DN 200 - DN 5000



Swivel flange (1.)



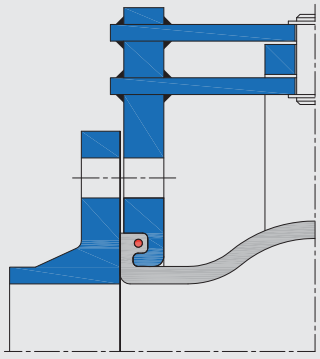
Solid rubber flange (2.)

Design G

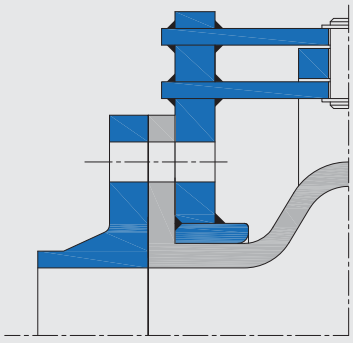
Rubber expansion joint with cardan shaft for absorbing reaction force, suitable for angular movement absorption in a circular plane. Two cardan shaft expansion joints with an intermediate pipe can absorb high lateral movement in two level. A combination of three (see fitting examples) can create soft corners in order to absorb movement in three planes.

Fixed point load: Angular stiffness torque and frictional torque from bearings

Production: 1. DN 32 - DN 1000
2. DN 200 - DN 5000



Swivel flange (1.)



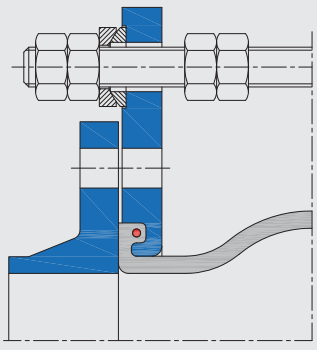
Solid rubber flange (2.)

Design H

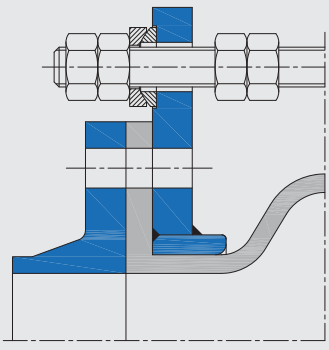
Rubber expansion joint with tie rods for absorbing reaction force, tie rods in PTFE-coated spherical washers and conical sockets, for reduction of frictional force. External, with additional adjustable inner end stop (lock nuts) as thrust limiter. Suitable for high lateral movement absorption.

Fixed point load: Lateral stiffness rates plus bearing stiffness rates

Production: 1. DN 200 - DN 1000
2. DN 50 - DN 5000



Swivel flange (1.)



Solid rubber flange (2.)

WILLBRANDT **Length Limiters / Tie Rods**

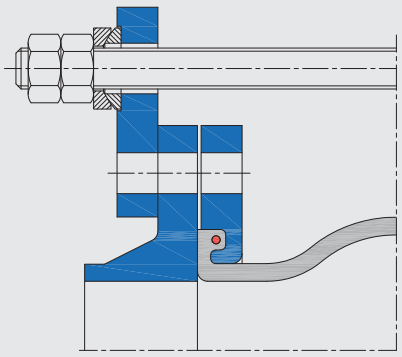
Design K

Segment bracing with tie rods from counter flanges to counter flange, as length limiter for absorbing reaction force of expansion joint, tie rods in PTFE-coated spherical washers and conical sockets, for reduction of frictional force, external. Suitable for lateral movement absorption.

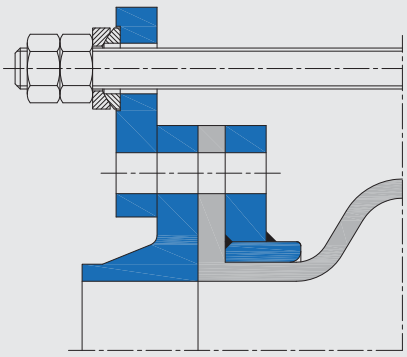
Fixed point load: Lateral stiffness rates plus bearing stiffness rates

Production: 1. DN 200 - DN 1000
2. DN 50 - DN 5000

Note: In the case of large expansion joints and high pressure, the undulating load on the rubber flange must be taken into account.



Swivel flange (1.)



Solid rubber flange (2.)

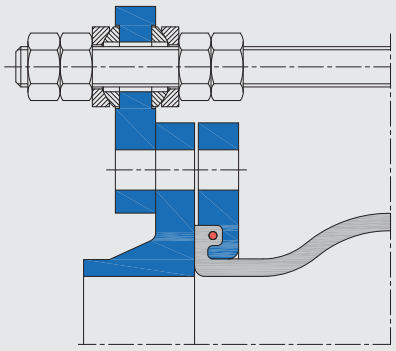
Design L

Segment bracing tie rods from counter flange to counter flange, PTFE-coated spherical washers and conical sockets, internal and external, for absorbing thrust and tensile force. Suitable for high lateral movement absorption in pressure and vacuum areas.

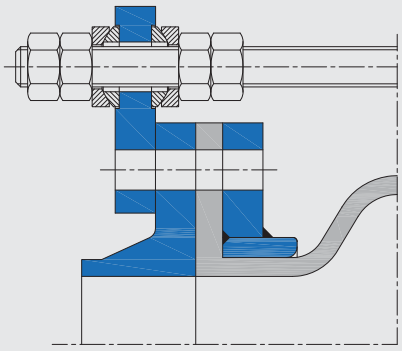
Fixed point load: Lateral stiffness rates plus bearing stiffness rates

Production: 1. DN 200 - DN 300
2. DN 50 - DN 5000

Note: In the case of large expansion joints and high pressure, the undulating load on the rubber flange must be taken into account.



Swivel flange (1.)



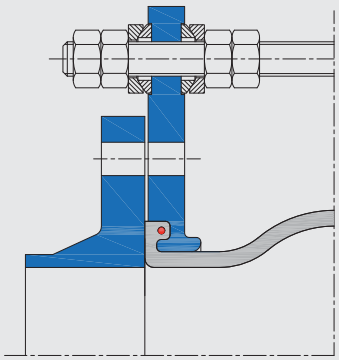
Solid rubber flange (2.)

Design M

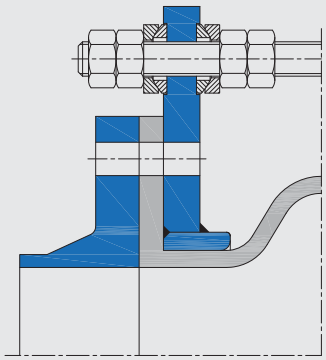
Rubber expansion joint, with tie rods, PTFE-coated spherical washers and conical sockets, internal and external, for absorbing thrust and tensile force. Suitable for high lateral movement absorption in pressure and vacuum areas.

Fixed point load: Lateral stiffness rate plus bearing stiffness rate

Production: 1. DN 200 - DN 1000
2. DN 50 - DN 5000



Swivel flange (1.)



Solid rubber flange (2.)

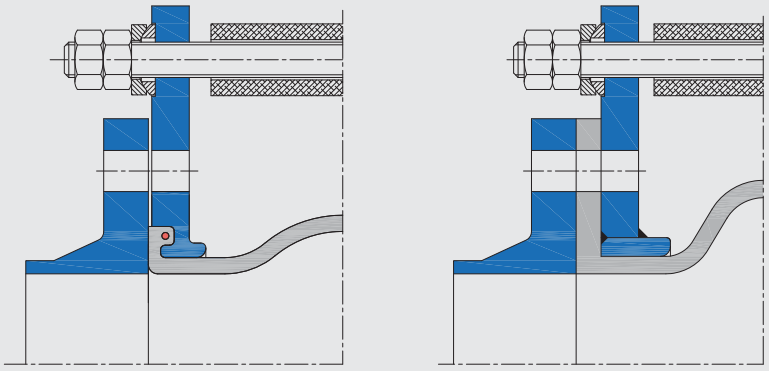
WILLBRANDT **Length Limiters / Tie Rods**

Design S

Rubber expansion joint with tie rods to absorb reaction force. Tie rods in PTFE-coated spherical washers and conical sockets, for reducing frictional force, external, includes thrust limiter for securing bellow. Suitable for high lateral movement absorption.

Fixed point load: For external end stops, lateral stiffness rates and bearing stiffness rates, full reaction force and axial stiffness rates in the case of compression.

Production: 1. DN 200 - DN 500
2. DN 50 - DN 500



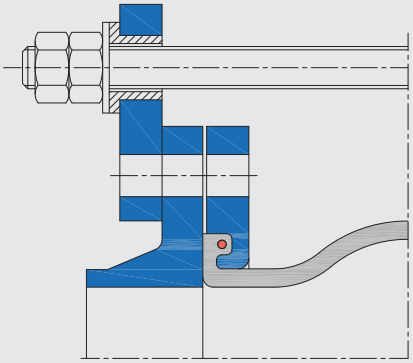
Swivel flange (1.)

Solid rubber flange (2.)

Design R

Segment bracing with tie rods from counter flanges to counter flange, as length limiter for absorbing reaction force. Tie rods in rubber bushings, suitable for sound and vibration absorption and for lateral movement absorption.

Production: DN 20 - DN 200
Max. operating pressure: 10 bar



WILLBRANDT **Supporting Rings**

As rubber expansion joints are highly elastic elements, the rubber expansion joint must be equipped for vacuum operation with a corresponding vacuum supporting ring. Different designs are available.

Vacuum supporting spiral

A loose internal vacuum spiral made from 1.4571 stainless steel. The spiral is used for high-corrugated expansion joints up to DN 500 (Type 49) and for low-corrugated expansion joints up to DN 300 (Type 50/51/55).

DN 32 - DN 300 (500)

Vacuum supporting rings with guided sleeves

Vacuum supporting ring with buffer plate made from 1.4571, 1.4539 stainless steel or special steel according to customers request. Can be used for DN 150 to DN 350.

DN 150 - DN 350

Vacuum supporting ring with lock

Vacuum supporting ring with lock made from 1.4571, 1.4539 stainless steel or special steel according to customer request. These supporting rings are used for DN 150/500 - DN 5000.

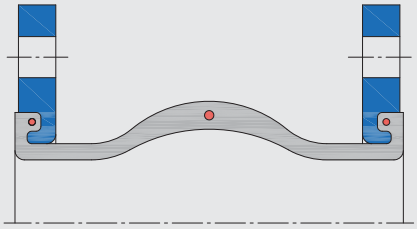
DN 150 - DN 450

from DN 5000

Vulcanised vacuum supporting ring

This version is used in applications in which heavily abrasive media may affact the supporting ring or in which media with fibrous materials are transported. It is also used at critical points, at which turbulences could cause fatigue failure or the supporting ring could be washed away.

Please bear in mind that vulcanised vacuum supporting rings significantly reduce the elasticity of the expansion joint and therefore limit the movement and pressure absorption. This version can only be used for hand-made expansion joints.

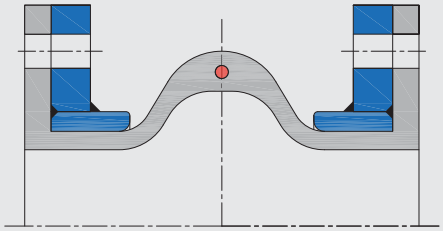


DN 200 - DN 1000

PTFE vacuum supporting ring

PTFE vacuum supporting ring for high chemical loads. However, please note that because the supporting ring is made from 100 % PTFE, the vacuum resistance falls as the temperature increases. In nominal diameters from DN 65 to DN 300, this version is used for low-corrugated expansion joints (our low-corrugated expansion joints up to DN 50 are vacuum-resistant without a supporting ring).

DN 50 - DN 300

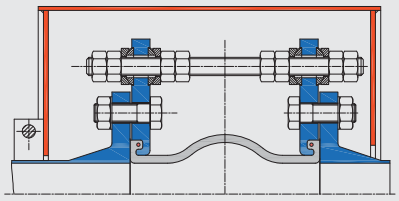


DN 100 - DN 5000

WILLBRANDT **Accessories**

Earth protection cover

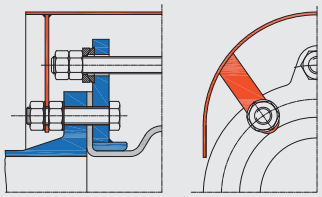
The earth protection cover is necessary if rubber expansion joints are built into the ground and the bellow requires protection from direct contact with earth and sand. The earth protection cover does not restrict the expansion joint's movement, which means that it can absorb subsidence and pipe shifts. The cover is manufactured in two parts, so that it can be mounted after the expansion joint has been completely installed. It is secured to the pipe on one side (preferably not the moving side).



Earth protection cover

Sun protection cover

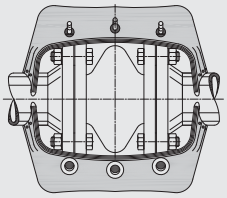
Used wherever heavy solar radiation is expected in order to avoid hardening (ageing). It is manufactured as a single part with ¾ circulation. It can be fastened directly using the flange connection bolts. It should however be noted that the bolts required for fastening the cover are longer than normal, as a second lock nut must also be accommodated. The covers are made from 1.4301 stainless steel; other materials are available upon request.



Sun protection cover

Flame protection cover

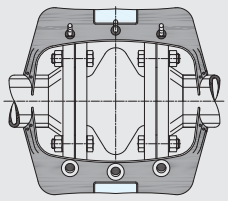
The flame protection cover is used to protect the unit wherever open flames are possible. The main field of application is ships' engine rooms. The cover is delivered as a single unit with a resealable opening. After the expansion joint has been completely installed, it is placed around the expansion joint and counter flange, and closed.



Flame protection cover

Acid protection cover

The acid protection cover is used for in applications where aggressive media are transported and personal protection is necessary. The cover is primarily made from PTFE and can be provided a window and an outlet valve. The cover is delivered as a single unit with a resealable opening. It will be mounted after the expansion joint has been completely installed. The cover is placed around the expansion joint and closed.



Acid protection cover

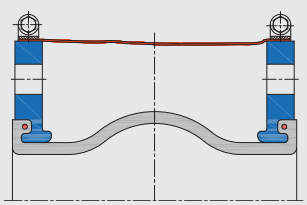
Spacer ring

A spacer ring made of metal is used, when the inner diameter of the sealing surface of the counter flange is greater than dhe diameter of the rubber bellow (please refer to the table for the rubber bellow sealing profile on page 118). This is applicable by using crimped flanges or slip-on flanges. An additional sealing between counter flange and spacer ring is necessary.

Spacer ring

Ember and dust protection

This is a simple protective band made from an aluminium coated glass fabric. It is designed to prevent damage to the expansion joint during operation under heavy load, e.g. falling hot ash or embers in steelworks. It is also designed to prevent heavy soiling between the bellow and flange, which can lead to significant abrasion during movement. The dust protection cover is delivered as a sleeve and attached to the flange using hose clamps. All covers are constructed so that the expansion joints' freedom of movement is not limited.



Ember and dust protection cover

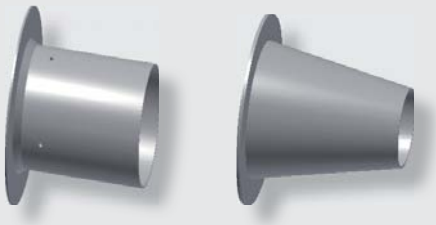
WILLBRANDT **Guide Sleeves**

Guide sleeve

Rubber expansion joints are elastic pipe elements with integral corrugation. This corrugation means that at high flow rates, turbulences may occur in the expansion joint. This may cause increased loss of pressure and damage the bellow. For media containing solids it is advisable to use a guide sleeve to protect the bellow. For normal liquids, a guide sleeve should be used at a flow rate of 4 m/s and for gases of 20 m/s. We generally recommend using a guide sleeve when transporting solid parts.

The guide sleeves are manufactured in various forms. If the expansion joint only absorbs axial movement, a fitted, angled pipe can be selected. If the expansion joint needs to absorb lateral movement, the guide sleeve must be offset at the opening; it is advisable to use a conical guided sleeve if there is high lateral movement.

For expansion joints with sealing bead and rotatable flanges, the guide sleeves are manufactured as a slide-in sleeves with a collar. For expansion joints with solid flanges, the guide sleeves are provided with a solid flange.



For rotatable flanges

For solid flanges

PTFE guide sleeve

This material is used if high chemical resistance to aggressive media is required.

Important note

The standard material for guide sleeves is 1.4541 or 1.4571 stainless steel. Guide sleeves can also be made from 1.4539 stainless steel for seawater or hardox for abrasive materials. Other materials are available upon request. Guided sleeves must be fitted with additional seals.

In order to prevent vacuums forming or dust settling between the guide sleeve and the bellow, guide sleeves are manufactured with corresponding relief holes.

- Cylindrical version for axial movement only
- Cylindrical version with conical neck (inlet) for axial and lateral movement
- Telescopic guided sleeve for axial and lateral movement and complete bellow protection
- Conical version for large inlet opening and for axial and lateral movement

We recommend guided sleeves for:

	Liquids	Gases
• Type 49	up from 4 m/s	up from 20 m/s
• Types 39, 50, 51, 53, 55	up from 5 m/s	up from 30 m/s
• Type 40	up from 5 m/s	up from 30 m/s

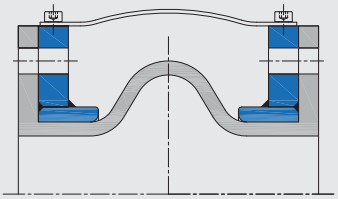
Please note that the standard guide sleeve is designed for axial movement. The max. lateral movement absorption is +/- 5 mm. If higher lateral movement is required, please note that the sleeve is reduced by double the value of the lateral movement in the external diameter of the pipe in order to prevent contact between the bellow and the guide sleeve at maximum load.

WILLBRANDT Potential equalisation

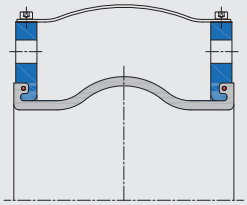
Rubber expansion joints have different electrically conductive resistances. It can be seen in the data sheets, there are expansion joints that are electrically conductive and some are electrically conductive dissipative, while CSM, FPM and PTFE expansion joints (white) are insulating.

In order to create conductivity for insulating or dissipating expansion joints, we recommend flange-to-flange potential equalisation. This guarantees that the corresponding levels can be tolerated in the piping system and that the system is earthed.

Type 40 A



Type 50 A

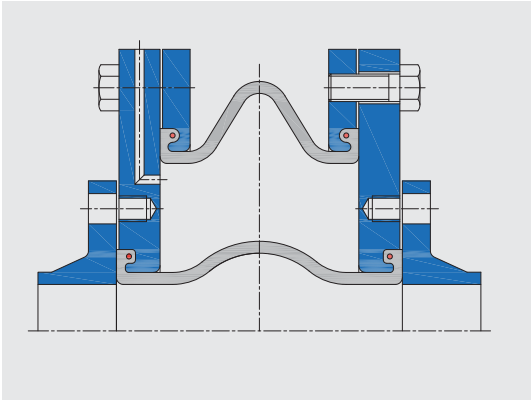


WILLBRANDT **Special Designs**

Safety expansion joint

Safety expansion joints are used wherever very aggressive media are transported and human lives or production plants are in danger if the expansion joint fails. A safety expansion joint comprises two pressure-resistant expansion joints selected according to the medium. The bellows are mounted so that there is a sealed intermediate space that can be monitored by manometer, pressure gauges or pressure sensor. This expansion joint can be produced with or without length limiters and for axial, lateral or angular movement absorption.

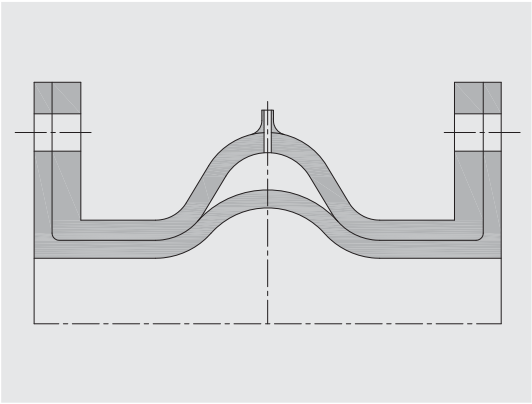
Both expansion joints are designed for full operating pressure. If the inner expansion joint is damaged, the outer expansion joint cover is still fully operational.



Safety bellow

Rubber expansion joints with a safety bellow are used wherever very aggressive media are transported and human lives or production plants are in danger if the expansion joint fails.

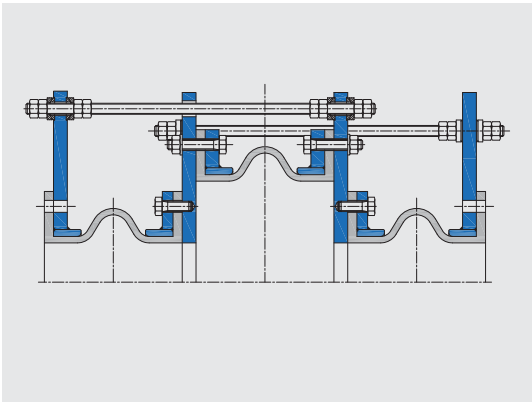
The safety bellow is a two-stage bellow with an intermediate layer and an outlet integrated into the external bellow. This outlet can be fitted with a probe, pressure gauge or drainage point so that the appropriate alarm can be sounded in the event of wear to the inner layer.



Axial balanced expansion joint

The axial balanced rubber expansion joint is used if axial movement occurs in the pipe system and cannot be absorbed by fixed points, e.g. turbine nozzle, pump housing and container nozzles.

The principle of this expansion joint is to neutralise any reaction expansion forces that occur as a result of the two small work expansion joints (DN pipes) using a expansion joint that is twice as large. This means it is only necessary to take account into the axial stiffness rate when the nozzles are loaded.

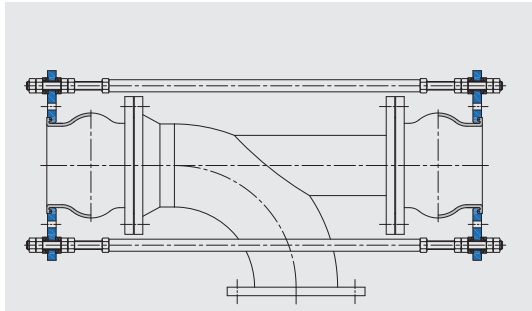


Pressure-balanced expansion joint

This expansion joint is used wherever there is axial movement but high loading is not permitted on the nozzles, e.g. nozzles for turbines or containers, which are very sensitive to axial shear forces.

The function of the pressure-balanced expansion joint is to deflect the medium at a 90° angle between the bellows, while a expansion joint with a blind flange absorbs the reaction force of the expansion joint that absorbs the movement.

The connecting rod between the two expansion joints should be regarded as a cardan cage that absorbs the reaction force. The stiffness rates from axial and lateral movement will continue to be transmitted to the fixed points or nozzles.



WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

WILLBRANDT rubber expansion joints are available in two ready-to-fit versions with standard connections (according to DIN, ASA, BS, etc.):

- **Rotatable steel flanges**
  These flanges should fit precisely and burrfree in the fitting area of the rubber bellow, whereby the sealing surface can protrude about 1 - 10 mm depending on the nominal diametre. The counter flange sealing surfaces can be smooth (Form A) or with sealing (Form B) according to EN 1092 - 1:2001.
- **Pressure-resistant solid rubber flanges**
  Flange bellows up to DN 2400 are delivered with one-piece steel swivel flanges (from DN 2500 divided). The counter flanges should have a smooth sealing surface according to EN 1092 - 1:2001 (Form A).

Both types of expansion joint are self-sealing; additional seals are unnecessary.

1. Planning instructions

Expansion joints must be arranged in pipes in such a way that regular maintenance and any necessary replacement can take place easily.

Ensure that the expansion joints do not rub against adjacent components also when expanded to the maximum permissible limits. The expansion joints must also not be exposed to high externally radiated or accumulated heat.

Universal expansion joints (without tie rods) for absorbing axial, lateral and angular movements

For a expansion joint to absorb the axial or lateral movements (expansion or compression) of a pipe, it must be fitted between two fixed points. Plain bearings (PB) must also be included for pipe routing/support.

The reaction forces, stiffness rates and friction forces must be taken into account in the dimensioning of the fixed points and plain bearings.

Reaction force (N) = effective area (mm²) x operating pressure (N/mm²)

F = A x P

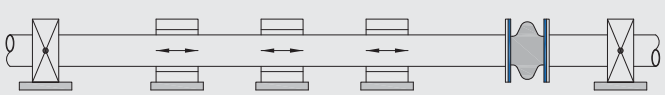
(Stiffness rates according to type data sheet)

Fitting example 1 (EB 1)

Compensation of axial expansion with expansion joints without tie rods

The reaction forces of the expansion joint are absorbed by the fixed bearings.

EB 1

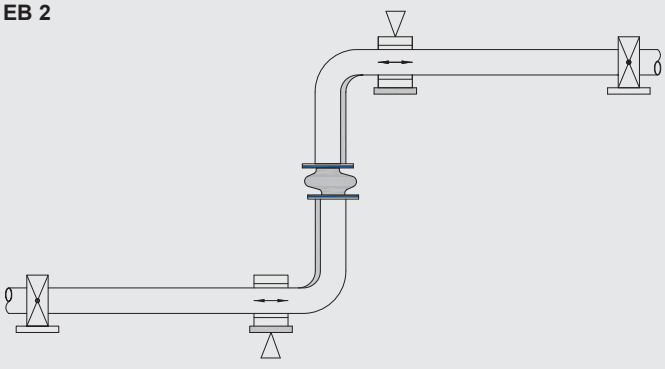


Fitting example 2 (EB 2)

Compensation of lateral and axial expansion with a expansion joint without tie rods

The reaction forces of the expansion joint are absorbed by the fixed bearings and plain bearings. The plain bearings must be appropriately supported! Stiffness rates must be absorbed by the fixed points.

EB 2

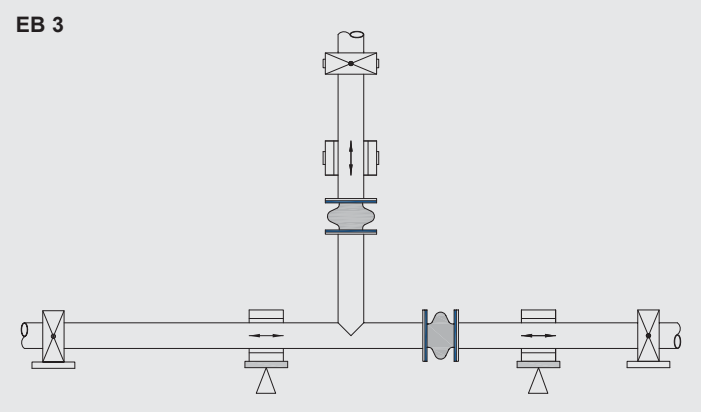


WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

Fitting example 3 (EB 3)

Compensation of lateral and axial expansion with expansion joints without tie rods arranged in a pipe outlet

The reaction forces of the expansion joint are absorbed by the fixed bearings and plain bearings. The plain bearings must be appropriately supported!



Lateral expansion joints (with tie rods) for absorbing lateral movements

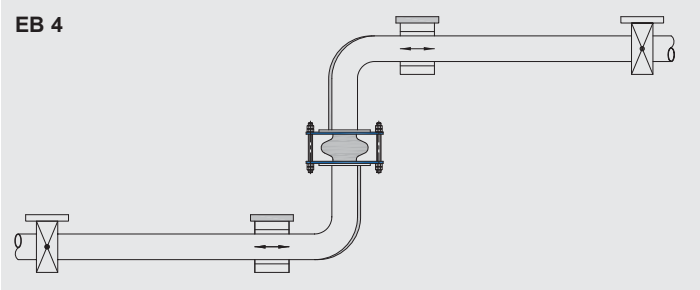
If a expansion joint for absorbing axial movements cannot be fitted between two fixed points, the axial movement must be converted into a lateral movement. This makes it possible to use an expansion joint with tie rods, which neutralises the occurring reaction forces (inside area of the expansion joint x operating pressure). With this arrangement, only appropriate plain bearings may be used for correct initiation of expansion.

A wide range of rubber expansion joints with tie rods can be found in our catalogue.

Fitting example 4 (EB 4)

Compensation of axial expansion by deflection into a lateral movement with expansion joints with tie rods

The stiffness rates of the expansion joint are absorbed by the fixed bearings. The plain bearings serve only for correct initiation of movement in the expansion joint! In contrast to **EB 2**, axial movement of the vertical pipe arm is disregarded.



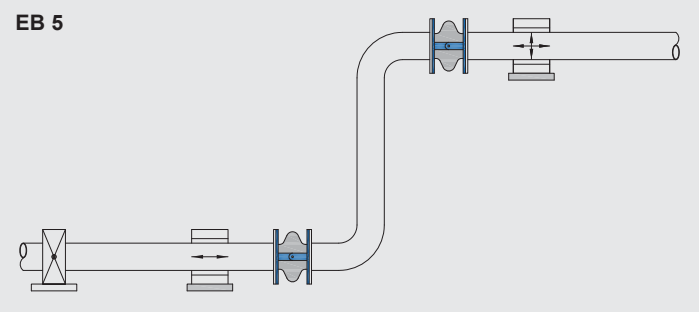
Angular expansion joints (with joint tie rods) for absorbing angular movements

In order to absorb significant axial movements with low stiffness rates, a combination of angular expansion joints with tie rods can be used.

Fitting example 5 (EB 5)

Compensation of axial expansion by deflection to angular movement using expansion joints with tie rods

Advantage: significant axial expansion can be absorbed by only two expansion joints. The reaction forces of a expansion joint are absorbed by the joint tie rods. The plain bearings serve only for correct initiation of movement in the expansion joint!



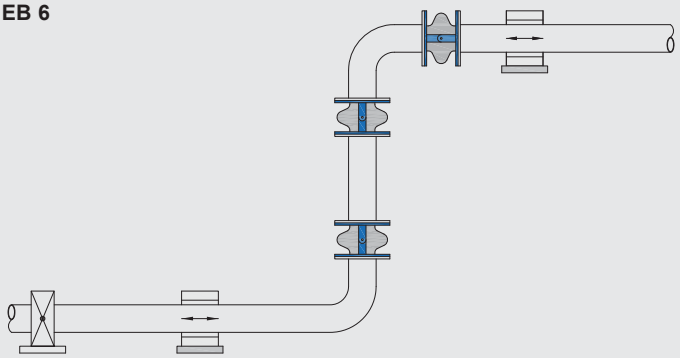
WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

Fitting example 6 (EB 6)

Arrangement of pipe joint expansion joints in three joint systems for compensating expansion in two directions

Advantage: high expansion compensation, low stiffness rates, soft corner. The reaction forces of the expansion joint are absorbed by the joint tie rods. The plain bearings serve only for correct initiation of movement in the expansion joint!

EB 6



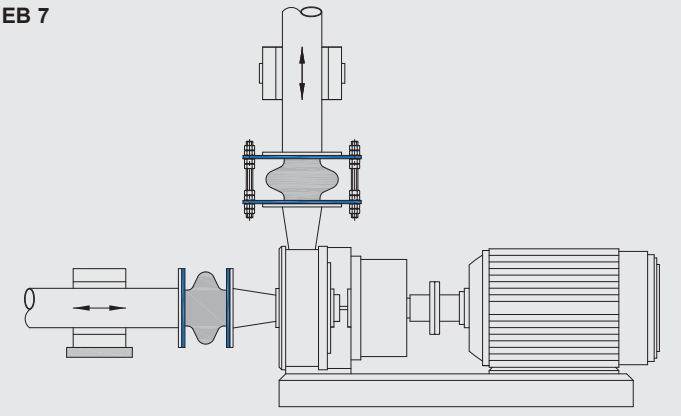
Fitting example 7 (EB 7)

Expansion joints for pump connection (with/without tie rods) for absorbing vibrations

The purpose of using rubber expansion joints on pumps is to prevent the transmission of forces, stresses and vibrations in order to decouple the piping system from the pump.

Expansion joints with tie rods should always be used for arrangement in pressure pipes to prevent the pump support from being overloaded due to the reaction forces. A vacuum supporting ring should be used on the suction side if possible (see type data sheet).

EB 7

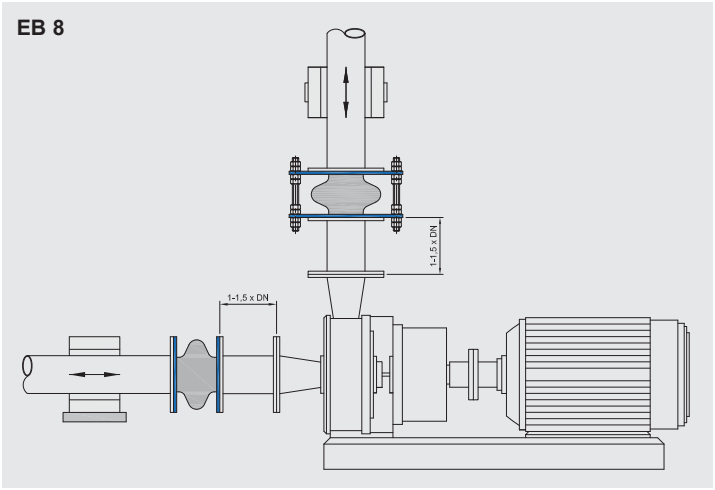


Fitting example 8 (EB 8)

For the transport of abrasive media (liquids containing solids such as water/sand), the expansion joints must not be arranged directly on the pump support (suction/pressure side) as there is a risk of the expansion joints being damaged due to relatively high velocities from turbulence and vortex formation on the pump support.
This applies similarly to elbows and outlets.

The fitting distance from the pump support to the expansion joint/elbow must be 1 to 1.5 times greater than the nominal diameter. Pump operation against a fully or partly closed gate or flap valve must be avoided. Cavitation must also be avoided as this can quickly damage the expansion joint.

EB 8



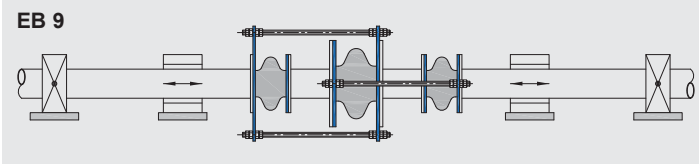
Fitting example 9 (EB 9)

Expansion joints with pressure relief for absorbing axial and lateral movement

Pressure-relieved expansion joints can be used to prevent the transmission of reaction forces resulting from excess or low pressure to adjacent fixed bearings, apparatus or machines.

Expansion joints for absorbing axial expansion without the transmission of reaction forces resulting from excess or low pressure to adjacent fixed bearings, apparatus or machines (observe stiffness rates).

EB 9

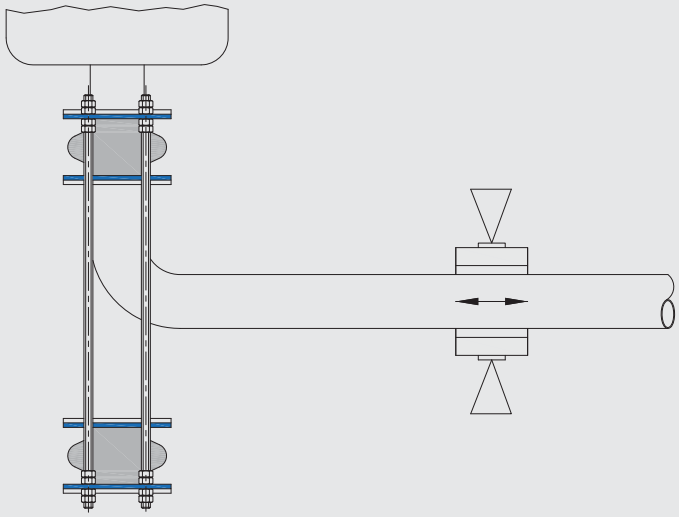


WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

Fitting example 10 (EB 10)

Expansion joints for absorbing axial and lateral expansion on an elbow without the transmission of reaction forces resulting from excess or low pressure to adjacent fixed bearings (stiffness rates).

EB 10



Expansion joints (with tie rods) for fitting/removal

To compensate for fitting inaccuracies or for easy fitting or removal, a expansion joint with tie rods can also be mounted directly on a valve.

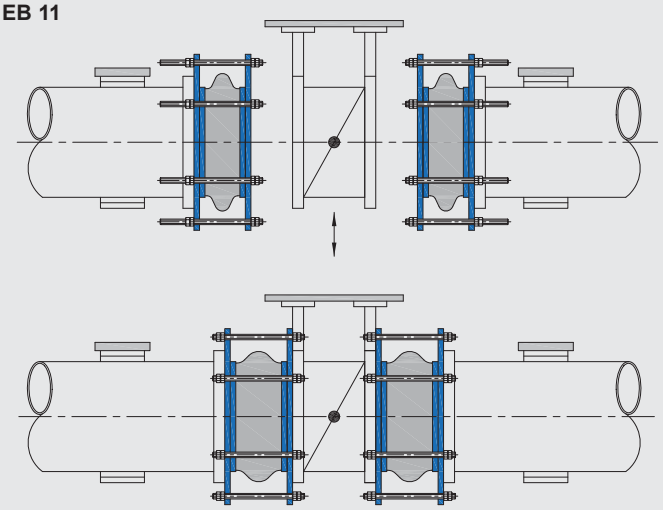
Fitting example 11 (EB 11)

Expansion joint with tie rods for fitting/removal

Tie rods prevent the transmission of reaction forces to a connected valve and by loosening the flange connection with the aid of the tie rod flange, the rubber bellow can be compressed to its maximum axial limits to enable removal of the valve.

Warning:
This is valid only for expansion joints with pressure-resistant solid rubber flanges. In case of expansion joints with rotatable flanges there is a danger that the bellow sealing bead could spring out of the flange groove. This could lead to lead to the sealing surfaces being crushed during re-fitting (see **EB 16 F**).

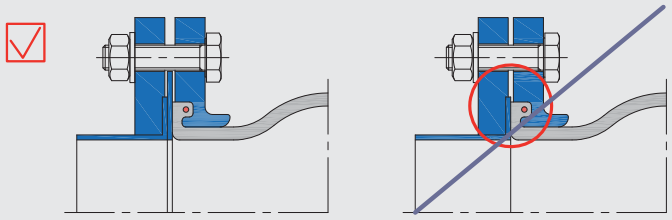
EB 11



Fitting example 12 (EB 12)

For rubberised pipes or valves, a blank gasket must be used to prevent a rubber-on-rubber seal.

EB 12



WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

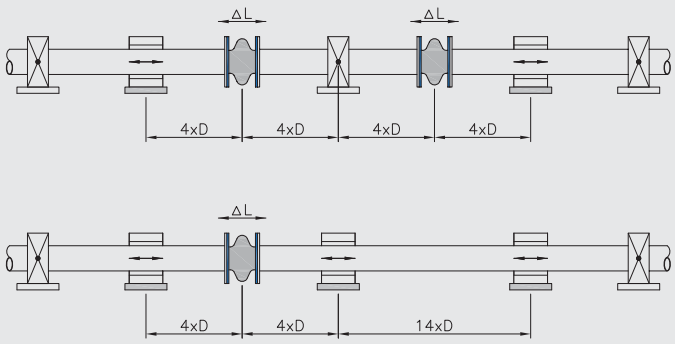
2. Pipe planning

Arrangement of guide bearings

The fixed points and guide bearings must be arranged so that:

- the expansion joint is not subject to loading from the weight of the pipe.
- bending caused by the arrangement of the fixed and floating bearings is avoided.
- suspension in self-aligning bearings is avoided. Plain or roller bearings should be used as a guide bearings.

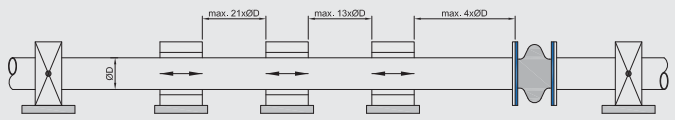
EB 13 A



Spacing of the guide bearings

- The distance between the expansion joint and the first bearing can be max. 4 x the pipe diameter.
- The distance between the first and the second bearing can be max. 14 x the pipe diameter.
- The distance between the remaining pipe bearings can be max. 21 x the pipe diameter. This distance must be reduced if necessary due to the inherent stability of the pipe.

EB 13 B



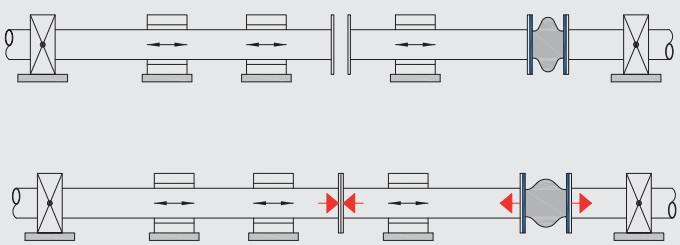
Initial tension of expansion joints

If a expansion joint is fitted with an initial tension greater than 10 mm axially or 5 mm laterally, the expansion joint must be fitted first and then the appropriate initial tension must be generated with the permanently fitted expansion joint at an open point in the pipe. **(Fitting example EB 14 + 15)**

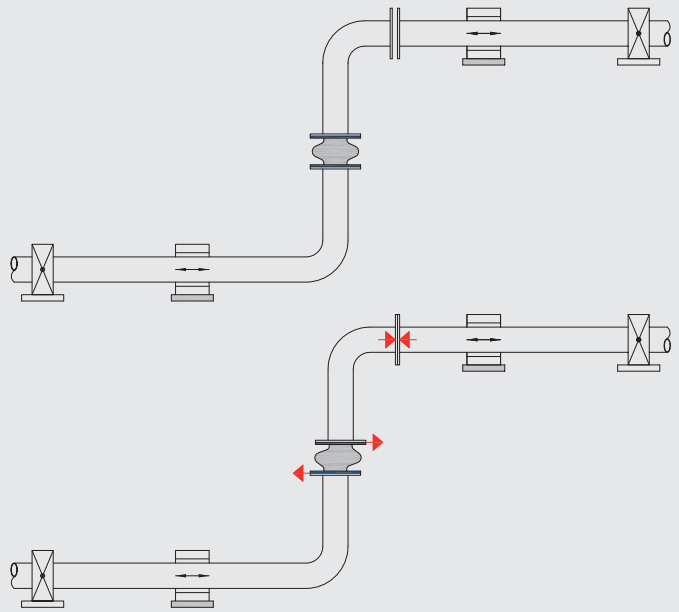
Reason: An as yet unfitted expansion joint with a higher initial tension will cause the sealing bead to spring out of the groove of the steel flange. This could damage the sealing bead or cause a leak.

For planning purposes, ensure that the pipe can be opened!

EB 14



EB 15



WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

3. Safety measures

Excess pressure, temperature rise, vacuum
Protect pipes against impermissible excess pressure, excessive temperature rise and uncontrolled vacuum. The limiting values are shown in the data sheets of our catalogue.

Water hammer and vacuum drop
Draining and venting options are provided to prevent water hammer and vacuum drop.

Resistance
The inner material of the bellow that comes into contact with the medium must be suitable for the medium transported in the pipe (see our resistance list). If the list does not contain a specific medium, we should be provided with appropriate data from the safety data sheet for chemical substances and preparations according to DIN 52900, Clauses 1 to 2.13 in order to allow us to determine whether the inner liner of the expansion joint is suitable.

Flow rate
For high flow rates, it must be clarified whether the expansion joints must be used with or without a guided sleeve in order to prevent wear due to excessive vortex formation.

Vacuum supporting spiral/ring
If the expected vacuum is higher than 0.8 bar absolute, a vacuum support spiral or vacuum supporting ring must be provided. These prevent the bellow from collapsing. For use directly downstream of a pump, flap valve or elbow, a check must be made to ensure correct positioning after fitting – see Fitting instructions + **Fitting example 17 (EB 17 G)**!

External influences
Extreme external influences make it necessary to protect the expansion joints via special measures:

- **Ground protection cover:** protects against damage to bellows, fouling and earth pressure on buried pipes.
- **UV protection cover:** protects against UV radiation and influences of weather in regions exposed to extreme sunlight.
- **Flame-retardant protective cover:** protects against fire up to 800 °C for 30 minutes.

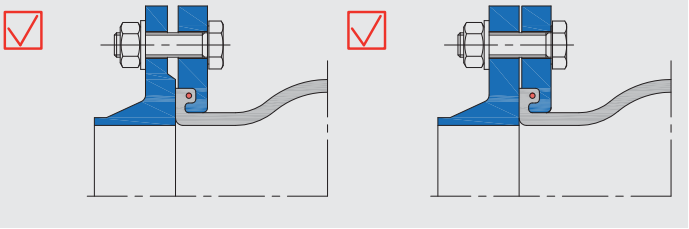
Dangerous media
The expansion joints must be provided with suitable splash protection for pipes used for transporting dangerous or environmentally harmful media.

Counter flanges / Flange connection
Counter flanges and flange connections must be as described in **Fitting example 16 (EB 16)** (below) to ensure a reliable sealing and to prevent damage to the rubber expansion joints.

Fitting example 16 (A - E)

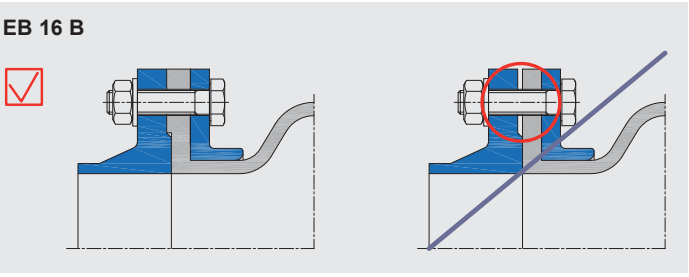
Counter flanges with and without projection according to EN 1092-1:2001 Form A or B must be used for expansion joints with rotatable flanges (EB 16 A). Only smooth counter flanges should be used for expansion joints with solid flanges. Other types are available on request.

EB 16 A



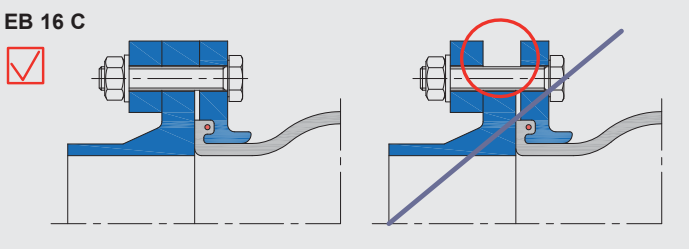
If a smooth flange cannot be used for expansion joints with solid rubber flanges, the recess of the counter flange must be compensated with a sealing with an appropriately thick ring or taken into account in rubber flange fabrication.

EB 16 B



When using loose flanges with thick bead, the gap above the bolts between both flanges must be filled with an appropriate ring. This stops the loose flange from tilting and thus prevents incorrect contact with the sealing surface!

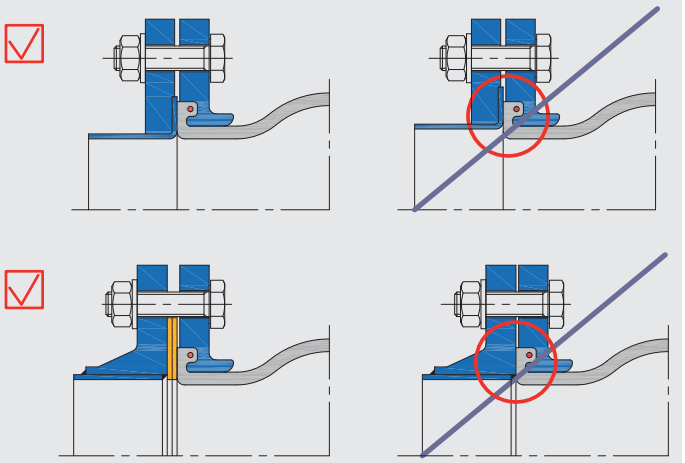
EB 16 C



WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

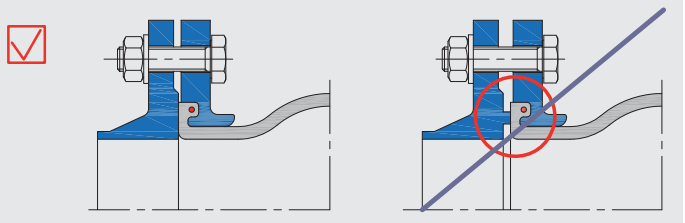
When using flare flanges and slip-on flanges, ensure that the internal diameter of the sealing surface of the counter flange corresponds to the internal diameter of the bellow. If this is not the case and the internal diameter of the counter flange is larger, a blank metal gasket and an additional sealing must be used!

EB 16 D



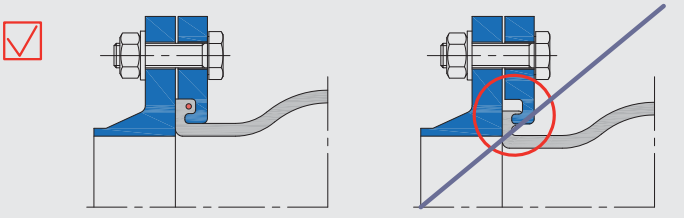
Counter flanges with a groove or tongue must not be used.

EB 16 E



Ensure during fitting that the rubber bead is located correctly in the groove of the expansion joint flange, otherwise the sealing surface may be damaged and leaks can occur!

EB 16 F



4. Packaging

- Check the packaging for external damage.
- Check the contents against the delivery note or packing list.
- If possible, do not unpack the expansion joints before fitting.
- Only open the packaging with a blunt object.
- Ensure that nails or staples in wooden crates do not come into contact with the rubber bellow.

5. Storage

See DIN 7716 - Guidelines for the storage of rubber parts:

- Rubber expansion joints must be stored without being subject to stress, deformation or kinking.
- Rubber expansion joints with steel flanges must be stored upright on the flanges (otherwise there is a risk of crushing).
- Store in a cool, dry, dust-free and moderately ventilated room.
- Protect rubber parts against draughts and cover if necessary. Ozone-generating equipment such as electric motors, fluorescent light sources, etc., must not be used at the place of storage.
- Do not store any solvents, fuels, chemicals or similar together with the expansion joints.

6. Transport

- Leave the parts packed.
- Note “TOP” at the top and “cable or lifting hook”.
- Steel backing rings (with bracing) and rubber expansion joint flanges must remain fastened until final fitting to avoid excessive loads on the rubber part!
- Do not use any sharp-edged tools, wire ropes, chains or lifting hooks (risk of damage to rubber).
- Always lift both steel flanges simultaneously. Shackle at both sides or place padded tie-bars through the expansion joint.
- For ground level transportation without means of transport, roll the expansion joint on the flanges.

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

7. Fitting

Rubber expansion joints are intended for absorbing movements under certain pressure and temperature conditions to be determined in advance. To ensure that the maximum service life is reached, the following must be observed for fitting:

Prior to fitting

- Check the packaging of the rubber expansion joints and after unpacking check the expansion joint itself for damage. Damaged expansion joints must not be fitted.
- Check the pipe run to ensure that it is straight in the area in which the expansion joint is to be fitted and that the pipe is limited by appropriate fixed points. Only one expansion joint or several expansion joints coupled to form a unit may be fitted between two fixed points.
- Check the size of the fitting gap. The counter flanges should be fitted in alignment with each other. The maximum deviation between the fitting gap and expansion joint can be +/- 10 mm axially and +/- 5 mm laterally.
- **Note:** If the aforementioned tolerances cannot be maintained, the procedure is as described in the section “Initial tension of expansion joints” **Fitting example 14 - 15 (EB 14 - 15)**.
- The pipe flanges must not be twisted towards each other when fitting a expansion joint with solid rubber flanges, as the expansion joint will be subject to torsion – this must be avoided as torsion can damage the expansion joint.
- The pipe flanges must be clean, grease-free, smooth, flat and burr-free.
- Ensure that the flange connections are as described in the section “Counter flanges/flange connections” **(EB 16 A - F)** under “Safety”.
- If a expansion joint is to be provided with a guided sleeve, it must be inserted into the expansion joint prior to fitting into the pipe (do not forget the sealing between guided sleeve and counter flange).
- If the use of a vacuum supporting spiral or vacuum supporting ring is necessary due to low pressure, these must be fitted in advance. In the case of vacuum supporting rings, the section “Vacuum support ring” (below) must be observed **(EB 17 G)**!

IMPORTANT

Welding in the vicinity of expansion joints must be avoided. If this cannot be avoided, the expansion joint must be covered with a fireproof and heat-resistant material to protect it against welding heat and flying sparks.

When welding the complete piping system, steel-wire expansion joints can be damaged by stray currents or electrical earth conduction. The anode and cathode of the electric welding connection must always be located on the same line section (and not be separated by the rubber compen-sator!). The rubber bellow must not be painted after fitting in the pipe.

It is also important to note that the expansion joint must not be insulated at temperatures above 50°C, as this will cause the rubber bellow to heat up and harden as a result of the accumulated heat.

Fitting a expansion joint with flange connection

- Centring mandrels, a rubber hammer and a torque wrench are required for fitting. Do not use any sharp-edged tools!
- Carefully insert the expansion joint into the fitting gap. Take care not to damage the sealing surfaces.
- No additional seals are required. The rubber sealing bead or rubber flange seals directly against the pipe flange.

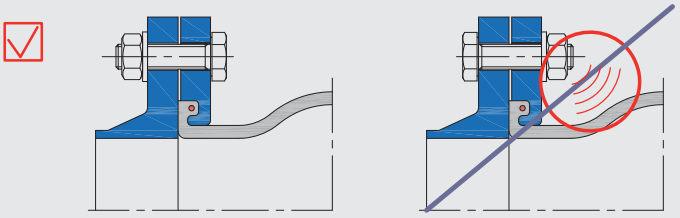
  Warning: Exceptions for rubberised pipe flanges, valves or blank gaskets - see corresponding section above!
- Fix the expansion joint at both flanges using at least two bolts or threaded rods. If necessary, the lifting device can be detached/ removed.
- When fitting expansion joints with tie rods, ensure that the tie rods are loosened so that the expansion joint is able to adjust to the fitting gap when tightened. Readjustment of the tie rods takes place after fitting the expansion joint - see page 17 "Supplementary installation instructions for expansion joints with length limiters".
- The remaining fixing bolts can now be inserted and tightened hand-tight.
- For the bolted flange connection, bolts with the strength class 8.8 should be used.
- Do not use a U-washer on the expansion joint flange.

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

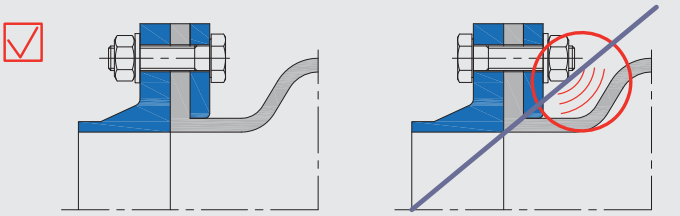
The following must be noted when inserting the bolts:

- Refer to tightening torque (Tables 1, 2 and 3, pages 114 - 115)
- For expansion joints with through holes, all bolts must be inserted with the bolt head towards the bellow to prevent damage to the bellow under pressure.

EB 17 A

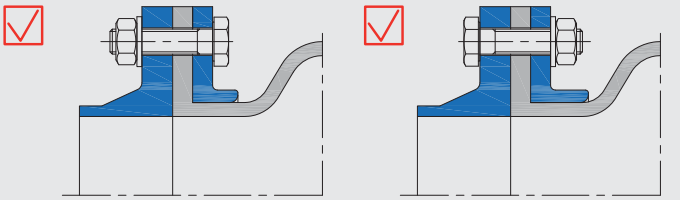


EB 17 B



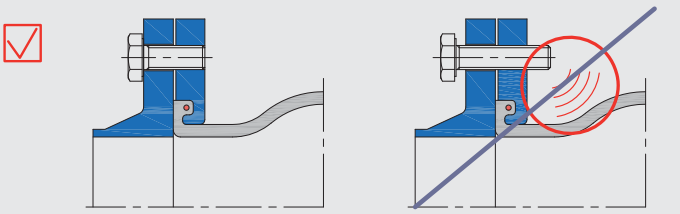
Exception: If the expansion joint has a long collar (supporting shoulder), the bolt can also be inserted the other way round - however the bolt must not be longer than the collar!

EB 17 C

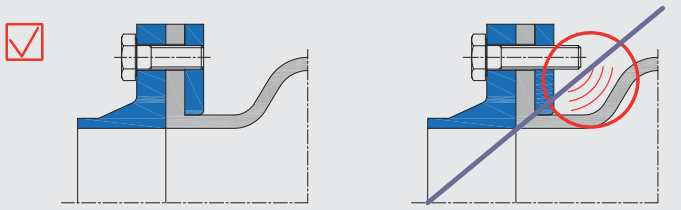


- **For expansion joints with tapped holes in the flange**, the bolts should be flush towards the bellow side with the flange, as protruding bolts are liable to damage the bellow under pressure.

EB 17 D



EB 17 E



- The bolted flange connections must be tightened as follows:

  Step 1:
  - Tighten all bolts by hand
  - Apply torque evenly according to Step 1 crosswise
  - Check gap width on outer edge of flange
  - Settling time ≥ 30 minutes

  Step 2:
  - Tighten all bolts crosswise according to Step 2
  - Check gap width

  Step 3:
  - Apply final torque according to Step 3 in two passes crosswise.
- The bolts do not require further tightening as this would ultimately damage the sealing surface.
- Throughout the entire fitting process, ensure that the sealing bead does not tilt. The protruding sealing surface should be compressed evenly on all sides.
- When fitting silicone rubber expansion joints, the specified tightening torques must be reduced by 30%.
- If a leak should occur during the subsequent pressure test, the bolts must be tightened with the torque according to Step 3. If the bolted flange connection is still leaky, the tightening torque must be increased slightly. Before retightening the bolts, the pressure in the expansion joint must be reduced.
- Throughout the entire fitting process, ensure that the expansion joint is not over-expanded or crushed.

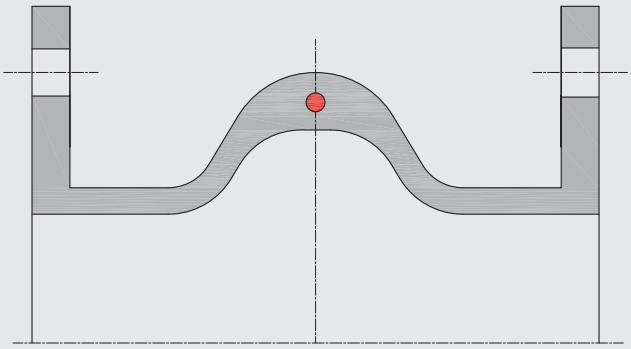
WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

Vacuum supporting ring

When fitting vacuum supporting rings arranged directly downstream of a pump, flap valve or elbow the vacuum supporting rings must be checked for correct positioning after fitting as follows (**EB 17 G)**:

- Firm seating (max. 10 - 15 mm clearance between bellow and ring on one side)
- If necessary, adapter plates should be used to obtain the permissible seat clearance (**EB 17 G)**.
- The connection lock should always be in the lower flow area (6°°).
- At high flow rates, a check should be made to determine whether a expansion joint with vulcanised supporting ring should be used in order to avoid fatigue failures due to strong turbulence **(EB 17 F)**.
- After fitting, check that the hexagon bolts and nuts are securely locked to prevent loosening.

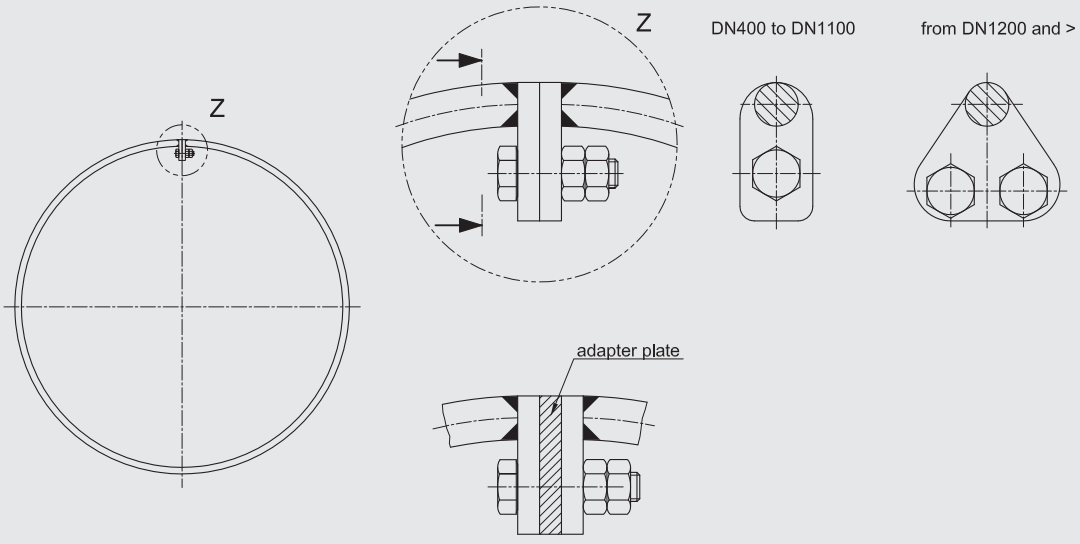
EB 17 F



8. Final fitting check

- Check the expansion joints on all sides for any visible damage and in particular clean the gap between the steel swivel flange and rubber bellow (remove foreign bodies, sand, etc.).
- After being fitted, the expansion joints should be provided with suitable protection against damage; this protection must only be removed directly prior to commissioning.
- The rubber parts must not be painted. Solvents and chemicals affect the surface and damage the bellow.
- The rubber expansion joints must not be insulated as this can cause the bellow to overheat and dry out and will ultimately lead to damage to the bellow.
- The best results are obtained when the expansion joint is able to function stress-free under operating conditions (initial tension must be taken into account when fitting).
- For expansion joints with tie rods, check the tie rods.
  It should be possible to tighten them hand-tight. The lock nuts must be tightened.
- If the installation situation allows, check that any supporting spirals/ rings are correctly seated and locked.

EB 17 G



WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

9. Measures prior to pressure test and commissioning

- Remove the protective covers and clean the expansion joint.
- Check the expansion joint for damage.
- Check that all supports, fixed and plain bearings are fitted and functional.
- Check the tie rods for even loading and if necessary adjust them to the prevailing conditions.

10. Pressure test

The rubber expansion joint is not a proper pressure vessel, but it is classified according to the Pressure Equipment Directive as a “pipe accessory” (pipe component). When fitting the expansion joint in piping, the sealing does not take place via a separate seal, but directly on the sealing surface of the integrated rubber bellow.

A one hundred per cent pressure test of the rubber expansion joint at the manufacturer can adversely influence the integrated rubber sealing surface. Pressure testing of the rubber expansion joints at the manufacturer therefore takes place only at the special request of the customer and with the utmost care.

The pressure test normally takes place only after the rubber expansion joints have been fully installed in the piping system. All of the instructions contained in these fitting instructions should be observed prior to the pressure test.

If leaks should occur in the area of the flange connection during the pressure test, the bolted flange connection must be retightened according to with the tightening table (Step 3).

11. Supplementary assembly and fittings instructions for Type 46

Type 46 rubber expansion joints should be fitted stress-free. The bolted connections should always be made using two wrenches to avoid torsion on the expansion joint **(EB 18)**.

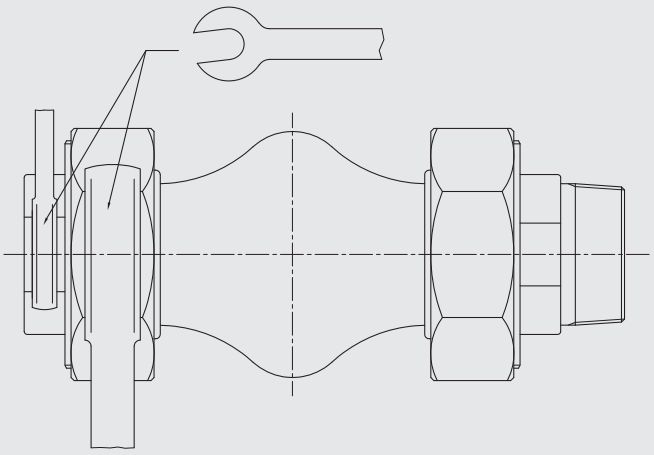
- Mount the bolting parts on the pipe and check the fitting gap! The fitting gap should be the same length as the expansion joint bellow (e.g. 130 mm +/- 5 mm).
- Insert the expansion joint and tighten using two wrenches as follows:

  DN 20/25
  The front threaded part must be used as a counter support and the sleeve nut must be tightened (to avoid torsion on the bellow).

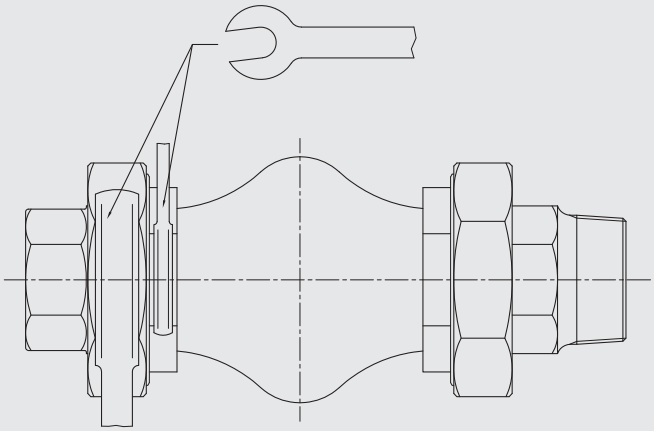
  DN 32 - 50
  The rear threaded part must be used as a counter support and the sleeve nut tightened (to avoid torsion on the bellow)

EB 18

DN 20/25



DN 32 - DN 50



All other fitting positions are as described in our main fitting instructions.

The tightening torque for all types is 100 Nm.

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

12. Supplementary assembly and fittings instructions for Type 49

There are various **bolt packs (SU)** for connecting Type 49 expansion joints to the pipe so that the bolt length is flush with the expansion joint bellow when using DIN flanges.

When fitting, ensure that the surfaces that contact the rubber bellow are free of burrs. Use the U-washers to correct the length (place under the bolt head).

Corresponding bolt pack (DIN)

	PN 6	PN 10	PN 16
DN 32	SU 1	SU 2	SU 2
DN 40	SU 1	SU 2	SU 2
DN 50	SU 1	SU 3	SU 3
DN 65	SU 1	SU 5	SU 5
DN 80	SU 4	SU 7	SU 7
DN 100	SU 4	SU 7	SU 7
DN 125	SU 5	SU 6	SU 6
DN 150	SU 6	SU 10	SU 10
DN 175	SU 6	SU 10	SU 10
DN 200	SU 8	SU 10	SU 11
DN 250	SU 9	SU 13	SU 17
DN 300	SU 11	SU 14	SU 18
DN 350	SU 12	SU 15	SU 19
DN 400	SU 15	SU 19	SU 21
DN 500	SU 16	SU 20	SU 22

Contents

Bolt pack	kg	Qty	Bolts ISO 4017	Qty	U-washers Ø
SU 1	0,35	8	M 12X30	8	13
SU 2	0,62	8	M 16X30	8	17
SU 3	0,67	8	M 16X35	8	17
SU 4	0,68	8	M 16X35	16	17
SU 5	1,4	16	M 16X35	16	17
SU 6	1,5	16	M 16X40	16	17
SU 7	1,55	16	M 16X40	32	17
SU 8	2,6	16	M 16X45	16	17
SU 9	2,4	24	M 16X45	48	17
SU 10	2,7	16	M 20X45	16	21
SU 11	4,1	24	M 20X45	24	21
SU 12	4,2	24	M 20X45	48	21
SU 13	4,3	24	M 20X50	48	21
SU 14	4,2	24	M 20X50	24	21
SU 15	5,8	32	M 20X50	64	21
SU 16	7,3	40	M 20X50	80	21
SU 17	6,7	24	M 24X50	48	25
SU 18	6,6	24	M 24X50	24	25
SU 19	9,3	32	M 24X55	64	25
SU 20	11,7	40	M 24X55	80	25
SU 21	13,5	32	M 27X60	64	28
SU 22	22,0	40	M 30X60	80	31

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

13. Supplementary assembly and fittings instructions for Type 60 - WRG

- The Type 60 WRG rubber-metal pipe connector must be fitted stress-free.
- The fitting gap must be 70 mm.
- The pipe connector must not be subject to tension, torsion or bending.
- No additional seals are required.
- Only hexagon head bolts according to DIN 933 with a washer should be used (note bolt length - see table below).
- The bolt tightening torque is 30 Nm.

All other fitting positions are as described in our main fitting instructions.

Bolt size for	**Flange PN 6**	**Flange PN 10**
DN 20	4 x M10 x 25	4 x M12 x 30
DN 25	4 x M10 x 25	4 x M12 x 30
DN 32	4 x M12 x 30	4 x M16 x 30
DN 40	4 x M12 x 30	4 x M16 x 30
DN 50	4 x M12 x 30	4 x M16 x 30
DN 65	4 x M12 x 30	4 x M16 x 30
DN 80	4 x M16 x 35	8 x M16 x 35
DN 100	4 x M16 x 35	8 x M16 x 35
DN 125	8 x M16 x 35	8 x M16 x 40
DN 150	8 x M16 x 35	8 x M20 x 40
DN 200	-	8 x M20 x 45

14. Supplementary assembly and fittings instructions for Type 61

- Type 61 is fitted as part of the pipe installation. Installation in the fitting gap is difficult in the case of very large nominal diameters.
- The pipe ends must be long enough to reach the beginning of the shaft on both sides.
- Only use wide GBS-clamps for fixing the expansion joint (min. 20 x 1 mm).
- At an operating pressure of up to 2 bar, one clamp is adequate per side. Above 2 bar, two clamps should be used.

All other fitting positions are as described in our main fitting instructions.

15. Supplementary assembly and fittings instructions for Type 64

The expansion joint must not be fitted before comnpletion of all work on the pipes and flanges and mounting of all anchors and supports. This is intended to prevent the expansion joint from being damaged by welding sparks, sharp-edged objects, etc.

As Type 64 expansion joints are made from extremely flexible material, their durability is dependent on careful and correct fitting.

- Avoid sharp edges and folds.
- Ducting flanges, swivel flanges or other steel parts included in the scope of delivery should be checked and correspond to the drawings. The bolt holes in each flange must be symmetrical.
- It is advisable to use a support plate or an inner frame when lifting the expansion joint. Preferably, the expansion joint should be pre-assembled with loose flanges and an internal sleeve (if included in the scope of delivery) on the ground before lifting.

All other fitting positions are as described in our main fitting instructions.

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

Tightening torque for Type 64

Material	Swivel flanges / bolts			
	40x10/M10	50x10/M12	60x10/M12	60x12/M16
EPDM	60 Nm	80 Nm	80 Nm	80 Nm
FPM	80 Nm	80 Nm	80 Nm	

Warning: Refer to the tightening scheme!

16. Supplementary assembly and fittings instructions for Type 80

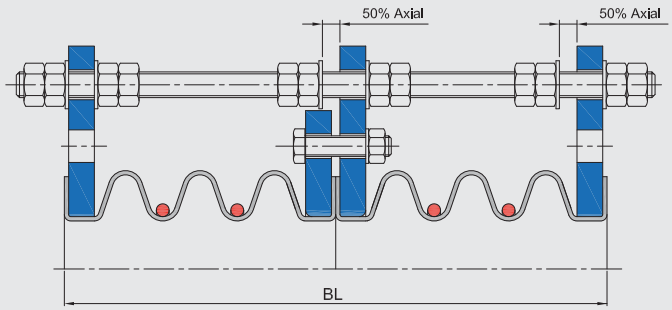
- The expansion joints are delivered with protective covers. These covers may only be removed directly prior to fitting. If these covers need to be removed in advance for the purpose of inspection, they must be screwed back into place.
- Welding, soldering and brazing on the PTFE bellow is not permitted as the bellow could be damaged and highly toxic gases could develop.
- It is not necessary to use seals between PTFE/PTFE sealing surfaces. It is advisable to use a 5-mm-thick PTFE sealing for connections to glass, enamel and other components.
- The flange connection bolts must be tightened according to the torque table below.
- The limiting bolts (tie rods) must be adjusted to the maximum permissible expansion after fitting the expansion joint. The limiting bolts must not be removed.
- In the course of commissioning, the flange connections should be retightened with the specified torque after reaching operating temperature.
- If leaks occur, the flange connections must be inspected to ensure that the flanges are parallel and for fouling or damage to the sealing surfaces.

  Minor indentations or damage can be removed with emery cloth.

When coupling Type 80 expansion joints, ensure that a corresponding blank gasket is used between the bellows that are being coupled in order to avoid a double PTFE effect.

When adjusting the continuous tie rods, ensure that the central flange is appropriately fixed with lock nuts on the right and left of the flange pair in order to avoid lateral buckling. The play between nuts and flange should be a maximum of 2 mm (in order to leave clearance for lateral movement). In the case of the outer flanges, the hexagon bolts should be arranged on the inside and outside so as to accommodate the desired axial expansion. During this process, ensure that the axial expansion is equally distributed between the two expansion joints. Please refer to EB 19.

EB 19



17. Supplementary installation instructions for expansion joints with length limiters

In order to correctly install rubber expansion joints with length limiters, please note the following points:

- Check gap measurements for permissible installation tolerances and adjust, if necessary.
- Loosen tie rod bolts so that stress-free installation is possible.
- Insert the expansion joint and screw into place according to the tightening torque plan. Note the tightening torque for the appropriate type.
- Fix tie rods to stop (without play) so that they can still be turned by hand. Then tighten the tie rods to the stipulated tightening torque using the relevant flange-side hexagon bolts.

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

18. Maintenance and monitoring

- The flange connection tightening torque must be checked once prior to final commissioning.
- First inspection 1 week after commissioning.
  Further inspections after 1, 4 and 12 months; then annually.

  The following must be checked:

  - External damage to rubber bellow, flange and tie rods
  - Deformations of the rubber flange between the bolts (displacement of flange surfaces)
  - Changes to the rubber bellow (bubbles, brittleness, cracks, hairline cracks
  - Impermissible displacement and misalignment of the tie rods
  - Corrosion and wear on the entire component
- The expansion joints can be cleaned with a weak soap solution and clear water. Do not use sharp-edged objects, wire brushes or emery cloth.

19. Maintenance and inspection instructions

After installing the rubber expansion joints according to our installation instructions, the following points should be included in the annual inspection:

- Check the installation position of the rubber expansion joint, i.e. the permissible combined axial and lateral expansion should not be exceeded.

  Reason: Pipe movement due to loose fixed points or plain bearings.
- Check for external damage to rubber and tie rods.
- Assess corrosion and wear on the entire component.
- Check rubber bellow for blistering.

  Reason: Minor damage to the inner bellow can lead to media reaching the cover via the reinforcement, which causes minor blistering.
- Check the bellow behind the swivel flanges for circumferential cracks.

  Reason: Overexpansion can lead to cracks on the outer cover at the end of the continuous reinforcement. If these cracks are deeper than 2 mm, we recommend replacing the bellow.
- Check the surface of the bellow for hairline cracks.

  Reason: External influences and incorrect media cause the cover to harden.

  Assessment: If these surface cracks are only superficial, they must be recorded (surface photo).

  The cracks should be re-assessed during the next annual inspection. If there are only minor changes, maintenance can take place at the time of the next inspection. If the cracks are deeper than 1.5 mm, the cover must be replaced.
- Check the bellow for hardening. This can be achieved using an impression test, e.g. by pressing the edge of a coin into the rubber. If the rubber is elastic, the notch will disappear; if it is hard, the notch will remain.

  A conclusive assessment using a Shore hardness test must be made to determine whether a expansion joint must be quickly replaced. The hardness should not exceed 80 to 84 Shore.

Normally, rubber expansion joints are maintenance-free - in cooling water systems and water operation a service life of 15 to 20 years can be expected. In oil and fuel plants, expansion joints should be replaced after 5 years and in chemical plants they should be replaced after 10 years.

If in doubt, we recommend that you send us photos of the relevant expansion joints for better assessment. Our expert staff will make an assessment.

20. Electrical conductivity

In case of rubber expansion joints, ensure that the expansion joints are either insulated, conduct electricity or have surface conductivity.

The values mentioned in our catalogue for the different qualities of rubber expansion joint relate to the inner, i.e. the rubber surface in contact with media. The following should be observed:

- **Range I**
  Electrical conductor electrical resistance < 10^6 Ohm cm
- **Range II**
  Antistatic - electrical resistance value: 10^6 to 10^9 Ohm cm
- **Range III**
  Electrical insulator - electrical resistance: Ohm cm > 10^9

Generally speaking, the harder the mix, the greater the conductivity. The reason for this is that the increased amount of soot in the mix reduces the resistance.

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

21. Flow rates

In case of rubber expansion joints and PTFE expansion joints, ensure that the maximum permissible flow velocities without guided sleeves are not exceeded. Permissible flow rate of many media not containing solids:

- for rubber expansion joints: 4.5 m/s
- for rubber expansion joints with PTFE coating: 3 m/s

If the rates are higher rates, we recommend using a guided sleeve.
In case of media containing solids, we generally recommend a guided sleeve due to wear.

When using guided sleeves, it should be noted that standard guided sleeves are designed for ± 5 mm laterally. If higher lateral measurements are required, the size of the guided sleeves should be reduced according to double the value of the lateral guidance.

22. Application of tightening torque

Fitting instructions

Tools — Centring mandrels, rubber hammer and torque wrench. All tools must be burr-free (danger of damage to rubber parts).

Use Strength Class 8.8 flange bolts
(Non-post-treated, lubricated bolts)

Step I
a) Insert all bolts and tighten evenly by hand.
b) Apply torque evenly according to Step 1 in three passes crosswise.

Check gap width on outer edge of flange.

c) Settling time ≥ 30 minutes

Step II
d) Tighten all bolts in three passes or to 2/3 of the final torque crosswise. Check gap width.
e) Settling time ≥ 60 minutes

Step III
f) Apply final torque in two passes crosswise.
NO FURTHER TIGHTENING!

Before testing pressure: Check torque in one pass crosswise using the final value (Step 3).

Subsequent inspections: Refer to maintenance instructions.
Only tighten flange bolts until final value (Step 3).

Flange tightening torque
The tightening torques for flange bolts provided in the table offer a specific surface pressure based on the entire sealing surface for solid flanges or the sealing bead in the case of rotating flanges.

In case of solid flanges, temporary settling process in the rubber flange area mean that under operating conditions the surface pressure falls to around 50% of the final value (Step III). The residual effective gripping and sealing force is completely sufficient and suitable for test pressures up to 1.5 times the operating pressure.

Tensile stresses from over-expansion of the expansion joint are not permissible.

Warning: The maximum tightening torques given must not be substantially exceeded, since excessive loading causes a constant increase in the flow in the elastomer and leads to destruction (crushing).

Tightening torque: Rough estimation of the final tightening torque for special flanges:

Rule of thumb: **MA = 0.2 x FVM x d2 (Nm)**

MA = Bolt tightening torque
d2 = Thread flank diameter

FVM = Initial tension at fitting = KA* x FKL
KA = Tightening factor ~ 1.4 lubricated,
against a firm support

K = Experimental value = 1.0 selected
flow process in rubber flange

FKL = Clamping force, contact pressure
7 N/mm² for total flange surface
for Type 40

$$FKL = \left(\frac{\text{Flange } D^2 - DN^2}{4} \right) \times \pi \; \frac{\text{Contact pressure}}{\text{Number of bolts}} \; (N)$$

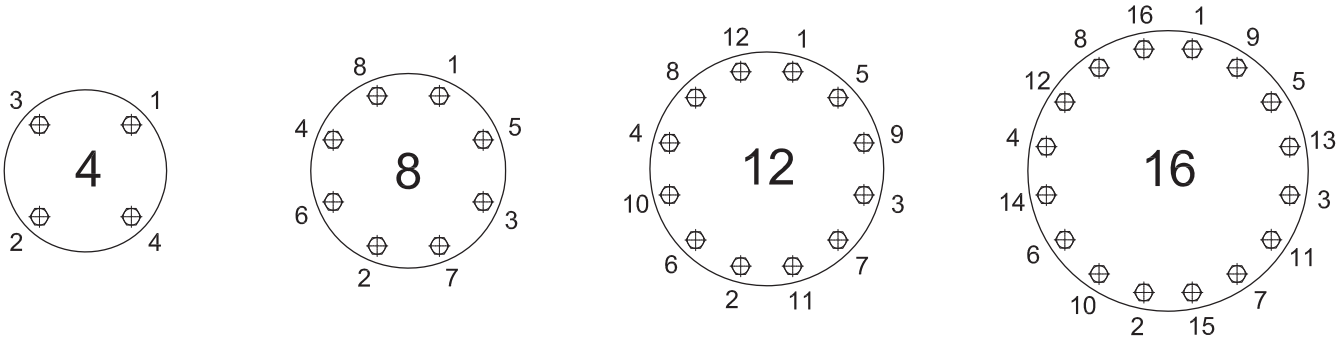
WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

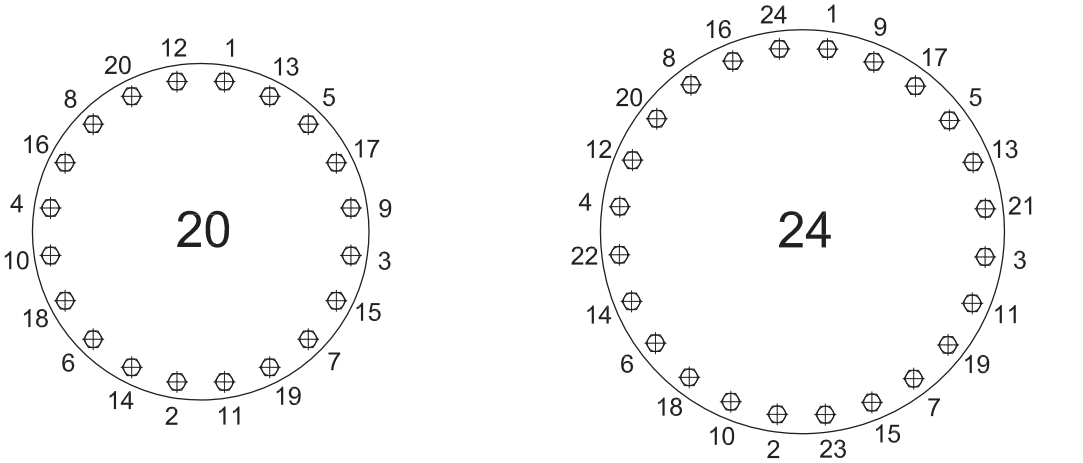
Note
The bolt tightening torques are valid only for steel flange connections and expansion joints with rubber-flange or profile seals. Separate tightening torques should be observed for GRP flange connections.

Important instructions for removing rubber expansion joints
When removing rubber expansion joints for revisions or conversion, ensure that the bolts are loosened crosswise, as during fitting.

Reason
When rubber-flange or profile seals are bolted, a high level of spring force is stored in the rubber elements. When they are loosened, the rubber element acts like a spring. As soon as the bolts are loosened, the rubber-flange/profile sealing attempts to creep into the free space, which can cause damage to the sealing and render the expansion joint unusable.

Tightening torque plan





WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

Table 1 Flange bolt tightening torques for Types 40, 42, 58 and 59

DN	Step 1				Step 2				Step 3			
	PN 6 Nm	PN 10 Nm	PN 16 Nm	ASA 150 Nm	PN 6 Nm	PN 10 Nm	PN 16 Nm	ASA 150 Nm	PN 6 Nm	PN 10 Nm	PN 16 Nm	ASA 150 Nm
200	34	54	37	57	67	107	74	114	100	160	110	170
250	30	44	57	50	61	87	114	101	90	130	170	150
300	47	50	70	74	94	101	141	147	140	150	210	220
350	57	47	64	97	114	94	127	194	170	140	190	290
400	47	67	87	87	94	134	174	174	140	200	260	260
450	54	60	84	100	107	121	167	201	160	180	250	300
500	47	67	117	94	94	134	234	187	140	200	350	280
550				114				227				340
600	70	97	174	134	141	194	347	267	210	290	520	400
650				124				247				370
700	67	104	134	117	134	207	267	234	200	310	400	350
750				134				267				400
800	97	144	180	200	194	287	361	401	290	430	540	600
850				190				381				570
900	110	137	170	204	221	274	341	407	330	410	510	610
950				240				481				720
1000	104	180	240	220	207	361	481	441	310	540	720	660
1050				244				487				730
1100	137	187	320	230	274	374	641	461	410	560	960	690
1150				244				487				730
1200	144	230	324	234	287	461	647	467	430	690	970	700
1250				284				567				850
1300	190	284	307	297	381	567	614	594	570	850	920	890
1350				324				647				970
1400	190	280	330	317	381	561	661	634	570	840	990	950
1450				350				701				1050
1500	204	384	450	320	407	767	901	641	610	1150	1350	960
1600	194	400	467		387	801	934		580	1200	1400	
1650				400				801				1200
1700	234	384	450		467	767	901		700	1150	1350	
1800	230	400	467	384	461	801	934	767	690	1200	1400	1150
1900	277	384	584		554	767	1167		830	1150	1750	
1950				467				934				1400
2000	280	417	567		561	834	1134		840	1250	1700	
2100	307	517	0	534	614	1034		1067	920	1550		1600
2200	297	517	600		594	1034	1201		890	1550	1800	
2250				517				1034				1550
2400	314	550	634	667	627	1101	1267	1334	940	1650	1900	2000
2500	384	567	600		767	1134	1201		1150	1700	1800	
2550				800				1601				2400
2600	400	550	634		801	1101	1267		1200	1650	1900	
2700				884				1767				2650
2800	417	600			834	1201			1250	1800		
2850				1034				2067				3100
3000	567	934		1367	1134	1867		2734	1700	2800		4100

Important note

The tightening torques for flange bolts provided in the table offer a specific surface pressure based on the entire sealing surface for solid rubber flanges or the sealing bead in the case of rotatable flanges. In the case of solid rubber flanges, temporary settling process in the rubber flange area mean that under operating conditions the surface pressure falls to around 50% of the final value (Step III).

The residual effective gripping and sealing force is completely sufficient and suitable for test pressures up to 1.5 times the operating pressure.

Warning: The stipulated max. tightening torque may not be substantially exceeded, as increased pressure loading on the flow in the elastomer progresses constantly and leads to destruction (crushing).

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

Table 2: Bolt tightening torques for Types 48, 49, 50, 51, 53, 55, 56 and 65

DN	Step 1 for all Nm	Step 2 for all Nm	Step 3				
			PN 6 Nm	PN 10 Nm	PN 16 Nm	PN 25 Nm	ASA 150 Nm
25	by hand	50	60	80	80	80	80
32	by hand	50	60	80	80	80	80
40	by hand	50	60	80	80	80	80
50	by hand	50	60	80	80	80	80
65	by hand	50	60	80	80	80	80
80	by hand	50	60	80	80	80	80
100	by hand	50	80	100	100	100	100
125	by hand	50	80	100	100	100	100
150	by hand	50	80	100	100	100	100
175	by hand	50	90	100	100	100	100
200	by hand	50	90	100	100	100	100
250	by hand	50	90	100	100	110	100
300	by hand	50	100	110	110	110	100
350	by hand	50	120	130	135	165	110
400	by hand	50	120	140	155	200	140
450	by hand	50	140	145	165	200	145
500	by hand	50	120	145	170	200	145
600	by hand	100	185	210	255	280	210
700	by hand	100	200	225	300	300	230
800	by hand	100	235	300	360	410	300
900	by hand	100	235	300	360	415	300
1000	by hand	100	300	360	425	525	360

Warning: Refer to the tightening scheme!

Table 3: Bolt tightening torques for Type 80

DN	PN 10				PN 25			
	Bolts		Torque Nm		Bolts		Torque Nm	
	Quantity	Thread			Quantity	Thread		
20	4	M12	10		4	M12	10	
25	4	M12	20		4	M12	20	
32	4	M16	30		4	M16	30	
40	4	M16	40		4	M16	40	
50	4	M16	50		4	M16	50	
65	8	M16	70		8	M16	40	
80	8	M16	40		8	M16	40	
100	8	M16	40		8	M20	50	
125	8	M16	50		8	M24	80	
150	8	M20	60		8	M24	90	
200	8	M20	90		12	M24	100	
250	12	M20	60		12	M27	120	
300	12	M20	70		-	-	-	
350	16	M20	110		-	-	-	
400	16	M24	160		-	-	-	
500	20	M24	180		-	-	-	
600	20	M27	240		-	-	-	
700	24	M27	260		-	-	-	

Warning: Refer to the tightening scheme!

WILLBRANDT **Planning, fitting and maintenance instructions for rubber expansion joints with rotatable flanges or solid flanges**

Threaded bolts and hexagonal nuts for fastening counter flanges to welding neck flanges according to DIN 1092-1 Type 11 for Types 50, 51, 55 and 39 (with perforations)

DN	PN 6			PN 10			PN 16		
	Quantity	Size	Length mm	Quantity	Size	Length mm	Quantity	Size	Length mm
20	8	M10	45	8	M12	55	8	M12	55
25	8	M12	50	8	M12	55	8	M12	55
32	8	M12	50	8	M16	55	8	M16	60
40	8	M12	50	8	M16	55	8	M16	60
50	8	M12	50	8	M16	60	8	M16	60
65	8	M12	50	16	M16	60	16	M16	60
80	8	M16	60	16	M16	65	16	M16	65
100	8	M16	60	16	M16	65	16	M16	65
125	16	M16	60	16	M16	65	16	M16	70
150	16	M16	65	16	M20	75	16	M20	75
200	16	M16	70	16	M20	80	24	M20	75
250	24	M20	75	24	M20	80	24	M24	85
300	24	M20	75	24	M20	80	24	M24	90
350	24	M20	75	32	M20	80	32	M24	90
400	32	M32	80	32	M24	90	32	M27	100
450	32	M32	85	40	M24	100	40	M27	110
500	40	M40	90	40	M24	100	40	M30	110
600	40	M40	90	40	M27	100	40	M33	120
700	48	M10	100	48	M27	110	48	M33	120
800	48	M27	110	48	M30	120	48	M36	130
900	48	M27	110	56	M30	120	56	M36	130
1000	56	M27	110	56	M33	120	56	M39	140

1 set = ISO 4017 hexagonal bolts + ISO 4032 hexagonal nuts + ISO 7089 U-washers

Warning: Refer to the tightening scheme!

WILLBRANDT **Pressure Units**

Absolute and relative atmospheric pressure

In everyday use, pressure is often measured with reference to atmospheric pressure, i.e. when someone says their car tyres have a pressure of 2.3 bar, they are actually 3.3 bar, but 2.3 bar above atmospheric pressure (approx. 1 bar). So 2.3 bar relative atmosphere is the same as 3.3 bar absolute atmosphere.

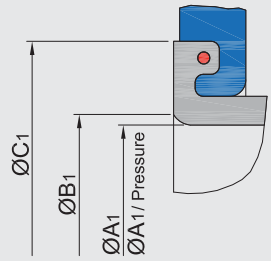
The unit "bara" or "bar(a) is used for absolute pressure.

Relative pressures is given in the unit "barg" (bar gauge [manometer]) or "barü" (bar over atmospheric pressure).

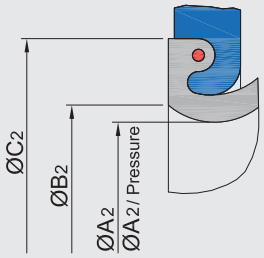
Unit symbol	Unit name	Pa = N/m²	bar	m WS	Torr = mm Hg	lbf/in²	in Hg
1 Pa = 1 N/m²	Pascal	1	0.00001	0.0001	0.0075	0.00014	0.000295
1 bar	bar	100000	1	10.1972	750.062	14.5037	29.53
1 kp/m² = 1 mm WC	millimetre water column	9.80665	-	0.001	0.07356	0.00142	0.0029
1 m WC	metre water column	9806.65	0.09807	1	73.5559	1.42233	2.8959
1 kp/cm² = 1 at	technical atmosphere	98066.5	0.98067	10	735.559	14.2233	28.959
1 atm	physical atmosphere	101325	1.01325	10.3323	760	14.696	29.9213
1 Torr = 1 mm Hg	millimetre of mercury	133.322	0.00133	0.013595	1	0.01934	0.03937
1 lbf/in²	pound-force per square inch	6894.76	0.06895	0.70307	51.7149	1	2.03602
1 lbf/ft²	pound-force per square foot	47.8803	0.00048	0.00488	0.35913	0.00694	0.01414
1 in Hg	inch of mercury	3386.39	0.03386	0.34532	25.4	0.49115	1

WILLBRANDT **Rubber Bellow Sealing Profile for Expansion Joints with Swivelling Flanges**

When selecting a counter flange it is important to ensure that the internal diameter only exceeds measurement B (rubber bellow) by 2 mm. If the internal diameter is larger, it is necessary to use a blank gasket (see fitting example **EB 16 D**).



Type 50
Type 55 (E)



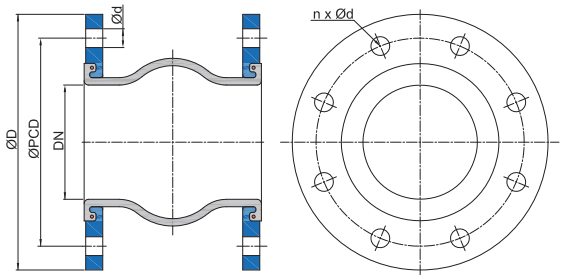
Type 49
Type 51
Type 55 (S)

DN	for Types 50 and 55 (E)				for Types 49, 51 and 55 (S)				
	C1 mm	**B1** mm	**A1** mm	**A1/pressure** mm	**C2** (Type 51/55) mm	**C2** (Type 49) mm	**B2** mm	**A2** mm	**A2/pressure** mm
20	66	37	28.5	30	-	-	-	-	-
25	66	37	28.5	30	-	-	-	-	-
32	66	37	28.5	30	79	79	42	35	37
40	74	42	36.0	39	79	79	42	35	37
50	86	55	45.0	48	88	89	57	45	47
65	106	71	60.5	64	104	104	69	59	61
80	118	81	74.0	77	119	119	86	75	77
100	138	106	94.0	98	142	142	110	98	100
125	166	132	121.0	125	169	169	137	125	127
150	192	160	147.0	151	195	195	164	149	151
175	252	213	202.0	206	-	-	200	197	200
200	252	213	202.0	206	244	245	200	197	200
250	304	257	250.0	254	295	295	256	252	255
300	354	309	300.0	304	351	345	304	299	302
350	412	350	330.0	340	400	396	358	354	357
400	470	414	404.0	408	450	450	405	402	405
450	520	445	445.0	450	512	-	-	-	-
500	570	514	504.0	508	563	550	508	504	507
600	675	611	603.0	607	675	-	-	-	-
700	780	708	680.0	695	-	-	-	-	-
750	820	758	751.0	755	-	-	-	-	-
800	887	813	801.0	805	-	-	-	-	-
900	987	907	897.0	900	-	-	-	-	-
1000	1087	1007	997.0	1000	-	-	-	-	-

WILLBRANDT **Tolerances According to the FSA Handbook for Handmade Expansion Joints** Types 39, 40, 42, 56, 57, 58, 59, 61, 62, 63 and 64

DN	Internal dimension	External flange dimension	Pitch circle diameter	Hole diameter	Overall length				Flange thickness			Flange hole alignment	
					≤ 150	≤ 300	≤ 600	> 600	≤ 10	≤ 15	>15	L ≤ 350	LF ≤ 350
≤ 550	±5	±6	±5	±2	±5	±5	±5	±1.0 %	±2	±3	±4	±3	±5
> 550 - ≤ 1150	±10	±13	±5	±2	±5	±5	±5	±1.0 %	±2	±3	±4	±3	±5
> 1150 - ≤ 1750	±10/-12	±19/-13	±6	±2	±6	±10	±10	±1.5 %	±2	±4	±4	±4	±6
> 1750	±10/-16	±25/-14	±6	±2	±6	±10	±10	±1.5 %	±2	±4	±4	±4	±6

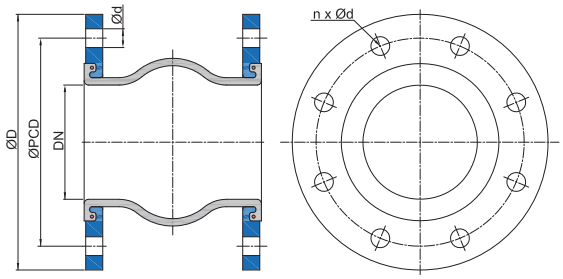
WILLBRANDT **Flange Connection Dimensions**



Flange table

DN		PN 6				PN 10				PN 16				PN 25			
	Inches	ØD mm	ØPCD mm	n	Ød mm	ØD mm	ØPCD mm	n	Ød mm	ØD mm	ØPCD mm	n	Ød mm	ØD mm	ØPCD mm	n	Ød mm
20		90	65	4	11	105	75	4	14	105	75	4	14	105	75	4	14
25	**1**	100	75	4	11	115	85	4	14	115	85	4	14	115	85	4	14
32	**1 ¼**	120	90	4	14	140	100	4	18	140	100	4	18	140	100	4	18
40	**1 ½**	130	100	4	14	150	110	4	18	150	110	4	18	150	110	4	18
50	**2**	140	110	4	14	165	125	4	18	165	125	4	18	165	125	4	18
65	**2 ½**	160	130	4	14	185	145	8	18	185	145	8	18	185	145	8	18
80	**3**	190	150	4	18	200	160	8	18	200	160	8	18	200	160	8	18
100	**4**	210	170	4	18	220	180	8	18	220	180	8	18	235	190	8	22
125	**5**	240	200	8	18	250	210	8	18	250	210	8	18	270	220	8	26
150	**6**	265	225	8	18	285	240	8	22	285	240	8	22	300	250	8	26
175	**7**	295	255	8	18	315	270	8	22	315	270	8	22	330	280	12	26
200	**8**	320	280	8	18	340	295	8	22	340	295	12	22	360	310	12	26
250	**10**	375	335	12	18	395	350	12	22	405	355	12	26	425	370	12	30
300	**12**	440	395	12	22	445	400	12	22	460	410	12	26	485	430	16	30
350	**14**	490	445	12	22	505	460	16	22	520	470	16	26	555	490	16	33
400	**16**	540	495	16	22	565	515	16	26	580	525	16	30	620	550	16	36
450	**18**	595	550	16	22	615	565	20	26	640	585	20	30	670	600	20	36
500	**20**	645	600	20	22	670	620	20	26	715	650	20	33	730	660	20	36
600	**24**	755	705	20	26	780	725	20	30	840	770	20	36	845	770	20	39
700	**28**	860	810	24	26	895	840	24	30	910	840	24	36	960	875	24	42
800	**32**	975	920	24	30	1015	950	24	33	1025	950	24	39	1085	990	24	48
900	**36**	1075	1020	24	30	1115	1050	28	33	1125	1050	28	39	1185	1090	28	48
1000	**40**	1175	1120	28	30	1230	1160	28	36	1255	1170	28	42	1320	1210	28	56
1200	**48**	1405	1340	32	33	1455	1380	32	39	1485	1390	32	48	-	-	-	-
1300	**52**	1520	1450	32	36	1565	1485	32	42	1585	1490	36	48	-	-	-	-
1400	**56**	1630	1560	36	36	1675	1590	36	42	1685	1590	36	48	-	-	-	-
1500	**60**	1730	1660	36	36	1795	1705	36	48	1810	1705	36	56	-	-	-	-
1600	**-**	1830	1760	40	36	1915	1820	40	48	1930	1820	40	56	-	-	-	-
1700	**-**	1940	1865	40	39	2015	1920	44	48	2030	1920	44	56	-	-	-	-
1800	**72**	2045	1970	44	39	2115	2020	44	48	2130	2020	44	56	-	-	-	-
1900	**-**	2155	2075	44	42	2220	2125	48	48	2240	2125	44	62	-	-	-	-
2000	**-**	2265	2180	48	42	2325	2230	48	48	2345	2230	48	62	-	-	-	-
2100	**84**	2375	2285	48	42	2440	2335	48	56	-	-	-	-	-	-	-	-
2200	**-**	2475	2390	52	42	2550	2440	52	56	2555	2440	52	62	-	-	-	-
2400	**96**	2685	2600	56	42	2760	2650	56	56	2765	2650	56	62	-	-	-	-
2500	**-**	2795	2705	56	48	2860	2750	56	56	2865	2750	60	62	-	-	-	-
2600	**-**	2905	2810	60	48	2960	2850	60	56	2965	2850	60	62	-	-	-	-
2800	**-**	3115	3020	64	48	3180	3070	64	56	-	-	-	-	-	-	-	-
3000	**120**	3315	3220	68	48	3405	3290	68	62	-	-	-	-	-	-	-	-
3200	**-**	3525	3430	72	48	-	-	-	-	-	-	-	-	-	-	-	-
3400	**-**	3735	3640	76	48	-	-	-	-	-	-	-	-	-	-	-	-
3600	**144**	3970	3860	80	56	-	-	-	-	-	-	-	-	-	-	-	-
3800	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4000	**-**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

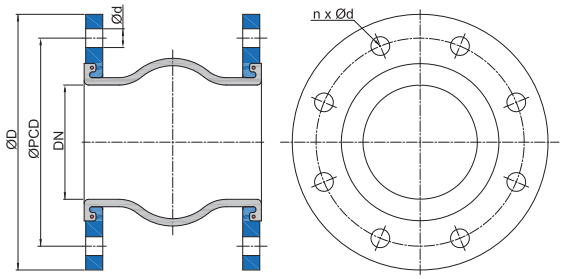
WILLBRANDT **Flange Connection Dimensions**



Flange table

DN		ASME B 16.5-150 lbs				ASME B 16.47 Series A 150 lbs				AWWA C207 Class D			
	Inches	ØD mm	ØPCD mm	n	Ød mm	ØD mm	ØPCD mm	n	Ød mm	ØD mm	ØPCD mm	n	Ød mm
20	3/4	-	-	-	-	-	-	-	-	-	-	-	-
25	1	108.0	79.2	4	15.7	-	-	-	-	-	-	-	-
32	1 ¼	117.0	89.0	4	15.7	-	-	-	-	-	-	-	-
40	1 ½	127.0	98.4	4	15.7	-	-	-	-	-	-	-	-
50	2	152.4	120.6	4	19.0	-	-	-	-	-	-	-	-
65	2 ½	177.8	139.7	4	19.0	-	-	-	-	-	-	-	-
80	3	190.5	152.4	4	19.0	-	-	-	-		-	-	-
100	4	228.6	190.5	8	19.0	-	-	-	-	-	-	-	-
125	5	254.0	215.9	8	22.2	-	-	-	-	-	-	-	-
150	6	279.4	241.3	8	22.2	-	-	-	-	-	-	-	-
-	7	311.2	269.9	8	22.2	-	-	-	-	-	-	-	-
200	8	342.9	298.4	8	22.2	-	-	-	-	-	-	-	-
250	10	406.4	361.9	12	25.4	-	-	-	-	-	-	-	-
300	12	482.6	431.8	12	25.4	-	-	-	-	482.6	431.8	12	25.4
350	14	533.4	476.2	12	28.6	-	-	-	-	533.4	476.3	12	28.6
400	16	596.9	539.7	16	28.6	-	-	-	-	596.9	539.8	16	28.6
450	18	635.0	577.8	16	31.8	-	-	-	-	635.0	577.9	16	31.8
500	20	698.5	635.0	20	31.8	-	-	-	-	698.5	635.0	20	31.8
550	22	749.3	692.2	20	34.9	-	-	-	-	749.3	692.2	20	34.9
600	24	812.8	749.3	20	34.9	-	-	-	-	812.8	749.3	20	34.9
650	26	-	-	-	-	870.0	806.4	24	34.9	870.0	806.4	24	34.9
700	28	-	-	-	-	927.1	863.6	28	34.9	927.1	863.6	28	34.9
750	30	-	-	-	-	984.3	914.4	28	34.9	984.3	914.4	28	34.9
800	32	-	-	-	-	1060.5	977.9	28	41.3	1060.5	977.9	28	41.3
850	34	-	-	-	-	1111.3	1028.7	32	41.3	1111.3	1028.7	32	41.3
900	36	-	-	-	-	1168.4	1085.8	32	41.3	1168.4	1085.9	32	41.3
950	38	-	-	-	-	1238.3	1149.4	32	41.3	1238.3	1149.4	32	41.3
1000	40	-	-	-	-	1289.1	1200.2	36	41.3	1289.1	1200.2	36	41.3
1050	42	-	-	-	-	1346.2	1257.3	36	41.3	1346.2	1257.3	36	41.3
1100	44	-	-	-	-	1403.4	1314.5	40	41.3	1403.4	1314.5	40	41.3
1150	46	-	-	-	-	1454.2	1365.3	40	41.3	1454.2	1365.3	40	41.3
1200	48	-	-	-	-	1511.3	1422.4	44	41.3	1511.3	1422.4	44	41.3
1250	50	-	-	-	-	1568.5	1479.6	44	47.6	1568.5	1479.6	44	47.6
1300	52	-	-	-	-	1625.6	1536.7	44	47.6	1625.6	1536.7	44	47.6
1350	54	-	-	-	-	1682.7	1593.8	44	47.6	1682.7	1593.8	44	47.6
1400	56	-	-	-	-	1746.3	1651.0	48	47.6	1746.3	1651.0	48	47.6
1450	58	-	-	-	-	1803.4	1708.2	48	47.6	1803.4	1708.2	48	47.6
1500	60	-	-	-	-	1854.2	1758.9	52	47.6	1854.2	1759.0	52	47.6
1650	66	-	-	-	-	-	-	-	-	-2032.0	1930.4	52	47.6
1800	72	-	-	-	-	-	-	-	-	2197.1	2095.5	60	47.6
1950	78	-	-	-	-	-	-	-	-	2362.2	2260.6	64	54.0
2100	84	-	-	-	-	-	-	-	-	2533.7	2425.7	64	54.0
2250	90	-	-	-	-	-	-	-	-	2705.1	2590.8	68	61.9
2400	96	-	-	-	-	-	-	-	-	2876.5	2755.9	68	61.9
2550	102	-	-	-	-	-	-	-	-	3048.0	2908.3	72	68.3
2700	108	-	-	-	-	-	-	-	-	3219.5	3067.1	72	68.3
2850	114	-	-	-	-	-	-	-	-	3390.9	3219.5	76	74.6
3000	120	-	-	-	-	-	-	-	-	3562.4	3371.9	76	74.6
3150	126	-	-	-	-	-	-	-	-	3734.0	3537.0	80	81.0
3300	132	-	-	-	-	-	-	-	-	3905.0	3702.0	80	81.0
3450	138	-	-	-	-	-	-	-	-	4077.0	3861.0	84	87.0
3600	144	-	-	-	-	-	-	-	-	4248.0	4020.0	84	87.0

WILLBRANDT **Flange Connection Dimensions**

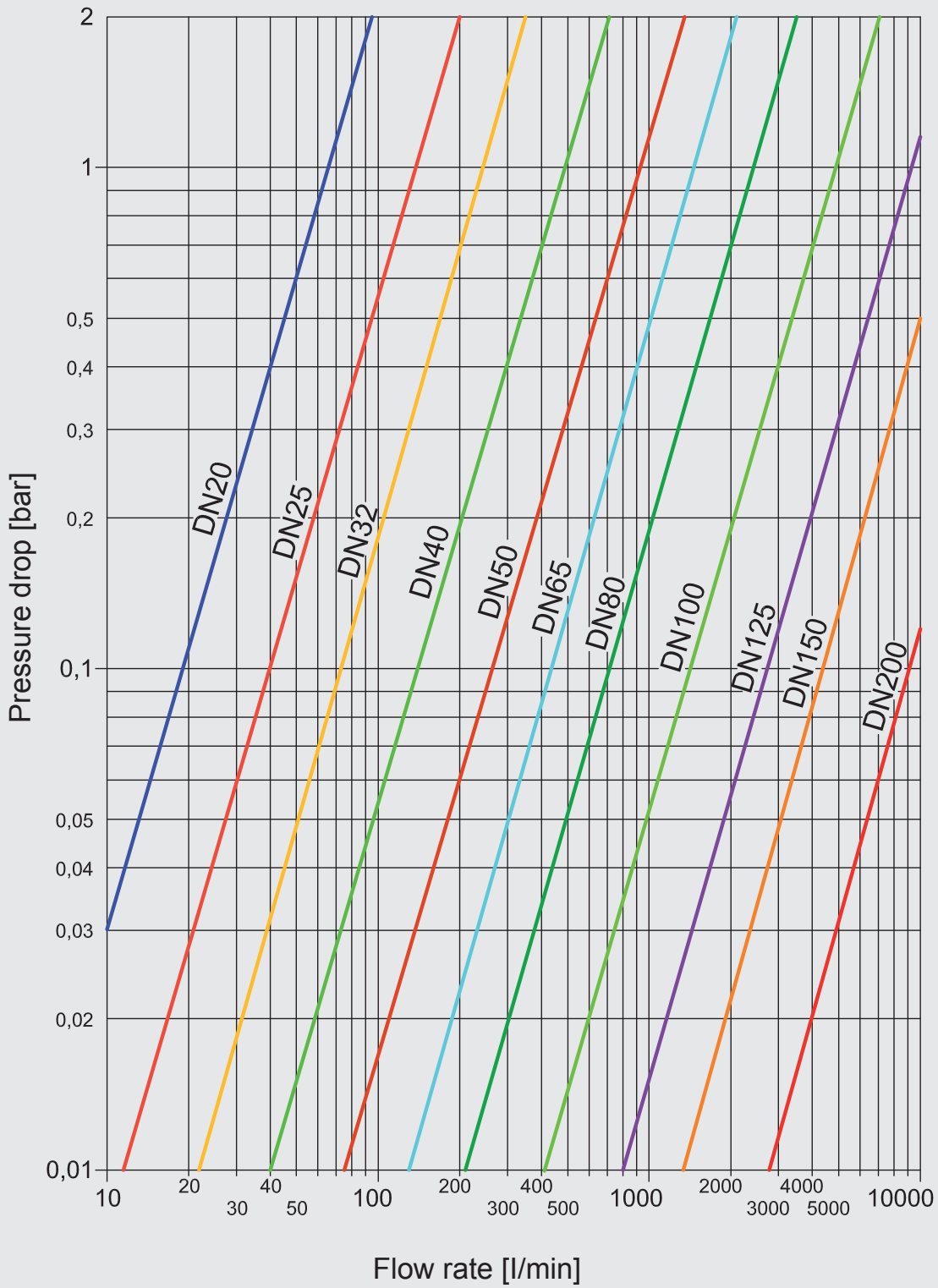


Flange table

DN		JIS B 2220 5K				JIS B 2220 10K				BS Table E			
	Inches	ØD mm	ØPCD mm	n	Ød mm	ØD mm	ØPCD mm	n	Ød mm	ØD mm	ØPCD mm	n	Ød mm
20	**-**	85	65	4	12	100	75	4	15	-	-	-	-
25	**-**	95	75	4	12	125	90	4	19	-	-	-	-
32	**-**	115	90	4	15	135	100	4	19	-	-	-	-
40	**-**	120	95	4	15	140	105	4	19	-	-	-	-
50	**-**	130	105	4	15	155	120	4	19	-	-	-	-
65	**-**	155	130	4	15	175	140	4	19	-	-	-	-
80	**-**	180	145	4	19	185	150	8	19	-	-	-	-
90	**-**	190	155	4	19	195	160	8	19	-	-	-	-
100	**4**	200	165	8	19	210	175	8	19	215.9	177.8	8	19.0
125	**5**	235	200	8	19	250	210	8	23	254.0	209.5	8	19.0
150	**6**	265	230	8	19	280	240	8	23	279.4	234.9	8	22.2
-	**7**	300	260	8	23	305	265	12	23	304.8	260.3	8	22.2
200	**8**	320	280	8	23	330	290	12	23	336.5	292.1	8	22.2
250	**10**	385	345	12	23	400	355	12	25	406.4	355.6	12	22.2
300	**12**	430	390	12	23	445	400	16	25	457.2	406.4	12	25.4
350	**14**	480	435	12	25	490	445	16	25	527.0	469.9	12	25.4
400	**16**	540	495	16	25	560	510	16	27	577.8	520.7	12	25.4
450	**18**	605	555	16	25	620	565	20	27	641.3	584.2	16	25.4
500	**20**	655	605	20	25	675	620	20	27	704.8	641.3	16	25.4
550	**22**	720	665	20	27	745	680	20	33	-	-	-	-
600	**24**	770	715	20	27	795	730	24	33	825.5	755.7	16	25.4
650	**26**	825	770	24	27	845	780	24	33	870.0	806.4	24	34.9
700	**28**	875	820	24	27	905	840	24	33	927.1	863.6	28	34.9
750	**30**	945	880	24	33	970	900	24	33	984.3	914.4	28	34.9
800	**32**	995	930	24	33	1020	950	28	33	1060.5	977.9	28	41.3
850	**34**	1045	980	24	33	1070	1000	28	33	1111.3	1028.7	32	41.3
900	**36**	1095	1030	24	33	1120	1050	28	33	1168.4	1085.8	32	41.3
950	**38**	-	-	-	-	-	-	-	-	1238.3	1149.4	32	41.3
1000	**40**	1195	1130	28	33	1235	1160	28	39	1289.1	1200.2	36	41.3
1050	**42**	-	-	-	-	-	-	-	-	1346.2	1257.3	36	41.3
1100	**44**	1305	1240	28	33	1345	1270	28	39	1403.4	1314.5	40	41.3
1150	**46**	-	-	-	-	-	-	-	-	1454.2	1365.3	40	41.3
1200	**48**	1420	1350	32	33	1465	1380	32	39	1511.3	1422.4	44	41.3
1250	**50**	-	-	-	-	-	-	-	-	-	-	-	-
1300	**52**	-	-	-		-	-	-	-	-	-	-	-
1350	**54**	1575	1505	32	33	1630	1540	36	45	-	-	-	-
1400	**56**	-	-	-	-	-	-	-	-	-	-	-	-
1450	**58**	-	-	-	-	-	-	-	-	-	-	-	-
1500	**60**	1730	1660	36	33	1795	1700	40	45	-	-	-	-

WILLBRANDT **Pressure Loss in Low-Corrugated Bellow Expansion Joint**

Types 39, 46, 50, 51, 53, and 55 for a liquid with a viscosity of 1 mm² (Englergrad)



WILLBRANDT **Movement Diagram for Combined Movement Absorption (axial and lateral)**

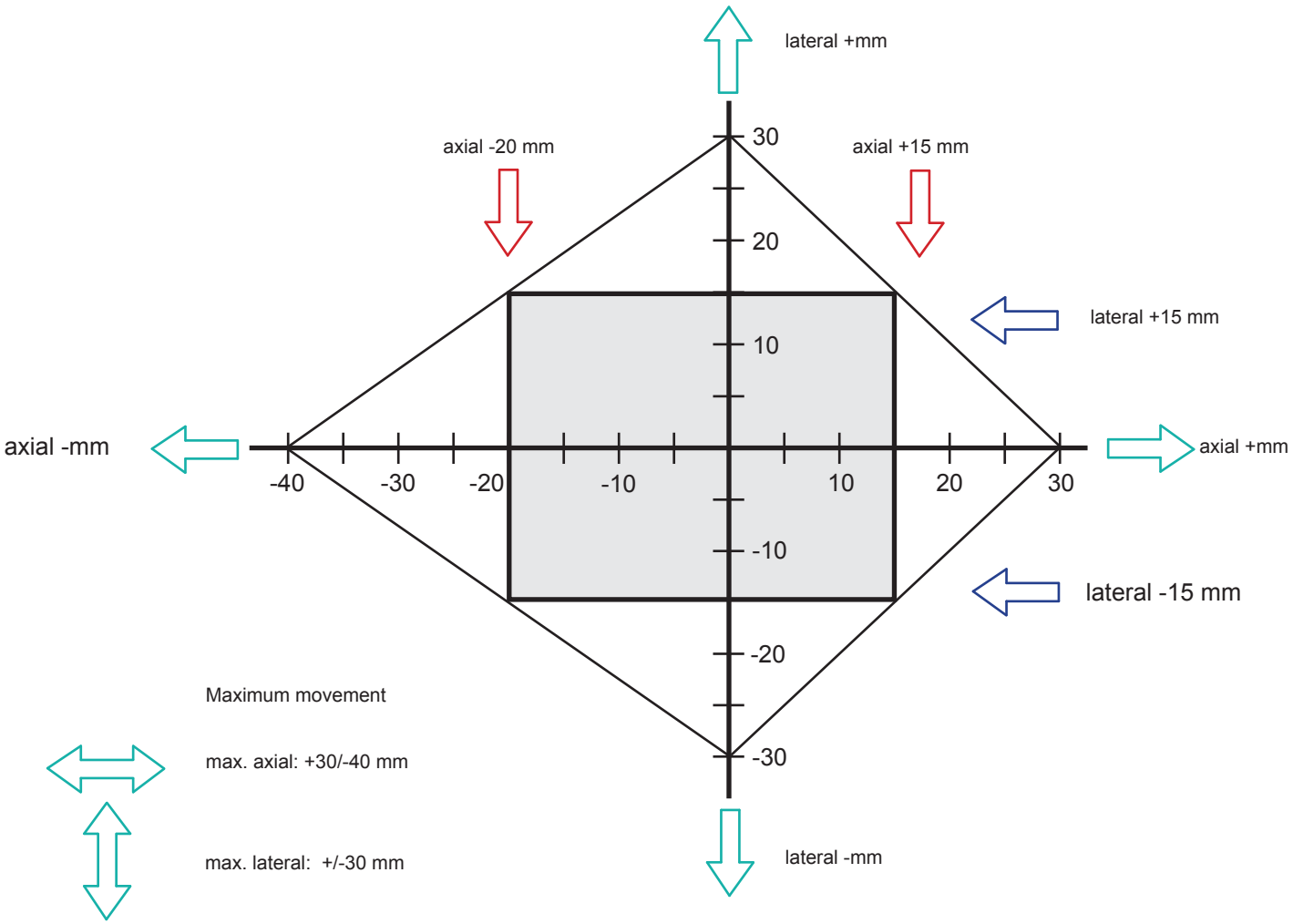
The rhombus below illustrates how a permissible combination of movement absorption can be represented for expansion joints.

The combination of lateral and axial movement may result in a maximum of 100 % utilisation for the expansion joint as a whole. The combined movements must fit into the rhombus as a rectangle.

Example:

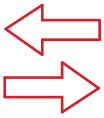
For movement of -20 mm and +15 mm axially, the expansion joint can absorb another +/-15 mm laterally.

This rhombus can be used for all nominal diameters and sizes if the corresponding permissible maximum values for the expansion joint are plotted in the rhombus.



Any combination of movements can be found in this diagram.

The combined current movements must fit into the rhombus as a rectangle.



Example: axial -20 mm

axial +15 mm

lateral max. +/-15 mm

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