

## PTFE expansion joints

### General description of PTFE expansion joints

For more than 45 years STENFLEX® PTFE expansion joints have been manufactured from top quality materials. They have served with distinction throughout decades of practical use. Constant further development and innovations continuously update our product range to meet the demands of current and changing markets. The result: efficient and highly reliable products with superior durability.

PTFE expansion joints are mainly used in the following industries:

- Chemical industry
- Process engineering
- Food product industry
- Beverage industry
- Pharmaceutical industry
- Treatment and disposal technology
- Information Technology



#### Purpose

PTFE expansion joints have been developed for certain applications.

PTFE has a universal chemical resistance against almost all chemicals and solvents within its continuous operating temperature – with the exception of molten alkalis, elementary fluorine and certain halogenes.

They are used primarily in appliances, machinery, apparatus and pipe-systems

- to compensate for movement
- to compensate for expansion caused by differences in temperature
- to reduce tension
- to dampen oscillation, hinder vibration transmission, muffle noise/sound
- as adapters to compensate for assembly or installation inaccuracies.

#### Development/Design

STENFLEX® PTFE expansion joints are rated by calculation and optimized by experimentation. Our development engineers use the most up-to-date development tools to validate the design process in terms of form, function and installation – from the earliest stage of the development process. This ensures that we can provide efficient, highly dependable products with a long service life.

#### Versions

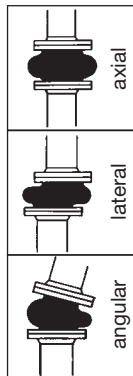
STENFLEX® PTFE expansion joints vary with regard to the following criteria:

- type (universal and lateral expansion joint)
- structure of the bellows (rated to pressure and temperature load)
- flange connection

Our PTFE expansion joints are delivered ready for installation.

In addition to our standard versions featured in the catalogue, we also develop special versions that are produced to operate under special conditions.

Connecting parts (that deviate from DIN), such as ISO, ANSI, BS, VG, SAE-standards etc. can also be supplied.



#### Universal PTFE expansion joints

##### Structure:

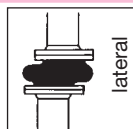
Bellows with connection parts (rotating flanges)

##### Movement absorption:

The absorption of axial, lateral, angular and simultaneous movement is possible. Universal expansion joints with two bellows and a connecting pipe are used to absorb large movement.

##### Fixed points:

Robust pipe fixed points and correct pipe-routing are essential when axial force must be absorbed.



#### Lateral PTFE expansion joints

##### Structure:

Bellows with flanges and laterally moving restraints

##### Movement absorption:

Lateral shift of the expansion joint is possible. The restraint absorbs axial reaction force and relieves pressure on the pipe's fixed points. Lateral expansion joints with two bellows and a connecting pipe are used to absorb large movement.

##### Fixed points:

Only light fixed points are needed to absorb lateral moving and friction force.

## PTFE bellows

### Structure

The STENFLEX® **type Ai expansion joint** consists of a single convolution molded bellows with synthetic fibre reinforcements. The bellows is equipped with a seamless PTFE lining and self-sealing flared ends. From DN 50 onward, type Ai is also equipped with an inner PTFE supporting ring.

PTFE bellows are available in two material grades:

- Bellows of white PTFE
- Bellows of black PTFE

White PTFE bellows are not electrically conductive. Hence they also insulate. Black PTFE bellows incorporate added soot. They are electrically conductive. The impedance is:  $<10^6$  Ohm (DIN IEC 93, VDE 0303-30).

### Material qualities

STENFLEX® PTFE bellows are made from top quality material grades to cover a range of operating conditions in many different areas.

The **type P expansion joint** consists of a multi-convolution molded PTFE bellows with self-sealing PTFE flared ends. Outer stainless steel stabilizing rings between the convolutions ensure that the shape will not change. They also stabilize the expansion joint.

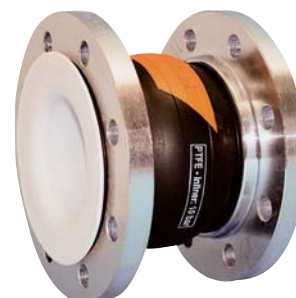
The expansion joints can be supplied with twin, three-fold or five-fold convolutions.

The bellows are contour-molded by high density extrusion. The bellows are not mechanically machined from solid material.

The operating limits of the bellows (pressure load ability depending on temperature) must be observed when rating the expansion joints.

PTFE is physiologically harmless within its thermal range of application.

Detailed documents regarding media resistance of PTFE bellows are available on request.



Rubber expansion joint type Ai with PTFE-lining



PTFE expansion joint type P

Material grade	Trade names	Properties	Applications
<b>PTFE</b> Polytetrafluoroethylene	Teflon Hostaflon Fluon Polyfluron	Heat-, and weather-proof material with outstanding chemical resistance to aggressive media. Excellent electrical insulating properties*. Temperature resistance in continuous operation from $-50$ °C to $+200$ °C.	Organic and inorganic acids, lyes, chloride, sulphate, solvents, bleaches, peroxide, fuels, mineral oil, hydraulic oil, halogens, gases

\*(white material)

## PTFE expansion joints

### General description of PTFE expansion joints

#### Connection parts

STENFLEX® PTFE expansion joints are supplied ready for installation. They are connected to pipes, fittings,

pumps, tanks etc., by standard flanges.

The connections are standardized to fit commercially available pipes and flanges. See data sheets for details.

#### Flanges

Flanges for PTFE expansion joints in the Ai-series have a special turned groove to accommodate the rubber rim and are mounted in a rotating position at the bellows. This makes it much easier to mount the pipeline.

The flanges have stabilizing collars on the side facing the bellows. This stabilizes the bellows and ensures compliance with safety spacing between the ends of the screws and the rubber bellows throughout the entire pressure and movement range. This eliminates the risk of damage to the rubber bellows possibly caused by the screwends.

STENFLEX® PTFE expansion joints in the P-series have rotating flanges.

STENFLEX® lateral expansion joints with tie rod restraints, have been developed for high operating pressures or large-diameter pipes. The axial force produced by pipeline inner pressure is absorbed by the expansion joint restraints. They relieve the pressure on the fixed points of the pipeline.

Flanges for lateral expansion joints are equipped with ears for tie rod restraints. Depending on expansion joint type and size, they differ as follows:

Flanges:

- Flange with molded ears
- Oval flanges

Flanges made of unalloyed steels are electrogalvanized or given an anti-corrosion prime coating. Stainless steel is used to meet tougher corrosion protection requirements. Other materials and forms of corrosion protection (hot-dip galvanizing, special varnish, special coating etc.) are available on request.

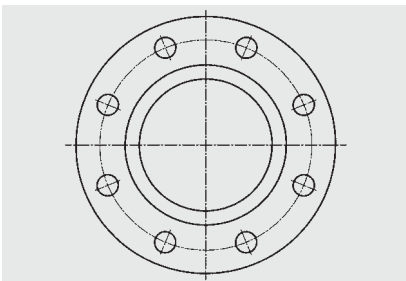
Flange material	Material No. as per DIN EN	Designation as per DIN EN / DIN
<b>Unalloyed steel</b>	<b>1.0038</b>	<b>S235JR</b>
<b>Stainless steel</b>	<b>1.4541</b>	<b>X6CrNiTi18-10</b>
	<b>1.4571</b>	<b>X6CrNiMoTi17-12-2</b>

#### Note

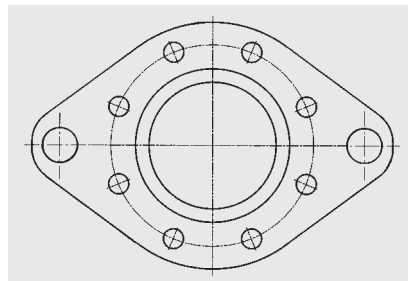
The permissible operating and testing pressure depends on the rating of the overall expansion joint taking account of all components:

- bellows
- flanges
- restraints

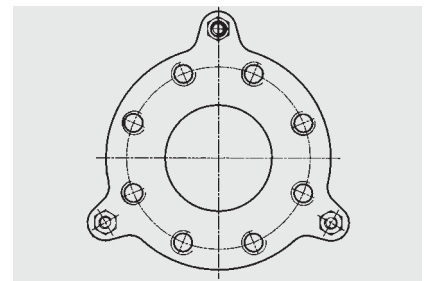
Standard flanges of the PTFE expansion joints are machined mechanically to the tolerated fit-sizes.



Standard flange with turned groove to accommodate rubber bellows and stabilizing collar (universal expansion joint)



Oval flange with ears for the restraints (lateral expansion joint)



Flange with molded ears for the restraints (lateral expansion joint)

## Restraints

Restraints are used for lateral expansion joints. The restraints absorb axial reaction force produced by internal pressure. Even so, the connected pipe must still be equipped with light fixed points to absorb the moving

force. The precise rating and operating parameters of the corresponding machine or plant must be known for optimum calculation of the restraints. Standard restraints are available for the lateral expansion joint program.

The restraints are calculated on the basis of material strength values at +50 °C. Reduced strength values are taken into consideration at higher temperatures.

### Tie rod restraints

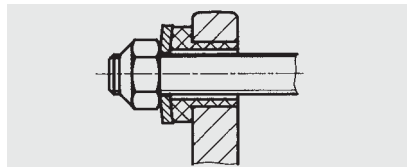
There are two types of tie rod restraints for lateral PTFE expansion joints

- Outer restraints: to absorb reaction force from internal pressure (e.g. type Ai-2, P2)
- Outer and inner restraints: to absorb reaction force from internal pressure and vacuum (type P-4).

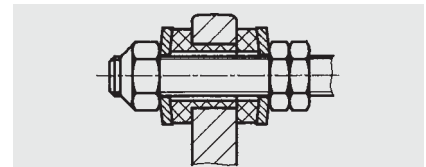
The tie rods in the flange ears are flexibly carried

- on silencing rubber sockets up to DN 150
- on spherical washers and conical seats as from DN 175.

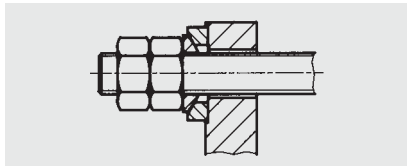
Standard tie rods, spherical washers and conical seats are electrogalvanized. Stainless steel can be used for restraint elements to meet higher corrosion protection requirements. Other anti-corrosion treatment – hot-dip galvanizing, special varnish, special coatings – are available on request.



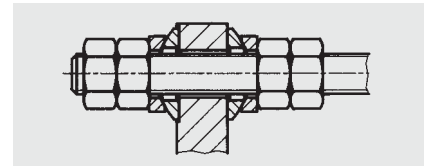
*Sound-damping outer restraint (lateral expansion joint)*



*Sound-damping outer and inner restraint (lateral expansion joint)*



*Outer restraint with spherical washer and conical seat (lateral expansion joint)*



*Outer and inner restraint with spherical washer and conical seat (lateral expansion joint)*

Material tie rod restraint	Material No. as per DIN EN	Designation as per DIN EN (DIN) or strength class
<b>Unalloyed steel</b>		
<b>Tie rods</b>	–	<b>5,6, 8,8</b>
<b>Washers</b>	–	<b>5, 8</b>
<b>Stainless steel</b>		
<b>Tie rods, washers</b>	<b>A2</b>	<b>50, 70</b>
	<b>A4</b>	<b>50, 70</b>

## PTFE expansion joints

### General description of PTFE expansion joints

#### Accessories

STENFLEX® PTFE expansion joints can be equipped with the following accessories:

- internal guide sleeves
- protective covers

#### Internal guide sleeves

Normally internal guide sleeves are not required to reduce flow resistance because STENFLEX® PTFE expansion joints have a streamlined surface with large transition radii (flow lines).

However, abrasive media or high flow velocities with high-frequency vibrations or turbulence (such as occur behind a pump) make it necessary to install internal guide sleeves.

The internal guide sleeves are made of PTFE and are fitted with a flared flange.

In the case of purely axial movement, cylindrical internal guide sleeves are used. For lateral and/or angular movement, conical internal guide sleeves are fitted (tapered cross section).

It is very important to note the direction of flow when installing expansion joints with internal guide sleeves.

#### Protective covers

STENFLEX® protective covers for expansion joints are used where special operating conditions make it necessary to protect the expansion joint from external effects, or where adverse operating conditions and dangerous flow media make it necessary to protect the environment with a preventive splash-guard.

#### Properties

- Flame-proof
- Flexible

#### Material

- Fabric

#### Use

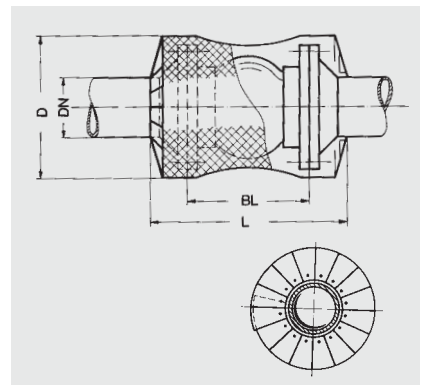
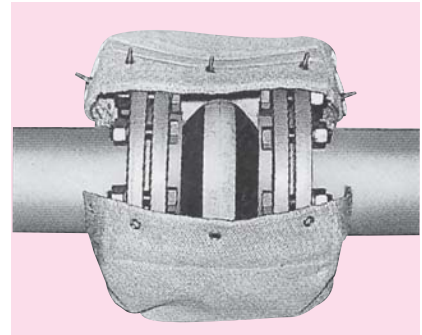
As protective cover to prevent flame penetration up to +800°C for up to 30 min. to preserve the full operational ability of the expansion joint for this period.

#### Structure

Flexible flame-proof protection cover made of special fabric with heat-resistant insulation inlays; ready for installation with fastening screws to seal the cover.

#### Installation

The expansion joint is mounted as usual. The protective cover also encompasses the pipe flanges.



STENFLEX® flame-proof protection cover K-1

#### Symbols for a quick product selection

The easy-to-find-list: symbols and their meaning. The colour bar of the following data sheets indicates small symbols depicting the special features of the corresponding types, for easy pre-selection.

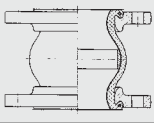
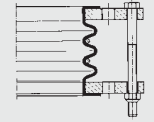
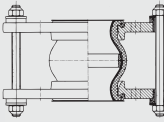
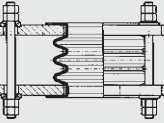
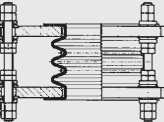
	Expansion joint to absorb lateral movement		Resistant to hot water (combined with temperature symbol)
	Universal expansion joint to absorb simultaneous movement in all three directions		Suitable for drinking water
	Maximum product pressure rate		Suitable for acids and lyes
	Flange connections		Suitable for oil or fatty media
	Maximum temperature		Suitable for gaseous media

## Applications / Possible uses / Industries

<i>Basic expansion joint types</i>		Universal-expansion joints		Lateral-expansion joints		
STENFLEX® Expansion joint types		Ai-1	P-1	Ai-2	P-2	P-4
<b>Applications</b>	Reducing tension	■	■	■	■	■
	Absorbing axial movement	■	■			
	Absorbing lateral movement	■	■	■	■	■
	Absorbing angular movement	■	■			
	Muffling oscillations at appliances	■	■	■	■	■
	Vibration damping	■	■	■	■	■
	Compensation for installation inaccuracies	■	■	■	■	■
<b>Possible uses</b>	Metal pipes	■	■	■	■	■
	Plastic pipes	■	■	■	■	■
	Pipes for aggressive media	■	■	■	■	■
	Pumps	■	■	■	■	■
	Fittings	■	■	■	■	■
<b>Industries</b>	Mechanical engineering	■	■	■	■	■
	Chemical industry	■	■	■	■	■
	Plant engineering	■	■	■	■	■
	Refuse incineration	■	■	■	■	■

Table showing prime applications, possible uses and industries

## Program summary

Universal PTFE expansion joints							
	Type	DN	Pressure rate bar	Max. operating temperature	Bellows material	Connection parts	Page
	<b>Ai-1</b>	DN 32-300	PN 10	+90 °C	EPDM with PTFE lining	rotating flanges	3.7
	<b>P-1</b>	DN 25-500	PN 10,5	+200 °C	PTFE	rotating flanges	3.9
Lateral PTFE expansion joints							
	<b>Ai-2</b>	DN 32-300	PN 10	+90 °C	EPDM with PTFE lining	rotating flanges with tie rod restraint	3.11
	<b>P-2</b>	DN 25-500	PN 10.5	+200 °C	PTFE	rotating flanges with tie rod restraint	3.13
	<b>P-4</b>	DN 25-500	PN 10.5	+200 °C	PTFE	rotating flanges with tie rod restraint	3.13

## Rubber expansion joint with PTFE lining Type Ai-1

Universal expansion joint DN 32 – DN 300



### Structure type Ai-1

Universal expansion joint consisting of a rubber bellows with seamless PTFE lining and rotating flanges

### Applications

- for conveying aggressive media
- very good chemical resistance
- resistant to most of the acids and lyes
- for compensating axial, lateral and angular movement
- for muffling vibration and noise
- for reducing thermal and mechanical tension
- to compensate for installation inaccuracies
- chemical industry
- beverage industry

### Rubber bellows with PTFE lining PN 10

- Flat-convoluted molded bellows made of EPDM
- Synthetic fibre reinforcement
- Wire-reinforced rubber rim
- Seamless PTFE lining with self-sealing flared ends

Material grade*	Colour code	Possible uses
<b>EPDM/PTFE</b>	<b>orange with stamp "PTFE-Inliner"</b>	<b>Chemicals, acids, lyes</b>

\*Check or inquire about the resistance of the rubber grade to temperature and medium

Technical calculation	Pressure
Max. perm. operating pressure	<b>10 bar*</b>
Max. permissible temperature	<b>+100 °C</b>
Bursting pressure	<b>≥ 20 bar</b>
Vacuum operation	<b>not suitable</b>

Max. operating pressure to be set 30 % lower for shock loads.

\*Temperature related decrease of pressure (see technical annex).

### Flanges

#### Version

- Rotating flanges with stabilizing collar
- Flange drilling for through bolts
- Special turned groove for rubber rim

#### Dimensions

Standard: DN 32 - DN 175 (PN 16)  
DN 200 - DN 300 (PN 10)  
according to EN 1092

Others: DIN EN, ANSI, BS etc.

Connection dimensions see technical annex

#### Materials

Standard: 1.0038 (S235JR)

Others: 1.4541, 1.4571,  
plastic (PP)

#### Corrosion protection

Standard: DN 32 - DN 150

electrogalvanized

DN 175 – DN 300

anti-corrosion primed

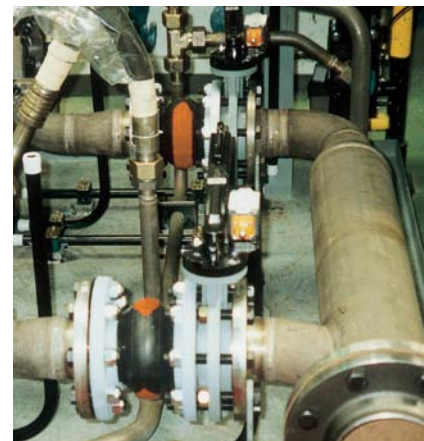
Others: hot-dip galvanized, special varnish, special coating, etc.

### Accessories

- Internal guide sleeve of PTFE
- Protective cover

### Certificates

- CE (DGR 97/23/EC)



STENFLEX® type Ai-1 with PTFE lining used in the chemical industry

## Dimensions standard program

DN	BL*	Pressure rate	ø di** Bellows inner ø mm	ø C Raised face ø mm	ø W Convolution ø unpressurized mm	PN Flange connection EN 1092	ø D Flange outer ø mm	b Flange thickness mm
32	131	10	25	82	78	16	140	16
40	131	10	33	92	86	16	150	16
50	131	10	43	101.5	97	16	165	16
65	131	10	59	127	113	16	185	18
80	156	10	71	133	135	16	200	20
100	156	10	94	171.5	160	16	220	20
125	156	10	121	192	184	16	250	22
150	157	10	146	218	212	16	285	22
175	157	10	169	248	236	16	315	22
200	182	10	195	273	265	10	340	24
250	182	10	245	328	318	10	395	26
300	207	10	296	378	373	10	445	28

\*DN 32 - DN 300 also available as type Ri-1, length 136.

\*\*For manufacturing reasons the inner diameter may vary by  $\pm 3$  or  $\pm 5$  mm

## Movement compensation/bellows cross sectional area

DN	Δ ax Axial movement		Δ lat Lateral movement ± mm	Δ ang Angular movement ± ∠ degrees	A* Effective bellows cross sectional area at 6 bar cm <sup>2</sup>	Weight approx. kg
	Compression - mm	Elongation + mm				
32	18	5	8	13	0	3.4
40	18	5	8	13	0	3.9
50	18	5	8	11	0	4.6
65	18	5	8	9	15	5.8
80	18	5	8	7	30	7.5
100	18	5	8	6	40	8.4
125	18	5	8	5	60	11.1
150	18	5	8	4	120	13.8
175	18	5	8	4	180	16.4
200	23	8	8	3	220	20.3
250	23	8	8	3	280	24.6
300	23	8	8	3	460	29.2

Please inquire for simultaneous (different) movement

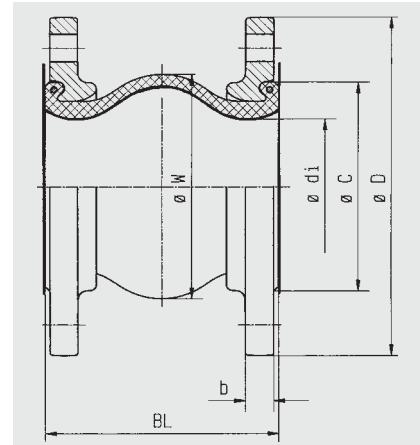
\*Effective bellows cross sectional area is a theoretical value

## Note

Please comply with the general technical instructions regarding reaction force, moving force, fixed point load, installation instructions etc.

Subject to technical alterations and deviations resulting from the manufacturing process.

## Versions



### Type Ai-1

Universal expansion joint with PTFE lining and PTFE supporting ring



## PTFE expansion joint - Type P-1

Universal expansion joint DN 15 – DN 500



### Structure type P-1

Universal expansion joint consisting of PTFE bellows with rotating flanges

### PTFE bellows PN 5.5 / PN 9 / 10.5

- Multiple convolution bellows made of PTFE
- Outer supporting rings of stainless steel between the convolutions
- Bellows with self-sealing PTFE flange ends
- Inner surface repellent of foreign matter

Material quality*	Possible uses
<b>PTFE</b>	<b>Aggressive acids and lyes, e.g., chloride, sulphate, solvents, bleaches, peroxide, fuels</b>

\*Check or inquire about the resistance of the material quality to temperature and medium

DN	DN 200 - 500	DN 125 - 150	DN 15 - 100	Temperature
Pressure rate	PN 5.5	PN 9	PN 10.5	
max. tol. operating pressure	<b>5.5 bar</b>	<b>9.0 bar</b>	<b>10.5 bar</b>	<b>up to +20 °C</b>
	<b>3.5 bar</b>	<b>5.5 bar</b>	<b>7 bar</b>	<b>up to +100 °C</b>
	<b>2.5 bar</b>	<b>4.0 bar</b>	<b>4 bar</b>	<b>up to +150 °C</b>
	<b>1.7 bar</b>	<b>2.5 bar</b>	<b>3 bar</b>	<b>up to +200 °C</b>
Vacuum operation	≥ 0.01 bar abs. DN 15 - 150 ≥ 0.20 bar abs. DN 200 - 250 ≥ 0.70 bar abs. DN 300 - 500			

Max. operating pressure should be set 30 % lower for shock load

### Flanges

#### Version

- Rotating flange
- threaded holes

#### Dimensions

Standard: DN 25 - 150 (PN 16)  
 DN 200 - 500 (PN 10)  
 according to EN 1092

Others: DIN EN, ANSI, BS etc.

Connection dimensions: see technical annex

#### Materials

Standard: 1.0038 (S235JR)

Others: 1.4541, 1.4571

#### Corrosion protection

Standard: DN 15 - DN 300  
 electrogalvanized  
 DN 350 - DN 500  
 anti-corrosion primed

Others: hot-dip galvanized, special varnish, special coatings

### Applications

- for conveying aggressive media
- for compensating axial, lateral and angular movements
- for muffling vibration and noise
- for reducing thermal and mechanical tension
- to compensate for installation inaccuracies
- chemical industry
- treatment and disposal technology
- pharmaceutical industry

### Accessories

- Internal guide sleeve of PTFE
- Protective cover



STENFLEX® type P1 in disposal pipes for chloro-electrolysis

## Dimensions standard program

DN	BL	Pressure rate bar	ø di Bellows inner ø mm	ø C Raised face ø mm	PN Flange connection EN 1092	ø D Flange outer ø mm	b Flange thickness mm	H Flange height mm
15	46	10.5	21.5	45	16	95	8	143
20	46	10.5	21.5	58	16	105	8	153
25	46	10.5	21.5	68	16	115	8	163
32	46	10.5	34.5	78	16	140	10	194
40	46	10.5	34.5	88	16	150	10	204
50	56	10.5	48.3	102	16	165	12	219
65	77	10.5	58.5	122	16	185	12	239
80	77	10.5	73.2	138	16	200	12	267
100	91	10.5	99.3	158	16	220	15	287
125	111	9.0	123.0	188	16	250	15	330
150	101	9.0	147.8	212	16	285	18	370
200	137	5.5	205.1	268	10	340	20	460
250	200	5.5	256.6	320	10	395	22	515
300	196	5.5	280.5	370	10	445	25	605
350	215	5.5	on request	on request	10	on request	on request	on request
400	233	5.5	on request	on request	10	on request	on request	on request
450	280	5.5	on request	on request	10	on request	on request	on request
500	327	5.5	on request	on request	10	on request	on request	on request

Larger DN's other structural lengths, higher pressures, other movement absorption available on request. Dimensions according to GR 12-0040 standard available on request.

## Movement compensation / bellows cross section at area

DN	Δ ax Axial movement ± mm	C <sub>ax</sub> Axial recoil rate N/mm	Δ lat Lateral movement ± mm	Δ ang Angular movement ± ∠ degrees	A* Effective bellows cross sectional area cm <sup>2</sup>	Weight approx. kg
15	6	18	4	14	3	1.7
20	6	18	4	14	5	1.7
25	13	18	6	14	10	1.7
32	13	38	6	14	19	2.1
40	13	44	6	14	19	2.6
50	15	57	9	14	30	3.8
65	19	81	9	14	45	4.6
80	25	98	13	14	70	5.3
100	25	107	13	14	112	7.0
125	25	118	14	14	166	11.4
150	28	112	14	14	245	12.7
200	28	123	14	14	400	21.0
250	30	116	14	14	660	27.0
300	30	107	15	14	770	35.0
350	32	on request	18	14	on request	60.0
400	35	on request	20	14	on request	75.0
450	30	on request	20	14	on request	91.0
500	30	on request	25	14	on request	110.0

Please inquire for simultaneous (different) movement  
Table values refer to +20 °C and triple convoluted expansion joints  
\*Effective bellows cross sectional area is a theoretical value.

## Note

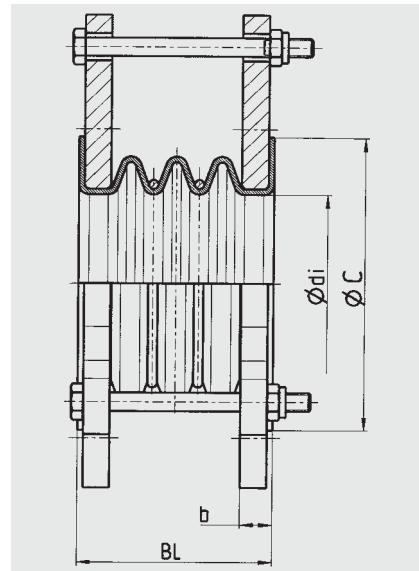
Additional PTFE seals necessary for installation in glass, graphite or ceramic pipes.

Type P1 is equipped with 3 check screws as transportation protection and to guarantee flawless installation. These are not impact-, or force-absorbing parts along the lines of the tie rods, and must be removed after completing installation.

Please comply with general technical instructions regarding reaction force, adjusting force, fixed point load, installation instructions etc.

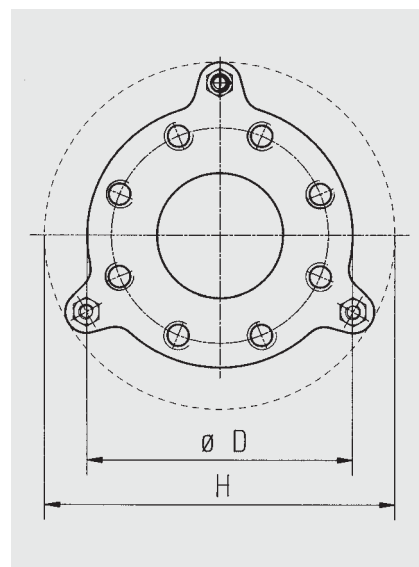
Subject to technical alterations and deviations resulting from the manufacturing process.

## Version



**Type P-1**  
Universal PTFE expansion joint

## Flange version



Molded ears for restraint as transportation safeguard only

## Rubber expansion joint with PTFE lining Type Ai-2

Lateral expansion joint DN 32 – DN 300



### Structure type Ai-2

Lateral expansion joint consisting of a rubber bellows with seamless PTFE lining and rotating flanges, also with tie rods (outer restraints) to absorb reaction force from internal pressure

### Applications

- for conveying aggressive media
  - very good chemical resistance
  - resistant to most acids and lyes
- for compensating lateral movement
- for muffling vibration and noise
- for reducing thermal and mechanical tension
- to compensate for installation inaccuracies
- chemical industry
- beverages industry

### Rubber bellows with PTFE lining PN 10

- Flat-convoluted molded bellows made of EPDM
- Synthetic fibre reinforcement
- Wire-reinforced rubber rim
- Seamless PTFE lining with self-sealing flared ends, from DN 50 with inner PTFE supporting ring

Material grade*	Colour code	Possible uses
EPDM/PTFE	orange with stamp "PTFE-Inliner"	Chemicals, acids, lyes

\*Check or inquire about the resistance of the rubber grade to temperature and medium

Technical calculation	Pressure
Max. perm. operating pressure	10 bar*
Max. permissible temperature	+100 °C
Bursting pressure	≥ 20 bar
Vacuum operation	not suitable

Max. operating pressure to be set 30 % lower for shock loads.  
\*Temperature related decrease of pressure (see technical annex).

### Flanges

#### Version

- Flanges with stabilizing collar and ears to carry the tie rods
- Flange drilling for through bolts
- Special turned groove for rubber rim

#### Dimensions

Standard: DN 32 - DN 175 (PN 16)  
DN 200 - DN 300 (PN 10)  
according to EN 1092

Others: DIN EN, ANSI, BS etc.

Connection dimensions see technical annex

#### Materials

Standard: 1.0038 (S235JR)

Others: 1.4541, 1.4571

#### Corrosion protection

Standard: DN 32 – DN 300  
electrogalvanized

Others: hot-dip galvanized, special varnish, special coating, etc.

### Tie rod restraints

- DN 20 – DN 150 Tie rods carried on silencing rubber sockets
- DN 175 – DN 300 Tie rods carried on spherical washers and conical seats

#### Materials

Standard: tie rods 8.8

Others: stainless steel

#### Corrosion protection

Standard: electrogalvanized

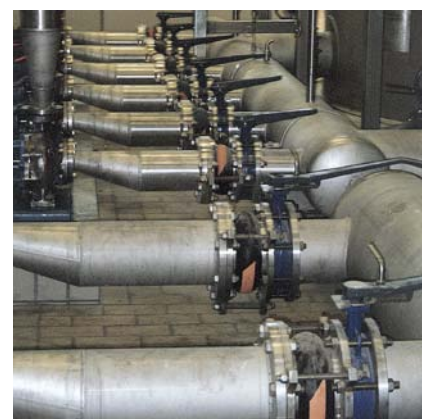
Others: hot-dip galvanized

### Accessories

- Internal guide sleeve of PTFE
- Protective cover

### Certificates

- CE (DGR 97/23/EC)



STENFLEX® type Ai-2 with PTFE lining in a beverages rack

## Dimensions standard program

DN	BL*	Pressure rate	ø di** Bellows inner ø	ø C Raised face ø	ø W Convolution ø unpressurized	PN Flange connection EN 1092	ø D Flange outer ø	b Flange thickness	H Flange height
	mm	bar	mm	mm	mm		mm	mm	mm
32	131	10	25	82	78	16	140	16	220
40	131	10	33	92	86	16	150	16	230
50	131	10	43	101.5	97	16	165	16	240
65	131	10	59	127	113	16	185	18	260
80	156	10	71	133	135	16	200	20	300
100	156	10	94	171.5	160	16	220	20	350
125	156	10	121	192	184	16	250	22	385
150	157	10	146	218	212	16	285	22	420
175	157	10	169	248	236	16	315	22	450
200	182	10	195	273	265	10	340	24	440
250	182	10	245	328	318	10	395	26	495
300	207	10	296	378	373	10	445	28	545

\*DN 32 - DN 300 also available as type Ri-2, length 136.

\*\*For manufacturing reasons the inner diameter may vary by  $\pm 3$  or  $\pm 5$  mm

## Movement compensation

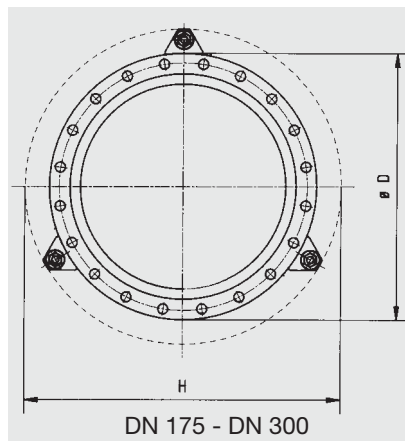
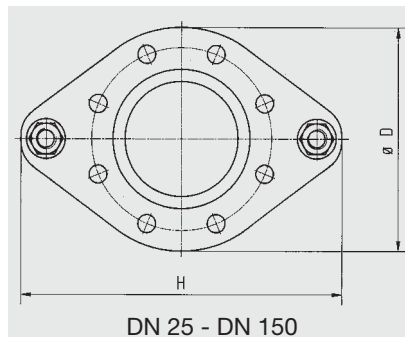
DN	$\Delta$ lat Lateral movement $\pm$ mm	Weight approx. kg
32	8	5.1
40	8	5.6
50	8	6.3
65	8	7.6
80	8	11.0
100	8	13.0
125	8	17.3
150	8	20.3
175	8	21.0
200	8	25.0
250	8	29.2
300	8	34.0

## Note

Please comply with the general technical instructions regarding reaction force, moving force, fixed point load, installation instructions etc.

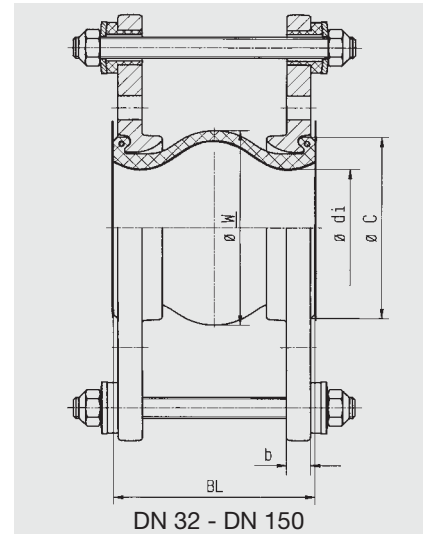
Subject to technical alterations and deviations resulting from the manufacturing process.

## Flange versions



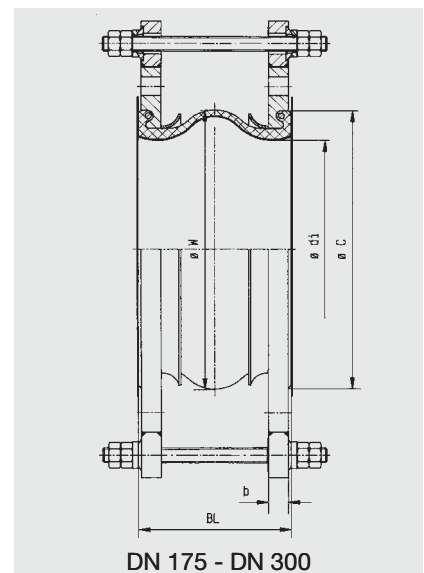
Number of tie rods depending on pressure

## Versions



### Type Ai-2

Lateral expansion joint with PTFE lining, with tie rods (outer restraints) carried on silencing rubber sockets.

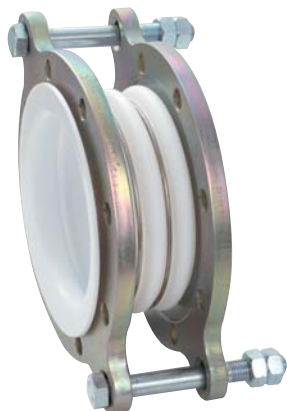


### Type Ai-2

Lateral expansion joint with PTFE lining, with tie rods (outer restraints) carried on spherical washers and conical seats.

## PTFE expansion joint - Type P-2 and P-4

Lateral expansion joint DN 15 – DN 500



### Structure type P-2

Lateral expansion joint consisting of a PTFE bellows and rotating flanges with tie rods (outer restraints) to absorb reaction force from internal pressure

### Structure type P-4

Lateral expansion joint consisting of a PTFE bellows and rotating flanges with tie rods (outer and inner restraints) to absorb reaction force from internal pressure or vacuum

### PTFE bellows PN 5,5 / PN 9 / PN 10,5

- Multiple convolution bellows made of PTFE
- Outer stabilizing rings of stainless steel between the convolutions
- Self-sealing PTFE flared ends
- Inner surface repellent of foreign matter

Material grade*	Possible uses
<b>PTFE</b>	<b>Aggressive acids and lyes, e.g. chloride, sulphate, solvents, bleaches, peroxide, fuels, gases</b>

\*Check or inquire about the resistance of the rubber grade to temperature and medium

DN	DN 200 - 500 PN 5,5	DN 125 - 150 PN 9	DN 15 - 100 PN 10,5	Temperature
Pressure rate				
Max. perm. operating pressure	<b>5.5 bar</b>	<b>9.0 bar</b>	<b>10.5 bar</b>	<b>up to +20 °C</b>
	<b>3.5 bar</b>	<b>5.5 bar</b>	<b>7 bar</b>	<b>up to +100 °C</b>
	<b>2.5 bar</b>	<b>4.0 bar</b>	<b>4 bar</b>	<b>up to +150 °C</b>
	<b>1.7 bar</b>	<b>2.5 bar</b>	<b>3 bar</b>	<b>up to +200 °C</b>
Vacuum operation	<b>≥ 0.01 bar abs. DN 15 - 150</b> <b>≥ 0.20 bar abs. DN 200 - 250</b> <b>≥ 0.70 bar abs. DN 300 - 500</b>			

Max. operating pressure to be set 30 % lower for shock loads.

### Flanges

#### Version

- Rotating flanges with ears to carry tie rods
- threaded holes

#### Dimensions

Standard: DN 25 - 150 (PN 16)  
DN 200 - 500 (PN 10)  
according to EN 1092

Others: DIN EN, ANSI, BS etc.

Connection dimensions see technical annex

#### Materials

Standard: 1.0038 (S235JR)

Others: 1.4541, 1.4571

#### Corrosion protection

Standard: DN 15 - DN 300  
electrogalvanized  
DN 350 - DN 500  
anti-corrosion primed

Others: hot-dip galvanized, special varnish, special coating, etc.

### Applications

- for conveying aggressive media
- for compensating lateral movement
- for muffling vibration and noise
- for reducing thermal and mechanical tension
- to compensate for installation inaccuracies
- chemical industry
- treatment and disposal technology
- pharmaceutical industry

### Tie rod restraints

- Tie rods carried on spherical washers and conical seats

#### Materials

Standard: tie rods 8.8

Others: stainless steel

#### Corrosion protection

Standard: electrogalvanized

Others: hot-dip galvanized

### Accessories

- Internal guide sleeve of PTFE
- Protective cover

## Dimensions standard program

DN	BL mm	Pressure rate bar	ø di Bellows inner ø mm	ø C Raised face ø mm	PN Flange connection EN 1092	ø D Flange outer ø mm	b Flange thickness mm	H Flange height mm
15	46	10.5	21.5	45	16	95	8	143
20	46	10.5	21.5	58	16	105	8	153
25	46	10.5	21.5	68	16	115	8	163
32	46	10.5	34.5	78	16	140	10	194
40	46	10.5	34.5	88	16	150	10	204
50	56	10.5	48.3	102	16	165	12	219
65	77	10.5	58.5	122	16	185	12	239
80	77	10.5	73.2	138	16	200	12	267
100	91	10.5	99.3	158	16	220	15	287
125	111	9.0	123.0	188	16	250	15	330
150	101	9.0	147.8	212	16	285	18	370
200	137	5.5	205.1	268	10	340	20	460
250	200	5.5	256.6	320	10	395	22	515
300	196	5.5	280.5	370	10	445	25	605
350	215	5.5	on request	on request	10	on request	on request	on request
400	233	5.5	on request	on request	10	on request	on request	on request
450	280	5.5	on request	on request	10	on request	on request	on request
500	327	5.5	on request	on request	10	on request	on request	on request

Larger sizes (DN), other lengths (BL), higher pressure rate, different movement compensation available on request  
Dimensions according to GR 12-0040 standard available on request.

## Movement compensation

DN	Δ lat Lateral movement mm	Weight approx. kg
15	4	1.7
20	4	2.1
25	6	2.3
32	6	2.8
40	6	3.1
50	9	4.3
65	9	5.1
80	13	5.8
100	13	7.5
125	14	11.9
150	14	13.2
200	14	21.5
250	14	27.7
300	15	35.8
350	18	61.0
400	20	76.0
450	20	92.0
500	25	112.0

Table values refer to +20 °C and triple-convoluted expansion joints

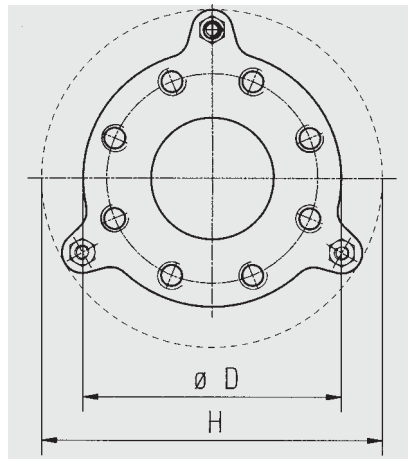
## Note

Additional PTFE gaskets necessary for installation in glass, graphite or ceramic pipes.

Please comply with the general technical instructions regarding reaction force, moving force, fixed point load, installation instructions etc.

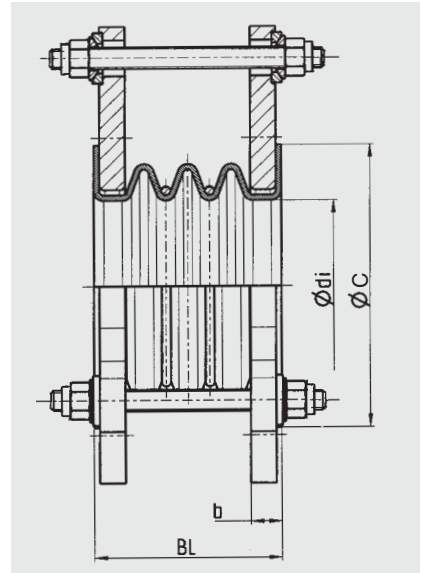
Subject to technical alterations and deviations resulting from the manufacturing process.

## Flange version



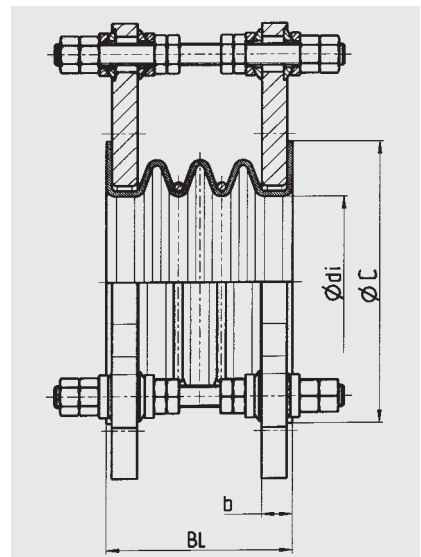
Number of tie rods depending on pressure

## Versions



### Type P-2

Lateral PTFE expansion joint, with tie rods (outer restraints) carried on spherical washers and conical seats



### Type P-4

Lateral PTFE expansion joint, design as type P-2, additional inner restraints, carried on spherical washers and conical seats.