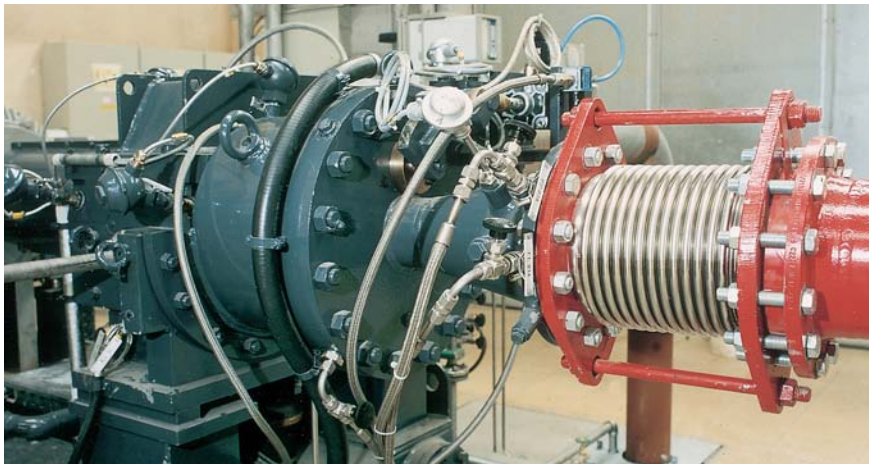
STENFLEX®

Steel expansion joints

General description of steel expansion joints



STENFLEX® steel expansion joints have served with distinction for more than 45 years. They are the preferred flexible pipe connection elements of choice in manufactured appliances, machinery, apparatus and piping engineering.

Constant further development and innovations update our product range to meet the needs of current and changing markets, and fulfil the requirements of industry in regard to:

- Operating safety
- Reliability
- Pressure and temperature resistance
- Vacuum stability
- Flexibility
- Impermeability
- Corrosion resistance
- No maintenance
- Long service life

The large-scale industrial manufacture of steel bellows, constant control of compliance with all manufacturing, business and quality processes in line with EN ISO 9001:2008 and decades of experience in the development and manufacture of steel expansion joints: all this guarantees a uniform product of the highest standard. It underlines the STENFLEX® Quality Claim.

Our expertise in expansion joint engineering is reflected in the long service life and consequently in the high operational reliability of our steel expansion joints, thanks to the excellent production functionality and quality.

For decades our steel expansion joints have been used in a wide variety of applications, and guarantee trouble-free operation on-site.

STENFLEX® has been assessed and approved as manufacturer of steel expansion joints, on the basis of AD norms of the Pressure Equipment Directive and international standards. Calculations are based among other factors, on AD 2000-B12, DIN EN 14917 and EJMA. STENFLEX® steel expansion joints have been certified by numerous classification, and acceptance societies, and bear the CE mark.

Our engineers together with our R&D department are always available for technical consultation, and ready to help in solving specific application problems at any time.

Purpose

Steel expansion joints are used in appliances, machines, apparatus and pipe systems where space is restricted

- to compensate for movement
- to compensate for expansion
- to reduce tension
- to absorb noise and oscillation transmission
- to compensate for ground and foundation settlement
- as adapters to compensate for installation inaccuracies
- as dismantling pieces for fittings

Steel expansion joints are flexible pipe connection elements and are used in a variety of industrial applications:

- Machine engineering
- Domestic industry
- Chemical industry
- Process plant engineering
- Gas and water supply
- Exhaust technology

Development/Design

STENFLEX® steel expansion joints are rated theoretically using state-of-the-art computing techniques (which include the Finite Element Method). They are optimized under experimental conditions. National and international calculation standards are used to rate the bellows.

Our development engineers use the most up-to-date development tools throughout the development stage to validate the construction process in terms of form, function and installation. Hence we can offer our customers the following advantages:

- Design and development in line with the specific requirements, resulting in safe and extremely durable expansion joints
- Efficient products by incorporating superior functionality
- Structures that are easy to install
- Reduced lead times for special designs

Versions

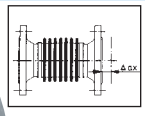
STENFLEX® steel expansion joints vary according to the following criteria:

- type (universal/lateral/angular expansion joints)
- pipe connection type (flange, welding end or threaded connection)
- material quality of the bellows (rated to the media transported in the pipes)
- bellows structure (rated to the movement, pressure and temperature load)

Our expansion joints are delivered ready for installation. STENFLEX® manufactures expansion joints in nominal widths DN 15 – DN 2800 and for nominal pressure rates PN 1 - PN 25. A wide range of materials is used, with temperature resistance from –196 °C to +900 °C.

Together with the standard and basic versions featured in the catalogue, special versions can also be developed and produced on request, for special operating conditions or special structures.

Connection parts (that deviate from DIN) such as EN, ISO, ANSI, VG, SAE standards etc. are also available.

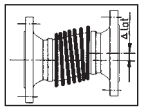


Axial expansion joints

Structure:
Steel bellows with connection parts (flange, welding end or threaded connection).

Movement absorption:
Axial shift, and slight all-round movement of the expansion joint is possible. Axial expansion joints with two bellows are used to absorb larger movement.

Fixed points:
Robust pipe fixed points and correct pipe routing are necessary to absorb the axial forces.

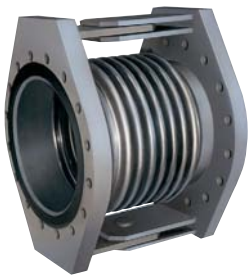


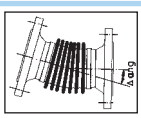
Lateral expansion joints

Structure:
Steel bellows with laterally movable restraints and flanges or welding ends.

Movement absorption:
Lateral shift of the expansion joint is possible. The restraint absorbs axial reaction force and relieves the 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 required to absorb lateral movement and friction force.





Angular expansion joints

Structure:
Steel bellows with hinge restraint and flanges or welding ends. The rotating axis of the hinge restraint is in the middle of the bellows.

Movement absorption:
Angular movement of the expansion joint is possible. The angular joints regulate a defined angular movement, absorb axial reaction force and relieve the pressure on the pipe's fixed points.
We differentiate between angular expansion joints with a hinge (bellows angular movement guided on one plane) and angular expansion joints with a cardan hinge restraint (bellows movement guided on two planes).

Fixed points: Only light fixed points are required to absorb angular movement force and friction force.

Steel expansion joints

General description of steel expansion joints

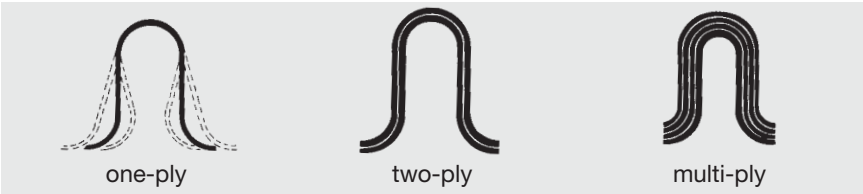
Steel bellows

Structure

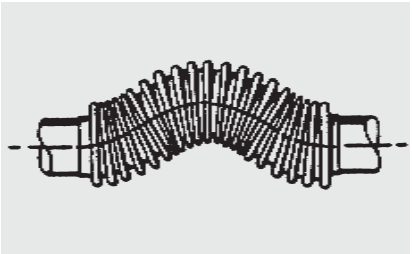
STENFLEX® steel bellows are available in a variety of structures and versions. The steel bellows is the flexible element of every expansion joint. It must fulfil the requirement for good movability with simultaneous pressure resistance.

Variable parameters (wall thickness, number of plies, convolution geometry, number of convolutions) determine the pressure resistance, movement absorption and spring rate (self-resisting force) of the bellows. One-ply, two-ply and multi-ply bellows are manufactured from various materials with different wall thicknesses.

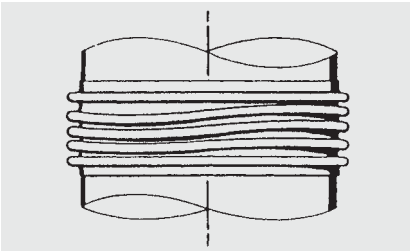
Our calculation methods ascertain the stability limits. The ability to withstand buckling is the prime criterion for smaller bellows diameters, whereas in larger bellows diameters it is convolution stability.



Multi-ply bellows are to be used for vibration load



Buckling instability of a steel expansion joint



Convolution instability of a steel expansion joint

Material qualities

STENFLEX® expansion joint bellows are manufactured from top quality sheet metal. Different material qualities are used to cover the many operating conditions in various industrial applications.

The outstanding characteristic of the steels and alloys is their particular resistance to chemically aggressive liquid media. Please ask our Technical Consulting Service for detailed information about the media resistance of individual materials.

Bellows material	Material No. as per DIN EN	Designation as per DIN EN (DIN)	Properties	Applications
Stainless steel	1.4541	X6CrNiTi18-10	For aggressive media, good endurance at low temperatures	Food-product industry, film and photo industry, nitrogen fertilizer industry, silencer and exhaust purification systems, low temperature technology
	1.4404 1.4571	X2CrNiMo17-12-2 X6CrNiMoTi17-12-2	The Mo component results in greater resistance to pitting corrosion from media containing chloride, suitable for drinking water and food products	Chemical industry, oil, soap and textile industries, dyeing plant, dairies, breweries, pharmaceutical industry, petrochemical and coal-tar industry, water supply and water treatment
Heat resistant steel	1.4828	X15CrNiSi20-12	Heat resistant	Furnace and apparatus construction, air pre-heaters, steel and metallurgical industry
	1.4878	X12CrNiTi18-9	Heat resistant	Steel and metallurgical industry
Nickel-based alloy	2.4858 (Incoloy 825)	NiCr21Mo	Highly resistant to oxidizing and non-oxidizing hot acids (sulphuric and phosphoric acid)	Chemical engineering, plant for air purification, oil and gas extraction, reprocessing plant, acid production, petrol facilities

Rating, service life

Steel bellows, as a rule, are rated for a temperature of +20 °C, the nominal pressure and a load of 1000 load cycles.

One load cycle refers to the procedure beginning at zero position, from where the expansion joint moves to the maximum elongation (positive) position, back through the zero position to the maximum compression (negative) position, and back to the zero position.

Together with the tolerable operating conditions

- pressure
- temperature
- movement
- number of load cycles

the following parameters can also influence the service life of expansion joints:

- corrosion
- high-frequency oscillations
- sympathetic vibration
- pressure shocks
- temperature shocks
- incorrect installation

Corrosion can be caused by incorrect selection or combination of materials, conveyance of aggressive media and inappropriate cleaning with chemical agents.

High-frequency oscillations and sympathetic vibration must be avoided by all means, because this will result in fatigue failure/fracture.

Pressure and temperature shocks must be avoided. It is important not to exceed the permitted maximum values.

Incorrect installation can be prevented by compliance with our installation and assembly instructions.

In the case of unrestrained expansion joints, the absence of fixed points can cause the pipeline to shift. This usually destroys the expansion joint.

Connection parts

STENFLEX® steel expansion joints are supplied ready for installation. They are connected to pipes, fittings, pumps, tanks etc. by flanges, welding ends or threaded connections. The connections are standardized to fit commercially available flanges, threads and pipes.

Flanges

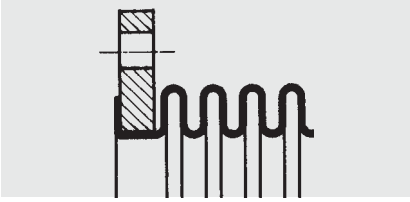
STENFLEX® steel expansion joints, series SF, are supplied with rotating flanges or fixed flanges.

Standard flanges are drilled in accordance to EN 1092. Standard screws can be used because the flanges are drilled for through bolts. Other flange connections are possible, e.g. to DIN EN, ANSI, BS, VG, SAE, for exhaust pipes and ventilation systems.

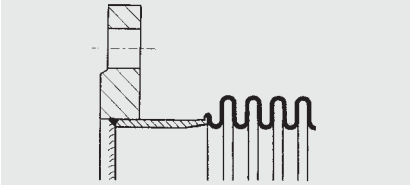
Flanges for lateral expansion joints are equipped with ears for tie rod restraints. The design differs between flanges with molded ears and oval flanges, depending on expansion joint type and size.

Angular expansion joints are equipped with oval flanges and welded hinge restraints.

Flanges of unalloyed steel 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.), can be supplied on request.



Steel expansion joint with rotating flange with flared bellows



Steel expansion joint with fixed flange

Flange material	Material No. as per DIN EN	Designation as per DIN EN (DIN)
Unalloyed steel	**1.0038**	**S235JR**
	1.0577	**S355J2**
Stainless steel	**1.4404**	**X2CrNiMo17-12-2**
	1.4541	**X6CrNiTi18-10**
	1.4571	**X6CrNiMoTi17-122**
	1.4828	**X15CrNiSi20-12**
High-temperature steel	**1.0425**	**P265GH (H II)**
	1.0460	**P250GH (HI)**

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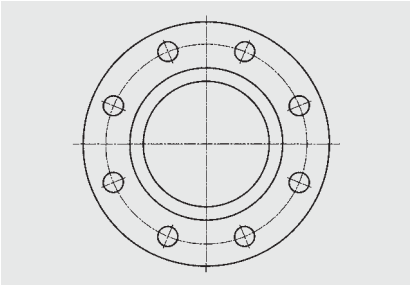
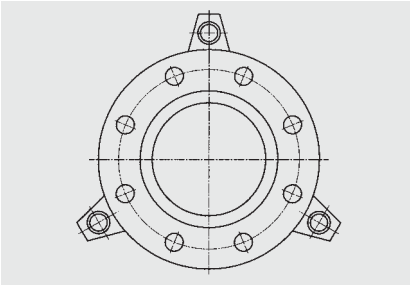
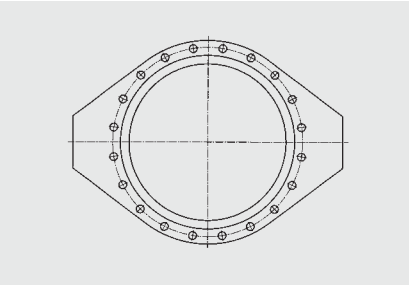
General description of steel expansion joints



Standard flange (axial and universal expansion joints)



Flange with welded restraint or molded ears to accomodate the tie rods (lateral expansion joints)

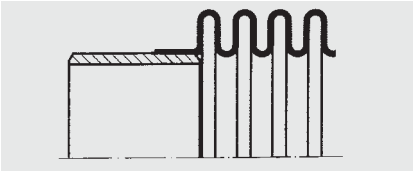


Oval flange (angular expansion joints)

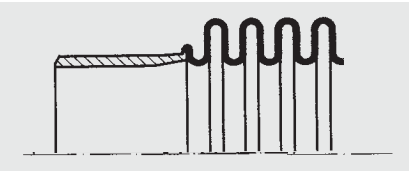
Welding ends

Steel expansion joints, series SA, are equipped with welding ends. The dimensions of the welding ends are rated in accordance with the ISO pipe standards, or to customer specifications.

Welding ends of unalloyed steel are given an anti-corrosion prime coating. Stainless steel is used to meet tougher corrosion protection requirements. Other materials, and forms of corrosion protection (special varnish, special coating etc.), are available on request.



Steel expansion joint with welding ends – bellows welded to reinforcing ring



Steel expansion joint with welding ends – bellows welded with flared seam

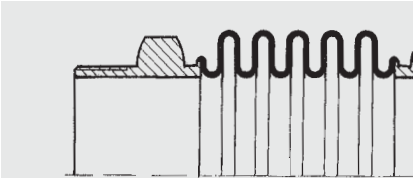
Welding end material	Material No. as per DIN EN	Designation as per DIN EN (DIN)
Unalloyed steel	**1.0038**	**S235JR**
	1.0577	**S355J2**
Stainless steel	**1.4404**	**X2CrNiMo17-12-2**
	1.4541	**X6CrNiTi18-10**
	1.4571	**X6CrNiMoTi17-12-2**
	1.4828	**X15CrNiSi20-12**
High-temperature steel	**1.0305**	**P235G1TH (St 35.8I)**
	1.5415	**16Mo3 (15Mo3)**

Threaded connections

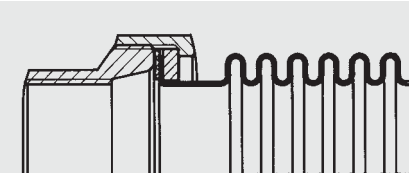
STENFLEX® steel expansion joints with threaded connections series SG, are primarily used in the domestic industry for smaller dimensions up to DN 50. They are equipped with female or male thread, in accordance with ISO 7-1 (DIN 2999).

Threaded connections of high-temperature steel are given an anti-corrosion prime coating. Malleable castings are electrogalvanized. Stainless steel is used to meet tougher corrosion protection requirements. It is also suitable for copper and plastic pipes.

Other materials, and forms of corrosion protection (special varnish, special coating etc.), are available on request.



Type SG-10 with male thread



Type SG-11 with female thread

Threaded part material	Material No. as per DIN EN	Designation as per DIN EN (DIN)
High-temperature steel	**1.0305**	**P235G1TH (St 35.8 I)**
Malleable casting	**0.8040**	**GJMW-400-5**
Stainless steel	**1.4541**	**X6CrNiTi18-10**
	1.4571	**X6CrNiMoTi17-12-2**

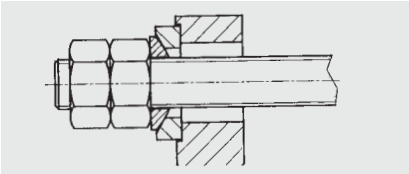
Restraints

Restraints are used for lateral and angular expansion joints. The restraints absorb axial reaction force produced by inner pressure. Even so, the connected pipe must be equipped with light fixed points to absorb moving force and moments. Precise rating details and operating parameters of the corresponding machinery or equipment must be known to correctly calculate the degree of restraint needed. Standard restraints are available for the lateral and angular expansion joint program. They are calculated on the basis of the material strength values at +20 °C. Reduced strength values at higher temperatures are taken into account.

Tie rod restraints

Lateral expansion joints are equipped with adapters for tie rod restraints. The design differs between flanges with welded ears or oval flanges depending on the expansion joint type and size. Tie rod restraints run flexibly on sperical washers and conical seats.

The tie rods, spherical washers, conical seats, and nuts are electrogalvanized. Ears of unalloyed steel are given an anti-corrosion prime coating. Stainless steel is used to meet tougher corrosion protection requirements. Other materials, and forms of corrosion protection (special varnish, special coating, etc.), can be supplied on request.



Outer restraint with spherical washers and conical seats (lateral expansion joints)

Material tie rod restraint	Material No. as per DIN EN	Designation as per DIN EN (DIN) or strength class
Unalloyed steel		
Ears	**1.0038**	**S235JR**
Tie rods		**5.6, 8.8**
Nuts		**5, 8**
Spherical washers/conical seats	**1.0401**	**C15**
Stainless steel		
Ears	**1.4541**	**X6CrNiTi18-10**
	1.4571	**X6CrNiMoTi17-12-2**
Tie rods, nuts	**A2**	**50, 70**
	A4	**50, 70**
Spherical washers/conical seats	**1.4305**	**X8CrNiS18-9**
High-temperature steel		
Ears	**1.5415**	**16Mo3 (15Mo3)**
Tie rods, nuts	**1.7225**	**42CrMo4**
	1.7709	**21CrMoV5-7**

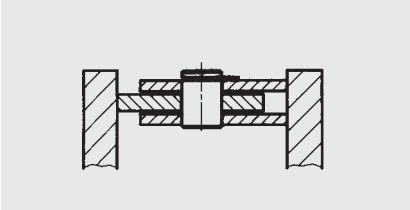
Steel expansion joints

General description of steel expansion joints

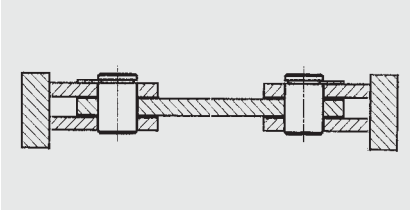
Hinge restraints

Angular expansion joints are equipped with oval flanges and hinge restraints that consist of joint bars and bolts.

Connection parts of unalloyed steel are given an anti-corrosion prime coating. Stainless steel parts are used to meet tougher corrosion protection requirements. Other materials and forms of corrosion protection (special varnish, special coating etc.) can be supplied on request.



Hinge restraint with joint bars and bolts (angular expansion joints)



Hinge restraint with joint bars and bolts (lateral expansion joints)

Material hinge restraint	Material No. as per DIN EN	Designation as per DIN EN (DIN)
Unalloyed steel	**1.0038**	**S235JR**
	1.0577	**S355J2**
Stainless steel	**1.4541**	**X6CrNiTi18-10**
	1.4571	**X6CrNiMoTi17-12-2**
High-temperature steel	**1.0305**	**P235G1TH (St 35.8I)**
	1.5415	**16Mo3 (15Mo3)**

Accessories

STENFLEX® steel expansion joints can be provided with the following accessories:

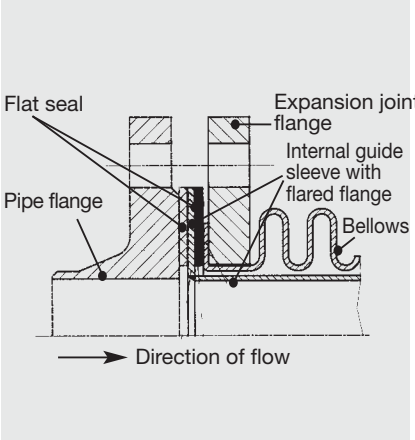
- Internal guide sleeve
- Guide sleeve
- Protective cover

Internal guide sleeves

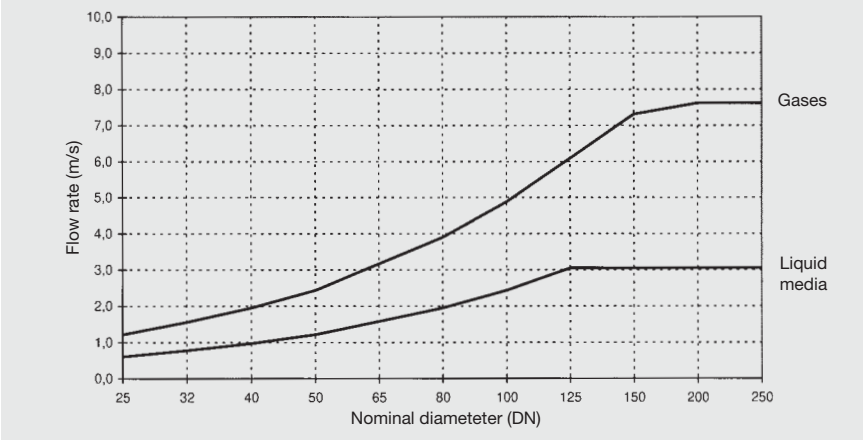
Internal guide sleeves can be inserted or welded into the expansion joint. As a rule they are made of stainless steel. Internal guide sleeves are required to handle higher flow speeds (see diagram) and the resulting possible resonance in the bellows. Also to deal with turbulence as a result of deflection in the direction of flow (e.g. behind pumps, valves, T-pieces, pipe bends).

Even under these conditions, the internal guide sleeve is intended to guide the medium turbulence free through the convoluted bellows.

An internal guide sleeve also provides the bellows with reliable protection from abrasion by the medium. In this case the internal guide sleeve must have thicker walls.

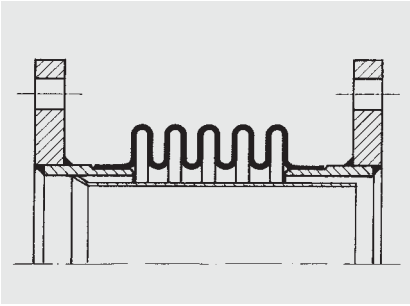


Internal guide sleeve with flared flange

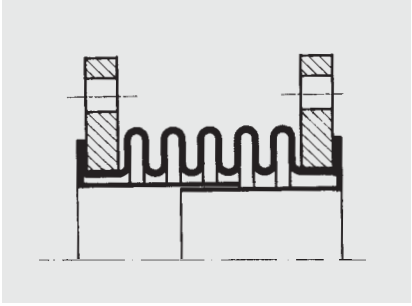


Internal guide sleeves have proven successful as protection for the bellows at flow rates above the curve. The data are of indicative nature.

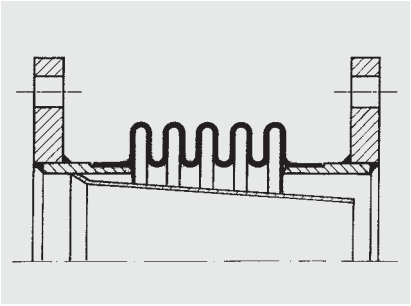
Axial expansion joints are equipped with cylindrical internal guide sleeves and lateral expansion joints with conical internal guide sleeves. Axial expansion joints with internal guide sleeve and flared flange require an additional seal between the bellows flare and the flared flange. In conical internal guide sleeves the tapered cross-section must be taken into account (pressure loss and flow rates). Telescopic internal guide sleeves with a narrow gap are used where the medium is able to flow through the expansion joint in both directions. Attention must be paid to the direction of flow to ensure that expansion joints with internal guide sleeve function properly. The direction of flow is indicated by the arrow marked on the expansion joint.



Axial expansion joint with cylindrical internal guide sleeve



Axial expansion joint with telescopic internal guide sleeve



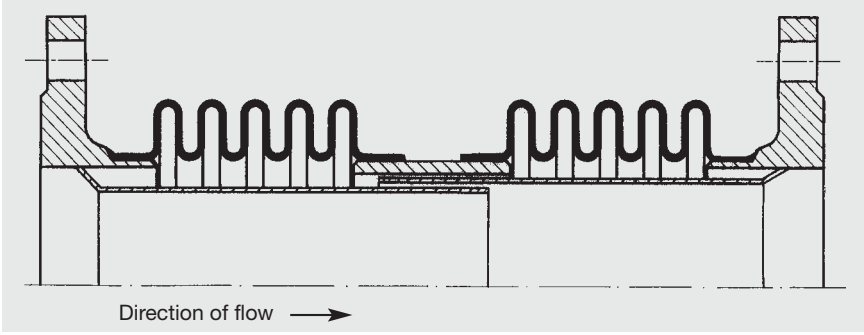
Lateral expansion joint with conical internal guide sleeve

Guide sleeves

Guide sleeves stabilize the expansion joint in its axial movement and prevent it from buckling. As a rule, guide sleeves are made of thick-walled, stainless or unalloyed steel.

Axial expansion joints with two bellows are provided with guide sleeves in the factory, as a rule with a telescopic design.

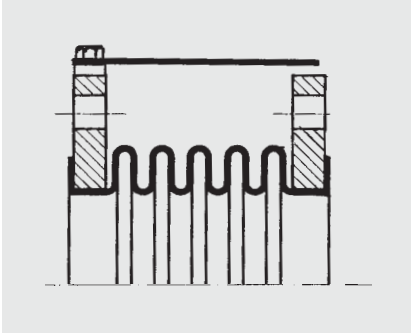
Expansion joint guide sleeves do not supersede pipe guide bearings.



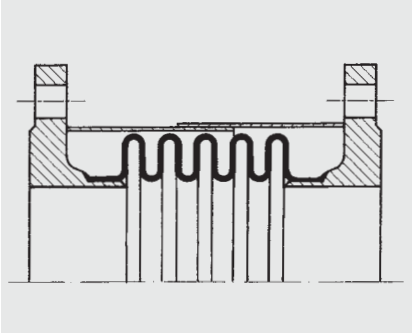
Axial expansion joint with telescopic guide sleeve

Protective covers

Protective covers are used to protect the bellows from damage during installation and operation. The pipes, fitted to the outside, protect the bellows reliably from splashes of welding materials or other mechanical influence. As a rule protective covers are made of stainless or unalloyed steel and can be fitted on the outside both over the flanges and between the flanges.



Expansion joint with removable protective cover on the outside over the flanges



Expansion joint with telescopic protective cover between the flanges

STENFLEX®

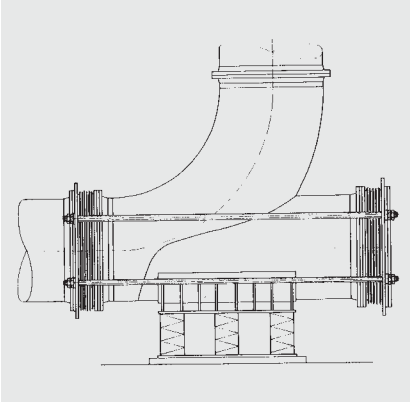
Steel expansion joints

Compensation systems

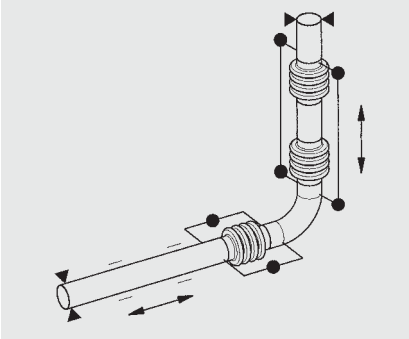
With more than 45 years of experience in expansion joint engineering, STENFLEX® is the competent partner for application-oriented solutions. STENFLEX® compensation pipe pieces can be supplied on request as complete system solution with ready mounted expansion joints. As a rule, these are angular and lateral expansion joints, designed according to customer requirements.

Pipe sections, bends, T-pieces and expansion joints are put together with the necessary restraints, hinges, and accessories, to form a unit.

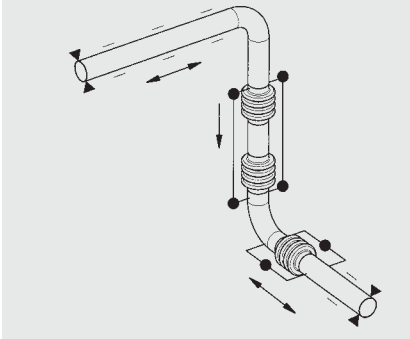
Our experts assist in the selection and optimum arrangement of the system components to produce a compensation system ready to be installed.



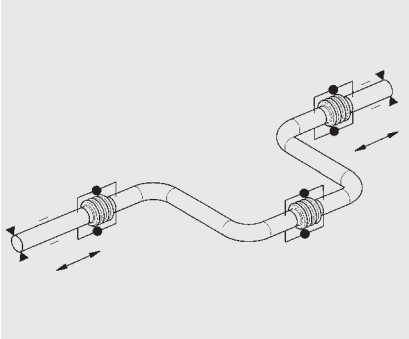
Compensation systems with lateral and angular expansion joints



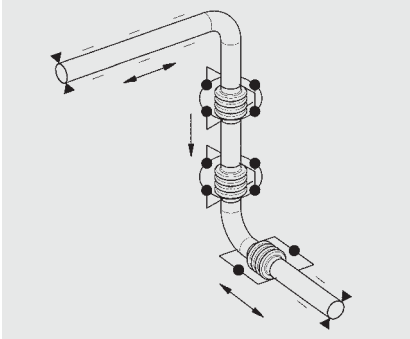
L-shaped triple joint
1 angular and 1 lateral expansion joint with hinge restraints



3D triple joint
1 angular and 1 lateral expansion joint with tie rod restraints



U-shaped triple joint
3 angular expansion joints with hinge restraints



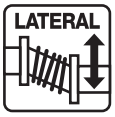
3D triple joint
2 angular expansion joints with cardan hinge restraint and 1 angular expansion joint with hinge restraint

Restrained STENFLEX® stainless steel expansion joints type SF-25 to absorb thermal expansion in a transformer plant

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 that illustrate the special features of the corresponding types, for easy pre-selection.

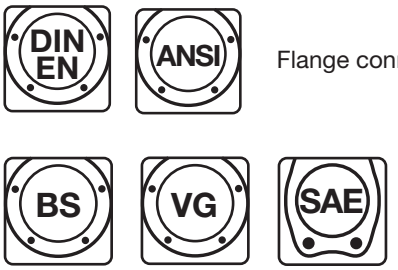
Expansion joint to absorb axial movement



Expansion joint to absorb lateral movement

Expansion joint to absorb angular movement

Maximum product pressure rate



Flange connections

Threaded connection to ISO

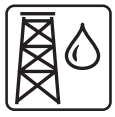
Minimum/maximum temperature

Resistant to hot water (combined with temperature symbol)

Suitable for sound and oscillation absorption

Suitable for drinking water and food products

Suitable for acids and lyes



Suitable for oils or fatty media

Suitable for gaseous media

STENFLEX®

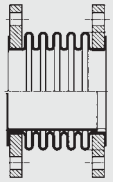
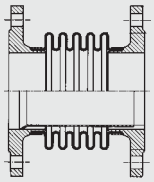
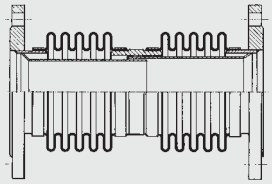
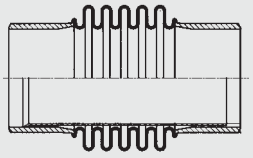
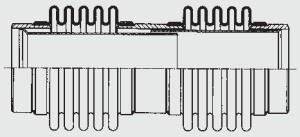
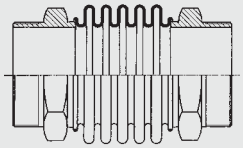
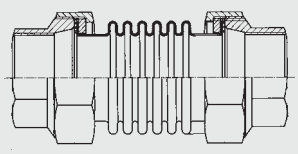
Steel expansion joints

Applications/Possible uses/Industries

Basic expansion joint types	Axial expansion joints							Lateral expansion joints									Angular expansion joints			
STENFLEX® Expansion joint types	SF-10	SF-11	SF-13	SA-10	SA-13	SG-10	SG-11	SF-20	SF-21	SF-23	SF-24	SF-25	SA-20	SA-23	SA-24	SA-25	SF-32	SF-33	SA-30	SA-33
Applications																				
Reducing tension	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Absorbing axial movement	■	■	■	■	■	■	■			■				■						
Absorbing lateral movement								■	■	■	■	■	■	■	■	■				
Absorbing angular movement																	■	■	■	■
Double or triple joint systems for absorbing large movement																	■	■	■	■
Absorbing oscillation	■	■		■		■	■	■	■	■			■	■						
Muffling sound	■	■		■		■	■	■	■	■			■	■						
Installation and dismantling aid								■	■											
Compensating for installation inaccuracies	■	■		■		■	■	■	■	■		■	■	■		■				
Possible uses																				
Metal pipes	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Plastic/copper pipes						■	■													
Motors	■	■		■				■	■	■			■	■						
Pumps	■	■						■	■	■			■	■						
Compressors	■	■		■				■	■	■			■	■						
Turbines	■	■		■				■	■	■			■	■						
Heat exchangers	■	■		■				■	■	■			■	■						
Condensers	■	■						■	■	■				■						
Separators	■	■		■				■	■				■							
Biogas plants	■	■		■	■		■	■	■				■							
Solar technology	■	■	■	■	■	■	■	■	■				■							
Industries																				
Mechanical engineering	■	■		■		■	■	■	■	■			■	■						
Domestic industry	■	■	■	■	■	■	■	■	■				■							
Heating installation	■	■	■	■	■	■	■	■	■	■			■	■						
Chemical industry	■							■												
Plant construction	■	■	■					■	■	■	■	■		■	■	■	■	■	■	■
Power industry		■	■		■			■	■	■	■	■		■	■	■	■	■	■	■
Shipbuilding	■	■		■	■			■	■	■			■	■						
Pipeline construction	■	■	■	■	■			■	■	■	■	■	■	■	■	■	■	■	■	■
Hydraulic systems	■			■				■		■		■	■	■		■				
Printing and paper industry	■	■						■	■											
Exhaust technology/gas supply systems	■	■		■	■		■	■	■	■			■	■						
Water supply and water treatment	■			■		■		■												
Renewable energy technology	■	■	■	■	■	■	■	■	■				■							

Table showing the prime applications, possible uses and industries.

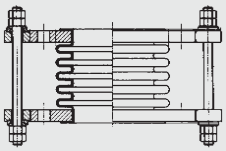
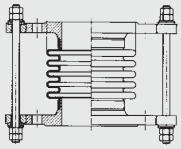
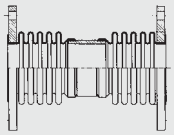
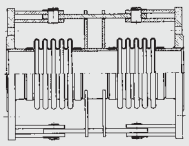
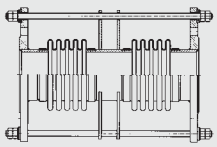
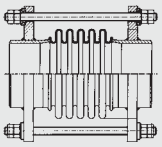
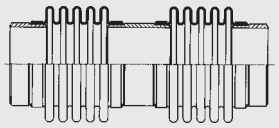
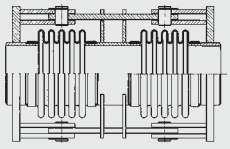
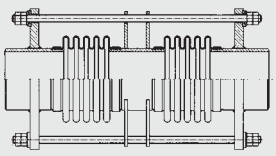
Program summary

Axial steel expansion joints	Type	DN	Pressure rate	Max. operating temperature	Bellows material	Connection parts/restraints	Page
	**SF-10**	DN 25 - 2800 DN 300 - 2000 DN 15 - 1000 DN 15 - 500 on request on request	PN 2,5 PN 6 PN 10 PN 16	+550 °C +550 °C +550 °C +550 °C +450 °C +900 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404 2.4858 1.4828, 1.4878	rotating flanges	6.15
	**SF-11**	DN 15 - 500 DN 200 - 250	PN 16 PN 10	+550 °C +550 °C	1.4541, 1.4571 1.4541, 1.4571	fixed flanges	6.19
	**SF-13**	DN 20 - 1200 DN 20 - 250	PN 10 PN 16	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	fixed flanges	6.21
	**SA-10**	DN 20 - 2800 DN 15 - 2000 DN 15 - 1200 DN 15 - 1000 on request on request	PN 2,5 PN 6 PN 10 PN 16	+550 °C +550 °C +550 °C +550 °C +450 °C +900 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404 2.4858 1.4828, 1.4878	welding ends	6.23
	**SA-13**	DN 15 - 1200 DN 15 - 250	PN 10 PN 16	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	welding ends	6.27
	**SG-10**	DN 15 - 50	PN 16	+550 °C	1.4541, 1.4571, 1.4404	male thread and hexagon	6.29
	**SG-11**	DN 15 - 50	PN 16	+550 °C	1.4541, 1.4571, 1.4404	female thread and hexagon	6.30

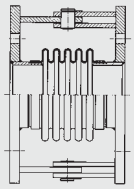
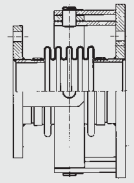
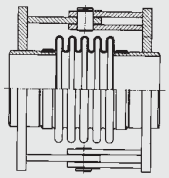
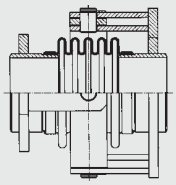
STENFLEX®

Steel expansion joints

Program summary

Lateral steel expansion joints	Type	DN	Pressure rate	Max. operating temperature	Bellows material	Connection parts/restraints	Page
	**SF-20**	DN 32 - 500 DN 32 - 500 on request	PN 10 PN 16	+550 °C +550 °C +900 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404 1.4828, 1.4878	rotating flanges with tie rod restraints	6.31
	**SF-21**	DN 32 - 500	PN 16	+550 °C	1.4541, 1.4571	fixed flanges with tie rod restraints	6.33
	**SF-23**	on request	PN 1 PN 6	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	rotating flanges	6.35
	**SF-24**	on request	PN 6 PN 10	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	fixed flanges with tie rod restraints	6.36
	**SF-25**	on request	PN 6 PN 10	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	fixed flanges with tie rod restraints	6.37
	**SA-20**	on request	PN 16	+550 °C	1.4541, 1.4571, 1.4404	welding ends with tie rod restraints	6.38
	**SA-23**	on request	PN 1 PN 6	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	welding ends	6.39
	**SA-24**	on request	PN 6 PN 10	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	welding ends with hinge restraints	6.40
	**SA-25**	on request	PN 6 PN 10	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	welding ends with tie rod restraints	6.41

Program summary

Angular steel expansion joints	Type	DN	Pressure rate	Max. operating temperature	Bellows material	Connection parts/restraints	Page
	**SF-32**	on request	PN 6 PN 16	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	fixed flanges with hinge restraints	6.42
	**SF-33**	on request	PN 6 PN 16	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	fixed flanges with cardan-hinge restraints	6.43
	**SA-30**	on request	PN 6 PN 16	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	welding ends with hinge restraints	6.44
	**SA-33**	on request	PN 6 PN 16	+550 °C +550 °C	1.4541, 1.4571, 1.4404 1.4541, 1.4571, 1.4404	welding ends with cardan-hinge restraints	6.45

STENFLEX®

SF-10/1-C12

Steel expansion joint ▪ Type SF-10

Axial expansion joint DN 15 – DN 2800

DN 15 - DN 500

DN 600 - DN 2800

Structure type SF-10

☐ Vacuum-proof, short-length axial expansion joint, consisting of a stainless steel bellows and rotating flanges

Applications

- **for compensating axial movement**
- **for reducing tension, damping noise and oscillation in pipes and their system components, e.g.**
  - **pumps**
  - **motors**
  - **machines**
- **for installation in**
  - **industrial applications**
  - **gas and water supply**
  - **exhaust systems**
  - **heating installations**
  - **drinking water systems**
- **to compensate for installation inaccuracies**

Steel bellows PN 2.5 / PN 6 / PN 10 / PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure
☐ DN 15 – DN 500 with flared ends
☐ DN 600 – DN 2800 with pre-welded flared ends

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C**	**Low temperature, acids, lyes, gases,**
		up to +550 °C	**fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**
Heat-resistant steel	**1.4828**	**+900 °C**	**Hot gases, steam, air**
	1.4878	**+800 °C**	**Hot gases, steam, air**
Nickel-based alloy	**2.4858 (Incoloy 825)**	**+450 °C**	**Sulphuric acid, phosphoric acid, petrol, öl, gases**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Accessories

☐ Internal guide sleeve
☐ Protective tube
☐ Gas sealings for DVGW-application

Certificates

☐ CE (DGR 97/23/EG)
☐ American Bureau of Shipping
☐ Bureau Veritas
☐ DVGW (DN 32 - DN 200)
☐ Germanischer Lloyd
☐ Lloyd´s Register of Shipping
☐ RINA
☐ RMRS

Flanges

Version

☐ Rotating flanges
☐ Flange drilling for through bolts

Dimensions

Standard: DN 1200 - DN 2800 (PN 2,5)
DN 300 - DN 2000 (PN 6)
DN 15 - DN 1000 (PN 10)
DN 15 - DN 500 (PN 16)
according to EN 1092
Others: DIN EN, ANSI, BS etc.
Connection dimensions see technical annex

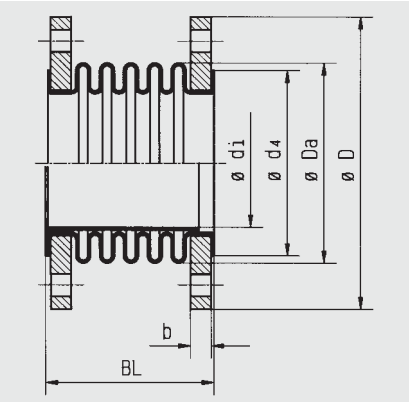
Materials

Standard: 1.0038 (S235JR), 1.4541, 1.4404
Others: stainless steel, etc.

Corrosion protection

Standard: DN 32 - DN 250 electro-galvanized,
DN 300 - DN 2800 anti-corrosion primed
Others: hot-dip galvanized, special varnish, special coating etc.

Version



Type SF-10

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.

Pressure rate PN 2.5 standard program

DN	BL mm	Δ ax_{tot} Axial move-ment mm	C_{ax} Axial spring rate N/mm	Δ lat_{tot} Lateral move-ment mm	C_{lat} Lateral spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø d_4 Flared end ø mm	ø D_a Bellows outer ø mm	PN Flange connec-tion EN 1092	ø D Flange outer ø mm	b Flange thick-ness mm	Weight approx. kg
25	105	25	28	13	10	10	68	42	16	115	16	3.9
32	135	30	15	26	8	15	56	51	16	140	16	3.8
40	135	30	17	20	15	22	65	61	16	150	16	3.9
50	160	44	16	34	12	34	80	76	16	165	18	5.3
65	175	56	25	26	18	55	95	96	16	185	20	7.0
80	190	68	20	28	18	78	110	114	16	200	20	7.9
100	195	70	19	26	22	114	140	136	16	220	22	10.0
125	200	72	26	21	49	174	165	168	16	250	22	12.3
150	220	80	28	21	62	246	200	197	16	285	24	16.1
200	230	86	36	19	118	424	254	253	10	340	24	20.7
250	245	96	50	19	208	622	310	302	10	395	26	26.1
300	180	48	119	–	–	990	364	386	6	440	24	27.0
300	265	98	60	14	399	990	364	386	6	440	24	30.0
350	185	48	129	–	–	1179	396	418	6	490	26	38.0
350	270	98	65	14	515	1179	396	418	6	490	26	40.0
400	185	46	146	–	–	1507	452	469	6	540	28	44.0
400	270	94	73	12	744	1507	452	469	6	540	28	47.0
450	190	46	162	–	–	1878	498	520	6	595	30	54.0
450	275	92	81	10	1032	1878	498	520	6	595	30	57.0
500	190	44	178	–	–	2282	548	570	6	645	30	58.0
500	275	90	89	8	1378	2282	548	570	6	645	30	62.0
600	195	44	212	–	–	3227	670	672	6	755	32	77.0
600	280	88	106	7	2315	3227	670	672	6	755	32	81.0
700	210	44	246	–	–	4336	775	774	6	860	40	111.0
700	295	88	123	–	–	4336	775	774	6	860	40	116.0
800	220	42	279	–	–	5595	857	875	6	975	44	133.0
800	305	86	140	–	–	5595	857	875	6	975	44	139.0
900	225	42	313	–	–	7014	958	976	6	1075	48	160.0
900	310	86	156	–	–	7014	958	976	6	1075	48	167.0
1000	235	42	346	–	–	8610	1080	1078	6	1175	52	212.0
1000	320	86	173	–	–	8610	1080	1078	6	1175	52	220.0
1200	210	42	413	–	–	12291	1263	1282	2.5	1375	30	152.0
1200	295	84	207	–	–	12291	1263	1282	2.5	1375	30	160.0
1400	210	42	478	–	–	16536	1462	1484	2.5	1575	30	175.0
1400	295	84	239	–	–	16536	1462	1484	2.5	1575	30	185.0
1600	210	42	543	–	–	21408	1662	1682	2.5	1790	30	219.0
1600	295	84	271	–	–	21408	1662	1682	2.5	1790	30	231.0
1800	210	42	607	–	–	26909	1862	1882	2.5	1990	30	245.0
1800	295	84	304	–	–	26909	1862	1882	2.5	1990	30	258.0
2000	210	42	672	–	–	33039	2062	2082	2.5	2190	30	271.0
2000	295	84	336	–	–	33039	2062	2082	2.5	2190	30	285.0
2200	210	42	736	–	–	39796	2262	2282	2.5	2405	35	365.0
2200	295	84	368	–	–	39796	2262	2282	2.5	2405	35	381.0
2400	210	42	800	–	–	47182	2462	2482	2.5	2605	35	387.0
2400	295	84	400	–	–	47182	2462	2482	2.5	2605	35	414.0
2800	210	42	928	–	–	63839	2862	2882	2.5	3030	35	520.0
2800	295	84	464	–	–	63839	2862	2882	2.5	3030	35	540.0

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Please inquire for deviating values.
For pure axial movement: inner diameter of internal guide sleeve mentioned in tables PN 6, PN 10, PN 16.
If Δ ax and Δ lat occur simultaneously, the table values must be reduced accordingly. The sum of all shares must not exceed 100 %.
*Effective bellows cross sectional area is a theoretical value.

Steel expansion joint ▪ Type SF-10

Axial expansion joint

Pressure rate PN 6 standard program

DN	BL mm	Δax_{tot} Axial spring rate mm	C_{ax} Axial move-ment N/mm	A* Effective bellows cross sectional area cm^2	ø d_4 Flared end ø mm	ø D_a Bellows outer ø mm	ø d_i Internal guide sleeve ø mm	PN Flange connec-tion EN 1092	ø D Flange outer ø mm	b Flange thickness mm	Weight approx. kg
300	180	43	119	990	364	386	310	6	440	24	27.0
300	265	68	99	962	364	376	310	6	440	24	29.0
350	185	42	129	1176	396	418	342	6	490	26	38.0
350	270	70	96	1152	396	410	342	6	490	26	39.0
400	190	40	146	1507	452	469	393	6	540	28	44.0
400	270	72	98	1486	452	463	393	6	540	28	47.0
450	190	38	178	1870	498	518	444	6	595	30	54.0
450	275	74	98	1863	498	516	444	6	595	30	57.0
500	190	36	215	2265	548	566	494	6	645	30	58.0
500	275	68	98	2273	548	568	494	6	645	30	62.0
600	195	36	256	3207	670	668	596	6	755	32	77.0
600	280	72	128	3207	670	668	596	6	755	32	81.0
700	210	34	327	4301	775	768	698	6	860	40	111.0
700	295	68	164	4301	775	768	698	6	860	40	115.0
800	220	32	411	5542	857	867	795	6	975	44	132.0
800	305	64	206	5542	857	867	795	6	975	44	137.0
900	230	32	460	6955	958	968	896	6	1075	48	159.0
900	310	64	230	6955	958	968	896	6	1075	48	165.0
1000	235	30	565	8528	1080	1068	998	6	1175	52	211.0
1000	320	60	283	8528	1080	1068	998	6	1175	52	218.0
1200	225	27	1634	12303	1264	1283	1202	6	1405	30	186.0
1200	310	55	817	12303	1264	1283	1202	6	1405	30	200.0
1400	225	27	1894	16549	1464	1483	1402	6	1630	35	275.0
1400	320	55	947	16549	1464	1483	1402	6	1630	35	291.0
1600	225	27	2152	21424	1664	1683	1602	6	1830	35	312.0
1600	320	55	1076	21424	1664	1683	1602	6	1830	35	331.0
1800	225	27	2410	26927	1864	1883	1802	6	2045	35	371.0
1800	320	55	1205	26927	1864	1883	1802	6	2045	35	392.0
2000	225	27	2667	33058	2064	2083	2002	6	2265	35	444.0
2000	320	55	1334	33058	2064	2083	2002	6	2265	35	467.0

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Please inquire for deviating values.
*Effective bellows cross sectional area is a theoretical value.

Pressure rate PN 10 standard program

DN	BL mm	Δ ax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø d_4 Flared end ø mm	ø D_a Bellows outer ø mm	ø d_i Internal guide sleeve ø mm	PN Flange connection EN 1092	ø D Flange outer ø mm	b Flange thickness mm	Weight approx. kg
15	108	17	21	7	45	38	18	16	95	14	1.5
20	108	17	21	7	58	38	18	16	105	16	2.1
25	125	26	49	16	54	54	25	16	115	16	2.4
32	135	26	49	16	54	54	32	16	140	18	4.0
40	135	30	111	25	68	66	38	16	150	18	4.5
50	155	36	177	34	75	79	49	16	165	18	5.5
65	165	40	199	54	95	96	63	16	185	20	7.4
80	175	46	148	78	110	115	76	16	200	20	8.4
100	180	46	175	115	140	137	96	16	220	22	10.1
125	200	50	79	173	165	168	123	16	250	22	13.2
150	230	50	160	243	200	197	148	16	285	24	17.3
200	230	70	219	422	254	253	198	10	340	24	22.1
250	245	52	624	620	310	302	249	10	395	26	28.6
300	190	20	439	990	364	386	310	10	445	26	31.0
300	285	40	219	990	364	386	310	10	445	26	33.0
350	200	20	481	1176	396	418	342	10	505	30	48.0
350	290	40	241	1176	396	418	342	10	505	30	50.0
400	205	19	549	1507	452	469	393	10	565	32	60.0
400	295	38	274	1507	452	469	393	10	565	32	62.0
450	210	19	616	1878	498	520	444	10	615	36	72.0
450	305	38	308	1878	498	520	444	10	615	36	76.0
500	215	19	682	2282	548	570	494	10	670	38	86.0
500	310	38	341	2282	548	570	494	10	670	38	90.0
600	225	18	894	3217	670	670	596	10	780	42	117.0
600	315	37	447	3217	670	670	596	10	780	42	121.0
700	250	26	970	4343	775	775	698	10	895	50	176.0
700	345	52	485	4343	775	775	698	10	895	50	184.0
800	225	25	1104	5603	857	876	795	10	1015	30	140.0
800	320	50	552	5603	857	876	795	10	1015	30	149.0
900	225	25	1236	7023	958	977	896	10	1115	30	154.0
900	320	50	618	7023	958	977	896	10	1115	30	164.0
1000	225	25	1369	8619	1060	1078	998	10	1230	35	205.0
1000	320	50	685	8619	1060	1078	998	10	1230	35	217.0

Pressure rate PN 16 standard program

DN	BL mm	Δ ax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø d_4 Flared end ø mm	ø D_a Bellows outer ø mm	ø d_i Internal guide sleeve ø mm	PN Flange connection EN 1092	ø D Flange outer ø mm	b Flange thickness mm	Weight approx. kg
15	108	17	21	7	45	38	18	16	95	14	1.5
20	108	17	21	7	58	38	18	16	105	16	2.1
25	125	26	49	16	54	54	25	16	115	16	2.4
32	135	26	49	16	54	54	32	16	140	18	4.0
40	135	30	111	25	68	66	38	16	150	18	4.5
50	155	36	177	34	75	79	49	16	165	18	5.5
65	165	40	199	54	95	96	63	16	185	20	7.4
80	175	46	148	78	110	115	76	16	200	20	8.4
100	180	46	175	115	140	137	96	16	220	22	10.1
125	200	50	79	173	165	168	123	16	250	22	13.2
150	230	50	160	243	200	197	148	16	285	24	17.3
200	230	70	219	422	254	253	198	16	340	26	23.1
250	245	52	624	620	310	302	249	16	405	29	33.3
300	220	22	863	995	364	388	310	16	460	32	44.0
300	320	44	432	995	364	388	310	16	460	32	49.0
350	225	21	946	1182	396	420	342	16	520	35	63.0
350	325	43	473	1182	396	420	342	16	520	35	68.0
400	230	21	1078	1514	452	471	393	16	580	38	80.0
400	330	43	539	1514	452	471	393	16	580	38	85.0
450	240	21	1210	1886	498	522	444	16	640	42	101.0
450	340	43	605	1886	498	522	444	16	640	42	108.0
500	245	21	1338	2290	548	572	494	16	715	46	140.0
500	345	42	669	2290	548	572	494	16	715	46	148.0

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 1.0 bar (brief periods). Please inquire for deviating values. *Effective bellows cross sectional area is a theoretical value.

STENFLEX®

SF-11/1-C12

Steel expansion joint ▪ Type SF-11

Axial expansion joint DN 15 – DN 500

Applications

- for compensating axial movement
- for reducing tension, in pipes and their system components, e.g.
  - pumps
  - compressors
  - motors
  - turbines
  - machines
  - process plants
- for installation in
  - industrial applications
  - gas and water supply
  - exhaust systems
  - heating installations
- to compensate for installation inaccuracies

Structure type SF-11

☐ Vacuum-proof axial expansion joint consisting of a stainless steel bellows and welded flanges

Steel bellows PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Accessories

☐ Internal guide sleeve
☐ Protective tube
☐ Gas sealings for DVGW-application

Flanges

Version
☐ Welded flanges with turned seal
☐ Flange drilling for through bolts

Dimensions
Standard: DN 15 - DN 500 (PN 16) according to EN 1092
Others: DIN EN, ANSI, BS etc.
Connection dimensions see technical annex

Materials
Standard: 1.0038 (S235JR), 1.0460 (P250GH)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

Certificates

☐ CE (DGR 97/23/EG)
☐ American Bureau of Shipping
☐ Bureau Veritas
☐ DVGW (DN 32 - DN 200)
☐ Germanischer Lloyd
☐ Lloyd´s Register of Shipping
☐ RMRS

Note

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

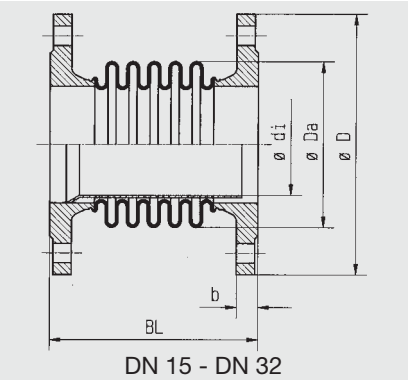
Subject to technical alterations and deviations resulting from the manufacturing process.

Pressure rate PN 16 standard program

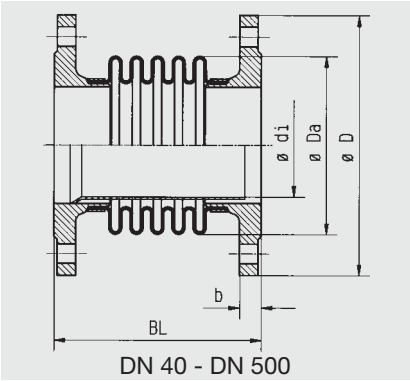
DN	BL mm	Δ ax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø d_i Internal guide sleeve inner ø mm	PN Flange connec-tion EN 1092	ø D Flange outer ø mm	b Flange thickness mm	Weight approx. kg
15	100	20	30	7	36	14	16	95	14	1.5
20	100	20	30	7	36	18	16	105	16	2.0
25	105	25	28	10	42	24	16	115	16	2.4
32	150	20	49	16	54	32	16	140	18	3.9
40	175	26	132	25	66	38	16	150	18	4.3
50	205	32	197	36	79	49	16	165	18	5.3
65	210	36	221	54	96	64	16	185	20	6.4
80	225	38	188	78	115	77	16	200	20	8.2
100	235	42	175	115	137	96	16	220	20	9.7
125	265	50	79	173	168	123	16	250	22	14.0
150	290	50	156	243	197	150	16	285	22	17.2
200	310	70	237	422	253	199	16	340	24	24.9
250	335	52	624	620	302	250	16	405	26	36.0
300	255	25	455	993	387	299	16	460	28	49.0
300	405	52	379	990	386	299	16	460	28	56.0
350	260	25	496	1180	419	329	16	520	30	71.0
350	415	54	379	1182	420	329	16	520	30	79.0
400	265	24	564	1511	470	380	16	580	32	88.0
400	420	54	431	1514	471	380	16	580	32	98.0
450	265	23	693	1875	519	431	16	640	34	104.0
450	420	53	484	1886	522	431	16	640	34	115.0
500	265	23	767	2278	569	482	16	715	36	134.0
500	420	53	535	2290	572	482	16	715	36	147.0

For larger sizes (DN) please see type SF-16. Also available with PN 10 flange connection.
Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 1.6 bar (brief periods). Please inquire for deviating values. *Effective bellows cross sectional area is a theoretical value.

Versions



DN 15 - DN 32



DN 40 - DN 500

Type SF-11

Steel expansion joint ▪ Type SF-13

Axial expansion joint DN 20 – DN 1200

Structure type SF-13

☐ Vacuum-proof axial expansion joint consisting of two stainless steel bellows (DN 125 - DN 1000 with connecting pipe) and welded flanges

☐ Guide sleeves to stabilize the expansion joint

☐ Guide sleeves do not supersede pipe guide bearings

Steel bellows PN 10 / PN 16

☐ Multiple convolution bellows in various stainless steel grades

☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Flanges

Version

☐ Welded flanges, up to DN 250 with turned seal

☐ Flange drilling for through bolts

Dimensions

Standard: DN 20 - DN 1200 (PN 10)
DN 20 - DN 250 (PN 16)
according to EN 1092

Others: DIN EN, ANSI, BS etc.

Connection dimensions see technical annex

Materials

Standard: 1.0038 (S235JR),

Others: stainless steel, etc.

Corrosion protection

Standard: anti-corrosion primed

Others: special varnish, etc.

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.

Applications

- **for compensating large axial movement**
- **for installation in**
  - **long pipe routings**
  - **industrial applications**
  - **heating installations**

Connecting pipe

Materials

Standard: 1.0305 (St 35.8),
1.0038 (S235JR), 1.4541

Others: stainless steel etc.

Corrosion protection

Standard: anti-corrosion primed

Others: special varnish etc.

Guide Sleeve

Standard: 1.4541

Special designs

Other sizes (DN), lengths or pressure ratings on request.

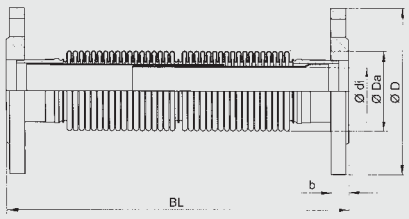
Accessories

☐ Protective tube

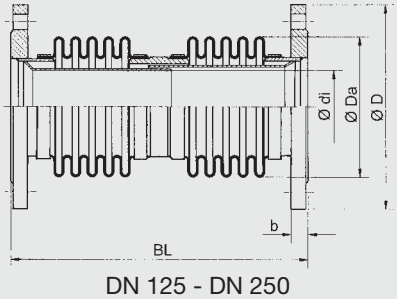
Certificates

☐ CE (DGR 97/23/EC)

Versions



DN 15 - DN 100



DN 125 - DN 250

Type SF-13

Pressure rate PN 10 standard program

DN	BL mm	Δ ax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø d_i Guide sleeve inner ø mm	PN Flange connection EN 1092	ø D Flange outer ø mm	b Flange thickness mm	Weight approx. kg
20	270	48	25	7	38	18	16	105	16	2.2
25	285	40	25	16	54	24	16	115	16	2.9
32	285	40	25	16	54	32	16	140	16	3.9
40	320	52	34	25	66	37	16	150	16	4.6
50	340	68	44	36	79	47	16	165	18	6.2
65	380	72	51	54	96	60	16	185	18	8.3
80	380	80	40	78	116	74	16	200	20	10.4
100	410	80	46	115	136	95	16	220	20	11.6
125	495	100	40	173	168	116	16	250	22	18.0
150	555	100	78	243	196	145	16	285	22	23.0
200	565	140	119	422	253	193	10	340	26	35.2
250	570	104	312	620	302	246	10	395	29	46.0
300	720	100	88	990	386	291	10	445	26	67.0
350	720	100	96	1176	418	323	10	505	30	85.0
400	720	99	110	1507	469	373	10	565	32	105.0
450	730	98	123	1878	520	424	10	615	36	124.0
500	730	98	136	2282	570	475	10	670	38	143.0
600	740	96	163	3227	672	577	10	780	42	185.0
700		96	190	4336	774	678	10	895		
800	on request	128	221	5603	876	780	10	1015	on request	on request
900		128	247	7023	977	877	10	1115		
1000		128	274	8619	1079	979	10	1230		
1200		128	327	12303	1283	1182	10	1455		

Pressure rate PN 16 standard program

DN	BL mm	Δ ax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø d_i Guide sleeve inner ø mm	PN Flange connection EN 1092	ø D Flange outer ø mm	b Flange thickness mm	Weight approx. kg
20	270	48	25	7	38	18	16	105	16	2.2
25	285	40	25	16	54	24	16	115	16	2.9
32	285	40	25	16	54	32	16	140	16	3.9
40	320	52	34	25	66	37	16	150	16	4.6
50	340	68	44	36	79	47	16	165	18	6.2
65	380	72	51	54	96	60	16	185	18	8.3
80	380	80	40	78	116	74	16	200	20	10.4
100	410	80	46	115	136	95	16	220	20	11.6
125	495	100	40	173	168	116	16	250	22	18.0
150	555	100	78	243	196	145	16	285	22	23.0
200	565	140	119	422	253	193	16	340	26	35.2
250	570	104	312	620	302	246	16	405	29	47.9

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 1.0 bar (brief periods). Please inquire for deviating values. *Effective bellows cross sectional area is a theoretical value.

STENFLEX®

SA-10/1-C12

Steel expansion joint ▪ Type SA-10

Axial expansion joint DN 15 – DN 2800

Applications

- for compensating axial movement
- for reducing tension, damping noise and oscillation in pipes and their system components, e.g.
  - compressors
  - motors
  - turbines
  - machines
  - process plants
- for installation in
  - industrial applications
  - exhaust systems
  - heating installations
  - gas supply lines

Structure type SA-10

☐ Vacuum-proof axial expansion joint consisting of a stainless steel bellows and welded pipe ends (welding ends)

Steel bellows PN 2.5 / PN 6 / PN 10 / PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C**	**Low temperature, acids, lyes, gases,**
		up to +550 °C	**fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**
Heat-resistant steel	**1.4828**	**+900 °C**	**Hot gases, steam, air**
	1.4878	**+800 °C**	**Hot gases, steam, air**
Nickel-based alloy	**2.4858 (Incoloy 825)**	**+450 °C**	**Sulphuric acid, phosphoric acid, petrol, öl, gases**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Welding ends

Version
☐ Welded pipe ends
Dimensions
Standard: see tables
Others: DIN EN, ANSI, BS etc.

Materials
Standard: 1.0305 (St 35.8I), 1.0038 (S235JR), 1.4541
Others: stainless steel, etc.
Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

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.

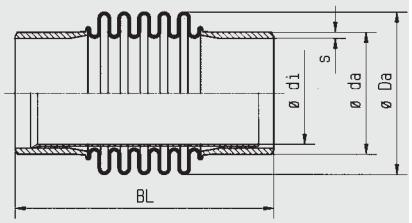
Special designs

Other sizes (DN), lengths or pressure ratings on request.

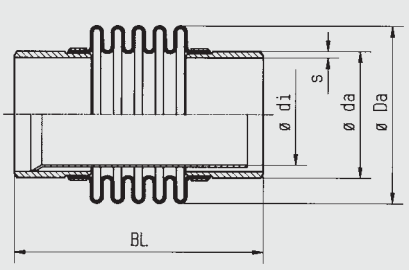
Accessories

☐ Internal guide sleeve
☐ Protective tube

Versions



DN 15 - DN 100



DN 125 - DN 2800

Type SA-10

Certificates

☐ CE (DGR 97/23/EC)
☐ American Bureau of Shipping
☐ Bureau Veritas
☐ DVGW (DN 32 - DN 200)
☐ Germanischer Lloyd
☐ Lloyd´s Register of Shipping

Pressure rate PN 2.5 standard program

DN	BL mm	Δ ax$_{tot}$ Axial movement mm	C_{ax} Axial spring rate N/mm	Δ lat$_{tot}$ Lateral movement mm	C_{lat} Lateral spring rate N/mm	A* Effective bellows cross sectional area cm²	ø D_a Bellows outer ø mm	ø d_a x s Pipe connection mm	Weight approx. kg
20	175	20	30	11	15	7	36	26,9x2,3	0.2
25	185	25	28	13	17	10	42	33,7x2,6	0.4
32	185	28	16	22	12	15	51	42,4x2,6	0.5
40	190	30	17	20	15	22	61	48,3x2,6	0.6
50	205	40	18	20	17	34	76	60,3x2,9	0.7
65	230	52	23	20	22	55	96	76,1x2,9	1.1
80	240	60	22	22	26	75	114	88,9x3,2	1.5
100	240	64	20	20	30	114	136	114,3x4,0	1.6
125	270	72	26	21	49	174	168	139,7x4,0	2.8
150	300	80	28	21	62	246	197	168,3x4,5	3.8
200	300	86	36	19	118	424	253	219,1x6,3	5.5
250	300	96	50	19	208	622	302	273,0x6,3	6.1
300	245	49	119			990	386	323,9x8,0	13.0
300	370	122	48	24	204	990	386	323,9x8,0	16.0
350	245	48	129			1176	418	355,6x8,0	14.0
350	370	120	52	21	264	1176	418	355,6x8,0	18.0
400	245	47	146			1507	469	406,4x8,0	17.0
400	370	118	58	18	381	1507	469	406,4x8,0	21.0
450	245	46	162			1878	520	457x8,0	19.0
450	370	116	65	16	528	1878	520	457x8,0	23.0
500	245	45	178			2282	570	508x8,0	21.0
500	370	114	71	14	705	2282	570	508x8,0	26.0
600	245	44	212			3227	672	610x8,0	25.0
600	370	112	85	12	1185	3227	672	610x8,0	31.0
700	245	44	246			4336	774	711x8,0	29.0
700	370	110	98	10	1847	4336	774	711x8,0	37.0
800	245	43	279			5595	875	813x8,0	34.0
800	370	109	112	9	2707	5595	875	813x8,0	42,0
900	245	43	313			7014	976	914x10,0	45.0
900	370	109	125	8	3799	7014	976	914x10,0	54.0
1000	245	43	346			8610	1078	1016x10,0	50.0
1000	370	108	138	7	5164	8610	1078	1016x10,0	61.0
1200	245	42	413			12291	1282	1219x10,0	60.0
1200	370	107	165			12291	1282	1219x10,0	73.0
1400	245	42	478			16536	1482	1420x10,0	70.0
1400	370	107	191			16536	1482	1420x10,0	85.0
1600	245	42	543			21408	1682	1620x10,0	80.0
1600	370	107	217			21408	1682	1620x10,0	97.0
1800	245	42	607			26909	1882	1820x10,0	90.0
1800	370	107	243			26909	1882	1820x10,0	109.0
2000	245	42	672			33039	2082	2020x10,0	100.0
2000	370	107	269			33039	2082	2020x10,0	121.0
2200	245	42	736			39796	2282	2220x10,0	110.0
2200	370	107	294			39796	2282	2220x10,0	133.0
2400	245	42	800			47182	2482	2420x10,0	120.0
2400	370	107	320			47182	2482	2420x10,0	145.0
2800	245	42	928			63839	2882	2820x10,0	139.0
2800	400	107	371			63839	2882	2820x10,0	169.0

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 0.25 bar (brief periods). Please inquire for deviating values. For pure axial movement: inner diameter of internal guide sleeve mentioned in tables PN 6, PN 10, PN 16.
If Δ ax and Δ lat occur simultaneously, the table values must be reduced accordingly. The sum of all shares must not exceed 100 %.
*Effective bellows cross sectional area is a theoretical value.

STENFLEX®

SA-10/3-C12

Steel expansion joint ▪ Type SA-10

Axial expansion joint

Pressure rate PN 6 standard program

DN	BL mm	Δ ax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø d_i Guide sleeve inner ø mm	ø d_a x s Pipe connection mm	Weight approx. kg
15	175	24	49	7	38	14	21.3x2.0	0.3
20	175	24	49	7	38	18	26.9x2.3	0.2
25	185	20	49	16	54	24	33.7x2.6	0.5
32	185	20	49	16	54	32	42.4x2.6	0.4
40	190	26	67	25	66	37	48.3x2.6	0.6
50	205	34	87	36	79	51	60.3x2.9	0.9
65	230	36	102	54	96	64	76.1x2.9	1.3
80	230	40	80	78	116	78	88.9x3.2	1.9
100	240	40	91	115	136	99	114.3x4.0	2.1
125	270	50	79	173	168	123	139.7x4.0	3.6
150	300	50	156	243	196	150	168.3x4.5	4.8
200	300	70	237	422	253	199	219.1x6.3	6.8
250	300	52	624	620	302	251	273.0x6.3	8.3
300	245	43	119	990	386	294	323.9x8.0	13
300	400	74	182	993	387	294	323.9x8.0	20
350	245	42	129	1176	418	326	355.6x8.0	14
350	400	73	199	1180	419	326	355.6x8.0	22
400	245	41	146	1507	469	376	406.4x8,0	17
400	400	72	226	1511	470	376	406.4x8.0	25
450	245	38	178	1870	518	427	457x8.0	19
450	400	71	253	1883	521	427	457x8.0	29
500	245	36	215	2265	566	478	508x8.0	21
500	370	79	117	2240	560	478	508x8.0	25
600	245	36	256	3207	668	580	610x8.0	25
600	370	82	125	3187	664	580	610x8.0	30
700	245	34	327	4301	768	681	711x8.0	29
700	370	84	131	4301	768	681	711x8.0	36
800	245	32	411	5542	867	783	813x8.0	33
800	370	80	164	5542	867	783	813x8.0	41
900	245	32	460	6955	968	880	914x10.0	44
900	370	80	184	6955	968	880	914x10.0	53
1000	255	27	1369	8619	1079	982	1016x10.0	55
1000	400	68	548	8619	1079	982	1016x10.0	72
1200	255	27	1634	12303	1283	1185	1219x10.0	66
1200	400	68	654	12303	1283	1185	1219x10.0	87
1400	255	27	1894	16549	1483	1386	1420x10.0	77
1400	400	68	757	16549	1483	1386	1420x10.0	101
1600	255	27	2152	21424	1683	1586	1620x10.0	88
1600	400	68	861	21424	1683	1586	1620x10.0	116
1800	255	27	2410	26927	1883	1786	1820x10.0	99
1800	400	68	964	26927	1883	1786	1820x10.0	130
2000	255	27	2667	33058	2083	1986	2020x10.0	110
2000	400	68	1067	33058	2083	1986	2020x10.0	144

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 0.6 bar (brief periods). Please inquire for deviating values.
*Effective bellows cross sectional area is a theoretical value.

Pressure rate PN 10 standard program

DN	BL mm	Δax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø d_i Guide sleeve inner ø mm	ø d_a x s Pipe connection mm	Weight approx. kg
15	175	24	49	7	38	14	21.3x2.0	0.3
20	175	24	49	7	38	18	26.9x2.3	0.2
25	185	20	49	16	54	24	33.7x2.6	0.5
32	185	20	49	16	54	32	42.4x2.6	0.4
40	190	26	67	25	66	37	48.3x2.6	0.6
50	205	34	87	36	79	51	60.3x2.9	0.9
65	230	36	102	54	96	64	76.1x2.9	1.3
80	230	40	80	78	116	78	88.9x3.2	1.9
100	240	40	91	115	136	99	114.3x4.0	2.1
125	270	50	79	173	168	123	139.7x4.0	3.6
150	300	50	156	243	196	150	168.3x4.5	4.8
200	300	70	237	422	253	199	219.1x6.3	6.8
250	300	52	624	620	302	251	273.0x6.3	8.3
300	250	20	439	979	382	294	323.9x8.0	13
300	390	46	212	979	382	294	323.9x8.0	16
350	250	20	481	1170	416	326	355.6x8.0	14
350	390	48	211	1170	416	326	355.6x8.0	18
400	250	19	549	1507	469	376	406,4x8.0	17
400	390	49	220	1507	469	376	406.4x8.0	21
450	250	19	616	1878	520	427	457x8.0	19
450	390	49	246	1878	520	427	457x8.0	23
500	250	19	682	2282	570	478	508x8.0	21
500	390	49	273	2282	570	478	508x8.0	26
600	250	18	894	3217	670	580	610x8.0	25
600	390	46	358	3217	670	580	610x8.0	31
700	255	26	970	4343	775	681	711x8.0	33
700	400	65	388	4343	775	681	711x8.0	45
800	255	25	1104	5603	876	783	813x8.0	37
800	400	64	442	5603	876	783	813x8.0	51
900	255	25	1236	7023	977	880	914x10.0	49
900	400	64	495	7023	977	880	914x10.0	65
1000	255	25	1369	8619	1079	982	1016x10.0	55
1000	400	64	548	8619	1079	982	1016x10.0	72
1200	255	26	1634	12303	1283	1185	1219x10.0	66
1200	400	65	654	12303	1283	1185	1219x10.0	87

Pressure rate PN 16 standard program

DN	BL mm	Δax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø d_i Guide sleeve inner ø mm	ø d_a x s Pipe connection mm	Weight approx. kg
15	175	24	49	7	38	14	21.3x2.0	0.3
20	175	24	49	7	38	18	26.9x2.3	0.2
25	185	20	49	16	54	24	33.7x2.6	0.5
32	185	20	49	16	54	32	42.4x2.6	0.4
40	190	26	67	25	66	37	48.3x2.6	0.6
50	205	34	87	36	79	51	60.3x2.9	0.9
65	230	36	102	54	96	64	76.1x2.9	1.3
80	230	40	80	78	116	78	88.9x3.2	1.9
100	240	40	91	115	136	99	114.3x4.0	2.1
125	270	50	79	173	168	123	139.7x4.0	3.6
150	300	50	156	243	196	150	168.3x4.5	4.8
200	300	70	237	422	253	199	219.1x6.3	6.8
250	300	52	624	620	302	251	273.0x6.3	8.3
300	255	25	455	993	387	294	323.9x8.0	15
300	410	52	379	990	386	294	323.9x8.0	22
350	255	25	496	1180	419	326	355.6x8.0	16
350	410	54	379	1182	420	326	355.6x8.0	25
400	255	24	564	1511	470	376	406.4x8.0	19
400	410	54	431	1514	471	376	406.4x8.0	28
450	255	23	693	1875	519	427	457.0x8.0	21
450	410	53	484	1886	522	427	457.0x8.0	32
500	255	23	767	2278	569	478	508.0x8.0	23
500	410	53	535	2290	572	478	508.0x8.0	36
600	260	21	1600	3237	674	580	610.0x8.0	30
600	410	52	640	3237	674	580	610.0x8.0	43
700	260	20	1860	4347	776	681	711.0x8.0	35
700	410	52	744	4347	776	681	711.0x8.0	50
800	260	20	2115	5608	877	783	813.0x8.0	40
800	410	52	846	5608	877	783	813.0x8.0	58
900	260	21	2369	7029	978	880	914.0x10.0	52
900	410	52	948	7029	978	880	914.0x10.0	72
1000	260	21	2625	8626	1080	982	1016.0x10.0	58
1000	410	52	1050	8626	1080	982	1016.0x10.0	80

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 0.6 bar (brief periods). Please inquire for deviating values. *Effective bellows cross sectional area is a theoretical value.

STENFLEX®

max. +550 °C | min. -196 °C | PN 16 | AXIAL

SA-13/1-C12

Steel expansion joint ▪ Type SA-13

Axial expansion joint DN 15 - DN 1200

Applications

- **for compensating large axial movement**
- **for installation in**
  - **long pipe routings**
  - **industrial applications**
  - **heating installations**
- **for gas supply lines**

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Structure type SA-13

☐ Vacuum-proof axial expansion joint consisting of two stainless steel bellows (DN 125 - DN 1200 with connecting pipe) and welded pipe ends (welding ends)

☐ Guide sleeves to stabilize the expansion joint

☐ Guide sleeves do not supersede pipe guide bearings

Guide sleeve

Materials

Standard: 1.4541

Accessories

☐ Protective tube

Steel bellows PN 10 / PN 16

☐ Multiple convolution bellows in various stainless steel grades

☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Certificates

☐ CE (DGR 97/23/EG)
☐ American Bureau of Shipping
☐ Bureau Veritas
☐ DVGW (DN 32 - DN 200)
☐ Germanischer Lloyd
☐ Lloyd´s Register of Shipping

Welding ends/connecting pipe

Version

☐ Welded pipe ends and connecting pipe

Dimensions

Standard: see tables

Others: DIN EN, ANSI, BS etc.

Materials

Standard: 1.0305 (St 35.8I), 1.0038 (S235JR)

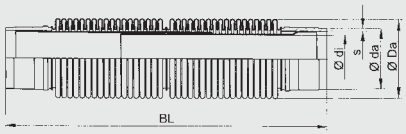
Others: stainless steel, etc.

corrosion protection

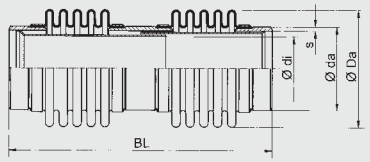
Standard: anti-corrosion primed

Others: special varnish, etc.

Versions



DN 15 - DN 100



DN 125 - DN 250

Type SA-13

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.

Pressure rate PN 10 standard program

DN	BL mm	Δax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø d_i Guide sleeve inner ø mm	ø d_a x s Pipe connection mm	Weight approx. kg
15	260	48	25	7	38	14	21.3x2.0	0.5
20	260	48	25	7	38	18	26.9x2.3	0.5
25	270	40	25	16	54	24	33.7x2.6	0.5
32	270	40	25	16	54	32	42.4x2.6	0.9
40	300	52	34	25	66	37	48.3x2.6	1.3
50	320	68	44	36	79	47	60.3x2.9	1.9
65	357	72	51	54	96	60	76.1x2.9	3.0
80	360	80	40	78	116	74	88.9x3.2	3.8
100	390	80	46	115	136	95	114.3x4.0	4.4
125	475	100	40	173	168	116	139.7x4.0	8.1
150	535	100	78	243	196	145	168.3x4.5	11.0
200	545	140	119	422	253	193	219.1x6.3	17.1
250	545	104	312	620	302	246	273.0x6.3	21.4
300	700	100	88	990	386	291	323.9x8.0	40.0
350	700	100	96	1176	418	323	355.6x8.0	44.0
400	700	99	110	1507	469	373	406.8x8.0	50.0
450	700	98	123	1878	520	424	457.0x8.0	57.0
500	700	98	136	2282	570	475	508.0x8.0	63.0
600	700	96	163	3227	672	577	610.0x8.0	76.0
700	700	96	190	4336	774	678	711.0x8.0	89.0
800	730	128	221	5603	876	780	813.0x8.0	129.0
900	730	128	247	7023	977	877	914.0x10.0	156.0
1000	730	128	274	8619	1079	979	1016.0x10.0	173.0
1200	730	128	327	12303	1283	1182	1219.0x10.0	209.0

Pressure rate PN 16 standard program

DN	BL mm	Δax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø d_i Guide sleeve inner ø mm	ø d_a x s Pipe connection mm	Weight approx. kg
15	260	48	25	7	38	14	21.3x2.0	0.5
20	260	48	25	7	38	18	26.9x2.3	0.5
25	270	40	25	16	54	24	33.7x2.6	0.5
32	270	40	25	16	54	32	42.4x2.6	0.9
40	300	52	34	25	66	37	48.3x2.6	1.3
50	320	68	44	36	79	47	60.3x2.9	1.9
65	357	72	51	54	96	60	76.1x2.9	3.0
80	360	80	40	78	116	74	88.9x3.2	3.8
100	390	80	46	115	136	95	114.3x4.0	4.4
125	475	100	40	173	168	116	139.7x4.0	8.1
150	535	100	78	243	196	145	168.3x4.5	11.0
200	545	140	119	422	253	193	219.1x6.3	17.1
250	545	104	312	620	302	246	273.0x6.3	21.4

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 1.0 bar (brief periods). Please inquire for deviating values.
*Effective bellows cross sectional area is a theoretical value.

Steel expansion joint ▪ Type SG-10

Axial expansion joint DN 15 – DN 50

Structure type SG-10

☐ Vacuum-proof axial expansion joint consisting of a stainless steel bellows and threaded connection parts

☐ Connection parts with hexagon insert bit and male thread

Steel bellows PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Threaded connection parts

Version
☐ Male thread
Dimensions
Standard: R 1/2“ – R 2“ ISO 7-1 (DIN 2999)

Materials
Standard: 1.4541
Others: stainless steel

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.

Pressure rate PN 16 standard program

DN	BL mm	Δ ax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	D1 Male thread ø inch	L Length of thread mm	SW Width across mm	Weight approx. kg
15	125	24	49	7.0	38	R 1/2”	13	32	0.25
20	130	24	49	7.0	38	R 3/4”	15	32	0.25
25	145	20	49	16.0	54	R 1”	17	46	0.52
32	185	20	49	16.0	54	R 1 1/4”	19	-	0.54
40	200	26	87	25.0	66	R 1 1/2”	19	-	0.80
50	225	34	87	35.0	78	R 2”	24	-	1.20

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 1.6 bar (brief periods). Please inquire for deviating values.
*Effective bellows cross sectional area is a theoretical value.

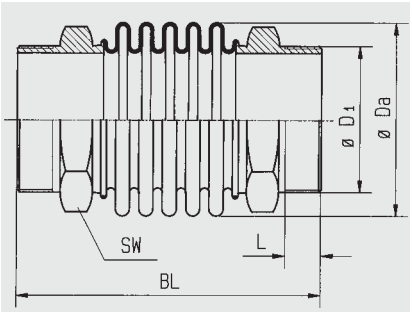
Applications

- for compensating axial movement
- for reducing tension, in pipes and their system components, e.g.
  - pumps
  - compressors
  - motors
  - turbines
  - machines
- to compensate for installation inaccuracies
- for installation in
  - heating installations
  - drinking water systems
- for pipe systems of stainless or unalloyd steel
- for copper or plastic pipes
- for pressfitting systems

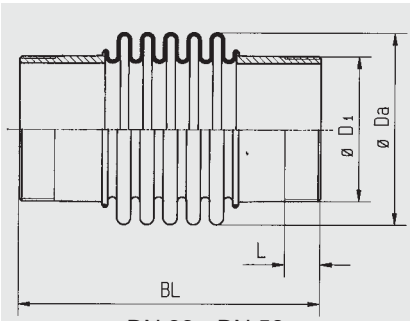
Certificates

☐ CE (DGR 97/23/EC)

Versions



DN 15 - DN 25



DN 32 - DN 50

Type SG-10

Steel expansion joint ▪ Type SG-11

Axial expansion joint DN 15 – DN 50

Structure type SG-11

- ☐ Vacuum-proof axial expansion joint consisting of a stainless steel bellows and threaded connection parts
- ☐ Bellows with flared ends, connection parts with union nut and flat packing
- ☐ Connection parts with female thread

Steel bellows PN 16

- ☐ Multiple convolution bellows in various stainless steel grades
- ☐ One ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Threaded connection parts

Version

- ☐ Female thread
- ☐ Union nut with female thread acc. ISO 228-1

Dimensions

Standard: Female thread Rp 1/2“ - Rp 2“ acc. ISO 7-1 (DIN 2999)

Materials

Standard: GJMW-400-5 (malleable casting)

Corrosion protection

Standard: electrogavanized

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.

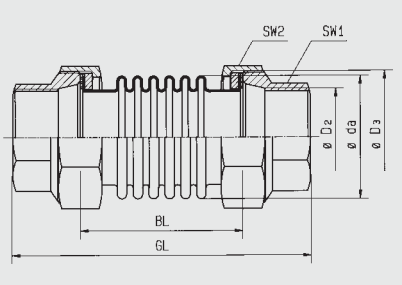
Applications

- **for compensating axial movement**
- **for reducing tension, in pipes and their system components, e.g.**
  - **pumps**
  - **compressors**
  - **motors**
  - **turbines**
  - **machines**
- **to compensate for installation inaccuracies**
- **for installation in**
  - **exhaust systems**
  - **heating installations**
- **gas supply lines**

Certificates

- ☐ CE (DGR 97/23/EG)
- ☐ DVGW (DN 25 -DN 50)

Version



Type SG-11

Pressure rate PN 16 standard program

DN	BL mm	GL mm	Δ ax_{tot} Axial movement mm	C_{ax} Axial spring rate N/mm	A* Effective bellows cross sectional area cm^2	ø D_a Bellows outer ø mm	ø D2 Female thread ø inch	ø D3 Union nut ø inch	SW 1 Width across mm	SW 2 Width across mm	Weight approx. kg
15	**130**	**185**	**24**	**28**	**5**	**36**	**Rp 1/2”**	**G 1”**	**25**	**38**	**0.5**
20	**135**	**190**	**24**	**30**	**7**	**36**	**Rp 3/4”**	**G 1 1/4”**	**31**	**47**	**0.8**
25	**150**	**212**	**26**	**49**	**16**	**54**	**Rp 1”**	**G 1 1/2”**	**38**	**53**	**0.9**
32	**158**	**224**	**30**	**111**	**25**	**66**	**Rp 1 1/4”**	**G 2”**	**48**	**66**	**1.3**
40	**154**	**226**	**30**	**111**	**25**	**66**	**Rp 1 1/2”**	**G 2 1/4”**	**53**	**73**	**1.7**
50	**161**	**245**	**36**	**177**	**35**	**79**	**Rp 2”**	**G 2 3/4”**	**66**	**90**	**2.6**

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 1.6 bar (brief periods). Please inquire for deviating values.
*Effective bellows cross sectional area is a theoretical value.

STENFLEX®

SF-20/1-C12

Steel expansion joint ▪ Type SF-20

Lateral expansion joint DN 32 – DN 500

Structure type SF-20

☐ Vacuum-proof, short-length lateral expansion joint, consisting of a stainless steel bellows and rotating flanges

☐ Rotating flanges with tie rods to absorb reaction force

Steel bellows PN 10 / PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade*	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**
Heat-resistant steel	**1.4828**	**+900 °C**	**Hot gases, steam, air**
	1.4878	**+800 °C**	**Hot gases, steam, air**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Flanges

Version
☐ Rotating flanges
☐ Flange drilling for through bolts

Dimensions
Standard: DN 32 - DN 500 (PN 10)
DN 32 - DN 500 (PN 16)
according to EN 1092
Others: DIN EN, ANSI, BS etc.
Connection dimensions see technical annex

Materials
Standard: 1.0038 (S235JR), 1.4541
Others: stainless steel

Corrosion protection
Standard: DN 32 - DN 250 electrogalvanized, DN 300 - DN 500 anti-corrosion primed
Others: hot-dip galvanized, special varnish, special coating, etc.

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.

Applications

- **for compensating lateral movement**
- **for reducing tension, in pipes and their system components, e.g.**
  - **pumps**
  - **motors**
  - **machines**
- **for installation in**
  - **industrial applications**
  - **gas and water supply**
  - **exhaust systems**
  - **heating installations**
  - **drinking water systems**
- **to compensate for installation inaccuracies**

Tie rod restraints

☐ Outer restraints carried on spherical washers/conical seats

Materials
Standard: tie rods 8.8
Others: stainless steel

Corrosion protection
Standard: electrogalvanized
Others: hot-dip galvanized

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Accessories

☐ Internal guide sleeve
☐ Protective tube
☐ Gas sealings for DVGW-application

Certificates

☐ CE (DGR 97/23/EG)
☐ American Bureau of Shipping
☐ Bureau Veritas
☐ DVGW (DN 32 - DN 200)
☐ Germanischer Lloyd
☐ Lloyd´s Register of Shipping

Pressure rate PN 10 standard program

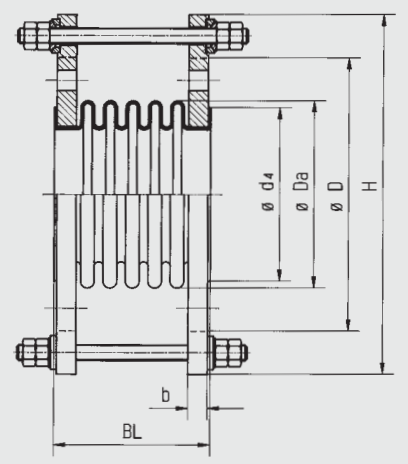
DN	BL mm	Δ lat_{tot} Lateral movement mm	C_{lat} Lateral spring rate N/mm	F_{fric} Friction force restraints N/bar	ø d4 Flared end ø mm	ø D_a Bellows outer ø mm	PN Flange connection EN 1092	ø D Flange outer ø mm	H Flange height mm	b Flange thickness mm	Weight approx. kg
32	135	14	28	4	54	54	16	140	226	16	5.0
40	135	16	74	6	68	66	16	150	236	16	5.5
50	155	16	114	8	75	79	16	165	251	18	7.1
65	165	18	177	11	95	96	16	185	271	18	8.6
80	175	18	174	15	110	115	16	200	286	20	10.2
100	180	16	266	21	140	137	16	220	306	20	11.5
125	200	14	156	37	165	168	16	250	353	22	16.3
150	230	14	313	46	200	197	16	285	388	22	19.3
200	230	14	715	93	254	253	10	340	457	24	27.0
250	245	10	2571	130	310	302	10	395	512	26	33.9
300	285	7	1225	121	364	388	10	445	570	26	40.0
350	290	6	1597	142	396	420	10	505	630	30	57.0
400	295	5	2332	179	452	471	10	565	690	32	72.0
450	305	4	3264	321	498	522	10	615	793	36	99.0
500	310	4	4389	385	548	572	10	670	848	38	113.0

Pressure rate PN 16 standard program

DN	BL mm	Δ lat_{tot} Lateral movement mm	C_{lat} Lateral spring rate N/mm	F_{fric} Friction force restraints N/bar	ø d4 Flared end ø mm	ø D_a Bellows outer ø mm	PN Flange connection EN 1092	ø D Flange outer ø mm	H Flange height mm	b Flange thickness mm	Weight approx. kg
32	135	14	28	4	54	54	16	140	226	16	5.0
40	135	16	74	6	68	66	16	150	236	16	5.5
50	155	16	114	8	75	78	16	165	251	18	7.1
65	165	18	177	11	95	96	16	185	271	18	8.6
80	175	18	174	15	110	115	16	200	286	20	10.2
100	180	16	266	21	140	137	16	220	306	20	11.5
125	200	14	156	37	165	168	16	250	353	22	16.3
150	230	14	313	46	200	197	16	285	388	22	19.3
200	230	14	715	93	254	253	16	340	457	26	28.1
250	245	10	2571	130	310	302	16	405	570	29	47.0
300	320	8	2051	110	364	388	16	460	584	32	58.0
350	325	7	2671	129	396	420	16	520	644	35	80.0
400	330	6	3896	242	452	471	16	580	760	38	109.0
450	340	5	5446	294	498	522	16	640	820	42	139.0
500	345	5	7317	353	548	572	16	715	893	46	186.0

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 1.0 bar (brief periods). Please inquire for deviating values.

Version



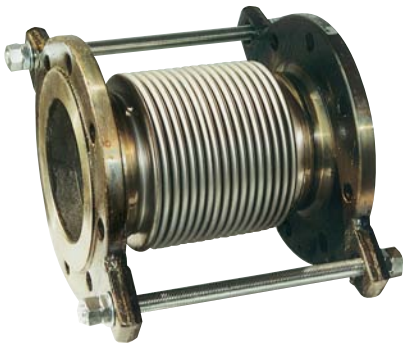
Type SF-20
Outer restraints, carried on spherical washers/conical seats (ball joint)

STENFLEX®

SF-21/1-C12

Steel expansion joint ▪ Type SF-21

Lateral expansion joint DN 32 – DN 500



Applications

- **for compensating lateral movement**
- **for reducing tension, in pipes and their system components, e.g.**
  - **pumps**
  - **compressors**
  - **motors**
  - **turbines**
  - **machines**
  - **process plants**
- **for installation in**
  - **industrial applications**
  - **gas and water supply**
  - **exhaust systems**
  - **heating installations**
- **to compensate for installation inaccuracies**

Structure type SF-21

☐ Vacuum-proof lateral expansion joint consisting of a stainless steel bellows and welded flanges

☐ Flanges with tie rods to absorb reaction force

Steel bellows PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Tie rod restraints

☐ Outer restraints carried on spherical washers/conical seats

Materials
Standard: tie rods 8.8
Others: stainless steel

Corrosion protection
Standard: electrogalvanized

Flanges

Version
☐ Welded flanges with turned seal
☐ Flange drilling for through bolts

Dimensions
Standard: DN 32 - DN 500 (PN 16) according to EN 1092
Others: DIN EN, ANSI, BS etc.
Connection dimensions see technical annex

Materials
Standard: 1.0038 (S235JR), 1.0460 (P250GH)
Others: stainless steel

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Accessories

☐ Internal guide sleeve
☐ Protective tube
☐ Gas sealings for DVGW-application

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.

Certificates

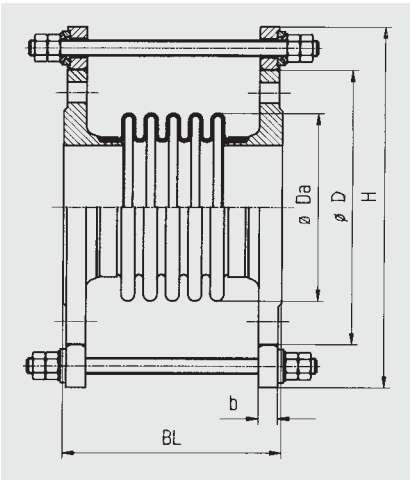
☐ CE (DGR 97/23/EG)
☐ American Bureau of Shipping
☐ Bureau Veritas
☐ DVGW (DN 32 - DN 200)
☐ Germanischer Lloyd
☐ Lloyd´s Register of Shipping

Pressure rate PN 16 standard program

DN	BL mm	Δ lat$_{tot}$ Lateral movement mm	C_{lat} Lateral spring rate N/mm	F_{fric} Friction force restraints N/bar	ø D_a Bellows outer ø mm	PN Flange connec-tion EN 1092	ø D Flange outer ø mm	H Flange height mm	b Flange thickness mm	Weight approx. kg
32	150	8	28	4	54	16	140	220	18	4.2
40	175	10	125	6	66	16	150	230	18	4.5
50	205	14	157	8	79	16	165	245	18	6.4
65	210	14	237	11	96	16	185	265	18	7.8
80	225	13	278	15	115	16	200	280	20	9.4
100	235	14	302	21	137	16	220	320	20	11.9
125	265	14	156	37	168	16	250	350	22	16.5
150	290	14	313	46	197	16	285	385	22	21.0
200	310	14	761	93	253	16	340	440	24	30.0
250	335	10	2571	130	302	16	405	505	26	44.5
300	405	12	1145	88	386	16	460	534	28	66.0
350	415	11	1368	103	420	16	520	594	30	92.0
400	420	10	1995	130	471	16	580	650	32	113.0
450	415	9	2788	248	522	16	640	763	34	149.0
500	420	8	3746	298	572	16	715	828	36	188.0

Table values refer to +20 °C, bellows material 1.4541, 1000 cycles. Max. allowable pressure pulsation of 1.6 bar (brief periods). Please inquire for deviating values.

Version



Type SF-21
Outer restraints, carried on spherical washers/conical seats (ball joint)

Steel expansion joint ▪ Type SF-23

Lateral expansion joint

Customized production

Applications

- **for compensating simultaneous axial and lateral movement**
- **for reducing tension, in pipes and their system components, e.g.**
  - **pumps**
  - **compressors**
  - **motors**
  - **turbines**
  - **machines**
  - **process plants**
- **for installation in**
  - **long pipe routings**
  - **industrial application**
  - **exhaust systems**
  - **heating installations**
- **to compensate for installation inaccuracies**

Structure type SF-23

☐ Vacuum-proof lateral expansion joint consisting of two stainless steel bellows with connecting pipe and rotating flanges

☐ Suitable for simultaneous movements

☐ Long connecting pipes allow large lateral movements

Steel bellows PN 1 / PN 6

☐ Multiple convolution bellows in various stainless steel grades

☐ One ply or multi-ply structure

☐ DN 50 – DN 500 with flared ends

☐ DN 600 – DN 1000 with pre-welded flared ends

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Connecting pipe/guide sleeve

Materials

Standard: 1.0305 (St 35.8)
1.0038 (S235JR)
Others: stainless steel etc.

Corrosion protection

Standard: anti-corrosion primed
Others: special varnish etc.

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Flanges

Version

☐ Rotating flanges

☐ Flange drilling for through bolts

Dimensions

Standard: DN 50 - DN 1000 (PN 6) according to EN 1092
Others: DIN EN, ANSI, BS etc.

Connection dimensions see technical annex

Materials

Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection

Standard: DN 50 - DN 250 electrogalvanized, DN 300 - DN 1000 anti-corrosion primed
Others: hot-dip galvanized, special varnish, special coating etc.

Certificates

☐ CE (DGR 97/23/EC)

☐ American Bureau of Shipping

☐ Bureau Veritas

☐ Germanischer Lloyd

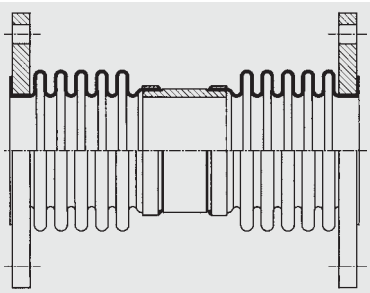
☐ Lloyd´s Register of Shipping

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.

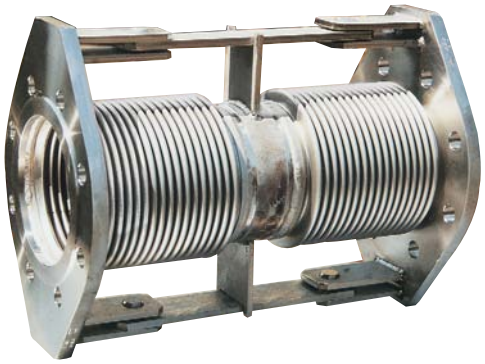
Version



Type SF-23

Steel expansion joint ▪ Type SF-24

Lateral expansion joint, movable in one plane



Customized production

Applications

- **for compensating large lateral movement**
- **for reducing tension**
- **for installation in**
  - **industrial applications**
  - **pipe line and plant construction**

Structure type SF-24

☐ Vacuum-proof lateral expansion joint consisting of two stainless steel bellows with connecting pipe, pipe ends and welded flanges

☐ Double hinge restraints to absorb reaction force

☐ Long connecting pipes allow large lateral movements

Steel bellows PN 6 / PN 10

☐ Multiple convolution bellows in various stainless steel grades

☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Hinge restraints

☐ Pivot of joint bars at bellow's center

☐ Joint bars control bellow's movement

Materials

Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection

Standard: anti-corrosion primed
Others: special varnish, etc.

Pipe ends/connecting pipe

Materials

Standard: 1.0305 (St 35.8), 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection

Standard: anti-corrosion primed
Others: special varnish, etc.

Flanges

Version

☐ Welded flanges

☐ Flange drilling for through bolts

Dimensions

Standard: DN 200 - DN 500 (PN 10)
DN 32 - DN 150 (PN 16)
according to EN 1092
Others: DIN EN, ANSI, BS etc.
Connection dimensions see technical annex

Materials

Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection

Standard: anti-corrosion primed
Others: special varnish, etc.

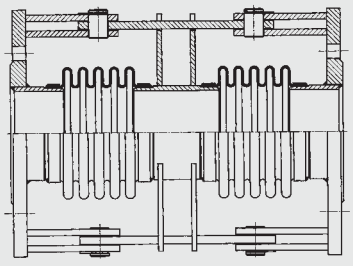
Special designs

Other sizes (DN), lengths or pressure ratings on request.

Certificates

☐ CE (DGR 97/23/EC)

Version



Type SF-24

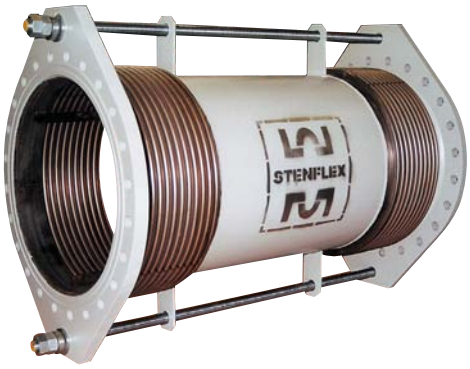
Note

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.

Steel expansion joint ▪ Type SF-25

Lateral expansion joint, movable in all planes



Customized production

Applications

- for compensating large lateral movement
- for 3D movement absorption in pipe systems
- for reducing tension
- for installation in
  - industrial applications
  - pipe line and plant construction

Structure type SF-25

☐ Vacuum-proof lateral expansion joint consisting of two stainless steel bellows with connecting pipe, pipe ends and welded flanges

☐ Tie rods to absorb reactiong force

☐ Long connecting pipes allow large movements

Steel bellows PN 10

☐ Multiple convolution bellows in various stainless steel grades

☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Flanges

Version

☐ Welded flanges

☐ Flange drilling for through bolts

Dimensions

Standard: DN 200 - DN 500 (PN 10)
DN 32 - DN 150 (PN 16)
according to EN 1092

Others: DIN EN, ANSI, BS etc.

Connection dimensions see technical annex

Materials

Standard: 1.0038 (S235JR)

Others: stainless steel, etc.

Corrosion protection

Standard: anti-corrosion primed

Others: special varnish, etc.

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.

Tie rod restraints

☐ Outer restraints, carried on spherical washers and conical seats

Materials

Standard: tie rods 8.8

Others: stainless steel, etc.

Corrosion protection

Standard: electrogalvanized

Pipe ends/connecting pipe

Materials

Standard: 1.0305 (St 35.8),
1.0038 (S235JR)

Others: stainless steel, etc.

Corrosion protection

Standard: anti-corrosion primed

Others: special varnish, etc.

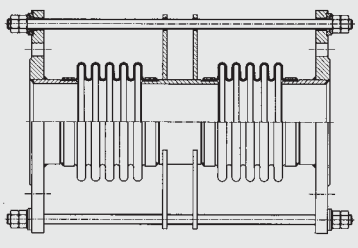
Special designs

Other sizes (DN), lengths or pressure ratings on request.

Certificates

☐ CE (DGR 97/23/EC)

Version



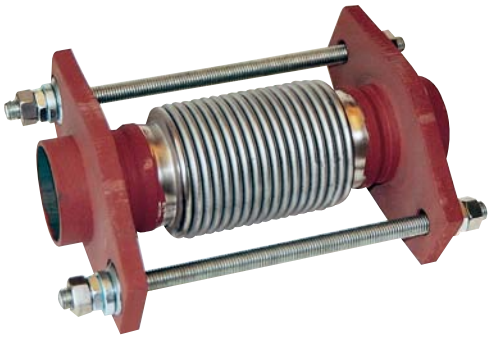
Type SF-25

STENFLEX®

SA-20/C12

Steel expansion joint ▪ Type SA-20

Lateral expansion joint



Customized production

Applications

- for compensating lateral movement
- for reducing tension, in pipes and their system components, e.g.
  - compressors
  - motors
  - turbines
  - machines
  - process plants
- for installation in
  - industrial applications
  - exhaust systems
  - heating installations
  - gas supply lines

Structure type SA-20

☐ Vacuum-proof lateral expansion joint consisting of a stainless steel bellows and welded pipe ends (welding ends)

☐ Welded joint bars with tie rod restraints to absorb reaction force

Steel bellows PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Welding ends

Version
☐ Welded pipe ends
Dimensions
Standard: see tables
Others: DIN EN, ANSI, BS etc.

Materials
Standard: 1.0305 (St 35.8), 1.0038 (S235JR)
Others: stainless steel, etc.
Corrosion protection
Standard: anti-corrosion primed
Others: special varnish

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.

Tie rod restraints

☐ Outer restraints carried on spherical washers/conical seats
Materials
Standard: tie rods 8.8
Others: stainless steel
Corrosion protection
Standard: electrogalvanized

Special designs

Other sizes (DN), lengths or pressure ratings on request.

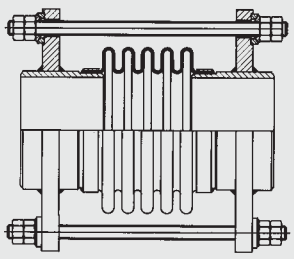
Accessories

☐ Internal guide sleeve
☐ Protective tube

Certificates

☐ CE (DGR 97/23/EG)
☐ American Bureau of Shipping
☐ Bureau Veritas
☐ DVGW (DN 32 - DN 200)
☐ Germanischer Lloyd
☐ Lloyd´s Register of Shipping

Versions



Type SA-20
Outer restraints, carried on spherical washers/conical seats (ball joint)

STENFLEX®

SA-23/C12

Steel expansion joint ▪ Type SA-23

Lateral expansion joint

Customized production

Structure type SA-23

☐ Vacuum-proof lateral expansion joint consisting of two stainless steel bellows with connecting pipe and welded pipe ends (welding ends)
☐ Suitable for simultaneous movements
☐ Long connecting pipes allow large lateral movements

Steel bellows PN 1 / PN 6

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Welding ends/connecting pipe

Version
☐ Welded pipe ends and connecting pipe

Dimensions
Standard: see tables of type SA-13
Others: DIN EN, ANSI, BS etc.

Materials
Standard: 1.0305 (St 35.8I), 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

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.

Applications

- **for compensating simultaneous axial and lateral movement**
- **for reducing tension, in pipes and their system components, e.g.**
  - **compressors**
  - **motors**
  - **turbines**
  - **machines**
  - **process plants**
- **for installation in**
  - **long pipe routings**
  - **industrial applications**
  - **exhaust systems**
  - **heating installations**
- **to compensate for installation inaccuracies**

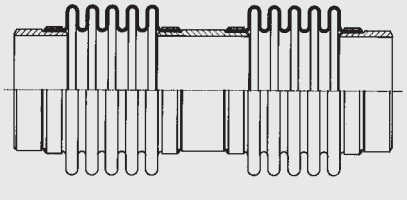
Special designs

Other sizes (DN), lengths or pressure ratings on request.

Certificates

☐ CE (DGR 97/23/EC)
☐ American Bureau of Shipping
☐ Bureau Veritas
☐ Germanischer Lloyd
☐ Lloyd´s Register of Shipping

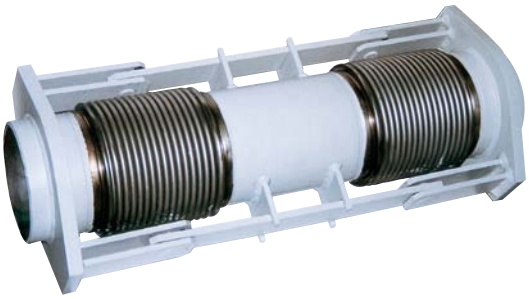
Version



Type SA-23

Steel expansion joint ▪ Type SA-24

Lateral expansion joint, movable in one plane



Customized production

Structure type SA-24

☐ Vacuum-proof lateral expansion joint consisting of two stainless steel bellows with connecting pipe and welded pipe ends (welding ends)
☐ Welded joint bars with double hinge restraints to absorb reaction force
☐ Long connecting pipes allow large lateral movements

Steel bellows PN 6 / PN 10

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Welding ends/connecting pipe

Version
☐ Welded pipe ends and connecting pipe

Dimensions
Standard: see tables of type SA-13
Others: DIN EN, ANSI, BS etc.

Materials
Standard: 1.0305 (St 35.8I), 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

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.

Applications

- **for compensating large lateral movement**
- **for reducing tension**
- **for installation in**
  - **industrial applications**
  - **pipe line and plant construction**

Hinge restraints

☐ Pivot of joint bars at center of bellows
☐ Joint bars control bellows movement

Materials
Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

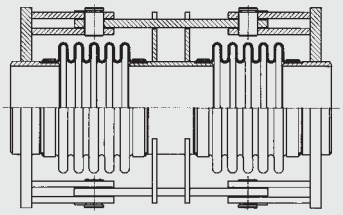
Special designs

Other sizes (DN), lengths or pressure ratings on request.

Certificates

☐ CE (DGR 97/23/EC)

Version



Type SA-24

Steel expansion joint ▪ Type SA-25

Lateral expansion joint, movable in all planes

Customized production

Structure type SA-25

☐ Vacuum-proof lateral expansion joint consisting of two stainless steel bellows with connecting pipe and welded pipe ends (welding ends)
☐ Welded joint bars with tie rods to absorb reaction force
☐ Long connecting pipes allow large lateral movements

Steel bellows PN 6 / PN 10

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Welding ends/connecting pipe

Version
☐ Welded pipe ends and connecting pipe

Dimensions
Standard: see tables of type SA-13
Others: DIN EN, ANSI, BS etc.

Materials
Standard: 1.0305 (St 35.8I), 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

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.

Applications

- **for compensating large lateral movement**
- **for 3D movement absorption in pipe systems**
- **for reducing tension**
- **for installation in**
  - **industrial applications**
  - **pipe line and plant construction**

Tie rod restraints

☐ Outer restraints, carried on spherical washers and conical seats

Materials
Standard: tie rods 8.8
Others: stainless steel, etc.

Corrosion protection
Standard: electrogalvanized

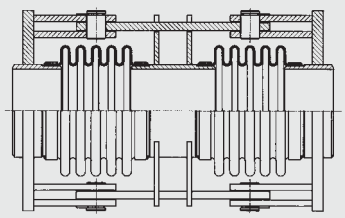
Special designs

Other sizes (DN), lengths or pressure ratings on request.

Certificates

☐ CE (DGR 97/23/EC)

Version



Type SA-25

Steel expansion joint ▪ Type SF-32

Angular expansion joint, movable in one plane

Customized production

Structure type SF-32

☐ Vacuum-proof angular expansion joint consisting of a stainless steel bellows with pipe ends and welded flanges

☐ Hinge restraints to absorb reaction force

Steel bellows PN 6 / PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Flanges

Version
☐ Welded flanges
☐ Flange drilling for through bolts

Dimensions
Standard: DN 50 - DN 1000 (PN 6)
DN 50 - DN 250 (PN 16)
according to EN 1092
Others: DIN EN, ANSI, BS etc.
Connection dimensions see technical annex

Materials
Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

Pipe ends

Materials
Standard: 1.0305 (St 35.8),
1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

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.

Applications

- **for compensating angular movement in angular pipe routings**
- **as double or triple joint compensation system for large movements**
- **for reducing tension**
- **for installation in**
  - **industrial applications**
  - **pipe line and plant construction**

Hinge restraints

☐ Pivot of joint bars at center of bellows
☐ Hinge restraints control bellows movement

Materials
Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

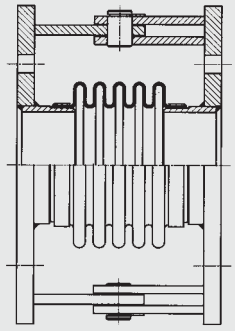
Special designs

Other sizes (DN), lengths or pressure ratings on request.

Certificates

☐ CE (DGR 97/23/EC)

Version



Type SF-32

Steel expansion joint ▪ Type SF-33

Angular expansion joint, cardanic movable

Customized production

Applications

- for compensating angular movement in angular and deflecting pipe routings
- as double or triple joint compensation system for large movements
- for reducing tension
- for installation in
  - industrial applications
  - pipe line and plant construction

Structure type SF-33

☐ Vacuum-proof angular expansion joint consisting of a stainless steel bellows with pipe ends and welded flanges

☐ Welded cardan hinge restraints to absorb reaction force

Steel bellows PN 6 / PN 16

☐ Multiple convolution bellows in various stainless steel grades

☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Cardan hinge restraints

☐ Pivot of joint bars at center of bellows

☐ Hinge restraints control bellows movement

Materials

Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection

Standard: anti-corrosion primed
Others: special varnish, etc.

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Flanges

Version

☐ Welded flanges

☐ Flange drilling for through bolts

Dimensions

Standard: DN 50 - DN 500 (PN 6)
DN 50 - DN 250 (PN 16)
according to EN 1092
Others: DIN EN, ANSI, BS etc.

Connection dimensions see technical annex

Materials

Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection

Standard: anti-corrosion primed
Others: special varnish, etc.

Certificates

☐ CE (DGR 97/23/EC)

Pipe ends

Materials

Standard: 1.0305 (St 35.8),
1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection

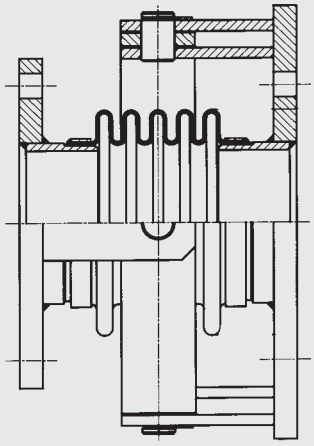
Standard: anti-corrosion primed
Others: special varnish, etc.

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.

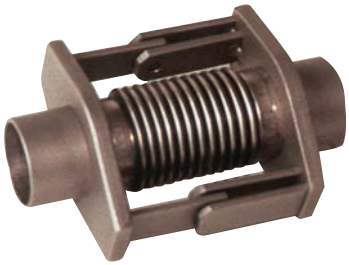
Version



Type SF-33

Steel expansion joint ▪ Type SA-30

Angular expansion joint, movable in one plane



Customized production

Applications

- for compensating angular movement in angular pipe routings
- as double or triple joint compensation system for large movements
- for reducing tension
- for installation in
  - industrial applications
  - pipe line and plant construction

Structure type SA-30

☐ Vacuum-proof angular expansion joint consisting of a stainless steel bellows and welded pipe ends (welding ends)

☐ Welded joint bars with hinge restraints to absorb reaction force

Steel bellows PN 6 / PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Hinge restraints

☐ Pivot of joint bars at center of bellows
☐ Hinge restraints control bellows movement

Materials
Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Certificates

☐ CE (DGR 97/23/EC)

Welding ends

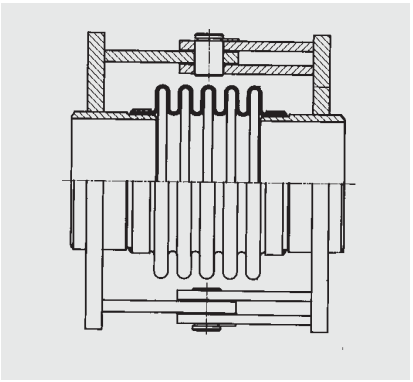
Version
☐ Welded pipe ends

Dimensions
Standard: see tables of type SA-10
Others: DIN EN, ANSI, BS etc.

Materials
Standard: 1.0305 (St 35.8I), 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

Version



Type SA-30

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.

STENFLEX®

SA-33/E10

Steel expansion joint ▪ Type SA-33

Angular expansion joint, cardanic movable

Customized production

Applications

- for compensating angular movement in angular and deflecting pipe routings
- as double or triple joint compensation system for large movements
- for reducing tension
- for installation in
  - industrial applications
  - pipe line and plant construction

Structure type SA-33

☐ Vacuum-proof angular expansion joint consisting of a stainless steel bellows and welded pipe ends (welding ends)

☐ Welded joint bars with cardan hinge restraints to absorb reaction force

Steel bellows PN 6 / PN 16

☐ Multiple convolution bellows in various stainless steel grades
☐ One ply or multi-ply structure

Material grade *	Material No. as per DIN EN	Temperature**	Possible uses
Stainless steel	**1.4541**	**-196 °C up to +550 °C**	**Low temperature, acids, lyes, gases, fertilizers**
	1.4404, 1.4571	**+550 °C**	**Media containing chloride, oil, soap, drinking water, food stuff, petrol**

* Check or inquire about the resistance of material grades to temperature and medium.
** Check or inquire about reduction in pressure by temperature.

Hinge restraints

☐ Pivot of joint bars at center of bellows
☐ Hinge restraints control bellows movement

Materials
Standard: 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

Special designs

Other sizes (DN), lengths or pressure ratings on request.

Welding ends

Version
☐ Welded pipe ends

Dimensions
Standard: see tables of type SA-10 according to EN 1092
Others: DIN EN, ANSI, BS etc.

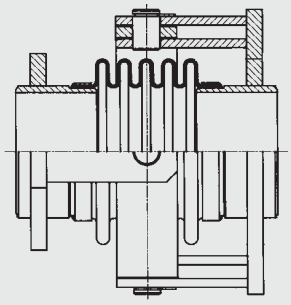
Materials
Standard: 1.0305 (St 35.8I), 1.0038 (S235JR)
Others: stainless steel, etc.

Corrosion protection
Standard: anti-corrosion primed
Others: special varnish, etc.

Certificates

☐ CE (DGR 97/23/EC)

Version



Type SA-33

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.