



**FLEXIBLE  
PIPE CONNECTIONS  
GENERAL CATALOGUE**

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## RUBBER-METAL ELEMENTS

### Program summary

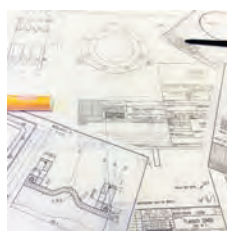
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# STENFLEX®

## – SETTING STANDARDS!

For 50 years, industrial pipeline construction applications throughout the world have relied on flexible pipe connections by STENFLEX®, the specialists for high-quality construction elements in:

- Nuclear power plants, conventional power plants and large-scale plant construction
- Heating, ventilation and air conditioning, as well as drinking water and waste water engineering
- Mechanical engineering, motor production, industrial equipment construction
- Shipbuilding and ships chandlers, as well as the foodstuff and chemical industries



Three features set STENFLEX® expansion joint technology apart: It is entirely maintenance-free, highly reliable in application and extremely durable.

This means that operators can rely on our expansion joints for cost-effectiveness and sustainability.

---

# TECHNICAL SOLUTIONS

We make it possible: Technical support from STENFLEX®

STENFLEX® engineers combine experience and know-how gained throughout five decades of market leadership in the field of flexible pipe connectors.

The CAD experts of our design and engineering department actively seek and appreciate dialogue with the industry and their customers which they then use to turn technical innovations into products that meet requirements and conform to applicable standards.

What we can offer you at STENFLEX®:

- Technical support in the selection of suitable pipe connectors taking installation and planning guidelines into account
- Application-based dimensioning and calculation of expansion joints
- Offers including drawings with technical data and installation dimensions
- Continuous product optimisation in line with up-to-date technical advances and developments, taking into account the requirements of applicable standards and regulations
- Innovations tailored to respond to the needs of the market

## ... AIMING BEYOND THE BENCHMARK!

STENFLEX® expansion joints are used in a wide variety of applications. Proven STENFLEX® quality has traditionally been relied upon in the following sectors:



## APPLICATIONS

- Mechanical engineering, motor production and industrial equipment construction, as well as on turbines and compressors
- Building service engineering utilities: Heating, ventilation and air conditioning, as well as drinking water and waste water engineering
- Power engineering of nuclear plants, conventional power plants and large-scale plant construction
- Ship building and ships chandlers
- Waste incineration
- Dedusting and filtering technology
- Materials handling
- Water supply and water treatment
- Process engineering
- Chemicals industry, petro-chemicals and refineries
- Metal construction, smelting works and steelworks
- Paper, beverages and foodstuffs industries
- Gas and water supply as well as water treatment plants
- Heat supply and district heating plants
- Environmental engineering, incinerators
- Hydraulic installations and rolling mills



# PRODUCT APPLICATIONS

## SUMMARY

| Products                                                                      | Rubber expansion joints                                                           | Vibration and noise absorbers                                                     | Steel expansion joints                                                            | PTFE expansion joints                                                               | Swivel joints                                                                       | Rubber-metal bearing elements                                                       |
|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| This table contains the main applications for STENFLEX® products              |  |  |  |  |  |  |
| Absorption of pipe expansion and movement (axial, lateral, angular)           | ■                                                                                 |                                                                                   | ■                                                                                 | ■                                                                                   | ■                                                                                   |                                                                                     |
| Absorption of vibration/oscillation and noise                                 | ■                                                                                 | ■                                                                                 | ■                                                                                 | ■                                                                                   |                                                                                     | ■                                                                                   |
| Tension reduction                                                             | ■                                                                                 | ■                                                                                 | ■                                                                                 | ■                                                                                   |                                                                                     |                                                                                     |
| Absorption of rotational movement and torsion                                 |                                                                                   |                                                                                   |                                                                                   |                                                                                     | ■                                                                                   |                                                                                     |
| Compensation of pipeline offsets (installation inaccuracies, ground settling) | ■                                                                                 |                                                                                   | ■                                                                                 | ■                                                                                   |                                                                                     |                                                                                     |
| Dismantling pieces on fittings                                                | ■                                                                                 | ■                                                                                 | ■                                                                                 | ■                                                                                   |                                                                                     |                                                                                     |
| Elastic reduction adapters in pipes                                           | ■                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Elastic wall sealing systems                                                  | ■                                                                                 |                                                                                   |                                                                                   |                                                                                     |                                                                                     |                                                                                     |
| Rotary lead-through systems, loading systems                                  |                                                                                   |                                                                                   |                                                                                   |                                                                                     | ■                                                                                   |                                                                                     |
| Conveyance of particularly aggressive media                                   |                                                                                   |                                                                                   |                                                                                   | ■                                                                                   |                                                                                     |                                                                                     |
| Mountings of machines and apparatus                                           |                                                                                   |                                                                                   |                                                                                   |                                                                                     |                                                                                     | ■                                                                                   |

---

## BEING STENFLEX® – WHAT IT MEANS TO US

Established in 1965, STENFLEX® today develops, produces and supplies flexible pipe connections to customers through-out the world. The company's product portfolio includes rubber and steel expansion joints, PTFE expansion joints, pipe connectors, swivel joints and rubber-metal bearing elements.

STENFLEX® offers something exceptional in terms of the quality, value and durability of its products. The STENFLEX® brand has become inextricably linked with rubber and steel expansion joints made of traditional materials such as EPDM, NBR, butyl and stainless steel. These provide the optimum conditions for absorbing motion and noise.

STENFLEX® stands for delayed material aging, thanks to protective components, absolute and sustained flange-sealing and ease of installation. Add to this high resistance to pressure surges thanks to vulcanised reinforcing materials made of synthetic fibres and steel wire – all this at maximum cost-effectiveness.

We owe our success to the following core competences:

- Ongoing development of the product range
- Comprehensive customer service thanks to an international sales network
- Maximum reliability and adherence to deadlines
- Uncompromising customer focus
- Responsibility towards our customers and their needs
- Consistently superior product quality, compliant with DIN EN ISO 9001:2015

# SERVICE

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## PHILOSOPHY

From our point of view, corporate success is inextricably linked to responsibility. This we accept gladly – for the benefit of our customers, our employees and our environment.

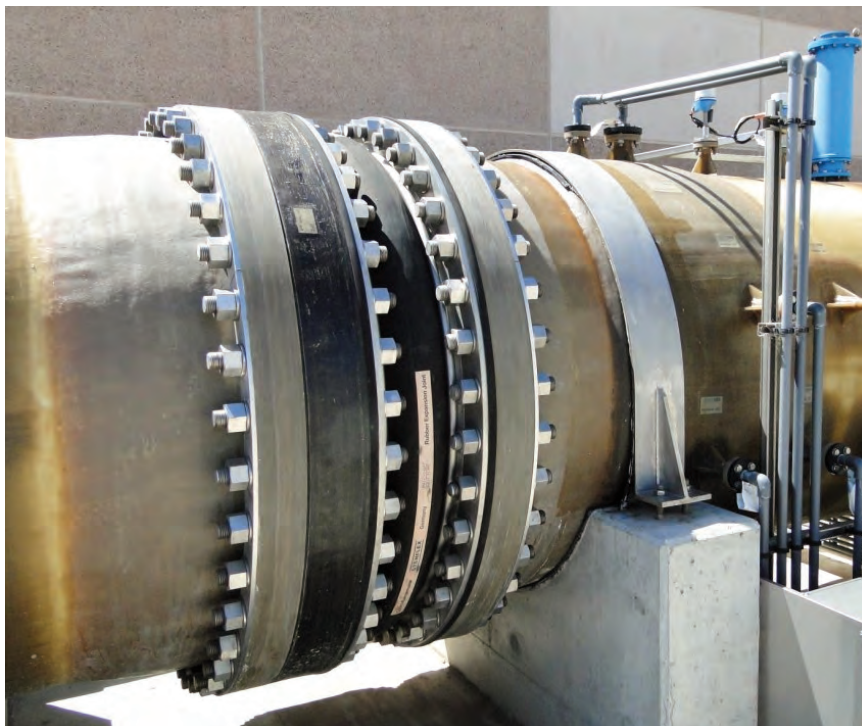
The key to satisfying our customers lies in the proven dependability of the support we give, the service we offer and the state-of-the-art quality of all STENFLEX® products.

STENFLEX® leads the field in innovation and expertise. This expertise grows with every order we fulfill and benefits our customers, who gain access to 50 years of specialty know-how and engineering.

It is STENFLEX® company policy that we actively promote a culture of mutual respect within our organisation, and towards our corporate partners. And are committed to fair conduct towards our competitors.

# REVISION

## PROFESSIONAL INSPECTION FOR RELIABLE LONG-TERM OPERATION



STENFLEX® offers regular inspections to ensure reliable plant operation

STENFLEX® stands for exceptional reliability and sustained performance when it comes to pipe connections. The guarantees we provide for new components should also apply to equipment which is already in operation. For this reason we offer a revision service for all installed expansion joints comprising the inspection and evaluation of equipment.

This typically involves STENFLEX® employees measuring the hardness of the rubber, checking the installation position and visually inspecting the bellows for possible damage such as bubbles and tears, or layer separation. This inspection will identify defects on both the exterior surface and the inside of the bellows.

Once the revision process is complete, customers (such as operators of power plants and industrial installations) receive a written inspection report containing recommendations for maintenance work along with proposals to replace outdated expansion joints, should this be necessary.

### STENFLEX®

**Stahl-Kompensatoren**  
**Steel-Type expansion joints**  
**Compensateurs en acier**  
**Compensadores de acero**  
**Compensatori d'acciaio**  
**Stålkompensatorer**  
**χαλύβδινων διαστολικών**  
**Ocelové kompenzátory**

Montage- und Betriebsanleitung  
Installation and operating instructions  
Notice de montage et de service  
Instrucciones para el montaje y el servicio  
Istruzioni per il montaggio e l'esercizio  
Monterings- och bruksanvisning  
Οδηγίες τοποθέτησης και λειτουργίας  
Návod k montáži a obsluze



B2110.00001994-00

### STENFLEX®

**Rohrdrehgelenke**  
**Swivel joints**  
**Jointes tournants**  
**Articulaciones giratorias**  
**Giunti girevoli per tubi**  
**Kullänkar**  
**αρθρώσεις σωλήνων**  
**Otočnych kloubů**

Montage- und Betriebsanleitung  
Installation and operating instructions  
Notice de montage et de service  
Instrucciones para el montaje y el servicio  
Istruzioni per il montaggio e l'esercizio  
Monterings- och bruksanvisning  
περιστρεφόμενες αρθρώσεις σωλήνων  
Otočnych kloubů



D141.00001998-00

### STENFLEX®

**Gummi-Kompensatoren Typenreihe D**  
**Rubber expansion joints Type Series D**  
**Compensateurs en élastomère de types D**  
**Compensadores de goma Serie D**  
**Compensatori di gomma della serie tipo D**  
**Gummi-kompensatorer typserie D**  
**ελαστικά αντικραδασμικά της σειράς D**  
**Gumové kompenzátory typové řady D**

Montage- und Betriebsanleitung  
Installation and operating instructions  
Notice de montage et de service  
Instrucciones para el montaje y el servicio  
Istruzioni per il montaggio e l'esercizio  
Monterings- och bruksanvisning  
Οδηγίες τοποθέτησης και λειτουργίας  
Návod k montáži a obsluze



G171.00000906-00

# QUALITY MANAGEMENT

## STENFLEX® IS SETTING A HIGH STANDARD

Our flexible pipe connections are designed and dimensioned in compliance with national and international regulatory standards. The optimum quality of STENFLEX® products has been confirmed by approval bodies and independent test institutes worldwide.

To ensure that our products and processes continue to remain at a consistently high level in future, we work in compliance with ISO 9001:2015.

Many of our products have achieved KTA 1401 approval for use in nuclear plants.

When it comes to quality, STENFLEX® promises the following:

- STENFLEX® production meets the highest quality demands. Our design and engineering department will continue to introduce innovations and product improvements.
- STENFLEX® products have been approved by international classification bodies and independent testing institutes.
- STENFLEX® products stand out due to a multitude of successful component and performance tests.
- Before being put to use in practical applications, all type series undergo stringent testing in all manner of areas. These include fire resistance tests as well as burst, pressure and leak tests.
- Most type series are subject to the European Pressure Equipment Directive and are therefore CE-compliant.

Special tests and acceptance testing by authorities can be arranged for customers on request.



# TYPE APPROVAL AND SUITABLE

# CERTIFICATION AND APPROVALS

STENFLEX® has attained all major and approved national and international manufacturer certificates, component tests and special Certificates of Competence. Our production processes are based on the ISO 9001:2015 quality management system, which has been in use throughout our organisation for a number of years.

## CERTIFIED QUALITY MANAGEMENT SYSTEM IN ACCORDANCE WITH:



**EN ISO 9001:2015**  
Management service Quality seal



**VGB Powertech**  
Certified for nuclear facilities  
Suitability approval for quality assurance  
Approval according to KTA 1401



**CE-marking**  
Tested according to  
PED 2014/68/EU



**DIN approved**  
Tested for DIN 4809  
registered number: 3 E002

## CLASSIFICATION AND CERTIFICATION BODIES:



**ABS**  
Type Approvals



**China Corporation Register of Shipping**  
Type Approvals



**Bureau Veritas**  
Type Approvals



**Korean Register of Shipping**  
Type Approvals



**DNV GL® / DNV®**  
Type Approvals



**DIN DVGW**  
KTW-recommendation for drinking water  
Certified for gas supply products



**Lloyd's Register**  
Type Approvals



**ACS**  
Certified for drinking water



**Registro Italiano Navale**  
Type Approvals



**WRAS**  
Certified for drinking water



**Russian Maritime Register of Shipping**  
Type Approvals



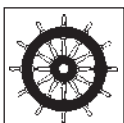
**FDA**  
Certified for foods



**CCS (China Classification Society)**  
Type Approvals



**DIN GOST TÜV**  
Certification GOST-R/TR



**MED**  
Marine Equipment Directive  
(protection against fire)



**TÜV Rheinland DIN CERTCO**  
in accordance with DIN 4809



**Nippon Kaiji Kyokai**  
Type Approvals



**TÜV Anlagen und Umwelt**  
Testing for radioresistance

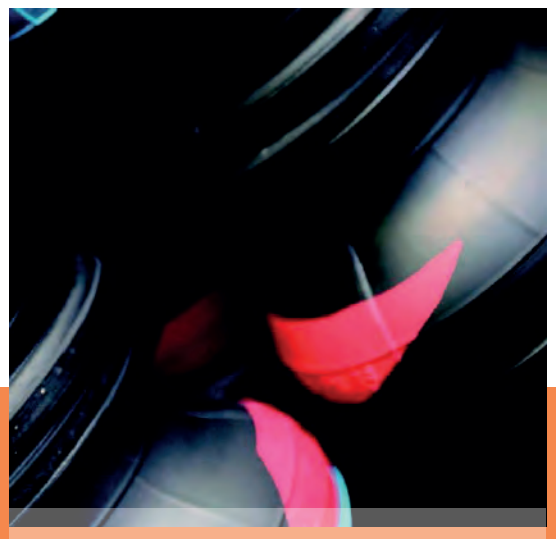
# TESTING

# RUBBER EXPANSION JOINTS

## PROGRAMME OVERVIEW

---

STENFLEX® **RUBBER EXPANSION JOINTS**  
ARE USED TO ABSORB MOVEMENTS AND  
DAMP VIBRATION AND NOISE ON INDUSTRIAL  
EQUIPMENT, MACHINERY AND PUMPS,  
AS WELL AS IN PIPELINE SYSTEMS.



QUALITY.

# RUBBER EXPANSION JOINTS

## GENERAL DESCRIPTION OF RUBBER EXPANSION JOINTS

STENFLEX® rubber expansion joints have served with distinction for 50 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. Numerous patent applications and on-going optimization of the formulae for our rubber grades ensure that our customers always receive state-of-the-art products; highly reliable and of superior durability.

The large-scale industrial manufacture of the rubber bellows, constant control of compliance with all manufacturing, business and quality processes in line with EN ISO 9001:2015 and decades of experience in the development and manufacture of rubber expansion joints: all this guarantees a uniform product of the highest standard. It underlines the STENFLEX® Quality Claim.

Nearly all nuclear plants throughout Europe are equipped with STENFLEX® expansion joints. Many of our rubber expansion joints have been used in a large variety of applications. They have served on site in trouble-free operation for decades. STENFLEX® rubber expansion joints have passed national and international Type Approvals and suitability tests and are certified by numerous classification societies.

Our engineers in the fields of mechanical-, and processing-plant engineering work hand-in-hand with our modern R & D department. They are always available for technical consultation and ready to help in solving specific application problems at any time.

## DEVELOPMENT/DESIGN

STENFLEX® rubber expansion joints are rated by state-of-the-art computing techniques (which include the Finite Element Method). They are optimized under experimental conditions.

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.

This means we 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 product functionality
- Structures that are easy to install
- Reduced lead times for special designs

The excellent features of STENFLEX® rubber expansion joints include outstanding absorption of movement and good vibration damping properties. Depending on the particular expansion joint type, a maximum of the forces produced by the pipe internal pressure is absorbed by the specific design of the expansion joint itself, and not passed on to neighbouring system components.

## PURPOSE

Expansion joints are used in appliances, machinery, apparatus and pipe systems where space is limited:

- to compensate for movement
- to compensate for expansion caused by differences in temperature
- to reduce tension
- to absorb noise and vibration transmission
- to compensate for ground, and foundation settlement
- to compensate for pipeline movement aboard ships
- as adapters to compensate for installation inaccuracies
- as dismantling pieces for fittings
- as elastic sealing elements, where pipelines pass through walls

Rubber expansion joints are used in a variety of industrial applications:

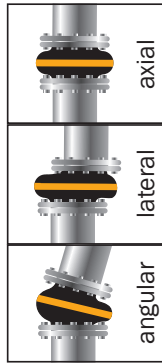
- Machine engineering
- Domestic industry
- Processing plant engineering
- Power station technology
- Shipbuilding

## VERSIONS

Rubber expansion joints differ according to the following criteria:

- type (universal/lateral/angular expansion joints)
- pipe connection type (flange, thread)
- rubber quality of the bellows (rated to the media transported in the pipes)
- bellows structure (rated to the pressure and temperature load)

Our expansion joints are delivered ready to install. Together with the standard versions featured in the catalogue, special versions can also be developed and produced on request for special operating conditions. Connection parts (that deviate from DIN) such as ISO, ANSI, BS, VG and SAE standards etc. are also possible.



### Universal rubber expansion joints

**Structure:** Rubber bellows with connection parts (flange or thread)

**Movement absorption:** Axial, lateral, angular and simultaneous movement absorption is possible. Universal expansion joints with two bellows and a connecting pipe are used to absorb large movement.

**Fixed points:** To absorb axial force a pipe's fixed points must be robust. Pipe routing must be correct.



### Lateral rubber expansion joints:

**Structure:** Rubber bellows with flanges and laterally movable restraints.

**Movement absorption:** Lateral shift of the expansion joints is possible. The restraint absorbs axial reaction force and relieves the pressure on the pipe's fixed points. In double joints the type of restraint allows for movement on one plane; in ball joints it allows for all-around movement. 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 force from lateral movement and friction force.

**Attention!** Lateral expansion joints with tie rod restraints are not designed for axial adjusting movements. However, if axial adjusting movements are initiated, the tie rod restraints cannot compensate the compressive force and will be transferred to the fixed points of the piping instead.



### Angular rubber expansion joints:

**Structure:** Rubber bellows with flanges and hinge restraint. 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). Angular expansion joints with connecting pipe are used to compensate large movements.

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

# RUBBER EXPANSION JOINTS

## GENERAL DESCRIPTION OF RUBBER EXPANSION JOINTS (RUBBER BELLOWS)

### MATERIAL QUALITIES

STENFLEX® rubber bellows are made of elastic synthetic elastomers. Their wide range of industrial applications are covered with combinations of the four standard elastomer qualities EPDM, CIIR, NBR and CR together with tensile reinforcing elements.

Elastomers are basic materials that are processed by adding sulphur, fillers, plasticizers and aging protection agents to produce rubber compounds suitable for vulcanization. Under the influence of temperature and pressure the vulcanization process (cross linkage) converts the rubber compounds into rubber grades – with their typical elastic properties.

Material properties such as hardness, elasticity, tensile strength, temperature resistance, etc., are rated to the corresponding application. Documents detailing media resistance of the rubber grades are available on request.



For different pressure and temperature requirements, different reinforcing materials (synthetic fibres or steel cord) are used in the intermediate layer of the rubber bellows. The rubber collar is self-sealing and additionally reinforced with wire cable cores for stability (protruding wire in the illustration).



The expansion joints are available in different rubber qualities to ensure the optimum solution for every application. The rubber quality can be recognised by the different colour markings. The additional embossing on the bellows serves to identify the nominal size and the product designation.

### STRUCTURE

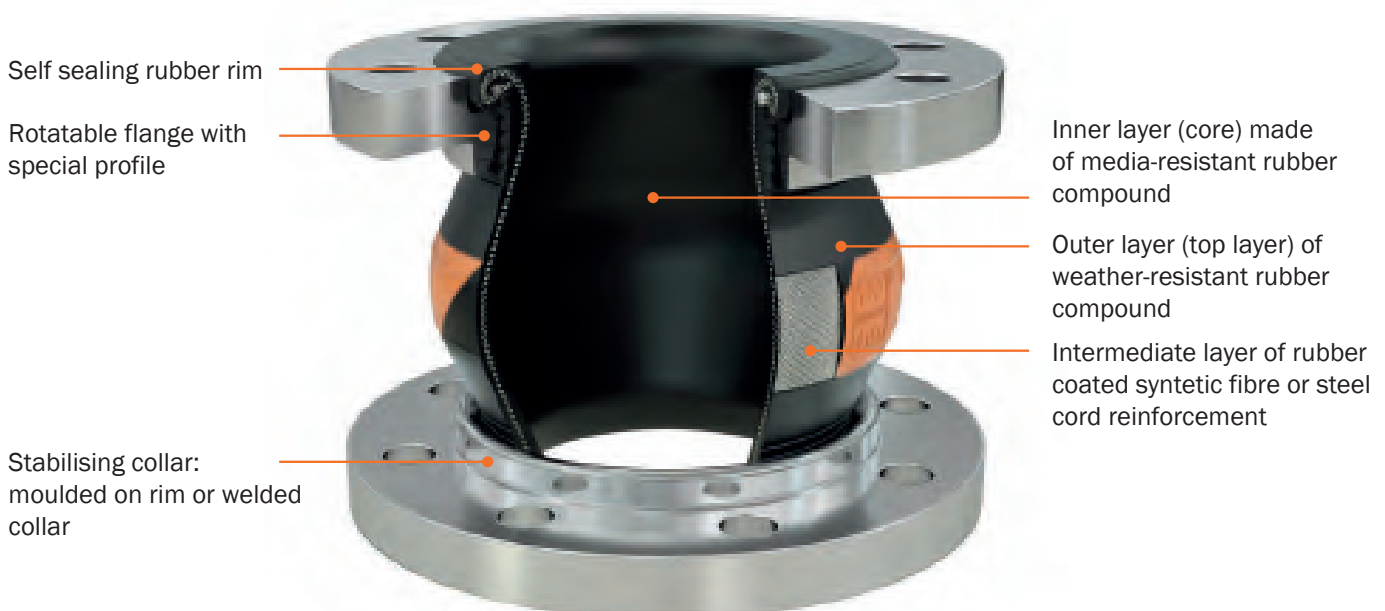
STENFLEX® rubber bellows have been optimized by calculation and verified by experimentation to produce highly elastic pressure-resistant bellows with flow contours to meet demanding absorption tasks.

Rubber bellows have a three-ply wall structure:

- inner ply (core) of medium-resistant rubber compound
- intermediate ply of rubber compound with tensile elements for reinforcement
- outer ply (cover layer) of weather-proof rubber compound

The arrangement of the tensile reinforcing elements is ascertained by calculation and experimentation to ensure that the force of pressure within the bellows can be absorbed. A permanent bond exists between the embedded tensile reinforcing elements and the rubber material.

The rubber grades used for the inner and outer ply are empirically defined rubber compounds rated to certain properties (media resistance, ozone resistance, UV resistance, elasticity, wear-proof characteristics, etc.)



# RUBBER EXPANSION JOINTS

## GENERAL DESCRIPTION OF RUBBER EXPANSION JOINTS (RUBBER BELLOWS)

| STENFLEX®<br>colour code                                                                  | Properties                                                                                                                                                                                                                                                                                                      | Applications                                                                                                                                                                  |
|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rubber grade: EPDM Ethylene propylene diene rubber<br>Trade name: Buna AP Keltan Vistaton |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                               |
| orange                                                                                    | Heat- and weather-proof rubber grade with special resistance to highly oxidizing media and very many chemicals (not oil-resistant). Temperature resistance in continuous operation* from -40 °C to +100 °C. Resistant to hot water up to +100 °C.                                                               | Water, hot water, cooling water, sea water, steam, acids, lyes, pickling lyes, hypochlorite solutions etc. Special type AS in heating systems (as per DIN 4809 up to +110 °C) |
| Rubber grade: CIIR Chloro isobutylene isoprene rubber<br>Trade name: Butyl                |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                               |
| white                                                                                     | Rubber grade complying with the latest hygiene directives for drinking water systems as per KTW recommendation by the German Health Department (KTW = Plastics for drinking water). Impermeable to gas. Temperature resistance in continuous operation* -40 °C to +90 °C. Resistant to hot water up to +90 °C.  | Recommended for drinking water supply systems                                                                                                                                 |
| Rubber grade: NBR Nitril-butadiene rubber<br>Trade name: Perbunan                         |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                               |
| red                                                                                       | Quality with excellent oil resistance, very resistant to swelling, e.g. even in contact with petrol/benzole mixture, impermeable to gas for hydrocarbons. Temperature resistance in continuous operation* -30 °C to +100 °C, resistant to hot water up to +70 °C.                                               | Fuel oil, mineral oil, blast furnace waste gas, compressed air systems, cooling water with antifreezing compound                                                              |
| Rubber grade: CR Polychloroprene rubber<br>Trade name: Neoprene Baypren                   |                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                               |
| —                                                                                         | Multi-purpose rubber grade with good oil, weather and flame resistance, very good resistance to ageing. Resistant to various organic and inorganic chemicals. Impermeable to gas for hydrocarbons. Temperature resistance in continuous operation* from -30 °C to +100 °C, resistant to hot water up to +70 °C. | Weather-proof outer ply (cover layer)                                                                                                                                         |

\*The given temperature for continuous operation refers solely to the rubber grade. When reinforcements or other filling material is embedded, the temperature resistance in continuous operation increases.

# RUBBER EXPANSION JOINTS

## GENERAL DESCRIPTION OF RUBBER EXPANSION JOINTS (CONNECTION PARTS)

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

### FLANGES

Flanges for rubber expansion joints in the series A, AR, AS, B, E, G, GR-SAE, MS, R and RS have a specially machined groove designed to accommodate the rubber rim. They are fitted in a rotating position at the bellows to simplify mounting to the pipeline.

STENFLEX® rubber expansion joints in the series C, D, and W have press-on retaining flanges.

The flanges have a stabilizing collar on the side facing the bellows (moulded on rim or welded collar). This stabilizes the rubber bellows and ensures compliance with safety spacing between the ends of the screws and the rubber bellows throughout the entire range of pressure and movement. The purpose is to eliminate the risk of damage to the rubber bellows caused by the screw ends. Special flanges are fitted with stabilizer rings.

Standard screws can be used because the flanges are drilled for through-bolts according to EN 1092 (DIN 2501). Other pitch circles and bores are possible e.g. to ANSI (ASA), BS, SAE and for ventilation systems.

Flanges vary according to expansion joint type (universal, lateral and angular expansion joints) and size as follows:

- Standard flanges
- Flanges with molded ears
- Flanges with welded ears
- Oval flanges
- Flanges with two pitch circles
- Flanges made to other standards

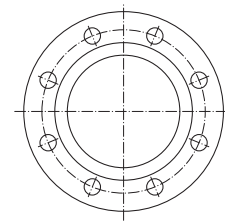
Standard flanges for rubber expansion joints are machined to produce a fit within the tolerances.

The following special versions are possible on request:

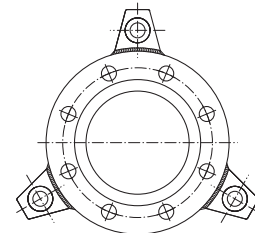
- All-round machined flanges
- Special materials deviating from the standard data sheet (stainless steels, aluminum, etc.)

Flanges made of unalloyed steels are galvanized and blue chromated 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, coating etc.) can be supplied on request.

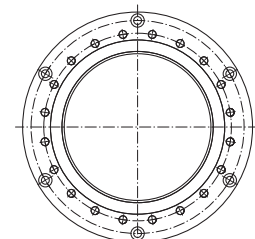
| Flange material | Material No. as per DIN EN | Abbreviation as per DIN EN (DIN) |
|-----------------|----------------------------|----------------------------------|
| Unalloyed steel | <b>1.0038</b>              | <b>S235JR</b>                    |
|                 | <b>1.0577</b>              | <b>S355J2</b>                    |
| Stainless steel | <b>1.4541</b>              | <b>X6CrNiTi18-10</b>             |
|                 | <b>1.4571</b>              | <b>X6CrNiMoTi17-12-2</b>         |
|                 | <b>1.4404</b>              | <b>X2CrNiMo17-12-2</b>           |



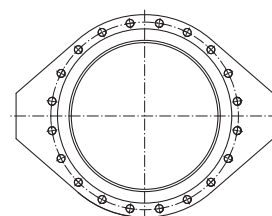
Standard flange with machined groove for rubber rim and stabilizing collar (universal expansion joint)



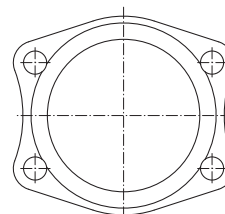
Flange with welded ears or molded ears for the restraints (lateral expansion joints)



Flange with second pitch circle for the restraints (lateral expansion joints)



Oval flange (angular expansion joints)



Flange as per SAE standard (Type GR-SAE)

# RUBBER EXPANSION JOINTS

## GENERAL DESCRIPTION OF RUBBER EXPANSION JOINTS

### THREADED CONNECTIONS

Threaded connections are primarily used in domestic industry. Rubber expansion joints type AG-5 and AS-5 are equipped with female thread and flat seal in accordance with ISO 228-1, or with female or male thread (thread sealing) in accordance with ISO 7-1 (DIN 2999).

The threaded connections for type AS-5 are made of galvanized annealed cast iron. Stainless steel connection parts are used to meet increased anti-corrosion requirements (type AG-5). These are also suitable for pipes made of copper or plastic.

| Material threaded part | Material No. as per DIN EN | Abbreviation as per DIN EN (DIN) |
|------------------------|----------------------------|----------------------------------|
| <b>Unalloyed steel</b> | <b>1.0038</b>              | <b>S235JR</b>                    |
| <b>Stainless steel</b> | <b>1.4571</b>              | <b>X6CrNiMoTi17-12-2</b>         |

### TIE ROD RESTRAINTS

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

- External restraints to absorb reaction force from internal pressure (e.g. type A-2, AR-2, AS-2, B-2, R-2)
- External and internal restraints to absorb reaction force from internal pressure and vacuum (e.g. type A-4, AR-4, AS-4, B-4).

The tie rods in the flange ears for the lateral movement are carried

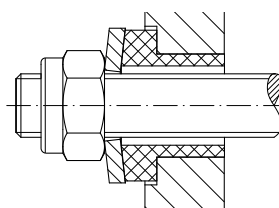
- by sound damping rubber sockets up to DN 150
- by spherical washers and conical seats as from DN 175

The tie rods, spherical washers and conical seats are galvanized and blue chromated. Stainless steel can be used for restraint elements to satisfy increased corrosion protection requirement. Other anti-corrosion coatings (hot-dip galvanizing, special varnish, coating) are available on request.

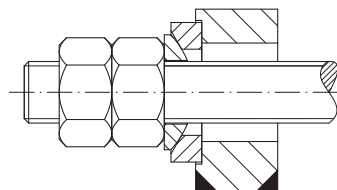
| Material tie rod restraintg | Material No. as per DIN EN             | Abbreviation as per DIN EN (DIN) or strength class |
|-----------------------------|----------------------------------------|----------------------------------------------------|
| <b>Unalloyed steel</b>      |                                        |                                                    |
| Tie rods                    | –                                      | <b>8.8</b>                                         |
| Washers                     | –                                      | <b>8.8</b>                                         |
| <b>Stainless steel</b>      |                                        |                                                    |
| Tie rods, Washers           | <b>A2, 1.4057</b><br><b>A4, 1.4057</b> | <b>50, 70, C3-80</b><br><b>50, 70, C3-80</b>       |

## RESTRAINTS

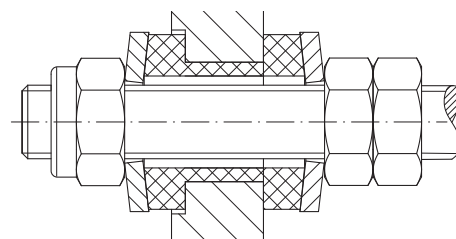
Restraints are used for lateral and angular expansion joints. The restraints absorb the axial reaction force produced by internal pressure. Even so, the connected pipe must be equipped with light fixed points to absorb momentum force. The precise rating and operating parameters of the corresponding machinery or equipment must be known to calculate the degree of restrain correctly. Standard restraints are available for the lateral and angular expansion joint program. They are calculated on the basis of the material strength values at +50 °C. Reduced strength values are taken into consideration at higher temperatures.



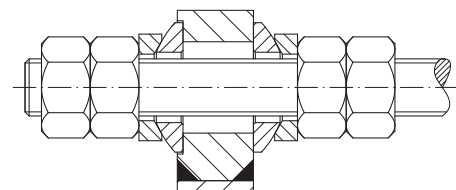
Sound damping external restraint (lateral expansion joint)



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



Sound damping external and internal restraint (lateral expansion joint)



External and internal restraint with spherical washer and conical seat (lateral expansion joint)

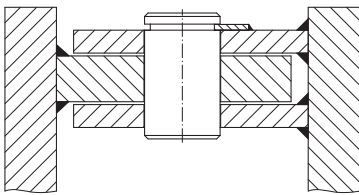
# RUBBER EXPANSION JOINTS

## GENERAL DESCRIPTION OF RUBBER EXPANSION JOINTS

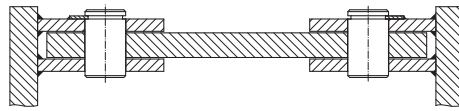
### HINGE RESTRAINTS

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

The hinge restraints of unalloyed steel are coated with anti-corrosion primer. Stainless steel parts are used to satisfy tougher corrosion protection requirements. Other materials and forms of corrosion protection (hot-dip galvanizing, special varnish, coating, etc.,) are available on request.



Restraint with welded joint bars and bolts (angular expansion joint)



Double hinge restraint with welded straps and bolts (lateral expansion joint)

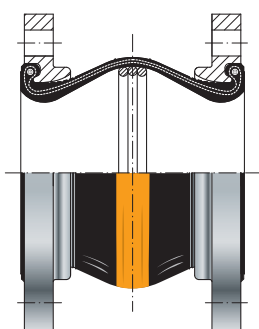
| Material hinge restraint | Material No. as per DIN EN | Abbreviation as per DIN EN (DIN) |
|--------------------------|----------------------------|----------------------------------|
| <b>Unalloyed steel</b>   | <b>1.0038</b>              | <b>S235JR</b>                    |
|                          | <b>1.0577</b>              | <b>S355J2</b>                    |
| <b>Stainless steel</b>   | <b>1.4541</b>              | <b>X6CrNiTi18-10</b>             |
|                          | <b>1.4571</b>              | <b>X6CrNiMoTi17-12-2</b>         |

### ACCESSORIES

STENFLEX® rubber expansion joints can be equipped with vacuum supporting rings, internal guide sleeves, outer protective covers, protective hoods or protective tubes.

### VACUUM SUPPORTING RINGS

Depending on diameter and type, STENFLEX® rubber expansion joints are used for light to medium negative pressure. Vacuum supporting rings are fitted to the inner surface of the bellows convolutions for greater negative pressures (vacuum).



Rubber expansion joint with vacuum supporting ring

As a rule, the supporting rings are made of stainless steel up to DN400, for DN450 and larger, rubber-covered steel rings are used.

### GUIDE SLEEVES

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

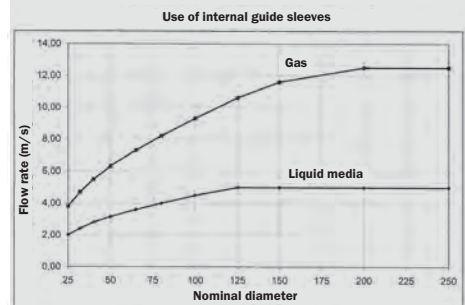
However, abrasive media or high flow velocities (see diagram) with high-frequency vibrations or turbulence (e.g. behind a pump) require that internal guide sleeves are installed to protect the rubber structure.

As a rule, the internal guide sleeves are made of stainless steel and are fitted with a flared flange. This seals the internal guide sleeve on the one side directly to the sealing face of the rubber bellows; on the other side of the flared flange an additional seal must be used against the counter flange.

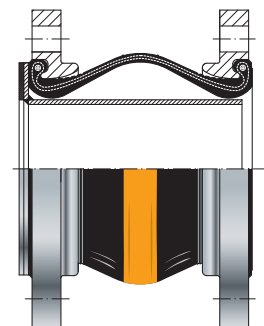
In the case of purely axial movement, cylindrical guide sleeves are used. For lateral and/or angular movement, conical internal guide sleeves are fitted (tapering cross section).

Telescopic internal guide sleeves are only used in special cases.

Being aware of the flow direction is very important when installing expansion joints with internal guide sleeves.



For flow rates, above the curve, it is advisable to install internal guide sleeves to protect the bellows. The data are of indicative nature.



Rubber expansion joint with cylindrical internal guide sleeve and additional soft seal to the counter flange.



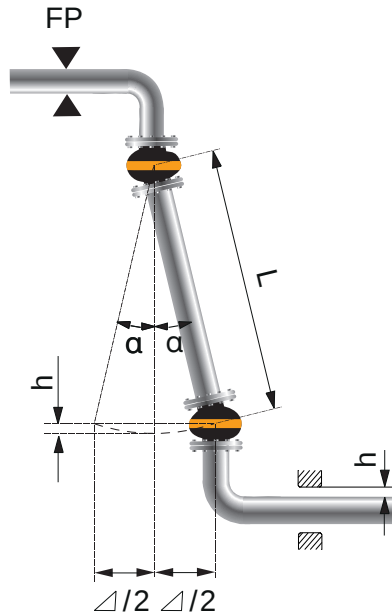
# RUBBER EXPANSION JOINTS

## COMPENSATION SYSTEMS

For over 50 years now, customers working in the field of industrial pipeline construction around the world have relied on flexible pipe connections from STENFLEX® – the specialist for high-quality construction elements.

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, protective covers etc., 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.



Installation with 50 % pre-tension

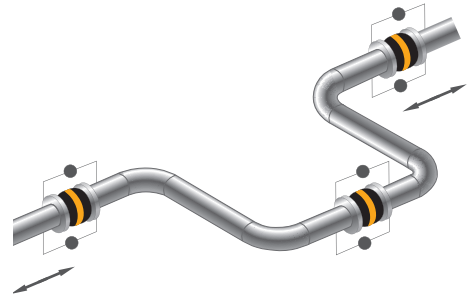
Expansion absorption  $\Delta$  depends on the centre-to-centre spacing  $L$  of the expansion joints and the maximum deflection angle  $\alpha$ . It is calculated according to the following formula:

$$L = \frac{\Delta/2}{\sin \alpha} \quad \Delta/2 = L \cdot \sin \alpha$$

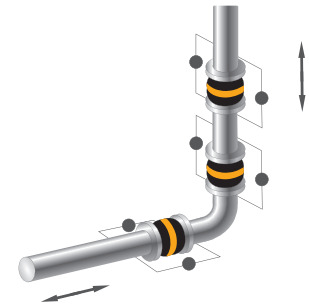
The deflecting pipeline must have sufficient play in the guide bearing to allow for the radian measure. It is calculated as follows:

$$h = L (1 - \cos \alpha)$$

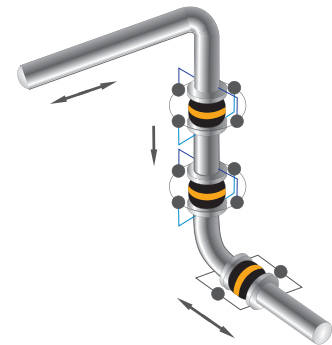
## COMPENSATION SYSTEMS WITH ANGULAR EXPANSION JOINTS



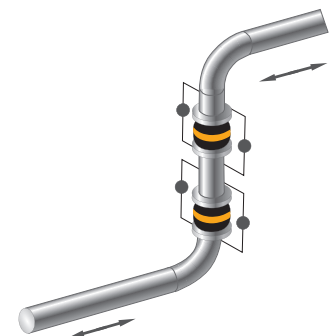
U-shaped triple joint, 3 angular expansion joints



L-shaped triple joint, 3 angular expansion joints



3D triple joint, 2 cardan hinged restraint expansion joints, 1 angular expansion joint



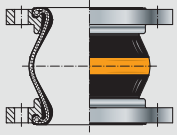
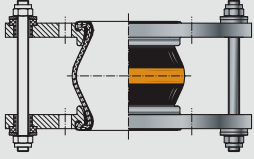
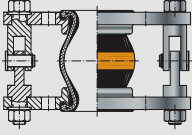
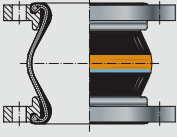
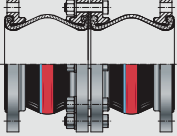
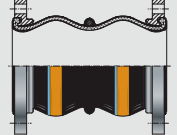
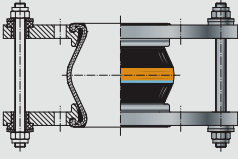
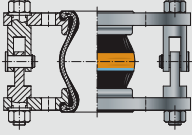
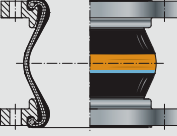
Z-shaped double joint, 2 angular expansion joints





# RUBBER EXPANSION JOINTS

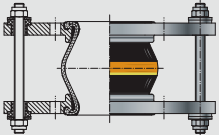
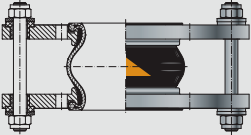
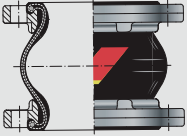
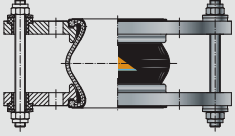
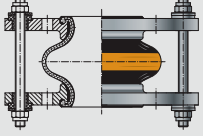
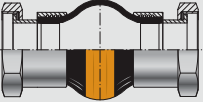
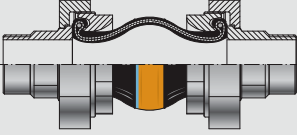
## PROGRAM SUMMARY

|                                                                                     | Type                 | DN           | Pressure rate bar | Max. operating temperature* | Rubber grades   | Connection parts                        | Page |
|-------------------------------------------------------------------------------------|----------------------|--------------|-------------------|-----------------------------|-----------------|-----------------------------------------|------|
|    | <b>A-1</b>           | DN 20 – 1000 | PN 16             | +90 °C                      | EPDM, NBR, CIIR | rotatable flanges                       | 30   |
|    | <b>A-2<br/>A-4</b>   | DN 20 – 1000 | PN 16             | +90 °C                      | EPDM, NBR, CIIR | rotatable flange with tie rod restraint | 32   |
|    | <b>A-3</b>           | DN 32 – 1000 | PN 16             | +90 °C                      | EPDM, NBR, CIIR | rotatable flange with hinge restraint   | 34   |
|   | <b>AS-1</b>          | DN 25 – 400  | PN 16             | +110 °C                     | EPDM, NBR       | rotatable flanges                       | 36   |
|  | <b>AS-1D</b>         | DN 25 – 250  | PN 16             | +110 °C                     | EPDM, NBR       | rotatable flanges                       | 38   |
|  | <b>MS-1</b>          | DN 65 – 250  | PN 16             | +110 °C                     | EPDM, NBR       | rotatable flanges                       | 40   |
|  | <b>AS-2<br/>AS-4</b> | DN 25 – 400  | PN 16             | +110 °C                     | EPDM, NBR       | rotatable flange with tie rod restraint | 42   |
|  | <b>AS-3</b>          | DN 25 – 400  | PN 16             | +110 °C                     | EPDM, NBR       | rotatable flange with hinge restraint   | 44   |
|  | <b>VS-1</b>          | DN 40 – 150  | PN 16             | +110 °C                     | EPDM, NBR       | rotatable flanges                       | 46   |
|  | <b>AR-1</b>          | DN 20 - 600  | PN 25             | +110 °C                     | EPDM, NBR       | rotatable flanges                       | 48   |

\*Consideration of pressure reduction at maximum temperatures, see technical annex page 198

# RUBBER EXPANSION JOINTS

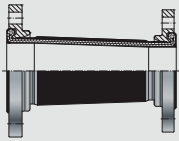
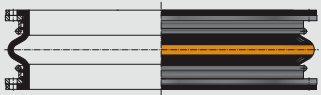
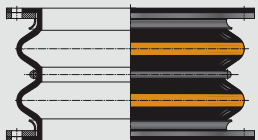
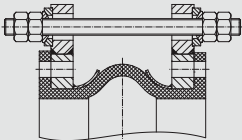
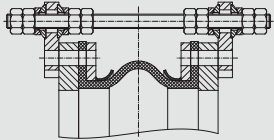
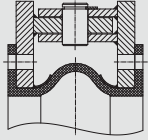
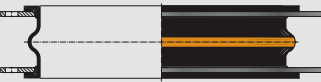
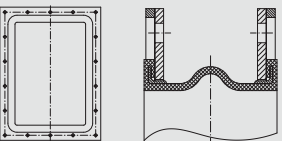
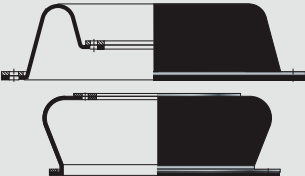
## PROGRAM SUMMARY

|                                                                                     | Type                       | DN          | Pressure rate bar | Max. operating temperature* | Rubber grades   | Connection parts                        | Page |
|-------------------------------------------------------------------------------------|----------------------------|-------------|-------------------|-----------------------------|-----------------|-----------------------------------------|------|
|    | <b>AR-2</b><br><b>AR-4</b> | DN 20 – 600 | PN 25             | +110 °C                     | EPDM, NBR       | rotatable flange with tie rod restraint | 50   |
|    | <b>R-1</b>                 | DN 25 – 300 | PN 16             | +90 °C                      | EPDM, NBR, CIIR | rotatable flanges                       | 52   |
|    | <b>R-2</b>                 | DN 25 – 300 | PN 16             | +90 °C                      | EPDM, NBR, CIIR | rotatable flange with tie rod restraint | 54   |
|   | <b>GR-SAE</b>              | DN 40 – 125 | PN 16             | +110 °C                     | NBR             | rotatable SAE-flange                    | 56   |
|  | <b>RS-1</b>                | DN 25 – 300 | PN 16             | +90 °C                      | EPDM, NBR       | rotatable flanges                       | 58   |
|  | <b>RS-2</b>                | DN 25 – 300 | PN 16             | +90 °C                      | EPDM, NBR       | rotatable flange with tie rod restraint | 60   |
|  | <b>B-1</b>                 | DN 32 – 400 | PN 16             | +90 °C                      | EPDM, NBR       | rotatable flanges                       | 62   |
|  | <b>B-2</b><br><b>B-4</b>   | DN 32 – 400 | PN 16             | +90 °C                      | EPDM, NBR       | rotatable flange with tie rod restraint | 64   |
|  | <b>AG-5</b>                | DN 20 – 400 | PN 16             | +100 °C                     | EPDM, NBR, CIIR | female and/or male thread               | 66   |
|  | <b>AS-5</b>                | DN 32 – 40  | PN 16             | +110 °C                     | EPDM, NBR       | female and/or male thread               | 67   |

\*Consideration of pressure reduction at maximum temperatures, see technical annex page 198

# RUBBER EXPANSION JOINTS

## PROGRAM SUMMARY

|                                                                                     | Type                                                     | DN                                                                | Pressure rate bar      | Max. operating temperature* | Rubber grades   | Connection parts                                             | Page |
|-------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------|------------------------|-----------------------------|-----------------|--------------------------------------------------------------|------|
|    | <b>E</b>                                                 | DN 20 – 250                                                       | PN 10                  | +90 °C                      | EPDM, NBR       | rotatable flanges                                            | 68   |
|    | <b>G</b>                                                 | DN 25 – 100<br>DN 125 – 250                                       | PN 16<br>PN 10         | +90 °C                      | EPDM, NBR       | rotatable flanges                                            | 70   |
|    | <b>C-1</b>                                               | DN 300 – 2400<br>DN 300 – 2800<br>DN 300 – 3600                   | PN 16<br>PN 10<br>PN 4 | +90 °C                      | EPDM, NBR, CIIR | press-on retaining flange                                    | 72   |
|   | <b>C-2</b>                                               | DN 300 – 2000<br>DN 300 – 2000                                    | PN 10<br>PN 4          | +90 °C                      | EPDM, NBR, CIIR | press-on retaining flange                                    | 74   |
|  | <b>C-31</b>                                              | DN 300 – 1000<br>DN 300 – 1000<br>DN 300 – 2400<br>DN 2500 – 3600 | PN 16<br>PN 10<br>PN 4 | +90 °C<br>+90 °C<br>+90 °C  | EPDM, NBR, CIIR | press-on retaining flange with tie rod restraint             | 76   |
|  | <b>C-35</b>                                              | DN 300 – 3600                                                     | on request             | +90 °C                      | EPDM, NBR, CIIR | press-on retaining flange with tie rod restraint on segments | 78   |
|  | <b>C-41</b>                                              | DN 300 – 3600                                                     | on request             | +90 °C                      | EPDM, NBR, CIIR | press-on retaining flange with hinge restraint               | 79   |
|  | <b>D-11</b><br><b>D-30</b>                               | DN 300 – 7500<br>DN 300 – 7500                                    | PN 0,7                 | +90 °C                      | EPDM, NBR       | rotatable press-on retaining flange or tightening straps     | 80   |
|  | <b>D-21</b><br><b>D-22</b><br><b>D-41</b><br><b>D-42</b> | DN 150 – 7500<br>DN 150 – 7500<br>DN 150 – 7500<br>DN 150 – 7500  | PN 0,7                 | +90 °C                      | EPDM, NBR       | press-on retaining frame                                     | 82   |
|  | <b>W-1</b><br><b>W-2</b>                                 | DN 80 – 3400<br>DN 200 – 800                                      | PN 2,5                 | +110 °C                     | EPDM, NBR       | press-on retaining flange                                    | 84   |

\*Consideration of pressure reduction at maximum temperatures, see technical annex page 198

# RUBBER EXPANSION JOINT TYPE A-1

## UNIVERSAL EXPANSION JOINT DN 20 – DN 1000



### STRUCTURE TYPE A-1 / RUBBER BELLOWS PN 16

- Universal expansion joint, consisting of a rubber bellows with rotatable flanges
- Highly elastic molded bellows in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            | CIIR           |
|---------------|------------------------|--------------------------------|----------------|
| Colour code   | orange                 | red                            | white          |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                                                        |
|-------------------------------|----------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                                |
| Max. perm. temperature        | +100 °C                                                                                |
| Bursting pressure             | ≥ 48 bar                                                                               |
| Vacuum operation              | DN 20 – 50 without vacuum supporting ring,<br>DN 65 – 1000 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Rotable flanges with stabilizing collar
- Flange drilling for through bolts
- Special machined groove for rubber rim

|                      | Standard                          |                                     | Others                                                                 |
|----------------------|-----------------------------------|-------------------------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092                           |                                     | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)                   |                                     | 1.4571                                                                 |
| Corrosion protection | DN 20 – DN 400 electro-galvanized | DN 450 – DN 1000 hot-dip galvanized | 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 reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for absorbing vibration and noise
- for compensating axial, lateral and angular movement
- for compensating simultaneous movement in cooling water pipes
- to compensate for installation inaccuracies
- as installation and dismantling aid

### CERTIFICATES

- CE (PED 2014/68/EU)
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- Drinking water
- TÜV Süd (KTA)
- Bureau Veritas
- Others see technical annex

### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube

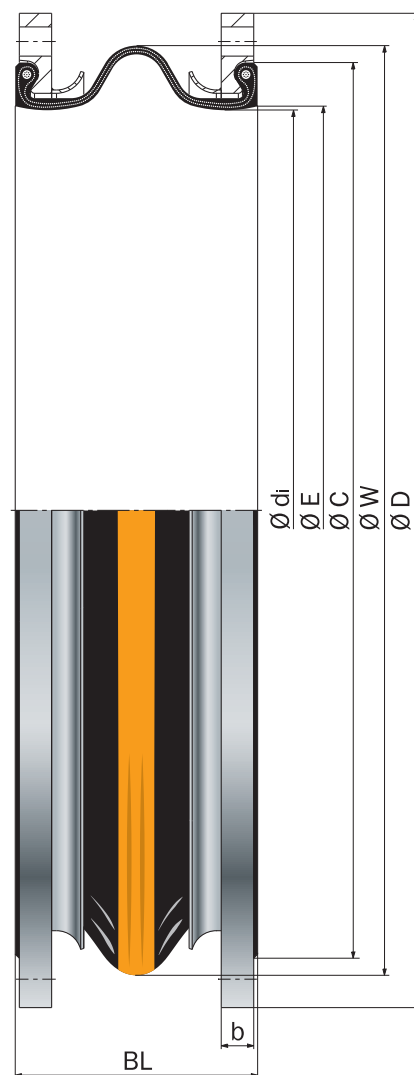
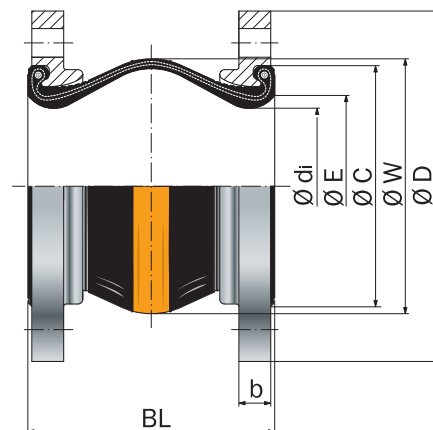
## DIMENSIONS STANDARD PROGRAM

| DN   | BL* | Pressure rate bar | Ø di<br>Bellows inner Ø<br>mm | Ø C<br>Raised face outer Ø<br>mm | Ø E<br>Raised face inner Ø<br>mm | Ø W**<br>Convolution Ø<br>mm | PN<br>Flange connection<br>EN 1902 | Ø D<br>Flange outer Ø<br>mm | b<br>Flange thickness<br>mm |
|------|-----|-------------------|-------------------------------|----------------------------------|----------------------------------|------------------------------|------------------------------------|-----------------------------|-----------------------------|
| 20   | 100 | 16                | 22 ± 3                        | 51                               | 30                               | 55                           | 16                                 | 115                         | 16                          |
| 25   | 100 | 16                | 22 ± 3                        | 51                               | 30                               | 55                           | 16                                 | 115                         | 16                          |
| 32   | 125 | 16                | 31 ± 3                        | 72                               | 39                               | 78                           | 16                                 | 140                         | 16                          |
| 32   | 150 | 16                | 31 ± 3                        | 72                               | 39                               | 88                           | 16                                 | 140                         | 16                          |
| 40   | 125 | 16                | 39 ± 3                        | 81                               | 45                               | 86                           | 16                                 | 150                         | 16                          |
| 40   | 150 | 16                | 39 ± 3                        | 81                               | 45                               | 96                           | 16                                 | 150                         | 16                          |
| 50   | 125 | 16                | 49 ± 3                        | 95                               | 56                               | 97                           | 16                                 | 165                         | 16                          |
| 50   | 150 | 16                | 49 ± 3                        | 95                               | 56                               | 107                          | 16                                 | 165                         | 16                          |
| 65   | 125 | 16                | 65 ± 3                        | 115                              | 72                               | 113                          | 16                                 | 185                         | 18                          |
| 65   | 150 | 16                | 65 ± 3                        | 115                              | 72                               | 123                          | 16                                 | 185                         | 18                          |
| 80   | 150 | 16                | 77 ± 3                        | 127                              | 84                               | 135                          | 16                                 | 200                         | 20                          |
| 100  | 150 | 16                | 100 ± 3                       | 151                              | 109                              | 160                          | 16                                 | 220                         | 20                          |
| 125  | 150 | 16                | 127 ± 3                       | 178                              | 133                              | 184                          | 16                                 | 250                         | 22                          |
| 150  | 150 | 16                | 153 ± 3                       | 206                              | 161                              | 212                          | 16                                 | 285                         | 22                          |
| 175  | 150 | 16                | 176 ± 3                       | 230                              | 185                              | 236                          | 16                                 | 315                         | 22                          |
| 200  | 150 | 10                | 202 ± 3                       | 260                              | 209                              | 265                          | 10                                 | 340                         | 25                          |
| 200  | 175 | 10                | 202 ± 3                       | 260                              | 209                              | 265                          | 10                                 | 340                         | 25                          |
| 250  | 175 | 10                | 252 ± 3                       | 313                              | 262                              | 318                          | 10                                 | 395                         | 25                          |
| 250  | 200 | 10                | 252 ± 3                       | 313                              | 262                              | 318                          | 10                                 | 395                         | 25                          |
| 300  | 200 | 10                | 303 ± 3                       | 363                              | 312                              | 373                          | 10                                 | 445                         | 25                          |
| 350  | 200 | 10                | 344 ± 3                       | 423                              | 360                              | 420                          | 10                                 | 505                         | 30                          |
| 400  | 200 | 10                | 396 ± 3                       | 474                              | 410                              | 460                          | 10                                 | 565                         | 30                          |
| 450  | 250 | 10                | 435 ± 8                       | 532                              | 450                              | 575                          | 10                                 | 615                         | 35                          |
| 500  | 250 | 10                | 485 ± 8                       | 584                              | 500                              | 625                          | 10                                 | 670                         | 35                          |
| 600  | 250 | 10                | 585 ± 8                       | 684                              | 600                              | 725                          | 10                                 | 780                         | 40                          |
| 700  | 275 | 10                | 690 ± 10                      | 800                              | 700                              | 850                          | 10                                 | 895                         | 40                          |
| 800  | 275 | 10                | 790 ± 10                      | 900                              | 800                              | 950                          | 10                                 | 1015                        | 40                          |
| 900  | 300 | 10                | 890 ± 10                      | 1008                             | 900                              | 1050                         | 10                                 | 1115                        | 40                          |
| 1000 | 300 | 10                | 990 ± 10                      | 1108                             | 1000                             | 1150                         | 10                                 | 1230                        | 40                          |

\*DN 25 to DN 300 also available in BL 130 mm as Type R-1. \*\*unpressurized. From DN 200 also available with pressure rate 16 bar. Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION

| DN   | BL  | Δ ax<br>Axial movement |                 | Δ lat<br>Lateral movement<br>± mm | Δ ang*<br>Angular movement<br>± ° degrees | A** Effective bellows cross sectional area at 16 bar cm² | Permissible vacuum w/o supporting ring at length BL bar absolute | Weight approx. kg |
|------|-----|------------------------|-----------------|-----------------------------------|-------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------|-------------------|
|      |     | Compression - mm       | Elongation + mm |                                   |                                           |                                                          |                                                                  |                   |
| 20   | 100 | 20                     | 10              | 10                                | 25                                        | 0                                                        | -                                                                | 2.3               |
| 25   | 100 | 20                     | 10              | 10                                | 25                                        | 0                                                        | -                                                                | 2.3               |
| 32   | 125 | 35                     | 10              | 15                                | 25                                        | 1                                                        | 0.6                                                              | 3.3               |
| 32   | 150 | 35                     | 20              | 20                                | 25                                        | 0                                                        | 0.5                                                              | 3.4               |
| 40   | 125 | 35                     | 10              | 15                                | 25                                        | 6                                                        | 0.6                                                              | 3.7               |
| 40   | 150 | 35                     | 20              | 20                                | 25                                        | 1                                                        | 0.5                                                              | 3.8               |
| 50   | 125 | 35                     | 10              | 15                                | 25                                        | 12                                                       | 0.6                                                              | 4.4               |
| 50   | 150 | 35                     | 20              | 20                                | 25                                        | 13                                                       | 0.5                                                              | 4.5               |
| 65   | 125 | 35                     | 10              | 15                                | 25                                        | 23                                                       | 0.6                                                              | 5.2               |
| 65   | 150 | 35                     | 20              | 20                                | 20                                        | 30                                                       | 0.7                                                              | 5.3               |
| 80   | 150 | 40                     | 10              | 15                                | 20                                        | 42                                                       | 0.65                                                             | 7.2               |
| 100  | 150 | 40                     | 10              | 15                                | 15                                        | 68                                                       | 0.65                                                             | 8.0               |
| 125  | 150 | 40                     | 10              | 15                                | 15                                        | 92                                                       | 0.7                                                              | 10.7              |
| 150  | 150 | 40                     | 10              | 15                                | 12                                        | 173                                                      | 0.75                                                             | 13.0              |
| 175  | 150 | 40                     | 10              | 15                                | 10                                        | 247                                                      | 0.8                                                              | 15.6              |
| 200  | 150 | 20                     | 30              | 15                                | 8                                         | 435                                                      | 0.9                                                              | 18.4              |
| 200  | 175 | 45                     | 15              | 15                                | 8                                         | 264                                                      | 0.9                                                              | 18.6              |
| 250  | 175 | 45                     | 15              | 15                                | 7                                         | 503                                                      | 0.9                                                              | 24.2              |
| 250  | 200 | 35                     | 35              | 15                                | 6                                         | 545                                                      | 0.9                                                              | 24.3              |
| 300  | 200 | 45                     | 15              | 15                                | 6                                         | 550                                                      | 0.9                                                              | 30.2              |
| 350  | 200 | 45                     | 15              | 15                                | 5                                         | 990                                                      | 0.95                                                             | 40.1              |
| 400  | 200 | 45                     | 15              | 15                                | 5                                         | 1100                                                     | 0.95                                                             | 48.8              |
| 450  | 250 | 50                     | 30              | 30                                | 8                                         | 1706                                                     | 0.35                                                             | 64.0              |
| 500  | 250 | 50                     | 30              | 30                                | 7                                         | 2013                                                     | 0.35                                                             | 72.0              |
| 600  | 250 | 50                     | 30              | 30                                | 6                                         | 3006                                                     | 0.35                                                             | 90.0              |
| 700  | 275 | 50                     | 30              | 30                                | 5                                         | 4250                                                     | 0.5                                                              | 120.0             |
| 800  | 275 | 50                     | 30              | 30                                | 5                                         | 5440                                                     | 0.5                                                              | 155.0             |
| 900  | 300 | 50                     | 30              | 30                                | 4                                         | 7000                                                     | 0.6                                                              | 170.0             |
| 1000 | 300 | 50                     | 30              | 30                                | 3.5                                       | 8544                                                     | 0.6                                                              | 205.0             |



### Type A-1

Universal expansion joint, without restraint

\*Larger Δ D ang possible for compressed installation length.

\*\*Effective bellows cross sectional area is a theoretical value.

Please inquire for simultaneous (different) movement.

# RUBBER EXPANSION JOINT TYPE A-2, A-4

## LATERAL EXPANSION JOINT DN 20 – DN 1000



### STRUCTURE TYPE A-2, A-4 / RUBBER BELLOWS PN 16

- **Type A-2:** Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external restraints) to absorb reaction force from internal pressure
- **Type A-4:** Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external and internal restraints) to absorb reaction force from internal pressure or vacuum
- Highly elastic molded bellows in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            | CIIR           |
|---------------|------------------------|--------------------------------|----------------|
| Colour code   | orange                 | red                            | white          |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                                                        |
|-------------------------------|----------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                                |
| Max. perm. temperature        | +100 °C                                                                                |
| Bursting pressure             | ≥ 48 bar                                                                               |
| Vacuum operation              | DN 20 – 50 without vacuum supporting ring,<br>DN 65 – 1000 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

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

|                      | Standard                          |                                     | Others                                                                 |
|----------------------|-----------------------------------|-------------------------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092                           |                                     | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)                   |                                     | 1.4571                                                                 |
| Corrosion protection | DN 20 – DN 400 electro-galvanized | DN 450 – DN 1000 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 reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibration and noise
- for compensating lateral movement
- to compensate for installation inaccuracies
- to compensate for ground and foundation settlement or tank settlement during filling

### TIE ROD RESTRAINTS

- DN 20 – DN 150 Tie rods carried on silencing rubber sockets
- DN 175 – DN 1000 Tie rods carried on spherical washers and conical seats

### Materials

Standard: tie rods 8.8

Others: stainless steel

### Corrosion protection

Standard: electrogalvanized

Others: hot-dip galvanized

### CERTIFICATES

- CE (PED 2014/68/EU)
- Bureau Veritas
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- Drinking water
- TÜV Süd (KTA)
- Others see technical annex

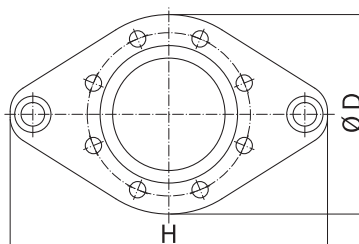
## DIMENSIONS STANDARD PROGRAM

| DN   | BL* | Pressure rate bar | Ø di<br>Bellows inner Ø mm | Ø C<br>Raised face outer Ø mm | Ø E<br>Raised face inner Ø mm | Ø W**<br>Convolution Ø mm | PN<br>Flange connection EN 1902 | Ø D<br>Flange outer Ø mm | b<br>Flange thickness mm | H<br>Flange height mm |
|------|-----|-------------------|----------------------------|-------------------------------|-------------------------------|---------------------------|---------------------------------|--------------------------|--------------------------|-----------------------|
| 20   | 100 | 16                | 22 ± 3                     | 51                            | 30                            | 55                        | 16                              | 115                      | 16                       | 195                   |
| 25   | 100 | 16                | 22 ± 3                     | 51                            | 30                            | 55                        | 16                              | 115                      | 16                       | 195                   |
| 32   | 125 | 16                | 31 ± 3                     | 72                            | 39                            | 78                        | 16                              | 140                      | 16                       | 220                   |
| 32   | 150 | 16                | 31 ± 3                     | 72                            | 39                            | 88                        | 16                              | 140                      | 16                       | 220                   |
| 40   | 125 | 16                | 39 ± 3                     | 81                            | 45                            | 86                        | 16                              | 150                      | 16                       | 230                   |
| 40   | 150 | 16                | 39 ± 3                     | 81                            | 45                            | 96                        | 16                              | 150                      | 16                       | 230                   |
| 50   | 125 | 16                | 49 ± 3                     | 95                            | 56                            | 97                        | 16                              | 165                      | 16                       | 240                   |
| 50   | 150 | 16                | 49 ± 3                     | 95                            | 56                            | 107                       | 16                              | 165                      | 16                       | 240                   |
| 65   | 125 | 16                | 65 ± 3                     | 115                           | 72                            | 113                       | 16                              | 185                      | 18                       | 260                   |
| 65   | 150 | 16                | 65 ± 3                     | 115                           | 72                            | 123                       | 16                              | 185                      | 18                       | 260                   |
| 80   | 150 | 16                | 77 ± 3                     | 127                           | 84                            | 135                       | 16                              | 200                      | 20                       | 300                   |
| 100  | 150 | 16                | 100 ± 3                    | 151                           | 109                           | 160                       | 16                              | 220                      | 20                       | 350                   |
| 125  | 150 | 16                | 127 ± 3                    | 178                           | 133                           | 184                       | 16                              | 250                      | 22                       | 385                   |
| 150  | 150 | 16                | 153 ± 3                    | 206                           | 161                           | 212                       | 16                              | 285                      | 22                       | 420                   |
| 175  | 150 | 16                | 176 ± 3                    | 230                           | 185                           | 236                       | 16                              | 315                      | 22                       | 440                   |
| 200  | 150 | 10                | 202 ± 3                    | 260                           | 209                           | 265                       | 10                              | 340                      | 25                       | 465                   |
| 200  | 175 | 10                | 202 ± 3                    | 260                           | 209                           | 265                       | 10                              | 340                      | 25                       | 465                   |
| 250  | 175 | 10                | 252 ± 3                    | 313                           | 262                           | 318                       | 10                              | 395                      | 25                       | 520                   |
| 250  | 200 | 10                | 252 ± 3                    | 313                           | 262                           | 318                       | 10                              | 395                      | 25                       | 520                   |
| 300  | 200 | 10                | 303 ± 3                    | 363                           | 312                           | 373                       | 10                              | 445                      | 25                       | 570                   |
| 350  | 200 | 10                | 344 ± 3                    | 423                           | 360                           | 420                       | 10                              | 505                      | 30                       | 630                   |
| 400  | 200 | 10                | 396 ± 3                    | 474                           | 410                           | 460                       | 10                              | 565                      | 30                       | 690                   |
| 450  | 250 | 10                | 435 ± 8                    | 532                           | 450                           | 575                       | 10                              | 615                      | 35                       | 795                   |
| 500  | 250 | 10                | 485 ± 8                    | 584                           | 500                           | 625                       | 10                              | 670                      | 35                       | 850                   |
| 600  | 250 | 10                | 585 ± 8                    | 684                           | 600                           | 725                       | 10                              | 780                      | 40                       | 960                   |
| 700  | 275 | 6                 | 690 ± 10                   | 800                           | 700                           | 850                       | 10                              | 895                      | 40                       | 1075                  |
| 800  | 275 | 6                 | 790 ± 10                   | 900                           | 800                           | 950                       | 10                              | 1015                     | 40                       | 1195                  |
| 900  | 300 | 4                 | 890 ± 10                   | 1008                          | 900                           | 1050                      | 10                              | 1115                     | 40                       | 1295                  |
| 1000 | 300 | 4                 | 990 ± 10                   | 1108                          | 1000                          | 1150                      | 10                              | 1230                     | 40                       | 1410                  |

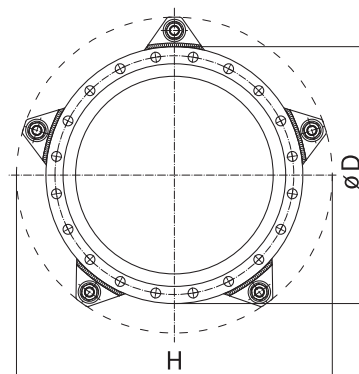
\*DN 32 to DN 300 also available in BL 130 mm as Type R-2. \*\*unpressurized. From DN 200 higher pressure rate available on request. Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION / FLANGE VERSIONS

| DN   | BL  | Δ lat<br>Lateral movement ± mm | Permissible vacuum w/o supporting ring at length BL bar absolute | Weight type A-2 approx. kg |
|------|-----|--------------------------------|------------------------------------------------------------------|----------------------------|
| 20   | 100 | 10                             | -                                                                | 3.9                        |
| 25   | 100 | 10                             | -                                                                | 3.9                        |
| 32   | 125 | 15                             | 0.6                                                              | 5.1                        |
| 32   | 150 | 20                             | 0.5                                                              | 5.2                        |
| 40   | 125 | 15                             | 0.6                                                              | 5.6                        |
| 40   | 150 | 20                             | 0.5                                                              | 5.7                        |
| 50   | 125 | 15                             | 0.6                                                              | 6.3                        |
| 50   | 150 | 20                             | 0.5                                                              | 6.4                        |
| 65   | 125 | 15                             | 0.6                                                              | 8.0                        |
| 65   | 150 | 20                             | 0.7                                                              | 8.1                        |
| 80   | 150 | 15                             | 0.65                                                             | 10.7                       |
| 100  | 150 | 15                             | 0.65                                                             | 12.6                       |
| 125  | 150 | 15                             | 0.7                                                              | 16.8                       |
| 150  | 150 | 15                             | 0.75                                                             | 19.6                       |
| 175  | 150 | 15                             | 0.8                                                              | 19.9                       |
| 200  | 150 | 15                             | 0.9                                                              | 22.5                       |
| 200  | 175 | 15                             | 0.9                                                              | 22.7                       |
| 250  | 175 | 15                             | 0.9                                                              | 27.5                       |
| 250  | 200 | 15                             | 0.9                                                              | 27.6                       |
| 300  | 200 | 15                             | 0.9                                                              | 31.6                       |
| 350  | 200 | 15                             | 0.95                                                             | 46.7                       |
| 400  | 200 | 15                             | 0.95                                                             | 57.8                       |
| 450  | 250 | 30                             | 0.35                                                             | 85.7                       |
| 500  | 250 | 30                             | 0.35                                                             | 98.0                       |
| 600  | 250 | 30                             | 0.35                                                             | 133.9                      |
| 700  | 275 | 30                             | 0.5                                                              | 173.5                      |
| 800  | 275 | 30                             | 0.5                                                              | 213.6                      |
| 900  | 300 | 30                             | 0.6                                                              | 250.0                      |
| 1000 | 300 | 30                             | 0.6                                                              | 295.5                      |



DN 20 - DN 150

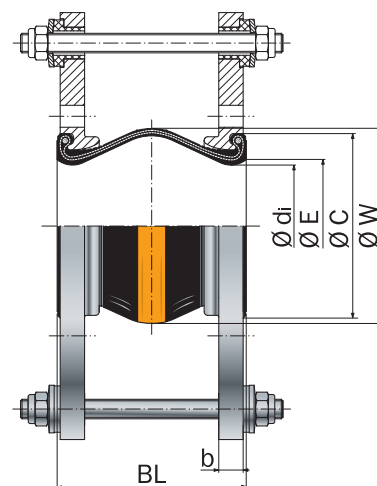


DN 175 - DN 1000

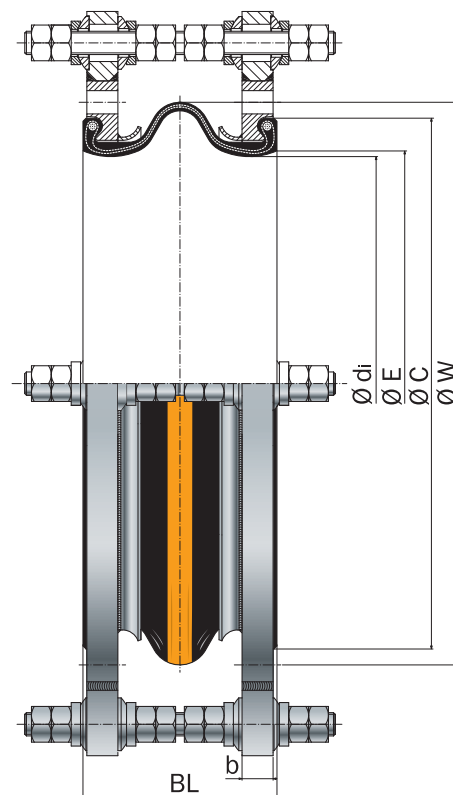
Number of tie rods depending on pressure

### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube

**Type A-2**

Tie rods, external restraints, carried on silencing rubber sockets

**Type A-4**

Design as type A-2, additional internal restraints, carried on spherical washers and conical seats

# RUBBER EXPANSION JOINT TYPE A-3

## ANGULAR EXPANSION JOINT DN 32 – DN 1000



### STRUCTURE TYPE A-3 / RUBBER BELLOWS PN 16

- Angular expansion joint consisting of a rubber bellows and flanges
- Welded hinge restraints to absorb reaction force from internal pressure or vacuum
- Highly elastic molded bellows in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            | CIIR           |
|---------------|------------------------|--------------------------------|----------------|
| Colour code   | orange                 | red                            | white          |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                                                        |
|-------------------------------|----------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                                |
| Max. perm. temperature        | +100 °C                                                                                |
| Bursting pressure             | ≥ 48 bar                                                                               |
| Vacuum operation              | DN 32 – 50 without vacuum supporting ring,<br>DN 65 – 1000 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Oval flanges with stabilizing collar and hinge restraints
- Flange drilling for through bolts
- Special machined groove for rubber rim

|                      | Standard                          |                                        | Others                                                                 |
|----------------------|-----------------------------------|----------------------------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092                           |                                        | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)                   |                                        | stainless steel, etc.                                                  |
| Corrosion protection | DN 32 – DN 175 electro-galvanized | DN 200 – DN 1000 anti-corrosion primed | 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 angular movement
- as double or triple joint compensation system for large movements
  - for ground and foundation settlement
  - for tank settlement during filling
- in plastic pipe systems
- apparatus engineering and tank construction
- power station technology

### HINGE RESTRAINTS

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

### Materials

Standard: 1.0038 (S235JR),  
1.0577 (S355J2)

Others: stainless steel, etc.

### Corrosion protection

Standard: DN 32 - DN 175  
electrogalvanized  
DN 200 - DN 1000  
anti-corrosion primed

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

### CERTIFICATES

- CE (PED 2014/68/EU)
- Bureau Veritas
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- Drinking water
- TÜV Süd (KTA)
- Others see technical annex

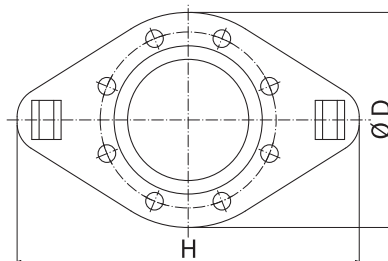
## DIMENSIONS STANDARD PROGRAM

| DN   | BL* | Pressure rate | Ø di Bellows inner Ø | Ø C Raised face outer Ø | Ø E Raised face inner Ø | Ø W** Con- volution Ø | PN Flange connec- tion EN 1902 | Ø D Flange outer Ø | b Flange thick- ness | H Flange height |
|------|-----|---------------|----------------------|-------------------------|-------------------------|-----------------------|--------------------------------|--------------------|----------------------|-----------------|
| 32   | 125 | 16            | 31 ± 3               | 72                      | 39                      | 78                    | 16                             | 140                | 16                   | 220             |
| 40   | 125 | 16            | 39 ± 3               | 81                      | 45                      | 86                    | 16                             | 150                | 16                   | 230             |
| 50   | 125 | 16            | 49 ± 3               | 95                      | 56                      | 97                    | 16                             | 165                | 16                   | 240             |
| 65   | 125 | 16            | 65 ± 3               | 115                     | 72                      | 113                   | 16                             | 185                | 18                   | 260             |
| 80   | 150 | 16            | 77 ± 3               | 127                     | 84                      | 135                   | 16                             | 200                | 20                   | 300             |
| 100  | 150 | 16            | 100 ± 3              | 151                     | 109                     | 160                   | 16                             | 220                | 20                   | 350             |
| 125  | 150 | 16            | 127 ± 3              | 178                     | 133                     | 184                   | 16                             | 250                | 22                   | 385             |
| 150  | 150 | 16            | 153 ± 3              | 206                     | 161                     | 212                   | 16                             | 285                | 22                   | 420             |
| 175  | 150 | 16            | 176 ± 3              | 230                     | 185                     | 236                   | 16                             | 315                | 22                   | 445             |
| 200  | 175 | 10            | 202 ± 3              | 260                     | 209                     | 265                   | 10                             | 340                | 25                   | 470             |
| 250  | 175 | 10            | 252 ± 3              | 313                     | 262                     | 318                   | 10                             | 395                | 25                   | 530             |
| 300  | 200 | 10            | 303 ± 3              | 363                     | 312                     | 373                   | 10                             | 445                | 25                   | 550             |
| 350  | 200 | 10            | 344 ± 3              | 423                     | 360                     | 420                   | 10                             | 505                | 30                   | 645             |
| 400  | 200 | 10            | 396 ± 3              | 474                     | 410                     | 460                   | 10                             | 565                | 30                   | 740             |
| 450  | 250 | 10            | 435 ± 8              | 532                     | 450                     | 575                   | 10                             | 615                | 40                   | 845             |
| 500  | 250 | 10            | 485 ± 8              | 584                     | 500                     | 625                   | 10                             | 670                | 40                   | 895             |
| 600  | 250 | 10            | 585 ± 8              | 684                     | 600                     | 725                   | 10                             | 780                | 45                   | 1020            |
| 700  | 275 | 6             | 690 ± 10             | 800                     | 700                     | 850                   | 10                             | 895                | 45                   | 1140            |
| 800  | 275 | 6             | 790 ± 10             | 900                     | 800                     | 950                   | 10                             | 1015               | 45                   | 1285            |
| 900  | 300 | 4             | 890 ± 10             | 1008                    | 900                     | 1050                  | 10                             | 1115               | 50                   | 1385            |
| 1000 | 300 | 4             | 990 ± 10             | 1108                    | 1000                    | 1150                  | 10                             | 1230               | 55                   | 1485            |

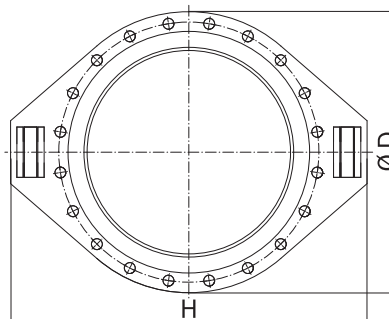
From DN 200 higher pressure rate available on request. Please contact us for further flange dimensions. \*The measure BL (length) for DN 400 - 1000 is approx. 6 mm shorter when fitted. \*\*unpressurized

## MOVEMENT COMPENSATION / FLANGE VERSIONS

| DN   | Δ ang Angular movement ± < degrees | Weight approx. kg |
|------|------------------------------------|-------------------|
| 32   | 25                                 | 6.0               |
| 40   | 25                                 | 6.5               |
| 50   | 25                                 | 7.2               |
| 65   | 25                                 | 8.6               |
| 80   | 20                                 | 12.1              |
| 100  | 15                                 | 14.0              |
| 125  | 15                                 | 17.6              |
| 150  | 12                                 | 20.4              |
| 175  | 10                                 | 23.1              |
| 200  | 8                                  | 34.5              |
| 250  | 7                                  | 39.6              |
| 300  | 6                                  | 45.2              |
| 350  | 5                                  | 70.0              |
| 400  | 5                                  | 95.0              |
| 450  | 8                                  | 155.0             |
| 500  | 7                                  | 190.0             |
| 600  | 6                                  | 250.0             |
| 700  | 5                                  | 290.0             |
| 800  | 5                                  | 360.0             |
| 900  | 4                                  | 425.0             |
| 1000 | 3.5                                | 550.0             |



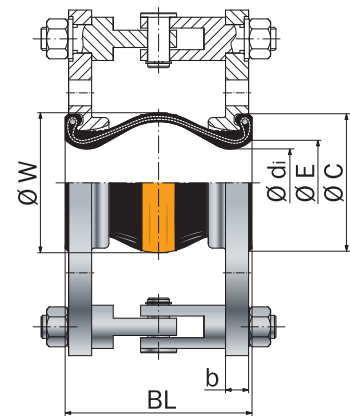
DN 32 - DN 150



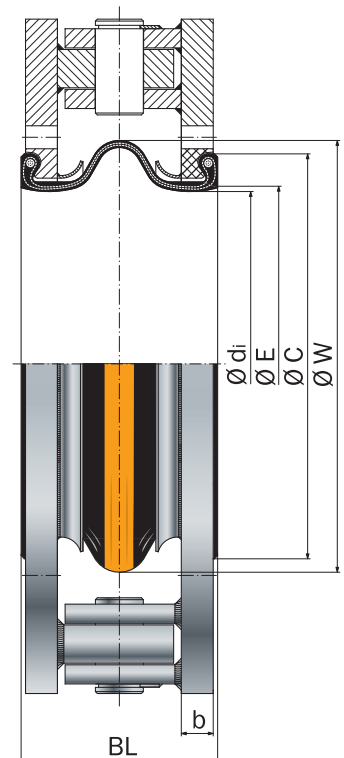
DN 175 - DN 1000

## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood



DN 32 - DN 150



DN 175 - DN 1000

### Type A-3

Angular expansion joint with hinge restraints

# RUBBER EXPANSION JOINT TYPE AS-1

## FLAME-PROOF

## UNIVERSAL EXPANSION JOINT

### DN 25 – DN 400



### STRUCTURE TYPE AS-1 / RUBBER BELLOWS PN 16

- Universal expansion joint, consisting of a rubber bellows and rotatable flanges
- Highly elastic molded bellows in various rubber grades
- Steel wire cord reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance < 100 Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/blue            | red/blue                       |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 50 bar                                                                              |
| Vacuum operation              | DN 25 – 50 without vacuum supporting ring,<br>DN 65 – 400 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Rotable flanges with stabilizing collar
- Flange drilling for through bolts, DN 25 with Drill holes
- Special machined groove for rubber rim

|                      | Standard          | Others                                                                 |
|----------------------|-------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| Corrosion protection | electrogalvanized | 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.

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of the rubber expansion joint. According to VDI Directive 2035, DIN 4809 part 1 and VGB R 455P, the manufacturer of the chemicals must state that the materials used in the expansion joint, especially for the rubber bellows, will not be damaged by the chemicals.

### APPLICATIONS

- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibration and noise
  - at appliances
  - in cooling water and lub oil pipes
- for compensating axial, lateral and angular movement
- to compensate for installation inaccuracies
- to meet fire protection regulations
- shipbuilding industry
- in heating plants

### CERTIFICATES

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- DNV GL® / DNV®
- Bureau Veritas
- Lloyd's Register of Shipping
- TÜV/DIN 4809 (DN 25 – 200)
- TÜV Süd (KTA)
- MED
- Others see technical annex

## DIMENSIONS STANDARD PROGRAM

| DN  | BL* | Pressure rate | Ø di<br>Bellows inner Ø | Ø C<br>Raised face outer Ø | Ø E<br>Raised face inner Ø | Ø W***<br>Con-volution Ø | PN<br>Flange connection EN 1902 | Ø D<br>Flange outer Ø | b<br>Flange thickness |
|-----|-----|---------------|-------------------------|----------------------------|----------------------------|--------------------------|---------------------------------|-----------------------|-----------------------|
| 25  | 125 | 16            | 31 ± 3                  | 72                         | 39                         | 78                       | 16**                            | 115                   | 16                    |
| 32  | 125 | 16            | 31 ± 3                  | 72                         | 39                         | 78                       | 16                              | 140                   | 16                    |
| 32  | 150 | 16            | 31 ± 3                  | 72                         | 39                         | 88                       | 16                              | 140                   | 16                    |
| 40  | 125 | 16            | 39 ± 3                  | 81                         | 45                         | 86                       | 16                              | 150                   | 16                    |
| 40  | 150 | 16            | 39 ± 3                  | 81                         | 45                         | 96                       | 16                              | 150                   | 16                    |
| 50  | 125 | 16            | 49 ± 3                  | 95                         | 56                         | 97                       | 16                              | 165                   | 16                    |
| 50  | 150 | 16            | 49 ± 3                  | 95                         | 56                         | 107                      | 16                              | 165                   | 16                    |
| 65  | 125 | 16            | 65 ± 3                  | 115                        | 72                         | 113                      | 16                              | 185                   | 18                    |
| 65  | 150 | 16            | 65 ± 3                  | 115                        | 72                         | 123                      | 16                              | 185                   | 18                    |
| 80  | 150 | 16            | 77 ± 3                  | 127                        | 84                         | 135                      | 16                              | 200                   | 20                    |
| 100 | 150 | 16            | 100 ± 3                 | 151                        | 109                        | 160                      | 16                              | 220                   | 20                    |
| 125 | 150 | 16            | 127 ± 3                 | 178                        | 133                        | 184                      | 16                              | 250                   | 22                    |
| 150 | 150 | 16            | 153 ± 3                 | 206                        | 161                        | 212                      | 16                              | 285                   | 22                    |
| 175 | 150 | 16            | 176 ± 3                 | 230                        | 185                        | 236                      | 16                              | 315                   | 22                    |
| 200 | 150 | 10            | 202 ± 3                 | 260                        | 209                        | 265                      | 10                              | 340                   | 25                    |
| 200 | 175 | 10            | 202 ± 3                 | 260                        | 209                        | 265                      | 10                              | 340                   | 25                    |
| 250 | 175 | 10            | 252 ± 3                 | 313                        | 262                        | 318                      | 10                              | 395                   | 25                    |
| 250 | 200 | 10            | 252 ± 3                 | 313                        | 262                        | 318                      | 10                              | 395                   | 25                    |
| 300 | 200 | 10            | 303 ± 3                 | 363                        | 312                        | 373                      | 10                              | 445                   | 25                    |
| 350 | 200 | 10            | 344 ± 3                 | 423                        | 360                        | 420                      | 10                              | 505                   | 30                    |
| 400 | 200 | 10            | 396 ± 3                 | 474                        | 410                        | 460                      | 10                              | 565                   | 30                    |

\* DN 25 up to DN 300 also available as type RS-1 in length 130.

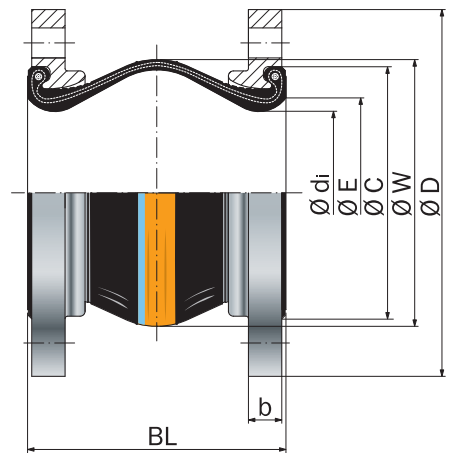
\*\* Flanges with drill holes M 12.

\*\*\* unpressurized

From DN 200 pressure rate 16 bar also available with flanges PN 16. Please contact us for further flange dimensions.

## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Protective hood
- Protective tube



**Type AS-1**

Universal expansion joint without restraint

## MOVEMENT COMPENSATION

| DN  | BL  | Δ ax<br>Axial movement |                 | Δ lat<br>Lateral movement | Δ ang*<br>Angular movement | A** Effective bellows cross sectional area at 16 bar cm <sup>2</sup> | Permissible vacuum w/o supporting ring at length BL bar absolute | Weight approx. kg |
|-----|-----|------------------------|-----------------|---------------------------|----------------------------|----------------------------------------------------------------------|------------------------------------------------------------------|-------------------|
|     |     | Compression - mm       | Elongation + mm |                           |                            |                                                                      |                                                                  |                   |
| 25  | 125 | 30                     | 10              | 15                        | 25                         | 0                                                                    | 0                                                                | 2.2               |
| 32  | 125 | 30                     | 10              | 15                        | 25                         | 0                                                                    | 0                                                                | 3.3               |
| 32  | 150 | 35                     | 15              | 20                        | 25                         | -14                                                                  | 0.5                                                              | 3.4               |
| 40  | 125 | 30                     | 10              | 15                        | 25                         | 0                                                                    | 0                                                                | 3.7               |
| 40  | 150 | 35                     | 15              | 20                        | 25                         | -25                                                                  | 0.7                                                              | 3.8               |
| 50  | 125 | 30                     | 10              | 15                        | 25                         | 0                                                                    | 0                                                                | 4.4               |
| 50  | 150 | 35                     | 15              | 20                        | 25                         | -14                                                                  | 0.7                                                              | 4.6               |
| 65  | 125 | 30                     | 10              | 15                        | 25                         | 0                                                                    | 0                                                                | 5.2               |
| 65  | 150 | 35                     | 15              | 20                        | 20                         | -25                                                                  | 0.7                                                              | 5.4               |
| 80  | 150 | 40                     | 10              | 15                        | 20                         | 12                                                                   | 0.2                                                              | 7.2               |
| 100 | 150 | 40                     | 10              | 15                        | 15                         | 9                                                                    | 0.4                                                              | 8.0               |
| 125 | 150 | 40                     | 10              | 15                        | 15                         | 18                                                                   | 0.65                                                             | 10.7              |
| 150 | 150 | 40                     | 10              | 15                        | 12                         | 52                                                                   | 0.65                                                             | 13.0              |
| 175 | 150 | 40                     | 10              | 15                        | 10                         | 54                                                                   | 0.7                                                              | 15.9              |
| 200 | 150 | 20                     | 20              | 10                        | 8                          | 285                                                                  | 0.8                                                              | 18.8              |
| 200 | 175 | 45                     | 15              | 15                        | 8                          | 56                                                                   | 0.7                                                              | 19.1              |
| 250 | 175 | 45                     | 15              | 15                        | 7                          | 191                                                                  | 0.7                                                              | 24.8              |
| 250 | 200 | 35                     | 15              | 15                        | 6                          | 54                                                                   | 0.5                                                              | 25.1              |
| 300 | 200 | 45                     | 15              | 15                        | 6                          | 255                                                                  | 0.75                                                             | 30.9              |
| 350 | 200 | 45                     | 15              | 15                        | 5                          | 563                                                                  | 0.5                                                              | 42.0              |
| 400 | 200 | 45                     | 15              | 15                        | 5                          | 875                                                                  | 0.3                                                              | 51.0              |

\* Larger Δ ang possible for compressed installation length.

\*\*Effective bellows cross sectional area is a theoretical value.

Please inquire for simultaneous (different) movement.

# RUBBER EXPANSION JOINT TYPE AS-1D

## FLAME-PROOF

## TWIN-CONVOLUTED UNIVERSAL EXPANSION JOINT DN 25 – DN 400



### STRUCTURE TYPE AS-1D / RUBBER BELLOWS PN 16

- Universal expansion joint (double shafted), consisting of a rubber bellows and rotatable flanges
- Highly elastic molded bellows in various rubber grades
- Steel wire cord reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance < 100 Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/blue            | red/blue                       |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 50 bar                                                                              |
| Vacuum operation              | DN 25 – 50 without vacuum supporting ring,<br>DN 65 – 400 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Rotable flanges with stabilizing collar
- Flange drilling for through bolts, DN 25 with Drill holes
- Special machined groove for rubber rim

|                      | Standard          | Others                                                                 |
|----------------------|-------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| Corrosion protection | electrogalvanized | 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.

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of the rubber expansion joint. According to VDI Directive 2035, DIN 4809 part 1 and VGB R 455P, the manufacturer of the chemicals must state that the materials used in the expansion joint, especially for the rubber bellows, will not be damaged by the chemicals.

### APPLICATIONS

- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibration and noise
  - at appliances
  - in cooling water and lub oil pipes
- for compensating axial, lateral and angular movement
- to compensate for installation inaccuracies
- to meet fire protection regulations
- shipbuilding industry
- in heating plants

### CERTIFICATES

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- DNV GL® / DNV®
- Bureau Veritas
- Lloyd's Register of Shipping
- TÜV/DIN 4809 (DN 25 – 200)
- TÜV Süd (KTA)
- MED
- Others see technical annex

## DIMENSIONS STANDARD PROGRAM

| DN  | BL* | Pres-<br>sure<br>rate | Ø d <sub>i</sub><br>Bellows<br>inner<br>Ø | Ø C<br>Raised<br>face<br>outer Ø | Ø E<br>Raised<br>face<br>inner Ø | Ø W***<br>Con-<br>volution<br>Ø | PN<br>Flange<br>connec-<br>tion<br>EN 1902 | Ø D<br>Flange<br>outer<br>Ø | b<br>Flange<br>thick-<br>ness<br>mm |
|-----|-----|-----------------------|-------------------------------------------|----------------------------------|----------------------------------|---------------------------------|--------------------------------------------|-----------------------------|-------------------------------------|
| 25  | 255 | 16                    | 31±3                                      | 72                               | 39                               | 78                              | 16**                                       | 115                         | 16                                  |
| 32  | 255 | 16                    | 31±3                                      | 72                               | 39                               | 78                              | 16                                         | 140                         | 16                                  |
| 32  | 305 | 16                    | 31±3                                      | 72                               | 39                               | 88                              | 16                                         | 140                         | 16                                  |
| 40  | 255 | 16                    | 39±3                                      | 81                               | 45                               | 86                              | 16                                         | 150                         | 16                                  |
| 40  | 305 | 16                    | 39±3                                      | 81                               | 45                               | 96                              | 16                                         | 150                         | 16                                  |
| 50  | 255 | 16                    | 49±3                                      | 95                               | 56                               | 97                              | 16                                         | 165                         | 16                                  |
| 50  | 305 | 16                    | 49±3                                      | 95                               | 56                               | 107                             | 16                                         | 165                         | 16                                  |
| 65  | 255 | 16                    | 65±3                                      | 115                              | 72                               | 113                             | 16                                         | 185                         | 18                                  |
| 65  | 305 | 16                    | 65±3                                      | 115                              | 72                               | 123                             | 16                                         | 185                         | 18                                  |
| 80  | 305 | 16                    | 77±3                                      | 127                              | 84                               | 135                             | 16                                         | 200                         | 20                                  |
| 100 | 305 | 16                    | 100±3                                     | 151                              | 109                              | 160                             | 16                                         | 220                         | 20                                  |
| 125 | 305 | 16                    | 127±3                                     | 178                              | 133                              | 184                             | 16                                         | 250                         | 22                                  |
| 150 | 305 | 16                    | 153±3                                     | 206                              | 161                              | 212                             | 16                                         | 285                         | 22                                  |
| 175 | 305 | 16                    | 176±3                                     | 230                              | 185                              | 236                             | 16                                         | 315                         | 22                                  |
| 200 | 305 | 10                    | 202±3                                     | 260                              | 209                              | 265                             | 10                                         | 340                         | 25                                  |
| 200 | 355 | 10                    | 202±3                                     | 260                              | 209                              | 265                             | 10                                         | 340                         | 25                                  |
| 250 | 355 | 10                    | 252±3                                     | 313                              | 262                              | 318                             | 10                                         | 395                         | 25                                  |
| 250 | 405 | 10                    | 252±3                                     | 313                              | 262                              | 318                             | 10                                         | 395                         | 25                                  |

\* DN 25 up to DN 300 also available as type RS-1 in length 130.

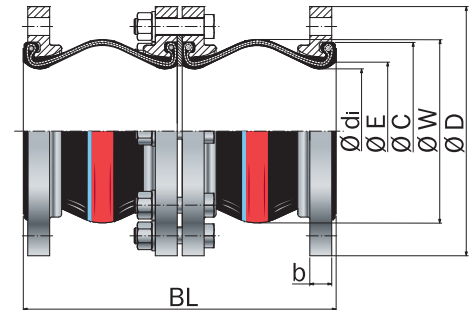
\*\* Flanges with drill holes M 12.

\*\*\* unpressurized

From DN 200 pressure rate 16 bar also available with flanges PN 16. Please contact us for further flange dimensions.

## ACCESSORIES

- Vakuumstützring
- Leitrohr
- Schutzhaube
- Schutzrohr



**Type AS-1D**

Universal expansion joint (double shafted) without restraint

## MOVEMENT COMPENSATION

| DN  | BL  | Δ ax<br>Axial<br>movement |                    | Δ lat<br>Lateral<br>movement<br>± mm | Δ ang*<br>Angular<br>move-<br>ment<br>± ∠<br>degrees | A**<br>Effective<br>bellows cross<br>sectional area<br>at 16 bar<br>cm² | Permissible<br>vacuum w/o<br>supporting<br>ring<br>at length BL<br>bar absolute | Weight<br>approx.<br>kg |
|-----|-----|---------------------------|--------------------|--------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------|
|     |     | Compression<br>- mm       | Elongation<br>+ mm |                                      |                                                      |                                                                         |                                                                                 |                         |
| 25  | 255 | 60                        | 20                 | 55                                   | 50                                                   | 0                                                                       | 0                                                                               | 4,9                     |
| 32  | 255 | 60                        | 20                 | 55                                   | 50                                                   | 0                                                                       | 0                                                                               | 7,4                     |
| 32  | 305 | 70                        | 30                 | 65                                   | 50                                                   | -14                                                                     | 0,5                                                                             | 7,6                     |
| 40  | 255 | 60                        | 20                 | 55                                   | 50                                                   | 0                                                                       | 0                                                                               | 8,3                     |
| 40  | 305 | 70                        | 30                 | 65                                   | 50                                                   | -25                                                                     | 0,7                                                                             | 8,5                     |
| 50  | 255 | 60                        | 20                 | 55                                   | 50                                                   | 0                                                                       | 0                                                                               | 9,7                     |
| 50  | 305 | 70                        | 30                 | 65                                   | 50                                                   | -14                                                                     | 0,7                                                                             | 10,1                    |
| 65  | 255 | 60                        | 20                 | 38                                   | 50                                                   | 0                                                                       | 0                                                                               | 12,1                    |
| 65  | 305 | 70                        | 30                 | 53                                   | 40                                                   | -25                                                                     | 0,7                                                                             | 12,5                    |
| 80  | 305 | 80                        | 20                 | 38                                   | 40                                                   | 12                                                                      | 0,2                                                                             | 16,2                    |
| 100 | 305 | 80                        | 20                 | 30                                   | 30                                                   | 9                                                                       | 0,4                                                                             | 17,9                    |
| 125 | 305 | 80                        | 20                 | 25                                   | 30                                                   | 18                                                                      | 0,65                                                                            | 23,5                    |
| 150 | 305 | 80                        | 20                 | 20                                   | 24                                                   | 52                                                                      | 0,65                                                                            | 29,3                    |
| 175 | 305 | 80                        | 20                 | 17                                   | 20                                                   | 54                                                                      | 0,7                                                                             | 35,2                    |
| 200 | 305 | 40                        | 40                 | 21                                   | 16                                                   | 285                                                                     | 0,8                                                                             | 42,6                    |
| 200 | 355 | 90                        | 30                 | 25                                   | 16                                                   | 56                                                                      | 0,7                                                                             | 43,2                    |
| 250 | 355 | 90                        | 30                 | 21                                   | 14                                                   | 191                                                                     | 0,7                                                                             | 57,6                    |
| 250 | 405 | 70                        | 30                 | 21                                   | 12                                                   | 54                                                                      | 0,5                                                                             | 58,2                    |

\* Larger Δ ang possible for compressed installation length.

\*\*Effective bellows cross sectional area is a theoretical value.

Please inquire for simultaneous (different) movement.

# RUBBER EXPANSION JOINT TYPE MS-1

## FLAME-PROOF

## TWIN-CONVOLUTED UNIVERSAL EXPANSION JOINT DN 65 – DN 250



## STRUCTURE TYPE MS-1 / RUBBER BELLOWS PN 16

- Universal expansion joint (double shafted), consisting of a rubber bellows and rotatable flanges
- Highly elastic molded bellows in various rubber grades
- Steel wire cord reinforcement
- Wire-reinforced self-sealing rubber rim

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/blue            | red/blue                       |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                   |
|-------------------------------|---------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                           |
| Max. perm. temperature        | +130 °C                                           |
| Bursting pressure             | ≥ 50 bar                                          |
| Vacuum operation              | with vacuum supporting ring (at permanent vacuum) |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

## FLANGES / VERSIONS

- Rotatable flanges with stabilizing collar
- Flange drilling for through bolts
- Special machined groove for rubber rim annex

|                             | Standard          | Others                                                                 |
|-----------------------------|-------------------|------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| <b>Corrosion protection</b> | electrogalvanized | 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.

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of the rubber expansion joint. According to VDI Directive 2035, DIN 4809 part 1 and VGB R 455P, the manufacturer of the chemicals must state that the materials used in the expansion joint, especially for the rubber bellows, will not be damaged by the chemicals.

## APPLICATIONS

- for compensating large axial, lateral and angular movement
- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibration and noise
  - at appliances
  - in cooling water and lub oil
  - pipes
- to compensate for installation inaccuracies
- to meet fire protection regulations
- shipbuilding industry
- in heating plants

## CERTIFICATES

- CE (PED 2014/68/EU)
- DNV GL® / DNV®

## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pres-<br>sure<br>rate | Ø dj<br>Bellows<br>inner<br>Ø<br>mm | Ø C<br>Raised<br>face<br>outer Ø<br>mm | Ø E<br>Raised<br>face<br>inner Ø<br>mm | Ø W*<br>Con-<br>volution<br>Ø<br>mm | PN<br>Flange<br>connec-<br>tion<br>EN 1902 | Ø D<br>Flange<br>outer<br>Ø<br>mm | b<br>Flange<br>thick-<br>ness<br>mm |
|-----|-----|-----------------------|-------------------------------------|----------------------------------------|----------------------------------------|-------------------------------------|--------------------------------------------|-----------------------------------|-------------------------------------|
| 65  | 220 | 16                    | 63+5/63-1                           | 115                                    | 72 ± 1                                 | 113                                 | 16                                         | 185                               | 18                                  |
| 80  | 250 | 16                    | 75+5/75-1                           | 127                                    | 84 ± 1                                 | 135                                 | 16                                         | 200                               | 20                                  |
| 100 | 275 | 16                    | 98+5/98-1                           | 151                                    | 109 ± 1                                | 160                                 | 16                                         | 220                               | 20                                  |
| 125 | 275 | 16                    | 125+5/125-1                         | 178                                    | 133 ± 1                                | 184                                 | 16                                         | 250                               | 22                                  |
| 150 | 275 | 16                    | 151+5/151-1                         | 206                                    | 161 ± 1                                | 212                                 | 16                                         | 285                               | 22                                  |
| 200 | 275 | 10                    | 200+5/200-1                         | 260                                    | 209 ± 1                                | 265                                 | 10                                         | 340                               | 25                                  |
| 250 | 275 | 10                    | 250+5/250-1                         | 313                                    | 262 ± 1                                | 218                                 | 10                                         | 395                               | 25                                  |

\*unpressurized

Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION

| DN  | BL  | Δ ax<br>Axial<br>movement |                    | Δ lat<br>Lateral<br>move-<br>ment<br>± mm | Δ ang*<br>Angular<br>move-<br>ment<br>± <°<br>degrees | A**<br>Effective<br>bellows cross<br>sectional area<br>at 16 bar<br>cm² | Permissible<br>vacuum w/o<br>supporting<br>ring<br>at length BL<br>bar absolute | Weight<br>approx.<br>kg |
|-----|-----|---------------------------|--------------------|-------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------|
|     |     | Compression<br>- mm       | Elongation<br>+ mm |                                           |                                                       |                                                                         |                                                                                 |                         |
| 65  | 220 | 60                        | 20                 | 30                                        | 30                                                    | 14                                                                      | 0,0                                                                             | 6,05                    |
| 80  | 250 | 80                        | 20                 | 30                                        | 30                                                    | 12                                                                      | 0,0                                                                             | 7,90                    |
| 100 | 275 | 80                        | 20                 | 30                                        | 30                                                    | 16                                                                      | 0,4                                                                             | 9,17                    |
| 125 | 275 | 80                        | 20                 | 30                                        | 30                                                    | 15                                                                      | 0,5                                                                             | 11,80                   |
| 150 | 275 | 80                        | 20                 | 30                                        | 24                                                    | 29                                                                      | 0,4                                                                             | 14,40                   |
| 200 | 275 | 90                        | 30                 | 30                                        | 16                                                    | 152                                                                     | 0,7                                                                             | 20,40                   |
| 250 | 275 | 90                        | 30                 | 15                                        | 10                                                    | 328                                                                     | 1,0                                                                             | 28,00                   |

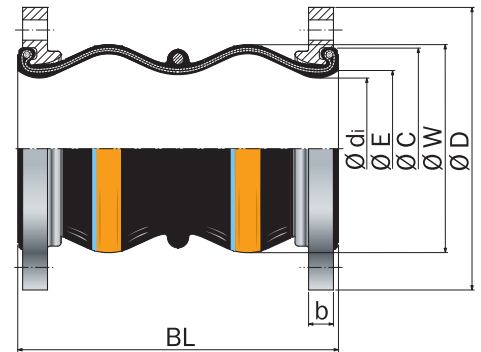
\* Larger Δ ang possible for compressed installation length.

\*\*Effective bellows cross sectional area is a theoretical value.

Please inquire for simultaneous (different) movement.

## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve



### Type MS-1

Universal expansion joint without restraint

# RUBBER EXPANSION JOINT TYPE AS-2, AS-4 FLAME-PROOF

## LATERAL EXPANSION JOINT DN 25 – DN 400



### STRUCTURE TYPE AS-2, AS-4 / RUBBER BELLOWS PN 16

- **Type AS-2:** Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external restraints) to absorb reaction force from internal pressure
- **Type AS-4:** Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external and internal restraints) to absorb reaction force from internal pressure or vacuum
- Highly elastic molded bellows in various rubber grades
- Steel wire cord reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/blue            | red/blue                       |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 50 bar                                                                              |
| Vacuum operation              | DN 32 – 50 without vacuum supporting ring,<br>DN 65 – 400 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

## FLANGES / VERSIONS

- Flanges with stabilizing collar and ears to carry the tie rods
- Flange drilling for through bolts, DN 25 with Drill holes
- Special machined groove for rubber rim

|                             | Standard          | Others                                                                 |
|-----------------------------|-------------------|------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| <b>Corrosion protection</b> | electrogalvanized | hot-dip galvanized, special varnish, special coating, etc.             |

## NOTE

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

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of the rubber expansion joint. According to VDI Directive 2035, DIN 4809 part 1 and VGB R 455P, the manufacturer of the chemicals must state that the materials used in the expansion joint, especially for the rubber bellows, will not be damaged by the chemicals.

## APPLICATIONS

- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibration and noise
  - at appliances
  - in cooling water and lub oil pipes
- for compensating lateral movement
- to compensate for installation inaccuracies
- to meet fire protection regulations
- shipbuilding industry
- in heating plants

## TIE ROD RESTRAINTS

- DN 25 – DN 150 Tie rods carried on silencing rubber sockets
- DN 175 – DN 400 Tie rods carried on spherical washers and conical seats

### Materials

Standard: tie rods 8.8

Others: stainless steel

### Corrosion protection

Standard: electrogalvanized

Others: hot-dip galvanized

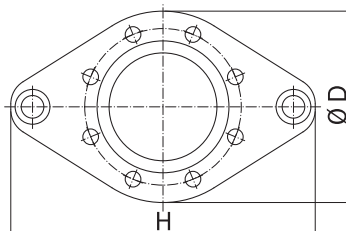
## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pres-<br>sure<br>rate | Ø dj<br>Bellows<br>inner<br>Ø | Ø C<br>Raised<br>face<br>outer Ø | Ø E<br>Raised<br>face<br>inner Ø | Ø W*<br>Con-<br>volution<br>Ø | PN<br>Flange<br>connec-<br>tion<br>EN 1902 | Ø D<br>Flange<br>outer<br>Ø | b<br>Flange<br>thick-<br>ness | H<br>Flange<br>height |
|-----|-----|-----------------------|-------------------------------|----------------------------------|----------------------------------|-------------------------------|--------------------------------------------|-----------------------------|-------------------------------|-----------------------|
|     | mm  | bar                   | mm                            | mm                               | mm                               | mm                            |                                            | mm                          | mm                            | mm                    |
| 25  | 125 | 16                    | 31 ± 3                        | 72                               | 39                               | 78                            | 16                                         | 115                         | 16                            | 220                   |
| 32  | 125 | 16                    | 31 ± 3                        | 72                               | 39                               | 78                            | 16                                         | 140                         | 16                            | 220                   |
| 32  | 150 | 16                    | 31 ± 3                        | 72                               | 39                               | 88                            | 16                                         | 140                         | 16                            | 220                   |
| 40  | 125 | 16                    | 39 ± 3                        | 81                               | 45                               | 86                            | 16                                         | 150                         | 16                            | 230                   |
| 40  | 150 | 16                    | 39 ± 3                        | 81                               | 45                               | 96                            | 16                                         | 150                         | 16                            | 230                   |
| 50  | 125 | 16                    | 49 ± 3                        | 95                               | 56                               | 97                            | 16                                         | 165                         | 16                            | 240                   |
| 50  | 150 | 16                    | 49 ± 3                        | 95                               | 56                               | 107                           | 16                                         | 165                         | 16                            | 240                   |
| 65  | 125 | 16                    | 65 ± 3                        | 115                              | 72                               | 113                           | 16                                         | 185                         | 18                            | 260                   |
| 65  | 150 | 16                    | 65 ± 3                        | 115                              | 72                               | 123                           | 16                                         | 185                         | 18                            | 260                   |
| 80  | 150 | 16                    | 77 ± 3                        | 127                              | 84                               | 135                           | 16                                         | 200                         | 20                            | 300                   |
| 100 | 150 | 16                    | 100 ± 3                       | 151                              | 109                              | 160                           | 16                                         | 220                         | 20                            | 350                   |
| 125 | 150 | 16                    | 127 ± 3                       | 178                              | 133                              | 184                           | 16                                         | 250                         | 22                            | 385                   |
| 150 | 150 | 16                    | 153 ± 3                       | 206                              | 161                              | 212                           | 16                                         | 285                         | 22                            | 420                   |
| 175 | 150 | 16                    | 176 ± 3                       | 230                              | 185                              | 236                           | 16                                         | 315                         | 22                            | 440                   |
| 200 | 150 | 10                    | 202 ± 3                       | 260                              | 209                              | 265                           | 10                                         | 340                         | 25                            | 465                   |
| 200 | 175 | 10                    | 202 ± 3                       | 260                              | 209                              | 265                           | 10                                         | 340                         | 25                            | 465                   |
| 250 | 175 | 10                    | 252 ± 3                       | 313                              | 262                              | 318                           | 10                                         | 395                         | 25                            | 520                   |
| 250 | 200 | 10                    | 252 ± 3                       | 313                              | 262                              | 318                           | 10                                         | 395                         | 25                            | 520                   |
| 300 | 200 | 10                    | 303 ± 3                       | 363                              | 312                              | 373                           | 10                                         | 445                         | 25                            | 570                   |
| 350 | 200 | 10                    | 344 ± 3                       | 423                              | 360                              | 420                           | 10                                         | 505                         | 30                            | 630                   |
| 400 | 200 | 10                    | 396 ± 3                       | 474                              | 410                              | 460                           | 10                                         | 565                         | 30                            | 690                   |

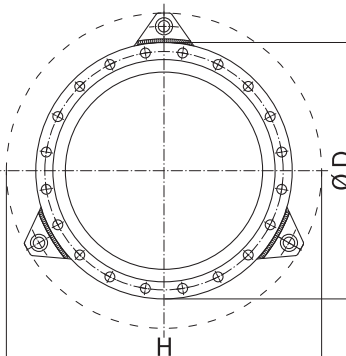
\*unpressurized. From DN 200 higher pressure rate available on request.  
Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION / FLANGE VERSIONS

| DN  | BL  | Δ lat<br>Lateral<br>move-<br>ment<br>± mm | Permissible<br>vacuum w/o<br>supporting ring<br>at length BL<br>bar absolute | Weight<br>type<br>AS-2<br>approx.<br>kg |
|-----|-----|-------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------|
|     | mm  |                                           |                                                                              |                                         |
| 25  | 125 | 15                                        | 0                                                                            | 4.2                                     |
| 32  | 125 | 15                                        | 0                                                                            | 5.1                                     |
| 32  | 150 | 20                                        | 0.5                                                                          | 5.2                                     |
| 40  | 125 | 15                                        | 0                                                                            | 5.6                                     |
| 40  | 150 | 20                                        | 0.7                                                                          | 5.7                                     |
| 50  | 125 | 15                                        | 0                                                                            | 6.2                                     |
| 50  | 150 | 20                                        | 0.7                                                                          | 6.4                                     |
| 65  | 125 | 15                                        | 0                                                                            | 7.9                                     |
| 65  | 150 | 20                                        | 0.7                                                                          | 8.1                                     |
| 80  | 150 | 15                                        | 0.2                                                                          | 10.7                                    |
| 100 | 150 | 15                                        | 0.4                                                                          | 12.6                                    |
| 125 | 150 | 15                                        | 0.65                                                                         | 16.8                                    |
| 150 | 150 | 15                                        | 0.65                                                                         | 19.6                                    |
| 175 | 150 | 15                                        | 0.7                                                                          | 20.3                                    |
| 200 | 150 | 15                                        | 0.8                                                                          | 22.9                                    |
| 200 | 175 | 15                                        | 0.7                                                                          | 23.2                                    |
| 250 | 175 | 15                                        | 0.7                                                                          | 28.1                                    |
| 250 | 200 | 15                                        | 0.5                                                                          | 28.4                                    |
| 300 | 200 | 15                                        | 0.75                                                                         | 32.2                                    |
| 350 | 200 | 15                                        | 0.5                                                                          | 44.7                                    |
| 400 | 200 | 15                                        | 0.3                                                                          | 58.6                                    |



DN 25 - DN 150



DN 175 - DN 400

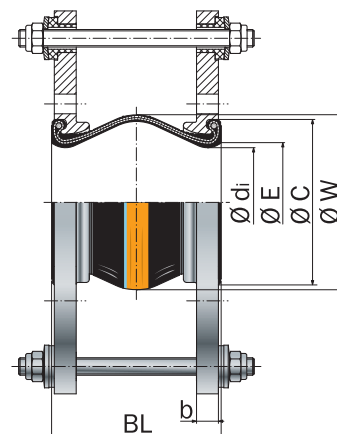
Number of tie rods depending  
on pressure

## CERTIFICATES

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- Bureau Veritas
- MED
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- TÜV/DIN 4809
- TÜV Süd (KTA)
- Others see technical annex

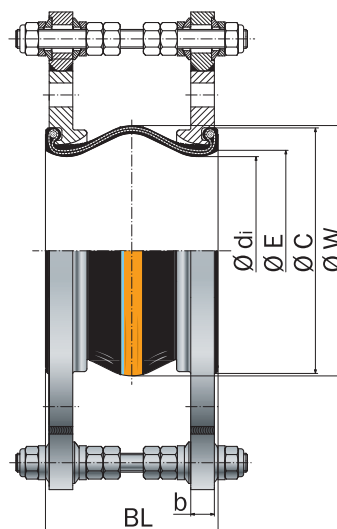
## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Protective hood
- Protective tube



### Type AS-2

Tie rods, external restraints, carried on  
silencing rubber sockets



### Type AS-4

Design as type AS-2, additional internal  
restraints, carried on spherical washers  
and conical seats

# RUBBER EXPANSION JOINT TYPE AS-3

## FLAME-PROOF

## ANGULAR EXPANSION JOINT

### DN 32 – DN 400



## STRUCTURE TYPE AS-3 / RUBBER BELLOWS PN 16

- Angular expansion joint consisting of a rubber bellows and flanges
- Welded hinge restraints to absorb reaction force from internal pressure or vacuum
- Highly elastic molded bellows in various rubber grades
- Steel wire cord reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance < 100 Ohm (DIN IEC 93, VDE 0303-30)

|                      |                        |                                |
|----------------------|------------------------|--------------------------------|
| <b>Rubber grade*</b> | EPDM                   | NBR                            |
| <b>Colour code</b>   | orange/blue            | red/blue                       |
| <b>Possible uses</b> | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 50 bar                                                                              |
| Vacuum operation              | DN 32 – 50 without vacuum supporting ring,<br>DN 65 – 400 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

## FLANGES / VERSIONS

- Oval flanges with stabilizing collar and hinge restraints
- Flange drilling for through bolts
- Special machined groove for rubber rim

|                             | Standard          | Others                                                                       |
|-----------------------------|-------------------|------------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215       |
| <b>Materials</b>            | 1.0038 (S235JR)   | stainless steel etc.                                                         |
| <b>Corrosion protection</b> | electrogalvanized | anti-corrosion primed, hot-dip galvanized, special varnish and 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.

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of the rubber expansion joint. According to VDI Directive 2035, DIN 4809 part 1 and VGB R 455P, the manufacturer of the chemicals must state that the materials used in the expansion joint, especially for the rubber bellows, will not be damaged by the chemicals.

## APPLICATIONS

- for compensating angular movement
- as double or triple joint compensation system for large movements
  - for tank settlement during filling
  - in plastic pipe systems
- to meet fire protection regulations
  - in shipbuilding industry
  - in chemical industry

## HINGE RESTRAINTS

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

### Materials

Standard: 1.0038 (S235JR),  
1.0577 (S355J2)

Others: stainless steel, etc.

### Corrosion protection

Standard: DN 32 - DN 175  
electrogalvanized  
DN 200 - DN 400  
anti-corrosion primed

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

## DIMENSIONS STANDARD PROGRAM

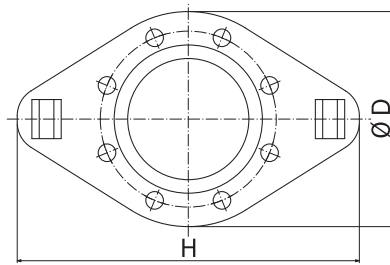
| DN  | BL* | Pressure rate | Ø dj<br>Bellows inner Ø | Ø C<br>Raised face outer Ø | Ø E<br>Raised face inner Ø | Ø W**<br>Con-<br>volution Ø | PN<br>Flange connec-<br>tion<br>EN 1902 | Ø D<br>Flange outer Ø | b<br>Flange thick-<br>ness | H<br>Flange height |
|-----|-----|---------------|-------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------------------|-----------------------|----------------------------|--------------------|
|     | mm  | bar           | mm                      | mm                         | mm                         | mm                          |                                         | mm                    | mm                         | mm                 |
| 32  | 125 | 16            | 31 ± 3                  | 72                         | 39                         | 78                          | 16                                      | 140                   | 16                         | 220                |
| 40  | 125 | 16            | 39 ± 3                  | 81                         | 45                         | 86                          | 16                                      | 150                   | 16                         | 230                |
| 50  | 125 | 16            | 49 ± 3                  | 95                         | 56                         | 97                          | 16                                      | 165                   | 16                         | 240                |
| 65  | 125 | 16            | 65 ± 3                  | 115                        | 72                         | 113                         | 16                                      | 185                   | 18                         | 260                |
| 80  | 150 | 16            | 77 ± 3                  | 127                        | 84                         | 135                         | 16                                      | 200                   | 20                         | 300                |
| 100 | 150 | 16            | 100 ± 3                 | 151                        | 109                        | 160                         | 16                                      | 220                   | 20                         | 350                |
| 125 | 150 | 16            | 127 ± 3                 | 178                        | 133                        | 184                         | 16                                      | 250                   | 22                         | 385                |
| 150 | 150 | 16            | 153 ± 3                 | 206                        | 161                        | 212                         | 16                                      | 285                   | 22                         | 420                |
| 175 | 150 | 16            | 176 ± 3                 | 230                        | 185                        | 236                         | 16                                      | 315                   | 22                         | 450                |
| 200 | 175 | 10            | 202 ± 3                 | 260                        | 209                        | 265                         | 10                                      | 340                   | 25                         | 440                |
| 250 | 175 | 10            | 252 ± 3                 | 313                        | 262                        | 318                         | 10                                      | 385                   | 25                         | 505                |
| 300 | 200 | 10            | 303 ± 3                 | 363                        | 312                        | 373                         | 10                                      | 445                   | 25                         | 560                |
| 350 | 200 | 10            | 344 ± 3                 | 423                        | 360                        | 425                         | 10                                      | 505                   | 34                         | 620                |
| 400 | 200 | 10            | 396 ± 3                 | 474                        | 410                        | 470                         | 10                                      | 565                   | 38                         | 680                |

From DN 200 higher pressure rate available on request. Please contact us for further flange dimensions. \*The measure BL (length) for DN 400 is approx. 6 mm shorter when fitted.

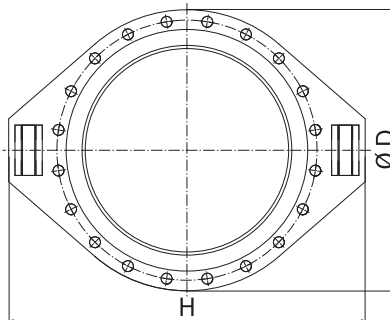
\*\*unpressurized

## MOVEMENT COMPENSATION / FLANGE VERSIONS

| DN  | Δ ang<br>Angular<br>movement<br>± ° degrees | Weight<br>approx.<br>kg |
|-----|---------------------------------------------|-------------------------|
| 32  | 25                                          | 6.0                     |
| 40  | 25                                          | 6.5                     |
| 50  | 25                                          | 7.2                     |
| 65  | 25                                          | 8.6                     |
| 80  | 20                                          | 12.1                    |
| 100 | 15                                          | 14.0                    |
| 125 | 15                                          | 17.6                    |
| 150 | 12                                          | 20.4                    |
| 175 | 10                                          | 23.1                    |
| 200 | 8                                           | 34.5                    |
| 250 | 7                                           | 39.6                    |
| 300 | 6                                           | 45.2                    |
| 350 | 5                                           | 67.0                    |
| 400 | 5                                           | 93.0                    |



DN 32 - DN 150



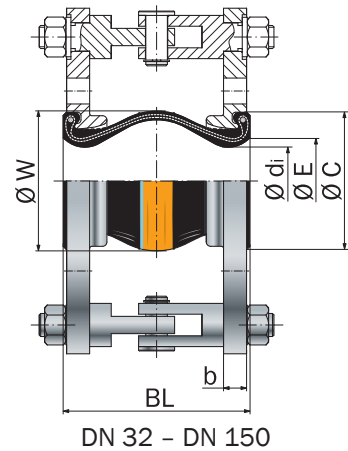
DN 175 - DN 400

## CERTIFICATES

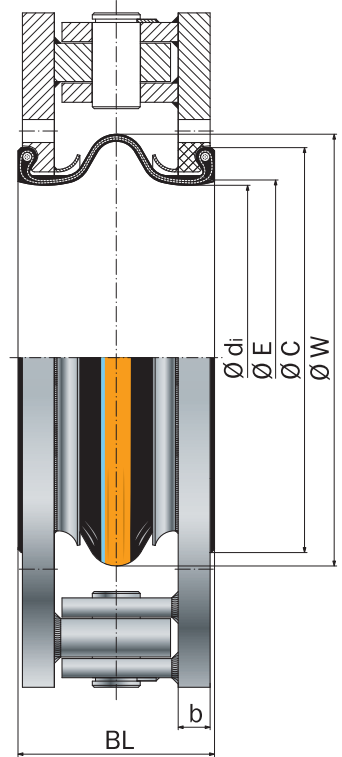
- CE (PED 2014/68/EU)
- RINA
- MED
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- TÜV/DIN 4809
- Others see technical annex

## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Protective hood



DN 32 - DN 150



DN 175 - DN 400

## Type AS-3

Angular expansion joint with hinge restraints

# RUBBER EXPANSION JOINT TYPE VS-1

## FLAME-PROOF

## UNIVERSAL EXPANSION JOINT

### DN 40 – DN 150



## STRUCTURE TYPE VS-1 / RUBBER BELLOWS PN 16

- Universal expansion joint, consisting of a rubber bellows and rotating flanges
- Highly elastic molded bellows in various rubber grades
- Steel wire cord reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance < 100 Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/blue            | red/blue                       |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                          |               |               |
|-------------------------------|----------------------------------------------------------|---------------|---------------|
| Max. perm. operating pressure | 16 bar                                                   | 10 bar        | 6 bar         |
| Max. perm. temperature        | up to +60 °C                                             | up to +100 °C | up to +110 °C |
|                               | up to +130 °C for brief periods*                         |               |               |
| Bursting pressure             | ≥ 50 bar                                                 |               |               |
| Vacuum operation              | ≥ 0,05 bar abs. with vacuum supporting ring (from DN 65) |               |               |

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

\*> +110 °C the manufacturer's approval must be obtained for the corresponding operating conditions.

## FLANGES / VERSIONS

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

|                      | Standard          | Others                                                |
|----------------------|-------------------|-------------------------------------------------------|
| Dimensions           | VG 85356          |                                                       |
| Materials            | 1.0038 (RSt 37-2) | 1.4541, 1.4571 etc.                                   |
| Corrosion protection | electrogalvanized | hot-dip galvanized, special varnish and 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.

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of the rubber compensator. According to VDI Directive 2035, DIN 4809 part 1 and VGB R 455P, the manufacturer of the chemicals must state that the materials used in the compensator, especially for the rubber bellows, will not be damaged by the chemicals.

## APPLICATIONS

- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibration and noise
  - at appliances
  - in cooling water and lub oil pipes
- for compensating axial, lateral and angular movement
- to compensate for installation inaccuracies
- to meet fire protection regulations
- shipbuilding industry
- in heating plants

## CERTIFICATES

- CE (PED 2014/68/EU)

## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve

## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pres-<br>sure<br>rate | Ø d <sub>i</sub><br>Bellows<br>inner Ø | Ø C<br>Raised<br>face Ø | Ø E<br>Raised<br>face<br>inner Ø | Ø W*<br>Con-<br>volution<br>Ø | Ø K<br>pitch<br>circle<br>diam. Ø | n x Ø d<br>number x<br>bore<br>diam. Ø | Ø D<br>Flange<br>outer Ø | b<br>Flange<br>thick-<br>ness<br>mm |
|-----|-----|-----------------------|----------------------------------------|-------------------------|----------------------------------|-------------------------------|-----------------------------------|----------------------------------------|--------------------------|-------------------------------------|
| 40  | 125 | 16                    | 32 ± 3                                 | 71                      | 42                               | 74                            | 84                                | 6 x 11                                 | 108                      | 16                                  |
| 50  | 125 | 16                    | 40 ± 3                                 | 83                      | 50                               | 88                            | 96                                | 6 x 11                                 | 120                      | 16                                  |
| 65  | 125 | 16                    | 61 ± 3                                 | 103                     | 68                               | 113                           | 116                               | 8 x 11                                 | 140                      | 18                                  |
| 80  | 150 | 16                    | 72 ± 3                                 | 113                     | 81                               | 137                           | 126                               | 8 x 11                                 | 150                      | 18                                  |
| 100 | 150 | 16                    | 93 ± 3                                 | 135                     | 101                              | 145                           | 148                               | 10 x 11                                | 172                      | 18                                  |
| 125 | 150 | 16                    | 117 ± 4                                | 163                     | 127                              | 178                           | 176                               | 10 x 11                                | 200                      | 20                                  |
| 150 | 150 | 16                    | 143 ± 5                                | 189                     | 151                              | 201                           | 202                               | 12 x 11                                | 226                      | 20                                  |

\*unpressurized

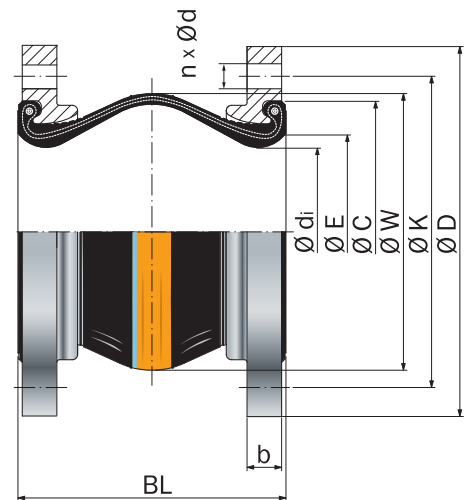
## MOVEMENT COMPENSATION

| DN  | Δ ax<br>Axial movement |                    | Δ lat<br>Lateral<br>movement<br>± mm | Δ ang*<br>Angular<br>movement<br>± ∠ degrees | A** Effective<br>bellows cross<br>sectional area<br>at 16 bar<br>cm <sup>2</sup> | Weight<br>approx.<br>kg |
|-----|------------------------|--------------------|--------------------------------------|----------------------------------------------|----------------------------------------------------------------------------------|-------------------------|
|     | Compression<br>- mm    | Elongation<br>+ mm |                                      |                                              |                                                                                  |                         |
| 40  | 30                     | 10                 | 15                                   | 25                                           | 0                                                                                | 1.9                     |
| 50  | 30                     | 10                 | 15                                   | 21                                           | 0                                                                                | 2.3                     |
| 65  | 30                     | 10                 | 15                                   | 17                                           | 19                                                                               | 3.0                     |
| 80  | 40                     | 10                 | 15                                   | 14                                           | 23                                                                               | 3.4                     |
| 100 | 40                     | 10                 | 15                                   | 11                                           | 28                                                                               | 4.2                     |
| 125 | 40                     | 10                 | 15                                   | 9                                            | 49                                                                               | 5.7                     |
| 150 | 40                     | 10                 | 15                                   | 7                                            | 81                                                                               | 6.6                     |

\* Larger Δ ang possible for compressed installation length.

\*\*Effective bellows cross sectional area is a theoretical value.

Please inquire for simultaneous (different) movement.



DN 40 – DN 150

### Type VS-1

Universal compensator without restraint

# RUBBER EXPANSION JOINT TYPE AR-1

## UNIVERSAL EXPANSION JOINT DN 20 – DN 600



### STRUCTURE TYPE AR-1 / RUBBER BELLOWS PN 25

- Universal expansion joint, consisting of a rubber bellows and rotatable flanges
- Highly elastic molded bellows in various rubber grades
- High-tensile synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/yellow          | red/yellow                     |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 25 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 75 bar                                                                              |
| Vacuum operation              | DN 20 – 50 without vacuum supporting ring,<br>DN 65 – 600 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Rotatable flanges with stabilizing collar
- Flange drilling for through bolts
- Special machined groove for rubber rim

|                      | Standard          | Others                                                                 |
|----------------------|-------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| Corrosion protection | electrogalvanized | hot-dip galvanized, special varnish and 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 reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
- for muffling vibration and noise
  - at appliances
  - in cooling water and lube oil pipes
- for compensating axial, lateral and angular movement
- for compensating simultaneous movement in cooling water pipes
- to compensate for installation inaccuracies
- in sprinkler systems

### CERTIFICATES

- CE (PED 2014/68/EU)

### ACCESSORIES

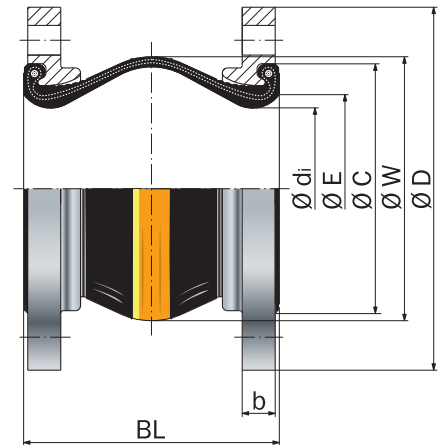
- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube

## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pressure rate | Ø di<br>Bellows inner<br>Ø mm | Ø C<br>Raised face<br>outer Ø mm | Ø E<br>Raised face<br>inner Ø mm | Ø W**<br>Con-<br>volution<br>Ø mm | PN*<br>Flange connec-<br>tion<br>EN 1902 | Ø D<br>Flange outer<br>Ø mm | b<br>Flange thick-<br>ness<br>mm |
|-----|-----|---------------|-------------------------------|----------------------------------|----------------------------------|-----------------------------------|------------------------------------------|-----------------------------|----------------------------------|
| 20  | 100 | 25            | 22 ± 3                        | 51                               | 30                               | 55                                | 25                                       | 115                         | 16                               |
| 25  | 100 | 25            | 22 ± 3                        | 51                               | 30                               | 55                                | 25                                       | 115                         | 16                               |
| 32  | 125 | 25            | 31 ± 3                        | 72                               | 39                               | 78                                | 25                                       | 140                         | 16                               |
| 40  | 125 | 25            | 39 ± 3                        | 81                               | 45                               | 86                                | 25                                       | 150                         | 16                               |
| 50  | 125 | 25            | 49 ± 3                        | 95                               | 56                               | 97                                | 25                                       | 165                         | 16                               |
| 65  | 125 | 25            | 65 ± 3                        | 115                              | 72                               | 113                               | 25                                       | 185                         | 18                               |
| 80  | 150 | 25            | 77 ± 3                        | 127                              | 84                               | 135                               | 25                                       | 200                         | 20                               |
| 100 | 150 | 25            | 100 ± 3                       | 151                              | 109                              | 160                               | 25                                       | 235                         | 20                               |
| 125 | 150 | 25            | 127 ± 3                       | 178                              | 133                              | 184                               | 25                                       | 270                         | 22                               |
| 150 | 150 | 25            | 153 ± 3                       | 206                              | 161                              | 212                               | 25                                       | 300                         | 22                               |
| 200 | 175 | 25            | 202 ± 3                       | 260                              | 209                              | 265                               | 25                                       | 360                         | 25                               |
| 250 | 175 | 25            | 252 ± 3                       | 313                              | 262                              | 318                               | 25                                       | 425                         | 25                               |
| 300 | 200 | 25            | 303 ± 3                       | 363                              | 312                              | 373                               | 25                                       | 485                         | 25                               |
| 350 | 200 | 25            | 344 ± 3                       | 423                              | 360                              | 420                               | 25                                       | 555                         | 30                               |
| 400 | 200 | 25            | 396 ± 3                       | 474                              | 410                              | 460                               | 25                                       | 620                         | 30                               |
| 500 | 250 | 25            | 485 ± 8                       | 584                              | 500                              | 625                               | 25                                       | 730                         | 35                               |
| 600 | 250 | 25            | 585 ± 8                       | 684                              | 600                              | 725                               | 25                                       | 845                         | 40                               |

\*also available with flanges PN 16 and PN 10.

\*\*unpressurized



### Type AR-1

Universal expansion joint, without restraint

## MOVEMENT COMPENSATION

| DN  | Δ ax<br>Axial movement |                 | Δ lat<br>Lateral movement | Δ ang*<br>Angular movement | A** Effective bellows cross sectional area at 25 bar | Permissible vacuum w/o supporting ring at length BL bar absolute | Weight approx. kg |
|-----|------------------------|-----------------|---------------------------|----------------------------|------------------------------------------------------|------------------------------------------------------------------|-------------------|
|     | Compression - mm       | Elongation + mm |                           |                            |                                                      |                                                                  |                   |
| 20  | 20                     | 10              | 10                        | 25                         | 0                                                    | -                                                                | 2.3               |
| 25  | 20                     | 10              | 10                        | 25                         | 0                                                    | -                                                                | 2.3               |
| 32  | 35                     | 10              | 15                        | 25                         | 0                                                    | 0                                                                | 3.3               |
| 40  | 35                     | 10              | 15                        | 25                         | 1                                                    | 0.5                                                              | 3.7               |
| 50  | 35                     | 10              | 15                        | 25                         | 1                                                    | 0.4                                                              | 4.4               |
| 65  | 35                     | 10              | 15                        | 25                         | 1                                                    | 0.5                                                              | 4.9               |
| 80  | 40                     | 10              | 15                        | 20                         | 2                                                    | 0.6                                                              | 6.5               |
| 100 | 40                     | 10              | 15                        | 15                         | 5                                                    | 0.6                                                              | 9.5               |
| 125 | 40                     | 10              | 15                        | 15                         | 8                                                    | 0.5                                                              | 13.0              |
| 150 | 40                     | 10              | 15                        | 12                         | 41                                                   | 0.4                                                              | 15.3              |
| 200 | 45                     | 15              | 15                        | 8                          | 54                                                   | 0.6                                                              | 21.8              |
| 250 | 45                     | 15              | 15                        | 7                          | 72                                                   | 0.6                                                              | 31.6              |
| 300 | 45                     | 15              | 15                        | 6                          | 226                                                  | 0.6                                                              | 41.6              |
| 350 | 45                     | 15              | 15                        | 5                          | 460                                                  | 0.65                                                             | 56.7              |
| 400 | 45                     | 15              | 15                        | 5                          | 880                                                  | 0.8                                                              | 69.0              |
| 500 | 50                     | 30              | 15                        | 7                          | 2164                                                 | 0.6                                                              | 99.0              |
| 600 | 50                     | 30              | 20                        | 6                          | 3201                                                 | 0.5                                                              | 141.0             |

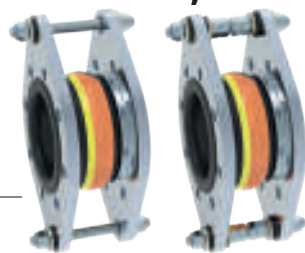
\* Larger Δ ang possible for compressed installation length.

\*\*Effective bellows cross sectional area is a theoretical value.

Please inquire for simultaneous (different) movement.

## RUBBER EXPANSION JOINT TYPE AR-2, AR-4

### LATERAL EXPANSION JOINT DN 20 – DN 600



#### STRUCTURE TYPE AR-2, AR-4 / RUBBER BELLOWS PN 25

- **Type AR-2:** Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external restraints) to absorb reaction force from internal pressure
- **Type AR-4:** Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external and internal restraints) to absorb reaction force from internal pressure or vacuum
- Highly elastic molded bellows in various rubber grades
- High-tensile synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/yellow          | red/yellow                     |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 25 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 75 bar                                                                              |
| Vacuum operation              | DN 20 – 50 without vacuum supporting ring,<br>DN 65 – 600 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

## FLANGES / VERSIONS

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

|                             | Standard          | Others                                                                 |
|-----------------------------|-------------------|------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| <b>Corrosion protection</b> | electrogalvanized | hot-dip galvanized, special varnish and 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 reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
- for muffling vibration and noise
  - at appliances
  - in cooling water and lube oil pipes
- for compensating lateral movement
- to compensate for installation inaccuracies
- in sprinkler systems

## TIE ROD RESTRAINTS

- DN 20 – DN 150 Tie rods carried on silencing rubber sockets
- DN 200 – DN 600 Tie rods carried on spherical washers and conical seats

## Materials

Standard: tie rods 8.8

Others: stainless steel

## Corrosion protection

Standard: electrogalvanized

Others: hot-dip galvanized

## CERTIFICATES

- CE (PED 2014/68/EU)

## ACCESSORIES

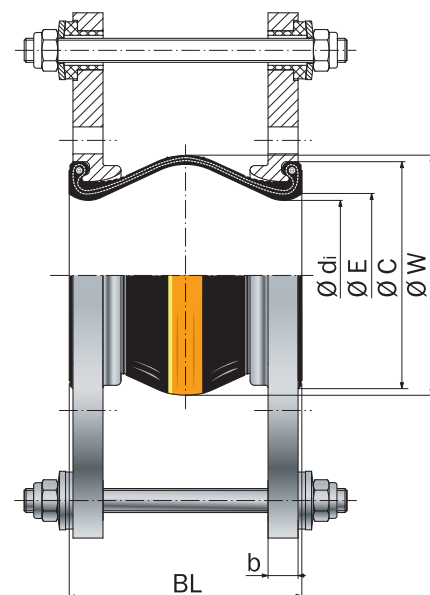
- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube

## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pressure<br>rate | Ø dj<br>Bellows<br>inner Ø | Ø C<br>Raised<br>face<br>outer Ø | Ø E<br>Raised<br>face<br>inner Ø | Ø W**<br>Con-<br>volution<br>Ø | PN*<br>Flange<br>connec-<br>tion<br>EN 1902 | Ø D<br>Flange<br>outer<br>Ø | b<br>Flange<br>thick-<br>ness | H<br>Flange<br>height |
|-----|-----|------------------|----------------------------|----------------------------------|----------------------------------|--------------------------------|---------------------------------------------|-----------------------------|-------------------------------|-----------------------|
|     | mm  | bar              | mm                         | mm                               | mm                               | mm                             |                                             | mm                          | mm                            | mm                    |
| 20  | 100 | 25               | 22 ± 3                     | 51                               | 30                               | 55                             | 25                                          | 115                         | 16                            | 195                   |
| 25  | 100 | 25               | 22 ± 3                     | 51                               | 30                               | 55                             | 25                                          | 115                         | 16                            | 195                   |
| 32  | 125 | 25               | 31 ± 3                     | 72                               | 39                               | 78                             | 25                                          | 140                         | 16                            | 220                   |
| 40  | 125 | 25               | 39 ± 3                     | 81                               | 45                               | 86                             | 25                                          | 150                         | 16                            | 230                   |
| 50  | 125 | 25               | 49 ± 3                     | 95                               | 56                               | 97                             | 25                                          | 165                         | 16                            | 240                   |
| 65  | 125 | 25               | 65 ± 3                     | 115                              | 72                               | 113                            | 25                                          | 185                         | 18                            | 260                   |
| 80  | 150 | 25               | 77 ± 3                     | 127                              | 84                               | 135                            | 25                                          | 200                         | 20                            | 300                   |
| 100 | 150 | 25               | 100 ± 3                    | 151                              | 109                              | 160                            | 25                                          | 235                         | 20                            | 350                   |
| 125 | 150 | 25               | 127 ± 3                    | 178                              | 133                              | 184                            | 25                                          | 270                         | 22                            | 385                   |
| 150 | 150 | 25               | 153 ± 3                    | 206                              | 161                              | 212                            | 25                                          | 300                         | 22                            | 420                   |
| 200 | 175 | 25               | 202 ± 3                    | 260                              | 209                              | 265                            | 25                                          | 360                         | 25                            | 485                   |
| 250 | 175 | 25               | 252 ± 3                    | 313                              | 262                              | 318                            | 25                                          | 425                         | 25                            | 550                   |
| 300 | 200 | 25               | 303 ± 3                    | 363                              | 312                              | 373                            | 25                                          | 485                         | 25                            | 610                   |
| 350 | 200 | 25               | 344 ± 3                    | 423                              | 360                              | 420                            | 25                                          | 555                         | 30                            | 680                   |
| 400 | 200 | 25               | 396 ± 3                    | 474                              | 410                              | 460                            | 25                                          | 620                         | 30                            | 745                   |
| 500 | 250 | 35               | 485 ± 8                    | 584                              | 500                              | 625                            | 25                                          | 730                         | 35                            | 910                   |
| 600 | 250 | 25               | 585 ± 8                    | 684                              | 600                              | 725                            | 25                                          | 845                         | 40                            | 1025                  |

\* also available with flanges PN 16 and PN 10.

\*\*unpressurized

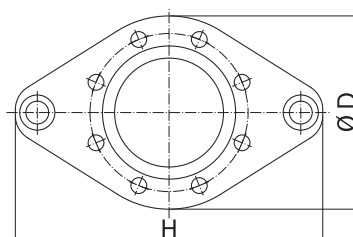


### Type AR-2

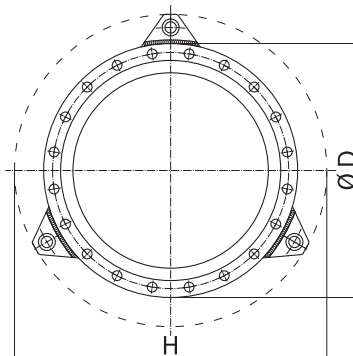
Tie rods, external restraints, carried on silencing rubber sockets

## MOVEMENT COMPENSATION / FLANGE VERSIONS

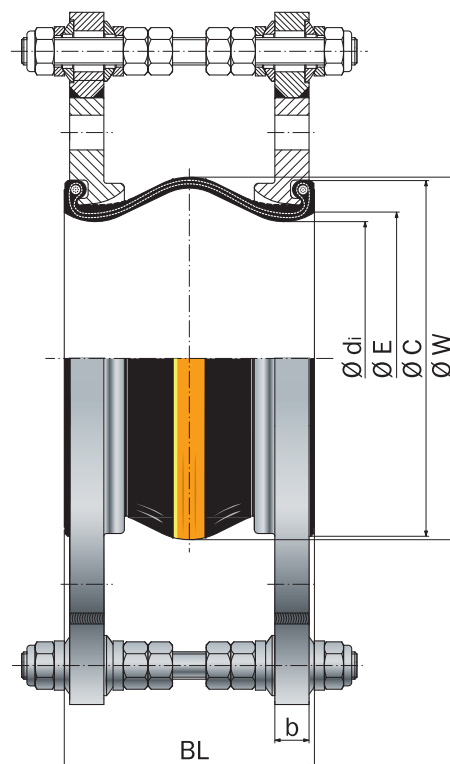
| DN  | Δ lat<br>Lateral<br>move-<br>ment<br>± mm | Permissible<br>vacuum w/o<br>supporting ring<br>at length BL<br>bar absolute | Weight<br>type<br>AR-2<br>approx.<br>kg |
|-----|-------------------------------------------|------------------------------------------------------------------------------|-----------------------------------------|
| 20  | 10                                        | -                                                                            | 3.9                                     |
| 25  | 10                                        | -                                                                            | 3.9                                     |
| 32  | 15                                        | 0                                                                            | 5.1                                     |
| 40  | 15                                        | 0.5                                                                          | 5.6                                     |
| 50  | 15                                        | 0.4                                                                          | 6.2                                     |
| 65  | 15                                        | 0.5                                                                          | 7.6                                     |
| 80  | 15                                        | 0.6                                                                          | 10.7                                    |
| 100 | 15                                        | 0.6                                                                          | 13.8                                    |
| 125 | 15                                        | 0.5                                                                          | 18.6                                    |
| 150 | 15                                        | 0.4                                                                          | 21.2                                    |
| 200 | 15                                        | 0.6                                                                          | 27.3                                    |
| 250 | 15                                        | 0.6                                                                          | 35.4                                    |
| 300 | 15                                        | 0.6                                                                          | 42.5                                    |
| 350 | 15                                        | 0.65                                                                         | 74.0                                    |
| 400 | 15                                        | 0.8                                                                          | 85.7                                    |
| 500 | 15                                        | 0.6                                                                          | 168.6                                   |
| 600 | 20                                        | 0.5                                                                          | 220.6                                   |



DN 20 - DN 150



DN 200 - DN 600

Number of tie rods depending  
on pressure

### Type AR-4

Design as type AR-2, additional internal  
restraints, carried on spherical washers  
and conical seats

# RUBBER EXPANSION JOINT TYPE R-1

LENGTH 130 MM

## UNIVERSAL EXPANSION JOINT DN 25 – DN 300



### STRUCTURE TYPE R-1 / RUBBER BELLOWS PN 16

- Universal expansion joint consisting of a rubber bellows and rotatable flanges
- Flat-convoluted molded bellows in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            | CIIR           |
|---------------|------------------------|--------------------------------|----------------|
| Colour code   | orange                 | red                            | white          |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +100 °C                                                                               |
| Bursting pressure             | ≥ 48 bar                                                                              |
| Vacuum operation              | DN 25 – 50 without vacuum supporting ring,<br>DN 65 – 300 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Rotable flanges with stabilizing collar
- Flange drilling for through bolts, DN 25 with Drill holes
- Special machined groove for rubber rim

|                      | Standard          | Others                                                                 |
|----------------------|-------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)   | 1.4541, 1.4571                                                         |
| Corrosion protection | electrogalvanized | 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 reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibration and noise
- for compensating axial, lateral and angular movement
- to compensate for installation inaccuracies
- as installation and dismantling aid

### CERTIFICATES

- CE (PED 2014/68/EU)
- Bureau Veritas
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- TÜV Süd (KTA)
- Drinking water

### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube

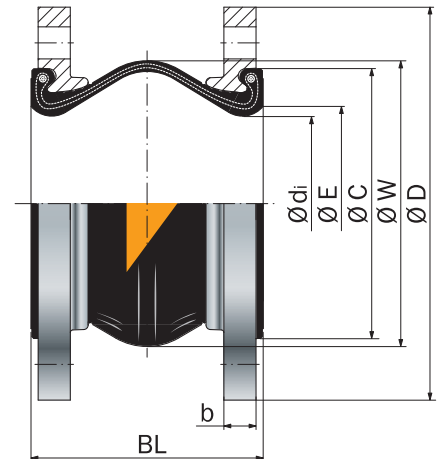
## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pres-<br>sure<br>rate | Ø d <sub>i</sub><br>Bellows<br>inner<br>Ø | Ø C<br>Raised<br>face<br>outer Ø | Ø E<br>Raised<br>face<br>inner Ø | Ø W*<br>Con-<br>volution<br>Ø | PN<br>Flange<br>connec-<br>tion<br>EN 1902 | Ø D<br>Flange<br>outer<br>Ø | b<br>Flange<br>thick-<br>ness |
|-----|-----|-----------------------|-------------------------------------------|----------------------------------|----------------------------------|-------------------------------|--------------------------------------------|-----------------------------|-------------------------------|
| 25  | 130 | 16                    | 31 ± 3                                    | 72                               | 39                               | 88                            | 16                                         | 115                         | 16                            |
| 32  | 130 | 16                    | 31 ± 3                                    | 72                               | 39                               | 88                            | 16                                         | 140                         | 16                            |
| 40  | 130 | 16                    | 39 ± 3                                    | 81                               | 45                               | 96                            | 16                                         | 150                         | 16                            |
| 50  | 130 | 16                    | 49 ± 3                                    | 95                               | 56                               | 107                           | 16                                         | 165                         | 16                            |
| 65  | 130 | 16                    | 65 ± 3                                    | 115                              | 72                               | 123                           | 16                                         | 185                         | 18                            |
| 80  | 130 | 16                    | 77 ± 3                                    | 127                              | 84                               | 135                           | 16                                         | 200                         | 20                            |
| 100 | 130 | 16                    | 100 ± 3                                   | 151                              | 109                              | 160                           | 16                                         | 220                         | 20                            |
| 125 | 130 | 16                    | 127 ± 3                                   | 178                              | 133                              | 184                           | 16                                         | 250                         | 22                            |
| 150 | 130 | 16                    | 153 ± 3                                   | 206                              | 161                              | 212                           | 16                                         | 285                         | 22                            |
| 200 | 130 | 10                    | 202 ± 3                                   | 260                              | 209                              | 260                           | 10                                         | 340                         | 25                            |
| 250 | 130 | 10                    | 252 ± 3                                   | 313                              | 262                              | 313                           | 10                                         | 395                         | 25                            |
| 300 | 130 | 10                    | 303 ± 3                                   | 363                              | 312                              | 363                           | 10                                         | 445                         | 25                            |

\*unpressurized

From DN 200 pressure rate 16 bar also available with flanges PN 16.

Please contact us for further flange dimensions.



**Type R-1**

Universal expansion joint without restraint

## MOVEMENT COMPENSATION

| DN  | Δ ax<br>Axial<br>movement |                    | Δ lat<br>Lateral<br>move-<br>ment<br>± mm | Δ ang*<br>Angular<br>move-<br>ment<br>± <°<br>degrees | A** Effective<br>bellows<br>cross<br>sectional area<br>at 16 bar<br>cm <sup>2</sup> | Permissible<br>vacuum w/o<br>supporting<br>ring<br>at length BL<br>bar absolute | Weight<br>approx.<br>kg |
|-----|---------------------------|--------------------|-------------------------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------|
|     | Compression<br>- mm       | Elongation<br>+ mm |                                           |                                                       |                                                                                     |                                                                                 |                         |
| 25  | 35                        | 10                 | 15                                        | 25                                                    | 8                                                                                   | -                                                                               | 2.2                     |
| 32  | 35                        | 10                 | 15                                        | 25                                                    | 8                                                                                   | 0.6                                                                             | 3.3                     |
| 40  | 35                        | 10                 | 15                                        | 25                                                    | 9                                                                                   | 0.6                                                                             | 3.8                     |
| 50  | 35                        | 10                 | 15                                        | 25                                                    | 19                                                                                  | 0.6                                                                             | 4.5                     |
| 65  | 35                        | 10                 | 15                                        | 25                                                    | 33                                                                                  | 0.7                                                                             | 5.2                     |
| 80  | 30                        | 10                 | 15                                        | 20                                                    | 53                                                                                  | 0.65                                                                            | 7.1                     |
| 100 | 30                        | 10                 | 15                                        | 15                                                    | 98                                                                                  | 0.6                                                                             | 8.0                     |
| 125 | 30                        | 10                 | 15                                        | 15                                                    | 103                                                                                 | 0.75                                                                            | 10.5                    |
| 150 | 30                        | 10                 | 15                                        | 10                                                    | 203                                                                                 | 0.65                                                                            | 12.8                    |
| 200 | 25                        | 10                 | 15                                        | 7                                                     | 379                                                                                 | 0.7                                                                             | 18.2                    |
| 250 | 25                        | 10                 | 15                                        | 6                                                     | 525                                                                                 | 0.7                                                                             | 23.7                    |
| 300 | 20                        | 10                 | 15                                        | 5                                                     | 769                                                                                 | 0.8                                                                             | 30.4                    |

\* Larger Δ ang possible for compressed installation length.

\*\*Effective bellows cross sectional area is a theoretical value.

Please inquire for simultaneous (different) movement.

# RUBBER EXPANSION JOINT TYPE R-2

LENGTH 130 MM

## LATERAL EXPANSION JOINT DN 25 – DN 300



### STRUCTURE TYPE R-2 / RUBBER BELLOWS PN 16

- Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external restraints) to absorb reaction force from internal pressure.
- Flat-convoluted molded bellows in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            | CIIR           |
|---------------|------------------------|--------------------------------|----------------|
| Colour code   | orange                 | red                            | white          |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +100 °C                                                                               |
| Bursting pressure             | ≥ 48 bar                                                                              |
| Vacuum operation              | DN 25 – 50 without vacuum supporting ring,<br>DN 65 – 300 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Flanges with stabilizing collar and ears to carry the tie rods
- Flange drilling for through bolts, DN 25 with Drill holes
- Special machined groove for rubber rim

|                      | Standard          | Others                                                                 |
|----------------------|-------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)   | 1.4541, 1.4571                                                         |
| Corrosion protection | electrogalvanized | 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 reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibration and noise
- for compensating lateral movement
- to compensate for installation inaccuracies
- to compensate for ground and foundation settlement or tank settlement during filling

### TIE ROD RESTRAINTS

- DN 25 – DN 150 Tie rods carried on silencing rubber sockets
- DN 200 – DN 300 Tie rods carried on spherical washers and conical seats

### Materials

Standard: tie rods 8.8

Others: stainless steel

### Corrosion protection

Standard: electrogalvanized

Others: hot-dip galvanized

### CERTIFICATES

- CE (PED 2014/68/EU)
- Bureau Veritas
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- TÜV Süd (KTA)
- Drinking water

## DIMENSIONS STANDARD PROGRAM

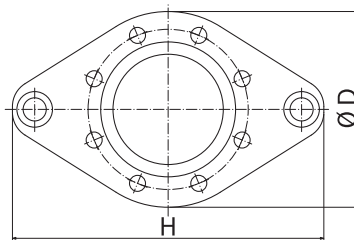
| DN  | BL  | Pres-<br>sure<br>rate | Ø di<br>Bellows<br>inner Ø | Ø C<br>Raised<br>face<br>outer Ø | Ø E<br>Raised<br>face<br>inner Ø | Ø W*<br>Con-<br>volution<br>Ø | PN<br>Flange<br>connec-<br>tion<br>EN 1902 | Ø D<br>Flange<br>outer<br>Ø | b<br>Flange<br>thick-<br>ness | H<br>Flange<br>height |
|-----|-----|-----------------------|----------------------------|----------------------------------|----------------------------------|-------------------------------|--------------------------------------------|-----------------------------|-------------------------------|-----------------------|
| 25  | 130 | 16                    | 31 ± 3                     | 72                               | 39                               | 88                            | 16                                         | 115                         | 16                            | 210                   |
| 32  | 130 | 16                    | 31 ± 3                     | 72                               | 39                               | 88                            | 16                                         | 140                         | 16                            | 220                   |
| 40  | 130 | 16                    | 39 ± 3                     | 81                               | 45                               | 96                            | 16                                         | 150                         | 16                            | 230                   |
| 50  | 130 | 16                    | 49 ± 3                     | 95                               | 56                               | 107                           | 16                                         | 165                         | 16                            | 240                   |
| 65  | 130 | 16                    | 65 ± 3                     | 115                              | 72                               | 123                           | 16                                         | 185                         | 18                            | 260                   |
| 80  | 130 | 16                    | 77 ± 3                     | 127                              | 84                               | 135                           | 16                                         | 200                         | 20                            | 300                   |
| 100 | 130 | 16                    | 100 ± 3                    | 151                              | 109                              | 160                           | 16                                         | 220                         | 20                            | 350                   |
| 125 | 130 | 16                    | 127 ± 3                    | 178                              | 133                              | 184                           | 16                                         | 250                         | 22                            | 385                   |
| 150 | 130 | 16                    | 153 ± 3                    | 206                              | 161                              | 212                           | 16                                         | 285                         | 22                            | 420                   |
| 200 | 130 | 10                    | 202 ± 3                    | 260                              | 209                              | 260                           | 10                                         | 340                         | 25                            | 465                   |
| 250 | 130 | 10                    | 252 ± 3                    | 313                              | 262                              | 313                           | 10                                         | 395                         | 25                            | 520                   |
| 300 | 130 | 10                    | 303 ± 3                    | 363                              | 312                              | 363                           | 10                                         | 445                         | 25                            | 570                   |

\*unpressurized

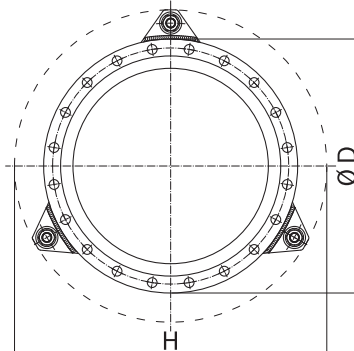
From DN 200 higher pressure rate available on request.

## MOVEMENT COMPENSATION / FLANGE VERSIONS

| DN  | Δ lat<br>Lateral<br>move-<br>ment<br>± mm | Permissible<br>vacuum w/o<br>supporting ring<br>at length BL<br>bar absolute | Weight<br><br>approx.<br>kg |
|-----|-------------------------------------------|------------------------------------------------------------------------------|-----------------------------|
| 25  | 15                                        | -                                                                            | 4.5                         |
| 32  | 15                                        | 0.6                                                                          | 5.1                         |
| 40  | 15                                        | 0.6                                                                          | 5.6                         |
| 50  | 15                                        | 0.6                                                                          | 6.3                         |
| 65  | 15                                        | 0.7                                                                          | 7.7                         |
| 80  | 15                                        | 0.65                                                                         | 10.5                        |
| 100 | 15                                        | 0.6                                                                          | 12.5                        |
| 125 | 15                                        | 0.75                                                                         | 16.5                        |
| 150 | 15                                        | 0.65                                                                         | 19.2                        |
| 200 | 15                                        | 0.7                                                                          | 22.0                        |
| 250 | 15                                        | 0.7                                                                          | 26.8                        |
| 300 | 15                                        | 0.8                                                                          | 32.3                        |



DN 25 - DN 150

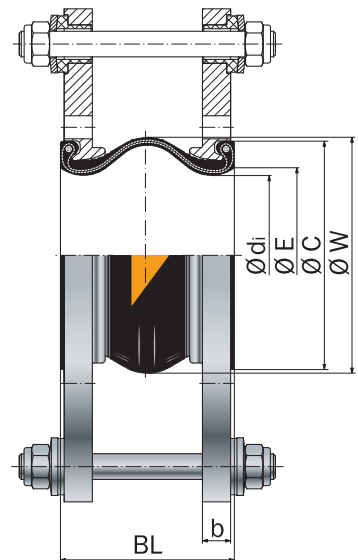


DN 200 - DN 300

Number of tie rods depending on pressure

### ACCESSORIES

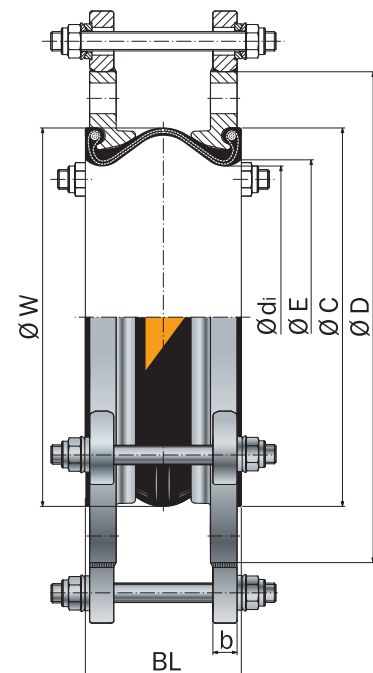
- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube



DN 25 - DN 150

#### Type R-2

Tie rods, external restraints, carried on silencing rubber sockets



DN 200 - DN 300

#### Type R-2

Tie rods, external restraints, carried on spherical washers and conical seats

# RUBBER EXPANSION JOINT TYPE GR-SAE

## UNIVERSAL-EXPANSION JOINT DN 32 – DN 125



### STRUCTURE TYPE GR-SAE / RUBBER BELLOWS PN 16

- Universal expansion joint consisting of a rubber bellows and rotatable flanges
- Elastic molded bellows
- High-tensile synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|                      |                                |
|----------------------|--------------------------------|
| <b>Rubber grade*</b> | NBR                            |
| <b>Colour code</b>   | red/yellow                     |
| <b>Possible uses</b> | hydrocarbon containing liquids |

\*Inquire about the resistance of the rubber grade depending on the kind of oil and additives.

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 48 bar                                                                              |
| Vacuum operation              | DN 32 – 50 without vacuum supporting ring,<br>DN 65 – 125 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Rotatable flanges with stabilizing collar
- Flange drilling for through bolts according to SAE-standard, suitable for socket head cap screw acc. DIN 6912
- Special machined groove for rubber rim

|                             | Standard                    | Others                                                                                    |
|-----------------------------|-----------------------------|-------------------------------------------------------------------------------------------|
| <b>Dimensions</b>           | SAE-standard<br>3000 psi    | PN 16 according to EN 1092<br>Connection dimensions see<br>technical annex page 213 – 215 |
| <b>Materials</b>            | aluminium                   | 1.0038 (S235JR) etc.                                                                      |
| <b>Corrosion protection</b> | not necessary for aluminium | electrogalvanized 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 reducing thermal and mechanical tension in pipes and their system components
- for compensating axial, lateral and angular movement
- for muffling vibration and oscillation at aggregates
- for damping noise transmission at
  - pumps
  - machines
  - fittings
- in hydraulic plants
- in lub oil lines
- mechanical engineering

### CERTIFICATES

- CE (PED 2014/68/EU)

### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube

## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pressure<br>rate | $\varnothing d_i$<br>Bellows<br>inner $\varnothing$<br>mm | $\varnothing C$<br>Raised face<br>outer $\varnothing$<br>mm | $\varnothing E$<br>Raised face<br>inner $\varnothing$<br>mm | $\varnothing W$<br>Convolution $\varnothing$<br>unpressurized<br>mm |
|-----|-----|------------------|-----------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------|
| 32  | 100 | 16               | $22 \pm 3$                                                | 51                                                          | 30                                                          | 55                                                                  |
| 40  | 130 | 16               | $28 \pm 3$                                                | 66                                                          | 34                                                          | 81                                                                  |
| 50  | 130 | 16               | $38 \pm 3$                                                | 76                                                          | 44                                                          | 91                                                                  |
| 65  | 130 | 16               | $48 \pm 3$                                                | 89                                                          | 57                                                          | 103                                                                 |
| 80  | 130 | 16               | $66 \pm 3$                                                | 106                                                         | 74                                                          | 118                                                                 |
| 100 | 130 | 16               | $90 \pm 3$                                                | 135                                                         | 101                                                         | 146                                                                 |
| 125 | 130 | 16               | $118 \pm 4$                                               | 161                                                         | 130                                                         | 170                                                                 |

## MOVEMENT COMPENSATION

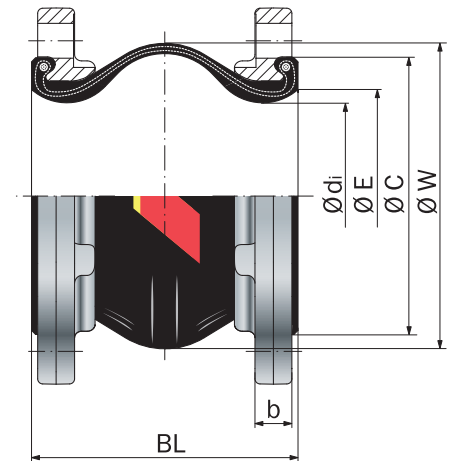
| DN  | $\Delta ax$<br>Axial movement |                    | $\Delta lat$<br>Lateral<br>movement<br>$\pm$ mm | $\Delta ang$<br>Angular<br>movement<br>$\pm \angle$ degrees | A* Effective<br>bellows cross<br>sectional area<br>at 16 bar<br>cm <sup>2</sup> | Weight<br>approx.<br>kg |
|-----|-------------------------------|--------------------|-------------------------------------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------|
|     | Compression<br>- mm           | Elongation<br>+ mm |                                                 |                                                             |                                                                                 |                         |
| 32  | 20                            | 10                 | 10                                              | 25                                                          | 0                                                                               | 0.4                     |
| 40  | 20                            | 10                 | 10                                              | 20                                                          | 38                                                                              | 0.5                     |
| 50  | 20                            | 10                 | 10                                              | 20                                                          | 46                                                                              | 0.7                     |
| 65  | 20                            | 10                 | 10                                              | 15                                                          | 62                                                                              | 0.8                     |
| 80  | 20                            | 10                 | 10                                              | 12                                                          | 76                                                                              | 1.1                     |
| 100 | 20                            | 10                 | 10                                              | 8                                                           | 109                                                                             | 1.5                     |
| 125 | 20                            | 10                 | 10                                              | 8                                                           | 165                                                                             | 1.8                     |

Please inquire for simultaneous (different) movement.

\*Effective bellows cross sectional area is a theoretical value.

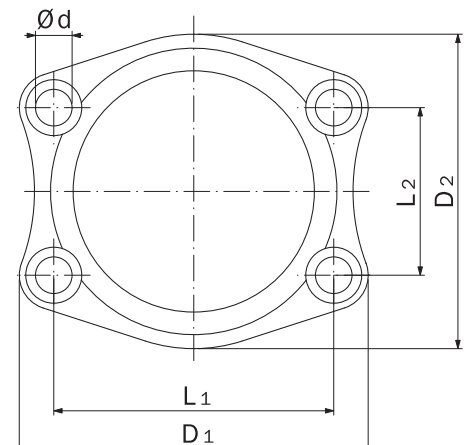
## FLANGE DIMS. ACCORDING TO SAE-STANDARD

| DN  | L <sub>1</sub><br>mm | L <sub>2</sub><br>mm | D <sub>1</sub><br>mm | D <sub>2</sub><br>mm | b<br>mm | d<br>mm |
|-----|----------------------|----------------------|----------------------|----------------------|---------|---------|
| 32  | 58,7                 | 30,2                 | 79                   | 64                   | 16      | 11      |
| 40  | 70                   | 35,7                 | 94                   | 75                   | 16      | 13      |
| 50  | 78                   | 43,0                 | 102                  | 86                   | 16      | 13      |
| 65  | 89                   | 51,0                 | 116                  | 98                   | 16      | 13      |
| 80  | 106                  | 62,0                 | 134                  | 120                  | 18      | 17      |
| 100 | 130                  | 78,0                 | 162                  | 146                  | 18      | 17      |
| 125 | 152                  | 92,0                 | 190                  | 170                  | 18      | 17      |



### Type GR-SAE

Universal expansion joint



Flange according to SAE-standard

# RUBBER EXPANSION JOINT TYPE RS-1

## FLAME-PROOF

## UNIVERSAL EXPANSION JOINT

### DN 25 – DN 300



### STRUCTURE TYPE RS-1 / RUBBER BELLOWS PN 16

- Universal-expansion joint, consisting of a flat-convoluted rubber bellows and rotatable flanges
- Flat-convoluted molded bellows in various rubber grades
- Steel wire cord reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance < 100 Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/blue            | red/blue                       |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 50 bar                                                                              |
| Vacuum operation              | DN 20 – 50 without vacuum supporting ring,<br>DN 65 – 300 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Rotable flanges with stabilizing collar
- Flange drilling for through bolts, DN 25 with Drill holes
- Special machined groove for rubber rim

|                      | Standard          | Others                                                                 |
|----------------------|-------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| Corrosion protection | electrogalvanized | hot-dip galvanized, special varnish and 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.

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of the rubber expansion joint. According to VDI Directive 2035, the manufacturer of the chemicals must state that the data indicating that the materials used in the expansion joint, especially for the rubber bellows, will not be damaged by the chemicals.

### APPLICATIONS

- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibrations and noise
  - at appliances
  - in cooling water and lub oil pipes
- for compensating axial, lateral and angular movement
- to compensate for installation inaccuracies
- to meet fire protection regulations
- shipbuilding industry
- in heating plants

### CERTIFICATES

- CE (PED 2014/68/EU)
- Bureau Veritas
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- TÜV/DIN 4809 (DN 25 – 200)
- American Bureau of Shipping
- MED
- TÜV Süd (KTA)

## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pres-<br>sure<br>rate | Ø d <sub>i</sub><br>Bellows<br>inner<br>Ø | Ø C<br>Raised<br>face<br>outer Ø | Ø E<br>Raised<br>face<br>inner Ø | Ø W*<br>Con-<br>volution<br>Ø | PN<br>Flange<br>connec-<br>tion<br>EN 1902 | Ø D<br>Flange<br>outer<br>Ø | b<br>Flange<br>thick-<br>ness<br>mm |
|-----|-----|-----------------------|-------------------------------------------|----------------------------------|----------------------------------|-------------------------------|--------------------------------------------|-----------------------------|-------------------------------------|
| 25  | 130 | 16                    | 31 ± 3                                    | 72                               | 39                               | 88                            | 16                                         | 115                         | 16                                  |
| 32  | 130 | 16                    | 31 ± 3                                    | 72                               | 39                               | 88                            | 16                                         | 140                         | 16                                  |
| 40  | 130 | 16                    | 39 ± 3                                    | 81                               | 45                               | 96                            | 16                                         | 150                         | 16                                  |
| 50  | 130 | 16                    | 49 ± 3                                    | 95                               | 56                               | 107                           | 16                                         | 165                         | 16                                  |
| 65  | 130 | 16                    | 65 ± 3                                    | 115                              | 72                               | 123                           | 16                                         | 185                         | 18                                  |
| 80  | 130 | 16                    | 77 ± 3                                    | 127                              | 84                               | 135                           | 16                                         | 200                         | 20                                  |
| 100 | 130 | 16                    | 100 ± 3                                   | 151                              | 109                              | 160                           | 16                                         | 220                         | 20                                  |
| 125 | 130 | 16                    | 127 ± 3                                   | 178                              | 133                              | 184                           | 16                                         | 250                         | 22                                  |
| 150 | 130 | 16                    | 153 ± 3                                   | 206                              | 161                              | 212                           | 16                                         | 285                         | 22                                  |
| 200 | 130 | 16                    | 202 ± 3                                   | 260                              | 209                              | 260                           | 10                                         | 340                         | 25                                  |
| 250 | 130 | 16                    | 252 ± 3                                   | 313                              | 262                              | 313                           | 10                                         | 395                         | 25                                  |
| 300 | 130 | 16                    | 303 ± 3                                   | 363                              | 312                              | 363                           | 10                                         | 445                         | 25                                  |

\*unpressurized. From DN 200 pressure rate 16 bar also available with flanges PN 16.  
Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION

| DN  | Δ ax<br>Axial<br>movement |                    | Δ lat<br>Lateral<br>move-<br>ment | Δ ang*<br>Angular<br>move-<br>ment | A** Effective<br>bellows<br>cross<br>sectional area<br>at 16 bar<br>cm <sup>2</sup> | Permissible<br>vacuum w/o<br>supporting<br>ring<br>at length BL<br>bar absolute | Weight<br>approx.<br>kg |
|-----|---------------------------|--------------------|-----------------------------------|------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|-------------------------|
|     | Compression<br>- mm       | Elongation<br>+ mm |                                   |                                    |                                                                                     |                                                                                 |                         |
| 25  | 35                        | 10                 | 15                                | 25                                 | 0                                                                                   | -                                                                               | 2.2                     |
| 32  | 35                        | 10                 | 15                                | 25                                 | 0                                                                                   | 0                                                                               | 3.3                     |
| 40  | 35                        | 10                 | 15                                | 25                                 | 0                                                                                   | 0.2                                                                             | 3.8                     |
| 50  | 35                        | 10                 | 15                                | 25                                 | 2                                                                                   | 0.2                                                                             | 4.5                     |
| 65  | 35                        | 10                 | 15                                | 25                                 | 3                                                                                   | 0.4                                                                             | 5.2                     |
| 80  | 30                        | 10                 | 15                                | 20                                 | 16                                                                                  | 0.4                                                                             | 7.1                     |
| 100 | 30                        | 10                 | 15                                | 15                                 | 48                                                                                  | 0.4                                                                             | 8.0                     |
| 125 | 30                        | 10                 | 15                                | 15                                 | 81                                                                                  | 0.4                                                                             | 10.5                    |
| 150 | 30                        | 10                 | 15                                | 10                                 | 143                                                                                 | 0.4                                                                             | 12.8                    |
| 200 | 25                        | 10                 | 15                                | 7                                  | 191                                                                                 | 0.4                                                                             | 19.0                    |
| 250 | 25                        | 10                 | 15                                | 6                                  | 413                                                                                 | 0.5                                                                             | 24.5                    |
| 300 | 20                        | 10                 | 15                                | 5                                  | 533                                                                                 | 0.6                                                                             | 31.3                    |

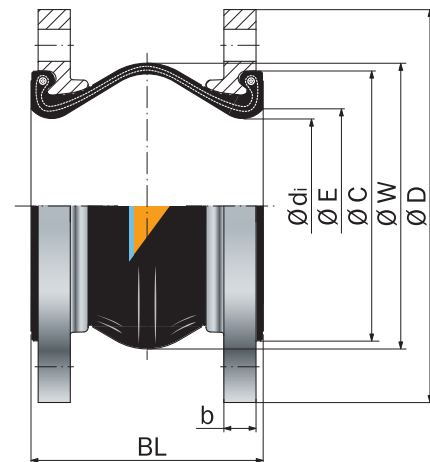
\* Larger Δ ang possible for compressed installation length.

\*\*Effective bellows cross sectional area is a theoretical value.

Please inquire for simultaneous (different) movement.

## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Protective hood
- Protective tube



### Type RS-1

Universal-expansion joint, without restraint

# RUBBER EXPANSION JOINT TYPE RS-2

## FLAME-PROOF

## LATERAL EXPANSION JOINT

### DN 25 – DN 300



## STRUCTURE TYPE RS-2 / RUBBER BELLOWS PN 16

- Lateral-expansion joint, consisting of a rubber bellows with rotatable flanges and tie rods (external restraints) to absorb reaction force from internal pressure
- Flat-convoluted molded bellows in various rubber grades
- Steel wire cord reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance < 100 Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                   | NBR                            |
|---------------|------------------------|--------------------------------|
| Colour code   | orange/blue            | red/blue                       |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +130 °C                                                                               |
| Bursting pressure             | ≥ 50 bar                                                                              |
| Vacuum operation              | DN 20 – 50 without vacuum supporting ring,<br>DN 65 – 300 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

## FLANGES / VERSIONS

- Flanges with stabilizing collar and ears to carry the tie rods
- Flange drilling for through bolts, DN 25 with Drill holes
- Special machined groove for rubber rim

|                      | Standard          | Others                                                                 |
|----------------------|-------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| Corrosion protection | electrogalvanized | hot-dip galvanized, special varnish and 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.

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of the rubber expansion joint.

According to VDI Directive 2035, and VGB R 455, the manufacturer of the chemicals must state the data indicating that the materials used in the expansion joint, especially for the rubber bellows, will not be damaged by the chemicals.

## APPLICATIONS

- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
- for muffling vibrations and noise
  - at appliances
  - in cooling water and lub oil pipes
- for compensating lateral movement
- to compensate for installation inaccuracies
- to meet fire protection regulations
- shipbuilding industry
- in heating plants

## TIE ROD RESTRAINTS

- DN 25 – DN 150 Tie rods carried on silencing rubber sockets
- DN 200 – DN 300 Tie rods carried on spherical washers and conical seats

## Materials

Standard: tie rods 8.8

Others: stainless steel

## Corrosion protection

Standard: electrogalvanized

Others: hot-dip galvanized

## DIMENSIONS STANDARD PROGRAM

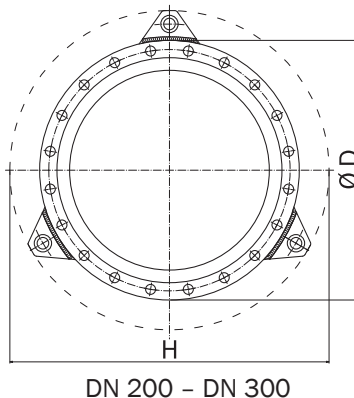
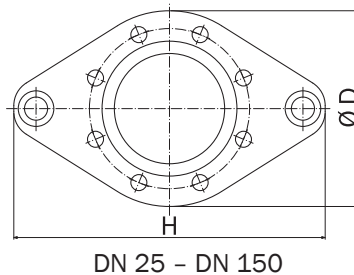
| DN  | BL  | Pressure rate | Ø dj<br>Bellows inner Ø | Ø C<br>Raised face outer Ø | Ø E<br>Raised face inner Ø | Ø W*<br>Con-<br>volution Ø | PN<br>Flange connec-<br>tion<br>EN 1902 | Ø D<br>Flange outer Ø | b<br>Flange thick-<br>ness | H<br>Flange height |
|-----|-----|---------------|-------------------------|----------------------------|----------------------------|----------------------------|-----------------------------------------|-----------------------|----------------------------|--------------------|
|     | mm  | bar           | mm                      | mm                         | mm                         | mm                         |                                         | mm                    | mm                         | mm                 |
| 25  | 130 | 16            | 31 ± 3                  | 72                         | 39                         | 88                         | 16                                      | 115                   | 16                         | 210                |
| 32  | 130 | 16            | 31 ± 3                  | 72                         | 39                         | 88                         | 16                                      | 140                   | 16                         | 220                |
| 40  | 130 | 16            | 39 ± 3                  | 81                         | 45                         | 96                         | 16                                      | 150                   | 16                         | 230                |
| 50  | 130 | 16            | 49 ± 3                  | 95                         | 56                         | 107                        | 16                                      | 165                   | 16                         | 240                |
| 65  | 130 | 16            | 65 ± 3                  | 115                        | 72                         | 123                        | 16                                      | 185                   | 18                         | 260                |
| 80  | 130 | 16            | 77 ± 3                  | 127                        | 84                         | 135                        | 16                                      | 200                   | 20                         | 300                |
| 100 | 130 | 16            | 100 ± 3                 | 151                        | 109                        | 160                        | 16                                      | 220                   | 20                         | 350                |
| 125 | 130 | 16            | 127 ± 3                 | 178                        | 133                        | 184                        | 16                                      | 250                   | 22                         | 385                |
| 150 | 130 | 16            | 153 ± 3                 | 206                        | 161                        | 212                        | 16                                      | 285                   | 22                         | 420                |
| 200 | 130 | 10            | 202 ± 3                 | 260                        | 209                        | 260                        | 10                                      | 340                   | 25                         | 465                |
| 250 | 130 | 10            | 252 ± 3                 | 313                        | 262                        | 313                        | 10                                      | 395                   | 25                         | 520                |
| 300 | 130 | 10            | 303 ± 3                 | 363                        | 312                        | 363                        | 10                                      | 445                   | 25                         | 570                |

\*unpressurized

From DN 200 pressure rate 16 bar also available with flanges PN 16.  
Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION / FLANGE VERSIONS

| DN  | Δ lat<br>Lateral move-<br>ment<br>± mm | Permissible vacuum w/o<br>supporting ring at length BL<br>bar absolute | Weight<br>approx.<br>kg |
|-----|----------------------------------------|------------------------------------------------------------------------|-------------------------|
| 25  | 15                                     | -                                                                      | 4.9                     |
| 32  | 15                                     | 0                                                                      | 5.1                     |
| 40  | 15                                     | 0.2                                                                    | 5.6                     |
| 50  | 15                                     | 0.2                                                                    | 6.3                     |
| 65  | 15                                     | 0.4                                                                    | 7.7                     |
| 80  | 15                                     | 0.4                                                                    | 10.4                    |
| 100 | 15                                     | 0.4                                                                    | 12.4                    |
| 125 | 15                                     | 0.4                                                                    | 16.5                    |
| 150 | 15                                     | 0.4                                                                    | 19.2                    |
| 200 | 15                                     | 0.4                                                                    | 22.0                    |
| 250 | 15                                     | 0.5                                                                    | 30.0                    |
| 300 | 15                                     | 0.6                                                                    | 37.0                    |



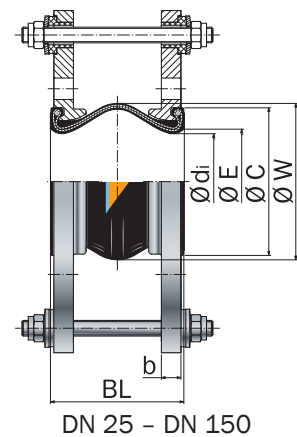
Number of tie rods depending on pressure

### CERTIFICATES

- CE (PED 2014/68/EU)
- Bureau Veritas
- DNV GL® / DNV®
- Lloyd's Register of Shipping
- TÜV/DIN 4809 (DN 25 - 200)
- TÜV Süd (KTA)
- MED
- American Bureau of Shipping

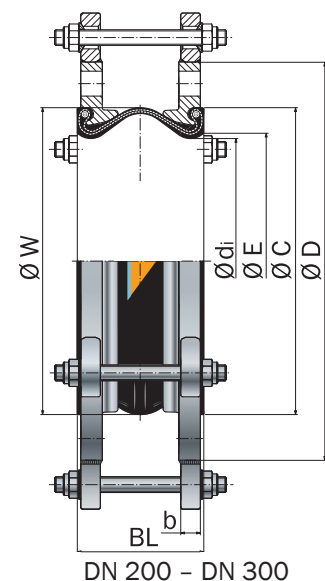
### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood



#### Type RS-2

Tie rods, external restraints, carried on silencing rubber sockets



#### Type RS-2

Tie rods, external restraints, carried on spherical washers and conical seats

# RUBBER EXPANSION JOINT TYPE B-1

## HIGHLY FLEXIBLE

## UNIVERSAL EXPANSION JOINT

## DN 32 – DN 400



### STRUCTURE TYPE B-1 / RUBBER BELLOWS PN 16

- Universal expansion joint consisting of a rubber bellows and rotatable flanges
- Very elastic molded bellows with specially deep convolution in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|                      |                        |                                |
|----------------------|------------------------|--------------------------------|
| <b>Rubber grade*</b> | EPDM                   | NBR**                          |
| <b>Colour code</b>   | orange                 | red                            |
| <b>Possible uses</b> | Hot water, acids, lyes | hydrocarbon containing liquids |

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

\*\*Only available in large lots.

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +100 °C                                                                               |
| Bursting pressure             | ≥ 48 bar                                                                              |
| Vacuum operation              | DN 32 – 40 without vacuum supporting ring,<br>DN 50 – 400 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- DN 32 – DN 150 rotatable flanges with stabilizing collar and drilling for through bolts
- DN 175 – DN 400 rotatable flanges drilled with threaded holes
- Special machined groove for rubber rim

|                             | Standard          | Others                                                                 |
|-----------------------------|-------------------|------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| <b>Corrosion protection</b> | electrogalvanized | hot-dip galvanized, special varnish and 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 large axial and lateral movements
- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
- for muffling vibration and noise at appliances
- for compensating simultaneous movement in cooling water pipes
- to compensate for installation inaccuracies
- power station technology
- chemical industry

### CERTIFICATES

- CE (PED 2014/68/EU)

### ACCESSORIES

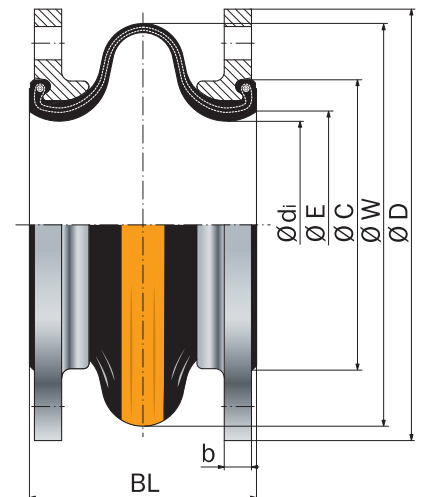
- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube

## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pres-<br>sure<br>rate | Ø d <sub>i</sub><br>Bellows<br>inner<br>Ø<br>mm | Ø C<br>Raised<br>face<br>outer Ø<br>mm | Ø E<br>Raised<br>face<br>inner Ø<br>mm | Ø W*<br>Con-<br>volution<br>Ø<br>mm | PN<br>Flange<br>connec-<br>tion<br>EN 1902 | Ø D<br>Flange<br>outer<br>Ø<br>mm | b<br>Flange<br>thick-<br>ness<br>mm |
|-----|-----|-----------------------|-------------------------------------------------|----------------------------------------|----------------------------------------|-------------------------------------|--------------------------------------------|-----------------------------------|-------------------------------------|
| 32  | 125 | 16                    | 30 ± 3                                          | 75                                     | 42                                     | 100                                 | 16                                         | 150                               | 16                                  |
| 40  | 125 | 16                    | 30 ± 3                                          | 75                                     | 42                                     | 100                                 | 16                                         | 150                               | 16                                  |
| 50  | 125 | 16                    | 40 ± 3                                          | 86                                     | 61                                     | 115                                 | 16                                         | 165                               | 16                                  |
| 65  | 125 | 16                    | 61 ± 3                                          | 105                                    | 71                                     | 144                                 | 16                                         | 185                               | 16                                  |
| 80  | 150 | 16                    | 74 ± 3                                          | 118                                    | 82                                     | 167                                 | 16                                         | 200                               | 18                                  |
| 100 | 150 | 16                    | 92 ± 3                                          | 137                                    | 101                                    | 197                                 | 16                                         | 220                               | 18                                  |
| 125 | 150 | 16                    | 116 ± 3                                         | 166                                    | 130                                    | 230                                 | 16                                         | 250                               | 18                                  |
| 150 | 150 | 16                    | 139 ± 3                                         | 191                                    | 150                                    | 266                                 | 16                                         | 285                               | 18                                  |
| 175 | 100 | 16                    | 177 ± 3                                         | 217                                    | 183                                    | 282                                 | 16                                         | 315                               | 18                                  |
| 200 | 125 | 10                    | 201 ± 3                                         | 264                                    | 207                                    | 320                                 | 10                                         | 340                               | 22                                  |
| 250 | 125 | 10                    | 251 ± 3                                         | 314                                    | 260                                    | 374                                 | 10                                         | 395                               | 23                                  |
| 300 | 150 | 10                    | 302 ± 3                                         | 370                                    | 313                                    | 443                                 | 10                                         | 445                               | 28                                  |
| 350 | 150 | 10                    | 347 ± 3                                         | 424                                    | 354                                    | 485                                 | 10                                         | 505                               | 28                                  |
| 400 | 150 | 10                    | 392 ± 3                                         | 474                                    | 407                                    | 535                                 | 10                                         | 565                               | 30                                  |

\*unpressurized

From DN 200 pressure rate 16 bar also available with flanges PN 16.  
Please contact us for further flange dimensions.



DN 32 – DN 150

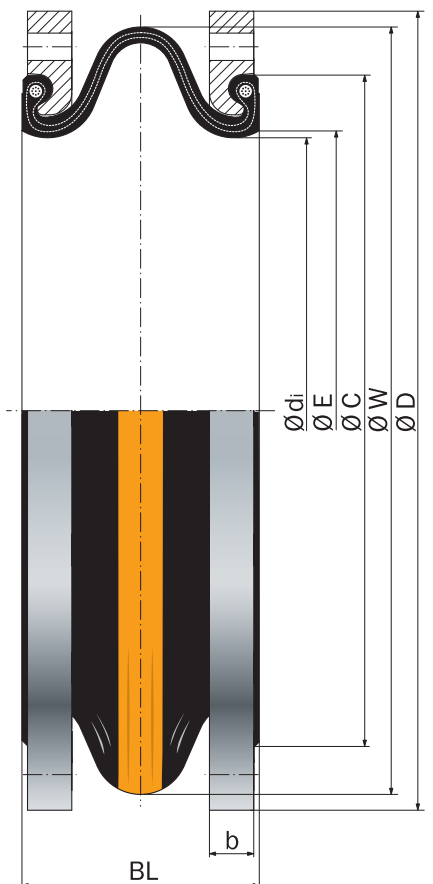
### Type B-1

Universal expansion joint without restraint, flanges with drilling for through bolts

## MOVEMENT COMPENSATION

| DN  | Δ ax<br>Axial movement |                    | Δ lat<br>Lateral<br>movement<br>± mm | A* Effective<br>bellows cross<br>sectional area at<br>16 bar<br>cm <sup>2</sup> | Weight<br><br>approx.<br>kg |
|-----|------------------------|--------------------|--------------------------------------|---------------------------------------------------------------------------------|-----------------------------|
|     | Compression<br>- mm    | Elongation<br>+ mm |                                      |                                                                                 |                             |
| 32  | 25                     | 15                 | 15                                   | 21                                                                              | 4.0                         |
| 40  | 25                     | 15                 | 15                                   | 21                                                                              | 4.4                         |
| 50  | 30                     | 15                 | 15                                   | 30                                                                              | 4.3                         |
| 65  | 35                     | 20                 | 15                                   | 55                                                                              | 4.9                         |
| 80  | 45                     | 20                 | 20                                   | 90                                                                              | 5.7                         |
| 100 | 45                     | 25                 | 20                                   | 150                                                                             | 7.2                         |
| 125 | 45                     | 35                 | 25                                   | 220                                                                             | 9.5                         |
| 150 | 45                     | 35                 | 25                                   | 330                                                                             | 10.4                        |
| 175 | 25                     | 40                 | 25                                   | 432                                                                             | 13.6                        |
| 200 | 35                     | 40                 | 35                                   | 553                                                                             | 17.0                        |
| 250 | 35                     | 40                 | 35                                   | 730                                                                             | 21.3                        |
| 300 | 45                     | 50                 | 35                                   | 975                                                                             | 29.5                        |
| 350 | 45                     | 50                 | 35                                   | 1242                                                                            | 36.8                        |
| 400 | 45                     | 50                 | 35                                   | 1600                                                                            | 47.9                        |

\*Effective bellows cross sectional area is a theoretical value.  
Please inquire for simultaneous (different) movement.



DN 175 – DN 400

### Type B-1

Universal expansion joint without restraint, flanges drilled with threaded holes

# RUBBER EXPANSION JOINT TYPE B-2, B-4

## HIGHLY FLEXIBLE LATERAL EXPANSION JOINT

### DN 32 – DN 400



#### STRUCTURE TYPE B-2, B-4 / RUBBER BELLOWS PN 16

- **Type B-2:** Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external restraints) to absorb reaction force from internal pressure
- **Type B-4:** Lateral expansion joint consisting of a rubber bellows with rotatable flanges and tie rods (external and internal restraints) to absorb reaction force from internal pressure or vacuum
- Very elastic molded bellows with specially high convolution in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|                      |                        |                                |
|----------------------|------------------------|--------------------------------|
| <b>Rubber grade*</b> | EPDM                   | NBR**                          |
| <b>Colour code</b>   | orange                 | red                            |
| <b>Possible uses</b> | Hot water, acids, lyes | hydrocarbon containing liquids |

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

\*\*Only available in large lots.

| Technical design              |                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------|
| Max. perm. operating pressure | 16 bar*                                                                               |
| Max. perm. temperature        | +100 °C                                                                               |
| Bursting pressure             | ≥ 48 bar                                                                              |
| Vacuum operation              | DN 32 – 40 without vacuum supporting ring,<br>DN 50 – 400 with vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

#### FLANGES / VERSIONS

- DN 32 – DN 150 flanges with stabilizing collar and through bolts and with ears to carry the tie rods
- DN 175 – DN 400 flanges drilled with threaded holes and with segments to carry the tie rods
- Special machined groove for rubber rim

|                             | Standard          | Others                                                                 |
|-----------------------------|-------------------|------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)   | 1.4541, 1.4571 etc.                                                    |
| <b>Corrosion protection</b> | electrogalvanized | hot-dip galvanized, special varnish and 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 large axial and lateral movements
- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - compressors
- for muffling vibration and noise at appliances
- to compensate for installation inaccuracies
- power engineering
- chemical industry

#### TIE ROD RESTRAINTS

- DN 32 – DN 150 Tie rods carried on silencing rubber sockets
- DN 175 – DN 400 Tie rods carried on spherical washers and conical seats

#### Materials

Standard: tie rods 8.8

Others: stainless steel

#### Corrosion protection

Standard: electrogalvanized

Others: hot-dip galvanized

#### CERTIFICATES

- CE (PED 2014/68/EU)

#### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Flame-proof protective cover
- Protective hood
- Protective tube

## DIMENSIONS STANDARD PROGRAM

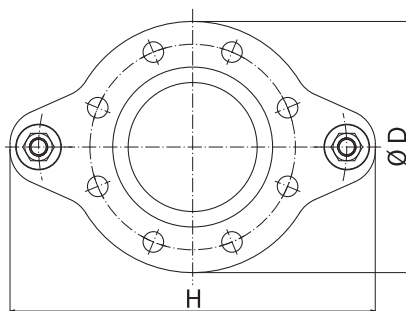
| DN  | BL  | Pressure rate | Ø di<br>Bellows inner Ø | Ø C<br>Raised face outer Ø | Ø E<br>Raised face inner Ø | Ø W*<br>Con-<br>volution Ø | PN<br>Flange connec-<br>tion<br>EN 1902 | Ø D<br>Flange outer Ø | b<br>Flange thick-<br>ness | H<br>Flange height |
|-----|-----|---------------|-------------------------|----------------------------|----------------------------|----------------------------|-----------------------------------------|-----------------------|----------------------------|--------------------|
| 32  | 125 | 16            | 30 ± 3                  | 75                         | 42                         | 100                        | 16                                      | 150                   | 16                         | 230                |
| 40  | 125 | 16            | 30 ± 3                  | 75                         | 42                         | 100                        | 16                                      | 150                   | 16                         | 230                |
| 50  | 125 | 16            | 40 ± 3                  | 86                         | 61                         | 115                        | 16                                      | 165                   | 16                         | 240                |
| 65  | 125 | 16            | 61 ± 3                  | 105                        | 71                         | 144                        | 16                                      | 185                   | 18                         | 260                |
| 80  | 150 | 16            | 74 ± 3                  | 118                        | 82                         | 167                        | 16                                      | 200                   | 20                         | 300                |
| 100 | 150 | 16            | 92 ± 3                  | 137                        | 101                        | 197                        | 16                                      | 220                   | 20                         | 350                |
| 125 | 150 | 16            | 116 ± 3                 | 166                        | 130                        | 230                        | 16                                      | 250                   | 22                         | 385                |
| 150 | 150 | 16            | 139 ± 3                 | 191                        | 150                        | 266                        | 16                                      | 285                   | 22                         | 420                |
| 175 | 100 | 16            | 177 ± 3                 | 217                        | 183                        | 282                        | 16                                      | 315                   | 22                         | 437                |
| 200 | 125 | 10            | 201 ± 3                 | 264                        | 207                        | 320                        | 10                                      | 340                   | 22                         | 462                |
| 250 | 125 | 10            | 251 ± 3                 | 314                        | 260                        | 374                        | 10                                      | 395                   | 23                         | 517                |
| 300 | 150 | 10            | 302 ± 3                 | 370                        | 313                        | 443                        | 10                                      | 445                   | 28                         | 619                |
| 350 | 150 | 10            | 347 ± 3                 | 424                        | 354                        | 485                        | 10                                      | 505                   | 28                         | 679                |
| 400 | 150 | 10            | 392 ± 3                 | 474                        | 407                        | 535                        | 10                                      | 565                   | 30                         | 739                |

\*unpressurized

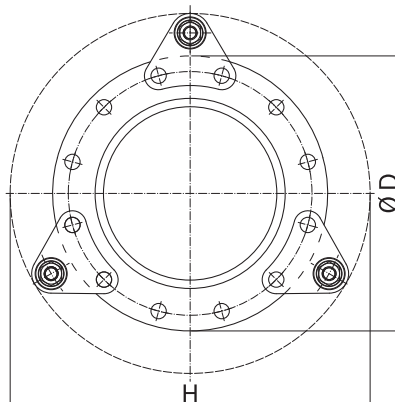
Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION / FLANGE VERSIONS

| DN  | Δ lat<br>Lateral move-<br>ment<br>± mm | Weight<br>type B-2<br><br>approx.<br>kg |
|-----|----------------------------------------|-----------------------------------------|
| 32  | 15                                     | 6.2                                     |
| 40  | 15                                     | 6.2                                     |
| 50  | 15                                     | 6.2                                     |
| 65  | 15                                     | 7.7                                     |
| 80  | 20                                     | 10.6                                    |
| 100 | 20                                     | 13.3                                    |
| 125 | 25                                     | 18.5                                    |
| 150 | 25                                     | 22.5                                    |
| 175 | 25                                     | 24.0                                    |
| 200 | 35                                     | 25.1                                    |
| 250 | 35                                     | 25.9                                    |
| 300 | 35                                     | 48.1                                    |
| 350 | 35                                     | 57.5                                    |
| 400 | 35                                     | 69.4                                    |

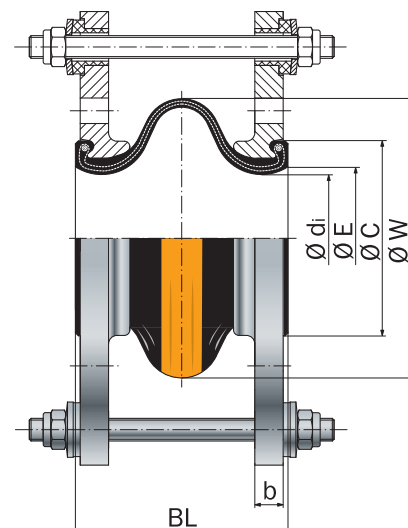


DN 32 - DN 150



DN 175 - DN 400

Number of tie rods depending on pressure

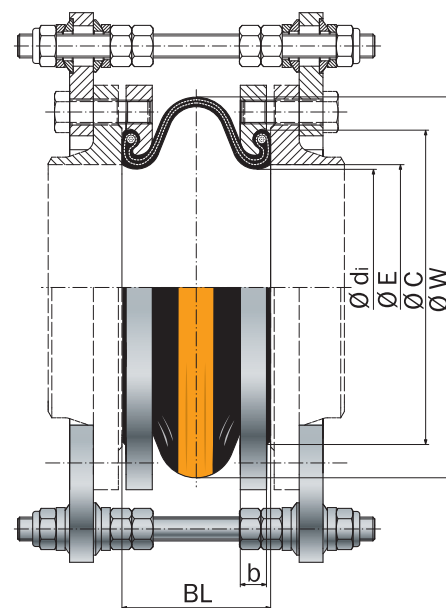


DN 32 - DN 150

### Type B-2

DN 32 - DN 150 Tie rods, external restraints, carried in silencing sockets

DN 175 - DN 400 Tie rods, external restraints, carried in segments, on spherical washers and conical seats



DN 175 - DN 400

### Type B-4

DN 32 - DN 150 Tie rods, external and internal restraints, carried in silencing sockets

DN 175 - DN 400 Tie rods, external and internal restraints, carried in segments, on spherical washers and conical seats

# RUBBER EXPANSION JOINT TYPE AG-5

## UNIVERSAL-EXPANSION JOINT DN 20 – DN 50



### STRUCTURE TYPE AG-5 / RUBBER BELLOWS PN 16

- Universal expansion joint consisting of a rubber bellows with threaded ends
- Male or female thread
- Combination of female/male thread
- Highly elastic molded bellows in various rubber grades
- Synthetic fibre reinforcement
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

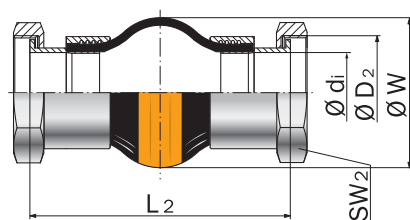
| Rubber grade* | EPDM                   | NBR                            | CIIR           |
|---------------|------------------------|--------------------------------|----------------|
| Colour code   | orange                 | red                            | white          |
| Possible uses | Hot water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

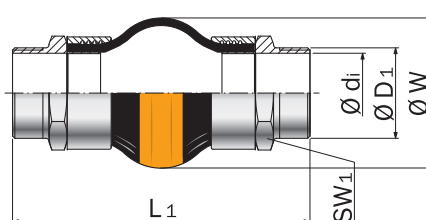
| Technical design              |          |
|-------------------------------|----------|
| Max. perm. operating pressure | 16 bar*  |
| Max. perm. temperature        | +100 °C  |
| Bursting pressure             | ≥ 48 bar |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).



**Type AG-5** with female thread union nut with flat gasket



**Type AG-5** with male thread

### DIMENSIONS STANDARD PROGRAM

| DN | L1  | L2  | Pressure rate | Ø di Bellows inner Ø | Ø W Convolution unpressurized | Ø D1 Male thread Ø | Ø D2 Female thread Ø | SW1 Width across | SW2 Width across |
|----|-----|-----|---------------|----------------------|-------------------------------|--------------------|----------------------|------------------|------------------|
|    | mm  | mm  | bar           | mm                   | mm                            | inch               | inch                 | mm               | mm               |
| 20 | 200 | 172 | 16            | 20                   | 60                            | R 3/4"             | G 1"                 | 30               | 36               |
| 25 | 200 | 172 | 16            | 26                   | 67                            | R 1"               | G 1 1/4"             | 36               | 46               |
| 32 | 200 | 172 | 16            | 33                   | 80                            | R 1 1/4"           | G 1 1/2"             | 46               | 55               |
| 40 | 200 | 172 | 16            | 40                   | 87                            | R 1 1/2"           | G 2"                 | 55               | 65               |
| 50 | 200 | 172 | 16            | 52                   | 99                            | R 2"               | G 2 1/2"             | 65               | 80               |

### 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 reducing thermal and mechanical tension
- for muffling vibration and noise
- for compensating axial, lateral and angular movement
- to compensate for installation inaccuracies
- domestic industry
- for heating plants and hot water pipes
- in oil hydraulic systems

### CERTIFICATES

- CE (PED 2014/68/EU)
- Drinking water

### THREADED ENDS/VERSIONS

- Male thread acc. ISO 7-1 (DIN 2999).
- Union nut with female thread acc. ISO 228-1; flat sealing, suitable for drinking water

### Materials

Standard: 1.4571

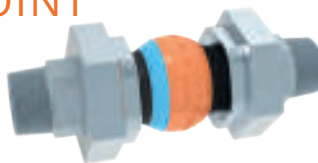
### MOVEMENT COMPENSATION

| DN | Δ ax Axial movement |                 | Δ lat Lateral movement | Δ ang Angular movement | Weight     |
|----|---------------------|-----------------|------------------------|------------------------|------------|
|    | Compression - mm    | Elongation + mm | ± mm                   | ± < degrees            | approx. kg |
| 20 | 30                  | 10              | 10                     | 25                     | 0.5        |
| 25 | 30                  | 10              | 10                     | 25                     | 0.6        |
| 32 | 35                  | 10              | 15                     | 25                     | 0.8        |
| 40 | 35                  | 10              | 15                     | 25                     | 1.1        |
| 50 | 35                  | 10              | 15                     | 22                     | 1.3        |

Please inquire for simultaneous (different) movement

## RUBBER EXPANSION JOINT TYPE AS-5

### UNIVERSAL-EXPANSION JOINT DN 32 - DN 40



#### STRUCTURE TYPE AS-5 / RUBBER BELLOWS PN 16

- Universal expansion joint consisting of a rubber bellows with threaded ends
- Male or female thread
- Combination of female/male thread
- Highly elastic molded bellows in various rubber grades
- Steel wire cord reinforcement
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|                      |                        |                                |
|----------------------|------------------------|--------------------------------|
| <b>Rubber grade*</b> | EPDM                   | NBR                            |
| <b>Colour code</b>   | orange/blue            | red/blau                       |
| <b>Possible uses</b> | Hot water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                |
|-------------------------------|--------------------------------|
| Max. perm. operating pressure | 16 bar*                        |
| Max. perm. temperature        | +130 °C                        |
| Bursting pressure             | ≥ 50 bar                       |
| Vacuum operation              | without vacuum supporting ring |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

#### THREADED ENDS / VERSIONS

- Male thread acc. ISO 7-1 (DIN 2999).
- Union nut with female thread acc. ISO 228-1; flat sealing.

|                  | Standard                                            |
|------------------|-----------------------------------------------------|
| <b>Materials</b> | 1.0038 (S235JR) (Malleable iron), electrogalvanized |

#### DIMENSIONS STANDARD PROGRAM

| DN | L <sub>1</sub> | L <sub>2</sub> | Pres-<br>sure<br>rate | Ø d <sub>i</sub><br>Bellows<br>inner<br>Ø | Ø W<br>Convolution<br>Ø unpres-<br>surized | Ø D <sub>1</sub><br>Male<br>thread<br>Ø | Ø D <sub>2</sub><br>Female<br>thread<br>Ø | SW <sub>1</sub><br>Width<br>across | SW <sub>2</sub><br>Width<br>across | SW <sub>3</sub><br>Width<br>across | Ø A<br>Union<br>nut<br>Ø |
|----|----------------|----------------|-----------------------|-------------------------------------------|--------------------------------------------|-----------------------------------------|-------------------------------------------|------------------------------------|------------------------------------|------------------------------------|--------------------------|
|    | mm             | mm             | bar                   | mm                                        | mm                                         | inch                                    | inch                                      | mm                                 | mm                                 | mm                                 | mm                       |
| 32 | 237            | 187            | 16                    | 34 ± 3                                    | 70                                         | R 1 1/4"                                | G 1 1/4"                                  | 75                                 | 47                                 | 90                                 | 104                      |
| 40 | 239            | 189            | 16                    | 34 ± 3                                    | 70                                         | R 1 1/2"                                | G 1 1/2"                                  | 75                                 | 54                                 | 90                                 | 104                      |

#### NOTE

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

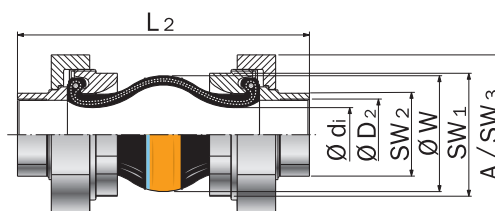
Subject to technical alterations and deviations resulting from the manufacturing process.

#### APPLICATIONS

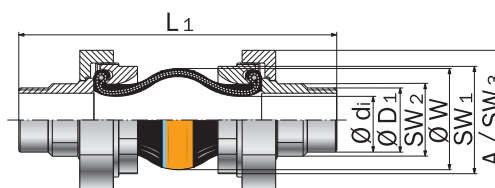
- for reducing thermal and mechanical tension
- for muffling vibration and noise
- for compensating axial, lateral and angular movement
- to compensate for installation inaccuracies
- for heating plants and hot water pipes

#### CERTIFICATES

- CE (PED 2014/68/EU)
- TÜV/DIN 4809



Type AS-5 with female thread



Type AS-5 with male thread

#### MOVEMENT COMPENSATION

| DN | Δ ax<br>Axial<br>movement<br>Compression<br>- mm | Elongation<br>+ mm | Δ lat<br>Lateral<br>move-<br>ment<br>± mm | Δ ang<br>Angular<br>move-<br>ment<br>± < degrees | Weight<br>approx.<br>kg |
|----|--------------------------------------------------|--------------------|-------------------------------------------|--------------------------------------------------|-------------------------|
| 32 | 30                                               | 10                 | 15                                        | 25                                               | 2.4                     |
| 40 | 30                                               | 10                 | 15                                        | 25                                               | 2.6                     |

Please inquire for simultaneous (different) movement

# RUBBER EXPANSION JOINT TYPE E

## CYLINDRICAL LATERAL EXPANSION JOINT

### DN 20 – DN 250



## STRUCTURE TYPE E / RUBBER BELLOWS PN 10

- Lateral expansion joint consisting of a cylindrical rubber bellows without convolution and rotatable flanges
- Cylindrical bellows without convolution in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim (type E)
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|                      |                                                  |                                |
|----------------------|--------------------------------------------------|--------------------------------|
| <b>Rubber grade*</b> | EPDM                                             | NBR                            |
| <b>Colour code</b>   | orange                                           | red                            |
| <b>Possible uses</b> | Cooling, hot, waste, brackish water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |              |
|-------------------------------|--------------|
| Max. perm. operating pressure | 10 bar*      |
| Max. perm. temperature        | +100 °C      |
| Bursting pressure             | ≥ 30 bar     |
| Vacuum operation              | not suitable |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

## FLANGES / VERSIONS

- Special machined groove for rubber rim
- Flange drilling for through bolts

|                             | Standard          | Others                                                                 |
|-----------------------------|-------------------|------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)   | stainless steel etc.                                                   |
| <b>Corrosion protection</b> | electrogalvanized | special varnish and coating, etc.                                      |

## NOTE

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

Reaction force, moving force and fixed point load have to be calculated as for universal expansion joints (no tie rod restraints available).

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

## APPLICATIONS

- for compensating lateral movement
- to improve the flow of media (smooth passage)
- for deposit-free passage of solid matter, e.g. at pumps for gypsum suspension
- for muffling vibration and noise
- as cylindrical elastic transition piece at
  - pumps
  - pipelines
  - engines
  - ventilating fans/blowers
  - cooling water lines
- cement industry
- conveyance technology

## SPECIAL VERSIONS

Other sizes or lengths on request

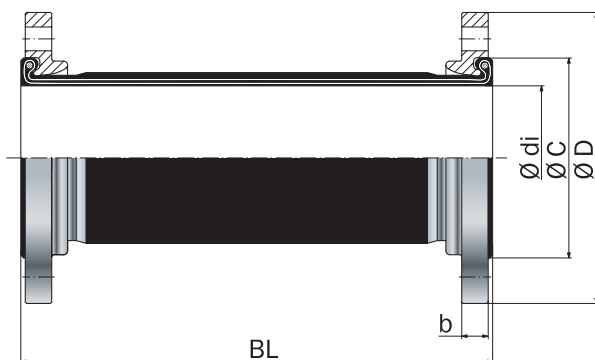
## CERTIFICATES

- CE (PED 2014/68/EU)

## DIMENSIONS STANDARD PROGRAM

| DN  | BL  | Pressure<br>rate<br>bar | Ø d <sub>i</sub><br>Bellows<br>inner Ø<br>mm | Ø C<br>Raised<br>face Ø<br>mm | PN<br>Flange<br>connection<br>EN 1902 | Ø D<br>Flange<br>outer Ø<br>mm | b<br>Flange<br>thickness<br>mm | Δ lat<br>Lateral<br>movement<br>± mm | Weight<br>approx.<br>kg |
|-----|-----|-------------------------|----------------------------------------------|-------------------------------|---------------------------------------|--------------------------------|--------------------------------|--------------------------------------|-------------------------|
| 20  | 160 | 10                      | 25                                           | 51                            | 16                                    | 115                            | 16                             | 30                                   | 2.3                     |
| 25  | 160 | 10                      | 25                                           | 51                            | 16                                    | 115                            | 16                             | 30                                   | 2.3                     |
| 32  | 200 | 10                      | 39                                           | 72                            | 16                                    | 140                            | 16                             | 25                                   | 3.4                     |
| 40  | 200 | 10                      | 45                                           | 81                            | 16                                    | 150                            | 16                             | 25                                   | 3.9                     |
| 50  | 230 | 10                      | 56                                           | 95                            | 16                                    | 165                            | 16                             | 25                                   | 4.7                     |
| 65  | 290 | 10                      | 72                                           | 115                           | 16                                    | 185                            | 18                             | 20                                   | 5.8                     |
| 80  | 310 | 10                      | 84                                           | 127                           | 16                                    | 200                            | 20                             | 20                                   | 7.9                     |
| 100 | 350 | 10                      | 109                                          | 151                           | 16                                    | 220                            | 20                             | 20                                   | 9.2                     |
| 125 | 350 | 10                      | 133                                          | 178                           | 16                                    | 250                            | 22                             | 20                                   | 12.1                    |
| 150 | 350 | 10                      | 161                                          | 206                           | 16                                    | 285                            | 22                             | 20                                   | 14.7                    |
| 200 | 350 | 10                      | 209                                          | 260                           | 10                                    | 340                            | 25                             | 15                                   | 21.3                    |
| 250 | 350 | 10                      | 262                                          | 313                           | 10                                    | 395                            | 25                             | 15                                   | 26.3                    |

Please contact us for further flange dimensions.



### Type E

Cylindrical lateral expansion joint with  
rotatable flanges

# RUBBER EXPANSION JOINT TYPE G

## CONICAL

## LATERAL EXPANSION JOINT

## DN 25 – DN 250



### STRUCTURE TYPE G / RUBBER BELLOWS PN 6, 10, 16

- Lateral expansion joint consisting of a conical rubber bellows without convolution and rotatable flanges
- Conical bellows without convolution in various rubber grades
- Synthetic fibre reinforcement
- Wire-reinforced self-sealing rubber rim
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|                      |                                                  |                                |
|----------------------|--------------------------------------------------|--------------------------------|
| <b>Rubber grade*</b> | EPDM                                             | NBR                            |
| <b>Colour code</b>   | orange                                           | red                            |
| <b>Possible uses</b> | Cooling, hot, waste, brackish water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                        |                      |
|-------------------------------|------------------------|----------------------|
| DN                            | DN 125:80 – DN 250:200 | DN 40:25 – DN 100:80 |
| Pressure rate                 | PN 10                  | PN 16                |
| Max. perm. operating pressure | 10 bar*                | 16 bar*              |
| Max. perm. temperature        | +100 °C                | +100 °C              |
| Bursting pressure             | ≥ 30 bar               | ≥ 48 bar             |
| Vacuum operation              | not suitable           |                      |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Special machined groove for rubber rim
- Flange drilling for through bolts

|                             | Standard          | Others                                                                 |
|-----------------------------|-------------------|------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)   | stainless steel etc.                                                   |
| <b>Corrosion protection</b> | electrogalvanized | hot-dip galvanized, special varnish and coating, etc.                  |

### NOTE

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

Reaction force, moving force and fixed point load have to be calculated as for universal expansion joints (no tie rod restraints available).

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

### APPLICATIONS

- for compensating lateral movement
- to improve the flow of media (smooth passage)
- for deposit-free passage of solid matter, e.g. at pumps for gypsum suspension
- for muffling vibration and noise
- as conical elastic transition piece at
  - pumps
  - pipelines
  - engines
  - ventilating fans/blowers
  - cooling water lines
- cement industry
- conveyance technology

### SPECIAL VERSIONS

Other sizes or lengths on request

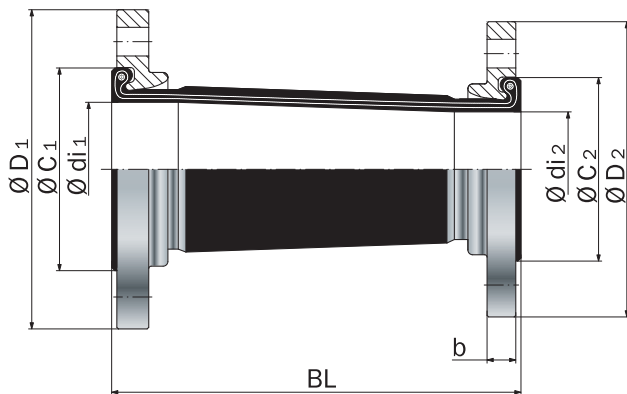
### CERTIFICATES

- CE (PED 2014/68/EU)

## DIMENSIONS STANDARD PROGRAM

| DN        | BL  | Pressure<br>rate<br>bar | $\varnothing$ di <sub>1</sub> : $\varnothing$ di <sub>2</sub><br>Bellows<br>inner $\varnothing$<br>mm | $\varnothing$ C <sub>1</sub> : $\varnothing$ C <sub>2</sub><br>Raised<br>face $\varnothing$<br>mm | PN<br>Flange<br>connection<br>EN 1902 | $\varnothing$ D <sub>1</sub> : $\varnothing$ D <sub>2</sub><br>Flange<br>outer $\varnothing$<br>mm | b<br>Flange<br>thickness<br>mm | $\Delta$ lat<br>Lateral<br>movement<br>$\pm$ mm | Weight<br>approx.<br>kg |
|-----------|-----|-------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------|----------------------------------------------------------------------------------------------------|--------------------------------|-------------------------------------------------|-------------------------|
| 40 : 25   | 250 | 16                      | 45 : 30                                                                                               | 81 : 51                                                                                           | 16/16                                 | 150 : 115                                                                                          | 16 : 16                        | 30                                              | 3.2                     |
| 40 : 32   | 250 | 16                      | 45 : 39                                                                                               | 81 : 72                                                                                           | 16/16                                 | 150 : 140                                                                                          | 16 : 16                        | 30                                              | 3.7                     |
| 50 : 32   | 250 | 16                      | 56 : 39                                                                                               | 95 : 72                                                                                           | 16/16                                 | 165 : 140                                                                                          | 16 : 16                        | 30                                              | 4.1                     |
| 50 : 40   | 250 | 16                      | 56 : 45                                                                                               | 95 : 81                                                                                           | 16/16                                 | 165 : 150                                                                                          | 16 : 16                        | 30                                              | 4.4                     |
| 65 : 40   | 250 | 16                      | 72 : 45                                                                                               | 115 : 81                                                                                          | 16/16                                 | 185 : 150                                                                                          | 18 : 16                        | 30                                              | 5.2                     |
| 65 : 50   | 250 | 16                      | 72 : 56                                                                                               | 115 : 95                                                                                          | 16/16                                 | 185 : 165                                                                                          | 18 : 16                        | 30                                              | 5.6                     |
| 80 : 50   | 250 | 16                      | 84 : 56                                                                                               | 127 : 95                                                                                          | 16/16                                 | 200 : 165                                                                                          | 20 : 16                        | 30                                              | 6.3                     |
| 80 : 65   | 250 | 16                      | 84 : 72                                                                                               | 127 : 115                                                                                         | 16/16                                 | 200 : 185                                                                                          | 20 : 18                        | 30                                              | 7.1                     |
| 100 : 65  | 250 | 16                      | 109 : 72                                                                                              | 151 : 115                                                                                         | 16/16                                 | 220 : 185                                                                                          | 20 : 18                        | 30                                              | 7.5                     |
| 100 : 80  | 250 | 16                      | 109 : 84                                                                                              | 151 : 127                                                                                         | 16/16                                 | 220 : 200                                                                                          | 20 : 20                        | 25                                              | 8.2                     |
| 125 : 80  | 250 | 10                      | 133 : 84                                                                                              | 178 : 127                                                                                         | 16/16                                 | 250 : 200                                                                                          | 22 : 20                        | 25                                              | 9.7                     |
| 125 : 100 | 250 | 10                      | 133 : 109                                                                                             | 178 : 151                                                                                         | 16/16                                 | 250 : 220                                                                                          | 22 : 20                        | 25                                              | 10.0                    |
| 150 : 80  | 250 | 10                      | 161 : 84                                                                                              | 206 : 127                                                                                         | 16/16                                 | 285 : 200                                                                                          | 22 : 20                        | 25                                              | 10.9                    |
| 150 : 100 | 250 | 10                      | 161 : 109                                                                                             | 206 : 151                                                                                         | 16/16                                 | 285 : 220                                                                                          | 22 : 20                        | 25                                              | 11.4                    |
| 150 : 125 | 250 | 10                      | 161 : 133                                                                                             | 206 : 178                                                                                         | 16/16                                 | 285 : 250                                                                                          | 22 : 22                        | 25                                              | 12.8                    |
| 200 : 125 | 250 | 10                      | 209 : 133                                                                                             | 260 : 178                                                                                         | 10/16                                 | 340 : 250                                                                                          | 25 : 22                        | 25                                              | 16.0                    |
| 200 : 150 | 250 | 10                      | 209 : 161                                                                                             | 260 : 206                                                                                         | 10/16                                 | 340 : 285                                                                                          | 25 : 22                        | 25                                              | 17.2                    |
| 250 : 150 | 250 | 10                      | 262 : 161                                                                                             | 313 : 206                                                                                         | 10/16                                 | 395 : 285                                                                                          | 25 : 22                        | 25                                              | 19.3                    |
| 250 : 200 | 250 | 10                      | 262 : 209                                                                                             | 313 : 260                                                                                         | 10/10                                 | 395 : 340                                                                                          | 25 : 25                        | 25                                              | 22.4                    |

Please contact us for further flange dimensions.



### Type G

Conical lateral expansion joint with  
rotatable flanges

# RUBBER EXPANSION JOINT TYPE C-1

## UNIVERSAL EXPANSION JOINT DN 300 – DN 3600



### STRUCTURE TYPE C-1 / RUBBER BELLOWS PN 4, 10, 16

- Universal expansion joint consisting of a rubber bellows and press-on retaining flanges
- Available in various bellow's geometries and special lengths
- Elastic robust bellows in various rubber grades
- Synthetic fibre reinforcement
- Full-faced self-sealing rubber flanges with drilling for through bolts
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                                      | NBR                            | CIIR           |
|---------------|-------------------------------------------|--------------------------------|----------------|
| Colour code   | orange                                    | red                            | white          |
| Possible uses | Cooling, sea, brackish water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                   |               |               |
|-------------------------------|---------------------------------------------------|---------------|---------------|
| DN                            | DN 300 – 3600                                     | DN 300 – 2800 | DN 300 – 2400 |
| Pressure rate                 | PN 4                                              | PN 10         | PN 16         |
| Max. perm. operating pressure | 4 bar*                                            | 10 bar*       | 16 bar*       |
| Max. perm. temperature        | +100 °C                                           | +100 °C       | +100 °C       |
| Bursting pressure             | ≥ 15 bar                                          | ≥ 30 bar      | ≥ 48 bar      |
| Vacuum operation              | with vacuum supporting ring (at permanent vacuum) |               |               |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Press-on retaining flanges with stabilizing collar
- Flange drilling for through bolts

|                      | Standard          | Others                                                                 |
|----------------------|-------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092           | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)   | 1.0577 (S355J2), 1.4541, 1.4571 etc.                                   |
| Corrosion protection | electrogalvanized | special varnish and 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 reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - condensers
- for compensating axial, lateral and angular movement
- for compensating simultaneous movement in cooling water pipes
- to compensate for installation inaccuracies
- to compensate for ground and foundation settlement
- as installation and dismantling aid
- power station technology
- process plant engineering

### CERTIFICATES

- CE (PED 2014/68/EU)
- Drinking water
- TÜV Süd (KTA)

### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Protective tube

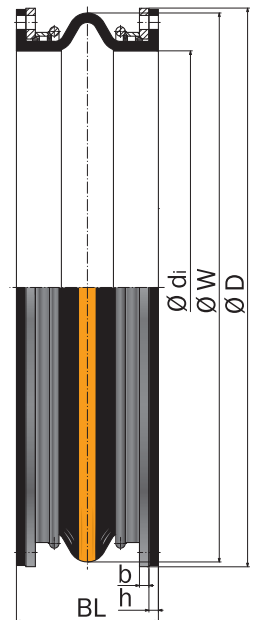
## DIMENSIONS STANDARD PROGRAM

| DN   | Pressure rate<br>bar | Bellows                                                          |                                               | Steel flange                                        |                                                      |                                     | w/o vacuum supporting ring |                                                |                         | with vacuum supporting ring |                                                |                         |
|------|----------------------|------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------|------------------------------------------------------|-------------------------------------|----------------------------|------------------------------------------------|-------------------------|-----------------------------|------------------------------------------------|-------------------------|
|      |                      | Ø d <sub>i</sub><br>Bellows<br>inner Ø<br>tolerance<br>±1%<br>mm | h<br>Rubber<br>flange<br>thick-<br>ness<br>mm | Ø D<br>Flange<br>outer Ø<br>PN 6<br>(EN 1092)<br>mm | Ø D<br>Flange<br>outer Ø<br>PN 10<br>(EN 1092)<br>mm | b<br>Flange<br>thick-<br>ness<br>mm | BL<br>mm                   | Ø W<br>Convolution<br>Ø<br>unpressurized<br>mm | Weight<br>approx.<br>kg | BL<br>mm                    | Ø W<br>Convolution<br>Ø<br>unpressurized<br>mm | Weight<br>approx.<br>kg |
| 300  | 4/10/16              | 300                                                              | 15                                            | 440                                                 | 445                                                  | 20                                  | 250                        | 413                                            | 34                      | 250                         | 413                                            | 40                      |
| 350  | 4/10/16              | 350                                                              | 15                                            | 490                                                 | 505                                                  | 20                                  | 250                        | 463                                            | 38                      | 250                         | 463                                            | 45                      |
| 400  | 4/10/16              | 400                                                              | 15                                            | 540                                                 | 565                                                  | 20                                  | 250                        | 513                                            | 43                      | 250                         | 513                                            | 55                      |
| 450  | 4/10/16              | 450                                                              | 15                                            | 595                                                 | 615                                                  | 20                                  | 250                        | 563                                            | 54                      | 250                         | 563                                            | 60                      |
| 500  | 4/10/16              | 500                                                              | 15                                            | 645                                                 | 670                                                  | 20                                  | 250                        | 613                                            | 59                      | 250                         | 613                                            | 65                      |
| 600  | 4/10/16              | 600                                                              | 15                                            | 755                                                 | 780                                                  | 20                                  | 250                        | 713                                            | 80                      | 250                         | 713                                            | 80                      |
| 700  | 4/10/16              | 700                                                              | 15                                            | 860                                                 | 895                                                  | 20                                  | 250                        | 813                                            | 93                      | 250                         | 813                                            | 95                      |
| 750  | 4/10/16              | 750                                                              | 15                                            | 925                                                 | 965                                                  | 20                                  | 250                        | 863                                            | 103                     | 250                         | 863                                            | 115                     |
| 800  | 4/10/16              | 800                                                              | 20                                            | 975                                                 | 1015                                                 | 20                                  | 250                        | 923                                            | 118                     | 250                         | 923                                            | 130                     |
| 900  | 4/10/16              | 900                                                              | 20                                            | 1075                                                | 1115                                                 | 20                                  | 250                        | 1023                                           | 131                     | 250                         | 1023                                           | 145                     |
| 1000 | 4/10/16              | 1000                                                             | 20                                            | 1175                                                | 1230                                                 | 20                                  | 250                        | 1123                                           | 160                     | 250                         | 1123                                           | 165                     |
| 1100 | 4/10/16              | 1100                                                             | 20                                            | 1290                                                | 1345                                                 | 20                                  | 300                        | 1268                                           | 185                     | 325                         | 1310                                           | 210                     |
| 1200 | 4/10/16              | 1200                                                             | 20                                            | 1405                                                | 1455                                                 | 20                                  | 300                        | 1368                                           | 215                     | 325                         | 1410                                           | 240                     |
| 1300 | 4/10/16              | 1300                                                             | 20                                            | 1520                                                | 1565                                                 | 20                                  | 300                        | 1468                                           | 230                     | 325                         | 1510                                           | 255                     |
| 1400 | 4/10/16              | 1400                                                             | 20                                            | 1630                                                | 1675                                                 | 20                                  | 300                        | 1568                                           | 260                     | 325                         | 1610                                           | 290                     |
| 1500 | 4/10/16              | 1500                                                             | 20                                            | 1730                                                | 1795                                                 | 20                                  | 300                        | 1668                                           | 295                     | 325                         | 1710                                           | 325                     |
| 1600 | 4/10/16              | 1600                                                             | 20                                            | 1830                                                | 1915                                                 | 20                                  | 300                        | 1768                                           | 340                     | 325                         | 1810                                           | 380                     |
| 1700 | 4/10/16              | 1700                                                             | 20                                            | 1940                                                | 2015                                                 | 20                                  | 300                        | 1868                                           | 365                     | 325                         | 1910                                           | 400                     |
| 1800 | 4/10/16              | 1800                                                             | 20                                            | 2045                                                | 2115                                                 | 20                                  | 300                        | 1968                                           | 370                     | 325                         | 2010                                           | 410                     |
| 2000 | 4/10/16              | 2000                                                             | 20                                            | 2265                                                | 2325                                                 | 20                                  | 300                        | 2168                                           | 430                     | 325                         | 2210                                           | 460                     |
| 2100 | 4/10/16              | 2100                                                             | 20                                            | 2375                                                | 2440                                                 | 20                                  | 300                        | 2268                                           | 475                     | 325                         | 2310                                           | 515                     |
| 2200 | 4/10/16              | 2200                                                             | 25                                            | 2475                                                | 2550                                                 | 20                                  | 300                        | 2378                                           | 525                     | 325                         | 2420                                           | 575                     |
| 2300 | 4/10/16              | 2300                                                             | 25                                            | 2590                                                | 2650                                                 | 20                                  | 300                        | 2478                                           | 550                     | 325                         | 2520                                           | 600                     |
| 2400 | 4/10/16              | 2400                                                             | 25                                            | 2685                                                | 2760                                                 | 20                                  | 300                        | 2578                                           | 600                     | 325                         | 2620                                           | 650                     |
| 2500 | 4/10                 | 2500                                                             | 25                                            | 2795                                                | 2860                                                 | 20                                  | 300                        | 2678                                           | 620                     | 325                         | 2720                                           | 670                     |
| 2600 | 4/10                 | 2600                                                             | 25                                            | 2905                                                | 2960                                                 | 20                                  | 300                        | 2778                                           | 640                     | 325                         | 2820                                           | 690                     |
| 2800 | 4/10                 | 2800                                                             | 25                                            | 3115                                                | 3180                                                 | 20                                  | 300                        | 2978                                           | 690                     | 325                         | 3020                                           | 730                     |
| 3000 | 4                    | 3000                                                             | 25                                            | 3315                                                | 3405                                                 | 20                                  | 300                        | 3178                                           | 720                     | 325                         | 3220                                           | 770                     |
| 3200 | 4                    | 3200                                                             | 25                                            | 3525                                                | -                                                    | 20                                  | 300                        | 3378                                           | 740                     | 325                         | 3420                                           | 790                     |
| 3400 | 4                    | 3400                                                             | 25                                            | 3735                                                | -                                                    | 20                                  | 300                        | 3578                                           | 770                     | 325                         | 3620                                           | 820                     |
| 3600 | 4                    | 3600                                                             | 25                                            | 3975                                                | -                                                    | 20                                  | 300                        | 3778                                           | 820                     | 325                         | 3820                                           | 870                     |

Other lengths (BL) and pressure rates on request. Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION

| DN   | w/o vacuum supporting ring |                   |                           |                           |                                           | with vacuum supporting ring |                   |                           |                           |                                           |
|------|----------------------------|-------------------|---------------------------|---------------------------|-------------------------------------------|-----------------------------|-------------------|---------------------------|---------------------------|-------------------------------------------|
|      | Δ ax<br>Axial movement     |                   | Δ lat<br>Lateral movement | Δ ang<br>Angular movement | A* Effective bellows cross sectional area | Δ ax<br>Axial movement      |                   | Δ lat<br>Lateral movement | Δ ang<br>Angular movement | A* Effective bellows cross sectional area |
|      | Compression<br>-mm         | Elongation<br>+mm | ±mm                       | ±°<br>degrees             | cm <sup>2</sup>                           | Compression<br>-mm          | Elongation<br>+mm | ±mm                       | ±°<br>degrees             | cm <sup>2</sup>                           |
| 300  | 40                         | 30                | 30                        | 11.3                      | 1020                                      | 40                          | 30                | 30                        | 5.5                       | 1020                                      |
| 350  | 40                         | 30                | 30                        | 9.7                       | 1300                                      | 40                          | 30                | 30                        | 4.8                       | 1300                                      |
| 400  | 40                         | 30                | 30                        | 8.5                       | 1620                                      | 40                          | 30                | 30                        | 4.2                       | 1620                                      |
| 450  | 40                         | 30                | 30                        | 7.7                       | 1970                                      | 40                          | 30                | 30                        | 3.8                       | 1970                                      |
| 500  | 40                         | 30                | 30                        | 6.9                       | 2360                                      | 40                          | 30                | 30                        | 3.4                       | 2360                                      |
| 600  | 40                         | 30                | 30                        | 5.7                       | 3240                                      | 40                          | 30                | 30                        | 2.8                       | 3240                                      |
| 700  | 40                         | 30                | 30                        | 4.9                       | 4250                                      | 40                          | 30                | 30                        | 2.5                       | 4250                                      |
| 750  | 40                         | 30                | 30                        | 4.6                       | 4820                                      | 40                          | 30                | 30                        | 2.3                       | 4820                                      |
| 800  | 40                         | 30                | 30                        | 4.3                       | 5410                                      | 40                          | 30                | 30                        | 2.1                       | 5410                                      |
| 900  | 40                         | 30                | 30                        | 3.8                       | 6700                                      | 40                          | 30                | 30                        | 1.9                       | 6700                                      |
| 1000 | 40                         | 30                | 30                        | 3.4                       | 8140                                      | 40                          | 30                | 30                        | 1.7                       | 8140                                      |
| 1100 | 40                         | 30                | 30                        | 3.2                       | 10500                                     | 60                          | 35                | 35                        | 3.6                       | 11200                                     |
| 1200 | 40                         | 30                | 30                        | 2.9                       | 12300                                     | 60                          | 35                | 35                        | 3.3                       | 13000                                     |
| 1300 | 40                         | 30                | 30                        | 2.7                       | 14200                                     | 60                          | 35                | 35                        | 3.0                       | 15000                                     |
| 1400 | 40                         | 30                | 30                        | 2.5                       | 16300                                     | 60                          | 35                | 35                        | 2.8                       | 17100                                     |
| 1500 | 40                         | 30                | 30                        | 2.3                       | 18500                                     | 60                          | 35                | 35                        | 2.6                       | 19300                                     |
| 1600 | 40                         | 30                | 30                        | 2.2                       | 20800                                     | 60                          | 35                | 35                        | 2.5                       | 21700                                     |
| 1700 | 40                         | 30                | 30                        | 2.0                       | 23300                                     | 60                          | 35                | 35                        | 2.3                       | 24300                                     |
| 1800 | 40                         | 30                | 30                        | 1.9                       | 25900                                     | 60                          | 35                | 35                        | 2.2                       | 26900                                     |
| 2000 | 40                         | 30                | 30                        | 1.7                       | 31500                                     | 60                          | 35                | 35                        | 2.0                       | 32700                                     |
| 2100 | 40                         | 30                | 30                        | 1.6                       | 34500                                     | 60                          | 35                | 35                        | 1.9                       | 35800                                     |
| 2200 | 40                         | 30                | 30                        | 1.6                       | 37700                                     | 60                          | 35                | 35                        | 1.8                       | 39000                                     |
| 2300 | 40                         | 30                | 30                        | 1.5                       | 41000                                     | 60                          | 35                | 35                        | 1.7                       | 42300                                     |
| 2400 | 40                         | 30                | 30                        | 1.4                       | 44500                                     | 60                          | 35                | 35                        | 1.6                       | 45800                                     |
| 2500 | 40                         | 30                | 30                        | 1.4                       | 48000                                     | 60                          | 35                | 35                        | 1.6                       | 49500                                     |
| 2600 | 40                         | 30                | 30                        | 1.3                       | 51800                                     | 60                          | 35                | 35                        | 1.5                       | 53300                                     |
| 2800 | 40                         | 30                | 30                        | 1.2                       | 59600                                     | 60                          | 35                | 35                        | 1.4                       | 61200                                     |
| 3000 | 40                         | 30                | 30                        | 1.1                       | 68000                                     | 60                          | 35                | 35                        | 1.3                       | 69700                                     |
| 3200 | 40                         | 30                | 30                        | 1.0                       | 77000                                     | 60                          | 35                | 35                        | 1.2                       | 78800                                     |
| 3400 | 40                         | 30                | 30                        | 1.0                       | 86500                                     | 60                          | 35                | 35                        | 1.1                       | 88500                                     |
| 3600 | 40                         | 30                | 30                        | 1.0                       | 96600                                     | 60                          | 35                | 35                        | 1.1                       | 98600                                     |



**Type C-1**

Universal expansion joint without restraints

Please inquire for simultaneous (different) movement.

\*Effective bellows cross sectional area is a theoretical value.

# RUBBER EXPANSION JOINT TYPE C-2

## HIGHLY FLEXIBLE TWIN-CONVOLUTED

## UNIVERSAL EXPANSION JOINT

### DN 300 – DN 3600



#### STRUCTURE TYPE C-2 / RUBBER BELLOWS PN 4, 10

- Universal expansion joint consisting of a rubber bellows and press-on retaining flanges
- Outer stabilizing ring between the convolutions
- Available in special lengths
- Twin-convoluted very elastic robust bellows in various rubber grades
- Synthetic fibre reinforcement
- Full-faced self-sealing rubber flanges with drilling for through bolts
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                                      | NBR                            | CIIR           |
|---------------|-------------------------------------------|--------------------------------|----------------|
| Colour code   | orange                                    | red                            | white          |
| Possible uses | Cooling, sea, brackish water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                                       |               |
|-------------------------------|-----------------------------------------------------------------------|---------------|
| DN                            | DN 300 – 2000                                                         | DN 300 – 2000 |
| Pressure rate                 | PN 4                                                                  | PN 10         |
| Max. perm. operating pressure | 4 bar*                                                                | 10 bar*       |
| Max. perm. temperature        | +100 °C                                                               | +100 °C       |
| Bursting pressure             | ≥ 12 bar                                                              | ≥ 30 bar      |
| Vacuum operation              | Vacuum supporting rings on request (only for horizontal installation) |               |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

#### FLANGES / VERSIONS

- Press-on retaining flanges with stabilizing collar
- Flange drilling for through bolts

|                      | Standard           | Others                                                                 |
|----------------------|--------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092            | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)    | 1.0577 (S355J2), 1.4541, 1.4571 etc.                                   |
| Corrosion protection | hot-dip galvanized | special varnish and coating, electrogalvanized, etc.                   |

#### NOTE

For vertical installation please consult us for technical advice.

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, lateral and angular movement
- for reducing thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - fittings
  - condensers
- for compensating simultaneous movement in cooling water pipes
- to compensate for installation inaccuracies
- to compensate for ground and foundation settlement
- power station technology
- process plant engineering

#### CERTIFICATES

- CE (PED 2014/68/EU)
- Drinking water
- TÜV Süd (KTA)

#### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Protective tube

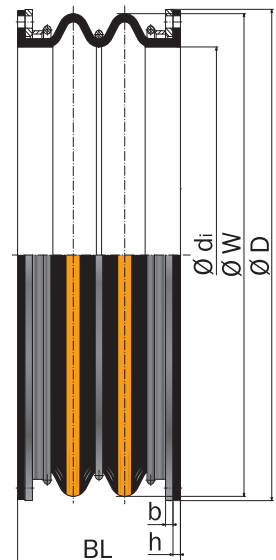
## DIMENSIONS STANDARD PROGRAM

| DN   | Pressure rate<br><br>bar | Bellows                                                          |                                          | Steel flange                                        |                                                      |                                     | w/o vacuum supporting ring |                                                |                         | with vacuum supporting ring |                                                |                         |
|------|--------------------------|------------------------------------------------------------------|------------------------------------------|-----------------------------------------------------|------------------------------------------------------|-------------------------------------|----------------------------|------------------------------------------------|-------------------------|-----------------------------|------------------------------------------------|-------------------------|
|      |                          | Ø d <sub>i</sub><br>Bellows<br>inner Ø<br>tolerance<br>±1%<br>mm | h<br>Rubber<br>flange<br>thickness<br>mm | Ø D<br>Flange<br>outer Ø<br>PN 6<br>(EN 1092)<br>mm | Ø D<br>Flange<br>outer Ø<br>PN 10<br>(EN 1092)<br>mm | b<br>Flange<br>thick-<br>ness<br>mm | BL<br>mm                   | Ø W<br>Convolution<br>Ø<br>unpressurized<br>mm | Weight<br>approx.<br>kg | BL<br>mm                    | Ø W<br>Convolution<br>Ø<br>unpressurized<br>mm | Weight<br>approx.<br>kg |
| 300  | 4/10                     | 300                                                              | 15                                       | 440                                                 | 445                                                  | 20                                  | 400                        | 413                                            | 35                      | 400                         | 413                                            | 40                      |
| 350  | 4/10                     | 350                                                              | 15                                       | 490                                                 | 505                                                  | 20                                  | 400                        | 463                                            | 45                      | 400                         | 463                                            | 50                      |
| 400  | 4/10                     | 400                                                              | 15                                       | 540                                                 | 565                                                  | 20                                  | 400                        | 513                                            | 55                      | 400                         | 513                                            | 60                      |
| 450  | 4/10                     | 450                                                              | 15                                       | 595                                                 | 615                                                  | 20                                  | 400                        | 563                                            | 60                      | 400                         | 563                                            | 65                      |
| 500  | 4/10                     | 500                                                              | 15                                       | 645                                                 | 670                                                  | 20                                  | 400                        | 613                                            | 65                      | 400                         | 613                                            | 70                      |
| 600  | 4/10                     | 600                                                              | 15                                       | 755                                                 | 780                                                  | 20                                  | 400                        | 713                                            | 80                      | 400                         | 713                                            | 85                      |
| 700  | 4/10                     | 700                                                              | 15                                       | 860                                                 | 895                                                  | 20                                  | 400                        | 813                                            | 100                     | 400                         | 813                                            | 105                     |
| 750  | 4/10                     | 750                                                              | 15                                       | 925                                                 | 965                                                  | 20                                  | 400                        | 863                                            | 115                     | 400                         | 863                                            | 120                     |
| 800  | 4/10                     | 800                                                              | 20                                       | 975                                                 | 1015                                                 | 20                                  | 400                        | 923                                            | 130                     | 400                         | 923                                            | 135                     |
| 900  | 4/10                     | 900                                                              | 20                                       | 1075                                                | 1115                                                 | 20                                  | 400                        | 1023                                           | 150                     | 400                         | 1023                                           | 155                     |
| 1000 | 4/10                     | 1000                                                             | 20                                       | 1175                                                | 1230                                                 | 20                                  | 400                        | 1123                                           | 170                     | 400                         | 1123                                           | 175                     |
| 1100 | 4/10                     | 1100                                                             | 20                                       | 1290                                                | 1345                                                 | 20                                  | 525                        | 1268                                           | 220                     | 550                         | 1310                                           | 280                     |
| 1200 | 4/10                     | 1200                                                             | 20                                       | 1405                                                | 1455                                                 | 20                                  | 525                        | 1368                                           | 240                     | 550                         | 1410                                           | 310                     |
| 1300 | 4/10                     | 1300                                                             | 20                                       | 1520                                                | 1565                                                 | 20                                  | 525                        | 1468                                           | 280                     | 550                         | 1510                                           | 350                     |
| 1400 | 4/10                     | 1400                                                             | 20                                       | 1630                                                | 1675                                                 | 20                                  | 525                        | 1568                                           | 320                     | 550                         | 1610                                           | 400                     |
| 1500 | 4/10                     | 1500                                                             | 20                                       | 1730                                                | 1795                                                 | 20                                  | 525                        | 1668                                           | 360                     | 550                         | 1710                                           | 450                     |
| 1600 | 4/10                     | 1600                                                             | 20                                       | 1830                                                | 1915                                                 | 20                                  | 525                        | 1768                                           | 400                     | 550                         | 1810                                           | 490                     |
| 1700 | 4/10                     | 1700                                                             | 20                                       | 1940                                                | 2015                                                 | 20                                  | 525                        | 1868                                           | 415                     | 550                         | 1910                                           | 520                     |
| 1800 | 4/10                     | 1800                                                             | 20                                       | 2045                                                | 2115                                                 | 20                                  | 525                        | 1968                                           | 430                     | 550                         | 2010                                           | 540                     |
| 2000 | 4/10                     | 2000                                                             | 20                                       | 2265                                                | 2325                                                 | 20                                  | 525                        | 2168                                           | 460                     | 550                         | 2210                                           | 620                     |
| 2100 |                          | 2100                                                             | 20                                       | 2375                                                | 2440                                                 | 20                                  | 525                        | 2268                                           |                         | 550                         | 2310                                           |                         |
| 2200 |                          | 2200                                                             | 25                                       | 2475                                                | 2550                                                 | 20                                  | 525                        | 2378                                           |                         | 550                         | 2420                                           |                         |
| 2300 |                          | 2300                                                             | 25                                       | 2590                                                | 2650                                                 | 20                                  | 525                        | 2478                                           |                         | 550                         | 2520                                           |                         |
| 2400 |                          | 2400                                                             | 25                                       | 2685                                                | 2760                                                 | 20                                  | 525                        | 2578                                           |                         | 550                         | 2620                                           |                         |
| 2500 |                          | 2500                                                             | 25                                       | 2795                                                | 2860                                                 | 20                                  | 525                        | 2678                                           |                         | 550                         | 2720                                           |                         |
| 2600 |                          | 2600                                                             | 25                                       | 2905                                                | 2960                                                 | 20                                  | 525                        | 2778                                           |                         | 550                         | 2820                                           |                         |
| 2800 | on request               | 2800                                                             | 25                                       | 3115                                                | 3180                                                 | 20                                  | 525                        | 2978                                           |                         | 550                         | 3020                                           |                         |
| 3000 |                          | 3000                                                             | 25                                       | 3315                                                | 3405                                                 | 20                                  | 525                        | 3178                                           |                         | 550                         | 3220                                           |                         |
| 3200 |                          | 3200                                                             | 25                                       | 3525                                                | -                                                    | 20                                  | 525                        | 3378                                           |                         | 550                         | 3420                                           |                         |
| 3400 |                          | 3400                                                             | 25                                       | 3735                                                | -                                                    | 20                                  | 525                        | 3578                                           |                         | 550                         | 3620                                           |                         |
| 3600 |                          | 3600                                                             | 25                                       | 3975                                                | -                                                    | 20                                  | 525                        | 3778                                           |                         | 550                         | 3820                                           |                         |

Other lengths (BL) and pressure rates on request. Please contact us for further flange dimensions.

## MOVEMENT COMPENSATION

| DN   | w/o vacuum supporting ring |                   |                           |                           |                                           | with vacuum supporting ring |                   |                           |                           |                                           |
|------|----------------------------|-------------------|---------------------------|---------------------------|-------------------------------------------|-----------------------------|-------------------|---------------------------|---------------------------|-------------------------------------------|
|      | Δ ax<br>Axial movement     |                   | Δ lat<br>Lateral movement | Δ ang<br>Angular movement | A* Effective bellows cross sectional area | Δ ax<br>Axial movement      |                   | Δ lat<br>Lateral movement | Δ ang<br>Angular movement | A* Effective bellows cross sectional area |
|      | Compression<br>-mm         | Elongation<br>+mm | ±mm                       | ±°<br>degrees             | cm <sup>2</sup>                           | Compression<br>-mm          | Elongation<br>+mm | ±mm                       | ±°<br>degrees             | cm <sup>2</sup>                           |
| 300  | 80                         | 60                | 50                        | 21.8                      | 1020                                      | 80                          | 60                | 50                        | 10.0                      | 1020                                      |
| 350  | 80                         | 60                | 50                        | 18.9                      | 1300                                      | 80                          | 60                | 50                        | 9.0                       | 1300                                      |
| 400  | 80                         | 60                | 50                        | 16.7                      | 1620                                      | 80                          | 60                | 50                        | 8.0                       | 1620                                      |
| 450  | 80                         | 60                | 50                        | 15.0                      | 1970                                      | 80                          | 60                | 50                        | 7.0                       | 1970                                      |
| 500  | 80                         | 60                | 50                        | 13.5                      | 2360                                      | 80                          | 60                | 50                        | 6.0                       | 2360                                      |
| 600  | 80                         | 60                | 50                        | 11.3                      | 3240                                      | 80                          | 60                | 50                        | 5.5                       | 3240                                      |
| 700  | 80                         | 60                | 50                        | 9.8                       | 4250                                      | 80                          | 60                | 50                        | 5.0                       | 4250                                      |
| 750  | 80                         | 60                | 50                        | 9.1                       | 4820                                      | 80                          | 60                | 50                        | 4.5                       | 4820                                      |
| 800  | 80                         | 60                | 50                        | 8.6                       | 5410                                      | 80                          | 60                | 50                        | 4.0                       | 5410                                      |
| 900  | 80                         | 60                | 50                        | 7.6                       | 6700                                      | 80                          | 60                | 50                        | 3.5                       | 6700                                      |
| 1000 | 80                         | 60                | 50                        | 6.9                       | 8140                                      | 80                          | 60                | 50                        | 3.5                       | 8140                                      |
| 1100 | 80                         | 60                | 50                        | 6.5                       | 10500                                     | 80                          | 60                | 50                        | 7.3                       | 11200                                     |
| 1200 | 80                         | 60                | 50                        | 5.9                       | 12300                                     | 80                          | 60                | 50                        | 6.7                       | 13000                                     |
| 1300 | 80                         | 60                | 50                        | 5.5                       | 14200                                     | 80                          | 60                | 50                        | 6.2                       | 15000                                     |
| 1400 | 80                         | 60                | 50                        | 5.1                       | 16300                                     | 80                          | 60                | 50                        | 5.7                       | 17100                                     |
| 1500 | 80                         | 60                | 50                        | 4.9                       | 18500                                     | 80                          | 60                | 50                        | 5.4                       | 19300                                     |
| 1600 | 80                         | 60                | 50                        | 4.5                       | 20800                                     | 80                          | 60                | 50                        | 5.0                       | 21700                                     |
| 1700 | 80                         | 60                | 50                        | 4.1                       | 23300                                     | 80                          | 60                | 50                        | 4.7                       | 24300                                     |
| 1800 | 80                         | 60                | 50                        | 3.9                       | 25900                                     | 80                          | 60                | 50                        | 4.5                       | 26900                                     |
| 2000 | 80                         | 60                | 50                        | 3.7                       | 31500                                     | 80                          | 60                | 50                        | 4.0                       | 32700                                     |
| 2100 | 80                         | 60                | 50                        | 3.3                       | 34500                                     | 80                          | 60                | 50                        | 3.8                       | 35800                                     |
| 2200 | 80                         | 60                | 50                        | 3.2                       | 37700                                     | 80                          | 60                | 50                        | 3.7                       | 39000                                     |
| 2300 | 80                         | 60                | 50                        | 3.1                       | 41000                                     | 80                          | 60                | 50                        | 3.5                       | 42300                                     |
| 2400 | 80                         | 60                | 50                        | 3.0                       | 44500                                     | 80                          | 60                | 50                        | 3.4                       | 45800                                     |
| 2500 | 80                         | 60                | 50                        | 2.9                       | 48000                                     | 80                          | 60                | 50                        | 3.2                       | 49500                                     |
| 2600 | 80                         | 60                | 50                        | 2.7                       | 51800                                     | 80                          | 60                | 50                        | 3.1                       | 53300                                     |
| 2800 | 80                         | 60                | 50                        | 2.5                       | 59600                                     | 80                          | 60                | 50                        | 2.9                       | 61200                                     |
| 3000 | 80                         | 60                | 50                        | 2.4                       | 68000                                     | 80                          | 60                | 50                        | 2.7                       | 69700                                     |
| 3200 | 80                         | 60                | 50                        | 2.3                       | 77000                                     | 80                          | 60                | 50                        | 2.5                       | 78800                                     |
| 3400 | 80                         | 60                | 50                        | 2.2                       | 86500                                     | 80                          | 60                | 50                        | 2.4                       | 88500                                     |
| 3600 | 80                         | 60                | 50                        | 2.1                       | 96600                                     | 80                          | 60                | 50                        | 2.3                       | 98600                                     |



### Type C-2

Highly flexible universal expansion joint without restraint

Please inquire for simultaneous (different) movement.

\*Effective bellows cross sectional area is a theoretical value.

## CUSTOMIZED PRODUCTION

## RUBBER EXPANSION JOINT TYPE C-31

LATERAL EXPANSION JOINT  
DN 300 – DN 3600

## STRUCTURE TYPE C-31 / RUBBER BELLOWS PN 4, 10, 16

- Lateral expansion joint consisting of a rubber bellows and press-on retaining flanges and tie rods
- Tie rods (external restraints) to absorb reaction force from internal pressure
- Alternative: Tie rods (external and internal restraints) to absorb reaction force from internal pressure or vacuum
- Available in various bellows geometries and special lengths
- Elastic robust bellows in various rubber grades
- Synthetic fibre reinforcement
- Full-faced self-sealing rubber flanges with drilling for through bolts
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|                      |                                           |                                |                |
|----------------------|-------------------------------------------|--------------------------------|----------------|
| <b>Rubber grade*</b> | EPDM                                      | NBR                            | CIIR           |
| <b>Colour code</b>   | orange                                    | red                            | white          |
| <b>Possible uses</b> | Cooling, sea, brackish water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                   |               |               |
|-------------------------------|---------------------------------------------------|---------------|---------------|
| DN                            | DN 300 – 2400                                     | DN 300 – 1000 | DN 300 – 1000 |
| Pressure rate                 | PN 4                                              | PN 10         | PN 16         |
| Max. perm. operating pressure | 4 bar*                                            | 10 bar*       | 16 bar*       |
| Max. perm. temperature        | +100 °C                                           | +100 °C       | +100 °C       |
| Bursting pressure             | ≥ 15 bar                                          | ≥ 30 bar      | ≥ 48 bar      |
| Vacuum operation              | with vacuum supporting ring (at permanent vacuum) |               |               |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

## FLANGES / VERSIONS

- Press-on retaining flanges with stabilizing collar
- With ears or with second bolt circle to carry the tie rods (depending on DN and PN)
- Flange drilling for through bolts

|                             | Standard                           | Others                                                                 |
|-----------------------------|------------------------------------|------------------------------------------------------------------------|
| <b>Dimensions</b>           | EN 1092                            | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)<br>1.0577 (S355J2) | stainless steel etc.                                                   |
| <b>Corrosion protection</b> | hot-dip galvanized                 | special varnish and 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 thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - condensers
- to compensate for installation inaccuracies
- to compensate for ground and foundation settlement
- as installation and dismantling aid
- power station technology
- process plant engineering

## TIE ROD RESTRAINTS

- Tie rods carried on spherical washers and conical seats

## Materials

Standard: tie rods 8.8

Others: stainless steel

## Corrosion protection

Standard: hot-dip galvanized

Others: special coating, etc.

## CERTIFICATES

- CE (PED 2014/68/EU)
- Drinking water
- TÜV Süd (KTA)

## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Protective tube

## DIMENSIONS STANDARD PROGRAM

| DN   | Pressure rate<br><br>bar | Bellows                                              |                                               | without vacuum supporting ring |            |            |                                                     |                             | with vacuum supporting ring |            |            |                                                     |                             |
|------|--------------------------|------------------------------------------------------|-----------------------------------------------|--------------------------------|------------|------------|-----------------------------------------------------|-----------------------------|-----------------------------|------------|------------|-----------------------------------------------------|-----------------------------|
|      |                          | Ø di<br>Bellows<br>inner Ø<br>tolerance<br>±1%<br>mm | h<br>Rubber-<br>flange<br>thickness<br><br>mm | BL mm<br>at rated pressure     |            |            | Ø W<br>Convolution<br>Ø<br>unpressuri-<br>zed<br>mm | Weight<br><br>approx.<br>kg | BL mm<br>at rated pressure  |            |            | Ø W<br>Convolution<br>Ø<br>unpressuri-<br>zed<br>mm | Weight<br><br>approx.<br>kg |
|      |                          |                                                      |                                               | 4bar                           | 10 bar     | 16 bar     |                                                     |                             | 4bar                        | 10 bar     | 16 bar     |                                                     |                             |
| 300  | 4/10/16                  | 300                                                  | 15                                            | 250                            | 250        | 250        | 413                                                 | 86                          | 250                         | 250        | 250        | 413                                                 | 92                          |
| 350  | 4/10/16                  | 350                                                  | 15                                            | 250                            | 250        | 250        | 463                                                 | 100                         | 250                         | 250        | 250        | 463                                                 | 108                         |
| 400  | 4/10/16                  | 400                                                  | 15                                            | 250                            | 250        | 250        | 513                                                 | 118                         | 250                         | 250        | 250        | 513                                                 | 121                         |
| 450  | 4/10/16                  | 450                                                  | 15                                            | 250                            | 250        | 250        | 563                                                 | 132                         | 250                         | 250        | 250        | 563                                                 | 137                         |
| 500  | 4/10/16                  | 500                                                  | 15                                            | 250                            | 250        | 275        | 613                                                 | 144                         | 250                         | 250        | 275        | 613                                                 | 149                         |
| 600  | 4/10/16                  | 600                                                  | 15                                            | 250                            | 250        | 275        | 713                                                 | 173                         | 250                         | 250        | 275        | 713                                                 | 205                         |
| 700  | 4/10/16                  | 700                                                  | 15                                            | 250                            | 275        | 275        | 813                                                 | 255                         | 250                         | 275        | 275        | 813                                                 | 263                         |
| 750  | 4/10/16                  | 750                                                  | 15                                            | 250                            | 275        | 300        | 863                                                 | 294                         | 250                         | 275        | 300        | 863                                                 | 343                         |
| 800  | 4/10/16                  | 800                                                  | 20                                            | 275                            | 275        | 300        | 923                                                 | 357                         | 275                         | 275        | 300        | 923                                                 | 363                         |
| 900  | 4/10/16                  | 900                                                  | 20                                            | 275                            | 300        | 325        | 1023                                                | 397                         | 275                         | 300        | 325        | 1023                                                | 453                         |
| 1000 | 4/10/16                  | 1000                                                 | 20                                            | 275                            | 300        | 325        | 1123                                                | 539                         | 275                         | 300        | 325        | 1123                                                | 555                         |
| 1100 | 4                        | 1100                                                 | 20                                            | 325                            |            |            | 1268                                                | 545                         | 325                         |            |            | 1310                                                | 565                         |
| 1200 | 4                        | 1200                                                 | 20                                            | 350                            |            |            | 1368                                                | 665                         | 350                         |            |            | 1410                                                | 715                         |
| 1300 | 4                        | 1300                                                 | 20                                            | 350                            |            |            | 1468                                                | 800                         | 350                         |            |            | 1510                                                | 830                         |
| 1400 | 4                        | 1400                                                 | 20                                            | 350                            |            |            | 1568                                                | 970                         | 350                         |            |            | 1610                                                | 1005                        |
| 1500 | 4                        | 1500                                                 | 20                                            | 350                            |            |            | 1668                                                | 1070                        | 350                         |            |            | 1710                                                | 1210                        |
| 1600 | 4                        | 1600                                                 | 20                                            | 350                            |            |            | 1768                                                | 1300                        | 350                         |            |            | 1810                                                | 1340                        |
| 1700 | 4                        | 1700                                                 | 20                                            | 350                            |            |            | 1868                                                | 1360                        | 375                         |            |            | 1910                                                | 1515                        |
| 1800 | 4                        | 1800                                                 | 20                                            | 350                            | on request | on request | 1968                                                | 1530                        | 375                         | on request | on request | 2010                                                | 1575                        |
| 2000 | 4                        | 2000                                                 | 20                                            | 375                            |            |            | 2168                                                | 1875                        | 375                         |            |            | 2210                                                | 1935                        |
| 2100 | 4                        | 2100                                                 | 20                                            | 375                            | on request | on request | 2268                                                | 2115                        | 375                         | on request | on request | 2310                                                | 2175                        |
| 2200 | 4                        | 2200                                                 | 25                                            | 375                            | on request | on request | 2378                                                | 2435                        | 400                         | on request | on request | 2420                                                | 2495                        |
| 2300 | 4                        | 2300                                                 | 25                                            | 375                            |            |            | 2478                                                | 2645                        | 400                         |            |            | 2520                                                | 2605                        |
| 2400 | 4                        | 2400                                                 | 25                                            | 375                            |            |            | 2578                                                | 2865                        | 400                         |            |            | 2620                                                | 2940                        |

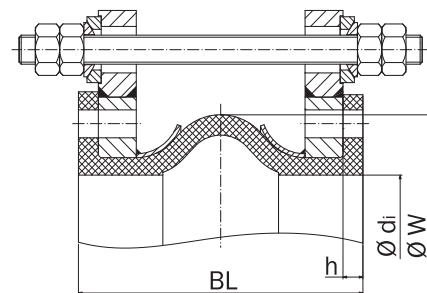
Values are based on flange dimensions according to EN 1092 PN 10. Please contact us for further flange dimensions.

Lengths (BL) may vary and depend on flange drilling, operating pressure, possible vacuum, operating temperature.

Larger sizes (DN) on request.

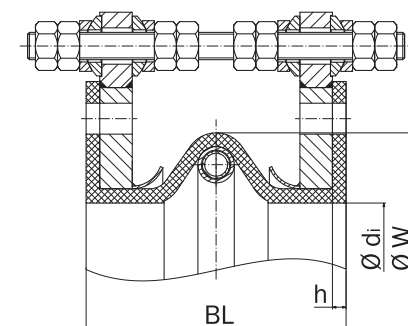
## MOVEMENT COMPENSATION / VERSIONS

| DN   | without vacuum supporting ring   | with vacuum supporting ring      |
|------|----------------------------------|----------------------------------|
|      | Δ lat<br>Lateral movement<br>±mm | Δ lat<br>Lateral movement<br>±mm |
| 300  | 30                               | 30                               |
| 350  | 30                               | 30                               |
| 400  | 30                               | 30                               |
| 450  | 30                               | 30                               |
| 500  | 30                               | 30                               |
| 600  | 30                               | 30                               |
| 700  | 30                               | 30                               |
| 750  | 30                               | 30                               |
| 800  | 30                               | 30                               |
| 900  | 30                               | 30                               |
| 1000 | 30                               | 30                               |
| 1100 | 30                               | 35                               |
| 1200 | 30                               | 35                               |
| 1300 | 30                               | 35                               |
| 1400 | 30                               | 35                               |
| 1500 | 30                               | 35                               |
| 1600 | 30                               | 35                               |
| 1700 | 30                               | 35                               |
| 1800 | 30                               | 35                               |
| 2000 | 30                               | 35                               |
| 2100 | 30                               | 35                               |
| 2200 | 30                               | 35                               |
| 2300 | 30                               | 35                               |
| 2400 | 30                               | 35                               |



**Type C-31**

Lateral expansion joint, external restraints



**Type C-31**

Lateral expansion joint, external and internal restraints, with vacuum supporting ring

## CUSTOMIZED PRODUCTION

# RUBBER EXPANSION JOINT TYPE C-35

## LATERAL EXPANSION JOINT DN 300 – DN 3600



### STRUCTURE TYPE C-35 / RUBBER BELLOWS PN 4, 10

- Lateral expansion joint consisting of a rubber bellows and press-on retaining flanges
- Restrainer segments for fitting on the mating flanges on site
- Tie rods (external restraints) to absorb reaction force from internal pressure
- Alternative: Tie rods (external and internal restraints) to absorb reaction force from internal pressure or vacuum
- Available in various bellows geometries and special lengths
- Elastic robust bellows in various rubber grades
- Synthetic fibre reinforcement
- Full-faced self-sealing rubber flanges with drilling for through bolts
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                                      | NBR                            | CIIR           |
|---------------|-------------------------------------------|--------------------------------|----------------|
| Colour code   | orange                                    | red                            | white          |
| Possible uses | Cooling, sea, brackish water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                   |               |
|-------------------------------|---------------------------------------------------|---------------|
| DN                            | DN 300 – 3600                                     | DN 300 – 1000 |
| Pressure rate                 | PN 4                                              | PN 10         |
| Max. perm. operating pressure | 4 bar*                                            | 10 bar*       |
| Max. perm. temperature        | +100 °C                                           | +100 °C       |
| Bursting pressure             | ≥ 15 bar                                          | ≥ 30 bar      |
| Vacuum operation              | with vacuum supporting ring (at permanent vacuum) |               |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Press-on retaining flanges with stabilizing collar
- Segments to carry the tie rods to fit on mating flanges
- Flange drilling for through bolts

|                      | Standard                         | Others                                                                 |
|----------------------|----------------------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092                          | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR), 1.0577 (S355J2) | stainless steel etc.                                                   |
| Corrosion protection | hot-dip galvanized               | special varnish and 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 thermal and mechanical tension in pipes and their system components, e.g.
  - pumps
  - condensers
- to compensate for installation inaccuracies
- to compensate for ground and foundation settlement
- as installation and dismantling aid
- power station technology
- process plant engineering

### TIE ROD RESTRAINTS

- Tie rods carried on spherical washers and conical seats

### Materials

Standard: tie rods 8.8

Others: stainless steel

### Corrosion protection

Standard: hot-dip galvanized

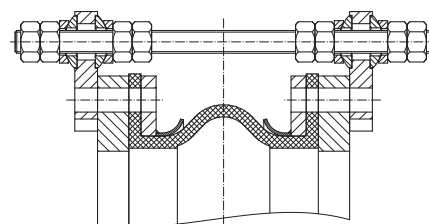
Others: special coating, etc.

### CERTIFICATES

- CE (PED 2014/68/EU)
- Drinking water
- TÜV Süd (KTA)

### ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve
- Protective tube



### Type C-35

Lateral expansion joint, outside and inside with segments and tie rods. Dimensions and movement compensation on request

## CUSTOMIZED PRODUCTION

# RUBBER EXPANSION JOINT TYPE C-41

## ANGULAR-EXPANSION JOINT

### DN 300 - DN 3600



## STRUCTURE TYPE C-41 / RUBBER BELLOWS PN 4, 10

- Angular expansion joint consisting of a rubber bellows and press-on retaining flanges
- Welded hinge restraints to absorb reaction force from internal pressure or vacuum
- Various bellows geometries
- Elastic, robust bellows in various rubber grades
- Synthetic fibre reinforcement
- Full-faced, self-sealing rubber flanges with drilling for through bolts
- Electrical impedance  $10^3$  bis  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

| Rubber grade* | EPDM                                      | NBR                            | CIIR           |
|---------------|-------------------------------------------|--------------------------------|----------------|
| Colour code   | orange                                    | red                            | white          |
| Possible uses | Cooling, sea, brackish water, acids, lyes | hydrocarbon containing liquids | Drinking water |

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

| Technical design              |                                                   |               |
|-------------------------------|---------------------------------------------------|---------------|
| DN                            | DN 300 – 3600                                     | DN 300 – 2800 |
| Pressure rate                 | PN 4                                              | PN 10         |
| Max. perm. operating pressure | 4 bar*                                            | 10 bar*       |
| Max. perm. temperature        | +100 °C                                           | +100 °C       |
| Bursting pressure             | ≥ 15 bar                                          | ≥ 30 bar      |
| Vacuum operation              | with vacuum supporting ring (at permanent vacuum) |               |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

## FLANGES / VERSIONS

- Oval press-on retaining flanges with stabilizing collar and hinge restraints
- Flange drilling for through bolts

|                      | Standard                         | Others                                                                 |
|----------------------|----------------------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092                          | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR), 1.0577 (S355J2) | stainless steel etc.                                                   |
| Corrosion protection | anti-corrosion primed            | hot-dip galvanized, special varnish and 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 angular movement
- as double or triple joint compensation system for large movements
- restraints to absorb reaction forces
- power station technology
- process plant engineering

## HINGE RESTRAINTS

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

## Materials

Standard: 1.0038 (S235JR), 1.0577 (S355J2)

Others: stainless steel, etc.

## Corrosion protection

Standard: hot-dip galvanized

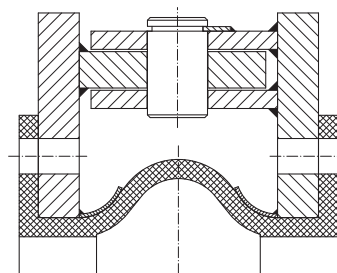
Others: special varnish, special coating, etc.

## CERTIFICATES

- CE (PED 2014/68/EU)
- Drinking water
- TÜV Süd (KTA)

## ACCESSORIES

- Vacuum supporting ring
- Internal guide sleeve



Type C-41

Angular expansion joint Dimensions and movement compensation on request

[www.stenfex.com](http://www.stenfex.com) / [info@stenflex.com](mailto:info@stenflex.com)

**CUSTOMIZED PRODUCTION**

# RUBBER EXPANSION JOINT TYPE D-11, D-30 ROUND UNIVERSAL EXPANSION JOINT DN 300 – DN 7500

**STRUCTURE TYPE D-11, D-30 / RUBBER BELLOWS PN 0,7**

- **Type D-11:**
  - Round universal expansion joint consisting of a rubber bellows and rotatable flanges
  - Wide rubber rim
- **Type D-30:**
  - Round universal expansion joint consisting of a rubber bellows with stainless steel tightening straps
  - Narrow rubber rim
- Extruded endless vulcanized profile band
- Without reinforcement
- Self-sealing rubber rim

|                      |                                           |                                           |
|----------------------|-------------------------------------------|-------------------------------------------|
| <b>Rubber grade*</b> | EPDM                                      | NBR                                       |
| <b>Colour code</b>   | orange                                    | red                                       |
| <b>Possible uses</b> | Air, gases containing acids or lyes, dust | gases with hydrocarbon containing liquids |

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

| <b>Technical design</b>       |                                                     |
|-------------------------------|-----------------------------------------------------|
| Max. perm. operating pressure | depending on DN not exceeding 0.7 bar g (see table) |
| Max. perm. temperature        | +90 °C                                              |
| Vacuum operation              | for light vacuum down to 0.98 bar abs.              |

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

**FLANGES / VERSIONS**

- Rotable flanges
- Flange drilling for through bolts

|                             | <b>Standard</b>                | <b>Others</b>                                                             |
|-----------------------------|--------------------------------|---------------------------------------------------------------------------|
| <b>Dimensions</b>           | DIN 86044<br>PN 6 nach EN 1092 | Connection dimensions see technical annex page 213 – 215                  |
| <b>Materials</b>            | 1.0038 (S235JR)                | 1.0577 (S355J2),<br>1.4541, 1.4571 etc.                                   |
| <b>Corrosion protection</b> | hot-dip galvanized             | special varnish and coating, etc.<br>Supply only for large order volumes. |

**NOTE**

Please comply with the general technical instructions and installation instructions.

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

Admissible operating pressure, effective cross sectional area, reaction forces, moving forces and spring rates depend on expansion joint's size. Please inquire.

**APPLICATIONS**

- for reducing thermal and mechanical tension, e.g. at
  - ventilating fans
  - blowers
- for muffling vibration and noise
- for compensating axial and lateral movement
- to compensate for installation inaccuracies
- air and ventilation technology
- dedusting and filter engineering (clean-room technology)

**ACCESSORIES**

- Internal guide sleeve

## DIMENSIONS STANDARD PROGRAM

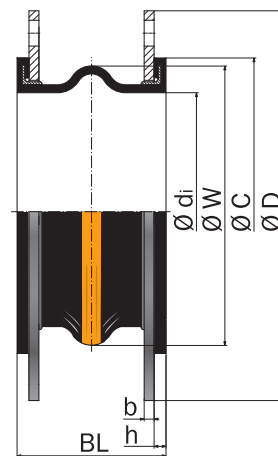
| DN   | BL  | Pressure rate | Ø di<br>Bellows inner Ø | Ø W<br>Convolution Ø unpressurized | Ø C<br>Raised face Ø |           | h<br>Rubber rim thickness |           | Ø D<br>Flange outer Ø |               | b<br>Flange thickness |
|------|-----|---------------|-------------------------|------------------------------------|----------------------|-----------|---------------------------|-----------|-----------------------|---------------|-----------------------|
|      |     |               |                         |                                    | Type D-11            | Type D-30 | Type E D-11               | Type D-30 | DIN 86044*            | EN 1092. PN 6 |                       |
|      | mm  | bar           | mm                      | mm                                 | mm                   | mm        | mm                        | mm        | mm                    | mm            | mm                    |
| 300  | 150 | 0.70          | 300                     | 354                                | 370                  | 340       | 12                        | 15        | 440                   | 440           | 10                    |
| 350  | 150 | 0.60          | 350                     | 404                                | 420                  | 390       | 12                        | 15        | 490                   | 490           | 10                    |
| 400  | 150 | 0.50          | 400                     | 454                                | 470                  | 440       | 12                        | 15        | 540                   | 540           | 10                    |
| 450  | 150 | 0.45          | 450                     | 504                                | 520                  | 490       | 12                        | 15        | 595                   | 595           | 10                    |
| 500  | 150 | 0.40          | 500                     | 554                                | 570                  | 540       | 12                        | 15        | 645                   | 645           | 10                    |
| 550  | 150 | 0.37          | 550                     | 604                                | 620                  | 590       | 12                        | 15        | 705                   |               | 10                    |
| 600  | 150 | 0.33          | 600                     | 654                                | 670                  | 640       | 12                        | 15        | 754                   | 755           | 10                    |
| 700  | 150 | 0.28          | 700                     | 754                                | 770                  | 740       | 12                        | 15        | 856                   | 860           | 10                    |
| 800  | 150 | 0.25          | 800                     | 854                                | 870                  | 840       | 12                        | 15        | 958                   | 975           | 10                    |
| 900  | 150 | 0.22          | 900                     | 954                                | 970                  | 940       | 12                        | 15        | 1060                  | 1075          | 10                    |
| 1000 | 150 | 0.20          | 1000                    | 1054                               | 1070                 | 1040      | 12                        | 15        | 1162                  | 1175          | 10                    |
| 1100 | 150 | 0.18          | 1100                    | 1154                               | 1170                 | 1140      | 12                        | 15        | 1266                  |               | 10                    |
| 1200 | 150 | 0.17          | 1200                    | 1254                               | 1270                 | 1240      | 12                        | 15        | 1366                  | 1405          | 10                    |
| 1300 | 150 | 0.15          | 1300                    | 1354                               | 1370                 | 1340      | 12                        | 15        | 1466                  |               | 10                    |
| 1400 | 150 | 0.14          | 1400                    | 1454                               | 1470                 | 1440      | 12                        | 15        | 1566                  | 1630          | 10                    |
| 1500 | 150 | 0.13          | 1500                    | 1554                               | 1570                 | 1540      | 12                        | 15        | 1666                  |               | 10                    |
| 1600 | 150 | 0.12          | 1600                    | 1654                               | 1670                 | 1640      | 12                        | 15        | 1766                  | 1830          | 10                    |
| 1700 | 150 | 0.11          | 1700                    | 1754                               | 1770                 | 1740      | 12                        | 15        | 1866                  |               | 10                    |
| 1800 | 150 | 0.10          | 1800                    | 1854                               | 1870                 | 1840      | 12                        | 15        | 1966                  | 2045          | 10                    |
| 1900 | 150 | 0.10          | 1900                    | 1954                               | 1970                 | 1940      | 12                        | 15        | 2066                  |               | 10                    |
| 2000 | 150 | 0.10          | 2000                    | 2054                               | 2070                 | 2040      | 12                        | 15        | 2166                  | 2265          | 10                    |

Other sizes up to DN 7500 on request.

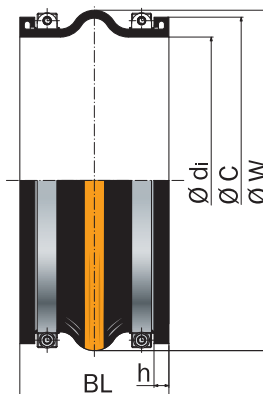
## MOVEMENT COMPENSATION

| DN   | Δ ax<br>Axial movement |                | C ax<br>Spring rate axial |                 | Δ lat<br>Lateral movement<br>±mm | C lat<br>Spring rate lateral<br>N/mm | A*<br>Effective bellows cross sectional area<br>cm <sup>2</sup> |
|------|------------------------|----------------|---------------------------|-----------------|----------------------------------|--------------------------------------|-----------------------------------------------------------------|
|      | Compression -mm        | Elongation +mm | Compression N/mm          | Elongation N/mm |                                  |                                      |                                                                 |
| 300  | 25                     | 15             | 12                        | 45              | 20                               | 15                                   | 750                                                             |
| 350  | 25                     | 15             | 14                        | 52              | 20                               | 18                                   | 1012                                                            |
| 400  | 25                     | 15             | 15                        | 60              | 20                               | 20                                   | 1300                                                            |
| 450  | 25                     | 15             | 17                        | 67              | 20                               | 22                                   | 1655                                                            |
| 500  | 25                     | 15             | 20                        | 75              | 20                               | 25                                   | 2000                                                            |
| 550  | 25                     | 15             | 22                        | 83              | 20                               | 28                                   | 2400                                                            |
| 600  | 25                     | 15             | 24                        | 90              | 20                               | 30                                   | 2900                                                            |
| 700  | 25                     | 15             | 27                        | 105             | 20                               | 35                                   | 3900                                                            |
| 800  | 25                     | 15             | 31                        | 120             | 20                               | 40                                   | 5100                                                            |
| 900  | 25                     | 15             | 35                        | 135             | 20                               | 45                                   | 6400                                                            |
| 1000 | 25                     | 15             | 39                        | 150             | 20                               | 51                                   | 7900                                                            |
| 1100 | 25                     | 15             | 43                        | 165             | 20                               | 57                                   | 9600                                                            |
| 1200 | 25                     | 15             | 47                        | 180             | 20                               | 63                                   | 11500                                                           |
| 1300 | 25                     | 15             | 51                        | 195             | 20                               | 70                                   | 13400                                                           |
| 1400 | 25                     | 15             | 55                        | 210             | 20                               | 77                                   | 15500                                                           |
| 1500 | 25                     | 15             | 59                        | 225             | 20                               | 85                                   | 17800                                                           |
| 1600 | 25                     | 15             | 63                        | 240             | 20                               | 93                                   | 20300                                                           |
| 1700 | 25                     | 15             | 67                        | 255             | 20                               | 102                                  | 22800                                                           |
| 1800 | 25                     | 15             | 71                        | 270             | 20                               | 112                                  | 25700                                                           |
| 1900 | 25                     | 15             | 75                        | 285             | 20                               | 123                                  | 28600                                                           |
| 2000 | 25                     | 15             | 79                        | 300             | 20                               | 135                                  | 31700                                                           |

Please inquire for simultaneous (different) movement.  
 \*Effective bellows cross sectional area is a theoretical value.



**Type D-11**  
with flanges



**Type D-30**  
with tightening straps

## CUSTOMIZED PRODUCTION

# RUBBER EXPANSION JOINT TYPE D-21, D-22, D-41, D-42 SQUARE OR OVAL UNIVERSAL EXPANSION JOINT DN 150 – DN 7500



## STRUCTURE TYPE D / RUBBER BELLOWS PN 0,7

- **Type D-21:**
  - Rectangular universal expansion joint consisting of a rubber bellows and press-on retaining frame
  - Wide rubber rim
- **Type D-22:**
  - Rectangular universal expansion joint consisting of a rubber bellows and press-on retaining frame
  - Frame with stiffening ring
  - Narrow rubber rim
- **Type D-41:**
  - Rectangular universal expansion joint consisting of a rubber bellows and press-on retaining frame (round corners)
  - Wide rubber rim
- **Type D-42:**
  - Rectangular universal expansion joint consisting of a rubber bellows and press-on retaining frame (round corners)
  - Frame with stiffening ring
  - Narrow rubber rim
- **RUBBER BELLOWS PN 0,7 bar g:**
  - Extruded, endless vulcanized profile band
  - Without reinforcement
  - Self-sealing rubber rim

|                      |                                           |                                           |
|----------------------|-------------------------------------------|-------------------------------------------|
| <b>Rubber grade*</b> | EPDM                                      | NBR                                       |
| <b>Colour code</b>   | orange                                    | red                                       |
| <b>Possible uses</b> | Air, gases containing acids or lyes, dust | gases with hydrocarbon containing liquids |

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

| Technical design              |                                                     |
|-------------------------------|-----------------------------------------------------|
| Max. perm. operating pressure | depending on DN not exceeding 0.7 bar g (see table) |
| Max. perm. temperature        | +90 °C                                              |
| Vacuum operation              | for light vacuum down to 0.98 bar abs.              |

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

## FLANGES / VERSIONS

- Retaining frame with drilling for through bolts

|                             | Standard                                                       | Others                                |
|-----------------------------|----------------------------------------------------------------|---------------------------------------|
| <b>Dimensions</b>           | Dimensions and drillings according to customer's specification |                                       |
| <b>Materials</b>            | 1.0038 (S235JR)                                                | unalloyed steel, stainless steel etc. |
| <b>Corrosion protection</b> | hot-dip galvanized                                             | special varnish and coating, etc.     |

## NOTE

Please comply with the general technical instructions and installation instructions.

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

Admissible operating pressure, effective cross sectional area, reaction forces, moving forces and spring rates depend on expansion joint's size. Please inquire.

## APPLICATIONS

- for reducing thermal and mechanical tension, e.g. at
  - ventilating fans
  - blowers
- for muffling vibration and noise
- for compensating axial and lateral movement
- to compensate for installation inaccuracies
- air and ventilation technology
- dedusting and filter engineering (clean-room technology)

## ACCESSORIES

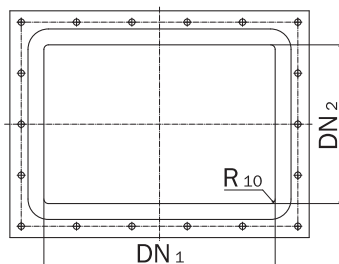
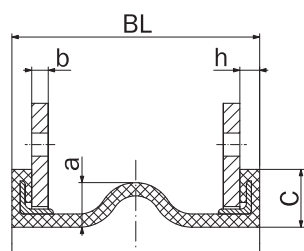
- Internal guide sleeve

## DIMENSIONS STANDARD PROGRAM

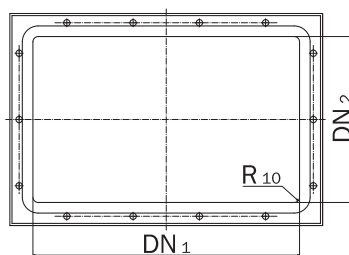
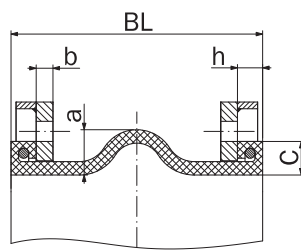
| TYPE | DN <sub>1</sub><br>Maximum<br>size<br>mm | DN <sub>2</sub><br>Minimum<br>size<br>mm | BL<br>mm | Minimum<br>circum-<br>ferential<br>size inside<br>mm | a<br>External<br>height<br>of con-<br>volution<br>mm | C<br>Rubber<br>rim<br>height<br>mm | h<br>Rubber<br>rim<br>thick-<br>ness<br>mm | b<br>Flange<br>thick-<br>ness<br>mm |
|------|------------------------------------------|------------------------------------------|----------|------------------------------------------------------|------------------------------------------------------|------------------------------------|--------------------------------------------|-------------------------------------|
| D 21 | 7500                                     | 150                                      | 150      | 900                                                  | 27                                                   | 35                                 | 12                                         | 10                                  |
| D 22 | 7500                                     | 150                                      | 150      | 900                                                  | 27                                                   | 20                                 | 15                                         | 10                                  |
| D 41 | 7500                                     | 150                                      | 150      | 900                                                  | 27                                                   | 35                                 | 12                                         | 10                                  |
| D 42 | 7500                                     | 150                                      | 150      | 900                                                  | 27                                                   | 20                                 | 15                                         | 10                                  |

## MOVEMENT COMPENSATION / VERSIONS

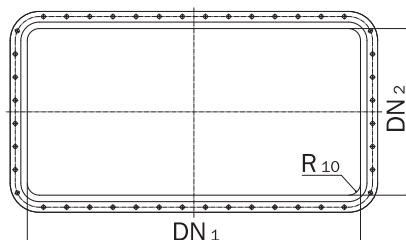
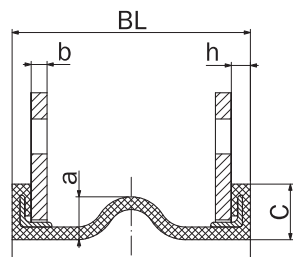
| TYPE | $\Delta$ ax<br>Axial movement<br>Compression<br>-mm |    | $\Delta$ lat<br>Lateral movement<br>$\pm$ mm |
|------|-----------------------------------------------------|----|----------------------------------------------|
|      | Elongation<br>+mm                                   |    |                                              |
| D 21 | 25                                                  | 15 | 20                                           |
| D 22 | 25                                                  | 15 | 20                                           |
| D 41 | 25                                                  | 15 | 20                                           |
| D 42 | 25                                                  | 15 | 20                                           |



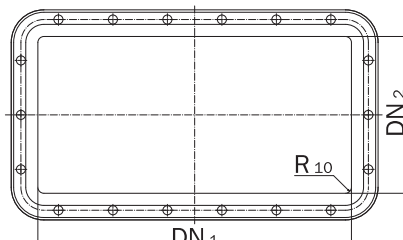
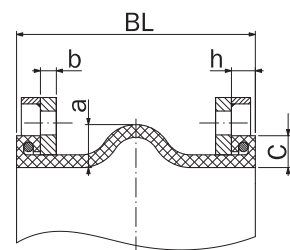
Type D-21



Type D-22



Type D-41



Type D-42

# RUBBER EXPANSION JOINT TYPE W-1, W-2

## WALL-SEALING EXPANSION JOINT DN 80 – DN 3400



### STRUCTURE TYPE W-1, W-2 / RUBBER BELLOWS PN 2,5

- **Type W-1:** Wall-sealing expansion joint consisting of a flat-convoluted rubber bellows with press-on retaining flanges
- **Type W-2:** Wall-sealing expansion joint consisting of a deep-convoluted rubber bellows with press-on retaining flanges. Suitable for large movements.
- Elastic robust bellows in various rubber grades
- Synthetic fibre reinforcement
- Bellows with flat convolution (type W-1) or deep convolution (type W-2)
- Full-faced self-sealing rubber flanges with drilling for through bolts
- Electrical impedance  $10^3$  to  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|                      |                                           |                                |
|----------------------|-------------------------------------------|--------------------------------|
| <b>Rubber grade*</b> | EPDM                                      | NBR                            |
| <b>Colour code</b>   | orange                                    | red                            |
| <b>Possible uses</b> | Cooling, sea, brackish water, acids, lyes | hydrocarbon containing liquids |

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

| Technical design              |                                             |
|-------------------------------|---------------------------------------------|
| Pressure rate                 | PN 2,5                                      |
| Max. perm. operating pressure | 2,5 bar*                                    |
| Max. perm. temperature        | +90 °C                                      |
| Bursting pressure             | ≥ 10 bar                                    |
| Vacuum operation              | with vacuum supporting ring (type W-1 only) |

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

\*Please consider a decrease of pressure due to temperature (see technical annex).

### FLANGES / VERSIONS

- Press-on retaining flanges
- Flange drilling for through bolts

|                             | Standard           | Others                            |
|-----------------------------|--------------------|-----------------------------------|
| <b>Materials</b>            | 1.0038 (S235JR)    | stainless steel etc.              |
| <b>Corrosion protection</b> | hot-dip galvanized | special varnish and 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

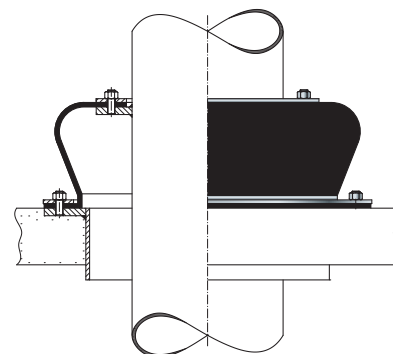
- to seal ducts on
  - vessels, or containers
  - wall ducts
- for compensating axial and lateral movement between pipe and wall duct
- for reliable sealing against ground-water
- process plant engineering
- power station technology
- cement industry

### CERTIFICATES

- CE (PED 2014/68/EU)

### ACCESSORIES

- Vacuum supporting ring (type W-1)



Installation drawing type W-1

## DIMENSIONS STANDARD PROGRAM TYPE W-1 / BL 150

| DN<br>Pipe-<br>line | DN<br>Wall<br>duct | Pres-<br>sure<br>rate<br><br>bar | Bellows                                                        |                                               | Wall duct                                                                  |                                                                |                                                                     | Pipeline                                                                   |                                                                |                                                                     |                                         | $\Delta$ ax<br>Axial<br>move-<br>ment<br><br>$\pm$ mm | $\Delta$ lat<br>Lateral<br>move-<br>ment<br><br>$\pm$ mm | Weight<br><br>approx.<br>kg |
|---------------------|--------------------|----------------------------------|----------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------|----------------------------------------------------------|-----------------------------|
|                     |                    |                                  | $\varnothing$ D<br>Bellows<br>inner<br>$\varnothing$<br><br>mm | h<br>Rubber<br>flange<br>thick-<br>ness<br>mm | $\varnothing$ d <sub>a</sub><br>Flange<br>outer<br>$\varnothing$<br><br>mm | $\varnothing$ K <sub>1</sub><br>PCD<br>$\varnothing$<br><br>mm | n <sub>1</sub> x $\varnothing$ d <sub>1</sub><br>Drilling<br><br>mm | $\varnothing$ d <sub>i</sub><br>Flange<br>inner<br>$\varnothing$<br><br>mm | $\varnothing$ K <sub>2</sub><br>PCD<br>$\varnothing$<br><br>mm | n <sub>2</sub> x $\varnothing$ d <sub>2</sub><br>Drilling<br><br>mm | b<br>Flange<br>thick-<br>ness<br><br>mm |                                                       |                                                          |                             |
| 80                  | 250                | 2.5                              | 290                                                            | 8                                             | 430                                                                        | 380                                                            | 8x14                                                                | 120                                                                        | 160                                                            | 8x14                                                                | 10                                      | 20                                                    | 30                                                       | 10.0                        |
| 100                 | 250                | 2.5                              | 290                                                            | 8                                             | 430                                                                        | 380                                                            | 8x14                                                                | 140                                                                        | 190                                                            | 8x14                                                                | 10                                      | 20                                                    | 30                                                       | 11.5                        |
| 150                 | 300                | 2.5                              | 440                                                            | 12                                            | 640                                                                        | 560                                                            | 12x23                                                               | 185                                                                        | 265                                                            | 8x23                                                                | 10                                      | 20                                                    | 30                                                       | 23.5                        |
| 200                 | 400                | 2.5                              | 495                                                            | 12                                            | 695                                                                        | 615                                                            | 12x23                                                               | 240                                                                        | 320                                                            | 12x23                                                               | 10                                      | 20                                                    | 30                                                       | 26.5                        |
| 250                 | 450                | 2.5                              | 570                                                            | 12                                            | 770                                                                        | 690                                                            | 12x23                                                               | 315                                                                        | 395                                                            | 12x23                                                               | 10                                      | 20                                                    | 30                                                       | 29.5                        |
| 250                 | 500                | 2.5                              | 570                                                            | 12                                            | 770                                                                        | 690                                                            | 12x23                                                               | 285                                                                        | 365                                                            | 12x23                                                               | 10                                      | 20                                                    | 30                                                       | 29.5                        |
| 300                 | 500                | 2.5                              | 570                                                            | 12                                            | 770                                                                        | 690                                                            | 12x23                                                               | 350                                                                        | 430                                                            | 12x23                                                               | 10                                      | 20                                                    | 30                                                       | 31.5                        |
| 400                 | 600                | 2.5                              | 665                                                            | 12                                            | 865                                                                        | 785                                                            | 16x23                                                               | 430                                                                        | 510                                                            | 16x23                                                               | 10                                      | 20                                                    | 30                                                       | 36.5                        |
| 500                 | 700                | 2.5                              | 770                                                            | 12                                            | 970                                                                        | 890                                                            | 16x23                                                               | 535                                                                        | 615                                                            | 16x23                                                               | 10                                      | 20                                                    | 30                                                       | 43.0                        |
| 600                 | 800                | 2.5                              | 870                                                            | 12                                            | 1070                                                                       | 990                                                            | 16x23                                                               | 635                                                                        | 715                                                            | 16x23                                                               | 10                                      | 20                                                    | 30                                                       | 48.5                        |
| 700                 | 900                | 2.5                              | 975                                                            | 12                                            | 1175                                                                       | 1095                                                           | 24x23                                                               | 730                                                                        | 810                                                            | 24x23                                                               | 15                                      | 20                                                    | 30                                                       | 64.5                        |
| 800                 | 1000               | 2.5                              | 1050                                                           | 12                                            | 1280                                                                       | 1200                                                           | 24x23                                                               | 840                                                                        | 920                                                            | 24x23                                                               | 15                                      | 20                                                    | 30                                                       | 73.5                        |
| 900                 | 1100               | 2.5                              | 1180                                                           | 12                                            | 1380                                                                       | 1300                                                           | 24x23                                                               | 940                                                                        | 1020                                                           | 24x23                                                               | 15                                      | 20                                                    | 30                                                       | 73.5                        |
| 1000                | 1200               | 2.5                              | 1280                                                           | 12                                            | 1480                                                                       | 1400                                                           | 24x23                                                               | 1040                                                                       | 1120                                                           | 24x23                                                               | 15                                      | 20                                                    | 30                                                       | 95.0                        |
| 1100                | 1300               | 2.5                              | 1380                                                           | 12                                            | 1580                                                                       | 1500                                                           | 24x23                                                               | 1140                                                                       | 1220                                                           | 24x23                                                               | 15                                      | 20                                                    | 30                                                       | 105.0                       |
| 1200                | 1400               | 2.5                              | 1490                                                           | 12                                            | 1690                                                                       | 1610                                                           | 24x23                                                               | 1250                                                                       | 1330                                                           | 24x23                                                               | 15                                      | 20                                                    | 30                                                       | 114.5                       |
| 1400                | 1600               | 2.5                              | 1636                                                           | 12                                            | 1880                                                                       | 1800                                                           | 24x23                                                               | 1440                                                                       | 1520                                                           | 24x23                                                               | 15                                      | 20                                                    | 30                                                       | 161.5                       |
| 1600                | 1800               | 2.5                              | 1880                                                           | 15                                            | 2080                                                                       | 2000                                                           | 28x23                                                               | 1640                                                                       | 1720                                                           | 28x23                                                               | 15                                      | 20                                                    | 30                                                       | 148.5                       |
| 1800                | 2000               | 2.5                              | 2080                                                           | 15                                            | 2280                                                                       | 2200                                                           | 32x23                                                               | 1840                                                                       | 1920                                                           | 32x23                                                               | 15                                      | 20                                                    | 30                                                       | 165.0                       |
| 2000                | 2200               | 2.5                              | 2280                                                           | 15                                            | 2480                                                                       | 2400                                                           | 36x23                                                               | 2060                                                                       | 2140                                                           | 36x23                                                               | 15                                      | 20                                                    | 30                                                       | 179.0                       |
| 2200                | 2400               | 2.5                              | 2480                                                           | 15                                            | 2680                                                                       | 2600                                                           | 36x23                                                               | 2260                                                                       | 2340                                                           | 36x23                                                               | 15                                      | 20                                                    | 30                                                       | 196.0                       |
| 2400                | 2600               | 2.5                              | 2665                                                           | 15                                            | 2880                                                                       | 2780                                                           | 48x23                                                               | 2460                                                                       | 2540                                                           | 48x23                                                               | 15                                      | 20                                                    | 30                                                       | 210.0                       |
| 2500                | 2700               | 2.5                              | 2785                                                           | 15                                            | 2980                                                                       | 2900                                                           | 48x23                                                               | 2560                                                                       | 2640                                                           | 36x23                                                               | 15                                      | 20                                                    | 30                                                       | 220.0                       |
| 3000                | 3200               | 2.5                              | 3280                                                           | 15                                            | 3490                                                                       | 3410                                                           | 48x23                                                               | 3050                                                                       | 3130                                                           | 48x23                                                               | 15                                      | 20                                                    | 30                                                       | 270.0                       |
| 3400                | 3600               | 2.5                              | 3610                                                           | 20                                            | 3830                                                                       | 3750                                                           | 108x23                                                              | 3450                                                                       | 3530                                                           | 108x23                                                              | 15                                      | 20                                                    | 30                                                       | 330.0                       |

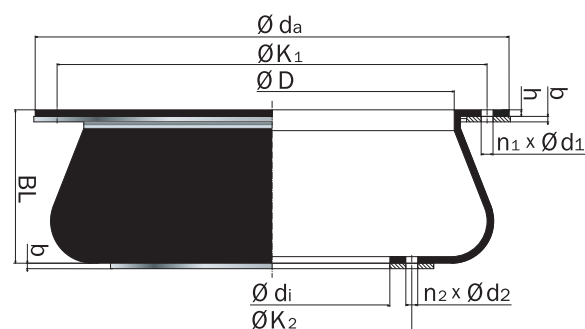
## DIMENSIONS STANDARD PROGRAM TYPE W-1 / BL 280

|      |      |     |      |    |      |      |       |      |      |       |    |    |    |       |
|------|------|-----|------|----|------|------|-------|------|------|-------|----|----|----|-------|
| 2200 | 2400 | 2.5 | 2480 | 15 | 2680 | 2600 | 36x23 | 2260 | 2340 | 36x23 | 15 | 40 | 60 | 226.0 |
|------|------|-----|------|----|------|------|-------|------|------|-------|----|----|----|-------|

## DIMENSIONS STANDARD PROGRAM TYPE W-2

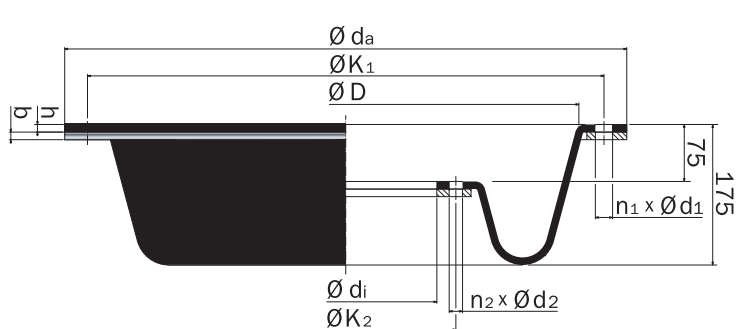
| DN<br>Pipe-<br>line | DN<br>Wall<br>duct | Pres-<br>sure<br>rate<br><br>bar | Bellows                                                        |                                               | Wall duct                                                                  |                                                                |                                                                     | Pipeline                                                                   |                                                                |                                                                     |                                         | $\Delta$ ax<br>Axial<br>move-<br>ment<br><br>$\pm$ mm | $\Delta$ lat<br>Lateral<br>move-<br>ment<br><br>$\pm$ mm | Weight<br><br>approx.<br>kg |
|---------------------|--------------------|----------------------------------|----------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------|----------------------------------------------------------|-----------------------------|
|                     |                    |                                  | $\varnothing$ D<br>Bellows<br>inner<br>$\varnothing$<br><br>mm | h<br>Rubber<br>flange<br>thick-<br>ness<br>mm | $\varnothing$ d <sub>a</sub><br>Flange<br>outer<br>$\varnothing$<br><br>mm | $\varnothing$ K <sub>1</sub><br>PCD<br>$\varnothing$<br><br>mm | n <sub>1</sub> x $\varnothing$ d <sub>1</sub><br>Drilling<br><br>mm | $\varnothing$ d <sub>i</sub><br>Flange<br>inner<br>$\varnothing$<br><br>mm | $\varnothing$ K <sub>2</sub><br>PCD<br>$\varnothing$<br><br>mm | n <sub>2</sub> x $\varnothing$ d <sub>2</sub><br>Drilling<br><br>mm | b<br>Flange<br>thick-<br>ness<br><br>mm |                                                       |                                                          |                             |
| 200                 | 450                | 2.5                              | 610                                                            | 10                                            | 740                                                                        | 680                                                            | 12x23                                                               | 240                                                                        | 290                                                            | 12x18                                                               | 10                                      | 80                                                    | 80                                                       | 19.5                        |
| 400                 | 800                | 2.5                              | 890                                                            | 12                                            | 1025                                                                       | 965                                                            | 16x23                                                               | 490                                                                        | 550                                                            | 16x23                                                               | 10                                      | 80                                                    | 80                                                       | 34.0                        |
| 500                 | 900                | 2.5                              | 1020                                                           | 12                                            | 1175                                                                       | 1115                                                           | 24x23                                                               | 620                                                                        | 680                                                            | 24x23                                                               | 12                                      | 80                                                    | 80                                                       | 48.0                        |
| 800                 | 1300               | 2.5                              | 1260                                                           | 15                                            | 1480                                                                       | 1420                                                           | 24x23                                                               | 850                                                                        | 910                                                            | 24x23                                                               | 15                                      | 80                                                    | 90                                                       | 93.0                        |

## VERSIONS



**Type W-1**

Wall-sealing expansion joint, flat-convoluted



**Type W-2**

Wall-sealing expansion joint, deep-convoluted, for large movements

# PIPE CONNECTORS

## PROGRAMME OVERVIEW

---

STENFLEX® **PIPE CONNECTORS** ARE INSTALLED ON PUMPS,  
CONTROL FITTINGS, MACHINERY AND INDUSTRIAL EQUIPMENT  
SPECIFICALLY TO INTERCEPT UNDESIRABLE SOUND TRANSMISSION  
AND ABSORB VIBRATION OCCURING IN PIPELINES.

QUALITY.



# PIPE CONNECTORS

## GENERAL DESCRIPTION OF PIPE CONNECTORS

STENFLEX® pipe connectors, just like STENFLEX® rubber expansion joints, have been used for 50 years as the preferred connection elements in appliance and piping engineering.

Pipe connectors are produced from top quality materials in large-scale industrial manufacturing. This guarantees a uniform high standard of quality and a long service life for our products.

STENFLEX® pipe connectors undergo constant quality monitoring to EN ISO 9001:2015 and come with type approval and suitability test certificates based on DIN 4809.

## PURPOSE

Pipe connectors are used at appliances, engines, machines, pumps and compressors primarily for

- absorbing sound and vibration/oscillation transmission

in many different industries, such as

- Mechanical engineering
- Shipbuilding
- Domestic industry
- Heating systems
- Water supply/treatment systems

## STRUCTURE

The STENFLEX® rubber-metal pipe connector has been optimized by calculation and experimentation to produce a well absorbing, pressure-resistant connecting element. This pipe connector consists of a cylindrical elastomer body with smooth inner surfaces and a fully embedded steel flange.

Absolute metallic separation of the steel flanges results in excellent noise or vibration damping by the elastomer body in-between. The pipe connectors have an integrated rubber sealing strip in the sealing area so that no additional gaskets are necessary (self-sealing).

## CONNECTION PARTS / FLANGES

The embedded steel flanges of the rubber-metal pipe connectors have threaded holes.

Connection dimensions as per DIN 2501, PN 6 or PN 10.

During installation, the screw lengths prescribed in the data sheets must be observed.



### Rubber-metal pipe connector

**Structure:** Rubber body with fully embedded steel flanges

### Damping, movement compensation:

Rubber-metal pipe connectors dampen noise and vibration caused by appliances, motors or pumps. Movement cannot be absorbed by these rubber-metal pipe connectors.

### Fixed points:

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

|                     |                                                                                                                                                                                                                                          |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Rubber grade</b> | CR Polychloroprene                                                                                                                                                                                                                       |
| <b>Trade name</b>   | Neoprene Baypren                                                                                                                                                                                                                         |
| <b>Properties</b>   | Rubber grade with good oil, weather and flame resistance, very good ageing resistance. Resistant to various inorganic chemicals. Impermeable to gas for hydrocarbons. Temperature resistance in continuous operation* -30 °C to +100 °C. |
| <b>Applications</b> | Water, hot water, cooling water                                                                                                                                                                                                          |

\* The given temperature for continuous operation refers solely to the rubber grade.

When reinforcements or other filling material are embedded, the temperature resistance in continuous operation increases.

## DEVELOPMENT / DESIGN

STENFLEX® pipe connectors are rated with state-of-the-art development tools (CAD, FEM), designed and optimized by experimentation already during the development phase.

As a result, they have outstanding absorbing properties. Standardized flange connections facilitate installation and safe integration in a pipe system.

## VERSIONS

Pipe connectors are supplied ready for installation.

## APPLICATIONS / POSSIBLE USES / INDUSTRIES

| Basic pipe connector types     |                       | Steel pipe connectors |
|--------------------------------|-----------------------|-----------------------|
| STENFLEX® Pipe connector types |                       | GRV                   |
| Applications                   | Reducing tension      |                       |
|                                | Absorbing vibration   | ■                     |
|                                | Muffling noise        | ■                     |
| Possible uses                  | Pipelines             | ■                     |
|                                | Engines               |                       |
|                                | Pumps                 | ■                     |
|                                | Fittings              | ■                     |
| Industries                     | Domestic industry     | ■                     |
|                                | Heating installations | ■                     |

Table showing the prime applications, possible uses and industries

## PROGRAM SUMMARY

|                                                                                     | Type | DN                         | Pressure rate bar | Max. operating temperature | Material | Connection parts/restraint elements | Page |
|-------------------------------------------------------------------------------------|------|----------------------------|-------------------|----------------------------|----------|-------------------------------------|------|
|  | GRV  | DN 20 – 200<br>DN 20 – 200 | PN 6<br>PN 10     | +100 °C<br>+100 °C         | CR<br>CR | flange with female thread           | 90   |

# RUBBER-METAL PIPE CONNECTOR TYPE GRV

## VIBRATION AND NOISE DAMPER DN 20 – DN 200



### STRUCTURE TYPE GRV / RUBBER BODY PN 6, PN 10

- Rubber-metal pipe connector consisting of a cylindrical rubber body with fully embedded steel flanges
- Steel flanges with threaded holes
- Absolute metallic separation of the steel flanges
- From DN 50 elastic embedded spacing control bolts
- Cylindrical rubber body made of elastic synthetic rubber
- Smooth rubber core therefore no contact between medium and flange
- Self-sealing rubber raised face
- Electrical impedance  $10^3$  bis  $10^6$  Ohm (DIN IEC 93, VDE 0303-30)

|               |                                    |
|---------------|------------------------------------|
| Rubber grade* | CR                                 |
| Possible uses | Hot water, cold water, acids, lyes |

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

| Technical design              |                                                    |        |
|-------------------------------|----------------------------------------------------|--------|
| DN                            | DN 20 – 200                                        |        |
| Pressure rate                 | PN 6                                               | PN 10  |
| Max. perm. operating pressure | 6 bar                                              | 10 bar |
| Max. perm. Temperature        | -30 °C bis +100 °C / to +110 °C for brief periods* |        |
| Bursting pressure             | ≥ 48 bar                                           |        |
| Vacuum operation              | ≥ 0,05 bar abs.                                    |        |

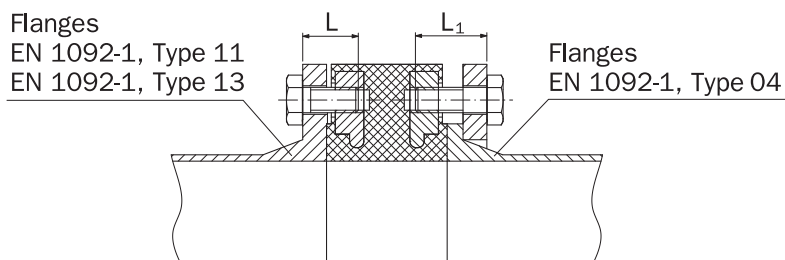
\* For temps. exceeding +100 °C, the manufacturer's approval must be obtained for the corresponding operating conditions..

### FLANGES / SCREW LENGTHS

Do not choose the screws to be too long; overlong screws damage the rubber body.

Please note the recommended screw length L and L<sub>1</sub> (see table).

**Detailed installation instructions indicating the necessary torques are included with every pipe connector.**



### NOTE

**Do not use to absorb tensile force, expansion, tension;** depending on temperature, STENFLEX® expansion joints made of rubber or steel should be used for this purpose.

Elastic elements in pipelines separate the rigid system and release the reaction force, produced by pipeline inner pressure. For the rubber-metal pipe connectors to work safely and reliably, it is presumed that the pipes are routed properly and the fixed points (HFP) are adequately rated to the reaction force.

Chemicals used for water treatment (particularly in heating systems and coolant systems) can corrode the materials of pipe connector. According to VDI Directive 2035, DIN 4809 part 1 and VGB R 455P, the manufacturer of the chemicals must state that the materials used in the pipe connector will not be damaged by the chemicals.

Please comply with the general technical instructions. Subject to technical alterations and deviations resulting from the manufacturing process.

### APPLICATIONS

- for interrupting unwanted sound and noise transmission
  - in pipeline systems
  - in heating systems
  - at pumps
  - at control fittings
  - at machines
  - at fittings and appliances
- in domestic industry
  - in residential properties
  - in hospitals
  - in schools
  - in public buildings
- in industrial applications

### CERTIFICATES

- Suitability approval for warm water and heating systems

## DIMENSIONS STANDARD PROGRAM PN 6

| DN  | BL* | Ø d <sub>i</sub><br>Inner Ø | Ø C<br>Raised<br>face Ø | Ø D<br>Outer Ø | G<br>Thread Ø<br>mm | L<br>Threaded<br>length<br>mm | PN<br>Flange-<br>connection<br>EN 1092 | Screws DIN 933 |         | Washer  | Weight        |
|-----|-----|-----------------------------|-------------------------|----------------|---------------------|-------------------------------|----------------------------------------|----------------|---------|---------|---------------|
|     | mm  | mm                          | mm                      | mm             |                     |                               |                                        | Thread         | L<br>mm | DIN 125 | approx.<br>kg |
| 20  | 76  | 23                          | 50                      | 94             | 4 x M 10            | 14                            | 6                                      | M 10           | 25      | 10,5    | 1.4           |
| 25  | 76  | 29                          | 60                      | 104            | 4 x M 10            | 16                            | 6                                      | M 10           | 25      | 10,5    | 1.9           |
| 32  | 76  | 38                          | 70                      | 124            | 4 x M 12            | 16                            | 6                                      | M 12           | 30      | 13,0    | 2.5           |
| 40  | 76  | 44                          | 80                      | 134            | 4 x M 12            | 16                            | 6                                      | M 12           | 30      | 13,0    | 3.1           |
| 50  | 76  | 55                          | 88                      | 144            | 4 x M 12            | 16                            | 6                                      | M 12           | 30      | 13,0    | 3.3           |
| 65  | 76  | 71                          | 108                     | 164            | 4 x M 12            | 16                            | 6                                      | M 12           | 30      | 13,0    | 4.0           |
| 80  | 76  | 81                          | 128                     | 194            | 4 x M 16            | 18                            | 6                                      | M 16           | 35      | 17,0    | 6.3           |
| 100 | 76  | 108                         | 148                     | 214            | 4 x M 16            | 18                            | 6                                      | M 16           | 35      | 17,0    | 6.6           |
| 125 | 76  | 133                         | 178                     | 244            | 8 x M 16            | 18                            | 6                                      | M 16           | 35      | 17,0    | 8.2           |
| 150 | 76  | 160                         | 202                     | 270            | 8 x M 16            | 18                            | 6                                      | M 16           | 35      | 17,0    | 8.9           |
| 200 | 96  | 209                         | 258                     | 325            | 8 x M 16            | 20                            | 6                                      | M 16           | 40      | 17,0    | 13.9          |

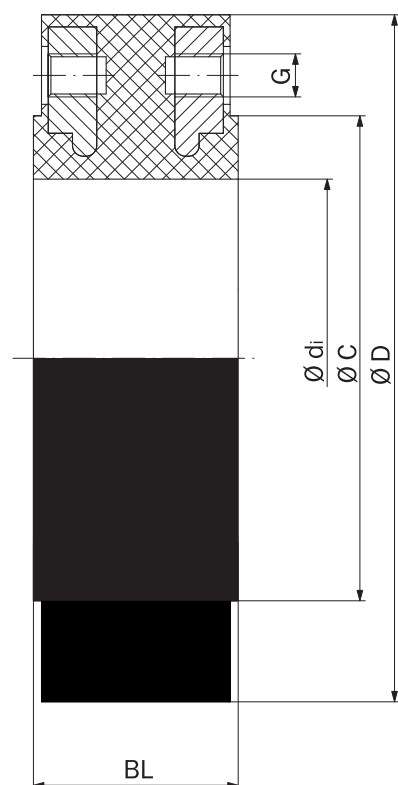
\*The measure BL (length) is approx. 6 mm shorter when fitted.

## DIMENSIONS STANDARD PROGRAM PN 10

| DN  | BL* | Ø d <sub>i</sub><br>Inner Ø | Ø C<br>Raised<br>face Ø | Ø D<br>Outer Ø | G<br>Thread Ø<br>mm | L<br>Threaded<br>length<br>mm | PN<br>Flange-<br>connection<br>EN 1092 | Screws DIN 933 |         |                      | Washer  | Weight        |
|-----|-----|-----------------------------|-------------------------|----------------|---------------------|-------------------------------|----------------------------------------|----------------|---------|----------------------|---------|---------------|
|     | mm  | mm                          | mm                      | mm             |                     |                               |                                        | Thread         | L<br>mm | L <sub>1</sub><br>mm | DIN 125 | approx.<br>kg |
| 20  | 76  | 23                          | 60                      | 109            | 4 x M 12            | 14                            | 10                                     | M 12           | 30      | 40                   | 13      | 2.1           |
| 25  | 76  | 29                          | 70                      | 119            | 4 x M 12            | 16                            | 10                                     | M 12           | 30      | 45                   | 13      | 2.7           |
| 32  | 76  | 38                          | 80                      | 144            | 4 x M 16            | 16                            | 10                                     | M 16           | 35      | 45                   | 17      | 3.9           |
| 40  | 76  | 44                          | 90                      | 154            | 4 x M 16            | 16                            | 10                                     | M 16           | 35      | 45                   | 17      | 4.4           |
| 50  | 76  | 55                          | 100                     | 169            | 4 x M 16            | 16                            | 10                                     | M 16           | 35      | 50                   | 17      | 5.0           |
| 65  | 76  | 71                          | 115                     | 189            | 4 x M 16            | 16                            | 10                                     | M 16           | 35      | 50                   | 17      | 6.0           |
| 80  | 76  | 81                          | 130                     | 204            | 8 x M 16            | 18                            | 10                                     | M 16           | 40      | 55                   | 17      | 7.1           |
| 100 | 76  | 108                         | 158                     | 224            | 8 x M 16            | 18                            | 10                                     | M 16           | 40      | 55                   | 17      | 7.6           |
| 125 | 76  | 133                         | 180                     | 255            | 8 x M 16            | 18                            | 10                                     | M 16           | 40      | 55                   | 17      | 9.5           |
| 150 | 76  | 160                         | 210                     | 291            | 8 x M 20            | 18                            | 10                                     | M 20           | 45      | 60                   | 21      | 11.6          |
| 200 | 96  | 209                         | 265                     | 345            | 8 x M 20            | 20                            | 10                                     | M 20           | 45      | 65                   | 21      | 17.7          |

\*The measure BL (length) is approx. 6 mm shorter when fitted.

## VERSIONS



### Type GRV

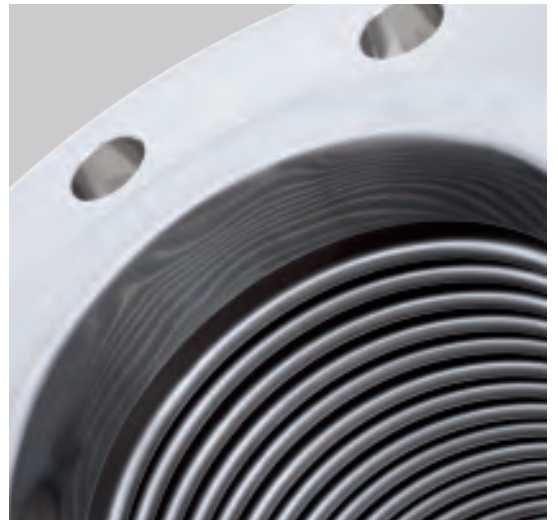
Rubber-metal pipe connector  
with elastic embedded spacing  
control bolt

# STEEL EXPANSION JOINTS

## PROGRAMME OVERVIEW

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STENFLEX® **STEEL-EXPANSION JOINTS** ARE USED AS FLEXIBLE PIPE CONNECTIONS IN MECHANICAL ENGINEERING AND THE CONSTRUCTION OF INDUSTRIAL EQUIPMENT AND PIPELINES. THEY ARE CHARACTERISED BY HIGH COMPRESSIVE STRENGTH AND THERMAL ENDURANCE, TESTED VACUUM STABILITY AND GOOD CHEMICAL RESISTANCE.



QUALITY.

# STEEL EXPANSION JOINTS

## GENERAL DESCRIPTION OF STEEL EXPANSION JOINTS

STENFLEX® steel expansion joints have served with distinction for 50 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 9001:2015 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-B13, 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.

## APPLICATIONS

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

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.



## 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.

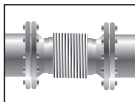
Hence we can offer our customers the following advantages:

- 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)



### Axial expansion joints

#### Structure:

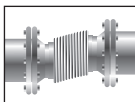
Steel bellows with connection parts (flange, welding end or threaded connection).

#### 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:

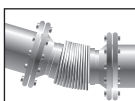
Steel bellows with laterally movable restraints and flanges or welding ends.

#### 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 (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.

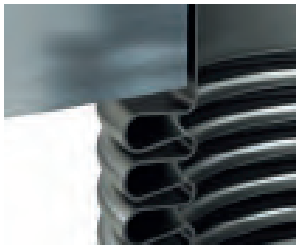
Variable parameters (wall thickness, number of plies, convolution geometry, number of convolutions) determine the pressure resistance, movement absorption and spring rate (self-resisting force) of the bellows. One-ply, two-ply and multi-ply bellows are manufactured from various materials with different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

### 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.

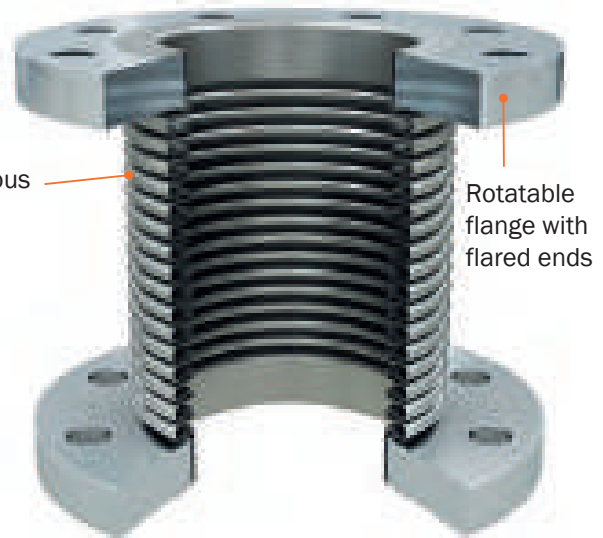


All products are marked with type, nominal size and pressure rating.

Multiple convolution bellows (e.g. two-ply) in various material qualities



The corrugations of the bellows compensate for movements by elastic deformation.



| Bellows material            | Material No. as per DIN EN | Designation as per DIN EN (DIN)       | Properties                                                                                                                                        | Applications                                                                                                                                                                          |
|-----------------------------|----------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Stainless steel</b>      | 1.4541                     | X6CrNiTi18-10                         | For aggressive media, good endurance for low temperature                                                                                          | Food-product industry, film and photo industry, nitrogen fertilizer industry, silencer and exhaust purification systems, low temperature technology                                   |
|                             | 1.4404<br>1.4571           | X2CrNiMo17-12-2<br>X6CrNiMo-Ti17-12-2 | 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 |
| <b>Heat resistant steel</b> | 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                                                                                                                                                      |
| <b>Nickel-based alloy</b>   | 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                                                      |

# STEEL EXPANSION JOINTS

## GENERAL DESCRIPTION (STEEL BELLOWS)

### 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 simultaneous 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.

| 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                     | X6CrNiMoTi17-12-2               |
|                        | 1.4828                     | X15CrNiSi20-12                  |
| High-temperature steel | 1.0425                     | P265GH (H II)                   |
|                        | 1.0460                     | P250GH (HI)                     |

## FLANGES

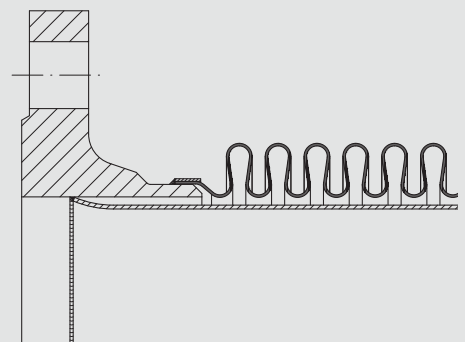
STENFLEX® steel expansion joints, series SF, are supplied with rotatable flanges or fixed flanges.

Standard flanges are drilled in accordance to EN 1092-1. 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.

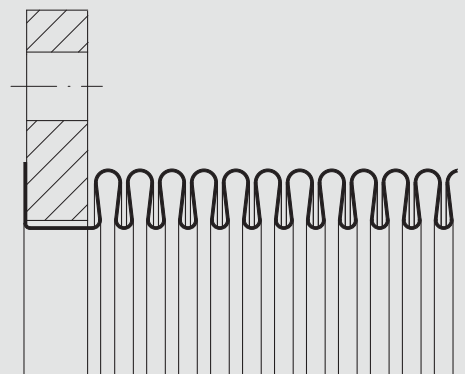
Flanges for lateral expansion joints are equipped with ears for tie rod restraints. The design differs between flanges with molded ears and oval flanges, depending on expansion joint type and size.

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

Flanges of unalloyed steel are electro-galvanized 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 fixed flange



Steel expansion joint with rotatable flanges with flared bellows

Flanges, see also page 98

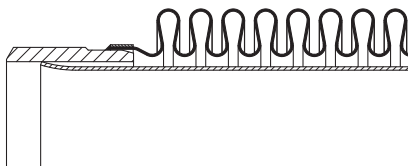
# STEEL EXPANSION JOINTS

## GENERAL DESCRIPTION OF STEEL EXPANSION JOINTS

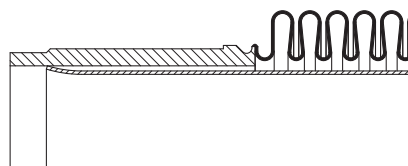
### WELDING ENDS

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.

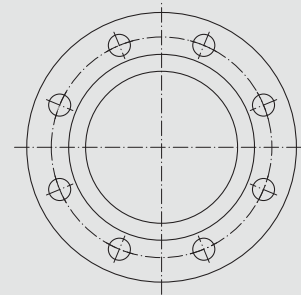


Steel expansion joint with welding ends – bellows welded to reinforcing ring and internal guide sleeve

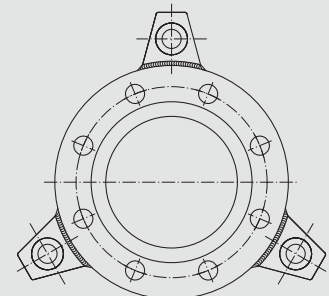


Steel expansion joint with welding ends – bellows welded with flared seam and internal guide sleeve

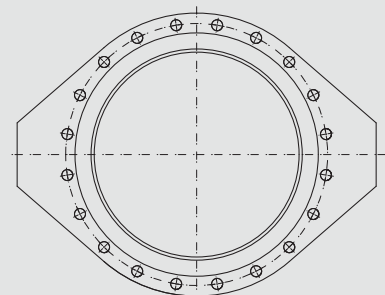
| Welding end material   | Material No. as per DIN EN | Designation as per DIN EN (DIN) |
|------------------------|----------------------------|---------------------------------|
| Unalloyed steel        | 1.0038                     | S235JR                          |
|                        | 1.0577                     | S355J2                          |
| Stainless steel        | 1.4404                     | X2CrNiMo17-12-2                 |
|                        | 1.4541                     | X6CrNiTi18-10                   |
|                        | 1.4571                     | X6CrNiMoTi17-12-2               |
|                        | 1.4828                     | X15CrNiSi20-12                  |
| High-temperature steel | 1.0345                     | P235GH                          |
|                        | 1.5415                     | 16Mo3 (15Mo3)                   |



Standard flange  
(axial and universal expansion joints)



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



Oval flange (angular expansion joints)

Flanges, see also page 97

### 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.

| Threaded part material | Material No. as per DIN EN | Designation as per DIN EN (DIN) |
|------------------------|----------------------------|---------------------------------|
| Malleable casting      | 0.8040                     | GJMW-400-5 (GTW-40-05)          |
| Stainless steel        | 1.4541                     | X6CrNiTi18-10                   |

# STEEL EXPANSION JOINTS

## GENERAL DESCRIPTION OF STEEL EXPANSION JOINTS

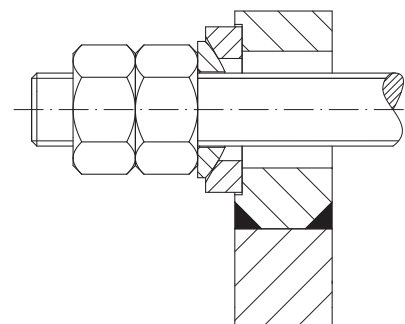
### RESTRAINTS

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 spherical 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.



External 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 |
|-------------------------------------|----------------------------|---------------------------------------------------|
| <b>Unalloyed steel</b>              |                            |                                                   |
| Ears                                | 1.0038                     | S235JR                                            |
| Tie rods                            |                            | 5.6, 8.8                                          |
| Nuts                                |                            | 5, 8                                              |
| Spherical washers/<br>conical seats | 1.0401                     | C15                                               |
| <b>Stainless steel</b>              |                            |                                                   |
| Ears                                | 1.4541                     | X6CrNiTi18-10                                     |
|                                     | 1.4571                     | X6CrNiMo-Ti17-12-2                                |
| Tie rods, nuts                      | A2                         | 50, 70                                            |
|                                     | A4                         | 50, 70                                            |
| Spherical washers/<br>conical seats | 1.4305                     | X8CrNiS18-9                                       |
| <b>High-temperature steel</b>       |                            |                                                   |
| 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.

| 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

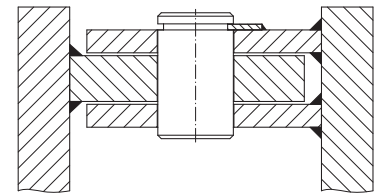
### INTERNAL GUIDE SLEEVES

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).

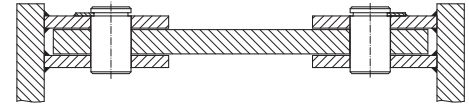
Even under these conditions, the internal guide sleeve is intended to guide the medium turbulence free through the convoluted bellows.

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.

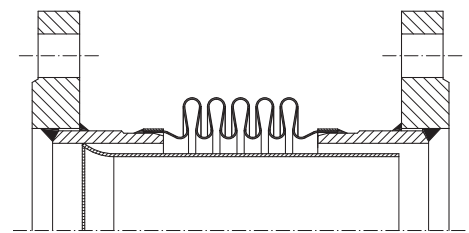
Axial expansion joints are equipped with cylindrical internal guide sleeves and lateral expansion joints with conical internal guide sleeves. Axial expansion joints with internal guide sleeve and flared flange require an additional seal between the bellows flare and the flared flange. In conical internal 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.



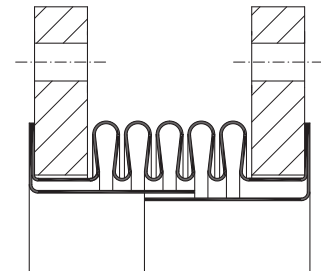
Hinge restraint with joint bars and bolts (angular expansion joints)



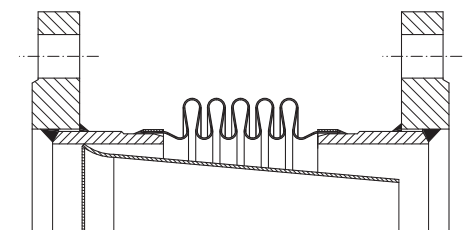
Hinge restraint with joint bars and bolts (lateral expansion joints)



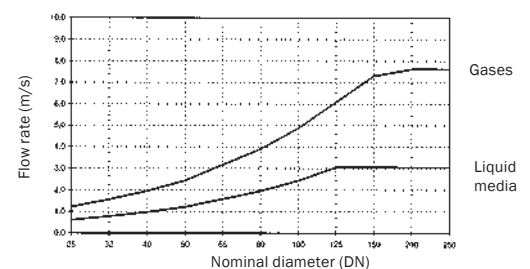
Axial expansion joint with cylindrical internal guide sleeve



Axial expansion joint with telescopic internal guide sleeve



Lateral expansion joint with conical internal guide sleeve



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

# STEEL EXPANSION JOINTS

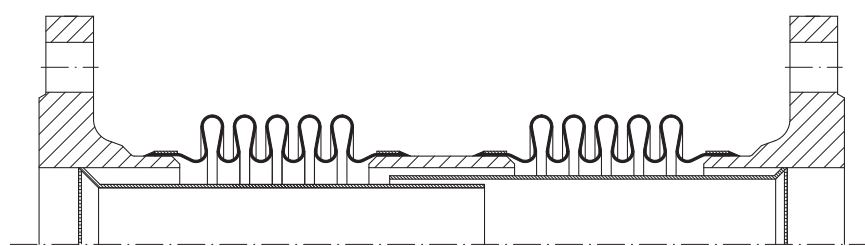
## GENERAL DESCRIPTION OF STEEL EXPANSION JOINTS

### GUIDE SLEEVES

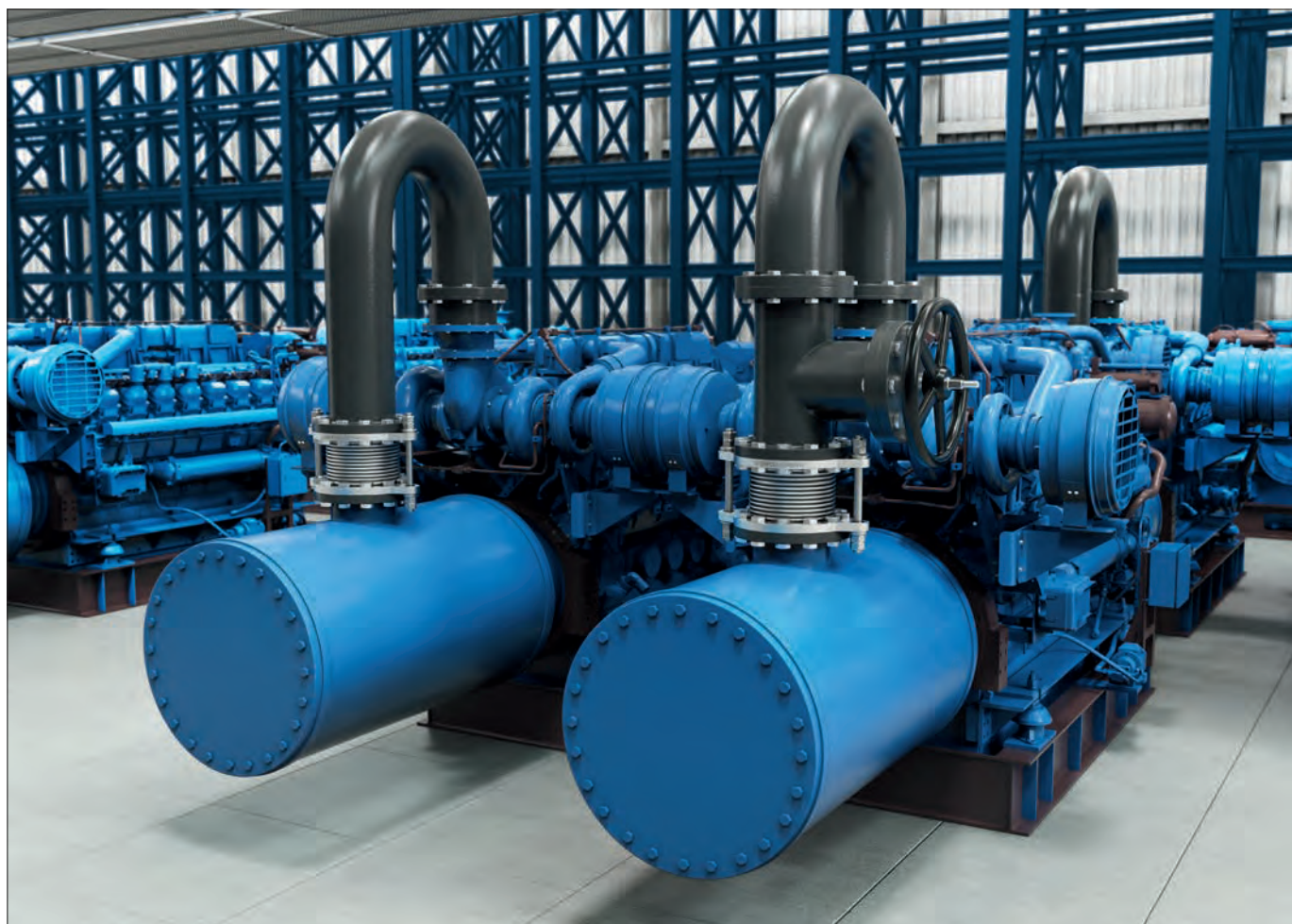
Guide sleeves stabilize the expansion joint in its axial movement and prevent it from buckling. As a rule, guide sleeves are made of thick-walled, stainless or unalloyed steel.

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.**



Direction of flow →  
Axial expansion joint with telescopic guide sleeve



Restrained STENFLEX® stainless steel expansion joints type SF20 / SF21 to absorb thermal expansion in a transformer plant

# STEEL EXPANSION JOINTS

## COMPENSATION SYSTEMS

With 50 years of experience in expansion joint engineering, STENFLEX® is the competent partner for application-oriented solutions.

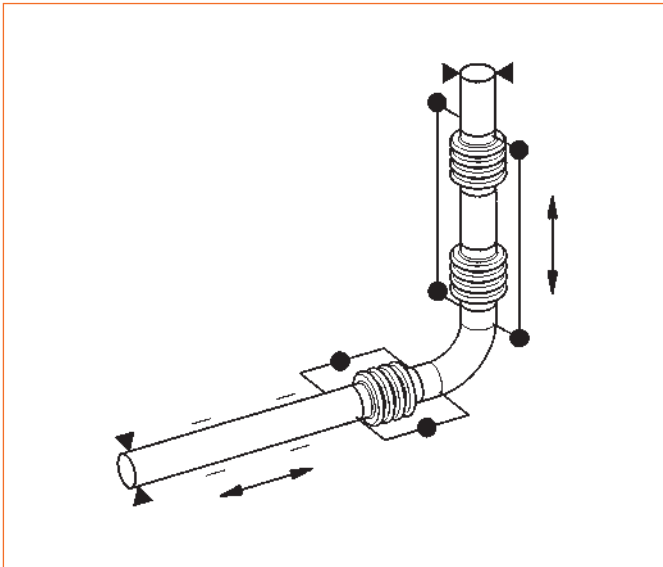
STENFLEX® compensation pipe pieces can be supplied on request as complete system solution with ready mounted expansion joints. As a rule, these are angular and lateral expansion joints, designed according to customer requirements.

Pipe sections, bends, T-pieces and expansion joints are put together with the

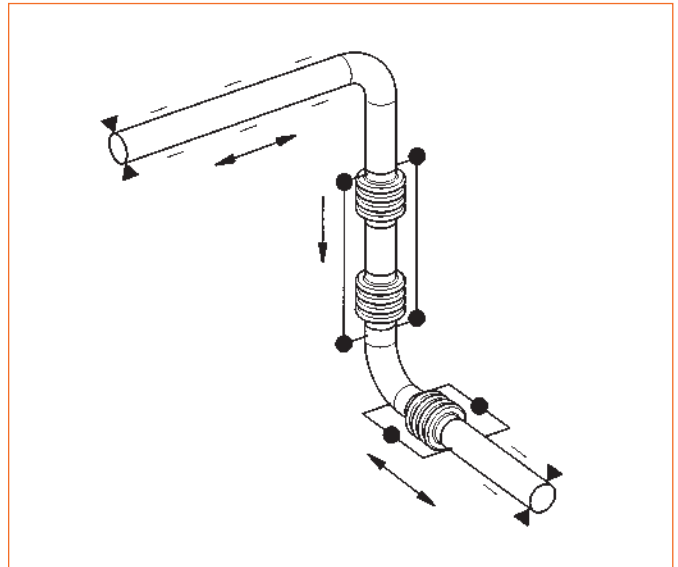
necessary restraints, hinges, and accessories, to form a unit.

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

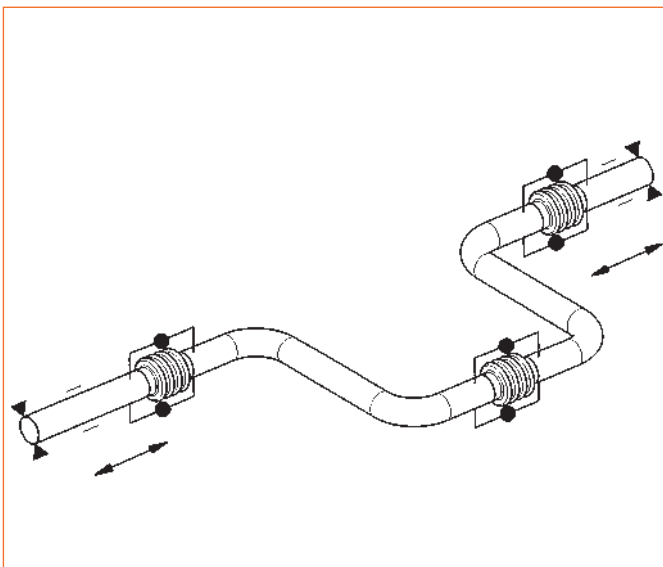
## COMPENSATION SYSTEMS WITH LATERAL AND ANGULAR EXPANSION JOINTS



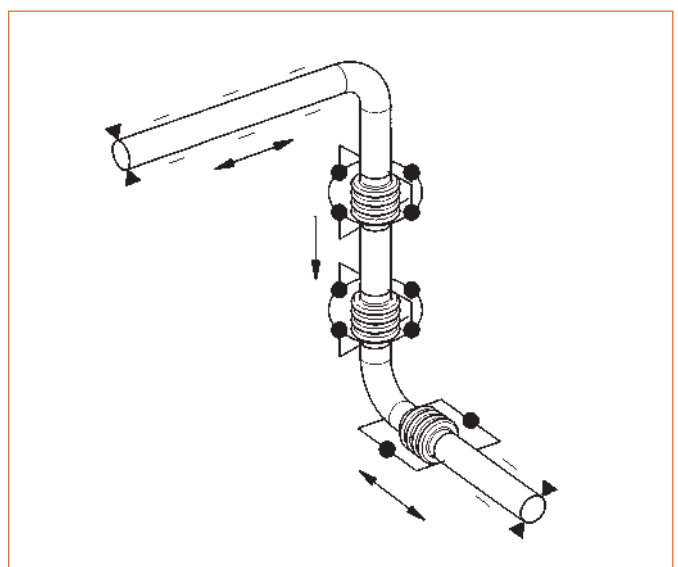
L-shaped triple joint  
1 angular and 1 lateral expansion joint with hinge restraints



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



# STEEL EXPANSION JOINTS

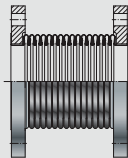
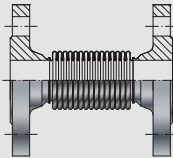
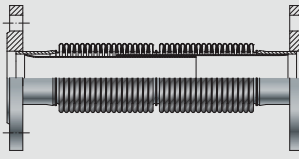
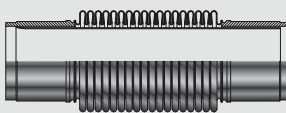
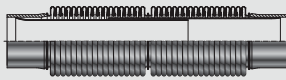
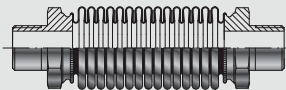
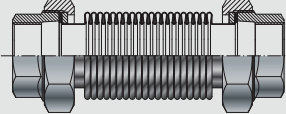
## APPLICATIONS / POSSIBLE USES / INDUSTRIES

| 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-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                                        |                        |       |       |       |       | ■     | ■                        |       |       |       |       |       |       |       |                          |       |       |       |       |  |
|                                 | Engines                                                     | ■                      | ■     |       | ■     |       |       |                          | ■     | ■     | ■     |       |       | ■     | ■     |                          |       |       |       |       |  |
|                                 | 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.

# STEEL-EXPANSION JOINTS

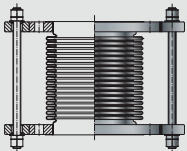
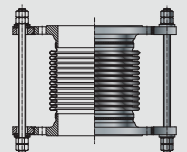
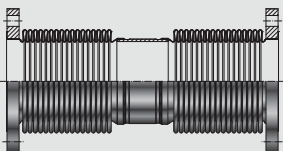
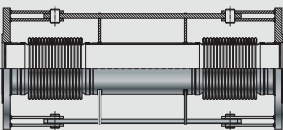
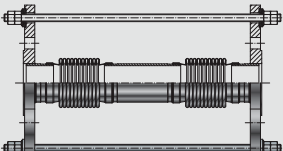
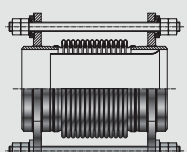
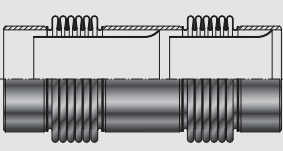
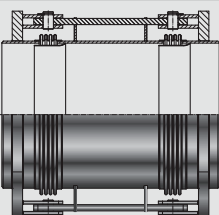
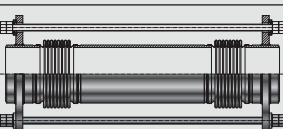
## PROGRAM SUMMARY

| AXIAL STEEL EXPANSION JOINTS                                                        |              |                                                                                          |                                  |                                                                |                                                                                                                                  |                             |      |
|-------------------------------------------------------------------------------------|--------------|------------------------------------------------------------------------------------------|----------------------------------|----------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------|------|
|                                                                                     | Type         | DN                                                                                       | Pressure rate bar                | Max. operating temperature                                     | Bellows material                                                                                                                 | Connection parts/restraints | Page |
|    | <b>SF-10</b> | DN 25 – 2800<br>DN 300 – 2000<br>DN 15 – 1000<br>DN 15 – 500<br>on request<br>on request | PN 2,5<br>PN 6<br>PN 10<br>PN 16 | +550 °C<br>+550 °C<br>+550 °C<br>+550 °C<br>+450 °C<br>+900 °C | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404<br>2.4858<br>1.4828, 1.4878 | rotatable flanges           | 108  |
|    | <b>SF-11</b> | DN 15 – 500<br>DN 200 – 250                                                              | PN 16<br>PN 10                   | +550 °C<br>+550 °C                                             | 1.4541, 1.4571<br>1.4541, 1.4571                                                                                                 | fixed flanges               | 112  |
|  | <b>SF-13</b> | DN 20 – 250<br>DN 20 – 1200                                                              | PN 16                            | +550 °C<br>+550 °C                                             | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404                                                                                 | fixed flanges               | 114  |
|  | <b>SA-10</b> | DN 20 – 2800<br>DN 15 – 2000<br>DN 15 – 1200<br>DN 15 – 1000<br>on request<br>on request | PN 2,5<br>PN 6<br>PN 10<br>PN 16 | +550 °C<br>+550 °C<br>+550 °C<br>+550 °C<br>+450 °C<br>+900 °C | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404<br>2.4858<br>1.4828, 1.4878 | welding ends                | 116  |
|  | <b>SA-13</b> | DN 15 – 1200<br>DN 15 – 250                                                              | PN 10<br>PN 16                   | +550 °C<br>+550 °C                                             | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404                                                                                 | welding ends                | 120  |
|  | <b>SG-10</b> | DN 15 – 50                                                                               | PN 16                            | +550 °C                                                        | 1.4541, 1.4571, 1.4404                                                                                                           | male thread and hexagon     | 122  |
|  | <b>SG-11</b> | DN 15 – 50                                                                               | PN 16                            | +550 °C                                                        | 1.4541, 1.4571, 1.4404                                                                                                           | female thread and hexagon   | 123  |

# STEEL EXPANSION JOINTS

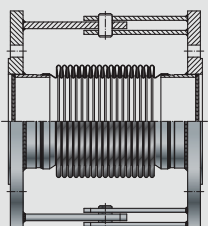
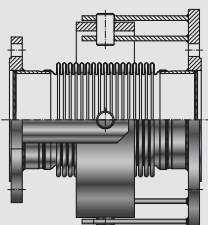
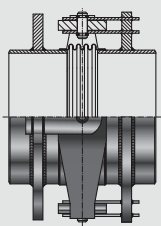
## PROGRAM SUMMARY

### LATERAL STEEL EXPANSION JOINTS

|                                                                                     | Type         | DN                                       | Pressure<br>rate<br>bar | Max. operating<br>temperature | Bellows material                                                   | Connection<br>parts/restraints                     | Page |
|-------------------------------------------------------------------------------------|--------------|------------------------------------------|-------------------------|-------------------------------|--------------------------------------------------------------------|----------------------------------------------------|------|
|    | <b>SF-20</b> | DN 32 – 500<br>DN 32 – 500<br>on request | PN 10<br>PN 16          | +550 °C<br>+550 °C<br>+900 °C | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404<br>1.4828, 1.4878 | rotatable<br>flanges with<br>tie rod<br>restraints | 124  |
|    | <b>SF-21</b> | DN 32 – 500                              | PN 16                   | +550 °C                       | 1.4541, 1.4571                                                     | fixed flanges<br>with tie rod<br>restraints        | 126  |
|   | <b>SF-23</b> | on request                               | PN 1<br>PN 6            | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404                   | rotatable<br>flanges                               | 128  |
|  | <b>SF-24</b> | on request                               | PN 6<br>PN 10           | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404                   | fixed flanges<br>with hinge<br>restraints          | 129  |
|  | <b>SF-25</b> | on request                               | PN 6<br>PN 10           | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404                   | fixed flanges<br>with tie rod<br>restraints        | 130  |
|  | <b>SA-20</b> | on request                               | PN 16                   | +550 °C                       | 1.4541, 1.4571, 1.4404                                             | welding ends<br>with tie rod<br>restraints         | 131  |
|  | <b>SA-23</b> | on request                               | PN 1<br>PN 6            | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404                   | welding ends                                       | 132  |
|  | <b>SA-24</b> | on request                               | PN 6<br>PN 10           | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404                   | welding ends<br>with hinge<br>restraints           | 133  |
|  | <b>SA-25</b> | on request                               | PN 6<br>PN 10           | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404                   | welding ends<br>with tie rod<br>restraints         | 134  |

# STEEL EXPANSION JOINTS

## PROGRAM SUMMARY

| ANGULAR STEEL EXPANSION JOINTS                                                      |              |            |                         |                               |                                                  |                                                     |      |
|-------------------------------------------------------------------------------------|--------------|------------|-------------------------|-------------------------------|--------------------------------------------------|-----------------------------------------------------|------|
|                                                                                     | Type         | DN         | Pressure<br>rate<br>bar | Max. operating<br>temperature | Bellows material                                 | Connection<br>parts/restraints                      | Page |
|    | <b>SF-32</b> | on request | PN 6<br>PN 16           | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404 | fixed flanges<br>with hinge<br>restraints           | 135  |
|   | <b>SF-33</b> | on request | PN 6<br>PN 16           | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404 | fixed flanges<br>with<br>cardan-hinge<br>restraints | 136  |
|  | <b>SA-33</b> | on request | PN 6<br>PN 16           | +550 °C<br>+550 °C            | 1.4541, 1.4571, 1.4404<br>1.4541, 1.4571, 1.4404 | welding ends<br>with<br>cardan-hinge<br>restraints  | 137  |

## STEEL-EXPANSION JOINT TYPE SF-10

### AXIAL EXPANSION JOINT DN 15 – DN 2800



#### STRUCTURE TYPE SF-10 STEEL BELLOWS PN 2,5, PN 6, PN 10, PN 16

- Vacuum-proof, short-length axial expansion joint, consisting of a stainless steel bellows and rotatable flanges
- Multiple convolution bellows in various stainless steel grades
- Single 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<br>up to +550 °C | Low temperature, acids, lyes, gases, fertilizers                         |
|                      | 1.4404<br>1.4571           | +550 °C                  | Media containing chloride, oil, soap, drinking water, food stuff, petrol |
| Heat-resistant steel | 1.4828<br>1.4878           | +900 °C<br>+800 °C       | Hot gases, steam, air                                                    |
| Nickel-based alloy   | 2.4858<br>(Incoloy 825)    | +450 °C                  | Sulphuric acid, phosphoric acid, petrol, oil, gases                      |

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

\*\* Check or inquire about reduction in pressure by temperature.

#### FLANGES / VERSIONS

- Rotatable flanges
- Flange drilling for through bolts

|                      | Standard                                |                                              | Others                                                                 |
|----------------------|-----------------------------------------|----------------------------------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092                                 |                                              | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR),<br>1.4541, 1.4404      |                                              | stainless steel etc.                                                   |
| Corrosion protection | DN 32 –<br>DN 250<br>electro-galvanized | DN 300 –<br>DN 2800<br>anti-corrosion primed | hot-dip galvanized,<br>special varnish,<br>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 axial movement
- for reducing tension, damping noise and oscillation in pipes and their system components, e.g.
  - pumps
  - engines
  - machines
- for installation in
  - industrial applications
  - gas and water supply
  - exhaust systems
  - heating installations
  - drinking water systems
- to compensate for installation inaccuracies

#### SPECIAL DESIGNS

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

#### CERTIFICATES

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- Bureau Veritas
- DVGW (DN 32 – DN 200)
- DNV GL® / DNV®
- RMRS
- RINA

#### ACCESSORIES

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

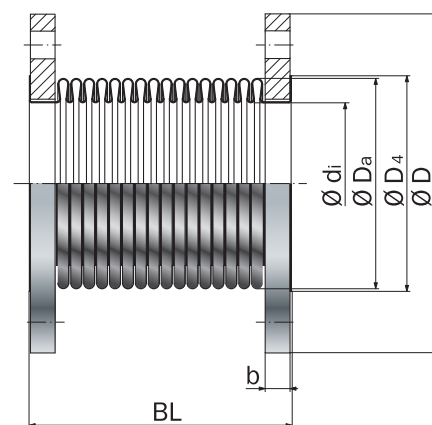
# PRESSURE RATE STANDARD PROGRAM PN 2,5

| DN   | BL  | $\Delta a_{x\text{tot}}^{**}$<br>Axial move-<br>ment<br>mm | C <sub>ax</sub><br>Axial<br>spring<br>rate<br>N/mm | $\Delta l_{at\text{tot}}$<br>Lateral<br>move-<br>ment<br>mm | C <sub>lat</sub><br>Lateral<br>spring<br>rate<br>N/mm | A* Effective<br>bellows cross<br>sectional<br>area<br>cm <sup>2</sup> | Ø d <sub>4</sub><br>Flared<br>end<br>Ø<br>mm | Ø D <sub>a</sub><br>Bellows<br>outer<br>Ø<br>mm | PN<br>Flange<br>connection<br>EN1092 | Ø D<br>Flange<br>outer<br>Ø<br>mm | b<br>Flange<br>thick-<br>ness<br>mm | Weight<br>approx.<br>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                               | 18                                  | 3.8                     |
| 40   | 135 | 30                                                         | 17                                                 | 20                                                          | 15                                                    | 22                                                                    | 65                                           | 61                                              | 16                                   | 150                               | 18                                  | 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                               | 18                                  | 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                               | 20                                  | 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                                                | -                                                           | -                                                     | 1176                                                                  | 396                                          | 418                                             | 6                                    | 490                               | 26                                  | 38.0                    |
| 350  | 270 | 96                                                         | 65                                                 | 14                                                          | 515                                                   | 1176                                                                  | 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                                                                  | 875                                          | 875                                             | 6                                    | 975                               | 44                                  | 150.0                   |
| 800  | 305 | 86                                                         | 140                                                | -                                                           | -                                                     | 5595                                                                  | 875                                          | 875                                             | 6                                    | 975                               | 44                                  | 156.0                   |
| 900  | 225 | 42                                                         | 313                                                | -                                                           | -                                                     | 7014                                                                  | 975                                          | 976                                             | 6                                    | 1075                              | 48                                  | 182.0                   |
| 900  | 310 | 86                                                         | 156                                                | -                                                           | -                                                     | 7014                                                                  | 975                                          | 976                                             | 6                                    | 1075                              | 48                                  | 188.0                   |
| 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                                                                 | 1262                                         | 1282                                            | 2.5                                  | 1375                              | 30                                  | 152.0                   |
| 1200 | 295 | 84                                                         | 207                                                | -                                                           | -                                                     | 12291                                                                 | 1262                                         | 1282                                            | 2.5                                  | 1375                              | 30                                  | 160.0                   |
| 1400 | 210 | 42                                                         | 478                                                | -                                                           | -                                                     | 16536                                                                 | 1462                                         | 1482                                            | 2.5                                  | 1575                              | 30                                  | 175.0                   |
| 1400 | 295 | 84                                                         | 239                                                | -                                                           | -                                                     | 16536                                                                 | 1462                                         | 1482                                            | 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  $\Delta a_x$  and  $\Delta l_{at}$  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.

\*\*This value represents the total possible movement. Example:  $\Delta a_{x\text{tot}} = 28\text{mm}$ . This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).



Type SF-10

## STEEL EXPANSION JOINT TYPE SF-10

### AXIAL EXPANSION JOINT DN 15 – DN 2800

#### PRESSURE RATE STANDARD PROGRAM PN 6

| DN   | BL<br>mm | $\Delta a_{x\text{tot}}^{**}$<br>Axial move-<br>ment<br>mm | $C_{ax}$<br>Axial<br>spring<br>rate<br>N/mm | A* Effective<br>bellows cross<br>sectional<br>area<br>cm <sup>2</sup> | $\varnothing d_4$<br>Flared<br>end<br>$\varnothing$<br>mm | $\varnothing D_a$<br>Bellows<br>outer<br>$\varnothing$<br>mm | $\varnothing d_i$<br>Internal<br>guide<br>sleeve $\varnothing$<br>mm | PN<br>Flange<br>connection<br>EN1092 | $\varnothing D$<br>Flange<br>outer<br>$\varnothing$<br>mm | b<br>Flange<br>thick-<br>ness<br>mm | Weight<br><br>approx.<br>kg |
|------|----------|------------------------------------------------------------|---------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------|--------------------------------------------------------------|----------------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------|-------------------------------------|-----------------------------|
| 300  | 195      | 28                                                         | 455                                         | 993                                                                   | 364                                                       | 387                                                          | 310                                                                  | 6                                    | 440                                                       | 24                                  | 29.0                        |
| 300  | 290      | 58                                                         | 228                                         | 993                                                                   | 364                                                       | 387                                                          | 310                                                                  | 6                                    | 440                                                       | 24                                  | 33.0                        |
| 350  | 200      | 28                                                         | 496                                         | 1180                                                                  | 396                                                       | 419                                                          | 342                                                                  | 6                                    | 490                                                       | 26                                  | 40.0                        |
| 350  | 295      | 58                                                         | 248                                         | 1180                                                                  | 396                                                       | 419                                                          | 342                                                                  | 6                                    | 490                                                       | 26                                  | 44.0                        |
| 400  | 200      | 28                                                         | 564                                         | 1511                                                                  | 452                                                       | 470                                                          | 393                                                                  | 6                                    | 540                                                       | 28                                  | 47.0                        |
| 400  | 300      | 56                                                         | 282                                         | 1511                                                                  | 452                                                       | 470                                                          | 393                                                                  | 6                                    | 540                                                       | 28                                  | 51.0                        |
| 450  | 205      | 28                                                         | 632                                         | 1883                                                                  | 498                                                       | 521                                                          | 444                                                                  | 6                                    | 595                                                       | 30                                  | 57.0                        |
| 450  | 305      | 56                                                         | 316                                         | 1883                                                                  | 498                                                       | 521                                                          | 444                                                                  | 6                                    | 595                                                       | 30                                  | 62.0                        |
| 500  | 205      | 28                                                         | 699                                         | 2287                                                                  | 548                                                       | 571                                                          | 494                                                                  | 6                                    | 645                                                       | 30                                  | 62.0                        |
| 500  | 305      | 56                                                         | 350                                         | 2287                                                                  | 548                                                       | 571                                                          | 494                                                                  | 6                                    | 645                                                       | 30                                  | 68.0                        |
| 600  | 210      | 28                                                         | 835                                         | 3233                                                                  | 670                                                       | 673                                                          | 596                                                                  | 6                                    | 755                                                       | 32                                  | 81.0                        |
| 600  | 310      | 56                                                         | 418                                         | 3233                                                                  | 670                                                       | 673                                                          | 596                                                                  | 6                                    | 755                                                       | 32                                  | 88.0                        |
| 700  | 230      | 27                                                         | 970                                         | 4343                                                                  | 775                                                       | 775                                                          | 698                                                                  | 6                                    | 860                                                       | 40                                  | 116.0                       |
| 700  | 325      | 54                                                         | 485                                         | 4343                                                                  | 775                                                       | 775                                                          | 698                                                                  | 6                                    | 860                                                       | 40                                  | 124.0                       |
| 800  | 225      | 27                                                         | 1104                                        | 5603                                                                  | 857                                                       | 876                                                          | 795                                                                  | 6                                    | 975                                                       | 30                                  | 112.0                       |
| 800  | 320      | 55                                                         | 552                                         | 5603                                                                  | 857                                                       | 876                                                          | 795                                                                  | 6                                    | 975                                                       | 30                                  | 121.0                       |
| 900  | 225      | 27                                                         | 1236                                        | 7023                                                                  | 958                                                       | 977                                                          | 896                                                                  | 6                                    | 1075                                                      | 30                                  | 125.0                       |
| 900  | 320      | 54                                                         | 618                                         | 7023                                                                  | 958                                                       | 977                                                          | 896                                                                  | 6                                    | 1075                                                      | 30                                  | 135.0                       |
| 1000 | 225      | 27                                                         | 1369                                        | 8619                                                                  | 1060                                                      | 1079                                                         | 998                                                                  | 6                                    | 1175                                                      | 30                                  | 135.0                       |
| 1000 | 320      | 54                                                         | 685                                         | 8619                                                                  | 1060                                                      | 1079                                                         | 998                                                                  | 6                                    | 1175                                                      | 30                                  | 147.0                       |
| 1200 | 225      | 27                                                         | 1634                                        | 12303                                                                 | 1264                                                      | 1283                                                         | 1202                                                                 | 6                                    | 1405                                                      | 30                                  | 186.0                       |
| 1200 | 320      | 54                                                         | 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      | 54                                                         | 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      | 54                                                         | 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      | 54                                                         | 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      | 54                                                         | 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.

\*\*This value represents the total possible movement. Example:  $\Delta a_{x\text{tot}} = 28\text{mm}$ . This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).

## PRESSURE RATE STANDARD PROGRAM PN 10

| DN   | BL  | $\Delta a_{x\text{tot}}^{**}$<br>Axial movement<br>mm | C <sub>ax</sub><br>Axial spring rate<br>N/mm | A* Effective<br>bellows cross sectional<br>area<br>cm <sup>2</sup> | $\emptyset d_4$<br>Flared end<br>$\emptyset$ mm | $\emptyset D_a$<br>Bellows outer<br>$\emptyset$ mm | $\emptyset d_i$<br>Internal guide sleeve<br>$\emptyset$ mm | PN<br>Flange connection<br>EN1092 | $\emptyset D$<br>Flange outer<br>$\emptyset$ mm | b<br>Flange thickness<br>mm | Weight<br>approx.<br>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                                             | 18                          | 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                                             | 20                          | 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 | 38                                                    | 219                                          | 422                                                                | 254                                             | 253                                                | 198                                                        | 10                                | 340                                             | 24                          | 22.1                    |
| 250  | 245 | 38                                                    | 624                                          | 620                                                                | 310                                             | 302                                                | 249                                                        | 10                                | 395                                             | 26                          | 28.6                    |
| 300  | 200 | 28                                                    | 455                                          | 993                                                                | 364                                             | 387                                                | 310                                                        | 10                                | 445                                             | 26                          | 33.0                    |
| 300  | 295 | 56                                                    | 288                                          | 993                                                                | 364                                             | 387                                                | 310                                                        | 10                                | 445                                             | 26                          | 36.0                    |
| 350  | 205 | 27                                                    | 496                                          | 1180                                                               | 396                                             | 419                                                | 342                                                        | 10                                | 505                                             | 30                          | 50.0                    |
| 350  | 305 | 54                                                    | 248                                          | 1180                                                               | 396                                             | 419                                                | 342                                                        | 10                                | 505                                             | 30                          | 54.0                    |
| 400  | 210 | 27                                                    | 564                                          | 1511                                                               | 452                                             | 470                                                | 393                                                        | 10                                | 565                                             | 32                          | 62.0                    |
| 400  | 310 | 54                                                    | 282                                          | 1511                                                               | 452                                             | 470                                                | 393                                                        | 10                                | 565                                             | 32                          | 67.0                    |
| 450  | 220 | 27                                                    | 632                                          | 1883                                                               | 498                                             | 521                                                | 444                                                        | 10                                | 615                                             | 36                          | 76.0                    |
| 450  | 315 | 54                                                    | 316                                          | 1883                                                               | 498                                             | 521                                                | 444                                                        | 10                                | 615                                             | 36                          | 81.0                    |
| 500  | 225 | 26                                                    | 699                                          | 2287                                                               | 548                                             | 571                                                | 494                                                        | 10                                | 670                                             | 38                          | 90.0                    |
| 500  | 320 | 53                                                    | 350                                          | 2287                                                               | 548                                             | 571                                                | 494                                                        | 10                                | 670                                             | 38                          | 96.0                    |
| 600  | 225 | 26                                                    | 835                                          | 3233                                                               | 654                                             | 673                                                | 596                                                        | 10                                | 780                                             | 30                          | 90.0                    |
| 600  | 320 | 52                                                    | 418                                          | 3233                                                               | 654                                             | 673                                                | 596                                                        | 10                                | 780                                             | 30                          | 97.0                    |
| 700  | 225 | 26                                                    | 970                                          | 4343                                                               | 756                                             | 775                                                | 698                                                        | 10                                | 895                                             | 30                          | 112.0                   |
| 700  | 320 | 52                                                    | 485                                          | 4343                                                               | 756                                             | 775                                                | 698                                                        | 10                                | 895                                             | 30                          | 120.0                   |
| 800  | 225 | 25                                                    | 1104                                         | 5603                                                               | 857                                             | 876                                                | 795                                                        | 10                                | 1015                                            | 30                          | 140.0                   |
| 800  | 320 | 51                                                    | 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 | 51                                                    | 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 STANDARD PROGRAM PN 16

| DN  | BL  | $\Delta a_{x\text{tot}}^{**}$<br>Axial movement<br>mm | C <sub>ax</sub><br>Axial spring rate<br>N/mm | A* Effective<br>bellows cross sectional<br>area<br>cm <sup>2</sup> | $\emptyset d_4$<br>Flared end<br>$\emptyset$ mm | $\emptyset D_a$<br>Bellows outer<br>$\emptyset$ mm | $\emptyset d_i$<br>Internal guide sleeve<br>$\emptyset$ mm | PN<br>Flange connection<br>EN1092 | $\emptyset D$<br>Flange outer<br>$\emptyset$ mm | b<br>Flange thickness<br>mm | Weight<br>approx.<br>kg |
|-----|-----|-------------------------------------------------------|----------------------------------------------|--------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------|------------------------------------------------------------|-----------------------------------|-------------------------------------------------|-----------------------------|-------------------------|
| 15  | 108 | 17                                                    | 21                                           | 7                                                                  | 45                                              | 38                                                 | 18                                                         | 16                                | 14                                              | 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                                             | 18                          | 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                                             | 20                          | 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 | 38                                                    | 219                                          | 422                                                                | 254                                             | 253                                                | 198                                                        | 16                                | 340                                             | 26                          | 23.1                    |
| 250 | 245 | 38                                                    | 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. \*\*This value represents the total possible movement. Example:

$\Delta a_{x\text{tot}} = 28\text{mm}$ . This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).

[www.stenflex.com](http://www.stenflex.com) / [info@stenflex.com](mailto:info@stenflex.com)

## STEEL EXPANSION JOINT TYPE SF-11

### AXIAL EXPANSION JOINT DN 15 – DN 500



#### STRUCTURE TYPE SF-11, STEEL BELLOWS PN 16

- Vacuum-proof axial expansion joint consisting of a stainless steel bellows and welded flanges
- Multiple convolution bellows in various stainless steel grades
- Single ply or multi-ply structure

| Material grade* | Material No. as per DIN EN | Temperature**            | Possible uses                                                            |
|-----------------|----------------------------|--------------------------|--------------------------------------------------------------------------|
| Stainless steel | 1.4541                     | -196 °C<br>up to +550 °C | Low temperature, acids, lyes, gases, fertilizers                         |
|                 | 1.4404<br>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 / VERSIONS

- Welded flanges with turned seal
- Flange drilling for through bolts

|                      | Standard                            | Others                                                                 |
|----------------------|-------------------------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092                             | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR),<br>1.0460 (P250GH) | stainless steel etc.                                                   |
| Corrosion protection | anti-corrosion primed               | 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 axial movement
- for reducing tension, in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
  - turbines
  - machines
  - process plants
- for installation in
  - industrial applications
  - gas and water supply
  - exhaust systems
  - heating installations
- to compensate for installation inaccuracies

#### GUIDE SLEEVE

##### Materials

Standard: 1.4541

#### SPECIAL DESIGN

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

#### CERTIFICATES

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- Bureau Veritas
- DVGW (DN 32 – DN 200)
- DNV GL® / DNV®
- RMRS
- Rina

#### ACCESSORIES

- internal guide sleeve
- Protective tube
- Gas sealings for DVGW-application

# PRESSURE RATE STANDARD PROGRAM PN 16

| DN  | BL  | $\Delta a_{x\text{tot}}^{**}$<br>Axial movement<br>mm | $C_{ax}$<br>Axial spring<br>rate<br>N/mm | A* Effective<br>bellows cross<br>sectional<br>area<br>cm <sup>2</sup> | $\varnothing D_a$<br>Bellows<br>outer<br>$\varnothing$<br>mm | $\varnothing d_i$<br>Internal<br>guide<br>sleeve $\varnothing$<br>mm | PN<br>Flange<br>connection<br>EN1092 | $\varnothing D$<br>Flange<br>outer<br>$\varnothing$<br>mm | b<br>Flange<br>thick-<br>ness<br>mm | Weight<br>approx.<br>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 | 38                                                    | 237                                      | 422                                                                   | 253                                                          | 199                                                                  | 16                                   | 340                                                       | 24                                  | 24.9                    |
| 250 | 335 | 38                                                    | 624                                      | 620                                                                   | 302                                                          | 250                                                                  | 16                                   | 405                                                       | 26                                  | 36.0                    |
| 300 | 260 | 22                                                    | 863                                      | 995                                                                   | 388                                                          | 299                                                                  | 16                                   | 460                                                       | 28                                  | 50.0                    |
| 300 | 410 | 52                                                    | 379                                      | 990                                                                   | 386                                                          | 299                                                                  | 16                                   | 460                                                       | 28                                  | 57.0                    |
| 350 | 265 | 21                                                    | 946                                      | 1182                                                                  | 420                                                          | 329                                                                  | 16                                   | 520                                                       | 30                                  | 72.0                    |
| 350 | 415 | 54                                                    | 379                                      | 1182                                                                  | 420                                                          | 329                                                                  | 16                                   | 520                                                       | 30                                  | 79.0                    |
| 400 | 270 | 21                                                    | 1078                                     | 1514                                                                  | 471                                                          | 380                                                                  | 16                                   | 580                                                       | 32                                  | 90.0                    |
| 400 | 420 | 54                                                    | 431                                      | 1514                                                                  | 471                                                          | 380                                                                  | 16                                   | 580                                                       | 32                                  | 98.0                    |
| 450 | 270 | 21                                                    | 1210                                     | 1886                                                                  | 522                                                          | 431                                                                  | 16                                   | 640                                                       | 34                                  | 105.0                   |
| 450 | 420 | 53                                                    | 484                                      | 1886                                                                  | 522                                                          | 431                                                                  | 16                                   | 640                                                       | 34                                  | 115.0                   |
| 500 | 270 | 21                                                    | 1338                                     | 2290                                                                  | 572                                                          | 482                                                                  | 16                                   | 715                                                       | 36                                  | 136.0                   |
| 500 | 420 | 53                                                    | 535                                      | 2290                                                                  | 572                                                          | 482                                                                  | 16                                   | 715                                                       | 36                                  | 147.0                   |

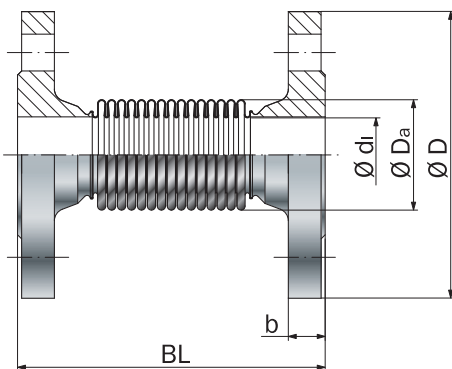
For larger sizes (DN) please see type SF-16. Also available with PN 10 flange connection.

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.

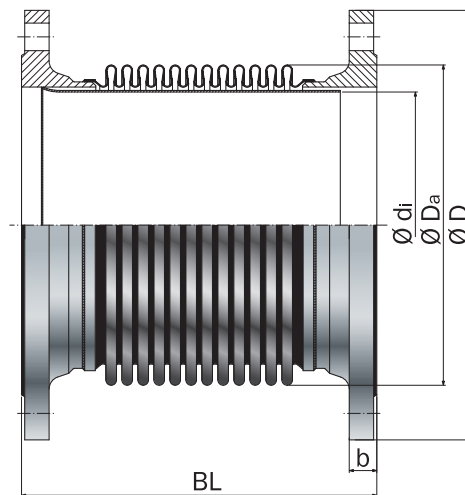
\*Effective bellows cross sectional area is a theoretical value.

\*\*This value represents the total possible movement. Example:  $\Delta a_{x\text{tot}}$  = 28mm. This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).



DN 15 – DN 32

**Type SF-11** without inner guide sleeve



DN 40 – DN 500

**Type SF-11** with inner guide sleeve

## STEEL EXPANSION JOINT TYPE SF-13

### AXIAL EXPANSION JOINT DN 20 – DN 1200



#### STRUCTURE TYPE SF-13 / STEEL BELLOWS PN 10, 16

- Vacuum-proof axial expansion joint consisting of two stainless steel bellows (DN 125 – DN 1200 with connecting pipe) and welded flanges
- Guide sleeves to stabilize the expansion joint
- Guide sleeves do not supersede pipe guide bearings
- Multiple convolution bellows in various stainless steel grades
- Single ply or multi-ply structure

| Material grade* | Material No. as per DIN EN | Temperature**            | Possible uses                                                            |
|-----------------|----------------------------|--------------------------|--------------------------------------------------------------------------|
| Stainless steel | 1.4541                     | -196 °C<br>up to +550 °C | Low temperature, acids, lyes, gases, fertilizers                         |
|                 | 1.4404<br>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 / VERSIONS

- Welded flanges, up to DN 250 with turned seal
- Flange drilling for through bolts

|                      | Standard              | Others                                                                 |
|----------------------|-----------------------|------------------------------------------------------------------------|
| Dimensions           | EN 1092               | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR)       | stainless steel etc.                                                   |
| Corrosion protection | anti-corrosion primed | 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: 1.0345 (P235GH),  
1.0038 (S235JR), 1.4541

Others: stainless steel etc.

##### Corrosion protection

Standard: anti-corrosion primed

Others: special varnish etc.

#### GUIDE SLEEVE

##### Materials

Standard: 1.4541

#### SPECIAL DESIGN

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

#### CERTIFICATES

- CE (PED 2014/68/EU)

#### ACCESSORIES

- Protective tube

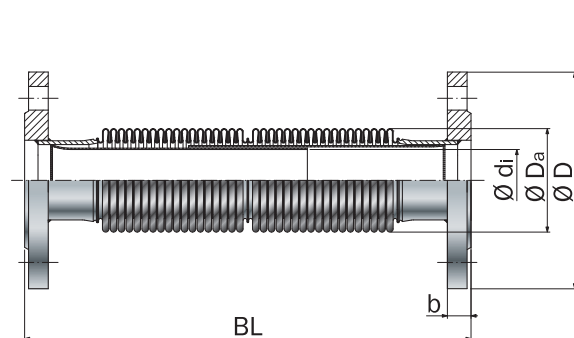
## PRESSURE RATE STANDARD PROGRAM PN 10

| DN   | BL         | $\Delta a_{x\text{tot}}^{**}$<br>Axial movement<br>mm | $C_{ax}$<br>Axial spring rate<br>N/mm | A* Effective bellows cross sectional area<br>cm <sup>2</sup> | $\varnothing D_a$<br>Bellows outer $\varnothing$<br>mm | $\varnothing d_i$<br>Internal guide sleeve $\varnothing$<br>mm | PN<br>Flange connection<br>EN1092 | $\varnothing D$<br>Flange outer $\varnothing$<br>mm | b<br>Flange thickness<br>mm | Weight<br>approx.<br>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        | 76                                                    | 119                                   | 422                                                          | 253                                                    | 193                                                            | 10                                | 340                                                 | 26                          | 35.2                    |
| 250  | 570        | 104                                                   | 312                                   | 620                                                          | 302                                                    | 246                                                            | 10                                | 395                                                 | 29                          | 46.0                    |
| 300  | 750        | 140                                                   | 91                                    | 993                                                          | 387                                                    | 291                                                            | 10                                | 445                                                 | 26                          | 91.0                    |
| 350  | 750        | 138                                                   | 99                                    | 1180                                                         | 419                                                    | 323                                                            | 10                                | 505                                                 | 30                          | 112.0                   |
| 400  | 750        | 136                                                   | 113                                   | 1511                                                         | 470                                                    | 373                                                            | 10                                | 565                                                 | 32                          | 126.0                   |
| 450  | 750        | 134                                                   | 126                                   | 1883                                                         | 521                                                    | 424                                                            | 10                                | 615                                                 | 36                          | 159.0                   |
| 500  | 750        | 132                                                   | 140                                   | 2287                                                         | 571                                                    | 475                                                            | 10                                | 670                                                 | 38                          | 183.0                   |
| 600  | 750        | 132                                                   | 167                                   | 3233                                                         | 673                                                    | 577                                                            | 10                                | 780                                                 | 42                          | 225.0                   |
| 700  |            |                                                       |                                       |                                                              |                                                        |                                                                |                                   |                                                     |                             |                         |
| 800  |            |                                                       |                                       |                                                              |                                                        |                                                                |                                   |                                                     |                             |                         |
| 900  |            |                                                       |                                       |                                                              |                                                        |                                                                |                                   |                                                     |                             |                         |
| 1000 | on request | on request                                            | on request                            | on request                                                   | on request                                             | on request                                                     | on request                        | on request                                          | on request                  | on request              |
| 1200 |            |                                                       |                                       |                                                              |                                                        |                                                                |                                   |                                                     |                             |                         |

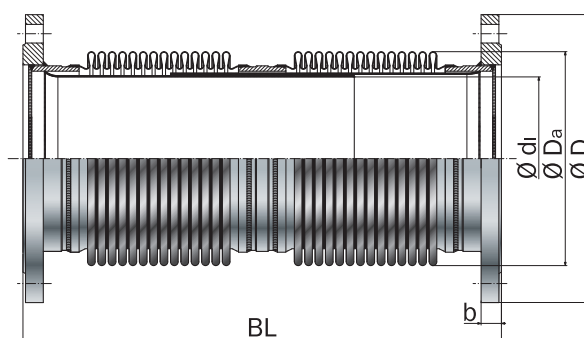
## PRESSURE RATE STANDARD PROGRAM PN 16

| DN  | BL  | $\Delta a_{x\text{tot}}^{**}$<br>Axial movement<br>mm | $C_{ax}$<br>Axial spring rate<br>N/mm | A* Effective bellows cross sectional area<br>cm <sup>2</sup> | $\varnothing D_a$<br>Bellows outer $\varnothing$<br>mm | $\varnothing d_i$<br>Internal guide sleeve $\varnothing$<br>mm | PN<br>Flange connection<br>EN1092 | $\varnothing D$<br>Flange outer $\varnothing$<br>mm | b<br>Flange thickness<br>mm | Weight<br>approx.<br>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 | 76                                                    | 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. \*\*This value represents the total possible movement. Example:  $\Delta a_{x\text{tot}} = 28\text{mm}$ . This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).



DN 15 - DN 100



DN 125 - DN 250

**Type SF-13** with inner guide sleeve

# STEEL EXPANSION JOINT TYPE SA-10

## AXIAL EXPANSION JOINT DN 15 – DN 2800



### STRUCTURE TYPE SA-10 STEEL BELLOWS PN 2,5, PN 6, PN 10, PN 16

- Vacuum-proof axial expansion joint consisting of a stainless steel bellows and welded pipe ends (welding ends)
- Multiple convolution bellows in various stainless steel grades
- Single ply or multi-ply structure

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

- Welded pipe ends

|                      | Standard                                       | Others               |
|----------------------|------------------------------------------------|----------------------|
| Dimensions           | see tables<br>page 117 – 119                   | on request           |
| Materials            | 1.0345 (P235GH),<br>1.0038 (S235JR),<br>1.4541 | stainless steel etc. |
| Corrosion protection | anti-corrosion primed                          | 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 axial movement
- for reducing tension, damping noise and oscillation in pipes and their system components, e.g.
  - compressors
  - engines
  - turbines
  - machines
  - process plants
- for installation in
  - industrial applications
  - exhaust systems
  - heating installations
  - gas supply lines

### SPECIAL DESIGN

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

### CERTIFICATES

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- Bureau Veritas
- DVGW (DN 32 – DN 200)
- RINA

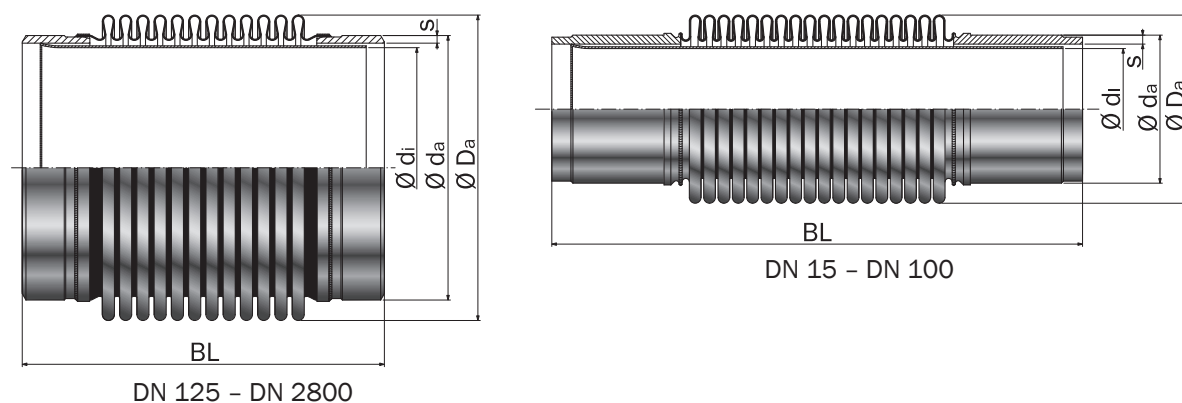
### ACCESSORIES

- Internal guide sleeve
- Protective tube

# PRESSURE RATE STANDARD PROGRAM PN 2,5

| DN   | BL  | $\Delta a_{x\text{tot}}^{**}$<br>Axial<br>move-<br>ment<br>mm | C <sub>ax</sub><br>Axial<br>spring<br>rate<br>N/mm | $\Delta l_{at\text{tot}}$<br>Lateral<br>move-<br>ment<br>mm | C <sub>lat</sub><br>Lateral<br>spring rate<br>N/mm | A*<br>Effective<br>bellows cross<br>sectional area<br>cm <sup>2</sup> | Ø D <sub>a</sub><br>Bellows<br>outer<br>Ø<br>mm | Ø d <sub>a</sub> x s<br>Pipe<br>connection<br>mm | Weight<br><br>approx.<br>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 | 106                                                           | 191                                                |                                                             |                                                    | 16536                                                                 | 1482                                            | 1420x10.0                                        | 85.0                        |
| 1600 | 245 | 42                                                            | 543                                                |                                                             |                                                    | 21408                                                                 | 1682                                            | 1620x10.0                                        | 80.0                        |
| 1600 | 370 | 106                                                           | 217                                                |                                                             |                                                    | 21408                                                                 | 1682                                            | 1620x10.0                                        | 97.0                        |
| 1800 | 245 | 42                                                            | 607                                                |                                                             |                                                    | 26909                                                                 | 1882                                            | 1820x10.0                                        | 90.0                        |
| 1800 | 370 | 106                                                           | 243                                                |                                                             |                                                    | 26909                                                                 | 1882                                            | 1820x10.0                                        | 109.0                       |
| 2000 | 245 | 42                                                            | 672                                                |                                                             |                                                    | 33039                                                                 | 2082                                            | 2020x10.0                                        | 100.0                       |
| 2000 | 370 | 106                                                           | 269                                                |                                                             |                                                    | 33039                                                                 | 2082                                            | 2020x10.0                                        | 121.0                       |
| 2200 | 245 | 42                                                            | 736                                                |                                                             |                                                    | 39796                                                                 | 2282                                            | 2220x10.0                                        | 110.0                       |
| 2200 | 370 | 106                                                           | 294                                                |                                                             |                                                    | 39796                                                                 | 2282                                            | 2220x10.0                                        | 133.0                       |
| 2400 | 245 | 42                                                            | 800                                                |                                                             |                                                    | 47182                                                                 | 2482                                            | 2420x10.0                                        | 120.0                       |
| 2400 | 370 | 106                                                           | 320                                                |                                                             |                                                    | 47182                                                                 | 2482                                            | 2420x10.0                                        | 145.0                       |
| 2800 | 245 | 42                                                            | 928                                                |                                                             |                                                    | 63839                                                                 | 2882                                            | 2820x10.0                                        | 139.0                       |
| 2800 | 370 | 105                                                           | 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 D<sub>ax</sub> and D<sub>lat</sub> 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. \*\*This value represents the total possible movement. Example:  $\Delta a_{x\text{tot}} = 28\text{mm}$ . This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).



**Type SA-10** with inner guide sleeve

# STEEL EXPANSION JOINT TYPE SA-10

## AXIAL EXPANSION JOINT DN 15 – DN 2800

### PRESSURE RATE STANDARD PROGRAM PN 6

| DN   | BL<br>mm | $\Delta a_{x_{tot}}^{**}$<br>Axial<br>movement<br>mm | C <sub>ax</sub><br>Axial<br>spring rate<br>N/mm | A* Effective<br>bellows cross<br>sectional area<br>cm <sup>2</sup> | Ø D <sub>a</sub><br>Bellows<br>outer Ø<br>mm | Ø d <sub>i</sub><br>Internal guide<br>sleeve Ø<br>mm | Ø d <sub>a</sub> x s<br>Pipe<br>connection<br>mm | Weight<br>approx.<br>kg |
|------|----------|------------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------|----------------------------------------------|------------------------------------------------------|--------------------------------------------------|-------------------------|
| 15   | 175      | 24                                                   | 49                                              | 7                                                                  | 38                                           | 14                                                   | 21,3x2,0                                         | 0,4                     |
| 20   | 175      | 24                                                   | 49                                              | 7                                                                  | 38                                           | 18                                                   | 26,9x2,3                                         | 0,4                     |
| 25   | 185      | 20                                                   | 49                                              | 16                                                                 | 54                                           | 24                                                   | 33,7x2,6                                         | 0,6                     |
| 32   | 185      | 20                                                   | 49                                              | 16                                                                 | 54                                           | 32                                                   | 42,4x2,9                                         | 0,5                     |
| 40   | 190      | 26                                                   | 67                                              | 25                                                                 | 66                                           | 37                                                   | 48,3x2,6                                         | 0,6                     |
| 50   | 205      | 34                                                   | 87                                              | 36                                                                 | 79                                           | 51                                                   | 60,3x2,9                                         | 0,8                     |
| 65   | 230      | 36                                                   | 102                                             | 54                                                                 | 96                                           | 64                                                   | 76,1x2,9                                         | 1,4                     |
| 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      | 38                                                   | 237                                             | 422                                                                | 253                                          | 199                                                  | 219,1x6,3                                        | 6,8                     |
| 250  | 300      | 38                                                   | 624                                             | 620                                                                | 302                                          | 251                                                  | 273,0x6,3                                        | 8,3                     |
| 300  | 255      | 29                                                   | 455                                             | 993                                                                | 387                                          | 294                                                  | 323,9x8,0                                        | 13                      |
| 300  | 400      | 74                                                   | 182                                             | 993                                                                | 387                                          | 294                                                  | 323,9x8,0                                        | 20                      |
| 350  | 255      | 29                                                   | 496                                             | 1180                                                               | 419                                          | 326                                                  | 355,6x8,0                                        | 14                      |
| 350  | 400      | 73                                                   | 199                                             | 1180                                                               | 419                                          | 326                                                  | 355,6x8,0                                        | 22                      |
| 400  | 255      | 28                                                   | 564                                             | 1511                                                               | 470                                          | 376                                                  | 406,4x8,0                                        | 17                      |
| 400  | 400      | 72                                                   | 226                                             | 1511                                                               | 470                                          | 376                                                  | 406,4x8,0                                        | 25                      |
| 450  | 255      | 28                                                   | 632                                             | 1883                                                               | 521                                          | 427                                                  | 457x8,0                                          | 19                      |
| 450  | 400      | 71                                                   | 253                                             | 1883                                                               | 521                                          | 427                                                  | 457x8,0                                          | 29                      |
| 500  | 255      | 28                                                   | 699                                             | 2287                                                               | 571                                          | 478                                                  | 508x8,0                                          | 21                      |
| 500  | 400      | 71                                                   | 280                                             | 2287                                                               | 571                                          | 478                                                  | 508x8,0                                          | 25                      |
| 600  | 255      | 28                                                   | 835                                             | 3233                                                               | 673                                          | 580                                                  | 610x8,0                                          | 25                      |
| 600  | 400      | 70                                                   | 334                                             | 3233                                                               | 673                                          | 580                                                  | 610x8,0                                          | 30                      |
| 700  | 255      | 27                                                   | 970                                             | 4343                                                               | 775                                          | 681                                                  | 711x8,0                                          | 29                      |
| 700  | 400      | 69                                                   | 388                                             | 4343                                                               | 775                                          | 681                                                  | 711x8,0                                          | 36                      |
| 800  | 255      | 27                                                   | 1104                                            | 5603                                                               | 876                                          | 783                                                  | 813x8,0                                          | 33                      |
| 800  | 400      | 69                                                   | 442                                             | 5603                                                               | 876                                          | 783                                                  | 813x8,0                                          | 41                      |
| 900  | 255      | 27                                                   | 1236                                            | 7023                                                               | 977                                          | 880                                                  | 914x10,0                                         | 44                      |
| 900  | 400      | 68                                                   | 495                                             | 7023                                                               | 977                                          | 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      | 67                                                   | 861                                             | 21424                                                              | 1683                                         | 1586                                                 | 1620x10,0                                        | 116                     |
| 1800 | 255      | 27                                                   | 2410                                            | 26927                                                              | 1883                                         | 1786                                                 | 1820x10,0                                        | 99                      |
| 1800 | 400      | 67                                                   | 964                                             | 26927                                                              | 1883                                         | 1786                                                 | 1820x10,0                                        | 130                     |
| 2000 | 255      | 27                                                   | 2667                                            | 33058                                                              | 2083                                         | 1986                                                 | 2020x10,0                                        | 110                     |
| 2000 | 400      | 67                                                   | 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. \*\*This value represents the total possible movement.

Example:  $\Delta a_{x_{tot}} = 28\text{mm}$ . This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).

## PRESSURE RATE STANDARD PROGRAM PN 10

| DN   | BL<br>mm | $\Delta a_{x\text{tot}}^{**}$<br>Axial<br>movement<br>mm | $C_{ax}$<br>Axial<br>spring rate<br>N/mm | A* Effective<br>bellows cross<br>sectional area<br>cm <sup>2</sup> | $\varnothing D_a$<br>Bellows<br>outer $\varnothing$<br>mm | $\varnothing d_i$<br>Internal guide<br>sleeve $\varnothing$<br>mm | $\varnothing d_a \times s$<br>Pipe<br>connection<br>mm | Weight<br>approx.<br>kg |
|------|----------|----------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------|-------------------------|
| 15   | 175      | 24                                                       | 49                                       | 7                                                                  | 38                                                        | 14                                                                | 21.3x2.0                                               | 0.4                     |
| 20   | 175      | 24                                                       | 49                                       | 7                                                                  | 38                                                        | 18                                                                | 26.9x2.3                                               | 0.4                     |
| 25   | 185      | 20                                                       | 49                                       | 16                                                                 | 54                                                        | 24                                                                | 33.7x2.6                                               | 0.6                     |
| 32   | 185      | 20                                                       | 49                                       | 16                                                                 | 54                                                        | 32                                                                | 42.4x2.9                                               | 0.5                     |
| 40   | 190      | 26                                                       | 67                                       | 25                                                                 | 66                                                        | 37                                                                | 48.3x2.6                                               | 0.6                     |
| 50   | 205      | 34                                                       | 87                                       | 36                                                                 | 79                                                        | 51                                                                | 60.3x2.9                                               | 0.8                     |
| 65   | 230      | 36                                                       | 102                                      | 54                                                                 | 96                                                        | 64                                                                | 76.1x2.9                                               | 1.4                     |
| 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      | 38                                                       | 237                                      | 422                                                                | 253                                                       | 199                                                               | 219.1x6.3                                              | 6.8                     |
| 250  | 300      | 38                                                       | 624                                      | 620                                                                | 302                                                       | 251                                                               | 273.0x6.3                                              | 8.3                     |
| 300  | 255      | 28                                                       | 455                                      | 993                                                                | 387                                                       | 294                                                               | 323.9x8.0                                              | 16                      |
| 300  | 400      | 62                                                       | 220                                      | 982                                                                | 383                                                       | 294                                                               | 323.9x8.0                                              | 20                      |
| 350  | 255      | 27                                                       | 496                                      | 1180                                                               | 419                                                       | 326                                                               | 355.6x8.0                                              | 17                      |
| 350  | 400      | 66                                                       | 218                                      | 1174                                                               | 417                                                       | 326                                                               | 355.6x8.0                                              | 22                      |
| 400  | 255      | 27                                                       | 564                                      | 1511                                                               | 470                                                       | 376                                                               | 406.4x8.0                                              | 20                      |
| 400  | 400      | 67                                                       | 226                                      | 1511                                                               | 470                                                       | 376                                                               | 406.4x8.0                                              | 25                      |
| 450  | 255      | 27                                                       | 632                                      | 1883                                                               | 521                                                       | 427                                                               | 457x8.0                                                | 22                      |
| 450  | 400      | 67                                                       | 253                                      | 1883                                                               | 521                                                       | 427                                                               | 457x8.0                                                | 29                      |
| 500  | 255      | 26                                                       | 699                                      | 2287                                                               | 571                                                       | 478                                                               | 508x8.0                                                | 25                      |
| 500  | 400      | 66                                                       | 280                                      | 2287                                                               | 571                                                       | 478                                                               | 508x8.0                                                | 32                      |
| 600  | 255      | 26                                                       | 835                                      | 3233                                                               | 673                                                       | 580                                                               | 610x8.0                                                | 30                      |
| 600  | 400      | 66                                                       | 334                                      | 3233                                                               | 673                                                       | 580                                                               | 610x8.0                                                | 38                      |
| 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 | 260      | 21                                                       | 3135                                     | 12311                                                              | 1284                                                      | 1185                                                              | 1219x10.0                                              | 70                      |
| 1200 | 410      | 54                                                       | 1254                                     | 12311                                                              | 1284                                                      | 1185                                                              | 1219x10.0                                              | 96                      |

## PRESSURE RATE STANDARD PROGRAM PN 16

| DN   | BL<br>mm | $\Delta a_{x\text{tot}}^{**}$<br>Axial<br>movement<br>mm | $C_{ax}$<br>Axial<br>spring rate<br>N/mm | A* Effective<br>bellows cross<br>sectional area<br>cm <sup>2</sup> | $\varnothing D_a$<br>Bellows<br>outer $\varnothing$<br>mm | $\varnothing d_i$<br>Internal guide<br>sleeve $\varnothing$<br>mm | $\varnothing d_a \times s$<br>Pipe<br>connection<br>mm | Weight<br>approx.<br>kg |
|------|----------|----------------------------------------------------------|------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------|-------------------------|
| 15   | 175      | 24                                                       | 49                                       | 7                                                                  | 38                                                        | 14                                                                | 21.3x2.0                                               | 0.4                     |
| 20   | 175      | 24                                                       | 49                                       | 7                                                                  | 38                                                        | 18                                                                | 26.9x2.3                                               | 0.4                     |
| 25   | 185      | 20                                                       | 49                                       | 16                                                                 | 54                                                        | 24                                                                | 33.7x2.6                                               | 0.6                     |
| 32   | 185      | 20                                                       | 49                                       | 16                                                                 | 54                                                        | 32                                                                | 42.4x2.9                                               | 0.5                     |
| 40   | 190      | 26                                                       | 67                                       | 25                                                                 | 66                                                        | 37                                                                | 48.3x2.6                                               | 0.6                     |
| 50   | 205      | 34                                                       | 87                                       | 36                                                                 | 79                                                        | 51                                                                | 60.3x2.9                                               | 0.8                     |
| 65   | 230      | 36                                                       | 102                                      | 54                                                                 | 96                                                        | 64                                                                | 76.1x2.9                                               | 1.4                     |
| 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      | 38                                                       | 237                                      | 422                                                                | 253                                                       | 199                                                               | 219.1x6.3                                              | 6.8                     |
| 250  | 300      | 38                                                       | 624                                      | 620                                                                | 302                                                       | 251                                                               | 273.0x6.3                                              | 8.3                     |
| 300  | 260      | 22                                                       | 863                                      | 995                                                                | 388                                                       | 294                                                               | 323.9x8.0                                              | 16                      |
| 300  | 410      | 52                                                       | 379                                      | 990                                                                | 386                                                       | 294                                                               | 323.9x8.0                                              | 22                      |
| 350  | 260      | 21                                                       | 946                                      | 1182                                                               | 420                                                       | 326                                                               | 355.6x8.0                                              | 17                      |
| 350  | 410      | 54                                                       | 379                                      | 1182                                                               | 420                                                       | 326                                                               | 355.6x8.0                                              | 25                      |
| 400  | 260      | 21                                                       | 1078                                     | 1514                                                               | 471                                                       | 376                                                               | 406.4x8.0                                              | 20                      |
| 400  | 410      | 54                                                       | 431                                      | 1514                                                               | 471                                                       | 376                                                               | 406.4x8.0                                              | 28                      |
| 450  | 260      | 21                                                       | 1210                                     | 1886                                                               | 522                                                       | 427                                                               | 457.0x8.0                                              | 22                      |
| 450  | 410      | 53                                                       | 484                                      | 1886                                                               | 522                                                       | 427                                                               | 457.0x8.0                                              | 32                      |
| 500  | 260      | 21                                                       | 1338                                     | 2290                                                               | 572                                                       | 478                                                               | 508.0x8.0                                              | 25                      |
| 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  | 270      | 22                                                       | 3486                                     | 7044                                                               | 980                                                       | 880                                                               | 914.0x10.0                                             | 53                      |
| 900  | 430      | 56                                                       | 1394                                     | 7044                                                               | 980                                                       | 880                                                               | 914.0x10.0                                             | 83                      |
| 1000 | 270      | 22                                                       | 3860                                     | 8643                                                               | 1082                                                      | 982                                                               | 1016.0x10.0                                            | 59                      |
| 1000 | 430      | 56                                                       | 1544                                     | 8643                                                               | 1082                                                      | 982                                                               | 1016.0x10.0                                            | 92                      |

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. \*\*This value represents the total possible movement. Example:  $\Delta a_{x\text{tot}} = 28\text{ mm}$ . This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm). [www.stenflex.com](http://www.stenflex.com) / [info@stenflex.com](mailto:info@stenflex.com)

## STEEL EXPANSION JOINT TYPE SA-13

### AXIAL EXPANSION JOINT DN 15 – DN 1200



#### STRUCTURE TYPE SA-13 / STEEL BELLOWS PN 16

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

| Material grade* | Material No. as per DIN EN | Temperature**            | Possible uses                                                            |
|-----------------|----------------------------|--------------------------|--------------------------------------------------------------------------|
| Stainless steel | 1.4541                     | -196 °C<br>up to +550 °C | Low temperature, acids, lyes, gases, fertilizers                         |
|                 | 1.4404<br>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.

#### VERSIONS: WELDING ENDS/CONNECTING PIPE

- Welded pipe ends and connecting pipe

|                      | Standard                             | Others               |
|----------------------|--------------------------------------|----------------------|
| Dimensions           | see tables<br>page 121               | on request           |
| Materials            | 1.0345 (P235GH),<br>1.0038 (S235JR), | stainless steel etc. |
| Corrosion protection | anti-corrosion primed                | 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
- for gas supply lines

#### GUIDE SLEEVE

##### Materials

Standard: 1.4541

#### SPECIAL DESIGN

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

#### CERTIFICATES

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- Bureau Veritas
- DVGW (DN 32 – DN 200)
- RINA

#### ACCESSORIES

- Protective tube

# PRESSURE RATE STANDARD PROGRAM PN 16

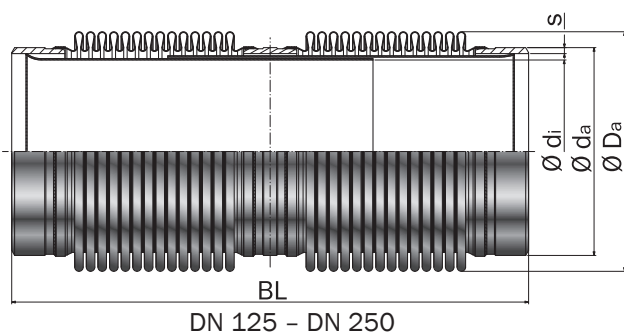
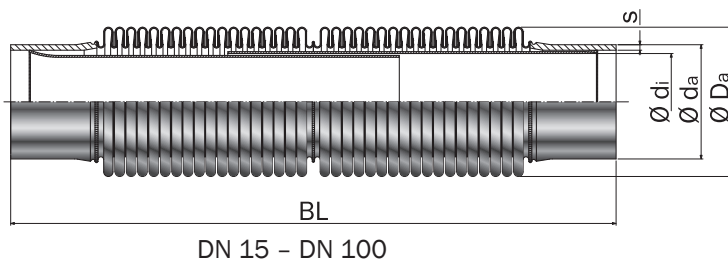
| DN  | BL  | $\Delta a_{x\text{tot}}^{**}$<br>Axial movement | $C_{ax}$<br>Axial spring rate | $A^*$<br>Effective bellows cross sectional area | $\varnothing D_a$<br>Bellows outer $\varnothing$ | $\varnothing d_i$<br>Internal guide sleeve $\varnothing$ | $\varnothing d_a \times s$<br>Pipe connection | Weight<br>approx. kg |
|-----|-----|-------------------------------------------------|-------------------------------|-------------------------------------------------|--------------------------------------------------|----------------------------------------------------------|-----------------------------------------------|----------------------|
|     | mm  | mm                                              | N/mm                          | cm <sup>2</sup>                                 | mm                                               | mm                                                       | mm                                            |                      |
| 15  | 260 | 48                                              | 25                            | 7                                               | 38                                               | 14                                                       | 21.3x2.0                                      | 0.7                  |
| 20  | 260 | 48                                              | 25                            | 7                                               | 38                                               | 18                                                       | 26.9x2.3                                      | 0.7                  |
| 25  | 270 | 40                                              | 25                            | 16                                              | 54                                               | 24                                                       | 33.7x2.6                                      | 1.0                  |
| 32  | 270 | 40                                              | 25                            | 16                                              | 54                                               | 32                                                       | 42.4x2.9                                      | 1.0                  |
| 40  | 300 | 52                                              | 34                            | 25                                              | 66                                               | 37                                                       | 48.3x2.6                                      | 1.1                  |
| 50  | 320 | 68                                              | 44                            | 36                                              | 79                                               | 47                                                       | 60.3x2.9                                      | 1.9                  |
| 65  | 357 | 72                                              | 51                            | 54                                              | 96                                               | 60                                                       | 76.1x2.9                                      | 2.8                  |
| 80  | 358 | 80                                              | 40                            | 78                                              | 116                                              | 74                                                       | 88.9x3.2                                      | 3.6                  |
| 100 | 386 | 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 | 76                                              | 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.

\*\*This value represents the total possible movement. Example:  $\Delta a_{x\text{tot}}$  = 28mm. This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).



**Type SA-13** with inner guide sleeve

# STEEL EXPANSION JOINT TYPE SG-10

## AXIAL EXPANSION JOINT DN 15 – 50 MALE THREAD



### STRUCTURE TYPE SG-10 / STEEL BELLOWS PN 16

- Vacuum-proof axial expansion joint consisting of a stainless steel bellows and threaded connection parts
- Connection parts with hexagon insert bit and male thread
- Multiple convolution bellows in various stainless steel grades
- Single ply structure

| Material grade* | Material No. as per DIN EN | Temperature**            | Possible uses                                                            |
|-----------------|----------------------------|--------------------------|--------------------------------------------------------------------------|
| Stainless steel | 1.4541                     | -196 °C<br>up to +550 °C | Low temperature, acids, lyes, gases, fertilizers                         |
|                 | 1.4404<br>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.

### VERSIONS / THREADED CONNECTION PARTS

- Male thread

|            | Standard                            | Others               |
|------------|-------------------------------------|----------------------|
| Dimensions | R 1/2" - R 2"<br>ISO 7-1 (DIN 2999) | on request           |
| Materials  | 1.4541                              | stainless steel etc. |

### PRESSURE RATE STANDARD PROGRAM PN 16

| DN | BL  | D <sub>ax tot</sub> ** | C <sub>ax</sub> | A* Effective                                 | Ø D <sub>a</sub> | Ø D <sub>1</sub> | L  | SW | Weight     |
|----|-----|------------------------|-----------------|----------------------------------------------|------------------|------------------|----|----|------------|
|    | mm  | mm                     | mm              | bellows cross sectional area cm <sup>2</sup> | mm               | inch             | mm | mm | approx. kg |
| 15 | 125 | 24                     | 49              | 7                                            | 38               | R 1/2"           | 13 | 32 | 0.2        |
| 20 | 130 | 24                     | 49              | 7                                            | 38               | R 3/4"           | 15 | 32 | 0.2        |
| 25 | 145 | 20                     | 49              | 16                                           | 54               | R 1"             | 17 | 46 | 0.5        |
| 32 | 185 | 20                     | 49              | 16                                           | 54               | R 1 1/4"         | 19 | -  | 0.5        |
| 40 | 200 | 26                     | 67              | 25                                           | 66               | R 1 1/2"         | 19 | -  | 0.8        |
| 50 | 225 | 34                     | 87              | 35                                           | 79               | R 2"             | 24 | -  | 1.2        |

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.

\*\*This value represents the total possible movement. Example:  $\Delta x_{tot} = 28$  mm. This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm).

### NOTE

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

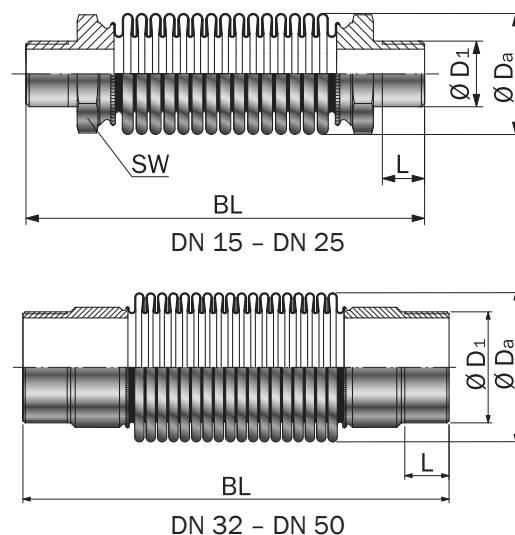
Subject to technical alterations and deviations resulting from the manufacturing process.

### APPLICATIONS

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

### CERTIFICATES

- CE (PED 2014/68/EU)



Type SG-10

# STEEL EXPANSION JOINT TYPE SG-11

## AXIAL EXPANSION JOINT DN 15 – 50 FEMALE THREAD



### STRUCTURE TYPE SG-11 / STEEL BELLOWS PN 16

- 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
- Multiple convolution bellows in various stainless steel grades
- Single ply structure

| Material grade* | Material No. as per DIN EN | Temperature**            | Possible uses                                                            |
|-----------------|----------------------------|--------------------------|--------------------------------------------------------------------------|
| Stainless steel | 1.4541                     | -196 °C<br>up to +550 °C | Low temperature, acids, lyes, gases, fertilizers                         |
|                 | 1.4404<br>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.

### VERSIONS / THREADED CONNECTION PARTS

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

|                      | Standard                                              |
|----------------------|-------------------------------------------------------|
| Dimensions           | Female thread Rp 1/2" - Rp 2" acc. ISO 7-1 (DIN 2999) |
| Materials            | GJMW-400-5 (malleable casting)                        |
| Corrosion protection | electrogalvanized                                     |

### PRESSURE RATE STANDARD PROGRAM PN 16

| DN | BL  | GL  | D <sub>ax tot</sub> **<br>Axial movement<br>mm | C <sub>ax</sub><br>Axial spring rate<br>N/mm | A* Effective bellows cross sectional area<br>cm <sup>2</sup> | Ø D <sub>a</sub><br>Bellows outer Ø<br>mm | Ø D <sub>2</sub><br>Female thread Ø<br>inch | Ø D <sub>3</sub><br>Union nut Ø<br>inch | SW <sub>1</sub><br>Width across<br>mm | SW <sub>2</sub><br>Width across<br>mm | Weight<br>approx.<br>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. \*\*This value represents the total possible movement. Example:

Δ a<sub>tot</sub> = 28mm. This means that the expansion joint has a total movement value of 28 mm (= +/- 14 mm). [www.stenflex.com](http://www.stenflex.com) / [info@stenflex.com](mailto:info@stenflex.com)

### NOTE

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

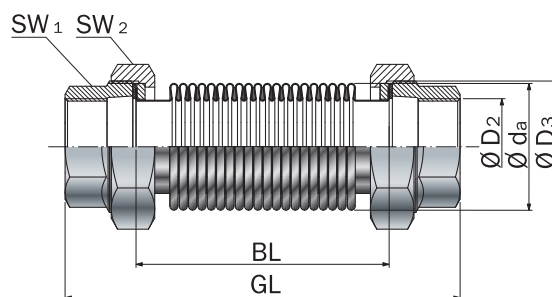
Subject to technical alterations and deviations resulting from the manufacturing process.

### APPLICATIONS

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

### CERTIFICATES

- CE (PED 2014/68/EU)
- DVGW (DN 25 -DN 50)



Type SG-11

# STEEL EXPANSION JOINT TYPE SF-20

## LATERAL EXPANSION JOINT DN 32 – DN 500



### STRUCTURE TYPE SF-20 / STEEL BELLOWS PN 10, 16

- Vacuum-proof, short-length lateral expansion joint, consisting of a stainless steel bellows and rotatable flanges
- Rotatable flanges with tie rods to absorb reaction force
- Multiple convolution bellows in various stainless steel grades
- Single ply or multi-ply structure

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

- Rotatable flanges
- Flange drilling for through bolts

|                      | Standard                                     |                                          | Others                                                                 |
|----------------------|----------------------------------------------|------------------------------------------|------------------------------------------------------------------------|
| Dimensions           | DN 32 – DN 500<br>acc. EN 1092-1<br>PN 10/16 |                                          | ANSI, BS etc. Connection dimensions see technical annex page 213 – 215 |
| Materials            | 1.0038 (S235JR), 1.4541                      |                                          | stainless steel etc.                                                   |
| Corrosion protection | DN 32 – DN 250<br>electro-galvanized         | DN 300 – DN 500<br>anti-corrosion primed | 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
  - engines
  - 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

- External restraints carried on spherical washers/conical seats

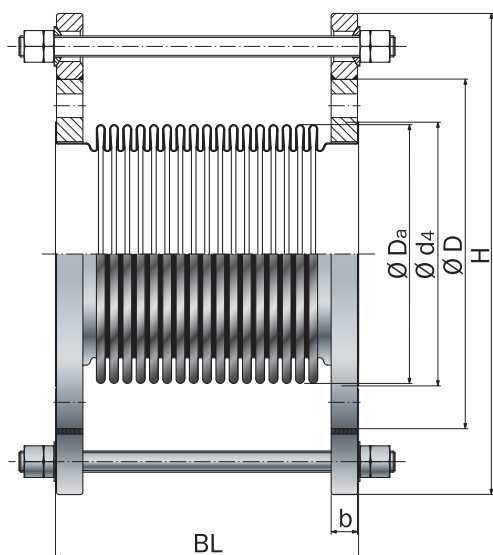
#### Materials

Standard: tie rods 8.8

Others: stainless steel

#### Corrosion protection

Standard: electrogalvanized

**Type SF-20**

External restraints, carried on spherical washers/conical seats (ball joint)

**SPECIAL DESIGN**

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

**CERTIFICATES**

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- Bureau Veritas
- DVGW (DN 32 – DN 200)
- DNV GL® / DNV®
- RINA

**ACCESSORIES**

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

**PRESSURE RATE STANDARD PROGRAM PN 10**

| DN  | BL  | $\Delta \text{lat}_{\text{tot}}$<br>Lateral<br>movement | C <sub>lat</sub><br>Lateral<br>spring rate | F <sub>fric</sub><br>Friction force<br>restraints | Ø d <sub>4</sub><br>Flared<br>end<br>Ø | Ø D <sub>a</sub><br>Bellows<br>outer<br>Ø | PN<br>Flange<br>connection | Ø D<br>Flange<br>outer<br>Ø | H<br>Flange<br>height | b<br>Flange<br>thickness | Weight<br>approx.<br>kg |
|-----|-----|---------------------------------------------------------|--------------------------------------------|---------------------------------------------------|----------------------------------------|-------------------------------------------|----------------------------|-----------------------------|-----------------------|--------------------------|-------------------------|
|     | mm  | mm                                                      | N/mm                                       | N/bar                                             | mm                                     | mm                                        | EN1092                     | mm                          | mm                    | mm                       |                         |
| 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 | 9                                                       | 715                                        | 93                                                | 254                                    | 253                                       | 10                         | 340                         | 457                   | 24                       | 27.0                    |
| 250 | 245 | 8                                                       | 2571                                       | 130                                               | 310                                    | 302                                       | 10                         | 395                         | 512                   | 26                       | 33.9                    |
| 300 | 295 | 10                                                      | 1152                                       | 175                                               | 364                                    | 387                                       | 10                         | 445                         | 570                   | 26                       | 48.0                    |
| 350 | 305 | 9                                                       | 1493                                       | 202                                               | 396                                    | 419                                       | 10                         | 505                         | 630                   | 30                       | 65.0                    |
| 400 | 310 | 8                                                       | 2171                                       | 255                                               | 452                                    | 470                                       | 10                         | 565                         | 690                   | 32                       | 78.0                    |
| 450 | 315 | 7                                                       | 3034                                       | 440                                               | 498                                    | 521                                       | 10                         | 615                         | 793                   | 36                       | 108.0                   |
| 500 | 320 | 6                                                       | 4074                                       | 528                                               | 548                                    | 571                                       | 10                         | 670                         | 848                   | 38                       | 123.0                   |

**PRESSURE RATE STANDARD PROGRAM PN 16**

| DN  | BL  | $\Delta \text{lat}_{\text{tot}}$<br>Lateral<br>movement | C <sub>lat</sub><br>Lateral<br>spring rate | F <sub>fric</sub><br>Friction force<br>restraints | Ø d <sub>4</sub><br>Flared<br>end<br>Ø | Ø D <sub>a</sub><br>Bellows<br>outer<br>Ø | PN<br>Flange<br>connection | Ø D<br>Flange<br>outer<br>Ø | H<br>Flange<br>height | b<br>Flange<br>thickness | Weight<br>approx.<br>kg |
|-----|-----|---------------------------------------------------------|--------------------------------------------|---------------------------------------------------|----------------------------------------|-------------------------------------------|----------------------------|-----------------------------|-----------------------|--------------------------|-------------------------|
|     | mm  | mm                                                      | N/mm                                       | N/bar                                             | mm                                     | mm                                        | EN1092                     | mm                          | mm                    | mm                       |                         |
| 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 | 9                                                       | 715                                        | 93                                                | 254                                    | 253                                       | 16                         | 340                         | 457                   | 26                       | 28.1                    |
| 250 | 245 | 8                                                       | 2571                                       | 130                                               | 310                                    | 302                                       | 16                         | 405                         | 570                   | 29                       | 47.0                    |
| 300 | 320 | 8                                                       | 2051                                       | 163                                               | 364                                    | 388                                       | 16                         | 460                         | 584                   | 32                       | 63.0                    |
| 350 | 325 | 7                                                       | 2671                                       | 191                                               | 396                                    | 420                                       | 16                         | 520                         | 644                   | 35                       | 82.0                    |
| 400 | 330 | 6                                                       | 3896                                       | 242                                               | 452                                    | 471                                       | 16                         | 580                         | 704                   | 38                       | 105.0                   |
| 450 | 340 | 5                                                       | 5446                                       | 415                                               | 498                                    | 522                                       | 16                         | 640                         | 820                   | 42                       | 144.0                   |
| 500 | 345 | 5                                                       | 7317                                       | 499                                               | 548                                    | 572                                       | 16                         | 715                         | 893                   | 46                       | 193.0                   |

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.

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## STEEL EXPANSION JOINT TYPE SF-21

### LATERAL EXPANSION JOINT DN 32 – DN 500



#### STRUCTURE TYPE SF-21 / STEEL BELLOWS PN 16

- Vacuum-proof lateral expansion joint consisting of a stainless steel bellows and welded flanges
- Flanges with tie rods to absorb reaction force
- Multiple convolution bellows in various stainless steel grades
- Single ply or multi-ply structure

| Material grade* | Material No. as per DIN EN | Temperature**            | Possible uses                                                            |
|-----------------|----------------------------|--------------------------|--------------------------------------------------------------------------|
| Stainless steel | 1.4541                     | -196 °C<br>up to +550 °C | Low temperature, acids, lyes, gases, fertilizers                         |
|                 | 1.4404<br>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 / VERSIONS

- Welded flanges with turned seal
- Flange drilling for through bolts

|                             | Standard                                     | Others                                                                       |
|-----------------------------|----------------------------------------------|------------------------------------------------------------------------------|
| <b>Dimensions</b>           | DN 32 – DN 500<br>acc. EN 1092-1<br>PN 10/16 | ANSI, BS etc. Connection<br>dimensions see technical<br>annex page 213 – 215 |
| <b>Materials</b>            | 1.0038 (S235JR)<br>1.0460 (P250GH)           | stainless steel etc.                                                         |
| <b>Corrosion protection</b> | anti-corrosion primed                        | 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 lateral movement
- for reducing tension, in pipes and their system components, e.g.
  - pumps
  - compressors
  - engines
  - turbines
  - machines
  - process plants
- for installation in
  - industrial applications
  - gas and water supply
  - exhaust systems
  - heating installations
- to compensate for installation inaccuracies

#### TIE ROD RESTRAINTS

- External restraints carried on spherical washers/conical seats

##### Materials

Standard: tie rods 8.8

Others: stainless steel

##### Corrosion protection

Standard: electrogalvanized

#### SPECIAL DESIGN

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

#### CERTIFICATES

- CE (PED 2014/68/EU)
- American Bureau of Shipping
- Bureau Veritas
- DVGW (DN 32 – DN 200)
- RINA

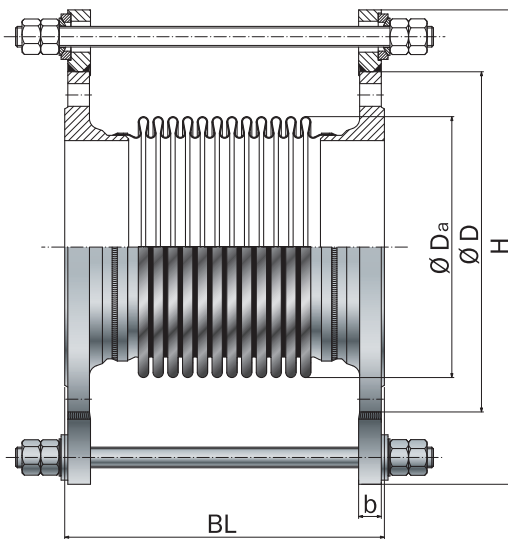
**ACCESSORIES**

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

**PRESSURE RATE STANDARD PROGRAM PN 16**

| DN  | BL  | $\Delta \text{lat}_{\text{tot}}$<br>Lateral<br>movement | $C_{\text{lat}}$<br>Lateral<br>spring rate | $F_{\text{fric}}$<br>Friction force<br>restraints | $\varnothing D_a$<br>Bellows<br>outer<br>$\varnothing$<br>mm | PN<br>Flange<br>connection | $\varnothing D$<br>Flange<br>outer<br>$\varnothing$<br>mm | H<br>Flange<br>height | b<br>Flange<br>thickness | Weight<br>approx.<br>kg |
|-----|-----|---------------------------------------------------------|--------------------------------------------|---------------------------------------------------|--------------------------------------------------------------|----------------------------|-----------------------------------------------------------|-----------------------|--------------------------|-------------------------|
|     | mm  | mm                                                      | N/mm                                       | N/bar                                             |                                                              | EN1092                     | mm                                                        | mm                    | mm                       |                         |
| 32  | 150 | 8                                                       | 28                                         | 4                                                 | 54                                                           | 16                         | 140                                                       | 220                   | 18                       | 4.9                     |
| 40  | 175 | 10                                                      | 125                                        | 5                                                 | 66                                                           | 16                         | 150                                                       | 230                   | 18                       | 5.4                     |
| 50  | 205 | 14                                                      | 157                                        | 6                                                 | 79                                                           | 16                         | 165                                                       | 245                   | 18                       | 6.5                     |
| 65  | 210 | 14                                                      | 237                                        | 9                                                 | 96                                                           | 16                         | 185                                                       | 265                   | 18                       | 7.6                     |
| 80  | 225 | 13                                                      | 278                                        | 12                                                | 115                                                          | 16                         | 200                                                       | 280                   | 20                       | 9.7                     |
| 100 | 235 | 14                                                      | 302                                        | 18                                                | 137                                                          | 16                         | 220                                                       | 300                   | 20                       | 10.9                    |
| 125 | 265 | 14                                                      | 156                                        | 35                                                | 168                                                          | 16                         | 250                                                       | 370                   | 22                       | 19.0                    |
| 150 | 290 | 14                                                      | 313                                        | 45                                                | 197                                                          | 16                         | 285                                                       | 405                   | 22                       | 22.6                    |
| 200 | 310 | 9                                                       | 761                                        | 73                                                | 253                                                          | 16                         | 340                                                       | 460                   | 24                       | 33.0                    |
| 250 | 335 | 8                                                       | 2571                                       | 101                                               | 302                                                          | 16                         | 405                                                       | 525                   | 26                       | 44.2                    |
| 300 | 410 | 12                                                      | 1145                                       | 131                                               | 386                                                          | 16                         | 460                                                       | 584                   | 28                       | 71.0                    |
| 350 | 415 | 11                                                      | 1368                                       | 155                                               | 420                                                          | 16                         | 520                                                       | 644                   | 30                       | 94.0                    |
| 400 | 420 | 10                                                      | 1995                                       | 197                                               | 471                                                          | 16                         | 580                                                       | 704                   | 32                       | 118.0                   |
| 450 | 420 | 9                                                       | 2788                                       | 350                                               | 522                                                          | 16                         | 640                                                       | 818                   | 34                       | 153.0                   |
| 500 | 420 | 8                                                       | 3746                                       | 425                                               | 572                                                          | 16                         | 715                                                       | 893                   | 36                       | 193.0                   |

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.

**Type SF-21**

External restraints, carried on spherical washers/conical seats (ball joint)