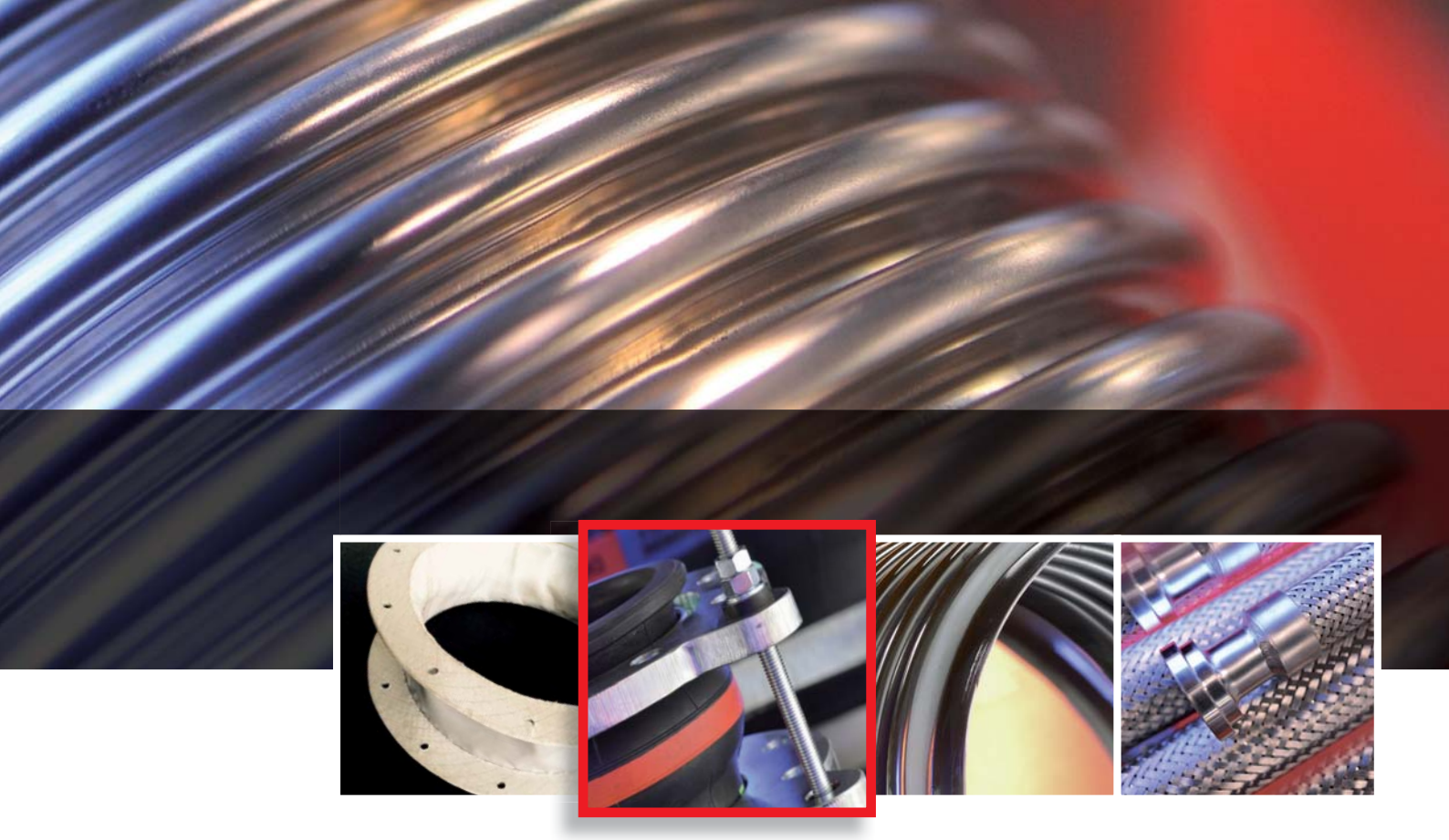

Rubber
expansion joints

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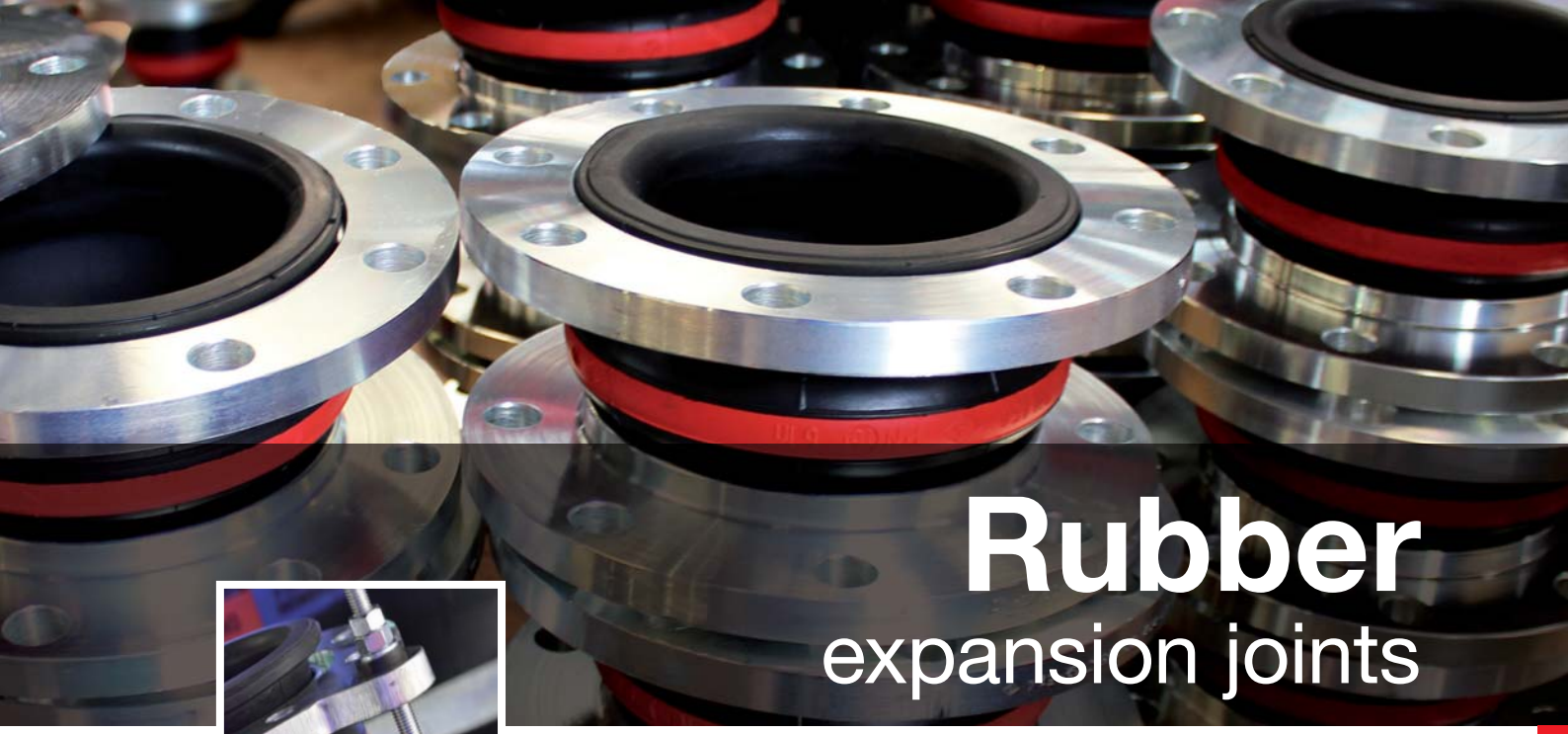


Rubber
expansion joints

Introduction

Rubber expansion joints are flexible connecting elements manufactured of natural or synthetic elastomers, fluoro-plastics and fabrics used to absorb movements in a piping system while containing pressure and a medium running through it. Sometimes it is necessary to include metallic reinforcements to assure proper and safe operation of the expansion joint.

ROTH rubber expansion joints are designed according to the Pressure Equipment Directive PED 97/23/EC for the specified operating conditions and are available with DVGW approval for gas or with TÜV approval for heating applications acc. to DIN4809.

Rubber expansion joints are used in heating systems, air-conditioning and ventilation systems, power plants, refineries, chemical plants, ship-building and many other industries. Their outstanding features are high absorption of movements and excellent noise reduction.

ROTH rubber expansion joints are designed and manufactured considering all environment related factors, including the following:

- Chemical resistance of internal layers;
- Temperature resistance of internal layers;
- Pressure-resistant reinforcing fabrics;
- Weather conditions;
- Ozone and UV-resistance of external layers.

Available with flanges or threaded connectors, ROTH rubber expansion joints are versatile and convenient solutions for most piping systems. They provide high flexibility, wide movement compensation, good environmental resistance and easy installation.

Type A

Applications, Construction

ROTH rubber expansion joints are used in heating systems, air-conditioning and ventilation systems, power plants, refineries, chemical plants, ship-building and many other industries. The outstanding features are high absorption of movements and excellent noise reduction.

According to their individual applications, different rubber qualities are available. Fabrics that are reinforced with nylon-cord or aramid-cord serve as pressure bearers.

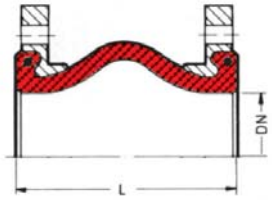
Constructive Types

Type A rubber expansion joints consist of a rubber bellow and two backing flanges. The sealing is made directly on the rubber collar which extends the bellow and overlaps the flanges.

Type A series includes two basic models: restrained and unrestrained bellows. The unrestrained design provides more flexibility but it does not protect the bellow from any accidental movements, above its capacity, that could damage it permanently.

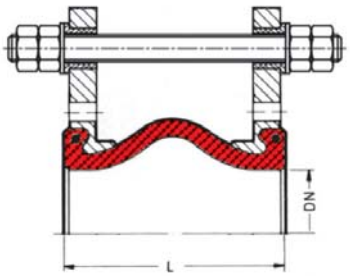
A1

Rubber Expansion Joint
with flange.



A1-T

Rubber Expansion Joint
with flange and tie rods.



Flanges are manufactured according to international standards DIN, ANSI, also available with threaded holes. Common materials used for flanges are: carbon steel, galvanized steel, aluminum and stainless steel.

Materials

Common rubber qualities and their applications are listed in the following table. Other rubber qualities for higher temperatures and other types of applications are available on request.

Material	Color (marking)	Common applications	Max. Temp
NEOPRENE	▲ black	air, gas, low-conc. acids	70 °C
NEOPRENE	▲ gray	water	70 °C
EPDM	▲ red	warm water	90 °C
EPDM SP	▲ red	hot water - heating systems	110 °C
NITRIL	▲ yellow	oils, mineral fats	80 °C
NITRIL	△ white	potable water - food grade	80 °C
HYPALON	▲ green	acids, alkaline	80 °C
BUTYL	▲ blue	potable water	90 °C
VITON	▲ purple	strong acids, aromatic solvents	90 °C

Pressure and Vacuum Strength

The recommended pressure ratings are listed in the following table. This data apply to Type A from DN 32 up to DN 400 and to Type B from DN 20 up to DN 50.

Material	Color	Permissible operating data					
		Pressure	Temp.	Pressure	Temp.	Pressure	Temp.
NEOPRENE	▲ black	16	50	10	70	-	-
NEOPRENE	▲ gray	16	70	16	70	-	-
EPDM	▲ red	16	50	12	70	10	90
EPDM SP	▲ red	16	70	10	100	6	110
NITRIL	▲ yellow	16	50	12	70	10	80
NITRIL	△ white	16	50	12	70	10	80
HYPALON	▲ green	16	50	12	70	10	80
BUTYL	▲ blue	16	50	12	70	10	90
VITON	▲ purple	16	50	12	70	10	90

The vacuum strength depends on whether an expansion joint is equipped with internal support rings or not. The ring are made out of stainless steel for a higher durability.

DN	Without support ring		With support ring	
	Pressure [bar]	Suction [mm]	Pressure [bar]	Suction [mm]
32 - 1000	-0.2	2	-1	10

Standard Program PN16

Our standard program for rubber expansion joints Type A includes the following items for a nominal pressure of 16 bar. Please note that the standard overall length for all items is 130mm, if not specified otherwise. Other sizes, overall lengths, nominal pressures and movements are available on request.

DN	Overall length [mm]	Capable movements			
		Axial compression [-mm]	Axial extension [+mm]	Lateral [+/-mm]	Angular [+/- deg]
32	130	30	30	30	35
40	130	30	30	30	35
50	130	30	30	30	35
65	130	30	30	30	30
80	130	30	30	30	30
100	130	30	30	30	25
125	130	30	30	30	25
150	130	30	30	30	20
200	130	30	30	30	15
250	130	30	30	30	10
300	130	30	30	30	10

Depending on individual working conditions, we recommend to consider some degree of movement limitations in order to achieve a higher life-span of the bellows.

Working temperature	up to 50°C	up to 70°C	up to 90°C
Movement limitation	≈ 100%	≈ 75%	≈ 60%

Installation Instructions

The screws of the flange must be crosswise in stages firmly tightened to avoid the jamming of the sealing surfaces. The sealing bead thickness should be compressed evenly around from 3 to 1,5 mm.

The tightening torque is sufficient for an operating pressure of 16 bar (approval pressure of 25 bar). Further tightening of the screws is not necessary, particularly since this could destroy the sealing surfaces. The screw heads must face the bellows to avoid damaging the bellows body during the operating of the installation.

The sealing surfaces should fit without a burr at the whole width of the flanges. If there are differences to the inner pipe or collar diameter, this must be equivalent to the nominal dimension with rubber sealing rings (min. 5 mm thick).

Type B

Applications, Construction

ROTH rubber expansion joints Type B in a low convolution high pressure design are suitable for sanitary, heating, air-conditioning and swimming pool use and for solar technology, as well as apparatus, pipeline and motor construction. They absorb thermal expansion and vibration, compensates axial and lateral movements, and are resistant to chemical and mechanical stresses.

Constructive Types

Type B rubber expansion joints consist of a rubber bellow and a threaded coupling at both ends. Couplings are manufactured according to international standards ISO280 or DIN2999. Common materials used for the couplings are: malleable cast iron, galvanized steel, yellow brass.

B1	B2	B3
Rubber Expansion Joint with external thread couplings.	**Rubber Expansion Joint** with internal thread couplings.	**Rubber Expansion Joint** with internal/ external thread couplings.

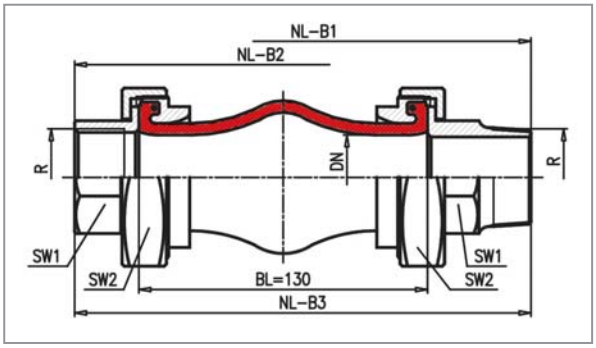
Materials

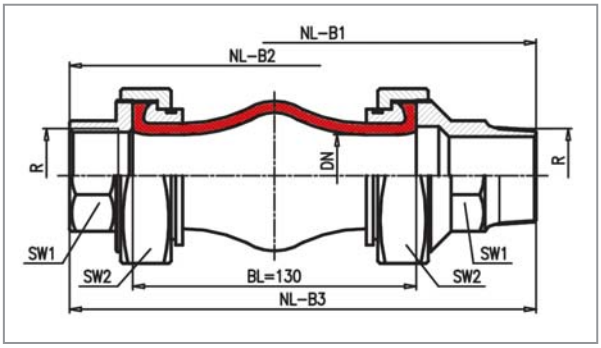
Materials and applications are similar to those used for Type A expansion joints. The data is given in the following table.

Material	Color (marking)	Common applications	Max. Temp
NEOPRENE	▲ black	air, gas, low-conc. acids	70 °C
NEOPRENE	▲ gray	water	70 °C
EPDM	▲ red	warm water	90 °C
EPDM SP	▲ red	hot water - heating systems	110 °C
NITRIL	▲ yellow	oils, mineral fats	80 °C
NITRIL	△ white	potable water - food grade	80 °C
HYPALON	▲ green	acids, alkaline	80 °C
BUTYL	▲ blue	potable water	90 °C
VITON	▲ purple	strong acids, aromatic solvents	90 °C

Standard Program PN16

Our standard program for rubber expansion joints Type B includes the following items for a nominal pressure of 16 bar. Please note that the overall length (NL) differs from a constructive type to another, although the bellow length is the same (BL). Designs with two cascading bellows are also available on request.





DN	Thread DIN 2999 [inch]	Bellow length BL [mm]	Width a/f SW				Overall length NL		
			Nylon cord		Aramid/ Steel cord		Type B1 [mm]	Type B2 [mm]	Type B3 [mm]
			SW1 [mm]	SW2 [mm]	SW1 [mm]	SW2 [mm]			
20	3/4	130	36	80	36	80	228	186	207
25	1	130	40	80	40	80	236	192	214
32	1 1/4	130	48	80	48	80	246	196	221
40	1 1/2	130	53	90	53	90	250	202	226
50	2	130	66	110	66	110	256	215	235

Installation Instructions

The installation should be free of any tension. Screws should always be tightened with two wrenches to avoid damaging torsions to the compensator.

Installation procedure:

- Attach the screw-joining parts to the pipes and check the installation gap;
- The installation gap must be equal to the compensator length (130 mm ± 5 mm);
- Insert the expansion joint in the gap;
- Tighten with two wrenches;
- Check for any leaks during the pressure test.

DN 20-25	DN 32-50
The front screw-in part is used as a steady and the union nut is tightened	The rear screw-in part is used as a steady and the union nut is tightened

Type C

Applications, Construction

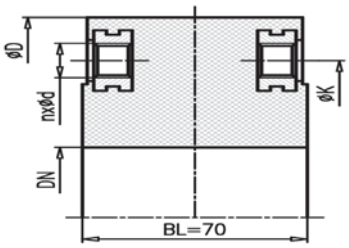
ROTH rubber expansion joints Type C are rubber-metal pipe joints for absorbing noise and surface vibrations in piping systems, on pumps, machines and apparatus.

The rubber expansion joints Type C are a cylindrical rubber buffer with vulcanized flange rings and holes according to DIN standards. The rubber-metal pipe joint construction is self-sealing, so that no additional gaskets are required.

Rubber expansion joints Type C can be installed in heating plants and in water/hot water piping systems, in houses, hospitals and schools. They can also be used with mild acids and lyes in industrial plants.

Constructive Types

Type C rubber expansion joint comes in two models which differ based on the quality of rubber used for the buffer. TÜV-Approval certificates for installing in heating plants are available only with the use of EPDM-SP rubber.



C1	C2
Rubber Expansion Joint EPDM.	**Rubber Expansion Joint** EPDM-SP with TÜV approval.

Materials

Type C rubber expansion joints are manufactured only in EPDM (rubber) with carbon steel flange on the inside. The flange pattern can be either PN6 or PN10. For higher pressure ratings we recommend installing an other type of rubber expansion joint (Type A or Type B), or even a stainless steel expansion joint.

Material	Color (marking)	Common applications	Max. Temp
EPDM	▲ red	warm water	90 °C
EPDM SP	▲ red	hot water - heating systems	110 °C

Standard Program PN6 / PN10

Our standard program for rubber expansion joints Type C includes the following items for a nominal pressure of 6 bar or 10 bar. The flange patterns for both standards are detailed in the following table. Please note that these items are not to be used in PN16 piping systems.

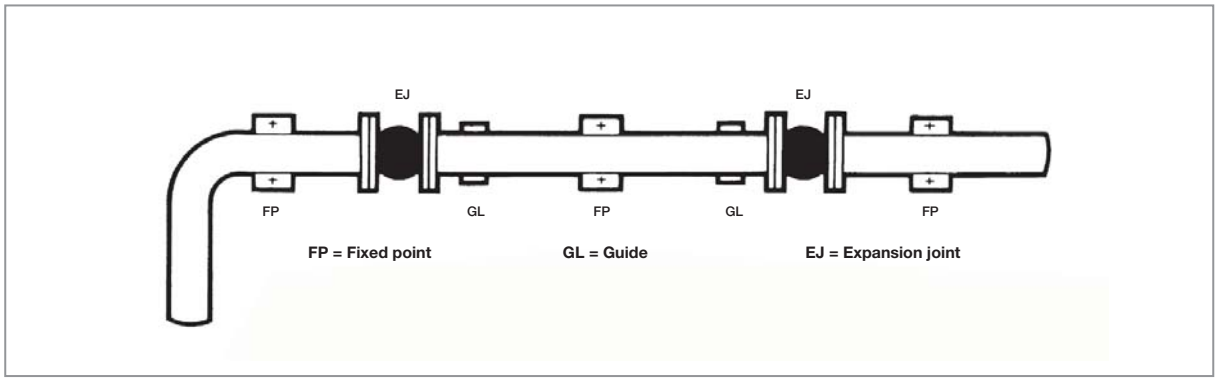
DN	Length [mm]	Flange DIN PN 6					Flange DIN PN 10				
		Ø D [mm]	Ø K [mm]	Ø d [mm]	n	Bolts	Ø D [mm]	Ø K [mm]	Ø d [mm]	n	Bolts
20	70	90	65	M10	4	M10x25	105	75	M12	4	M12x30
25	70	100	75	M10	4	M10x25	115	85	M12	4	M12x30
32	70	120	90	M12	4	M12x30	140	100	M16	4	M16x30
40	70	130	100	M12	4	M12x30	150	110	M16	4	M16x30
50	70	140	110	M12	4	M12x30	165	125	M16	4	M16x30
65	70	160	130	M12	4	M12x30	185	145	M16	4	M16x30
80	70	190	150	M16	4	M16x35	200	160	M16	8	M16x35
100	70	210	170	M16	4	M16x35	220	180	M16	8	M16x35
125	70	240	200	M16	8	M16x35	250	210	M16	8	M16x40
150	70	265	225	M16	8	M16x35	295	240	M20	8	M20x40
200	70	340	295	M20	8	M16x40	340	295	M20	8	M20x45

Installation Instructions

Reliable functioning requires guided pipelines and precisely designed fixed points. The rubber-metal pipe connections should be installed free of restraint. Installation gaps must be 70 mm wide. No tension, torsion or bending loads allowed.

If unrestrained installation is not possible, or if axial or radial movements are expected, then rubber expansion joints Type A or Type B should be used instead.

Additional gaskets are not required, since the sealing surfaces are made of rubber, expansion joints Type C are self-sealing. A bolt torque of 3 kpm is recommended for a proper tightening.



Handling, Servicing and Installation

In order to function correctly and safely, all rubber expansion joints require some precautions to be considered, which will also prolong their useful life (life-span), thus becoming elements with minimal maintenance requirements.

Most important information to bear in mind in the different stages of assembly for any type of rubber expansion joints are mentioned below:

- Do not expose any rubber expansion joints directly or indirectly to any solar radiation;
- Do not store rubber expansion joints vertically to avoid deformation (compression);
- Rubber expansion joints must be protected against oil, color, weld beads, sparks, sharp objects or excessive heat;
- Rubber expansion joints must not be insulated because of heat built-up!

Important Notes

Expansion joints are to be placed between sufficiently dimensioned fixed points. The fixed points must bear the full reactional forces and he pipe guides must be strictly regarded to avoid lateral shifting (pipe bend, overtension) of the expansion joints.

If installation according to these instructions is not guaranteed, joints equipped with tie-rod supports should be used. Such supports also help avoiding transmission of high-pressure forces to the pipe system.

The installation should be in an easily accessible location so that checks without any problems can be carried out. Rubber expansion joints must be regularly examined for the first signs of aging (leakage, embrittlement, blister).

Rubber expansion joints do not require any maintenance, but they must be regarded as wear-and-tear parts.

Rubber expansion joints are classified as pipeline accessories acc. PED (Pressure Equipment Devices)!