

Hints for the Pipework Designer

ERV rubber expansion joints are delivered ready for installation. The swiveling flanges can be fitted in any desired position and have stabilising rims to ease the assembly. Flanges with stabilising rim (collar) also helps to maintain a safety gap between the ends of the screws and the bellow throughout the whole range of movement and avoids injuries.

Correct Mating Flanges

Seals are not required if the sealing surface of the mating flanges of the pipework are of the same size. Seals (as shown in fig. E) should be only used in order to prevent damage to the rubber sealing surface, for example if the mating flanges either have a larger internal diameter, sharp edges or irregularities e.g. welding beads.

Crushing Strength

The maximum operating pressure and test pressure not only depends on the burst pressure of the rubber bellow but can also be affected by operating temperature and design pressure / nominal pressure of the used flanges. For full details please see page 1-6. The burst pressure (at room temperature) is at least 3 - 4 times the nominal pressure (PN). Pressure test certificates can be issued upon request.

Vacuum Resistance

The maximum vacuum depends on size, operating temperature, length of installation and the installation of vacuum support rings (page 1-36). Please see type specific data sheets for details. The vacuum resistance can be slightly increased even without vacuum support rings if the installation length is shortened (e. g. by 20 mm). The vacuum resistance decreases if a longer installation length is chosen, or the expansion joint is lengthened in operation.

Weather and Heat Resistance

The outer rubber (cover) is resistant against weathering and protects the reinforcements against ageing, abrasion and corrosion. For the permitted temperature range please see type specific data sheets. For permanently warm operating conditions including external radiation heat please see page 1-6.

ERV types with an outer rubber of CR or Hypalon (CSM) are (within limits) oil proof and flame resistant. An additional flame protection can be achieved by using a flame protection cover conforming to the 'Germanischer Lloyd' standard, see pages (1-37 and 1-17).

Pressure Loss

The internal design of the ERV bellows allows a high flow with little turbulence. Therefore the pressure loss is usually neglectible, even when dealing with high flow rates.

Noise Levels

Due to their design, ERV expansion joints reduce noise in pipelines. An even better reduction is achieved if the total installation length is shortened in a range of 5 - 10 mm.

Installation

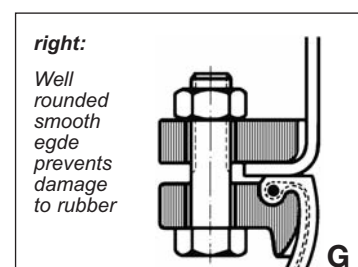
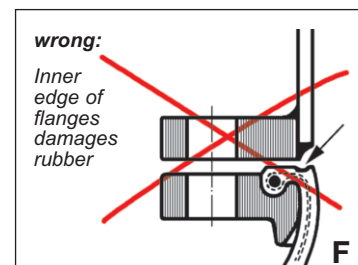
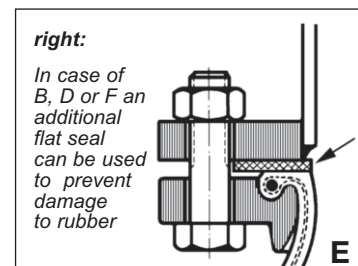
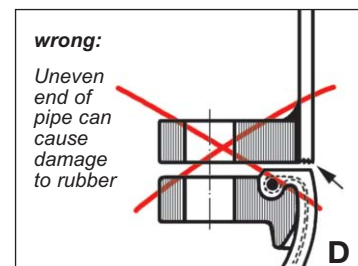
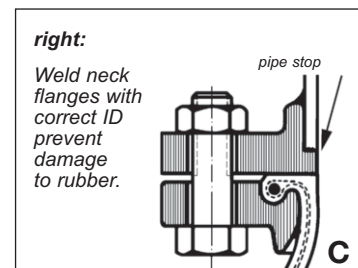
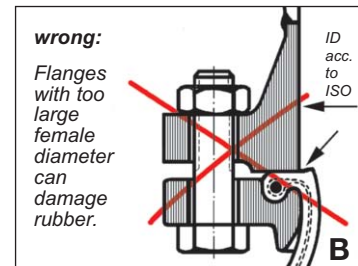
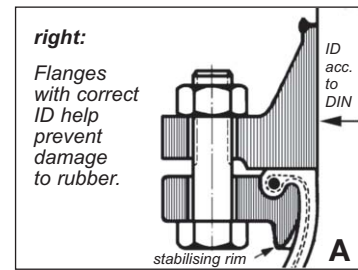
For the allowable range of movement please see type specific data sheets. If possible, the length of the installation gap is designed to be equal to the recommended installation length, or slightly shorter. The low inherent resistance of ERV allows a compression by hand and makes fitting into smaller gaps easy. For larger installation gaps or lateral offset, not more than 50% of the maximum area of movement should be used up in order to leave a reserve for operation. If the bellows is lengthened during operation, a jolted (compressed) installation is recommended. The position of installation must be accessible for visual examination. When installing the unit, installation hints (page 1-39) must be observed.

Restraint

The inherent resistance of ERV bellows is negligible in respect of calculations for anchorage points. Under pressure the bellow acts like a plunger, thus requiring to fix anchorage points for larger size expansion joints. Since the ERV construction absorbs part of these forces, the anchorage points may be correspondingly weaker. If such anchorage points cannot be provided, or if the stability of the other fittings is insufficient, the pressure thrust forces have to be absorbed by tie rods. For available types see catalogue page 1-34.

Identification

All ERV bellows have a vulcanised coloured type marking and an embossed text stating manufacturers mark, nominal width DN, nominal pressure PN as well as the manufacturing date.



Installation and Operation Hints for ERV Expansion Joints



ELAFLEX expansion joints are provided ready for installation. The standard flanges can be turned into any desired position. Additional sealings usually are not necessary. For installation please observe the following:

- 1) Prior to the installation of the expansion joint ensure that the mating flanges have satisfactory sealing surfaces.
 Protruding pipe ends, grooves and tongues are not permitted as the sealing surface of the bellows might be destroyed. (see hints for the pipework designer, page 1-38)
Attention: When using slip-on flanges the outside diameter must be larger than the sealing surface of the expansion joint.
- 2) Pay attention to the correct installation length: The pulling of expansion joints into installation gaps which are too large will lengthen the rubber bellow and might lead to the collar being drawn out of the flange groove (see picture). During the subsequent tightening of the screws the collar of the bellows would be crushed asymmetrically.
Please note: A considerable lengthening during installation decreases the allowable range of movement during operation. To shorten installation gaps, distance flanges are available.
- 3) If possible install the expansion joints in such way that the date of production is visible.
- 4) Screws should be inserted from the expansion joint side. If this is not feasible, it must be assured that the bellows may not touch the screws in all operating conditions.
- 5) We recommend to use bolts of property class 8.8. The bolts have to be fastened crosswise in 3 uniform steps.

When using a torque wrench:

1st step:
Tighten bolts equally by hand (pay attention to parallel sealing surfaces!).

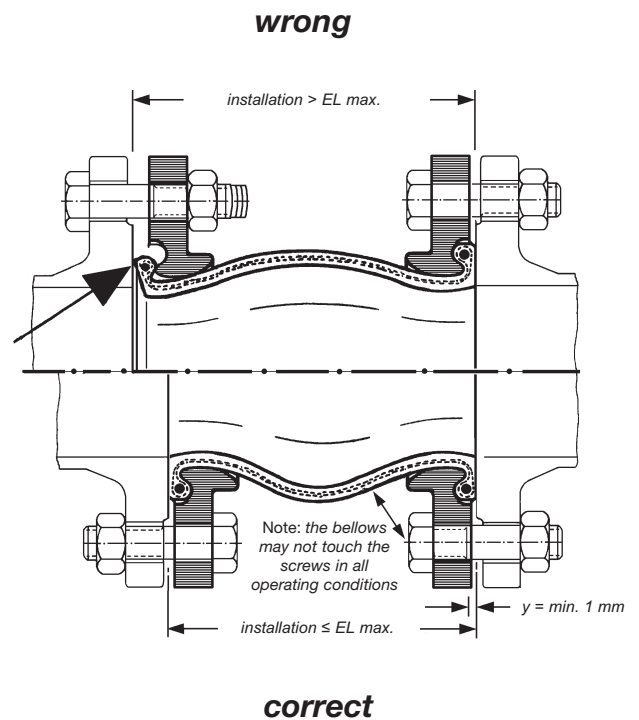
2nd step:
Fasten crosswise with torque 50 Nm.

3rd step:
Fasten crosswise

	approx. torque
up to DN 80	max. 80 Nm
up to DN 300	max. 100 Nm
up to DN 500	max. 130 Nm
DN 700	250 Nm
DN 800	300 Nm
DN 900	310 Nm
DN 1000	340 Nm

Do not use any sharp-edged tools which might damage the rubber bellow in case the tool slips.

- 6) If no torque wrench can be used during installation, the screws may only be tightened to an extent that between the metal flanges a distance "y" of at least 1 mm remains (see picture).
- 7) The test pressure of a bellow or flange is 1.5 x PN. This value depends on which component is weaker.
- 8) The rubber bellow of the expansion joint must not be painted! Solvents can damage the rubber cover, furthermore the colour coat impedes a proper visual inspection.
- 9) When welding and cutting, the rubber bellow must be protected against heat by all means. For electric welding it must be insured that the electric current does not pass through the bellows.
- 10) Permanent radiation heat above 90° C must be avoided. If necessary flame protection covers should be used (see page 1-37).
- 11) Rubber expansion joints are subject to wear and must be included to routine inspection of the pipe system (visual inspection of the expansion joint regarding damages as well as inspection for hardening by pushing in with a thumb).



correct

Information concerning the Pressure Equipment Directive (PED) 97/23/EC for ERV Rubber Expansion Joints

Elaflex rubber expansion joints are 'pressure equipment' according to this directive. Below we list those expansion joints which fall under category I-III:

1. Expansion joints for L.P. Gas (liquefied gases):

up to DN 40	- PN 25 bar	= category I
from DN 50 up to DN 100	- PN 25 bar	= category II

2. Expansion joints for liquid chemicals and petroleum based products:

up to DN 125	up to 16 bar working pressure	= no category
DN 150	up to 10 bar working pressure	= no category
DN 200	up to 10 bar working pressure	= no category
DN 250	from 8 up to 10 bar working pressure	= category I
DN 300	from 7 up to 10 bar working pressure	= category I
DN 350	from 6 up to 10 bar working pressure	= category I
DN 400	from 5 up to 10 bar working pressure	= category I
DN 500	from 4 up to 10 bar working pressure	= category I
DN 600	from 3,5 up to 10 bar working pressure	= category I
DN 700	from 3 up to 10 bar working pressure	= category I
DN 800	from 2,5 up to 10 bar working pressure	= category I
DN 900	from 2 up to 10 bar working pressure	= category I
DN 1000	from 2 up to 10 bar working pressure	= category I

3. Expansion joints for gas / natural gas:

If the expansion joint is intended for use with gas / natural gas, this has to be stated when ordering.

up to DN 25		= no category
from DN 32	up to DN 50 - PN 16 bar	= category I
from DN 65	up to DN 125 - PN 16 bar	= category II
from DN 150	up to DN 350 - PN 10 bar	= category II
from DN 400		= category III (special inquiry necessary)

4. Expansion joints for air:

If the expansion joint is intended for the use with air, this has to be stated when ordering.

up to DN 100	up to 10 bar working pressure	= no category
from DN 125	up to DN 250 up to 5 bar working pressure	= no category
from DN 250	up to DN 1000 up to 3,5 bar working pressure	= category I

To define the right category for all dangerous fluids or pressures not mentioned here, an inquiry is necessary. Please state medium, dimension, pressure, temperature and application.

Requirements:

' no category '	These expansion joints do only have to conform to 'sound engineering practice' (SEP). No declaration of conformity*) is necessary. For these expansion joints the CE marking must not be used.
' category I '	A certificate of conformity for the materials (at least EN 10204-2.2), a random pressure test, a declaration of conformity and a CE marking of the expansion joints are necessary.
' category II '	A specific test report for the materials (at least EN 10204-3.1, the pressure test of every joint, the declaration of conformity*) and a CE marking of the expansion joint with code number of the notified body etc. are necessary.

The manufacturer of the expansion joints is responsible for the adherence to these requirements. Rubber bellows or flanges alone are no pressure equipment according to this directive.

For the manufacturing of expansion joints ELAFLEX has been certified by Germanischer Lloyd. A copy of the certificate no. 77 314 - 10HH is available on request.

*) Declarations of Conformity:

According to the PED, ELAFLEX customers may directly download the necessary declarations of conformity. Please use this free service under www.flexej.co.uk