upg PIPE SYSTEMS

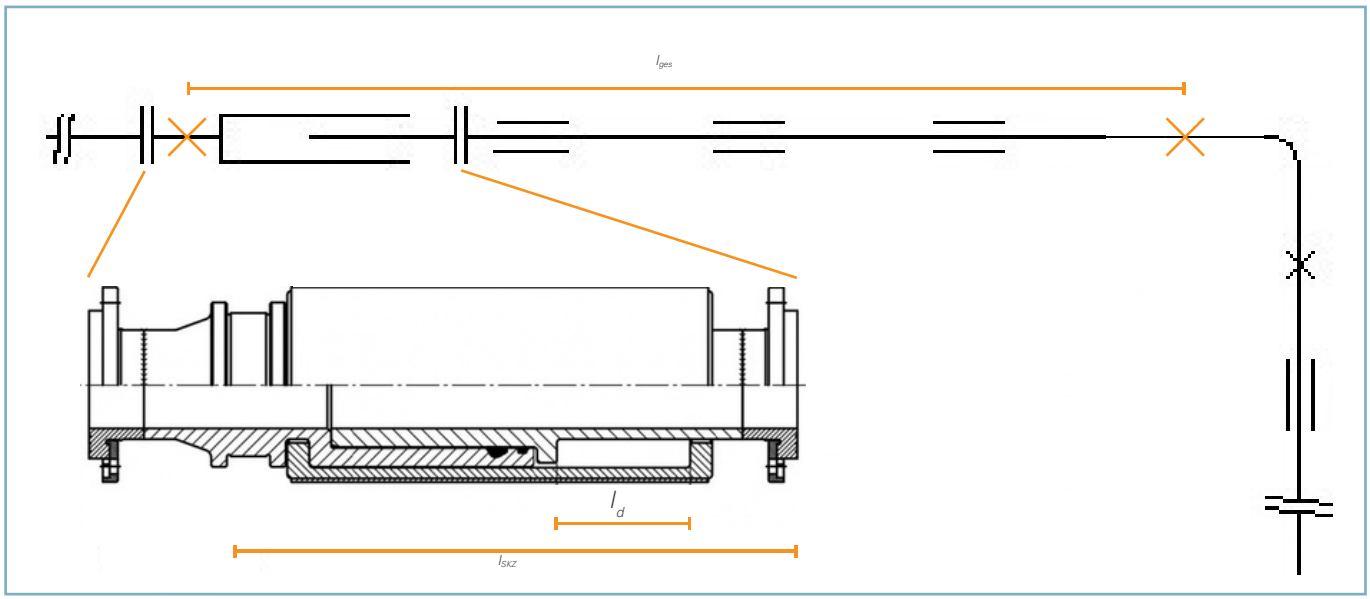
REINERT-RITZ



Expansion Compensator Installation Guide

Ultimate Solutions.
Intelligent Delivery.

PULL RESISTANT COMPENSATOR (SKZ) INSTALLATION GUIDELINES



The correct operation of our compensator can only be guaranteed when the pipeline has been de ned and laid according to the professional standards and directives.

Design of compensation distance:

- Calculation of the length of the pipeline between the fixed points is made according to DIN 16928 or to the directive DVS 2210, Part 1.
- The change in length of the pipeline is determined by the pressure and the thermal loading (change in temperature)
- The maximum expansion distance (l_d)shall not be exceeded.
- The maximum pull resistance according to ISO 3501 should be taken into account.

Design fixed and moving points:

- Pipe guides should be incorporated to prevent buckling of the pipeline.
- The alignment of the pipeline must be ensured.
- In the design of the fixed points and the clamping structures the pipe outside diameter d1 has to be considered for the calculation of the axial force (Reinert-Ritz fixed points are designed for this force).

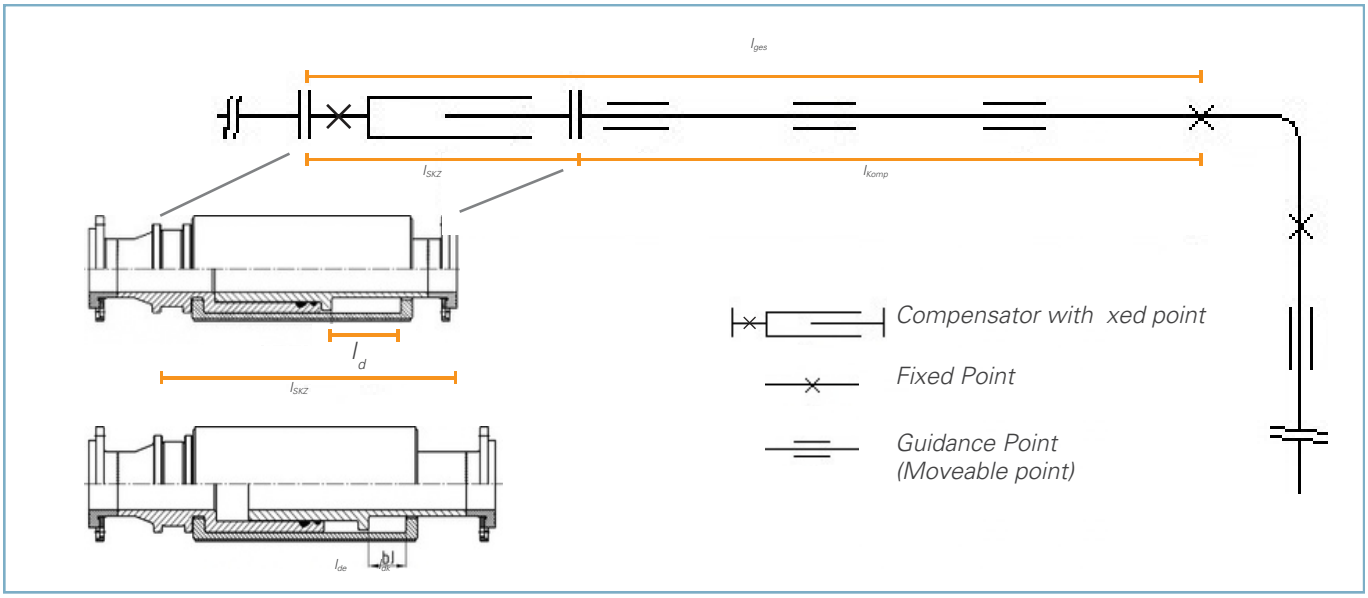
Installation:

- When mounting, the default of the expansion distances are taken into account according to the expected expansion (see design & example).
- When delivered, the SKZ is in the compressed status.
- The SKZ, depending upon the dimension, is not moveable manually.

Operation:

- Maximum operating pressure is 16bar (a short-term increase in pressure to 21bar, during a pressure test, is permissable).
- The SKZ is designed for vacuum operation up to -0,8 bar.
- The SKZ is designed only for above ground operation.
- The resistance of the EPDM lip seal to the medium must be proven.
- Encrustation may damage the seals, resulting in possible leakage.

1.1 INSTALLATION EXAMPLE THERMAL EXPANSION COMPENSATION WITH PULL RESISTANT COMPENSATOR (SKZ)



A) We are seeking, under given environmental conditions, the compensation needed from the compensator for the length of free pipe (l_{ges}).

The equation for the calculation of the change of length due to thermal circumstances is:

$$\Delta L = \propto \times L \times \Delta T$$

where

ΔL = change in length in $[mm]$

$\Delta \propto$ = linear coefficient of expansion in $[\frac{mm}{m \times K}]$

ΔL = required length of the compensation distance in $[m]$

ΔT = change in temperature $[K]$

Material	orientation value for $\propto$ in $[\frac{mm}{m \times K}]$
PP	0,15
PE-HD	0,20
PVDF	0,12 bis 0,18
PVC	0,08

For example:
Installation of compensators in a PE100 / HPDE pipe system experiencing temperature difference of -10°C to +40°C

$$\Delta L = l_d = 170\ mm$$

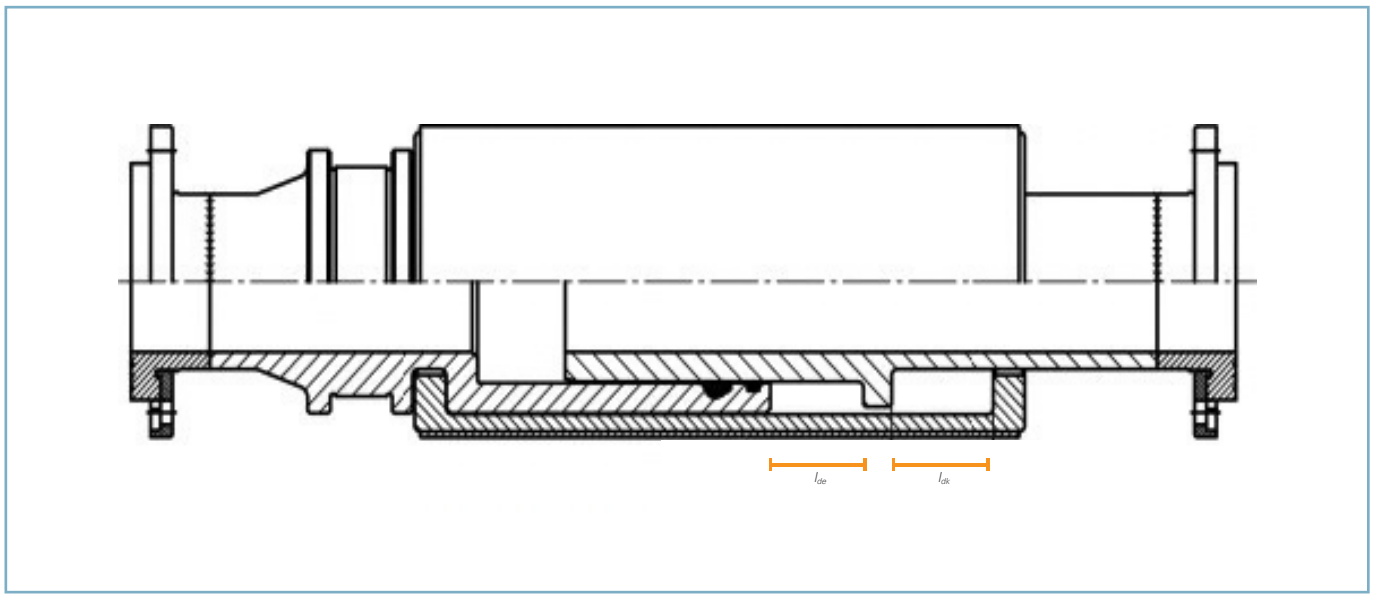
$$\Delta \propto = 0,20 \frac{mm}{m \times K}$$

$$\Delta T = 40°C - (-10°C) = 50\ K$$

$$l_{ges} = l_{SKZ} + l_{Komp} = L = \frac{\Delta L}{\propto \times \Delta T} = \frac{170\ mm}{0,2 \frac{mm}{m \times K} \times 50\ K} = 17\ m$$

A compensation distance of 17m can be taken into account between the fixed point of the compensator and the next fixed point in this example.

1.2 INSTALLATION EXAMPLE: THERMAL EXPANSION COMPENSATION WITH PULL-RESISTANT COMPENSATOR (SKZ)



B) Determining the division of the maximum moving distance (ld) into an expansion distance (l_{de}) and a contraction distance (l_{dk}).

In order that the compensator can take into account both expansions and contractions in the system, it is possible to install a position which will match the to be expected contraction distance (l_{dk}) and expansion distance (l_{de}) .

Use the Point A) of the procedure to determine the installation position: the temperature range was speci ed as -10°C to +40°C. The compensator is incorporated at an ambient temperature of 20°C.

Starting from the installation position, the maximum warming of the pipeline is expected to be:

$$\Delta T_{de} = 40℃ - (20℃) = 20\ K$$

Starting from the installation position, the maximum cooling of the pipeline is expected to be:

$$\Delta T_{dk} = 20℃ - (-10℃) = 30\ K.$$

Using the two temperature differences the actual installation position can now be determined.

Using the basic formula $\Delta L = \propto \times L \times \Delta T$, determine the expansion distance (l_{de}) and the contraction distance (l_{dk}) for the temperature differences:

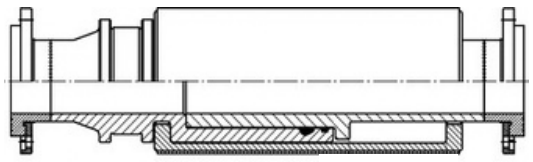
$$l_{de} = \Delta L = \propto \times L \times \Delta T_{de} = 0,20 \frac{mm}{m \times K} \times 17\ m \times 20\ K = 68\ mm$$

$$l_{dk} = \Delta L = \propto \times L \times \Delta T_{dk} = 0,20 \frac{mm}{m \times K} \times 17\ m \times 30\ K = 102\ mm$$

Thus, the movement distance (l_d) of 170 mm is divided between the two movements for expansion and contraction on the basis of the installation situation. Based on the expansion distance (l_{de}), the compensator can be appropriately set at the site.This compensator can be set to the determined expansion distance (l_{de}) from the compressed delivery status (see installation instructions).

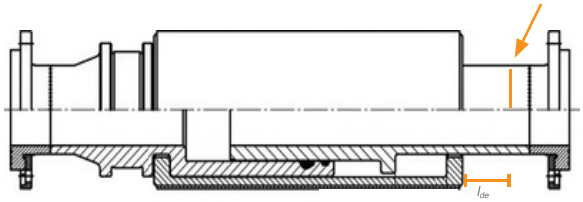
This is only an example! For the design of a compensator we ask you to respect the current rules. Furthermore, in addition to the thermal expansion there is also the expansion is due to axial loading (amongst other things, caused by internal pressure) which has to be considered. We recommend that the design of the compensator is compiled by a specialized planning / engineering firm.

PULL RESISTANT COMPENSATOR (SKZ) INSTALLATION INSTRUCTIONS



Delivery status: compressed

graduated markings



Installation status: expanded to the calculated expansion distance (l_{de})

Expansion distance

l_{de} = _____

Warning: If this calculated value is not known, contact the appropriate planning of ce before installiation!

When the value of the expansion distance is known, the compensator can be installed as follows:

1. Check that the compensator is in the delivery status, i.e. fully compressed
2. Pull the compensator to the required expansion distance (l_{de}) . The expansion distance is shown by the graduated markings as shown.
3. Install the compensator in the described position and after the installation, check once more that the expansion distance.

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