

Installation instructions

PFEIFER VarioSonic SL staircase bearings

Application area

PFEIFER VarioSonic SL staircase bearings are designed to transmit the vertical influences from angled or twisted precast staircases (Fig. 1) or precast stair landings into the wall of the staircase (Fig. 4). Corresponding cutouts need to be positioned in the staircase walls for this purpose. They can also be used as bearings at starting or end points (Fig. 2-3) of flights of stairs at the landing or the floor.

The rated resistance is depending on the width of the joint and the position in the precast element as pic. 6/7. If there is a large edge gap it may be necessary to order the longer lateral force bolts. Planned lateral forces cannot be applied. A stable support must be provided (Fig. 5).

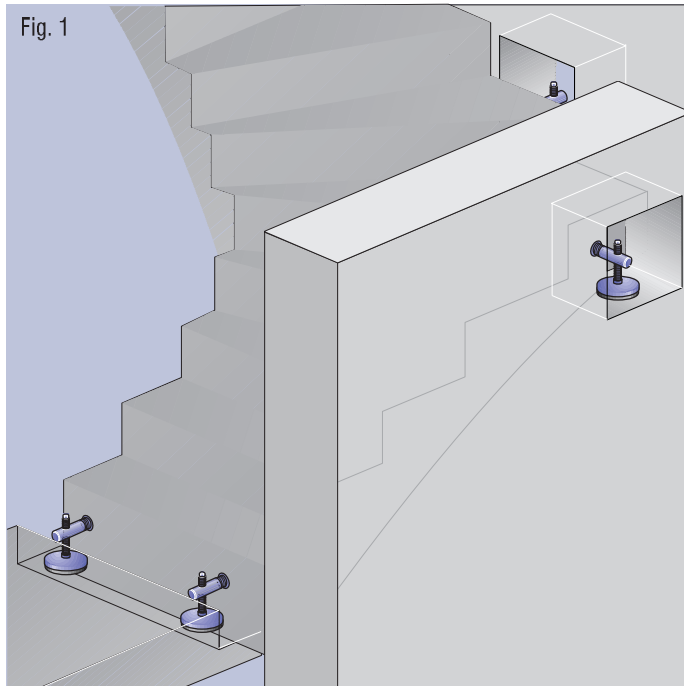


Fig. 1

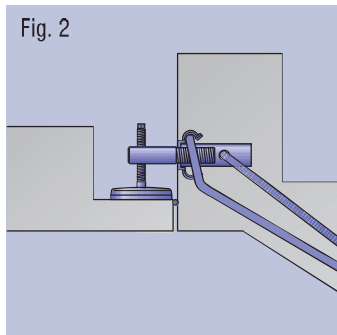


Fig. 2

Fig. 2:
Bearing on a staircase landing with VarioSonic SL without a sound insulation box

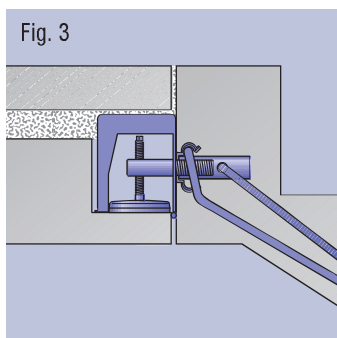


Fig. 3

Fig. 3:
Bearing on a staircase landing with VarioSonic SL with a sound insulation box

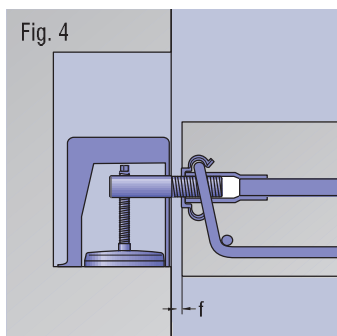


Fig. 4

Fig. 4:
Bearing supporting a flight of stairs or landing with VarioSonic SL in the staircase wall

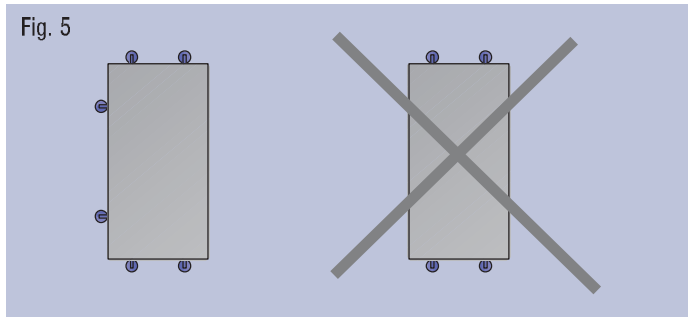


Fig. 5

Dimensioning of the VarioSonic SL

Different gap widths f can arise as a result of variations in the design of the stair gap, for example due to fire regulations. The rated resistance of the bearing force is shown as a function of the gap width in the diagram in Fig. 6. Exact compliance with the boundary conditions specified in planning is required in order to avoid excess loads.

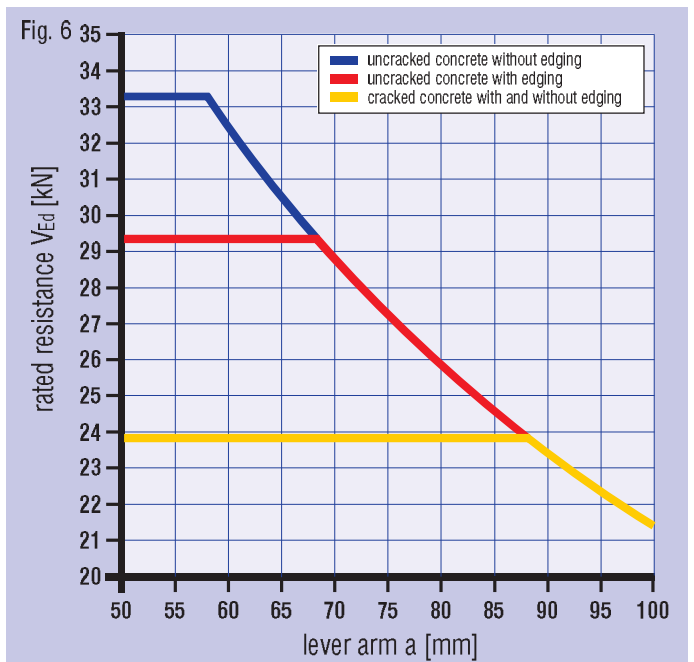
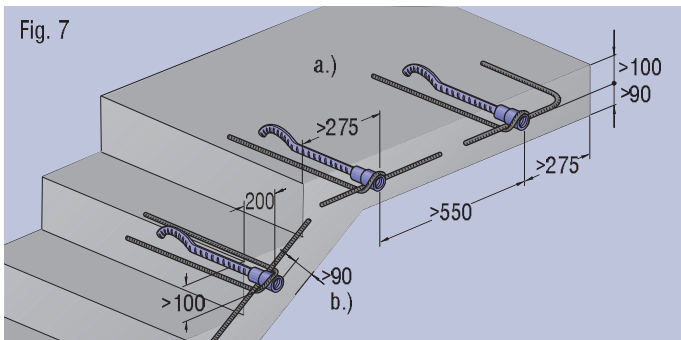


Fig. 6

Installation:

Edge and axis distances of the anchors in the precast staircase or landing

The local load transmission into the concrete is ensured by maintaining the distances between the bearings themselves and between the bearings and the free edge – see Fig. 7. The minimum component thicknesses required here must also be satisfied. The lower distance from the anchor to the edge of 90 mm applies to a concrete cover thickness of $c = 2.5$ cm. This distance needs to be changed accordingly if the concrete cover has a different thickness.



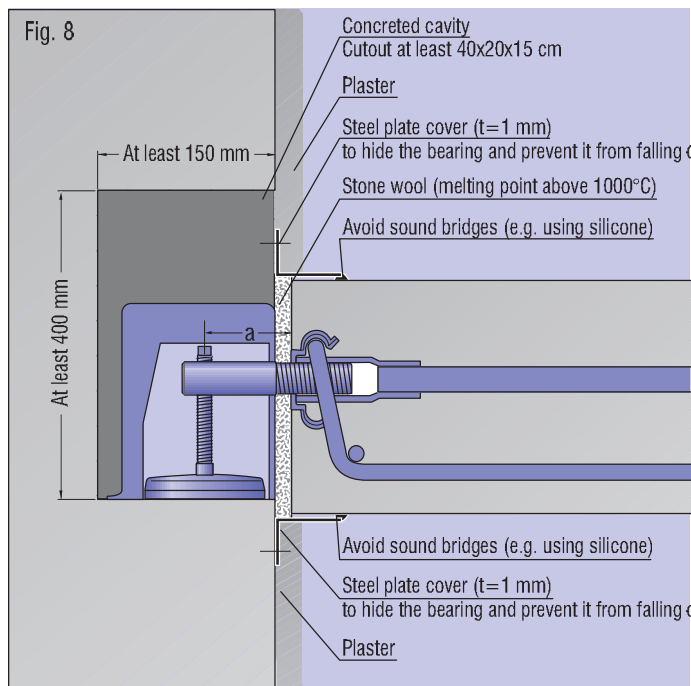
Installation of the lateral force bolts

Due to various design configurations of the stair gap, there may be different bolt projections, joint width and thus lever arms „a“. Various joint widths lead to different depths for the shear bolt. The minimum depth is 40 mm.

The shear pin transmits the vertical effects as a cantilever screwed into the sleeve on the adjustable foot. Depending on the lever arm „a“ learns of the transverse force bolt different bending moments, while the transverse force is not changed. The design resistance of the bearing as a function of lever arm „a“ is shown in the diagram Figure 6.

Side cutout openings in the staircase wall

A corresponding cutout must be provided in the staircase wall if the VarioSonic SL staircase bearing is used. The lateral force bolt protrudes into this cutout, and the positioning foot rests upon the base area of the cutout. The opening must be large enough to allow subsequent turning of the positioning foot around the lateral force bolt. The minimum dimensions are shown in Fig. 8. The base



area must be capable of absorbing the pressure forces which depend upon the vertical influences. In the case of brickwork walls, it may also be necessary to install a concrete layer.

$$\text{Surface pressure: } \sigma = \frac{V_{Rd}}{7853} \text{ [N/mm}^2\text{]}$$

The dimensions of the cutout can be made smaller if no further footstep noise insulation measures are to be installed (e.g. when using the SL-H or SL-W without foam box).

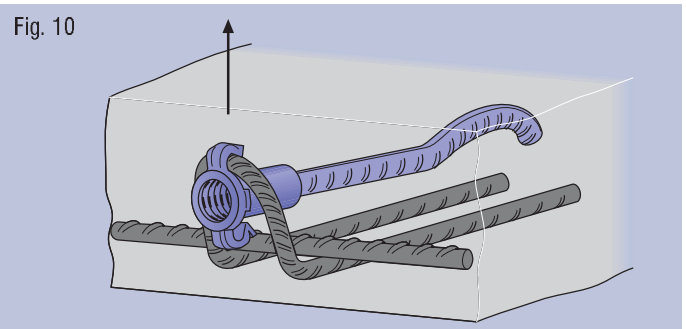
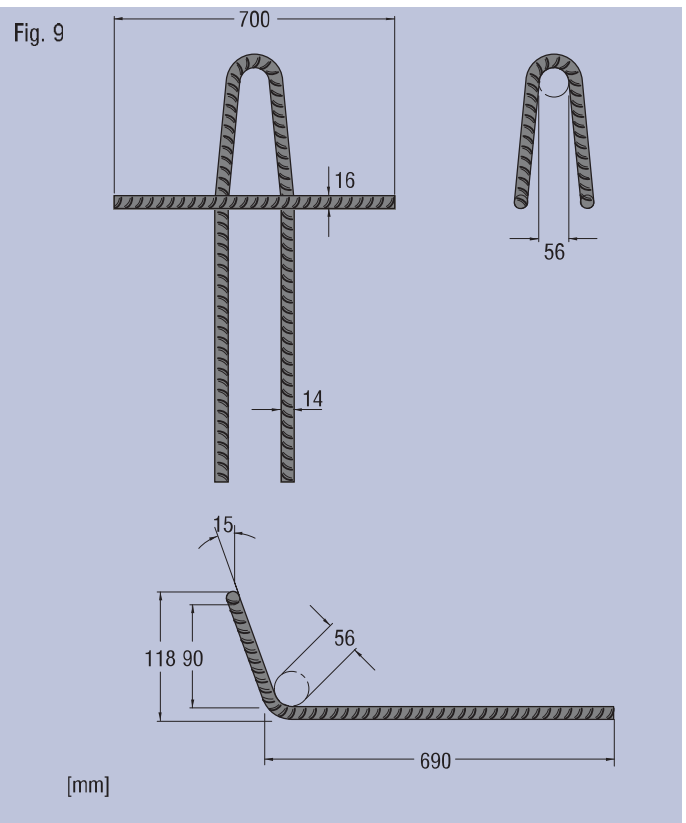
For fire safety reasons the back of the cutout often needs to be closed off or remain closed. The minimum residual wall thickness should be chosen in accordance with the fire safety regulations. This results in the minimum wall thickness for the staircase wall.

Anchor selection

Two different anchor types are available: the PFEIFER wave anchor and the PFEIFER socket. The corresponding choice should be made in accordance with the data sheet when ordering. The wave anchor is a complete lifting anchor, including the load-bearing main reinforcement in the form of a wavy, pressed-in concrete steel anchor. However, the PFEIFER socket may be a better choice particularly in applications where space is restricted in the longitudinal direction of the anchor (twisted staircase). Here, the main load-bearing reinforcement should be installed at the site in accordance with the installation instructions for PFEIFER socket. The reinforcement should be adapted to the geometry of the component.

Additional reinforcement for lateral tensile force acting on the anchors in the staircase or landing

In addition to the standard reinforcement provision of reinforcement in precast flights of stairs or stair landings, a lateral tensile reinforcement should also be installed which transmits the vertical forces at right angles to the component plane. The lateral tensile reinforcement comprises a holding pin with a lateral bar in accordance with the installation instructions for PFEIFER wave anchors (Fig. 9). It is secured without play or gap to the front end of sleeve of the anchor (Fig. 10) by means of the VarioSonic data clip. This is very important for an effective transmission of forces. The flame-red VarioSonic dataclip is visible at the front end of the precast stairs and ensures that a non-designated and properly reinforced lifting anchor is used by mistake. The lateral bar can be angled through 90° if the installation is close to the edge and directed rearwards with the standard concrete cover (Fig. 7).



Installation instructions for PFEIFER VarioSonic SLE stair bearings

Application area

PFEIFER VarioSonic SLE stair bearings are used on straight or twisted stairs to support the ends on the floor or landings (Fig. 11). To do this, a formed bracket is installed on the stairs and on the floor. The VarioSonic SLE is positioned between floor and stairs, where it transmits the vertical force components.

Components

The VarioSonic SLE is supplied as a complete unit. As can be seen in Fig. 12, it comprises an positioning foot with a neoprene bearings, the installation flange and the plastic pipe.

Transmission of forces

In accordance with the static type verification, a rated resistance of 33.6 kN applies to the VarioSonic SLE bearing.

The verification calculations for the transmission of forces in the concrete and the design of the concrete consoles including the positioning of the reinforcement are to be performed by the engineer responsible for the load-bearing structure. A qualitative positioning of the reinforcement in the flight of stairs is shown in Fig. 14.

The pressure forces (depending on the vertical influences) underneath the SLE need to be taken into account:

$$\text{Surface pressure: } \sigma = \frac{V_{Rd}}{7853} \text{ [N/mm}_2\text{]}$$

Installation

Minimum and intermediate distances need to be taken into account during installation of the VarioSonic SLE staircase bearings. These can be seen in Fig. 13, which also shows the adjustment potential and gap distances. The minimum plate thickness of 100 mm must be satisfied, whereby any protruding plastic pipe can be simply cut off.

Fig. 12

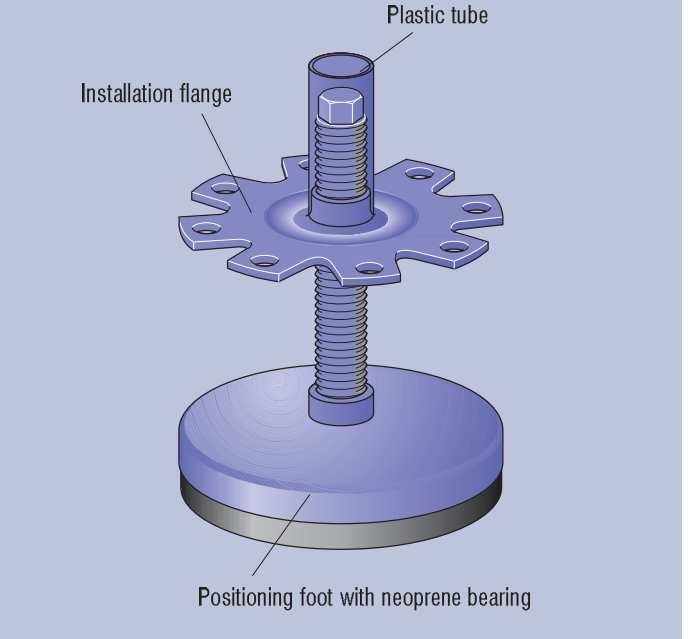


Fig. 13

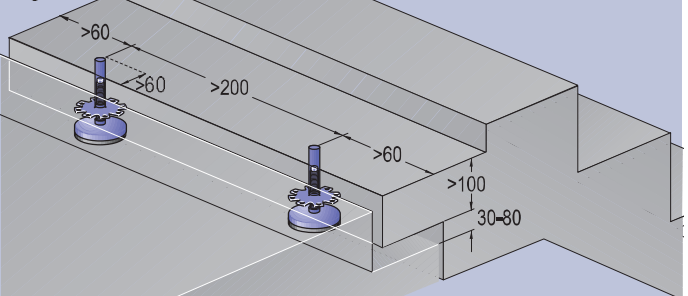


Fig. 14

