PFEIFER-VS®-Box CLASSIC
PFEIFER-VS®-Box EASYFILL

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PFEIFER-VS® System: Your solution for lightning-fast, problemfree assembly of precast concrete wall elements

To work with PFEIFER offers you plenty of advantages

Advantages in the planning phase

- Safety from a single source: the intelligently co-ordinated spectrum of products in the PFEIFER-VS® System offers the planner a comprehensive range for any application
- Safety through steel ferrules that transmit the full cable breaking force into the concrete element without additional retention reinforcement
- Spring-back wire rope loops allow the planner to arrange precast concrete sections flexibly

Advantages in precast element production

- Easy fixing to the formwork by nailing or gluing to steel formwork with hot-melt adhesive
- Careful processing and accurate fabrication ensures that the highest demands for sealing against concrete slurry penetration are satisfied

Advantages in precast element assembly

- The wire rope loops are easily folded out using a roofing hammer – no difficult bending of reinforcing steel, no time-consuming screwing
- No corrosion, since the recess rail and wire ropes are galvanized
- Flexible, spring-back wire rope loops allow precast concrete elements to be placed leaving gaps

Advantages for purchasing

- PFEIFER offers a comprehensive, well-rounded range with VS® Boxes
- Special economic solution through modern production plants
- Easy handling saves assembly time and wage costs

The right box for every joint

Joint is filled with grout ...

- Highly penetrating
- Simple handling
- No feed pump required
- Even relatively few joints can be filled economically

VS® BOX CLASSIC

Joint is filled with plastic joint filling mortar

- Plastic and stable in the joint without formwork
- No formwork necessary
- Mixing and conveying can be done in one step
- Pump conveying to the joint

VS® BOX EASYFILL

PFEIFER-VS®-Box CLASSIC

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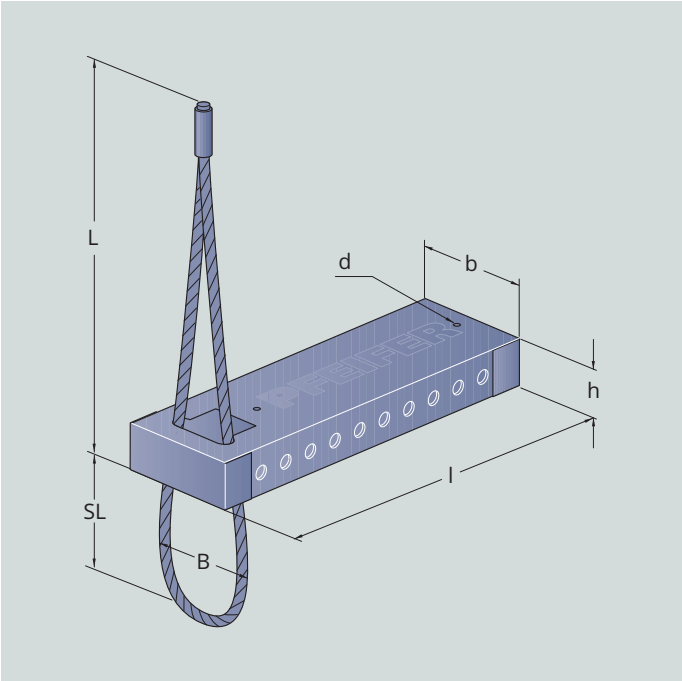
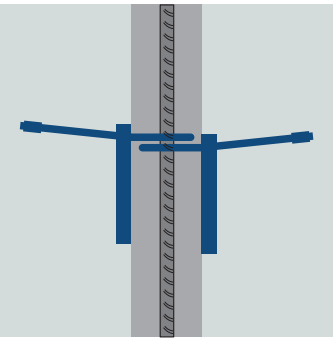
Connecting elements
VS® Box

The PFEIFER-VS®-Box CLASSIC is used for the non load-bearing connection of concrete elements. It consists of a construction-orientated and stable steel sheet box in which the folding, flexible wire rope loop is located. Wall joints can be produced economically, easily and safely.

Materials:
Box: Steel sheet, galvanized
Steel rope: high-strength, galvanized
Steel ferrule
Cover: Tape





Part no.	Type	Dimensions [mm]							Colour clip	Packing unit/ pieces	Weight approx. [kg/pc]
		b	l	h	d	L	SL	B			
389146	VS® 80	50	160	20	3	212	80	60	black ■	110	0,21
389147	VS® 100	50	160	20	3	212	100	65	white □	110	0,22
389148	VS® 120	50	160	20	3	212	120	70	window grey ■	110	0,23

PFEIFER-VS®-Box Easyfill

PFEIFER

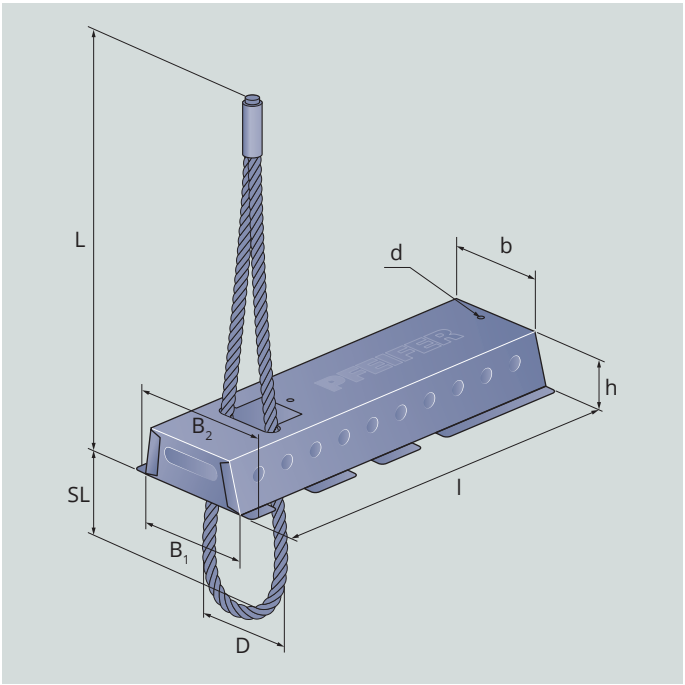
Connecting elements

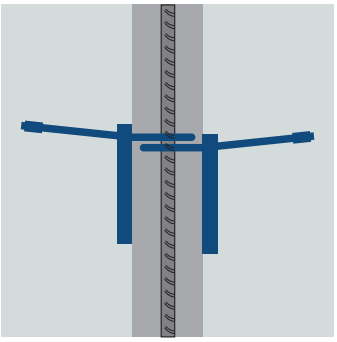
VS® Box

The PFEIFER-VS®-Box EASYFILL is used for the non load-bearing connection of concrete elements. It consists of a construction-orientated and stable steel sheet box in which the folding, flexible wire rope loop is located. Wall joints can be produced economically, easily and safely.
In comparison with the VS® Box CLASSIC, it is also usable in combination with plastic joint filling mortar.

Materials:

Box: Steel sheet, galvanized
Steel rope: high-strength, galvanized
Steel ferrule
Cover: Tape





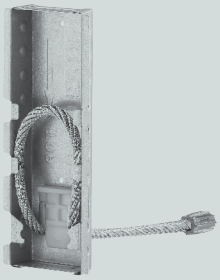
Part no.	Type	Dimensions [mm]									Colour clip	Packing unit/ pieces	Weight approx. [kg/pc]
		b	l	h	d	L	SL	D	B_1	B_2			
325523	VS® 80	45	160	20	3	212	80	55	50	60	black ■	800	0,21
325524	VS® 100	45	160	20	3	212	100	62	50	60	white □	800	0,22
325525	VS® 120	45	160	20	3	212	114	70	50	60	window grey ■	800	0,23

General installation instructions for the PFEIFER-VS® Box

Use

Figure 1

Figure 2



The PFEIFER-VS® Boxes are provided for the connection of reinforced concrete precast wall elements (Figures 3 to 6) made of concrete quality C30/37 or better.
The following joint filling variants are possible:

	Grout	plastic mortar
VS® Box CLASSIC	✓	✗
VS® Box EASYFILL	✓	✓

Figure 3: Butt joint

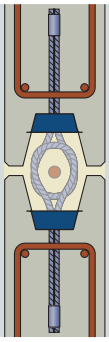


Figure 4: Corner joint

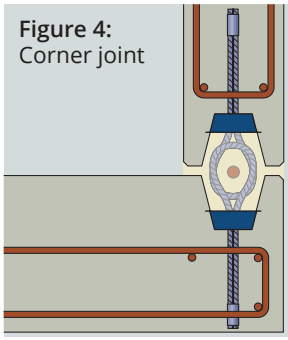


Figure 5: T-joint

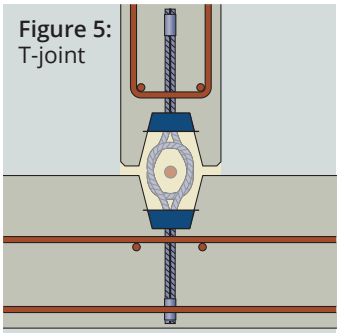
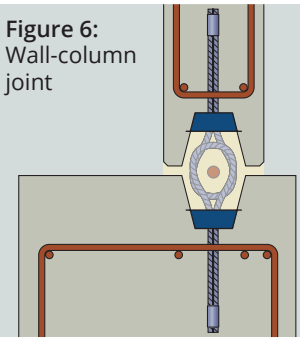


Figure 6: Wall-column joint



Dimensioning

Notice:

In statically relevant areas in Germany products with a building authority approval (VS®-Slim-Box, VS®-ISI-system) have to be used.

Installation

Figure 7: Joint geometry

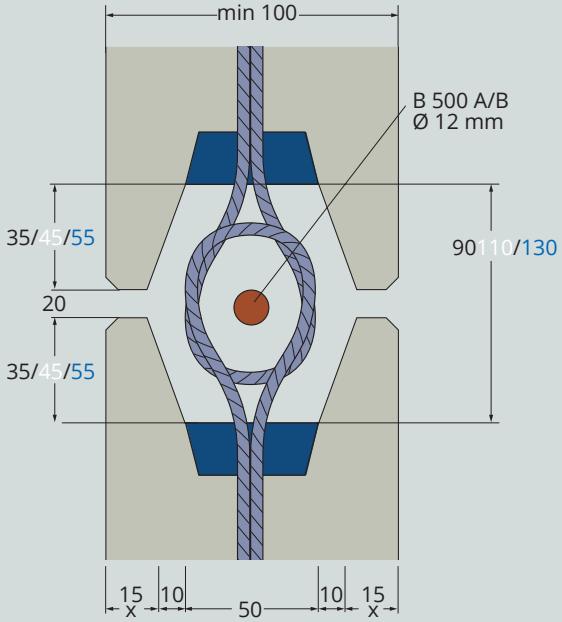
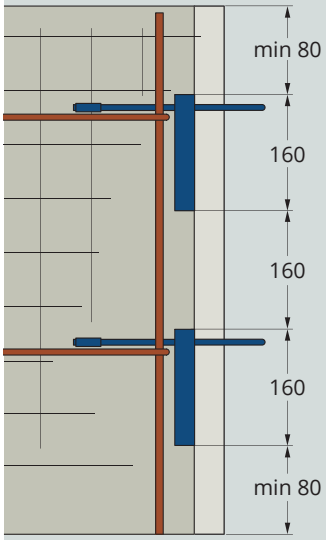
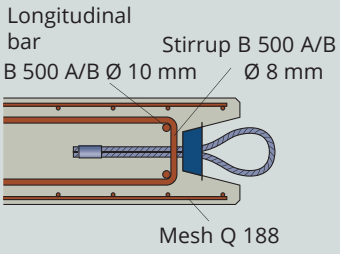


Figure 8: Reinforcement



Notice:

As an alternative to the stirrups, a suitable mesh cap can also be installed.



Notice:

Reinforcement layout according to Figures 7 and 8 is recommended in the reinforced concrete precast elements for the VS® Box systems. Other national regulations have local priority over this recommendation, and if they exist it is essential that they are observed.

Instructions for installation and use

Component joint

Standard joint = 20 mm (Figure 10), maximum joint = 40 mm (Figure 11), minimum joint = 10 mm (Figure 12)

Figure 9

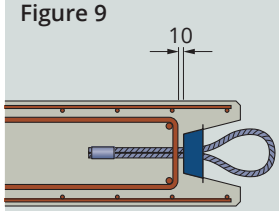


Figure 10

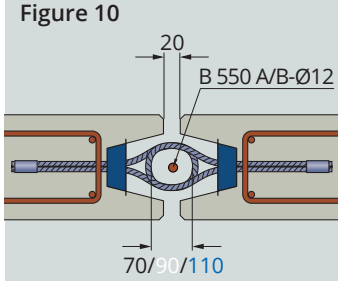


Figure 11

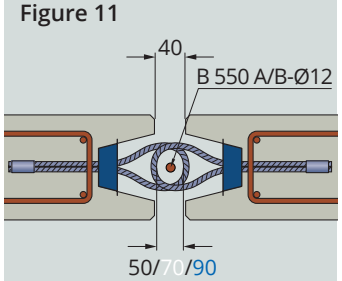
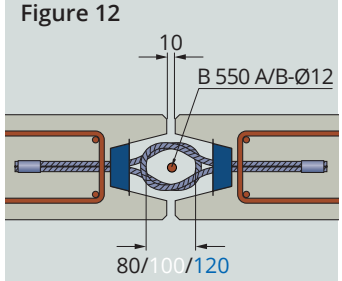


Figure 12



Installation tolerances

Figure 13

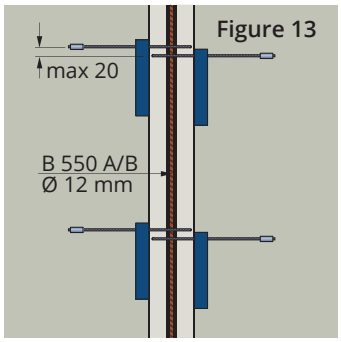
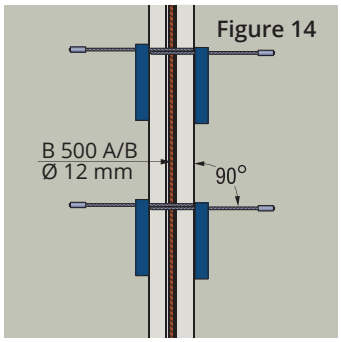


Figure 14



Vertically, the loops are usually to be fitted without any offset, so that they touch one another and lie directly on top of one another (Figure 13). A maximum vertical position tolerance of 20 mm is permitted (Figure 14).

Manufacture of the steel reinforced concrete precast elements

Figure 15

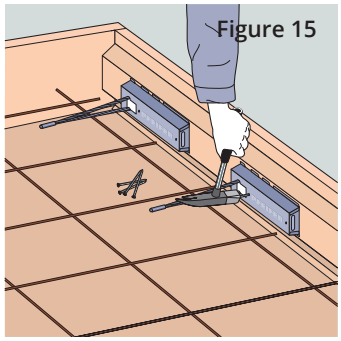
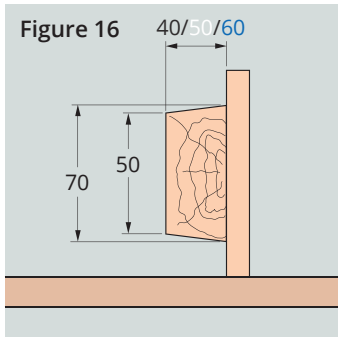


Figure 16



The wall components are usually concreted on formwork tables. A trapezoidal strip is fastened to the frontal vertical end of the wall elements, according to Figure 15. The dimensions of the trapezoidal wood can be obtained from Figure 16. When inserting the VS® Box into the formwork, it is necessary to ensure that the wire rope end is threaded as straight as possible between the reinforcement. Fixing the loops to the mesh reinforcement with wire prevents the loops from slipping out of place.

Figure 17

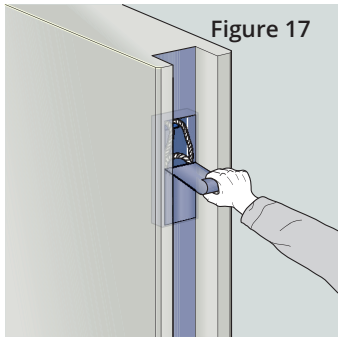
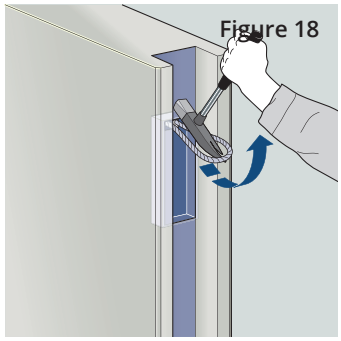


Figure 18



After demoulding

The flexible cover tape is simply pulled off after demoulding (Figure 17). The wire rope loops can then easily be folded out, using a tool to avoid any inquiry (Figure 18).
The wire rope loop should protrude perpendicularly from the component (Figure 19), and should spring back to this position again even after having been pushed aside when assembling the components. To do this, the loop is fixed into the round recess of the steel metal box. (Figure 20/21).

Figure 19

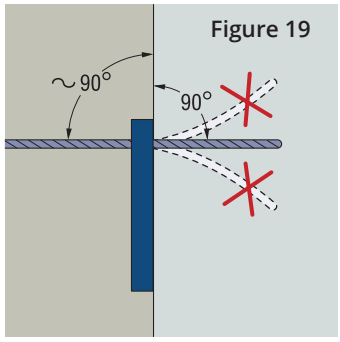


Figure 20

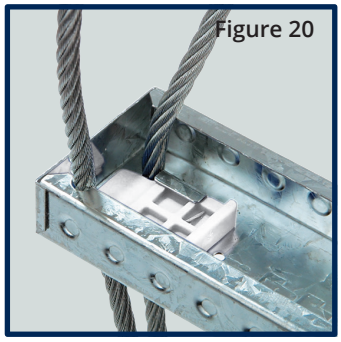
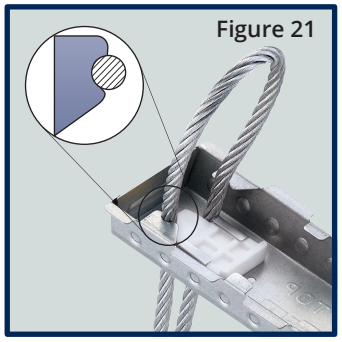


Figure 21



Assembling the precast elements:

The joints, the VS® Boxes and the loops must be clean, free from dirt or from separative fluids. The wall components are either placed on a bed of mortar or on underlaid plates of different heights using the permitted connection method. The components must be levelled so that their position and heights are in accordance.

Joint filling with grout

Information and notes

The properties of the grout in the joint play an important role in a load-bearing connection of precast concrete elements with the PFEIFER-VS® system elements.

Grout properties

- ✓ Very free-flowing for at least 90 minutes
- ✓ Shrinkage-compensated
- ✓ Resistant to frost and de-icing salt
- ✓ Can be pumped with mixing and conveying pumps
- ✓ Corrosion inhibiting
- ✓ Production certified according to DIN ISO 9001
- ✓ Delivered as bagged goods (25 kg bags)

VS®-Box CLASSIC

VS®-Box EASYFILL

Joint filling

The grout is added continuously until the planned height is reached.
The formwork must be able to withstand the pressure created in this way.
Compaction is not necessary. Nevertheless, air removal by poking with the reinforcing steel or the application of an internal vibrator is recommended. The grout sets very quickly, and allows work to continue promptly.

Joint formwork variants

1. Board formwork

In order to completely fill a precast element joint flush with VS®, a shuttering board (Figure 22) is to be attached on both sides. It is recommended that foam rubber is applied to the shuttering boards in order to compensate for unevenness. When the shuttering boards are properly fastened and it has been ensured that grout material cannot flow anywhere, the joint can be filled. The formwork can be removed, cleaned and reused after the material has hardened.

2. Mortar seal

Another variant makes it possible to close the joint flanks with the plastic mortar (Figure 23). After this mortar has hardened, the core area of the joint can be filled with grout and the higher performance of the systems can be achieved.

3. VS® FDS Joint Pressure Formwork

The joint pressure formwork consists of two hoses, 4 m long. These are very slightly pumped up, and pressed into the slot of the joint, so that the casting space of the loops is not impaired. After the hose has been inserted over the full height of the joint, the hoses are brought up to the rated pressure, and the joint is sealed (Figure 24). The joint grouting can now be introduced from above, over the full height of at most 3.54 m. After the grout has hardened, the air pressure can be released and the hose removed. It can be reused after cleaning.
Please follow the detailed installation instructions.

4. Sealed compriband

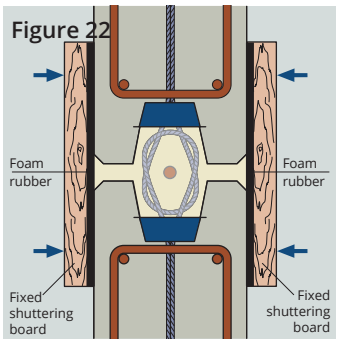
Another way to cast the joints with grout is the variant sketched in Figure 25. In this case, prior to grouting, a foam cord/compriband is inserted into the joint in a defined manner, after which a permanent elastic jointing is applied.
When this jointing has completely hardened, the grouting can be carried out without any additional formwork measures. The pressure that arises during grouting must, however, be borne in mind. This should be determined by the operating company, allowing suitable grouting sections to be chosen to avoid the jointing from being pushed out.

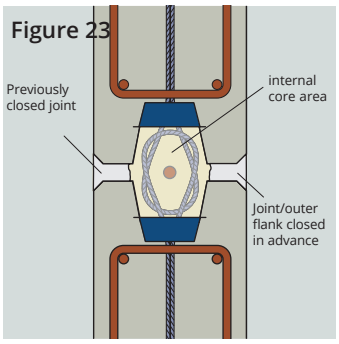
Grout consumption

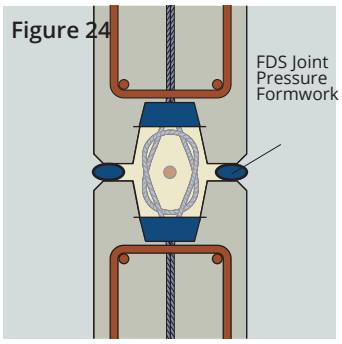
Table 4 below makes it possible to calculate an estimation of the fully-filled joints; an average grout consumption per metre of joint, based on walls that are 3.5 m high, is given.

Caution:

If joint pressure formwork or pre-compressed strips are to be pressed into the side joints without affecting the casting space, the effective lateral concrete coverage of the rail and the wire rope loop is reduced. The remaining cross-section must satisfy the applicable minimum requirements.







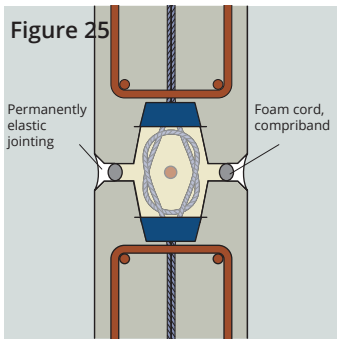


Table 4:
Grout volumes for standard joint (20 mm), 2 VS®-Boxes/m

Wall thickness [cm]	14	16	18	20	22	24
VS®-Box: 80	8,24	8,64	9,04	9,44	9,84	10,24
VS®-Box: 100	9,44	9,84	20,24	10,64	11,04	11,44
VS®-Box: 120	10,64	11,04	11,44	11,84	12,24	12,64

Joint filling with plastic joint filling mortar

Information and notes

The advantage of joint filling mortar is the filling of precast joints without formwork. The optimised, plastic/thixotropic properties of this mortar means that it is stable after being poured in the joint, without the need for further measures.

Mortar properties

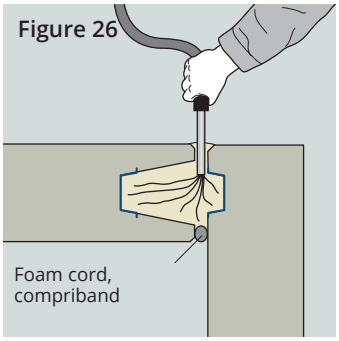
- ✓ Non-shrinking, with a gel-like consistency
- ✓ Easy preparation
- ✓ Can be pumped with conventional screw pumps
- ✓ High early and final strengths
- ✓ Resistant to frost and de-icing agents
- ✓ Impermeable to water
- ✓ Low water/cement ratio
- ✓ Production certified according to DIN ISO 9001
- ✓ Monitored externally and in-house
- ✓ Delivered as bagged goods (25 kg bags)

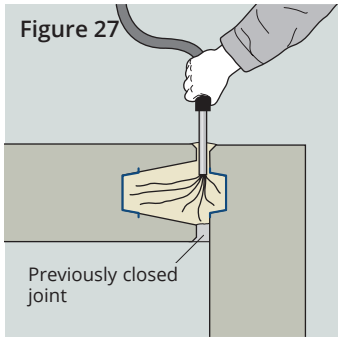
VS®-Box EASYFILL

Joint filling

First completely close off one joint flank using foam cord, profiled rubber (Figure 26) or alternatively using joint filling mortar (Figure 27). After sealing with a joint filling mortar, wait for the mortar to harden. After this, working from the other side, the remaining joint, which is now closed on one side, should be filled from the bottom to the top evenly and continuously. Gently poking the joint with the filling nozzle or the filling pipe ensures a proper result. The joint can easily be drawn flat after having been filled.

Joint formwork variants





Nozzle making

The user can make the filling nozzle from commercially available 22 mm ($^3/_4$") copper heating pipe. It can be attached to the pump hose with the aid of a solder fitting (Figures 28 and 29).

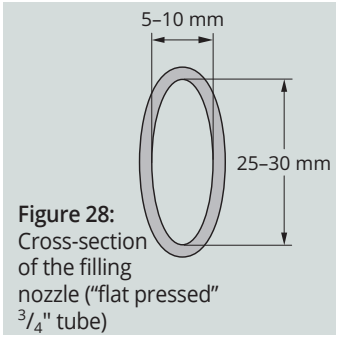


Figure 28: Cross-section of the filling nozzle ("flat pressed" $^3/_4$" tube)

Notice:

This information only concerns the introduction of the material into the joint!

Caution:

Do not constrict the filling space. If pre-compressed strips are to be pressed into the side joints without affecting the casting space, the effective lateral concrete coverage of the rail and the wire rope loop is reduced. This must also be taken into account by the planners in the dimensioning.

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Notes

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