

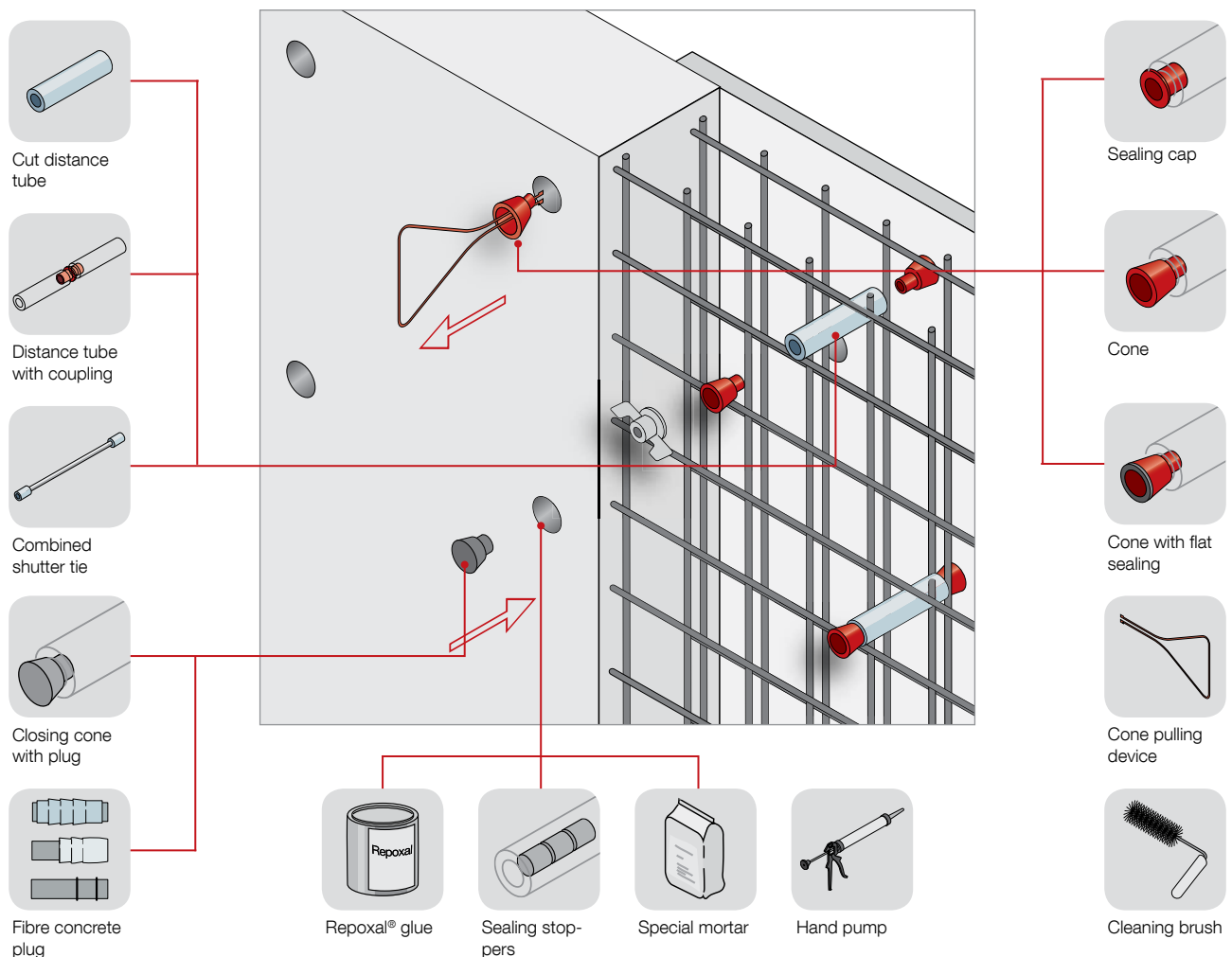


Fibre concrete distance tubes

Distance tubes are used to guarantee concrete wall thickness using reusable tie bars.

Distance tubes are the perfect technical solution for shutter ties.

- High compressive strength
- Large contact area, therefore reduced pressure on the formwork
- Conforms to EN 1992-1-1:2011-01 (Eurocode 2) and DIN 18216 (formwork anchors for concrete formwork)
- Water resistant – the combination of various distance tube options with sealing stoppers and cones gives an impermeable shutter tie system that has been tested and certified according to EN 12390-8 (3 days at 5 bar water pressure)
- Fire resistance - helps to prevent the spread of fire and smoke in a fire event due to the use of tubes and sealing stoppers of fire resistance classes F30-F180, which are suitable for fire walls to F90 according to EN13501-1:2002
- Sound Proofing - helps to prevent noise transfer by the use of the tubes and appropriate stoppers

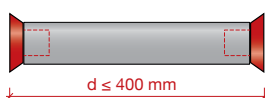




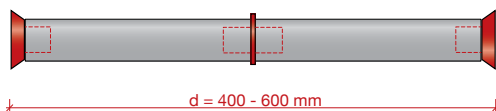
Material advantages

- Distance tubes made of fibre-reinforced concrete bond monolithically with the concrete, thus preventing the penetration of water. Distance tubes and cones made of fibre-reinforced concrete have a very high compressive strength.
- The stoppers and cones are glued using the tried-and-tested Repoxal®. This system meets the requirements for noise insulation, fire protection and pressing water loads.
- Sealing cones provide for homogeneous, durable and aesthetically appealing concrete surfaces.

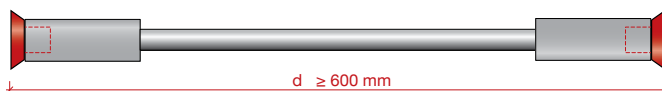
Different combinations of distance tubes are used, depending on the wall thickness. For maintenance of the specified wall thickness, the length of the selected cone or sealing cap must be included in the calculation together with the length of the distance tube. Dimensions can be found in the current MAX FRANK Product List to enable the correct choice of type; custom productions are also possible on enquiry.



Distance tube, single section



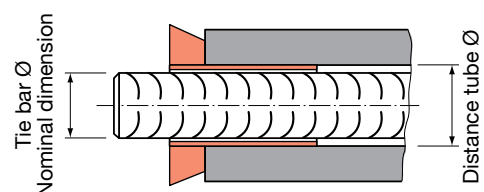
Distance tube, two sections with coupler



Composite distance tube of two lengths of fibre concrete tube with intermediate steel tube

Selection table tie bar

Distance tube Ø	Tie bar Ø nominal dimension
22	12.5
22	15.0
27	20.0
32	22.0

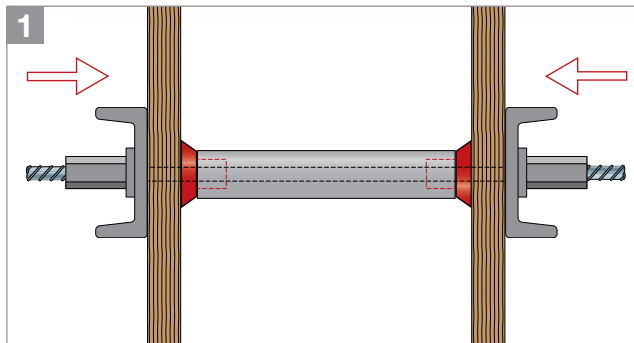


Assembly procedure

The use of distance tubes, installed with plastic sealing caps and cones and after formwork stripping sealed with fibre-reinforced concrete stoppers and cones, results in a tried and tested system that is suitable for the most diverse physical and chemical environments.

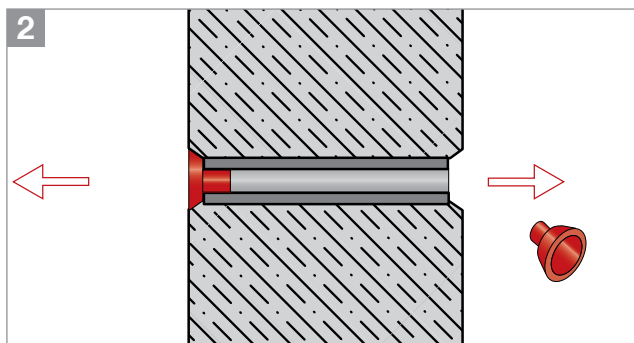
For architects and planners, who focus increasingly on exposed concrete, the large selection of sealing cones offers a wide variety of design possibilities.

Described below are the work steps required to ensure the optimum sealing of distance tubes.

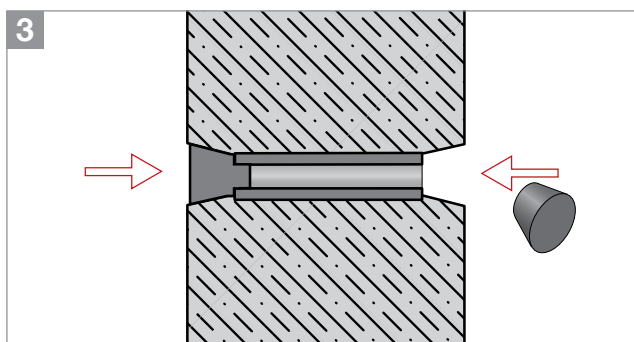


Formwork ties are located in a grid pattern to suit the layout and loading conditions of the formwork. At each location a fibre-reinforced concrete distance tube in combination with plastic sealing caps or cones is used to form a sleeve to ensure an exact wall thickness and to protect the reusable threaded anchor steel.

The fibre-concrete material of the distance tubes can absorb high compressive loads and the large contact area reduces pressure on the formwork face.



The use of a plastic sealing cap or cone compensates for any unevenness of the formwork surface and prevents the ingress of any cement slurry. Following demoulding, the plastic sealing cones are removed with the aid of a cone pull-out device. The installation depth of the distance tubes is increased if sealing cones are used, a permanent truncated cone-like recess remains.

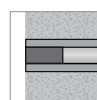


MAX FRANK offers a wide range of concrete sealing cones with different shapes, textures and colours. Apart from the fibre-reinforced concrete versions, cones are also available in a cast concrete version.

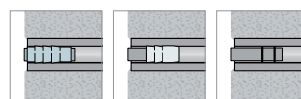
The cones are glued with a precise fit on both sides using the Repoxal® two-component glue. The tried-and-tested Repoxal® TW is the ideal solution for the fast, clean sealing of tie holes in the drinking water sector.

Plastic sealing cap

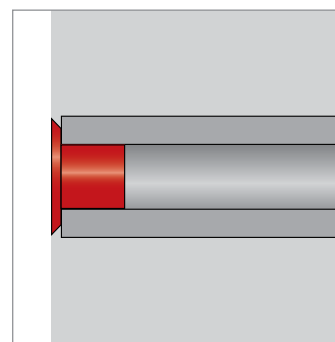
The plastic sealing cap helps to distribute any pressure from the formwork evenly, accommodates small misalignments and seals the end of the distance tube to prevent the ingress of cement slurry. The distance tubes can be sealed with stoppers made of fibre-reinforced concrete, FB-Kombistop, FB-Aktivstop and FB-Easystop for the respective requirement. Concrete sealing caps complete the system.



glued



plugged



Plastic cone 1 cm

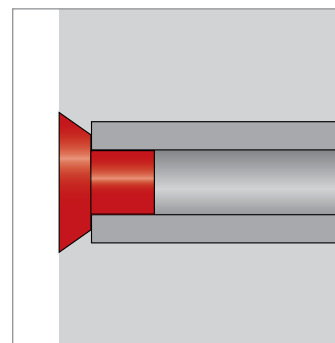
This cone can be used for the same applications as the sealing cap, but enables higher pressures to be absorbed and can compensate for larger weak points in the formwork such as unevenness or damage. Sealing with the various types of stoppers and cones complete the system.



glued



plugged



Plastic cone 3 cm

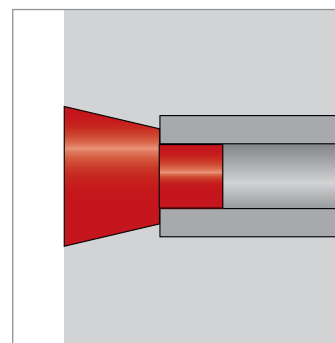
This cone can be used for the same applications as the 3 cm cone but can also be used where tensioning is not at right angles to the formwork. The cone can be cut on site to suit the required angles. Sealing with the various types of stoppers and cones complete the system.



glued



plugged

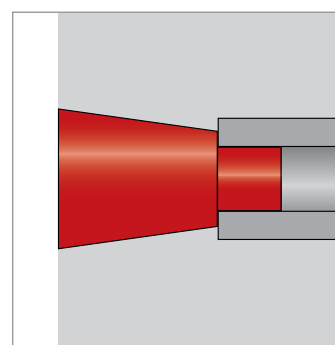


Plastic cone 5 cm

This cone can be used for the same applications as the 3 cm cone. Sealing with the various types of stoppers and cones complete the system. However, just one flush-fitting cone glued on both sides is sufficient to achieve a waterproof seal up to 5 bars.

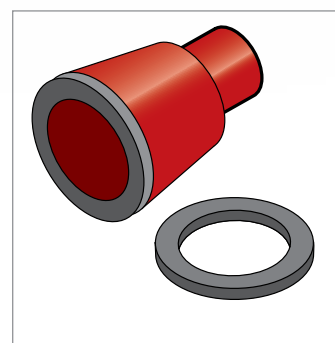


glued



Flat gaskets

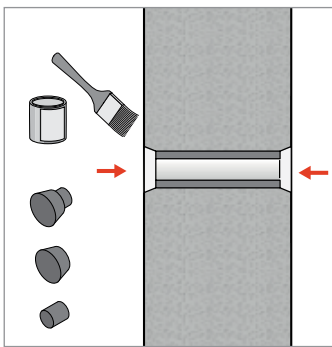
All our plastic sealing cones are delivered with a flat gasket made of an absorbent plastic. The porous seal between the face of the formwork and the sealing cap ensures a balanced water content at the surface. Surplus concreting water and air bubbles are drained away and the formation of concrete honeycombs is prevented.





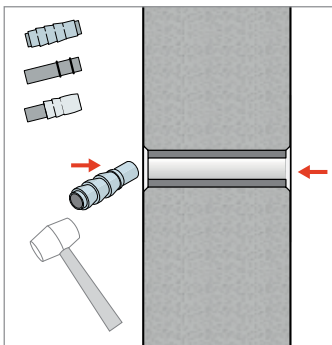
Sealing options

There are various options available for the sealing of fibre concrete distance tubes, depending upon structural requirements with regard to appearance, weathering and function. The sealing method should be agreed by the building owner and other interested parties at an early stage, since each sealing option requires a different hole shape.



Gluing of fibre-reinforced concrete stoppers and cones

The watertight sealing of tie-bar holes is created using MAX FRANK distance tubes is accomplished using glued-in fibre reinforced concrete stoppers. Gluing using the tried-and-tested Repoxal® glue produces a flush closure. In combination with MAX FRANK sealing cones, the tie-bar hole can be used as an element in exposed concrete surfaces. Flush versions or versions with shadow gaps are ideally suited to this.

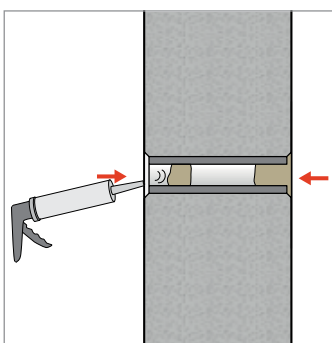


Fibre-reinforced concrete sealing stoppers

In addition to the glued sealing stopper, MAX FRANK also offers the following for the sealing of tie-bar hole:

- FB-Kombistop with integrated rubber seal,
- FB-Easystop with integrated sealing rings and
- FB-Aktivstop with integrated expanding seal.

The various sealing stoppers cover the different requirements for the sealing of distance tubes with regard to building physics and conditions of use (see page 28/29). The simple sealing can be carried out in all weathers, enabling work to continue immediately.



Grouting with expanding mortar

The special non-shrink mortar 3/25 can also be used to completely fill distance tubes. With the aid of the manual grouting gun, the special mortar is quickly injected into the tie-bar hole and, after trowelling with a float, a closed surface appearance is obtained.

FB-Kombistop with integrated rubber seal

The FB-Kombistop is a fibre-reinforced concrete sealing stopper enclosed in silicone rubber. This material combination enables the waterproof sealing of distance tubes by simply tapping in the stopper with a rubber mallet. The simple sealing of the distance tubes can be carried out at any time and enables work such as backfilling and water filling to commence immediately.



FB-Aktivstop with integrated expanding seal

The FB-Aktivstop is a fibre-reinforced concrete sealing stopper enclosed in an expanding material. This material combination enables the waterproof sealing of distance tubes by simply tapping in the stopper with a rubber mallet. As a custom version, the Aktivstop Platinum 100 can be used to seal the conical anchor opening of the Platinum 100 formwork from the Hünnebeck company. It is tapped in from the inside on the side facing away from the water. The properties correspond to those of the standard version of the Aktivstop.



FB-Easystop with integrated sealing rings

This material combination enables the sealing of distance tubes for rising structural elements above the basement level. They are simply screwed in by hand. The simple sealing of the distance tubes can be carried out at any time and enables work such as backfilling and water filling to commence immediately. The simple sealing of the distance tubes are also suitable for exposed concrete.



Fibre-reinforced concrete sealing stopper with Repoxal®

The gluing of the stopper with Repoxal® glue satisfies the requirements for noise insulation, fire protection and pressing water loads. Use is possible in the drinking water sector with Repoxal® TW glue. After installation, backfilling and water filling should be delayed until the glue has hardened.



Stoppers in standard formats

1 stopper with Repoxal®	2 stoppers with Repoxal®	FB-Aktivstop	FB-Easystop	FB-Kombi-stop	Expanding mortar + 2 stoppers with Repoxal®

Properties:

Pressing water		not tested	5 bar	5 bar	⊖	5 bar	not tested
Fire protection		F30	F30 - F180	not tested	not tested	not tested	F90 Fire wall ¹⁾
Noise insulation		not tested	yes	not tested	not tested	not tested	yes
Installation in frosty weather		⊖	⊖	⊕	⊕	⊕	⊖
Drinking water		⊕	⊕	⊖	⊖	⊕	⊖
Appearance				⊖		⊖	⊖

Stress:

Salt water	⊕	⊕	⊕	⊕	⊖	⊕
Acids/alkalis	○	○	⊕	○	○	○
Liquid manure	○	○	⊕	○	⊖	○
Hydrocarbons	○	○	⊖	○	⊖	○
Crude oil/mineral oil	○	○	⊖	⊕	⊖	○

⊕ suitable ○ conditionally suitable ⊖ not suitable

Remarks

1) For a through-seal without hollow space, in combination with two stoppers

Sampling with the building owner is recommended with regard to appearance and dimensions

Appearance



Optically very high quality execution (sampling is recommended).



Optically high quality execution with standard cones



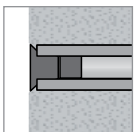
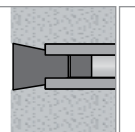
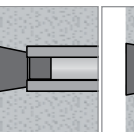
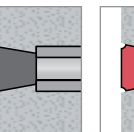
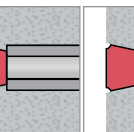
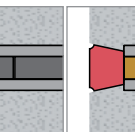
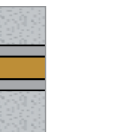
Optically normal execution



Not optically suitable as "exposed concrete"

Cone

Custom formats

						
1 cm cone with bung + 1 stopper	3 cm cone with bung + 1 stopper	3 cm cone without bung + 1 stopper	5 cm cone without bung	Custom cone	Custom cone + through-stopper ¹⁾	Custom cone + expanding mortar

Properties:

Pressing water		5 bar	5 bar	not tested	5 bar
Fire protection		F30 - F180	F30 - F180	F30 - F180	F30 - F180
Noise insulation		yes	yes	yes	yes
Installation in frosty weather		⊖	⊖	⊖	⊖
Drinking water		⊕	⊕	⊕	⊕
Appearance					

Appearance



Stress:

Salt water	⊕	⊕	⊕	⊕
Acids/alkalis	○	○	○	○
Liquid manure	○	○	○	○
Hydrocarbons	○	○	○	○
Crude oil/mineral oil	○	○	○	○

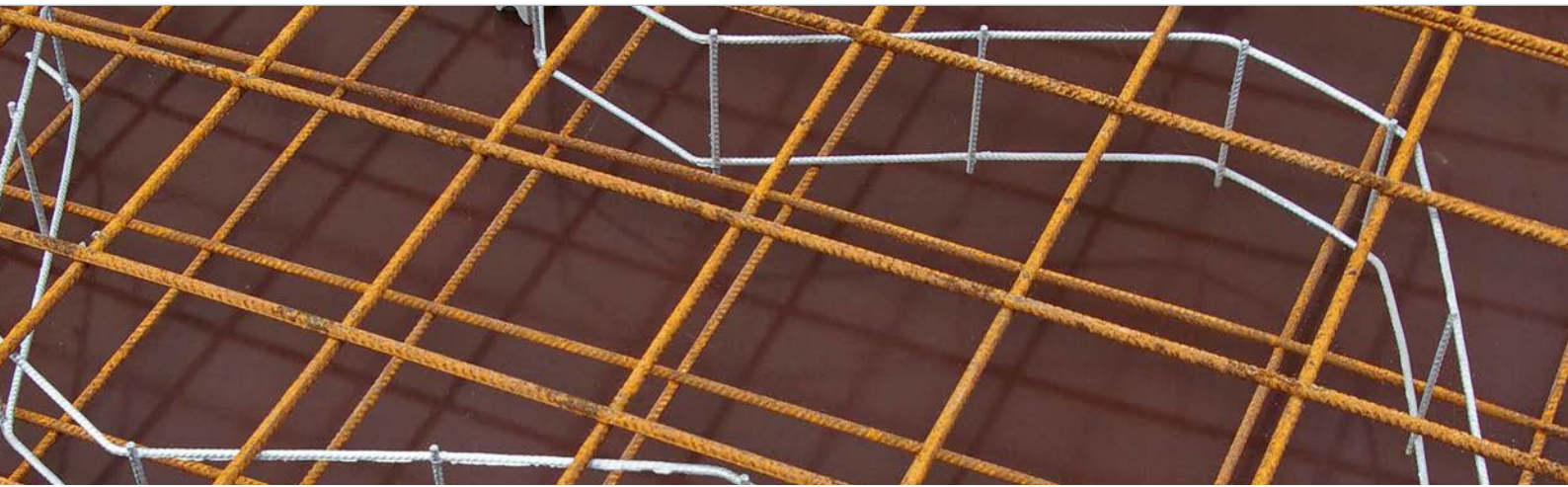
⊕ suitable ○ conditionally suitable ⊖ not suitable

Custom colours

Cones are available in the standard colours anthracite, grey, sienna red and white.

Colour accuracy cannot be guaranteed on account of fluctuations in the natural raw materials.

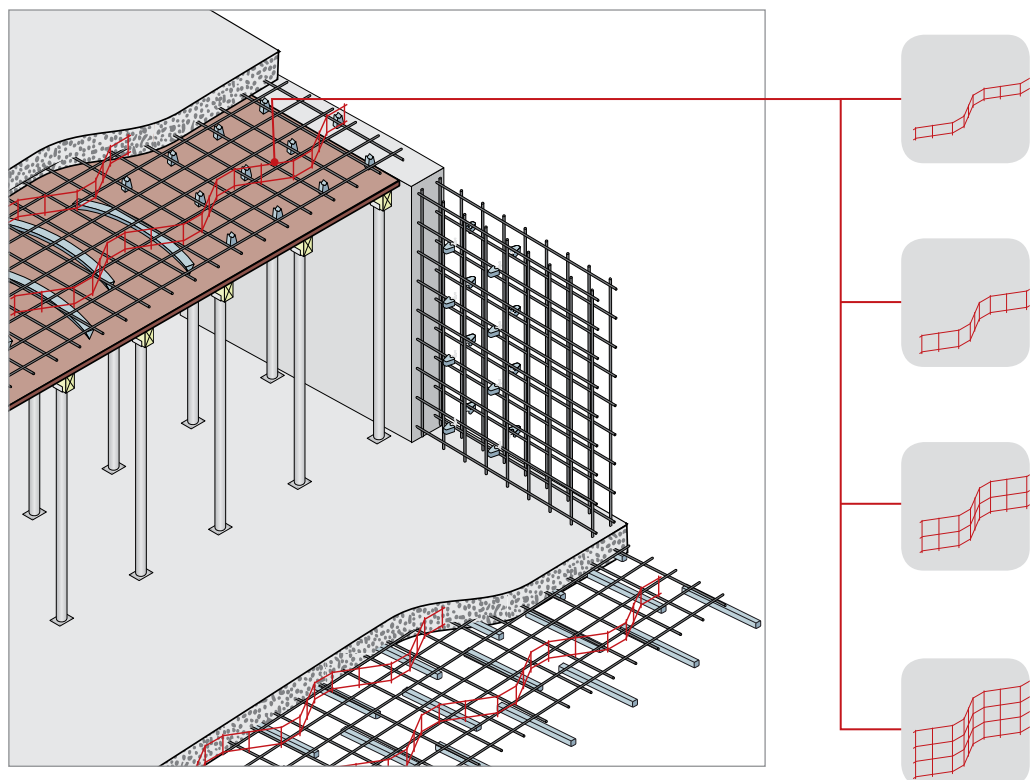




U-Korb®

Continuous high chairs are used as spacers between the lower and upper reinforcement layers in bases, slabs and walls. They fix the distance between both reinforcement layers and hold them in the correct structural position.

- Tested according to DBV fact sheet "Supports" according to Eurocode 2
- Saves time and material through fast laying and a support width of 20 cm
- Non-tipping due to a stable contact surface with the lower reinforcement
- No contact with the formwork, therefore no damage to the formwork skin and no rust stain formation on the concrete surface
- Strong – able to support foot traffic
- Especially suitable for mesh and individual bar reinforcement
- The weight of the steel in the high chairs can be calculated as part of the reinforcement based on VOB (German contract procedure for building works), part C DIN 18331, section 5.3.1.1.



Determination of the necessary U-Korb® size:

Determination of the necessary U-Korb® size, taking into account the required concrete cover and the desired ceiling thickness:

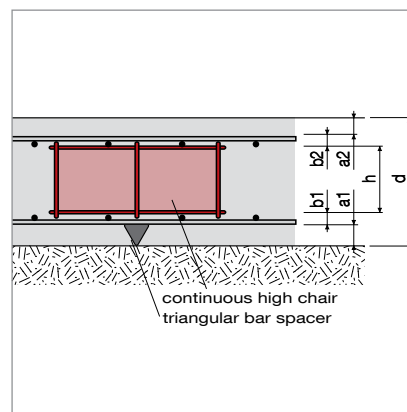
		Example:
1. Concrete cover of the lower reinforcement	a1	30 mm
2. Concrete cover of the upper reinforcement	a2	20 mm
3. Overall height of the lower reinforcement*	b1	15 mm
4. Overall height of the upper reinforcement*	b2	15 mm
	Total x	80 mm

Desired ceiling thickness "d" minus total "x" = necessary U-Korb® height "h".

In our example for a desired ceiling thickness of 200 mm: $200 - 80 = 120$ mm.

U-Korb® height corresponds to UKS12.

*please take into account the mat overlapping joints



Required information when ordering continuous high chairs:

The following number of continuous high chairs are required for normal construction loadings:

Bar diameters	Placing interval s	Approx usage/m ²
$\varnothing \leq 6.5$ mm	500 mm	1.0
$\varnothing > 6.5$ mm	700 mm	0.7

This table can only be used as a guideline for determining requirements. The load-bearing capacity corresponds to the load of a normal reinforcement. Additional loads, above all point loads, cannot be transmitted.

The exact installation spacing must always be adapted to the requirements of the reinforcement and the concrete cover and must be checked on site. Decisive above all are the acceptable deflections when walking on the reinforcement (concreting).

In the case of reinforcement structures that are not walked on, e.g. when using the U-cage in wall structures, the determined requirement can be reduced by 10 to 20%.

