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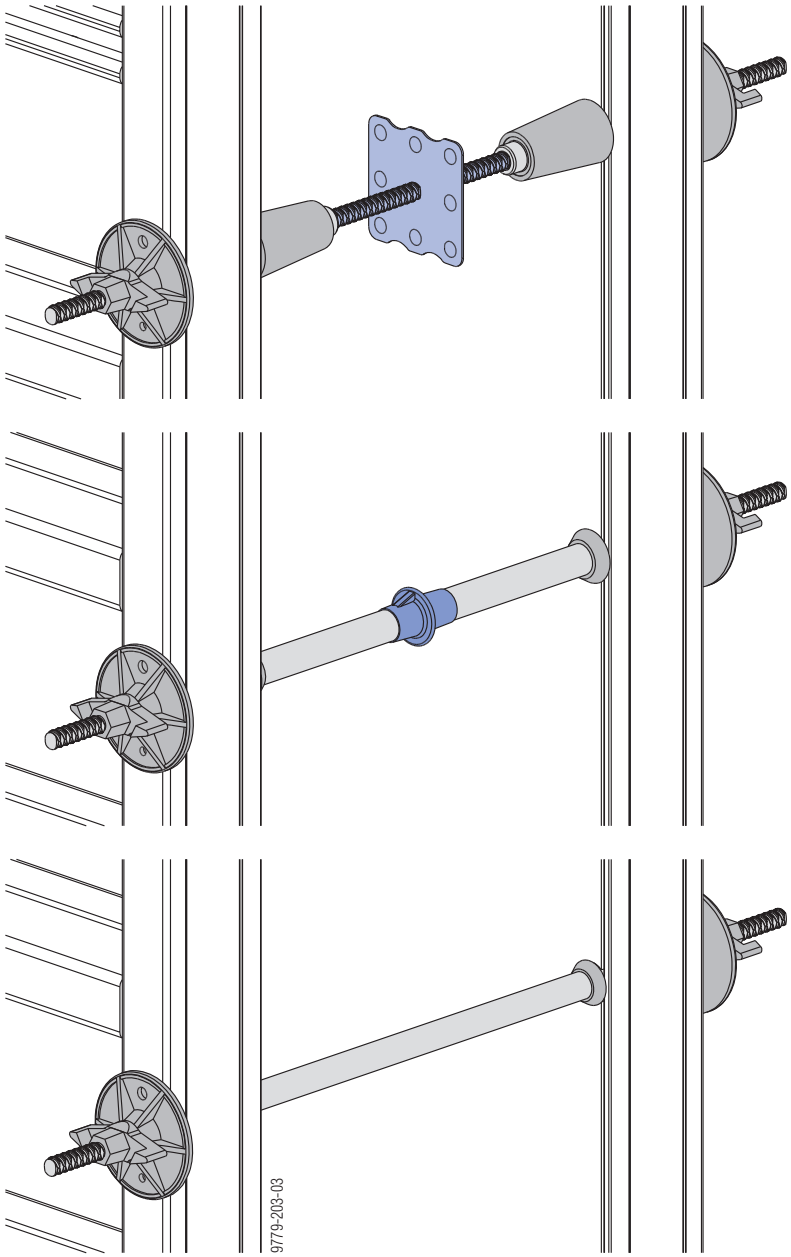
en-GB

Formwork & Scaffolding.
We make it work.

Form-tie points for special requirements

User Information

Instructions for assembly and use (Method statement)



Contents

Introduction

Elementary safety warnings

User target groups

- This booklet is aimed at all persons who will be working with the Doka product or system that it describes. It contains information on the standard design for setting up this system, and on correct, compliant utilisation of the system.
- All persons working with the product described herein must be familiar with the contents of this booklet and with all the safety instructions it contains.
- Persons who are incapable of reading and understanding this booklet, or who can do so only with difficulty, must be instructed and trained by the customer.
- The customer is to ensure that the information materials provided by Doka (e.g. User Information booklets, Instructions for Assembly and Use, Operating Instruction manuals, plans etc.) are up to date and available to all users, and that they have been made aware of them and have easy access to them at the usage location.
- In the relevant technical documentation and formwork utilisation plans, Doka shows the workplace safety precautions that are necessary in order to use the Doka products safely in the usage situations shown.
  In all cases, users are obliged to ensure compliance with national laws, standards and regulations throughout the entire project and to take appropriate additional or alternative workplace safety precautions where necessary.

Hazard assessment

- The customer is responsible for drawing up, documenting, implementing and continually updating a hazard assessment at every job-site.
  This booklet serves as the basis for the site-specific hazard assessment, and for the instructions given to users on how to prepare and utilise the system. It does not substitute for these, however.

Remarks on this booklet

- This document can be used as general Instructions for Assembly and Use (Method Statement) or be incorporated into site-specific Instructions for Assembly and Use (Method Statement).
- **The graphics, animations and videos in this document or app sometimes depict partially assembled assemblies and may require additional safety equipment and/or measures to comply with safety regulations.**
  The customer must ensure all applicable regulations are complied with, even if they are not shown or implied in the graphics, animations and videos provided.
- **Individual sections contain further safety instructions and/or special warnings as applicable.**

Planning

- Provide safe workplaces for those using the formwork (e.g. for when it is being erected/dismantled, modified or repositioned etc). It must be possible to get to and from these workplaces via safe access routes!
- **If you are considering any deviation from the details and instructions given in this booklet, or any application which goes beyond those described in the booklet, then revised static calculations must be produced for checking, as well as supplementary assembly instructions.**

Regulations; industrial safety

- All laws, Standards, industrial safety regulations and other safety rules applying to the utilisation of our products in the country and/or region in which you are operating must be observed at all times.
- If a person or object falls against, or into, the sideguard component and/or any of its accessories, the component affected may only continue in use after it has been inspected and passed by an expert.

Rules applying during all phases of the assignment

- The customer must ensure that this product is erected and dismantled, reset and generally used for its intended purpose in accordance with the applicable laws, standards and rules, under the direction and supervision of suitably skilled persons.
  These persons' mental and physical capacity must not in any way be impaired by alcohol, medicines or drugs.
- Doka products are technical working appliances which are intended for industrial / commercial use only, always in accordance with the respective Doka User Information booklets or other technical documentation authored by Doka.
- The stability and load-bearing capacity of all components and units must be ensured during all phases of the construction work!
- Do not step on or apply strain to cantilevers, closures, etc. until suitable measures to ensure their stability have been correctly implemented (e.g. by tie-backs).
- Strict attention to and compliance with the functional instructions, safety instructions and load specifications are required. Non-compliance can cause accidents and severe injury (risk of fatality) and considerable damage to property.
- Sources of fire in the vicinity of the formwork are prohibited. Heaters are permissible only when used correctly and situated a correspondingly safe distance from the formwork.
- Customer must give due consideration to any and all effects of the weather on the equipment and regards both its use and storage (e.g. slippery surfaces, risk of slipping, effects of the wind, etc.) and implement appropriate precautionary measures to secure the equipment and surrounding areas and to protect workers.
- All connections must be checked at regular intervals to ensure that they are secure and in full working order.
  In particular threaded connections and wedged connections have to be checked and retightened as necessary in accordance with activity on the jobsite and especially after out-of-the-ordinary occurrences (e.g. after a storm).
- It is strictly forbidden to weld Doka products – in particular anchoring/tying components, suspension components, connector components and castings etc. – or otherwise subject them to heating.
  Welding causes serious change in the microstructure of the materials from which these components are made. This leads to a dramatic drop in the failure load, representing a very great risk to safety.
  It is permissible to cut individual tie rods to length with metal cutting discs (introduction of heat at the end of the rod only), but it is important to ensure that flying sparks do not heat and thus damage other tie rods.
  The only articles which are allowed to be welded are those for which the Doka literature expressly points out that welding is permitted.

Assembly

- The equipment/system must be inspected by the customer before use, to ensure that it is in an acceptable condition. Steps must be taken to exclude components that are damaged, deformed, or weakened due to wear, corrosion or rot (e.g. fungal decay).
- Using our safety and formwork systems together with those of other manufacturers can create risks that may lead to injury and damage to property. This requires separate verification by the user.
- The equipment/system must be assembled and erected in accordance with the applicable laws, standards and rules by trained customer personnel whilst maintaining any applicable safety inspections that may be required.
- It is not permitted to modify Doka products; such modifications constitute a safety risk.

Closing the formwork

- Doka products and systems must be set up so that all loads acting upon them are safely transferred!

Pouring

- Do not exceed the permitted fresh-concrete pressures. Over-high pouring rates overload the formwork, cause greater deflection and risk breakage.

Stripping the formwork

- Do not strip out the formwork until the concrete has reached sufficient strength and the person in charge has given the order for the formwork to be stripped out!
- When stripping out the formwork, never use the crane to break concrete cohesion. Use suitable tools such as timber wedges, special pry-bars or system features such as Framax stripping corners.
- When stripping out the formwork, do not endanger the stability of any part of the structure, or of any scaffolding, platforms or formwork that is still in place!

Transporting, stacking and storing

- Observe all country-specific regulations applying to the handling of formwork and scaffolding. For system formwork the Doka slinging means stated in this booklet must be used – this is a mandatory requirement.
  If the type of sling is not specified in this document, the customer must use slinging means that are suitable for the application envisaged and that comply with the regulations.
- When lifting, always make sure that the unit to be lifted and its individual parts can absorb the forces that occur.
- Remove loose parts or secure them so that they cannot slip out of position and drop.
- When lifting formwork or formwork accessories with a crane, no persons must be carried along, e.g. on working platforms or in multi-trip packaging.
- All components must be stored safely, following all the special Doka instructions given in the relevant sections of this document!

Maintenance

- Only original Doka components may be used as spare parts. Repairs may only be carried out by the manufacturer or authorised facilities.

Miscellaneous

The weights as stated are averages for new material; actual weights can differ, depending on material tolerances. Dirt accretions, moisture saturation, etc. can also affect weight.
We reserve the right to make alterations in the interests of technical progress.

Symbols used

The following symbols are used in this document:

DANGER
This is a notifier drawing attention to an extremely dangerous situation in which non-compliance with this notifier will lead to death or severe, irreversible injury.

WARNING
This is a notifier drawing attention to a dangerous situation in which non-compliance with this notifier can lead to death or severe, irreversible injury.

CAUTION
This is a notifier drawing attention to a dangerous situation in which non-compliance with this notifier can lead to slight, reversible injury.

NOTICE
This is a notifier drawing attention to a situation in which non-compliance with this notifier can lead to malfunctions or damage to property.

Instruction
Indicates that actions have to be performed by the user.

Sight-check
Indicates that you need to do a sight-check to make sure that necessary actions have been carried out.

Tip
Points out useful practical tips.

Reference
Cross-references other documents.

Preliminary remarks

To pour walls, it is necessary to have wall-ties with sufficient load-bearing capacity.

In general, a distinction is made between:

- wall-ties where no special requirements are made – these only need sustain the pressure of the fresh concrete – and
- wall-ties for special requirements that are fulfilled by additional measures aimed at making the tie-points e.g.:
  - water-impermeable
  - fire-resistant
  - sound-insulating
  - gas-impermeable
  - radiation-proof

This manual offers ideas and suggested solutions for form-tie points that need to meet one or more of the requirements stated above.

General remarks:

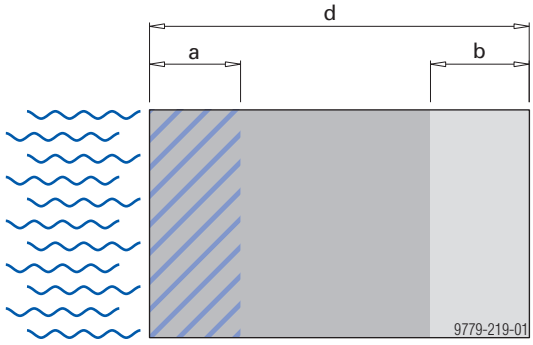
- Choosing a suitable formwork system with a widely spaced form-tie pattern is one way of reducing the number of expensive wall-ties that are needed. This will, of course, depend upon the circumstances and requirements applying on each site.
- If the main sealing function is intended to be in the middle of the wall (in the same way as with joint-sealing tape), this has the advantage that the form-tie point is watertight from the moment the formwork is stripped.
- Sealing measures that are carried out on the outside only, e.g. by bonding, call for extremely skilled, painstaking work.
- Tie-holes with small conical openings are more pleasing to the eye (fair-faced concrete) and easier to close off.
- In order to ensure that the wall-tie fulfils the requirements made of it, the points below must be followed, regardless of which design variant is selected:
  - the wall-tie must be precisely defined in the tendering documents
  - the relevant regulations and Standards must be observed
  - the manufacturer's installation instructions must be followed
  - the personnel involved must be sufficiently skilled

Water-impermeable concrete, and the wall-ties used in it

Concrete with high water-penetration resistance (watertight concrete without any extra sealing layers), has been in use for many years now.

When it comes to manufacturing and casting watertight concrete, there is plenty of good, detailed literature with references to DIN regulations etc. Watertight form-ties, on the other hand, do not receive anything like as much attention in the pertinent Standards.

- Recent investigations have shown that the depth of water penetration into watertight concrete is only approx. 7 cm
  Source: "Feuchtetransport durch Bauteile aus Beton" (Moisture transmission through concrete structural components) in "Beton- und Stahlbetonbau" (Concrete and reinforced concrete construction), 4 1999



a ... up to approx. 7 cm (capillary region)
b ... approx. 8 cm (drying-out region)
d ... Wall thickness

"Water-impermeable" means that more water vaporises from the side facing away from the water pressure than penetrates into the side which is exposed to it.

Form-tie points for special "dry" applications

The sealing techniques for fireproofing, acoustic insulation, radiation protection etc. are mostly similar to those for creating water-impermeable form-tie points, and use the same components.

Fitting the wall-tie

The properties set out in the test report can only be attained if the following conditions are met:

- only undamaged and clean components are used
- the components are only fitted by trained, skilled personnel
- all the relevant fitting instructions are followed

NOTICE

- Do not unscrew form ties prematurely (in "green", i.e. new, concrete) or with violent hammer-blows. This would break the adhesion between the tie rods and the concrete in which they are embedded,
  and might mean that the form-tie point is no longer watertight.

Concrete and concrete placement

In order for concrete structures to be cast in such a way that they fulfil architectural specifications, properly prepared wall-ties have to be combined with careful placing of the concrete.

- The concrete must be defined in accordance with the requirements
  - bid description to EN 206-1:2000
- Attention must be paid to the quality of concrete placement
  - vibration, weathering, concrete-placement method etc.

Minimum wall thicknesses

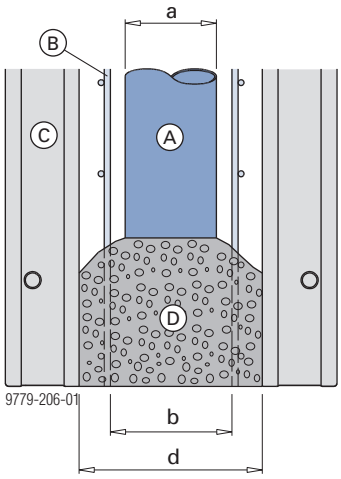
The wall thickness will be determined by the function that the structure will have to fulfil.

The following practical site-related factors may necessitate a larger wall thickness:

- the type of reinforcement
- the type of concrete placement (be aware of demixing due to drop height)
- the type of compaction (internal or external vibrators)

In practice, the wall thickness will already have been decided. If this thickness is not ideal, appropriate measures must be adopted.

Wall thickness required for placing the concrete by drop-pipe in accordance with the regulations



Example:
a ... Drop pipe diameter 15 cm
b ... min. 20 cm
d ... Wall thickness min. 30 cm

A	Drop-pipe
B	Reinforcement
C	Formwork
D	Concrete

(Source: Lohmeyer / Ebeling "Weisse Wannen - einfach und sicher" (Monolithic concrete tanks made easy).

Tender documents

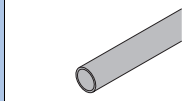
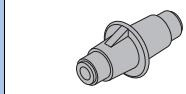
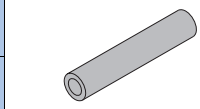
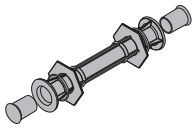
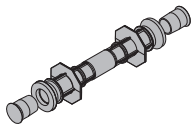
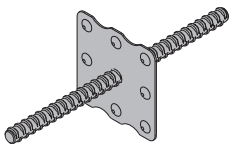
It is on the basis of the tender documents that the most suitable design variant will be chosen ("suitable", that is, in terms of the use to which the structure will later be put). All the variants outlined must make clear what additional work / costs will be involved, and the care that will need to be taken. It is advisable to give detailed descriptions of sizes, materials, fitting instructions and problem points. Also, there are several different design variants, as outlined in the following sections.

Tie rod system 15.0

Design variants - Form-tie system 15.0

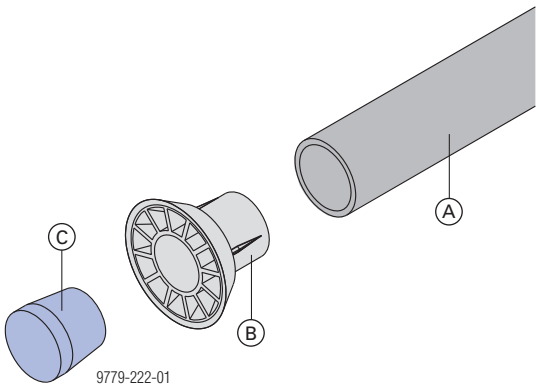
Overview of the products used in the Doka Tie rod system 15.0, and their areas of application.

Note:
For special applications, such as in tunnels, please contact the 'Global Expertise Center Infrastructure'.

Name		Water-impermeable	Sound-insulating	Fire-resistant	Smoke-proof	Suitable for drinking-water applications	Gas-impermeable	Radiation-proof	Suitable for FFC
Plastic tube 22mm with Plug 22mm[1]			✓	✓	✓				✓
Water stop connector 15.0		✓	✓	✓	✓				✓
Fibre concrete tube 22mm with 1 Fibre concrete plug D22 L20mm[1] per side				✓	✓	✓			
Fibre concrete tube 22mm with 2 Fibre concrete plugs D22 L20mm[2] per side		✓		✓	✓	✓	✓		
Fibre concrete tube 22mm completely closed off[3]		✓	✓	✓	✓	✓	✓	✓	
Fibre concrete tube 22mm with 1 Fibre concrete plug 22 D20 L50mm and 1 Fair-faced concrete cone 22/50 26/50mm per side		✓		✓					✓
Distance piece		✓	✓	✓	✓	✓			
Distance piece FFC		✓	✓	✓	✓	✓			✓
Water stop G 15.0		✓	✓	✓	✓		✓	✓	✓
Consumable Tie rod 15.0 with 2 Anchor cones 15.0			✓	✓	✓			✓	✓

[1] ... For preparing a form-tie point that is suitable for fair-faced concrete requirements, the 'Universal cone 22/10mm with sealing ring' is needed instead of the 'Universal cone 22/10mm'.
[2] ... glued with REPOXAL TW adhesive from FRANK
[3] ... 4/5 of the length are sufficient for sound insulation

Plastic tube 22mm



A	Plastic tube 22mm
B	Universal cone 22/10mm
C	Plug 22mm

Is suitable for preparing form-tie points that meet the following requirements:

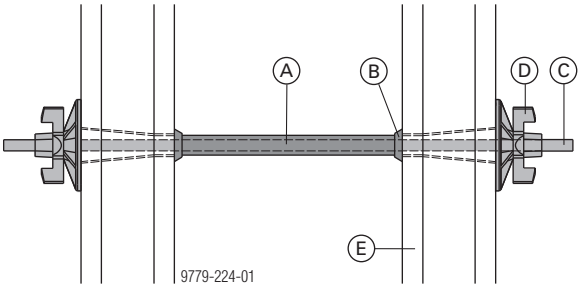
- sound-insulating
- fire-resistant to F90
- smoke-proof
- suitable for fair-faced concrete requirements

Preparing the form-tie point

➤ Cut the Plastic tube 22mm to the desired length and insert a Universal cone 22/10mm into each end.

The tie rods and super plates can be re-used over and over again. The plastic tube remains embedded in the concrete.

Form-tie point enclosed by formwork

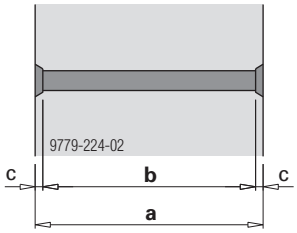


A	Plastic tube 22mm
B	Universal cone 22/10mm
C	Tie rod 15.0mm (length as dictated by formwork)
D	Super plate 15.0
E	Formwork

NOTICE

For preparing a form-tie point that is suitable for fair-faced concrete requirements, the 'Universal cone 22/10mm with sealing ring' is needed instead of the 'Universal cone 22/10mm'.

Formwork stripped from around form-tie point

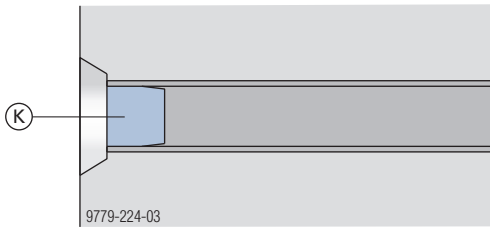


Variable dimensions:
a ... wall thickness
b ... cut-to-size length of the plastic tube

Fixed dimensions:
c ... 1 cm

Closing off the form-tie point

- ➤ Either remove the Universal cone 22/10mm or leave it in place.
- ➤ If the form-tie point is going to be closed with a Plug 22mm **(K)** , the Universal cone 22/10mm has to be removed beforehand.



Water-stop connector 15.0

Can be mounted in walls with a thickness of 20 cm and above.

Is suitable for preparing form-tie points that meet the following requirements:

- water-impermeable
- fire-resistant to F90
- sound-insulating
- smoke-proof
- suitable for fair-faced concrete requirements

Preparing the form-tie point

Various types of wall-tie can be prepared using the Water-stop connector.

- ➤ Always screw in components until they fully engage.
- ➤ Use **2 Spanners for tie-rods** to **tighten the tie-rods so firmly** that they cannot be dislodged when the form-tie assembly is being fitted or reinforcement is being placed.
- ➤ Never weld or heat tie-rods - risk of fracture!

General instructions for sealing the form-tie point

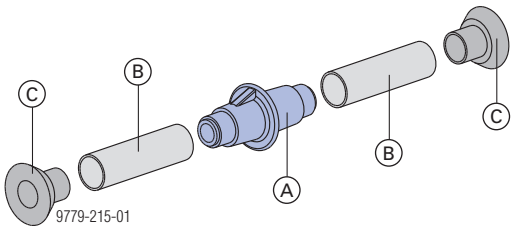
In its technical bulletin entitled ‘Fair-faced concrete’, the DBV (German Concrete Association) recommends leaving cone indentations as they are. This is because attempts to grout them level with the rest of the surface normally produce unsatisfactory results (colour differences, grouted areas have unclean edges).

NOTICE

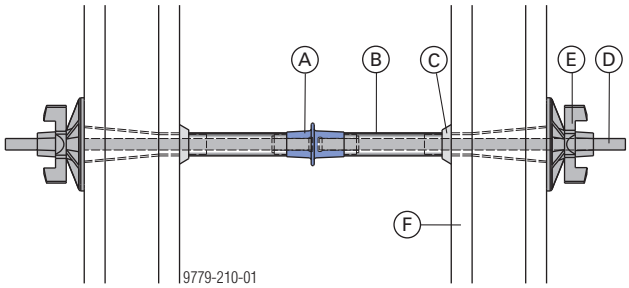
When stripping the formwork, make sure that the form-tie nuts are loosened uniformly on both sides of the form-tie point.

Variant 1: With plastic tubes and cones

In this variant, the tie rods can be reused.

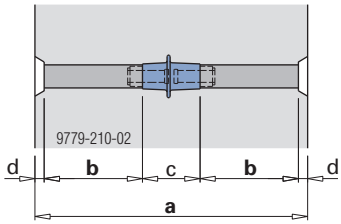


Form-tie point enclosed by formwork



A	Water stop connector 15.0
B	Plastic tube 26mm
C	Universal cone 26/10mm
D	Tie rod 15.0mm (length as dictated by formwork)
E	Super plate 15.0
F	Formwork

Formwork stripped from around form-tie point

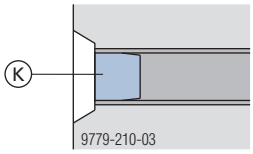


Variable dimensions:
a ... minimum wall thickness 20 cm
b ... depends on wall thickness

Fixed dimensions:
c ... 7.4 cm
d ... 1 cm

Closing off the form-tie point

- ➤ Either remove the Universal cone 26/10mm or leave it in place.
- ➤ If the form-tie point is going to be closed with a Plug 26mm **(K)** , the Universal cone 26/10mm has to be removed beforehand.

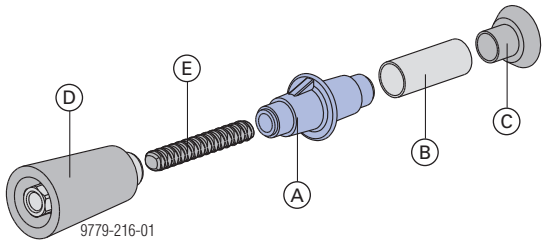


Variant 2: Anchor cone 15.0 on one side

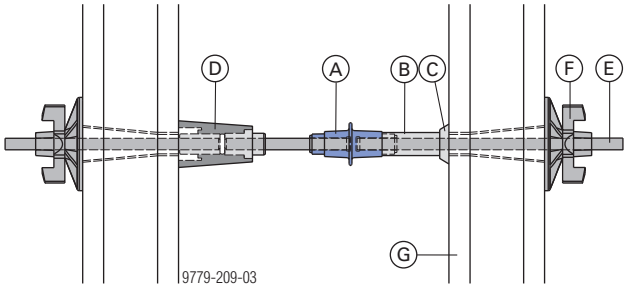
Can be mounted in walls with a thickness of 30 cm and above.

The anchor cone enables the 'Water stop connector plus
tie rod' assembly to be positioned and fixed on one side of the formwork even before the reinforcement is placed.

The tie rod on the cone-side remains in the concrete. The anchor cone can be used either on both sides or on one side only.



Form-tie point enclosed by formwork

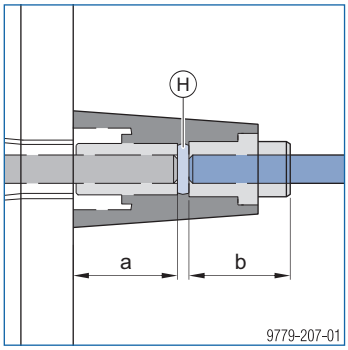


A	Water stop connector 15.0
B	Plastic tube 26mm
C	Universal cone 26/10mm
D	Anchor cone 15.0
E	Tie rod 15.0mm (length as dictated by formwork)
F	Super plate 15.0
G	Formwork

Tools needed for unscrewing the Anchor cone 15.0:

- Reversible ratchet 1/2"
- Box nut 24 1/2"

Screw-in depths of the Anchor cone 15.0



a ... screw-in depth: 53.5 mm
b ... screw-in depth: 52 mm

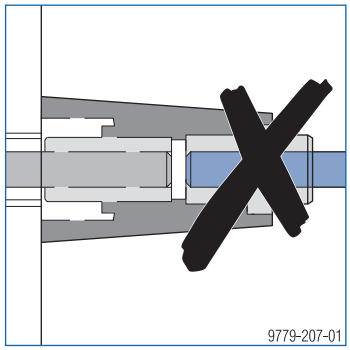
H	Locking pin of the Anchor cone 15.0

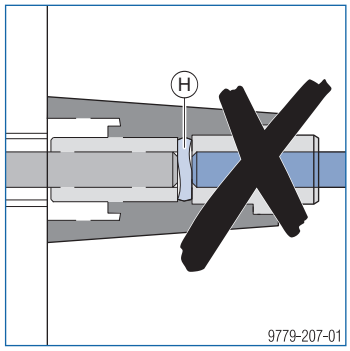
WARNING

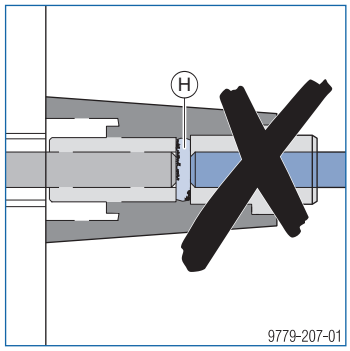
Wrong screw-in depth of the Anchor cone 15.0!

- ➤ The locking pin (H) must be in place in the Anchor cone 15.0.
- ➤ The locking pin must not be damaged in any way.
- ➤ The thread of the Anchor cone 15.0 must be free of dirt and concrete residues at all times.

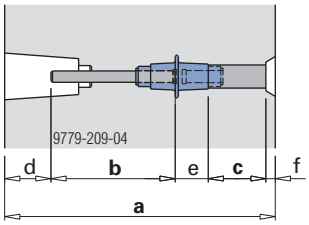
If any of the 3 cases apply, the Anchor cone 15.0 must be replaced!







Formwork stripped from around form-tie point



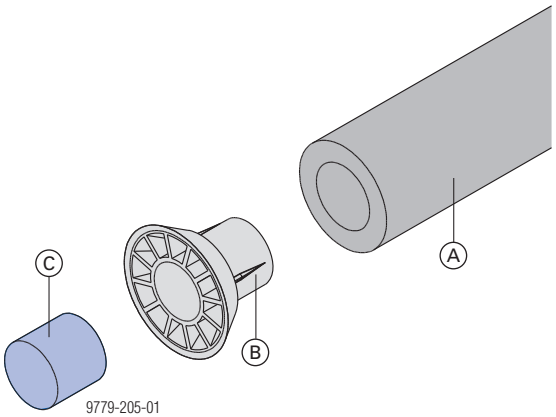
a ... minimum wall thickness 30 cm
b ... tie-rod length 11.6 cm where wall thickness is 30 cm
c ... 7.3 cm where wall thickness is 30 cm
d ... 6 cm
e ... 4.1 cm
f ... 1 cm

Closing off the form-tie point

- For details on closing off the openings on the anchor-cone side see the section headed ‘Water stop G 15.0’.
- For closing off the opposite side, see variant 1.

Fibre concrete tube 22mm

Can be mounted in walls with a thickness of 8 cm and above.



A	Fibre concrete tube 22mm
B	Universal cone 22/10mm
C	Fibre concrete plug D22 L20mm

Is suitable for preparing form-tie points that meet the following requirements:

- water-impermeable
- fire-resistant
- sound-insulating
- for civil defence structures (radiation-proof)

Proofs provided by Frank GmbH & Co. KG, Germany are available.

- smoke-proof

Proofs provided by Doka are available.

Ready-cut lengths available from Doka:

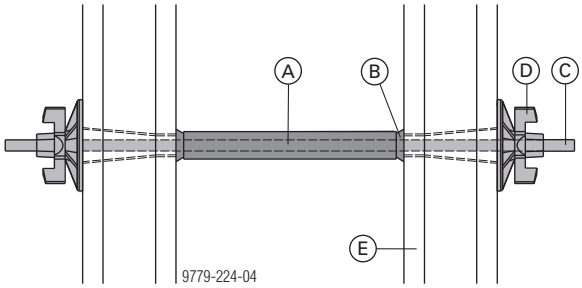
Name	For wall thickness
Fibre concrete tube 22mm 0.18m	20 cm
Fibre concrete tube 22mm 0.23m	25 cm
Fibre concrete tube 22mm 0.28m	30 cm
Fibre concrete tube 22mm 0.38m	40 cm
Fibre concrete tube 22mm 1.25m	For cutting to any length

Preparing the form-tie point

NOTICE

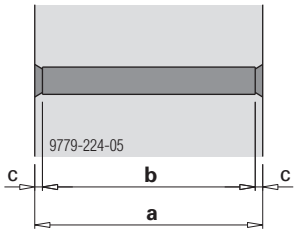
- Always use fibre concrete tubes of the same length – otherwise the formwork cannot be closed cleanly, and laitance may penetrate into the universal cones, making it difficult to remove them.
- Keep fibre concrete tubes well away from release agent. Also, do not wear release agent-smeared gloves when fitting them. Otherwise, the in-situ concrete will not bind sufficiently tightly to the tubes.
- Thoroughly moisten the fibre concrete tubes before pouring.
- Time any interruptions to placement correctly.

Form-tie point enclosed by formwork



A	Fibre concrete tube 22mm
B	Universal cone 22/10mm
C	Tie rod 15.0
D	Super plate 15.0
E	Formwork

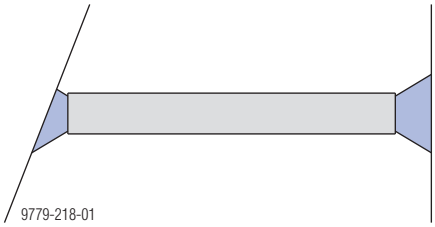
Formwork stripped from around form-tie point



Variable dimensions:
a ... minimum wall thickness 8 cm
b ... cut-to-size length of the Fibre concrete tube 22mm

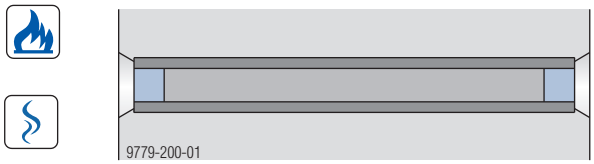
Fixed dimensions:
c ... 1 cm

Longer cones are also commercially available. These cones can be cut to size for e.g. sloping walls.



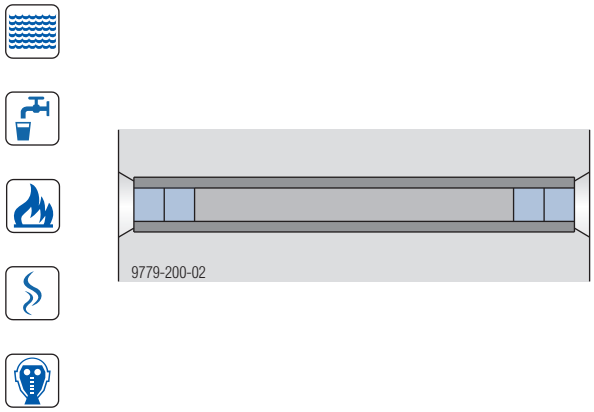
Methods of preparing the form-tie point in walls up to 40 cm thick

normal closure, fire-resistant to F30 and smoke-proof



- **One** Fibre concrete plug D22 L20mm glued in on each side.

watertight, fire-resistant to F30 - F180, smoke-proof and gas-tight closure



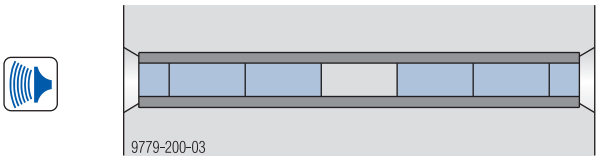
- **Two** Fibre concrete plugs D22 L20mm glued in on each side.
- Glue in place using REPOXAL TW adhesive from FRANK to ensure suitability for drinking water.

NOTICE

The version used on F90 fire-walls corresponds to the watertight type of closure with 2 plugs on either side.

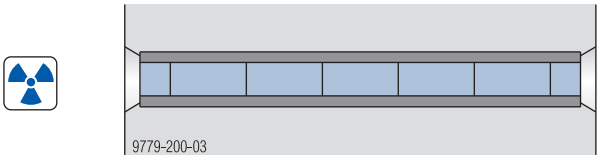
Also, completely grout the remaining cavity with FRANK special mortar 3/25.

Soundproof closure



- **Several** Fibre concrete plugs D22 L20mm are glued in, together filling 4/5 of the length of the fibre concrete tube.
- Glue in the plugs with REPOXAL two component adhesive.

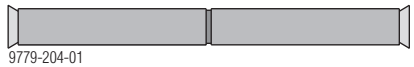
Radiation-proof closure



- **Several** Fibre concrete plugs D22 L20mm are glued in, together filling the whole length of the fibre concrete tube.
- Glue in the plugs with REPOXAL two component adhesive.

Wall-thicknesses over 40 cm

- From 40 to 60 cm – with a coupling in the middle



- Over 60 cm – with a steel tube in the middle

Note:
Suitable products for wall thicknesses greater than 40 cm are available from Frank GmbH & Co. KG, Germany, for example.

Minimum wall thicknesses for various fire-resistance classes

Reinforced concrete walls cast in normal concrete to DIN 4102-4: 1994-03

Fire-resistance class	Minimum wall thickness [mm]	
	Non-load-bearing	Load-bearing
F30	80	120
F60	90	130
F90	100	140
F120	120	160
F180	150	210

Fire-walls cast in normal concrete

Fire-resistance class	Minimum wall thickness [mm]		
	Non-reinforced	Reinforced	
		Non-load-bearing	Load-bearing
F90	200	120	140

Resistance

The whole form-tie point meets the special requirements set out in DBV's (German Concrete Association's) technical bulletin for spacers:

- enhanced freeze-thaw resistance
- varying thermal stress
- resistance to chemical attack (incl. seawater-resistance)

Closing off the form-tie point

NOTICE

The important job of plugging and sealing the form-tie point should only be entrusted to reliable and experienced workers or subcontractors.

Cleaning the centre-hole

➤ e.g. with a round brush or a drill bit. The fibre concrete tubes should be as dry as possible; any water must be removed.

If the plugs will not fit into the tube because cement paste has run into the opening and dried, this can be drilled out with a Widia drill bit. Specially short drill bits with exactly calibrated diameters are available for this job.

Mixing the REPOXAL two component adhesive

➤ Completely empty the contents of the hardener pot into the can of REPOXAL adhesive. Thoroughly mix the hardener and the adhesive to make a completely homogeneous mass.

Sealing the tubes with plugs

➤ Always start fitting the plugs on the side of the wall exposed to water pressure.

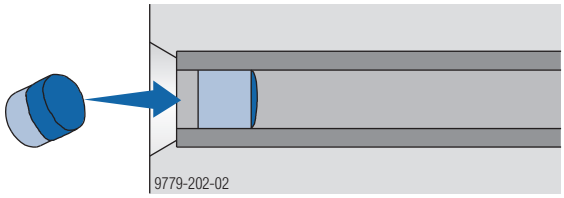
Wherever possible, wear gloves when fitting the plugs.

Any adhesive that gets onto your hands can be cleaned off with spirit or thinner. After this, wash your hands thoroughly with water and soap.

➤ Dip the first plug into the adhesive and briefly rotate it in the adhesive so that its entire circumference is wetted.

➤ Now these plugs should be left for several hours so that the adhesive can harden before the end opposite the water-pressure side is closed with plugs in the same way.
If you do not leave sufficient time for the adhesive to set, the air being compressed inside the tube may push out or loosen the plugs at the first end of the tube.

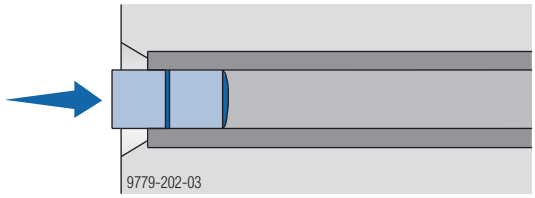
➤ Now push in the plug with the tamping tool until the top of the plug is approx. 5 mm inside the fibre concrete tube.



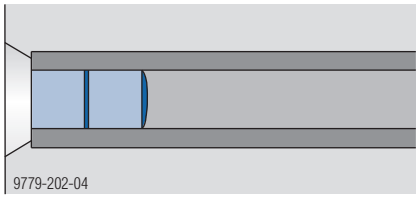
NOTICE

For drinking water requirements, use REPOXAL TW adhesive from FRANK.

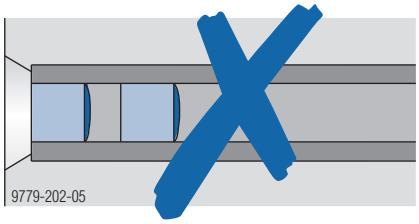
➤ Then insert the second plug, after dipping it into the adhesive in the same way. Push it in until it is flush with the end of the tube, then spread the rest of the adhesive.



Correctly closed-off form-tie point



Wrong:



NOTICE

If a hydrostatic pressure test is intended, this should be performed with only the two plugs on the water-pressure side inserted – i.e. before the plugs on the other side have been fitted. After the plugs have been inserted on the water-pressure side, the adhesive must be allowed to set. The waiting time depends heavily on the temperature of the structure:

- 20 °C approx. 10 days
- 10 °C approx. 24 days
- 5 °C approx. 40 days

After this waiting time, the tank or vessel (for example) can be filled.

Once any pressure test has been carried out, the end of the tube facing away from the water-pressure can be closed off with two plugs as described above.

REPOXAL two component adhesive

How to use

REPOXAL two component adhesive is used for plugging fibre concrete tubes.

Product description

Owing to its chemical composition, REPOXAL two component adhesive reacts with the REPOXAL hardener. This chemical reaction results in a hard, watertight adhesive.

Pot life

The ready-mixed adhesive remains workable for max. 4 hours at 20°C.

Setting time

At temperatures of 20°C, the glued plugs can be subjected to gentle loading after 48 hours, and to normal loading after 96 hours.

Higher temperatures shorten the pot-life and the reaction times, while lower temperatures prolong them.

At temperatures below +5°C, no chemical reaction takes place and the adhesive cannot set. For this reason, do not attempt to use the adhesive at temperatures below +5°C.

The temperatures given here always refer to the temperature of the building component.

Yield

For 1000 plugs, each 2 cm long, the following quantities of REPOXAL two component adhesive will be consumed:

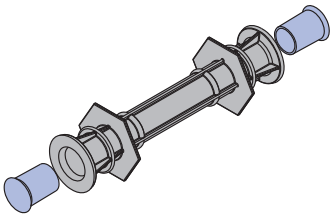
- Ø 22 mm - approx. 3 kg
- Ø 27 mm - approx. 4 kg
- Ø 32 mm - approx. 5 kg
- Ø 40 mm - approx. 7 kg

Resistance

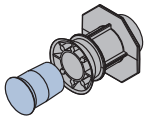
REPOXAL two component adhesive is resistant to tap water.

Distance piece 20, 25 and 30cm, and Distance piece FFC 22mm 20, 25 and 30cm

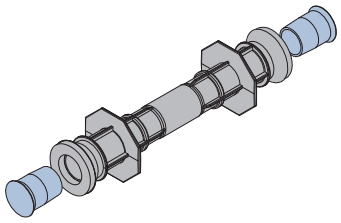
For wall thicknesses of 20, 25 and 30 cm.



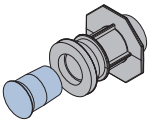
A Distance piece with integral plugs



B Tube end piece for variable wall thicknesses



D Distance piece FFC with integral plugs



E Tube end piece FFC 22mm for variable wall thicknesses

F Distance-piece plug 22mm

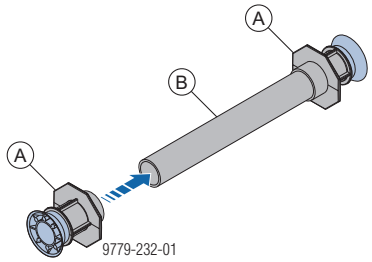
Is suitable for preparing form-tie points that meet the following requirements:

- water-impermeable
- fire-resistant to F90
- sound-insulating
- smoke-proof
- suitable for fair-faced concrete requirements

The main features:

- Easier handling, as this is a one-part system for all form-tie points (the plugs are included with the distance pieces).
- Obtaining exact lengths does not require any time-consuming cutting to length.
- The end-cones are easy to remove after the formwork has been stripped.
- No plastic discs protruding through the concrete surface.
- Attachable cone colour-coded blue.
- Attachable cone FFC colour-coded yellow.

➤ Push Tube end piece 22mm on to Plastic tube 22mm 2.50m.

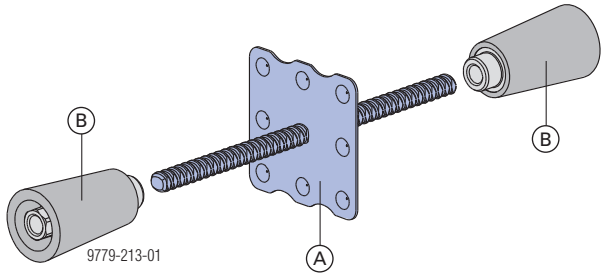


A Tube end piece 22mm or Tube end piece 22mm FFC

B Plastic tube 22mm 2.50m
Plastic tube cut to length = wall thickness minus 8 cm

Water stop G 15.0

Can be mounted in walls with a thickness of 25 cm and above.



A Water stop G 15.0
B Anchor cone 15.0

Is suitable for preparing form-tie points that meet the following requirements:

- water-impermeable
- fire-resistant to F90
- sound-insulating
- gas-impermeable
- radiation-proof
- smoke-proof
- suitable for fair-faced concrete requirements

➤ Always screw in components until they are fully engaged.
➤ Never weld or heat tie rods - risk of fracture!

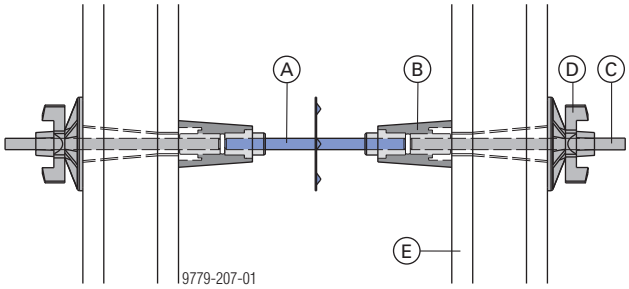
WARNING
➤ It is not permissible to use the water stop as a consumable form-tie component for a suspension point.

NOTICE
When stripping the formwork, make sure that the form-tie nuts are loosened uniformly on both sides of the form-tie point.

Preparing the form-tie point

The Water stop G 15.0 is an economical way of preparing form-tie points that will meet the above requirements.
The anchor cones, tie rods and super plates can be reused over and over again. The Water stop G remains embedded in the concrete.
The form tie can be ordered in various different lengths, as necessitated by the thickness of the wall. Can be ordered under art. n° 580100000.

Form-tie point enclosed by formwork

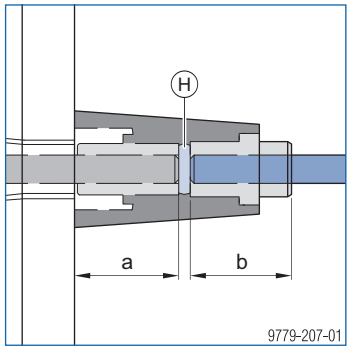


A Water stop G 15.0
B Anchor cone 15.0
C Tie rod 15.0mm (length as dictated by formwork)
D Super plate 15.0
E Formwork

Tools needed for unscrewing the Anchor cone 15.0:

- Reversible ratchet 1/2"
- Box nut 24 1/2"

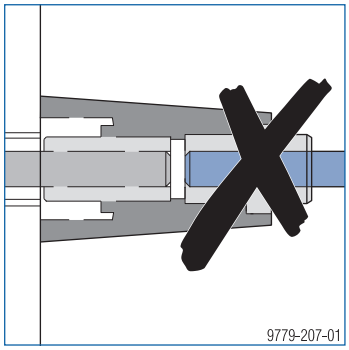
Screw-in depths of the Anchor cone 15.0

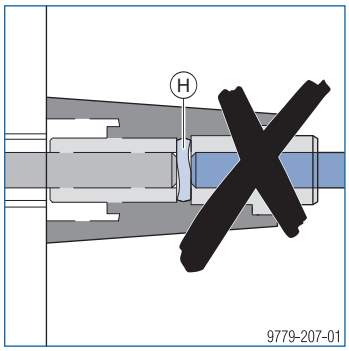


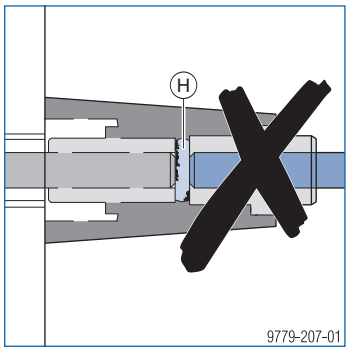
a ... screw-in depth: 53.5 mm
b ... screw-in depth: 52 mm

H Locking pin of the Anchor cone 15.0

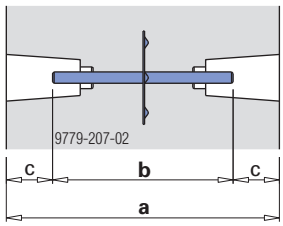
WARNING
Wrong screw-in depth of the Anchor cone 15.0!
➤ The locking pin (H) must be in place in the Anchor cone 15.0.
➤ The locking pin must not be damaged in any way.
➤ The thread of the Anchor cone 15.0 must be free of dirt and concrete residues at all times.
If any of the 3 cases apply, the Anchor cone 15.0 must be replaced!







Formwork stripped from around form-tie point



a ... minimum wall thickness 25 cm
b ... tie-rod length 13 cm where wall thickness is 25 cm
Up to a tie-rod length of 40 cm, the stop-anchor plate must be positioned midway along the tie rod.
For tie-rod lengths from 40 cm to 150 cm, the stop-anchor plate must be positioned at a fixed distance of 20 cm from the end of the tie rod.
(Varying lengths - b - can be ordered under art. n° 580100000).
c ... 6 cm

Closing off the form-tie point

In its technical bulletin entitled "Fair-faced concrete", the DBV (German Concrete Association) recommends leaving cone indentations as they are. This is because attempts to grout them level with the rest of the surface normally produce unsatisfactory results (colour differences, grouted areas have unclean edges).

NOTICE

If it is still necessary to close off the form-tie point, for rust protection reasons (tie rod), we recommend gluing in a fibre concrete plug.

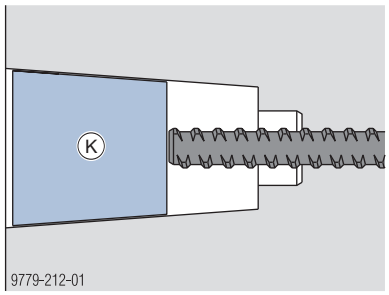
The job of closing off the form-tie point should only be carried out by reliable skilled workers or competent subcontractors.

Example with concrete cone

We recommend the following materials for gluing in the plugs:

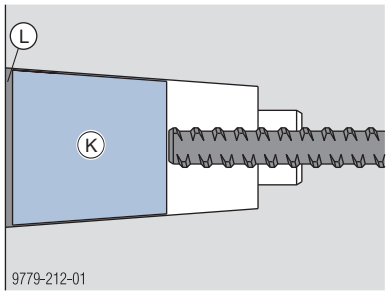
- Commercially available **mortar** of building material class A1 (non-combustible) according to DIN 4102-0 and DIN EN 13501-1 (e.g. Quick expansive mortar).
  Pay attention to the colour of the concrete here!
- Tile bonding cement (is mostly dark) in cases where the colour of the concrete is unimportant.

➤ Evenly distribute the mortar mixture in the conical opening and then slowly press the Concrete cone D58/48 L52mm **(K)** into the opening while gently turning it. (Using a piece of wood makes it easier to fit the plug on the right plane).



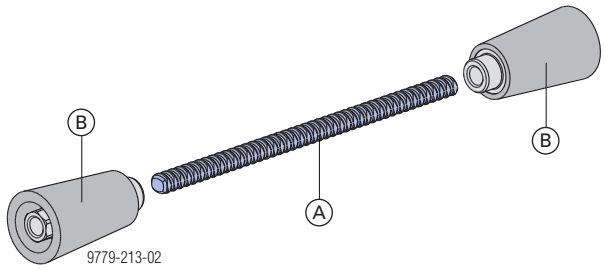
Grout level with the rest of the surface

➤ Fill the remaining space **(L)** with mortar and grout it smoothly.



Expendable tie-rod with Anchor cones 15.0

Can be mounted in walls with a thickness of 25 cm and above.



A Tie rod 15.0
B Anchor cone 15.0

Is suitable for preparing form-tie points that meet the following requirements:

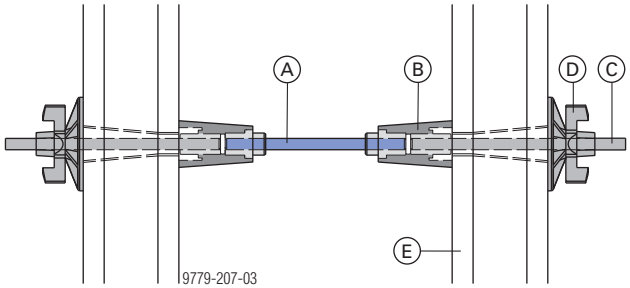
- fire-resistant to F90
- sound-insulating
- radiation-proof
- smoke-proof
- suitable for fair-faced concrete requirements

➤ Always screw in components until they are fully engaged.
➤ Never weld or heat tie rods - risk of fracture!

Preparing the form-tie point

The anchor cones and super plates can be re-used over and over again. The Tie rod 15.0 remains embedded in the concrete.

Form-tie point enclosed by formwork

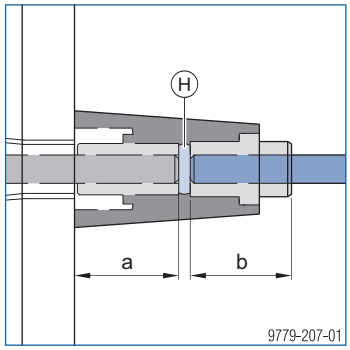


A Tie rod 15.0
B Anchor cone 15.0
C Tie rod 15.0 (length as dictated by formwork)
D Super plate 15.0
E Formwork

Tools needed for unscrewing the Anchor cone 15.0:

- Reversible ratchet 1/2"
- Box nut 24 1/2"

Screw-in depths of the Anchor cone 15.0



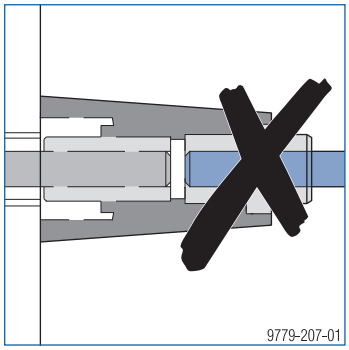
a ... screw-in depth: 53.5 mm
b ... screw-in depth: 52 mm

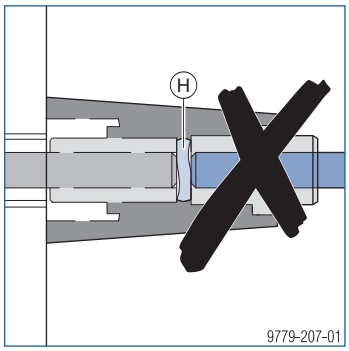
H Locking pin of the Anchor cone 15.0

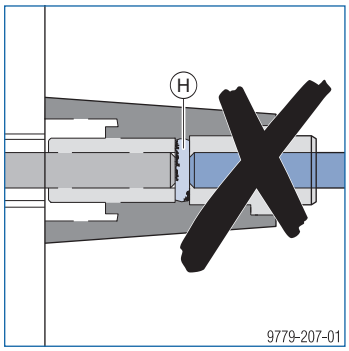
WARNING
Wrong screw-in depth of the Anchor cone 15.0!

➤ The locking pin (H) must be in place in the Anchor cone 15.0.
➤ The locking pin must not be damaged in any way.
➤ The thread of the Anchor cone 15.0 must be free of dirt and concrete residues at all times.

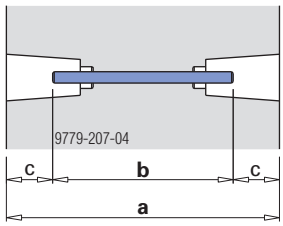
If any of the 3 cases apply, the Anchor cone 15.0 must be replaced!







Formwork stripped from around form-tie point



Variable dimensions:
a ... minimum wall thickness 25 cm where the form tie has a bond length of 27 mm in the concrete
b ... tie-rod length 13 cm where wall thickness is 25 cm

Fixed dimensions:
c ... 6 cm

Closing off the form-tie point

In its technical bulletin entitled "Fair-faced concrete", the DBV (German Concrete Association) recommends leaving cone indentations as they are. This is because attempts to grout them level with the rest of the surface normally produce unsatisfactory results (colour differences, grouted areas have unclean edges).

NOTICE

If it is still necessary to close off the form-tie point, for rust protection reasons (tie rod), we recommend gluing in a fibre concrete plug.

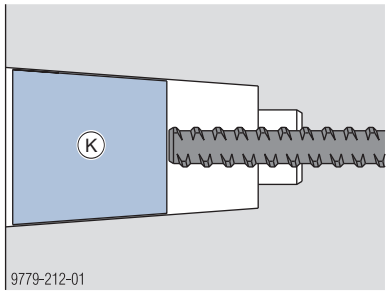
The job of closing off the form-tie point should only be carried out by reliable skilled workers or competent subcontractors.

Example with concrete cone

We recommend the following materials for gluing in the plugs:

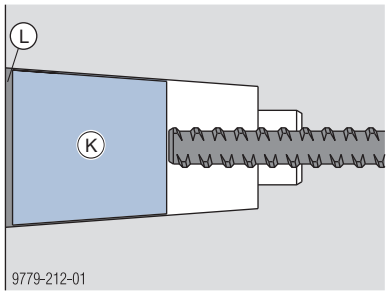
- Commercially available **mortar** of building material class A1 (non-combustible) according to DIN 4102-0 and DIN EN 13501-1 (e.g. Quick expansive mortar).
  Pay attention to the colour of the concrete here!
- Tile bonding cement (is mostly dark) in cases where the colour of the concrete is unimportant.

➤ Evenly distribute the mortar mixture in the conical opening and then slowly press the Concrete cone D58/48 L52mm **(K)** into the opening while gently turning it. (Using a piece of wood makes it easier to fit the plug on the right plane).



Grout level with the rest of the surface

➤ Fill the remaining space **(L)** with mortar and grout it smoothly.

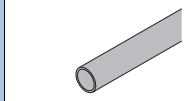
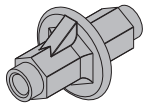
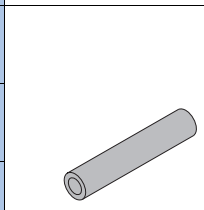


Tie rod system 20.0

Design variants – Form-tie system 20.0

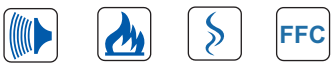
Overview of the products used in the Doka Tie rod system 20.0, and their areas of application.

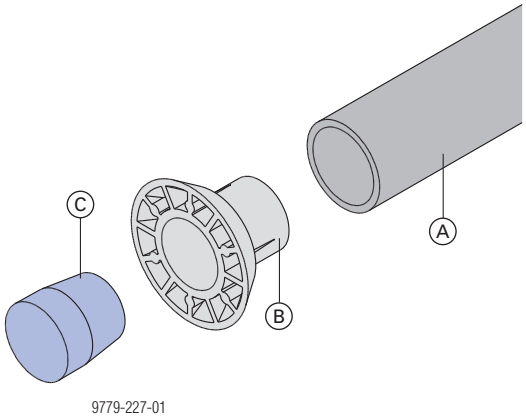
Note:
For special applications, such as in tunnels, please contact the 'Global Expertise Center Infrastructure'.

Name		Water-impermeable	Sound-insulating	Fire-resistant	Smoke-proof	Suitable for drinking-water applications	Gas-impermeable	Radiation-proof	Suitable for FFC
Plastic tube 26mm with Fair-faced concrete plug 26/10 D45mm or Plug 26mm				✓	✓				✓
Water stop connector 20.0		✓	✓	✓	✓				✓
Fibre concrete tube 26mm with 1 Fibre concrete plug D27 21mm[1)]				✓	✓	✓			
Fibre concrete tube 26mm with 2 Fibre concrete plugs D27 21mm [1)] per side		✓		✓	✓	✓	✓		
Fibre concrete tube 26mm completely closed off[2)]		✓	✓	✓	✓	✓	✓	✓	
Fibre concrete tube 26mm with 1 Fibre concrete plug 26 D24 L50mm and Fair-faced concrete cone 22/50 26/50mm		✓		✓					✓
Consumable Tie rod 20.0 with 2 Anchor cones 20.0			✓	✓	✓				✓

[1)] ... glued in with REPOXAL two component adhesive
[2)] ... 4/5 of the length are sufficient for sound insulation

Plastic tube 26mm





A	Plastic tube 26mm
B	Universal cone 26/10mm
C	Plug 26mm

Is suitable for preparing form-tie points that meet the following requirements:

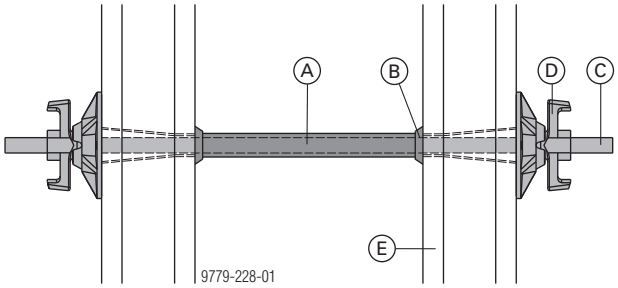
- sound-insulating
- fire-resistant
- smoke-proof
- suitable for fair-faced concrete requirements

Preparing the form-tie point

➤ Cut the Plastic tube 26mm to the desired length and insert a Universal cone 26/10mm into each end.

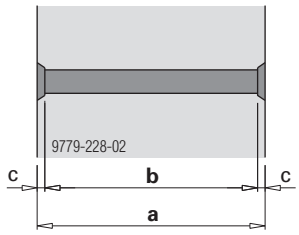
The tie rods and super plates can be re-used over and over again. The plastic tube remains embedded in the concrete.

Form-tie point enclosed by formwork



A	Plastic tube 26mm
B	Universal cone 26/10mm
C	Tie rod 20.0mm (length as dictated by formwork)
D	Super plate 20.0
E	Formwork

Formwork stripped from around form-tie point



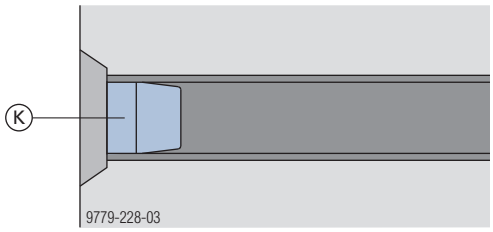
Variable dimensions:
a ... wall thickness
b ... cut-to-size length of the plastic tube

Fixed dimensions:
c ... 1 cm

Closing off the form-tie point

with Plug 26mm

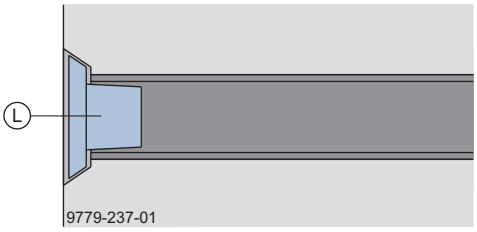
➤ Remove the Universal cone 26/10mm.
➤ Close the form-tie point with the Plug 26mm.



K Plug 26mm

with Fair-faced concrete plug 26/10 D45mm

➤ Remove the Universal cone 26/10mm.
➤ Close the form-tie point with the Fair-faced concrete plug 26/10 D45mm.



L Fair-faced concrete plug 26/10 D45mm

Water stop connector 20.0

Can be mounted in walls with a thickness of 20 cm and above.

Is suitable for preparing form-tie points that meet the following requirements:

- water-impermeable
- fire-resistant to F90
- sound-insulating
- smoke-proof
- suitable for fair-faced concrete requirements

Preparing the form-tie point

Various types of wall-tie can be prepared using the Water-stop connector.

- ➤ Always screw in components until they fully engage.
- ➤ Use **2 Spanners for tie-rods** to **tighten the tie-rods so firmly** that they cannot be dislodged when the form-tie assembly is being fitted or reinforcement is being placed.
- ➤ Never weld or heat tie-rods - risk of fracture!

General instructions for sealing the form-tie point

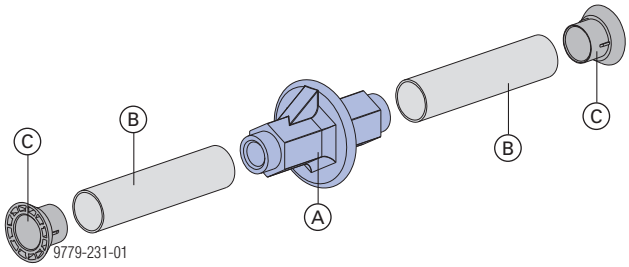
In its technical bulletin entitled ‘Fair-faced concrete’, the DBV (German Concrete Association) recommends leaving cone indentations as they are. This is because attempts to grout them level with the rest of the surface normally produce unsatisfactory results (colour differences, grouted areas have unclean edges).

NOTICE

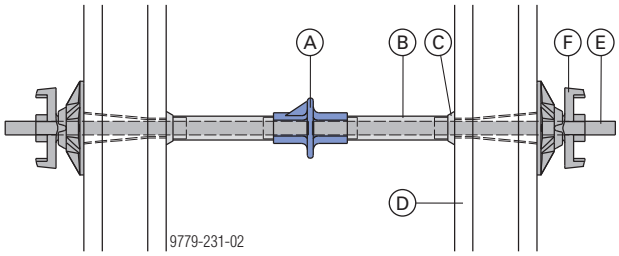
When stripping the formwork, make sure that the form-tie nuts are loosened uniformly on both sides of the form-tie point.

Variant 1: With plastic tubes and cones

In this variant, the tie rods can be reused.

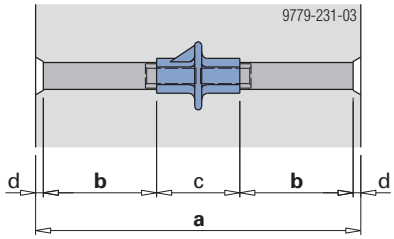


Form-tie point enclosed by formwork



A	Water stop connector 20.0
B	Plastic tube 32mm
C	Universal cone 32/10mm
D	Formwork
E	Tie rod 20.0mm (length as dictated by formwork)
F	Super plate 20.0

Formwork stripped from around form-tie point

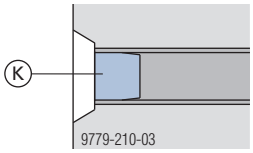


Variable dimensions:
a ... minimum wall thickness 20 cm
b ... depends on wall thickness

Fixed dimensions:
c ... 11 cm
d ... 1 cm

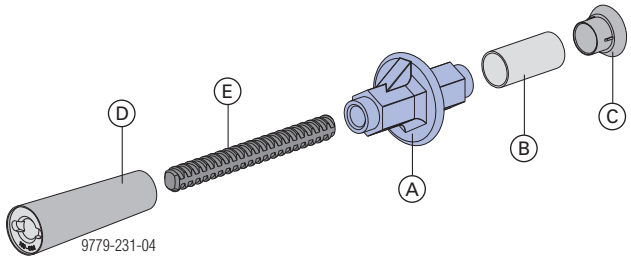
Closing off the form-tie point

- ➤ Either remove the Universal cone 32/10mm or leave it in place.
- ➤ If the form-tie point is going to be closed with a Plug 32mm **(K)** , the Universal cone 32/10mm has to be removed beforehand.

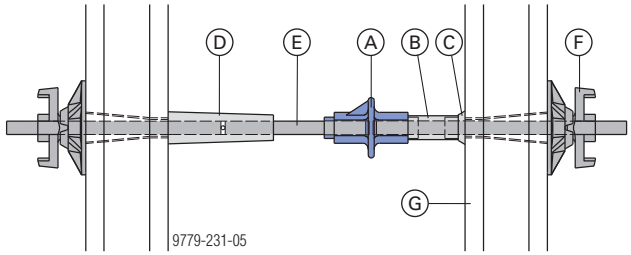


Variant 2: Anchoring cone 20.0 on one side

Can be mounted in walls with a thickness of 30 cm and above.
The anchoring cone enables the 'Water stop connector plus tie rod' assembly to be positioned and fixed on one side of the formwork even before the reinforcement is placed.
The tie rod on the cone-side remains in the concrete.
The anchoring cone can be used either on both sides or on one side only.

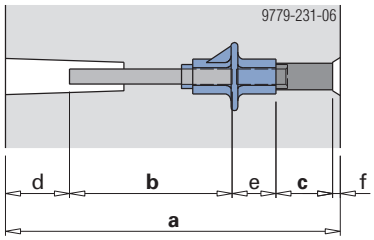


Form-tie point enclosed by formwork



A	Water stop connector 20.0
B	Plastic tube 32mm
C	Universal cone 32/10mm
D	Anchoring cone 20.0
E	Tie rod 20.0mm (length as dictated by formwork)
F	Super plate 20.0
G	Formwork

Formwork stripped from around form-tie point



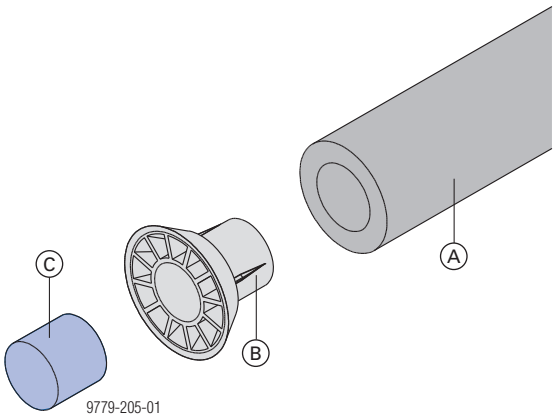
Variable dimensions:
a ... minimum wall thickness 35 cm
b ... tie-rod length 11.6 cm where wall thickness is 30 cm
c ... 7.3 cm where wall thickness is 30 cm

Fixed dimensions:
d ... 6 cm
e ... 4.1 cm
f ... 1 cm

Closing off the form-tie point

- For details on closing off the openings on the anchor-cone side see the section headed ‘Water stop G 15.0’.
- For closing off the opposite side, see variant 1.

Fibre concrete tube 26mm



A	Fibre concrete tube 26mm 1.25m
B	Universal cone 26/10mm
C	Fibre concrete plug D27 L21mm

Is suitable for preparing form-tie points that meet the following requirements:

- water-impermeable
- fire-resistant
- sound-insulating
- gas-impermeable

Proofs provided by Frank GmbH & Co. KG, Germany are available.

- smoke-proof

Proofs provided by Doka are available.

Cutting to length

NOTICE

On account of the manufacturing process, both ends of the tubes are slightly oval in shape. Consequently, short lengths have to be cut off the ends of the tubes so that the universal cones can be inserted.

➤ Cut 5 cm off each end of the tube. Then cut the tube to the desired length.
Cut to length = wall thickness minus 2 cm

Preparing the form-tie point

The form-tie point is prepared here in the same way as with the Form-tie system 15.0 using the Fibre concrete tube 22mm.

Closing off the form-tie point

The form-tie point is closed here in the same way as with the Tie rod system 15.0 using the Fibre concrete tube 22mm.

Follow the directions under “Fibre concrete tube 22mm” in the section Tie rod system 15.0.

REPOXAL two component adhesive

How to use

REPOXAL two component adhesive is used for plugging fibre concrete tubes.

Product description

Owing to its chemical composition, REPOXAL two component adhesive reacts with the REPOXAL hardener. This chemical reaction results in a hard, watertight adhesive.

Pot life

The ready-mixed adhesive remains workable for max. 4 hours at 20°C.

Setting time

At temperatures of 20°C, the glued plugs can be subjected to gentle loading after 48 hours, and to normal loading after 96 hours.

Higher temperatures shorten the pot-life and the reaction times, while lower temperatures prolong them.

At temperatures below +5°C, no chemical reaction takes place and the adhesive cannot set. For this reason, do not attempt to use the adhesive at temperatures below +5°C.

The temperatures given here always refer to the temperature of the building component.

Yield

For 1000 plugs, each 2 cm long, the following quantities of REPOXAL two component adhesive will be consumed:

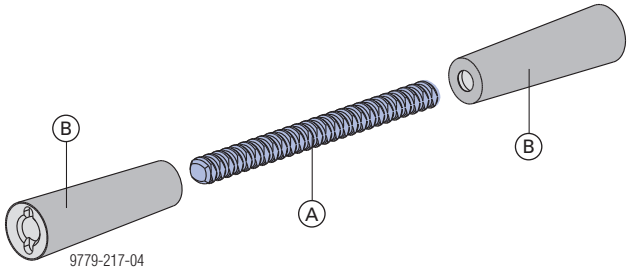
- Ø 22 mm - approx. 3 kg
- Ø 27 mm - approx. 4 kg
- Ø 32 mm - approx. 5 kg
- Ø 40 mm - approx. 7 kg

Resistance

REPOXAL two component adhesive is resistant to tap water.

Expendable tie-rod with Anchor cones 20.0

Can be mounted in walls with a thickness of 35 cm and above.



A	Tie rod 20.0
B	Anchoring cone 20.0 + Sealing sleeve 20.0

Note:
It is also possible to use the She-bolt 20.0 instead of the Anchoring cone 20.0.

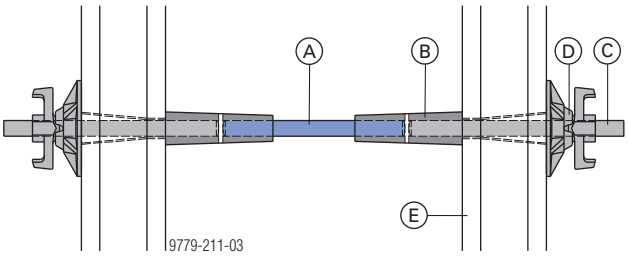
Is suitable for preparing form-tie points that meet the following requirements:
- fire-resistant to F90
- sound-insulating
- smoke-proof
- suitable for fair-faced concrete requirements

➤ Always screw in components until they are fully engaged.
➤ Never weld or heat tie rods - risk of fracture!

Preparing the form-tie point

The anchoring cones and super plates can be re-used over and over again. The Tie rod 20.0 remains embedded in the concrete.

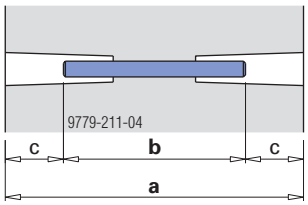
Form-tie point enclosed by formwork



A	Tie rod 20.0
B	Anchoring cone 20.0 + Sealing sleeve 20.0
C	Tie rod 20.0mm (length as dictated by formwork)
D	Super plate 20.0
E	Formwork

Tools needed for unscrewing the Anchoring cone:
- Cone spanner 20.0

Formwork stripped from around form-tie point



Variable dimensions:
a ... minimum wall thickness 35 cm
b ... depends on wall thickness

Fixed dimensions:
c ... 8.2 cm

Closing off the form-tie point

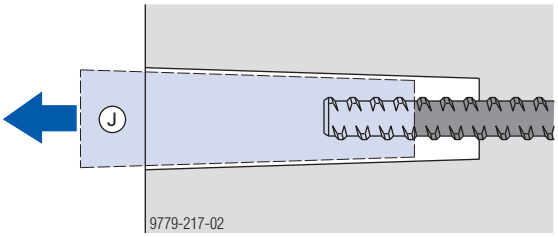
In its technical bulletin entitled "Fair-faced concrete", the DBV (German Concrete Association) recommends leaving cone indentations as they are. This is because attempts to grout them level with the rest of the surface normally produce unsatisfactory results (colour differences, grouted areas have unclean edges).

NOTICE

If it is still necessary to close off the form-tie point, for rust protection reasons (tie rod), we recommend gluing in a fibre concrete plug.

The job of closing off the form-tie point should only be carried out by reliable skilled workers or subcontractors.

➤ Remove the sealing sleeve **(J)** .



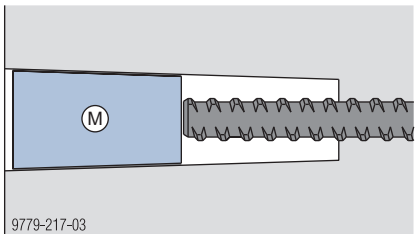
Example with concrete cone

We recommend the following materials for gluing in the plugs:

- Commercially available **mortar** of building material class A1 (non-combustible) according to DIN 4102-0 and DIN EN 13501-1 (e.g. Quick expansive mortar).

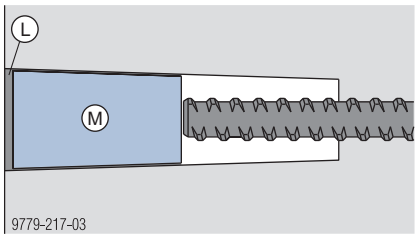
  Pay attention to the colour of the concrete here!
- Tile bonding cement (is mostly dark) in cases where the colour of the concrete is unimportant.

➤ Evenly distribute the mortar mixture in the conical opening and then slowly press the Concrete cone D47/43 L50mm **(M)** into the opening while gently turning it. (Using a piece of wood makes it easier to fit the plug on the right plane).



Grout level with the rest of the surface

➤ Fill the remaining space **(L)** with mortar and grout it smoothly.

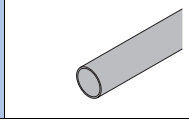


Anchor system 26.5:

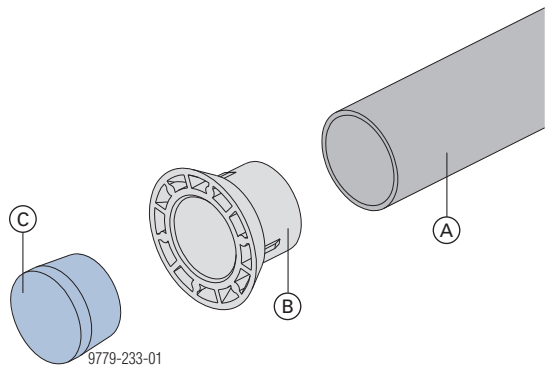
Design variants – Tie rod system 26.5

Overview of the products used in the Doka Tie rod system 26.5, and their areas of application.

Note:
For special applications, such as in tunnels, please contact the 'Global Expertise Center Infrastructure'.

Name		Water-impermeable	Sound-insulating	Fire-resistant	Smoke-proof	Suitable for drinking-water applications	Gas-impermeable	Radiation-proof	Suitable for FFC
Plastic tube 32mm with Plug 32mm			✓	✓	✓				✓

Plastic tube 32mm



A	Plastic tube 32mm
B	Universal cone 32/10mm
C	Plug 32mm

Is suitable for preparing form-tie points that meet the following requirements:

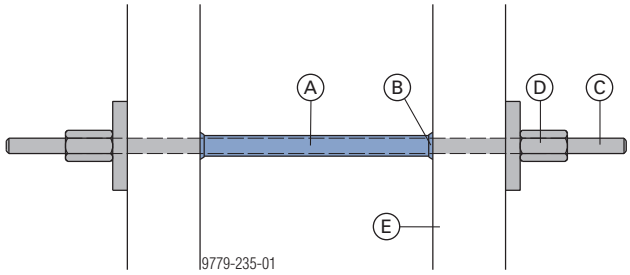
- sound-insulating
- fire-resistant
- smoke-proof
- suitable for fair-faced concrete requirements

Preparing the form-tie point

➤ Cut the Plastic tube 32mm to the desired length and insert a Universal cone 32/10mm into each end.

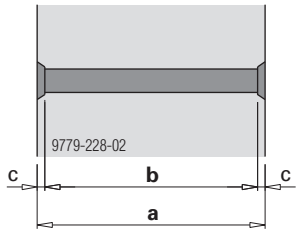
The tie rods and super plates can be re-used over and over again. The plastic tube remains embedded in the concrete.

Form-tie point enclosed by formwork



A	Plastic tube 32mm
B	Universal cone 32/10mm
C	Tie rod 26.5mm (length as dictated by formwork)
D	Anchor plate 26.5 + Hexagon nut 26.5
E	Formwork

Formwork stripped from around form-tie point



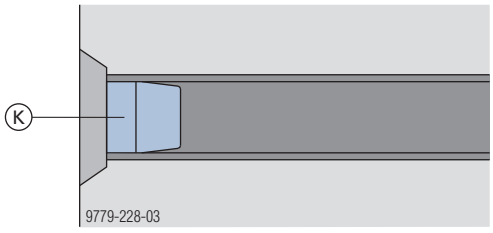
Variable dimensions:
a ... wall thickness
b ... cut-to-size length of the plastic tube

Fixed dimensions:
c ... 1 cm

Closing off the form-tie point

➤ Either remove the Universal cone 32/10mm or leave it in place.

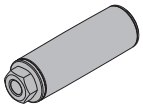
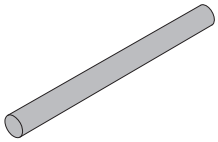
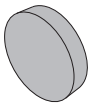
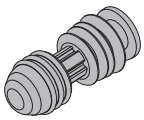
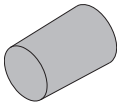
➤ If the form-tie point is going to be closed with a Plug 32mm (K), the Universal cone 32/10mm has to be removed beforehand.



Tie rod system Framax Xlife plus

Design variants - Tie rod system Framax Xlife plus

Overview of the products used in the Doka Tie rod system Framax Xlife plus, and their areas of application.

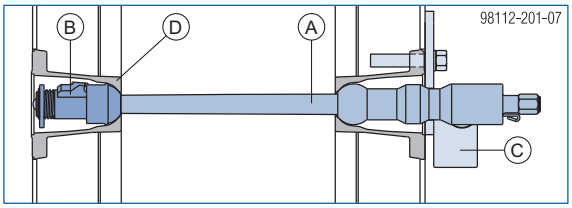
Name		Water-impermeable	Sound-insulating	Fire-resistant	Smoke-proof	Suitable for drinking-water applications	Gas-impermeable	Radiation-proof	Suitable for FFC
Framax Xlife plus plug 24mm, fitted deeper, filled and smoothed with mortar			✓	✓	✓				
Framax Xlife plus plug 24mm and Plug 24mm with hole and epoxy-resin adhesive		✓	✓	✓	✓				
Framax Xlife plus plug 24mm and Plug 24mm with hole and moulding mortar		✓	✓		✓				
Framax Xlife plus plug 24mm and Plug 24mm with hole			✓	✓	✓				
Framax Xlife plus screw plug 25mm		✓	✓	✓	✓				
Fibre concrete plug D24 21mm		✓		✓	✓				✓
Framax Xlife plus plug 38mm			✓	✓	✓				
Framax Xlife plus plug 38mm with moulding mortar and Plug 24mm with hole		✓	✓	✓	✓				
Framax Xlife plus concrete cone 28/25 300mm			✓	✓	✓				
Expansive mortar fully filled			✓	✓	✓				
Framax Xlife plus fair-faced concr. plug 87mm with expansive mortar			✓	✓	✓				✓
Framax Xlife plus sealing plug 25mm and sealing plug 28mm		✓							
Concrete cone D24/22 L50mm and Concrete cone D26/24 L38mm glued in			✓	✓	✓				✓

Preparing the form-tie point

with Framax Xlife plus form tie

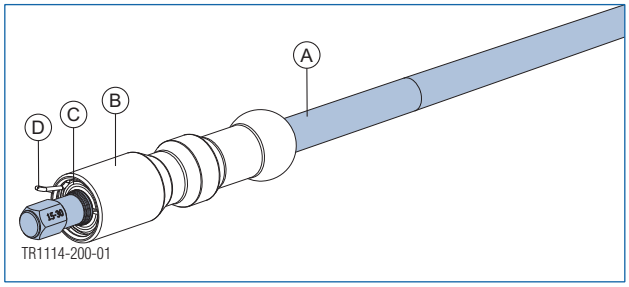
- Can be operated from one side
- For wall thicknesses from 15 cm to 60 cm
- no expendable jacket tubes

Tie rod system with Form-tie nut I 20.0:



A Framax Xlife plus form tie 20.0
B Framax Xlife plus form-tie nut I 20.0
D Framax Xlife plus distance protector
E Anchoring sleeve inside the framed formwork panel

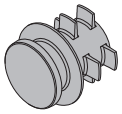
	Wall thicknesses in 0.5 cm increments	
Framax Xlife plus form tie 20.0 15-30cm	15 to 30 cm	Art. n° 589277000
Framax Xlife plus form tie 20.0 25-40cm	25 to 40 cm	Art. n° 589278000
Framax Xlife plus form tie 20.0 45-60cm	45 to 60 cm	Art. n° 589298000

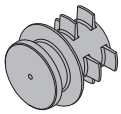


A Framax Xlife plus tie rod
B Ball pin
C Stop cylinder
D Locking spring

Closing the form-tie point with Framax Xlife plus plug 24mm, Framax Xlife plus plug 24mm with hole and expansive mortar

for form-tie holes of diam. 25 to 28 mm

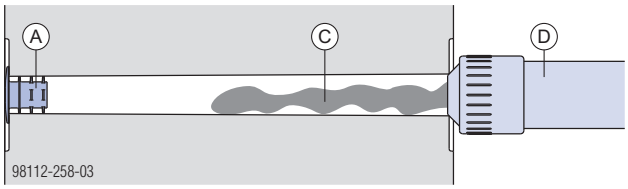




Water-impermeable form-tie point

➤ Close off one side of the form-tie hole with a plug.

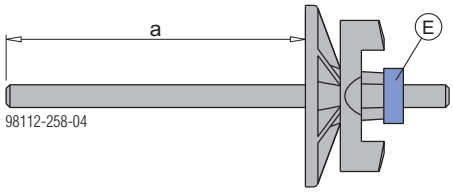
➤ Use the backfilling syringe to inject the form-tie hole with sufficient moulding mortar that this is at least 5 cm long when compressed.



A Framax Xlife plus plug 38mm or 24mm
C Mortar of building material class A1
D Backfilling syringe

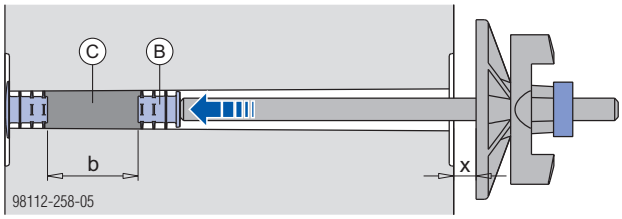
Using a Tie rod 15.0mm plus Super plate 15.0 makes it easier to fit the second plug.

To prevent the super plate from turning, fix it to the tie rod using adhesive tape **(E)** .



a ... wall thickness minus 11 cm

➤ Push the Framax Xlife plus plug 24mm with hole into the form-tie hole using the tie rod, and compress the moulding mortar.



b ... mortar of building material class A1, min. 5 cm
x ... when there is a gap between the concrete and the super plate, the mortar has been compressed to a length of min. 5 cm

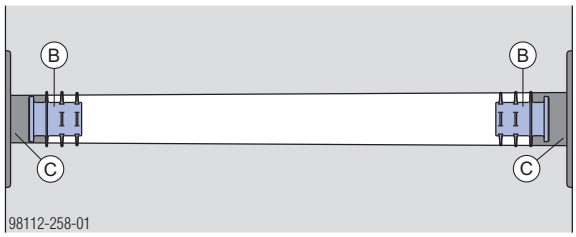
B Framax Xlife plus plug 24mm with hole
C Mortar of building material class A1

Fire-resistant form-tie point

Recessed in tie-hole

➤ Push the Framax Xlife plus plug 24mm into the form-tie hole by hand until it is recessed approximately 10 mm in the hole.

➤ Trowel off the tie hole with mortar.

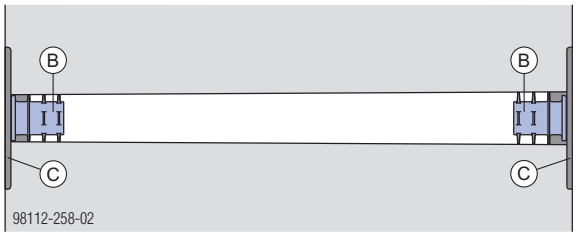


B Framax Xlife plus plug 24mm
C Mortar

Filled form-tie point

➤ Push the Framax Xlife plus plug 24mm into the form-tie hole.

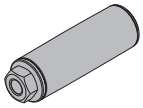
➤ Fill the form-tie point with mortar.



B Framax Xlife plus plug 24mm
C Mortar

Closing the form-tie point with Framax Xlife plus screw plug 25mm

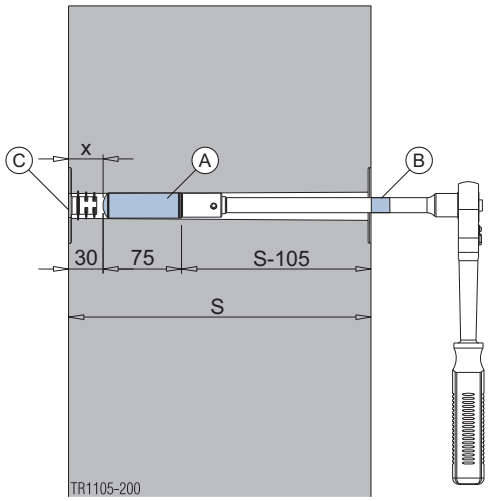
for form-tie holes of diam. 25 to 28 mm



NOTICE

- Test reports on the water tightness as per EN 12390-8 and fire resistance EI 180 as per EN 13501, Part 2, are available in DOPI, in English and German.
- Use a torque wrench to tighten the plugs to a tightening torque of 20 Nm.
- The plugs must not be installed below +10 °C.
- Make sure to use the plugs correctly in special applications (e.g. chemical substances).

Installation situation, e.g. in a wall with a thickness of S=300 mm



x ... min. 30 mm on the water side

A	Framax Xlife plus screw plug 25mm
B	Mark
C	Framax Xlife plus plug 23mm or 38mm

Installation

➤ Clean the inside of the form-tie point.

➤ Position the screw plug in the form-tie point on the side with the larger opening.

You can use adhesive tape as a mark for positioning the plug at the correct installation depth.

➤ Use a torque wrench to tighten the screw plug to a tightening torque of 20 Nm.

➤ If necessary, close the form-tie point with a Framax Xlife plus plug 24 or 38mm.

Product recommendation

SikaDur-31 DW

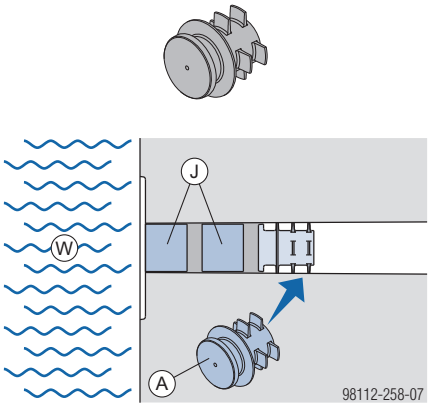
- Epoxy-resin-based 2-component adhesive approved for drinking-water applications.
- The surface must be free of dust and oil.
- Application temperature: min. +10 °C

Read and observe the manufacturer's technical data sheet!

Closing the form-tie point with Framax Xlife plus plug 24mm with hole, Fibre concrete plug D24 21mm and epoxy-resin adhesive

FFC

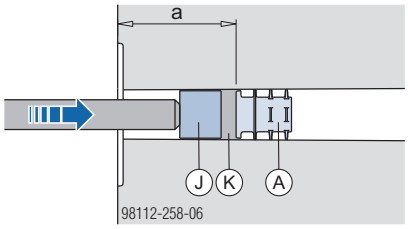
for form-tie holes of diam. 25 to 28 mm



A	Framax Xlife plus plug 24mm with hole
J	Fibre concrete plug D24 21mm
W	Water side

Note:
Use **Framax Xlife plus plugs 24mm with hole**! Air escapes through the hole in the plug as the adhesive is compressed.

- ➤ Clean the inside of the form-tie hole.
- ➤ Use a tie rod to push the Framax Xlife plus plug 24mm with hole approximately 6 cm into the form-tie hole.
- ➤ Push the first fibre concrete plug into the adhesive and compress the adhesive.



a ... approx. 6 cm

A	Framax Xlife plus plug 24mm with hole
J	Fibre concrete plug D24 21mm
K	Epoxy-resin adhesive

- ➤ Inject enough epoxy-resin adhesive to fill the form-tie hole of the fibre concrete plug to 5 mm below the surface of the concrete.
- ➤ Push the second fibre concrete plug into the adhesive and compress the adhesive.
- ➤ Use a spatula to remove the excess adhesive.

Product recommendation

Mapefix EP epoxy-resin adhesive

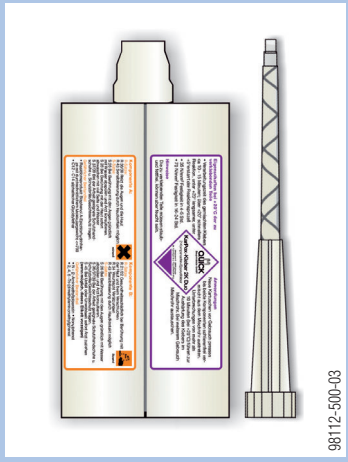
- Epoxy-resin-based 2-component adhesive for structural loads.
- The surface must be free of dust and oil.
- Application temperature: min. +5 °C

Read and observe the manufacturer's technical data sheet!

Quick-KarPox adhesive+mortar

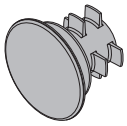
- Epoxy-resin-based 2-component adhesive for structural loads.
- The surface must be free of dust and oil.
- Application temperature: min. +5 °C

Read and observe the manufacturer's technical data sheet!



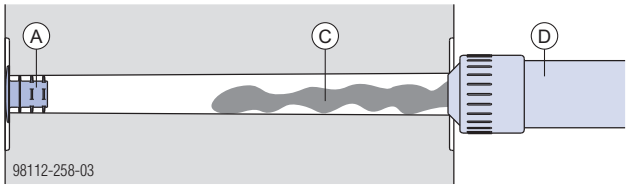
Closing the form-tie point with Framax Xlife plus plug 38mm

for form-tie holes of diam. 25 to 28 mm



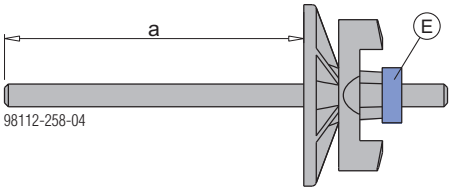
Water-impermeable form-tie point

➤ Close off one side of the form-tie hole with a plug.
➤ Use the backfilling syringe to inject the form-tie hole with sufficient moulding mortar that this is at least 5 cm long when compressed.



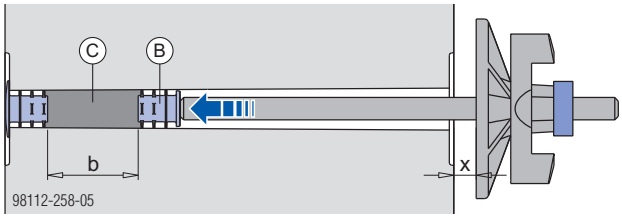
A Framax Xlife plus plug 38mm or 24mm
C Mortar of building material class A1
D Backfilling syringe

Using a Tie rod 15.0mm plus Super plate 15.0 makes it easier to fit the second plug.
To prevent the super plate from turning, fix it to the tie rod using adhesive tape **(E)** .



a ... wall thickness minus 11 cm

➤ Push the Framax Xlife plus plug 24mm with hole into the form-tie hole using the tie rod, and compress the moulding mortar.



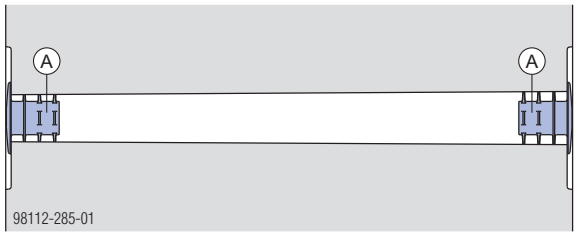
b ... mortar of building material class A1, min. 5 cm
x ... when there is a gap between the concrete and the super plate, the mortar has been compressed to a length of min. 5 cm

B Framax Xlife plus plug 24mm with hole
C Mortar of building material class A1

Fire-resistant, sound-proof and smoke-proof form-tie point

Installation

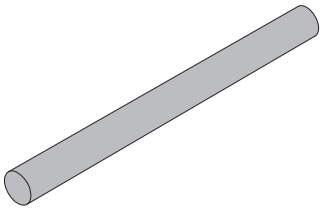
➤ Remove any concrete burrs.
➤ Push the Framax Xlife plus plug 38mm into the form-tie hole.



A Framax Xlife plus plug 38mm

Closing the form-tie point with Framax Xlife plus concrete plug 28/25 300mm

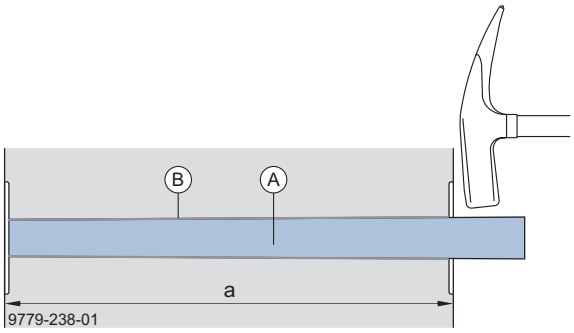
for form-tie holes of diam. 25 to 28 mm



➤ Dip the Framax Xlife plus concrete cone 28/25 300mm in cement slurry.

➤ Close the form-tie hole with the Framax Xlife plus concrete cone 28/25 300mm.

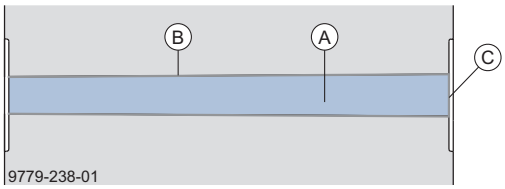
➤ Knock off the protruding end of the concrete cone with a hammer.



a ... minimum wall thickness 15 cm

A Framax Xlife plus concrete cone 28/25 300mm
B Cement slurry

➤ If necessary, plaster the form-tie hole.

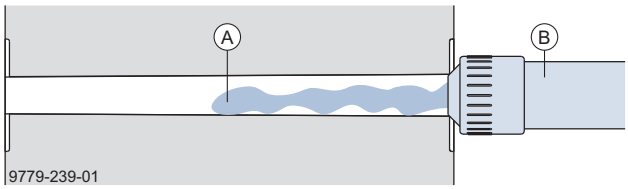


A Framax Xlife plus concrete cone 28/25 300mm
B Cement slurry
C Plaster

Closing the form-tie point with expansive mortar of building material class A1 (fully filled)

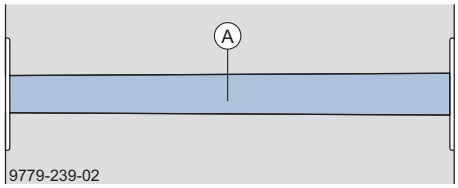
for form-tie holes of diam. 25 to 28 mm

➤ Use the backfilling syringe to inject the form-tie hole with expansive mortar.



A Expansive mortar of building material class A1
B Backfilling syringe

➤ Inject enough expansive mortar to fully fill the form-tie hole.



A Expansive mortar of building material class A1

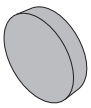
We recommend the following materials for gluing in the plugs:

- Commercially available **mortar** of building material class A1 (non-combustible) according to DIN 4102-0 and DIN EN 13501-1 (e.g. Quick expansive mortar).
  Pay attention to the colour of the concrete here!

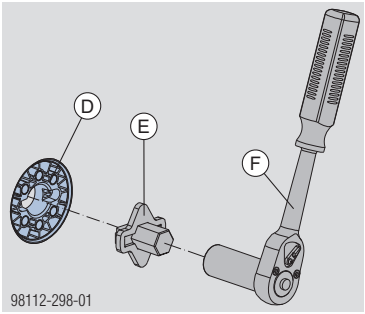
Closing the form-tie point with Framax Xlife plus fair-faced concr. plug 87mm

FFC

for form-tie holes of diam. 25 to 28 mm

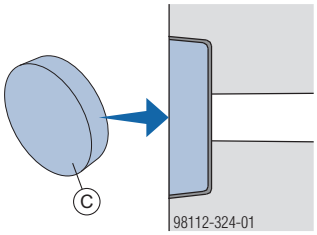


➤ Use the Framax Xlife plus cone spanner to remove the Framax Xlife plus fair-faced concr. cone 87mm.



D Framax Xlife plus fair-faced concr. cone 87mm
E Framax Xlife plus cone spanner
F Framax Xlife plus ratchet 1/2" SW24 L

➤ Close the open form-tie point with a Framax Xlife plus fair-faced concr. plug 87mm.



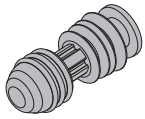
C Framax Xlife plus fair-faced concr. plug 87mm

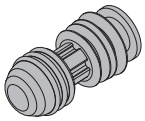
We recommend the following materials for gluing in the plugs:

- Commercially available **mortar** of building material class A1 (non-combustible) according to DIN 4102-0 and DIN EN 13501-1 (e.g. Quick expansive mortar).
  Pay attention to the colour of the concrete here!

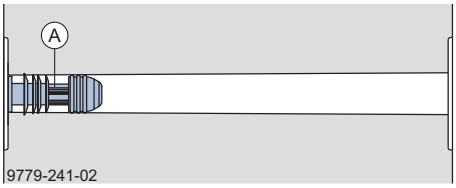
Closing the form-tie point with Framax Xlife plus sealing plug 25mm and sealing plug 28mm

for form-tie holes of diam. 25 to 28 mm



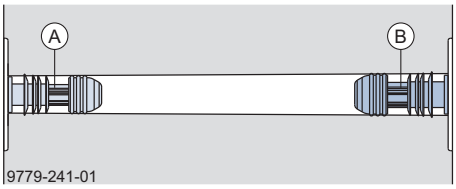


➤ Push the Framax Xlife plus sealing plug 25mm (yellow) into the smaller form-tie hole.



A Framax Xlife plus sealing plug 25mm (yellow)

➤ Push the Framax Xlife plus sealing plug 28mm (blue) into the larger form-tie hole.



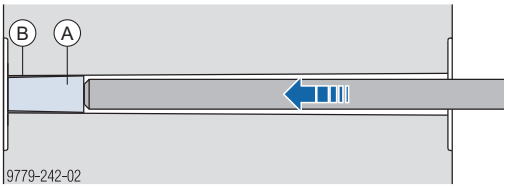
A Framax Xlife plus sealing plug 25mm (yellow)
B Framax Xlife plus sealing plug 28mm (blue)

Closing the form-tie point with Concrete cone D24/22 L50mm and Concrete cone D26/24 L38mm

FFC

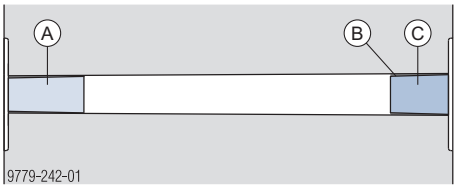
for form-tie holes of diam. 25 to 28 mm

- Clean the inside of the form-tie hole.
- Dip the Concrete cone D24/22 L50mm into the adhesive and briefly rotate it in the adhesive so that its entire circumference is wetted.
- Push the Concrete cone D24/22 L50mm into the form-tie hole using the tie rod.



A Concrete cone D24/22 L50mm
B Epoxy-resin adhesive

- Dip the Concrete cone D26/24 L38mm into the adhesive and briefly rotate it in the adhesive so that its entire circumference is wetted.
- Push the Concrete cone D26/24 L38mm into the form-tie hole.



A Concrete cone D24/22 L50mm
B Epoxy-resin adhesive
C Concrete cone D26/24 L38mm

Product recommendation

Mapefix EP epoxy-resin adhesive

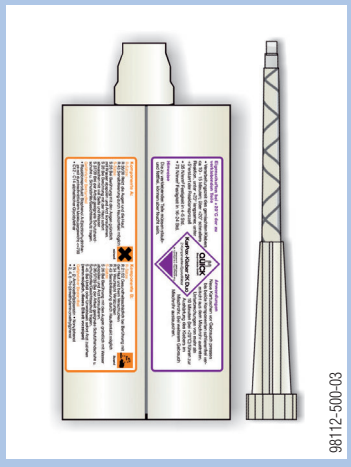
- Epoxy-resin-based 2-component adhesive for structural loads.
- The surface must be free of dust and oil.
- Application temperature: min. +5 °C

Read and observe the manufacturer's technical data sheet!

Quick-KarPox adhesive+mortar

- Epoxy-resin-based 2-component adhesive for structural loads.
- The surface must be free of dust and oil.
- Application temperature: min. +5 °C

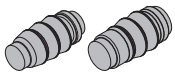
Read and observe the manufacturer's technical data sheet!



Tie rod system Monotec

Design variants – Tie rod system Monotec

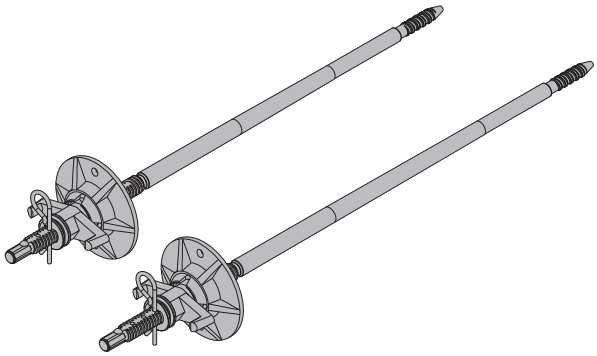
Overview of the products used in the Doka Tie rod system Monotec, and their areas of application.

Name		Water-impermeable	Sound-insulating	Fire-resistant	Smoke-proof	Suitable for drinking-water applications	Gas-impermeable	Radiation-proof	Suitable for FFC
Monotec plug			✓	✓	✓				✓
Monotec plug with moulding mortar and second plug		✓	✓	✓	✓				✓
Monotec combi-plug 20 with Combi-plug 22		✓	✓	✓	✓				✓

Preparing the form-tie point

with Monotec tie 15.0 B

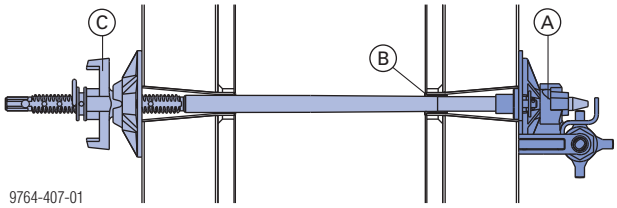
- Can be operated from one side
- For wall thicknesses from 15 cm to 35 cm
- no expendable jacket tubes



	Wall thicknesses in 1 cm increments
Monotec tie 15.0 B 15-25cm Framax	15 to 25 cm
Monotec tie 15.0 B 25-35cm Framax	25 to 35 cm

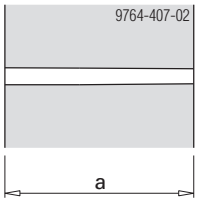
If the tie is placed through a universal waling, this reduces the max. wall thickness by 5 cm.

Form-tie point enclosed by formwork



A	Monotec combination nut 15.0 Framax or Monotec form-tie nut 15.0 Framax
B	Monotec sealing plug Framax
C	Monotec tie 15.0 B

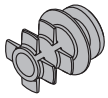
Formwork stripped from around form-tie point



a ... 15 to 35 cm

Closing the form-tie point with Monotec plug

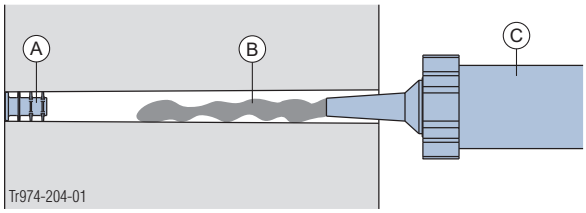
for form-tie holes of diam. 20 to 23 mm



Water-impermeable form-tie point

➤ Press a Monotec plug into the tie-hole, flush with the wall.

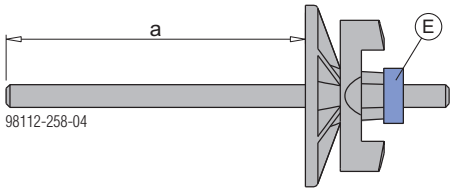
➤ Use the backfilling syringe to inject the form-tie hole with sufficient moulding mortar that this is at least 5 cm long when compressed.



A Monotec plug
B Mortar of building material class A1
C Backfilling syringe 600ml

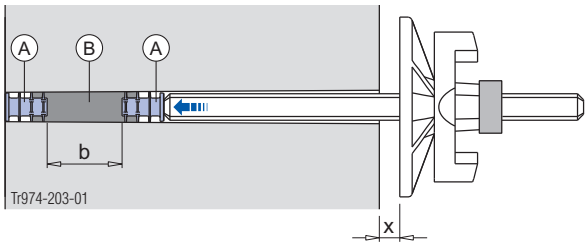
Using a Tie rod 15.0mm plus Super plate 15.0 makes it easier to fit the second plug.

To prevent the super plate from turning, fix it to the tie rod using adhesive tape **(E)** .



a ... wall thickness minus 11 cm

➤ Using the tie rod, press a second Monotec plug into the tie-hole and compress the moulding mortar with it.



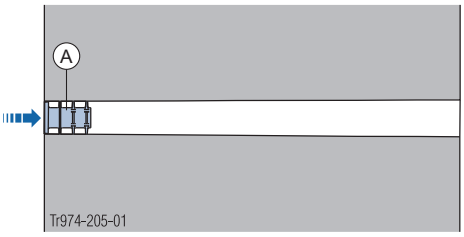
b ... Mortar of building material class A1, min. 5 cm
x ... when there is a gap between the concrete and the super plate, the mortar has been compressed to a length of min. 5 cm

A Monotec plug
B Mortar of building material class A1

Fire-resistant, sound-proof and smoke-proof form-tie point

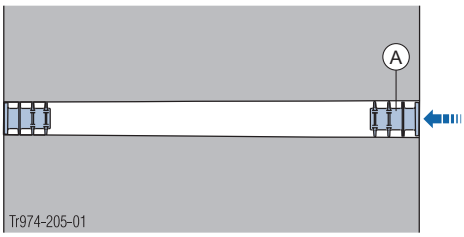
Note:
No mortar is needed for installing Monotec plugs.

➤ Push in the Monotec plug by hand as far as the first sealing lip, and hammer it into the form-tie hole with a rubber mallet until it is flush with the wall.



A Monotec plug

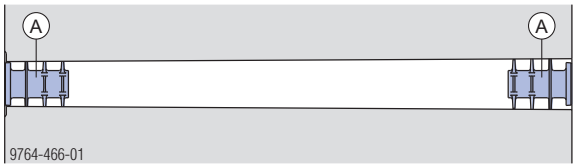
➤ Repeat this on the other side.



A Monotec plug

Fitted flush with wall (shadow gap)

➤ Press a Monotec plug into the tie-hole, by hand (using a piece of wood makes it easier to fit the plug flush with the wall).

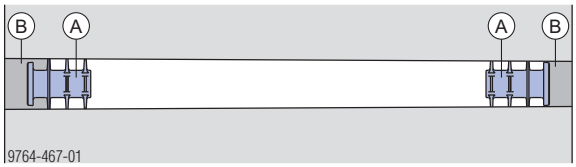


A Monotec plug

Recessed in tie-hole

➤ Press the Monotec plug approx. 10 mm into the tie-hole, by hand.

➤ Trowel off the tie hole with mortar.

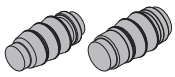


A Monotec plug

B Mortar

Closing the form-tie point with Monotec combi-plugs

for form-tie holes of diam. 20 to 23 mm

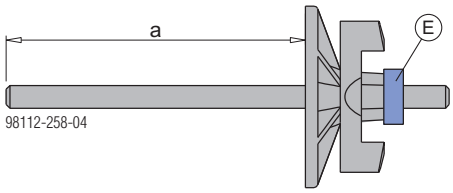


Water-impermeable form-tie point

Note:
No mortar is needed for installing Monotec combi-plugs.

Using a Tie rod 15.0mm plus Super plate 15.0 makes it easier to fit the plugs flush with the wall.

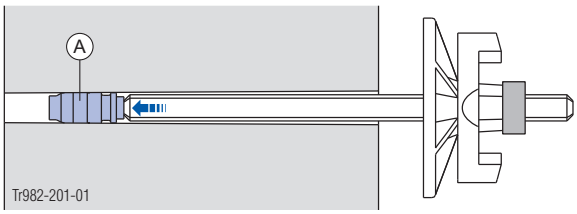
To prevent the super plate from turning, fix it to the tie rod using adhesive tape **(E)** .



a ... wall thickness minus 5 cm

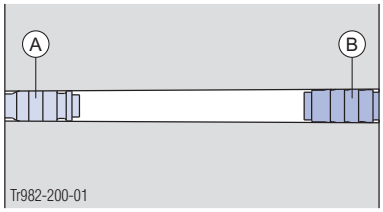
Fitted flush with wall (shadow gap)

➤ Moisten a Monotec combi-plug 20 with water and push it into the form-tie hole with the tie rod.



A Monotec combi-plug 20

➤ Push in the combi-plug by hand as far as the first sealing lip, and hammer it into the form-tie hole with a rubber mallet until it is flush with the wall.



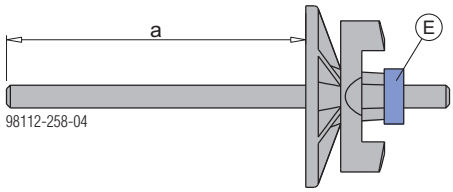
B Combi-plug 22

Fire-resistant, sound-proof and smoke-proof form-tie point

Note:
No mortar is needed for installing Monotec combi-plugs.

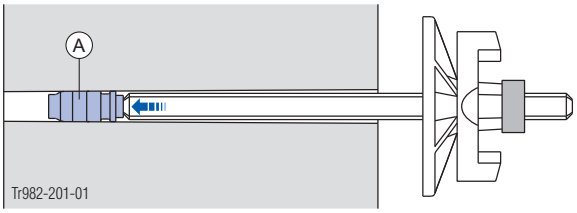
Using a Tie rod 15.0mm plus Super plate 15.0 makes it easier to fit the plugs flush with the wall.

To prevent the super plate from turning, fix it to the tie rod using adhesive tape **(E)** .



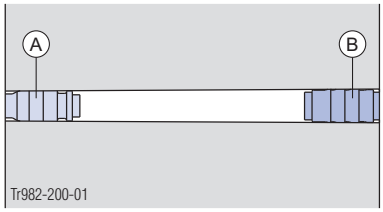
a ... wall thickness minus 5 cm

➤ Moisten a Monotec combi-plug (grey, diam. 23 mm) with water and push it into the form-tie hole with the tie rod.



A Monotec combi-plug (grey, diam. 23 mm)

➤ Push in the second Monotec combi-plug (transparent, diam. 24.5 mm) by hand as far as the first sealing lip, and hammer it into the form-tie hole with a rubber mallet until it is flush with the wall.

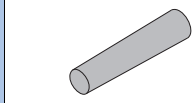


B Monotec combi-plug (transparent, diam. 24.5 mm)

Doka Tie rod system Dokaset

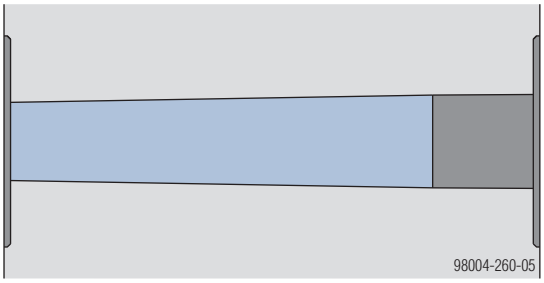
Design variants – Tie rod system Dokaset

Overview of the products used in the Doka Tie rod system Dokaset, and their areas of application.

Name		Water-impermeable	Sound-insulating	Fire-resistant	Smoke-proof	Suitable for drinking-water applications	Gas-impermeable	Radiation-proof	Suitable for FFC
Dokaset closure cone 20cm			✓	✓	✓				
Fibre concrete plug 35mm and Fibre concrete plug 40mm			✓	✓					

Dokaset closure cone 20cm

- fire-resistant
- sound-insulating
- smoke-proof



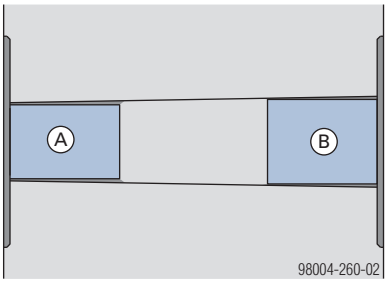
➤ As soon as the formwork has been removed, press a Dokaset closure cone into the opening.
The residual moisture in the concrete makes the cone sit firmly in place, so it is not necessary to glue it in.

➤ On walls that are less than 20 cm thick, simply knock off the projecting part of the cone with a hammer.

➤ On walls that are more than 20 cm thick, fill in the rest of the form-tie point with mortar mixture.

Fibre concrete plugs

- fire-resistant
- sound-insulating



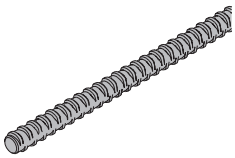
A Fibre concrete plug 35mm
B Fibre concrete plug 40mm

➤ Evenly distribute the mortar mixture in the conical opening and then slowly press the fibre concrete plug into the opening while gently turning it. (Using a piece of wood makes it easier to fit the plug on the right plane).
➤ Fit a fibre concrete plug into the opposite side of the wall.

Tie rod system 15.0

	[kg]	Article N°
Tie rod 15.0mm galvanised 0.50m	**0.72**	**581821000**
Tie rod 15.0mm galvanised 0.75m	**1.1**	**581822000**
Tie rod 15.0mm galvanised 1.00m	**1.4**	**581823000**
Tie rod 15.0mm galvanised 1.25m	**1.8**	**581826000**
Tie rod 15.0mm galvanised 1.50m	**2.2**	**581827000**
Tie rod 15.0mm galvanised 1.75m	**2.5**	**581828000**
Tie rod 15.0mm galvanised 2.00m	**2.9**	**581829000**
Tie rod 15.0mm galvanised 2.50m	**3.6**	**581852000**
Tie rod 15.0mm galvanised .....m	**1.4**	**581824000**
Tie rod 15.0mm non-treated 0.50m	**0.73**	**581870000**
Tie rod 15.0mm non-treated 0.75m	**1.1**	**581871000**
Tie rod 15.0mm non-treated 1.00m	**1.4**	**581874000**
Tie rod 15.0mm non-treated 1.25m	**1.8**	**581886000**
Tie rod 15.0mm non-treated 1.50m	**2.1**	**581876000**
Tie rod 15.0mm non-treated 1.75m	**2.5**	**581887000**
Tie rod 15.0mm non-treated 2.00m	**2.9**	**581875000**
Tie rod 15.0mm non-treated 2.50m	**3.6**	**581877000**
Tie rod 15.0mm non-treated 3.00m	**4.3**	**581878000**
Tie rod 15.0mm non-treated 3.50m	**5.0**	**581888000**
Tie rod 15.0mm non-treated 4.00m	**5.7**	**581879000**
Tie rod 15.0mm non-treated 5.00m	**7.2**	**581880000**
Tie rod 15.0mm non-treated 6.00m	**8.6**	**581881000**
Tie rod 15.0mm non-treated .....m	**1.4**	**581873000**

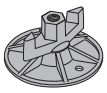
Ankerstab 15,0mm



DIN 18216

Super plate 15.0	**0.98**	**581966000**

Superplatte 15,0

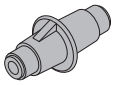


Galvanised
Height: 6 cm
Diameter: 12 cm
Width-across: 27 mm

DIN 18216

Water stop connector 15.0	**0.52**	**581914000**

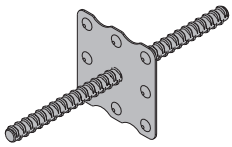
Wasserstopp 15,0



Non-treated
Length: 12 cm

Water stop G 15.0 13cm	**0.43**	**581807000**
Water stop G 15.0 18cm	**0.48**	**581808000**
Water stop G 15.0 38cm	**0.77**	**581809000**
Water stop G 15.0 33cm	**0.68**	**581818000**

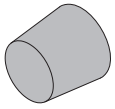
Wassersperre G 15,0



Non-treated
Width: 12 cm
Height: 12 cm
Custom lengths can be ordered under the special-component Art.n° 580100000, quoting the designation and the desired length in mm.

Concrete cone D58/48 L52mm	**0.22**	**581494000**

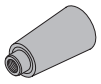
Betonkonus D58/48 L52mm



Grey

Anchor cone 15.0	**0.46**	**581967000**

Spannkonus 15,0

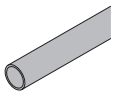


Yellow
Length: 11 cm
Diameter: 6 cm

DIN 18216

Plastic tube 22mm 2.50m	**0.45**	**581951000**

Kunststoffrohr 22mm 2,50m



PVC
Grey
Diameter: 2.6 cm

	[kg]	Article N°
Universal cone 22/10mm	**0.005**	**581995000**

Universal-Konus 22/10mm

Grey
Diameter: 4 cm

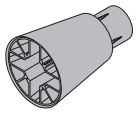
Universal cone 22/10mm with sealing ring	**0.01**	**581481000**

Universal-Konus 22/10mm mit Dichtring

Grey

Universal cone 22/50mm	**0.01**	**581482000**

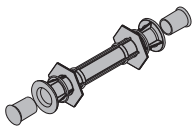
Universal-Konus 22/50mm



Grey

Distance piece 20cm	**0.04**	**581907000**
Distance piece 25cm	**0.05**	**581908000**
Distance piece 30cm	**0.06**	**581909000**

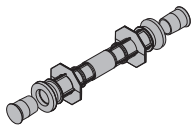
Distanzhalter



PE
Grey
Blue

Distance piece FFC 22mm 20cm	**0.06**	**581843500**
Distance piece FFC 22mm 25cm	**0.06**	**581844500**
Distance piece FFC 22mm 30cm	**0.07**	**581845500**

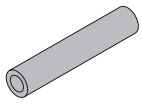
Distanzhalter FFC 22mm



PE
Grey
Yellow

Fibre concrete tube 22mm 0.18m	**0.28**	**581904000**
Fibre concrete tube 22mm 0.23m	**0.36**	**581905000**
Fibre concrete tube 22mm 0.28m	**0.44**	**581906000**
Fibre concrete tube 22mm 0.38m	**0.61**	**581903000**
Fibre concrete tube 22mm 1.25m	**2.3**	**581991000**

Faserbetonrohr 22mm



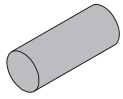
Fibre concrete plug D22 20mm	**0.02**	**581992000**

Faserbetonstopfen D22 20mm

Grey

Fibre concrete plug 22 D20 L50mm	**0.03**	**581485000**

Faserbetonstopfen 22 D20 L50mm



Grey

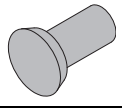
Plug 22mm	**0.003**	**581953000**

Verschlussstopfen 22mm

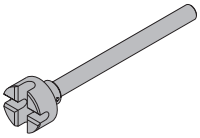
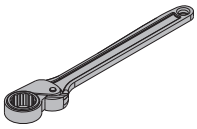
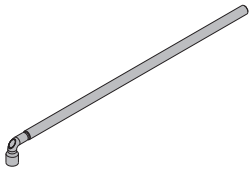
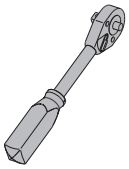
PE
Grey

Fair-faced concrete plug 22/10 D39mm	**0.02**	**581484000**

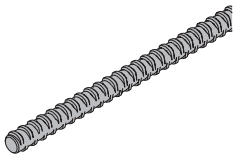
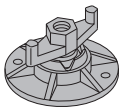
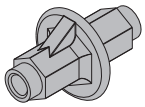
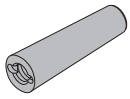
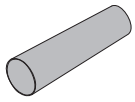
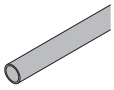
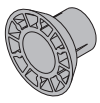
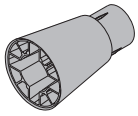
Sichtbetonstopfen 22/10 D39mm

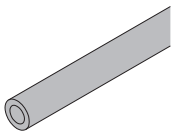
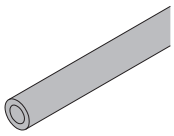
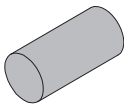
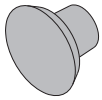
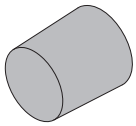
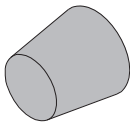
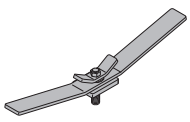


Grey

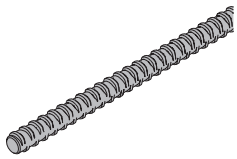
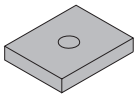
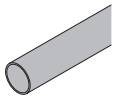
	[kg]	Article N°
REPOXAL two component adhesive REPOXAL-Zweikomponenten Kleber	1.2	581993000
Reducer 26/22mm Reduzierstück 26/22mm Black 	0.01	581853000
Protective cap 15.0/20.0 Schutzkappe 15,0/20,0 Yellow Length: 6 cm Diameter: 6.7 cm 	0.03	581858000
Tie-rod wrench 15.0/20.0 Ankerstabschlüssel 15,0/20,0 Galvanised 	1.8	580594000
Friction type ratchet SW27 Freilaufknarre SW27 Manganese-phosphated Length: 30 cm 	0.49	581855000
Box spanner 27 0.65m Steckschlüssel 27 0,65m Galvanised 	1.9	581854000
Reversible ratchet 1/2" Umschaltknarre 1/2" Galvanised 	0.73	580580000
Box nut 24 1/2" Stecknuss 24 1/2" 	0.12	580584000

Tie rod system 20.0

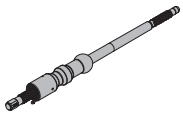
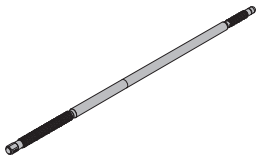
	[kg]	Article N°
Tie rod 20.0mm galvanised 0.50m	1.3	581411000
Tie rod 20.0mm galvanised 0.75m	1.9	581417000
Tie rod 20.0mm galvanised 1.00m	2.5	581412000
Tie rod 20.0mm galvanised 1.25m	3.2	581418000
Tie rod 20.0mm galvanised 1.50m	3.8	581413000
Tie rod 20.0mm galvanised 2.00m	5.0	581414000
Tie rod 20.0mm galvanised 2.50m	6.3	581430000
Tie rod 20.0mm galvanised .....m	2.5	581410000
Tie rod 20.0mm non-treated 0.50m	1.3	581405000
Tie rod 20.0mm non-treated 0.75m	1.9	581416000
Tie rod 20.0mm non-treated 1.00m	2.5	581406000
Tie rod 20.0mm non-treated 1.50m	3.8	581407000
Tie rod 20.0mm non-treated 2.00m	5.0	581408000
Tie rod 20.0mm non-treated .....m	2.5	581403000
Ankerstab 20,0mm 		DIN 18216
Super plate 20.0 B Superplatte 20,0 B Galvanised Height: 7 cm Diameter: 14 cm Width-across: 34 mm 	2.0	581424000
Water stop connector 20.0 Wasserstopp 20,0 Non-treated Length: 14 cm 	1.3	581467000
Anchoring cone 20.0 Ankerkonus 20,0 Galvanised Length: 15 cm Diameter: 5 cm 	2.4	581437000
Sealing sleeve 20.0 Dichtungshülse 20,0 Grey Length: 16 cm Diameter: 5 cm 	0.03	581441000
Plastic tube 26mm 2.00m Kunststoffrohr 26mm 2,00m PVC Grey Diameter: 3.1 cm 	0.59	581463000
Universal cone 26/10mm Universal-Konus 26/10mm Grey Diameter: 5 cm 	0.008	581464000
Universal cone 26/50mm Universal-Konus 26/50mm Grey 	0.01	581483000

	[kg]	Article N°
Fibre concrete tube 26mm 1.25m Faserbetonrohr 26mm 1,25m Grey	**2.7**	**581472500**
		
Fibre concrete tube 27mm 1.25m Faserbetonrohr 27mm 1,25m	**2.6**	**581472000**
		
Fibre concrete plug D27 21mm Faserbetonstopfen D27 21mm Grey	**0.03**	**581473000**
		
Fibre concrete plug 26 D24 L50mm Faserbetonstopfen 26 D24 L50mm Grey	**0.05**	**581486000**
		
Plug 26mm Verschlussstopfen 26mm PE Grey	**0.006**	**581465000**
		
Fair-faced concrete plug 26/10 D45mm Sichtbetonstopfen 26/10 D45mm Grey	**0.04**	**581856000**
		
Concrete cone D47/43 L50mm Betonkonus D47/43 L50mm Grey	**0.15**	**581490000**
		
Fair-faced concrete cone 22/50 26/50mm Sichtbetonkonus 22/50 26/50mm Grey	**0.05**	**581487000**
		
Cone spanner 20.0 Konusschlüssel 20,0 Galvanised Length: 57 cm	**3.5**	**581471000**
		

Tie rod system 26.5

	[kg]	Article N°
Tie rod 26.5mm non-treated .....m Ankerstab 26,5mm unbehandelt .....m	**4.5**	**581883000**
		
Anchor plate 26.5 Ankerplatte 26,5 Galvanised Length: 15 cm Width: 12 cm	**3.4**	**581986000**
		
Hexagon nut 26.5 Sechskantmutter 26,5 Galvanised Length: 8 cm Width-across: 46 mm	**0.73**	**581985000**
		
Plastic tube 32mm 2.00m Kunststoffrohr 32mm 2,00m PVC Grey Diameter: 3.6 cm	**0.6**	**581460000**
		
Universal cone 32/10mm Universal-Konus 32/10mm Grey Diameter: 5 cm	**0.008**	**581461000**
		
Plug 32mm Verschlussstopfen 32mm Grey	**0.007**	**581462000**
		

Tie rod system Framax Xlife plus 20.0

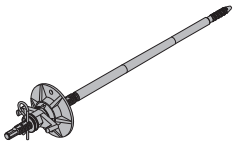
Framax Xlife plus form tie 20.0 15-30cm Length: 70 cm	**5.0**	**589277000**
Framax Xlife plus form tie 20.0 25-40cm Length: 80 cm	**5.4**	**589278000**
Framax Xlife plus form tie 20.0 45-60cm Length: 100 cm Framax Xlife plus-Anker 20,0 Galvanised	**6.2**	**589298000**
		
Framax Xlife plus tie rod 20.0 15-30cm Length: 70 cm	**2.7**	**589324000**
Framax Xlife plus tie rod 20.0 25-40cm Length: 80 cm	**3.1**	**589325000**
Framax Xlife plus tie rod 20.0 45-60cm Length: 100 cm Framax Xlife plus-Ankerstab 20,0 Galvanised	**4.0**	**589326000**
		

	[kg]	Article N°
Framax Xlife plus form-tie nut l 20.0 Framax Xlife plus-Ankermutter l 20,0 Length: 12 cm	1.2	589216500
Framax Xlife plus parking bolt Framax Xlife plus-Parkbolzen Galvanised Length: 20 cm	0.42	589327000
Framax Xlife plus distance protector Framax Xlife plus-Distanzsicherung Galvanised Height: 23 cm Width-across: 24 mm	1.3	589217000
Framax Xlife plus reducer l 20.0 Framax Xlife plus-Reduzierstück l 20,0 Galvanised Length: 12.5 cm	0.56	589329000
Framax Xlife plus ratchet 1/2" SW24 L Framax Xlife plus-Knarre 1/2" SW24 L Length: 30 cm	0.92	589221000
Framax Xlife plus ratchet 3/4" SW24 Framax Xlife plus-Knarre 3/4" SW24 Length: 100 cm	4.4	589220000
Framax Xlife plus fair-faced concr. cone 87mm Framax Xlife plus-Sichtbetonkonus 87mm Blue	0.09	589282000
Sealing disc 20/43 20.0/26.5 Dichtscheibe 20/43 20,0/26,5 Black	0.002	581836000
Framax Xlife plus cone spanner Framax Xlife plus-Konusschlüssel Galvanised Length: 5.5 cm	0.28	589284000
Framax Xlife plus fair-faced concr. plug 87mm Framax Xlife plus-Sichtbetonstopfen 87mm Grey	0.19	589283000

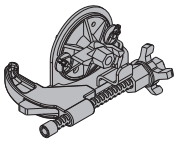
	[kg]	Article N°
Framax Xlife plus screw plug 25mm Framax Xlife plus-Schraubstopfen 25mm Black Width-across: 16 mm	0.1	589308000
Framax Xlife plus sealing plug 25mm Framax Xlife plus-Dichtstopfen 25mm Yellow	0.02	589248000
Framax Xlife plus sealing plug 28mm Framax Xlife plus-Dichtstopfen 28mm Blue	0.02	589249000
Framax Xlife plus plug 24mm Framax Xlife plus-Verschlussstopfen 24mm PE Grey	0.005	589219000
Framax Xlife plus plug 24mm with hole Framax Xlife plus-Stopfen 24mm mit Loch PE Colourless	0.004	589223000
Framax Xlife plus plug 38mm Framax Xlife plus-Verschlussstopfen 38mm PE Grey	0.006	589288000
Fibre concrete plug D24 21mm Faserbetonstopfen D24 21mm Grey	0.02	588922000
Framax Xlife plus concrete cone 28/25 300mm Framax Xlife plus-Betonkonus 28/25 300mm Grey	0.36	589338000
Concrete cone D24/22 L50mm Betonkonus D24/22 L50mm Grey	0.04	581488000
Concrete cone D26/24 L38mm Betonkonus D26/24 L38mm Grey	0.04	581489000

Tie rod system Monotec

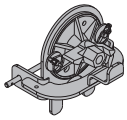
	[kg]	Article N°
Monotec tie 15.0 B 15-25cm Framax Length: 77 cm	3.9	588930500
Monotec tie 15.0 B 25-35cm Framax Length: 87 cm Monotec-Anker 15,0 B Framax Galvanised	4.1	588931500



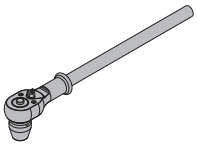
Monotec combination nut 15.0 Framax Monotec-Kombimutter 15,0 Framax Galvanised Width: 27 cm	5.2	588681000



Monotec form-tie nut 15.0 Framax Monotec-Ankermutter 15,0 Framax Galvanised Width: 19 cm	2.7	588684000

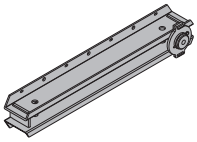


Monotec ratchet 3/4" SW17 Monotec-Knarre 3/4" SW17	1.6	588933000



Monotec sealing plug Framax Monotec-Dichtstopfen Framax Yellow Diameter: 2.9 cm	0.005	588932000

Monotec joint plate 0.75m Framax Monotec-Ausgleichsschiene 0,75m Framax Painted blue	9.9	588934000

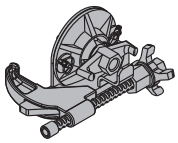


Combi-plug 22 Kombistopfen 22 Grey Length: 5 cm	0.03	588928000

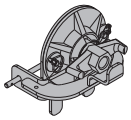
Monotec combi-plug 20 Monotec-Kombistopfen 20 Grey Length: 5 cm	0.02	588929000

Monotec plug Monotec-Verschlussstopfen PE Grey Diameter: 2.4 cm	0.003	588935000

Framax combination nut 20.0 Framax-Kombimutter 20,0 Galvanised Width: 27 cm	6.1	588683000

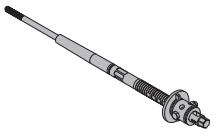


Framax form-tie nut 20.0 Framax-Ankermutter 20,0 Galvanised Width: 19 cm	3.6	588687000

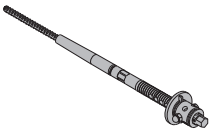


Tie rod system Dokaset

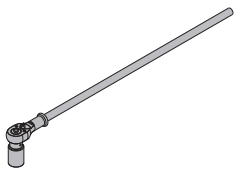
Dokaset tension tie 10-30cm B Dokaset-Zuganker 10-30cm B Galvanised Length: 115 cm	13.5	588910500



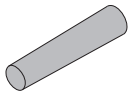
Dokaset tension tie 10-30cm Dokaset-Zuganker 10-30cm Galvanised Length: 115 cm	13.0	588910000



Dokaset ratchet 3/4" SW36 Dokaset-Knarre 3/4" SW36 Galvanised Length: 100 cm	5.1	588909000



Dokaset closure cone 20cm Dokaset-Verschlusskonus 20cm Length: 18 cm	0.5	588925000



Fibre concrete plug 35mm Faserbetonstopfen 35mm Grey	0.11	588923000

Fibre concrete plug 40mm Faserbetonstopfen 40mm Grey	0.14	588924000

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