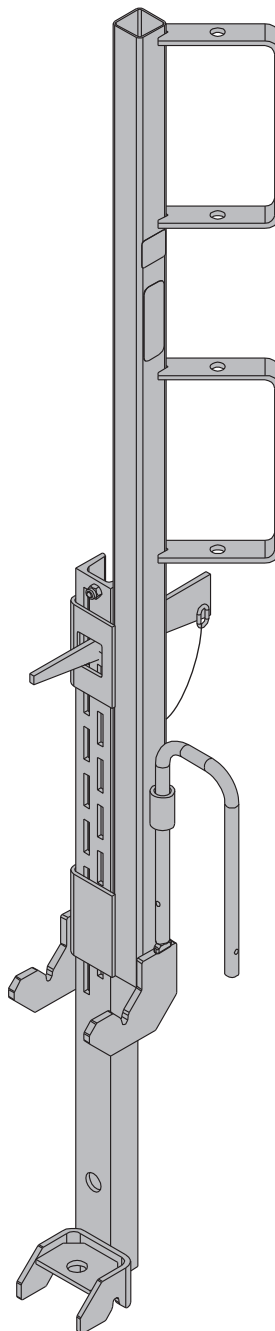


The Formwork Experts.

Handrail clamp T

User Information

Instructions for assembly and use (Method statement)



Contents

4	Elementary safety warnings
7	Eurocodes at Doka
8	Product description
9	Areas of use
12	Other possible areas of use
14	Structural design

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 booklet can also be used as a generic method statement or incorporated with a site-specific method statement.
- **Many of the illustrations in this booklet show the situation during formwork assembly and are therefore not always complete from the safety point of view.**
Any safety accessories not shown in these illustrations must still be used by the customer, in accordance with the applicable rules and regulations.
- **Further safety instructions, especially warnings, will be found in the individual sections of this booklet!**

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 side-guard 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. Heating appliances are only allowed if properly and expertly used, and set up a safe distance away from the formwork.
- The customer must consider all types of weather conditions on equipment and in connection with the use or storage of the equipment (e.g. slippery surfaces, risk of slippage, effects of wind, etc.) and must take steps in good time to safeguard the equipment and the surrounding areas and to protect the 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 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 suitable condition. Steps must be taken to rule out the use of any components that are damaged, deformed, or weakened due to wear, corrosion or rot.
- Combining our formwork systems with those of other manufacturers could be dangerous, risking damage to both health and property. If you intend to combine different systems, please contact Doka for advice first.
- The equipment/system must be assembled and erected in accordance with the applicable laws, Standards and rules by suitably skilled personnel of the customer's, having regard to any and all required safety inspections.
- It is not permitted to modify Doka products; any 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 out 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 regulations applying to the handling of formwork and scaffolding. In addition, the Doka slinging means must be used - this is a mandatory requirement.
- Remove any loose parts or fix them in place so that they cannot be dislodged or fall free!
- All components must be stored safely, following all the special Doka instructions given in the relevant sections of this booklet!

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 booklet:



DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE

Is used to address practices not related to physical injury.



Instruction

Indicates that actions need to be taken 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

Refers to other documents and materials.

Eurocodes at Doka

In Europe, a uniform series of Standards known as **Eurocodes** (EC) was developed for the construction field by the end of 2007. These are intended to provide a uniform basis, valid throughout Europe, for product specifications, tenders and mathematical verification. The EC are the world's most highly developed Standards in the construction field.

In the Doka Group, the EC are to be used as standard from the end of 2008. They will thus supersede the DIN norms as the "Doka standard" for product design.

The widely used "Permissible stress design" (comparing the actual stresses with the permissible stresses) has been superseded by a new safety concept in the EC.

The EC contrast the actions (loads) with the resistance (capacity). The previous safety factor in the permissible stresses is now divided into several partial factors. The safety level remains the same!

$$E_d \leq R_d$$

E_d Design value of effect of actions

(E ... effect; d ... design)
Internal forces from action F_d
(V_{Ed} , N_{Ed} , M_{Ed})

F_d Design value of an action

$F_d = \gamma_F \cdot F_k$
(F ... force)

F_k Characteristic value of an action

"actual load", service load
(k ... characteristic)
e.g. dead weight, live load, concrete pressure, wind

γ_F Partial factor for actions

(in terms of load; F ... force)
e.g. for dead weight, live load, concrete pressure, wind
Values from EN 12812

R_d Design value of the resistance

(R ... resistance; d ... design)
Design capacity of cross-section
(V_{Rd} , N_{Rd} , M_{Rd})

Steel: $R_d = \frac{R_k}{\gamma_M}$ Timber: $R_d = k_{mod} \cdot \frac{R_k}{\gamma_M}$

R_k Characteristic value of the resistance

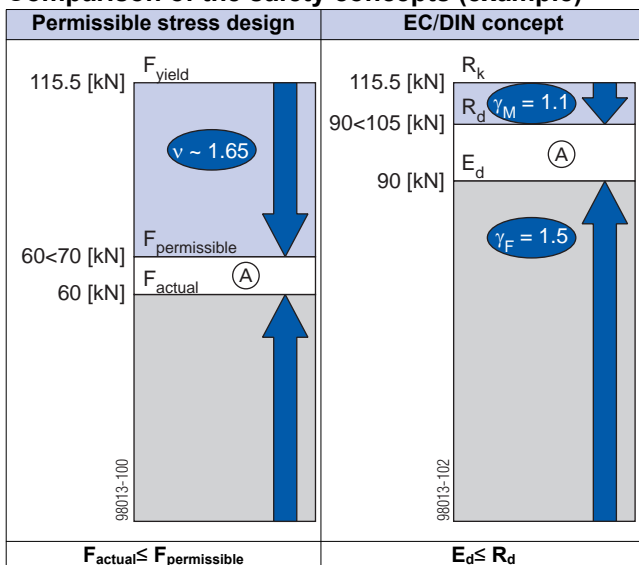
e.g. moment resistance to yield stress

γ_M Partial factor for a material property

(in terms of material; M...material)
e.g. for steel or timber
Values from EN 12812

k_{mod} Modification factor (only for timber – to take account of the moisture and the duration of load action)
e.g. for Doka beam H20
Values as given in EN 1995-1-1 and EN 13377

Comparison of the safety concepts (example)



A Utilisation factor

⚠ The "permissible values" communicated in Doka documents (e.g.: $Q_{permissible} = 70$ kN) do not correspond to the design values (e.g.: $V_{Rd} = 105$ kN)!

- ▶ Avoid any confusion between the two!
- ▶ Our documents will continue to state the permissible values.

Allowance has been made for the following partial factors:

- $\gamma_F = 1.5$
- $\gamma_{M, timber} = 1.3$
- $\gamma_{M, steel} = 1.1$
- $k_{mod} = 0.9$

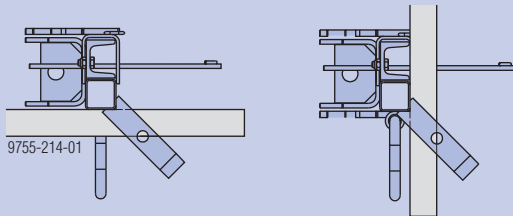
In this way, all the design values needed in an EC design calculation can be ascertained from the permissible values.

Product description

The main features:

The Handrail clamp T is used for erecting safety railings along exposed outer edges.

- Conforms to EN 13374 Class A
- It is designed so that it can be fastened onto various different building components, and this makes it suitable for:
 - bridge superstructures
 - guardrail systems on stairways either with or without projecting stone paving
 - edges of floor-slabs
 - openings in floor slabs
 - opposing guard-rails on Framax framed form-work and hollow-wall elements
- Handrail-post plate angled at 45°, to allow guard-rail boards to be inserted in either direction (i.e. at 90° to one another).



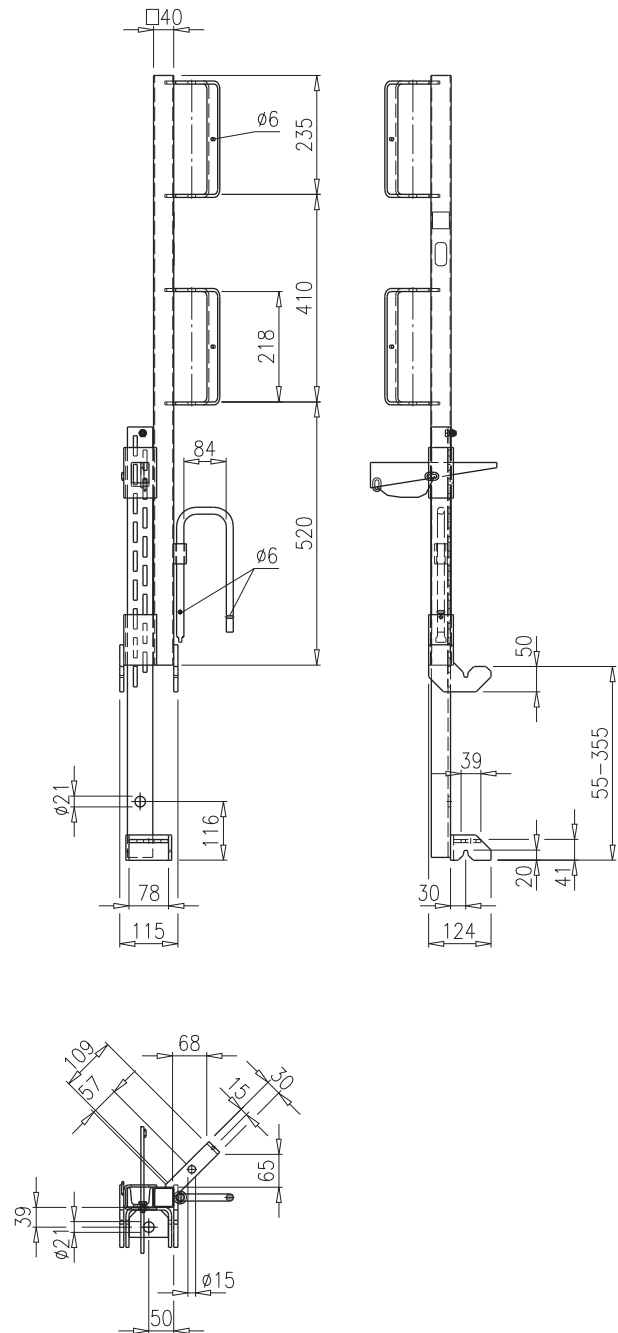
- Holes drilled in the handrail-post plates for mounting screw-on couplers so that guard-rails can be erected using scaffolding tubes.
- All-steel construction - hot-dip galvanised for maximum durability.

System dimensions

Handrail clamp T

Art.n° 584381000

Weight: 12.6 kg



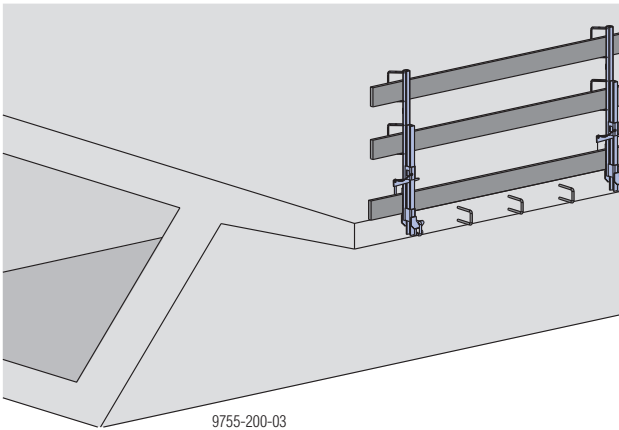
Dimensions in mm

Areas of use

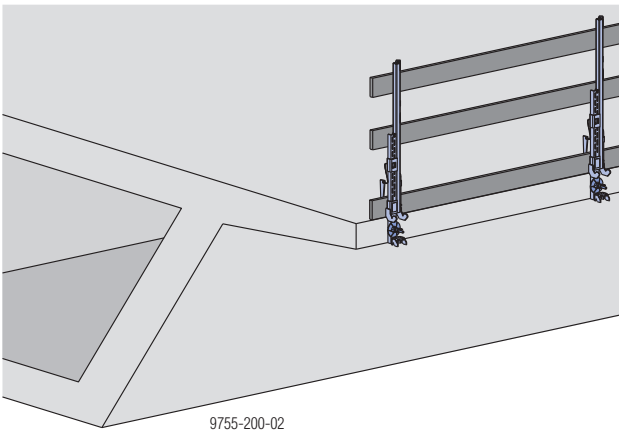
On bridge superstructures

The Handrail clamp T makes it possible to erect guard-rail systems. Depending on the structural condition and the local situation, the Handrail clamp T can be attached in various different ways, without modification.

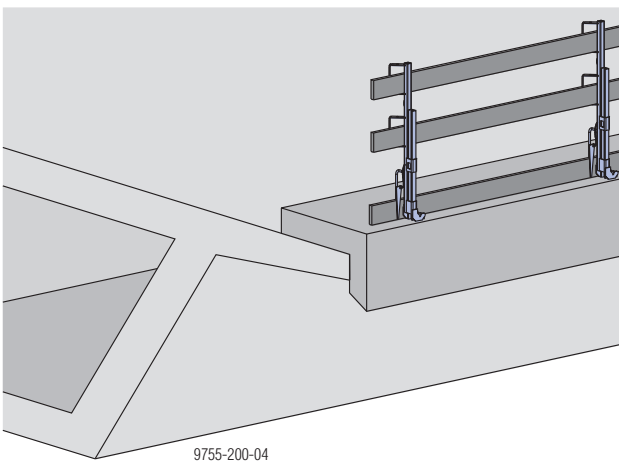
Variant 1 Fastened to reinforcement hoops



Variant 2 Fastened to end-face, where there are no reinforcement hoops



Variant 3 Floor-mounted to the already-completed edge kerb

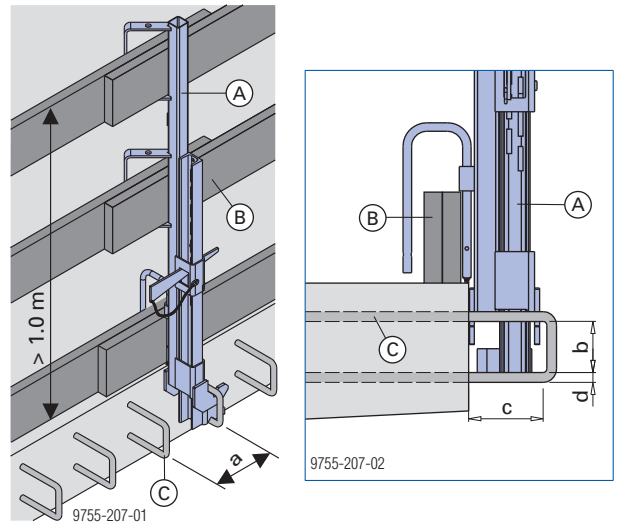


Variant 1 Fastened to reinforcement hoops

Quick to erect, as no preparatory work is needed, and no additional fixtures.

Assembly

- ▶ Hook both the clamping plates of the Handrail clamp T into the reinforcement hoop.
- ▶ Wedge in place firmly.



- a ... clear gap between the reinforcement hoops min. 13.0 cm
- b ... min 5.5 cm, max. 35.0 cm
- c ... min. 12 cm
- d ... min. 1.0 cm

- A** Handrail clamp T
- B** Guard-rail board
- C** Reinforcement hoop

Variant 2 Fastened to end-face

In cases where there are no reinforcement hoops. This method can also be used to erect guardrail systems on all types of floor-slabs and floor openings.

Preparations for making a suitable suspension point

The suspension point must be able to sustain a tensile force of
 $R_d \geq 13.5 \text{ kN}$ ($F_{perm} \geq 9 \text{ kN}$).
 e. g. a Bridge edge beam anchor 15.0



NOTICE

Incorporate the suspension points, spaced the required distance apart, in the course of constructing the bridge superstructure.

If there are no such built-in fixtures, it is possible to retro-fit anchorage points using Hilti HST M16 stud anchors, or other comparable makes of dowel.

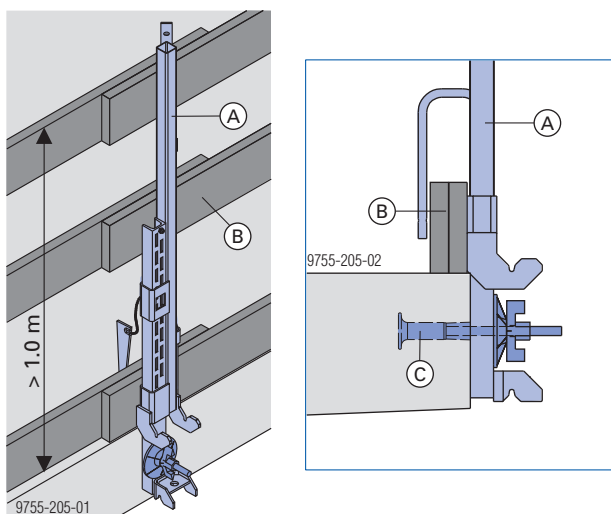


Follow the dowel manufacturer's fitting and installation instructions!

Minimum tightening torque: 90 Nm

How to erect (e.g. with Bridge edge beam anchor 15.0)

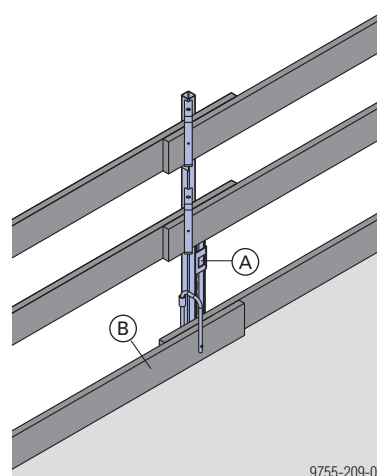
- ▶ Twist a Tie rod 15.0 (min. length 21 cm) into the Bridge edge beam anchor until fully engaged.
- ▶ Push the Handrail clamp T over the Tie rod 15.0 in the position shown, and tighten with a Super plate 15.0.



- A** Handrail clamp T
- B** Guardrail board
- C** Anchorage
(Bridge edge beam anchor 15.0 - Tie-rod 15.0 - Super-plate 15.0)

Extra function where an insulating layer is to be applied

Standard working situation: Toe-board is in bottom position



- A** Handrail clamp T
- B** Toeboard

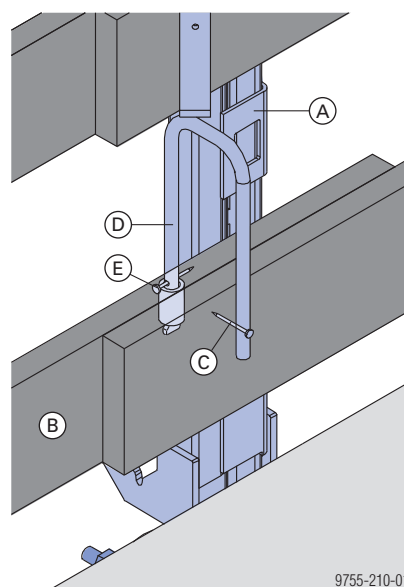
Raising the toeboard (only while the insulating layer is being applied)



WARNING

Because the toeboard is now raised, objects can fall off the edge of the structure.

- ▶ Take any loose items away from the edge.
- ▶ Only leave the toeboard in the raised position while the insulating layer is being applied.
- ▶ Nail the toeboard to the foot stirrup.
- ▶ Raise the foot stirrup and toeboard, and fix them in this position with a nail.



- A** Handrail clamp T
- B** Toeboard
- C** Nail, e.g. 28x60
- D** Foot stirrup
- E** Nail, e.g. 28x60

Variant 3 Floor-mounted

to the already-completed edge kerb.

Preparations

Ideally, the Handrail clamp T should be fastened to the built-in fixtures provided in readiness for the permanent railings. Other means of fixing should only be contemplated if it is not possible to use the built-in fixtures.

The fastener must be able to sustain a tensile force $R_d \geq 21 \text{ kN}$ ($F_{\text{perm}} \geq 14 \text{ kN}$).
Follow the manufacturers' applicable fitting instructions.

If there are no such built-in fixtures, it is possible to retro-fit anchorage points using Hilti HST M16 stud anchors, or other comparable makes of dowel.

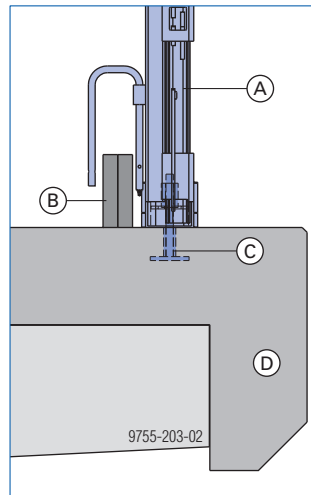
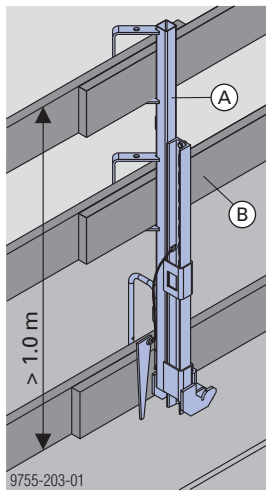


Follow the dowel manufacturer's fitting and installation instructions!

Minimum tightening torque: 90 Nm

Assembly

- ▶ Stand the Handrail clamp T on the floor at the anchoring location.
- ▶ Bolt down as per the instructions given by the anchor manufacturer. In particular, always keep the minimum distances from the edges!



- A** Handrail clamp T
- B** Guard-rail board
- C** Anchorage
- D** Edge kerb

Other possible areas of use

Fastened to end-face, with gap

e.g. for guardrail systems beside stairways

The Handrail clamp T is designed so that work can continue unhindered on both the top and the underside of the stairway.

It is even possible to lay tiles or flagstones on the steps without removing the railings. This ensures safety throughout the entire shell construction phase.

In this way, guardrail systems can also be erected on balconies, e.g. also where there are floor-paving tiles or flagstones projecting over the edge.

Preparations for making a suitable suspension point

The suspension point must be able to sustain a tensile force of
 $R_d \geq 13.5 \text{ kN}$ ($F_{perm} \geq 9 \text{ kN}$).
 e. g. a Bridge edge beam anchor 15.0



NOTICE

Incorporate the suspension points, spaced the required distance apart, in the course of constructing the bridge superstructure.

If there are no such built-in fixtures, it is possible to retro-fit anchorage points using Hilti HST M16 stud anchors, or other comparable makes of dowel.

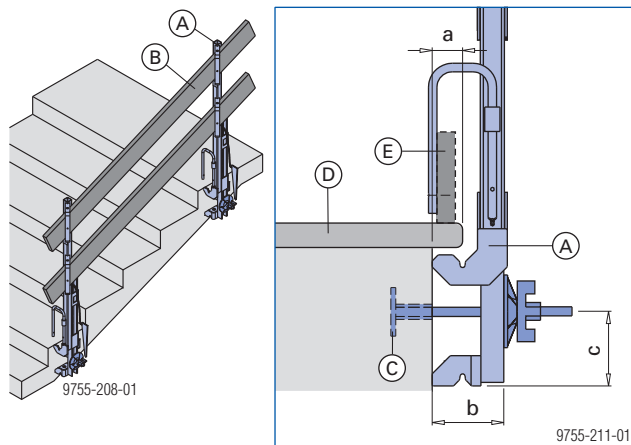


Follow the dowel manufacturer's fitting and installation instructions!

Minimum tightening torque: 90 Nm

How to erect (e.g. with Bridge edge beam anchor 15.0)

- ▶ Twist a Tie-rod 15.0 (min. length 29 cm) into the Bridge edge beam anchor until fully engaged.
- ▶ Push the Handrail clamp T over the Tie-rod 15.0 in the position shown, and tighten with a Super-plate 15.0.



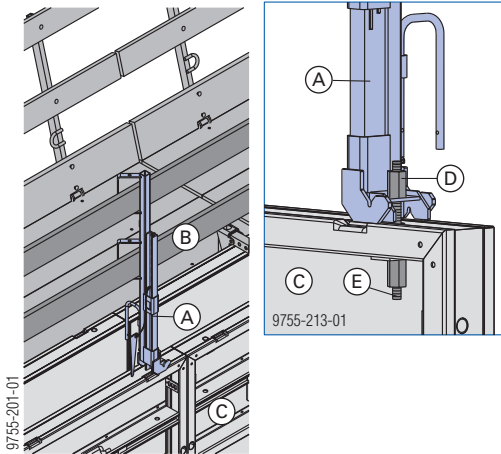
- a ... max. step overhang: 7 cm
- b ... 12.0 cm
- c ... 11.6 cm

- A** Handrail clamp T
- B** Guard-rail board
- C** Anchorage (Bridge edge beam anchor 15.0 - Tie-rod 15.0 - Super-plate 15.0)
- D** Tile or flagstone on step
- E** Toeboard (only needed on landings)

Opposing guard-rail

e.g. on Framax Xlife framed formwork

- ▶ Fasten the Handrail clamp T into the cross boreholes of the framed panel, using a Tie-rod 15.0 and 2 hexagon nuts.



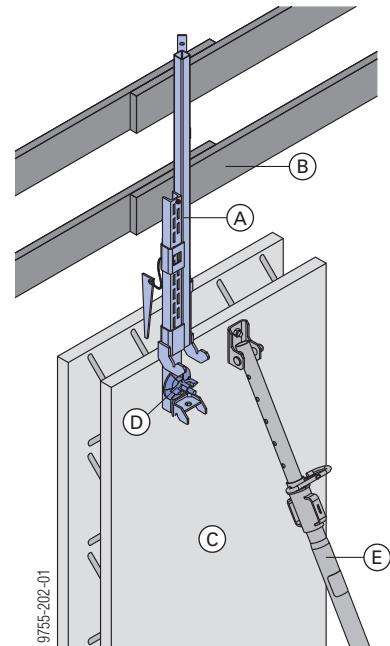
- A Handrail clamp T
- B Guard-rail board
- C Framax Xlife framed panel
- D Hexagon nut 15.0 (Art.n° 581964000)
- E Tie-rod 15.0 (l=min. 25 cm)

Guardrails on pre-cast hollow-wall members

The suspension point must be able to sustain a tensile force of $R_d \geq 13.5 \text{ kN}$ ($F_{\text{permissible}} \geq 9 \text{ kN}$).

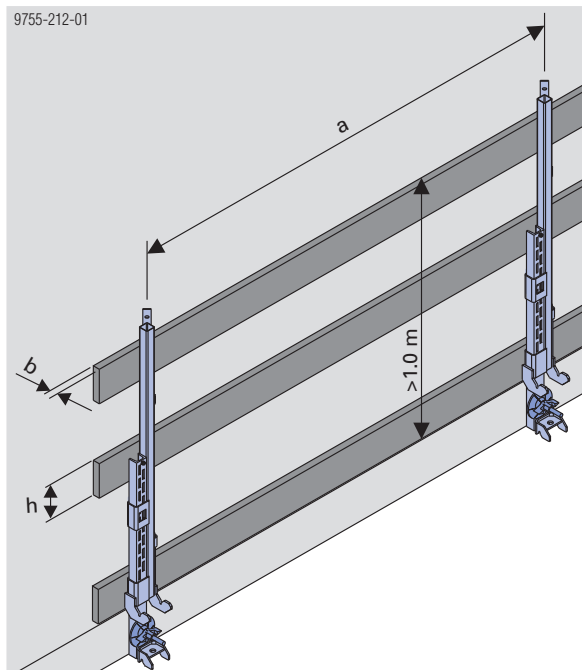
Note:

The anchoring components that are used here must first be checked with – and approved by – the precast element manufacturer.



- A Handrail clamp T
- B Guardrail board
- C Cavity-wall element
- D Anchorage
- E Plumbing strut 340 for pre-cast members (art. n° 588296)

Structural design



Guard-rail boards		Perm. centre-to-centre distance 'a' for heights above ground of	
Width 'w'	Height 'h'	Up to 40 m $q_{(ze)} \leq 0.84 \text{ kN/m}^2$	40 to 100 m $q_{(ze)} \leq 1.1 \text{ kN/m}^2$
3 cm	15 cm	2.00 m	2.00 m
4 cm ¹⁾	15 cm	2.50 m	2.00 m
3, 4 ¹⁾ , 5 cm ¹⁾	20 cm	2.00 m	1.50 m
Scaffold tube 48.3mm		3.00 m	3.00

$q_{(ze)}$... Dynamic pressure

The smaller permitted centre-to-centre distance when 20 cm high guard-rail boards are used is due to the higher wind loads which are exerted upon the Handrail clamp T.

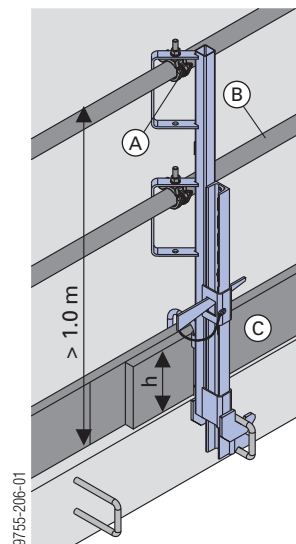
¹⁾ 4 cm and 5 cm guard-rail boards cannot be overlapped.

Using scaffold tubes

The holes in the Handrail-post plates make it possible to mount Screw-on couplers 48mm 50 (art. n° 682002000).

This means that it is also possible to use Scaffold tubes 48.3mm as the top and middle guardrails.

Tools for mounting the couplers and scaffold tubes:
Fork wrench 22 mm



h ...height of toeboard min. 20 cm

A Screw-on coupler 48mm 50

B Scaffold tube 48.3mm

C Toeboard

Near to you, worldwide

Doka is one of the world leaders in developing, manufacturing and distributing formwork technology for use in all fields of the construction sector.

With more than 160 sales and logistics facilities in over 70 countries, the Doka Group has a highly efficient distribution network which ensures that equipment and

technical support are provided swiftly and professionally.

An enterprise forming part of the Umdasch Group, the Doka Group employs a worldwide workforce of more than 6000.



www.doka.com/handrail-posts-and-clamps