INFRA-KIT

Modular heavy-duty shoring system

User Guide

Keep for later use!

HÜNNEBECK FORMWORK SOLUTIONS
BY BRAND SAFWAY

User Guide

Contents

1 Product features

The Hünnebeck INFRA-KIT is a versatile modular system that can take heavy loads safely and economically. It is particularly well suited for the construction of bridges, open and mining tunnels, and other civil engineering projects. Supporting structures can be reliably planned and implemented to accommodate the required loads. Due to the standardised, logical components and connections, the INFRA-KIT system is particularly user friendly and cost-efficient. The INFRA-KIT is safe and easy to assemble.

The system is flexible enough to meet the needs of the specific project, drastically decreasing the effort needed to plan standard applications. This means that the time and expense required to produce special parts is reduced to a minimum.

The modular system is based on the proven Load-bearing Frame Props, each of which has a safe working load of up to 210.00 kN, and the Main Beams that cover a wide range of uses. These components form the INFRA-KIT H system. Due to the high load-bearing capacity of the components, even tall supporting structures and wide-span thoroughfares can be easily constructed in compliance with EU-wide safety standards.

The INFRA-KIT H system is supplemented by walers and spindles from the INFRA-KIT L and M system. They are used e.g. to form trusses and to bear light and medium-sized loads imposed by various formwork or building geometries.

Practical and innovative details make it easy to work with this modular system. And additional components from the Hünnebeck product range can be added to the INFRA-KIT, ensuring efficient project planning, preparation and implementation. Hünnebeck's European rental park offers all of the components for rent.

1.1 Intended use

The INFRA-KIT is a modular shoring system for transferring heavy loads in bridge, tunnel and civil engineering construction. It is used for the temporary construction of supporting structures, truss structures and other load-bearing auxiliary structures on the construction site. The system consists of standardised components such as load frame supports, yoke beams, spindles and chords. These may only be used in the system combinations and applications described in these instructions.

The intended use comprises exclusively the use as a shoring system for transferring vertical and horizontal loads in construction operations, taking into account the permissible system load-bearing capacities. The maximum permissible load capacity per load frame support is 210.00 kN.

The INFRA-KIT may only be assembled, used and dismantled by qualified personnel. It must be used in accordance with the applicable instructions for assembly and use and in compliance with all legal and safety regulations of the country of use. Any deviation, extension or modification of the standard design described requires a separate static test and, if necessary, a supplementary risk assessment and assembly instructions.

2 General notes

2.1 Information regarding intended and safe use

2.1.1 Design

Design Risk Assessment

The Design Risk Assessment is an integral part of Hünnebeck‘s design process. The designer will assess the hazards and risks associated with erection, use and dismantling of the temporary works at an early stage of the design process.

Hünnebeck will communicate where risks to health and safety remain by including a "Residual Risk Note“ on the drawing. This note will be clearly visible and marked by the familiar black exclamation mark on a yellow triangle. The statement will be brief but clear to enable appropriate action by a competent contractor.

Planning

The structures must be dimensioned, set up, supported, propped, tied and designed such that all loads resulting from the intended use can be supported and transferred.

The installation schedule shall be determined in advance, during technical planning of the project. The system must be planned such that activities that pose a risk of falling are avoided and, if the risk is unavoidable, its occurrence is kept to a minimum.

All materials required at the site shall be available in sufficient quantities, in flawless condition, and easily accessible.

If the date and location of work coincides with the scheduled work of other contractors, these contractors shall be consulted and the work coordinated to avoid jeopardising each other’s work.

Design schemes

Where relevant site-specific design schemes are produced, they will generally be to a recognised standard arrangement. Otherwise calculations will be done to verify the design.

2.1.2 Moving the equipment

The contractor shall ensure that components, building materials and work equipment are stored, moved, transported, and installed such that they cannot unintentionally shift.

Transport

The special requirements of the system either as individual components and/or as pre-assembled parts regarding transportation procedures must be complied with. This applies not only to and from the site but also to the movement of individual components and/or pre-assembled parts on the construction site/place of use.

Lifting

All relevant regulations regarding lifting materials using mechanical means must be complied with.

When applicable, the lifting requirements of the individual components and/or pre-assembled parts must be followed.

2.1.3 Delivering and storing the equipment

Material check and inspection of components

Material deliveries are to be checked on arrival at the construction site/place of destination, as well as before each use, to ensure it‘s in serviceable condition and functions correctly. Changes to the material are not permitted.

- Damaged components:
  Damaged components should be identified, clearly labelled and isolated ("quarantined"). They shall not be included and/or mixed with components that are in good condition and are fit for use.
- Spare parts and repairs:
  Only original components may be used as spare parts. Repairs are to be carried out by the manufacturer or by authorised facilities only.
- Disposal:
  Destroyed parts or parts that can no longer be repaired shall be disposed of by a specialised company certified according to local regulations. Information on the materials used are available upon request.

The contractor shall ensure that destroyed or damaged components are no longer used and that the appropriate environment and conditions for storage and the particular application of the system(s) are supplied.

Using other products

Combining components from different manufacturers carries certain risks and is not permitted.

2.2 On-site safety general notes

Hazard assessment

The contractor is responsible for the compilation, documentation, implementation and revision of a hazard assessment for each construction site. The hazard assessment contains the assessment of the working conditions as they relate to potential danger to the employees. The contractors shall implement appropriate safety measures and ensure the compliance with and the effectiveness to prevent the potential hazards determined by the assessment.

The hazard assessment serves as a starting point for effective, targeted occupational safety measures. Document the results of the hazard assessment. The employees are obligated to implement the resulting measures as required by law.

Assembly instructions

The contractor is responsible for compiling a written set of assembly instructions. The instructions shall contain all of the information required to ensure that all tasks are performed safely. The hazard assessment and the User Guide can be used to help compile the assembly instructions.

Personnel qualifications

Technical work equipment is intended for commercial use only. The equipment shall be used only by properly trained personnel under the authority of qualified supervisors, appointed by the contractor. The supervisors shall ensure that any work it is carried out safely.

Personnel shall be briefed on relevant hazards related to the specific equipment and be familiar with the User Guide.

On-site preparations

The contractor shall ensure that the ground (erection surface) is stable and can bear the load of the constructions (e.g. formwork and falsework, auxiliary structures) throughout every stage of construction. This also includes basic assembly, dismantling, transport and moving of components and the inspection of the entire structure during and upon completion of assembly.

Hazardous areas shall be clearly visible during the entire working process. Openings in planks, slabs and roofs, as well as in the depressions, shall be secured with protective equipment and covers to prevent persons from falling off the platforms, into or stepping into the openings. Secondary fall protection can also be installed.

Covers shall be secured to prevent unintentional motion. All connectors shall be tight and, if necessary, re-tighten before every use and every time they are moved.

The contractor is responsible for keeping persons out of work areas and walkways where there is a risk of objects falling as well as for installing protection from falling objects.

Monitoring wind and temperature conditions

The contractor is responsible for monitoring the weather forecast/wind conditions and take the required preventive measures. This includes but is not limited to installation of additional safety measures.

Depending on the local conditions, (e.g. the surrounding area, structure height and building geometry) safety measures to prevent the structure from uplift, possibly even dismantling the system, may be required and should be determined on site.

Personal protective equipment (PPE)

It is essential to always wear PPE, with safety footwear S3, hard hat, hi-vis vest, gloves and safety glasses, when working. When working with hazardous substances, always check if less dangerous substitutions can be used instead.

Work at height

Work at height can be reduced / eliminated by considering the method of assembly and use:

- Walkways that are designed to be re-used, reduce the amount of time and effort dismantling and re-erecting;
- Walkways that can be pre-assembled on the ground and then raised by crane to an elevated position will remove some of the work at height;
- Installing completed walkways when the walkway is on the ground will remove work at height associated with the construction later on.

Measures to prevent falls from heights are mandatory when working more than 1.00 m off the ground. Side protection shall be installed when working near water, regardless of the working height.

Equipment and measures to prevent falling include side protection, working areas of adequate width (such as working platforms), fall protection devices (e.g. safety grating, protective or safety nets) or mobile scaffolds as well as personal fall protection.

Access points to working areas shall be equipped with protection (e.g. platform systems, ladders or staircase towers for specific systems) as intended by the manufacturer.

The need to work at height can be reduced by pre-assembling platform systems and walkway brackets on the ground and then raising them into place with a crane.

Personal fall protection

Personal fall protection shall always be provided and used when all other technical and organisational measures to prevent falls (e.g. nets) have been exhausted and there is still a risk of injury that could be minimised by using fall protection. Personal fall protection shall be suitable for the application and shall be inspected at least once a year.

Before the personal fall protection can be used, the responsible contractor is obligated to.

- Evaluate the risks in the course of a hazard assessment, to be able to implement effective, preventive measures.
- Develop a rescue plan and verify its effectiveness.
- Properly instruct and train the users of personal fall protection.

The proper personal fall protection depends on the hazard assessment. Suitable attachment points are required. The proper attachment points and equipment shall be determined for each individual case by a qualified supervisor authorised to give instructions.

2.2.1 Safety during assembly and use

Protective measures during work

Hazardous areas shall be clearly visible during the entire working process. Openings in planks, slabs and roofs, as well as in the depressions, shall be secured with protective equipment and covers to prevent persons from falling off the platforms, into or stepping into the openings. Secondary fall protection can also be installed. Secure covers to prevent unintentional motion.

All connectors shall be tight and, if necessary, re-tighten before every use and every time they are moved.

The contractor is responsible for keeping persons out of work areas and walkways where there is a risk of objects falling as well as for installing protection from falling objects.

The contractor is responsible for monitoring the weather forecast / wind conditions and take the required preventive measures. This includes but is not limited to installation of additional safety measures. Aggregation of snow, water or ice on the system and especially on the cladding and on the safety boxes has to be removed immediately to prevent overloading the system.

Tools and equipment

Only suitable and safe tools and equipment shall be used. Ensure that they are used as intended.

Assembly

Incorrect installation of components can lead to a risk of falling due to component failure.

Components shall only be installed as described and illustrated in this User Guide. Alternatives shall be verified by means of a suitable risk assessment.

Disassembly

Incorrect disassembly can lead to a risk of falling due to the failure of the structure. Components are only to be disassembled as described and illustrated in this User Guide. Alternatives are to be verified by means of a suitable risk assessment.

2.2.2 Laws and regulations

For the safety-related application and use of the products, all current country-specific laws, standards and other safety regulations shall be complied with, without exception. They form a part of the obligations of employers and employees regarding occupational and industrial safety.

Hünnebeck draws attention to the following Health and Safety legislation:

- The Construction (Health, Safety and Welfare) Regulations 1996 (CHSW Regs);
- Construction (Design and Management) Regulations 2015 (CDM Regs);
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER);
- Work at Height Regulations 2005 (WaH Regs);
- Manual Handling Operations Regulations 1992 (MHO Regs).
- The Personal Protective Equipment at Work Regulations 1992 (PPE Regs)

Other local regulations may be relevant and shall always be considered.

2.3 About this User Guide

This User Guide contains important information regarding the assembly and use of the INFRA-KIT system. These instructions are created to support effective working processes on site when using the INFRA-KIT system, therefore carefully read this User Guide before assembly and use of the system, always keep it at hand and archive it for future reference.

The User Guide is an integral component of the construction. It contains safety notes, information on the standard configuration, the intended use and a description of the system. Carefully follow the instructions on use and assembly of the equipment (standard configuration) contained in the User Guide. Enhancements, deviations or changes represent a potential hazard and therefore require separate verification or a set of assembly instructions which comply with the relevant laws, standards and safety regulations. The same applies in cases where formwork components are provided on site.

The contractor has to ensure that the User Guide is readily accessible on site and that employees are familiar with the User Guide before assembling or using the equipment.

It is the responsibility of the site Management/Supervisors to ensure that all operatives involved in the assembly of the formwork system have been made aware of this document and that they understand the drawings (if supplied) and the function of the various components. The contractor is also responsible for drawing up a comprehensive risk assessment and a set of installation instructions. The latter is not usually identical to the assembling instructions.

Hünnebeck can provide further guidance and on-site assistance on any issues contained in this document that are not clear. Further information can be found in the product‘s data sheets. IF IN DOUBT, ASK.

Representations

The representations shown in the assembly instructions are in part, situations of assembly and not always complete in terms of safety considerations. The safety installations which have possibly not been included in these representations must be available and must be in accordance with the latest regulations. Safety devices may not always appear in the illustrations, but they are nevertheless mandatory.

Overviews and diagrams are for illustrative purposes only and whilst we endeavour to ensure accuracy, we are not responsible for omissions or errors.

The details do not serve as absolute requirements. Based on the hazard assessment it might be necessary to implement essential preventive measures. The specifics of each case must always be taken into consideration.

Some of the illustrations in the assembly instructions show various states of assembly and are not always complete in terms of safety considerations. We explicitly reserve the right to make changes resulting from technical improvements.

Genuine components

The information provided assumes that any product combinations will be between genuine Hünnebeck products or products supplied by Hünnebeck unless otherwise stated. Combining components from different manufacturers carries certain risks.

Any unauthorised use in relation to third party products could give rise to a risk of collapse, damage, injury or death.

Miscellaneous

We explicitly reserve the right to make changes resulting from technical improvements. For the safety-related application and use of the products, all current country-specific laws, standards and other safety regulations shall be complied with, without exception. They form a part of the obligations of employers and employees regarding occupational and industrial safety.

2.3.1 Warnings and notes

DANGER	**Danger!** DANGER indicates a hazardous situation that, if not avoided, will cause death or serious injury.
WARNING	**Warning!** WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	**Caution!** CAUTION indicates a hazardous situation that, if not avoided, can cause minor or moderate injury.
NOTE	**Note!** NOTE indicates a hazard that can cause property damage.
	This symbol indicates that an additional inspection is required.
	This symbol indicates practical experience that will help the user, e.g. how to perform a task more easily or more quickly.
	This symbol indicates particularly important information, e.g. that a requirement shall be met.
	This symbol indicates that additional information from other documents is required. These documents could be User Guides or operating instructions for other products.

2.3.2 Instructions

In this document, instructions are always identified with the word “Step”, e.g.

Step 1 Insert the locking bolt into the hole from the outside.

Step 2 Secure the pin with the spring cotter pin.

2.3.3 Brand names

The following brand names are the property of Hünnebeck. The symbol indicating a registered trademark is omitted throughout the document.

- Hünnebeck®
- INFRA-KIT®
- MODEX®
- PROTECTO®

2.4 Other relevant documents

This User Guide should be read in conjunction with the following documents:

User Guides

- MODEX Modular Scaffold
- PROTECTO Edge Protection
- Load-bearing Frame Prop

Operating instructions

- Euro Trolley

Product information

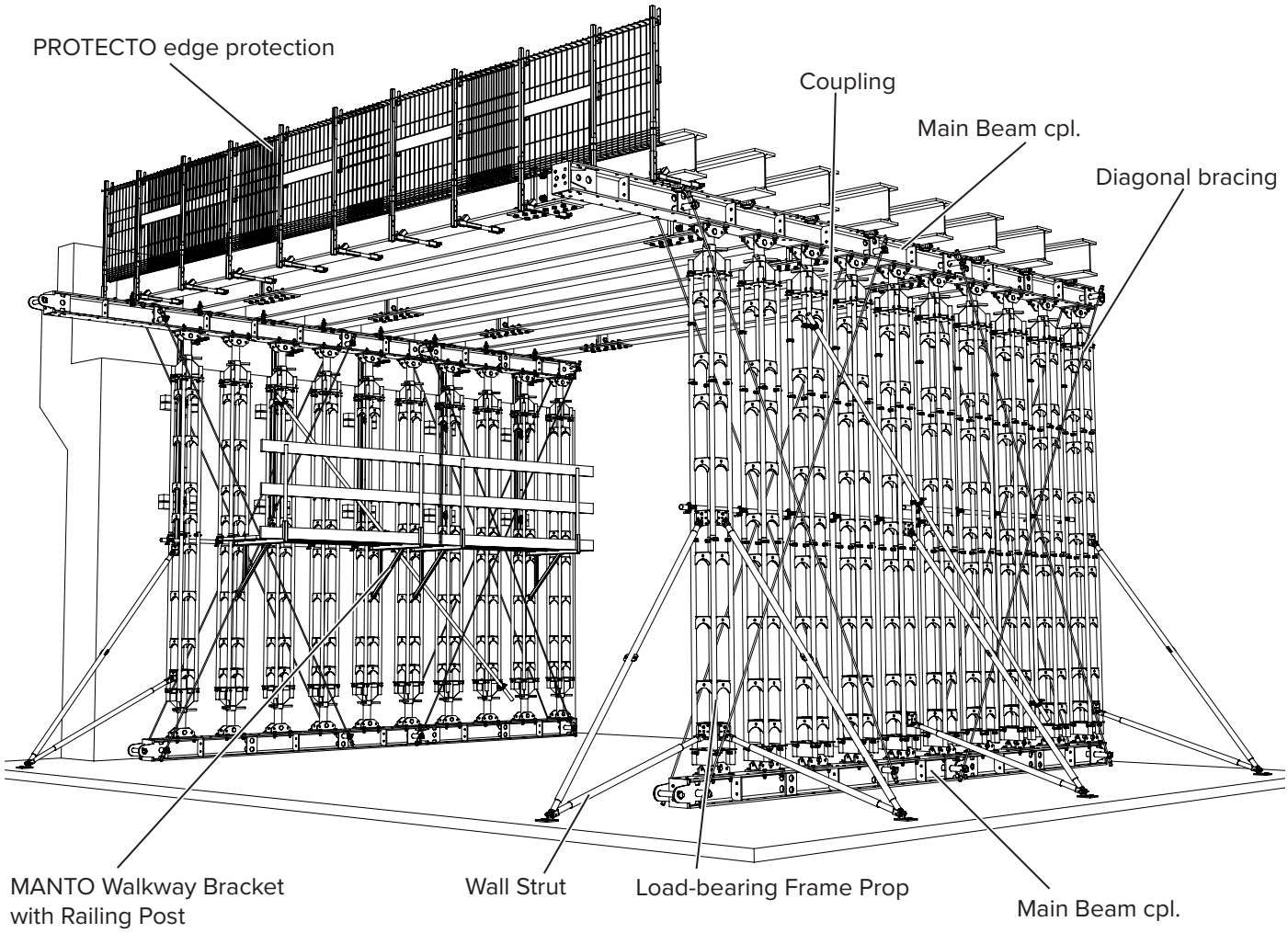
- Euro Lattice Boxes

All of these documents can be downloaded from the website https://www.huennebeck.com/literature.

Hünnebeck and Brand are brand names of BrandSafway.

3 Overview

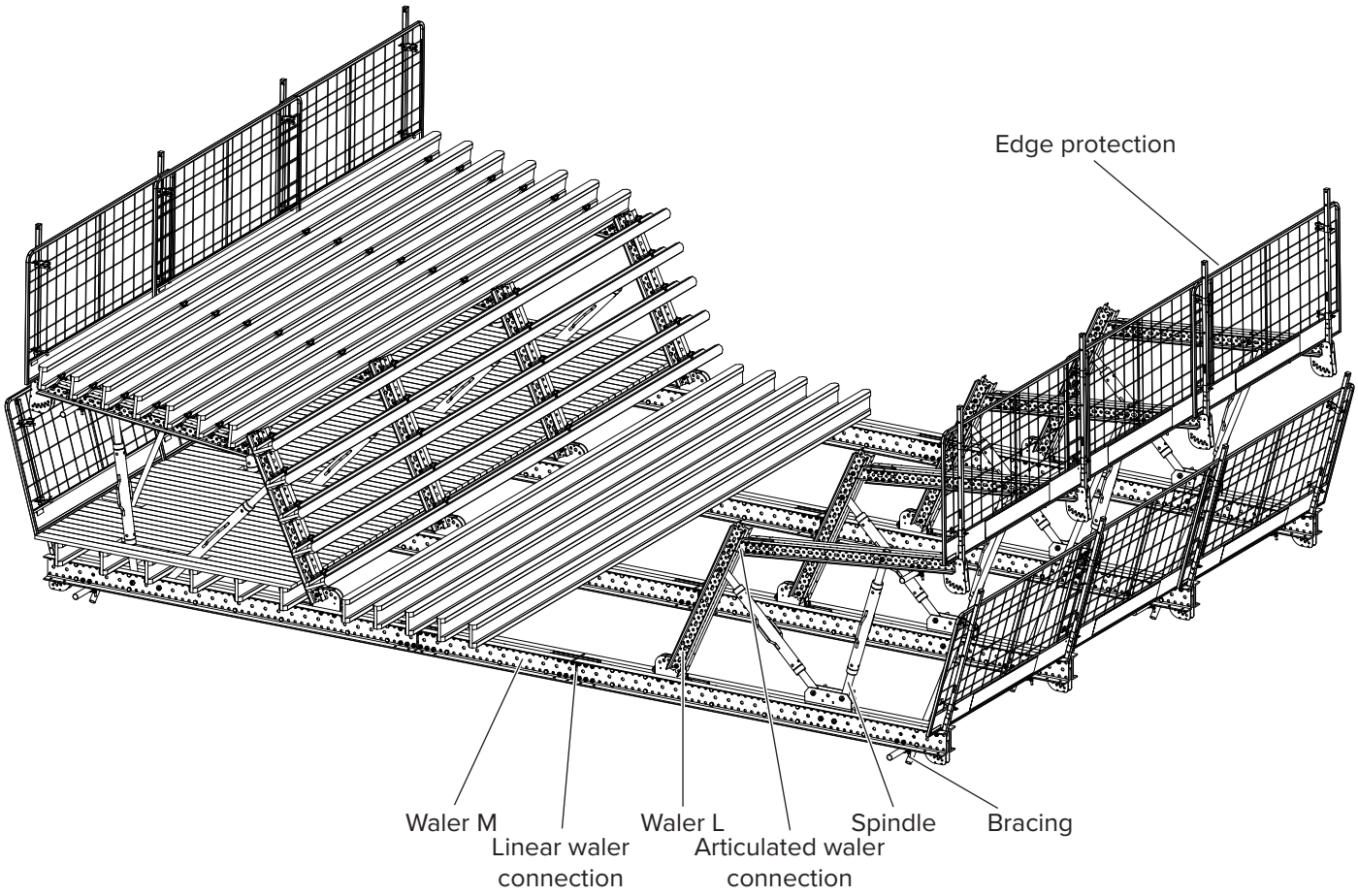
3.1 INFRA-KIT H



* For sale only (no rental). ** No longer produced.

Unless otherwise stated, all dimensions are in mm.

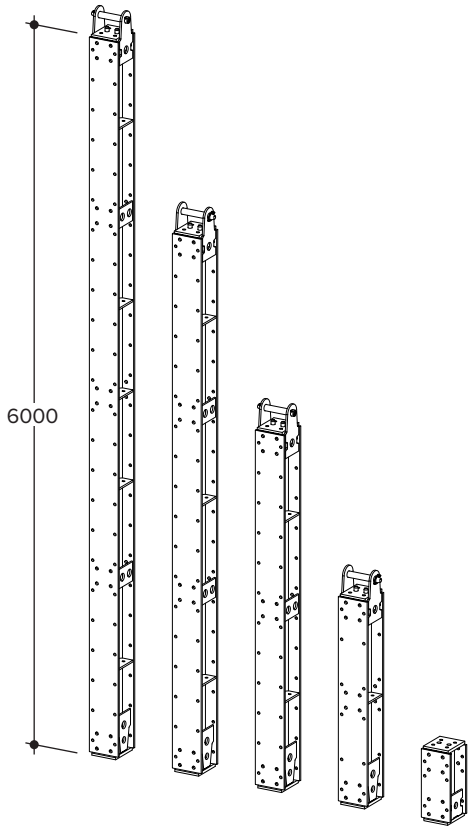
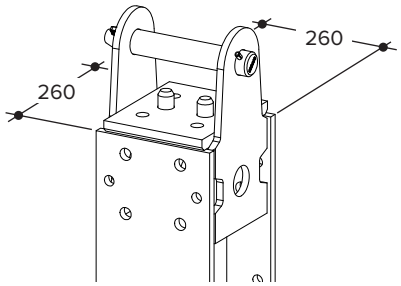
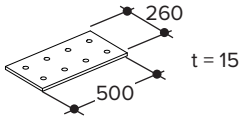
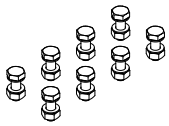
3.2 INFRA-KIT L and M



4 Components

Many different aspects of infrastructure construction can be handled with INFRA-KIT series. This is why the INFRA-KIT is available in three different sizes H, L and M. INFRA-KIT H is designed to transfer the heaviest loads, while INFRA-KIT L and M are intended to be used for lighter and medium-weight applications.

4.1 INFRA-KIT H

	Component	Part code	Weight [kg]
	**Main Beam 62**	**603670**	**82.94**
	Main Beam 175 cpl.	**603728**	**226.48**
	Main Beam 300 cpl.	**603709**	**349.10**
	Main Beam 450 cpl.	**603710**	**501.01**
	Main Beam 600 cpl.	**603711**	**653.21**
	Main Beam cpl. includes Connecting Pin cpl.		
			
	**Main Beam Joint Plate**	**603673**	**14.83**
	**Joint plate Bolt Set[1)]**	**603695**	**5.22**
	Consists of 8no. high tensile bolts M24 x 70 with washer and nut (w.a.f. 41).		

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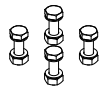
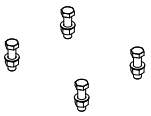
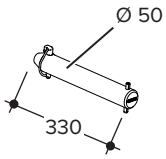
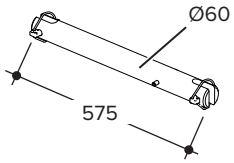
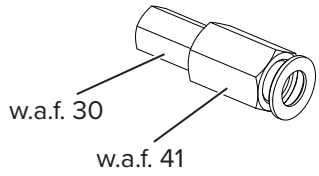
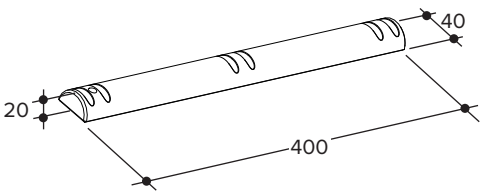
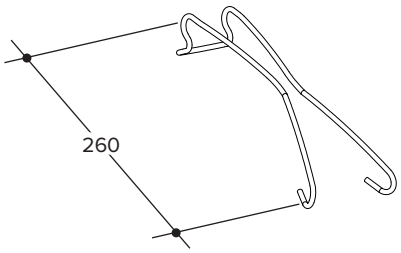
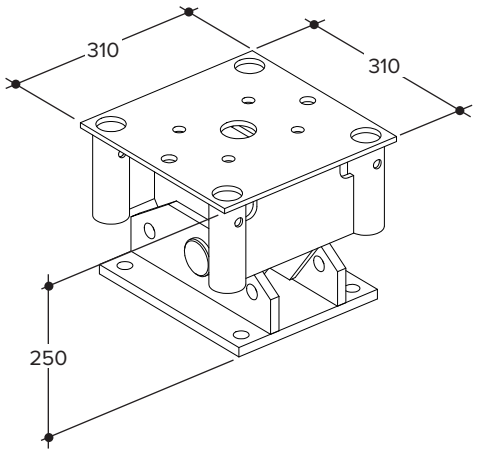
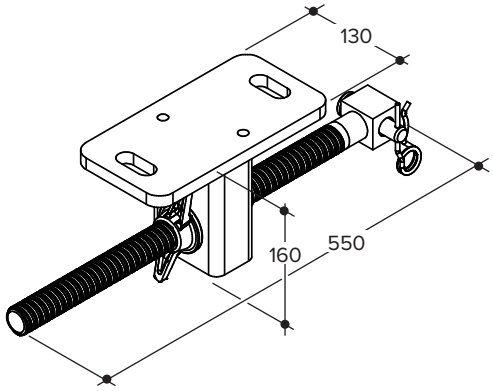
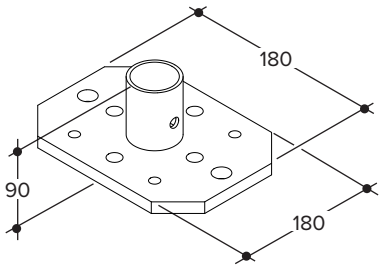
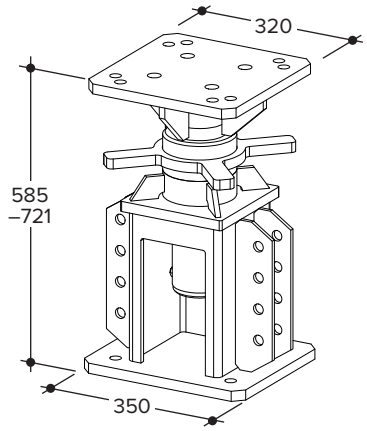
	Component	Part code	Weight [kg]
	**Main Beam Joint Bolt Set[1)]** Used to connect two Main Beams at the head. Consists of 4no. high tensile bolts M24 x 85 with washer and nut (w.a.f. 41).	**603696**	**2.82**
	**Load-bearing Frame Prop Bolt Set[1)]** Used to attach the Load-bearing Frame Prop. Consists of 4no. high tensile bolts M20 x 70 with washer and nut (w.a.f. 32).	**603697**	**1.34**
	**Connecting Pin cpl.** Included in main beam.	**603664**	**6.15**
	**Tension Bolt cpl.** For diagonal bracing with DW15 Tie Rods. Safe working load $F_{perm.} \leq 40.50$ kN	**603665**	**11.68**
	**Tension Nut Set DW15[1)]** For preloading of DW15 Tie Rods in diagonal bracing.	**603712**	**0.76**
	**Centering Bar 40/20** Used for centred transfer of loads from the deck into Main Beams.	**603706**	**1.94**
	**C-Bar Clip** Used to attach the Centring Bar 40/20 to the Main Beams. Use at least 1no. Clip or up to 3no. Clips per Centring Bar.	**603707**	**0.13**
	**Pin-jointed Base Plate** Used to attach Load-bearing Frame Props / MKII Soldiers to the Main Beam. The Load-bearing Frame Prop Bolt Set (code:603697) is used to secure the Pin-jointed Base Plate to the Main Beam. The Pin-jointed Base Plate replaces a Prop Jack 2 in a Load-Bearing Frame Prop layout. The Pin-jointed Base Plate allows a 7° inclination of Load-Bearing Frame Props / MK II Soldiers.	**603713**	**35.81**

	Component	Part code	Weight [kg]
	**Adjustable Abutment Bracket** Used to secure and align the diagonal brace to the abutment. For every two abutments, one additional Load-bearing Frame Prop Bolt Set (code:603697) is needed. Safe working load: $F_{perm} \leq 15.00$ kN	**603878**	**12.69**
	**MKII-Spindel Adaptor** Used to attach the MK II Soldiers. For every two Spindle Adapters, one additional Load-bearing Frame Prop Bolt Set (code:603697) is needed.	**603725**	**5.15**
	**IK Jack 500 H** Used with INFRA-KIT Main Beams and IK Walers M. Safe working load: 500 kN	**608690**	**87.15**

* For sale only (no rental). ** No longer produced.

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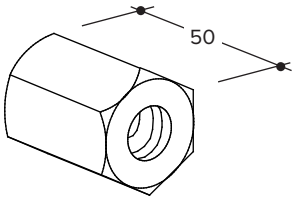
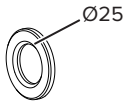
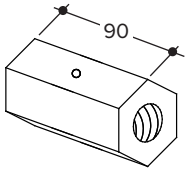
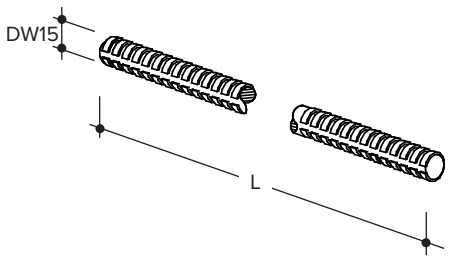
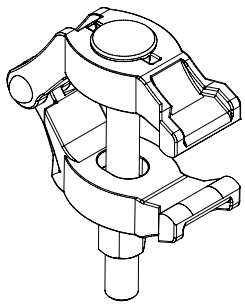
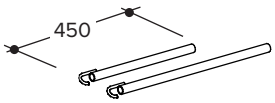
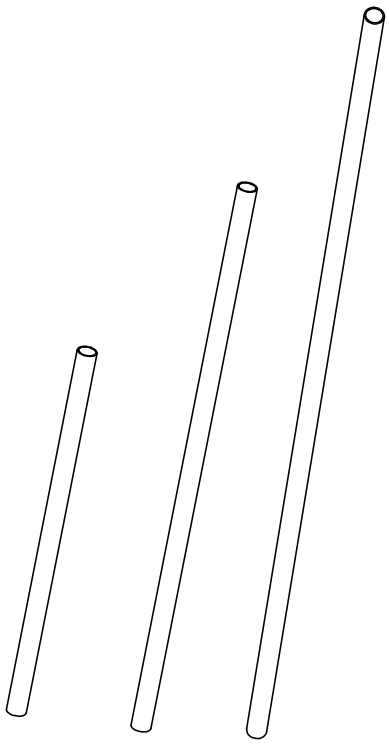
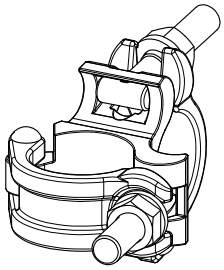
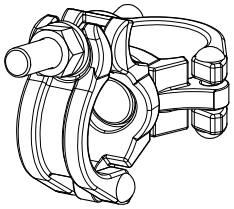
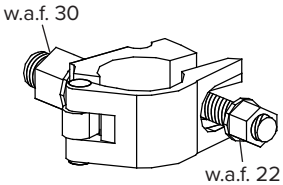
4.2 Accessories INFRA-KIT H

	Component	Part code	Weight [kg]
	**Hexagon Nut 15/50[1)]** To counter the tie rods on the Tension Bolt. Spanner w.a.f. 30 Safe working load: 90 kN	**164535**	**0.22**
	**Washer 25** Bearing for the Hexagon Nut 15/50 on the Tension Bolt to tense tie rods used in diagonal bracing.	**603699**	**0.03**
	**Hexagon Nut 15/90 with Pin[1)]** The Hexagon Nut 15/90 with Pin is used to connect two Tie Rods DW15. The pin prevents the rod on one side from being inserted too far and the rod on the other side from not being inserted far enough. W.a.f. 30 Safe working load: 90 kN	**164546**	**0.38**
	**Tie Rod 300 cm (DW15)[1)]** **Tie Rod 350 cm (DW15)[1)]** **Tie Rod 400 cm (DW15)[1)]** **Tie Rod 600 cm (DW15)[1)]** **Tie Rod per meter (DW15)[1)]** Safe working load: 90 kN	**24413** **24424** **24435** **136260** **164811**	**4.32** **5.04** **5.76** **8.64** **1.44**

WARNING

Warning!
Do not weld or heat Tie Rods. This could cause them to break!

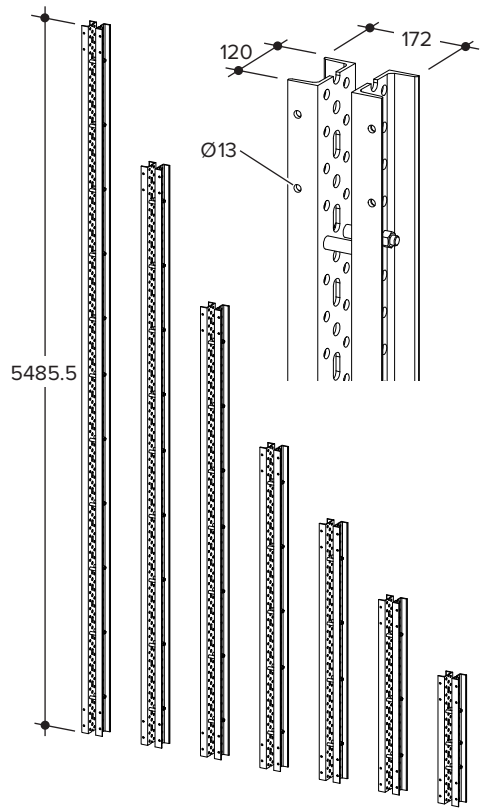
	**C-Clamp 16/70** Used to connect a Main Beam to a secondary beam in a flexible way. The clamping range is 16 to 70 mm. With a maximum torque of 150.00 Nm, the usable resistance with one friction surface is: 3.00 kN.	**603750**	**1.73**
	**Scaffold Retainer 75** **Scaffold Retainer 45** Steel tube Ø48.3 mm with Ø20 cm hook. For tying Load-Bearing Frame Props. Connected to the Prop with Couplers.	**78940** **78939**	**2.54** **1.65**

	Component	Part code	Weight [kg]
	**Scaffold Tube 48.3×50** l = 50 cm	**169001**	**1.90**
	Scaffold Tube 48.3×100 l = 100 cm	**169012**	**3.60**
	Scaffold Tube 48.3×150 l = 150 cm	**169023**	**5.72**
	Scaffold Tube 48.3×200 l = 200 cm	**169034**	**7.62**
	Scaffold Tube 48.3×250 l = 250 cm	**169045**	**9.53**
	Scaffold Tube 48.3×300 l = 300 cm	**169056**	**11.43**
	Scaffold Tube 48.3×350 l = 350 cm	**169067**	**13.34**
	Scaffold Tube 48.3×400 l = 400 cm	**169078**	**15.24**
	Scaffold Tube 48.3×450 l = 450 cm	**169089**	**17.15**
	Scaffold Tube 48.3×500 l = 500 cm	**169090**	**19.05**
	Scaffold Tube 48.3× 550 l = 550 cm	**169104**	**20.96**
	Scaffold Tube 48.3×600 l = 600 cm	**169115**	**22.86**
	**Rigid Coupler 48/48 w.a.f. 22** To connect scaffold tubes Ø48.3 right angles. Torque 50 Nm.	**2514**	**1.18**
	**Swivel Coupler 48/48 w.a.f. 22** To connect scaffold tubes Ø48.3 mm at any angle. Torque 50 Nm.	**2525**	**1.37**
	**Half Coupler 48/M20×30 w.a.f. 22 / w.a.f. 30**	**2488**	**0.90**
	Half Coupler 48/M20×70 w.a.f. 22 / w.a.f. 30 With an additional thread M20 × 30 mm or M20 × 70 mm. Torque 50 Nm.	**39846**	**0.96**

* For sale only (no rental). ** No longer produced.

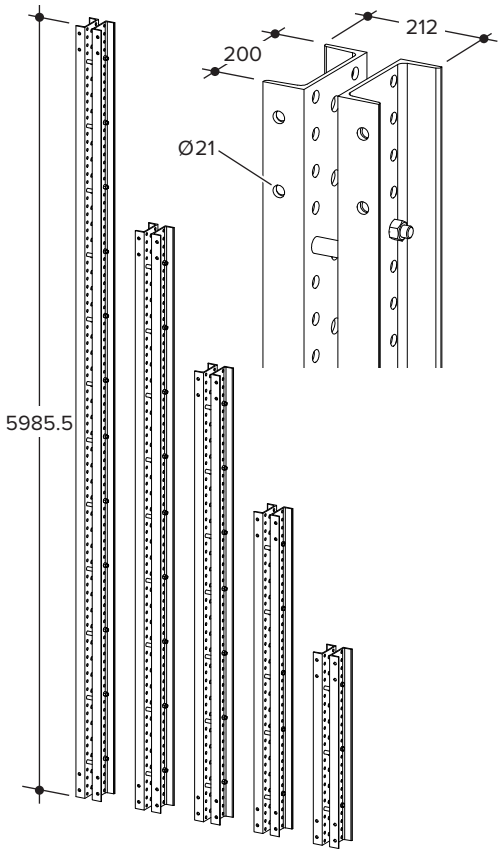
Unless otherwise stated, all dimensions are in mm.

4.3 INFRA-KIT L and M



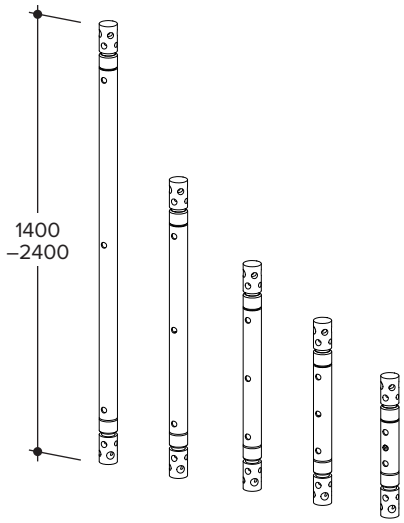
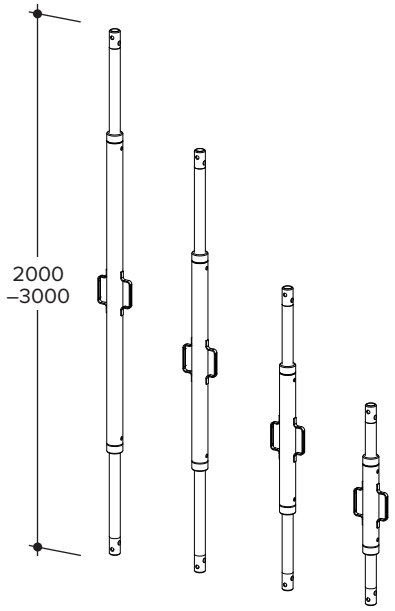
Component	Part code	Weight [kg]
IK Waler L 62.5	**608658**	**16.54**
IK Waler L 75	**608688**	**19.71**
IK Waler L 100	**608700**	**26.61**
IK Waler L 125	**608712**	**32.96**
IK Waler L 150	**608715**	**39.30**
IK Waler L 200	**608720**	**52.54**
IK Waler L 250	**608725**	**65.78**
IK Waler L 300	**608730**	**79.03**
IK Waler L 350	**608735**	**92.27**
IK Waler L 400	**608740**	**105.51**
IK Waler L 450	**608745**	**118.75**
IK Waler L 500	**608750**	**131.99**
IK Waler L 550	**608755**	**145.24**

Main component of the INFRA-KIT L system. With Spacer Sleeve IK Waler 16-62.



IK Waler M 150	**608615**	**76.10**
IK Waler M 200	**608620**	**101.79**
IK Waler M 250	**608625**	**127.48**
IK Waler M 300	**608630**	**153.17**
IK Waler M 350	**608635**	**178.86**
IK Waler M 400	**608640**	**204.55**
IK Waler M 450	**608645**	**230.24**
IK Waler M 500	**608650**	**255.92**
IK Waler M 550	**608655**	**286.79**
IK Waler M 600	**608660**	**307.30**

Main component of the INFRA-KIT M system. With Spacer Sleeve IK Waler 20-62.

	Component	Part code	Weight [kg]
	**IK Spindle 35/50 L** (35–50 cm)	**608930**	**8.10**
	IK Spindle 50/75 L (50–75 cm)	**608950**	**10.22**
	IK Spindle 65/100 L (65–100 cm)	**608970**	**12.14**
	IK Spindle 90/155 L (90–155 cm)	**608980**	**16.48**
	IK Spindle 140/240 L (140–240 cm)	**608990**	**23.01**
	Lightweight spindle used in framework. Connected directly to the IK Waler L/M at the IK Jack or to the Waler Connectors. For safe working load, refer to page 108.		
	**IK Spindle 70/110** (70–110 cm)	**608500**	**15.94**
	IK Spindle 100/170 (100–170 cm)	**608510**	**23.13**
	IK Spindle 140/240 (140–240 cm)	**608520**	**30.30**
	IK Spindle 200/300 (200–300 cm)	**608530**	**36.73**
	Adjustable spindle used in framework. Connected directly to the IK Waler L/M at the IK Jack or to the Waler Connectors. For safe working load, refer to page 109.		

* For sale only (no rental). ** No longer produced.

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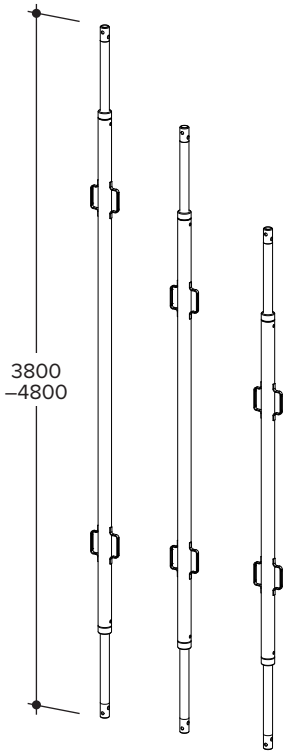
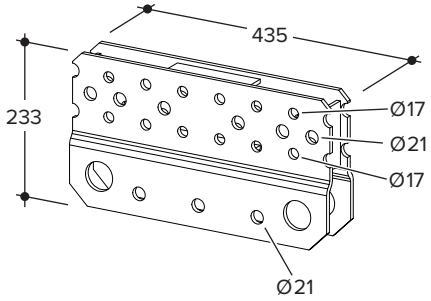
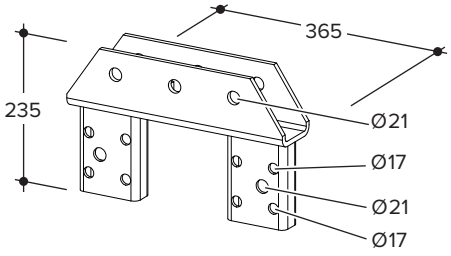
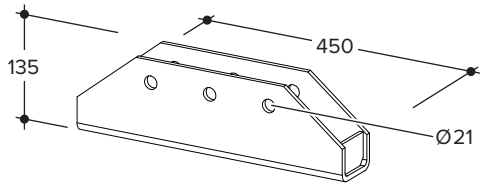
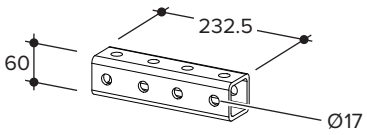
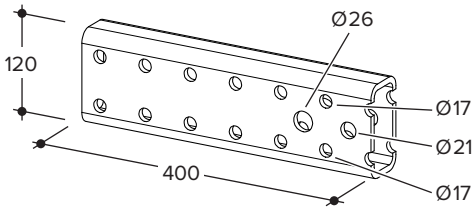
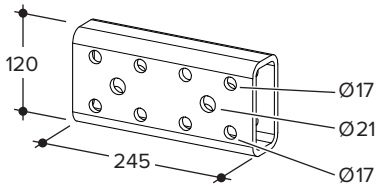
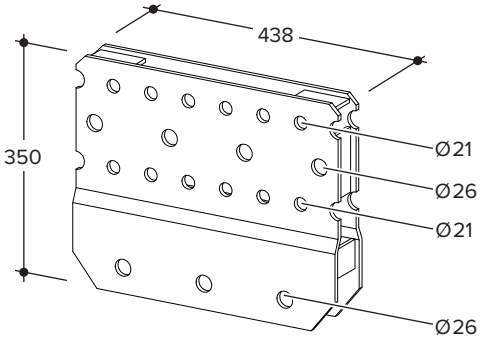
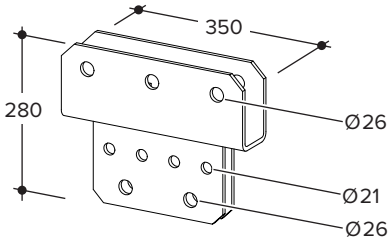
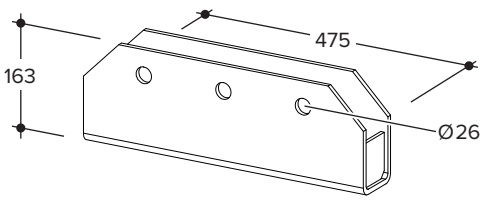
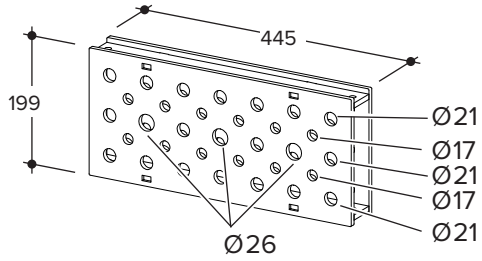
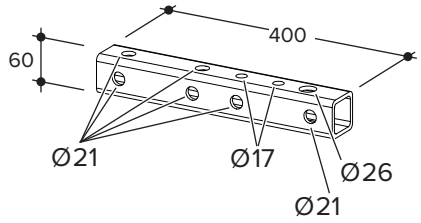
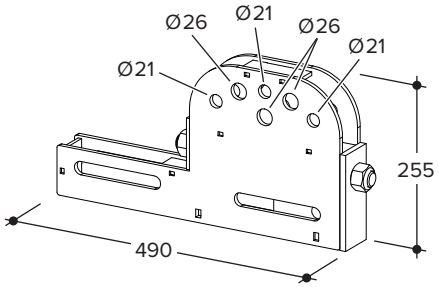
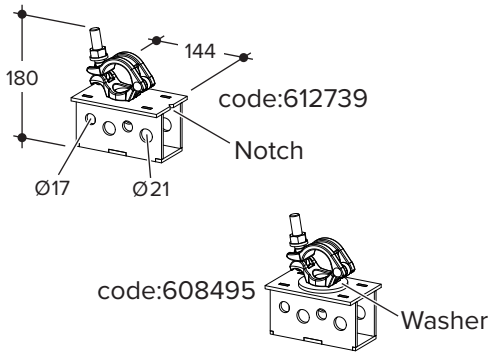
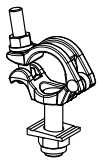
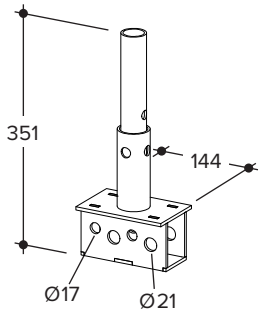
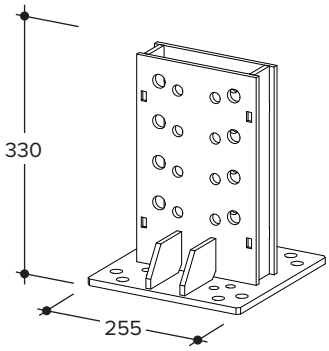
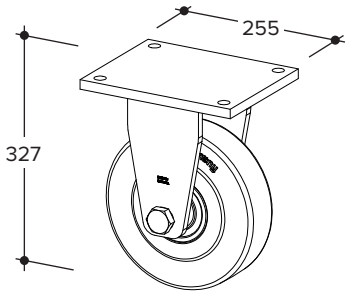
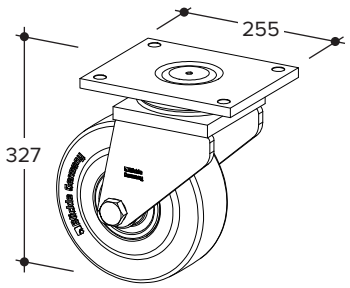
	Component	Part code	Weight [kg]
	**IK Spindle 260/360** (260–360 cm) **IK Spindle 320/420** (320–420 cm) **IK Spindle 380/480** (380–480 cm) Adjustable spindle used in framework. Connected directly to the IK Waler L/M at the IK Jack or to the Waler Connectors. For safe working load, refer to page 109.	**608540** **608550** **608560**	**44.45** **50.89** **57.31**
	**IK Waler Connector L** Used to create rigid connections between IK Walers L. With connector for IK Spindles.	**608420**	**13.20**
	**IK Adaptor Waler Connector L** Adapter for the IK Waler Connector L. When inserted into the IK Waler L, it allows for additional IK Spindles or IK Walers to be attached. Inserted into the Waler Connector L.	**608460**	**8.39**
	**IK Cross Connector L** Allows IK Spindles to be attached to the web of an IK Waler L.	**608450**	**8.56**

	Component	Part code	Weight [kg]
	**IK Adaptor L** Used to connect 2no. IK Walers L crosswise or parallel, one on top of the other.	**608480**	**2.19**
	**IK Waler Connector Flex L** For the rigid or articulated connection of IK Waler L to IK Waler L. Or for the articulated connection of IK Waler M to IK Waler L.	**608490**	**8.05**
	**IK Waler Connector L 25** For the rigid or articulated connection of IK Waler L to IK Waler L.	**608445**	**5.00**
	**IK Waler Connector M** For rigid connection of IK Walers M. Allows additional IK Spindles or IK Walers to be attached.	**608430**	**20.26**
	**IK Adaptor Waler Connector M** Adapter for the IK Waler Connector M. Allows additional Spindles or Walers to be attached. Inserted into the IK Waler Connector M.	**608440**	**12.01**
	**IK Cross Connector M** Allows IK Spindles to be attached to the web of the IK Waler M.	**608470**	**11.48**

* For sale only (no rental). ** No longer produced.

Unless otherwise stated, all dimensions are in mm.

	Component	Part code	Weight [kg]
	**IK Waler Connector Flex M** For the rigid or articulated connection of IK Walers M. It also provides an alternative way to attach the IK Waler L to the IK Waler M at right angles	**608485**	**12.73**
	**IK Adaptor M/L** Used to connect 2no. IK Walers M crosswise or parallel, one on top of the other. Also used to connect a Waler M to a Waler L.	**608770**	**3.77**
	**IK Adjustable Connector** For articulated connection of Walers outside of the hole grid of the Walers. For IK Waler L and IK Waler M. With integrated adjuster (w.a.f. 36) to adapt node spacing to the dimensions of the structure. Adjustment range +/- 62.5 mm. Refer to page 89.	**608850**	**17.88**
	**IK Scaffold Tube Adaptor** **IK Scaffold Tube Adaptor** Used to attach Ø48.3 mm scaffold tubes to IK Walers L and M. Coupler safe working load (slip): 7.00 kN. Differentiation feature: • code:608495 has a washer below the coupler • code:612739 has a notch on the top plate Refer to page 114.	**612739** **608495**	 **2.45**
	**Half Coupler 48/M20×70 w.a.f. 22** Used to attach Ø48.3 mm scaffold tubes to IK Walers M. Attached to the flange bores of the IK Waler M. With wedge-shaped washer and nyloc nut. Coupler safe working load (slip): 7.00 kN. Refer to page 115.	**608515**	**1.01**

	Component	Part code	Weight [kg]
	**IK MODEX Adaptor** Used in conjunction with MODEX components to construct edge protection. Can be used on an IK Waler L or an IK Waler M. Meets the requirements for temporary edge protection systems as specified by DIN EN 13374 – class A. Refer to page 127.	**608570**	**2.65**
	**IK Wheel Connector L/M** Used to attach swivel or fixed castors with a safe working load of 30.00 kN or 60.00 kN to an IK Waler L or an IK Waler M. Refer to page 106 (including for details of the bores).	**608600**	**18.08**
	**Heavy-duty Fixed Castor Ø200 (30 kN)** **Heavy-duty Fixed Castor Ø250 (60 kN)** Rigid castor used with the IK Wheel Connector. Refer to page 106.	**608603** **608604**	**6.80** **19.00**
	**Heavy-duty Swivel Castor Ø200 (30kN)** **Heavy-duty Swivel Castor Ø250 (60 kN)** Swivel castor used with the IK Wheel Connector.	**608606** **608607**	**9.30** **25.60**

* For sale only (no rental). ** No longer produced.

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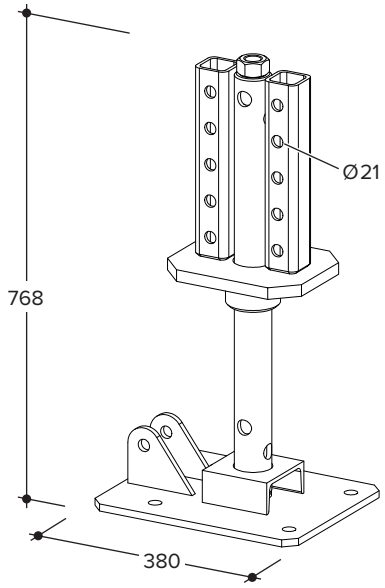
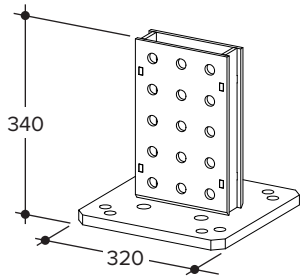
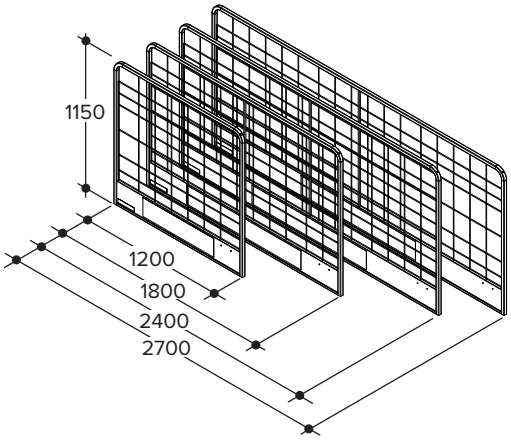
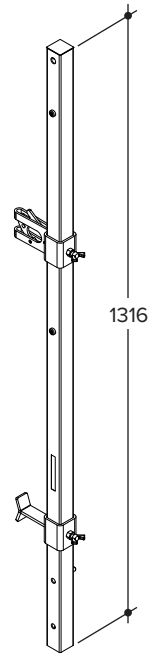
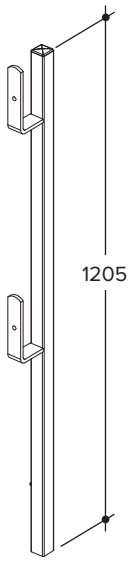
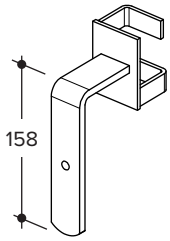
	Component	Part code	Weight [kg]
	**IK Jack 180 M** Used to lift and lower the IK Waler M. The IK Waler M can be attached to the Base Jack horizontally as well as vertically. Safe working load 180.00 kN. Refer to page 92.	**608775**	**36.34**
	**IK Jack 500 Adaptor M** Used to connect IK walters M to the IK Jack 500 H (code:608690).	**608671**	**24.84**

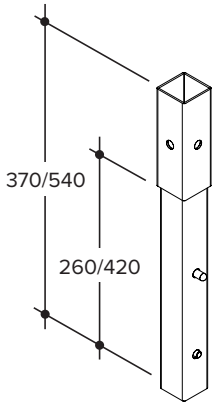
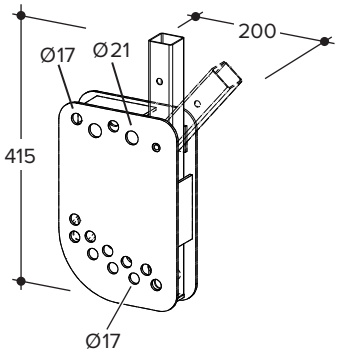
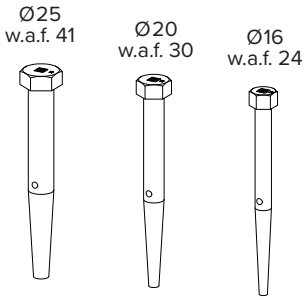
4.4 Accessories INFRA-KIT L and M

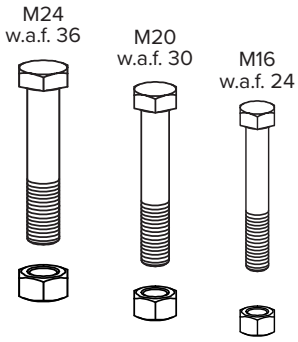
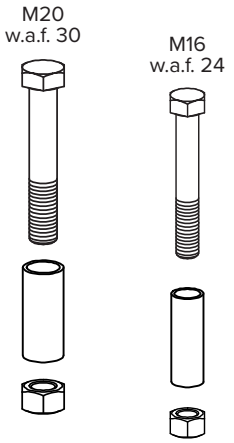
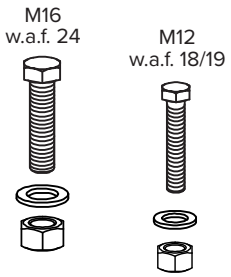
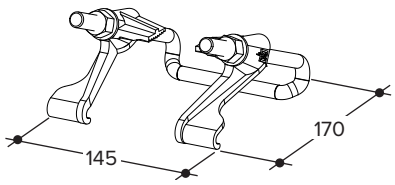
	Component	Part code	Weight [kg]
	**PROTECTO Panel G2 270**	**692778**	**21.00**
	PROTECTO Panel G2 240	**692772**	**19.50**
	PROTECTO Panel G2 180	**692766**	**14.50**
	PROTECTO Panel G2 120	**692760**	**10.00**
	Used in combination with the PROTECTO Post 130 Adjustable to provide edge protection. Maximum allowable post spacing is 2.40 m. When used with the PROTECTO Post 130 Adjustable, the PROTECTO Panel G2 complies with BS EN 13374 Class A.		

	Component	Part code	Weight [kg]
	**PROTECTO Post 130 adjustable** The PROTECTO Post 130 adjustable is used in combination with the PROTECTO Panel G2. An integrated safety device secures the post automatically to the various retaining elements. The PROTECTO Post 130 adjustable complies with BS EN 13374 Class A when used with the PROTECTO Panels G2.	**692750**	**4.50**
	**PROTECTO Railing Post** The PROTECTO Railing Post is used in conjunction with plank railings (see page 123). An integrated safety device secures the post automatically to the various retaining elements. The PROTECTO Railing Post complies with EN 13374 when used with plank railings. The planks used for railing must be 30 mm thick, 150 mm high and meet the requirements of strength class C24 according to EN 338 (formerly S10).	**601225**	**3.67**
	**PROTECTO Toeboard Retainer** Used with the PROTECTO Railing Post, this add-on secures the toeboard when using plank railings. The PROTECTO Toeboard Retainer can easily be attached to PROTECTO Railing Posts which have been already installed.	**601227**	**0.69**

* For sale only (no rental). ** No longer produced.

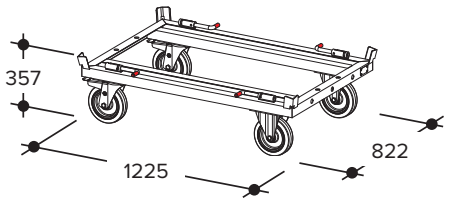
Unless otherwise stated, all dimensions are in mm.

	Component	Part code	Weight [kg]
	**PROTECTO Post Extension 26**	**602111**	**0.96**
	PROTECTO Post Extension 42	**602580**	**1.21**
	The PROTECTO Post Extensions are used to increase the height of the PROTECTO posts by 260 mm or 420 mm. When using the PROTECTO Post Extension 26, the maximum permissible post spacing is 1.70 m. When using the PROTECTO Post Extension 42, the maximum permissible post spacing is 1.30 m		
	**IK PROTECTO Adapter**	**608410**	**5.44**
	Used to secure a PROTECTO Railing Post to an IK Waler L or IK Waler M to construct edge protection. Adjustable 0°–30° with IK Walers M and 0°–45° with IK Walers L. Meets the requirements for temporary edge protection systems as specified by DIN EN 13374 – class A. Refer to page 125.		
	**IK Pin Ø16**	**608816**	**0.31**
	IK Pin Ø20	**608820**	**0.49**
	IK Pin Ø25	**608825**	**0.78**
	Used to connect IK L und M components. Must always be secured with a corresponding spring pin.		
	**Spring Pin Ø4**	**173776**	**0.02**
	Used to secure the IK Pin Ø16 and Ø20.		
	Spring Pin Ø5	**174553**	**0.04**
	Used to secure the IK Pin Ø25.		

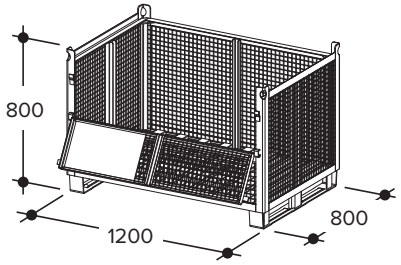
	Component	Part code	Weight [kg]
	**Hexagonal Bolt DIN EN ISO 4014-M16×120-10.9 galv.[1)]**	**608662**	**0.22**
	Self-locking Nut DIN EN ISO 7040-M16-10 galv.[1)]	**608703**	**0.04**
	Hexagonal Bolt DIN EN ISO 4014-M20×130-10.9 galv.[1)]	**608663**	**0.37**
	Self Locking Nut DIN EN ISO 7040-M20-10 galv.[1)]	**608618**	**0.07**
	Hexagonal Bolt DIN EN ISO 4014-M24×130-10.9 galv.[1)]	**608664**	**0.58**
	Hexagonal Nut DIN EN ISO 4032-M24-10 galv.[1)]	**608667**	**0.09**
	Used for tension-resistant connection of IK L and M components.		
	**Hexagonal Bolt DIN EN ISO 4014-M16×100-10.9 galv.[1)]**	**608702**	**0.19**
	Spacer Sleeve IK Waler L[1)]	**608496**	**0.05**
	Self-locking Nut DIN EN ISO 7040-M16-10 galv.[1)]	**608703**	**0.04**
	Hexagonal Bolt DIN EN ISO 4014-M20×110-10.9 galv.[1)]	**608617**	**0.33**
	Spacer Sleeve IK Waler M[1)]	**608498**	**0.10**
	Self-locking Nut DIN EN ISO 7040-M20-10 galv.[1)]	**608618**	**0.07**
	Used to connect the U-profiles of Walers L and M.		
	**Hexagonal Bolt DIN EN ISO 4017-M12×65-10.9 galv.[1)]**	**608627**	**0.07**
	Washer ISO 7092-12-200 HV galv.[1)]	**608632**	**0.01**
	Self-locking Nut DIN EN ISO 7040-M16-10 galv.[1)]	**608703**	**0.04**
	Hexagonal Bolt DIN EN ISO 4017-M16×65-10.9 galv.[1)]	**608628**	**0.13**
	Washer ISO 7092-16-200 HV galv.[1)]	**608633**	**0.01**
	Hexagonal Nut DIN EN ISO 10511-M12-10 galv.[1)]	**608622**	**0.02**
	Used to connect the Heavy-duty Castors to the IK Wheel Connector L/M (code:608600).		
	**H 20 Timber Beam Clamp** Used to connect H 20 timber beams with IK L walers. Waler U100, $N_{perm.}$: 2,7 kN IK L walers, $N_{perm.}$: 2,7 kN Refer to page 117.	**568048**	**0.79**

Unless otherwise stated, all dimensions are in mm.

4.5 General accessores

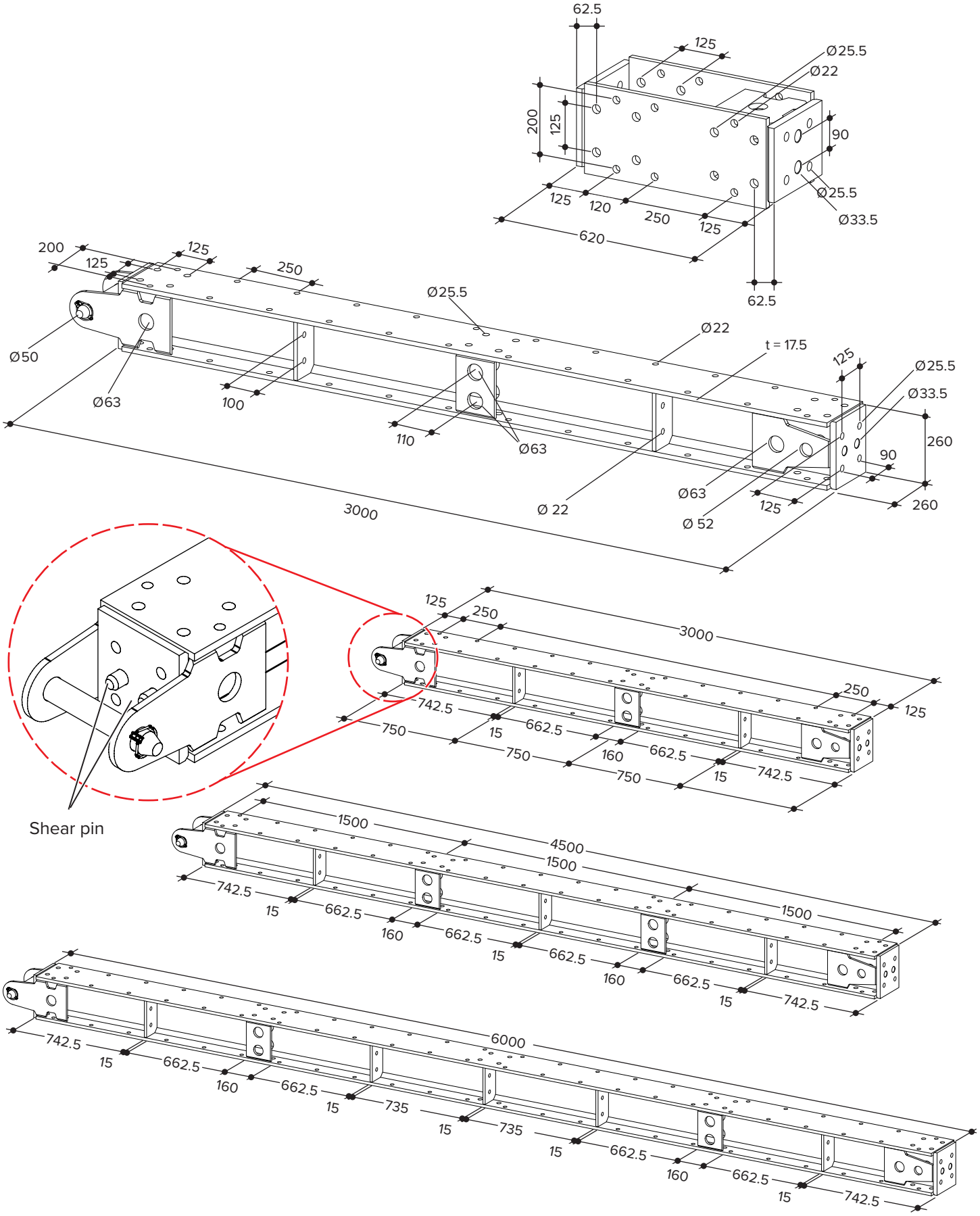
	Componen	Part code	Weight [kg]
	**Euro Trolley** Used for manual transportation of approved Hünnebeck transport aids. The Euro Trolley has 2 lockable swivel castors. SWL: 1,300.00 kg.	**607610**	**39.57**

Always observe the separate operating instructions for the Euro Trolley!

	**Euro Lattice Box** Used for storing and transporting small items. Can be moved with the Euro Trolley. SWL: 1,200.00 kg.	**548480**	**68.79**

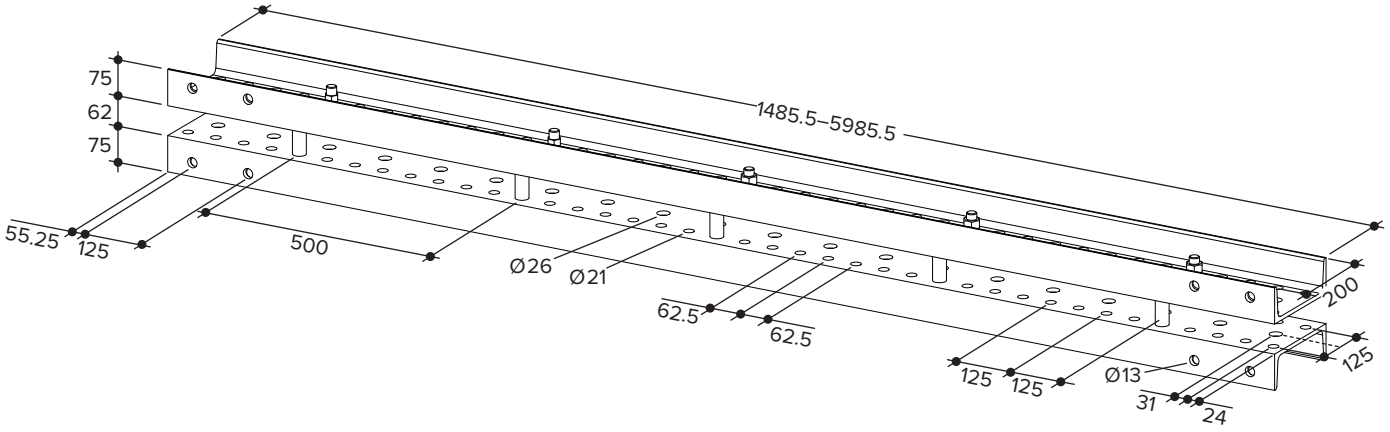
5 Component dimensions

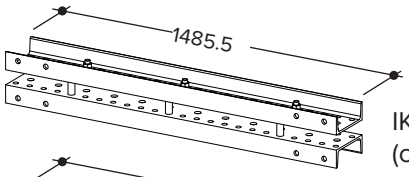
5.1 INFRA-KIT H



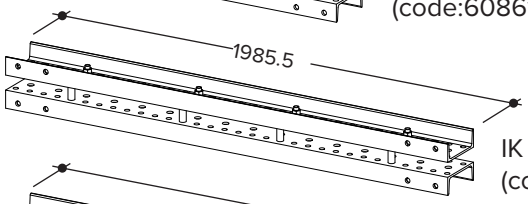
Unless otherwise stated, all dimensions are in mm.

5.2 INFRA-KIT M

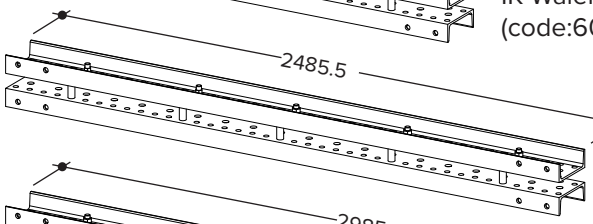




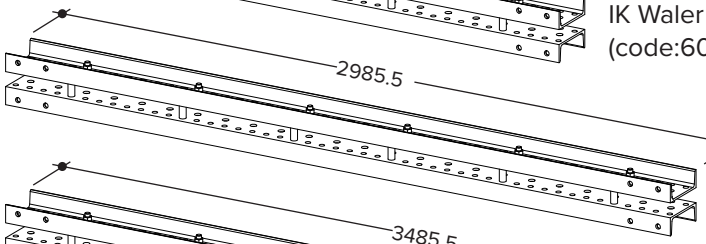
IK Waler M 150
(code:608615)



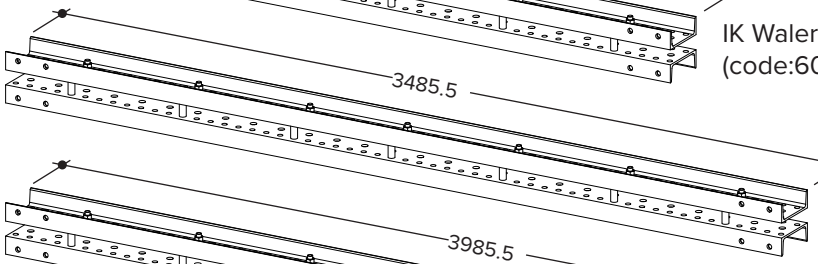
IK Waler M 200
(code:608620)



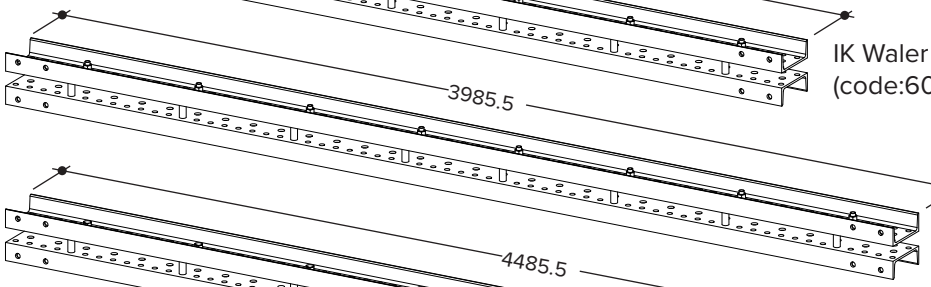
IK Waler M 250
(code:608625)



IK Waler M 300
(code:608630)



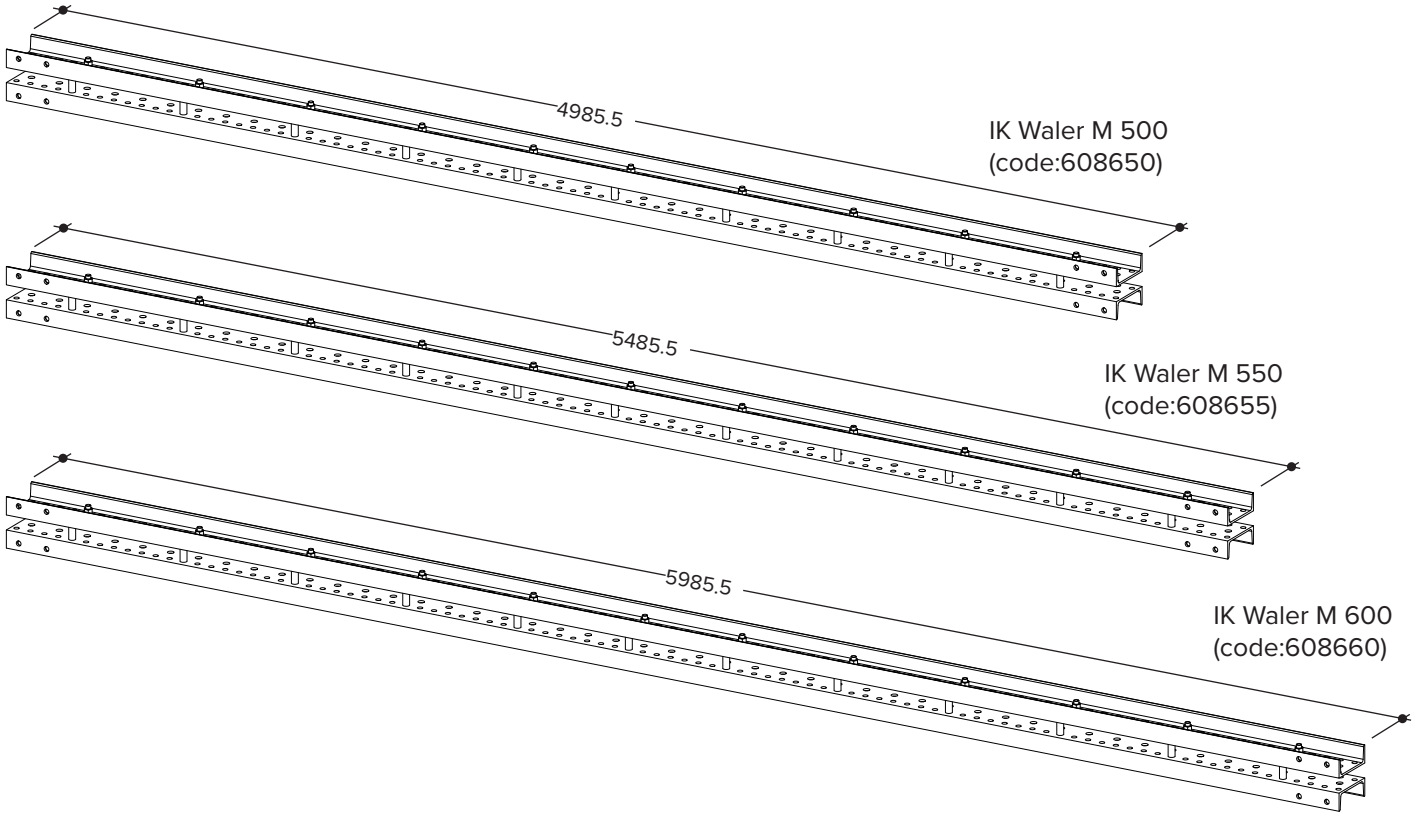
IK Waler M 350
(code:608635)



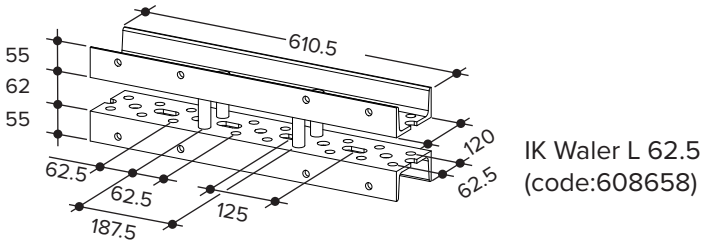
IK Waler M 400
(code:608640)

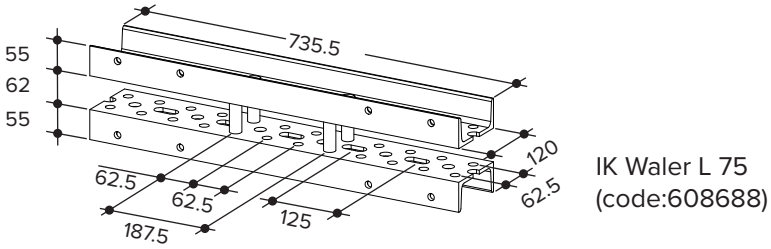
IK Waler M 450
(code:608645)

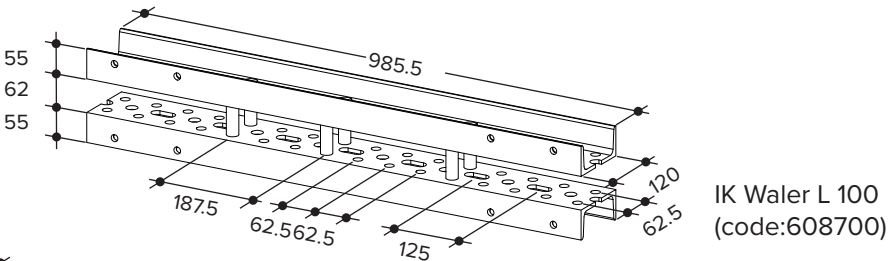
Unless otherwise stated, all dimensions are in mm.

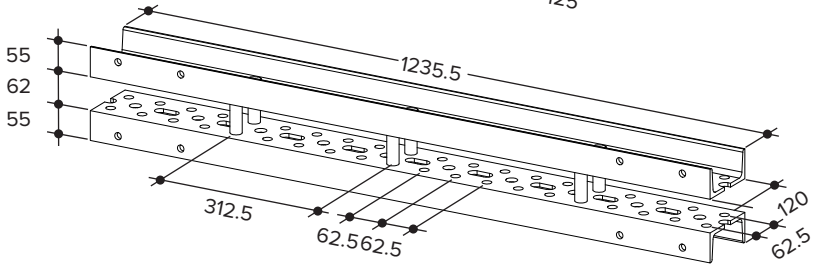


5.3 INFRA-KIT L

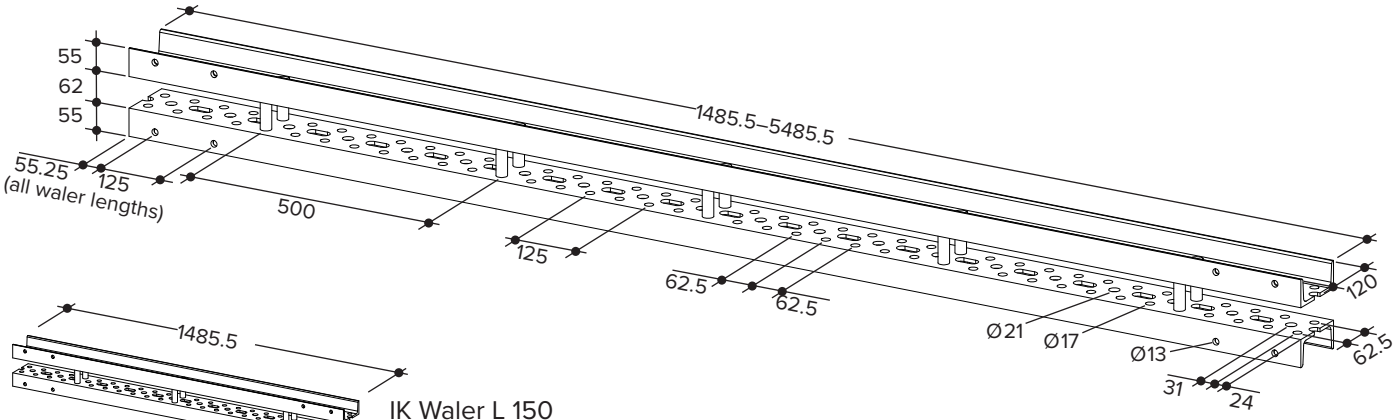




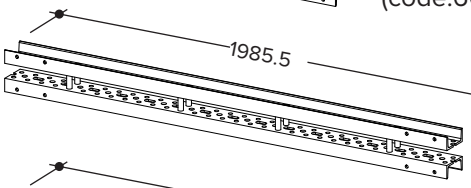




Unless otherwise stated, all dimensions are in mm.



IK Waler L 150
(code:608715)



IK Waler L 200
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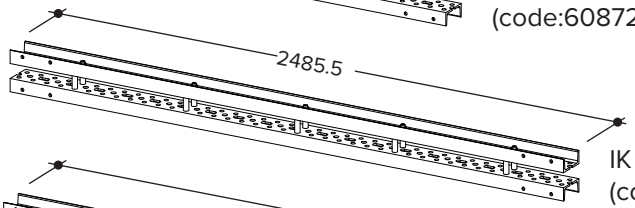

IK Waler L 250
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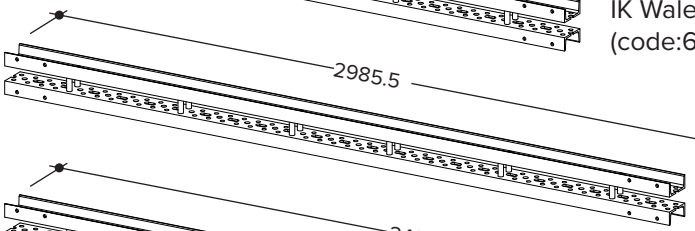
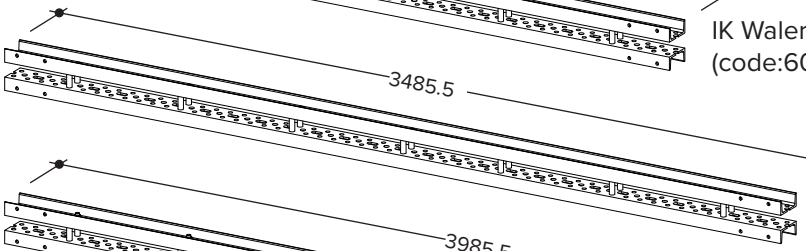
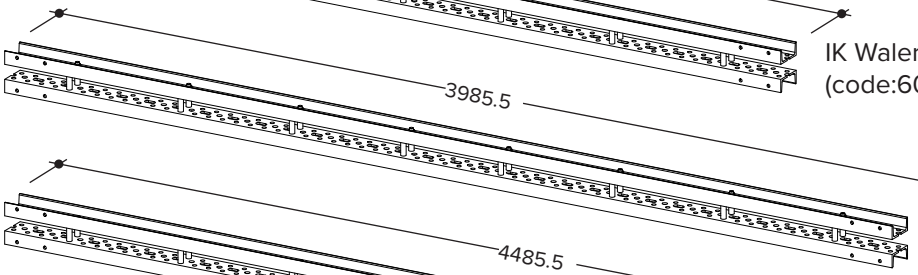


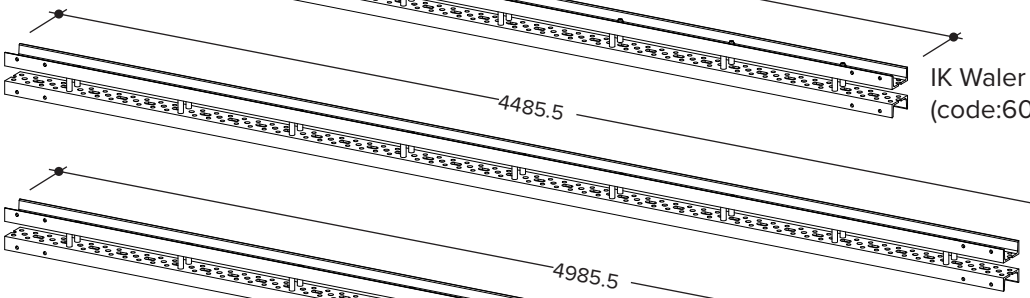
IK Waler L 300
(code:608730)



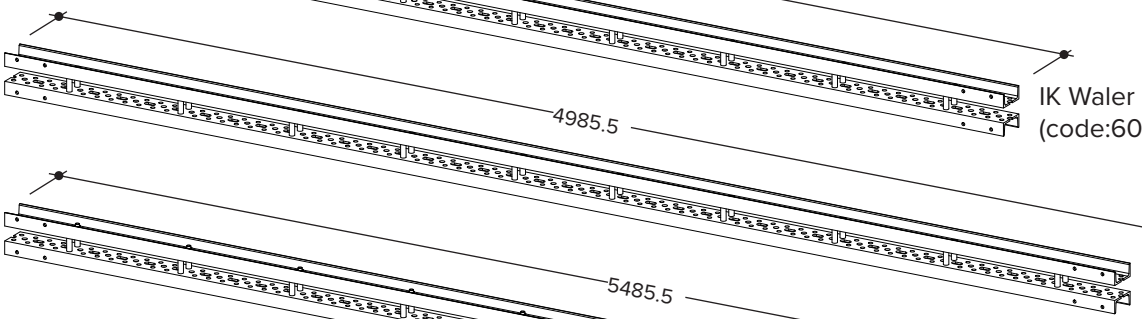
IK Waler L 350
(code:608735)



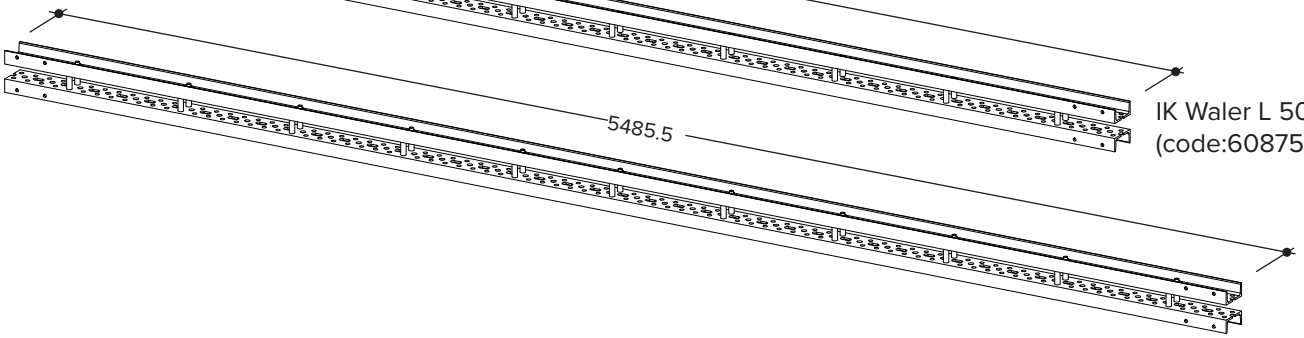
IK Waler L 400
(code:608740)



IK Waler L 450
(code:608745)



IK Waler L 500
(code:608750)



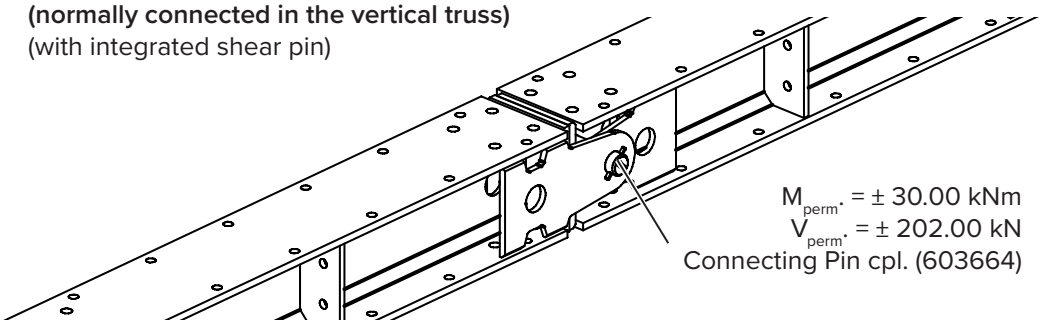
IK Waler L 550
(code:608755)

6 Connecting Beams INFRA-KIT H

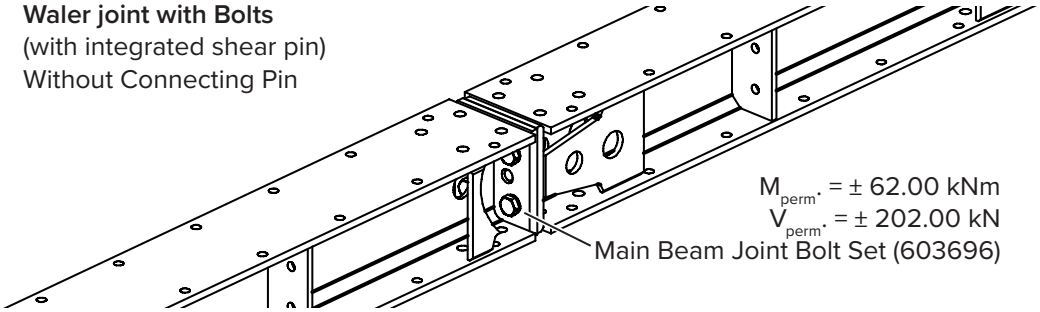
The following illustrations show the different beam connections possible with INFRA-KIT Beams.

Note that the examples shown below are only applicable when axial (*) loads do not exceed 100.00 kN.

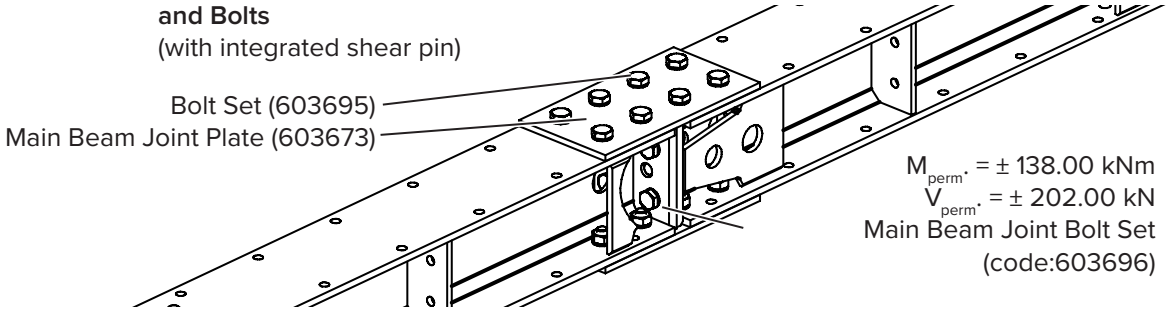
Waler connection using Connecting Pin (normally connected in the vertical truss)
(with integrated shear pin)



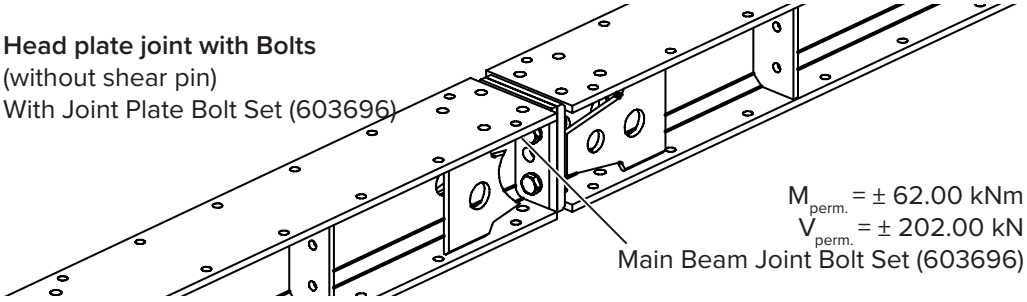
Waler joint with Bolts
(with integrated shear pin)
Without Connecting Pin



Waler joint with Main Beam Joint Plate and Bolts
(with integrated shear pin)



Head plate joint with Bolts
(without shear pin)
With Joint Plate Bolt Set (603696)



Unless otherwise stated, all dimensions are in mm.

7 General information on IK Walers L and M

The IK Walers L and M consist of two U-profiles connected to one another using Waler Bolts and Spacer Sleeves (Refer to section 9.1).

There are holes in the webs of the Walers. Connectors, Spindles and other components can be attached at the holes using the IK Pins.

WARNING

Connection can fail!

Bolts 8.8 have a lower SWL than IK Pins or bolts 10.9.

Using bolts 8.8 when the structure is subjected to the same load can cause connections to fail and the structure to collapse!

Keep in mind the reduced SWL (Refer to section 7.17 on page 49)!

The horizontal line in the H on the pin's head is aligned with the hole for the Spring Cotter Pin.

Bolts 10.9 of the respective diameter can be used instead for every connection shown with IK Pins! This does not change the SWL of the connections.

There are also holes in the flanges at the ends of the IK Walers M. They can be used e.g. to attach half couplers for scaffold tubes.

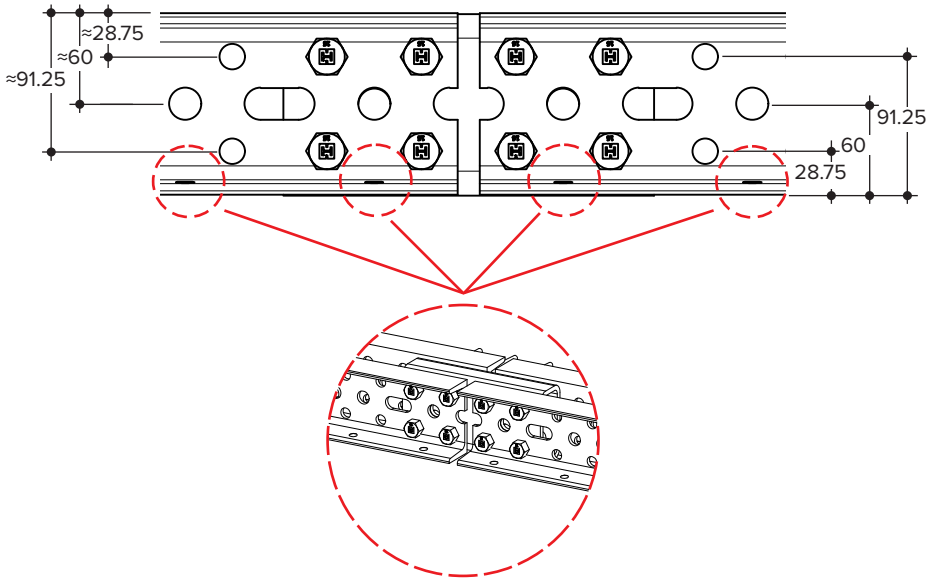
7.1 Orientation of Walers

The web holes of the Walers are made from one side of the flange with a precise dimension. Because of the manufacturing process, the tolerances are somewhat higher from the other side of the flange.

7.1.1 Identification mark

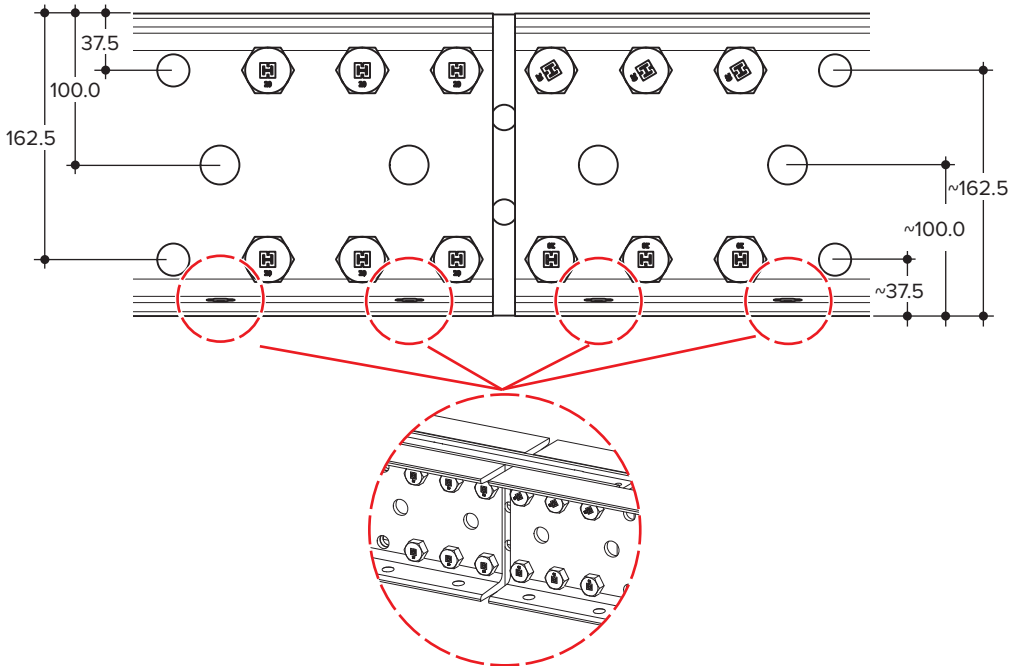
Waler L

On INFRA-KIT **Walers L**, the exact side of the flange is always the side **with** holes in the flanges.



Waler M

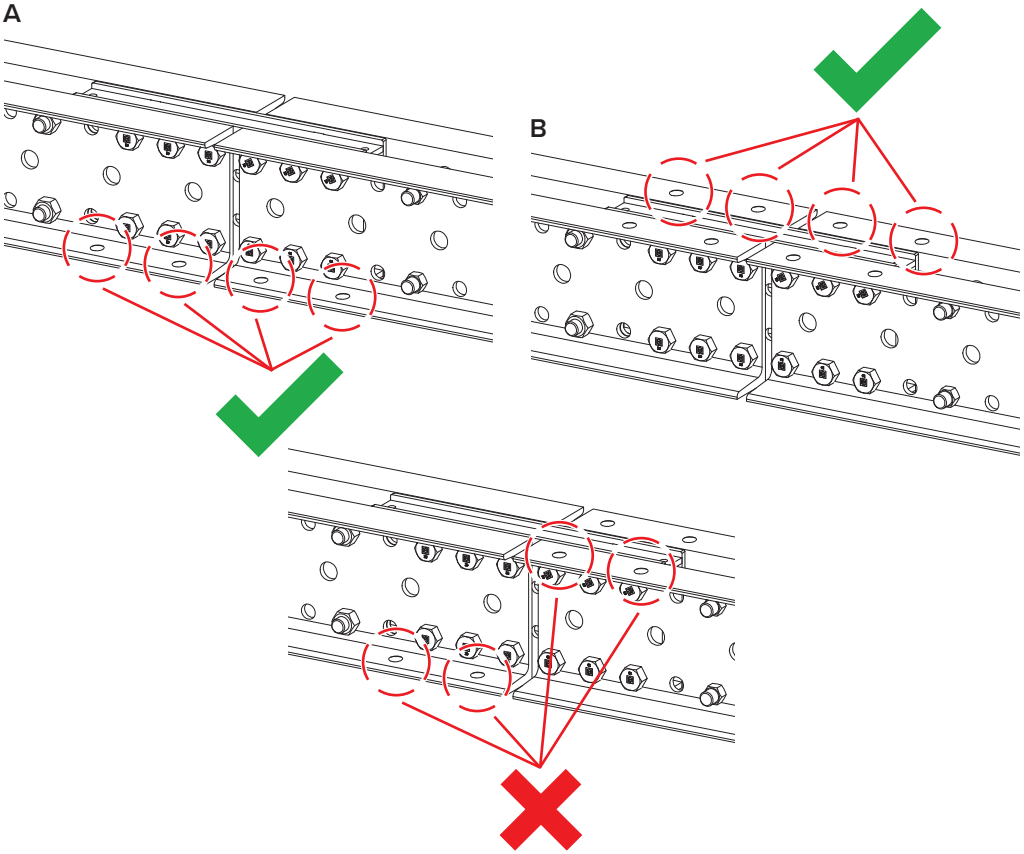
On INFRA-KIT **Walers M**, the exact side of the flange is always the side **without** holes in the flanges.



7.1.2 Applications

When walers are connected to one another, always verify that the the exact side faces are in the same direction. This is particularly important e.g. if formwork constructed of square timbers has to rest on the walers (example **A**) or the walers have to be precisely positioned on a support (e.g. IK Jack 180) (example **B**). The following illustrations show Walers M. The respective requirements apply to Walers L (be sure to use the correct side).

A



Unless otherwise stated, all dimensions are in mm.

8 Structural information

WARNING

Connection can fail!

The SWL of connected parts may be limited by the SWL of one of its components!

Overloading components can cause the structure to fail!
This can cause personal injury or death!

Comply with the SWLs of all components connected!

Always use the lowest SWL as a reference!

8.1 IK Walers

8.1.1 Walers L

SWL plastic moment

$N_{pl, SWL}$ = 486.7 kN
$V_{pl, z, SWL}$ = 87.9 kN
$M_{pl, y, SWL}$ = 21.8 kNm

Linear interaction can be used for SWL plastic moment verification

Cross section values

IK-L	I_z* [cm^4]	$w_{z, el}$* [cm^3]	I_y [cm^4]	$w_{y, el}$ [cm^3]	A [cm^2]	A_z [cm^2]	A_y [cm^2]	S_y [cm^3]	S_z [cm^3]	$N_{pl, Rd}$ [kN]	$V_{pl, z, Rd}$ [kN]	$M_{pl, y, Rd}$ [kNm]
150	86.1	22.1										
200	159.2	34.5										
250	185.0	37.5										
300	210.7	40.4										
350	242.8	43.4	680.9	113.5	29.2	9.1	5.1	65.3	11.6	730.0	131.9	32.7
400	274.8	46.3										
450	302.9	48.5										
500	330.9	50.6										
550	330.9	50.6										

* safety factor γ_{M2} = 1.25- for bolted connection included
E = 21,000 / γ_{M1} = 19,091 kN/cm^2

An elastic stress analysis is recommended for beams subjected to axial loads, and/or double bending in ultimate limit state.

Steel grade of Waler IK-L is S275.

Comply with proof of structural stability for beams subjected to compression!

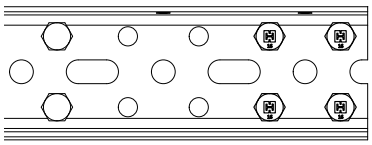
Use lateral restraint to counter lateral torsional buckling, i.e. bracings!

Pin load ratings

IK Pin Ø16 $F_{perm.}$ = 62.00 kN

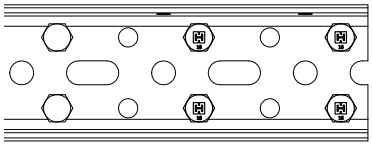
IK Pin Ø20 $F_{perm.}$ = 77.00 kN

Load ratings of standard pin arrangements



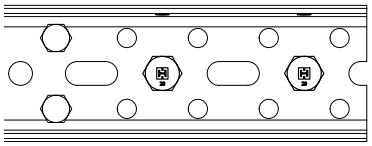
4no. IK Pins Ø16

$M_{perm.}$ = 10.90 kNm
$F_{hperm.}$ and $F_{vperm.}$ = 246.00 kN



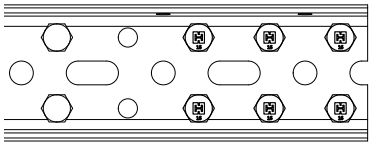
4no. IK Pins Ø16

$M_{perm.}$ = 17.22 kNm
$F_{hperm.}$ and $F_{vperm.}$ = 246.00 kN



2no. IK Pins Ø20

$M_{perm.}$ = 9.63 kNm
$F_{hperm.}$ and $F_{vperm.}$ = 154.00 kN



6no. IK Pins Ø16

$M_{perm.}$ = 18.94 kNm
$F_{hperm.}$ and $F_{vperm.}$ = 370.00 kN

Interaction equation: $\frac{M}{M_{zul.}} + \sqrt{\left[\frac{F_H}{F_{H,zul.}}\right]^2 + \left[\frac{F_V}{F_{V,zul.}}\right]^2} \leq 1{,}0$

Compressive load capacity of Waler L

Length of Waler [m]	Permitted compression force [kN] in IK Waler L with pinned bearing conditions (Euler case II)
3.00	214
3.50	191
4.00	135
4.50	121
5.00	105

8.1.2 Walers M

SWL plastic moment

$N_{pl, SWL}$ = 1,231.1 kN
$V_{pl, z, SWL}$ = 277.0 kN
$M_{pl, y, SWL}$ = 88.4 kNm

Linear interaction can be used for SWL plastic moment verification

8.1.3 Cross section values

IK-M	I_z* [cm⁴]	$w_{z, el}$* [cm³]	I_y [cm⁴]	$w_{y, el}$ [cm³]	A [cm²]	A_z [cm²]	A_y [cm²]	S_y [cm³]	S_z [cm³]	$N_{pl, Rd}$ [kN]	$V_{pl, z, Rd}$ [kN]	$M_{pl, y, Rd}$ [kNm]
150	295.3	53.8	3,539.3	353.9	57.2	22.3	7.8	205.5	29.3	1.846.7	415.5	132.6
200	381.0	76.2										
250	459.6	82.3										
300	538.2	88.3										
350	613.1	93.3										
400	688.0	98.2										
450	758.5	102.2										
500	828.9	106.2										
550	889.5	108.3										
600	950.0	110.3										

* safety factor γ_{M2} = 1.25- for bolted connection included

E = 21,000 / γ_{M1} = 19,091 kN/cm²

An elastic stress analysis is recommended for beams subjected to axial loads, and/or double bending in ultimate limit state.

Steel grade of Waler IK-M is S355.

Comply with proof of structural stability for beams subjected to compression!

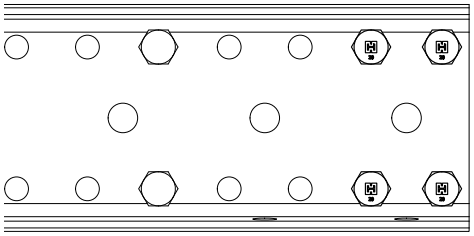
Use lateral restraint to counter lateral torsional buckling, i.e. bracings!

Pin load ratings

IK Pin Ø20 $F_{perm.}$ = 108.00 kN

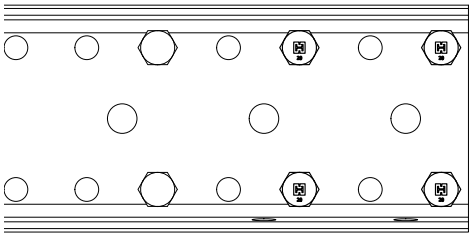
IK Pin Ø25 $F_{perm.}$ = 142.00 kN

Load ratings of standard pin arrangements



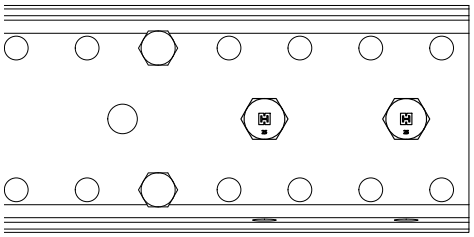
4no. IK Pins Ø20

$M_{perm.}$ = 30.20 kNm
$F_{hperm.}$ and $F_{vperm.}$ = 432.00 kN



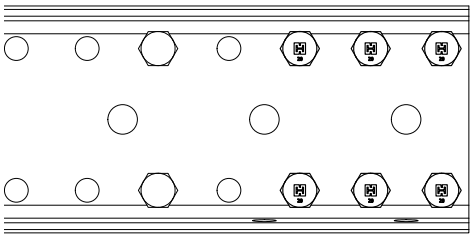
4no. IK Pins Ø20

$M_{perm.}$ = 38.20 kNm
$F_{hperm.}$ and $F_{vperm.}$ = 432.00 kN



2no. IK Pins Ø25

$M_{perm.}$ = 17.75 kNm
$F_{hperm.}$ and $F_{vperm.}$ = 284.00 kN



6no. IK Pins Ø20

$M_{perm.}$ = 47.73 kNm
$F_{hperm.}$ and $F_{vperm.}$ = 648.00 kN

Interaction equation: $\frac{M}{M_{zul.}} + \sqrt{\left[\frac{F_H}{F_{H,zul.}}\right]^2 + \left[\frac{F_V}{F_{V,zul.}}\right]^2} \leq 1{,}0$

Compressive load capacity of Waler M

Length of Waler [m]	Permitted compression force [kN] in IK Waler M with pinned bearing conditions (Euler case II)
3.00	587
3.50	528
4.00	427
4.50	390
5.00	346

Unless otherwise stated, all dimensions are in mm.

8.2 IK Waler Connectors

8.2.1 IK Waler Connector L (code:608420)

Stress resultant limits

$N_{pl,\ perm.}$ = 619.00 kN

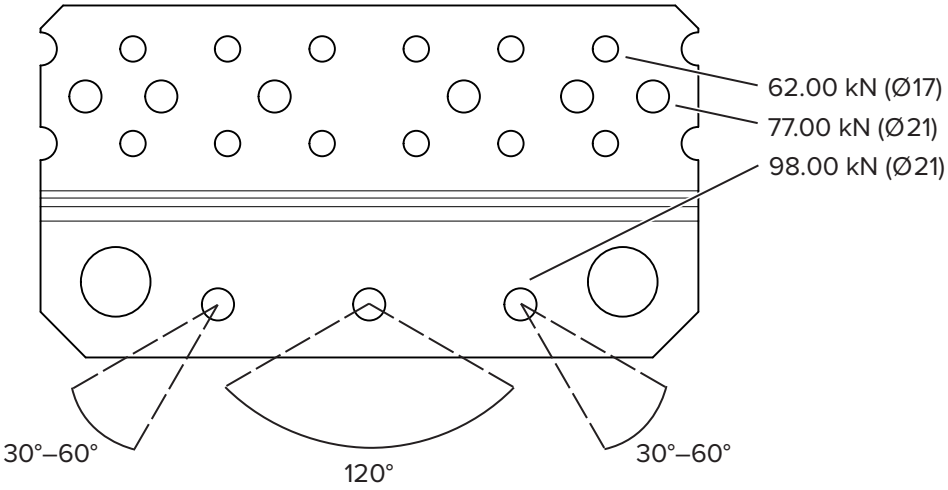
$V_{pl,\ z,\ perm.}$ = 462.00 kN

$M_{pl,\ y,\ perm.}$ = 34.00 kNm

Linear interaction can be used for cross-section verification.

Permitted load ratings of holes when connecting 3no. IK Spindles

☞	Attach IK Spindles only at the angles shown here! Always use 12no. IK Pins Ø16 to secure an IK Waler Connector L.



8.2.2 IK Waler Connector M (code:608430)

Stress resultant limits

$N_{pl,\ perm.}$ = 974.00 kN

$V_{pl,\ z,\ perm.}$ = 696.00 kN

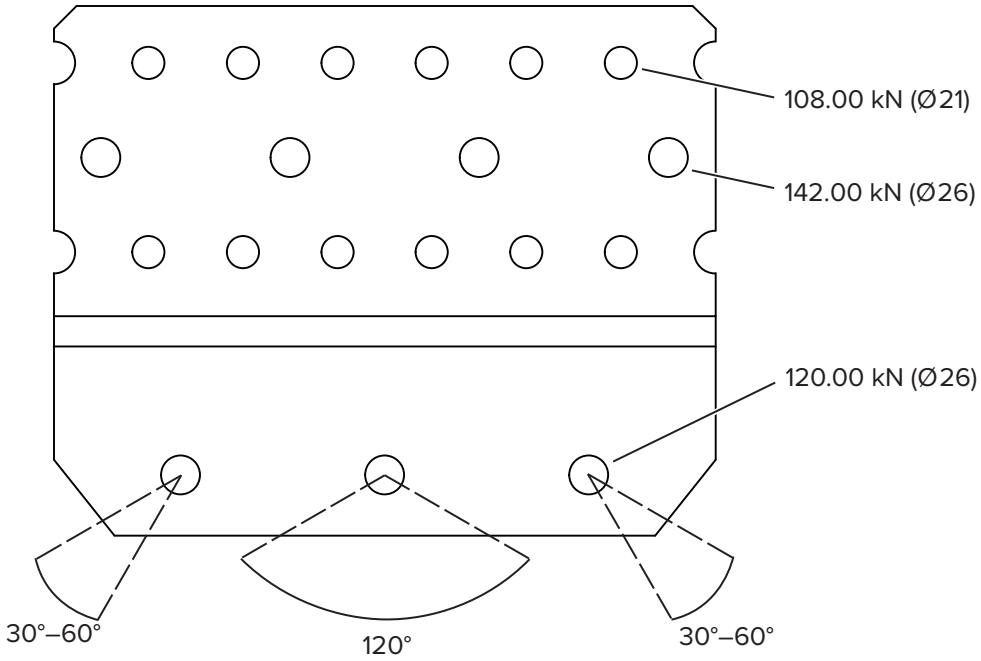
$M_{pl,\ y,\ perm.}$ = 82.39 kNm

Linear interaction can be used for cross-section verification.

Permitted load ratings of holes

Attach IK Spindles only at the angles shown here!

Always use 12no. IK Pins Ø20 to secure an IK Waler Connector M.



8.2.3 IK Waler Connector L 25 (code:608445)

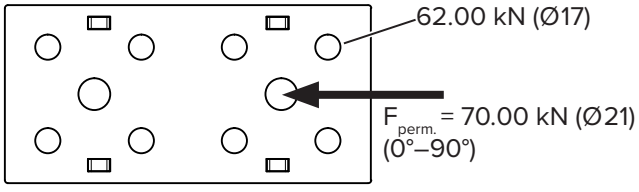
Stress resultant limits

$N_{pl,\ perm.}$ = 444.00 kN

$V_{pl,\ z,\ perm.}$ = 237.00 kN

$M_{pl,\ y,\ perm.}$ = 15.72 kNm

Linear interaction can be used for cross-section verification.



Always use 4no. IK Pins Ø16 to secure an IK Waler Connector L to the IK Waler L!

The maximum permitted bending moment $M_{perm.}$ when using 4no. IK Pins Ø16 is 10.90 kNm! Check if pin can withstand the imposed loads!

Unless otherwise stated, all dimensions are in mm.

8.2.4 IK Waler Connector Flex L (code:608490)

Stress resultant limits

$N_{pl,\ perm.}$ = 444.00 kN

$V_{pl,\ z,\ perm.}$ = 237.00 kN

$M_{pl,\ y,\ perm.}$ = 15.72 kNm

Linear interaction can be used for cross-section verification.

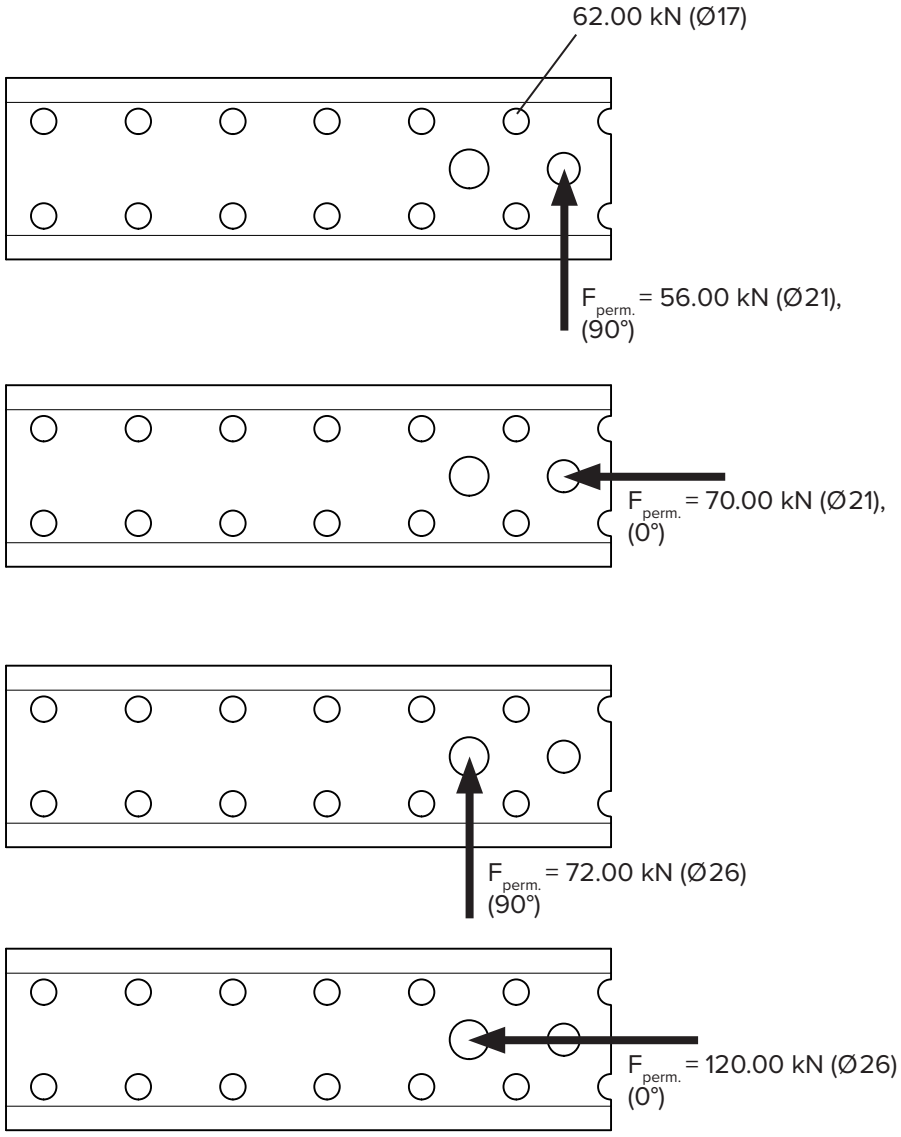
Permitted load ratings of holes

Always use 6no. IK Pins Ø16 to secure an IK Waler Connector Flex L to the IK Waler L!

The maximum permitted bending moment $M_{perm.}$ when using 6no. IK Pins Ø16 is 15.72 kNm!

Check if pin can withstand the imposed loads!

Linear interpolation can be applied to determine angles between 0° and 90°!



8.2.5 IK Waler Connector Flex M (code:608485)

Stress resultant limits

$N_{pl,\ perm.}$ = 602.00 kN

$V_{pl,\ z,\ perm.}$ = 396.00 kN

$M_{pl,\ y,\ perm.}$ = 37.72 kNm

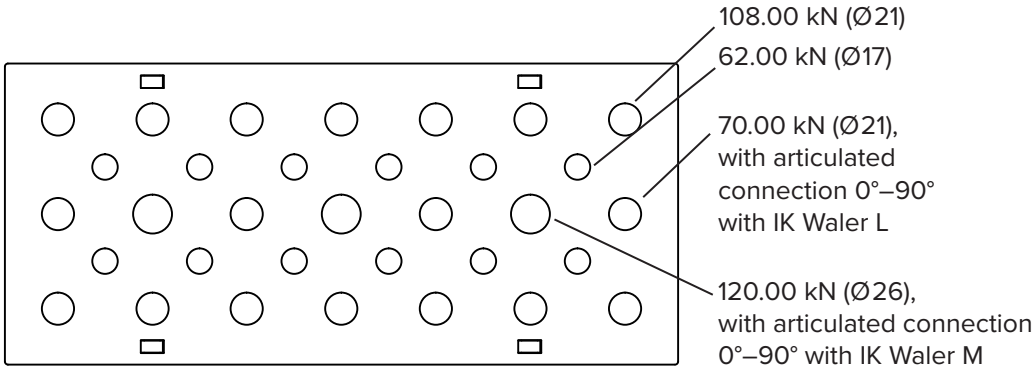
Linear interaction can be used for cross-section verification.

Permitted load ratings of holes

Always use 6no. IK Pins Ø20 to secure an IK Waler Connector Flex M to the IK Waler M!

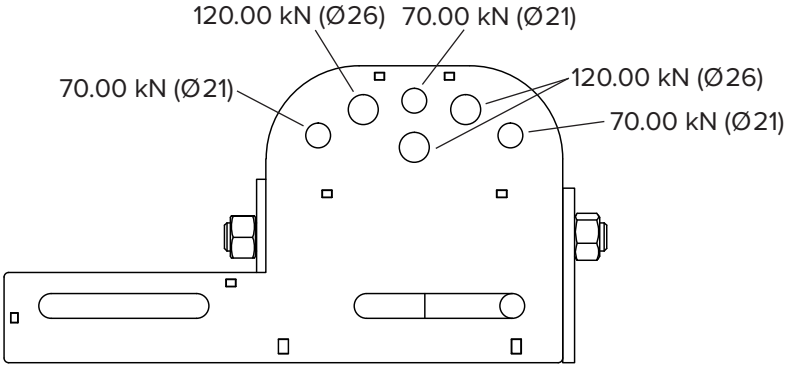
The maximum permitted bending moment $M_{perm.}$ when using 6no. IK Pins Ø20 is 37.72 kNm!

Check if pin can withstand the imposed loads!



8.2.6 IK Adjustable Connector

Permitted load ratings of holes



Unless otherwise stated, all dimensions are in mm.

8.3 IK Adaptor

8.3.1 IK Adaptor Waler Connector L (code:608460)

Stress resultant limits

$N_{pl,\ perm.}$ = 364.00 kN

$V_{pl,\ z,\ perm.}$ = 223.00 kN

$M_{pl,\ y,\ perm.}$ = 9.74 kNm

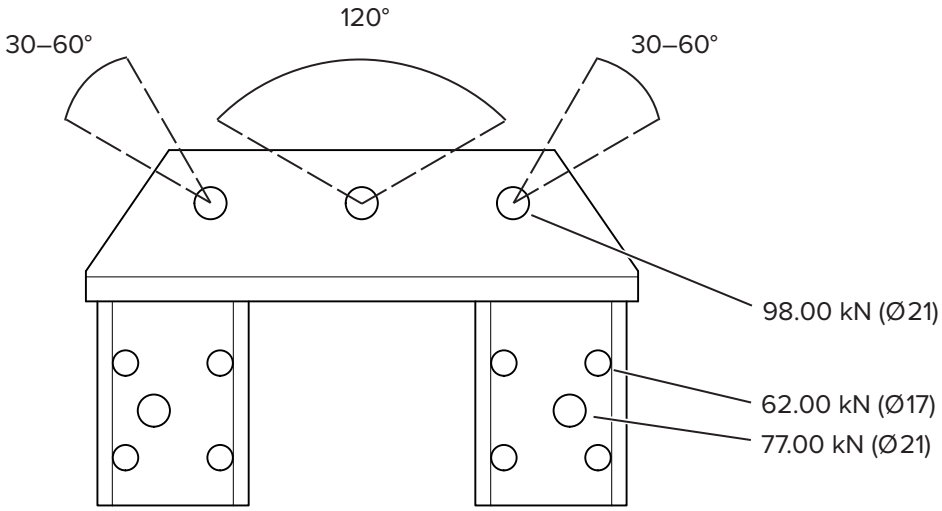
Linear interaction can be used for cross-section verification.

Permitted load ratings of holes when connecting 1no. IK Spindle

Attach IK Spindles only at the angles shown here!

Always use 8no. IK Pins Ø16 to secure an IK Adaptor Waler Connector L.

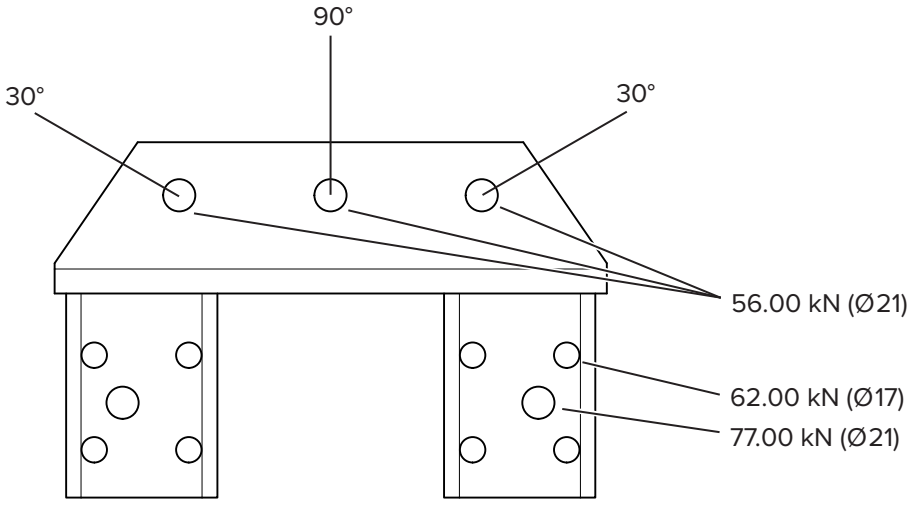
When IK Waler Connectors L and IK Adaptors Waler Connector L are used together, do not exceed the permitted bolt forces when attaching Waler L!

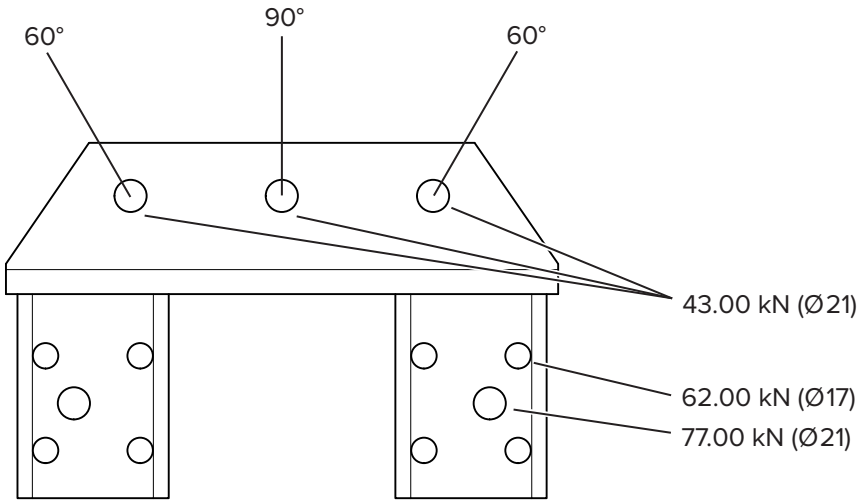


Permitted load ratings of holes when connecting 3no. IK Spindles

Attach IK Spindles only at the angles shown here!

Always use 8no. IK Pins Ø16 to secure an IK Adaptor Waler Connector L.





Linear interpolation can be applied to determine the load rating for angles between 30° and 60°.

8.3.2 IK Adaptor Waler Connector M (code:608440)

Stress resultant limits

$N_{pl,\ perm.}$ = 805.00 kN

$V_{pl,\ z,\ perm.}$ = 556.00 kN

$M_{pl,\ y,\ perm.}$ = 45.87 kNm

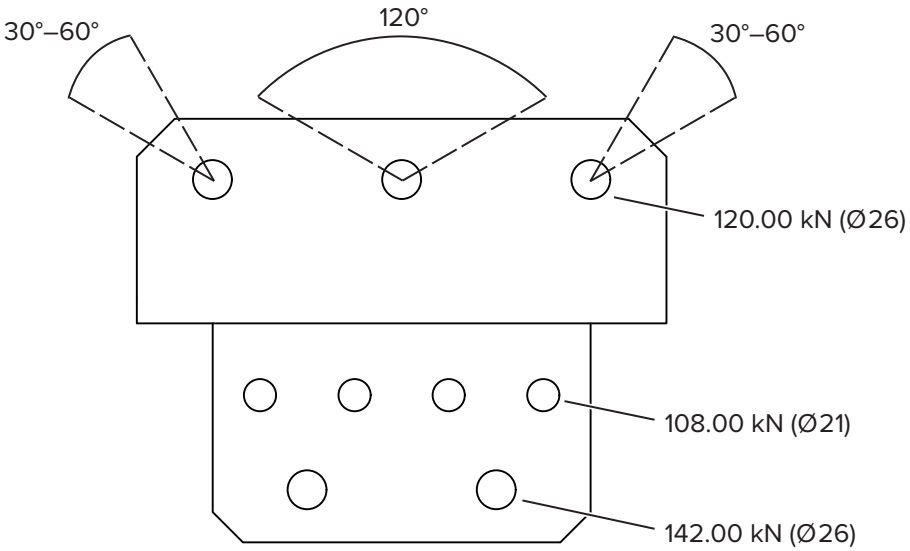
Linear interaction can be used for cross-section verification.

Permitted load ratings of holes

Attach IK Spindles only at the angles shown here!

Always use 4no. IK Pins Ø20 and 2no. IK Pins Ø25 to secure an IK Adaptor Waler Connector M.

When IK Waler Connectors M and IK Adaptors Waler Connector M are used together, do not exceed the permitted bolt forces when attaching Waler L!



Unless otherwise stated, all dimensions are in mm.

8.3.3 IK Adaptor L (code:608480)

Stress resultant limits

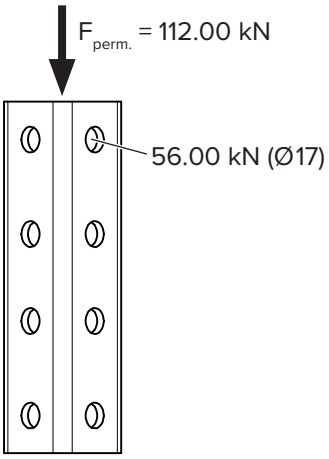
$N_{pl,\ perm.}$ = 171.00 kN

$V_{pl,\ z,\ perm.}$ = 56.00 kN

$M_{pl,\ y,\ perm.}$ = 3.70 kNm

Linear interaction can be used for cross-section verification.

Permitted load capacity



8.3.4 IK Adaptor M/L (code:608770)

Stress resultant limits

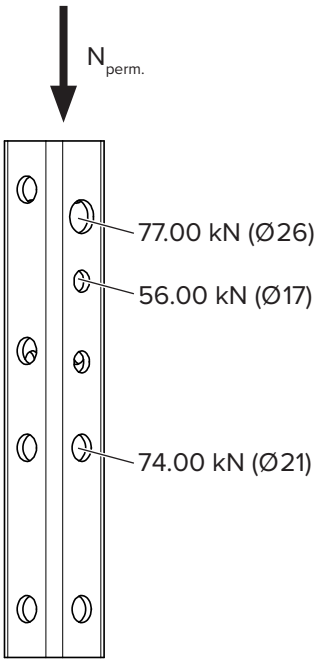
$N_{pl,\ perm.}$ = 150.00 kN

$V_{pl,\ z,\ perm.}$ = 50.00 kN

$M_{pl,\ y,\ perm.}$ = 3.32 kNm

Linear interaction can be used for cross-section verification.

Permitted load rating depending on configuration



Connecting Waler M to Waler M, parallel or crosswise
(refer to page 73 and page 74)
$N_{perm.}$ 136.00 kN

Connecting Waler M to Waler L, parallel or crosswise
(refer to page 75 and page 76)
$N_{perm.}$ 112.00 kN

Connecting Waler L to Waler L using Waler Connector L
(refer to page 86)
$N_{perm.}$ 74.00 kN

Connecting Waler L to Waler M using Waler Connector M
(refer to page 87)
$N_{perm.}$ 77.00 kN

Verification of cross-section for all three possible stress resultants (N, V, M) with linear interaction required!

8.4 IK Cross Connectors

8.4.1 IK Cross Connector L (code:608450)

Stress resultant limits

$N_{pl,\ perm.}$ = 481.00 kN

$V_{pl,\ z,\ perm.}$ = 259.00 kN

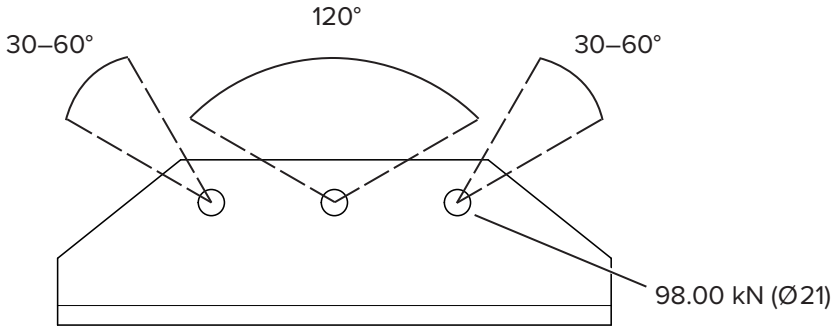
$M_{pl,\ y,\ perm.}$ = 16.97 kNm

Linear interaction can be used for cross-section verification.

Permitted load ratings of holes when connecting 1no. IK Spindle

Attach IK Spindles only at the angles shown here!

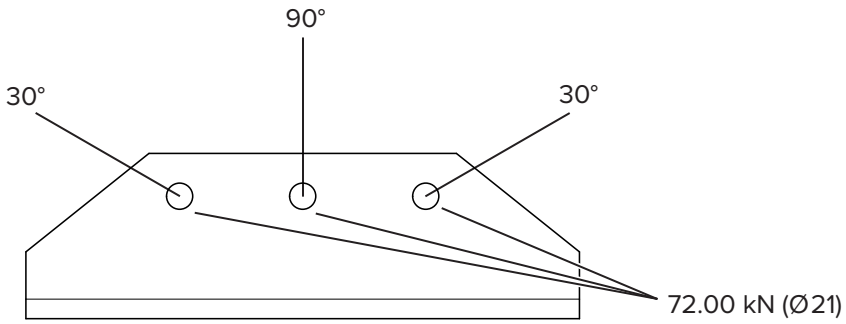
Always use 4no. Bolts M20 × 130-10.9 (code:608663) and 4no. Nuts M20-10 (code:608618) to secure the IK Cross Connector L!

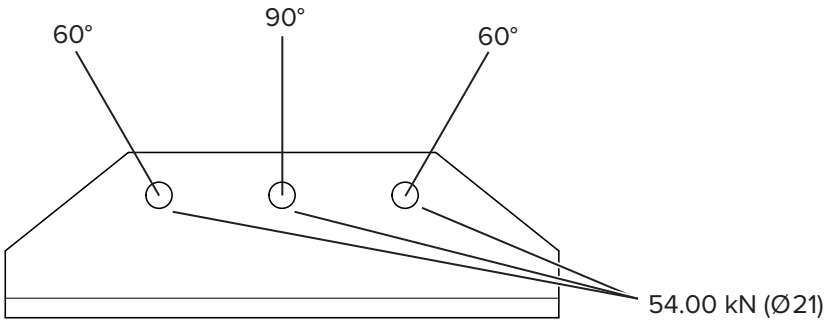


Permitted load ratings of holes when connecting 3no. IK Spindles

Attach IK Spindles only at the angles shown here!

Always use 4no. Bolts M20 × 130-10.9 (code:608663) and 4no. Nuts M20-10 (code:608618) to secure the IK Cross Connector L!





Linear interpolation can be applied to determine the load rating for angles between 30° and 60°.

Unless otherwise stated, all dimensions are in mm.

8.4.2 IK Cross Connector M (code:608470)

Stress resultant limits

$N_{pl,\ perm.}$ = 562.00 kN

$V_{pl,\ z,\ perm.}$ = 316.00 kN

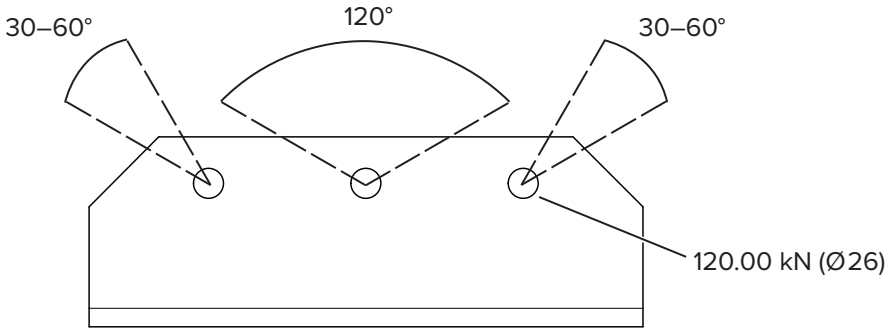
$M_{pl,\ y,\ perm.}$ = 23.74 kNm

Linear interaction can be used for cross-section verification.

Permitted load ratings of holes when connecting 1no. IK Spindle

Attach IK Spindles only at the angles shown here!

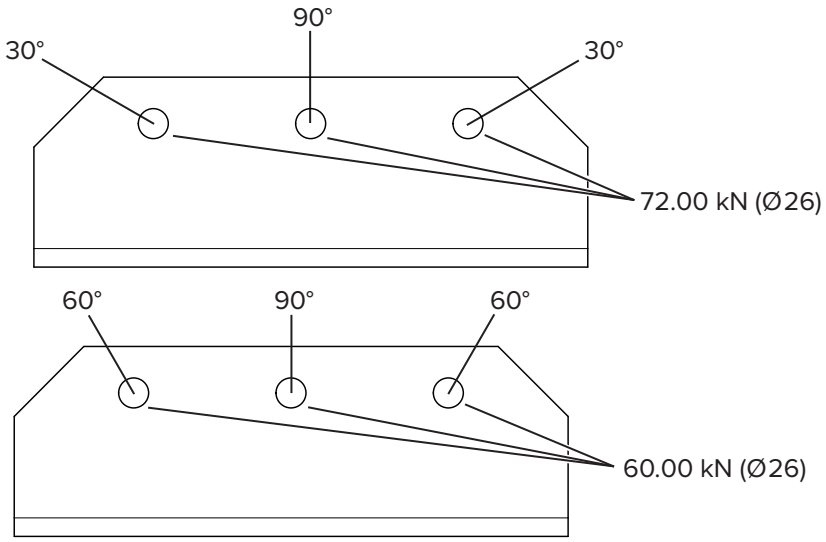
Always use 4no. Bolts M24 × 130 (code:608475) to secure the IK Cross Connector M!



Permitted load ratings of holes when connecting 3no. IK Spindles

Attach IK Spindles only at the angles shown here!

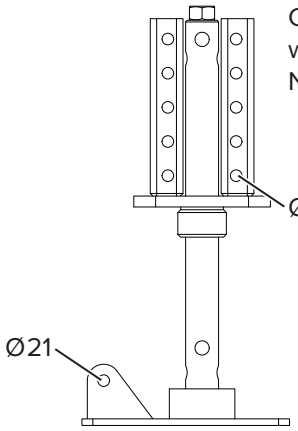
Always use 4no. Bolts M24 × 130 (code:608475) to secure the IK Cross Connector M!



Linear interpolation can be applied to determine the load rating for angles between 30° and 60°.

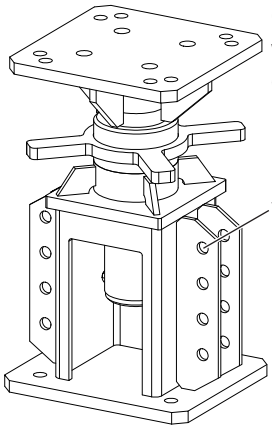
8.5 IK Jacks

8.5.1 IK Jack (code:608775)



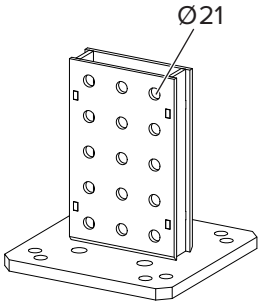
Connection to Waler M
with 4no. IK Pins Ø20
$N_{perm.}$ = 180.00 kN

8.5.2 IK Jack 500 H (code:608690)



Connection to Main Beam H
with 4no. M24 Bolts with Nut
or with 4no M20 Bolts with Nut
$N_{perm.}$ = 500.00 kN

8.5.3 IK Fußspindel 500 Adapter M (Art.-Nr. 608671)

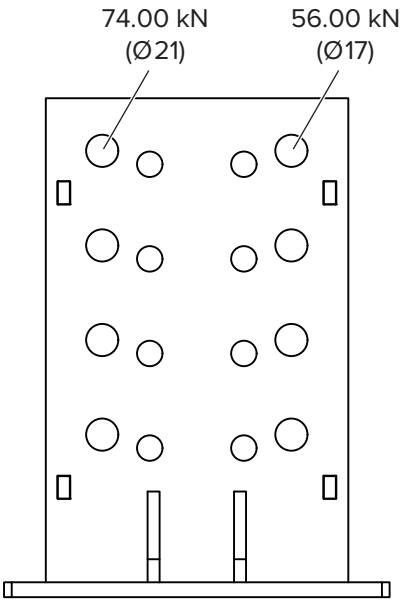


Connection to IK Waler M
with 6no. IK Pins Ø20
$N_{perm.}$ = 500.00 kN

Connection to 2no. IK Waler M
in L-arrangement
with 10no. IK Pins Ø20
$N_{perm.}$ = 432.00 kN
Shear force max. 68.00 kN

Unless otherwise stated, all dimensions are in mm.

8.5.4 IK Wheel Connector (code:608600)



Wheel load for connection with
IK Waler L and 4no. IK Pins Ø16
30.00 kN

Wheel load for connection
with IK Waler M and 4no. IK Pins Ø20
60.00 kN

8.6 Use of bolts of class 8.8

All SWLs indicated in Section 8 apply to the use of IK Pins or bolts of class 10.9.

Bolts of class 8.8 can be used as an alternative. However, the SWL of the connections is lower in this case.

The table below shows the SWLs of bolts of class 8.8 used in conjunction with INFRA-KIT.

☞ If in Section 8 a lower SWL for a connection than the SWL for the Bolt 8.8 is stated, the lower SWL always applies!

	M16 on IK Waler L [kN]	M20 on IK Waler L [kN]	M20 on IK Waler M [kN]	M24 on IK Waler M [kN]
Bolt 8.8 $F_{perm.}$ [kN]	45.70	84.42	79.49	131.36

9 Connecting IK Walers L and M

Various connectors are available for connecting walers. Always use the proper IK Pins to attach the connectors. Use IK Pins Ø16 or IK Pins Ø20 to connect Walers L and IK Pins Ø20 or IK Pins Ø25 to connect Walers M.

Screws 10.9 of the respective diameter can be used as an alternative for every connection! This does not change the SWL of the connections.

The positions of some of the Waler Bolts have to be changed for some of the Waler connections. This includes the bolts used to join the two U-profiles of the Walers to one another. The Waler Bolts can easily be removed and then inserted at the next possible position.

9.1 Changing position of Waler Bolts

The positions of some of the Waler Bolts in some of the waler connections shown in this section have to be changed. We recommend not putting the Waler Bolts back into place until the walers have been connected.

There is a Spacer Sleeve IK Waler on each Waler Bolt between the U-profiles. The Spacer Sleeve IK Waler keeps the U-profiles spaced as specified. The Spacer Sleeve IK Waler must be reinstalled when inserting the bolts again.

NOTE

Spacer Sleeves fall off!

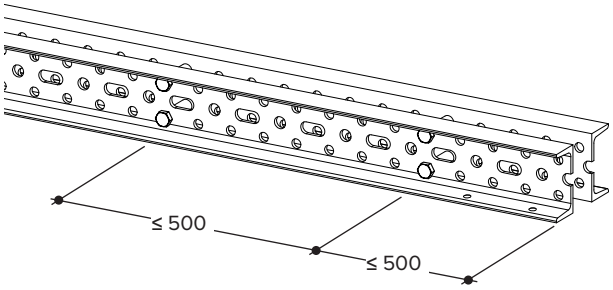
When the Waler Bolts are extracted from the walers, the Spacer Sleeve may fall off of the Waler Bolt. Work carefully to avoid losing the Spacer Sleeve!

NOTE

Do not exceed the maximum allowed spacing of the Waler Bolts!

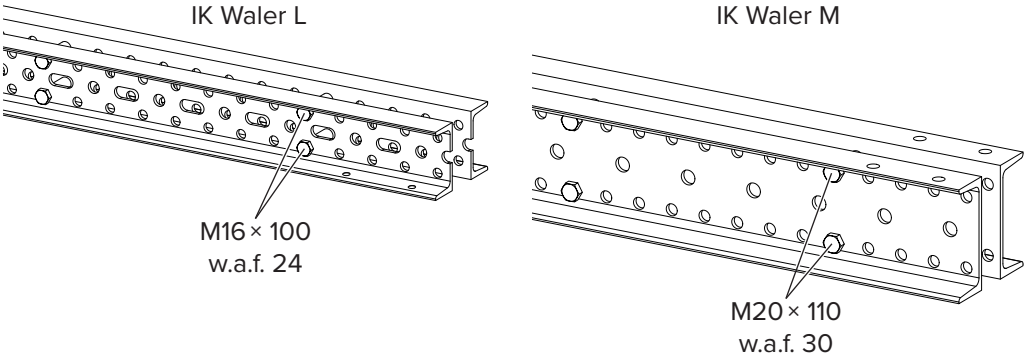
The Waler Bolts should be ≤ 500 mm away from the end of the Waler (max. 7 holes in between)!

The Waler Bolts should be spaced ≤ 500 mm apart (max. 7 holes in between)!

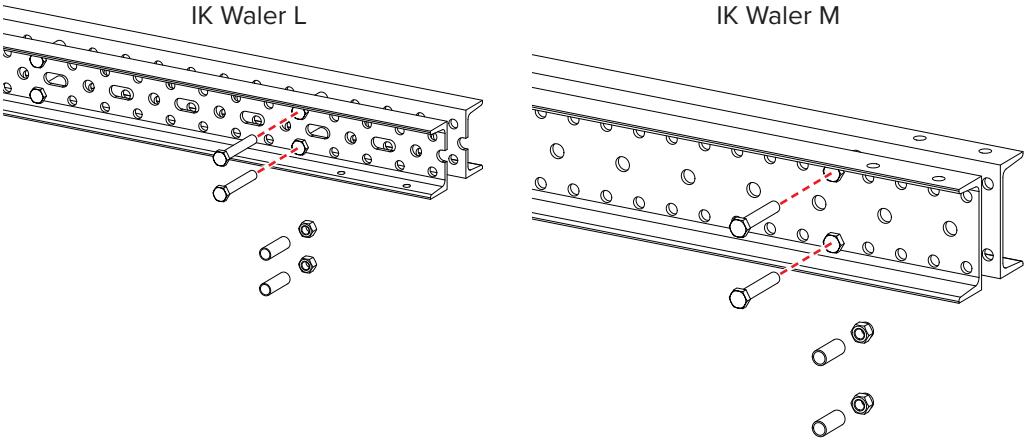


Waler Bolts should be fastened to the 5th hole from the waler's end to avoid problems when attaching connectors or adaptors.

Step 1 Release and remove the nuts from the Waler Bolts.



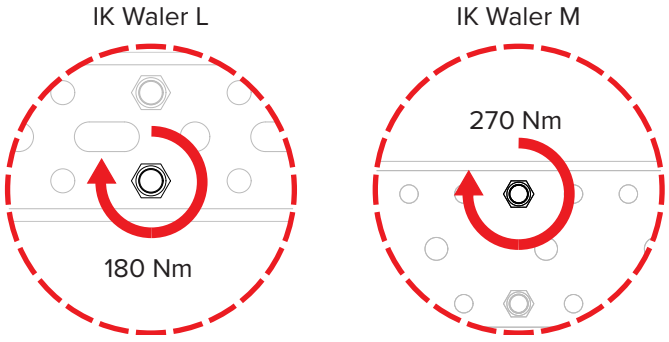
Step 2 Extract the Waler Bolts from the waler. Catch the Spacer Sleeves.



Step 3 Guide the Waler Bolts through the nearest possible hole in the U-profile.

Step 4 Slide the Spacer Sleeve onto the Waler Bolt.

Step 5 Guide the Waler Bolt through the other U-profile and secure with the nut. The required torque for tightening the nuts is shown below.



9.2 End-to-end connection of IK Walers

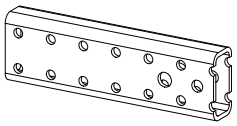
End-to-end connections can be done using various various components. The number and possible orientation of the connections vary depending on which spindles or walers are used. For information on how to connect Spindles, refer to page 108. For information on how to connect Walers, refer to page 83.

The following end-to-end connections are possible:

- With no connection points for spindles and walers
- With connection points to one side (flange)
- With connection points to both sides (flange)
- With connection points to one or both sides (web)

9.2.1 Connecting 2no. Walers L – without spindle connectors (with IK Waler Connector Flex L)

Components needed:

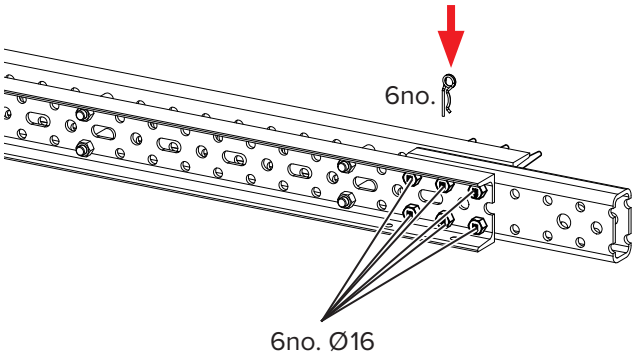


1no. IK Waler Connector Flex L
(code:608490)

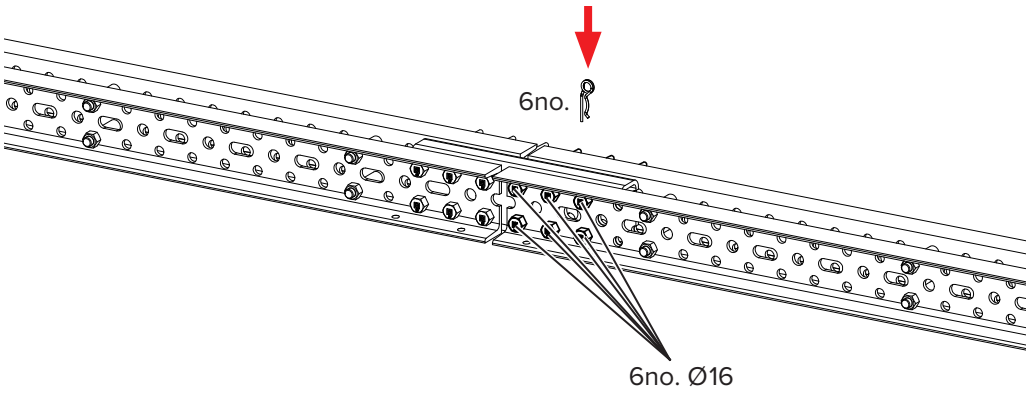
12no. IK Pins Ø16
(code:608816)

12no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Waler Connector Flex L into the first Waler L and fasten with 6no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the second waler over the IK Waler Connector Flex L and fasten with 6no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



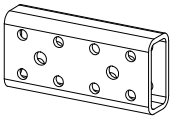
The bending moment capacity of this connection is 15.72 kNm!

Use the interaction equation to check if the pin connections can withstand the loads!

Unless otherwise stated, all dimensions are in mm.

9.2.2 Connecting 2no. Walers L – without spindle connectors (with IK Waler Connector L 25)

Components needed:

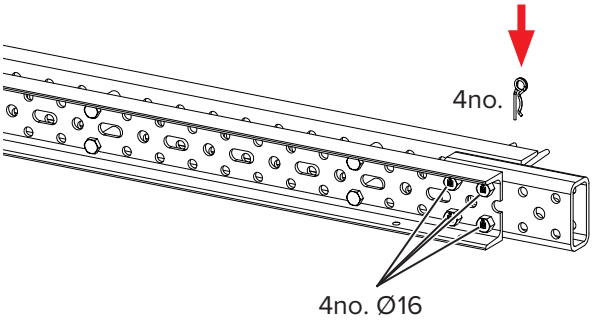


1no. IK Waler Connector L 25
(code:608445)

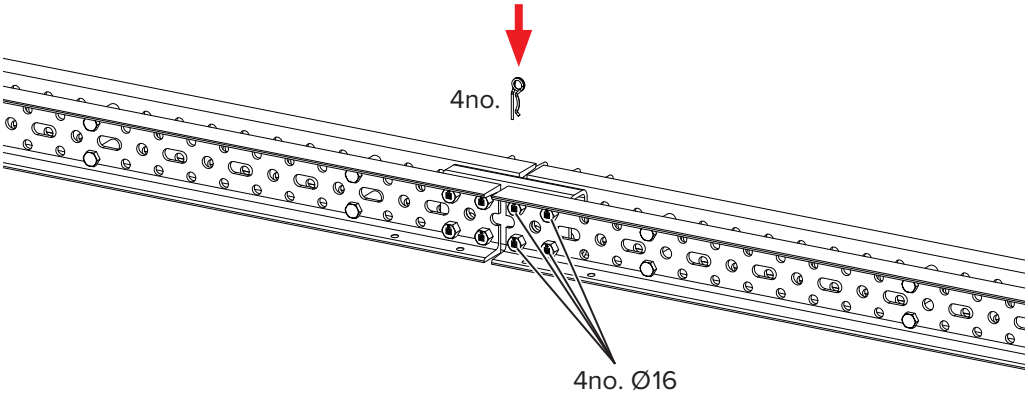
8no. IK Pins Ø16
(code:608816)

8no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Waler Connector L 25 into the first Waler L and fasten with 4no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the second Waler over the IK Waler Connector L 25 and fasten with 4no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.

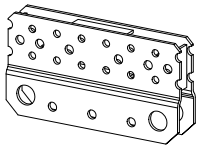


The bending moment capacity of this connection is 10.90 kNm!

Use the interaction equation to check if the pin connections can withstand the loads!

9.2.3 Connecting 2no. Walers L – with spindle connectors on one flange side

Components needed:

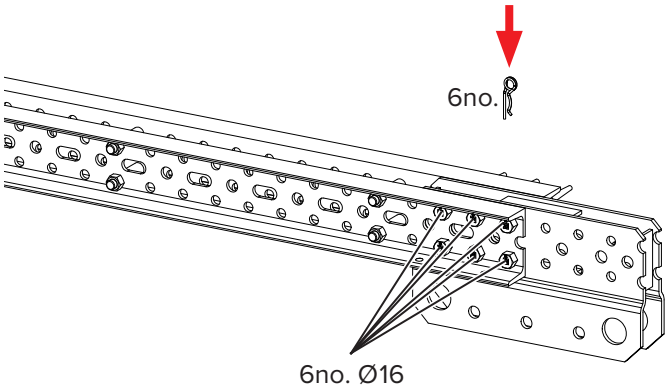


1no. IK Waler Connector L
(code:608420)

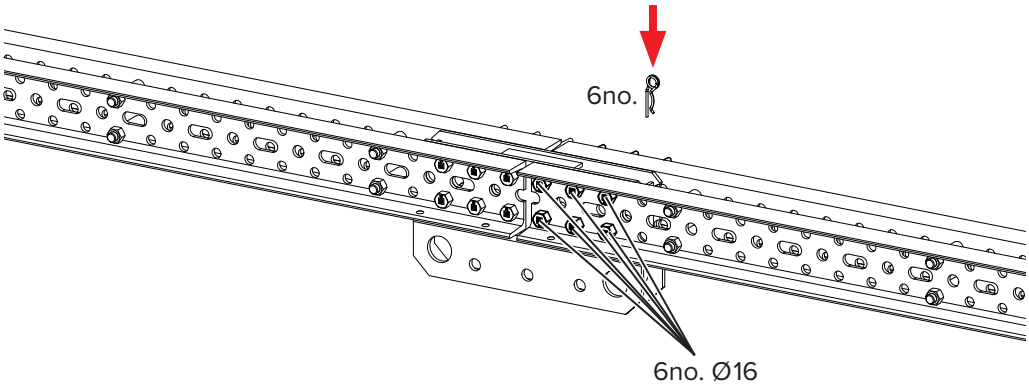
12no. IK Pins Ø16
(code:608816)

12no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Waler Connector L into the first Waler L and fasten with 6no. IK Pins Ø16.
Secure the IK Pins with the Spring Cotter Pins.



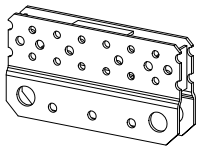
Step 2 Slide the second Waler L onto the IK Waler Connector L and fasten with 6no. IK Pins Ø16.
Secure the IK Pins with the Spring Cotter Pins.



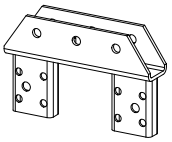
Unless otherwise stated, all dimensions are in mm.

9.2.4 Connecting 2no. Walers L – with spindle connectors on both flange sides

Components needed:



1no. IK Waler Connector L (code:608420)

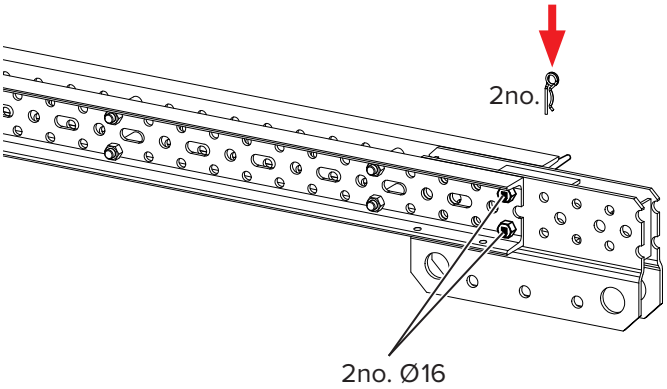


1no. IK Adaptor Waler Connector L (code:608460)

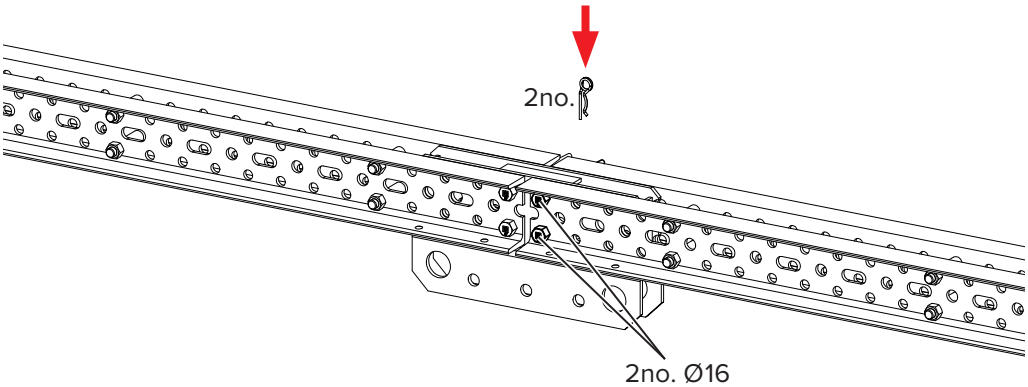
12no. IK Pins Ø16 (code:608816)

12no. Spring Cotter Pins 4 (code:173776)

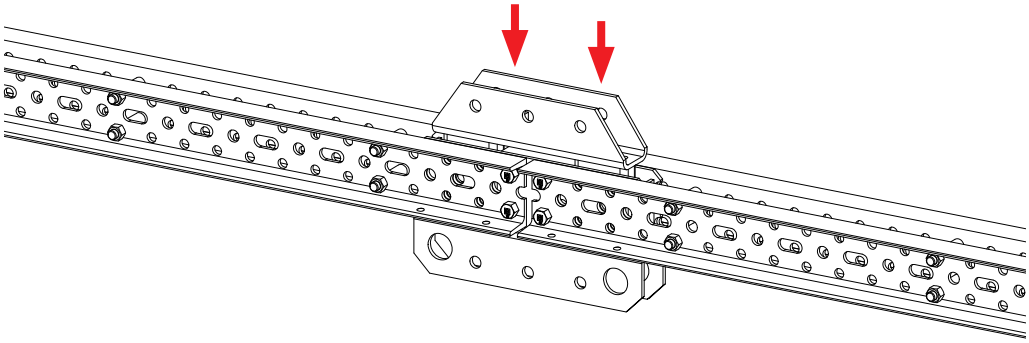
Step 1 Insert the IK Waler Connector L into the first Waler L and fasten with 2no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



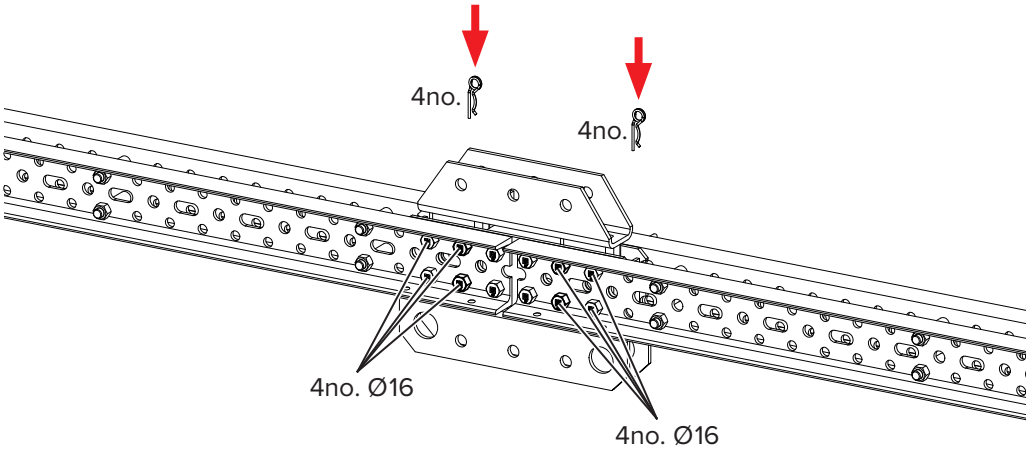
Step 2 Slide the second Waler L onto the IK Waler Connector L and fasten with 2no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



Step 3 Insert the IK Adaptor Waler Connector L into the IK Waler Connector L.



Step 4 Fasten all of the components with the remaining 8no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



Unless otherwise stated, all dimensions are in mm.

9.2.5 Connecting 2no. Walers L – with spindle connectors on one or both web sides

This connection can be done using the IK Cross Connector L (code:608420) on its own or in conjunction with the IK Waler Connector L (code:608460). Optionally, just the IK Waler Connector Adapter L can be used instead.

WARNING

Connection can fail!

When IK Pins are used to attach an IK Cross Connector to the IK Waler, the IK Cross Connector cannot absorb tensile loads!

This can cause failure and components can fall off!

This can cause personal injury or death!

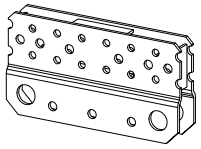
Always use bolts to attach an IK Cross Connector to the IK waler!

NOTE

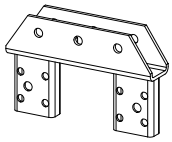
Comply with the lowest Safe Working Load!

This connection is created using only the 4no. Hexagon Bolts M20 x 130 with Nuts in the centre row of holes in the walers. Therefore the safe working load of the waler connection is lower than that of the standard connection with 12no. IK Pins Ø16.

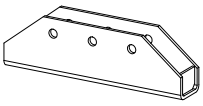
Components needed:



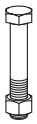
1no. IK Waler Connector L (code:608420)



1no. IK Adaptor Waler Connector L (code:608460)

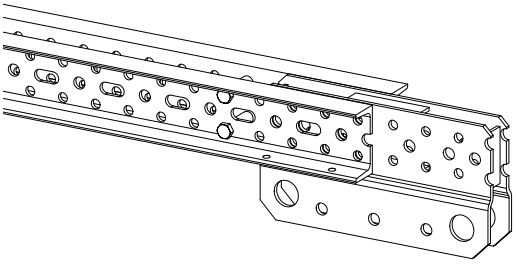


1no. or 2no. IK Cross Connector L (code:608450)

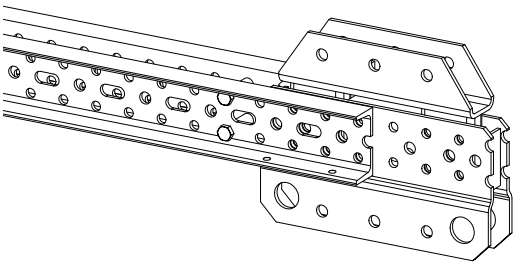


6no. Hex. Bolts M20 × 130-10.9 (code:608663) and 6no. Hex. Nuts M20-10 (code:608618)

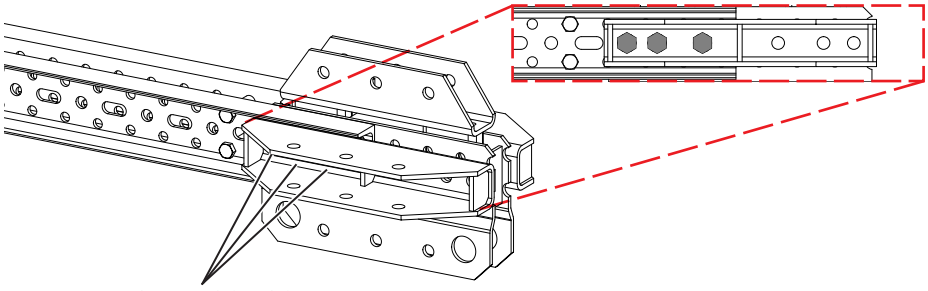
Step 1 Slide the IK Waler Connector L into the first Waler L.



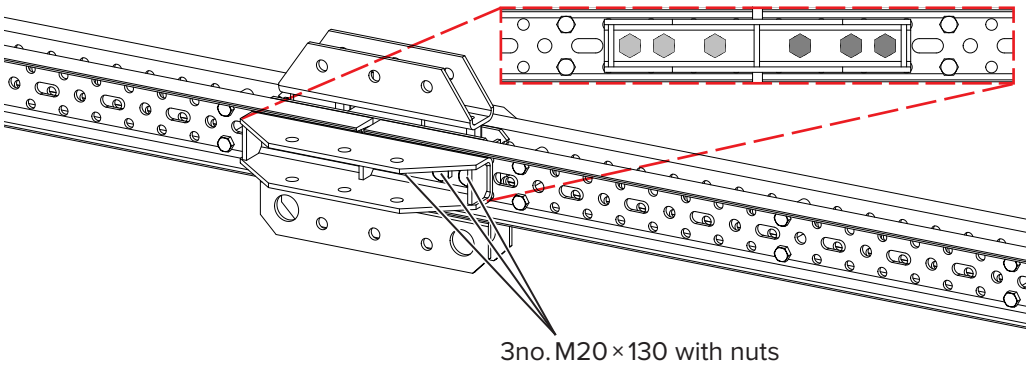
Step 2 Slide the IK Adaptor Waler Connector into the IK Waler Connector L.



Step 3 Press 1no. or 2no. IK Cross Connectors L against the web sides of the first Waler L and attach using 3no. Bolts M20 x 130 with nuts. Do not tighten the bolts.



Step 4 Slide the second Waler L onto the IK Waler Connector L and fasten with 3no. Bolts M20 x 130 with nuts. Tighten all six bolts.

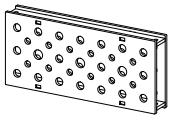


☞	The bending moment capacity of this connection is 9.63 kNm! Use the interaction equation to check if the pin connections can withstand the loads! Check if the connection of the IK Cross Connectors L (code:608450) with the bolts can withstand the imposed axial (N) loads.

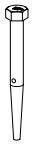
Unless otherwise stated, all dimensions are in mm.

9.2.6 Connecting 2no. Walers M – without spindle connectors

Components needed:



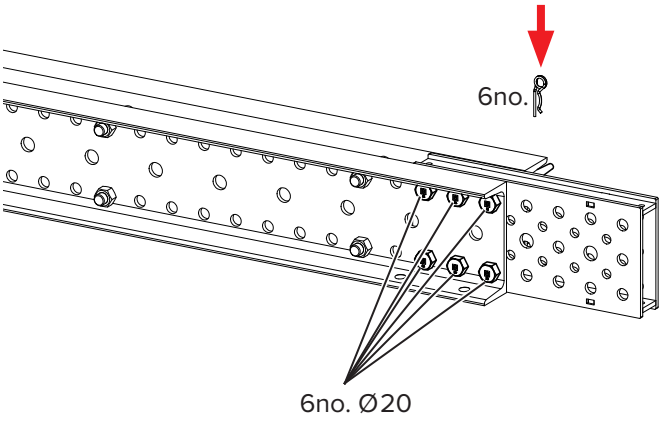
1no. IK Waler Connector Flex M
(code:608485)



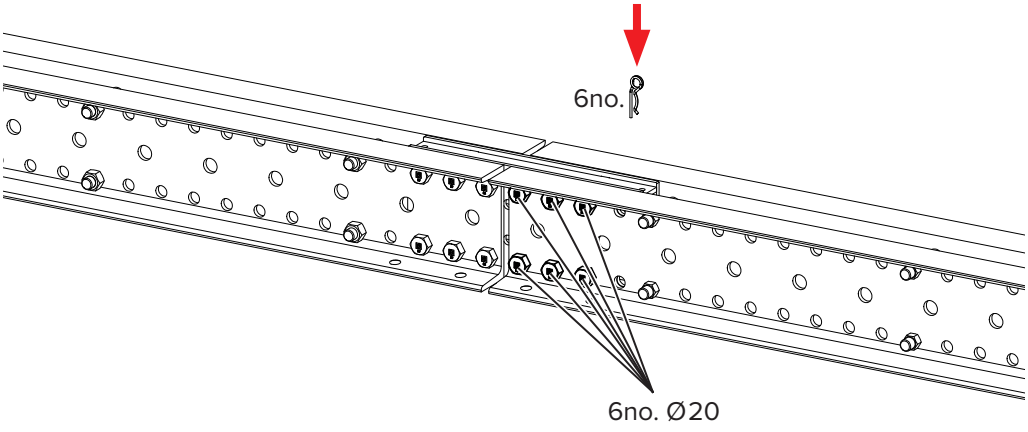
12no. IK Pins Ø20
(code:608820)

12no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Waler Connector Flex M into the first Waler M and fasten with 6no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the second Waler over the IK Waler Connector Flex M and fasten with 6no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.

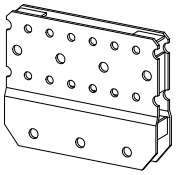


The bending moment capacity of this connection is 37.72 kNm!

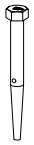
Use the interaction equation to check if the pin connections can withstand the loads!

9.2.7 Connecting 2no. Walers M – with spindle connectors on one flange side

Components needed:



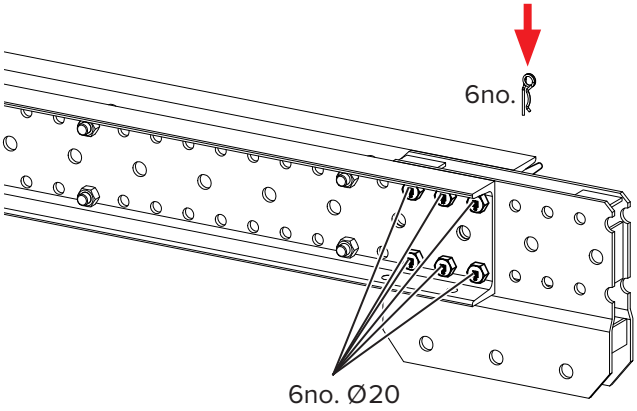
1no. IK Waler Connector M
(code:608430)



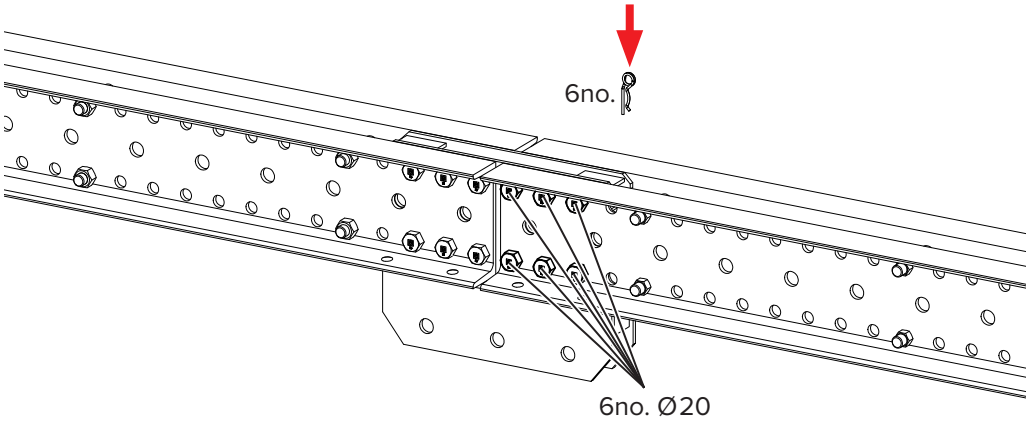
12no. IK Pins Ø20
(code:608820)

12no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Waler Connector M into the first Waler M and fasten with 6no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



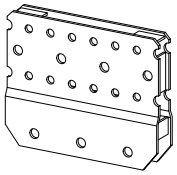
Step 2 Slide the second Waler M onto the IK Waler Connector M and fasten with 6no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



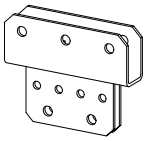
Unless otherwise stated, all dimensions are in mm.

9.2.8 Connecting 2no. Walers M – with spindle connectors on two flange sides

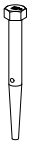
Components needed:



1no. IK Waler Connector M (code:608430)

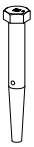


1no. IK Adaptor Waler Connector M (code:608440)



12no. IK Pins Ø20 (code:608820)

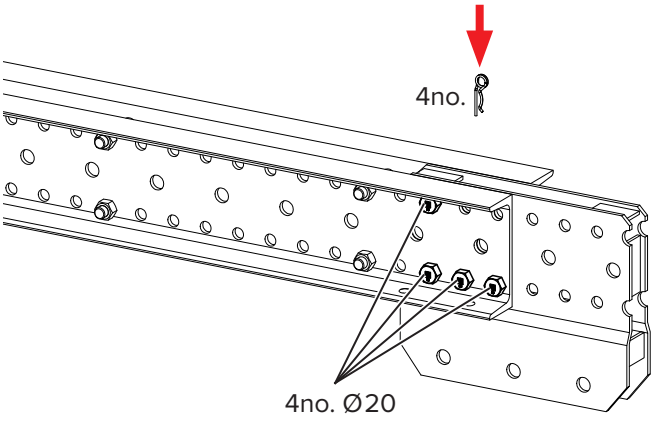
12no. Spring Cotter Pins 4 (code:173776)



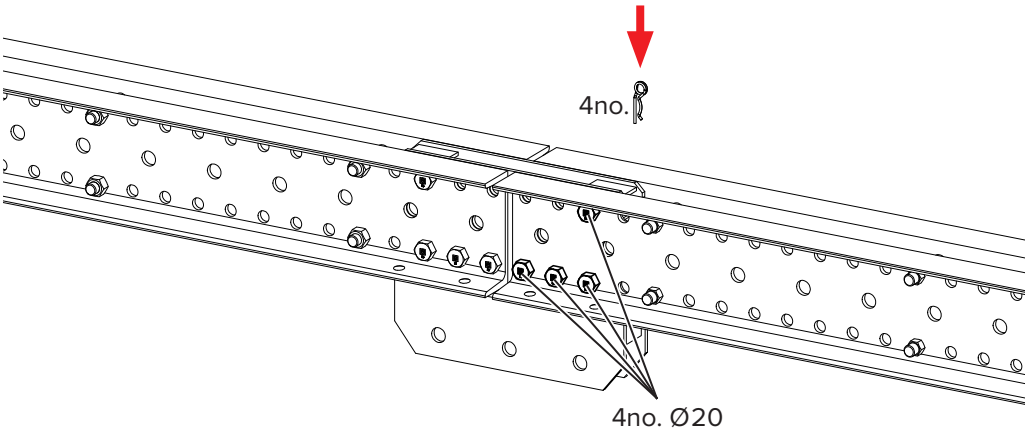
2no. IK Pins Ø25 (code:608825)

2no. Spring Cotter Pins 5 (code:174553)

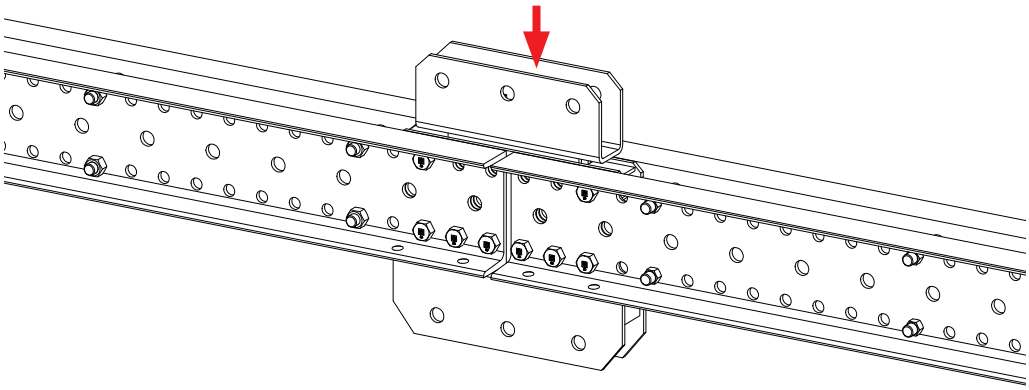
Step 1 Insert the IK Waler Connector M into the first Waler M and fasten with 4no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



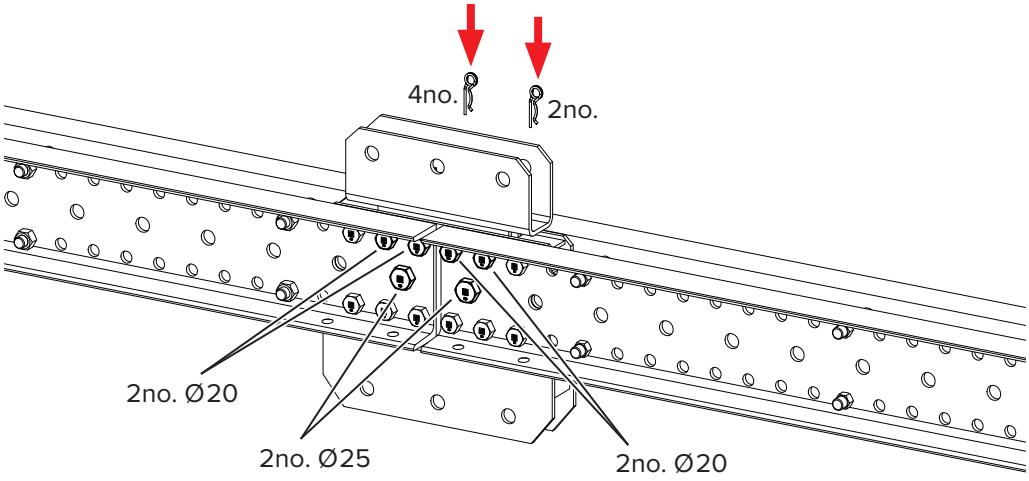
Step 2 Slide the second Waler M onto the IK Waler Connector M and fasten with 4no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



Step 3 Insert the IK Adaptor Waler Connector M into the IK Waler Connector M.



Step 4 Use the remaining 4no. IK Pins Ø20 and 2no. IK Pins Ø25 to secure all of the components. Secure the IK Pins with the Spring Cotter Pins.



Unless otherwise stated, all dimensions are in mm.

9.2.9 Connecting 2no. Walers M – with spindle connectors on one or two web sides

WARNING

Connection can fail!

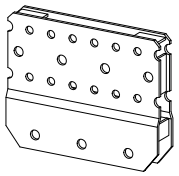
When IK Pins are used to attach an IK Cross Connector to the IK Waler, the IK Cross Connector cannot absorb tensile loads!

This can cause failure and components can fall off!

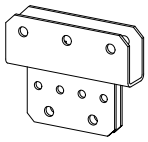
This can cause personal injury or death!

Always use bolts to attach an IK Cross Connector to the IK waler!

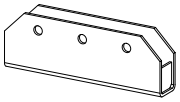
Components needed:



1no. IK Waler Connector M (code:608430)



1no. IK Adaptor Waler Connector M (code:608440)



1no. or 2no. IK Cross Connector M (code:608470)

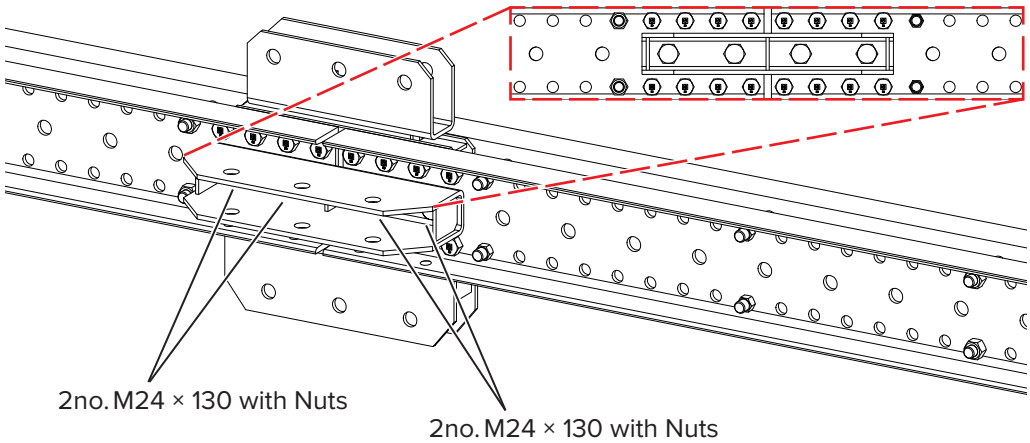
4no. Hexagon Bolts M24×130 with Nuts (code:608475)

12no. IK Pins Ø20 (code:608820)

12no. Spring Cotter Pins 4 (code:173776)

Step 1 Perform steps 1–4 of Section *Connecting 2no. Walers M – with spindle connectors on two flange sides* on page 63. Do not use IK Pins Ø25.

Step 2 Attach 1no. or 2no. IK Cross Connectors to the Walers using 4no. Bolts M24 x 130 with Nuts.



The bending moment capacity of this connection is 47.73 kNm!

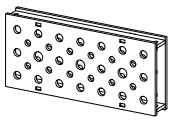
Use the interaction equation to check if the pin connections can withstand the loads!

Take into consideration the axial force (N) from the IK Cross Connectors separately only for the bolt connection!

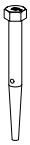
9.2.10 Connecting an IK Waler M to an IK Waler L

The Waler Connector Flex M can be used to connect an IK Waler M to an IK Waler L.

Components needed:



1no. IK Waler Connector Flex M
(code:608485)

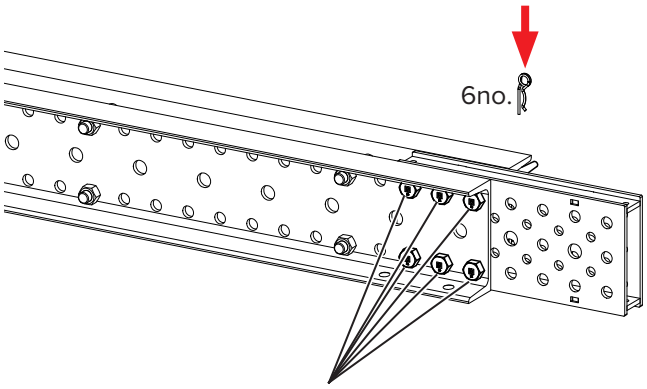


6no. IK Pins Ø20
(code:608820)

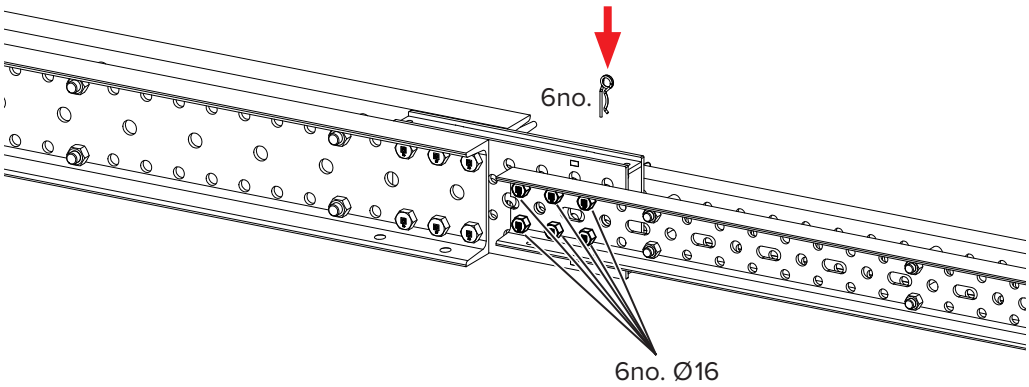
6no. IK Pins Ø16
(code:608816)

12no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Waler Connector Flex into the IK Waler M and fasten with 6no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the IK Waler L onto the IK Waler Connector Flex M and fasten with 6no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



The bending moment capacity of this connection is 18.94 kNm!

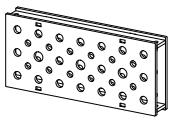
Use the interaction equation to check if the pin connections can withstand the loads!

Unless otherwise stated, all dimensions are in mm.

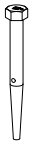
9.3 Perpendicular rigid connection of walers

9.3.1 Perpendicular connection of IK Walers M

Components needed:



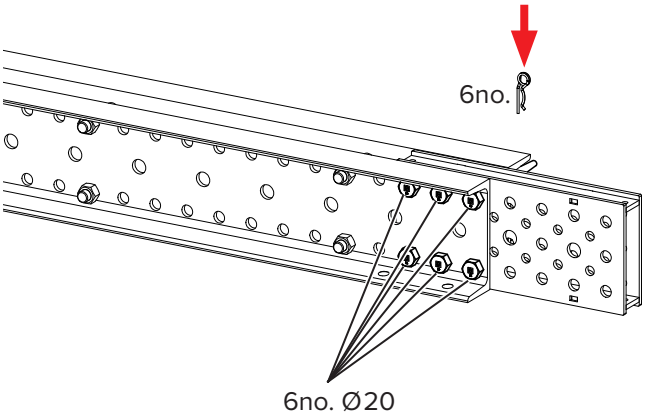
1no. IK Waler Connector Flex M (code:608485)



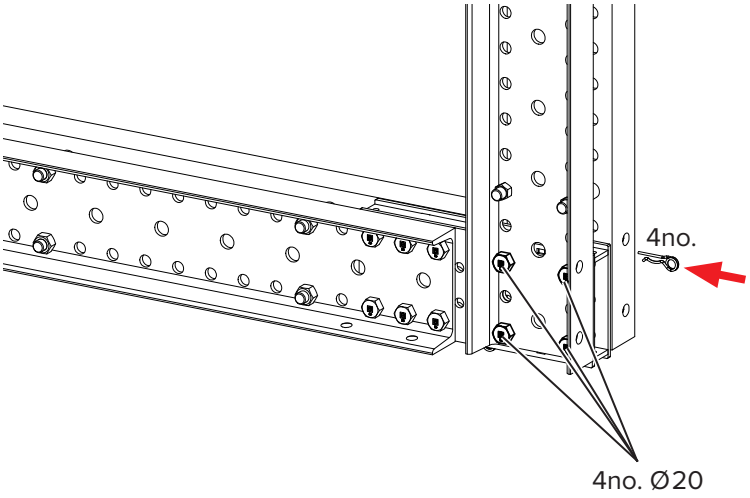
10no. IK Pins Ø20 (code:608820)

10no. Spring Cotter Pins 4 (code:173776)

Step 1 Insert the IK Waler Connector Flex M into the first Waler M and fasten with 6no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the second Waler M onto the IK Waler Connector Flex M at a right angle to the first IK Waler and fasten with 4no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.

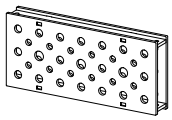


The bending moment capacity of this connection is 38.20 kNm!

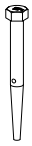
Use the interaction equation to check if the pin connections can withstand the loads!

9.3.2 Perpendicular connection of IK Waler M to IK Waler L

Components needed:



1no. IK Waler Connector Flex M
(code:608485)

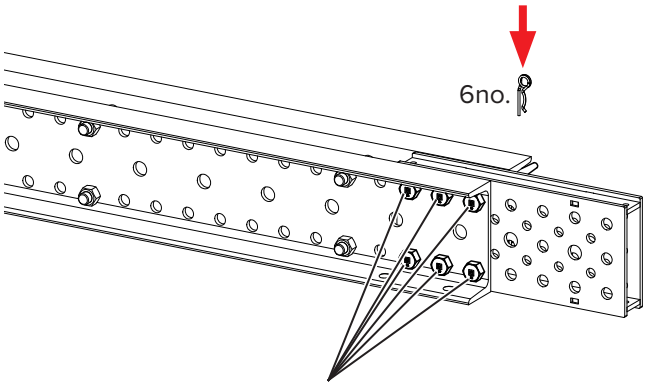


6no. IK Pins Ø20
(code:608820)

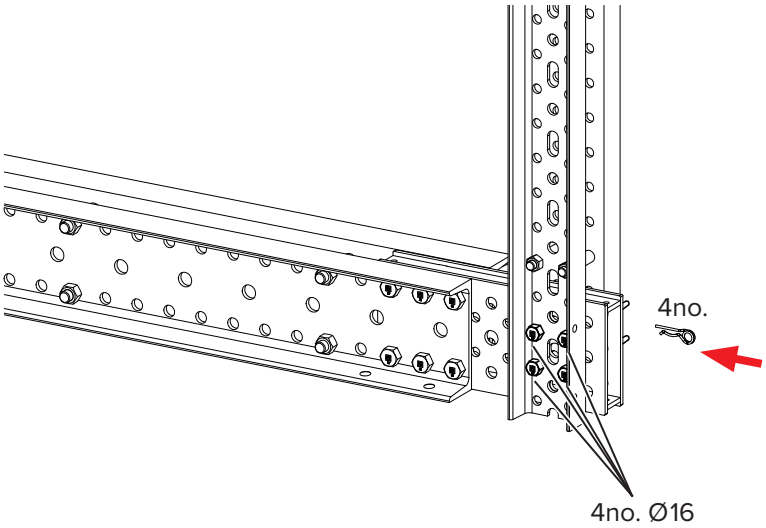
4no. IK Pins Ø16
(code:608816)

10no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Waler Connector Flex M into the first Waler M and fasten with 6no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the Waler L onto the IK Waler Connector Flex M at a right angle and fasten with 4no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



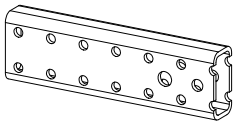
The bending moment capacity of this connection is 10.90 kNm!

Use the interaction equation to check if the pin connections can withstand the loads!

Unless otherwise stated, all dimensions are in mm.

9.3.3 Perpendicular connection of IK Walers L (with IK Waler Connector Flex L)

Components needed:

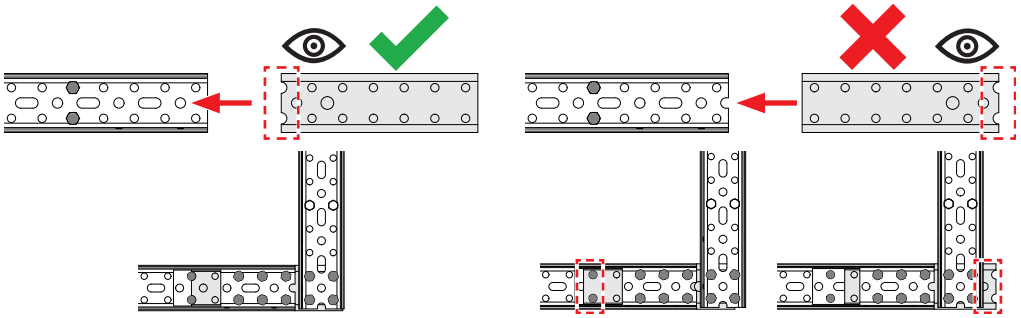


1no. IK Waler Connector Flex L
(code:608490)

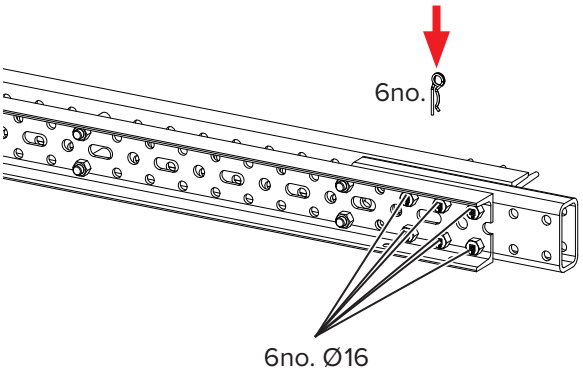
10no. IK Pins Ø16
(code:608816)

10no. Spring Cotter Pins 4
(code:173776)

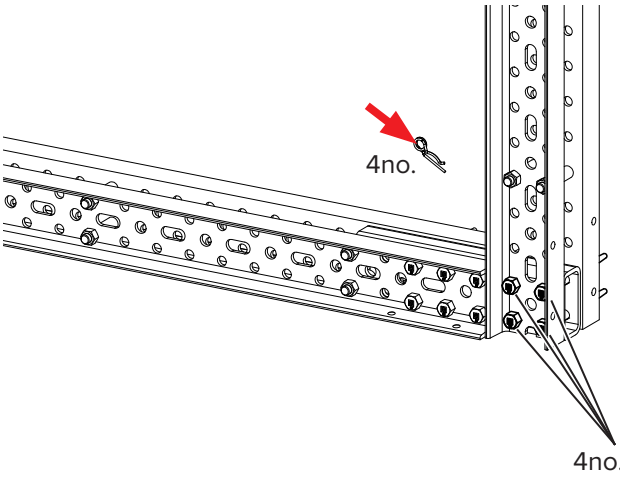
Check that the IK Waler Connector Flex L is correctly aligned!
Otherwise, it may collide with the spacers integrated in the waler or cause the waler connector to stand out of the waler.



Step 1 Insert the IK Waler Connector Flex L into the first Waler L and fasten with 6no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the Waler L onto the IK Waler Connector Flex L at a right angle and fasten with 4no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.

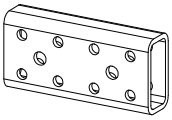


The bending moment capacity of this connection is 10.90 kNm!

Use the interaction equation to check if the pin connections can withstand the loads!

9.3.4 Perpendicular connection of IK Walers L (with IK Waler Connector L 25)

Components needed:

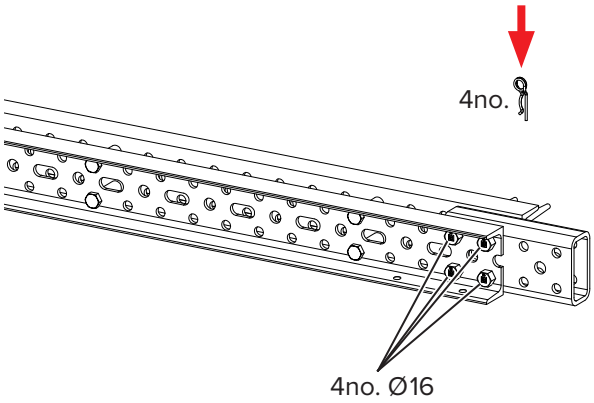


1no. IK Waler Connector L 25
(code:608445)

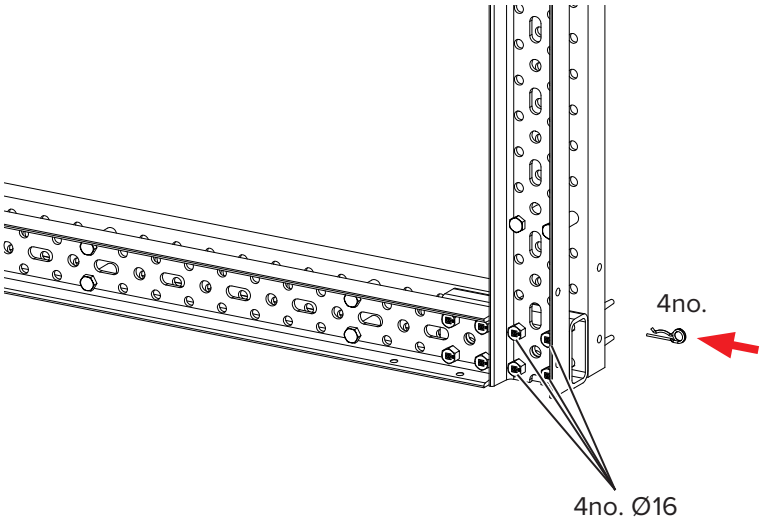
8no. IK Pins Ø16
(code:608816)

8no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Waler Connector L 25 into the first Waler L and fasten with 4no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the Waler L onto the IK Waler Connector L 25 at a right angle and fasten with 4no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



The bending moment capacity of this connection is 10.90 kNm!

Use the interaction equation to check if the pin connections can withstand the loads!

Unless otherwise stated, all dimensions are in mm.

9.4 Connecting Walers on top of one another

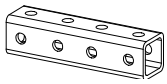
Two Walers L can be connected one on top of the other, parallel or crosswise using, the IK Adapter L.

The following Walers can be connected to one another using the IK Adapter M/L.

- 2no. Walers M on top of each another, parallel or crosswise
- 1no. Waler L on 1no. Waler M, parallel or crosswise

9.4.1 Connecting 2no. Walers

Components needed:

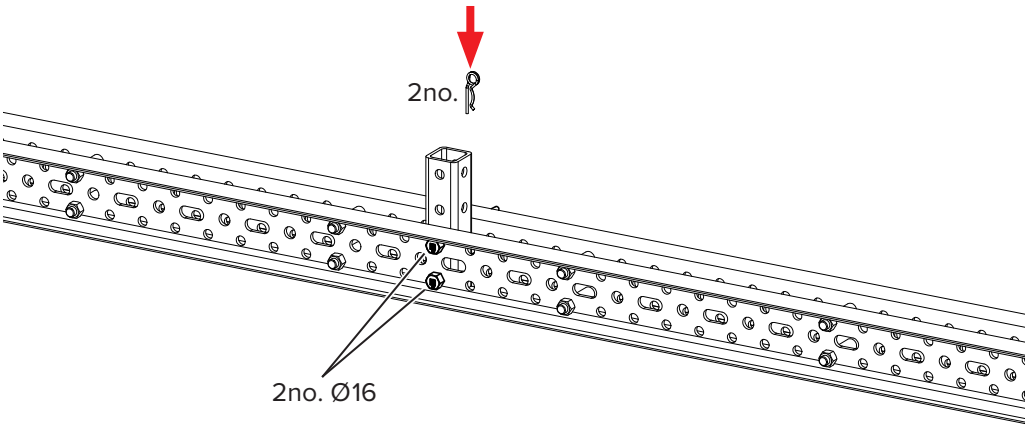


1no. IK Adaptor L
(code:608480)

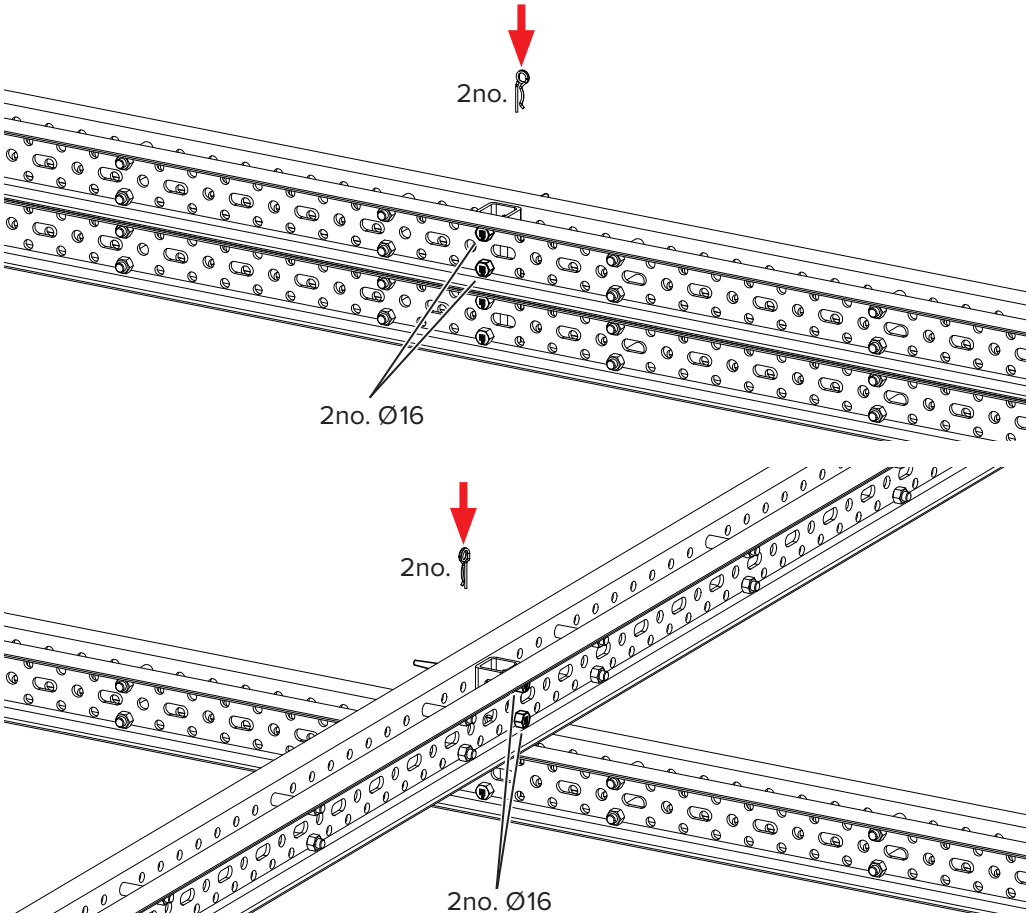
4no. IK Pins Ø16
(code:608816)

4no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Adaptor L into the first Waler L and fasten with 2no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



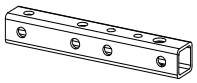
Step 2 Slide the second Waler L over the IK Adapter L, parallel or crosswise. Use 2no. IK Pins Ø16 to secure the IK Waler L. Secure the IK Pins with the Spring Cotter Pins.



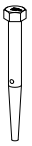
Unless otherwise stated, all dimensions are in mm.

9.4.2 Connecting 2no. Walers parallel to one another

Components needed:



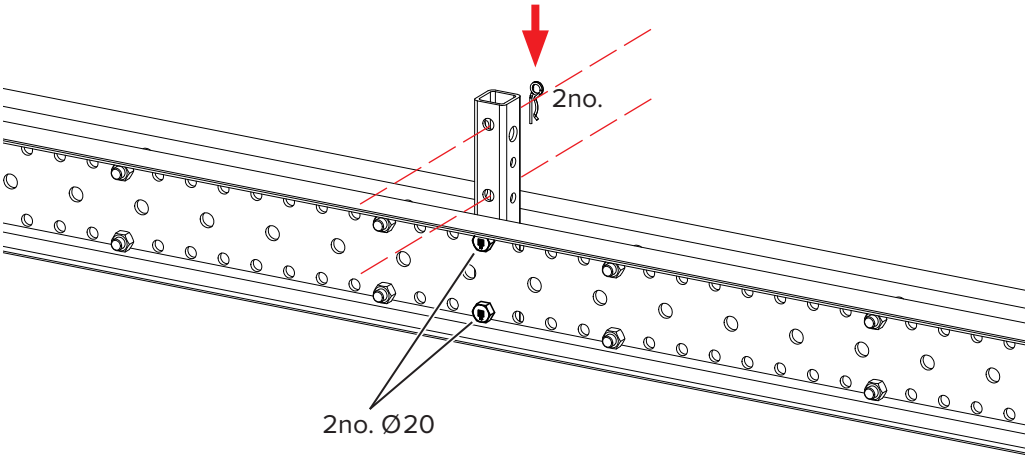
1no. IK Adaptor M/L
(code:608770)



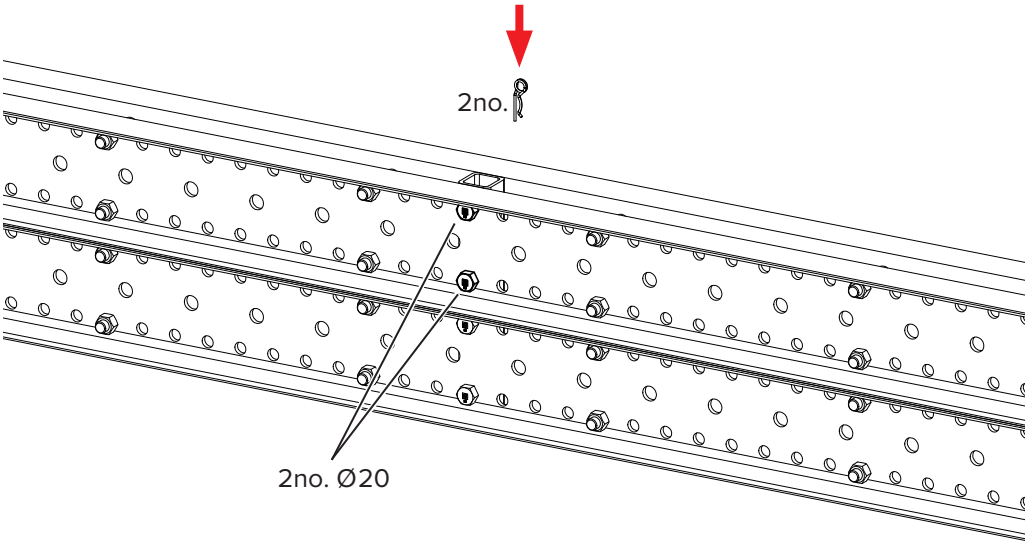
4no. IK Pins Ø20
(code:608820)

4no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Adaptor M/L into the first Waler M and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins. Ensure that the IK Adapter M/L is positioned such that the holes Ø20 are perpendicular to the Waler M.

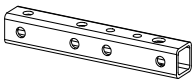


Step 2 Slide the second Waler M over the IK Adapter M, parallel to the first waler. Use 2no. IK Pins Ø20 to secure the IK Waler M. Secure the IK Pins with the Spring Cotter Pins.

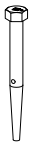


9.4.3 Connecting 2no. walers crosswise

Components needed:



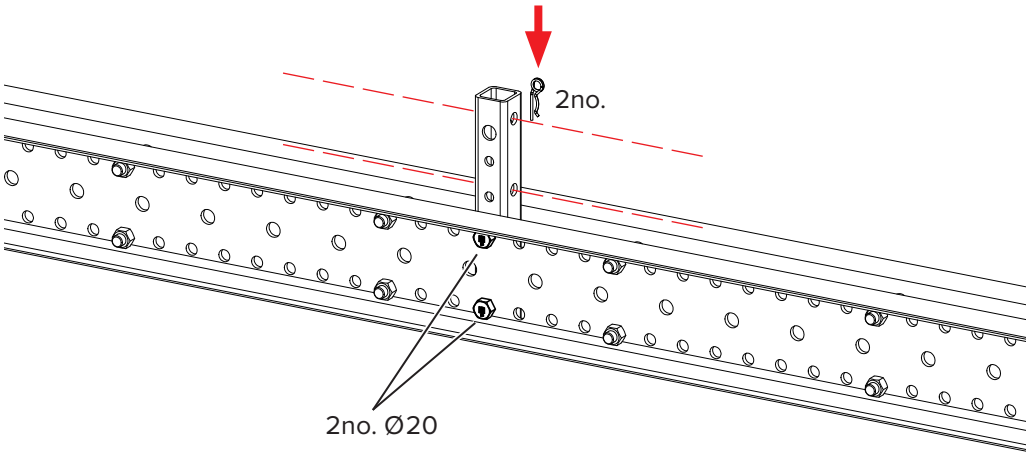
1no. IK Adaptor M/L
(code:608770)



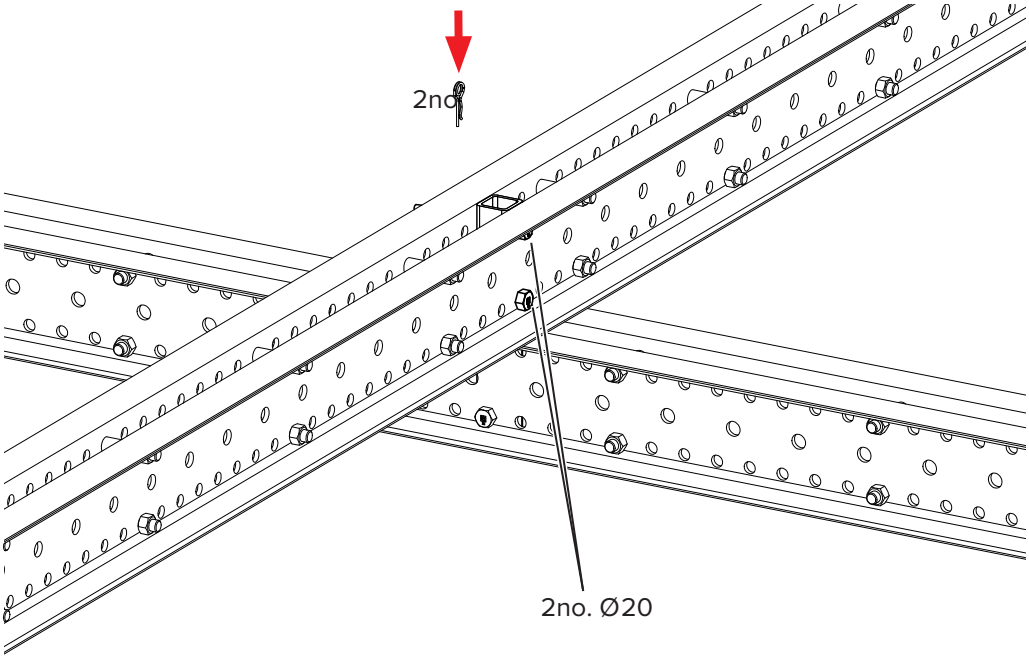
4no. IK Pins Ø20
(code:608820)

4no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Adaptor M/L into the first Waler M and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins. Ensure that the IK Adapter M/L is positioned such that the holes Ø20 are parallel to the Waler M.



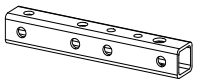
Step 2 Slide the second IK Waler M crosswise over the IK Adapter M/L. Use 2no. IK Pins Ø20 to secure the IK Waler M. Secure the IK Pins with the Spring Cotter Pins.



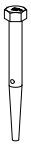
Unless otherwise stated, all dimensions are in mm.

9.4.4 Connecting Waler M to Waler L parallel to one another

Components needed:



1no. IK Adaptor M/L
(code:608770)



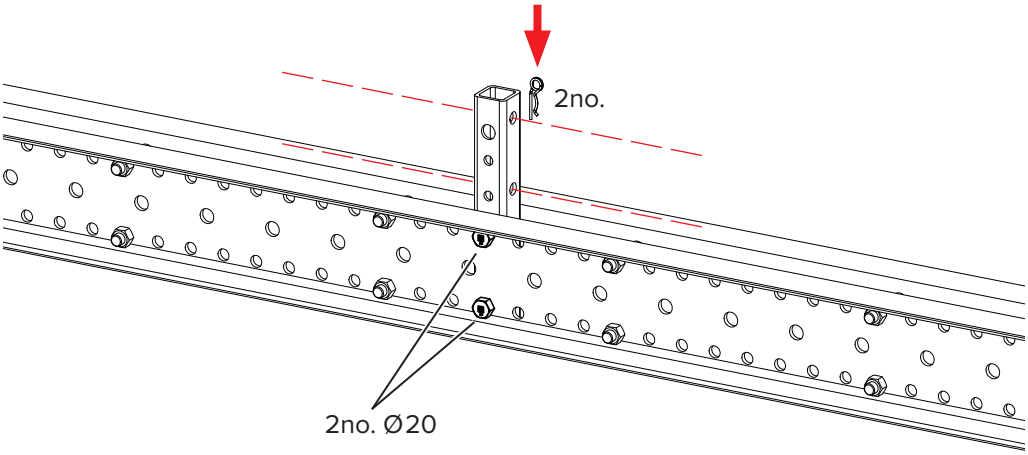
2no. IK Pins Ø25
(code:608825)

2no. Spring Cotter Pins 5
(code:174553)

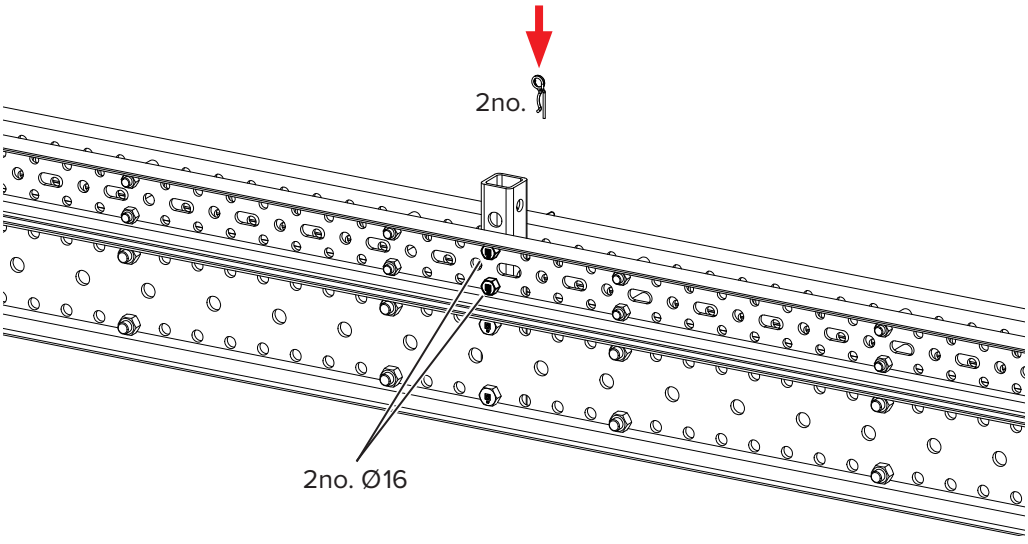
2no. IK Pins Ø16
(code:608816)

2no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Adaptor M/L into the Waler M and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins. Ensure that the IK Adapter M/L is positioned such that the holes Ø20 are parallel to the Waler M.

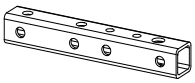


Step 2 Slide the Waler L over the IK Adapter M/L, parallel to the the Waler M. Use 2no. IK Pins Ø16 to secure the IK Waler L. Secure the IK Pins with the Spring Cotter Pins.

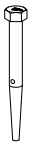


9.4.5 Connecting Waler M to Waler L crosswise

Components needed:

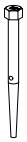


1no. IK Adaptor M/L
(code:608770)



2no. IK Pins Ø25
(code:608825)

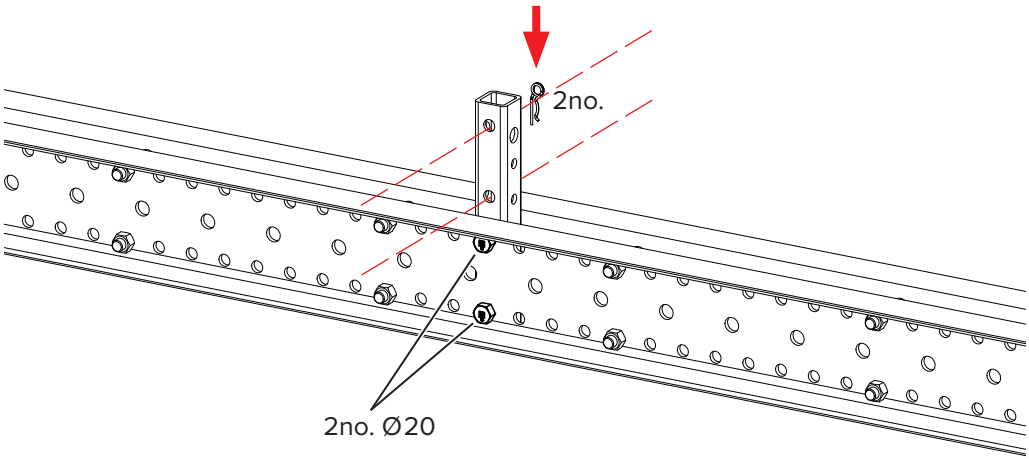
2no. Spring Cotter Pins 5
(code:174553)



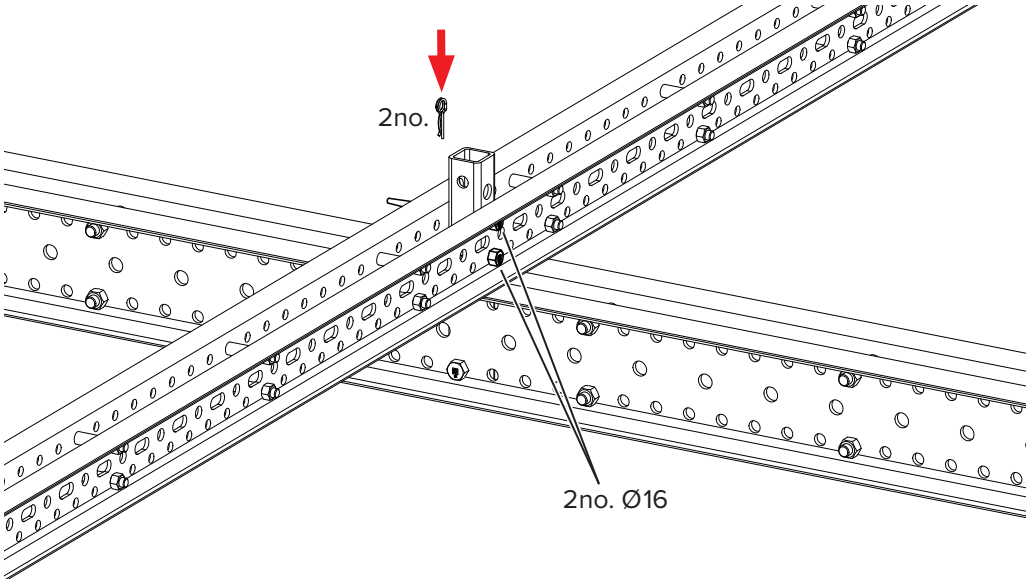
2no. IK Pins Ø16
(code:608816)

2no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Adaptor M/L into the Waler M and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins. Ensure that the IK Adapter M/L is positioned such that the holes Ø20 are perpendicular to the Waler M.



Step 2 Slide the Waler L crosswise over the IK Adapter M/L. Use 2no. IK Pins Ø16 to secure the IK Waler L. Secure the IK Pins with the Spring Cotter Pins.



Unless otherwise stated, all dimensions are in mm.

9.5 Articulated connection of walers

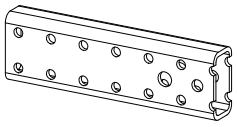
The following articulated connections can be created:

- Connecting an IK Waler L to an IK Waler L or an IK Waler M (using the IK Waler Connector Flex L)
- Connecting an IK Waler M to an IK Waler M or an IK Waler L (using the IK Waler Connector Flex M)
- Connecting an IK Waler L/M to an IK Waler L/M (using the IK Adjustable Connector L/M)
- Connecting an IK Waler L directly to an IK Waler M or an IK Waler L (using the IK Adaptor L)

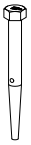
The Adjustable Connector can also be adjusted, allowing the walers to be connected outside of the hole grid.

9.5.1 Connecting IK Waler L to IK Waler L or Waler M (using Waler Connector Flex L)

Components needed:



1no. IK Waler Connector Flex L
(code:608490)

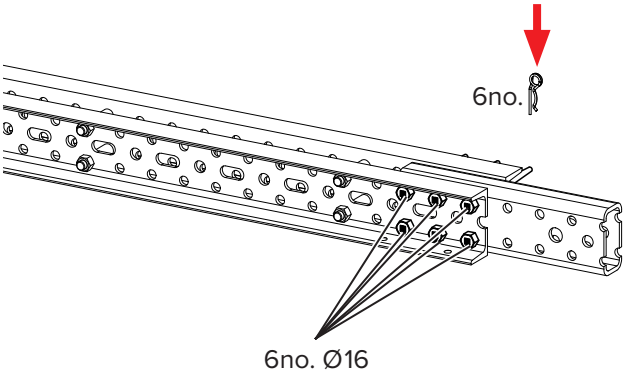


1no. IK Pin Ø20
(code:608820)
or 1no. IK Pin Ø25
(code:608825)

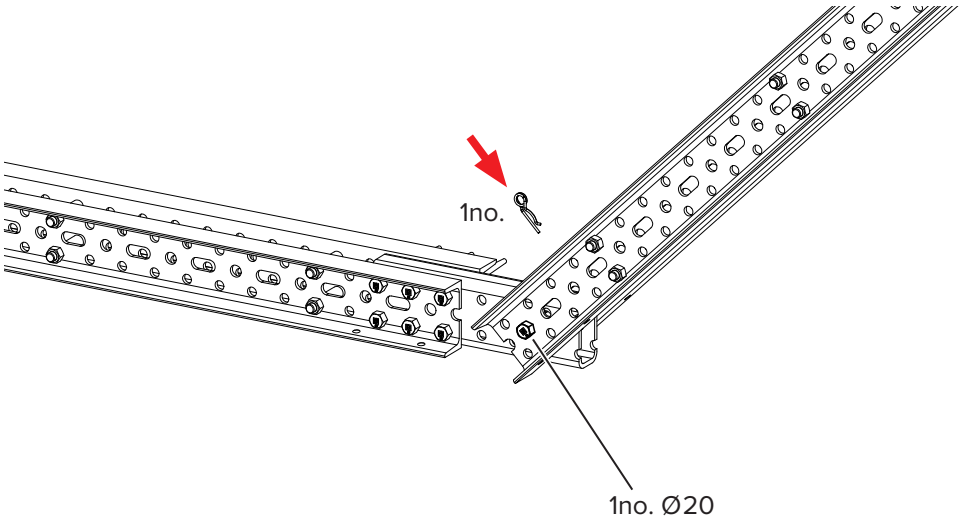
6no. IK Pins Ø16
(code:608816)

7no. Spring Cotter Pins 4
(code:173776)
or 6no. Spring Cotter Pins 4
and 1no. Spring Cotter Pin 5
(code:174553)

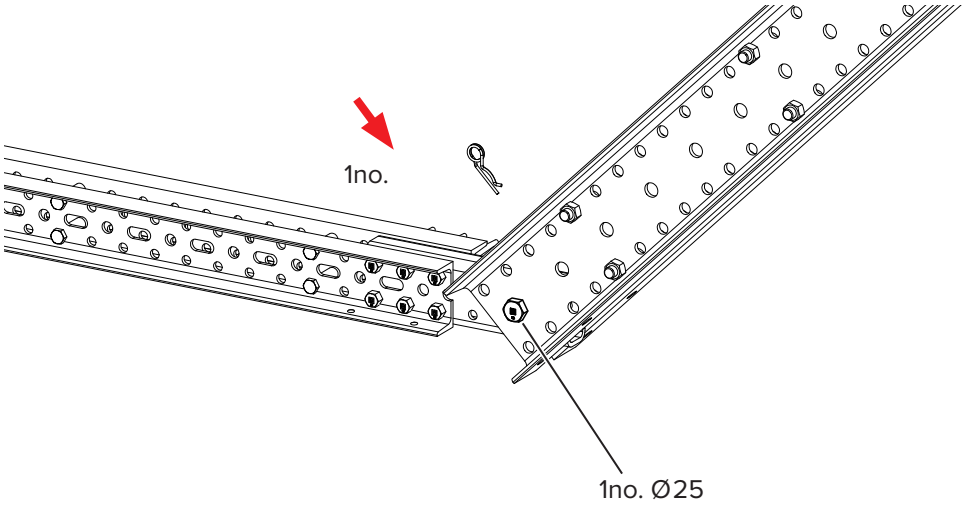
Step 1 Insert the IK Waler Connector Flex L into the first Waler L and fasten with 6no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Slide the second Waler L over the IK Waler Connector Flex L and fasten with 1no. IK Pin Ø20. Secure the IK Pins with the Spring Cotter Pins.



Or slide Waler M over the IK Waler Connector Flex L and fasten with 1no. IK Pin Ø25. Secure the IK Pins with the Spring Cotter Pins.

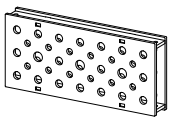


Unless otherwise stated, all dimensions are in mm.

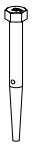
9.5.2 Connecting Waler M to Waler M or Waler L (using Waler Connector Flex M)

The walers used and the required angle between them will dictate how deep the IK Waler Connector Flex M is inserted on the walers.

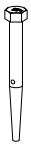
Components needed:



1no. IK Waler Connector Flex M (code:608485)



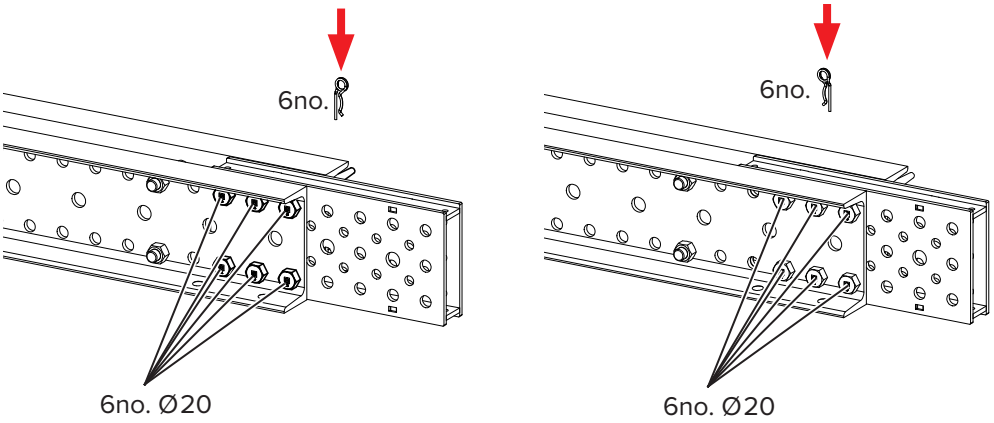
6no. IK Pins Ø20 (code:608820)



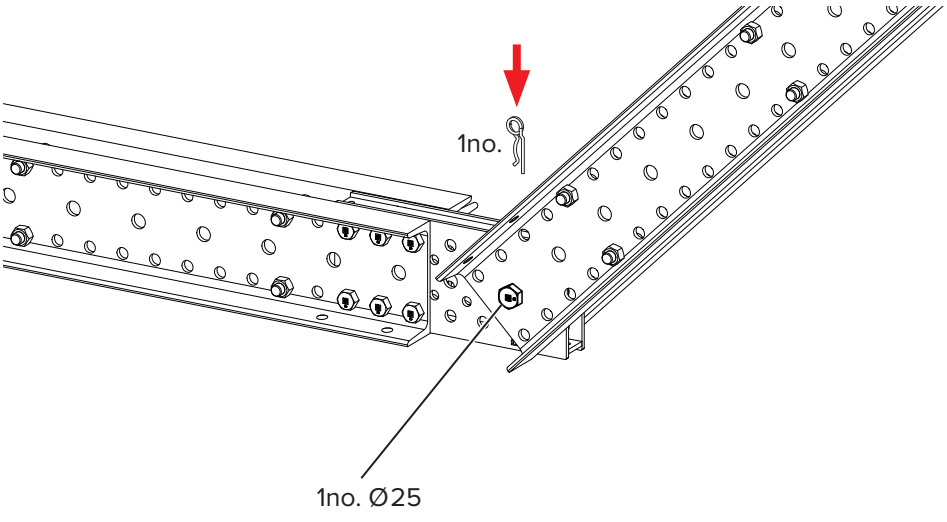
1no. IK Pin Ø20 (code:608820) or 1no. IK Pin Ø25 (code:608825)

7no. Spring Cotter Pins 4 (code:173776) or 6no. Spring Cotter Pins 4 and 1no. Spring Cotter Pin 5 (code:174553)

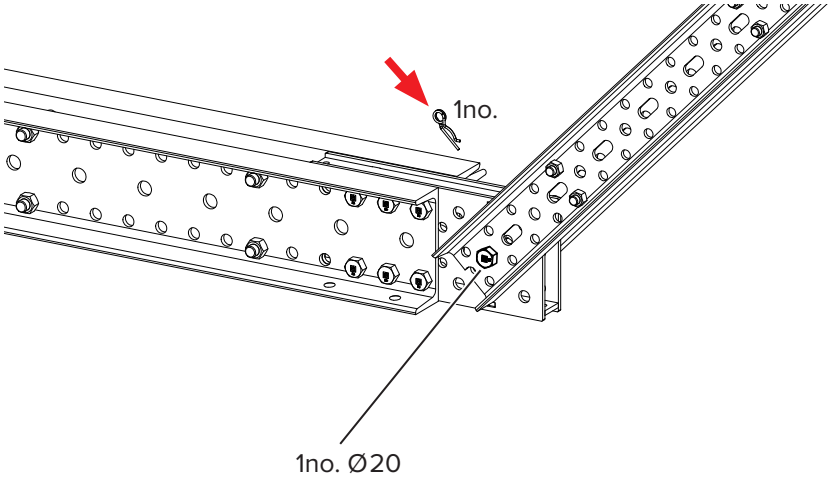
Step 1 Insert the IK Waler Connector Flex M into the first Waler M and fasten with 6no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins. Position the Waler Connector Flex as needed.



Step 2 Slide the second IK Waler M over the Waler Connector Flex M and fasten in a suitable hole with 1no. IK Pin Ø25. Secure the IK Pins with the Spring Cotter Pins.



Or slide the Waler L over the Waler Connector Flex M and fasten in a suitable hole with 1no. IK Pin Ø20. Secure the IK Pins with the Spring Cotter Pins.



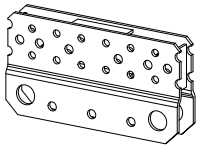
9.5.3 Connecting an IK Waler L/M to an IK Waler L/M (using the IK Adjustable Connector) (code:608850)

A Waler M can be connected to a Waler L using the Adjustable Connector. The Adjustable Connector can also be adjusted, allowing Walers to be connected outside of the hole grid. How to use the Adjustable Connector is described in Section *Articulated connection (outside the hole grid)* on page 89.

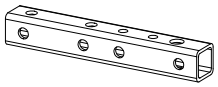
9.5.4 Connecting an IK Waler L to an IK Waler L (using the IK Adaptor M/L)

☞	Verification of cross-section for all three possible resulting stresses (N, V, M) with linear interaction is required!

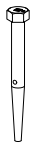
Components needed:



1no. IK Waler Connector L (code:608420)



1no. IK Adaptor M/L (code:608770)

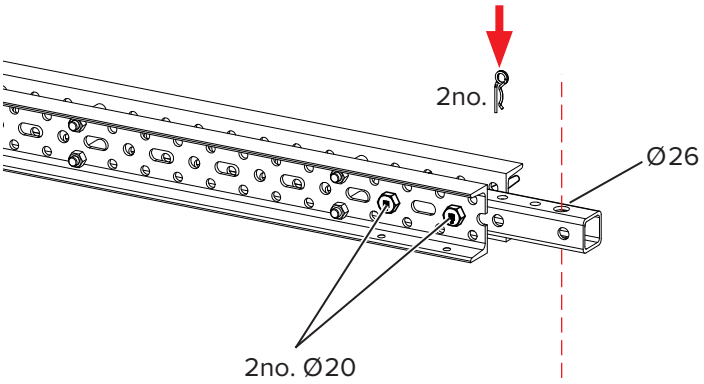


3no. IK Pins Ø20 (code:608821)

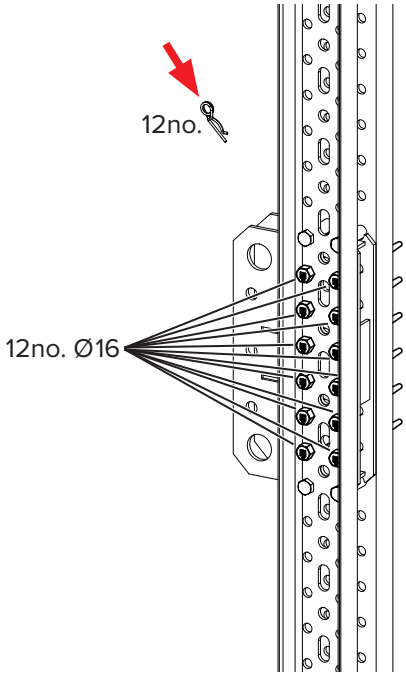
12no. IK Pins Ø16 (code:608816)

15no. Spring Cotter Pins 4 (code:173776)

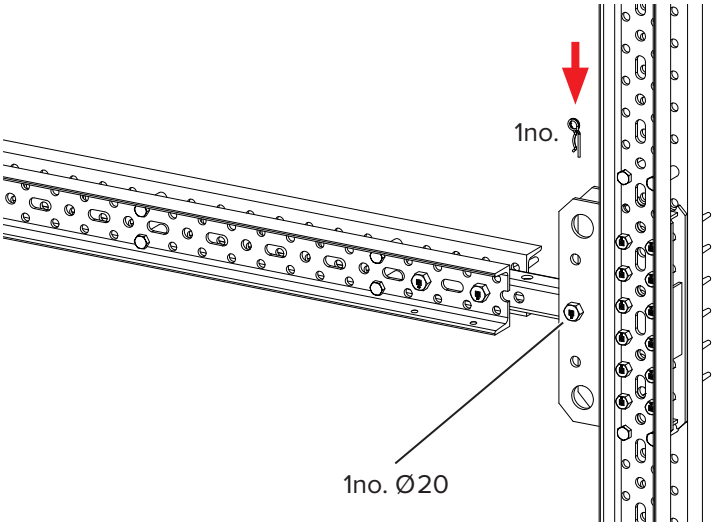
Step 1 Insert the IK Adaptor M/L into an IK Waler L and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins. Verify that the hole Ø26 faces the flange.



Step 2 Insert the IK Waler Connector L into the Waler L and fasten with 12no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



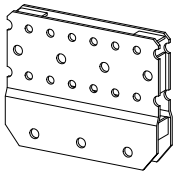
Step 3 Insert the IK Adaptor M/L into the IK Waler Connector L and fasten with 1no. IK Pin Ø20. Secure the IK Pins with the Spring Cotter Pins.



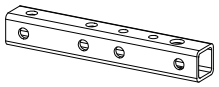
9.5.5 Connecting an IK Waler L to an IK Waler M (using the IK Adaptor M/L)

Verification of cross-section for all three possible resulting stresses (N, V, M) with linear interaction is required!

Components needed:

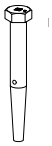


1no. IK Waler Connector M (code:608430)



1no. IK Adaptor M/L (code:608770)

14no. IK Pins Ø20 (code:608821)

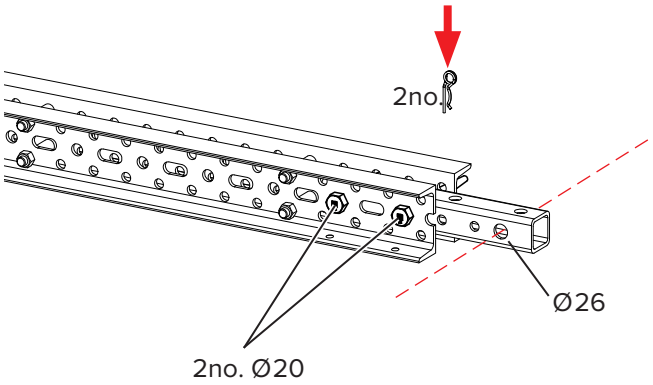


1no. IK Pin Ø25 (code:608825)

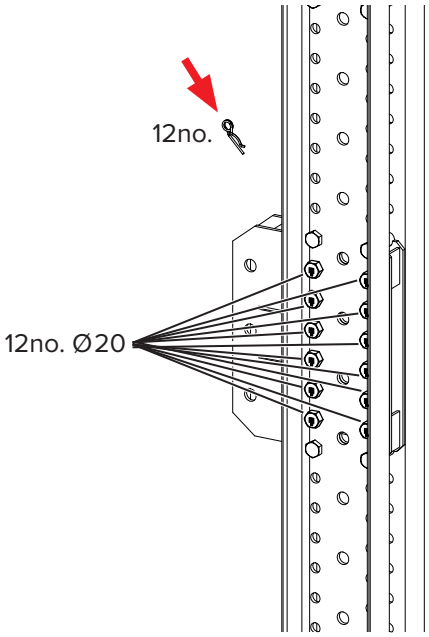
14no. Spring Cotter Pins 4 (code:173776)

1no. Spring Cotter Pin 5 (code:174553)

Step 1 Insert the IK Adaptor M/L into an IK Waler L and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins. Ensure that the hole Ø26 faces the web.

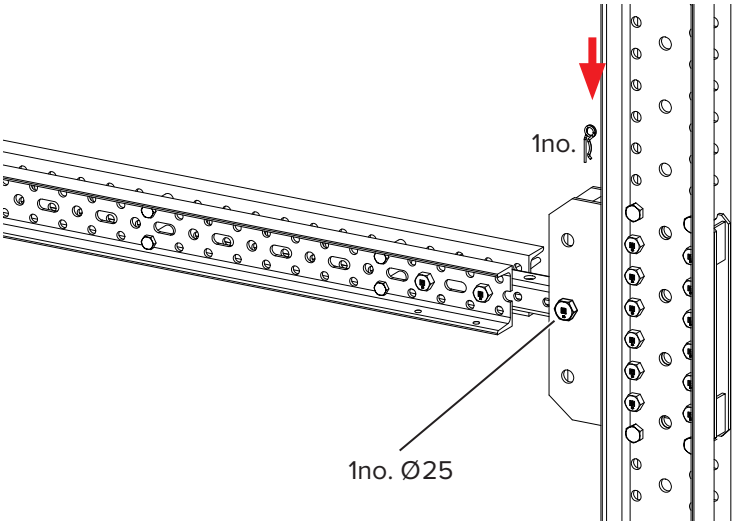


Step 2 Insert the IK Waler Connector L into the IK Waler L and fasten with 12no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



Unless otherwise stated, all dimensions are in mm.

Step 3 Insert the IK Adaptor M/L into the IK Waler Connector and fasten with 1no. IK Pin Ø25. Secure the IK Pins with the Spring Cotter Pins.

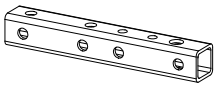


9.5.6 Connecting an IK Waler L directly to an IK Waler L (using the IK Adapter M/L)

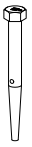
☞	Verification of cross-section for all three possible resulting stresses (N, V, M) with linear interaction is required!

A IK Waler L can be connected directly to a Waler L or e.g. to a spindle connector.

Components needed:



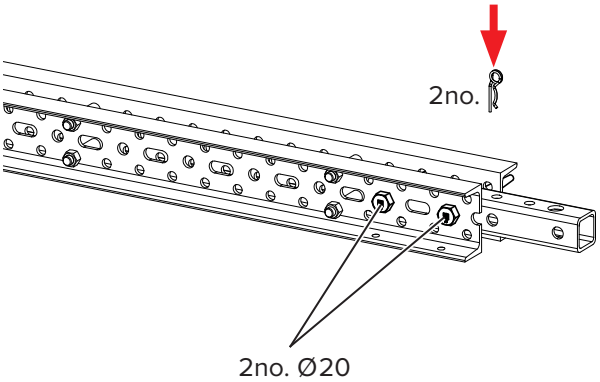
1no. IK Adaptor M/L
(code:608770)



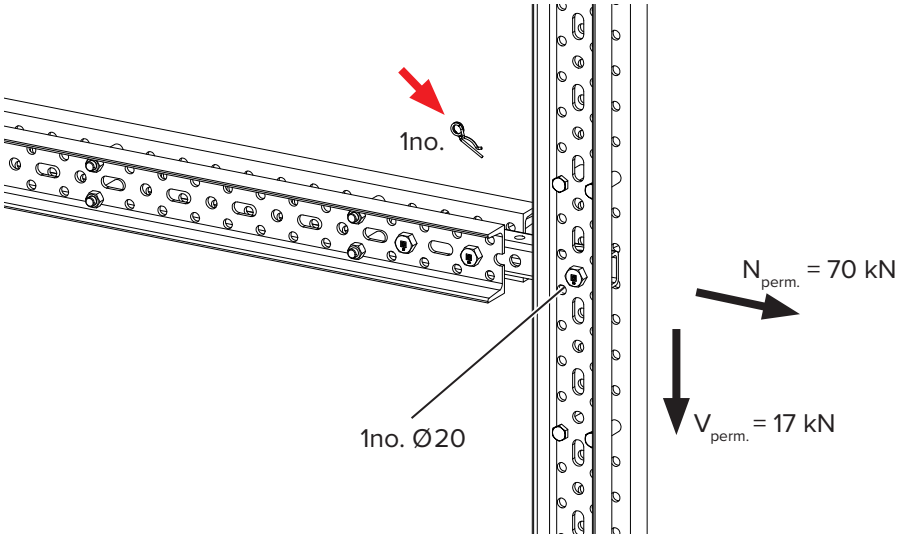
3no. IK Pins Ø20
(code:608821)

3no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Adaptor M/L into an IK Waler L and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Insert the waler and IK Adaptor M/L into the Waler or a spindle connector and secure with 1no. IK Pin Ø20. Secure the IK Pins with the Spring Cotter Pins.



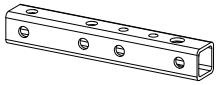
Unless otherwise stated, all dimensions are in mm.

9.5.7 Connecting an IK Waler L directly to an IK Waler M (using IK Adapter L)

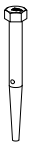
☞	Verification of cross-section for all three possible stress resultants (N, V, M) with linear interaction required!

An IK Waler L can be connected directly to a Waler M or e.g. to a spindle connector.

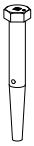
Components needed:



1no. IK Adaptor M/L
(code:608770)



2no. IK Pins Ø20
(code:608820)

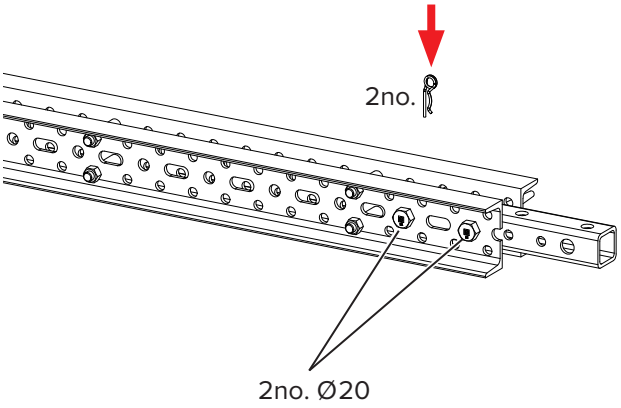


1no. IK Pin Ø25
(code:608825)

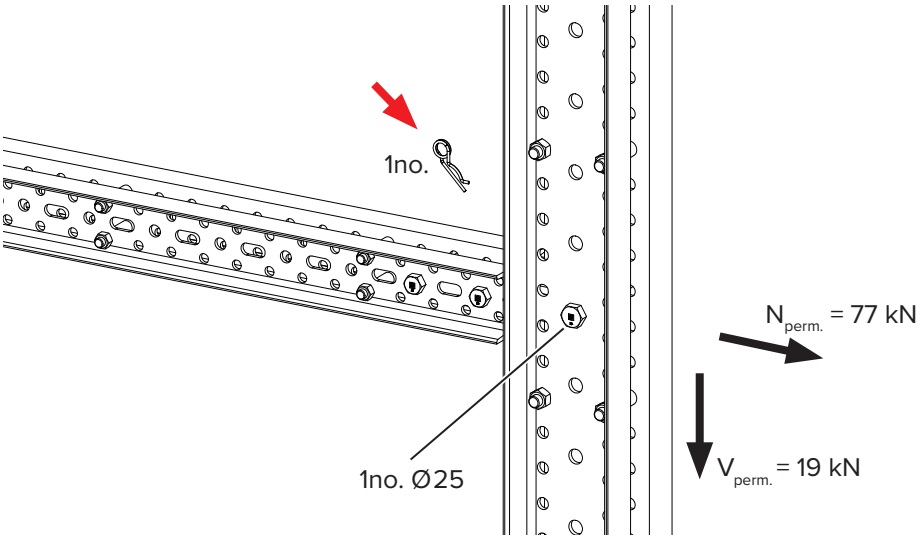
2no. Spring Cotter Pins 4
(code:173776)

1no. Spring Cotter Pin 5
(code:174553)

Step 1 Insert the IK Adaptor M/L into an IK Waler L and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



Step 2 Insert the IK Waler L and the IK Adaptor M/L into the IK Waler M or a spindle connector and secure with 1no. IK Pin Ø25. Secure the IK Pins with the Spring Cotter Pins.



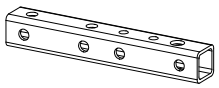
9.6 Articulated connection (using the waler's web)

Additional IK Walers can be connected to the webs of IK Walers using an IK Cross Connector and the IK Adapter M/L.

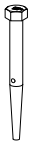
9.6.1 Connecting Waler L to Waler L

This connection can only take axial loads in relation to the waler's length!

Components needed:

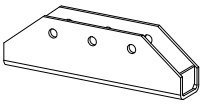


1no. IK Adaptor M/L (code:608770)

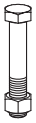


3no. IK Pins Ø20 (code:608820)

3no. Spring Cotter Pins 4 (code:173776)

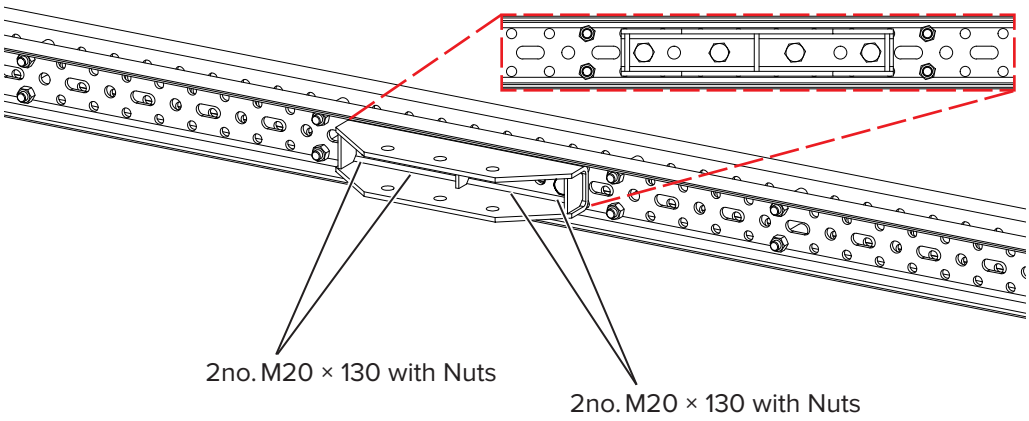


1no. IK Cross Connector L (code:608450)

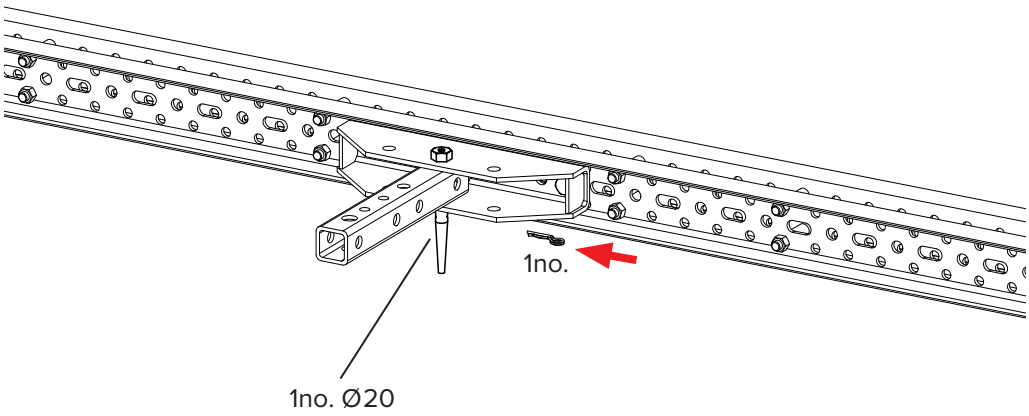


4no. Hex. Bolts M20×130-10.9 (code:608663) and 4no. Hex. Nuts M20-10 (code:608618)

Step 1 Use 4no. Bolts M20 x 130 and Nuts to attach the IK Cross Connector L to an IK Waler L.

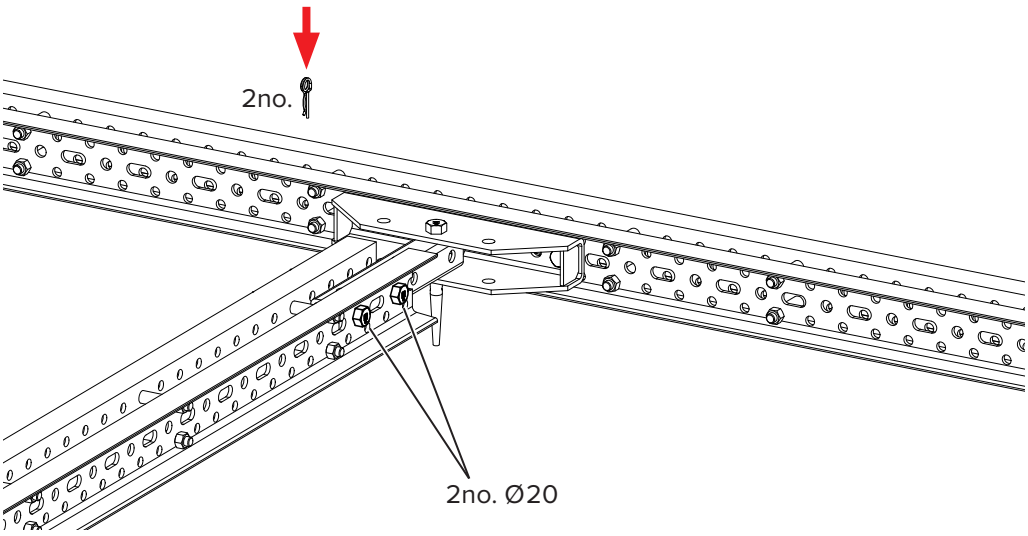


Step 2 Insert the IK Adaptor M/L into the IK Cross Connector L and fasten with 1no. Pin Ø20. Secure the Pin with a Spring Cotter Pin.



Unless otherwise stated, all dimensions are in mm.

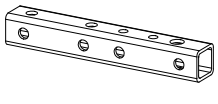
Step 3 Slide the second Waler L over the IK Adapter M/L and fasten with 2no. Pins Ø20. Secure the Pins with the Spring Cotter Pins.



9.6.2 Connecting an IK Waler L to an IK Waler M

This connection can only take axial loads in relation to the waler's length!

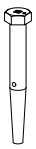
Components needed:



1no. IK Adaptor M/L (code:608770)

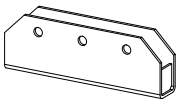
2no. IK Pins Ø20 (code:608820)

2no. Spring Cotter Pins 4 (code:173776)



1no. IK Pin Ø25 (code:608825)

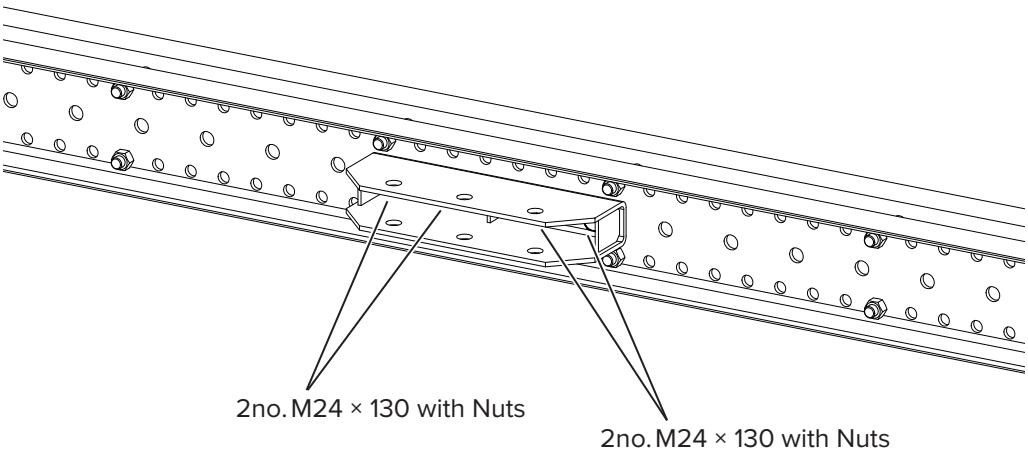
1no. Spring Cotter Pin 5 (code:174553)



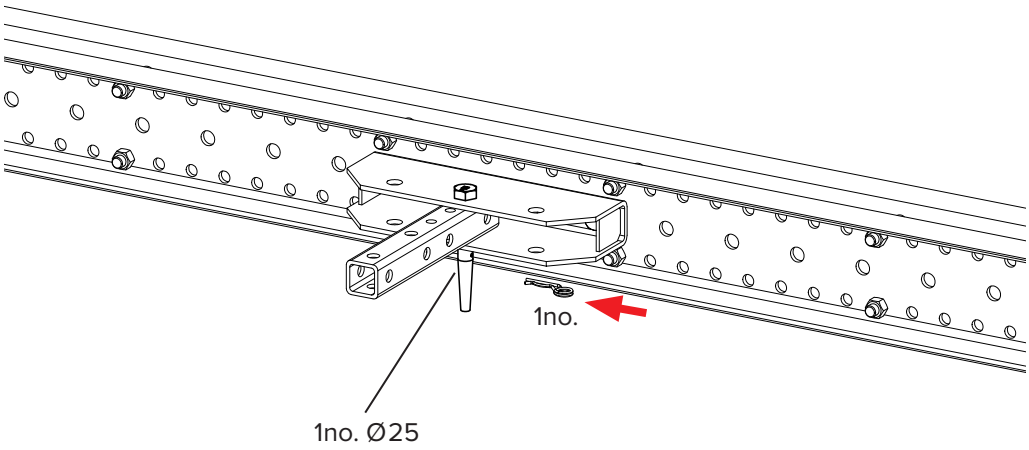
1no. IK Cross Connector M (code:608470)

4no. Hexagon Bolts M24×130 with Nuts (code:608475)

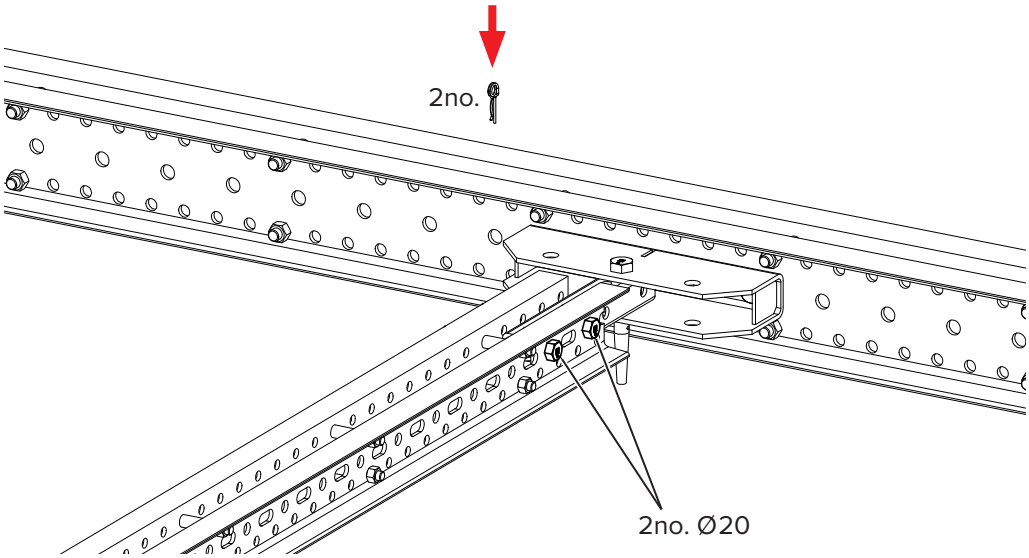
Step 1 Use 4no. Bolts M24 x 130 and Nuts to attach the IK Cross Connector M to a Waler M.



Step 2 Insert the IK Adaptor M/L into the IK Cross Connector M and fasten with 1no. Pin Ø25. Secure the Pin with a Spring Cotter Pin.



Step 3 Slide the Waler L over the IK Adapter M/L and fasten with 2no. Pins Ø20. Secure the Pins with the Spring Cotter Pins.



Unless otherwise stated, all dimensions are in mm.

9.7 Articulated connection (outside the hole grid)

Walers can be connected in an articulated way outside of the hole grid using the IK Adjustable Connector L/M. The IK Adjustable Connector L/M is continuously adjustable. It can be adjusted within a range of 0 to 104 mm.

First attach the IK Adjustable Connector using 2no. IK Pins Ø20. This allows the position of the IK Adjustable Connector to be easily adjusted and additional walers to be connected.

Before load can be applied to the IK Adjustable Connector, it has to be secured at any position with an additional IK Pin Ø20.

The positions of some of the Waler Bolts have to be changed for this connection (Refer to section 9.1 on page 52).

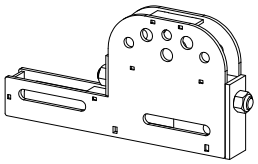
WARNING

Loaded system can fail!

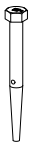
The system with IK Adjustable Connector L/M may only be loaded when the IK Adjustable Connector L/M is secured with an additional third IK Pin Ø20 in the IK Waler at any chosen position (see Step 4).

Benötigte Bauteile:

Bei Anschluss von IK L Gurten



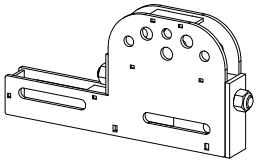
1no. IK Adjustable Connector (code:608850)



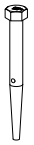
4no. IK Pins Ø20 (code:608820)

4no. Spring Cotter Pins 4 (code:173776)

Bei Anschluss von IK M Gurten

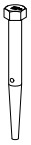


1no. IK Adjustable Connector (code:608850)



3no. IK Pins Ø20 (code:608820)

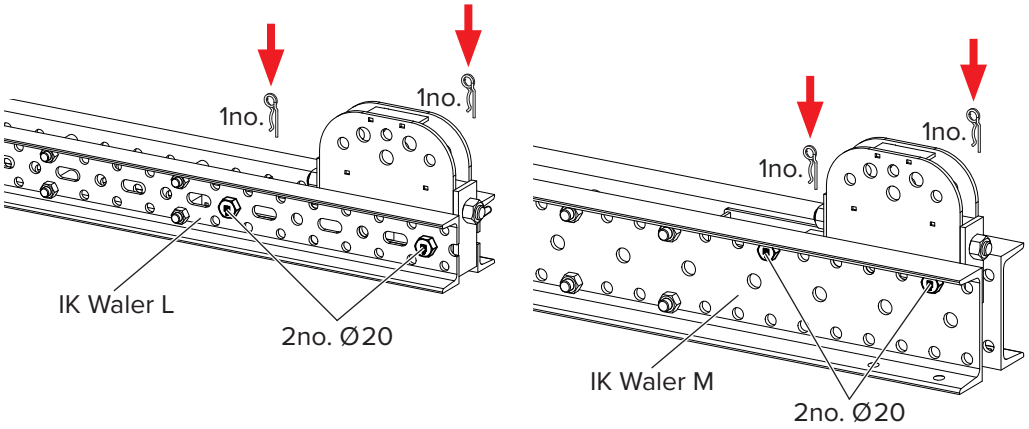
3no. Spring Cotter Pins 4 (code:173776)



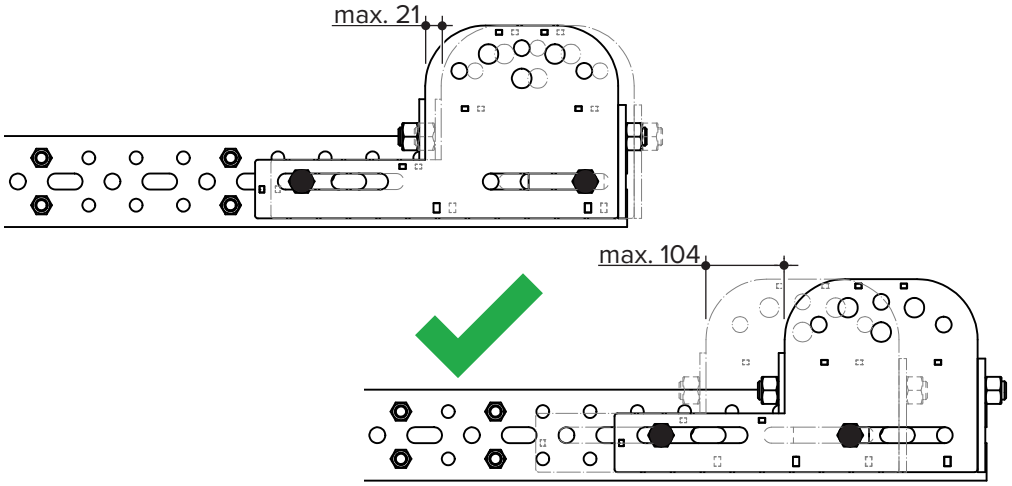
1× IK Pin Ø25 (code:608825)

1× Spring Cotter Pin 5 (code:174553)

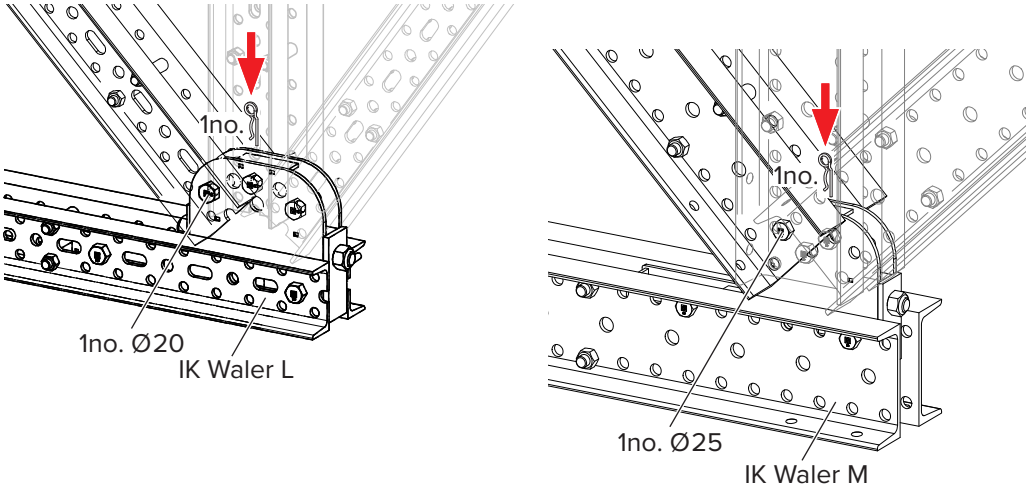
Step 1 Slide the IK Adjustable Connector into the Waler L and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



To use the full adjustment range of the IK Adjustable Connector (see Step 3 on page 91), the two IK Pins must be on the same side of the two slotted holes in the IK Adjustable Connector.

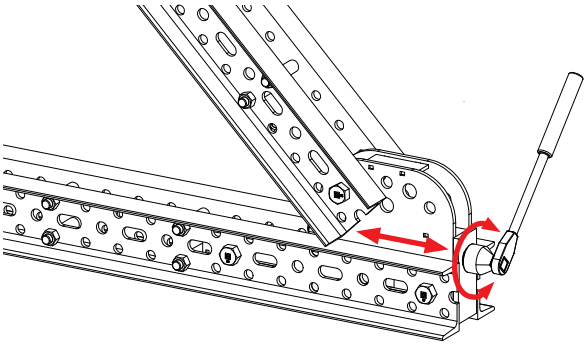


Step 2 Slide the Waler L over the IK Adjustable Connector and fasten with 1no. IK Pin Ø20. Secure the IK Pin with a Spring Cotter Pin.
Alternatively, slide the Waler M over the IK Adjustable Connector and fasten with 1no. IK Pin Ø25.
Secure the IK Pin with a Spring Cotter Pin.

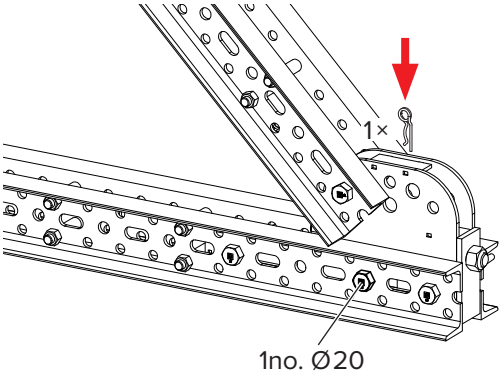


Unless otherwise stated, all dimensions are in mm.

Step 3 Adjust the IK Adjustable Connector L/M laterally according to the requirements.
To do so, place the MANTO Ratchet (code:408780) or a w.a.f. 36 socket wrench on the hexagon nut of the Connector and tighten in the desired direction.
The maximum adjustment range is up to 104 mm, depending on the position of the IK Pins.



Step 4 Insert an additional third IK Pin Ø20 into the IK Waler at any chosen position and secure with a Spring Cotter Pin 4.



10 Preparing base area

The IK Jacks are used to securely position the INFRA-KIT assemblies on the ground and adjust the height.

The IK Wheel Connector and the Heavy-duty Castors can be used to create mobile INFRA-KIT assemblies. Use the IK Jacks to raise and lower the assemblies.

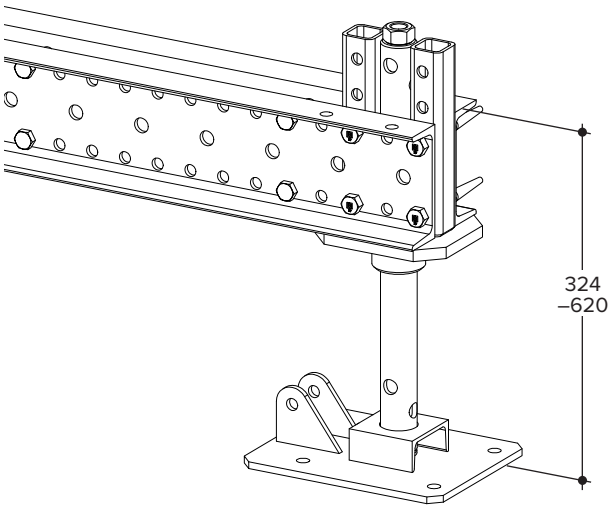
10.1 Attaching and operating the IK Jack 180

The IK Jacks 180 can be attached to horizontal as well as vertical IK Walers M. This section shows how to attach to a horizontal waler.

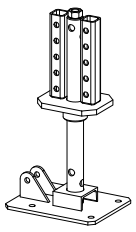
☞	The Waler should normally rest on the support plate. In this case the waler can be secured with IK Pins. If in exceptional cases the upper holes have to be used and the waler cannot rest on the support plate, the waler has to be secured with Bolts M20 × 130-10.9 (code:608663) and Nuts M20-10 (code:608618) instead of with IK Pins!

☞	Ensure that the exact side of the waler is resting on the support plate. On Waler M this is the side without flange bores! This is the only way that the waler can rest completely on the support plate!

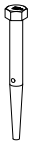
Waler M



Components needed:



1no. IK Jack 180 M
(code:608775)

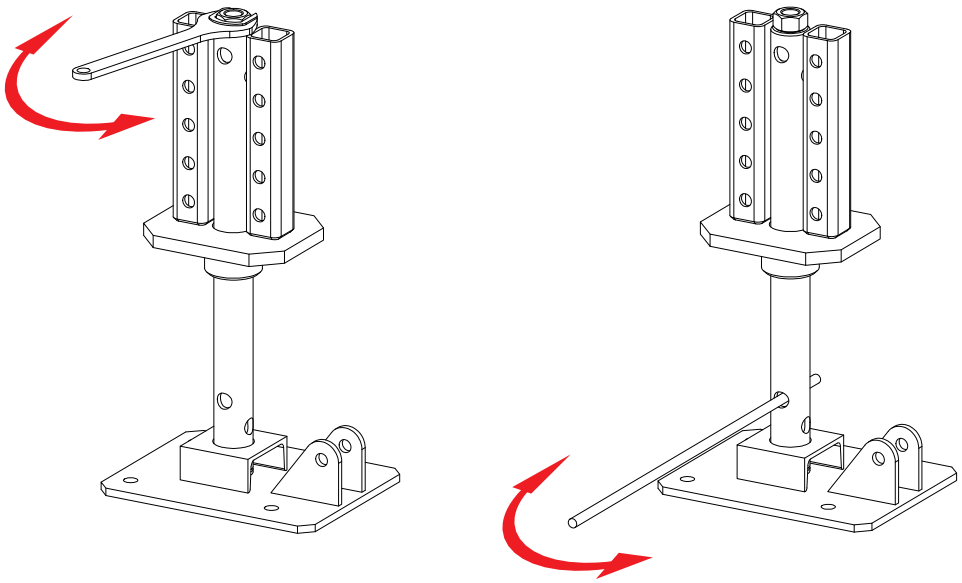


4no. IK Pins Ø20
(code:608820)

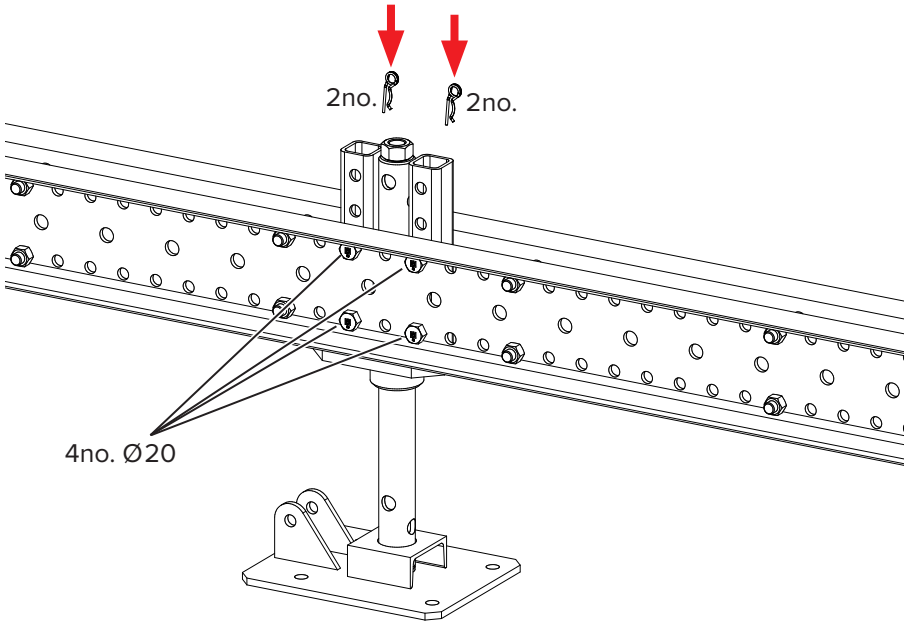
4no. Spring Cotter Pins 4
(code:173776)

Unless otherwise stated, all dimensions are in mm.

Step 1 Set the IK Jack to the desired height. Do this by turning the spindle with a spanner w.a.f. 46 or a suitable tool such as a tie rod.



Step 2 Slide the IK Jack into the Waler M and fasten with 4no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



10.2 Attaching and operating the IK Jack 500 H

The IK Jack 500 H (code:608690) is used to vertically adjust the height of INFRA-KIT main beams attached to the jack. A suitable standard lifting mechanism is needed to operate the jack when it is subjected to load. Loads of up to 500 kN can be lifted or lowered by 135 mm in conjunction with the INFRA-KIT system.

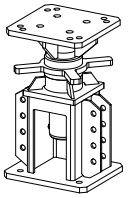
When a IK Jack 500 Adaptor M (code:608671) is connected to the IK Jack 500 H, it can also be used for IK Walers M.

10.2.1 On the INFRA-KIT Main Beam (waler H)

INFRA-KIT main beams can be attached to the IK Jack 500 H both vertically and horizontally. Depending on the position, use either 4no. M20 bolts with nuts (Load-bearing Frame Prop Bolt Set, code:603697) or 4no. M24 bolts with nuts (Main Beam Joint Bolt Set, code:603696).

Attaching to the base of a horizontal INFRA-KIT main beam

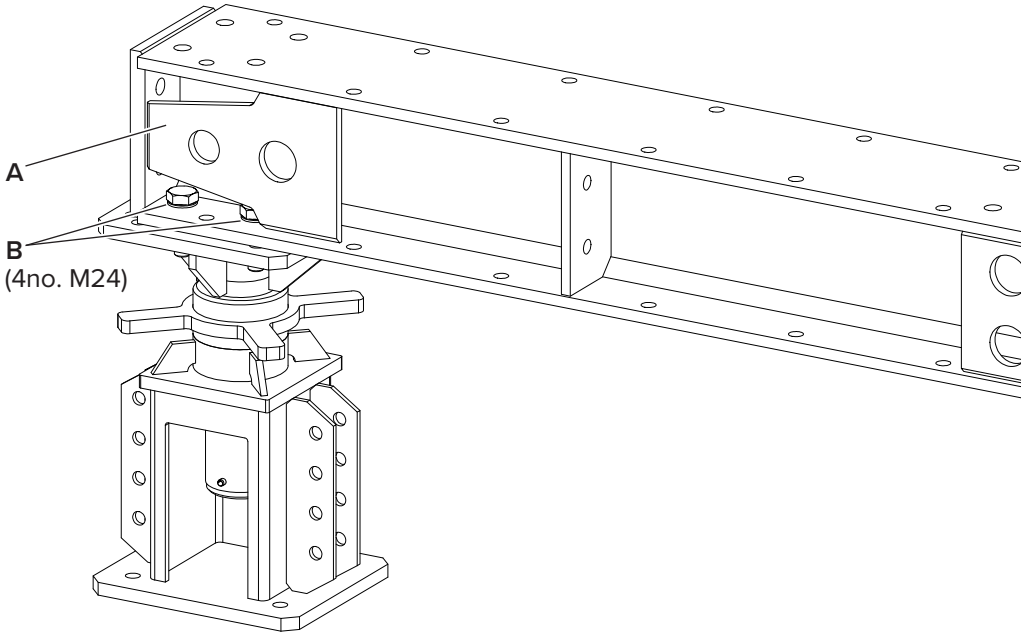
Components needed:



1no. IK Jack 500 H
(code:608690)

1no. Main Beam Joint Bolt Set
(code:603696)

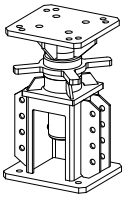
Step 1 Attach the INFRA-KIT main beam (**A**) to the upper plate of the IK Jack 500 H using the Main Beam Joint Bolt Set (**B**, code:603696).



Unless otherwise stated, all dimensions are in mm.

Attaching in the middle area of a horizontal INFRA-KIT main beam

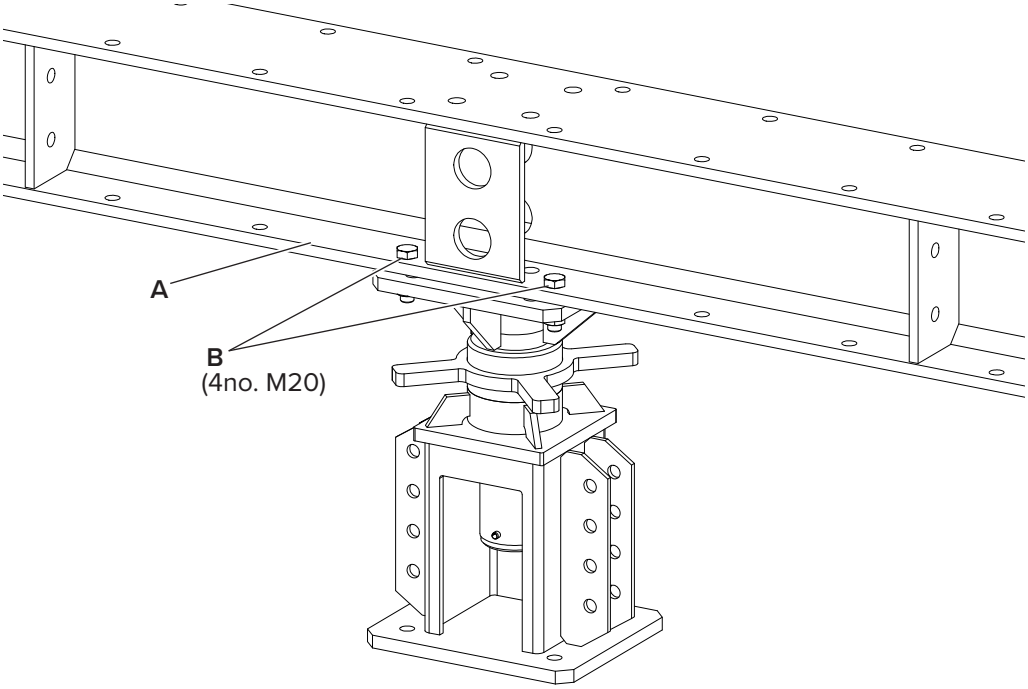
Components needed:



1no. IK Jack 500 H
(code:608690)

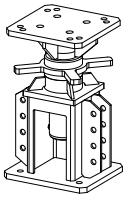
1no. Load-bearing Frame Prop Bolt Set
(code:603697)

Step 1 Attach the INFRA-KIT main beam (**A**) to the upper plate of the IK Jack 500 H using the Load-bearing Frame Prop Bolt Set (**B**, code:603697).



Attaching to a vertical INFRA-KIT main beam

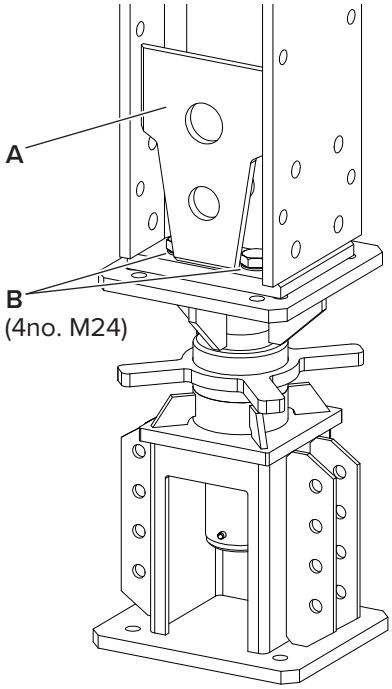
Components needed:



1no. IK Jack 500 H
(code:608690)

1no. Main Beam Joint Bolt Set
(code:603696)

Step 1 Attach the head plate of the INFRA-KIT main beam (**A**) to the upper plate of the IK Jack 500 H using the Main Beam Joint Bolt Set (**B**, code:603696).



Unless otherwise stated, all dimensions are in mm.

10.2.2 On the IK Waler M

IK Walers M can be attached to the IK Jack 500 H using the IK Jack 500 Adaptor M.

The SWL of the IK Jack 500 H can only be fully utilized if the IK Walers M are attached to the IK Jack 500 Adaptor M using 6no. IK Pins Ø20 (code:608820).

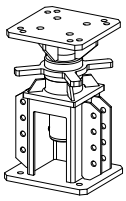
If fewer IK Pins Ø20 are used, the SWL is reduced. A compression force of 108 kN can be transferred per pin.

The SWL of the IK Jack 500 H is 500 kN.

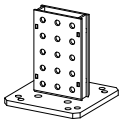
Make sure that the exact side of the waler always rests on the support plate. On IK Walers M, this is the side that has no flange holes (see chapter 7.1 on page 35)! By this it is ensured that the waler rests completely on the support plate!

Attaching to the IK Jack 500 H

Components needed:



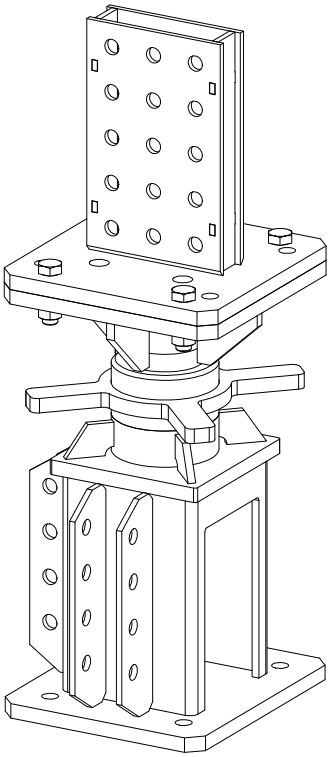
1no. IK Jack 500 H (code:608690)



1no. IK Jack 500 Adaptor M (code:608671)

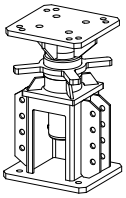
1no. Load-bearing Frame Prop Bolt Set (code:603697) or 1no. Main Beam Joint Bolt Set (code:603696)

Step 1 Attach the IK Jack 500 Adaptor M to the IK Jack 500 H using 4no. M20 or M24 bolts.

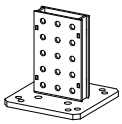


Attaching in the middle area of a horizontal IK Waler M

Components needed:



1no. IK Jack 500 H
(code:608690)



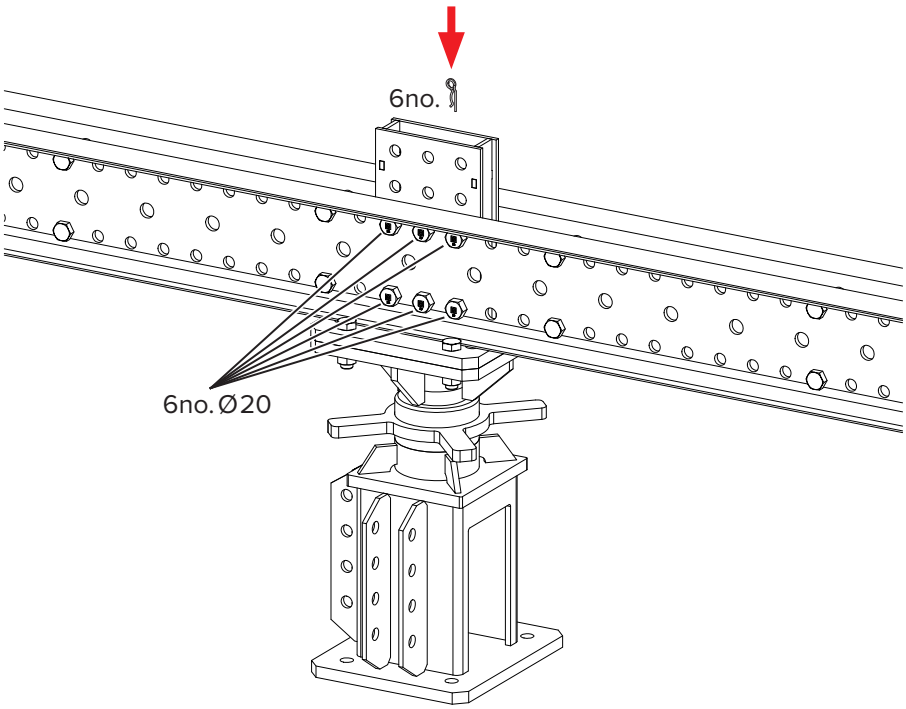
1no. IK Jack 500 Adaptor M
(code:608671)

1no. Load-bearing Frame Prop Bolt Set
(code:603697)
or 1no. Main Beam Joint Bolt Set
(code:603696)

6no. IK Pin Ø20
(code:608820)

6no. Spring Pin Ø4
(code:173776)

Step 1 Slide the IK Waler M over the IK Jack 500 Adaptor M and fasten with 6no. IK Pin Ø20. Secure the IK Pins with Spring Pins.



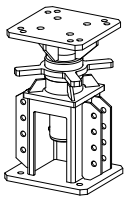
Unless otherwise stated, all dimensions are in mm.

Attaching to IK Waler M in L-arrangement

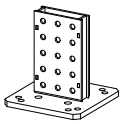
The SWL of the vertical IK Waler M in the application shown below is 432 kN.

When the vertical IK Waler M is fully utilized, the permissible shear force of the horizontal IK Waler M can therefore only be a maximum of 68 kN.

Components needed:

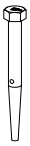


1no. IK Jack 500 H
(code:608690)



1no. IK Jack 500 Adaptor M
(code:608671)

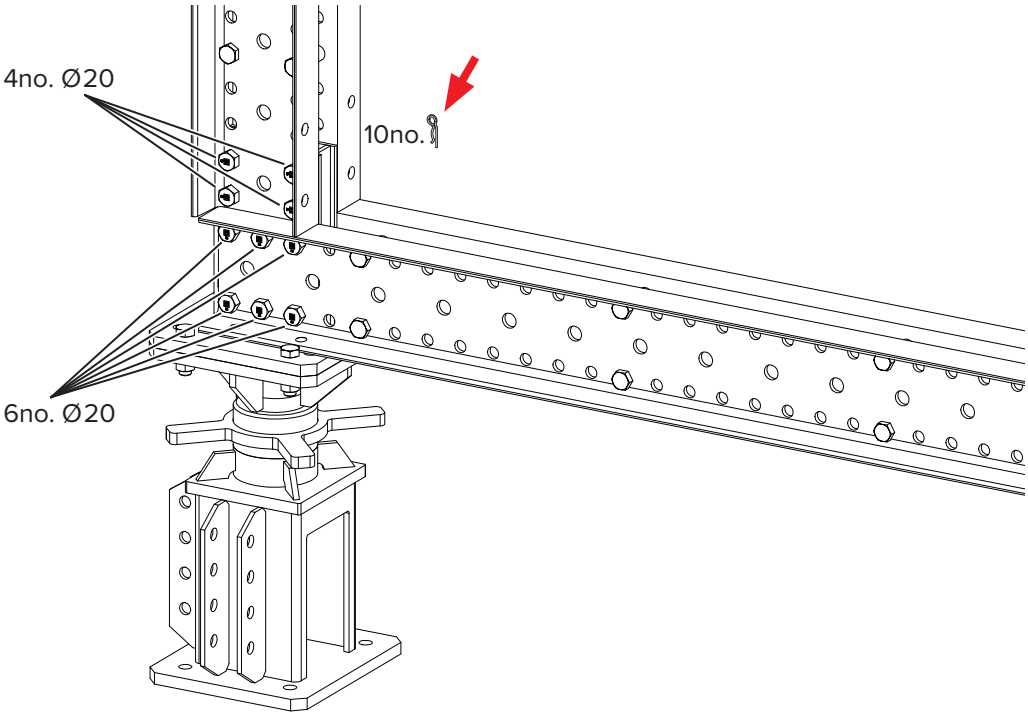
1no. Load-bearing Frame Prop Bolt Set
(code:603697)
or 1no. Main Beam Joint Bolt Set
(code:603696)



10no. IK Pin Ø20
(code:608820)

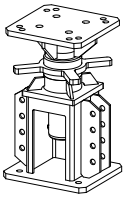
10no. Spring Pin Ø4
(code:173776)

Step 1 Slide the IK Walers M onto the IK Jack 500 Adaptor M and fasten with 10no. IK Pins Ø20. Secure all IK Pins with Spring Pins.

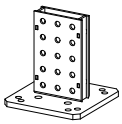


Attaching to a vertical IK Waler M

Components needed:



1no. IK Jack 500 H
(code:608690)



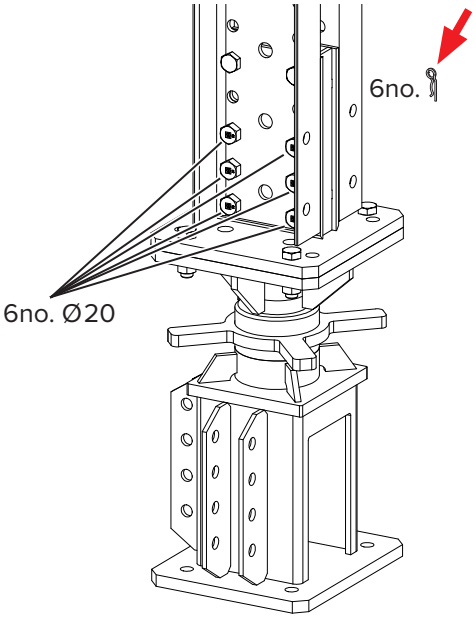
1no. IK Jack 500 Adaptor M
(code:608671)

1no. Load-bearing Frame Prop Bolt Set
(code:603697)
or 1no. Main Beam Joint Bolt Set
(code:603696)

6no. IK Pin Ø20
(code:608820)

6no. Spring Pin Ø4
(code:173776)

Step 1 Slide the IK Walers M onto the IK Jack 500 Adaptor M and fasten with 6no. IK Pins Ø20. Secure all IK Pins with Spring Pins.



Unless otherwise stated, all dimensions are in mm.

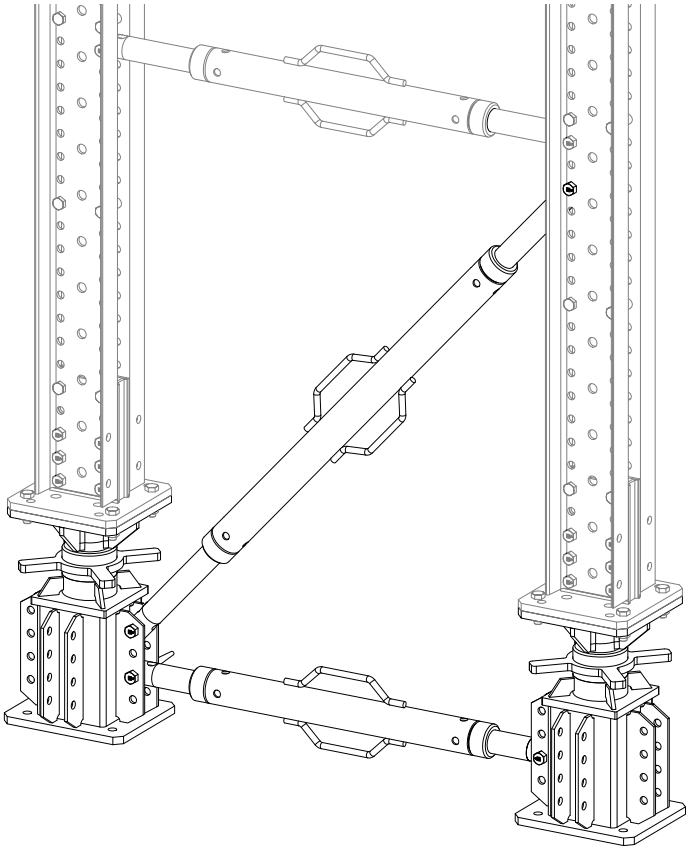
10.2.3 Attaching spindles

IK spindles can be attached to the side profiles of the IK Jack 500 Adaptor M. The SWL of a spindle connection is 108 kN. Comply with the SWL of the IK spindles used, taking into consideration the extension length (see safe working loads in chapter 11.1 on page 108).

If the IK Jack 500 H is not friction-locked to the ground, the H load must be calculated on the basis of the coefficient of friction and the compressive force.

When placed on concrete, the coefficient of friction of μ = 0.2 must be applied.

Example of application:



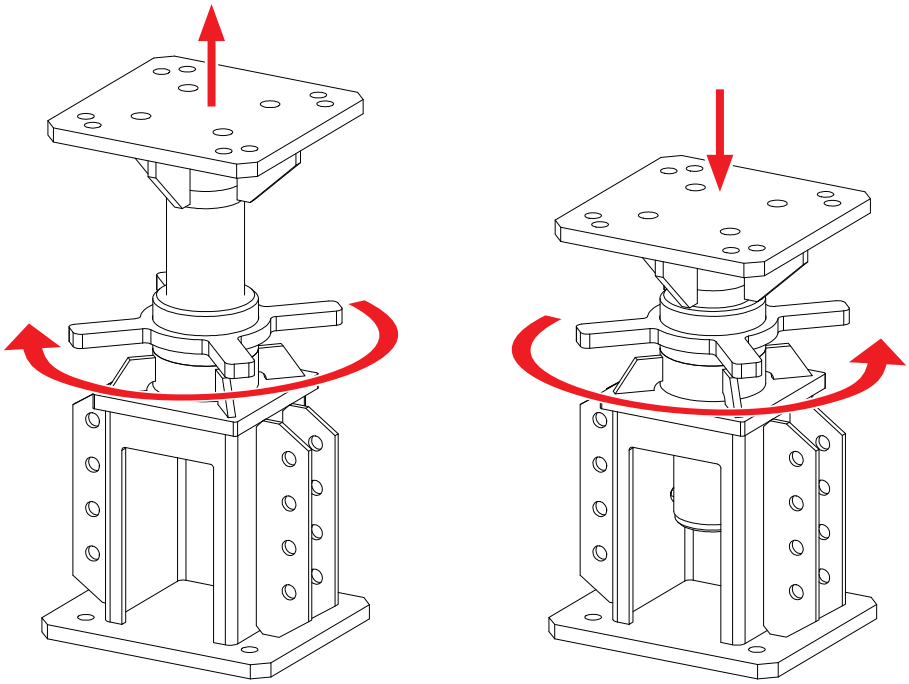
10.2.4 Spindling out and in

When not subjected to load

An IK Jack 500 H that is not subjected to load can be manually extended and retracted using the integrated large wing nut.

Step 1 To extend (raise) the jack, turn the wing nut clockwise.

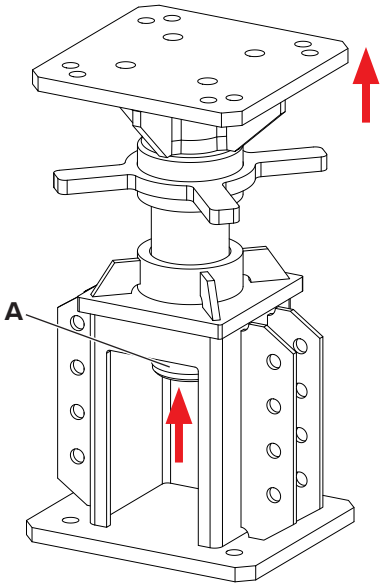
Step 2 To retract (lower) the jack, turn the wing nut counter-clockwise.



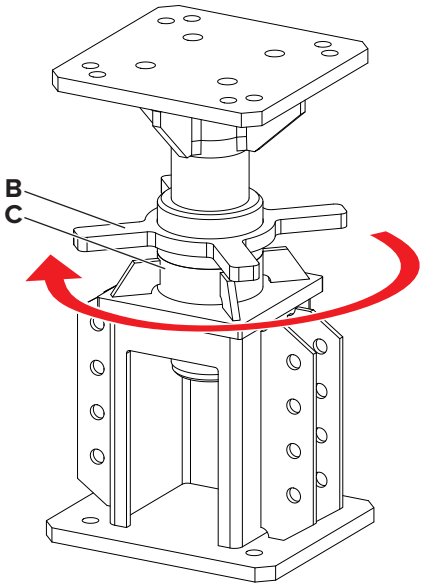
Raising when subjected to load

An IK Jack 500 H that is subjected to load can be extended and retracted using suitable standard lifting mechanisms.

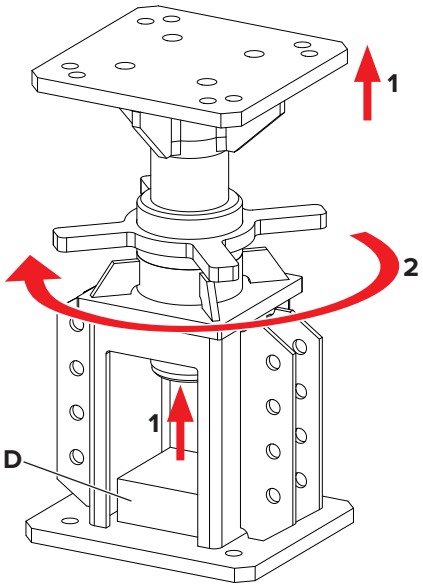
Step 1 Raise the spindle (**A**) of the IK Jack 500 H within the adjustment range of the jack using a suitable lifting mechanism.



Step 2 Turn the wing nut (**B**) clockwise all the way down to the stop on the lower part (**C**). The IK Jack 500 H is now fixed in position.

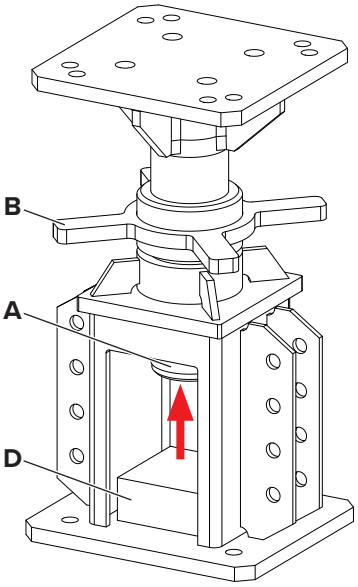


Step 3 Repeat steps 1 and 2 up to the desired height within the adjustment range of the jack. Use a filler piece (**D**) if necessary.



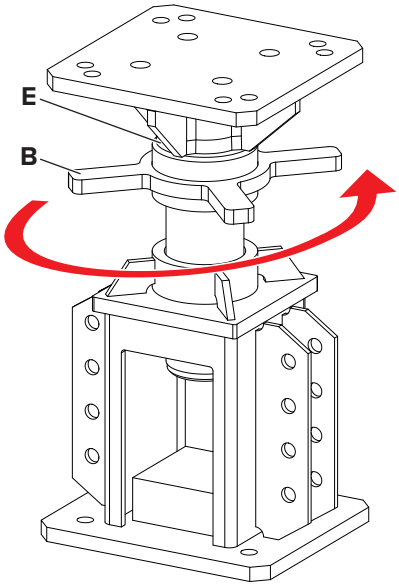
Lowering when subjected to load

Step 1 Raise the spindle (**A**) of the IK Jack 500 H slightly using a suitable lifting mechanism. If necessary, place a filler piece (D) underneath.
This releases the wing nut (**B**) of the jack.



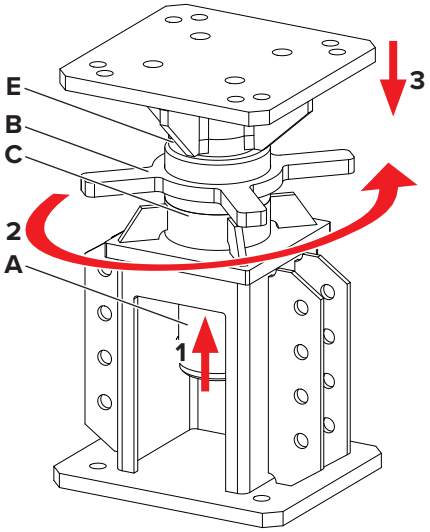
Unless otherwise stated, all dimensions are in mm.

Step 2 Turn the released wing nut (**B**) counter-clockwise all the way to the upper stop (**E**).



Step 3 Lower the spindle (**A**) of the IK Jack 500 H until the desired height is reached or the wing nut rests on the lower part (**C**).

Step 4 To spindle in further, repeat steps 1 to 3 without filler piece down to the desired height within the adjustment range of the foot spindle.

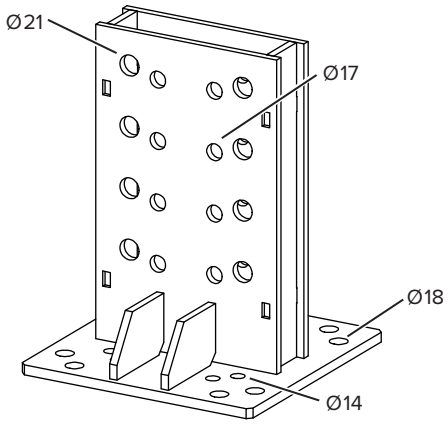


10.3 Attaching the IK Wheel Connector L/M and Heavy-duty Castors

Heavy-duty Castors can be attached to horizontal IK Walers M or L with the IK Wheel Connector L/M (code:608600). The IK Wheel Connector has holes Ø21 for IK Pins Ø20 that enable it to be attached to IK Walers M and holes Ø17 for IK Pins Ø16 that enable it to be attached to IK Walers L. This section shows how to attach to an IK Waler M.

Fist attach the Heavy-duty Castors to the IK Wheel Connector. Then attach both to the Waler.

10.3.1 IK Wheel Connector L/M



10.3.2 Attaching the Heavy-duty Castors to IK Wheel Connector L/M

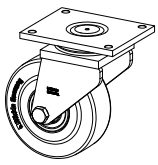
The Heavy-duty Castors can be attached to the IK Wheel Connector L/M. Use the bolts with nyloc nuts and washers indicated below to attach the Heavy-duty Castors.

The following table shows the bolts for the respective castors.

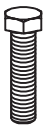
Heavy-duty Castor Load-bearing capacity	Head Setscrew	Nut	Washer	Spanner size
30.00 kN	M12×65 code:608627	M12-10 code:608622	12-200 code:608632	18/19
60.00 kN	M16 × 65 code:608628	M16-10 code:608623	16-200 code:608633	24

A Swivel Castor is used as an example. Other Heavy-duty Castors are connected in the same way.

Components needed:



1no. Heavy-duty Castor



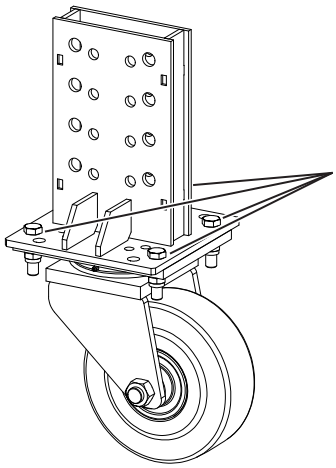
4no. Hexagon Bolts

4no. Nuts

4no. Washers

Unless otherwise stated, all dimensions are in mm.

Step 1 Use the 4no. Bolts with nyloc nuts and washers to secure the Heavy-duty Castor to the IK Wheel Connector. Tighten the bolts.



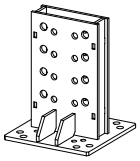
4no. Hexagon Bolts M12/M16 × 65
4no. Hexagon Nyloc Nuts M12/M16-10
4no. Washers M12/M16-200

10.3.3 Attaching the IK Wheel Connector L/M to IK Walers

☞	The Waler should normally rest on the support plate. In this case the waler can be secured with IK Pins. If in exceptional cases the upper holes have to be used and the waler cannot rest on the support plate, the waler has to be secured with Bolts M20×130-10.9 (code:608663) and nuts M20-10 (code:608618).

☞	Ensure that the exact side of the waler is resting on the support plate. On Waler M this is the side without flange bores! This is the only way that the waler can rest completely on the support plate!

Components needed:

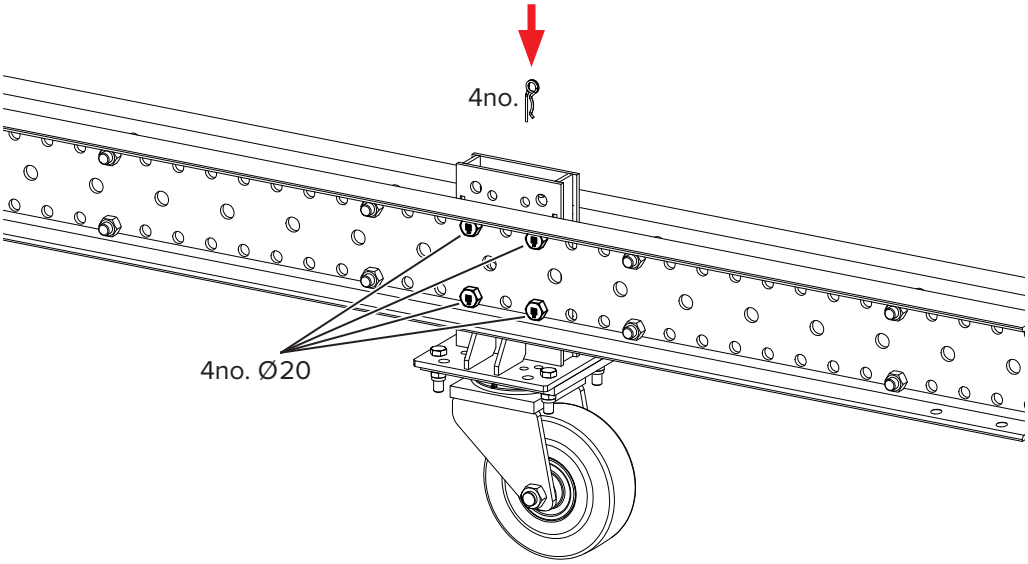


1no. IK Wheel Connector L/M (code:608600)

4no. IK Pins Ø20 (code:608820)

4no. Spring Cotter Pins 4 (code:173776)

Step 1 Slide the IK Wheel Connector into the Waler M and fasten with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



11 IK Spindles

Spindles support the Walers of the INFRA-KIT L and M system. The length of the Spindles can be adjusted. Spindles are available in lengths from 0.5 - 4.80 m. The Spindles can be connected directly to the Walers or by using various components.

11.1 Safe Working Loads

11.1.1 IK Spindle L

IK Spindle 35/50 L	With Waler L $F_{perm.}$ [kN]		With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø16**	**Ø20**	**Ø20**	**Ø25**
0.35	61.00	77.00	108.00	142.00
0.50	61.00	77.00	108.00	137.00

IK Spindle 50/75 L	With Waler L $F_{perm.}$ [kN]		With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø16**	**Ø20**	**Ø20**	**Ø25**
0.50	61.00	77.00	108.00	137.00
0.75	61.00	77.00	108.00	113.00

IK Spindle 65/100 L	With Waler L $F_{perm.}$ [kN]		With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø16**	**Ø20**	**Ø20**	**Ø25**
0.65	61.00	77.00	108.00	130.00
1.00	61.00	77.00	97.00	97.00

IK Spindle 90/155 L	With Waler L $F_{perm.}$ [kN]		With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø16**	**Ø20**	**Ø20**	**Ø25**
0.90	61.00	77.00	108.00	120.00
1.20	61.00	77.00	90.00	90.00
1.55	56.00	56.00	56.00	56.00

IK Spindle 140/240 L	With Waler L $F_{perm.}$ [kN]		With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø16**	**Ø20**	**Ø20**	**Ø25**
1.40	61.00	77.00	97.00	97.00
1.60	61.00	77.00	80.00	80.00
1.80	61.00	67.00	67.00	67.00
2.00	50.00	50.00	50.00	50.00
2.40	30.00	30.00	30.00	30.00

Unless otherwise stated, all dimensions are in mm.

11.1.2 IK Spindles

IK Spindle 70/110	With Waler L $F_{perm.}$ [kN]	With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø20**	**Ø20**	**Ø25**
0.70–1.10	77.00	108.00	142.00

IK Spindle 100/170	With Waler L $F_{perm.}$ [kN]	With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø20**	**Ø20**	**Ø25**
1.00–1.40	77.00	108.00	142.00
1.60	77.00	108.00	137.00
1.70	77.00	108.00	127.00

IK Spindle 140/240	With Waler L $F_{perm.}$ [kN]	With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø20**	**Ø20**	**Ø25**
1.40–1.60	77.00	108.00	142.00
2.20	77.00	103.00	103.00
2.40	77.00	87.00	87.00

IK Spindle 200/300	With Waler L $F_{perm.}$ [kN]	With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø20**	**Ø20**	**Ø25**
2.00	77.00	108.00	142.00
2.40	77.00	108.00	127.00
2.60	77.00	107.00	107.00
3.00	73.00	73.00	73.00

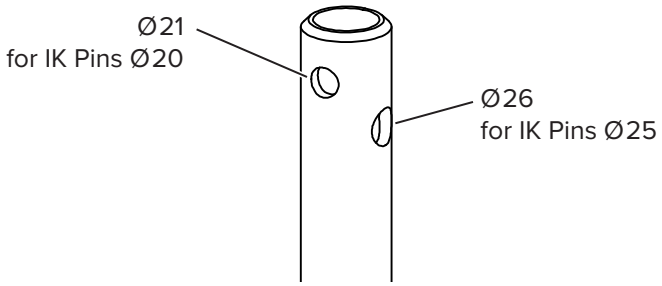
IK Spindle 260/360	With Waler L $F_{perm.}$ [kN]	With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø20**	**Ø20**	**Ø25**
2.60	77.00	108.00	123.00
3.00	77.00	97.00	97.00
3.40	77.00	80.00	80.00
3.60	67.00	67.00	67.00

IK Spindle 320/420	With Waler L $F_{perm.}$ [kN]	With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø20**	**Ø20**	**Ø25**
3.20	77.00	100.00	100.00
3.60	77.00	80.00	80.00
4.00	63.00	63.00	63.00
4.20	53.00	53.00	53.00

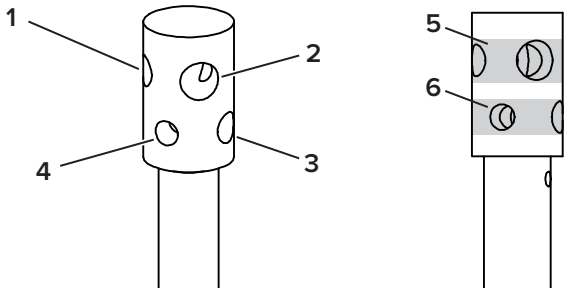
IK Spindle 380/480	With Waler L $F_{perm.}$ [kN]	With Waler M $F_{perm.}$ [kN]	
Extension [m]	**Ø20**	**Ø20**	**Ø25**
3.80	77.00	77.00	77.00
4.20	60.00	60.00	60.00
4.60	47.00	47.00	47.00
4.80	40.00	40.00	40.00

11.2 Possible connection points and extension lengths of IK Spindles

11.2.1 IK Spindles



11.2.2 IK Spindle L



1 Hole Ø21 for IK Pin Ø20

2 Hole Ø26 for IK Pin Ø25

3 Hole Ø17 for IK Pin Ø16

4 Hole Ø21 for IK Pin Ø20

5 Fastening row Ø21/Ø26

6 Fastening row Ø17/Ø21

IK Spindle	Extension length when attaching at fastening row Ø17/Ø21		Extension length when attaching at fastening row Ø21/Ø25		Dimensions	
	Min.	max.	Min.	max.	Min.	max.
35/50 L	352	466	427	541*	490	604
50/75 L	502	732	577	807*	640	870
65/100 L	652	982	727	1057*	790	1120
90/155 L	902	1532	977	1607*	1040	1670
140/240 L	1402	2382	1477	2457*	1540	2520

* For extension lengths greater than the nominal extension lengths, use the next-larger spindle.

Use the inner bores for the shortest extension of IK Spindles L.

To attach to other components such as IK Cross Connectors, use the outer bores.

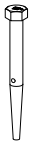
Unless otherwise stated, all dimensions are in mm.

11.3 Connecting IK Spindles directly to IK Walers

IK Spindles can be connected directly to both IK Walers M and IK Walers L. There are two holes at the end of each IK Spindle for this purpose.

11.3.1 Connecting an IK Spindle to an IK Waler L

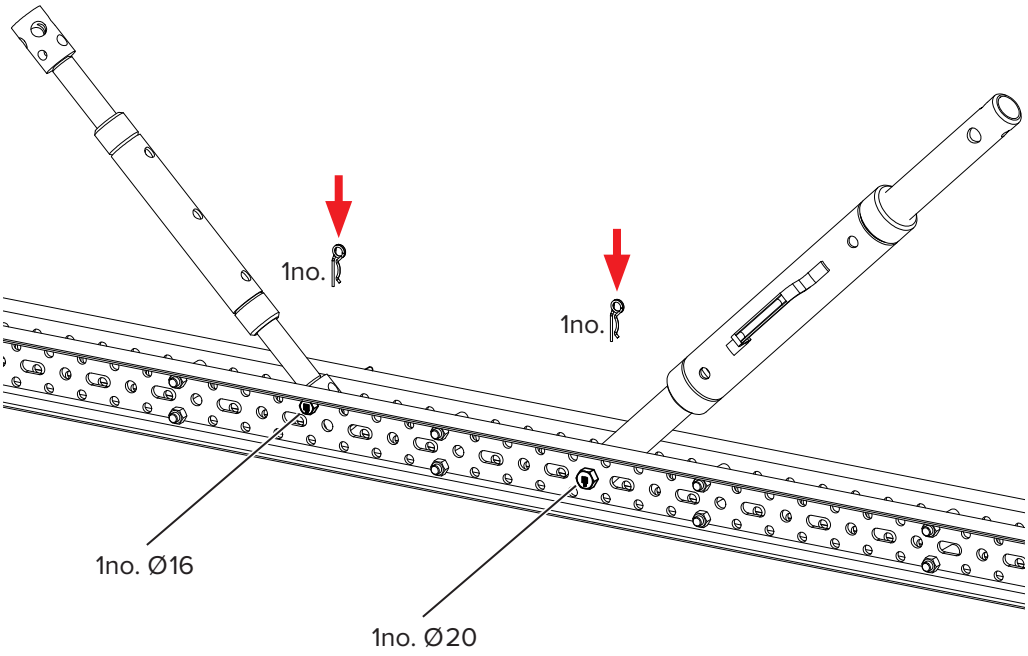
Components needed:



1no. IK Pin Ø16
(code:608816)
or
1no. IK Pin Ø20
(code:608820)

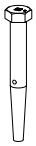
1no. Spring Cotter Pin 4
(code:173776)

Step 1 Fasten the IK Spindle to the bore in an IK Waler L with 1no. IK Pin Ø16 or 1no. IK Pin Ø20. Secure the IK Pin with the Spring Cotter Pin.



11.3.2 Connecting an IK Spindle to an IK Waler M

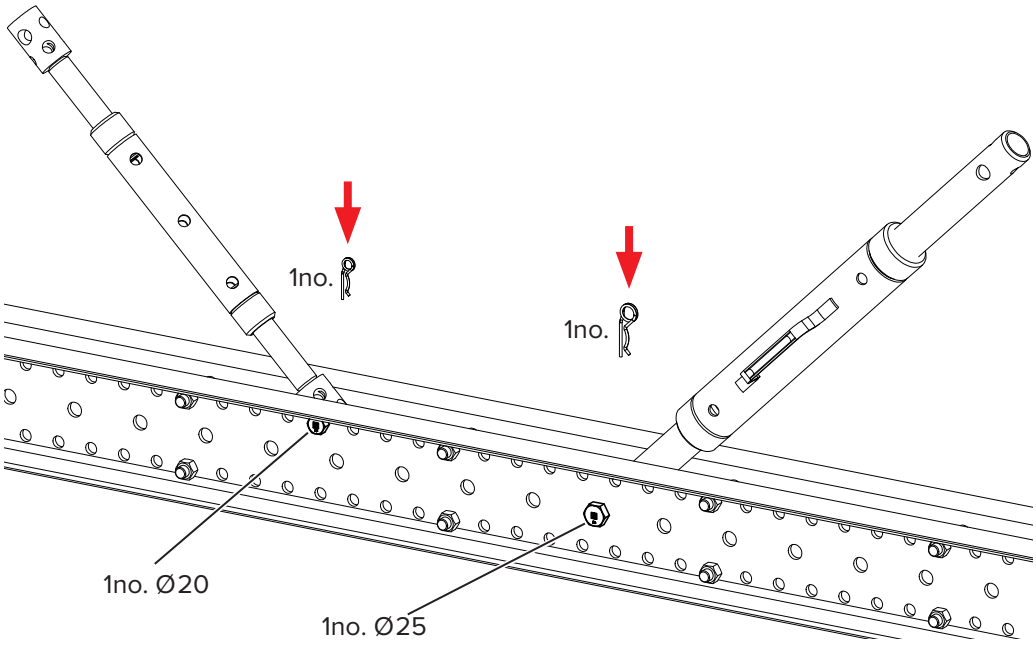
Components needed:



1no. IK Pin Ø20
(code:608820)
or
1no. IK Pin Ø25
(code:608825)

1no. Spring Cotter Pin 4
(code:173776)
or
1no. Spring Cotter Pin 5
(code:174553)

Step 1 Fasten the IK Spindle to the bore in an IK Waler M with 1no. IK Pin Ø20 or 1no. IK Pin Ø25. Secure the IK Pin with the Spring Cotter Pin.



11.4 Connecting IK Spindles to other components

IK Spindles can be connected to various components. These components are:

- IK Waler Connectors (also refer to page 56)
- IK Adaptor Waler Connectors (also refer to page 59)
- IK Adaptors (also refer to page 71)

The components can either be used as connectors to connect two IK Walers, as described in Section *Connecting IK Walers L and M* on page 52. Or the components can be connected anywhere along an IK Waler.

If connected along an IK Waler, the components can be attached to the centre row of holes. Since assembly is identical, only the completed states are shown.

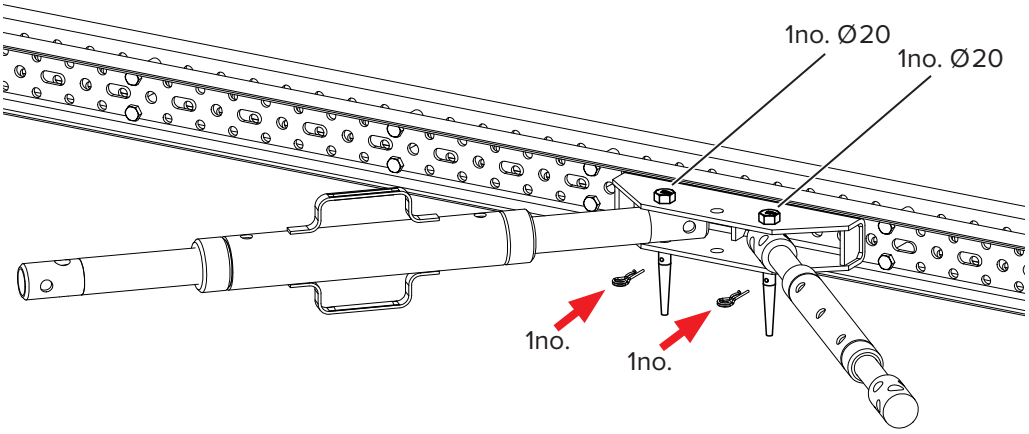
This section describes how to connect an IK Spindle to a component. The procedure is the same for all components. Use IK Pins Ø25 for components attached to IK Walers M. Use IK Pins Ø20 for components attached to IK Walers L.

Components needed:

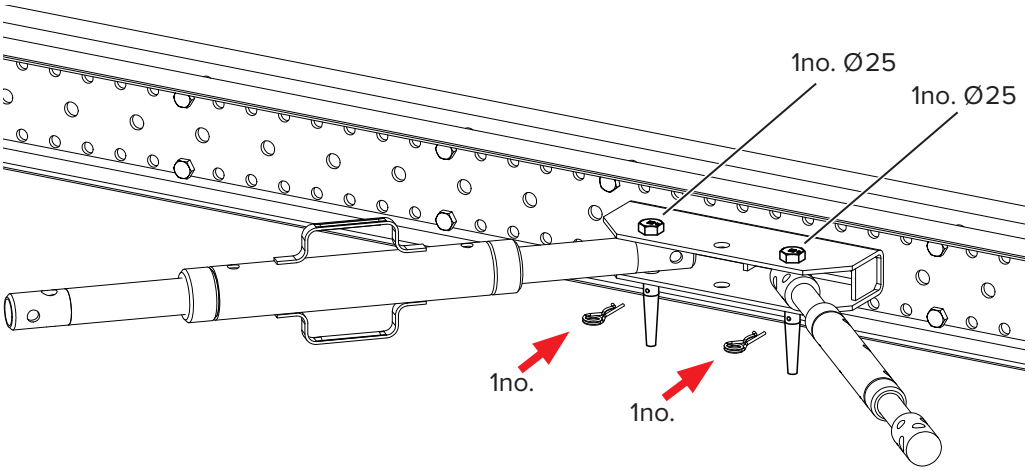
1no. IK Pin Ø20
(code:608820)
or
1no. IK Pin Ø25
(code:608825)

1no. Spring Cotter Pin 4
(code:173776)
or
1no. Spring Cotter Pin 5
(code:174553)

Step 1 Use an IK Pin Ø20 (IK Waler L) to fasten the IK Spindle to the component. Secure the IK Pin with a Spring Cotter Pin.



Or use an IK Pin Ø25 (IK Waler M) to fasten the IK Spindle to the component. Secure the IK Pin with a Spring Cotter Pin.



12 Bracing

IK Walers can be braced with Ø48.3 mm scaffold tubes. The scaffold tubes are connected to Walers L and M using the IK Scaffold Tube Adapter L/M.

In addition, scaffold tube couplers can be attached to the flange bores in the IK Walers M.

The scaffold tubes cannot transfer loads out of the structure. They can only be

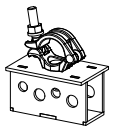
used to brace the IK Walers.

☞	The capacity of the bracing to withstand the imposed loads has to be checked separately!

12.1 Attaching the IK Scaffold Tube Adapter

12.1.1 Attaching the IK Scaffold Tube Adapter to an IK Waler L

Components needed:

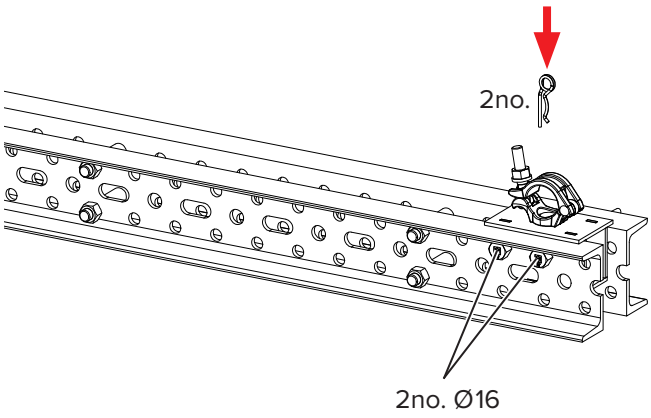


1no. IK Scaffold Tube Adapter (code:608495)

2no. IK Pins Ø16 (code:608816)

2no. Spring Cotter Pins 4 (code:173776)

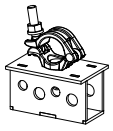
Step 1 Insert the IK Scaffold Tube Adapter into an IK Waler L and fasten to the top row of holes with 2no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



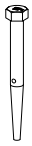
Unless otherwise stated, all dimensions are in mm.

12.1.2 Attaching the IK Scaffold Tube Adapter to an IK Waler M

Components needed:



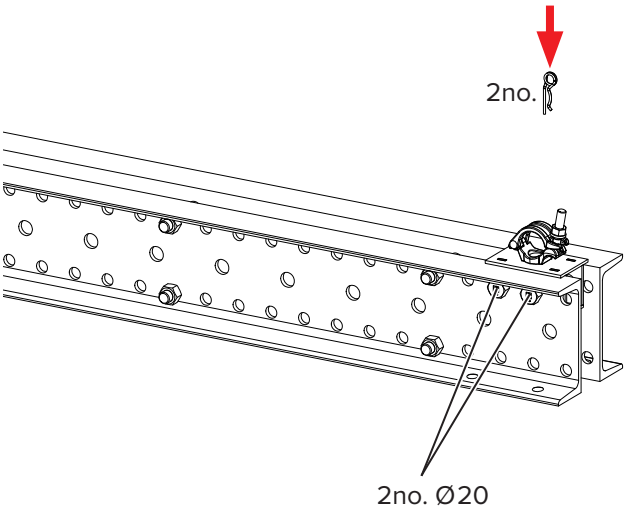
1no. IK Scaffold Tube Adapter (code:608495)



2no. IK Pins Ø20 (code:608820)

2no. Spring Cotter Pins 4 (code:173776)

Step 1 Insert the IK Scaffold Tube Adapter into an IK Waler M and fasten to the top row of holes with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



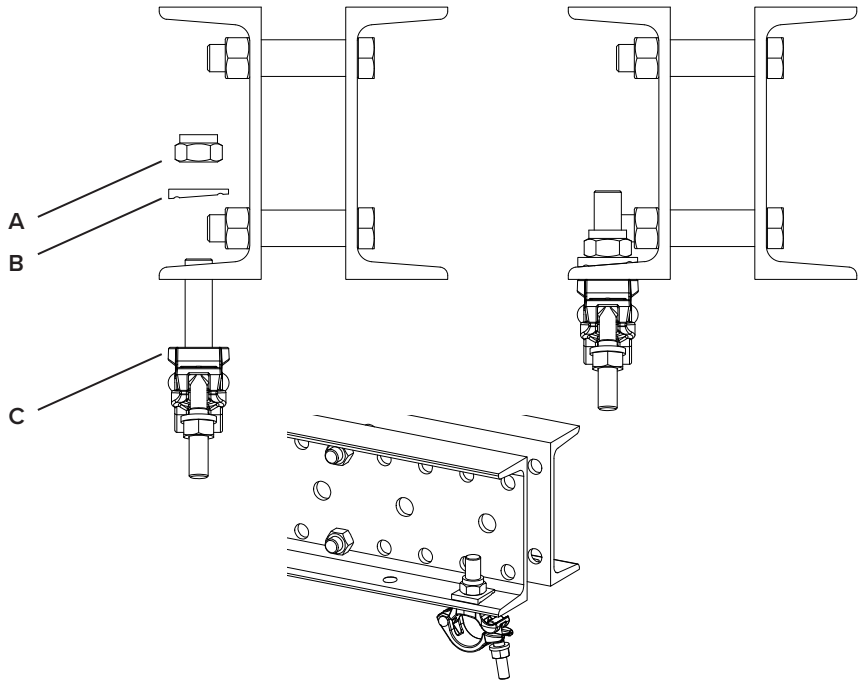
12.2 Attaching the Half Coupler to flange bores (only IK Walers M)

Scaffold tubes (Ø48.3 mm) can be attached to the flange bores of IK Walers M using the Half Coupler 48/M20 × 70. The wedge-shaped washer supplied with the equipment compensates for the diagonal underside of the flange.

Components needed:

1no. Half Coupler 48/M20 × 70 (code:608515)

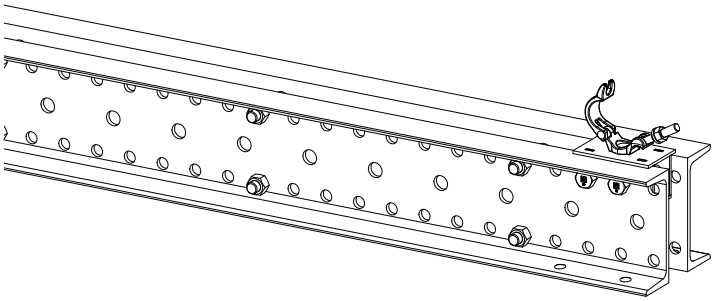
Step 1 Secure the half coupler (**C**) with the wedge-shaped washer (**B**) and the nyloc nut (w.a.f. 22) (**A**). The thicker side of the washer should face out.



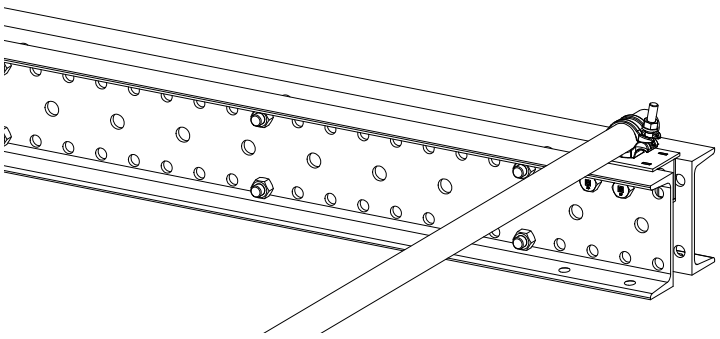
12.3 Bracing IK Walers

The following example shows how to brace walers using an IK Scaffold Tube Adapter. The procedure is the same for the Half Coupler 48/M20 × 70.

Step 1 Open the coupler on the IK Scaffold Tube Adapter L/M.



Step 2 Place any scaffold tube in the coupler, close the coupler and tighten the nut on the coupler (50 Nm).



Unless otherwise stated, all dimensions are in mm.

13 Connecting H 20 timber beams with IK walers

H 20 timber beams mounted on IK walers can be connected to IK Walers L using the H 20 Timber Beam Clamp (code:568048).

The procedure for fastening the clamps depends on the position of the beam node (external or internal).

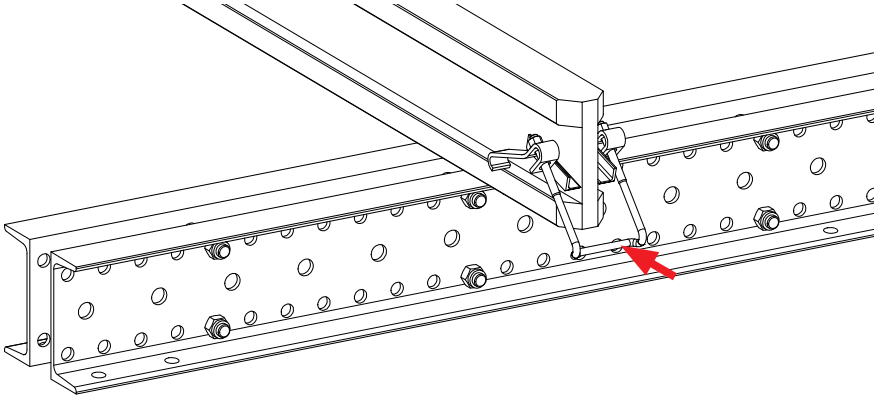
SWLs

Beam clamp	**Waler U100**	**IK Waler L** (U120)	**IK Waler M** (U200)
H 20 Timber Beam Clamp (code:568048)	2.7 kN	2.7 kN	–
IK H 20 Beam Clamp M (code:610610)	3.0 kN	3.1 kN	3.5 kN

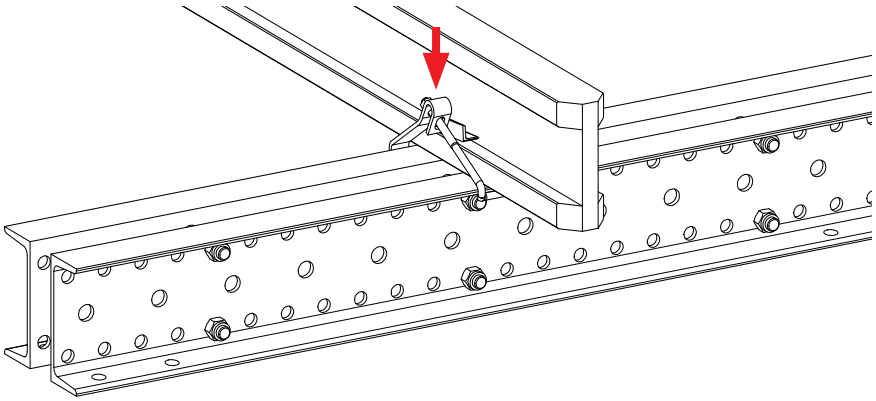
13.1 Connection with external beam nodes

The connection of H 20 timber beams with *external* IK M walers is done as follows:

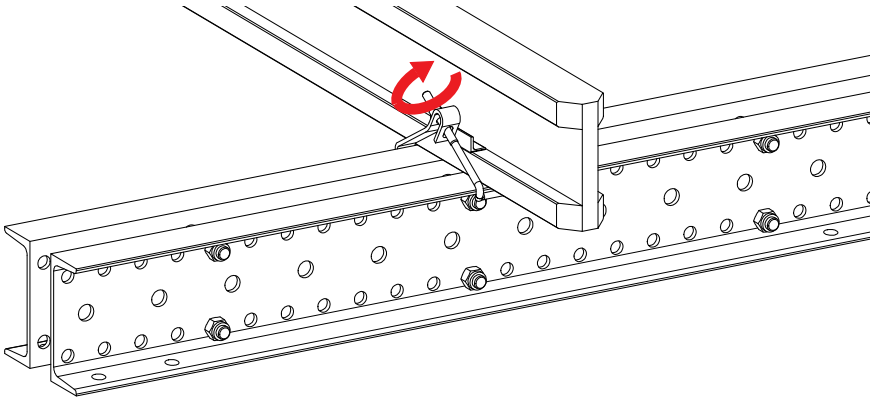
Step 1 Slide the IK H 20 Beam Clamp M along the H 20 timber beam as shown in the illustration.



Step 2 Place the IK H 20 Beam Clamp M on the IK M belt.



Step 3 Fasten the two nuts on the IK H 20 Beam Clamp M to secure the connection.

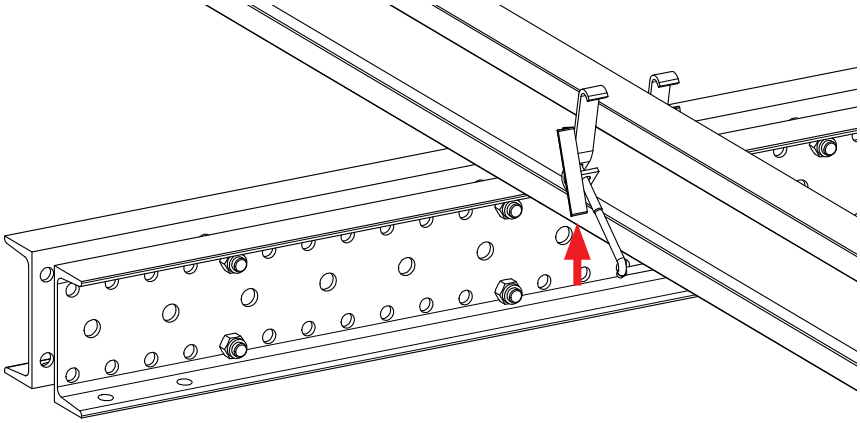


13.2 Connection with internal beam nodes

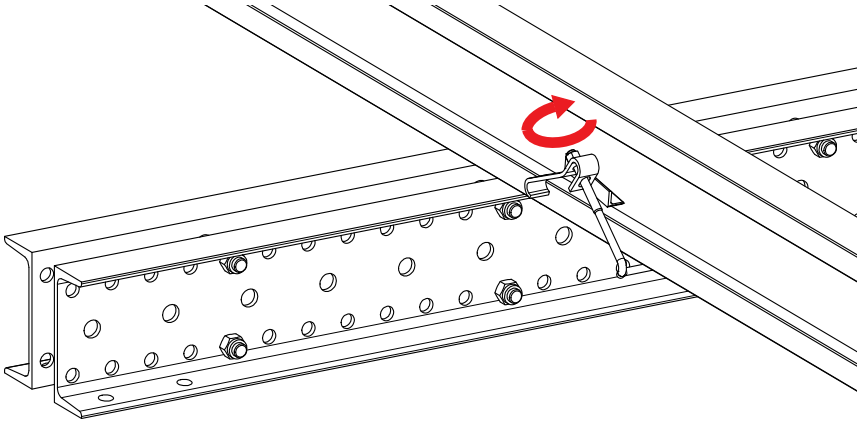
The connection of H 20 timber beams with *internal* IK M walers is done as follows:

Step 1 Turn the left and right clamping brackets of the IK H 20 Beam Clamp M so that the contact plates point outwards.

Step 2 Slide the IK H 20 Beam Clamp M up over the H 20 timber beam close to the beam node as shown in the illustration.



Step 3 Turn the left and right clamping brackets of the IK H 20 Beam Clamp Mso that they point towards the timber beam.



Step 4 Complete the assembly with steps 2 and 3 in section *Connection with external beam nodes* on page 117.

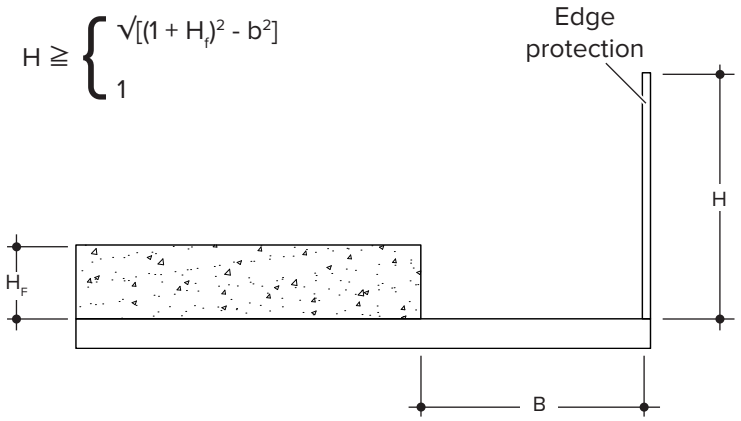
14 Edge protection

As specified in BS EN 13374 Temporary Edge Protection Systems, the minimum height between the working area and the top of the edge protection should be 1.00 m. This may vary if the top of the slab is to be considered as the working area instead of the top of the formwork panel, which will depend on how close the slab end is to the edge of the panel.

Height of edge protection

In accordance with BS EN 13374 Temporary Edge Protection Systems, the height of the edge protection should be determined as follows:

$$H \geqq \begin{cases} \sqrt{[(1 + H_f)^2 - b^2]} \\ 1 \end{cases}$$



The value of the height (H) determined by the formula above should be the highest of the two values.

As a reference, the below table shows the required edge protection height (H) when both the slab height (H1) and access width (b) are considered.

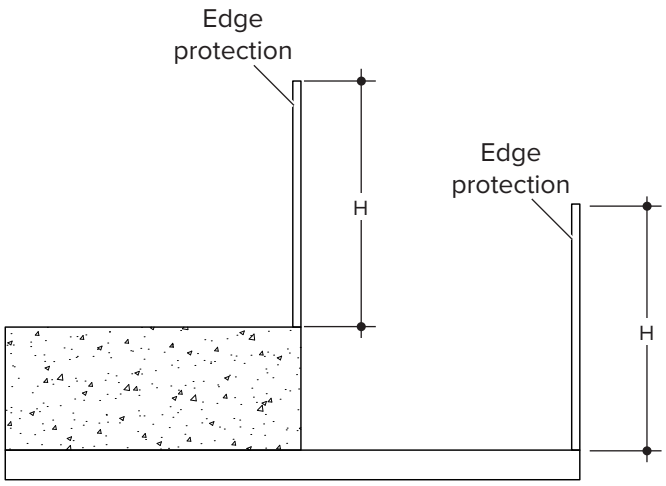
		Access width, b [m]									
		0.20	**0.30**	**0.40**	**0.50**	**0.60**	**0.70**	**0.80**	**0.90**	**1.00**	**1.10**
Level change, H_f [m]	**0.10**	1.08	1.06	1.02	1.00	1.00	1.00	1.00	1.00	1.00	1.00
	0.15	1.13	1.11	1.08	1.04	1.00	1.00	1.00	1.00	1.00	1.00
	0.20	**1.18**	**1.16**	1.13	1.09	1.04	1.00	1.00	1.00	1.00	1.00
	0.25	**1.23**	**1.21**	**1.18**	1.15	1.10	1.04	1.00	1.00	1.00	1.00
	0.30	**1.28**	**1.26**	**1.24**	**1.20**	1.15	1.10	1.02	1.00	1.00	1.00
	0.40	**1.39**	**1.37**	**1.34**	**1.31**	**1.26**	**1.21**	1.15	1.07	1.00	1.00
	0.50	**1.49**	**1.47**	**1.45**	**1.41**	**1.37**	**1.33**	**1.27**	**1.20**	1.12	1.02

Values in white cell: BS EN 13374, minimum protection height 1.00m.

Values in shaded cell: PROTECTO posts with PROTECTO Panel G2 or with timber railing. Provide protection to BS EN 13374.

Values in shaded cells and in bold:
PROTECTO posts with PROTECTO Panels G2 or with timber railings as standard do not provide enough protection height. The access width may need to be increased, or the PROTECTO posts used with appropriate extension socket (requires reduced post spacing) or secondary edge protection on the slab to be installed.

However, if the height of the slab is such that it becomes a fall hazard, then a secondary edge protection is required regardless of the distance between the slab edge and the formwork edge. The height of this secondary edge protection must be 1.00 m measured from the top of the slab.



Although these are some of the most common cases used on site, other solutions which comply with the current standard may be used depending on the individual job requirements.

The minimum height of the edge protection may vary from region to region. In Germany for example, the minimum height of the edge protection will change from 1.00 m to 1.10 m if the drop height is more than 12.00 m.

Refer to your local regulation for more information.

WARNING

Risk of fall from height!

Suitable protective measures must be in place during the installation of the edge protection systems. It is assumed that the operatives are protected by these measures during assembly and disassembly of the edge protection systems.

The performance of an edge protection system is directly related to the structure to which it is attached. The structure must withstand the extra imposed loads.

WARNING

Risk of collapse and fall from height!

All fixings of the edge protection system to the existing structure must suit the specific application and be selected by a competent person.

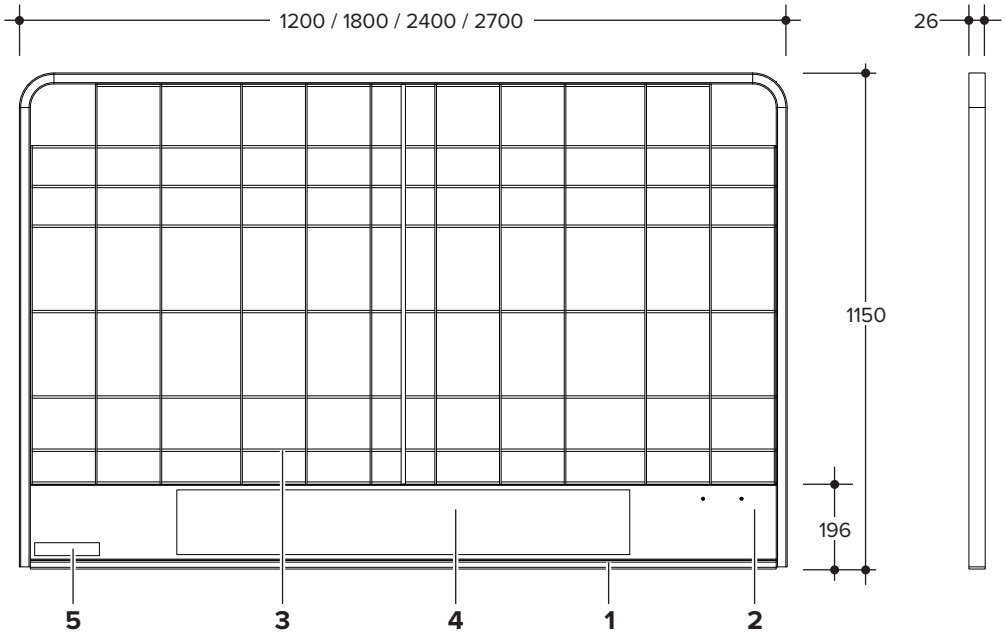
Customer to ensure that the concrete can take the extra imposed loads.

Unless otherwise stated, all dimensions are in mm.

14.1 Panels and posts

14.1.1 Panels

The PROTECTO Panel G2 can be used for edge protection on both wet deck and dry deck applications. The PROTECTO Panel G2 is to be used with the PROTECTO posts and depending on the application the required ancillary components will vary.



1 Steel frame

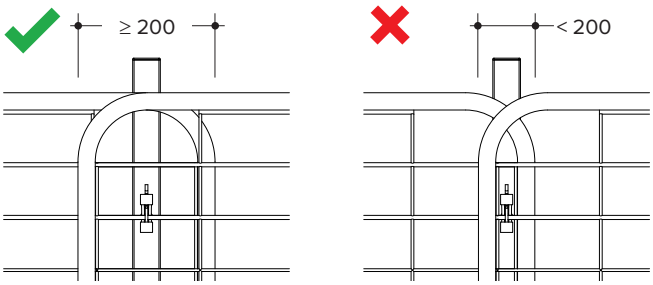
2 Steel toeboard

3 Steel wire Ø5.5 mm (horizontal) Ø3.75 mm (vertical)

4 Centre sticker (company branding)

5 Small sticker (item information)

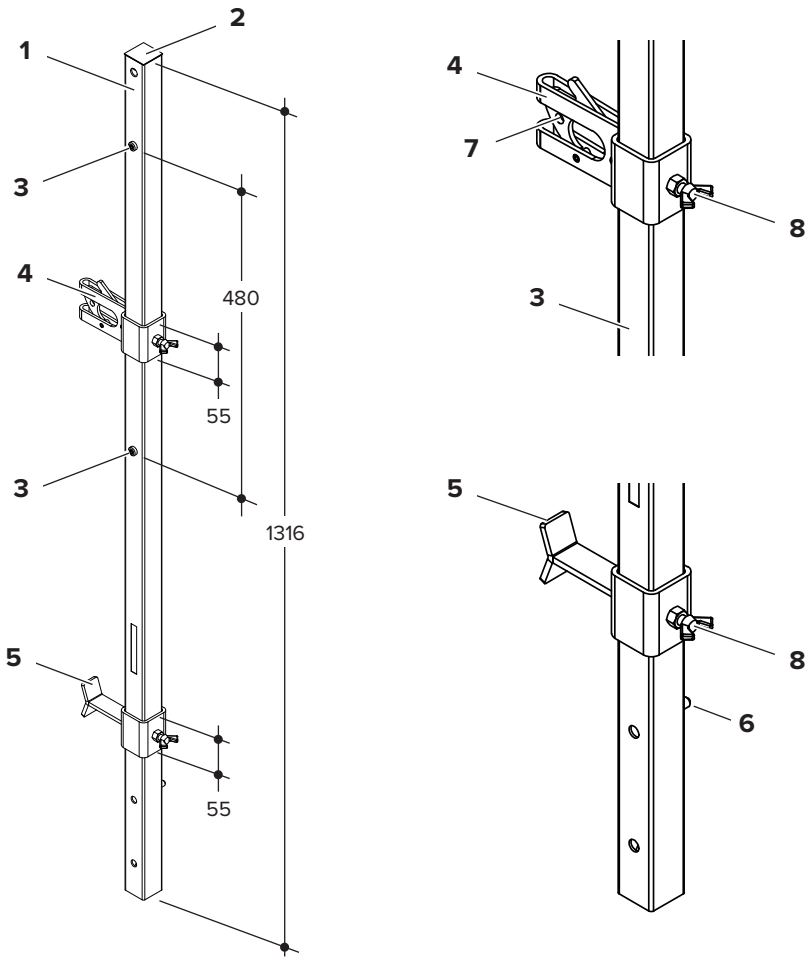
The minimum required panel overlap is 200 mm as shown below.



14.1.2 Posts

PROTECTO Post 130 Adjustable

The PROTECTO Post 130 Adjustable (code:692750) provides support for the PROTECTO Panels G2. The post has a cross-section of 35 x 35 mm which allows the PROTECTO Post 130 Adjustable (code:692750) to be used with the ancillaries of the PROTECTO Railing Post (code:601225).



1 SHS 35 x 35 x 2 mm

2 Plastic cap

3 Tapping screw as Ø12 mm stopper

4 Sliding latch

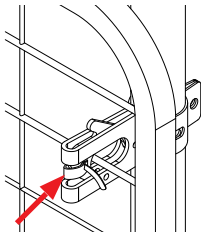
5 Sliding T latch

6 Safety device (not visible) - see page 124

7 Ø8 mm hole for plastic zip tie

8 Captive hexagonal nut and wing nut

It is recommend that the sliding latch is secured against accidental opening by using a plastic zip tie through the Ø8 mm hole.



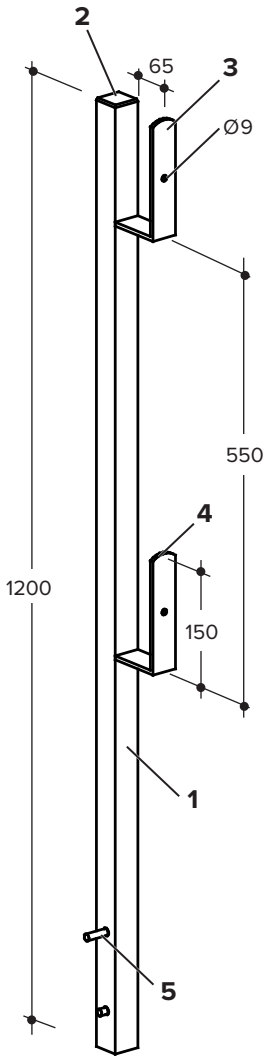
For additional security, a cable tie can be added (optional).

Unless otherwise stated, all dimensions are in mm.

PROTECTO Railing Post

The PROTECTO Railing Post (code:601225) can be used with the PROTECTO Panels G2 and the timber railing as an option for edge protection.

It is equipped with 2no. brackets for plank railings with dimensions of 150×30 mm. The post is secured by correctly inserting the integrated safety lock.



1 RHS 35 x 35 x 2 mm

2 Plastic cap

3 Top bracket

4 Bottom bracket

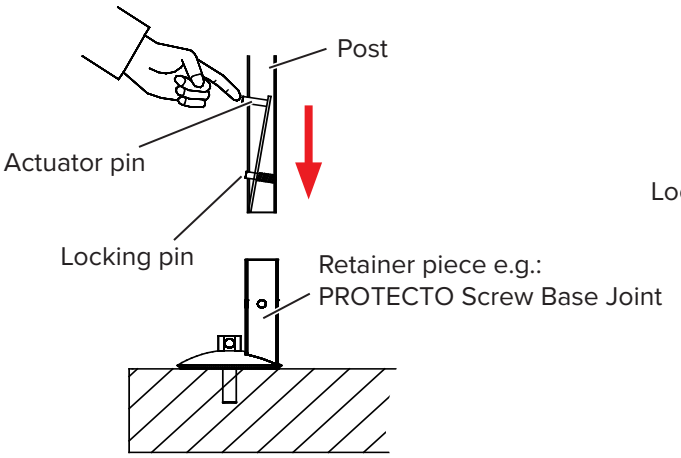
5 Safety device - see page 124

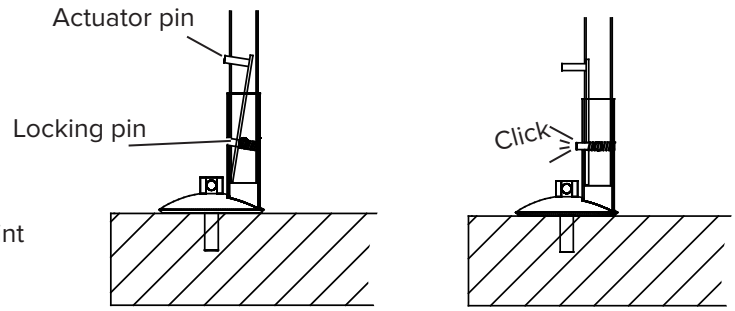
The PROTECTO Railing Post (code:601225) complies with BS EN 13374 when used with the PROTECTO Panels G2 and with plank railings. The planks used for railing must be 30 mm thick, 150 mm high and meet the requirements of strength class C24 according to EN 338 (formerly S10).

Safety device

The safety device is used to prevent accidental displacement of the PROTECTO posts. Both the PROTECTO Post 130 Adjustable (code:692750) and the PROTECTO Railing Post (code:601225) have a safety device.

To correctly install the PROTECTO posts, insert the post into the retainer and press the actuator pin of the safety lock. The locking pin retracts inside the post and the post can be inserted into the retainer. When the locking pin is inside the retainer piece, release the actuator pin. Insert the post into the retainer until the spring mechanism can be heard and seen as fully locked. Test the proper seating of the post by pulling and inspect visually the correct engagement of the locking pin.





WARNING

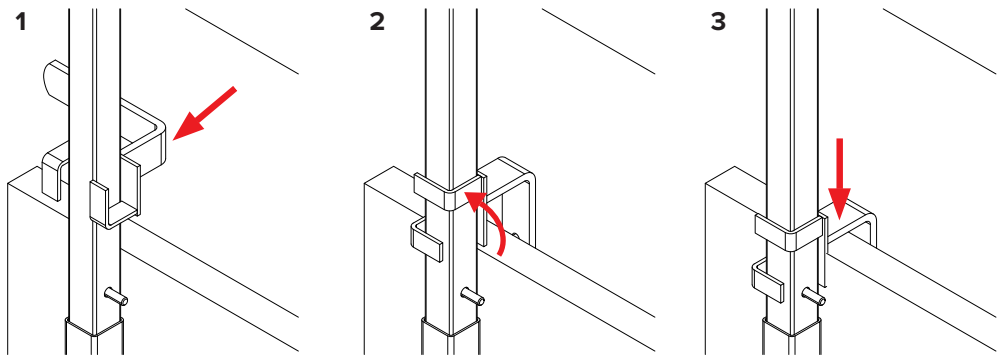
Risk of falling from height!

Do not use a post with a damaged or missing safety device.

Ensure that the locking pin is properly engaged to the retainer piece.

14.1.3 Toeboard retainer

The PROTECTO Toeboard Retainer (code:601227) is used in conjunction with the PROTECTO Railing Post (code:601225) to allow for a timber plank to be used as a toeboard. No tools are required to install the PROTECTO Toeboard Retainer (code:601227).



Unless otherwise stated, all dimensions are in mm.

14.2 Constructing edge protection with PROTECTO Post 130 Adjustable

Use the IK PROTECTO Adapter to attach the PROTECTO Post 130 Adjustable to IK Walers L and M. Complete edge protection can be erected with the aid of the PROTECTO Panel G2.

It is also possible to erect edge protection with components from the MODEX system. Use the IK MODEX Adapter to attach MODEX Vertical Posts to IK Walers.

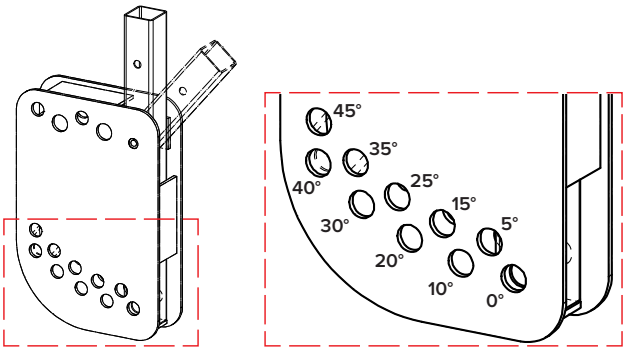
Use of PROTECTO and MODEX components is described in the respective User Guide. Always comply with the instructions in the User Guide to ensure safe erection and use!

14.3 Setting the angle of the IK PROTECTO Adapter

The IK PROTECTO Adapter has a swivelling sleeve for the PROTECTO Post 130 Adjustable. This means that the PROTECTO Post 130 Adjustable is always vertical, even when the IK Walers are inclined. Secure the position of the swivelling sleeve with 1no. IK Pin Ø16.

The following illustration shows the setting range of the IK PROTECTO Adapter.

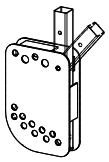
When the PROTECTO Adapter is used in an IK Waler M, the maximum achievable angle is 30°.



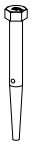
14.4 Attaching the IK PROTECTO Adapter

This section explains how to attach the IK PROTECTO Adapter to IK Walers L. The procedure is the same for IK Walers M, except that IK Pins Ø20 are used instead.

Components needed:



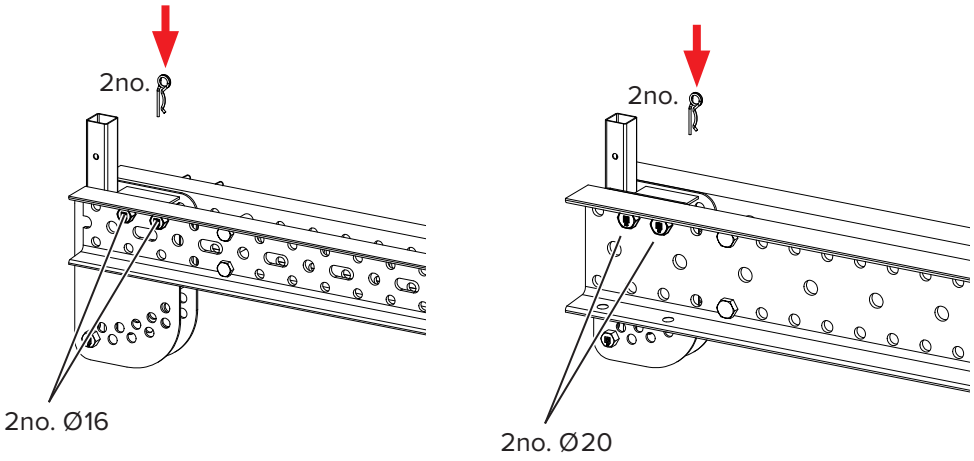
1no. IK PROTECTO Adapter (code:608410)



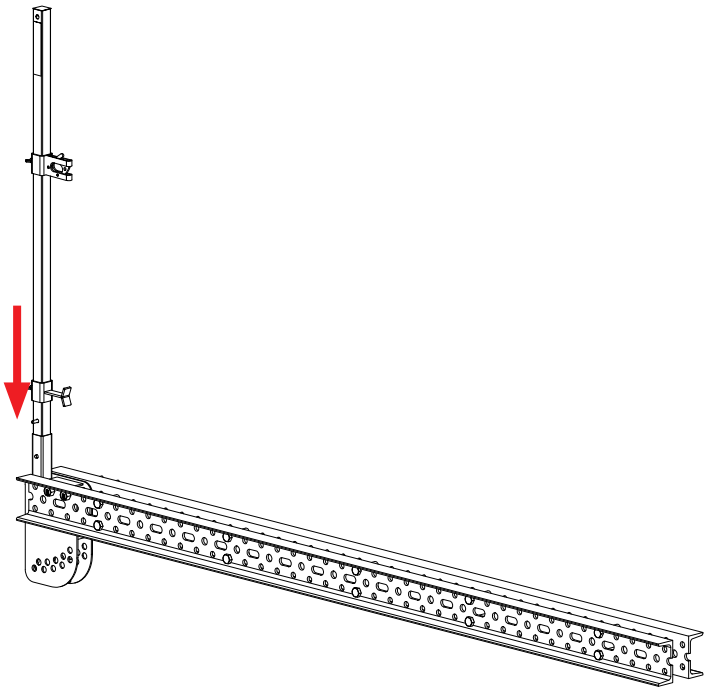
3no. IK Pins Ø16 (code:608816) or 2no. IK Pins Ø20 (code:608820) and 1no. IK Pin Ø16 (code:608816)

3no. Spring Cotter Pins 4 (code:173776)

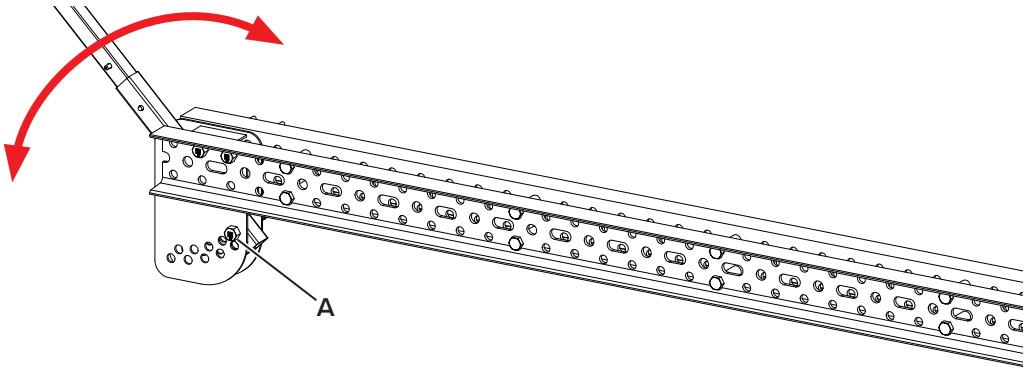
Step 1 Slide the IK PROTECTO Adapter into the IK Waler and secure with 2no. IK Pins Ø16 (IK Waler L) or 2no. IK Pins Ø20 (IK Waler M). Secure the IK Pins with the Spring Cotter Pins.



Step 2 Place the PROTECTO Post 130 Adjustable in the base for PROTECTO Posts.



Step 3 Adjust the angle of the IK PROTECTO Adapter. Remove the adjusting pin (**A**, IK Pin Ø16) from the IK PROTECTO Adapter, tilt the PROTECTO Railing Post and insert the pin again in the suitable hole. Secure the Pin with a Spring Cotter Pin.



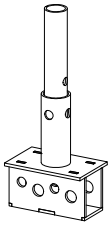
Unless otherwise stated, all dimensions are in mm.

14.5 Constructing edge protection with MODEX

IK MODEX Adapters should be spaced no more than 2.50 m apart!

14.5.1 Attaching the IK MODEX Adapter to an IK Waler L

Components needed:

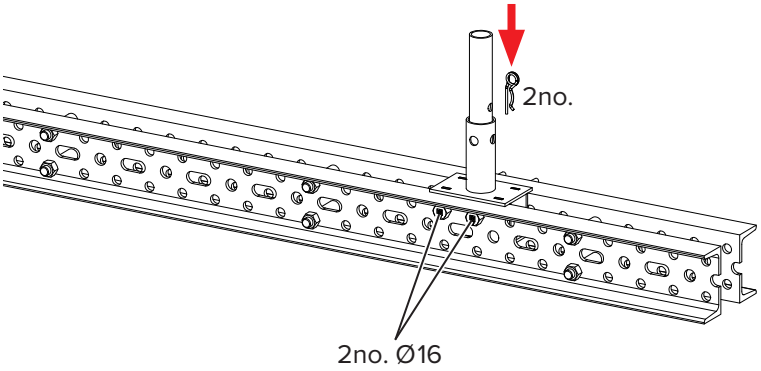


1no. IK MODEX Adapter (code:608570)

2no. IK Pins Ø16 (code:608816)

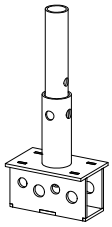
2no. Spring Cotter Pins 4 (code:173776)

Step 1 Insert the IK Scaffold Tube Adapter into an IK Waler L and fasten to the top row of holes with 2no. IK Pins Ø16. Secure the IK Pins with the Spring Cotter Pins.



14.5.2 Attaching the IK MODEX Adapter to an IK Waler M

Components needed:

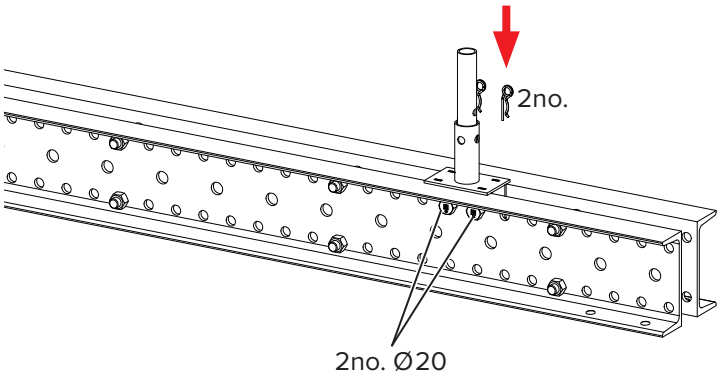


1no. IK MODEX Adapter
(code:608570)

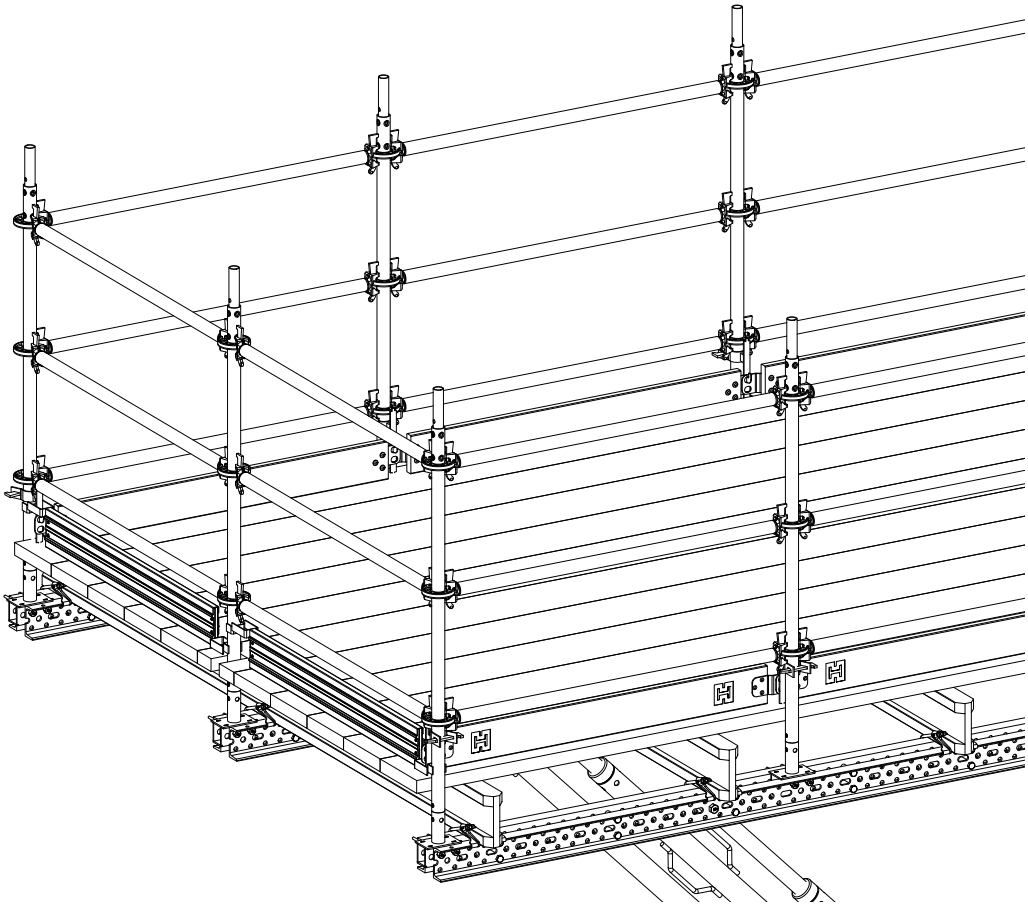
2no. IK Pins Ø20
(code:608820)

2no. Spring Cotter Pins 4
(code:173776)

Step 1 Insert the IK Scaffold Tube Adapter into an IK Waler M and fasten to the top row of holes with 2no. IK Pins Ø20. Secure the IK Pins with the Spring Cotter Pins.



14.5.3 Example of assembled MODEX edge protection



Unless otherwise stated, all dimensions are in mm.

15 Assembly of INFRA-KIT H

15.1 Recommended sequence for horizontal assembly and transport

15.1.1 Preparations

Step 1 Prepare a suitable assembly area (framing ground) The ground has to be level, well compacted, capable of withstanding the loads and accessible for a forklift or crane.

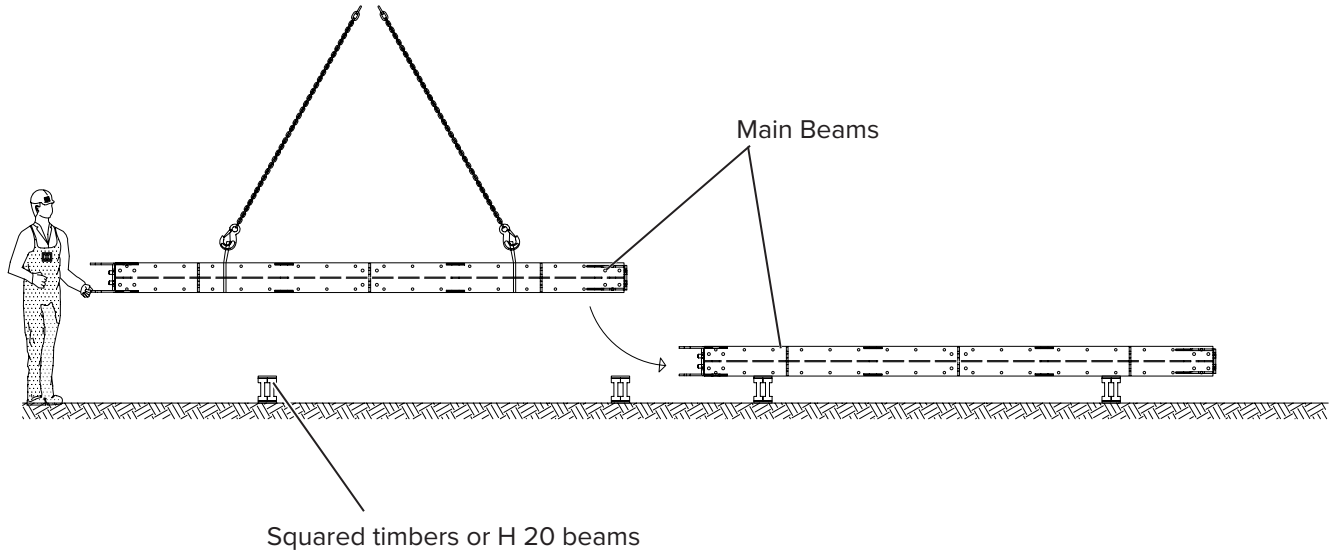
Step 2 Place squared timbers or H 20 beams as spacers on the ground in the assembly area.

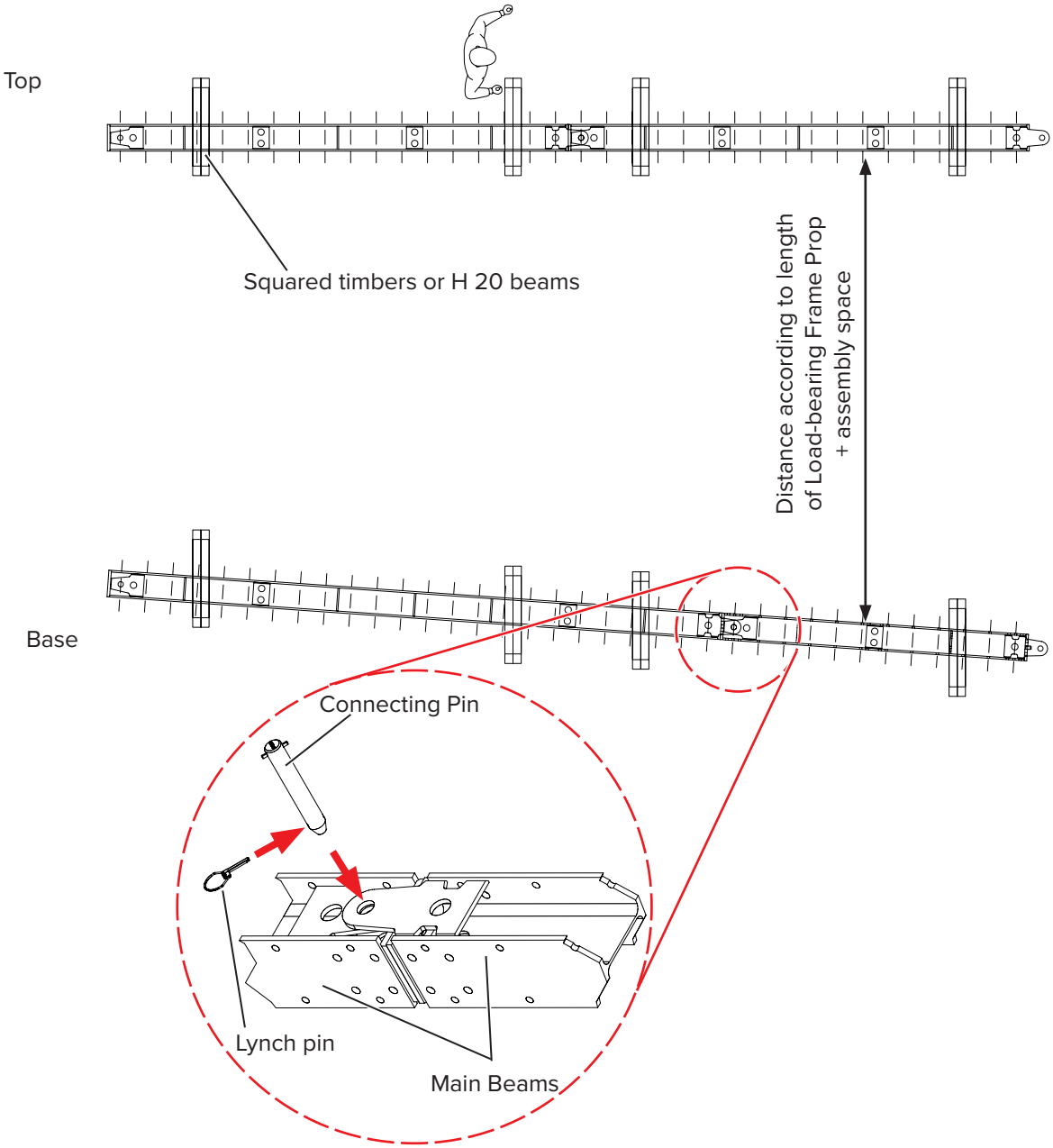
	To simplify assembly later, arrange the spacers (squared timber or H 20 beams) to accommodate the Main Beams and the components to be connected.

15.1.2 Main Beams

Step 1 Remove the Connecting Pins from the Main Beams and place the Main Beams into assembly position on squared timbers or H 20 beams.

Step 2 Align the Main Beams and insert the Connecting Pins. Secure the Connecting Pins with lynch pins.





Step 3 Slide the Main Beams together and secure with the Connecting Pin.

Step 4 Secure the Connecting Pins with lynch pins. Lock the safety clip in the lynch pin.

15.1.3 Bracing underside

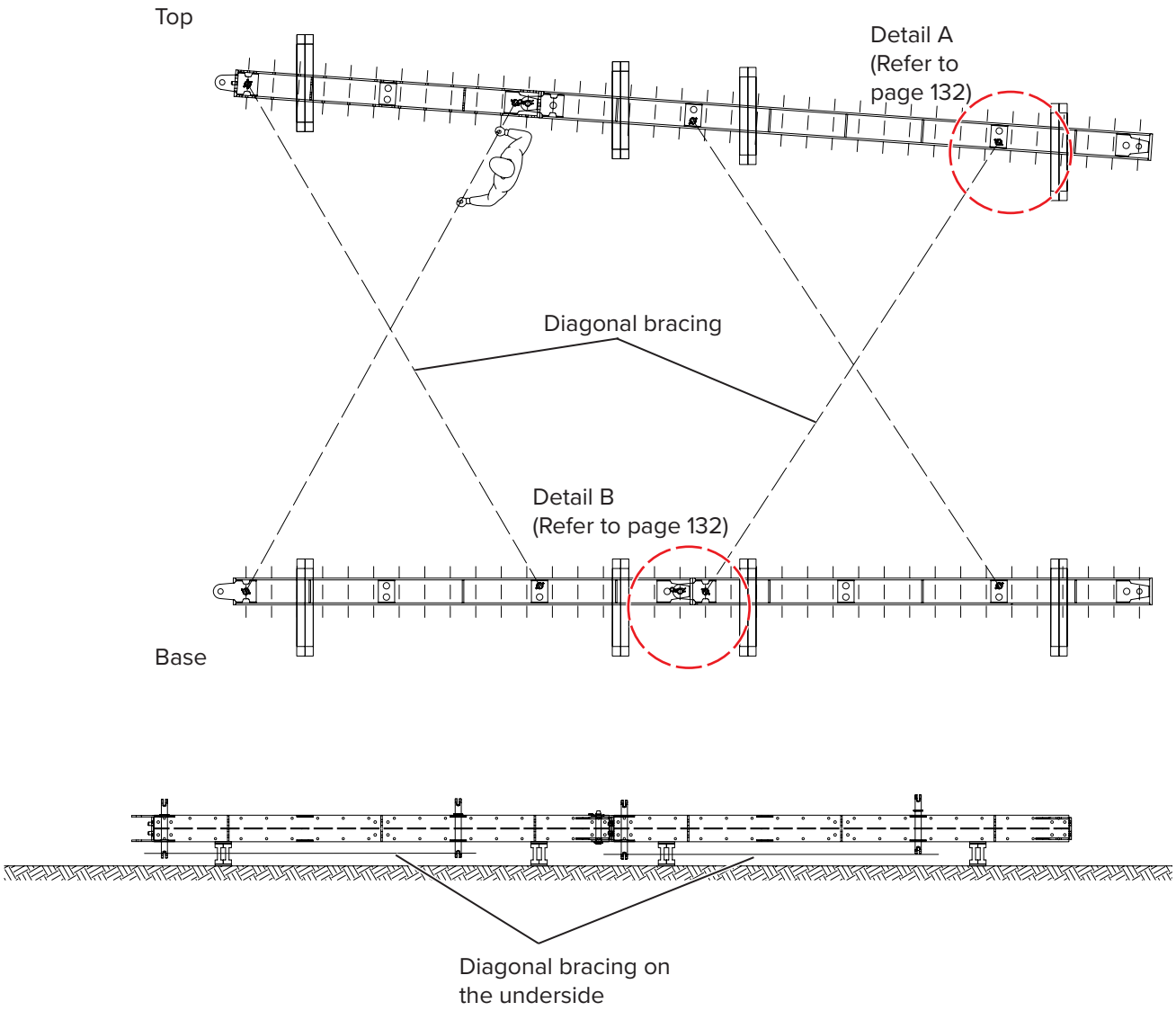
Step 1 Insert Tension Bolts.

Step 2 Insert the Tie Rods in the Tension Bolts on the underside of the diagonal bracing and secure with the lynch pins.

Step 3 Screw on the Tension Nut Set DW15 by the base (do not tighten!).

Step 4 Counter the Tie Rod to the Tension Bolt at the top with Hexagon Nuts 15/50 to prevent twisting.

Unless otherwise stated, all dimensions are in mm.



15.1.4 Installing Tie Rods

At the top with counter nuts – upper connection of diagonal bracing

WARNING	**Warning!** Depending on the capacity of the Tension Bolt, the safe working load (SWL) is restricted to 40.50 kN per Tie Rod.

Step 1 Remove one lynch pin from the Tension Bolt and insert the Tension Bolt into the Main Beam (Detail A, Fig. 1).

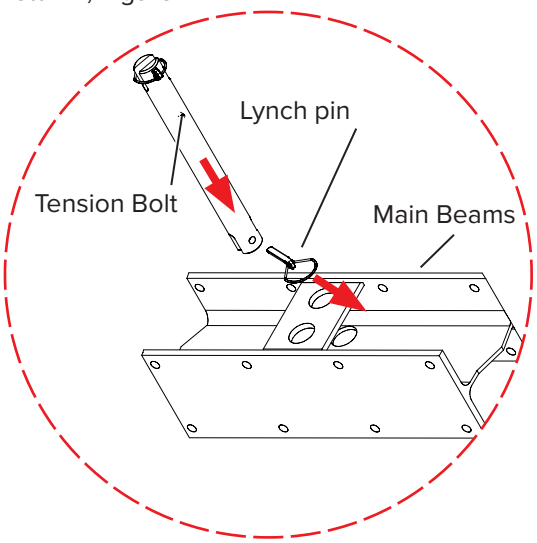
Step 2 Screw a Hexagon Nut 15/50 onto the Tie Rod.

Step 3 Slide the Washer 25 onto the Tie Rod and screw on the second Hexagon Nut 15/50 such that the nuts are on both sides of the Tension Bolt. The Washer 25 has to rest in the groove on the Tension Bolt.

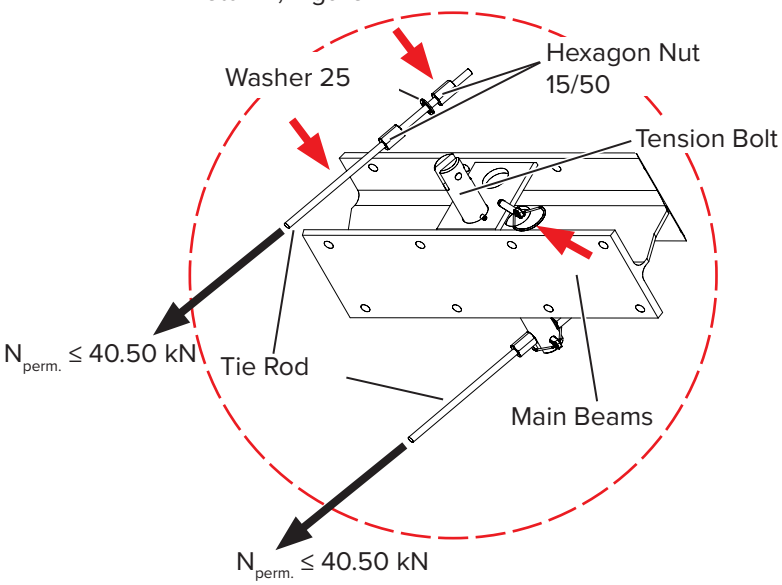
Step 4 Place the Tie Rod of the diagonal bracing laterally in the Tension Bolt and secure with the lynch pin (Detail A, Fig. 2).

Step 5 Tighten the Hexagon Nuts 15/50 on both sides against the Tension Bolt to prevent the Tie Rod from twisting.

Detail A, Figure 1



Detail A, Figure 2



At the base with Tension Nut Set

Step 1 Remove the lynch pin from the Tension Bolt and insert the Tension Bolt into the Main Beam (Detail B, Fig. 3).

Step 2 Screw a Hexagon Nut 15/50 onto the Tie Rod.

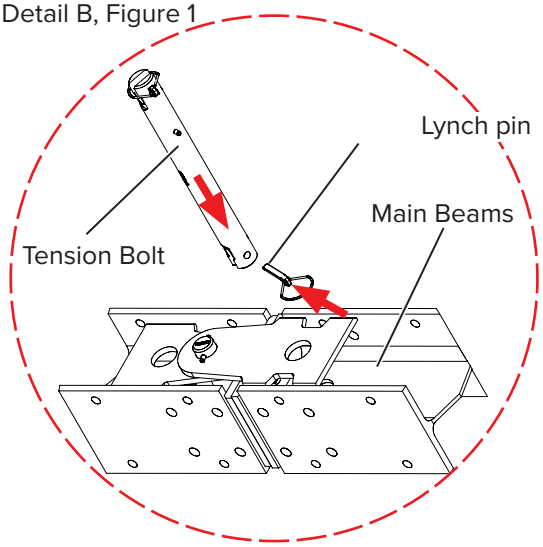
Step 3 Slide on Washer 25 and screw on the preload nut.

Step 4 The Washer 25 has to rest in the groove on the Tension Bolt.

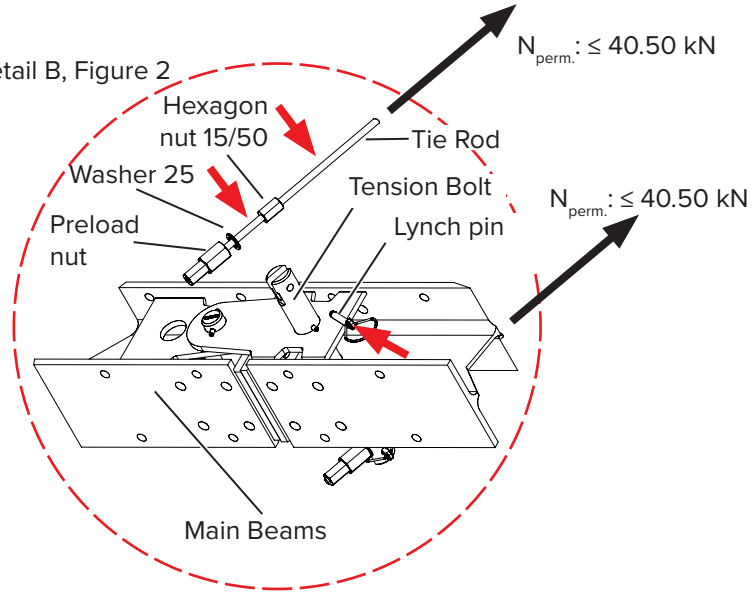
Step 5 Place the Tie Rod of the diagonal laterally in the Tension Bolt and secure with the lynch pin (Detail B, Fig. 4).

Step 6 Screw the preload nut hand-tight against the Tension Bolt.

Detail B, Figure 1



Detail B, Figure 2



Unless otherwise stated, all dimensions are in mm.

15.1.5 Installing the first and last Load-bearing Frame Prop

NOTE	**Note** Scaffold tubes and couplers are intended only to provide stability during assembly and transport, not to be used as structural members of the final assembly!

	If the Main Beams are intentionally not parallel to one another, we recommend horizontal assembly.

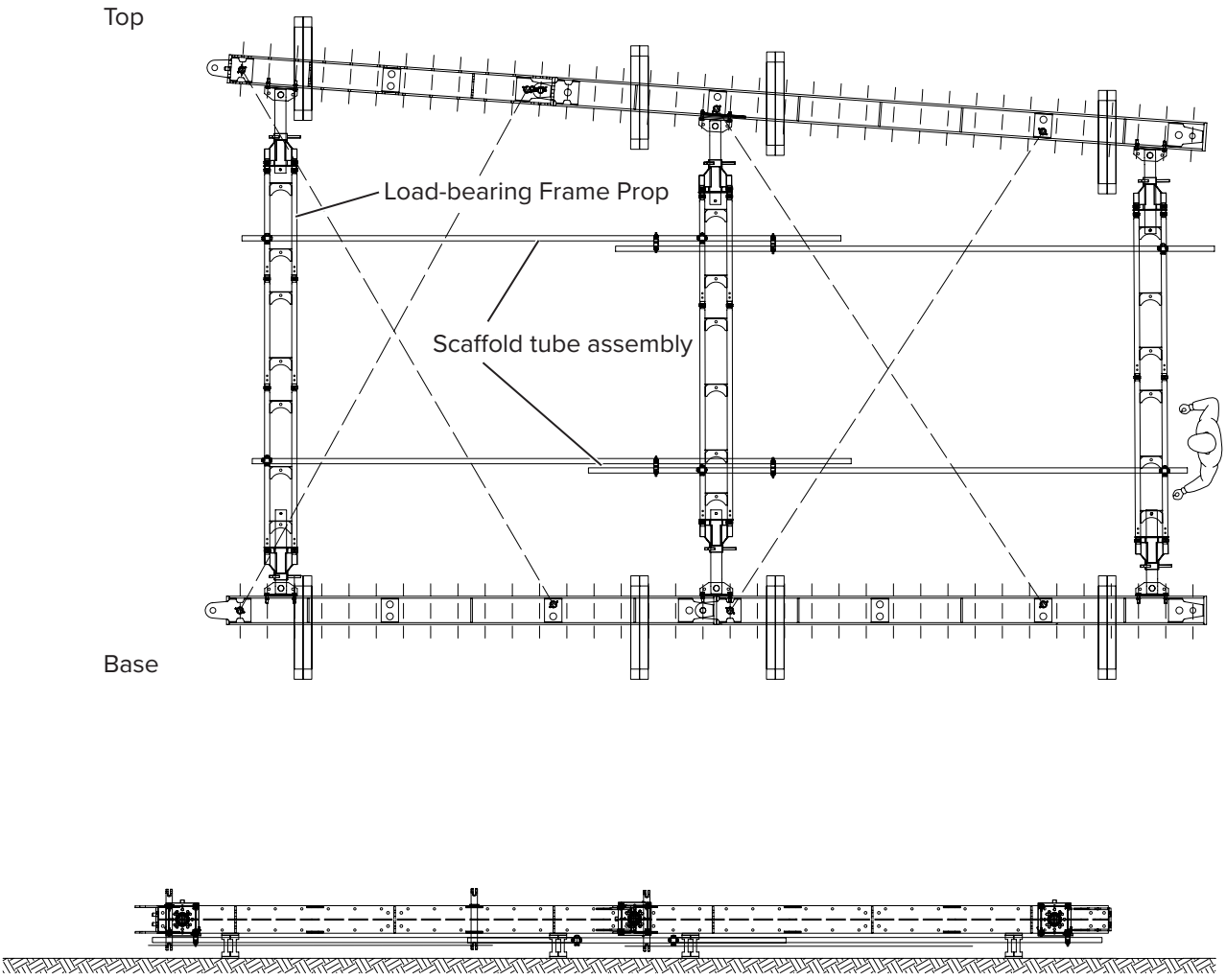
Step 1 Check actual ground height on site.

Step 2 Pre-assemble Load-bearing Frame Props to the correct length and pre-adjust the Spindles. Alternative: Install the Load-bearing Frame Props step by step.

Step 3 Use the Load-bearing Frame Prop Set to connect the first and last Load-bearing Frame Prop to the Main Beam (Refer to details on page 134).

Step 4 Ensure that the Main Beams are spaced properly at the top and base.

Step 5 Construct an assembly of horizontal scaffold tubes and couplers on the underside of the Load-bearing Frame Props for temporary bracing.

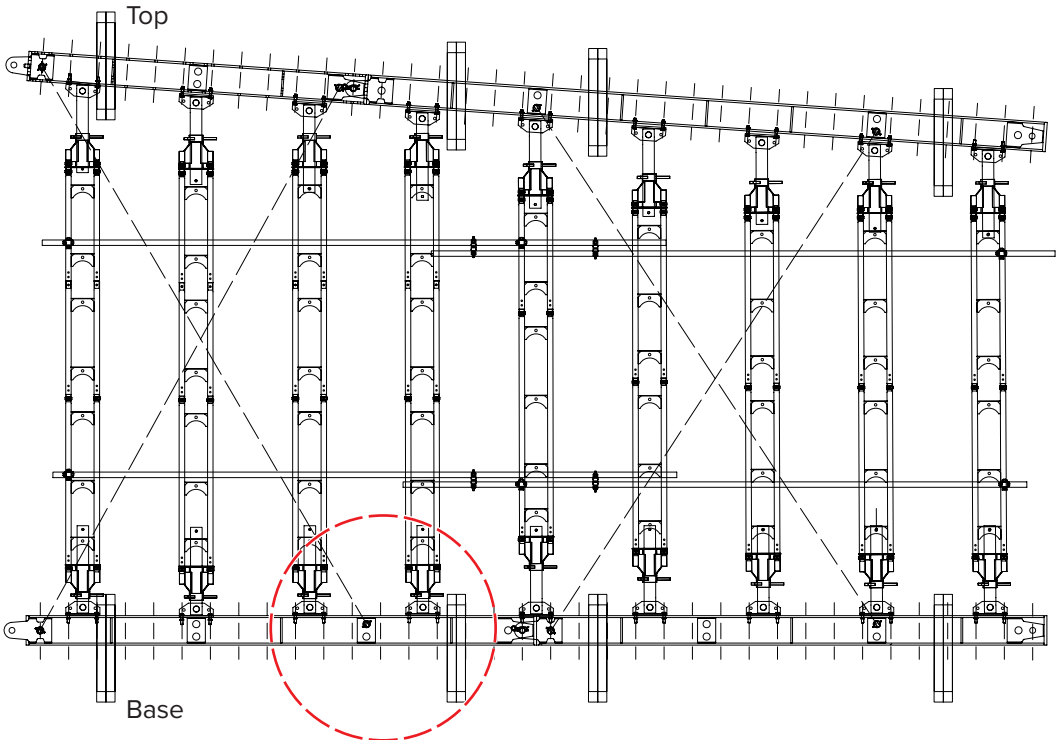


15.1.6 Middle Load-bearing Frame Props

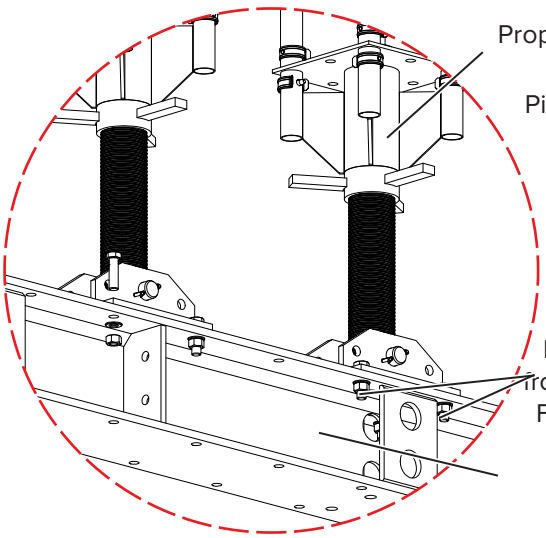
	To make the later fine adjustment of the vertical truss to the final height easier, it is advisable to initially leave 5 cm clearance when installing the middle Load-bearing Frame Props to the Head Jack.

Step 1 Pre-assemble the middle Load-bearing Frame Props, extend the Spindles to the correct length, and extend the upper Spindles. Make the extension 5 cm shorter than the required length.

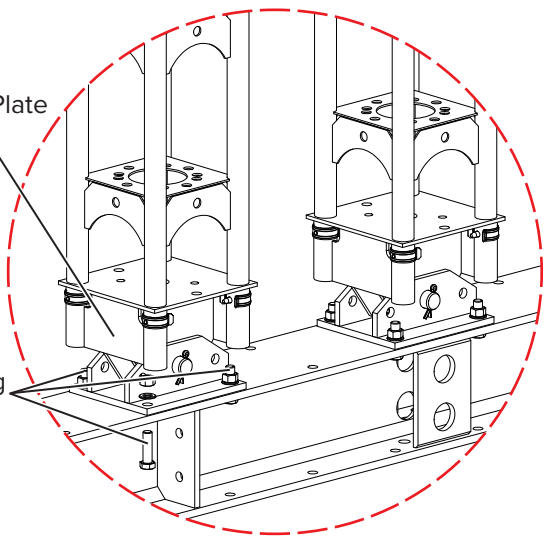
Step 2 Attach the middle Load-bearing Frame Props to the Main Beams. Use the Load-bearing Frame Prop Bolt Set to attach the Spindles to the Main Beam at the base. Tighten the Bolts securely. Use the Bolt Set to attach the Spindles to the Main Beam at the top as well. Tighten the bolts securely. The 5 cm clearance remains in the prop due to the shorter Spindles.



Detail D
Case A Prop Jack



Case B Pin-jointed Base Plate



Unless otherwise stated, all dimensions are in mm.

Use the Load-bearing Frame Prop Bolt Set to attach the Load-bearing Frame Prop to the Main Beam in both cases. The torque for M20 bolts can be found in the table on page 148.

WARNING

Warning!

Props not fixed with Bolts must be secured with Beam Clamps 16/70.

Step 1 Use couplers to attach a diagonal scaffold tube assembly to the top side of the Load-bearing Frame Props.

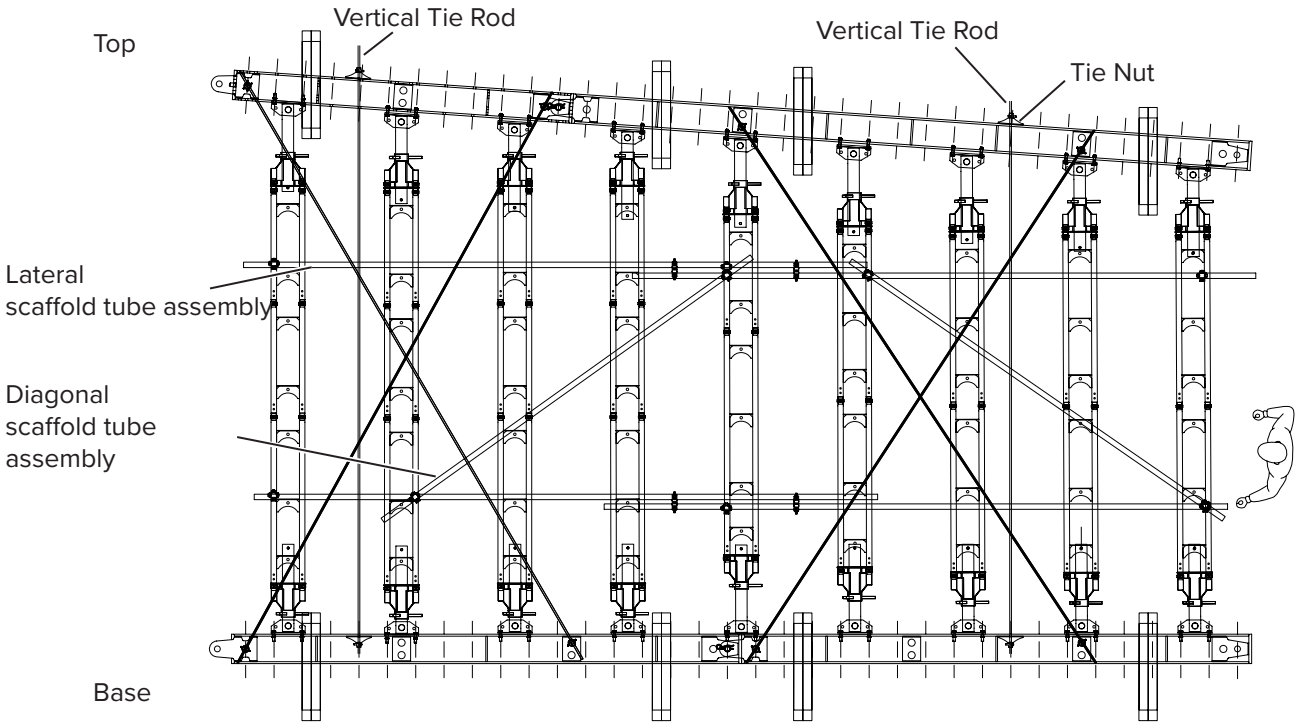
Step 2 Check that the diagonal bracing on top of the Load-bearing Frame Props is installed properly.

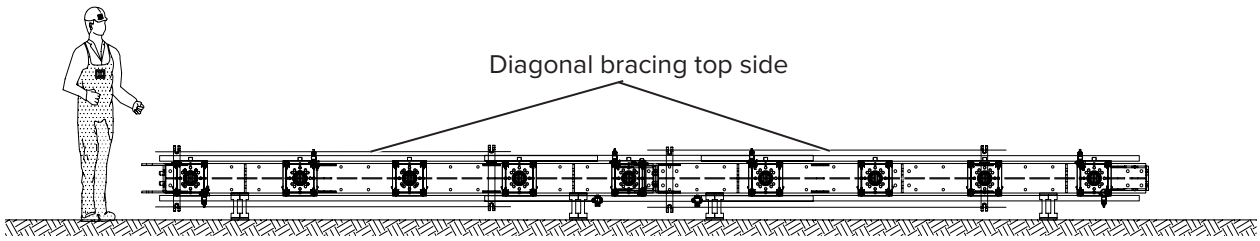
Step 3 Place 2no. vertical Tie Rods on each side of the lifting unit to secure. Insert the vertical Tie Rods and tighten them with Tie Nuts at the top and base of the structure.

Step 4 Attach the diagonal bracing to the top and tighten the Hexagon Nuts 15/15 against the Tension Bolt to prevent the Tie Rod from twisting.

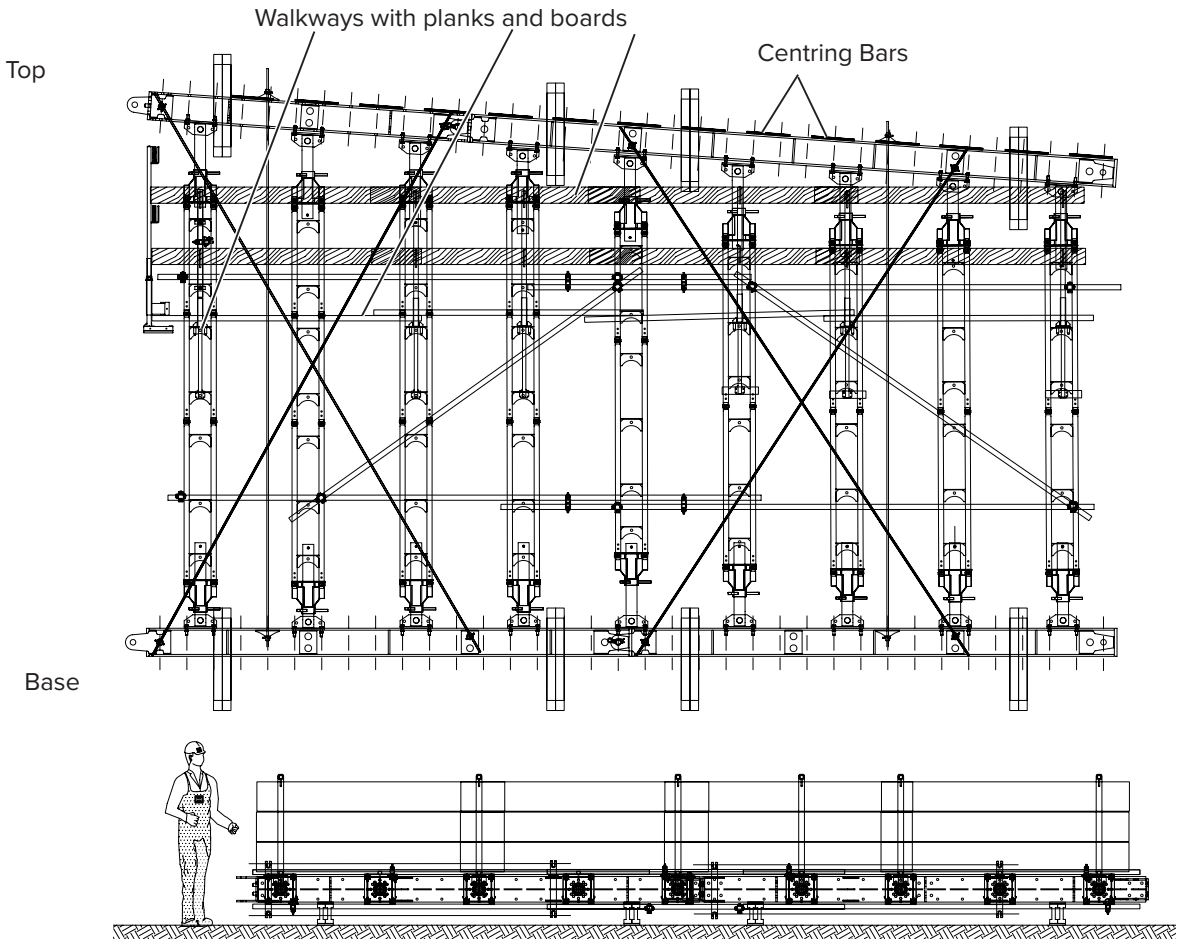
Step 5 Tighten the Tension Nut Set DW15 without preload on the Tie Rod at the base of the structure (Refer to page 146).

Step 6 Attach 2no. vertical Tie Rods for each pair of Main Beams.





Step 7 If necessary, install walkways, planks, boards and Centring Bars 40/20.

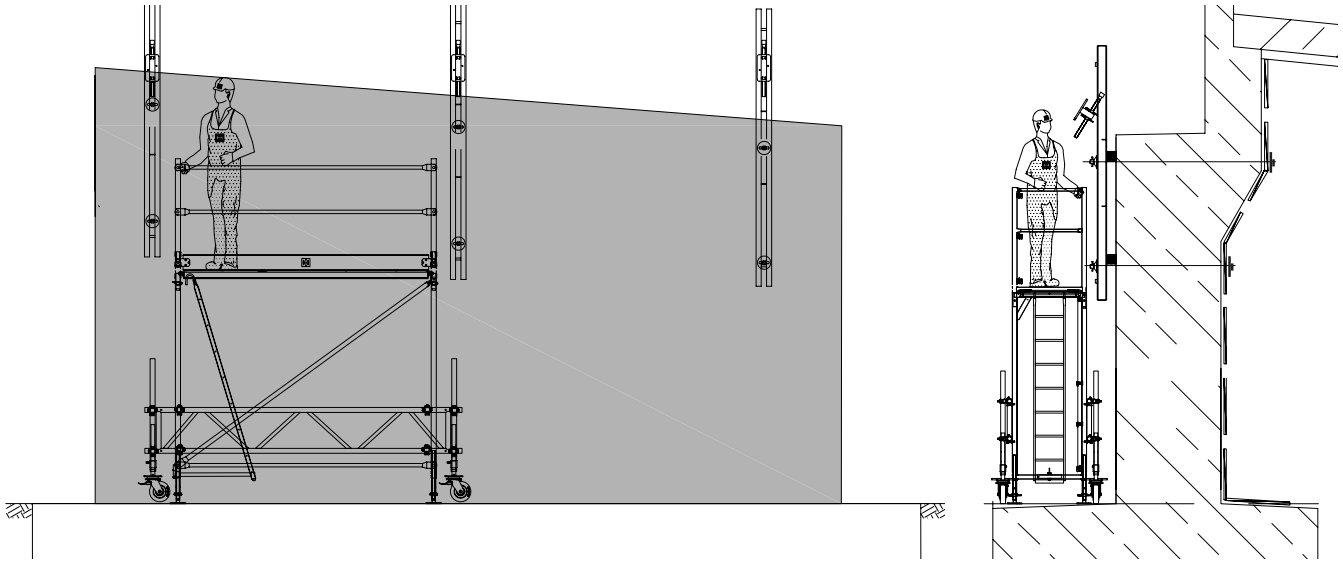


15.1.7 Preparing for tying for horizontal forces alongside abutment or pier

Step 1 Prepare the assembly area. The ground has to be level, well compacted and able to withstand the required load. Ensure easy access for a forklift or crane.

Step 2 Ensure safe access for mounting of Steel Walers and the Adjustable Abutment Bracket.

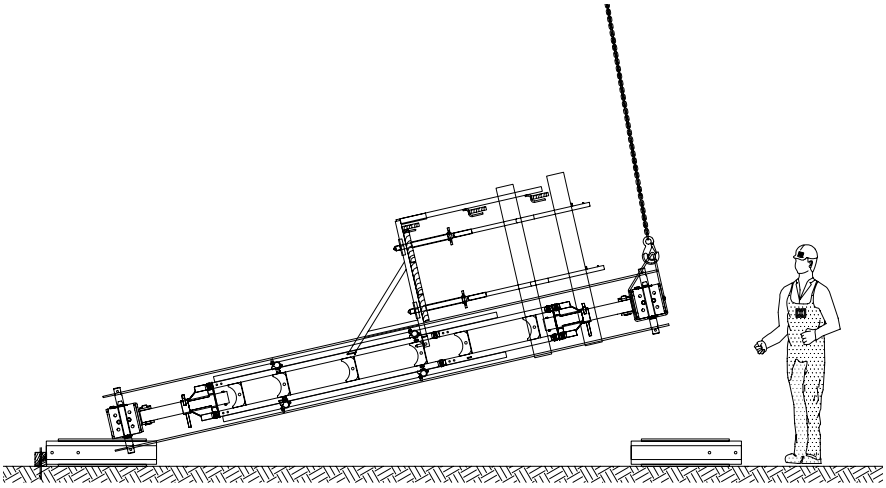
Step 3 Attach the Steel Walers and the Adjustable Abutment Bracket to the abutment or bridge pier. Consult the design scheme for information on the number of Steel Walers and the location. Secure the points where the Steel Walers are tied to the structure to prevent them from being released unintentionally.



Unless otherwise stated, all dimensions are in mm.

15.1.8 Raising and adjusting

Raising the pre-assembled module with suitable lifting equipment and positioning properly.



WARNING

Warning!

The vertical truss has to rest on its full surface!

If necessary add padding materials (e.g. lean concrete).

WARNING

Warning!

The Props have to be perpendicular to the ground! Deviation from vertical alignment may not be greater than 0.5 %.

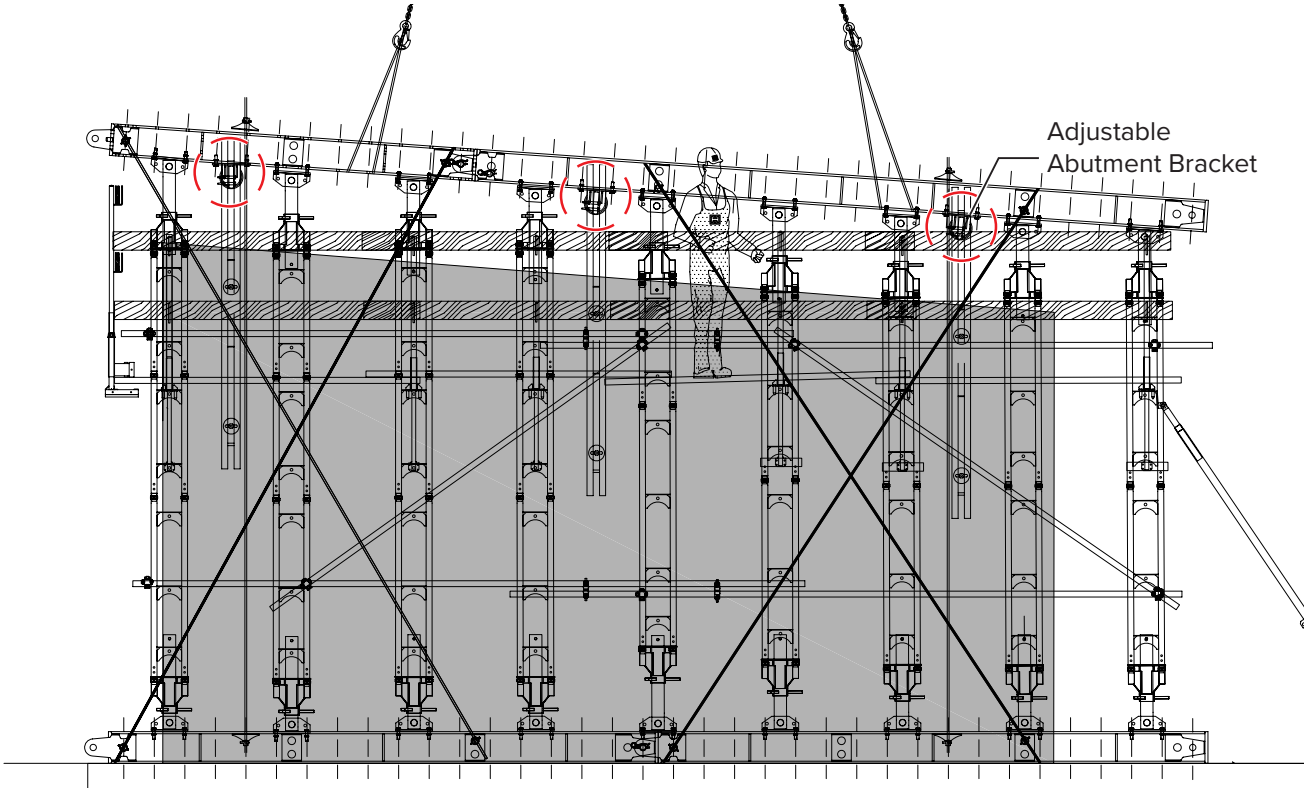
NOTE

NOTE!

When preloading the Tie Rods DW15, apply force step-by-step. Avoid different tensile forces in the Tie Rods to prevent damage and deflection.

When using multiple assemblies, a continuous connection of the Main Beams is recommended.

Step 1 Use the Adjustable Abutment Bracket to attach the pre-assembled module to the existing structure (abutment) while it is still secured with the lifting device.

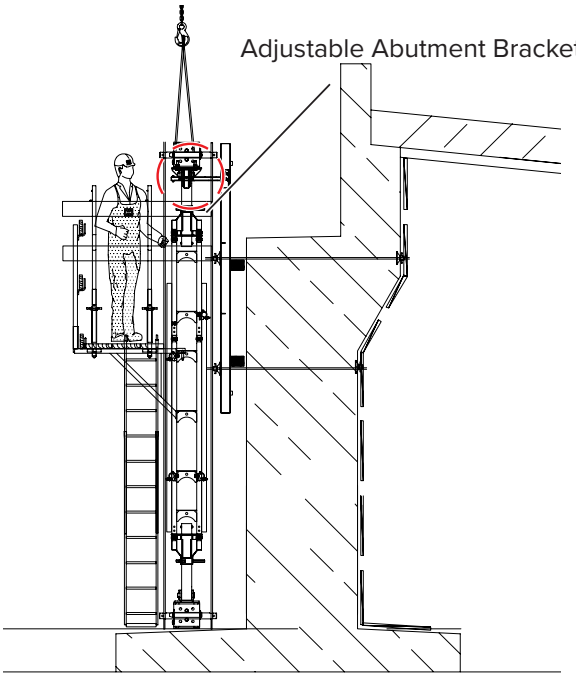


Step 2 After releasing the pre-assembled module from the lifting device, align it with the Adjustable Abutment Bracket. Align the assembly vertically with the Adjustable Abutment Bracket.

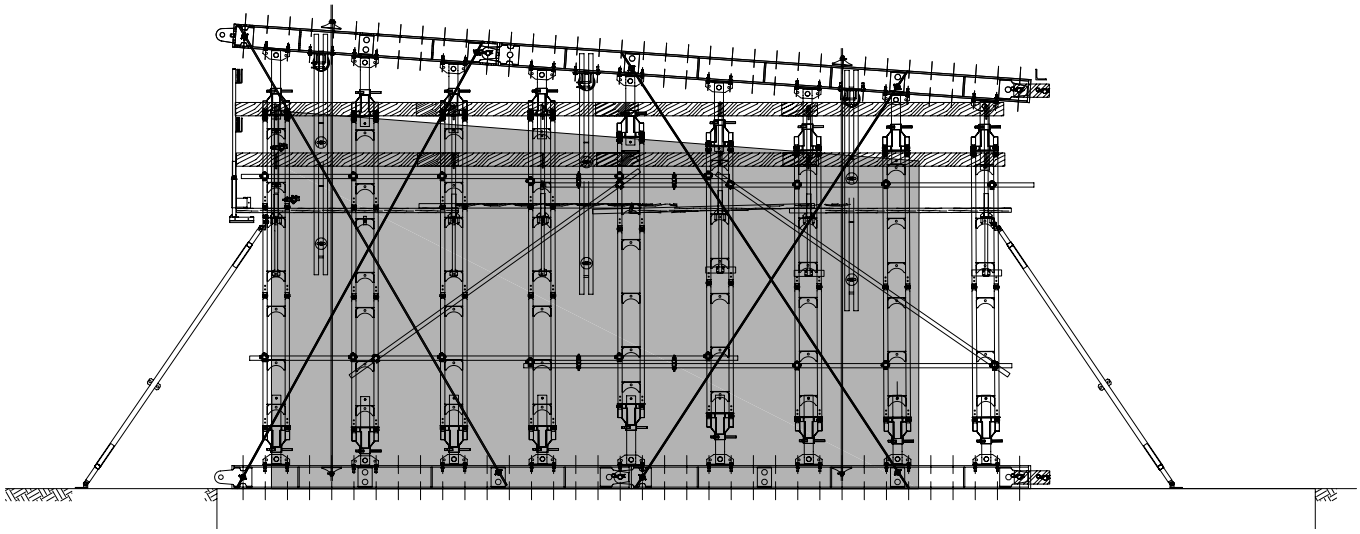
Step 3 Check if the Main Beam is at the right height in relation to the building and adjust if necessary. Adjust the Spindles at the outer Load-bearing Frame Props.

Step 4 Retract the Spindles of the middle Load-bearing Frame Props to force-fit under the flange of the Main Beam and tighten the bolts in the head plate.

Step 5 Align the pre-assembled modules lengthwise. Pre-tense the Tie Rods crosswise up to 10.00 kN by with the Tension Nut Set DW15 (Refer to page 146).



Unless otherwise stated, all dimensions are in mm.



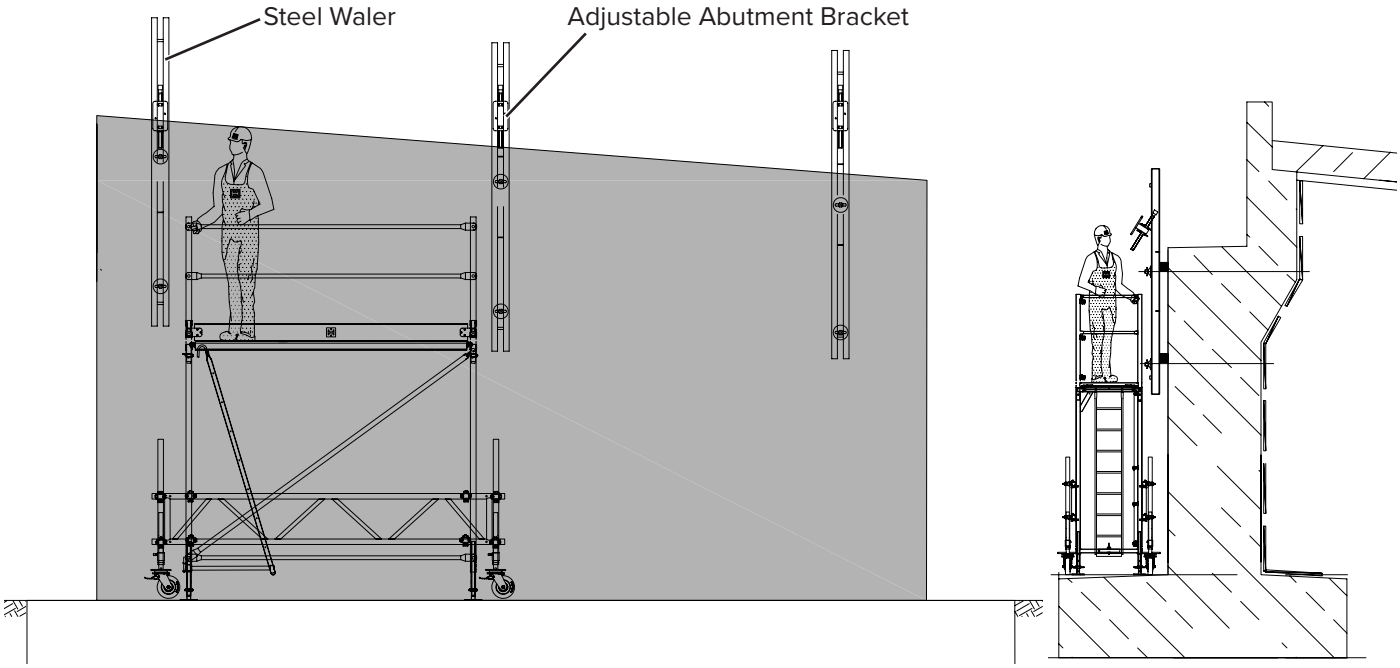
15.2 Recommended vertical assembly sequence on site

15.2.1 Preparations

Step 1 Prepare the assembly area. The ground has to be level, well compacted and able to withstand the required load. Ensure easy access for a forklift or crane.

Step 2 Ensure safe access for mounting of Steel Walers and the Adjustable Abutment Bracket.

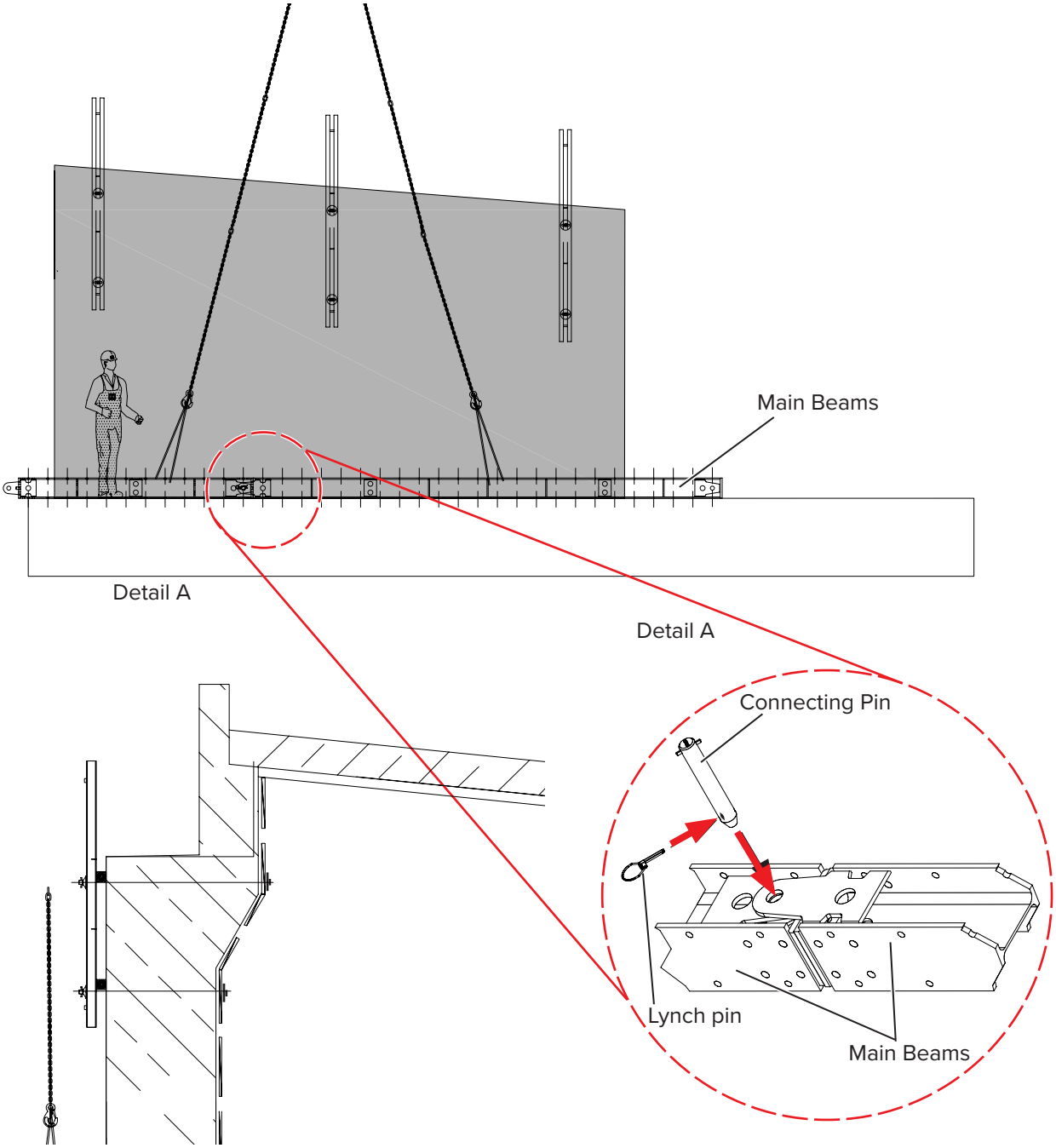
Step 3 Attach the Steel Walers and the Adjustable Abutment Bracket. Consult the design scheme for information on the number of Steel Walers and the location. Tie the Steel Walers such that they cannot be released unintentionally.



15.2.2 Lower Main Beams

Step 1 Remove the Connecting Pins from the Main Beams and raise the Main Beams into the assembly position using suitable lifting equipment.

Step 2 Align the Main Beams and insert the Connecting Pins. Secure the Connecting Pins with lynch pins.



Step 3 Slide the Main Beams together and secure with the Connecting Pin. Secure the Connecting Pins with lynch pins.

Unless otherwise stated, all dimensions are in mm.

15.2.3 First Load-bearing Frame Prop

WARNING

Warning!

Do not detach from the lifting device until the Load-bearing Frame Prop has been secured to prevent it from tipping or overturning.

BOSTA Scaffold Retainers for securing the Load-bearing Frame Prop have to be ordered separately!

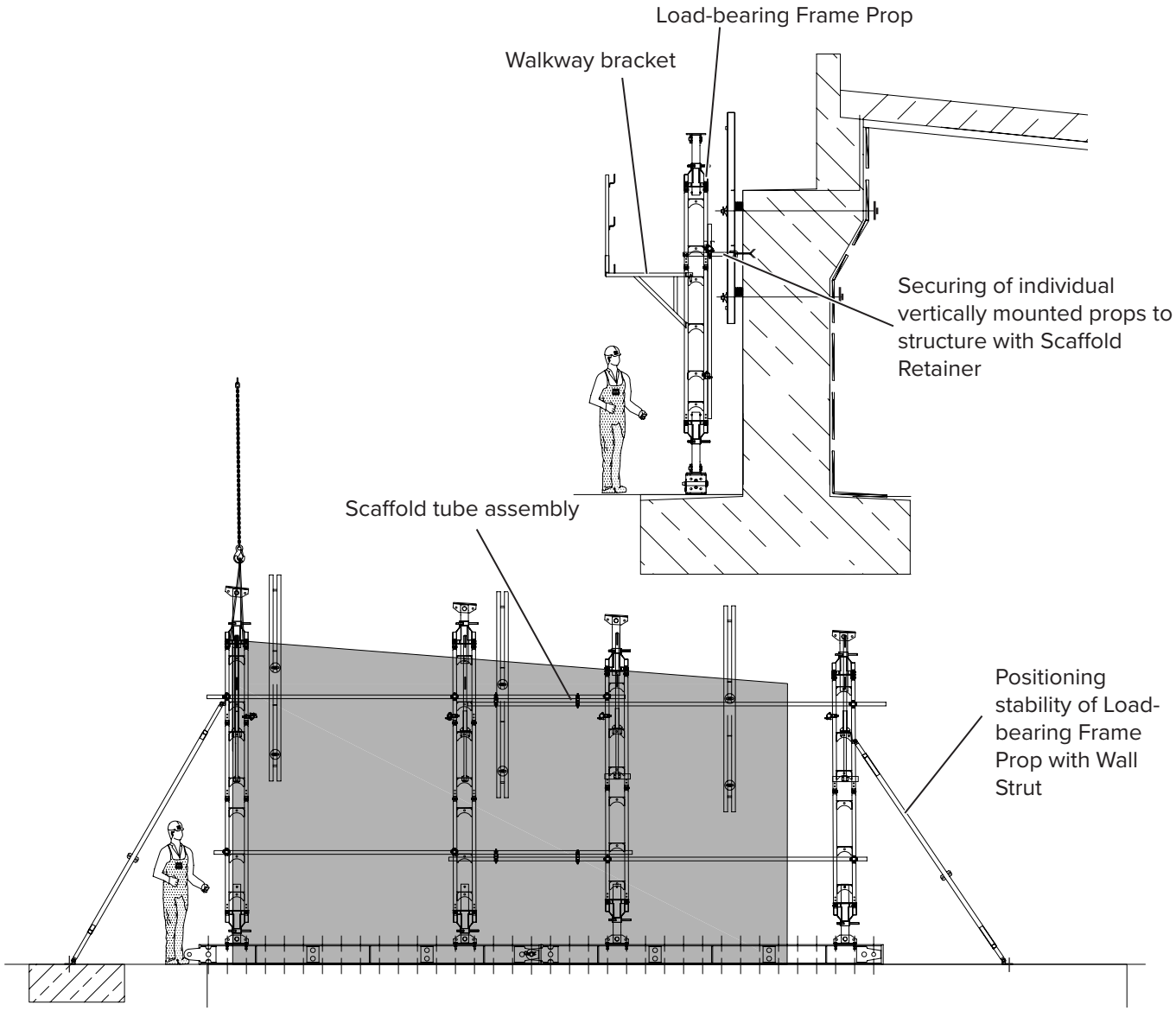
For greater distances between the first and last Load-bearing Frame Prop, the middle Props should be adjusted with 5 cm clearance. Use couplers and horizontal tubes to connect them.

Step 1 Check actual ground height on site and approximate height of Load-bearing Frame Prop before starting assembly.

Step 2 Pre-assemble Load-bearing Frame Props (including walkways) to the correct length and pre-adjust the spindles. Alternative: Install the Load-bearing Frame Props step by step.

Step 3 Fasten the first Load-bearing Frame Prop in the correct position on the lower Main Beam. Use the Load-bearing Frame Prop Bolt Set to connect the Load-bearing Frame Prop to the Main Beam.

Step 4 Use Wall Struts and Scaffold Retainers to secure the Load-bearing Frame Prop to the existing structure.



15.2.4 Middle Load-bearing Frame Props

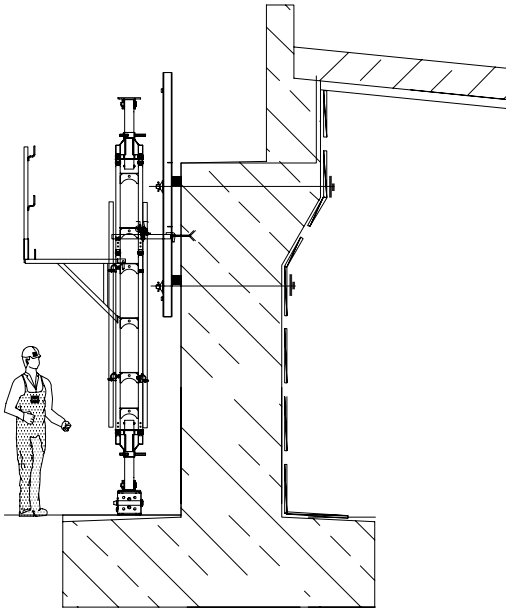
☞	To make the later fine adjustment of the vertical truss to the final height easier, it is advisable to initially leave 5 cm clearance when installing the middle Load-bearing Frame Props to the Head Jack.

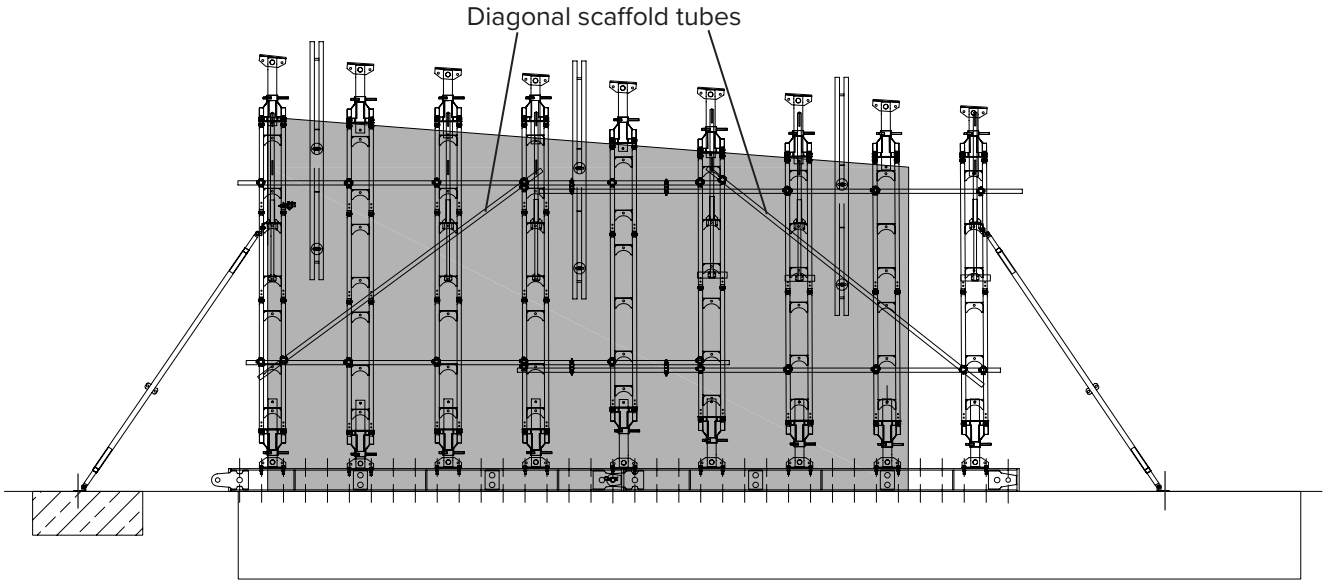
Step 1 Fasten the Load-bearing Frame Prop in the correct position on the lower Main Beam.

Step 2 Use the Bolt Set to connect the Load-bearing Frame Prop to the Main Beam.

Step 3 Extend the top Spindles about 5 cm less than the final length.

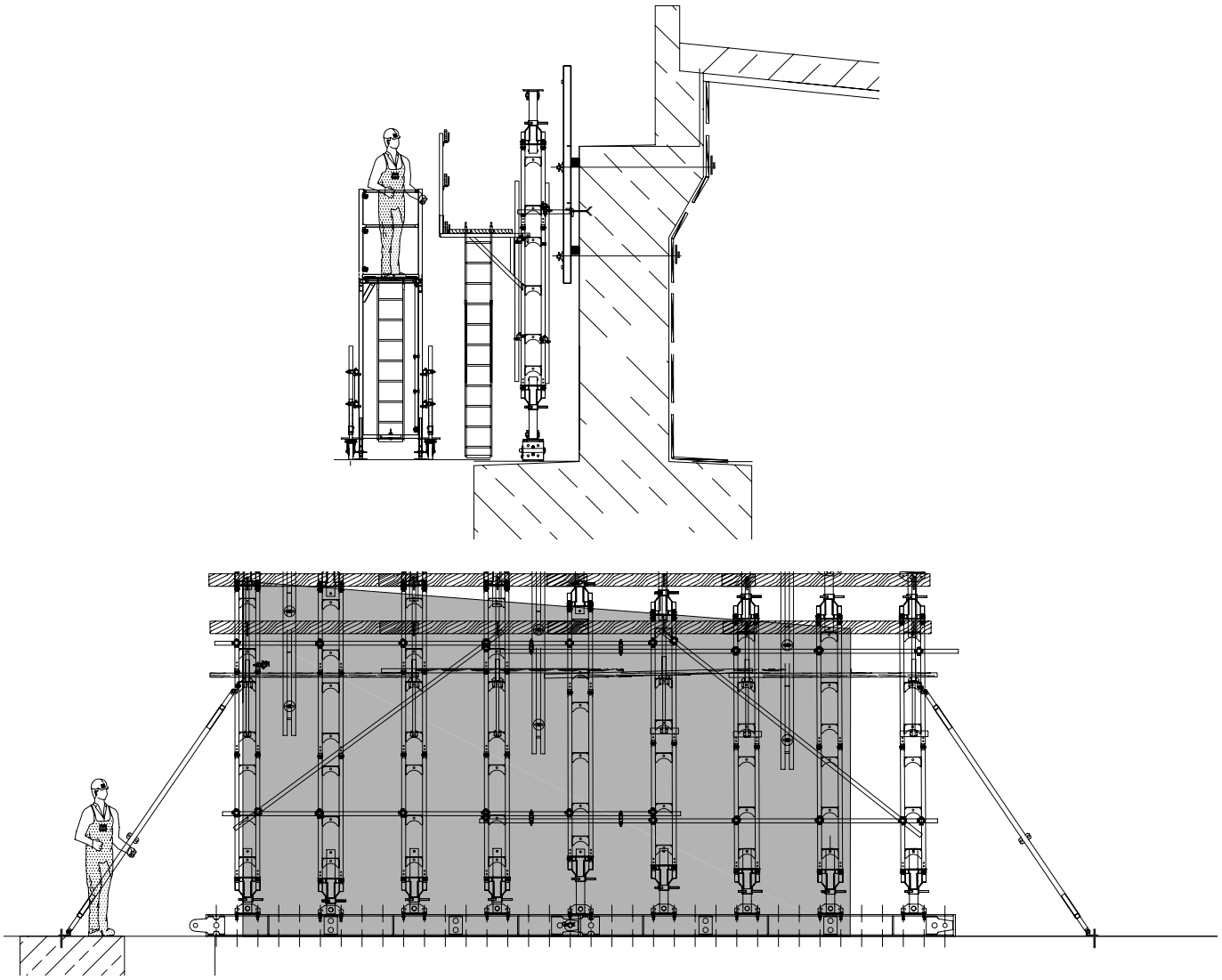
Step 4 Use couplers to attach diagonal scaffold tubes to Load-bearing Frame Props.





Unless otherwise stated, all dimensions are in mm.

Step 5 Add walkways, planks and railings as needed.



15.2.5 Upper Main Beam

Step 1 Use suitable lifting equipment to raise the Main Beam to the correct position on the Load-bearing Frame Prop.

Step 2 Securely screw the Main Beam onto the first and last Load-bearing Frame Prop with the Load-bearing Frame Prop Bolt Set.

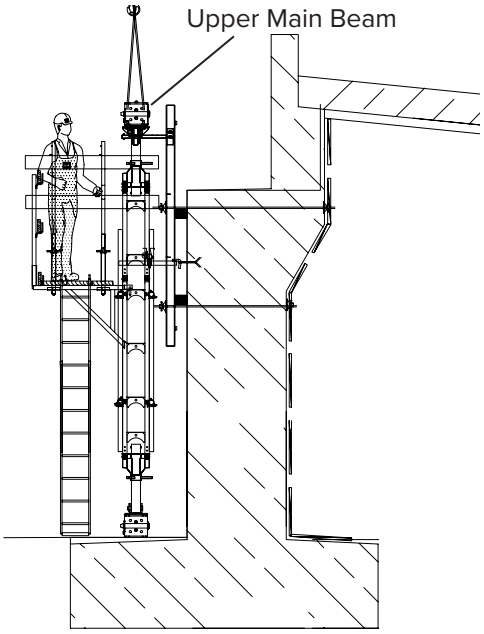
Step 3 Use the Adjustable Abutment Bracket to fasten the upper Main Beam to the existing structure.

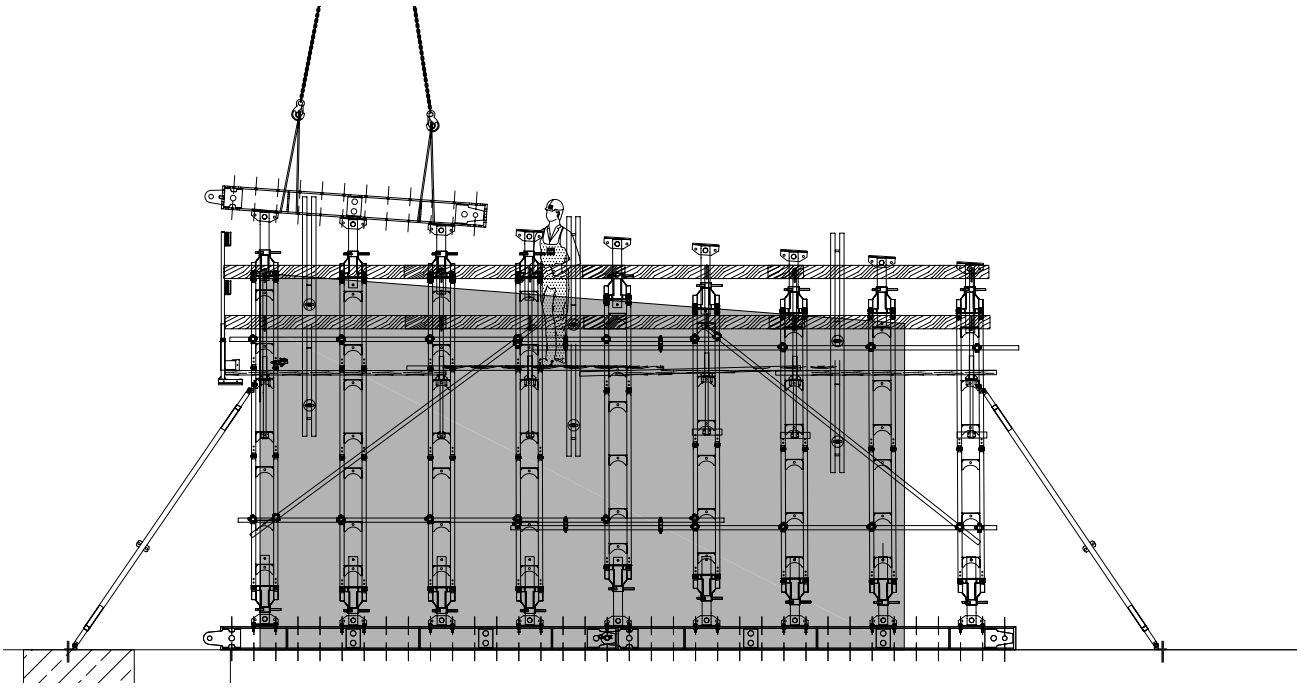
Step 4 Check the height of the Main Beam and adjust via the outer Props if necessary. Extend the upper Spindles of the middle Load-bearing Frame Props to the required length and then fasten them to the upper Main Beam with the Load-bearing Frame Prop Bolt Set.

WARNING

Warning!

Props not fixed with Bolts must be secured with Beam Clamps 16/70.





Unless otherwise stated, all dimensions are in mm.

15.2.6 Diagonal Bracing with Tie Rods

WARNING

Warning!

The vertical truss has to rest on its full surface. If necessary add padding materials (e.g. lean concrete).

NOTE

NOTE!

When preloading the Tie Rods DW15, apply force in increments and crosswise. Avoid different tensile forces in the Tie Rods to prevent damage and deflection.

Step 1 Insert Tension Bolts.

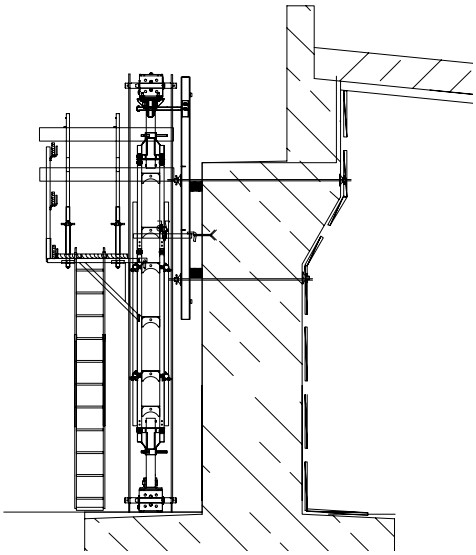
Step 2 Attach the Tie Rods crosswise to meet the requirements on site.

Step 3 Secure the diagonal bracing consisting of Tie Rods to the top side of the Main Beams.

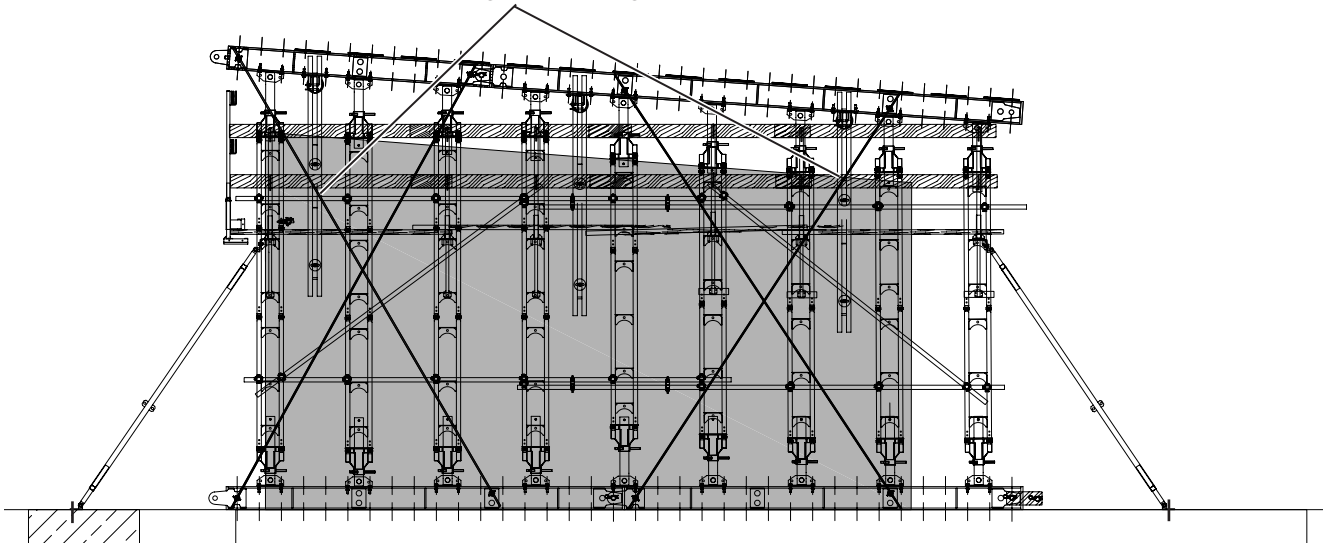
Step 4 Insert the Tie Rods and tighten against the Tension Bolt to prevent the Tie Rod from twisting.

Step 5 Tighten the Tension Nut Set DW15 at the lower end of the Tie Rod (Refer to page 131).

Step 6 Preload the diagonal Tie Rods step-by-step and crosswise up to 10.00 kN with the Tension Nut Set DW15 or the Hexagon Nuts 15/50 (Refer to page 146).



Diagonal bracing



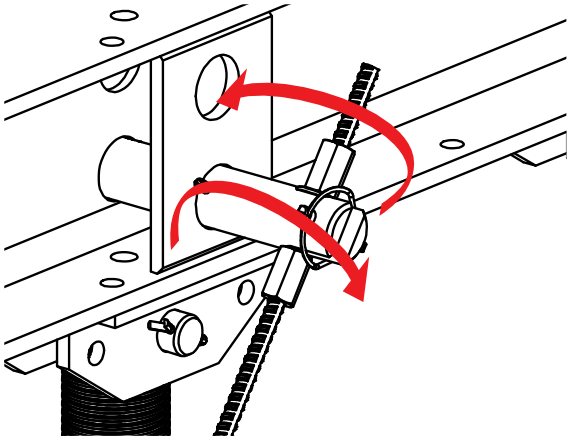
16 Preloading diagonal Tie Rods (INFRA-KIT H)

WARNING	**Warning!** Always comply with the preload specified in the structural calculation when assembling the diagonal bracing. Perform the described tasks crosswise on a pair of Tie Rods and within the diagonal bracing until the preload limit is reached. Internal loads caused by preloading have to be considered when dimensioning the Main Beams and Load-bearing Frame Props.

16.1 Countering Tie Rods at top

Step 1 Attach the two Hexagon Nuts 15/50 to the Tie Rod such that, when the Tie Rods are inserted into the Tension Bolt, they are on both sides of the Tension Bolt. Check that the lynch pin is inserted in the Tension Bolt.

Step 2 Then tighten both Hexagon Nuts 15/50 against the Tension Bolt on both sides until the Tie Rod is pressed firmly against the Tension Bolt.



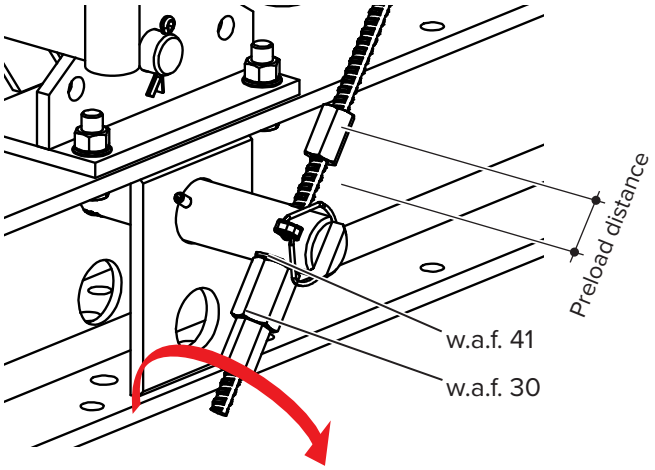
16.2 Preloading Tie Rods at base with Tension Nut Set DW15

Step 1 Check that the preload nut is screwed together completely.

Step 2 Slide the Washer 25 onto the Tie Rod and screw on the preload nut hand-tight.

Step 3 Tighten the outer nut size w.a.f. 41 against the Tension Bolt until the Tie Rod reaches 10.00 kN preloaded force. Create preload by turning the Tie Rod (Refer to section 6.3) or by applying a defined torque (Refer to section 6.4).

Step 4 Apply force crosswise to each Tie Rod pair and to the diagonal bracing (no more than a single turn of the nut) until the required force is achieved.



16.3 Imposing defined preload force with tie elongation

Step 1 Determine the preload distance. It is calculated by applying the tie elongation (Refer to the diagram below) and the distance between the Tension Bolts.

Step 2 Set the determined preload distance between the Tension Bolt and the inner Hexagon Nut 15/50.

Step 3 Apply tension to the Tie Rod by turning the preload nut one revolution.

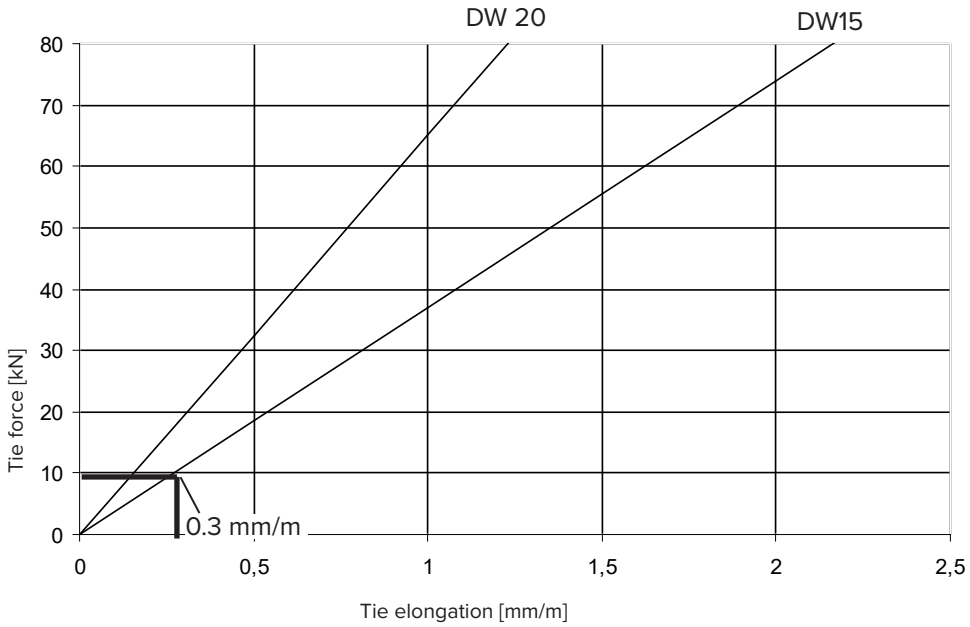
Step 4 Tighten all of the other Tie Rods in the diagonal bracing.

Step 5 Repeat this sequence until the inner Hexagon Nut is tensed against the Tension Bolt.

Example of how to calculate tie elongation

- Tie force 10.00 kN
- Tie Rod DW15, stressed length 6 m
- Slip 1 mm

The diagram shows the tie force in kN and the resulting tie elongation along the line DW15. In this case it is 03. mm/m.



So at a Tie Rod length of 6 m, the preload distance a is:

Formula:

Preload distance a = A = tie elongation (diagram 1) · stressed length + 1 mm slip

a = 0.3 mm/m × 6 m + 1 mm = 2.8 mm

⇒ preload distance a = 3.0 mm

WARNING

Warning!

Depending on the capacity of the Tension Bolt, the safe working load (SWL) is restricted to 40.50 kN per Tie Rod.

16.4 Imposing defined preload force with torque

Step 1 Refer to the diagram for the required torque.

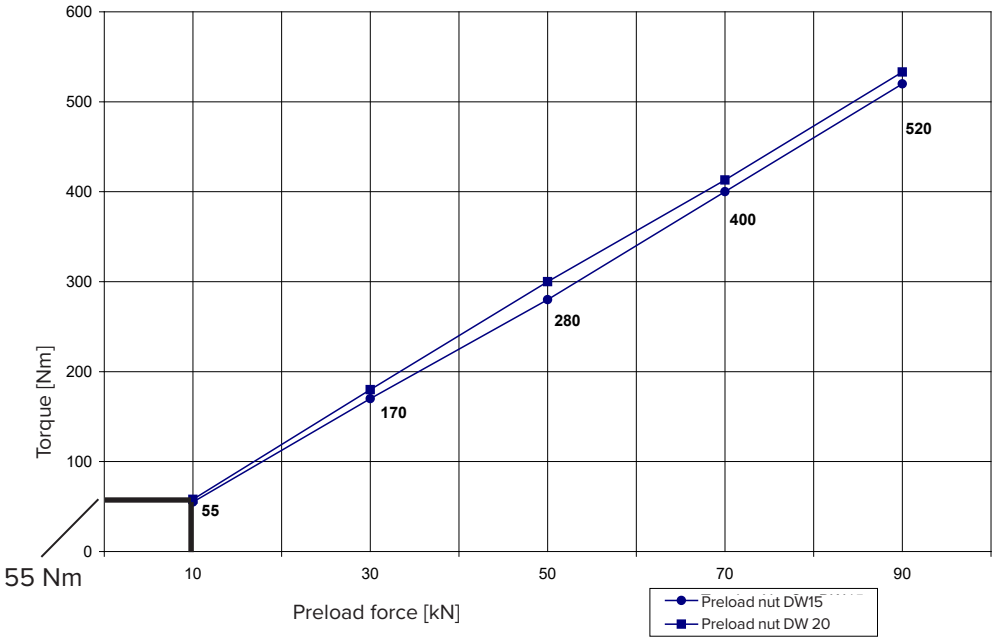
Step 2 Set the torque spanner to the required torque.

Step 3 Turn the preload nut one revolution.

Step 4 Tighten all of the other Tie Rods in the diagonal bracing.

Step 5 Repeat until the set torque is reached and the torque spanner releases.

Example: DW 15: 10.00 kN = reading 55.00 Nm



16.5 Torque for bolts with metric thread

Tighten all bolts used with the respective torque indicated in this table!

Torque for high-strength bolts 10.9			
Bolt	**Required preload force F_V [kN]**	**Preloading bolts with torque method**	
		Required torque M_V [Nm]	
		MoS_2 - greased	**Slightly greased**
M20	160.00	450.00	600.00
M24	220.00	800.00	1,100.00

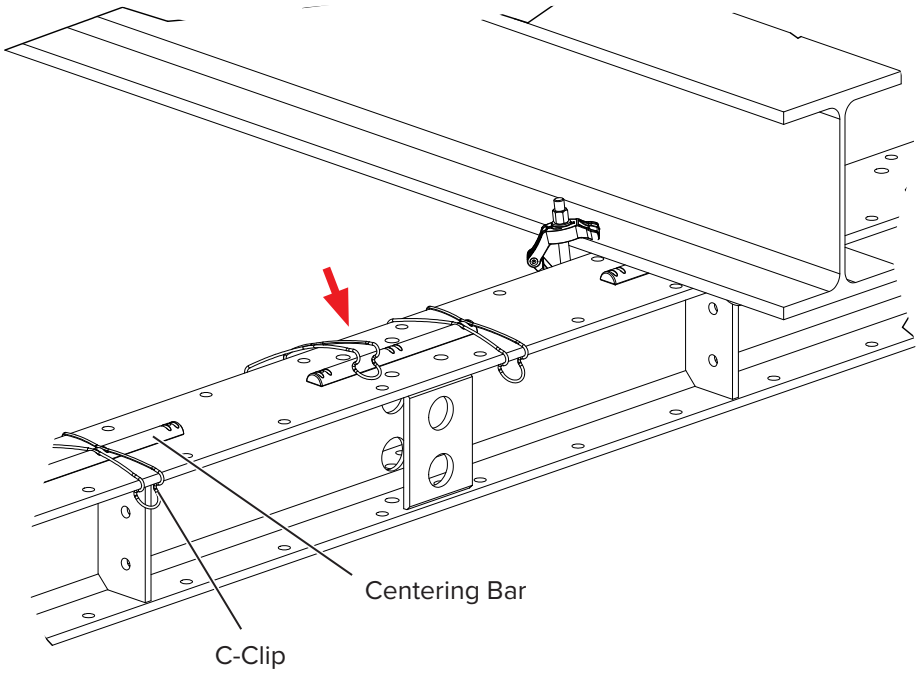
MoS_2 greased for galvanized bolts, slightly oiled - for non-galvanized bolts.

17 Attaching the Centering Bar

The Centering Bar transfers vertical loads from the deck into the Main Beams.

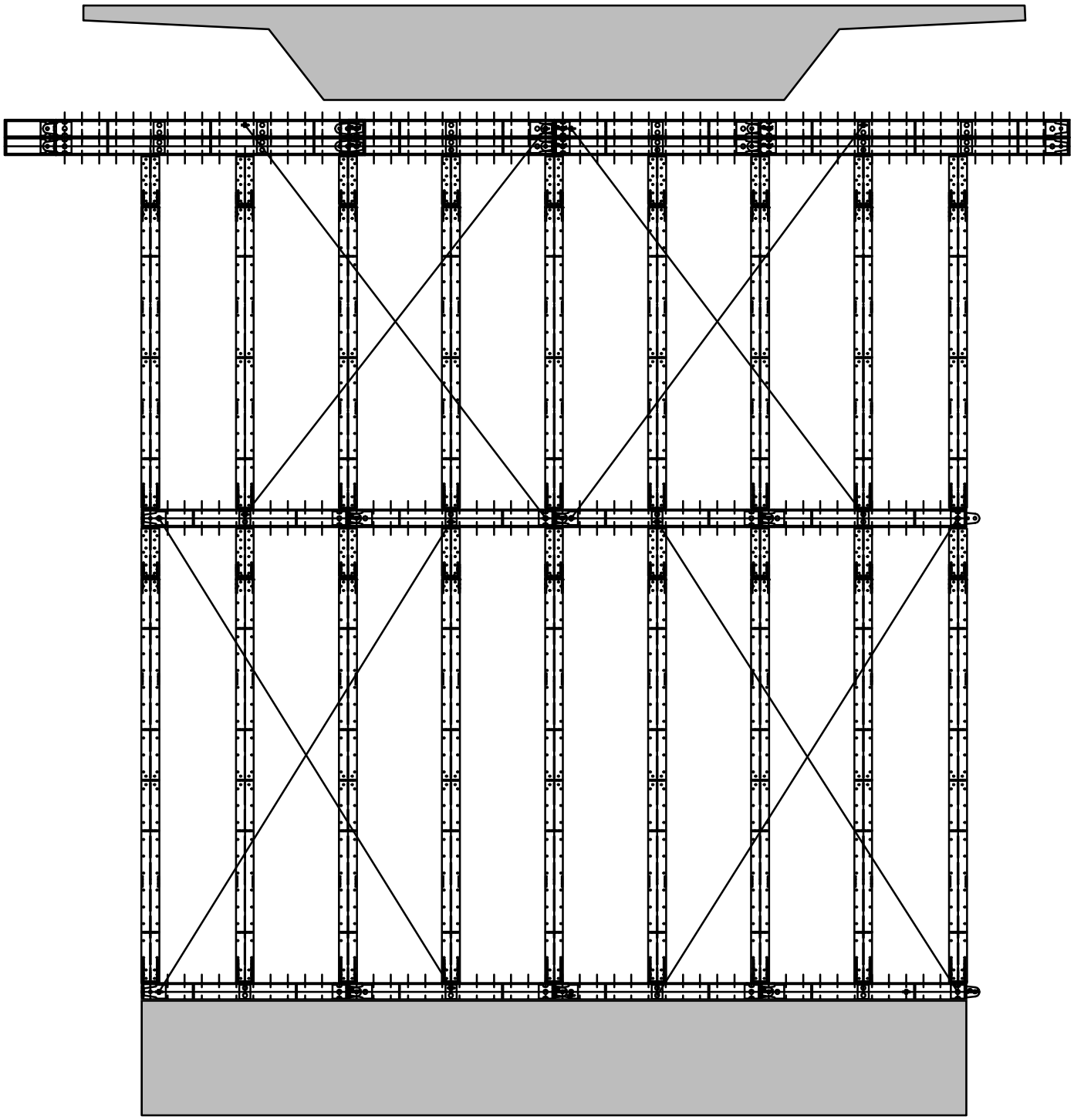
Secure the Centring Bar to prevent it from falling or slipping. Use the C-Clip.

Typically a single C-Clip is attached in the groove in the middle of the Centering Bar and clamped to the Main Beam. Up to three clips per bar can be used to secure a Centering Bar.



18 Additional example of use

High-load vertical trusses for large spans or bridge renovations/repairs (replacement of bridge bearings).



19 Chronology

Changes since edition 2023-10-11	Page(s)
Layout updated.	div.
Safety chapter revised.	5
Bolt overview revised.	28
Chapter 88 revised.	37
IK Waler M added to chapter 9.1.	52
Chapter 9.2.5 revised.	59
Note added in chapter 9.3.3.	69
Chapter 9.7 revised.	89
IK Jack 500 H and IK Jack 500 Adaptor M added.	16, 25 & 94
IK Scaffold Tube Adaptor added.	23 & 114
H 20 Timber Beam Clamp added.	28 & 117

Hünnebeck in the UK
Rush Lane, Dosthill
Tamworth, West Midlands, B77 1LT
Tel.: +44 (0) 1827 289 955
info-uk@huennebeck.com
www.huennebeck.com

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