



# Formwork for walls and columns

## User guide





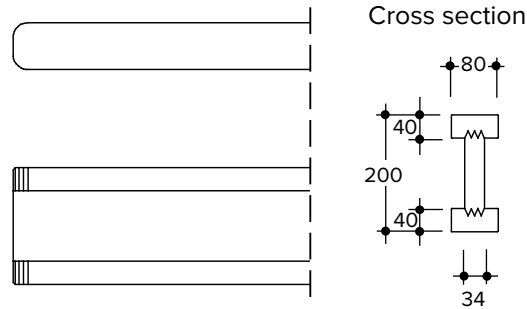
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## 1 H 20 Timber beam

### Beam dimensions

#### Beam end



## 2 Product features

The basis of the wall formwork is the H 20 timber beam. It is produced in an electronically-controlled production machine. Wood quality and splicing is continually checked. The H 20 Beam has a general technical approval, is sturdy, easy to handle because of the low weight of only 5.0 kg/m and offers a high load-bearing capacity with large distances between walers. The advantage: fewer ties.

Due to the project orientated arrangement of beams and tie positions, an optimum adaptation to ground plans and to the required concrete surface will be achieved.

The steel walers (clamped onto the H 20 timber beam) allow the formwork elements to be assembled quickly and simply. Assembly is as easy as disassembly.

The advantage: no problems with the restructuring of wall formwork units when a frequent change of ground plans takes place.

The H 20 wall formwork is an economical alternative to project-independent formwork systems. It is definitely the best when it comes to complicated ground plans and numerous uniform-type applications with the same wall heights.

The H 20 timber beams are used for wall, column and slab formwork.

They show high stability for low weight. All safety regulations and safety rules of local authorities have to be considered for application.

### 2.1 General

This user guide contains important information regarding the assembly and use of the H 20 Wall formwork by Hünnebeck as well as safety instructions that are important for safe application on site.

Those instructions are created to support effective working processes on site with the H 20 Wall formwork. Therefore read this user guide carefully before assembly and use of the H 20 Wall formwork carefully, keep it always at hand and archive it for reference.

Hünnebeck products are exclusively designed for commercial use by technically qualified users.

## 2.2 Safety instructions

### **Important information regarding the intended use and safe application of formwork and falsework**





The contractor is responsible for drawing up a comprehensive risk assessment and a set of installation instructions. The latter is not usually identical to the user guide.

- **Risk assessment**  
The contractor is responsible for the compilation, documentation, implementation and revision of a risk assessment for each construction site. His employees are obliged to implement the measures resulting from this in accordance with all legal requirements.
- **Installation Instructions**  
The contractor is responsible for compiling a written set of installation instructions. The assembly instructions forms part of the basis for the compilation of a set of installation instructions.
- **User guide**  
Formwork is technical work equipment which is intended for commercial use only. The intended use must take place exclusively through properly trained personnel and appropriately qualified supervisory personnel. The user guide is an integral component of the formwork construction. It comprises at least safety guidelines, details on the standard configuration and intended use, as well as the system description. The functional instructions (standard configuration) contained in the user guide are to be complied with as stated. Enhancements, deviations or changes represent a potential risk and therefore require separate verification (with the help of a risk assessment) or a set of installation instructions which comply with the relevant laws, standards and safety regulations. The same applies in those cases where formwork and/or falsework components are provided by the contractor.  
This user guide is intended for commercial users with appropriate technical training. The contents and processes described are in accordance with the legal and occupational safety regulations of Germany and Austria. Hünnebeck assumes no liability for deviations from the contents and processes described or for use outside this area of application.
- **Availability of the user guide**  
The contractor has to ensure that the user guide provided by the manufacturer or formwork supplier is available at the place of use. Site personnel are to be informed of this before assembly and use takes place, and that they are available at all times.
- **Representations**  
The representations shown in the user guide are, in part, situations of assembly and not always complete in terms of safety considerations. Any required safety installations not shown in these representations must nevertheless be available.
- **Storage and transportation**  
The special requirements of the respective formwork constructions regarding transportation procedures as well as storage must be complied with. By way of example, name the appropriate lifting gear to be used.
- **Material check**  
Formwork and falsework material deliveries are to be checked on arrival at the construction site/place of destination as well as before each use to ensure that they are in perfect condition and function correctly. Changes to the formwork materials are not permitted.
- **Spare parts and repairs**  
Only original components may be used as spare parts. Repairs are to be carried out by the manufacturer or authorized repair facilities only.



- Use of other products  
Combining formwork components from different manufacturers carries certain risks. They are to be individually verified and may result in the compilation of a separate set of assembly instructions required for the installation of the equipment.
- Safety symbols  
Individual safety symbols are to be complied with.

#### Examples:

 <b>DANGER</b>	<b>Danger!</b> DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 <b>WARNING</b>	<b>Warning!</b> WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 <b>CAUTION</b>	<b>Caution!</b> CAUTION used with the safety alert symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
<b>NOTE</b>	<b>Note</b> NOTE refers to practices not related to personal injury.
 <b>VISUAL CHECK</b>	<b>VISUAL CHECK</b> refers to a visual check and is not related to personal injury.

- Miscellaneous  
Technical improvements and modifications are subject to change without notice. For the safety-related application and use of the products, all current country-specific laws, standards as well as other safety regulations are to be complied with without exception. They form a part of the obligations of employers and employees regarding industrial safety. This results in, among other things, the responsibility of the contractor to ensure the stability of the formwork and falsework constructions as well as the structure during all stages of construction. This also includes the basic assembly, dismantling and the transportation of the formwork and falsework constructions or their components. The complete construction is to be checked during and after assembly.

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PO BOX 10 44 61  
40852 Ratingen  
Germany

## 3 Overview

### H 20 Wall formwork

showing the typical use of H 20 Beam with wall formwork elements.

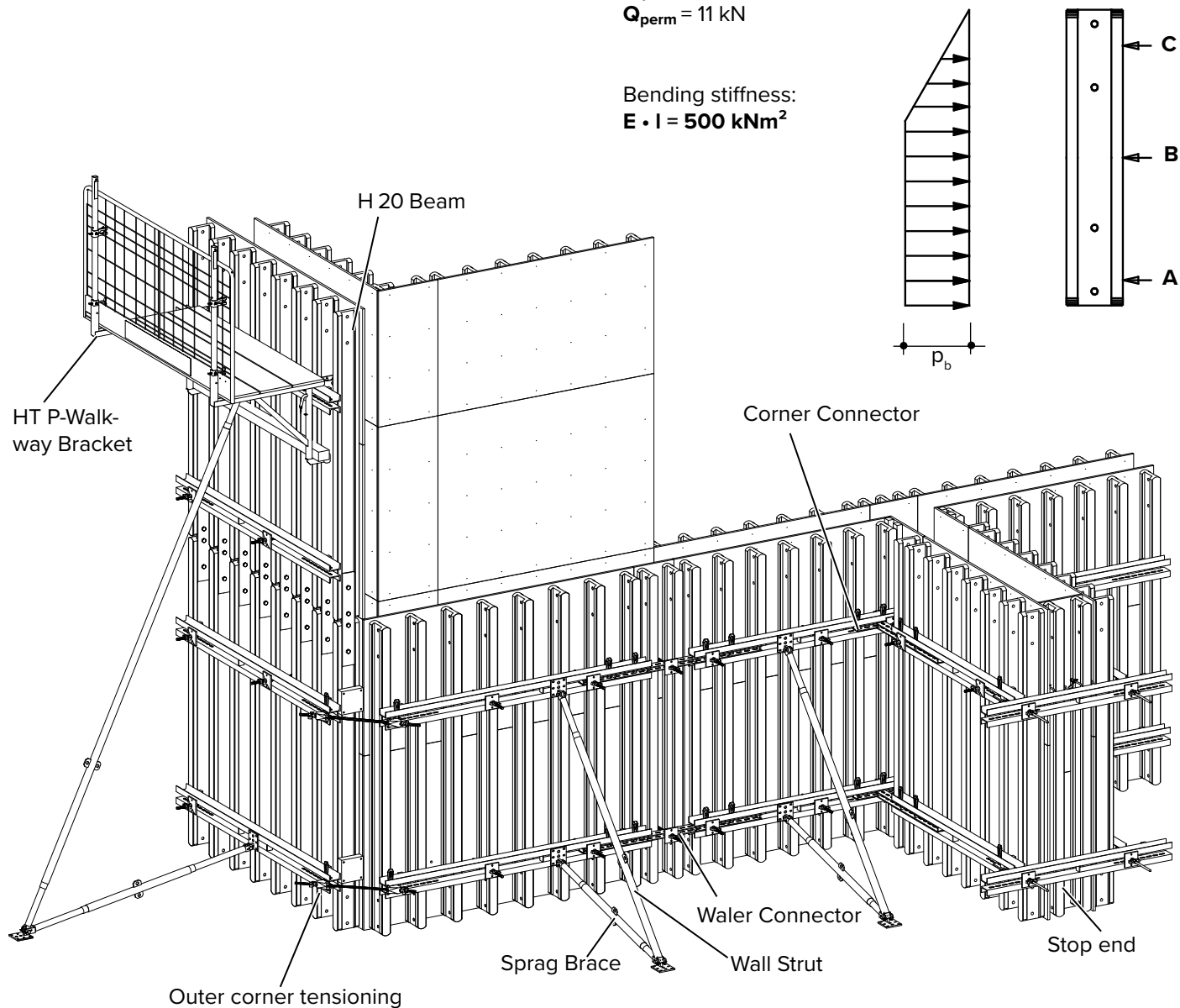
Static values:

$$M_{perm} = 5 \text{ kNm}$$

$$Q_{perm} = 11 \text{ kN}$$

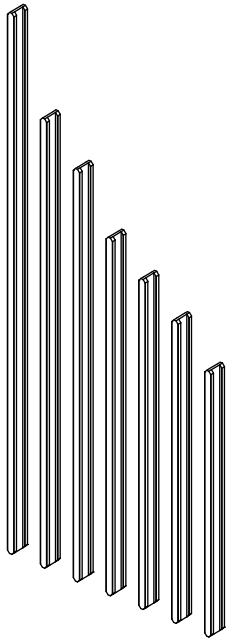
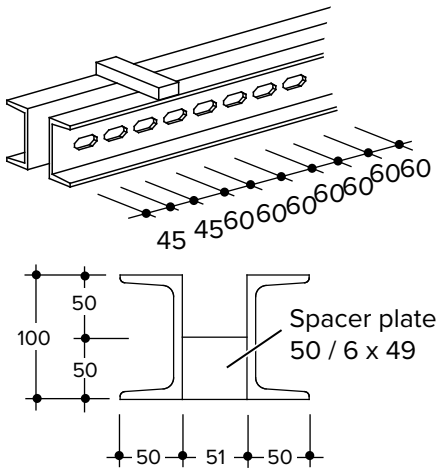
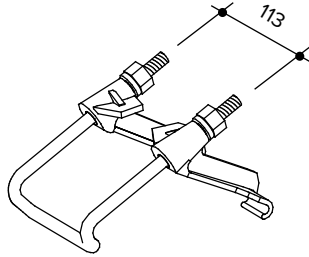
Bending stiffness:

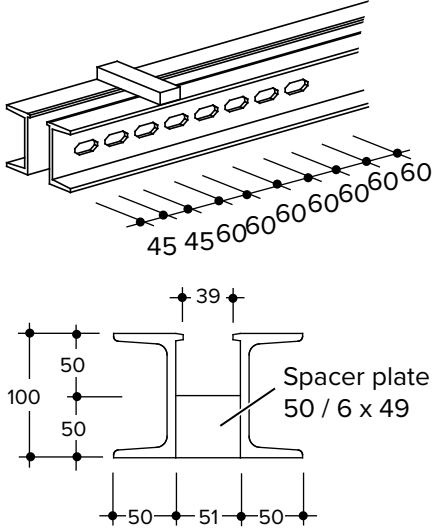
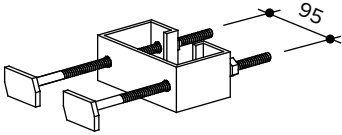
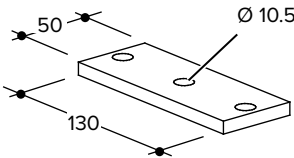
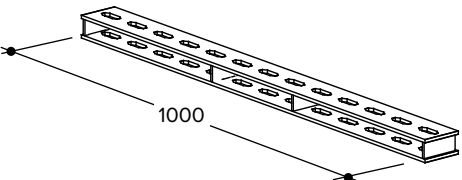
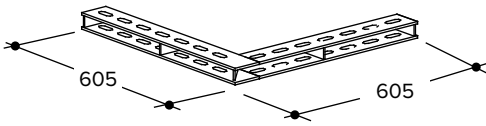
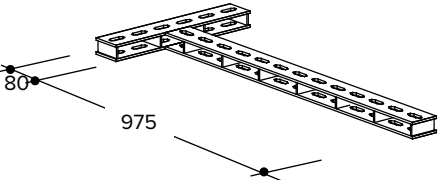
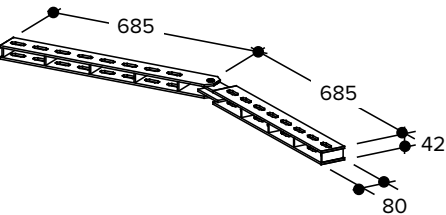
$$E \cdot I = 500 \text{ kNm}^2$$



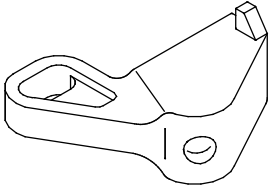
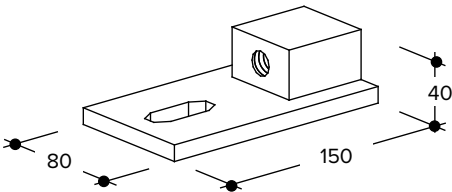
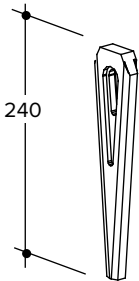
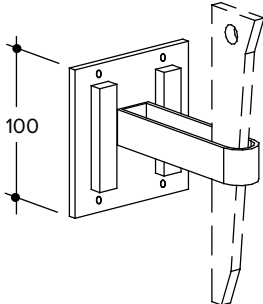
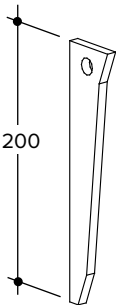
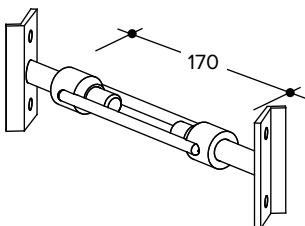


## 4 Components

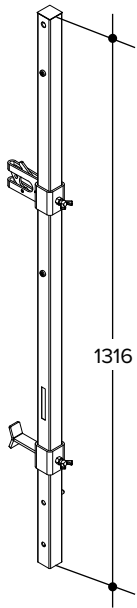
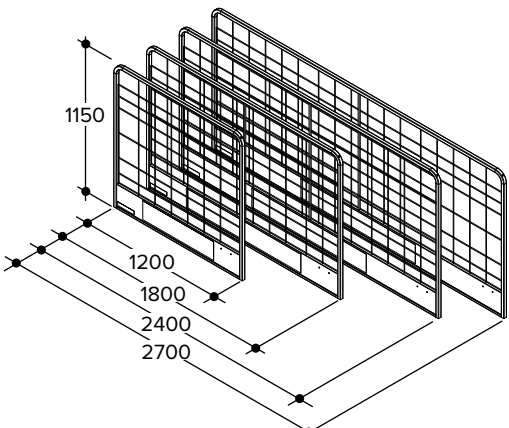
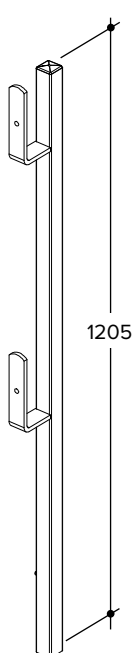
	Component	Product code	Weight [kg]
	H 20 Beam 190	581760	8.74
	H 20 Beam 245	581770	11.27
	H 20 Beam 265	581781	12.19
	H 20 Beam 290	581792	13.34
	H 20 Beam 330	581807	15.18
	H 20 Beam 360	581818	16.56
	H 20 Beam 390	581829	17.94
	H 20 Beam 450	581830	20.70
	H 20 Beam 490	581840	22.54
	H 20 Beam 590	581851	27.14
	Special lengths up to a max. length of 12.0 m on request (per running meter) <sup>1</sup>	603200	4.60
<p>The H 20 Beam is used for supporting and fastening face sheets. The spacing between the beams in the wall element depends on the concrete pressure and the selected shuttering skin.</p>			
	<b>Walers</b>		
	Steel Waler F 96	503871	22.46
	Steel Waler F 121	503882	27.85
	Steel Waler F 146	503893	33.43
	Steel Waler F 171	503908	38.86
	Steel Waler F 196	503919	44.29
	Steel Waler F 221	503920	49.72
	Steel Waler F 246	503930	55.20
	Steel Waler F 271	503941	60.73
	Steel Waler F 296	503952	66.16
<p>Special lengths are available on request. The walers are joined with Waler Connectors to create a pressure and tension resistant element connection. In that way the elements are connected in tight flush and close alignment.</p>			
	<b>H 20 Timber Beam Clamp</b>	<b>568048</b>	<b>0.79</b>
<p>The H 20 Timber Beam Clamp connects the H 20 Beam to the waler at any required position (see page 19).</p>			

	Component	Product code	Weight [kg]
	<b>Cam Waler 96*</b>	<b>505907</b>	<b>22.45</b>
	<b>Cam Waler 121*</b>	<b>505918</b>	<b>27.83</b>
	<b>Cam Waler 146*</b>	<b>505930</b>	<b>33.25</b>
	<b>Cam Waler 171*</b>	<b>505951</b>	<b>38.60</b>
	<b>Cam Waler 196*</b>	<b>505962</b>	<b>43.93</b>
	<b>Cam Waler 221*</b>	<b>505973</b>	<b>49.27</b>
	<b>Cam Waler 246*</b>	<b>505984</b>	<b>54.74</b>
	<b>Cam Waler 271*</b>	<b>506007</b>	<b>60.08</b>
	<b>Cam Waler 296*</b>	<b>506018</b>	<b>65.41</b>
	To be used with circular formwork. The Cam Walers provide support and tying locations for the formwork elements. The H 20 Beams are attached to the walers with the H 20 Beam Clamp Fastener RU.		
	<b>H 20 Beam Clamp Fastener RU</b>	<b>568703</b>	<b>1.04</b>
	The beam fastener is used to attach the H 20 Beam to Cam Walers when assembling circular formwork with intermediate arc templates (see page 37).		
	<b>Three-hole Plate*</b>	<b>506614</b>	<b>0.41</b>
	To be used with circular formwork. To connect the outer H 20 Beam to the arc templates of the formwork-element (see page 37).		
	<b>Waler Connector 100</b>	<b>505274</b>	<b>7.40</b>
	<b>Waler Connector 165</b>	<b>505296</b>	<b>13.00</b>
	For connecting formwork elements. To be attached to the walers with the Joining Wedge Z (see page 20).		
	<b>Corner Connector 60/60</b>	<b>505311</b>	<b>9.02</b>
	For forming inner corners of shafts. For connections the Joining Wedge Z is used (see page 30).		
	<b>Corner Connector H 20 / R 24</b>	<b>505436</b>	<b>11.00</b>
	For forming inner corners with length adjustments. For connections the Joining Wedge Z is used (see page 22).		
	<b>Hinged Connector 70/70</b>	<b>505355</b>	<b>12.00</b>
	<b>Double Hinged Connector 70/70</b>	<b>504328</b>	<b>12.50</b>
	For connecting skew arrangements of elements or polygonal element assemblies in circular formwork. Range 50° - 310° (see page 37).		

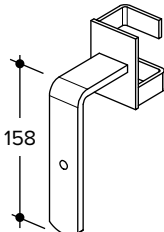


	Component	Product code	Weight [kg]
	<b>Outer Corner Bearing Z</b> Is attached to steel walers with the Joining Wedge Z. Holds the diagonal bracing of the outer corner (see page 24).	<b>504865</b>	<b>1.50</b>
	<b>Tension Strap</b> Component for stopends. Is mounted to the steel waler with the Joining Wedge Z. Can be used with Tie Rods DW15 (see page 26).	<b>505388</b>	<b>1.48</b>
	<b>Joining Wedge Z</b> Is used with waler, corner and hinged connectors, as well as outer corner bearings and tension straps (see page 22).	<b>505241</b>	<b>0.80</b>
	<b>Beam Fixing Device</b> <b>Beam Fixing Circular Formwork</b> Is used with infill panels and element extensions. Provides nail holes for attachment to H 20 Beams. Is attached to the connectors with the Wedge for Beam Fixing Device* see page 20. *Order separately.	<b>504512</b> <b>504887</b>	<b>1.00</b> <b>0.80</b>
	<b>Wedge for Beam Fixing Device</b> For locking the beam fixing devices and to attach Wall Struts or sprag braces. Also for mounting connection beam KK 230 (BKS struts). See page 20.	<b>504497</b>	<b>0.15</b>
	<b>Corner Stiffener R 24*</b> Is used as a diagonal stiffening between two H 20 Beams for inner corners. Connection angles have holes for nails with a diameter of 5 mm (see page 24).	<b>504291</b>	<b>0.70</b>

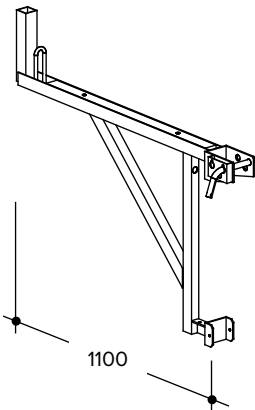
## 4.1 Edge protection

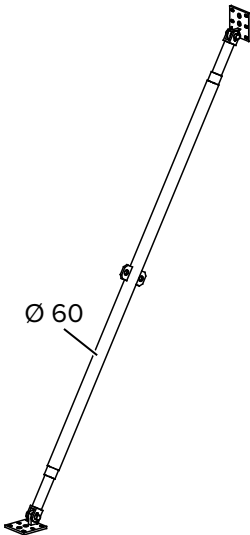
	Component	Product code	Weight [kg]
	<b>PROTECTO Post 130 Adjustable</b> The PROTECTO Post 130 Adjustable is used in combination with the PROTECTO Panel G2 An integrated safety device secures the post automatically to the various retaining elements.  The PROTECTO Post 130 Adjustable complies with BS EN 13374 Class A when used with the PROTECTO Panels G2.	<b>692750</b>	<b>4.50</b>
	<b>PROTECTO Panel G2 270</b> <b>PROTECTO Panel G2 240</b> <b>PROTECTO Panel G2 180</b> <b>PROTECTO Panel G2 120</b>	<b>692778</b> <b>692772</b> <b>692766</b> <b>692760</b>	<b>21,00</b> <b>19,50</b> <b>14,50</b> <b>10,00</b>
	Used in combination with the PROTECTO posts to provide edge protection.		
	Maximum allowable post spacing is 2.40 m		
	When used with the PROTECTO posts, the PROTECTO Panel G2 complies with BS EN 13374 Class A.		
	<b>PROTECTO Railing Post</b> The PROTECTO Railing Post is used in conjunction with the PROTECTO Panels G2 and plank railings. An integrated safety device secures the post automatically to the various retaining elements.  The PROTECTO Railing Post complies with EN 13374 when used with the PROTECTO Panels G2 and 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).	<b>601225</b>	<b>3.65</b>

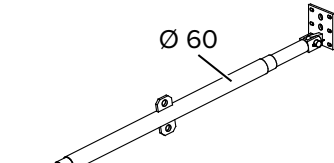


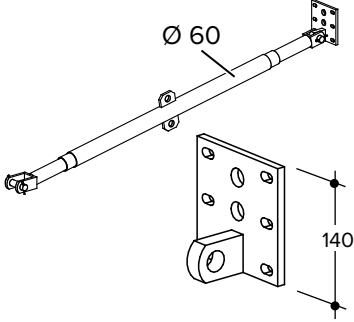
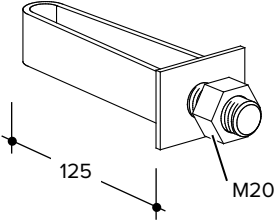
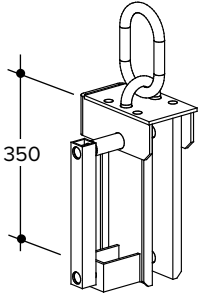
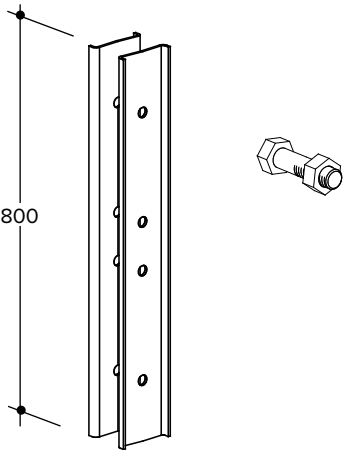
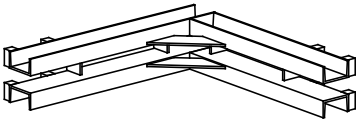
	Component	Product code	Weight [kg]
	<b>PROTECTO Toeboard Retainer</b>	<b>601227</b>	<b>0.69</b>
	<p>Used with the PROTECTO Railing Post, this add-on secures the toeboard when using plank railings.</p> <p>The PROTECTO Toeboard Retainer can easily be attached to PROTECTO Railing Posts which have been already installed.</p>		

## 4.2 Brackets and aligning struts

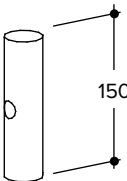
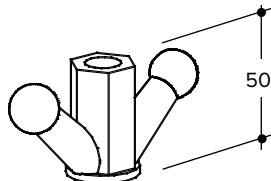
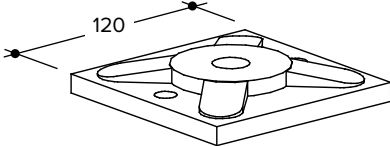
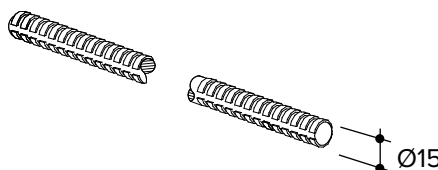

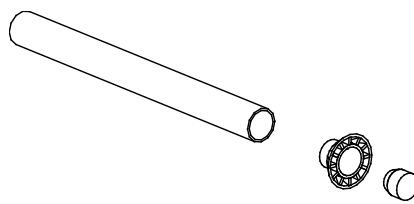
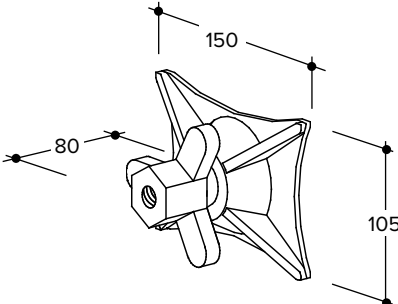
	Component	Product code	Weight [kg]
	<b>HT P-walkway bracket</b>	<b>606260</b>	<b>13.04</b>
	Walkway bracket with a useful width of 90 cm.		

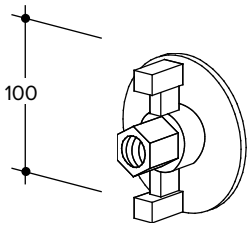
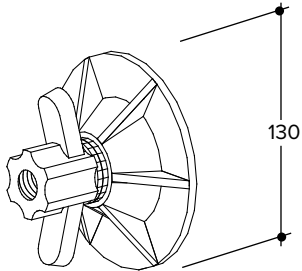
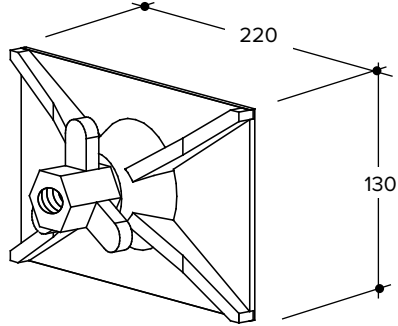
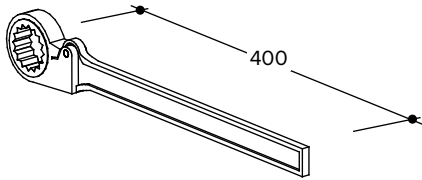
	<b>Wall Struts with 2 Hinge Plates lacquered</b>		
	<b>Wall Strut, Size 1 / 170-240*</b>	<b>506500</b>	<b>19.50</b>
	<b>Wall Strut, Size 2 / 220-290*</b>	<b>506420</b>	<b>21.00</b>
	<b>Wall Strut, Size 3 / 270-340*</b>	<b>506430</b>	<b>22.00</b>
	<b>Wall Strut, Size 4 / 320-390*</b>	<b>506463</b>	<b>24.00</b>
	<b>Wall Strut, Size 5 / 420-490*</b>	<b>506485</b>	<b>27.00</b>
	<b>Wall Strut, Size 6 / 530-590*</b>	<b>506555</b>	<b>40.00</b>
	<p>For aligning and bracing of formwork elements. It's attached to the waler with the Hinge Plate. This requires the strut wedge strap (product code 506670) and wedge (product code 504497) (see page 34).</p>		

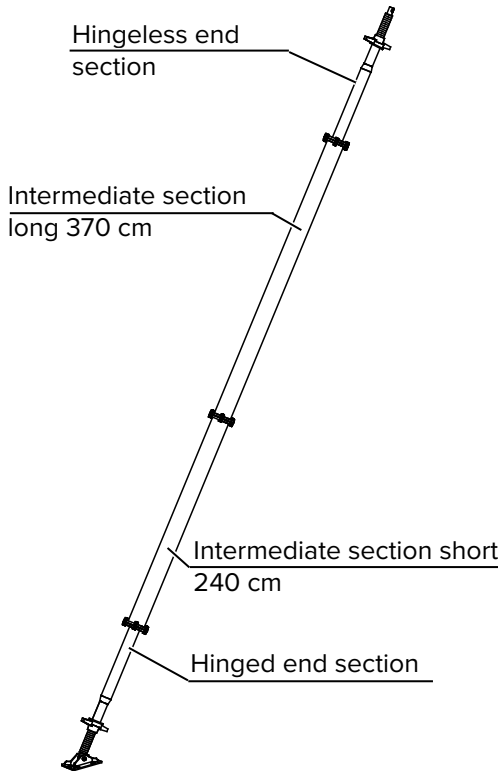
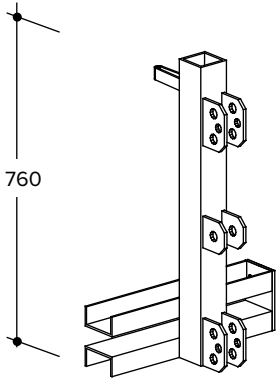
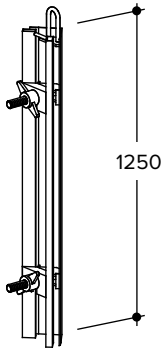
	<b>Sprag Brace, Size 1*</b>	<b>506511</b>	<b>16.00</b>
	<p>120 - 190 cm, for sizes 1 + 2 Wall Struts (with 1 Hinge Plate and 1 hinge bolt), see page 34.</p>		

	Component	Product code	Weight [kg]
	<b>Sprag Brace, Size 2</b> 170 - 240 cm, for sizes 3 + 4 Wall Struts (with 1 Hinge Plate and 1 hinge bolt), see page 34. Must be secured with the Hinge Plate to the lower waler. connection parts same as Wall Strut.	<b>506533</b>	<b>18.00</b>
	<b>Hinge Plate</b>	<b>506544</b>	<b>1.70</b>
	<b>Wedge Strap for Strut*</b> Is used for the connection of the Hinge Plates of Wall Struts and sprag braces. and sprag braces. Wedge (product code 504497) for fastening must be ordered separately (see page 34).	<b>506670</b>	<b>0.90</b>
	<b>H 20 Crane Hook*</b> For setting upright, transporting and shifting formwork elements (see page 31). Permitted load per crane hook: 500 kg (5.0 kN) Pay attention to the separate Operation Instructions.	<b>582320</b>	<b>8.76</b>
	<b>H 20 Extension Butt Strap*</b> Extension butt strap must be ordered 2x.	<b>582352</b>	<b>4.45</b>
	<b>Bolt M20x80 with Nut 4.6<sup>1)</sup></b> Used for connecting individual beams when wall elements are extended at height. For the extension of H 20 Beams, the following must be ordered: 2x H 20 Extension Butt Strap and 4x bolts M20, shown on page 29.	<b>489801</b>	<b>0.36</b>
	<b>Walers for column formwork</b>		
	<b>Column Waler 72/72*</b>	<b>505182</b>	<b>35.46</b>
	<b>Column Waler 89/89*</b>	<b>505208</b>	<b>44.33</b>
	<b>Column Waler 106/106*</b>	<b>505219</b>	<b>51.70</b>
	<b>Column Waler 123/123*</b>	<b>505220</b>	<b>60.60</b>
	For production of right-angled formwork halves with various dimensions for column formwork. With welded-on bearing supports for bracing. (see page 38). Order bracing separately.		

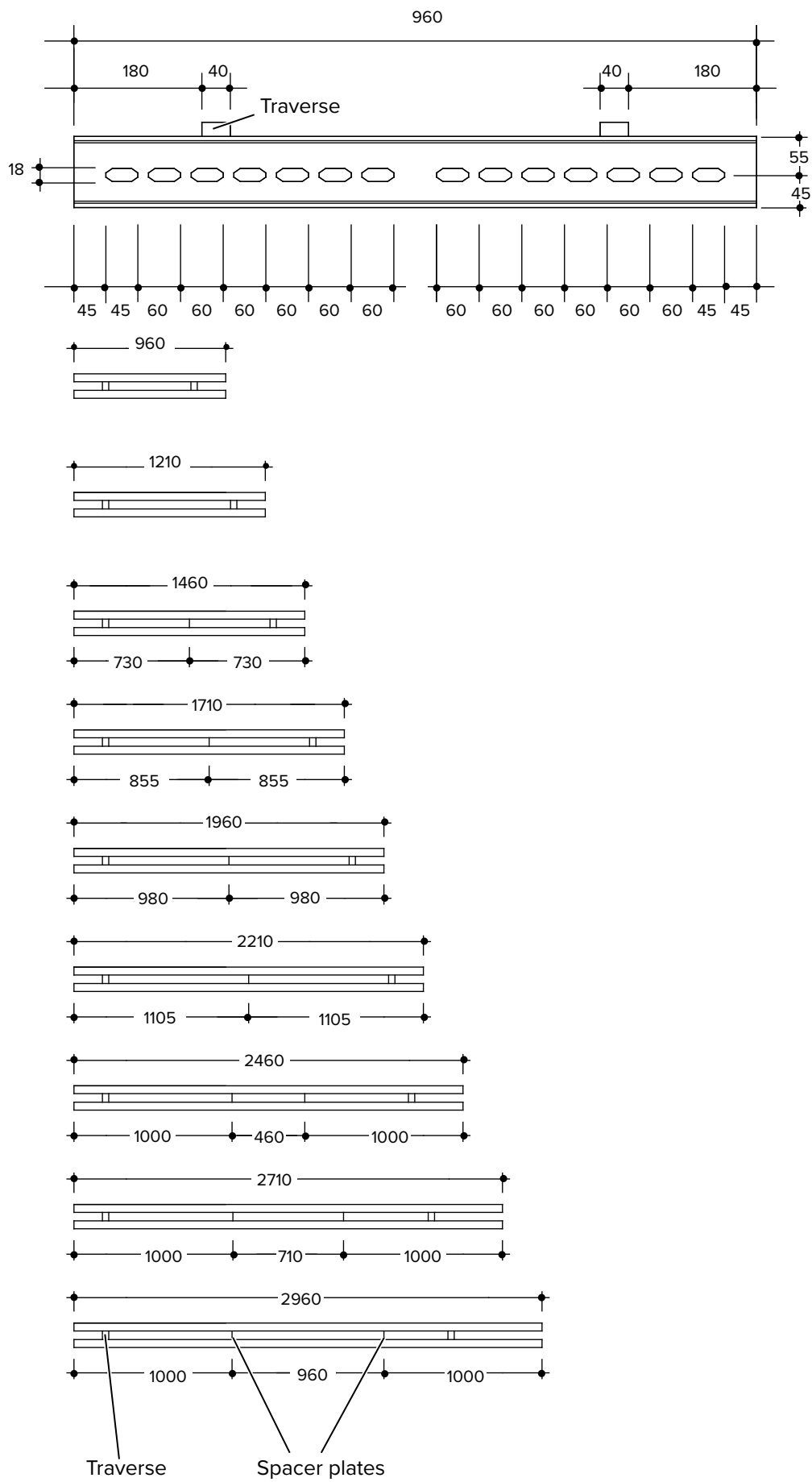


	Component	Product code	Weight [kg]
	<b>Bearing Bar for Column Waler*</b> Is placed behind the bearing support of the steel Column Waler and to hold a Tie Rod DW15 (see page 38).	<b>505230</b>	<b>1.90</b>
	<b>Wing Nut (galv.)</b> Is used for wall ties and for bracing corners in steel Column Walers. Permitted load: 90 kN (see page 38).	<b>509618</b>	<b>0.32</b>
	<b>Counter Plate 12/12¹</b> Used together with the Wing Nut. (product code 509618), see page 26.	<b>509559</b>	<b>1.00</b>
	<b>Tie Rod 75¹ (DW 15)</b>	<b>437660</b>	<b>1.08</b>
	<b>Tie Rod 100¹ (DW 15)</b>	<b>24387</b>	<b>1.44</b>
	<b>Tie Rod 130¹ (DW 15)</b>	<b>20481</b>	<b>1.87</b>
	<b>Tie Rod 175¹ (DW 15)</b> Max. permitted load: 90 kN	<b>20470</b>	<b>2.52</b>
<div>  <b>WARNING</b> </div> <div> <b>Warning!</b> Do not weld or heat Tie Rods due to danger of sudden failure!         </div>			
	<b>25 Sleeves 2.8x200¹ (each 200 cm long)</b>	<b>48220</b>	<b>15.35</b>
	<b>200 Cones 2.2¹</b>	<b>48311</b>	<b>1.52</b>
	<b>500 Plugs 2.3¹</b> Sleeves with Cones secure the distance between two opposite shuttering elements.	<b>48322</b>	<b>1.55</b>
	<b>Tie Nut 85 (DW 15)</b> With large base plate and spherical nut for up to 10° incline. Max. permitted load: 90 kN.	<b>20492</b>	<b>1.22</b>

	Component	Product code	Weight [kg]
	<b>Tension Nut (DW 15)</b> For use at stopends. Max. permitted load: 40 kN.	<b>197332</b>	<b>0.65</b>
	<b>MANTO Tie Nut (DW 15)</b> Even when under a full tie load, the MANTO Tie Nut can easily be loosened with the ratchet, due to the special sliding discs. Max. permitted load: 90 kN.	<b>464600</b>	<b>1.26</b>
	<b>Tie Nut 230 (DW 15)</b> With extremely large base plate and spherical nut. Up to 10° incline is possible. Max. permitted load: 90 kN.	<b>48344</b>	<b>2.40</b>
	<b>MANTO Ratchet</b> With the MANTO Ratchet (w.a.f. 36), Tie Nuts can be tightened or loosened quickly, saving effort and materials. Do not extend the ratchet arm!	<b>408780</b>	<b>1.00</b>

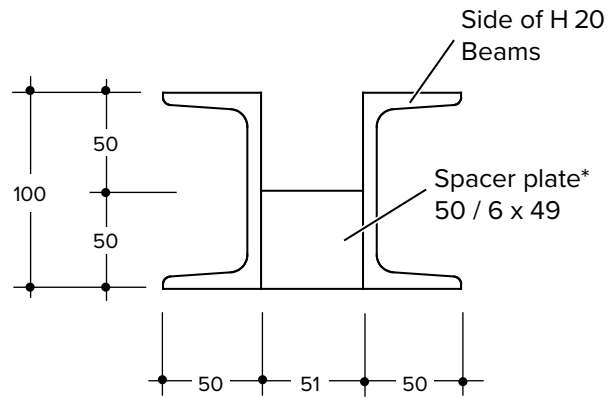
	Component	Product code	Weight [kg]
	<b>Inclined strut for extreme shuttering heights</b>		
	<b>BKS Hinged End Section</b>	<b>489102</b>	<b>36.20</b>
	<b>Hingeless End Section</b>	<b>489775</b>	<b>29.00</b>
	<b>Intermediate Section Short 240 cm</b>	<b>489113</b>	<b>44.00</b>
	<b>Intermediate Section Long 370 cm</b>	<b>489124</b>	<b>63.00</b>
	<b>Bolt M16 x 60 with Nut<sup>1)</sup> 4 pcs. per joint</b>	<b>489786</b>	<b>0.18</b>
	<b>Fit bolt M20 x 80 with Nut 4.6<sup>1)</sup> 1 pcs. per joint</b>	<b>489801</b>	<b>0.36</b>
	<b>joint</b> Combinable inclined struts (BKS struts) for tension- and compression resistant strutting and aligning of very high wall elements. Connection to the wall element with the CB 230 Beam Adapter. Order separately. (see page 36).		
	<b>CB 230 Beam Adapter*</b>	<b>529540</b>	<b>27.80</b>
	For connecting BKS inclined struts to the H 20 wall formwork (see page 36).		
	<b>Shaft Corner 125*</b>	<b>504659</b>	<b>31.50</b>
	<b>Shaft Corner 300*</b>	<b>504660</b>	<b>75.00</b>
	<b>Shaft Corner 400*</b>	<b>504670</b>	<b>100.00</b>
	Clamping mechanism permits connection to the wall element and eases stripping by loosening the clamping joint (see page 30).		

5 List of walers

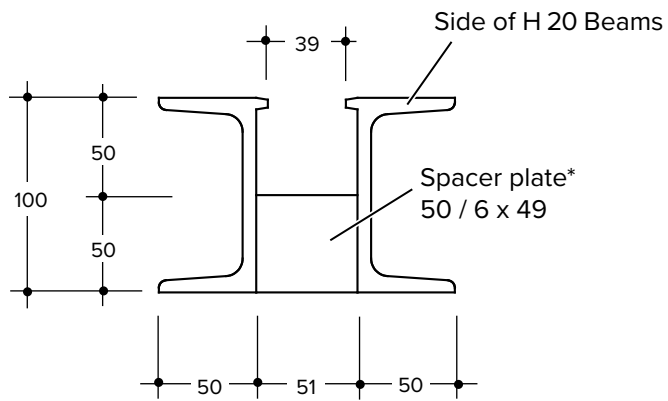




**Cross section F-steel waler**

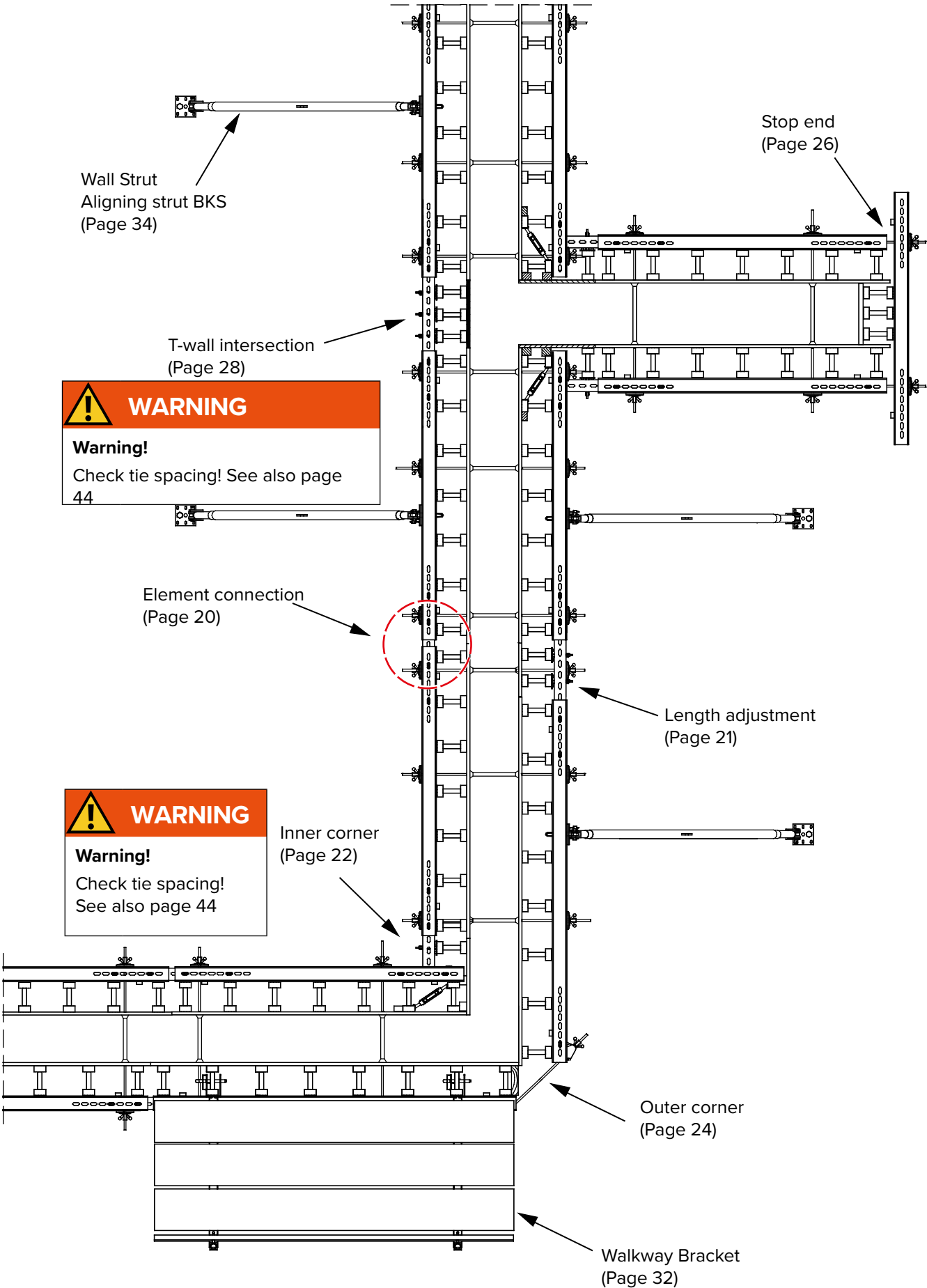


**Cross section cam steel waler**



\*Spacer plate starting from waler length 146 cm

6 Ground plan

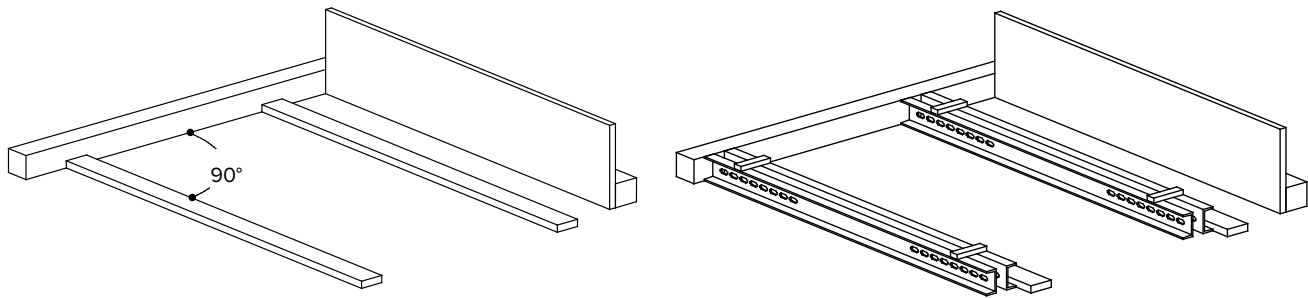


## 7 Assembly of elements

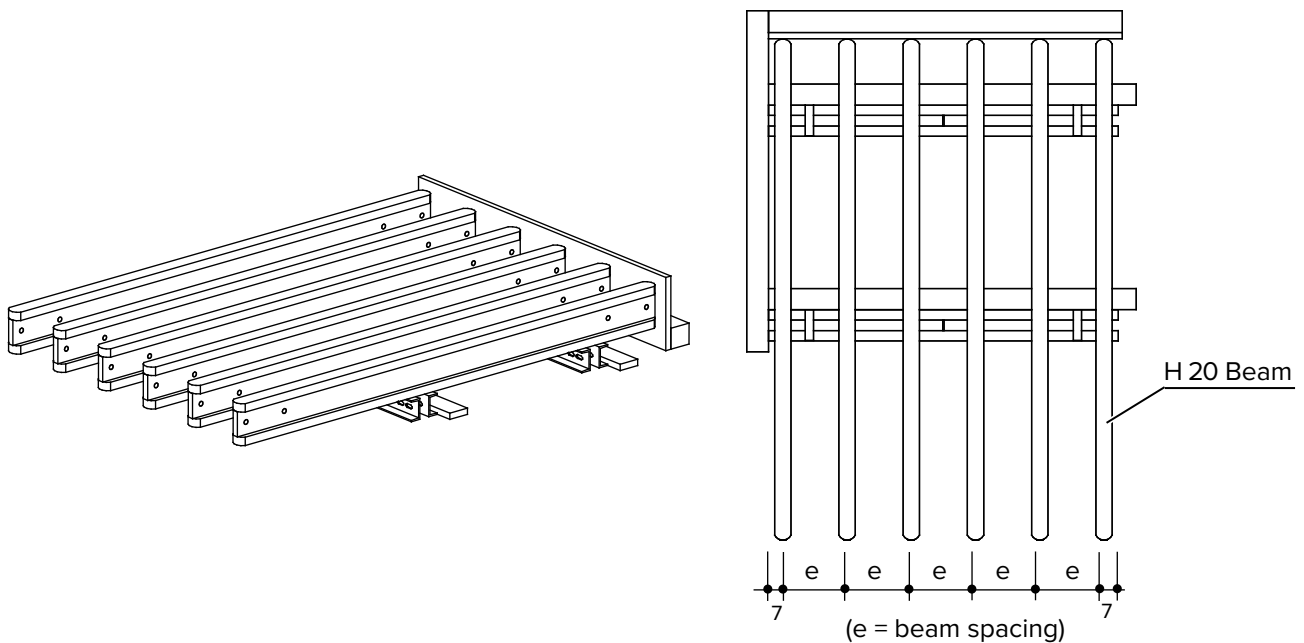
Preparation for assembly is the same for F-steel walers and for cam walers.

For basic assembly of the H 20 elements, an assembly floor which is large enough for the largest element must be provided. To ensure the precise positioning of the walers and H 20 Beams, stop bars are nailed on. The stop bars must correspond to the waler spacing.

Positioning the steel walers on the assembly floor. Cams for cam walers or traverses for steel walers are on the top.

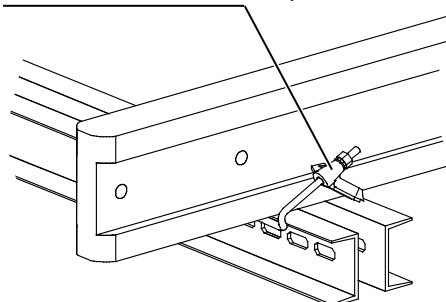


Positioning the H 20 Beam in the statically required spacing. Attachment of the beams with H 20 Timber Beam Clamps.



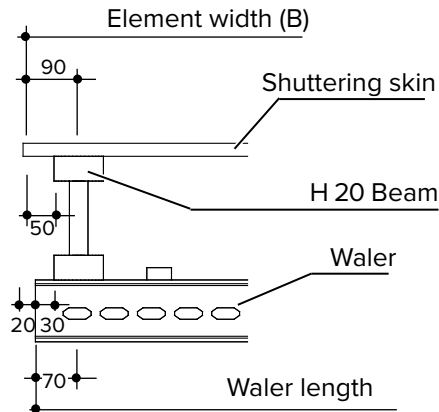
Attaching the H 20 Beam to the steel waler with the H 20 Timber Beam Clamp.

H 20 Timber Beam Clamp



Attaching the shuttering skin

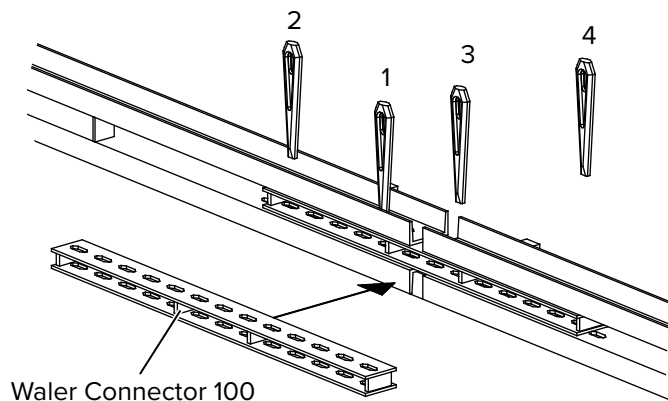
The shuttering skin is attached with nails, screw nails, or screws (preferably Spax screws). With its width of 8 cm, the H 20 Beam offers a firm base for nailing or screwing.



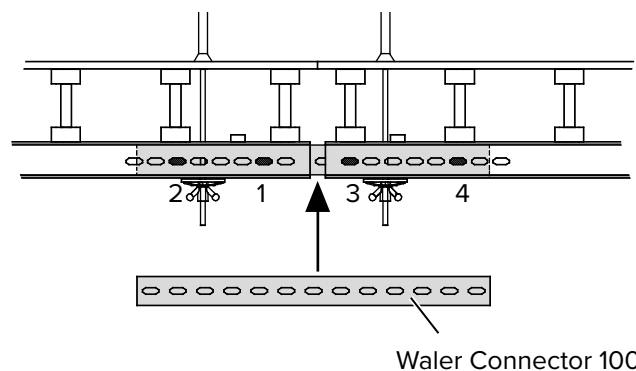
## 8 Element connection

### 8.1 Element connection

The connection of elements using Waler Connector 100 and four Joining Wedges Z produces an aligned, compression- and tension resistant tightening of the wall elements. The Waler Connector 100 can be used for infills of up to 20 cm max.



Place Waler Connector 100 with equal distances in the two adjacent walers and secure it with Joining Wedge 1 (first step). Then position Joining Wedge 2 (maximum possible spacing) and fasten it slightly. Now insert wedge 3 and 4.

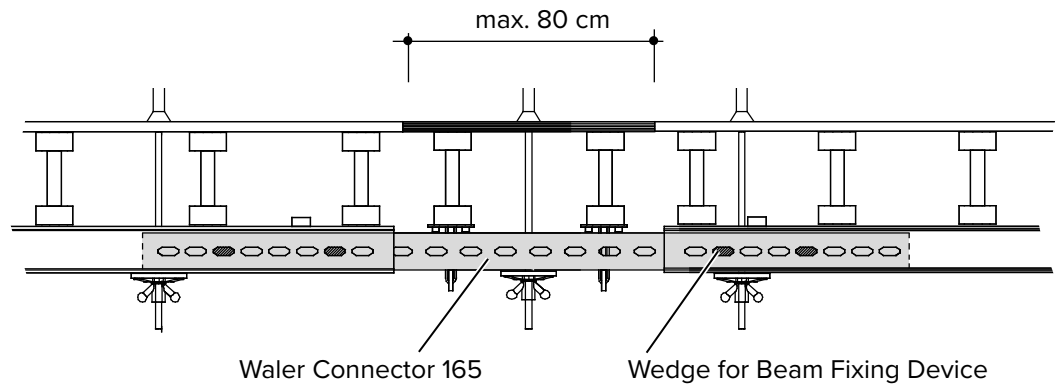


Fix wedge 1 and wedge 3 with a hammer until the panel joint is closed. Now fasten wedge 4 and wedge 2.

Waler Connector 165 is used for infills (max. 80 cm) or to extend shuttering elements. Maximum size of infills: 80 cm. Additional tying is necessary. For permissible loads,

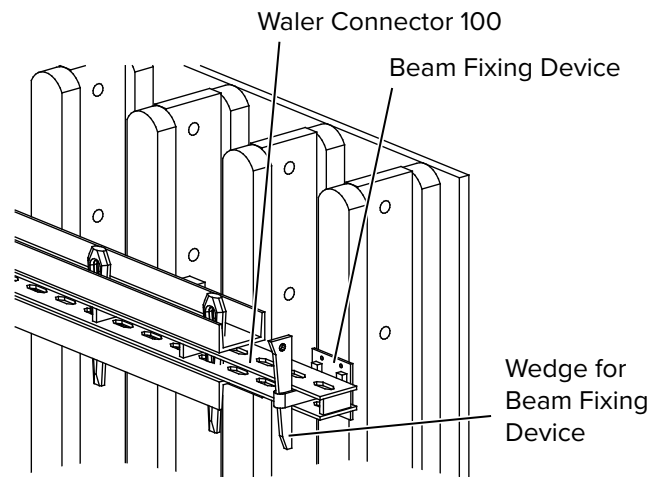


see page 42.

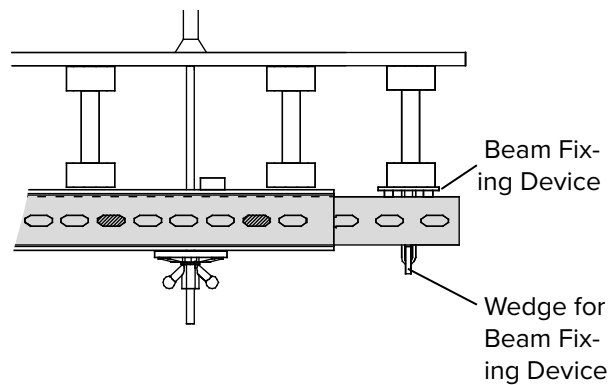


## 8.2 Length adjustment

The beam fixing device with the wedge for beam fixing device, and the H 20 Beam allow extension of the elements.



Depending on the concrete pressure, the maximum extension length is 30 cm. For permissible loads, see page 42.



## 9 Corners

### 9.1 Inner corner

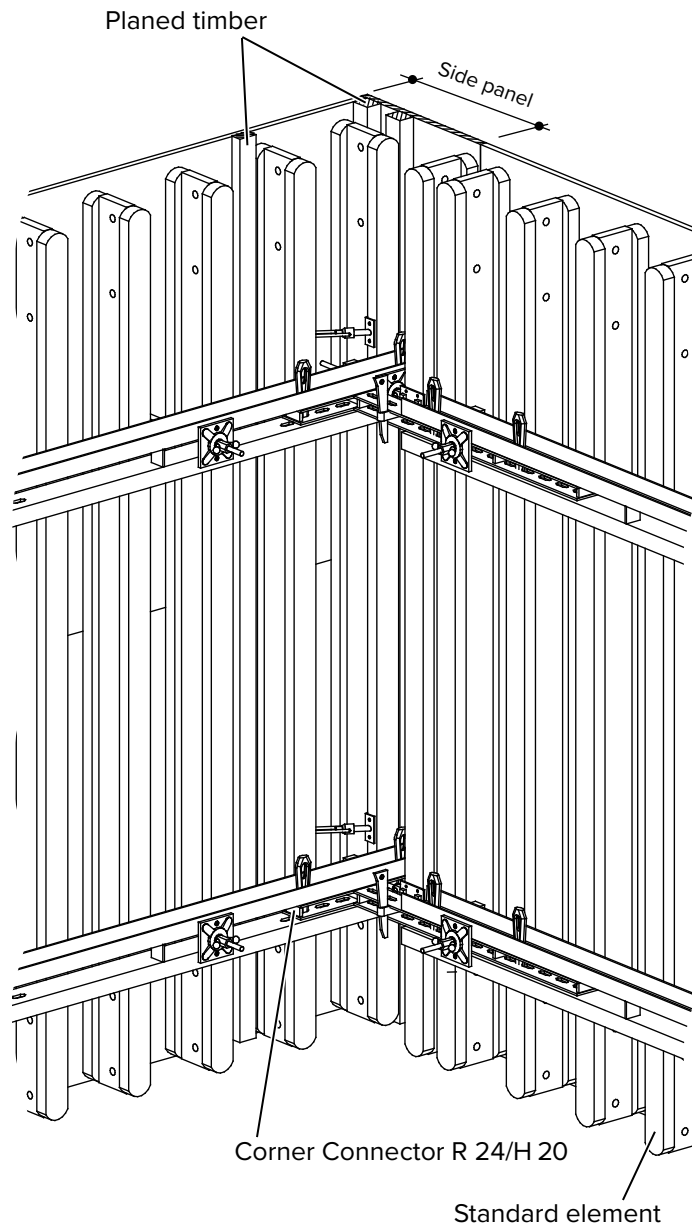
The corner connector R 24/H 20 allows you to build an inner corner by using standard elements. The waler is fastened with the Joining Wedges Z.



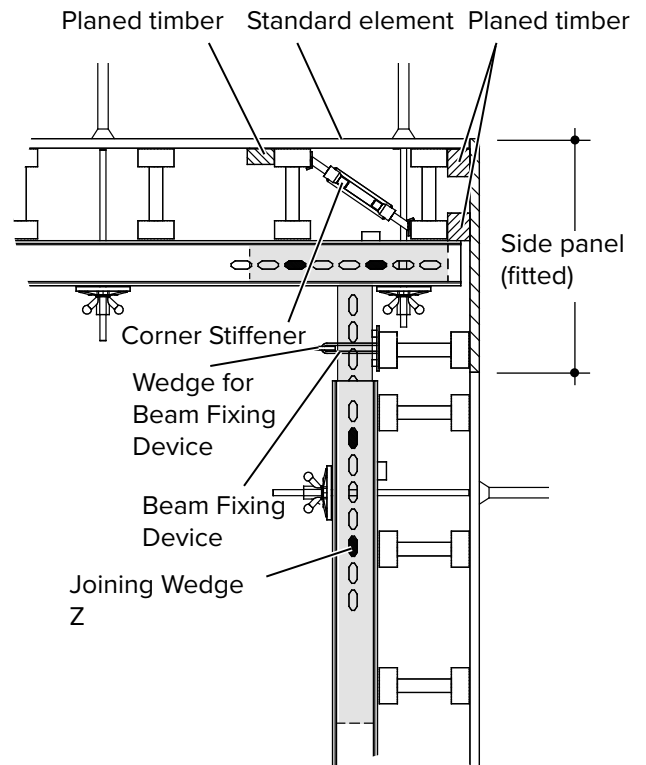
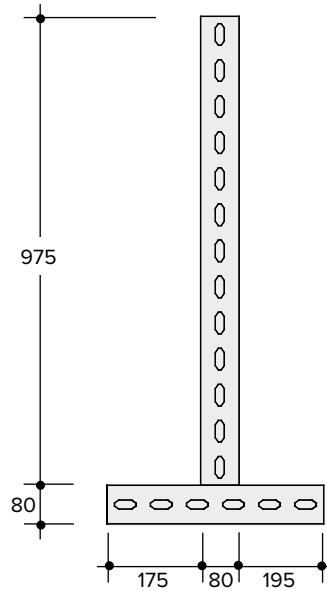
#### **WARNING**

#### **Warning!**

The shorter leg (17.5 cm) of the corner connector R 24/H 20 must point towards the inner corner of the H 20 formwork.



Corner Connector R 24/H 20



**Inner corner**

Corner Connector R 24/H 20  
Joining Wedge  
Corner Stiffener

Product code 505436 (1x)\*  
Product code 505241 (4x)\*  
Product code 504291 (1x)\*

\*per water level

## 9.2 Outer corner

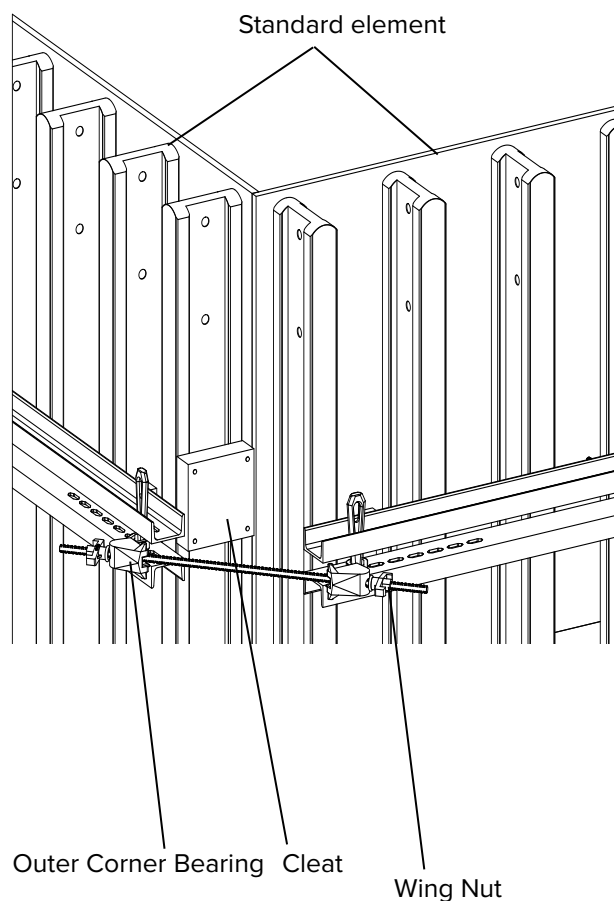
The standard outer corner is made from 2 standard elements. The timber cleat prevents an offset of the elements during tightening. The outer corner bearing is fastened to the steel waler with the Joining Wedge Z.



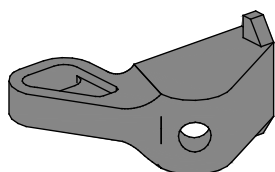
### WARNING

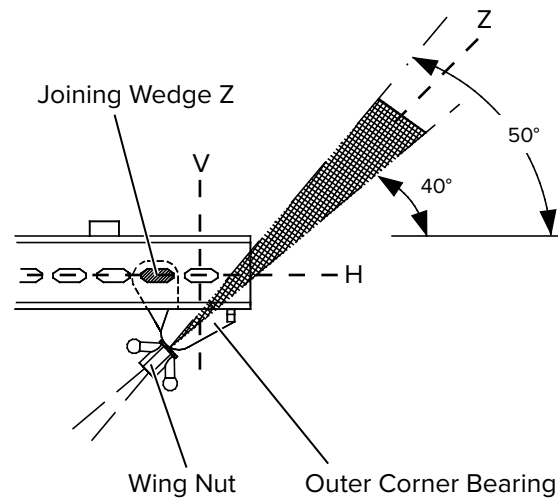
#### Warning!

Outer Corner Bearing application: min. 40° to max. 50°.

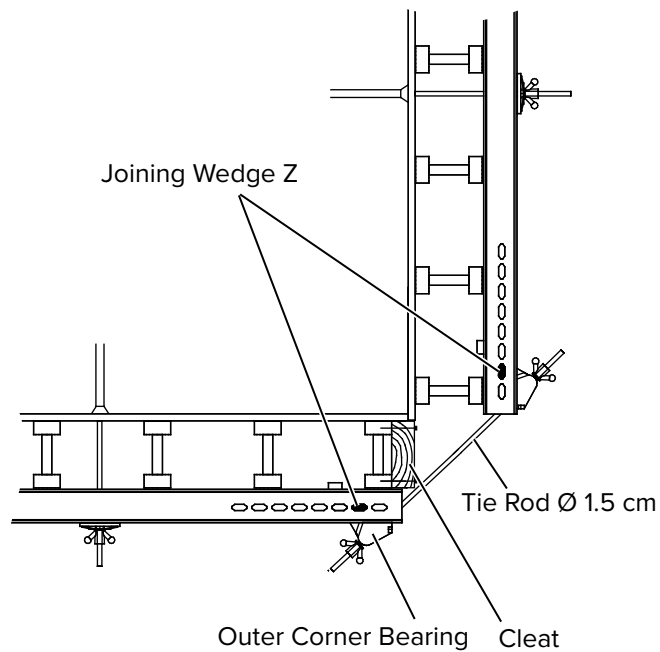


#### Outer Corner Bearing





Angle	SWL [kN]		
	H	V	Z
40°	16.00	13.40	20.90
45°	16.00	16.00	22.60
50°	16.00	19.00	24.80



#### Outer corner

Outer Corner Bearing  
Joining Wedge  
Tie Rod 100, Ø 1.5 cm  
Wing Nut

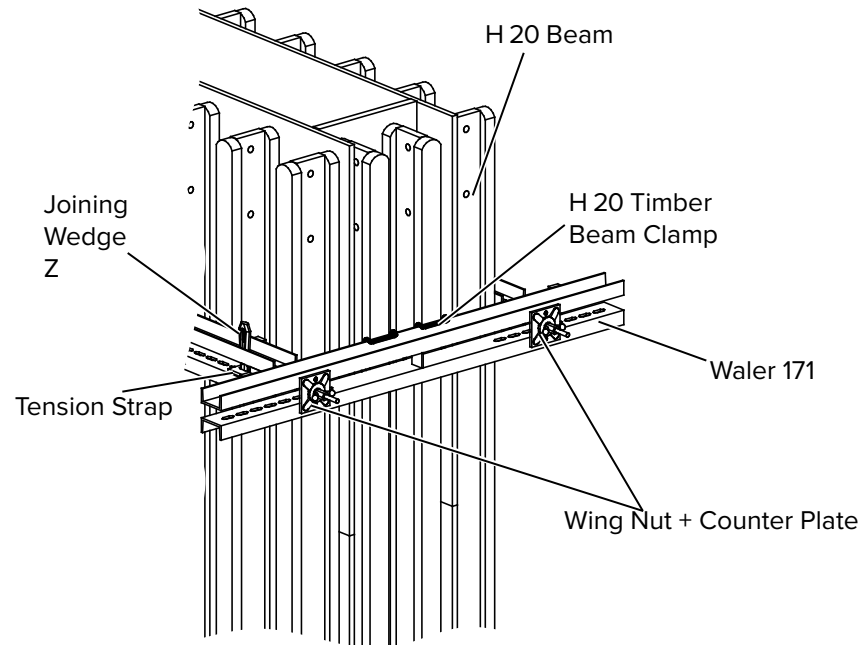
Product code 504865 (2x)\*  
Product code 505241 (2x)\*  
Product code 024387 (1x)\*  
Product code 509618 (2x)\*

\*per waler level

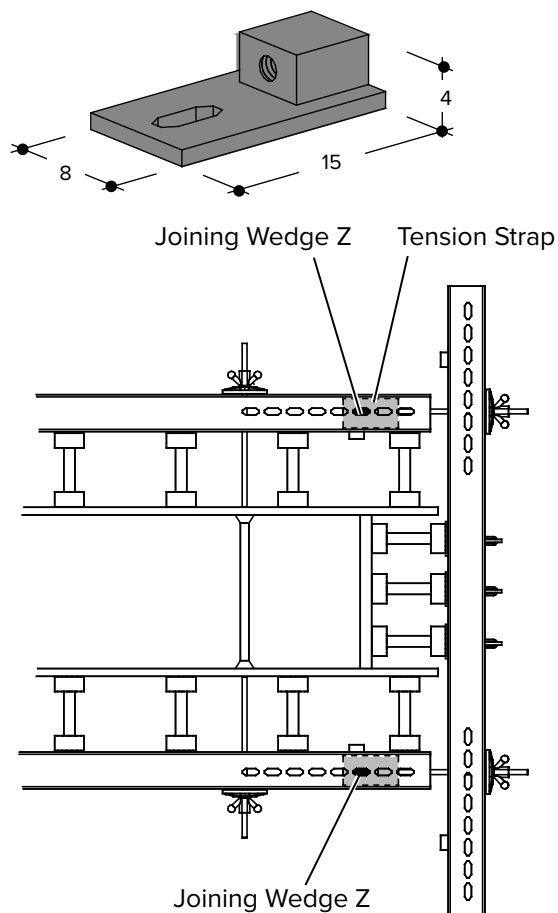


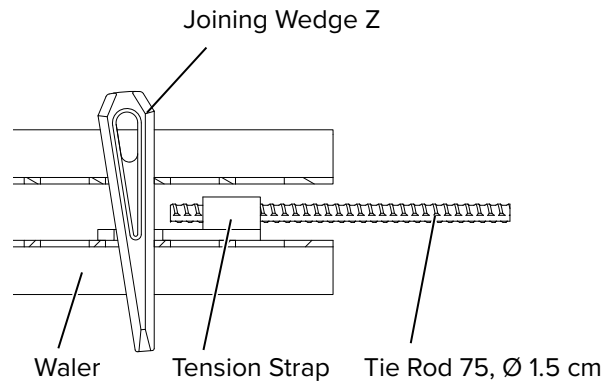
## 10 Stopend

The tension strap fits between the waler profiles of the standard elements and is fixed in place with the Joining Wedge Z. The tension loads from the fresh concrete are absorbed by the Tie Rods. The Wing Nut and Counter Plate allow stepless adjustment. At least 2 additional H 20 Beams must be used for the stopend.



### Tension Strap





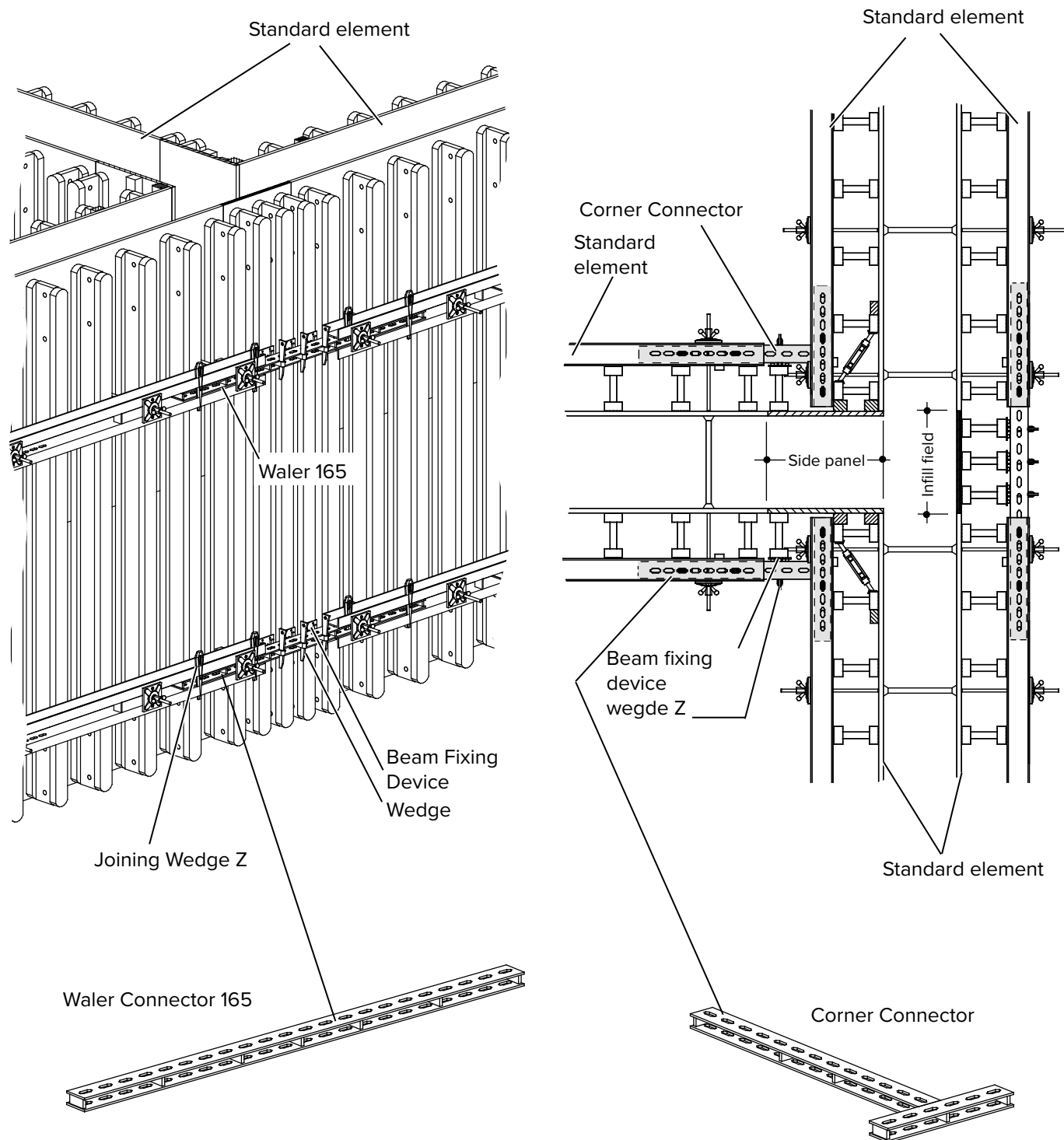
### Stopend

Tension Strap	Product code 505388 (2x)*
Joining Wedge	Product code 505241 (2x)*
Tie Rod 75, Ø 1.5 cm	Product code 437660 (2x)*
Wing Nut	Product code 509618 (2x)*
Counter Plate 12/12	Product code 509559 (2x)*
H 20 Timber Beam Clamp	Product code 568048 (2x)*
Waler 171	Product code 503908 (1x)*
H 20 Beam	Product code (2x)*

\*per waler level

## 11 T-wall intersection

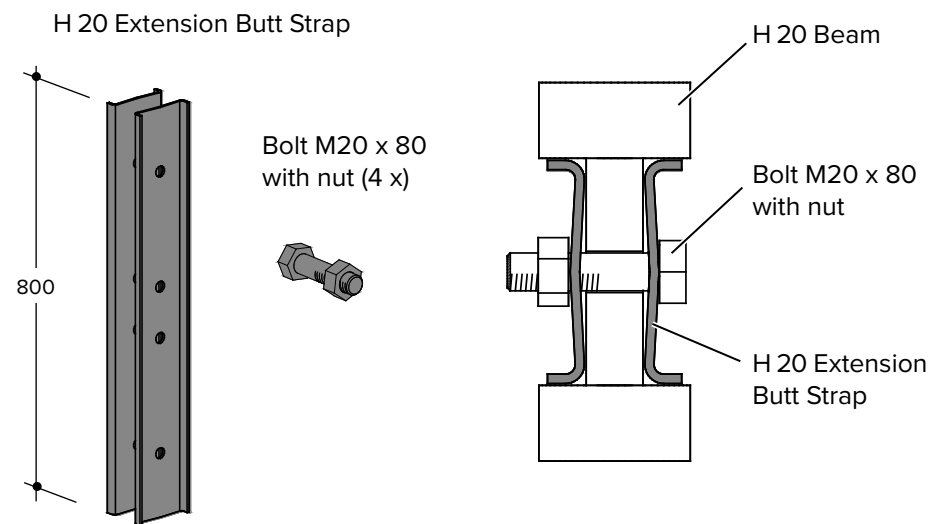
Construction of a T-wall intersection with standard elements and infill field. For the infill field, use Waler Connector 165 (see page 20). The inner corners are also constructed with standard panels, corner connector and infill shield (see page 22).



## 12 Height extension

The H 20 Extension Butt Strap is used for extending elements. It forms a connection between individual beams and produces a tension- and compression resistant, rigid, aligned and offset-free joint between beams or elements. The extension butt strap has to be installed on each H 20 Beam joint (exceptions are possible in individual cases, which must be carefully examined and precisely described). Both parts must be ordered in the following quantities:

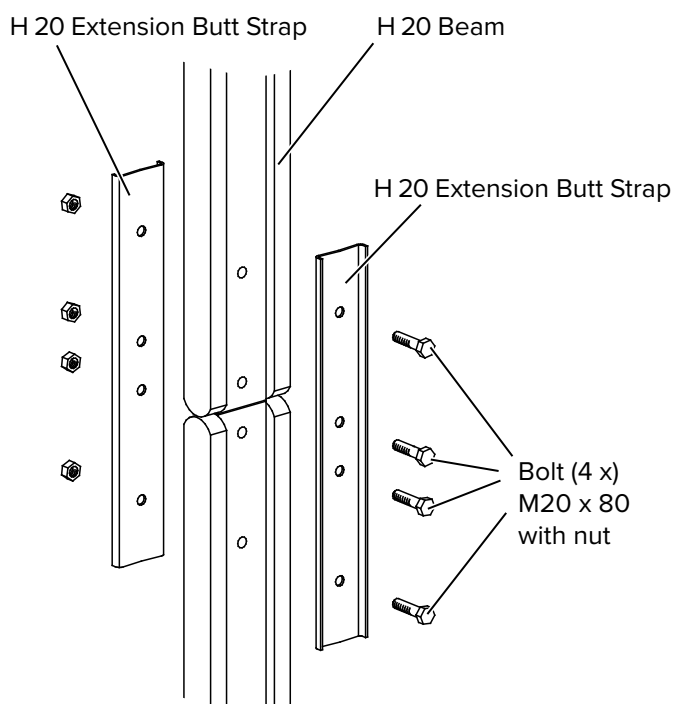
- 2 x H 20 Extension Butt Straps
- 4 x Bolts M20 x 80 with nuts



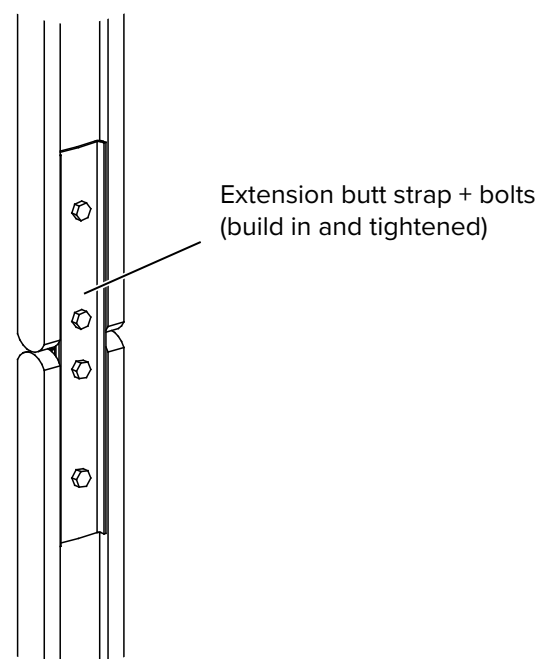
### WARNING

#### Warning!

The following static values must be kept when using the H 20 Extension Butt Strap:  
 perm. T = 5.0 kN  
 perm. M = 1.2 kNm

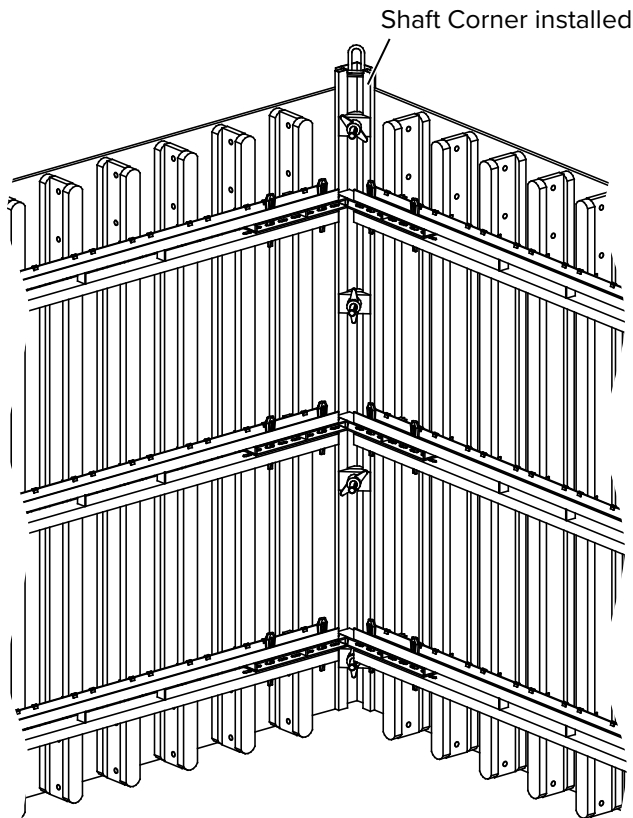


#### Beam butt joint ready for use

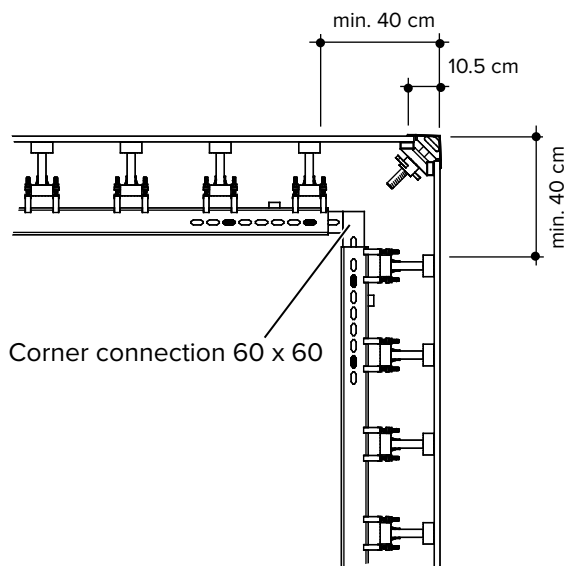
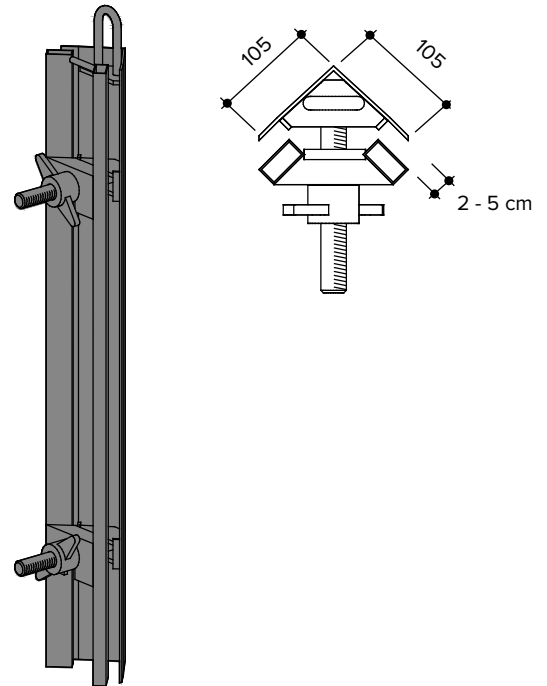


## 13 Shaft formwork

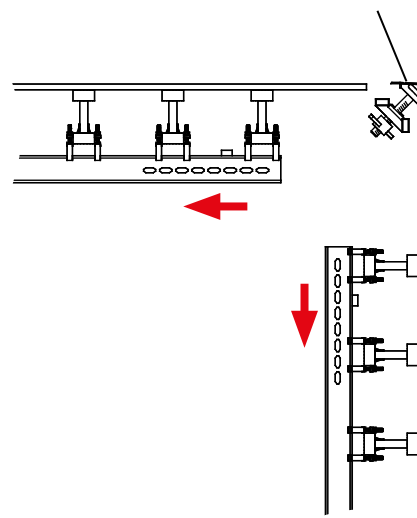
The Shaft Corner form in the inner area is designed to ease stripping of the formwork. The wall elements are provided with a protruding cantilever of the plywood supported by the Shaft Corner (see also detail below). The rectangular connection of the walers is executed by the corner connector 60 x 60 plus 4 Joining Wedges.



**Shaft Corner 125**  
**Shaft Corner 300**  
**Shaft Corner 400**



Shaft Corner dismantled



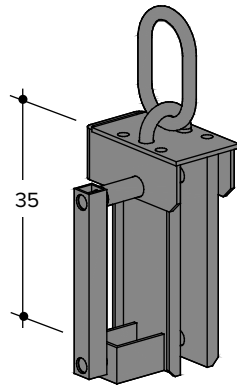


## 14 Crane hook

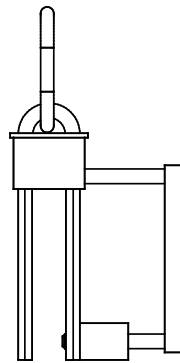
The H 20 Crane Hook is placed onto the H 20 Beam end and then secured with the integrated safety catch. The lower pin of the safety catch must be inserted to a complete stop. The permissible loading capacity per H 20 Crane Hook is:

perm. F = 500 kg (5 kN)

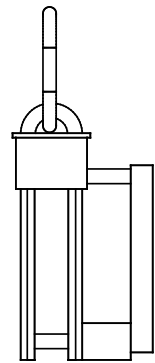
H 20 Crane Hook



H 20 Crane Hook  
(functions)



Safety catch  
(pulled out)



Safety catch  
(tightly inserted)

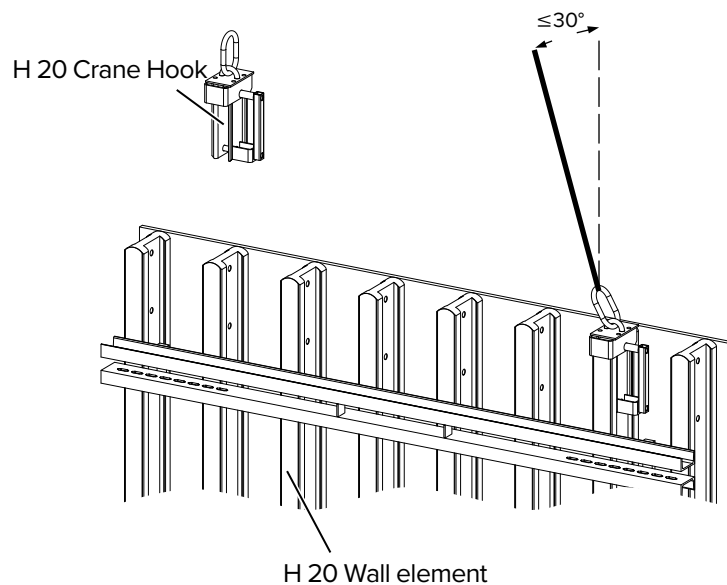


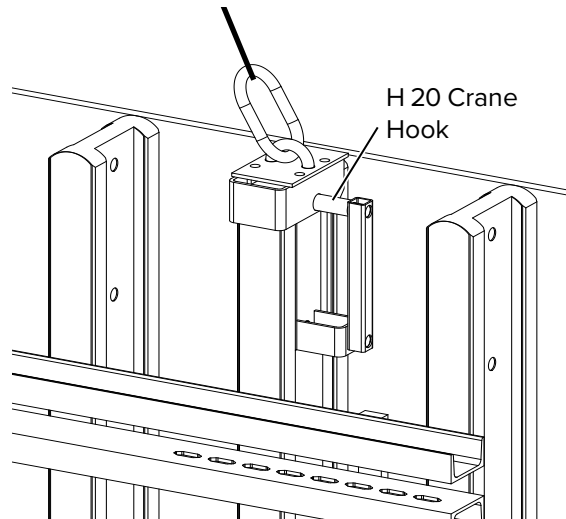
### WARNING

#### Warning!

The Crane Hook must be placed on the second to the last beam from the end of the H 20 Wall Element.

The operation instructions of the crane hook must be followed!





## WARNING

### Warning!

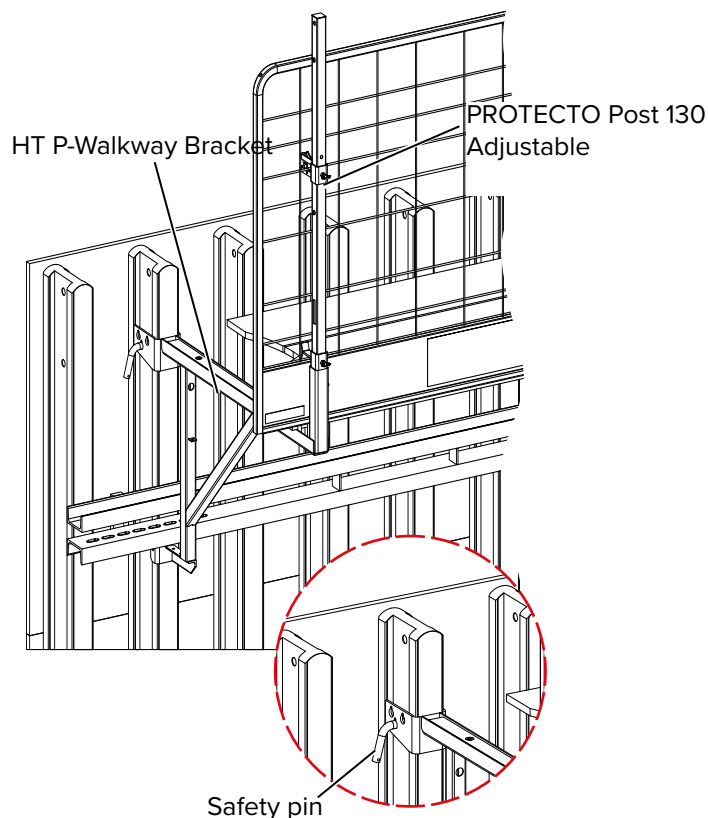
Use more nails to mount the plywood to the H 20 Beams in the area of the H 20 Crane Hook.

## 15 HT P-Walkway Bracket

The HT P-Walkway Bracket offers a working width of about 90 cm and is produced as a ready-to-use scaffold bracket with a loose railing post the PROTECTO Post 130 Adjustable (code:692750) which must be ordered additionally. The HT P-Walkway Bracket is provided with a wooden lath for fastening planks and with a safety pin for fixing the suspension head. Different ways to connect the bracket to the formwork:

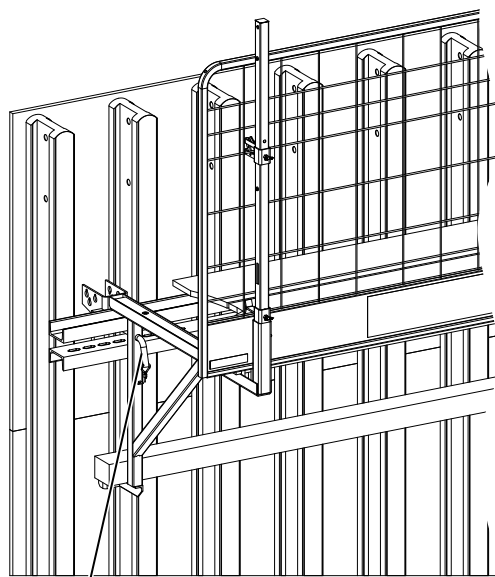
### 15.1 Attached to H 20 Beam

(Secured in the existing Ø 2.2 cm hole with the Safety Pin)



## 15.2 Mounted onto the horizontal waler

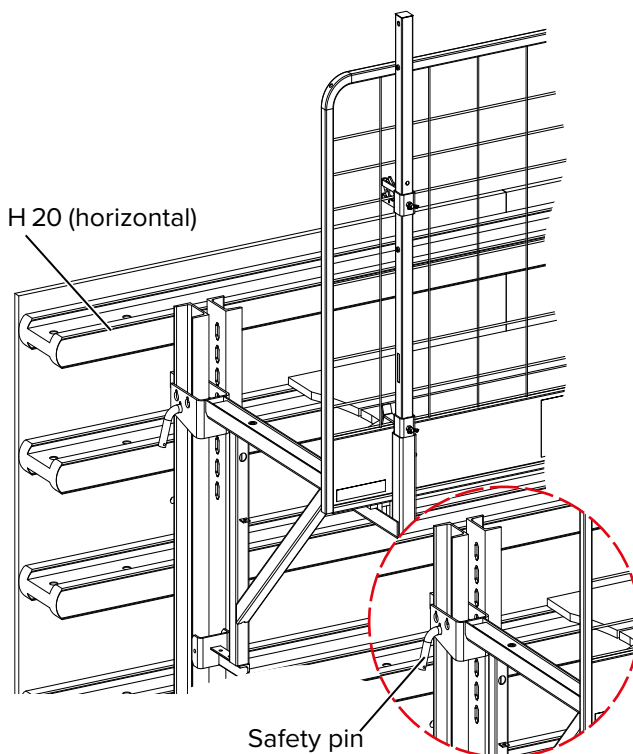
(secured by pinning)



Safety pin

## 15.3 Attached to a vertical waler

(secured by pinning)



H 20 (horizontal)

Safety pin

Plank dimensions and board thicknesses for guard rail should meet the needs of the specific construction site situation. Max. distance between walkway brackets: 1.50 m.



**WARNING**

**Warning!**

The walkway bracket is designed for Scaffolding Group 2, according to EN 12811-1.

## 16 Strutting the formwork

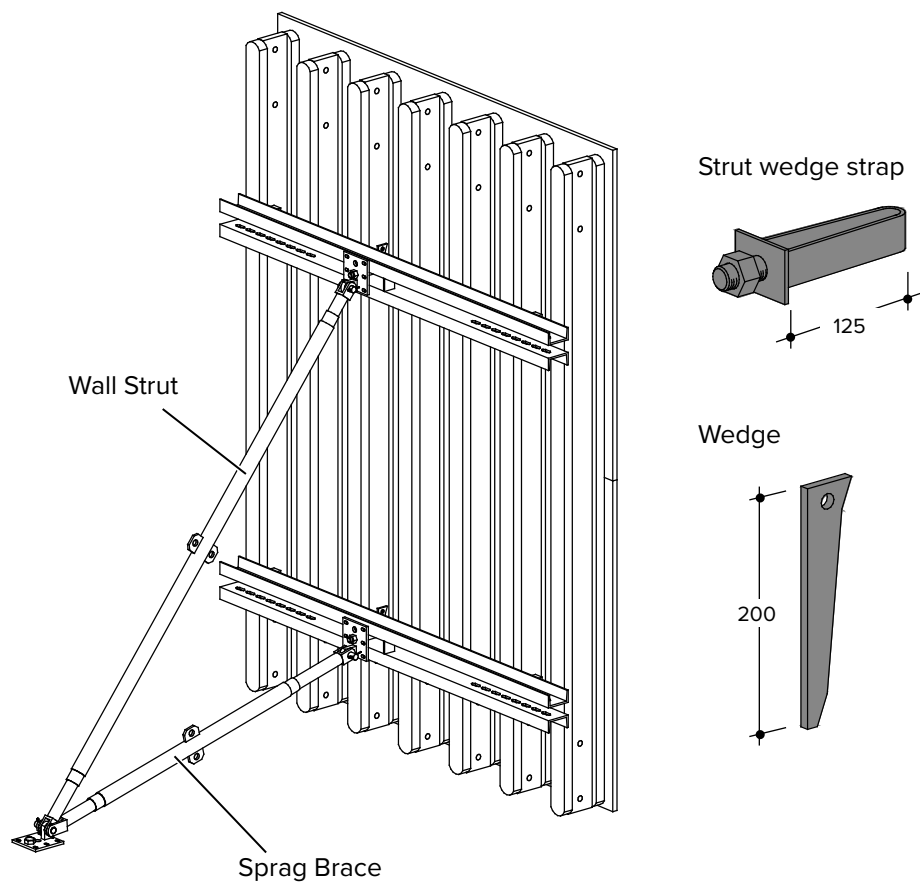
### Wall Struts with sprag braces

Used for aligning and supporting the formwork. To pick up wind loads they are tension and compression resistant. Wall Struts and sprag braces are supplied separately. The strut wedge strap and wedge are used for fastening them to the waler.

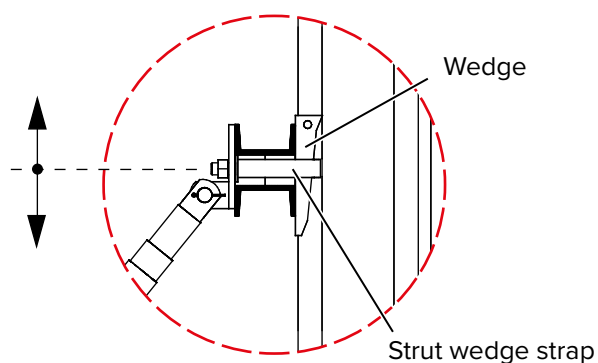
#### NOTE

#### Note

The maximum permissible load of the Wall Struts is limited by the strut wedge strap (see table on page 35).



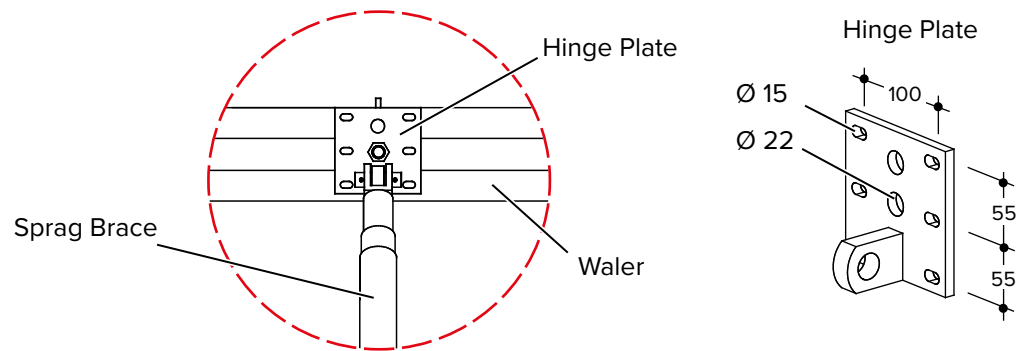
Wall Strut with double spindle and two Hinge Plates.



#### WARNING

#### Warning!

Vertical component max.  $V = \pm 6.5 \text{ kN}$



**Permissible load of Wall Strut in combination with strut wedge strap**  
with double spindle and two Hinge Plates

Size	Product code	$\alpha = 60^\circ$		$\alpha = 45^\circ$	
		l min. l max.	Perm. F (kN)	l min. l max.	Perm. F (kN)
1	506500	1.70 m	7.5	1.70 m	9.2
		2.40 m	7.5	2.40 m	9.2
2	506420	2.20 m	7.5	2.20 m	9.2
		2.90 m	7.5	2.90 m	9.2
3	506430	2.70 m	7.5	2.70 m	9.2
		3.40 m	7.5	3.40 m	9.2
4	506463	3.20 m	7.5	3.20 m	9.2
		3.90 m	7.5	3.90 m	9.0
5	506485	4.20 m	7.5	4.20 m	9.2
		4.90 m	7.5	4.90 m	7.0
6	506555	5.30 m	7.5	5.30 m	9.2
		5.90 m	7.5	5.90 m	9.2

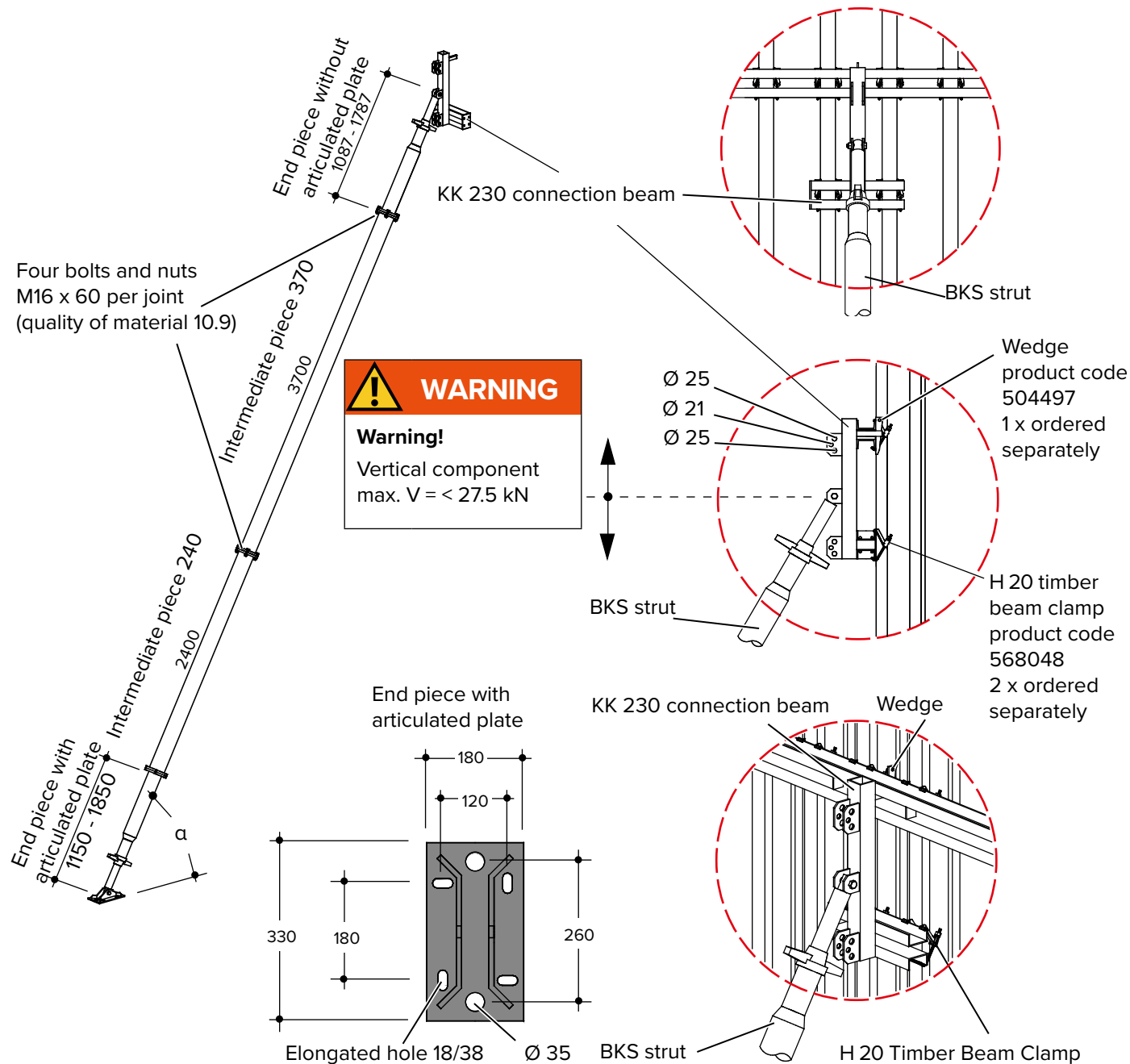
**Sprag Brace in combination with strut wedge strap**

with double spindle and one Hinge Plate

Size	Product code	l min. (m)	Perm. F (kN)	l max. (m)	Perm. F (kN)
1	506511	1.15	19	1.65	19
2	506533	1.70	19	2.40	19

## Aligning strut BKS

The BKS aligning struts are suitable for tension- and compression- resistant alignment of high or height-extended wall elements. The BKS struts consist of individual components which can be joined to make up the combinations shown below (Types 1 to 7). Permitted loads are also shown in the table.



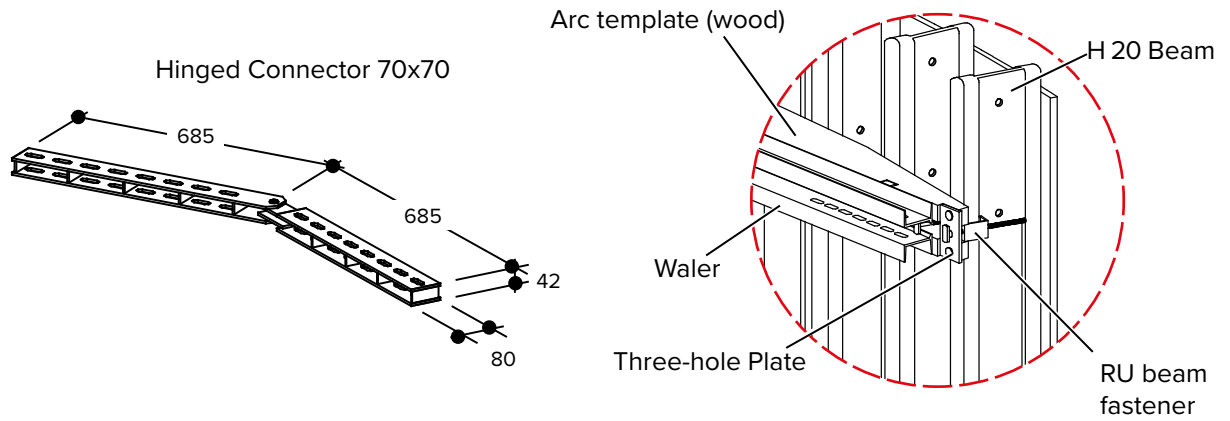
## Technical data of the BKS aligning struts

Type	Length [cm]		Perm. Load [kN] fully extended	Number of end pieces		Number of interm. pieces	
	min.	max.		with part. 489102	without part. 489775	short (240 cm) 489113	long (370 cm) 489124
BKS 4	703.7 - 843.7		25	per 1	per 1	2	-
BKS 5	833.7 - 973.7		22			1	1
BKS 6	963.7 - 1103.7		17.5			-	2
BKS 7	1073.7 - 1213.7		15			2	1



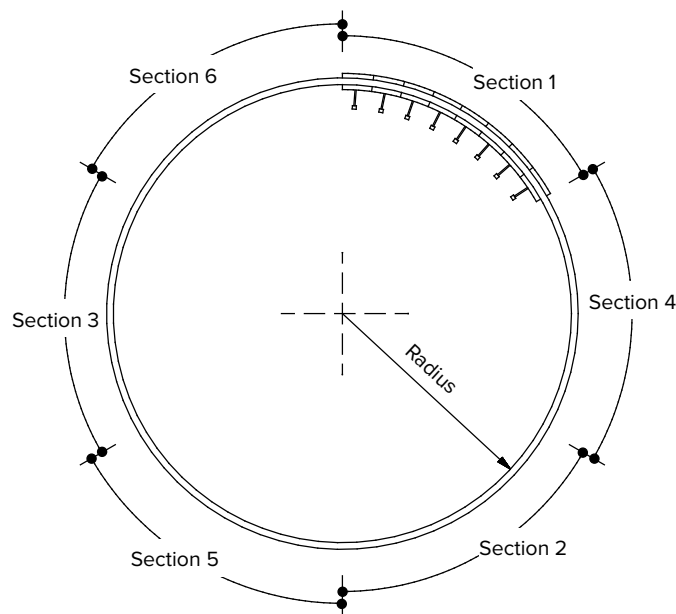
## 17 Circular formwork

H 20 elements that are in a polygonal arrangement (e.g. circular shuttering) can be connected with one another using the hinged connectors. They are secured by inserting the Joining Wedges into the cam walers.

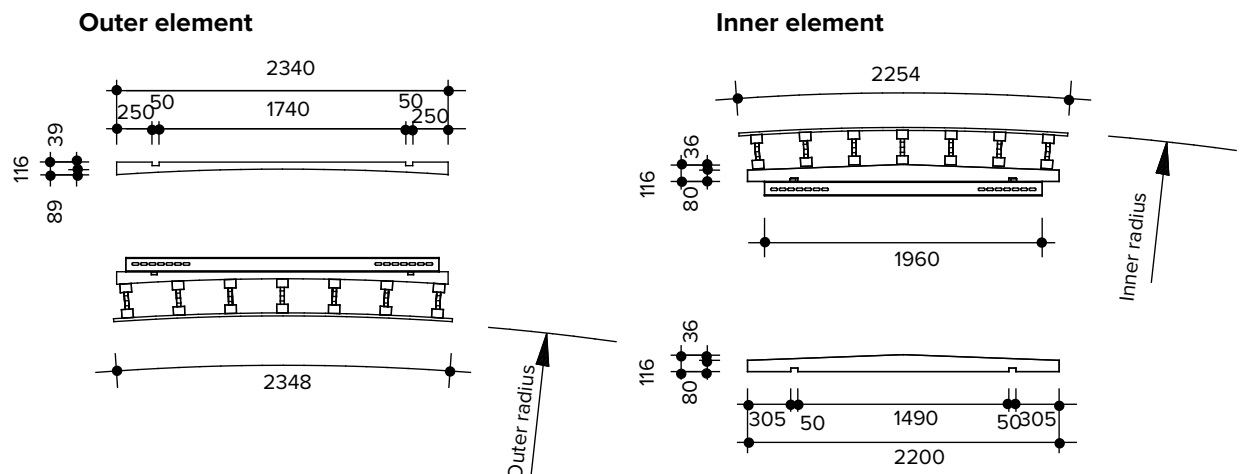


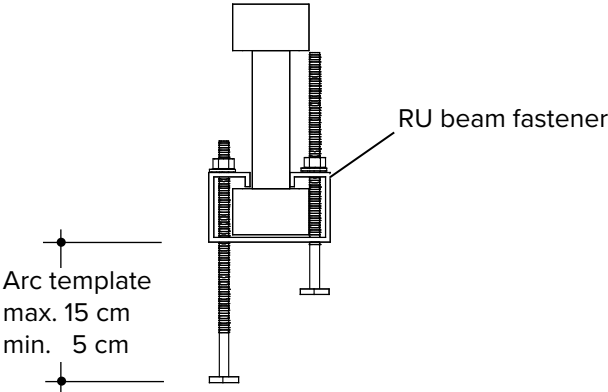
### Example:

Sequence of construction for circular structure.

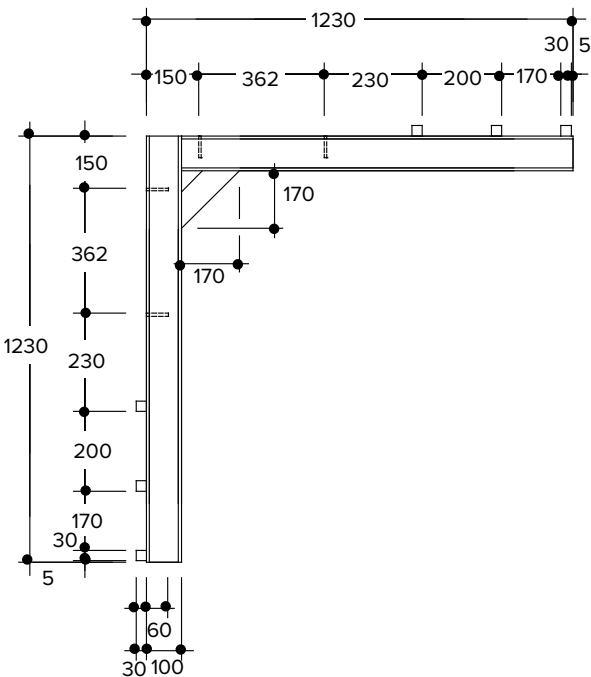
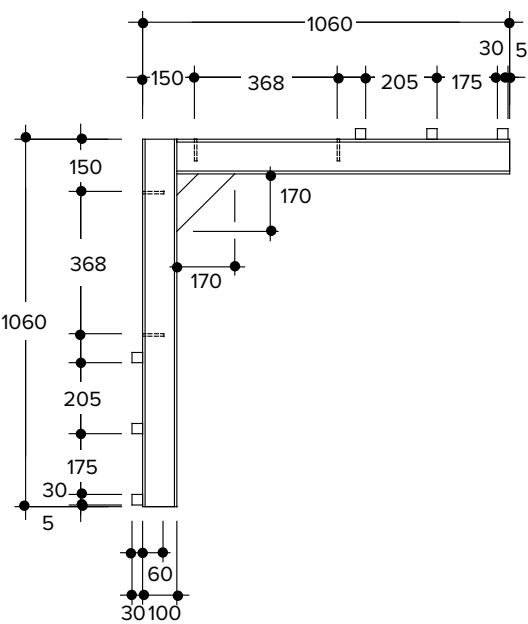
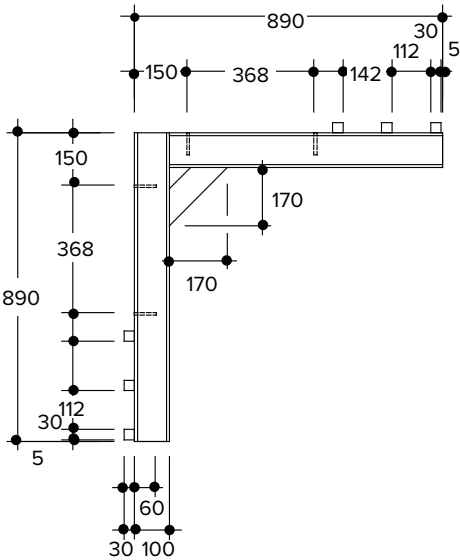
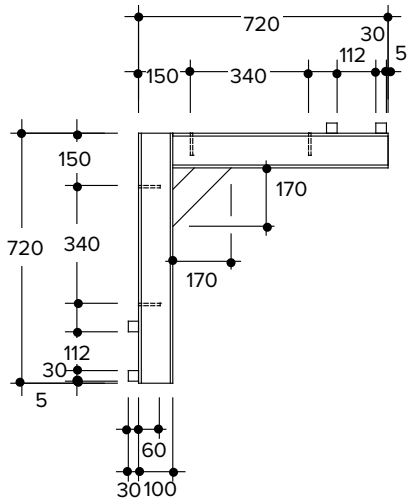


### Arc templates:

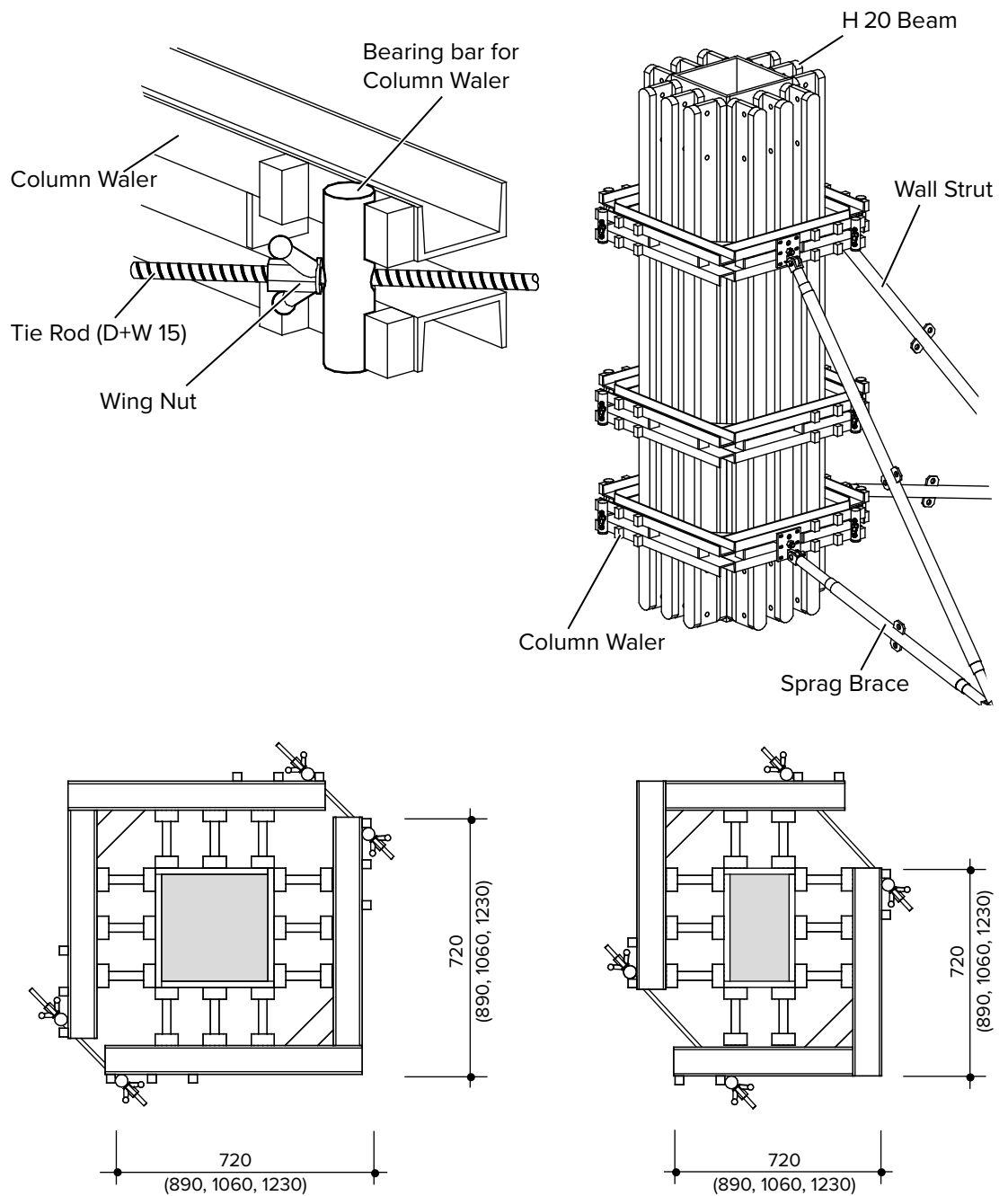




18 Column formwork

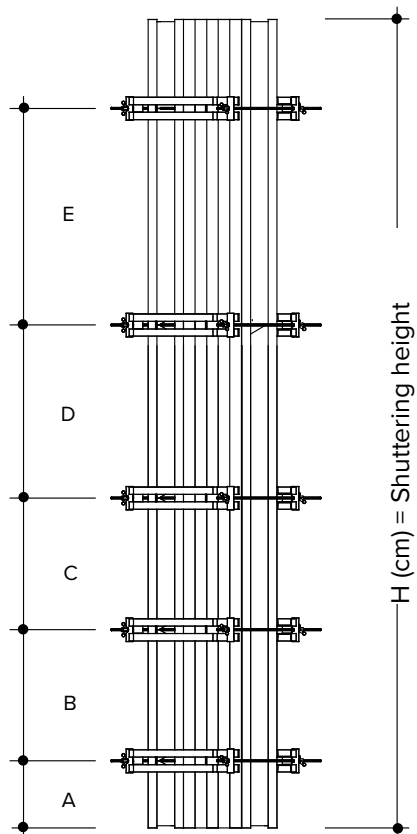


## 18.1 Corner tensioning



With Column Waler [cm]	Square cross-sections		Rectangular cross-sections	
	from	to	from	to
72 / 72	20 / 20	36 / 36	20 / 20	20 / 36
89 / 89	37 / 37	53 / 53	20 / 37	20 / 53
106 / 106	54 / 54	70 / 70	20 / 54	20 / 70
123 / 123	71 / 71	87 / 87	20 / 71	20 / 87

The Column Walers and H 20 Beams are connected with H 20 Timber Beam Clamps.



## 18.2 Table for column formwork

with a maximum concrete pressure of 80 kN/m<sup>2</sup>

h	A	B	C	D	E
245	45	130			
265	45	130			
290	30	100	100		
330	30	100	100		
360	30	100	130		
390	30	100	130		
450	30	90	100	130	
490	30	90	100	130	
590	30	90	90	130	130

## 18.3 Number of H 20 Beams

Column width (cm)	20	30	40	50	60	70	87
Number of beams per side	2	2	3	3	4	4	5



### WARNING

#### Warning!

The given values are valid for a 21.5 mm plywood.

## 19 Technical data

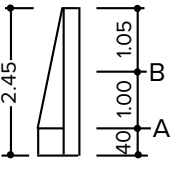
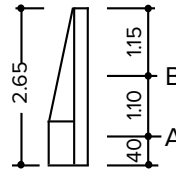
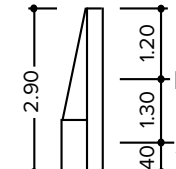
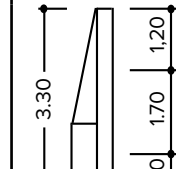
### General notes and explanations regarding the use of load tables on page 42 et seq.

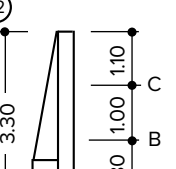
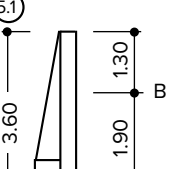
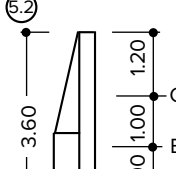
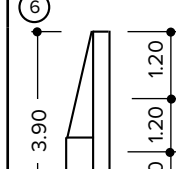
1. The tables contain concrete pressures of 40, 50, and 60 kN/m<sup>2</sup>. These pressures are used as basics for the design of the H 20 wall elements with regard to the number of beams and the dimensional grid on the related element width.
2. The wall heights of the elements are shown as static element systems with fixed arrangements of the walers (A, B, C, D, E). They are based on the standard length of the H 20 girders.
3. For the element systems 4, 5, 7, 8, and 9 there are always two ways of use for the same element height (H). The difference is in the number and position of the walers. The static element systems 4.1, 5.1, 7.1, 8.1 and 9.1 are equipped with one waler less than the alternative with same element height. This means that the number of H 20 Beams varies within the same element width. Usually the most economical element design is used.
4. The designs of the H 20 elements are defined by element numbers, based on 21 mm plywood with assumed E-Module of approx. 700 kN/cm<sup>2</sup>. Deviations from this value must be calculated analogously.
5. In the tables, below the row for the wall element system there are two rows showing the permitted beam spacing "e" [cm] in the wall element:  
a: the plywood (thickness 21 mm, E = 700 kN/cm<sup>2</sup> and  
b: the permitted static values of the H 20 Beam.  
For the element design the lower of these two values must be used for calculation.
6. The load of the waler (A, B, C, D, E) is given as a linear load [kN/m].
7. Underneath the element system and waler loads in the table you can find the allowed element numbers (1 - 41). The element numbers are based on the chosen concrete pressure and the element width (**B**), which are given by the 9 different waler lengths (see also page 42, left column in table).

### Notes and explanations with regard to the execution of elements on page 44 et seq.

1. On page 44, all constructional details that are important for the element design can be found (length of walers, element widths, quantity of H 20 Beams, exact spacing of beams, etc.). The fourth vertical column on page 44 contains the element numbers between 1 and 41, which are also given in the load tables. The arrangement of H 20 Beams is based on the details shown at the bottom of page 19 (Assembly of elements).
2. From page 45 the typical arrangements of wall ties can be taken (A, C, C/2, C1, C2, D, E) for each element number. The tying schemes 1, 3 and 4 are fully symmetrical. When using tying scheme 2, pay attention to wall elements of the same length B facing each other because this tying is not symmetrical.
3. Tie Rods D+W 15 mm diameter have to be applied for all elements (perm. load F = 90 kN per wall tie).

## 20 Load tables

Fresh concrete pressure $p_b$ [kN/m <sup>2</sup> ]			40	50	60	40	50	60	40	50	60	40	50	60
<b>Wall element system no.:</b>			①			②			③			④		
The heights of the wall elements shown in the static systems are based on standard H 20 Beam lengths between 2.45 m and 5.90 m. Element widths "B" from 1.0 m to 3.0 m can be used in steps of 25 cm (see also below).														
<b>Height of wall element [cm]:</b>			245			265			290			330		
Perm. beam spacing "e" acc. to plywood 21 mm [cm]			44	41	35	44	41	35	44	41	35	44	41	35
Perm. beam spacing "e" acc. to H 20 values [cm]			59	53	49	49	48	45	40	38	35	32	28	24
Linear load on waler [kN/m] at	A		33.7	40.6	43.7	34.8	43	48.2	38.7	48.4	55.6	47.5	59.4	69.4
	B		32.3	31.9	31.3	39.2	39.5	38.8	45.3	46.6	46.4	52.5	55.6	56.6
	C		-	-	-	-	-	-	-	-	-	-	-	-
	D		-	-	-	-	-	-	-	-	-	-	-	-
	E		-	-	-	-	-	-	-	-	-	-	-	-
<b>Relevant Element-No.</b>  for the execution of wall elements depending on waler length (element width B) and concrete pressure. (see also page 44 and 45).	Element width B [cm]	100	1	1	2	1	1	2	2	2	2	2	2	3
		125	4	4	5	4	4	5	4	4	5	5	5	6
		150	7	8	8	7	8	8	8	8	8	9	9	10
		175	11	11	12	11	11	12	11	12	12	12	13	14
		200	16	16	17	16	16	17	16	16	17	17	18	19
		225	20	21	21	20	21	21	21	21	21	22	23	24
		250	25	25	26	25	25	26	25	26	26	27	28	29
		275	30	31	32	30	31	32	31	31	32	33	34	35
		300	36	36	38	36	36	38	37	37	38	38	40	41

Fresh concrete pressure $p_b$ [kN/m <sup>2</sup> ]			40	50	60	40	50	60	40	50	60	40	50	60
<b>Wall element system no.:</b>			④.2			⑤.1			⑤.2			⑥		
The heights of the wall elements shown in the static systems are based on standard H 20 Beam lengths between 2.45 m and 5.90 m. Element widths "B" from 1.0 m to 3.0 m can be used in steps of 25 cm (see also below).														
<b>Height of wall element [cm]:</b>			330			360			360			390		
Perm. beam spacing "e" acc. to plywood 18 mm [cm]			44	41	35	44	41	35	44	41	35	44	41	35
Perm. beam spacing "e" acc. to H 20 values [cm]			52	49	41	22	20	18	48	42	35	44	39	33
Linear load on waler [kN/m] at	A		33.7	42.3	51	50.8	64	75.8	36.9	46	55.3	37.3	46.6	56.2
	B		30	36.3	38.8	61.2	66	68.2	34	42.7	47.8	43.7	54.8	62.5
	C		36.3	36.4	36.3	-	-	-	41.1	41.3	40.9	42.9	43.6	43.3
	D		-	-	-	-	-	-	-	-	-	-	-	-
	E		-	-	-	-	-	-	-	-	-	-	-	-
<b>Relevant element-No.</b>  for the execution of wall elements depending on waler length (element width B) and concrete pressure. (see also page 44 and 45).	Element width B [cm]	100	1	1	2	2	3	-	1	1	2	1	2	2
		125	4	4	5	5	6	-	4	4	5	4	4	5
		150	7	8	8	9	10	-	7	8	8	7	8	8
		175	11	11	12	13	14	-	11	11	12	11	12	12
		200	16	16	17	18	19	-	16	16	17	16	16	17
		225	20	21	21	23	24	-	20	21	21	20	21	22
		250	25	25	26	28	29	-	25	25	26	25	25	27
		275	30	31	32	34	35	-	31	31	32	30	31	32
		300	36	36	38	40	41	-	36	36	38	36	37	38

Fresh concrete pressure $p_b$ [kN/m <sup>2</sup> ]		40	50	60	40	50	60	40	50	60	40	50	60	
Wall element system no.:														
The heights of the wall elements shown in the static systems are based on standard H 20 Beam lengths between 2.45 m and 5.90 m. Element widths “B” from 1.0 m to 3.0 m can be used in steps of 25 cm (see also below).		450			450			490			490			
Height of wall element [cm]:		450			450			490			490			
Perm. beam spacing “e” acc. to plywood 18 mm [cm]		44	41	35	44	41	35	44	41	35	44	41	35	
Perm. beam spacing “e” acc. to H 20 values [cm]		33	27	22	51	42	35	31	25	21	40	39	36	
Linear load on waler [kN/m] at	A	42.9	53.5	64.5	34.9	43.5	52.1	42.4	52.9	63.8	35.9	44.9	53.8	
	B	61.5	76.9	89.4	39.7	50.1	60.6	70.8	89	104.7	39.9	49.6	60.1	
	C	43.7	44.6	44.1	42.1	50.2	54.5	50.8	53.1	53.6	41.4	52.5	60.2	
	D	-	-	-	31.2	31.1	30.8	-	-	-	46.8	48	48	
	E	-	-	-	-	-	-	-	-	-	-	-	-	
Relevant element-No.  for the execution of wall elements depending on waler length (element width B) and concrete pressure. (see also page 44 and 45).	Element width B [cm]	100	2	3	3	1	1	2	2	3	3	2	2	2
		125	5	5	6	4	4	5	5	6	6	4	4	5
		150	8	9	10	7	8	8	9	10	10	8	8	8
		175	12	13	-	11	11	12	13	14	-	11	12	12
		200	17	18	-	16	16	17	17	19	-	16	16	17
		225	22	23	-	20	21	21	22	24	-	21	21	21
		250	27	28	-	25	25	26	27	29	-	25	25	26
		275	32	34	-	30	31	32	33	35	-	31	31	32
		300	38	40	-	36	36	38	39	41	-	37	37	38

Fresh concrete pressure $p_b$ [kN/m <sup>2</sup> ]		40	50	60	40	50	60	
Wall element system no.:								
The heights of the wall elements shown in the static systems are based on standard H 20 Beam lengths between 2.45 m and 5.90 m. Element widths “B” from 1.0 m to 3.0 m can be used in steps of 25 cm (see also below).		590			590			
Height of wall element [cm]:								
Perm. beam spacing “e” acc. to plywood 18 mm [cm]		37	30	25	44	39	32	
Perm. beam spacing “e” acc. to H 20 values [cm]		37	30	25	47	39	32	
Linear load on waler [kN/m] at	A	39	48.8	58.5	35.5	44.4	53.3	
	B	58.4	72.7	87.6	42	52.5	62.8	
	C	55.6	70.6	82.9	45.1	56.4	68.2	
	D	51	52.8	53	41.7	51.6	57.9	
	E	-	-	-	39.7	40.1	39.8	
Relevant element-No.  for the execution of wall elements depending on waler length (element width B) and concrete pressure. (see also page 44 and 45).	Element width B [cm]	100	2	2	3	1	2	2
		125	4	5	6	4	5	5
		150	8	9	10	8	8	9
		175	12	13	14	12	12	13
		200	16	18	19	16	17	18
		225	21	22	24	21	21	22
		250	26	27	29	26	26	27
		275	31	33	35	31	32	33
		300	37	39	41	37	38	39



## 21 Design of elements

### 21.1 (Part 1) Arrangement and spacing of H 20 Beams

Designation and design of elements		Element no.	Qty. of H20 pcs./element	H 20 spacing due to element width	
waler [cm]	B [cm]			F [cm]	F [cm]
				B = F + M + FM = n x e [cm] (M = division measure, e = beam spacing)	
96	100	1	3	9	2 x 41
		2	4	9	3 x 27.3
		3	5	9	4 x 20.5
121	125	4	4	9	3 x 35.7
		5	5	9	4 x 26.8
		6	6	9	5 x 21.4
146	150	7	4	9	3 x 44
		8	5	9	4 x 33
		9	6	9	5 x 26.4
		10	7	9	6 x 22
171	175	11	5	9	4 x 39.3
		12	6	9	5 x 31.4
		13	7	9	6 x 26.2
		14	8	9	7 x 22.4
196	200	15	(5)	(9)	(beam spacing to wide for plywood)
		16	6	9	5 x 36.4
		17	7	9	6 x 30.3
		18	8	9	7 x 26
		19	9	9	8 x 22.8
221	225	20	6	9	5 x 41.4
		21	7	9	6 x 34.5
		22	8	9	7 x 29.6
		23	9	9	8 x 25.9
		24	10	9	9 x 23
246	250	25	7	9	6 x 38.7
		26	8	9	7 x 33.1
		27	9	9	8 x 29
		28	10	9	9 x 25.8
		29	11	9	10 x 23.2
271	275	30	7	9	6 x 42.8
		31	8	9	7 x 36.7
		32	9	9	8 x 32.1
		33	10	9	9 x 28.6
		34	11	9	10 x 25.7
		35	12	9	11 x 23.4
296	300	36	8	9	7 x 40.3
		37	9	9	8 x 35.3
		38	10	9	9 x 31.3
		39	11	9	10 x 28.2
		40	12	9	11 x 25.6
		41	13	9	12 x 23.5

F = fixed measure (at beginning and end)

## 21.2 (Part 2) Dimensional division and arrangement of wall ties

Element no.	Relevant tying scheme (shown right)	Distance of wall ties (depending on element width and nos.)								Examples of the different tying schemes ○ = type of scheme
		A [cm]	C [cm]	C/2 [cm]	C <sub>1</sub> [cm]	C <sub>2</sub> [cm]	D [cm]	E [cm]	A [cm]	
1	①	25	50	---	---	---	---	---	25	
2	①	25	50	---	---	---	---	---	25	
3	①	19	62	---	---	---	---	---	19	
4	①	25	75	---	---	---	---	---	25	
5	①	25	75	---	---	---	---	---	25	
6	①	19	87	---	---	---	---	---	19	
7	①	33	84	---	---	---	---	---	33	
8	①	33	84	---	---	---	---	---	33	
9	①	28	94	---	---	---	---	---	28	
10	①	40	70	---	---	---	---	---	40	
11	①	40	95	---	---	---	---	---	40	
12	①	33	109	---	---	---	---	---	33	
13	①	44	87	---	---	---	---	---	44	
14	②	19	---	---	67	70	---	---	19	
15	①	45	110	---	---	---	---	---	45	
16	①	38	124	---	---	---	---	---	38	
17	①	48	104	---	---	---	---	---	48	
18	②	27	---	---	71	75	---	---	27	
19	②	40	---	---	52	68	---	---	40	
20	①	43	138	---	---	---	---	---	43	
21	①	52	128	---	---	---	---	---	52	
22	②	32	---	---	79	82	---	---	32	
23	②	43	---	---	61	78	---	---	43	
24	②	40	---	---	71	74	---	---	40	
25	①	56	138	---	---	---	---	---	56	
26	①	56	138	---	---	---	---	---	56	
27	②	46	---	---	71	87	---	---	46	
28	③	43	---	82	---	---	---	---	43	
29	②	41	---	---	76	92	---	---	41	
30	②	44	---	---	85	102	---	---	44	
31	③	39	---	100	---	---	---	---	37,5	
32	②	50	---	---	79	96	---	---	50	
33	③	46	---	91.5	---	---	---	---	46	
34	②	45	---	---	84	101	---	---	45	
35	④	42	---	---	---	---	69	53	42	
36	③	42	---	108	---	---	---	---	42	
37	②	37	---	---	105	121	---	---	37	
38	③	50	---	100	---	---	---	---	50	
39	②	46	---	---	96	112	---	---	46	
40	④	45	---	---	---	---	75	60	45	
41	④	41	---	---	---	---	74	70	41	

At tie loads  $F > 90$  kN use only Tie Rods D+W 20. (perm.  $F = 150$  kN).

## 22 Important features

1. Basic assembly  
The steel walers are fastened to the H 20 timber beams with of H 20 Timber Beam Clamps. Fastening is possible at any section of the steel walers. Advantage: Quick and assured assembly and disassembly. Safe connection.
2. Element connection  
Adjacent elements are joined with waler connectors and Joining Wedges. Advantage: Connections are proof against tension and compression and is self aligning .
3. Adaptability  
The variable adaptation of H 20 Beams and steel walers makes the flexible arrangement to any shape of ground plan possible. The 165 cm long waler connector allows length adjustments of up to 80 cm. Advantage: Adequate adaptation to concrete pressure, problematic sections and adjustments.
4. Tying  
Wall ties can be positioned according to static requirements or as required by the concrete structure itself. Page 45 shows recommended tying schemes for standard elements. Advantage: Problematic sections can be resolved simply.
5. Height extension  
The H 20 wall elements can have their height extended by means of the H 20 Extension Butt Straps. These are needed in pairs for individual beams. Non-positive beam connections are assured in this way. Advantage: Use of elements for varying wall heights.
6. Versatility  
The H 20 large-area formwork can also be used in conjunction with climbing brackets and rigid support frames (single-sided formwork) as well as for columns, tunnels and other types of special formwork. Advantage: Multi-faceted applications.
7. Additional components  
All steel parts of the H 20 large-area formwork are hot-dip galvanized. Advantage: Clean components without rust. Long life expectancy of all steel parts.
8. Approval of H 20 Beam  
The H 20 timber beam has a general approval by the Building Supervisory Board. It is registered under No. Z-9.1-299. Production of H 20 Beams is continuously controlled. Advantage: High safety due to constant quality of the product.

## 23 Chronology

Changes compared to issue 2023-09-27	Page	Date
PROTECTO G2 included		2023-11-06
Outer corner cleats arrangement corrected	24	2023-11-06
Crane Hook application corrected	31	2023-11-06

**Hünnebeck in the UK**

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

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