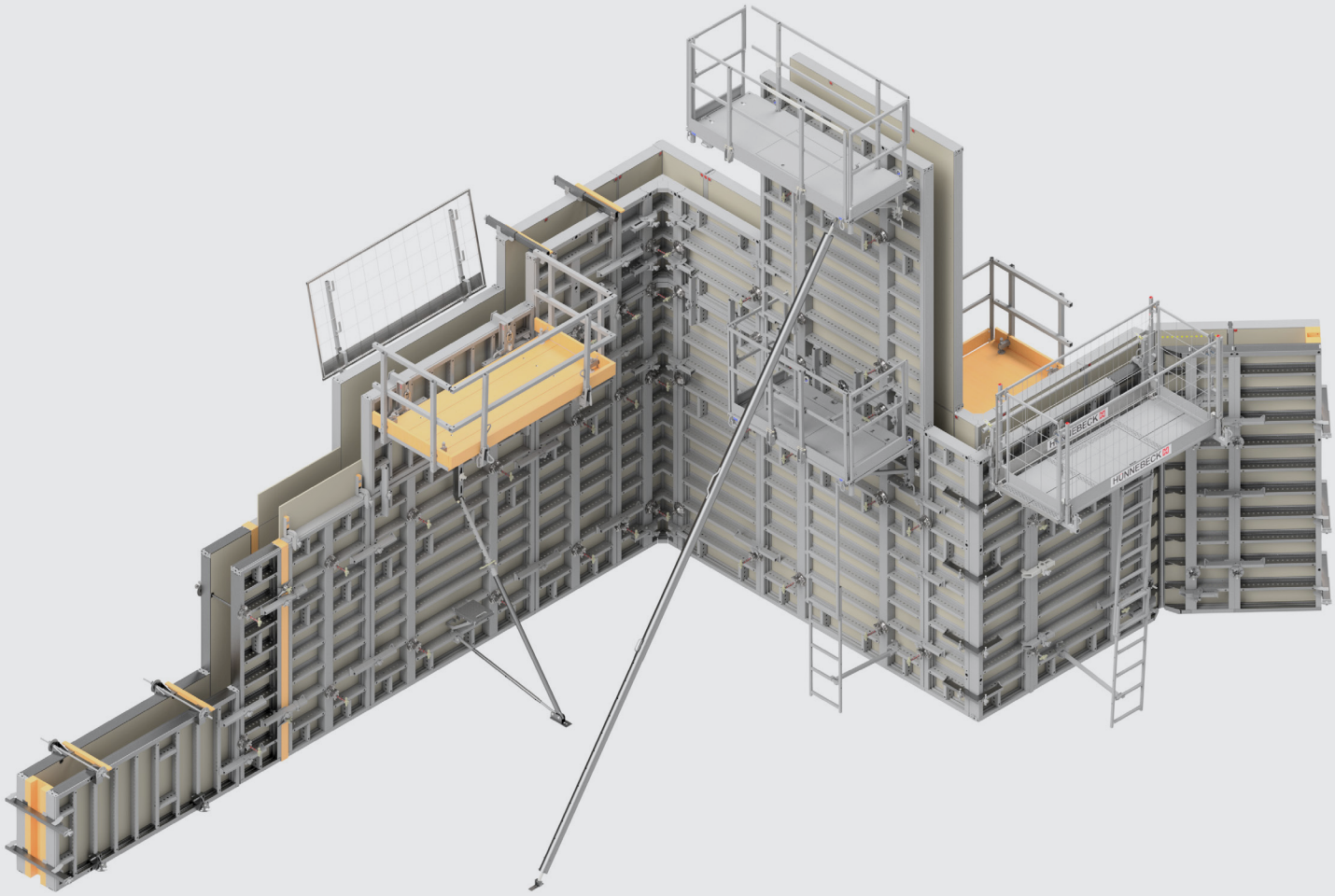
MANTO®

Large-frame panel formwork

User guide



HÜNNEBECK
BY BRAND SAFWAY

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1 MANTO formwork

MANTO formwork from Hünnebeck is rugged, ready-to-use frame panel formwork for all fields of concrete construction. All MANTO panels have sturdy 14 cm thick steel frame profiles that are hot dip galvanized on the inside and outside. The maximum fresh concrete pressure permitted is 80 kN/m^2.

The design of the MANTO panels permits the use of the panels in vertical or horizontal orientation. Extension panels and other accessories further extend the scope of use and assure safe and economical shuttering and concrete works. The “lever edge” in the lower edge profiles allows alignment of the erected panels using a crowbar. Interior H-ribs as well as V-ribs (only MANTO G3/G3 M) offer several different ways to attach accessories and support the form sheet.

The various connectors available can be used to ensure that all vertical, horizontal and extended panel joints fit tightly together and the panels are aligned perfectly without any mismatch. This also allows large-area panels to be repositioned without having to install any additional stiffening walers. Many connectors can be operated with the MANTO Ratchet or with a hammer. Using the MANTO Ratchet reduces fatigue when working from ground level (for single-storey formwork).

The permissible fresh concrete pressure for MANTO Giant Panels 240, Inner Corners 120 and 270, and Hinged Corners 120 and 270 built until 1991 is 60 kN/m^2 (Refer to page 217).

1.1 Intended use

MANTO formwork and the corresponding system components are used to wet-pour concrete structures of various geometries, e.g. walls or columns. Only the components shown in this manual may be used to connect the panels to one another. The permitted concrete pressure may not be exceeded.

Hünnebeck products are intended to be used only by competent personnel and only for commercial purposes.

1.2 General information

This user guide contains important information regarding the assembly and use of MANTO as well as safety procedures that are important for safe erection and use on site. This user guide is intended to support effective working processes with MANTO. It is essential to carefully read this user guide before erecting and using the MANTO formwork system. Keep the user guide nearby and save it for future reference.

1.3 General safety information

Important information regarding the intended and safe use of MANTO formwork

- Risk assessment
  The contractor is responsible for the preparation, documentation, implementation and revision of a risk assessment for each construction site. His employees are obliged to implement the resulting measures in accordance with all legal requirements.
- Assembly instructions
  The contractor is responsible for compiling written assembly instructions. The user guide is a fundamental aspect of the assembly instructions.
- User guide
  Formwork is a type of equipment intended only for commercial applications. The equipment may be used only by properly trained personnel under the authority of qualified supervisors.
  The user guide is an integral component of the formwork construction. It contains safety notes, information on the standard configuration, the intended use and a description of the system. 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 assembly instructions which comply with the relevant laws, standards and safety regulations. The same applies in cases where formwork/falsework components are provided on site.
- Accessibility of the user guide

  The contractor has to ensure that site personnel are familiar with the user guide and that it is readily accessible at all times.
- Illustrations
  Some of the illustrations in the user guide show incomplete assembly and do not necessarily show all aspects relevant to safety.
  Safety devices may not always appear in the illustrations, but they are nevertheless mandatory.
- Material check
  Formwork material deliveries are to be checked on arrival at the construction site / destination as well as before each use to ensure that they are in serviceable condition and function correctly. Modifications to the formwork materials are not permitted. The formwork material may not be used if it is damaged or defective.
- Spare parts and repairs
  Only original parts may be used as spare parts. Repairs may be performed only by the manufacturer or authorised facilities.
- Use of other products
  Combining formwork components from different manufacturers poses certain risks. Examine such components individually for suitability; they may require a separate user guide.

1.4 About this user guide

This user guide contains important information regarding the assembly and use of Hünnebeck MANTO formwork as well as safety procedures that are important for safe use on site. This user guide is intended to serve as an aid to working effectively with MANTO formwork. Read this user guide carefully prior to commencing work with the MANTO formwork and save it for future reference.

This user guide is designed for commercial users with proper professional training. The information and procedures described here comply with the laws and the occupational health and safety regulations of Germany and Austria. Hünnebeck assumes no liability in the event of deviations from the information and procedures described in the user guide or in the event that the equipment is used outside of this area.

1.4.1 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 that, if not avoided, can cause 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 note indicates that an additional inspection is required.
	This note shares practical experience with the user, e.g. how to perform a task more easily or quickly.
	This note indicates particularly important information, e.g. that a requirement has to be fulfilled.
	This symbol indicates that additional information from other documents is required. These documents could be user guides or operating instructions for other products.

1.4.2 Instructions

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.

1.4.3 Brand names

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

- HÜNNEBECK®
- EUROPLUS®
- Ecoply®
- MANTO®
- PLATINUM®
- PROTECTO®

1.5 Other relevant documents

This user guide describes the safe use and operation of the MANTO system. Please also observe and comply with the information and instructions contained in the following documents pertaining to specific components:

The PROTECTO edge protection user guide

The alignment struts user guide

The PLATINUM 100 platform and access user guide

The Universal Formwork Platform user guide

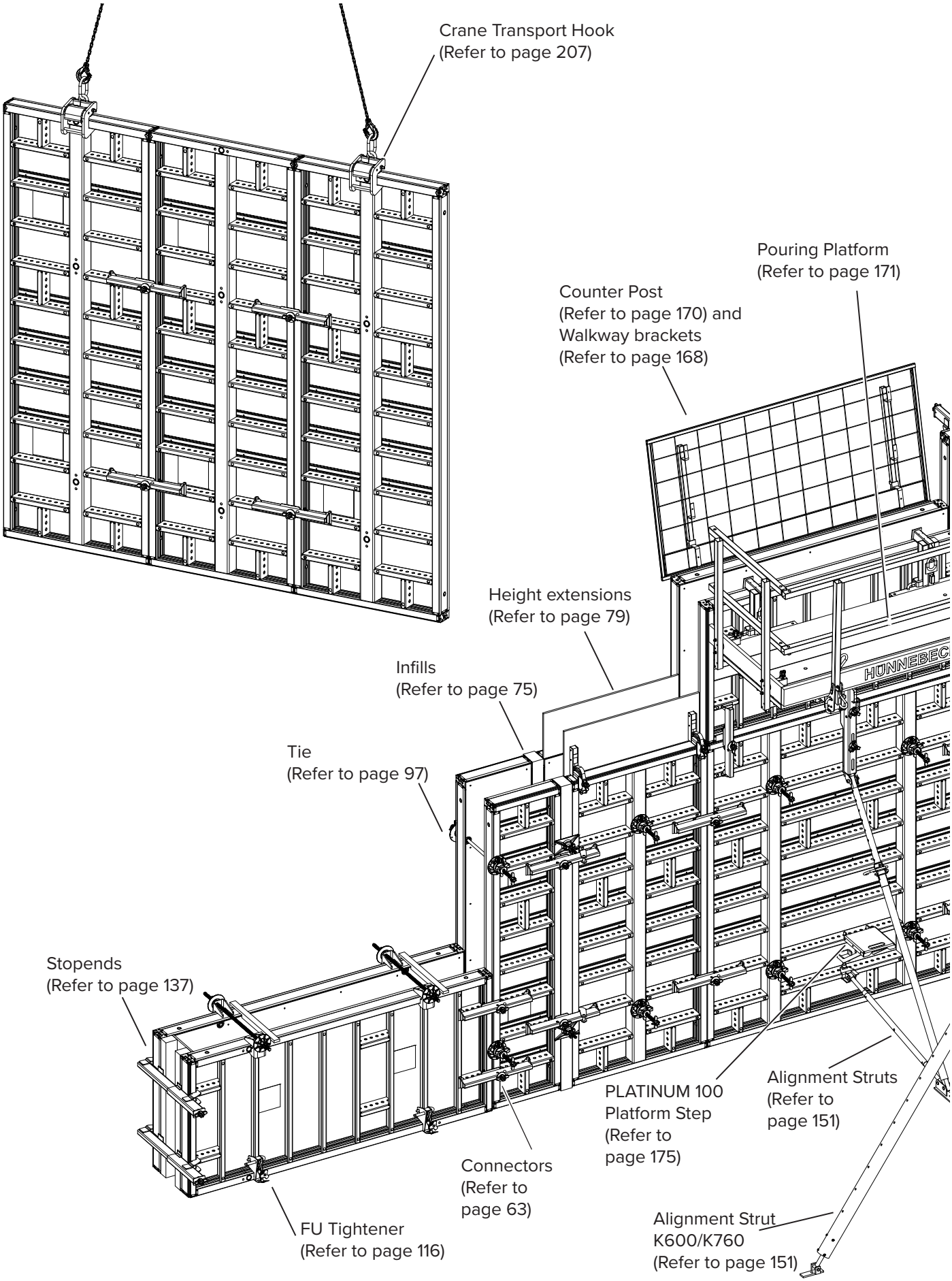
The MANTO Crane Adapter operating instructions

The PLATINUM 100 Lifting Waler operating instructions

The MANTO Loading Adapter operating instructions

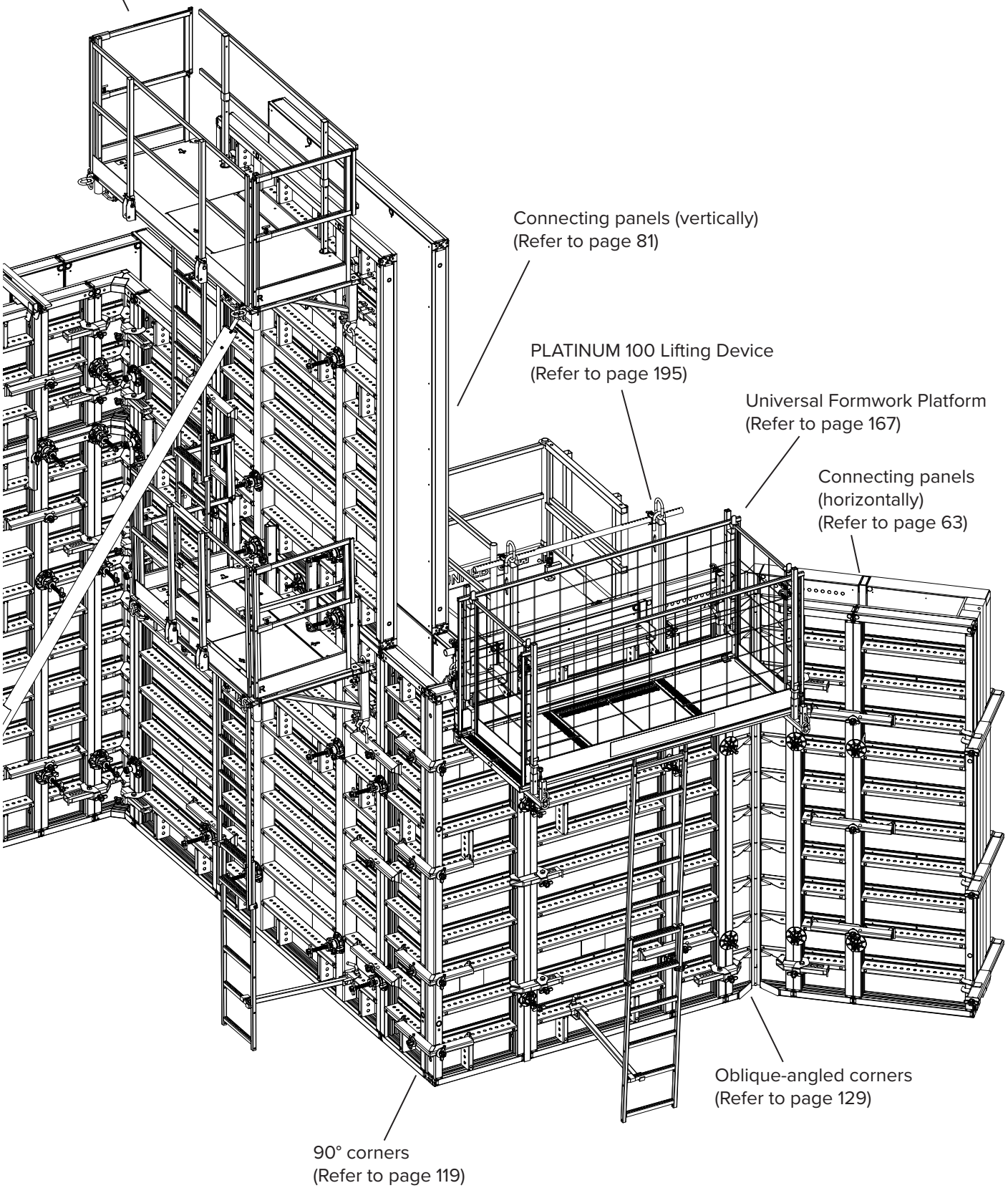
All of these documents can be downloaded at http://huennebeck.com/downloads.

2 Overview



Unless stated otherwise, all dimensions are given in mm.

The assembly shown is for illustration purposes only. Not all components are shown. All local requirements and regulations are to be complied with.

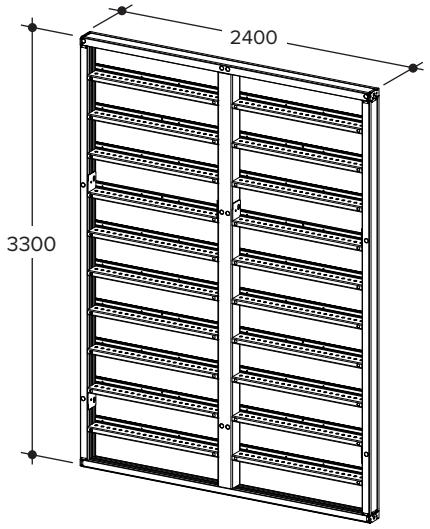
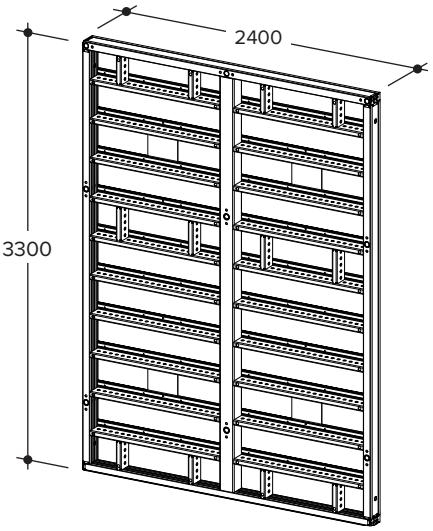


*only rental **no longer produced

3 Quick reference guide

MANTO panels have either an 18 mm form sheet made of birch plywood coated with phenolic resin or a 19 mm Ecoply full plastic form sheet. Panels with an Ecoply form sheet are marked as such in the following list.

3.1 Panels

	Component	Part code	Weight [kg]
	**MANTO Giant Panel 240/330 (7.92 m²)** **Generation 2** The largest panel with a height of 3.30 m. With 4no. tie holes per tie position. This allows 1no. MANTO Giant Panel to be used with 2no. opposing panels with a width of 1.20 m each. Also available with the Ecoply full plastic form sheet (19 mm). Refer to page 50.	**525759**	**371.18**
	**MANTO G3 Giant Panel 240/330 Ecoply (7.92 m²)** **MANTO G3 Giant Panel 240/330 (7.92 m²)*** **Generation 3** Like the 2nd generation MANTO Giant Panels 240/330, but with additional V-ribs, e.g. to connect Alignment Struts. With 3no. tie holes per tie position. Suitable for use with one-sided tie systems. Refer to page 56.	**608280** **609100**	**410.12** **410.55**

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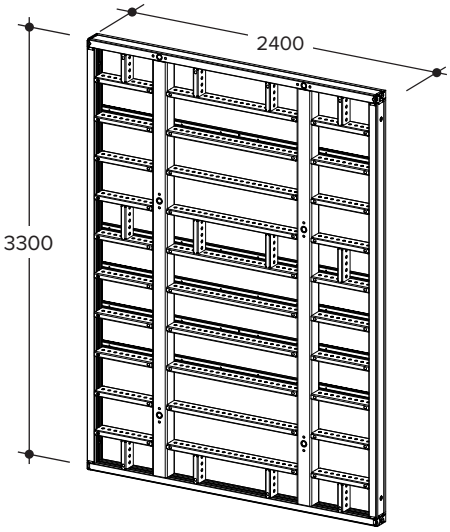
Unless stated otherwise, all dimensions are given in mm.

Component	Part code	Weight [kg]
MANTO G3 M Panel 240/330 Ecoply (7.92 m²)	**607820**	**441.42**
MANTO G3 M Panel 240/330 (7.92 m²)*	**609250**	**447.15**



Generation 3

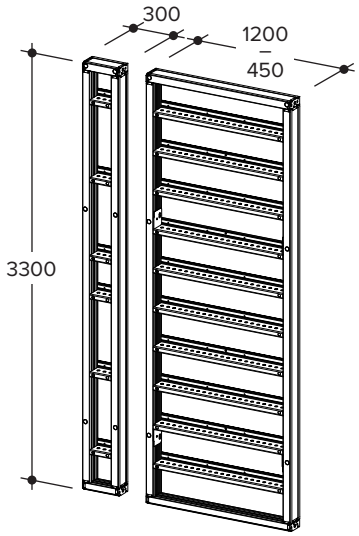
Like the MANTO G3 Giant Panels 240/330, but with 2no. centre profiles.

With 2no. tie holes per tie position.

Suitable for use with one-sided tie systems.

Refer to page 56.

MANTO Panel 120/330 (3.96 m²)	**525760**	**179.56**
MANTO Panel 105/330 (3.47 m²)	**525770**	**163.63**
MANTO Panel 90/330 (2.97 m²)	**525781**	**146.14**
MANTO Panel 75/330 (2.48 m²)	**525792**	**130.26**
MANTO Panel 60/330 (1.98 m²)	**525829**	**114.23**
MANTO Panel 45/330 (1.49 m²)	**525840**	**96.98**
MANTO Panel 30/330 (0.99 m²)	**600009**	**80.73**



Generation 2

MANTO panels 3.30 m high.

With 2no. tie holes per tie position.

Also available with the Ecoply full plastic form sheet (19 mm).

Refer to page 50.

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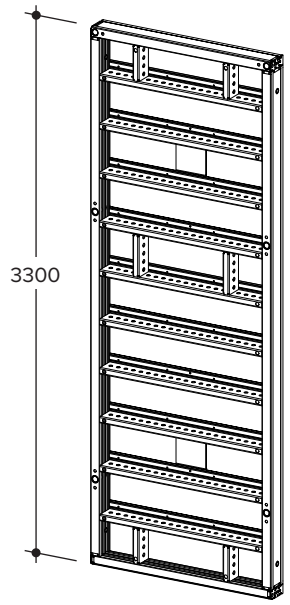
Quick reference guide



Component	Part code	Weight [kg]
MANTO G3 Panel 120/330 Ecoply (3.96 m²)	**608015**	**198.86**
MANTO G3 Panel 105/330 Ecoply (3.47 m²)	**608020**	**181.75**
MANTO G3 Panel 90/330 Ecoply (2.97 m²)	**608025**	**164.74**
MANTO G3 Panel 75/330 Ecoply (2.48 m²)	**608030**	**141.79**
MANTO G3 Panel 60/330 Ecoply (1.98 m²)	**608040**	**124.43**
MANTO G3 Panel 45/330 Ecoply (1.49 m²)	**608045**	**101.60**
MANTO G3 Panel 30/330 Ecoply (0.99 m²)	**608050**	**89.85**
MANTO G3 Panel 120/330 (3.96 m²)*	**609101**	**199.07**
MANTO G3 Panel 105/330 (3.47 m²)*	**609102**	**181.95**
MANTO G3 Panel 90/330 (2.97 m²)*	**609103**	**164.91**
MANTO G3 Panel 75/330 (2.48 m²)*	**609104**	**141.93**
MANTO G3 Panel 60/330 (1.98 m²)*	**609107**	**124.54**
MANTO G3 Panel 45/330 (1.49 m²)*	**609109**	**101.70**
MANTO G3 Panel 30/330 (0.99 m²)*	**609110**	**89.92**

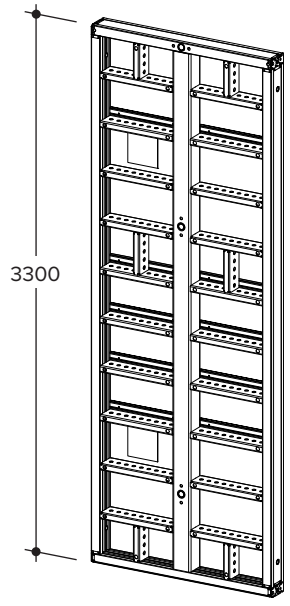
Generation 3

Like the 2nd generation MANTO panels, but with additional V-ribs, e.g. to connect Alignment Struts.

With 2no. tie holes per tie position.

Suitable for use with one-sided tie systems.

Refer to page 53.



MANTO G3 M Panel 120/330 Ecoply (3.96 m²)	**607830**	**244.70**
MANTO G3 M Panel 90/330 Ecoply (2.97 m²)	**607840**	**197.93**
MANTO G3 M Panel 60/330 Ecoply (1.98 m²)	**607850**	**142.05**
MANTO G3 M Panel 120/330 (3.96 m²)*	**609251**	**247.53**
MANTO G3 M Panel 90/330 (2.97 m²)*	**609252**	**200.05**
MANTO G3 M Panel 60/330 (1.98 m²)*	**609253**	**143.45**

Generation 3

Like the MANTO G3 panels, but with a centre profile.

With 1no. tie hole per tie position.

Suitable for use with one-sided tie systems.

Refer to page 56.

*only rental **no longer produced

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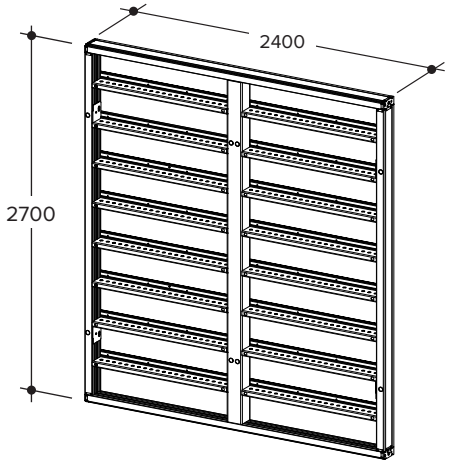
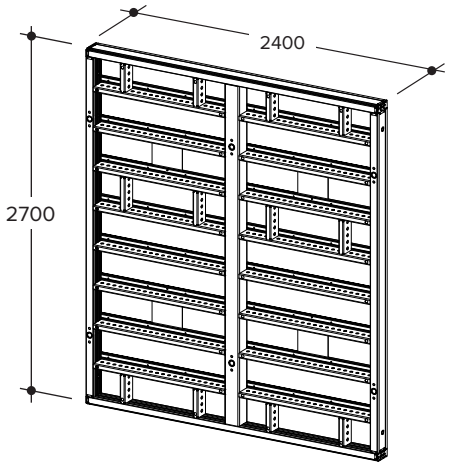
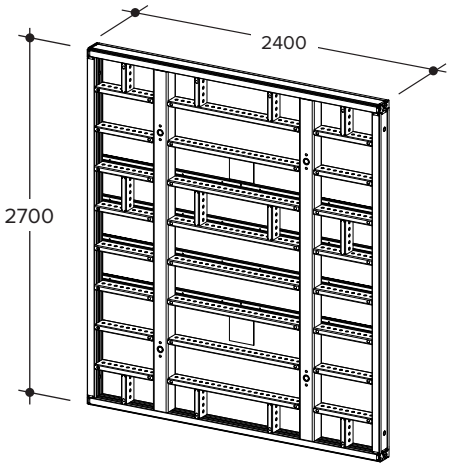
	Component	Part code	Weight [kg]
	**MANTO Giant Panel 240/270 (6.48 m²)** **Generation 2** With 4no. tie holes per tie position. This allows 1no. MANTO Giant Panel to be used with 2no. opposing panels with a width of 1.20 m each. Also available with the Ecoply full plastic form sheet (19 mm). Refer to page 50.	**534990**	**319.39**
	**MANTO G3 Giant Panel 240/270 Ecoply (6.48 m²)** **MANTO G3 Giant Panel 240/270 (6.48 m²)*** **Generation 3** Like the 2nd generation MANTO Giant Panels 240/270, but with additional V-ribs, e.g. to connect Alignment Struts. With 3no. tie holes per tie position. Suitable for use with one-sided tie systems. Refer to page 56.	**608290** **609111**	**357.03** **357.37**
	**MANTO G3 M Panel 240/270 Ecoply (6.48 m²)** **MANTO G3 M Panel 240/270 (6.48 m²)*** **Generation 3** Like MANTO G3 Giant Panels 240/270. With 2no. tie holes per tie position. Suitable for use with one-sided tie systems. Refer to page 56.	**607860** **609254**	**369.86** **374.55**

*only rental **no longer produced

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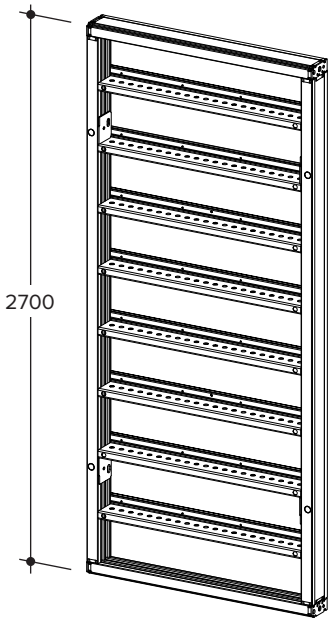


Component	Part code	Weight [kg]
MANTO Panel 120/270 (3.24 m²)	**446000**	**162.61**
MANTO Panel 105/270 (2.84 m²)	**446022**	**149.31**
MANTO Panel 90/270 (2.43 m²)	**446033**	**120.08**
MANTO Panel 75/270 (2.03 m²)	**446044**	**106.73**
MANTO Panel 60/270 (1.62 m²)	**446055**	**93.35**
MANTO Panel 45/270 (1.22 m²)	**450786**	**80.11**
MANTO Panel 30/270 (0.81 m²)	**600007**	**65.45**

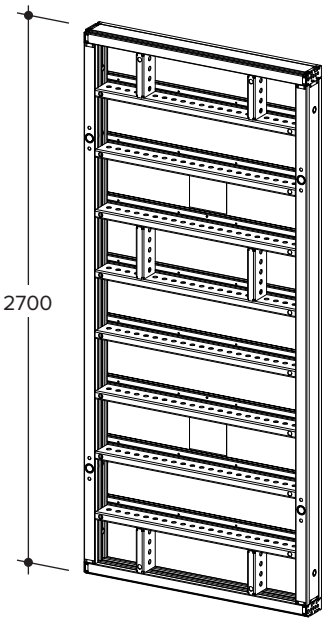
Generation 2

Additional panels 3.30 m high.

With 2no. tie holes per tie position.

Also available with the Ecoply full plastic form sheet (19 mm).

Refer to page 50.



MANTO G3 Panel 120/270 Ecoply (3.24 m²)	**608055**	**180.08**
MANTO G3 Panel 105/270 Ecoply (2.84 m²)	**608060**	**165.77**
MANTO G3 Panel 90/270 Ecoply (2.43 m²)	**608065**	**138.45**
MANTO G3 Panel 75/270 Ecoply (2.03 m²)	**608070**	**118.34**
MANTO G3 Panel 60/270 Ecoply (1.62 m²)	**608080**	**103.96**
MANTO G3 Panel 45/270 Ecoply (1.22 m²)	**608085**	**83.92**
MANTO G3 Panel 30/270 Ecoply (0.81 m²)	**608090**	**73.85**
MANTO G3 Panel 120/270 (3.24 m²)*	**609112**	**180.26**
MANTO G3 Panel 105/270 (2.84 m²)*	**609113**	**165.93**
MANTO G3 Panel 90/270 (2.43 m²)*	**609114**	**138.59**
MANTO G3 Panel 75/270 (2.03 m²)*	**609115**	**118.45**
MANTO G3 Panel 60/270 (1.62 m²)*	**609118**	**105.10**
MANTO G3 Panel 45/270 (1.22 m²)*	**609120**	**83.99**
MANTO G3 Panel 30/270 (0.81 m²)*	**609121**	**73.91**

Like the 2nd generation MANTO panels but with additional V-ribs, e.g. to connect Alignment Struts.

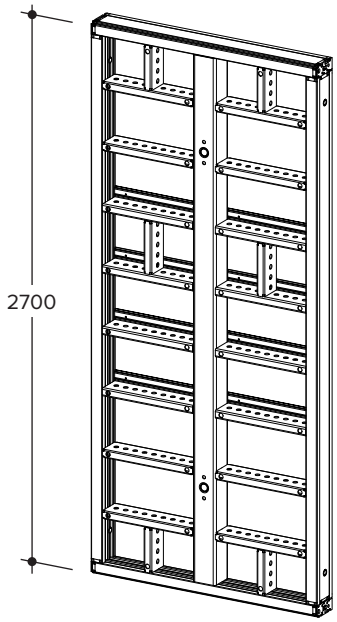
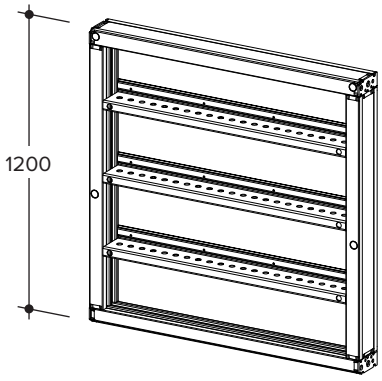
With 2no. tie holes per tie position.

Suitable for use with one-sided tie systems.

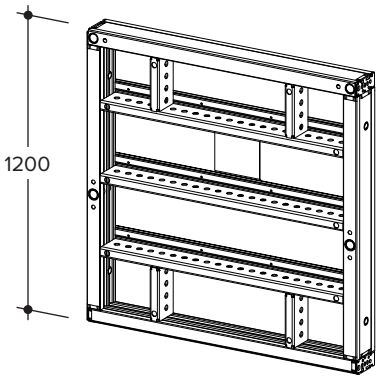
Refer to page 53.

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**MANTO G3 M Panel 120/270 Ecoply (3.24 m²)**	**607870**	**204.45**
	MANTO G3 M Panel 90/270 Ecoply (2.43 m²)	**607880**	**163.67**
	MANTO G3 M Panel 60/270 Ecoply (1.62 m²)	**607890**	**121.01**
	MANTO G3 M Panel 120/270 (3.24 m²)*	**609255**	**206.77**
	MANTO G3 M Panel 90/270 (2.43 m²)*	**609256**	**165.40**
	MANTO G3 M Panel 60/270 (1.62 m²)*	**609257**	**122.16**
	Generation 3 Like the MANTO G3 panels, but with a centre profile. With 1no. tie hole per tie position. Suitable for use with one-sided tie systems. Refer to page 56.		
	**MANTO Panel 120/120 (1.44 m²)**	**458175**	**72.86**
	MANTO Panel 105/120 (1.26 m²)	**458186**	**66.02**
	MANTO Panel 90/120 (1.08 m²)	**458197**	**59.21**
	MANTO Panel 75/120 (0.90 m²)	**458201**	**52.35**
	MANTO Panel 60/120 (0.72 m²)	**458223**	**45.39**
	MANTO Panel 45/120 (0.54 m²)	**458245**	**38.58**
	MANTO Panel 30/120 (0.36 m²)	**600002**	**32.04**
	Generation 2 Panels 1.20 m high. With 2no. tie holes per tie position. Also available with the Ecoply full plastic form sheet (19 mm). Refer to page 50.		

*only rental **no longer produced



Component	Part code	Weight [kg]
MANTO G3 Panel 120/120 Ecoply (1.44 m²)	**608095**	**82.90**
MANTO G3 Panel 105/120 Ecoply (1.26 m²)	**608100**	**73.14**
MANTO G3 Panel 90/120 Ecoply (1.08 m²)	**608105**	**69.49**
MANTO G3 Panel 75/120 Ecoply (0.90 m²)	**608110**	**58.61**
MANTO G3 Panel 60/120 Ecoply (0.72 m²)	**608120**	**51.30**
MANTO G3 Panel 45/120 Ecoply (0.54 m²)	**608125**	**41.16**
MANTO G3 Panel 30/120 Ecoply (0.36 m²)	**608130**	**35.55**
MANTO G3 Panel 120/120 (1.44 m²)*	**609122**	**82.98**
MANTO G3 Panel 105/120 (1.26 m²)*	**609123**	**73.21**
MANTO G3 Panel 90/120 (1.08 m²)*	**609124**	**69.55**
MANTO G3 Panel 75/120 (0.90 m²)*	**609125**	**58.66**
MANTO G3 Panel 60/120 (0.72 m²)*	**609128**	**51.79**
MANTO G3 Panel 45/120 (0.54 m²)*	**609130**	**41.21**
MANTO G3 Panel 30/120 (0.36 m²)*	**609131**	**35.58**

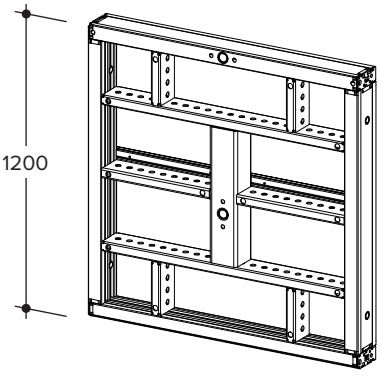
Generation 3

Like the 2nd generation MANTO panels but with additional V-ribs, e.g. to connect Alignment Struts.

With 2no. tie holes per tie position.

Suitable for use with one-sided tie systems.

Refer to page 53.



MANTO G3 M Panel 120/120 Ecoply (1.44 m²)	**607900**	**94.66**
MANTO G3 M Panel 90/120 Ecoply (1.08 m²)	**607910**	**78.89**
MANTO G3 M Panel 60/120 Ecoply (0.72 m²)	**607920**	**61.09**
MANTO G3 M Panel 120/120 (1.44 m²)*	**609258**	**95.68**
MANTO G3 M Panel 90/120 (1.08 m²)*	**609259**	**79.65**
MANTO G3 M Panel 60/120 (0.72 m²)*	**609260**	**61.60**

Generation 3

Like the MANTO G3 panels, but with a centre profile.

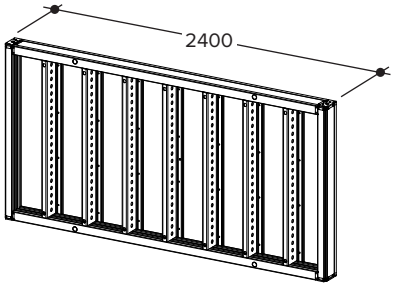
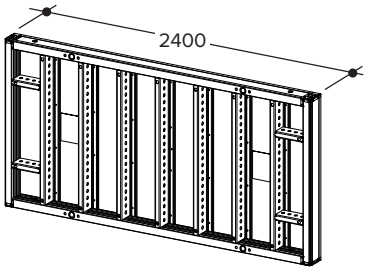
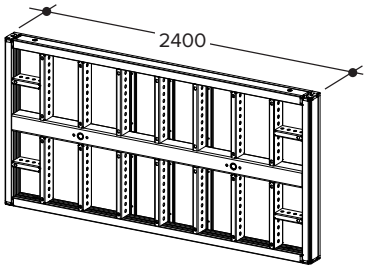
With 1no. tie hole per tie position.

Suitable for use with one-sided tie systems.

Refer to page 56.

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

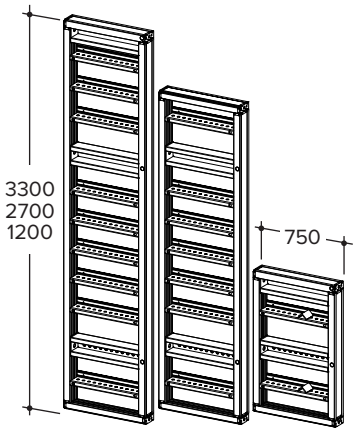
	Component	Part code	Weight [kg]
	**MANTO Panel 240/120 (2.88 m²)**	**446066**	**131.90**
	MANTO Panel 240/90 (2.16 m²)	**479194**	**107.85**
	MANTO Panel 240/60 (1.44 m²)	**453437**	**83.88**
	Generation 2 Range of extension panels that can be used as height extensions or as independent elements for smaller heights. With 2no. tie holes per tie position. Also available with the Ecoply full plastic form sheet (19 mm). Refer to page 50.		
	**MANTO G3 Panel 240/120 Ecoply (2.88 m²)**	**608135**	**147.01**
	MANTO G3 Panel 240/90 Ecoply (2.16 m²)	**608140**	**121.26**
	MANTO G3 Panel 240/60 Ecoply (1.44 m²)	**608145**	**91.65**
	MANTO G3 Panel 240/120 (2.88 m²)*	**609132**	**147.16**
	MANTO G3 Panel 240/90 (2.16 m²)*	**609133**	**121.39**
	MANTO G3 Panel 240/60 (1.44 m²)*	**609134**	**91.73**
	Generation 3 Like the 2nd generation MANTO panels but with additional V-ribs, e.g. to connect Alignment Struts. With 2no. tie holes per tie position. Suitable for use with one-sided tie systems. Refer to page 53.		
	**MANTO G3 M Panel 240/120 Ecoply (2.88 m²)**	**607960**	**180.71**
	MANTO G3 M Panel 240/90 Ecoply (2.16 m²)	**607970**	**146.17**
	MANTO G3 M Panel 240/60 Ecoply (1.44 m²)	**607980**	**110.44**
	MANTO G3 M Panel 240/120 (2.88 m²)*	**609261**	**182.77**
	MANTO G3 M Panel 240/90 (2.16 m²)*	**609262**	**147.70**
	MANTO G3 M Panel 240/60 (1.44 m²)*	**609263**	**111.44**
	Generation 3 Like the MANTO G3 panels, but with a centre profile. With 2no. tie holes per tie position. Suitable for use with one-sided tie systems. Refer to page 56.		

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

Quick reference guide

Component	Part code	Weight [kg]
MANTO MP Panel 75/330 (2.48 m²)	**533561**	**151.50**
MANTO MP Panel 75/270 (2.03 m²)	**454340**	**123.30**
MANTO MP Panel 75/120 (0.90 m²)	**454946**	**67.23**



Generation 2

Multi-purpose panels with a horizontal tie hole grid.

The 50 mm tying increments allow even the most difficult of formwork tasks to be accomplished.

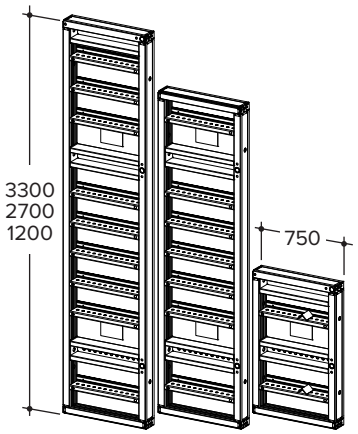
These panels can also be used for shuttering square and rectangular columns.

Because the panels are available in three different heights, the height of the structure can be easily adjusted.

Also available with the Ecoply full plastic form sheet (19 mm).

Refer to page 50.

MANTO G3 MP Panel 75/330 Ecoply	**608150**	**160.22**
(2.48 m²)	**608155**	**127.28**
MANTO G3 MP Panel 75/270 Ecoply (2.03 m²)	**608160**	**68.92**
MANTO G3 MP Panel 75/120 Ecoply (0.90 m²)	**609135**	**159.61**
MANTO G3 MP Panel 75/330 (2.48 m²)*	**609136**	**126.80**
MANTO G3 MP Panel 75/270 (2.03 m²)*	**609137**	**68.53**
MANTO G3 MP Panel 75/120 (0.90 m²)*		



Generation 3

Like 2nd generation MANTO MP panels.

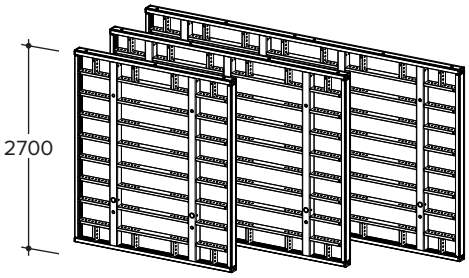
Suitable for use with one-sided tie systems.

Refer to page 53.

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

Component	Part code	Weight [kg]
MANTO Panel 240/270 L (6.48 m²)	**600860**	**423.48**
MANTO Panel 360/270 XL (9.72 m²)	**600861**	**616.78**
MANTO Panel 480/270 XXL (12.96 m²)	**600862**	**810.29**



Generation 2

MANTO XXL panels.

These panels can be used in vertical or horizontal orientation; they must, however, be arranged in such a way that they are facing each other.

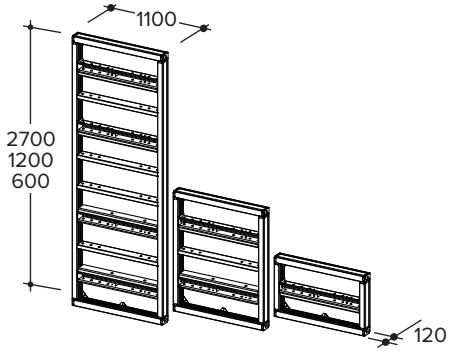
Panels are tied using the conventional tie method; refer to page 114.

Also available with the Ecoply full plastic form sheet (19 mm).

Refer to page 50.

No longer produced.

MANTO Column Frame 90/270	**470470**	**160.60**
MANTO Column Frame 90/120	**470480**	**68.40**
MANTO Column Frame 90/60	**490900**	**46.10**



Generation 2

Special frames for column formwork, used to form columns with edge lengths ranging from 200 mm to 900 mm (in 50 mm increments).

Supplied without a form sheet. Any plywood sheet with a sufficient load-bearing capacity can be nailed or bolted to the MANTO Column Frame on site.

Three panel heights are available for optimal height adjustment.

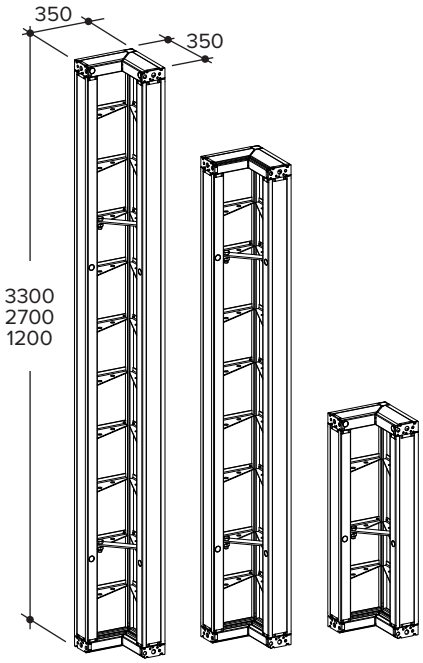
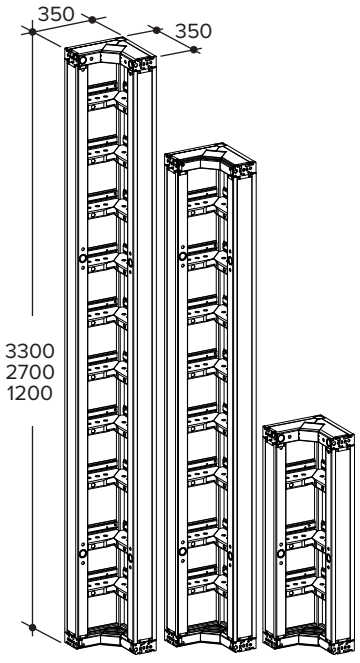
Permitted fresh concrete pressure: 100.00 kN/m²

Refer to page 50.

No longer produced.

*only rental **no longer produced

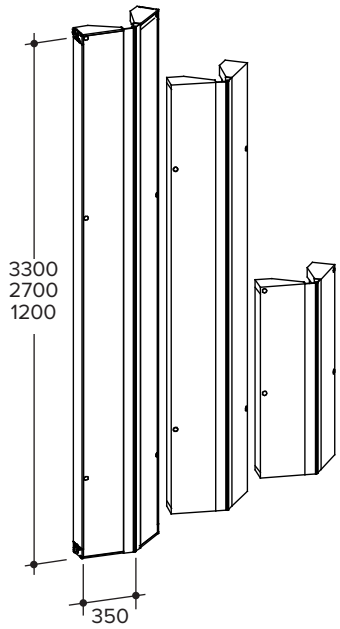
3.2 Corners

	Component	Part code	Weight [kg]
	**MANTO Inner Corner 35/330 (2.31 m²)**	**525851**	**113.80**
	MANTO Inner Corner 35/270 (1.89 m²)	**535001**	**94.46**
	MANTO Inner Corner 35/120 (0.84 m²)	**535012**	**45.86**
	Generation 2 This 90° Inner Corner is equipped with a releasing aid to shutter rectangular inner corners. The 90° angle can be decreased by 2° simply by unlatching the corner stiffener. Refer to page 119.		
	**MANTO G3 Inner Corner 35/330 Ecoply**	**607990**	**127.67**
	(2.31 m²)	**608000**	**105.43**
	MANTO G3 Inner Corner 35/270 Ecoply	**608010**	**50.95**
	(1.89 m²)	**609138**	**127.85**
	MANTO G3 Inner Corner 35/120 Ecoply	**609139**	**105.59**
	(0.84 m²)	**609140**	**51.03**
	MANTO G3 Inner Corner 35/330 (2.31 m²)*		
	MANTO G3 Inner Corner 35/270 (1.89 m²)*		
	MANTO G3 Inner Corner 35/120 (0.84 m²)*		
	Generation 3 The 90° Inner Corner with tie positions operated from only one side of the formwork. The legs of the G3 Inner Corner can be latched to the formwork with PM Aligning Wedge Clamps (offset arrangement) or with PLATINUM Universal Connectors. Suitable for use with one-sided tie systems. Refer to page 119.		

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

Component	Part code	Weight [kg]
MANTO Hinged Corner 35/330	**532188**	**135.39**
MANTO Hinged Corner 35/270	**534588**	**112.07**
MANTO Hinged Corner 35/120	**534577**	**54.26**



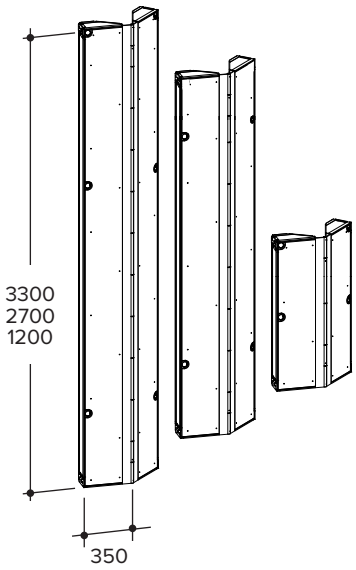
Generation 2

Flexible 350 mm wide corner panels for inner corners with angles from 60° to 175°.

Use PLATINUM Universal Connectors or Panel Clamps to connect corners < 90° to the panels.

Refer to page 129.

MANTO G3 Hinged Corner 35/330 Ecoply	**608255**	**140.99**
MANTO G3 Hinged Corner 35/270 Ecoply	**608265**	**116.81**
MANTO G3 Hinged Corner 35/120 Ecoply	**608275**	**57.07**
MANTO G3 Hinged Corner 35/330*	**609141**	**140.82**
MANTO G3 Hinged Corner 35/270*	**609142**	**116.64**
MANTO G3 Hinged Corner 35/120*	**609143**	**56.98**



Generation 3

Flexible 350 mm wide corner panels for inner corners with angles from 60° to 175°.

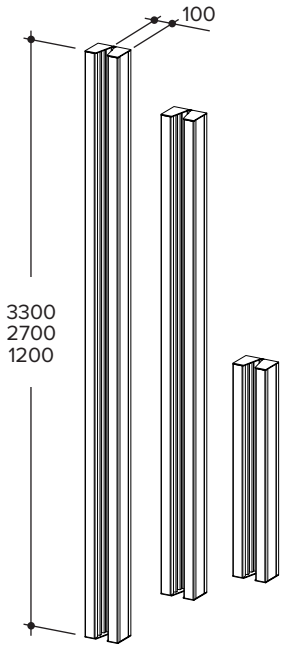
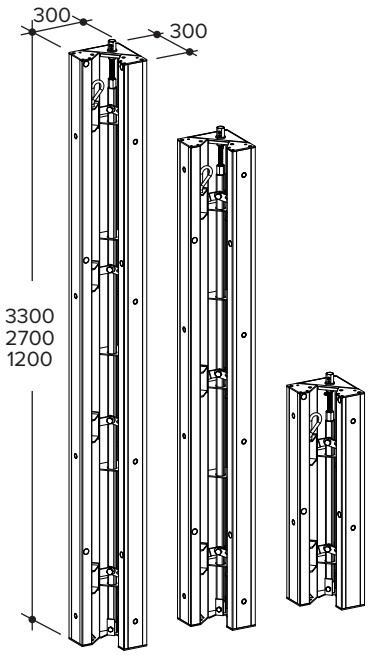
Use PLATINUM Universal Connectors or Panel Clamps to connect corners < 90° to the panels.

Suitable for use with one-sided tie systems.

Refer to page 129.

*only rental **no longer produced

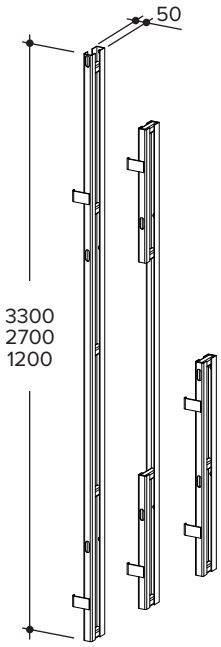
Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**MANTO Outer Corner 330**	**534040**	**84.10**
	MANTO Outer Corner 270	**462358**	**69.30**
	MANTO Outer Corner 120	**462222**	**31.40**
	Generation 2 Used as an outer corner. The legs are 100 mm long. Also used in shaft formwork with Hinged Corners. Adjustable from 60° to 192°. Refer to page 129.		
	**MANTO Shaft Corner 330**	**602402**	**195.14**
	MANTO Shaft Corner 270	**602400**	**157.12**
	MANTO Shaft Corner 120	**602401**	**76.89**
	Generation 2 Shaft formwork can be easily designed, assembled and lifted when using the MANTO Shaft Corners. The formwork is released from the concrete using the integrated mechanism. The whole shaft formwork can then be transported as a single unit by crane. Refer to page 177.		

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

Component	Part code	Weight [kg]
MANTO Corner Adjustment 5/330	**530156**	**32.50**
MANTO Corner Adjustment 5/270	**450606**	**20.40**
MANTO Corner Adjustment 5/120	**450617**	**11.90**

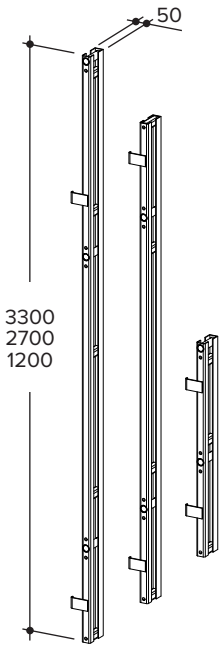


Generation 2

The Corner Adjustment is used for adapting differing wall dimensions in corners and T-wall connections.

Refer to page 119 and 133.

MANTO G3 Corner Adjustment 5/330	**608165**	**31.52**
MANTO G3 Corner Adjustment 5/270	**608170**	**25.74**
MANTO G3 Corner Adjustment 5/120	**608175**	**12.56**



Generation 3

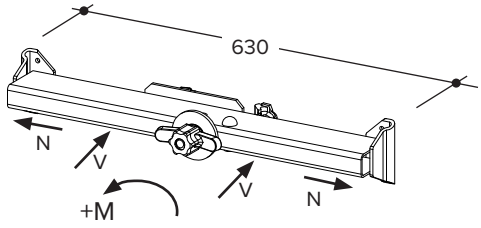
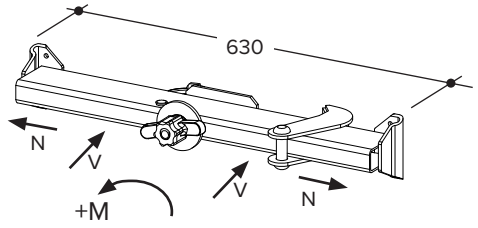
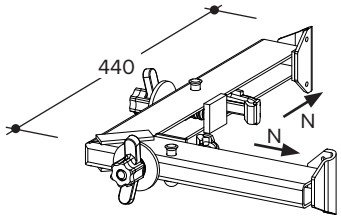
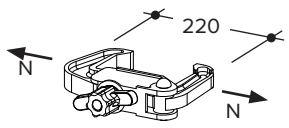
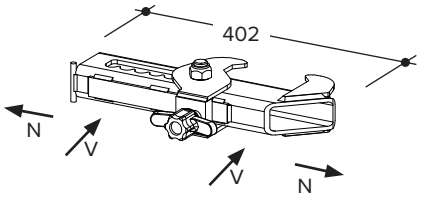
The Corner Adjustment is used for adapting differing wall dimensions in corners and T-wall connections.

Suitable for use with one-sided tie systems.

Refer to page 119 and 133.

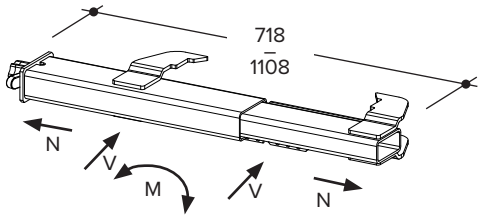
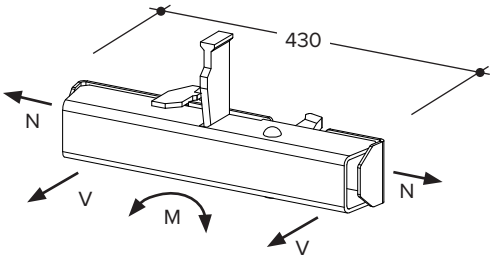
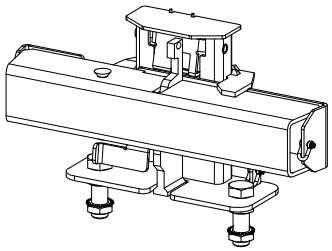
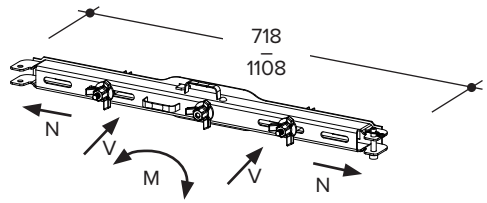
*only rental **no longer produced

3.3 Connectors

	Component	Part code	Weight [kg]
	**MANTO Aligning Panel Clamp** The MANTO Aligning Panel Clamp ensures that joints are closed securely and the panels are properly connected and aligned without offset, all in one process. This applies to both horizontal and vertical MANTO Panel connections. Safe Working Moment (-M, facing down): 1.70 kNm Safe Working Moment (+ M, facing up): 1.20 kNm SWL (N): 11.20 kN SWL (V): 6.70 kN Refer to page 64.	**448000**	**5.50**
	**Adjustable Aligning Clamp** Same as the MANTO Aligning Panel Clamp but allows for length adjustment of up to 150 mm. Safe Working Moment (-M, facing down): 1.70 kNm Safe Working Moment (+ M, facing up): 1.20 kNm SWL (N): 8.10kN SWL (V): 9.50kN Refer to page 72.	**467898**	**6.00**
	**Outer Corner Clamp** The Outer Corner Clamp connects and aligns MANTO Panels at right angles to create an outer corner. SWL (N): 17.50 kN Refer to page 119.	**448227**	**8.80**
	**Panel Clamp** Used to connect timber beams and ply-wood extensions as well as panels and shaft spindles. SWL (N): 8.00 kN. Refer to page 79.	**448010**	**3.01**
	**PLATINUM 100 Universal Connector** For joining MANTO panels and infills, and for connecting inner corners (Refer to page 121) and MANTO shaft corners (Refer to page 177). Permissible N: 20.0 kN Permissible V: 20.0 kN Refer to page 119.	**606209**	**6.34**

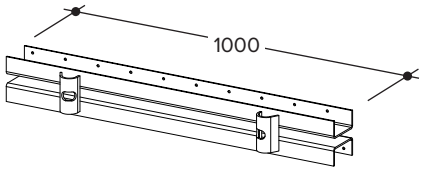
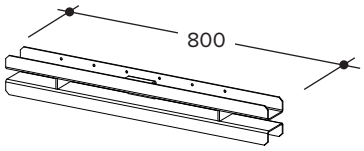
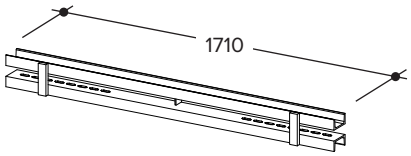
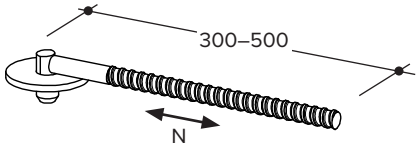
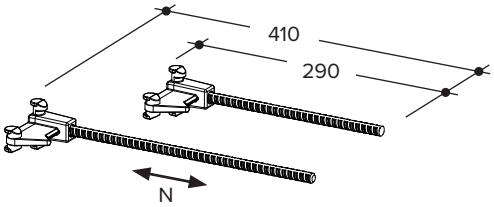
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**PLATINUM 100 Bulkhead Clamp** The tension-resistant Bulkhead Clamp is used to create a stopend without any additional anchors or other components, e.g. using timber beams and a form sheet. Safe Working Moment (M): 5.00 kNm SWL (N): 36.00 kN SWL (V): 36.00 kN Refer to page 139.	**604328**	**11.02**
	**PM Aligning Wedge Clamp** The PM Aligning Wedge Clamp ensures that joints are closed securely and the panels are properly connected and aligned without offset, all in one process. This applies to all horizontal and some vertical MANTO panel connections. Safe Working Moment (M): 2.00 kNm SWL (N): 15.00 kN SWL (V): 15.00 kN Refer to page 67	**606900**	**6.33**
	**Panel Connection Unit** The Panel Connection Unit is made up of the PM Aligning Wedge Clamp (code:606900) and the Aligning Wedge Clamp Holder (code:606970). The Aligning Wedge Clamp Holder secures the PM Aligning Wedge Clamp to the panel, where it is always readily available. See page 67	**609080**	**9.83**
	**PLATINUM 100 MANTO Extension Bar** The PLATINUM 100 MANTO Extension Bar is used to extend MANTO panels for formwork heights of 5.40 m and more. Extended panels are connected securely at the panel joint and are aligned. Additional Alignment Struts can be connected directly to the Extension Bar. Safe Working Moment (M): 4.50 kNm SWL (N): 15.00 kN SWL (V): 11.00 kN Refer to page 93.	**607000**	**18.83**

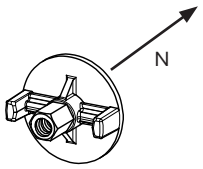
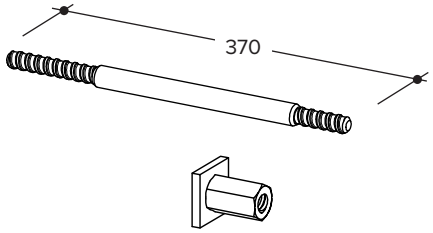
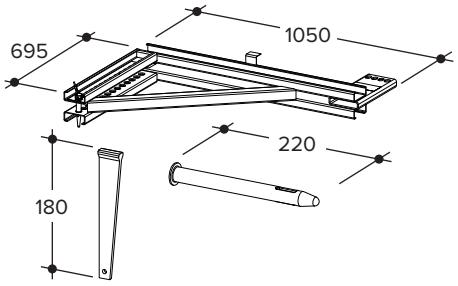
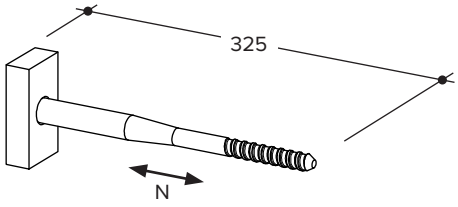
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**Multipurpose Waler 100** The Multipurpose Waler 100 spans length adjustments and transfers the loads into the MANTO panels. It is fastened with 2no. Multi Bolts or Waler Spanners. The result is a panel connection that is resistant to tension. It can also be used in stopends and with height extensions. The integrated nail holes facilitate formwork assembly. Refer to page 73.	**450764**	**13.10**
	**Waler 80** A Waler 80 can be used instead of the Multipurpose Waler 100.	**586980**	**6.30**
	**Steel Waler F 171** The Steel Waler F 171 is required to connect MANTO XL panels and XXL panels that have been extended. The PLATINUM 100 MANTO Extension Bar (code:607000) can be used as an alternative. The Steel Walers F 171 are connected to the panels using 4no. Multi Bolts or Waler Spanners and 4no. Tension Nuts per waler. Refer to page 95.	**503908**	**38.86**
	**Waler Spanner (300 mm)** **Waler Spanner L (500 mm)** Used to secure Multipurpose Walers 100 or any other walers and profiles. Simply hook the Waler Spanner into the grid holes of the H-ribs or V-ribs on the panel. An additional Tension Nut is required. SWL (N): 16.50 kN. Refer to page 142.	**452053** **454410**	**0.76** **1.07**
	**PLATINUM 100 Multi Bolt DW 15/29** **PLATINUM 100 Multi Bolt DW 15/41** The PLATINUM 100 Multi Bolt is used to connect ribs for stopends and for length adjustments on site. It is used in conjunction with the MANTO Tie Nut (code:464600). (Refer to page 142). SWL(N): 40.0 kN	**605820** **605810**	**1.35** **1.52**

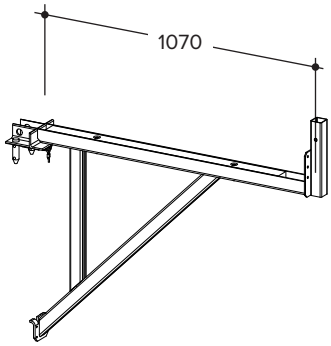
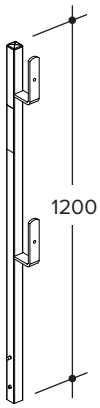
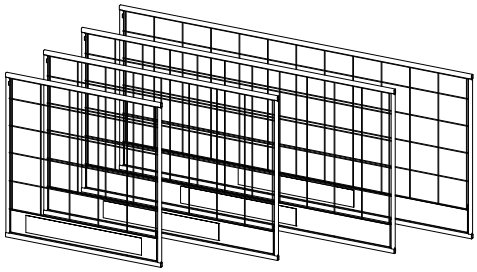
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**Tension Nut (DW 15)** Used in conjunction with the Waler Spanner and the Multi Bolt. SWL (N): 40.00 kN. Refer to page 142.	**197332**	**0.65**
	**MANTO MP Bolt** **MANTO MP Nut** For connecting MANTO MP panels when used as column formwork. Always use in conjunction with the Tie Nut 230 (code:48344). SWL (N): 50.00 kN Refer to page 144.	**454442** **454670**	**0.80** **0.34**
	**MANTO Column Angle Waler**** **Column Waler Wedge** **Column Waler Bolt** Used in conjunction with the MANTO panels to form columns from 200 mm to 650 mm (in 10 mm increments). The assembly is made of 4no. MANTO Column Angle Walers, which is attached to the MANTO panels at the height of the tie position. Refer to page 148.	**540005** **540049** **569189**	**23.80** **0.20** **0.54**
	**S-Bolt** Used to connect MANTO Column Frames. Always use in conjunction with the MANTO Tie Nut. SWL (N): 60.00 kN. Refer to page 146.	**479724**	**1.90**

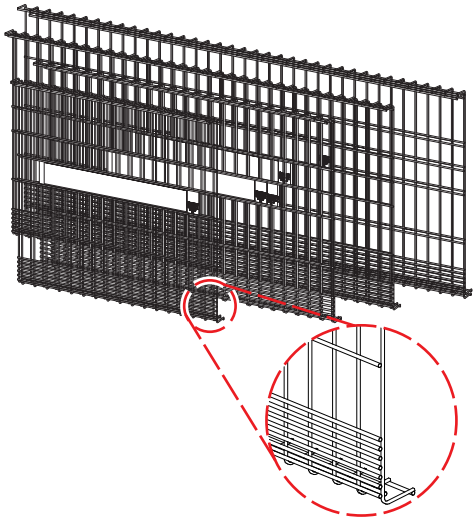
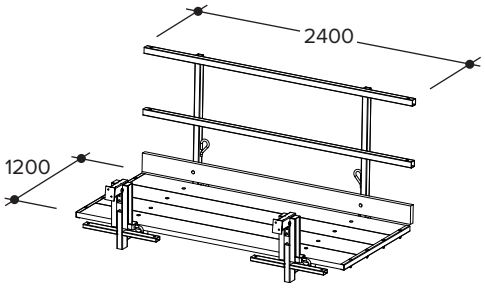
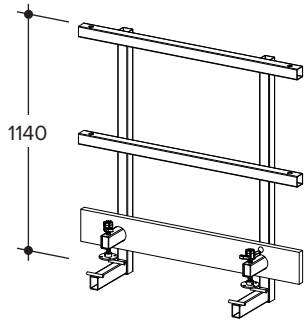
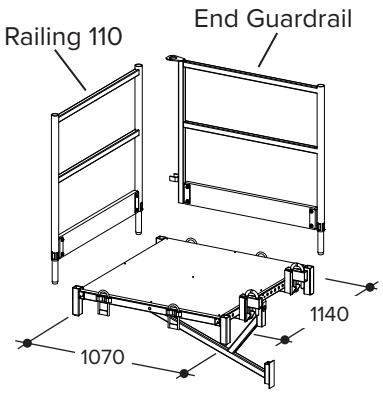
*only rental **no longer produced

3.4 Brackets and platforms

	Component	Part code	Weight [kg]
	**MANTO P-Walkway Bracket** Used to install a 900 mm wide platform. Simply attach the Walkway Bracket at the required height to the MANTO Panel by inserting the pins into a rib of the panel and securing with the Spring Pin. The Walkway Bracket can be tied either to an upright or a horizontal formwork panel (with an additional Waler Bolt D20). Planks provided on site have to be nailed to the integrated timber strip to secure against uplift and tilting. Refer to page 168.	**606240**	**11.92**
	**PROTECTO Railing Post** The PROTECTO Railing Post for the edge protection is inserted into the MANTO P-Walkway Bracket. Not available in all markets. Refer to page 168.	**601225**	**3.67**
	**Uni Mesh Panel 270** **Uni Mesh Panel 240** **Uni Mesh Panel 180** **Uni Mesh Panel 120** Galvanised mesh panel, 1.15 m high with a lightweight frame. The bars are positioned such that the panel cannot be unintentionally lifted out of the structure. But at the same time the bars are spaced far enough apart that it is easy to reach between them. Also available powder-coated in any RAL colour. Not available in all markets.	**607945** **607940** **607985** **607955**	**18.59** **16.88** **13.28** **9.69**

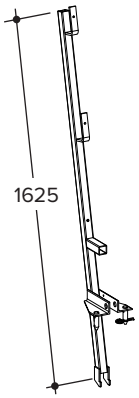
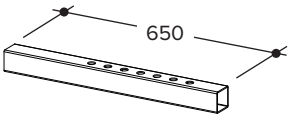
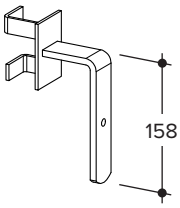
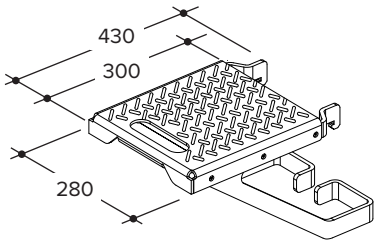
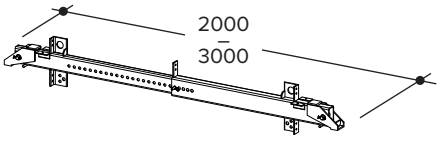
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**PROTECTO Mesh Panel 263**	**601231**	**22.20**
	PROTECTO Mesh Panel 240	**604730**	**20.14**
	PROTECTO Mesh Panel 180	**604731**	**15.31**
	PROTECTO Mesh Panel 130	**604733**	**11.09**
	Mesh panel, 1.15 m high, to be used along with PROTECTO Railing Posts. Allows Railing Posts to be spaced up to 2.40 m apart. The alternative to board railings. Not available in all markets. No longer produced.		
	**MANTO Pouring Platform**	**547165**	**140.79**
	A complete 2.4 m long x 1.20 m wide deck with planks and edge protection. Once the railing is unfolded, the pouring platform can be lifted by crane and hung on the MANTO formwork. The platform is automatically secured against uplift. Refer to page 171.		
	**Platform Railing**	**587252**	**24.23**
	Transverse railing for use on both ends of the MANTO Pouring Platform. It is fixed to the Pouring Platform using the integrated clamping screws. Refer to page 174.		
	**MANTO Universal Platform****	**562095**	**49.12**
	Railing 110 cpl.**	**582867**	**20.02**
	End Guardrail cpl.**	**582856**	**18.31**
	These three components form the platform system. Load Class 2 (1.50 kN/m^2) in accordance with DIN EN 12811 Part 1. Additional protection to prevent unintentional uplift and horizontal displacement have to be installed on site as specified by local regulations.		

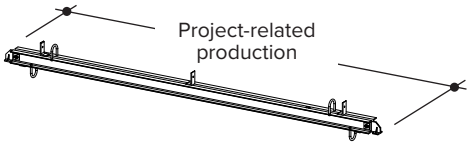
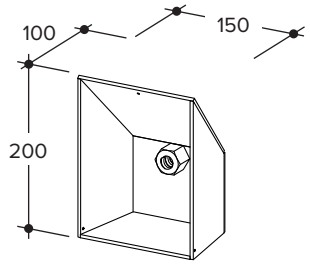
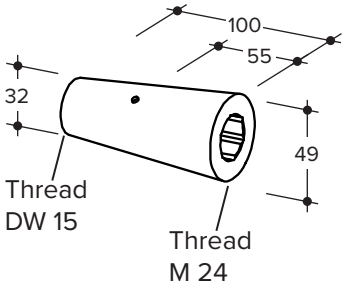
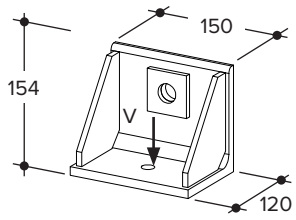
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**Counter Post** The Counter Post is hooked to the upper horizontal rib of the panel and secured with the attached spring pin. Installation is similar to the Walkway Bracket. The Counter Post can be fastened to panels lying flat when an additional Waler Bolt D20 is used. Refer to page 170.	**600814**	**9.20**
	**KG Railing Extension** Used with Waler Bolt D20 and Spring Pin 4. Refer to page 174.	**498218**	**3.60**
	**Toe Board Retainer** Used to secure the toe boards to the Counter Post. Marked with red paint for easy identification. Refer to page 170.	**603609**	**0.71**
	**PLATINUM 100 Platform Step** The PLATINUM 100 Platform Step may be attached up to a height of 1.00 m off the ground. The platform step can be used to reach components that are higher up the structure. SWL: 150.00 kg. Refer to page 175.	**606480**	**5.95**
	**Platform Beam 200 - 300** **Telescopic** Main beam of a shaft platform. Used to support secondary beams of a timber platform made to suit the enclosed space. Includes gravity latches that automatically click into place during lifting operations. Adjustable in 10 mm increments within a range of 1.00 m. Refer to page 190.	**600330**	**89.50**

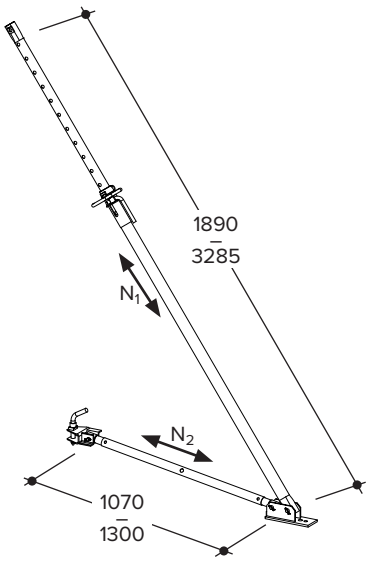
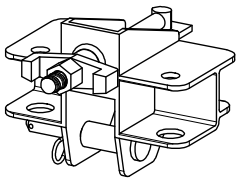
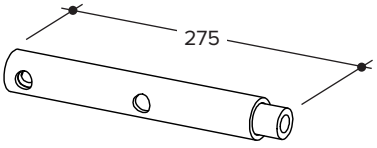
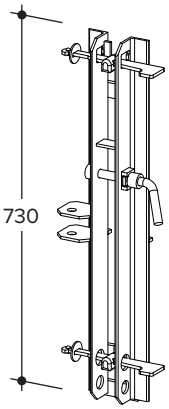
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**Platform Beam 350 - 400**	**410931**	**122.20**
	Platform Beam 300 - 350	**410920**	**108.80**
	Platform Beam 250 - 300	**410910**	**95.40**
	Platform Beam 200 - 250	**410909**	**82.00**
	Platform Beam 150 - 200	**410894**	**68.60**
	Platform Beam 125 - 150	**410883**	**55.20**
	The Platform Beam is not adjustable and is made to suit the application. Main beam of a shaft platform, equipped with flexible supports that automatically click into place during lifting operations. The timber construction and the platform decking are to be provided on site. Platform Beams < 1.25 m are available on request. Not for rental. Refer to page 189.		
	**Box-out** Provides the recess in the shaft wall for the Platform Beam. Due to its tapered shape, the Box-out can be recovered and, if in good condition, reused. Refer to page 189.	**410942**	**2.60**
	**A-Tie Cone M24/DW 15** Steel cone for suspended scaffolds. The front connection is equipped with an M24 thread and the rear side with a DW 15 connection for tie rods. The cone is reusable. Remove it from the concrete using an Allen key w.a.f. 24. (code:542471). Refer to page 192.	**496664**	**0.65**
	The A-Tie Cone M24/DW 15 must be provided with an adequate anchoring design for the site conditions. Details can be found in the German technical approval T-211.6-1854.		
	**KB Supporting Part** The KB Supporting Part is used to support the Platform Beams. The KB Supporting Part is secured with the Fit Bolt M24x70Z 8.8 and the A-Tie Cone M24/DW 15. SWL (V): 22.50 kN. Refer to page 192.	**600338**	**5.81**

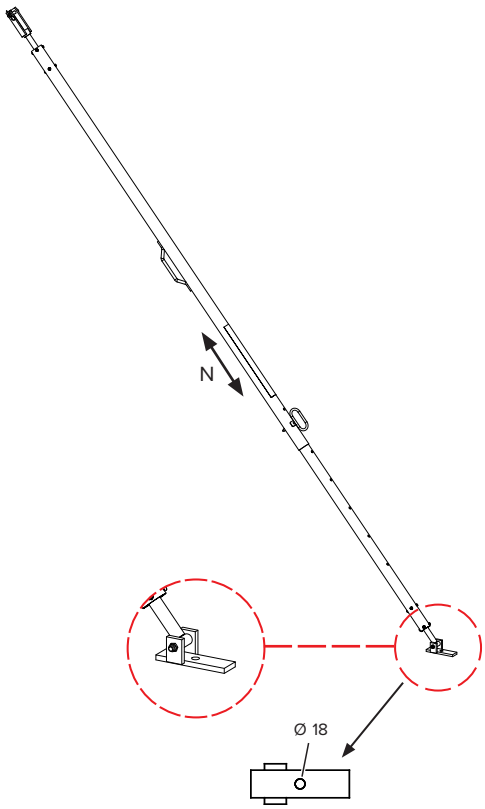
*only rental **no longer produced

3.5 Struts and props

	Component	Part code	Weight [kg]
	**MANTO Alignment Strut** The Alignment Strut is used to brace and align formwork no higher than 3.90 m. Each Alignment Strut must be ordered with a MANTO Strut Connector or a MANTO Strut Head. SWL (N_1) Min. extension: 27.00 kN. SWL (N_1) Max. extension: 8.00 kN. SWL (N_1) for other extensions can be interpolated. SWL (N_2): 7.50 kN Refer to page 158.	**565103**	**23.30**
	**MANTO Strut Head** Allows MANTO panels to be braced with the MANTO Alignment Strut. Combined with the Adapter for Alignment Struts, it can also be used with alignment struts. Combined with the Strut Adapter, it can also be used with EUROPLUS*new* struts. Refer to page 156 and page 158 for information on SWL.	**600035**	**4.33**
	**Adapter for Alignment Struts** Used along with the MANTO Strut Head or the MANTO Strut Connector to brace MANTO formwork with the aid of alignment struts. Refer to page 160.	**601733**	**1.31**
	**MANTO Strut Connector** Combined with the Adapter for Alignment Struts, it allows MANTO panels to be braced with alignment struts. Can also be used with the MANTO Alignment Strut. It is also suitable for connecting a BKS Strut up to a prop length of 8.00 m, in which case an additional Strut Adapter is required. If fixed horizontally, an additional Bolt D16x87 and Spring Pin 4 are required. SWL: Refer to page 157.	**565114**	**8.90**

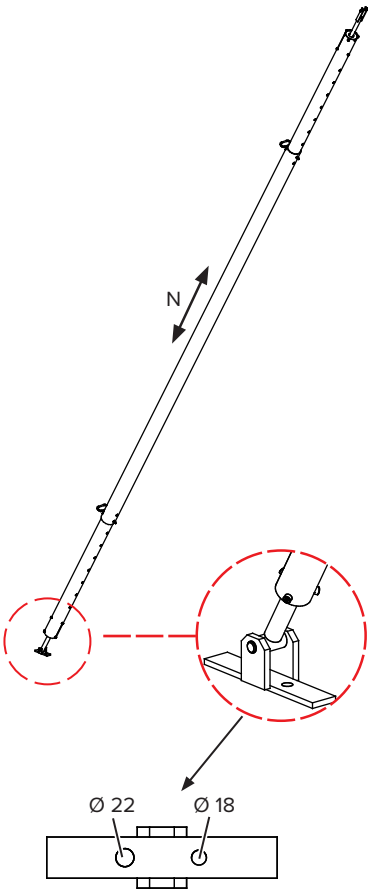
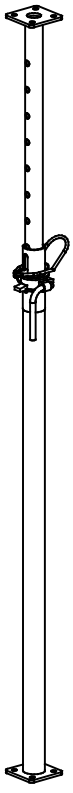
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**Alignment Strut K440** Minimum extension: 3.25 m: SWL (N): 20.00 kN. Including Adapter for Alignment Struts (3.35 m): SWL (N): 19.20 kN. Maximum extension: 4.40 m: SWL (N): 11.00 kN. Including Adapter for Alignment Struts (4.50 m): SWL (N): 9.90 kN.	**601208**	**23.42**
	Alignment Strut K600 Minimum extension: 4.80 m: SWL (N): 20.00 kN. Including Adapter for Alignment Struts (4.90 m): SWL (N): 17.30 kN. Maximum extension: 6.00 m: SWL (N): 14.00 kN. Including Adapter for Alignment Struts (6.10 m): SWL (N): 11.60 kN.	**601210**	**35.79**
	Alignment Strut K760 Minimum extension: 5.30 m: SWL (N): 20.00 kN. Including Adapter for Alignment Struts (5.40 m): SWL (N): 20.00 kN. Maximum extension: 7.60 m: SWL (N): 15.00 kN Including Adapter for Alignment Struts (7.70 m): SWL (N): 12.40 kN. Refer to page 159.	**601212**	**51.29**

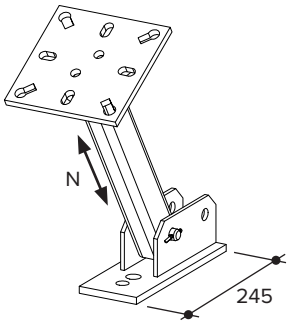
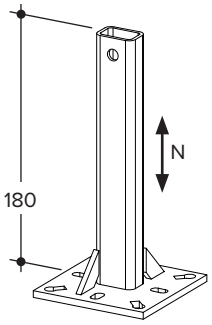
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

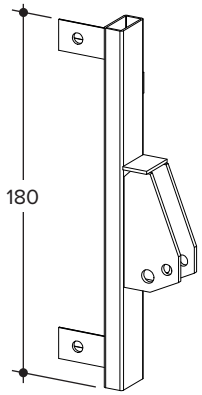
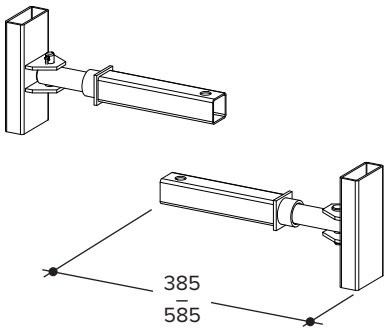
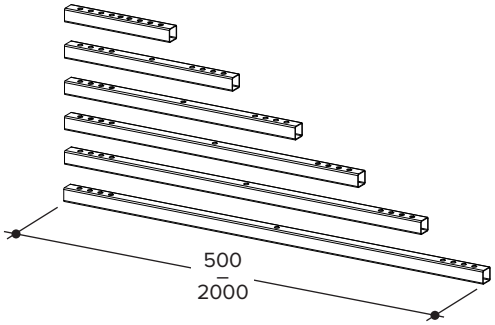
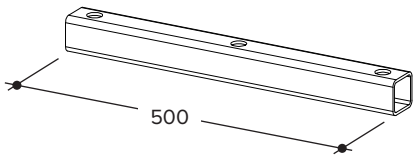
	Component	Part code	Weight [kg]
	**Alignment Strut Super 10** Minimum extension: 7.05 m: SWL (N): 27.00 kN. Including Adapter for Alignment Struts (7.15 m): SWL (N): 27.00 kN. Maximum extension: 10.25 m: SWL (N): 22.30 kN. Including Adapter for Alignment Struts (10.35 m): SWL (N): 18.30 kN. Refer to page 159.	**602095**	**84.03**
	**EUROPLUS*new* 30 - 150**	**601460**	**10.68**
	EUROPLUS*new* 20 - 250	**601390**	**13.15**
	EUROPLUS*new* 30 - 250	**601430**	**16.19**
	EUROPLUS*new* 20 - 300	**601400**	**16.82**
	EUROPLUS*new* 30 - 300	**601440**	**19.17**
	EUROPLUS*new* 20 - 350	**601410**	**20.52**
	EUROPLUS*new* 30 - 350	**601445**	**24.24**
	EUROPLUS*new* 20 - 400	**601415**	**23.79**
	EUROPLUS*new* 30 - 400	**601450**	**28.75**
	EUROPLUS*new* 20 - 550	**601425**	**36.07**
	All EUROPLUSnew steel props feature a quick-lowering mechanism, anti-crush guard and protection against sliding out of the inner tube. The props are hot-dip galvanised for long-term protection from corrosion. The strut is used to brace and align form-work at heights of 3.90 m - 6.00 m. Refer to page 161. *SWL pursuant to DIN EN 1065: 20 kN **SWL pursuant to DIN EN 1065: 30 kN		

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
 N_{perm} = 15.0 kN*	**Counter Nut A/DB 260/300** For EUROPLUS 260, 300 DB/DIN, EUROPLUS*new* 20-250, 20-300, EUROPLUS*new* 30-150	**107107**	**0.92**
	Counter Nut AS/DB 350/410 For EUROPLUS 350 DB/DIN, EUROPLUS*new* 20-350, 20-400, EUROPLUS*new* 30-250, 30-300, 30-350	**107118**	**1.00**
	Counter Nut EC 350/DB 450 For EUROPLUS 350 EC and 450 DB	**562051**	**1.50**
	Counter Nut EC 400/DC 550 For EUROPLUS 400 EC, 550 DC, EUROPLUS*new* 20-*550, 30-400* Reinforces EUROPLUSnew Props to absorb tensile loads. Must be attached when EUROPLUSnew Props are to serve as wind bracing (Refer to page 161).	**587675**	**1.39**
*Applies only to tensile loads in the EUROPLUSnew prop.			
	**Strut Base** Used to convert EUROPLUS*new* props to alignment struts. The bottom end of the EUROPLUS*new* prop connects to the Strut Base with 4no. M12x30 Bolts and Nuts. SWL (N): 34.00 kN. Note the limited tensile load of the EUROPLUS*new* prop! Refer to page 161.	**566369**	**7.70**
	**Strut Adapter** Used to convert EUROPLUS*new* props to alignment struts. The upper plate of the EUROPLUS*new* prop connects to the Strut Adapter with 4no. M12x30 Bolts and Nuts, which in turn connects to the MANTO Strut Connector or to the MANTO Strut Head. SWL (N): 34.00 kN. Note the limited tensile load of the EUROPLUS*new* prop! Refer to page 161.	**565331**	**4.88**

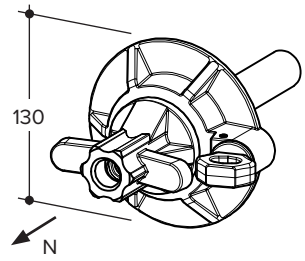
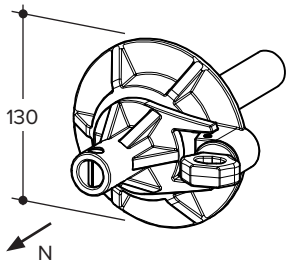
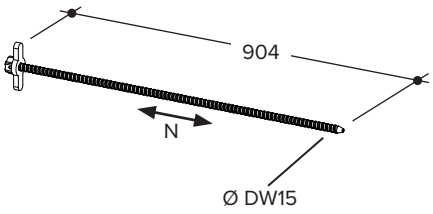
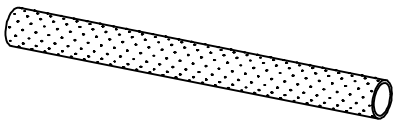
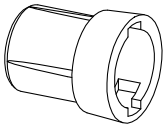
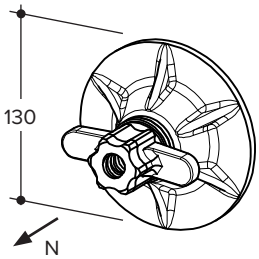
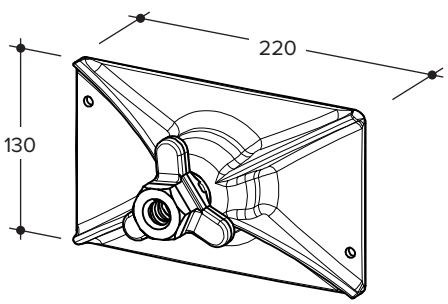
*only rental **no longer produced

	Component	Part code	Weight [kg]
	**BKS Strut Connector** Must be used with BKS props longer than 8.00 m. For each connection 2no. M20x40 Bolts and Nuts as well as 1no. M20x80 Bolt and Nut are required. SWL (N): 34.00 kN.	**482008**	**9.10**
	**Right Spindle Piece** **Left Spindle Piece** Assembled in conjunction with the Centre Tubes and the Connection Tube (if required) to form a spindle strut in shaft formwork. The flat ends are connected to the MANTO Panels using 2no. Panel Clamps per end. The Centre Tubes are connected to the Spindle Pieces with 2no. Waler Bolts D20 and 2no. Spring Pins 4 per connection. The right piece is marked blue and the left piece is marked red.	**524700** **524710**	**4.70** **4.70**
	**Centre Tube 50** **Centre Tube 80** **Centre Tube 110** **Centre Tube 140** **Centre Tube 170** **Centre Tube 200** Used with the Spindle Pieces to form a spindle strut used in shaft formwork. The Centre Tube connects to the Spindle Pieces with 2no. Waler Bolts D 20 and 2no. Spring Pins 4 per connection.	**524721** **524732** **524743** **524754** **524765** **524776**	**3.40** **5.40** **7.40** **9.40** **11.40** **13.40**
	**Connection Tube** Acts as a sleeve to join 2no. Centre Tubes end-to-end if a spindle strut is required to be longer than the available Centre Tubes. Secured using 2no. Waler Bolts D 20 and 2no. Spring Pins 4.	**533230**	**2.80**

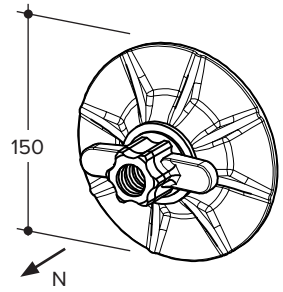
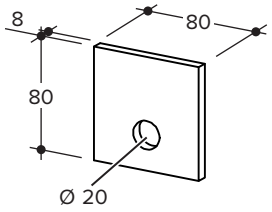
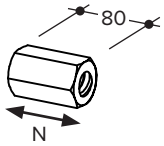
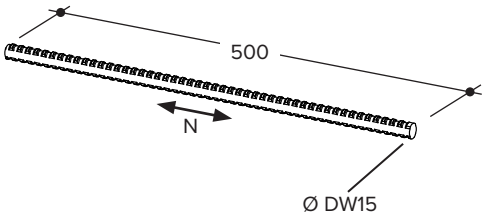
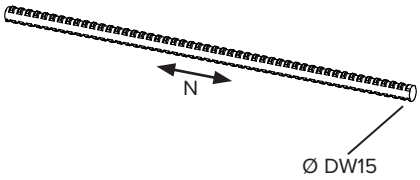
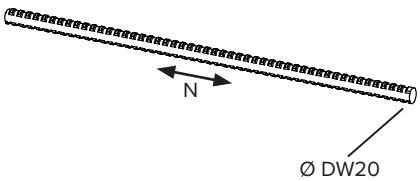
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

3.6 Tying components

	Component	Part code	Weight [kg]
	**MANTO Front Tie Nut** Part of the one-sided tie system. SWL (N): 90.00 kN	**607230**	**2.18**
	**MANTO Rear Tie Nut** Part of the one-sided tie system. SWL (N): 90.00 kN	**607240**	**2.11**
	**MR Tie Rod DW 15** Special tie rod for one-sided tying of MANTO G3 Panels. For wall thicknesses up to 37 cm. With a grip to facitilate insertion and extraction. SWL (N): 90 kN	**607250**	**1.71**
	**Tie Sleeve DW 15×2000 (Ø26/22)** **Tie Sleeve DW 20×2000 (Ø32/26)** Values in brackets indicate outer and inner diameters respectively. Length: 2.0 m	**605916** **605921**	**0.47** **0.84**
	**MR Sealing Cone**	**607122**	**0.01**
	**MANTO Tie Nut DW 15** Using a MANTO Ratchet or a hammer, the Tie Nut can be easily loosened due to the integrated rotating disk, even under full load. SWL (N): 90.00 kN.	**464600**	**1.26**
	**Tie Nut 230 DW 15** Tie nut with a large plate and a ball-type nut that allows for an inclination of up to 10°. SWL (N): 90.00 kN	**48344**	**2.40**

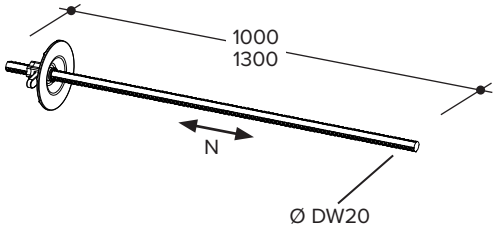
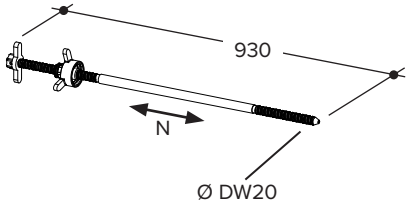
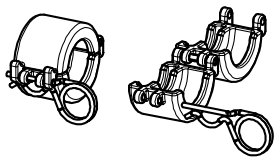
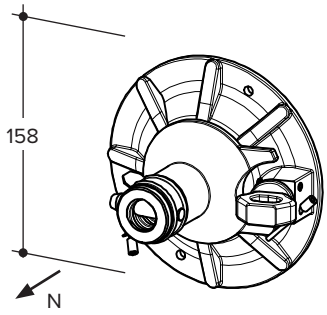
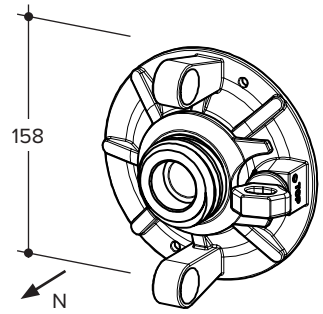
*only rental **no longer produced

	Component	Part code	Weight [kg]
	**Tie Nut DW 20/150** Easy to fasten tie nut to be used with Tie Rods DW 20. SWL (N): 150.00 kN.	**531481**	**1.51**
	**Plate 8/8** Used to allow the lower tie to be installed along with a Hexagonal Nut 15/50 in panels lying on the ground. Not for rental.	**400214**	**0.40**
	**Hexagonal Nut 15/50** Used as a tie nut for the rigid plates without thread. The nut has to be operated with a wrench (w.a.f. 30). SWL (N): 90.00 kN.	**164535**	**0.22**
	**Tie Rod DW 15 50** Connects the MANTO Column Angle Walers in assembled condition. Always use with 2no. MANTO Tie Nuts. SWL (N): 90.00 kN. Not for rental.	**102527**	**0.72**
	**Tie Rod DW 15 75** **Tie Rod DW 15 100** **Tie Rod DW 15 130** **Tie Rod DW 15 175** **Tie Rod DW 15 600** SWL (N): 90.00 kN. Not for rental.	**437660** **24387** **20481** **20470** **136260**	**1.08** **1.44** **1.87** **2.52** **8.64**
	**Tie Rod DW 20 100** **Tie Rod DW 20 130** SWL (N): 150.00 kN. Not for rental.	**531600** **531610**	**2.56** **3.33**

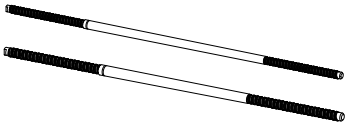
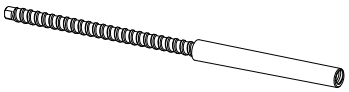
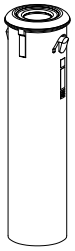
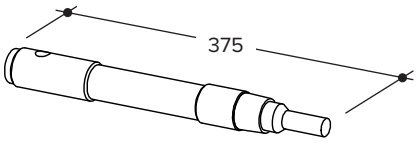
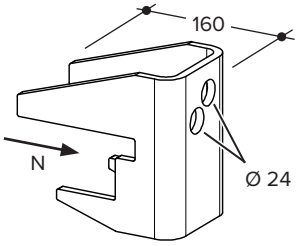
Never weld and/or heat Tie Rods. Heating can damage them, causing them to break when subjected to load.

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

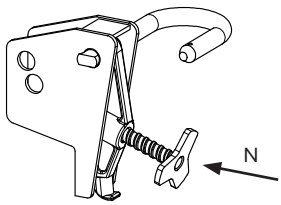
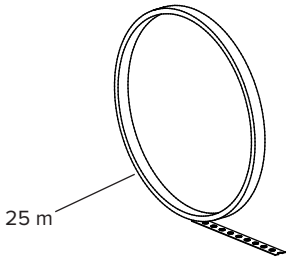
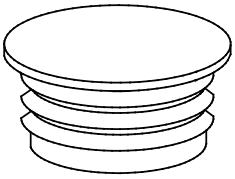
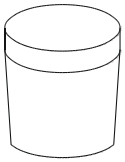
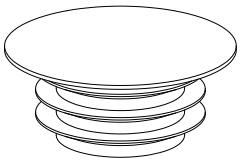
	Component	Part code	Weight [kg]
	**Tie Equipment DW 20 100**** **Tie Equipment DW 20 130**** Tie rod with a captive Tie Nut 150. SWL (N): 150.00 kN. Not for rental.	**534213** **534224**	**4.10** **4.80**
	**PLATINUM 100 Tie Rod G2** The PLATINUM 100 Tie Rod G2, used with the PLATINUM 100 Tie Nut Advancing Side and the PLATINUM 100 Tie Nut Closing Side, offers a ties system that is quick and easy to install. It can be operated either from the advancing side or from the closing side. It must be used along with the PLATINUM 100 Adjustment Clip. SWL (N): 150.00 kN. Refer to page 105 ff.	**606340**	**3.90**
	**PLATINUM 100 Adjustment Clip** Used to adjust the wall thickness on the PLATINUM 100 Tie Rod G2. Refer to page 105 ff.	**604021**	**0.26**
	**PLATINUM 100 Tie Nut Advancing Side** Used along with the PLATINUM 100 Tie Nut Closing Side and the PLATINUM 100 Tie Rod G2 to create the one-sided tie system. Refer to page 105 ff.	**604196**	**2.79**
	**PLATINUM 100 Tie Nut Closing Side** Used along with the PLATINUM 100 Tie Nut Advancing Side and the PLATINUM 100 Tie Rod G2 to create the one-sided tie system.	**604197**	**2.65**

*only rental **no longer produced

	Component	Part code	Weight [kg]
	**MANTO Taper Tie DW 15 100** Can be used with the MANTO G3 Sealing Insert (code:607925) without the Tie Sleeve. Refer to page 97.	**608330**	**2.10**
	**MANTO Taper Tie DW 20 100** **MANTO Taper Tie DW 20 115** Can be used with the MANTO G3 Sealing Insert (code:607925) without the Tie Sleeve. Refer to page 97.	**608331** **608332**	**3.60** **4.60**
	**MANTO She Bolt DW 15 45**	**608333**	**1.00**
	**MANTO She Bolt DW 20 50**	**608334**	**1.30**
	**MANTO G3 DW Insert** Protects the tie holes from wear and allows the use of different ties. Always choose the proper insert for the respective tie system. Not for rental. Refer to page 97.	**607915**	**0.05**
	**MANTO G3 Sealing Insert** Protects the tie holes from wear and allows the use of different ties. Always choose the proper insert for the respective tie system. Not for rental. Refer to page 97.	**607925**	**0.05**
	**MANTO G3 Replacement Tool** Used to extract the MANTO G3 plastic inserts (code:607915, 607925) and to remove concrete residue from the tie holes in the MANTO panels.	**608270**	**1.83**
	**Edge Tie Fastener MR** Attached to the edge profile of the MANTO panel to allow a tie to be placed above the panel and clear of the concrete. SWL (N): 10.00 kN.	**566667**	**2.40**

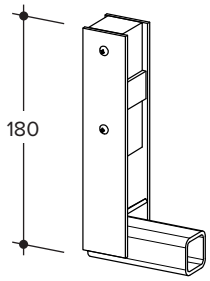
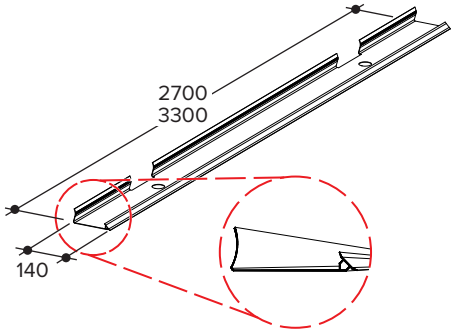
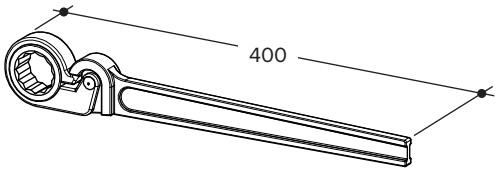
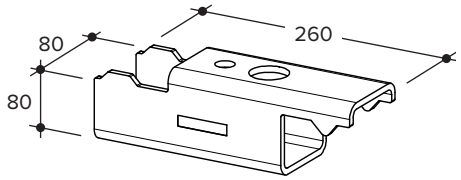
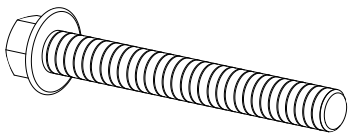
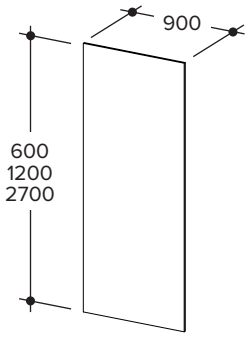
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**FU Tightener** Used in conjunction with the Punched Steel Tape to tie across foundation formwork. SWL (N): 12.00 kN.	**568357**	**3.60**
	**Punched Steel Tape 25.00 m** The FU Tightener and the Punched Steel Tape are used together in foundation formwork. Working load: 15.00 kN Not for rental.	**568081**	**17.20**
	**A Plug** Used to close Ø 24 mm and Ø 27 mm (with collar) tie holes.	**602250**	**0.01**
	**MANTO Plug** Used to close Ø 24 mm tie holes in the MANTO MP Panel.	**445716**	**0.01**
	**Plugs, 100 pieces** Used to close MANTO G3 DW Sealing Insert.	**197457**	**0.16**

*only rental **no longer produced

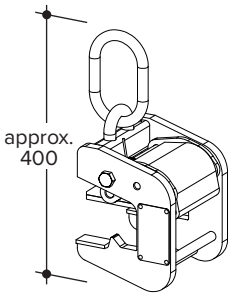
3.7 Accessories

	Component	Part code	Weight [kg]
	**MANTO Add-on Piece** With integrated nailing strip: for on-site extensions of up to 300 mm with 21 mm plywood. Each MANTO Add-on Piece is connected with a Panel Clamp.	**450157**	**1.55**
	**Triangular Column Fillet 270** **Triangular Column Fillet 330** Used to create chamfers of 20 mm in rectangular outer corners and columns. It is pushed onto the edge of the panel.	**544952** **549830**	**1.40** **1.70**
	**MANTO Ratchet** With the MANTO Ratchet (w.a.f. 36), the connectors and tie nuts can be operated quickly, quietly and easily without damaging the material.	**408780**	**1.00**
	Do not extend the ratchet lever!		
	**Panel Anchor Bracket** Protects MANTO panels from uplift. Secured in the concrete with the Anchor Bolt MM+SSK 16 x 130 mm Refer to page 151	**605999**	**2.27**
	**Anchor Bolt MM+SSK 16 x 130 mm** Used to temporarily secure the Panel Anchor Bracket to the existing structure. Only one Anchor Bolt is required per bracket. Refer to page 151	**443500**	**0.21**
	**Plywood Sheet 90/270 Undrilled**** **Plywood Sheet 90/120 Undrilled**** **Plywood Sheet 90/60 Undrilled*** 21 mm thick plywood sheets without tying holes for exposed concrete walls. Tying holes must be drilled on site as needed. Not for rental.	**479996** **480009** **490884**	**40.00** **17.80** **8.90**

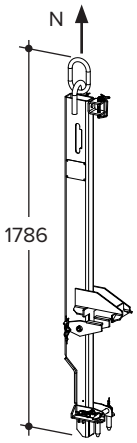
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

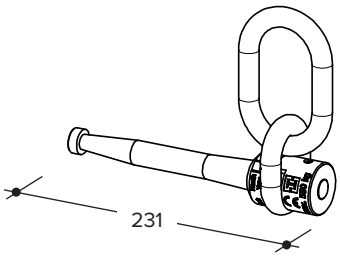
3.8 Lifting accessories

	Component	Part code	Weight [kg]
	**MANTO Crane Adapter** The Crane Adapter is attached to the edge profiles of the MANTO Panels. It is equipped with a self-locking safety catch. SWL (N): 10.00 kN.	**446710**	**14.27**

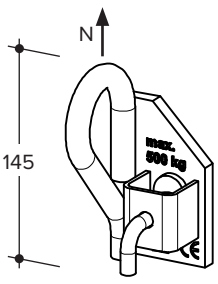
Always comply with the separate operating instructions for the MANTO Crane Adapter!

	Component	Part code	Weight [kg]
	**PLATINUM 100 Lifting Device** Used to raise and move panel assemblies consisting of PLATINUM 100 and MANTO panels. SWL (N): 15.00 kN	**606920**	**27.99**

Always comply with the separate operating instructions for the PLATINUM 100 Lifting Waler!

	Component	Part code	Weight [kg]
	**MANTO G3 Lifting Pin** For loading and unloading bundled panels. Not for use with G1 or G2 panels SWL (N): 5.50 kN Safe working load: 21.00 kN for a set of 4.	**608295**	**1.61**

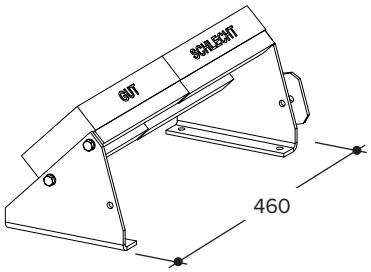
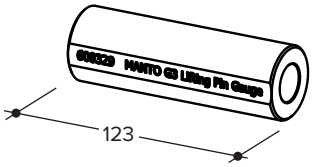
Always comply with the separate operating instructions for the MANTO G3 Lifting Pin!

	Component	Part code	Weight [kg]
	**MANTO Loading Adapter** For loading and unloading bundled panels. Not for use with G3 or G3 M panels SWL (N): 5.00 kN Safe working load: 20.00 kN for a set of 4.	**461033**	**1.21**

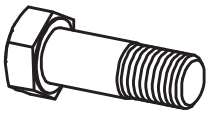
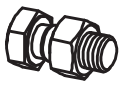
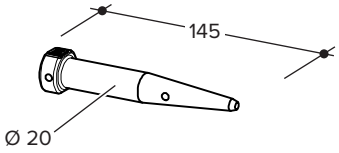
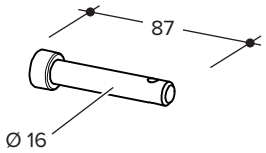
Always comply with the separate operating instructions for the MANTO Loading Adapter!

*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

	Component	Part code	Weight [kg]
	**Hook Template** Used to check the operating conditions of the MANTO Crane Adapter.	**548700**	**23.64**
	**MANTO G3 Lifting Pin Gauge** Used to check the operating conditions of the MANTO G3 Lifting Pin.	**608329**	**0.9**

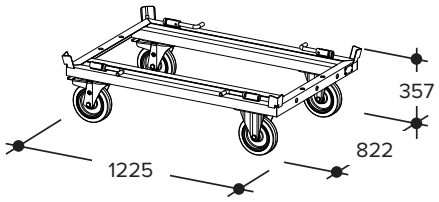
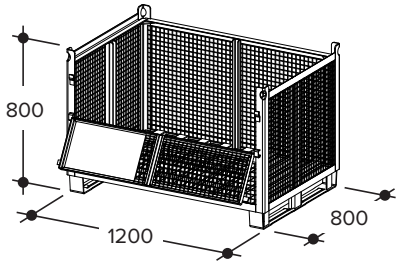
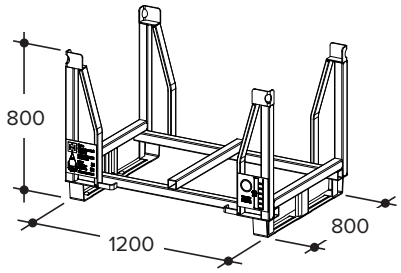
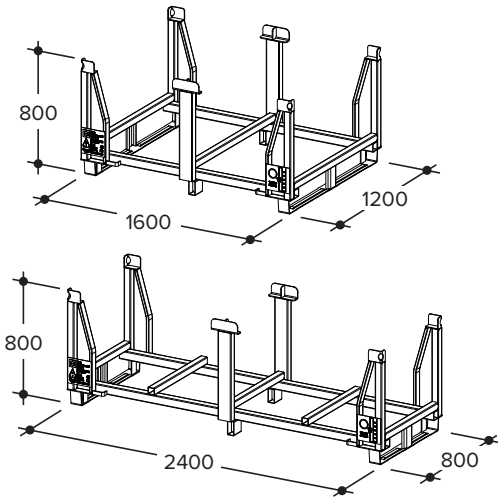
3.9 Fasteners

	Component	Part code	Weight [kg]
	**Fit Bolt M24x70 Z 8.8** Zinc bolt required to attach the KB Supporting Part to the A-Tie Cone M24/DW 15. Not for rental.	**185635**	**0.47**
	**Bolt M16x35 (with Nut) 8.8** Used with the extension of the MANTO Shaft Corner. Not for rental.	**603623**	**0.13**
	**Bolt M12x30 (with Nut) 4.6** Used to connect the EUROPLUSnew Prop to the Strut Base or Strut Adapter. Use 8no. per prop. Not for rental	**5210**	**0.06**
	**Waler Bolt D20** For connecting the MANTO Walkway Bracket to panels lying on the ground.	**420000**	**0.32**
	**Bolt D16x87** For connecting Alignment Struts to the MANTO Strut Connector when used horizontally.	**601908**	**0.19**
	**Spring Cotter Pin 4** Secures the Waler Bolt D 20 and the Bolt D16x87. Not for rental.	**173776**	**0.02**

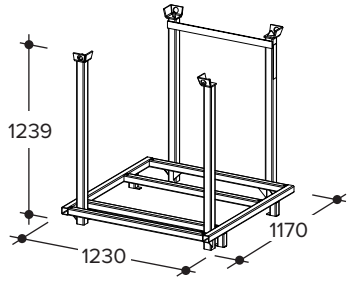
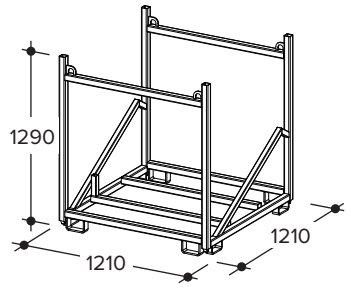
*only rental **no longer produced

Unless stated otherwise, all dimensions are given in mm.

3.10 Transport equipment

	Component	Part code	Weight [kg]
	**Euro Trolley** Used to manually manoeuvre approved Hünnebeck transport equipment. The Euro Trolley has 2no. lockable swivel castors. Working load: 1300 kg Refer to page 214.	**607610**	**39.57**
	**Euro Lattice Box** Lattice box used to store and transport small items by crane. Can be moved using the Euro Trolley. Working load: 1200 kg.	**548480**	**68.76**
	**Euro Stacking Frame 120/80** Stacking frame used to store and transport materials by crane. Can be moved using the Euro Trolley. Working load: 1200 kg.	**553689**	**54.47**
	**Euro Stacking Frame 160/120** **Euro Stacking Frame 240/80** Stacking frame used to store and transport materials by crane. Working load: 1200 kg.	**566494** **566509**	**84.02** **92.47**

*only rental **no longer produced

	Component	Part code	Weight [kg]
	**Uni Mesh Panel Rack** Rack used to store and transport by crane up to 50no. Universal Mesh Panels Can be moved using the Euro Trolley. Working load: 1050 kg. Refer to page 214.	**605558**	**65.74**
	**PROTECTO Mesh Panel Rack** Rack used to store and transport by crane up to 60no. PROTECTO Mesh Panels. Working load: 1100 kg. Refer to page 215.	**608375**	**97.94**

Unless stated otherwise, all dimensions are given in mm.

4 MANTO panels

The dimensions and possible combinations of the panels assure an accurate fit of the MANTO formwork to the structure to be formed.

The geometry and the profiles are similar for all panels. The panels have continuous edge profiles and perforated rib profiles positioned in 300 mm increments.

The corner of the panels, the area most severely stressed, is stiffened by a corner plate. The lower edge profile has a special leverage edge that significantly eases any fine adjustment with a pry bar after the panels have been positioned by crane.

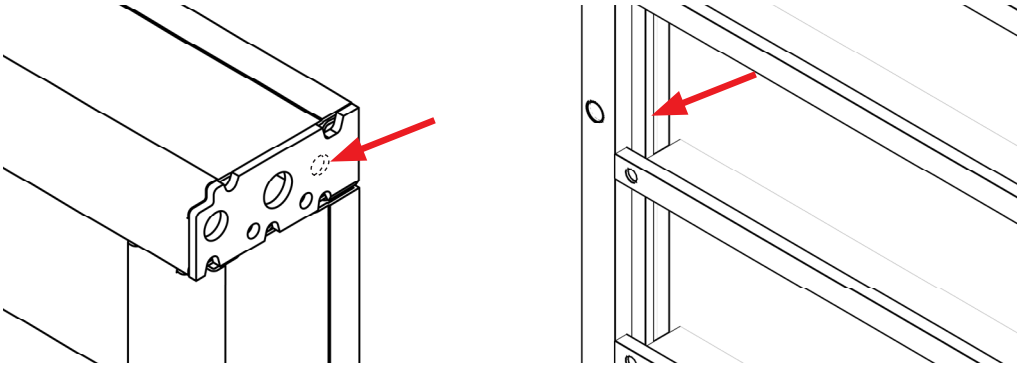
As a result of continuous development, new versions of the MANTO panels have been introduced and can be used in conjunction with older models.

These generations of MANTO panels are referred to as G2, G3 and G3 M.

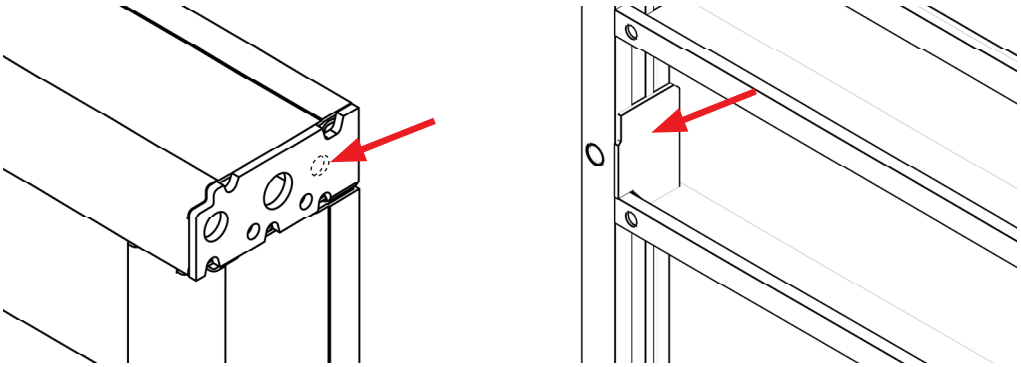
The following sections explain the differences between the various versions as well as the general rules for the use and/or how to combine different panels.

4.1 MANTO panels G1

MANTO panels without Ø 14 mm hole in the corner plates and without reinforcement plate on the inside of the long edge profile near the tie positions:



MANTO panels without Ø 14 mm hole in the corner plates and with reinforcement plate on the inside of the long edge profile near the tie positions:



Safe Working Loads for MANTO panels G1: 60.00 kN/m², with DW 15 only.

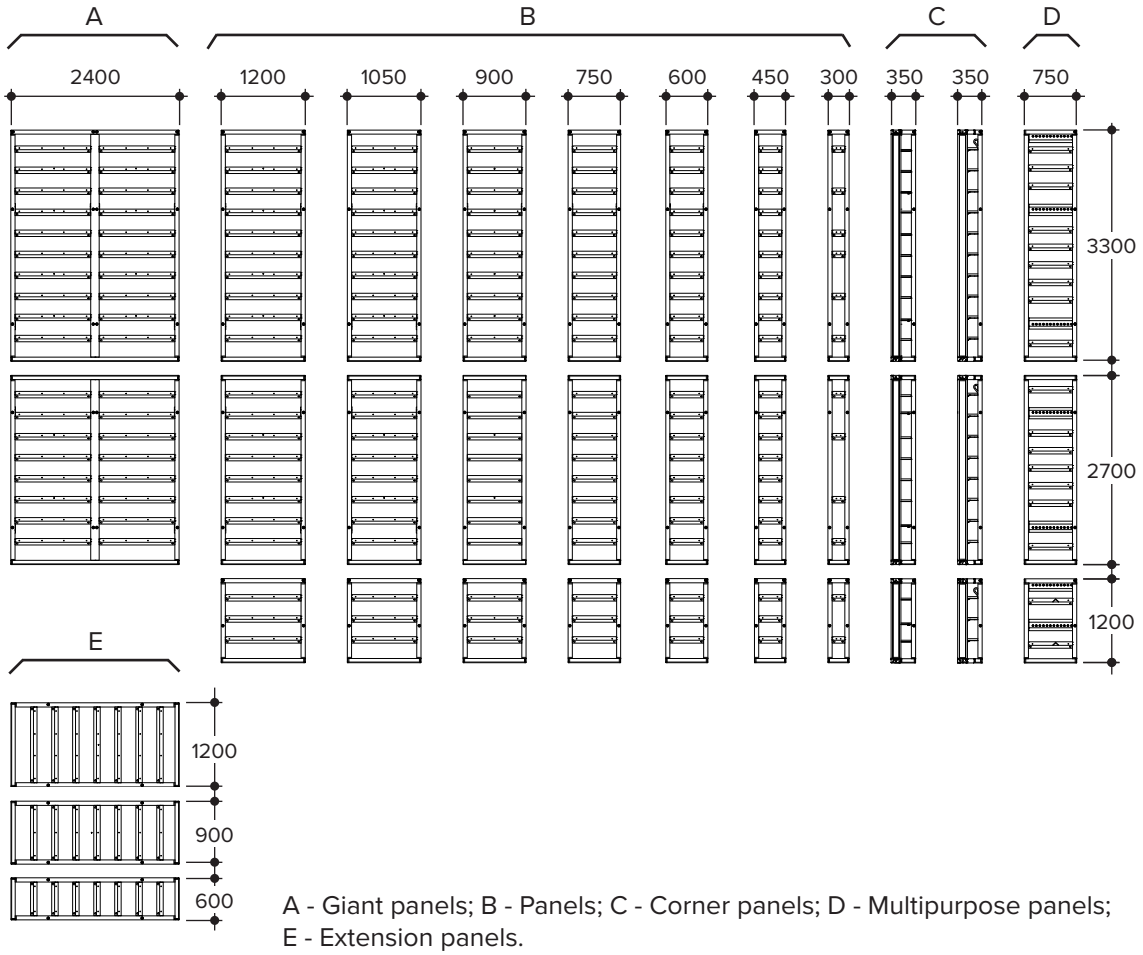
MANTO panels G1 are not suitable for use with DW 20.

MANTO panels G1 share the same code numbers as MANTO panels G2. However, they are no longer available from Hünnebeck.

4.2 MANTO panels G2

MANTO panels G2 can be identified by the following characteristics:

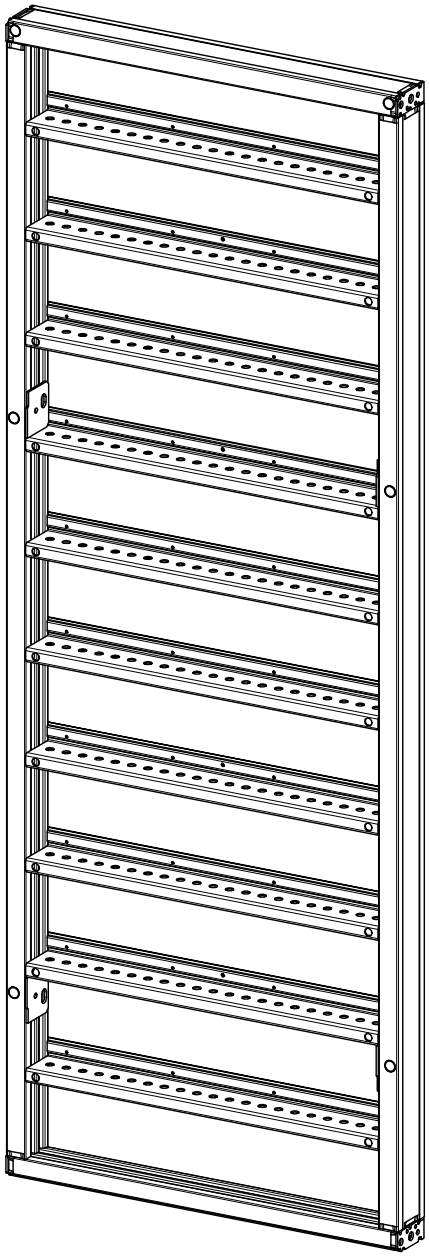
- Reinforcement plates on the inner side of the long edge profiles near the tie hole
  On panels 2.70 m high and ≥ 1.05 m wide and
  On panels 3.30 m high and ≥ 0.60 m wide
- Tie position on the long edge profile with just one hole (without smaller holes above and below tie hole, which are needed for single-side operated ties).
  MANTO Giant Panels also have pairs of tie positions on the centre profile
- No stiffeners between ribs and/or between ribs and smaller edge profiles
- With Ø 14 mm holes in the corner plates.

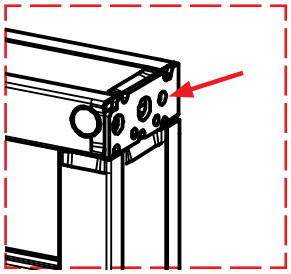


A - Giant panels; B - Panels; C - Corner panels; D - Multipurpose panels; E - Extension panels.

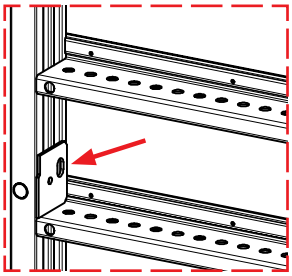
For Safe Working Loads for MANTO panels, refer to page 217.

Unless stated otherwise, all dimensions are given in mm.

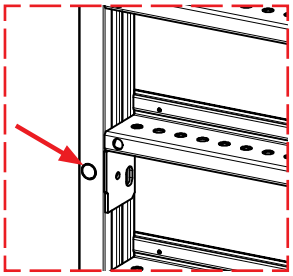




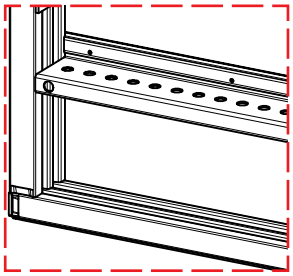
Ø14 mm holes in the corner plates.



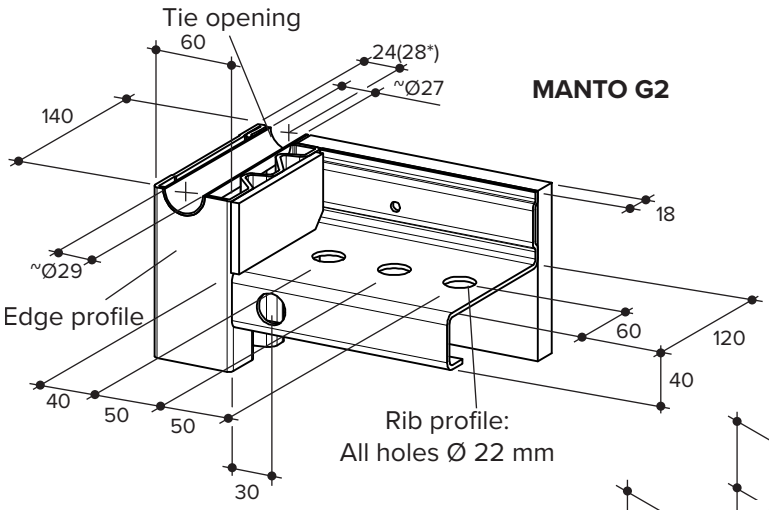
Reinforcement plates on the inside of the long edge profile, near the tie holes.



Tie position on the long edge profile without smaller ancillary holes (single-side operated ties not possible).

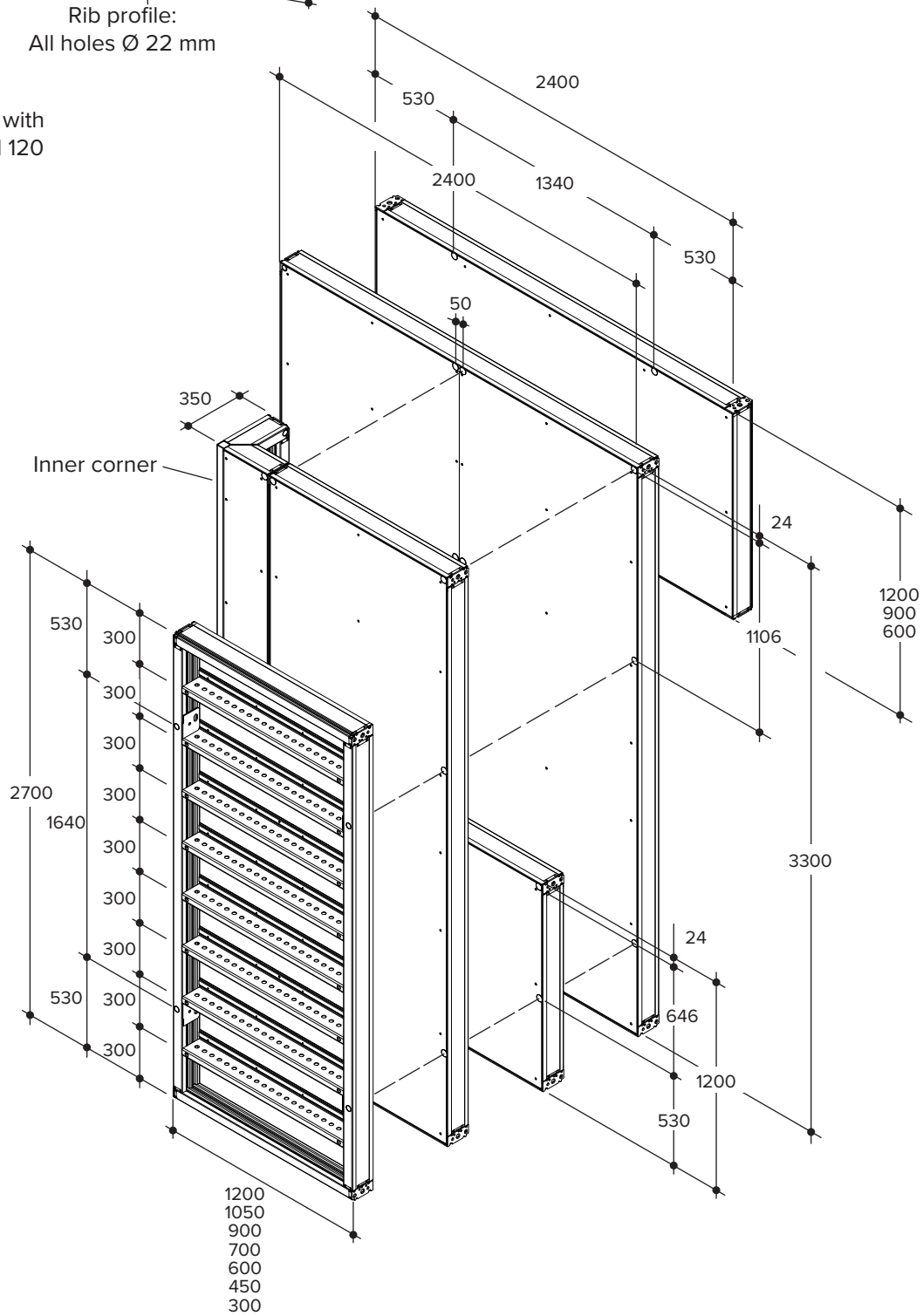


No stiffener elements between ribs and/or between ribs and smaller edge profiles.



MANTO G2

*Uppermost tie position with MANTO Panels 330 and 120

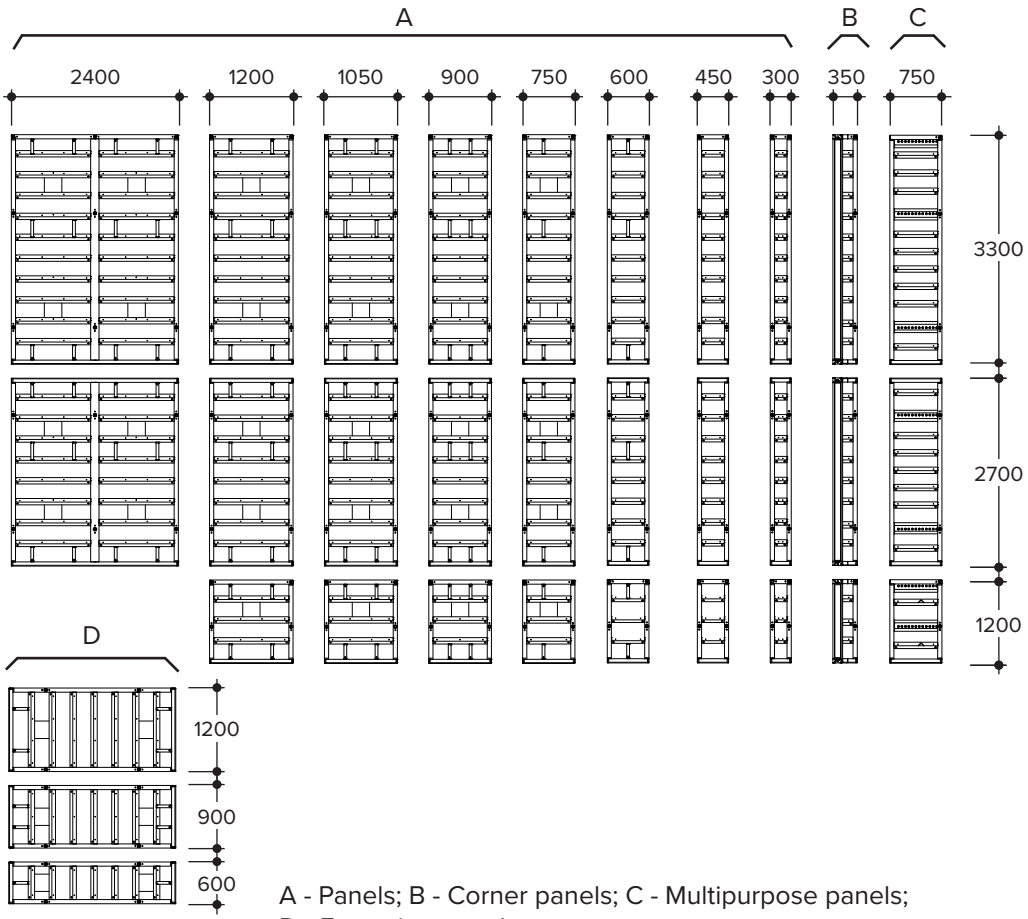


Unless stated otherwise, all dimensions are given in mm.

4.3 MANTO panels G3

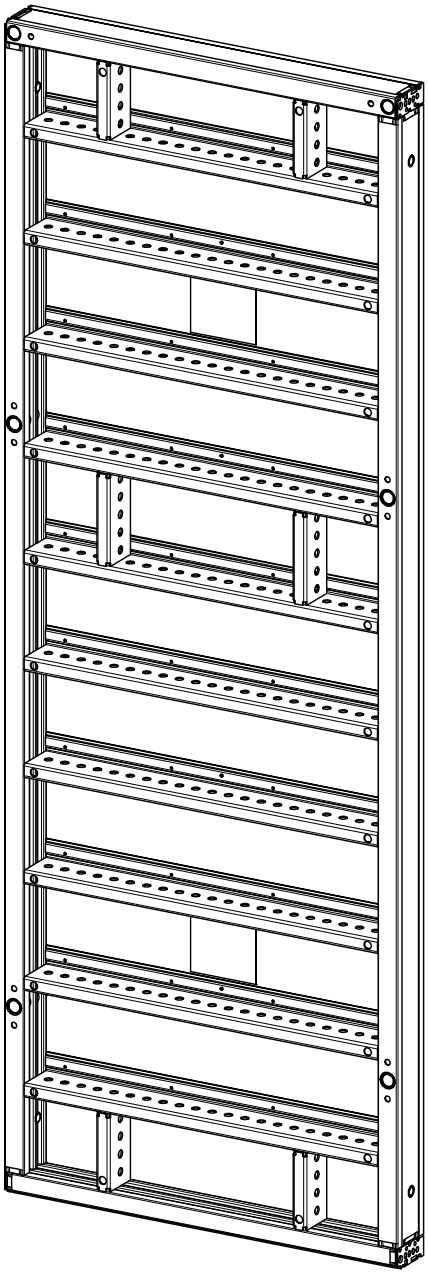
MANTO panels G3 can be identified by the following characteristics:

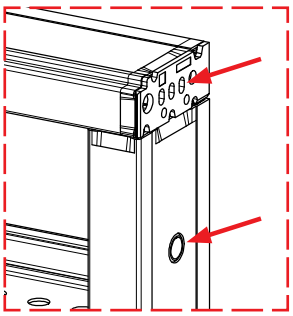
- No reinforcement plates on the inner side of the long edge profiles near the tie hole
- Tie position on the long edge profile with smaller holes above and below the tie hole, for the single-side operated anchors
- Bracing between ribs and/or between ribs and smaller edge profiles (in most panels).
- Holes Ø 22 in the edge profiles.



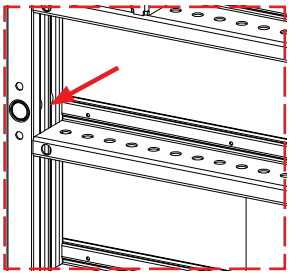
A - Panels; B - Corner panels; C - Multipurpose panels;
D - Extension panels.

For Safe Working Loads for MANTO panels, refer to page 217.

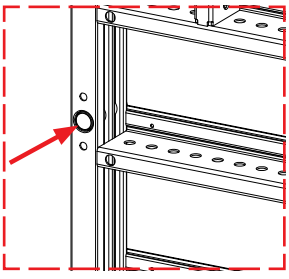




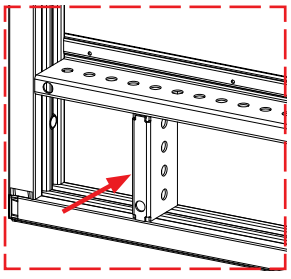
3no. slots in the corner plates and hole Ø 21. Thus easy to recognise in a stack.



No reinforcement plates on the inner side of the long edge profile near the tie holes.

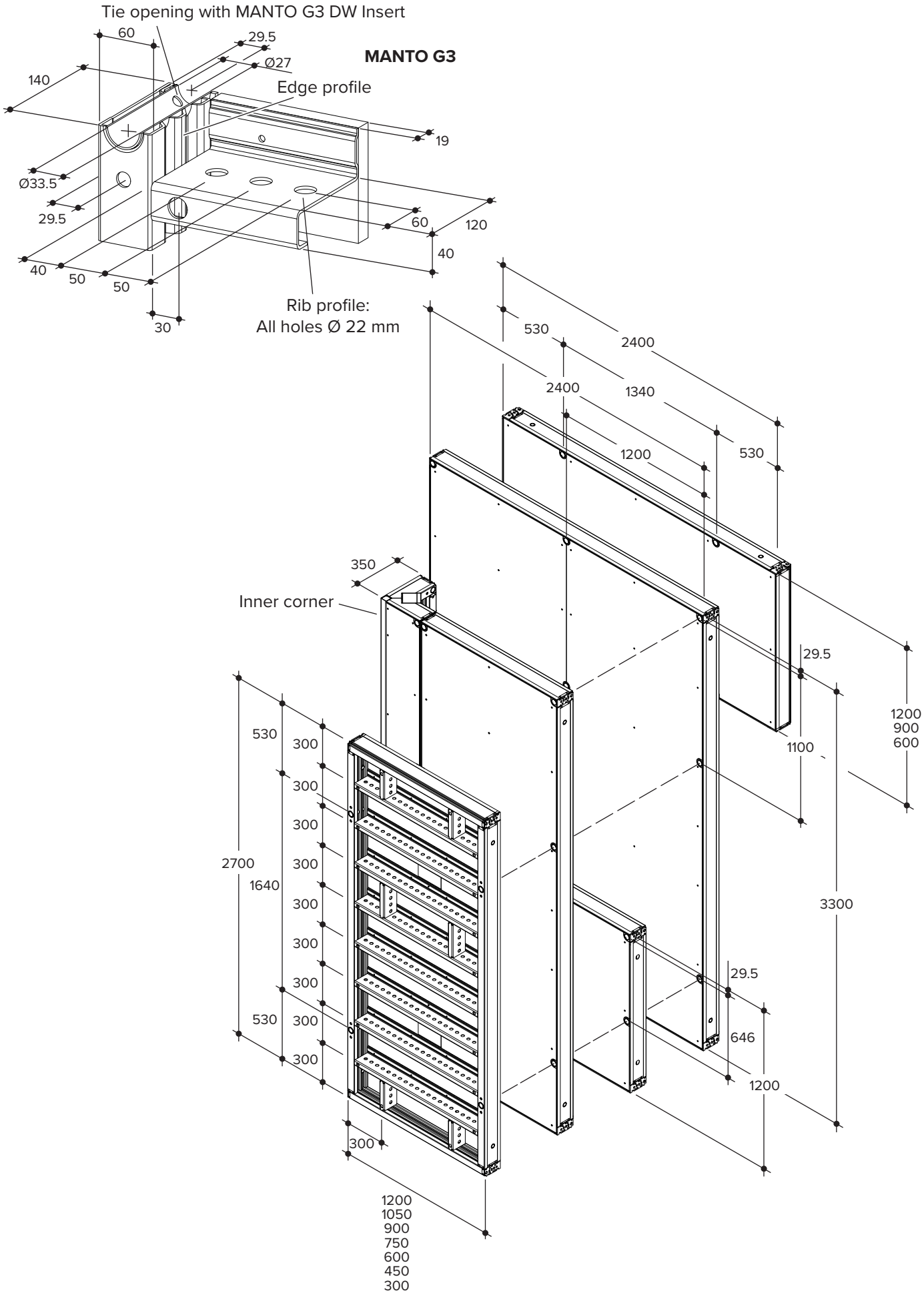


Tie position on the long edge profile with smaller ancillary holes for single-side operated anchors.



Stiffener elements between ribs and/or between ribs and smaller edge profiles (in most panels).

Unless stated otherwise, all dimensions are given in mm.

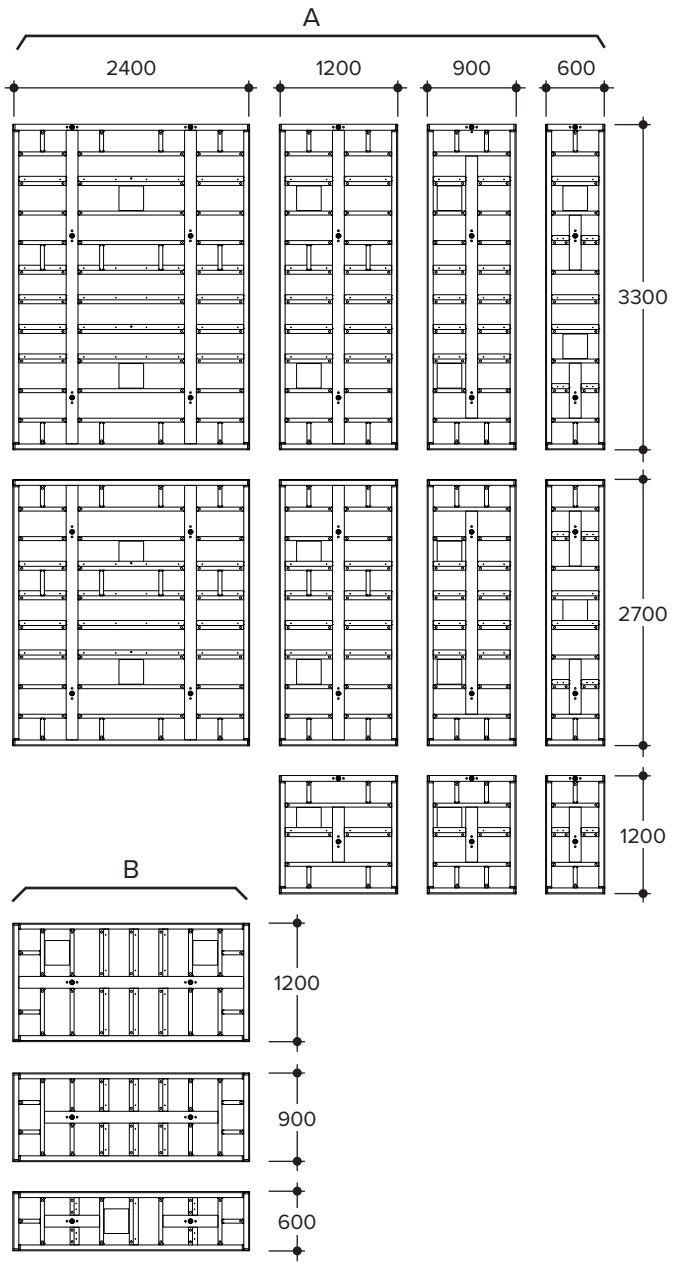


Unless stated otherwise, all dimensions are given in mm.

4.4 MANTO panels G3 M

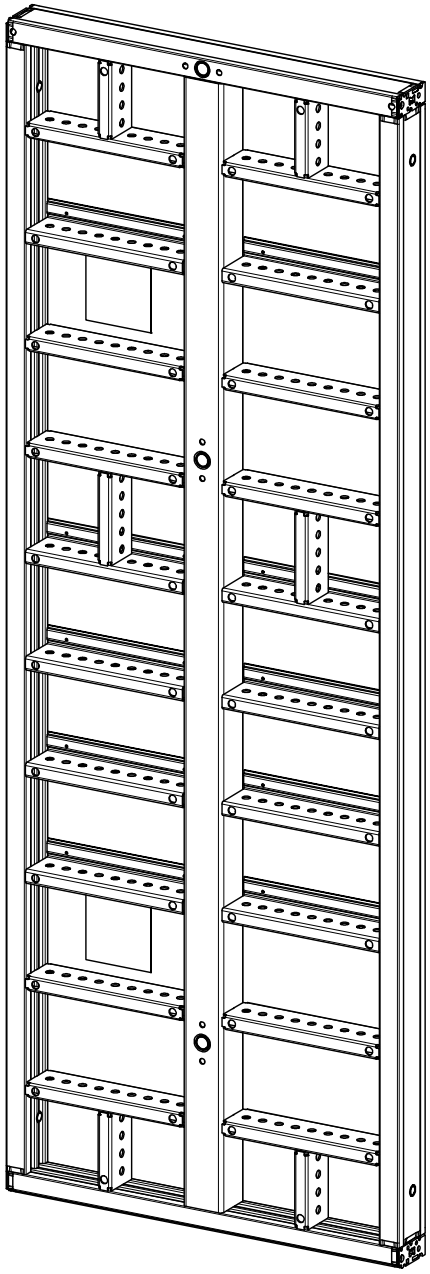
MANTO panels G3 M can be identified by the following characteristics:

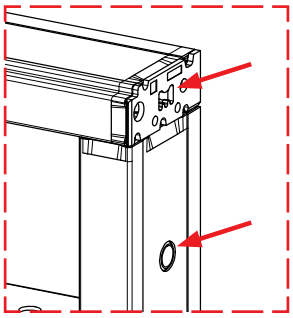
- Centre profile(s) on all panels with tie positions (with smaller holes above and below the tie hole, for the single-side operated ties);
- Long edge profiles without tie positions (some panels with tie position on the smaller edge profile) and no reinforcement plates;
- Stiffeners between ribs and/or between ribs and smaller edge profiles.
- Holes Ø 22 mm in the edge profiles.



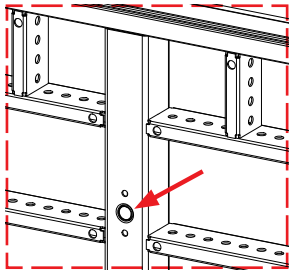
A - Panels; B - Extension panels.

For Safe Working Loads for MANTO panels, refer to page 217.

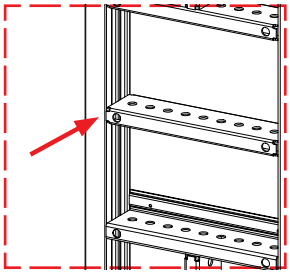




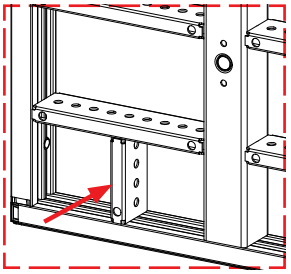
Stylised M in the corner plates and hole Ø 21. Thus easy to recognise in a stack.



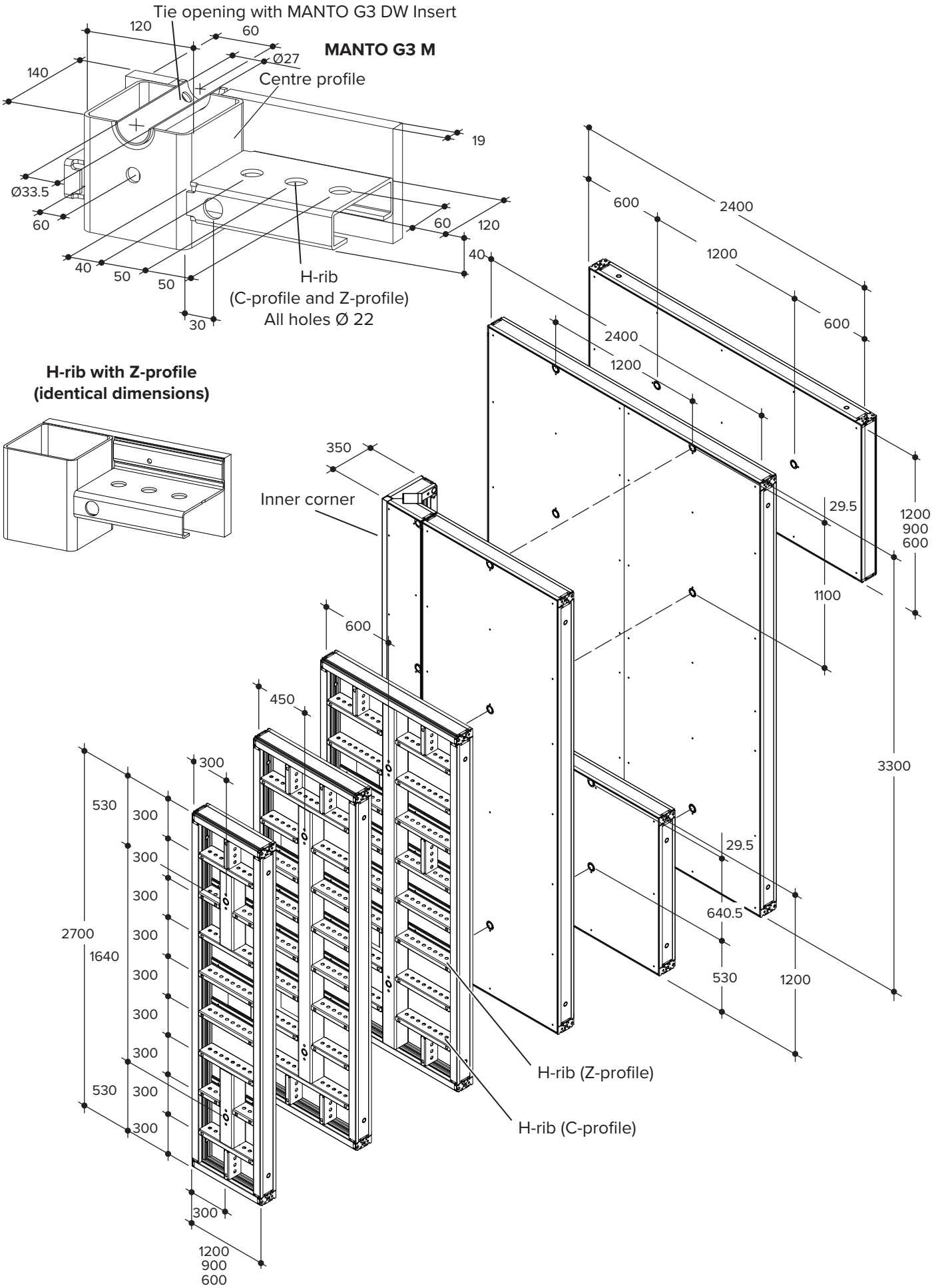
Centre profile with tie positions with smaller holes above and below the tie hole for single-side operated anchoring.



Long edge profiles without tie positions or reinforcement plates.



Stiffener elements between ribs and/or between ribs and smaller edge profiles.



Unless stated otherwise, all dimensions are given in mm.

4.5 Rules for using MANTO panels of different generations

It is essential to follow these rules when using MANTO panels of different generations in the same formwork:

- All panels must be able to withstand the same fresh concrete pressure. Pay particular attention to the reduced concrete pressure permitted for MANTO Panels G1 (refer to page 49).
- Panels of different generations can be connected horizontally (side-by-side) (Refer to section 4.6 on page 60). The rules for connecting panels horizontally apply to all generations of panels.
- Single-sided operated ties can only be used in MANTO panels G3 or G3 M.
- Panels of different generations can be used opposite one another as shown in the following tables.

MANTO panels Two-sided tying

Advancing side		Closing side		
		G2	G3	G3 M
	G2	✓	✓	–
	G3	✓	✓	–
	G3 M	–	–	✓

MANTO panels Single-sided tying

Advancing side		Closing side		
		G2	G3	G3 M
	G2	–	–	–
	G3	–	✓	–
	G3 M	–	–	✓

MANTO Giant Panels* Two-sided tying

Advancing side		Closing side		
		G2	G3	G3 M
	G2	✓	–	–
	G3	–	✓	–
	G3 M	–	–	✓

MANTO Giant Panels* Single-sided tying

Advancing side		Closing side		
		G2	G3	G3 M
	G2	–	–	–
	G3	–	✓	–
	G3 M	–	–	✓

*Also applies to MANTO G3 M Panels 240/330 and MANTO G3 M Panels 240/270

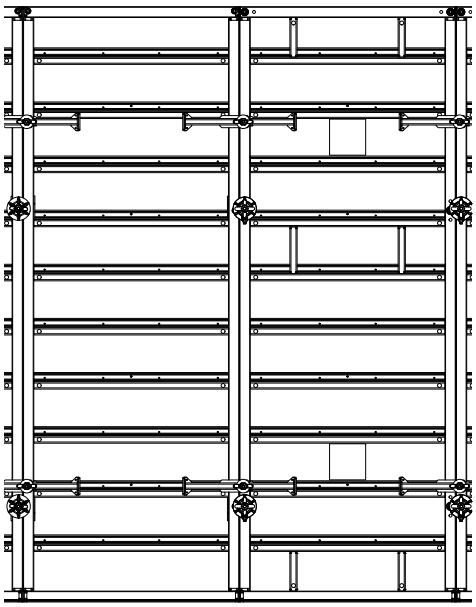
All other rules contained in this user guide apply to MANTO panels G1, G2, G3 and G3 M.

4.6 Examples of the connection of MANTO panels of different generations

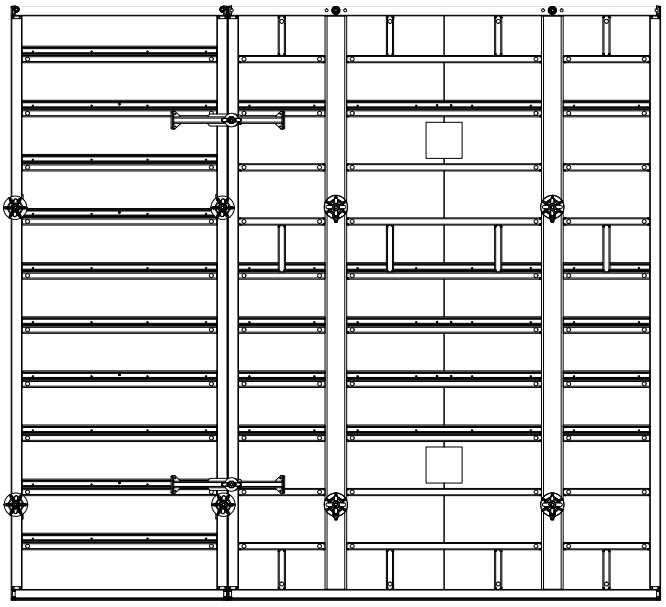
The following illustrations show examples of panels connected to one another using the MANTO Aligning Panel Clamp. The panels shown here can also be connected with the PM Aligning Wedge Clamp (potentially using a different position).

The uppermost tie position on MANTO Panels 330 is needed only when panels are stacked.

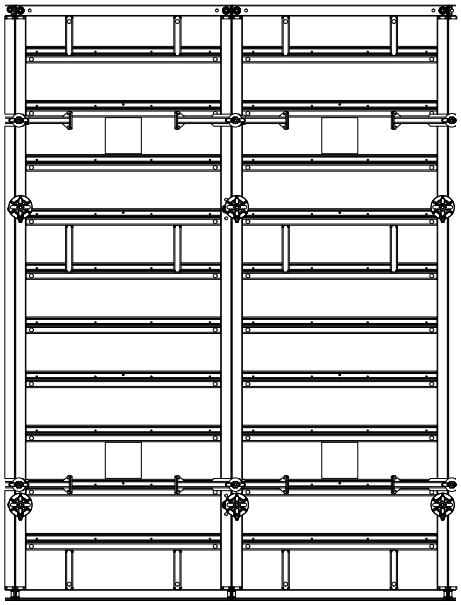
MANTO G2 **MANTO G3**



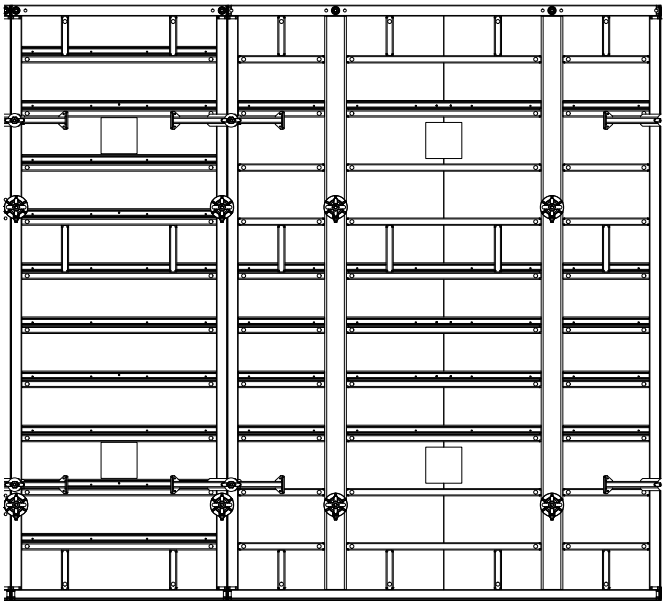
MANTO G2 **MANTO G3 M**



MANTO G3 **MANTO G3**



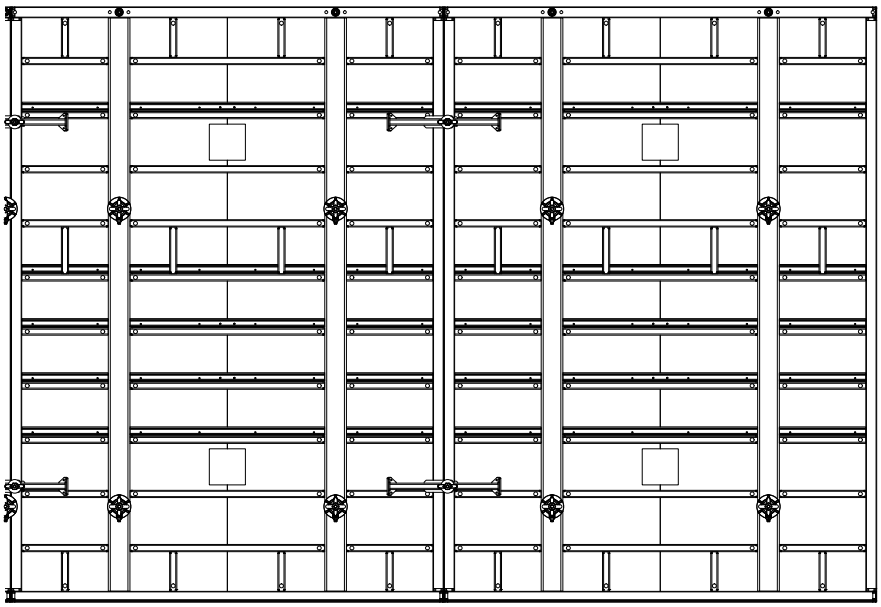
MANTO G3 **MANTO G3 M**



Unless stated otherwise, all dimensions are given in mm.

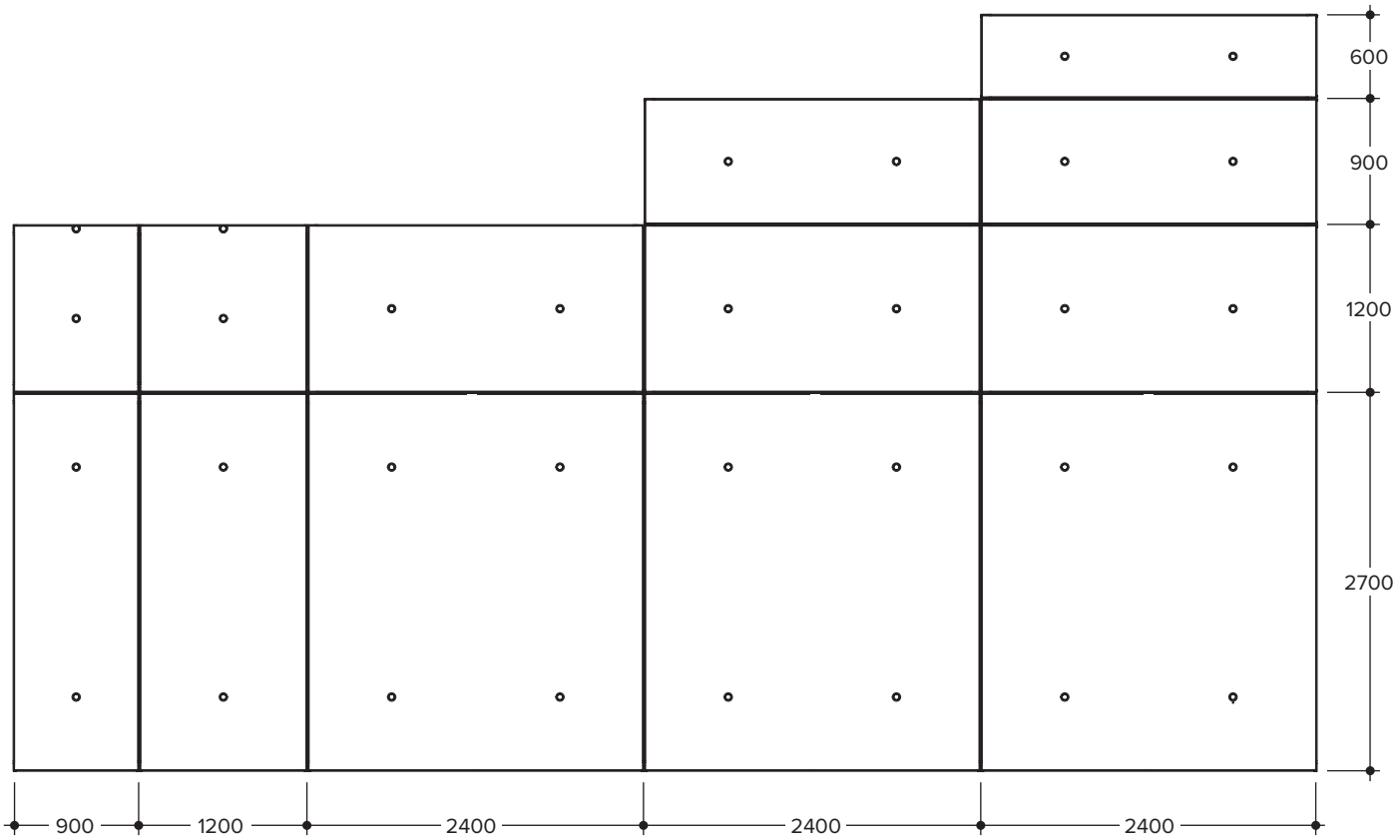
MANTO G3 M

MANTO G3 M

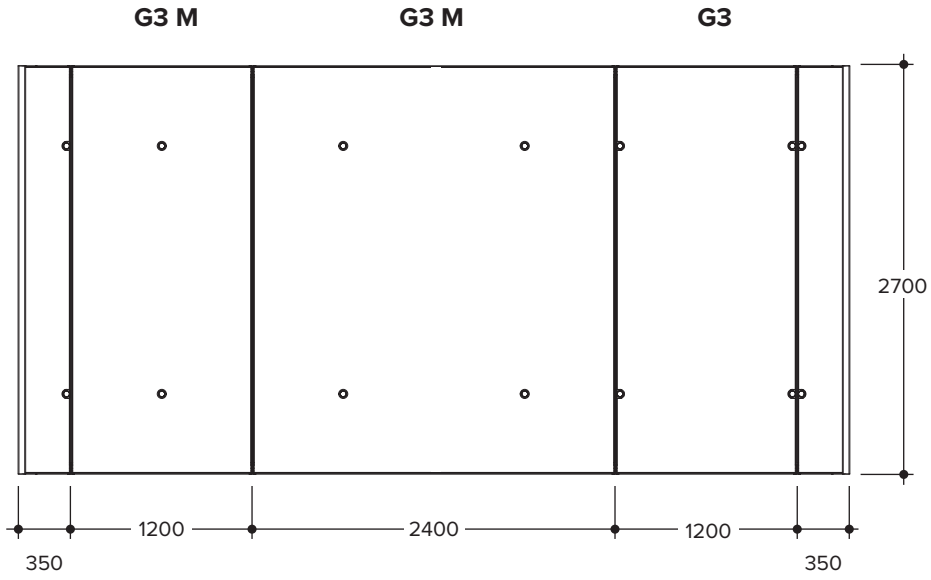


4.7 Tie pattern

Example: MANTO G3 M, stacked



Example: MANTO G3 and MANTO G3 M in the inner corner



Unless stated otherwise, all dimensions are given in mm.

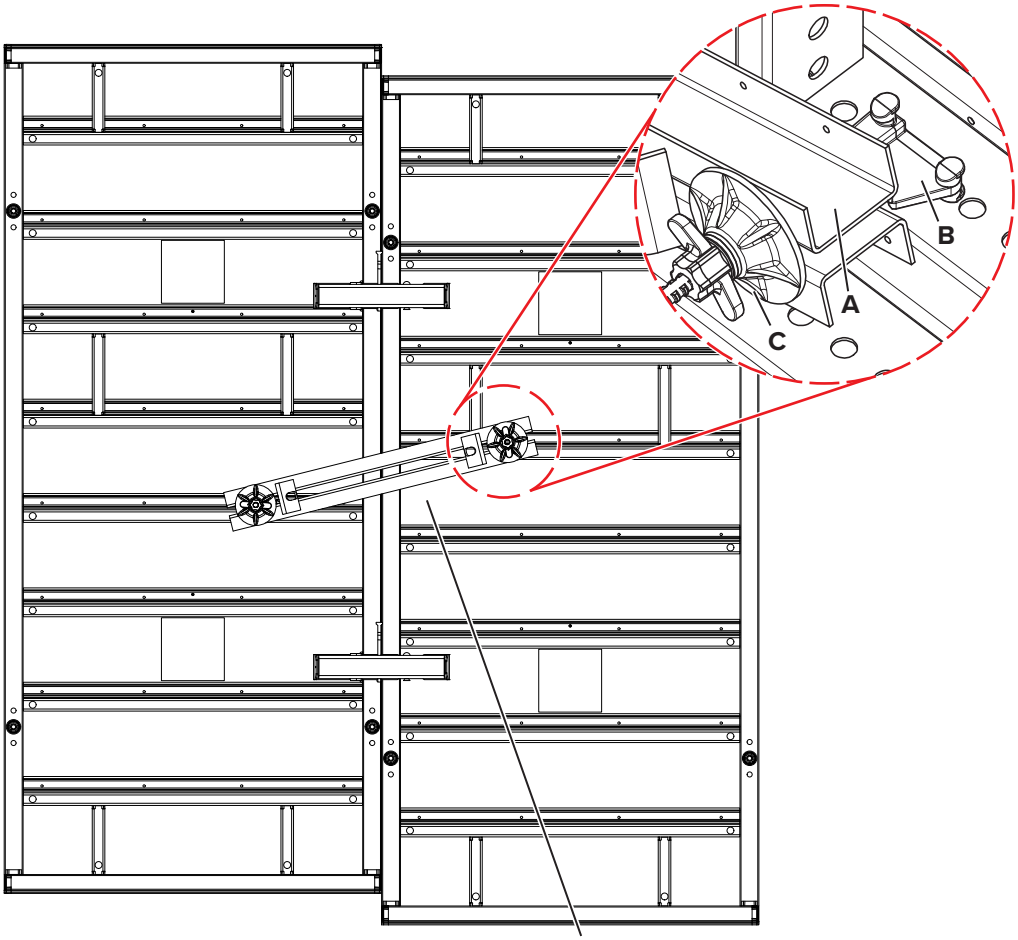
5 Connecting panels horizontally

MANTO panels are normally connected to one another using the MANTO Aligning Panel Clamp or the PM Aligning Wedge Clamp. The Adjustable Aligning Clamp or the Multipurpose Waler 100 has to be used for infills at the vertical joint.

Check that all connectors are tight and, if necessary, retighten before every use and every time they are moved.

5.1 Height offset

MANTO panels can be connected with a height offset of 20 mm using the MANTO connectors. For greater offsets and when the connectors cannot grasp over the H-ribs, the vertical joints have to be braced with MANTO walers as well.



Multipurpose Waler 100 (**A**, code:450764)
PLATINUM 100 Multi Bolt (**B**, code:605810)
MANTO Tie Nut (**C**, code:464600)

5.2 Using the MANTO Aligning Panel Clamp

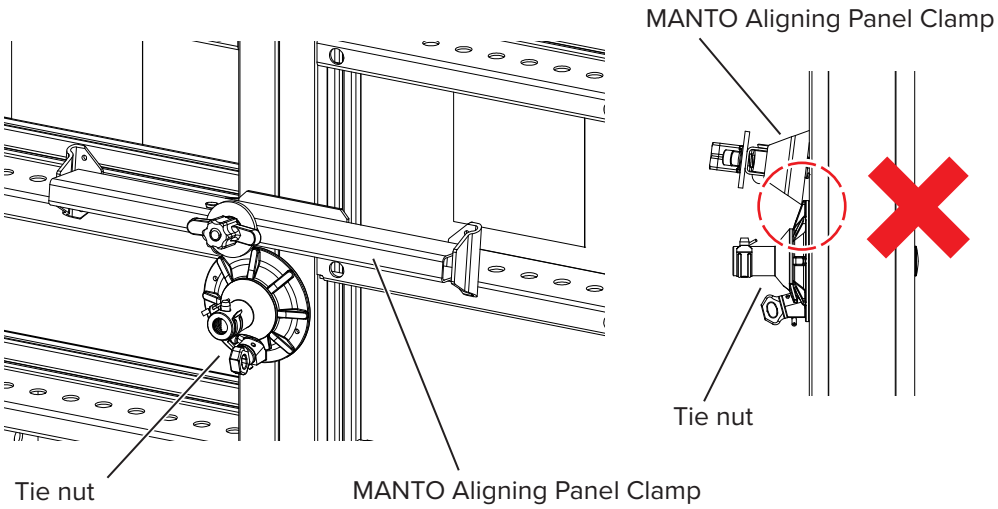
The MANTO Aligning Panel Clamp can be used for all vertical and horizontal panel joints. The MANTO Aligning Panel Clamp, with its aligning profile of 630 mm, provides an absolutely tight, flush-mounted and perfectly aligned panel joint when it is used correctly.

WARNING

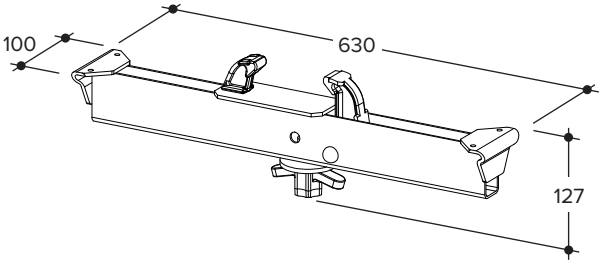
Risk of injury from falling MANTO panels!

If it is not attached correctly, the MANTO Aligning Panel Clamp can release and formwork elements can fall off when being transported by crane.

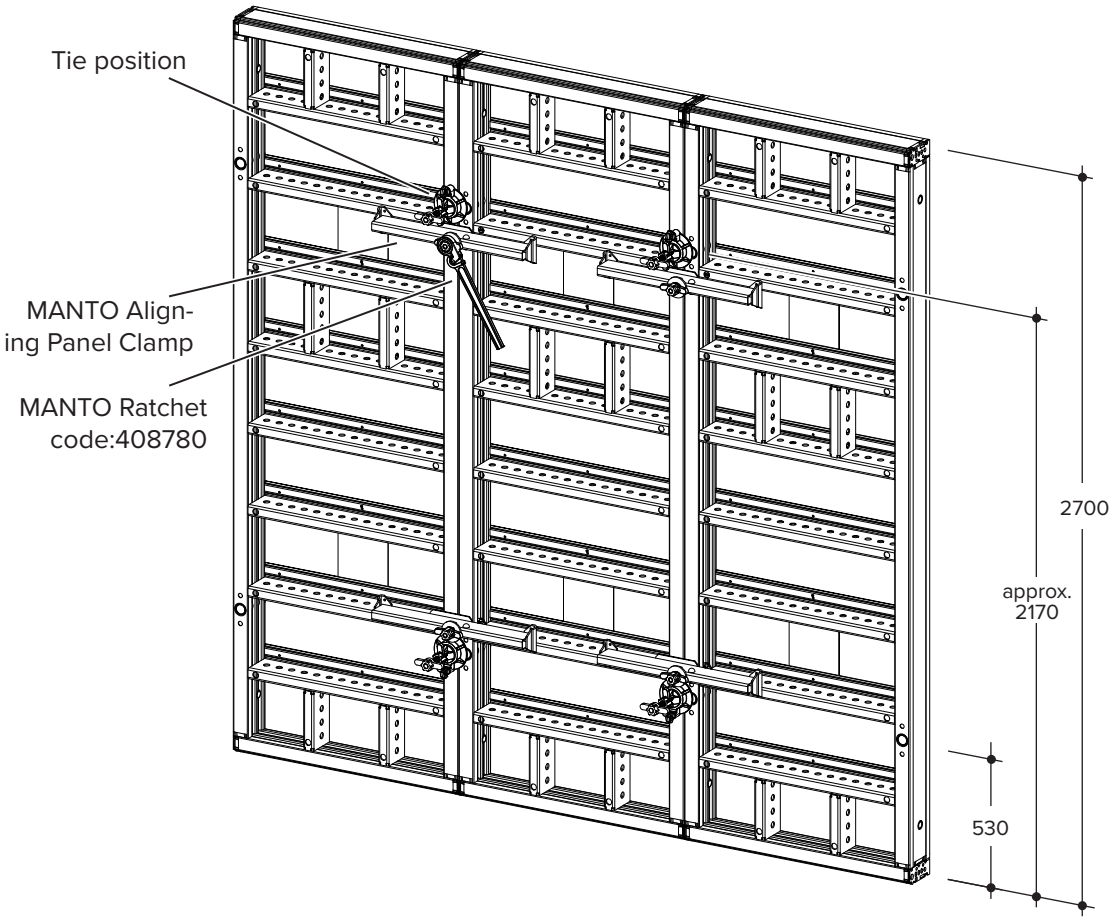
Every time the MANTO Aligning Panel Clamp is attached, check that it is not resting on the PLATINUM 100 Tie Nut. The MANTO Aligning Panel Clamp has to rest against the MANTO panels. If necessary, attach the MANTO Aligning Panel Clamp to the next-higher or next-lower H-rib.



MANTO Aligning Panel Clamp (code:448000)



Unless stated otherwise, all dimensions are given in mm.



Step 1 If possible, mount MANTO Aligning Panel Clamps near the ties at the edge profiles of the panel frame. The supporting surfaces of the MANTO Aligning Panel Clamps should have full contact with the ribs of the panel.

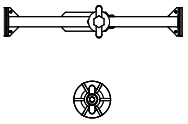
Step 2 Use the MANTO Ratchet to tighten the MANTO Aligning Panel Clamps. The MANTO Ratchet can be operated quickly, quietly and easily without damaging the material. If there is no MANTO Ratchet available, tighten the MANTO Aligning Panel Clamp by striking a hammer against the wing of the wing nut.

Connecting panels horizontally

Typical arrangements

The following illustrations show typical connecting arrangements between MANTO Panels when joining panels side-by-side. For clarity, a legend of the components used is shown below.

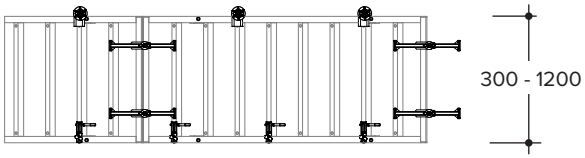
Legend



MANTO Aligning Panel Clamp (code:448000) or PM Aligning Wedge Clamp

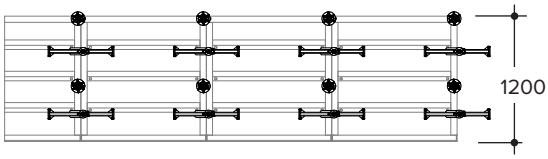
MANTO Tie Nut (code: 464600) or Tie Nut 150 (code:531481)

Formwork height: 0.30 m to 1.20 m

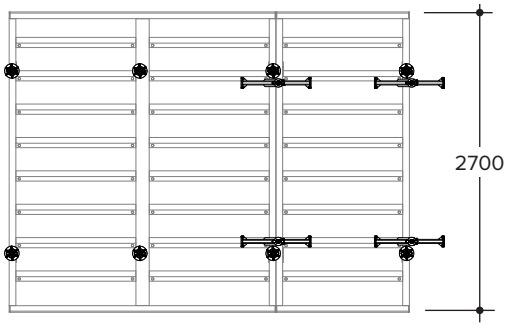


The above arrangement shows tying using the FU Tightener (code:568357). For more information, refer to page 116.

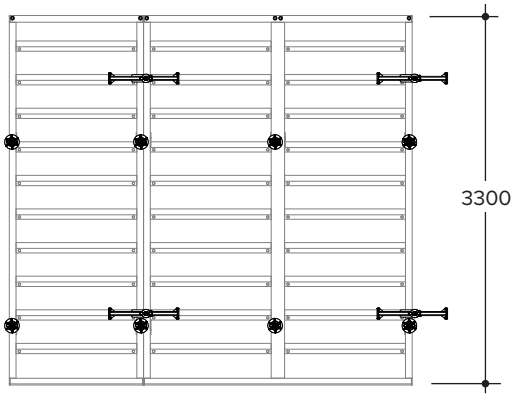
Formwork height: 1.20 m



Formwork height: 2.70 m



Formwork height: 3.30 m



The uppermost tie position on MANTO Panels 330 is needed only when panels are stacked.

Unless stated otherwise, all dimensions are given in mm.

5.3 With the PM Aligning Wedge Clamp

Use the PM Aligning Wedge Clamp (code:606900) to connect MANTO Panels and align them flush without offset.

If the PM Aligning Wedge Clamp is not attached to the panel joint, e.g. when the formwork is being moved, it can be fastened in the Aligning Wedge Clamp Holder (code:606970) to store it. Then it is readily available for the next use.

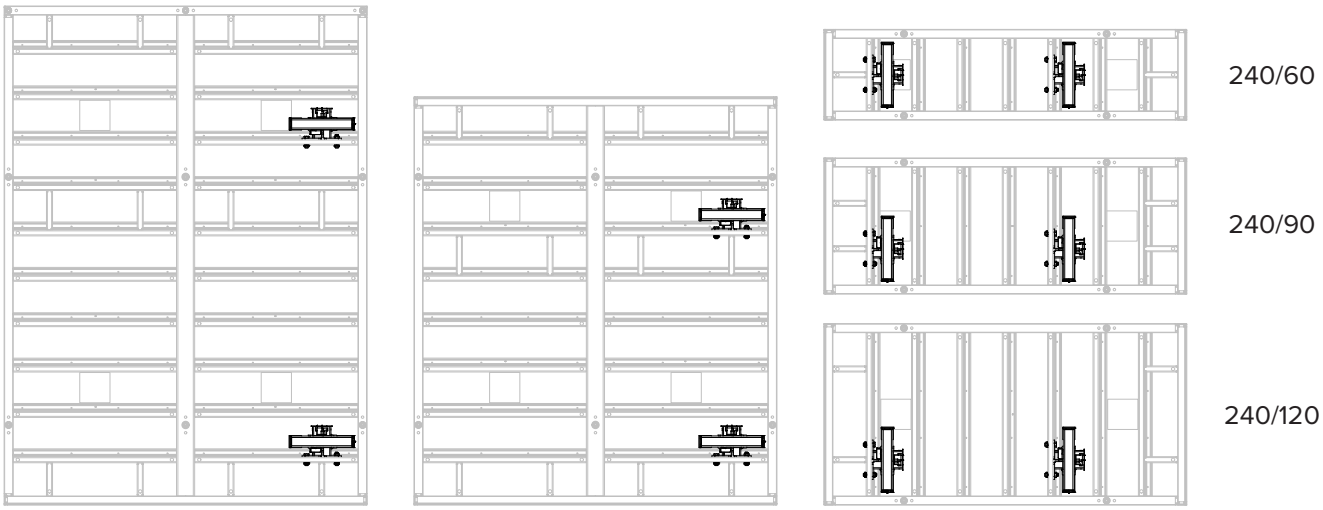
The PM Aligning Wedge Clamp and the Aligning Wedge Clamp Holder together make up the Panel Connection Unit. The PM Aligning Wedge Clamp can also be purchased separately.

5.3.1 Attaching Panel Connection Unit to MANTO panel

The mounting positions of the Panel Connection Unit are shown in the following illustrations. Attaching the Panel Connection Unit in these positions ensures that the PM Aligning Wedge Clamp can always be mounted in a suitable position. We recommend adhering to these mounting positions.

The Panel Connection Unit cannot be attached to panels that are not shown in the following illustrations. However, the panels can still be connected using the PM Aligning Wedge Clamps available separately.

MANTO G2/G3 Panels 240

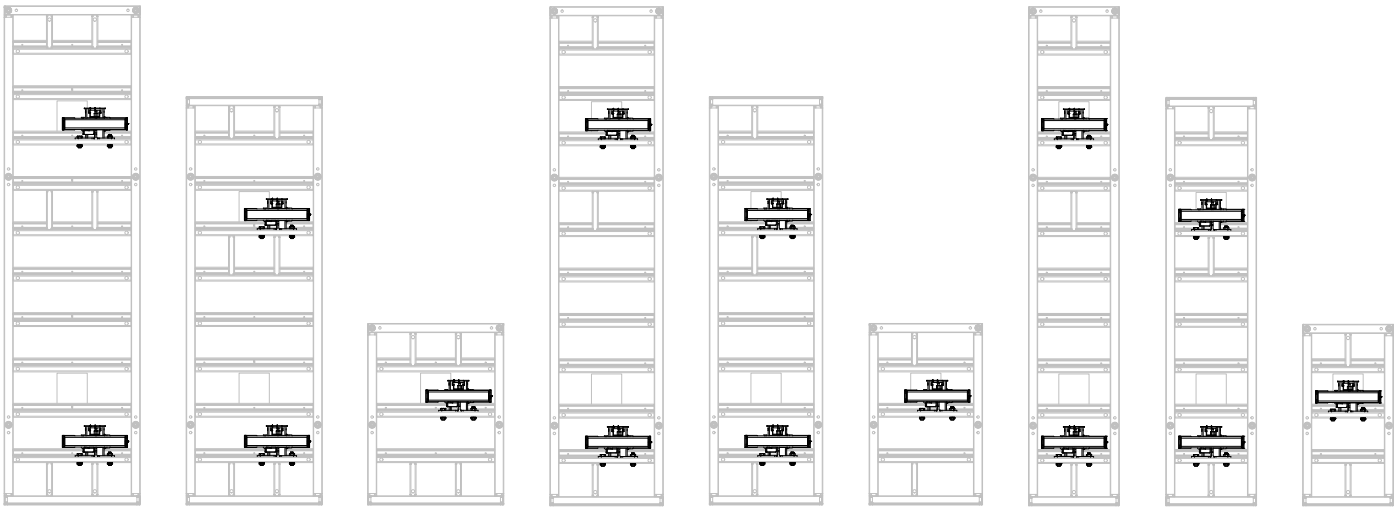


MANTO G2/G3 Panels 120 and 105

Unless stated otherwise, all dimensions are given in mm.

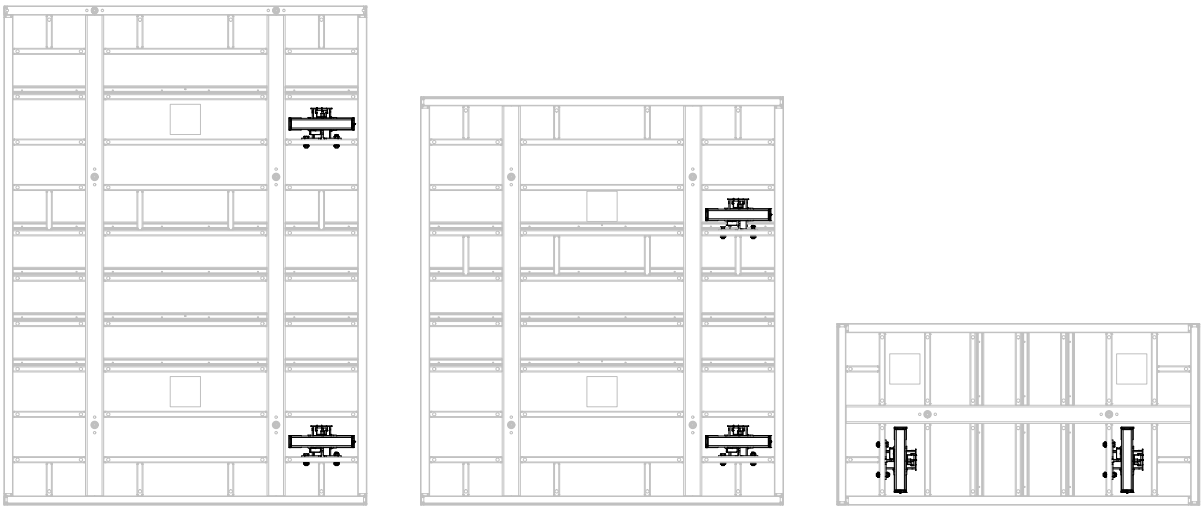
Connecting panels horizontally

MANTO G2/G3 Panels 90, 75 and 60



90/330 90/270 90/120 75/330 75/270 75/120 60/330 60/270 60/120

MANTO G2/G3 M Panels 240



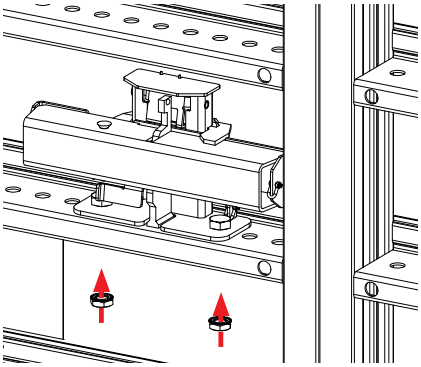
240/330 240/270 240/120

MANTO G3 M Panels 120

120/330 120/270 120/120

Unless stated otherwise, all dimensions are given in mm.

Step 1 Use the included bolts and nuts to attach the Panel Connection Unit (code:609080) to the panel rib.



5.3.2 Removing PM Aligning Wedge Clamp from Aligning Wedge Clamp Holder and attaching to panel joint

The PM Aligning Wedge Clamp can be used to connect MANTO Panels side by side (vertical joint).

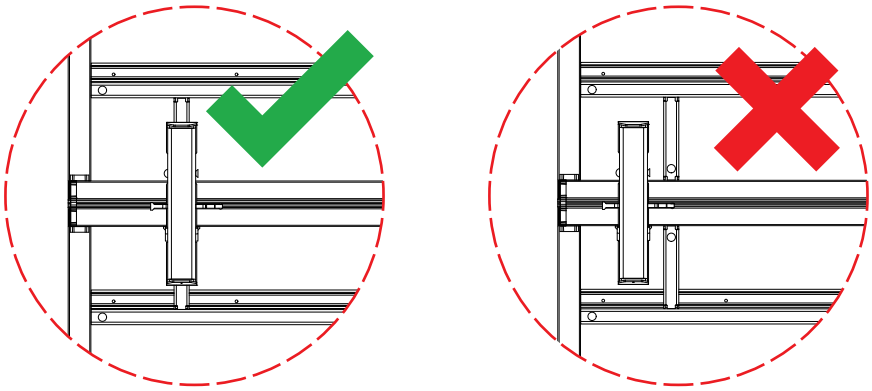
Stacked MANTO G3 and G3/M panels (horizontal joints) can also be connected to one another with the PM Aligning Wedge Clamp. The PM Aligning Wedge Clamp should be attached such that it rests against a V-rib.

WARNING

Risk of injury from falling formwork elements!

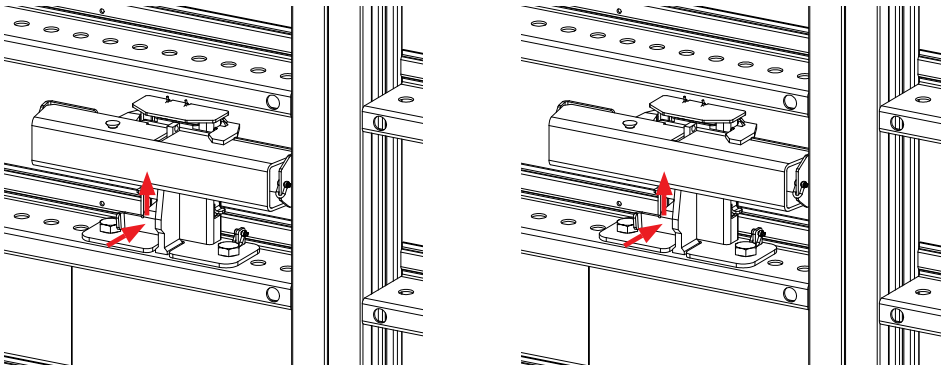
If the PM Aligning Wedge Clamp on the horizontal rib is not attached over a V-rib, the panel connection is not secure.

A PM Aligning Wedge Clamp on a horizontal rib always has to be attached over a V-rib!



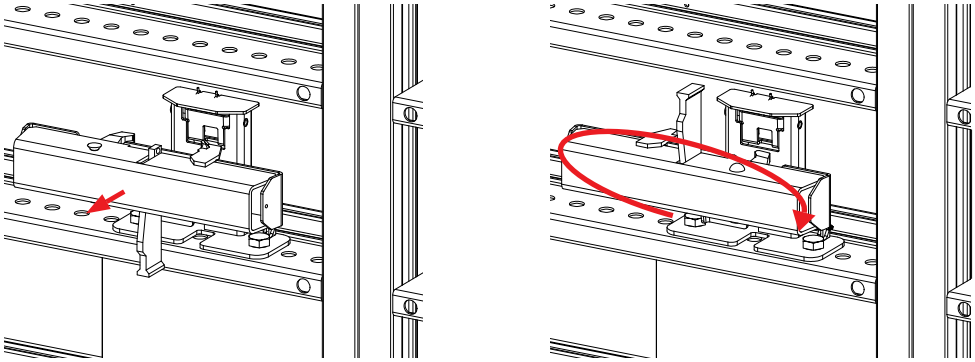
Connecting panels horizontally

Step 2 Release the PM Aligning Wedge Clamp by pressing the lever towards the panel and then upwards.

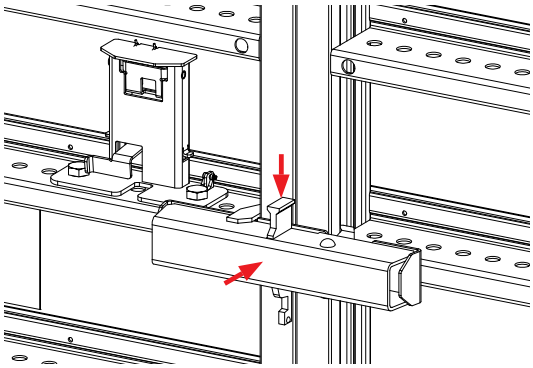


Step 3 Pull the PM Aligning Wedge Clamp out of the Panel Connection Unit (code:609070).

Step 4 Rotate the PM Aligning Wedge Clamp 180° (the wedge head must face upwards).

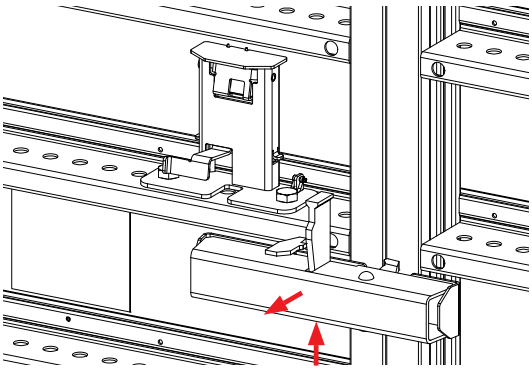


Step 5 Place the PM Aligning Wedge Clamp in the required position and lock it in place by striking the top of the wedge with a hammer.



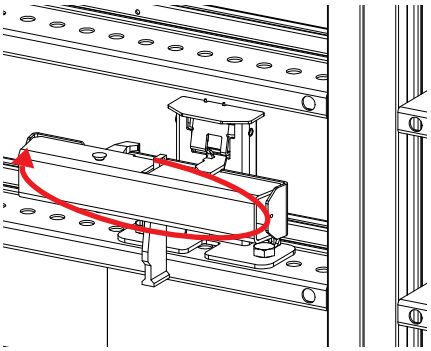
5.3.3 Detaching PM Aligning Wedge Clamp from panel joint and attaching it to Aligning Wedge Clamp Holder

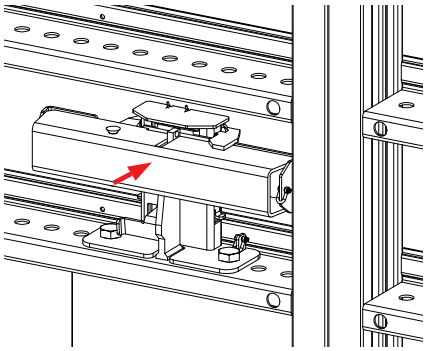
Step 1 Strike the bottom of the wedge with a hammer to release the PM Aligning Wedge Clamp and pull the clamp out.



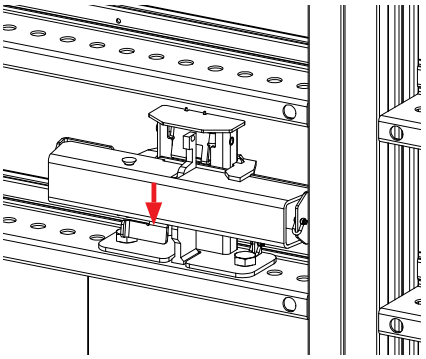
Step 2 Rotate the PM Aligning Wedge Clamp 180° (the wedge head must face downwards).

Step 3 Place the PM Aligning Wedge Clamp on top of the mounting profile of the holding device. This will automatically adjust the clamp extension to fit the device.





Step 4 Push the PM Aligning Wedge Clamp downwards until it clicks in place.



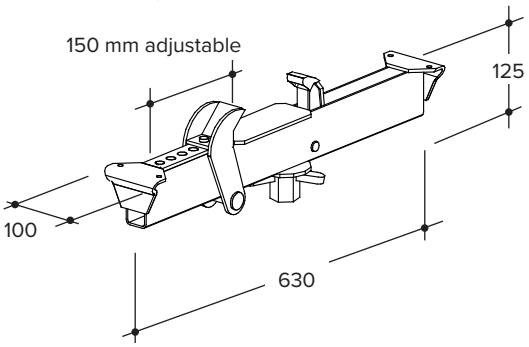
5.3.4 Detaching Panel Connection Unit from MANTO panel

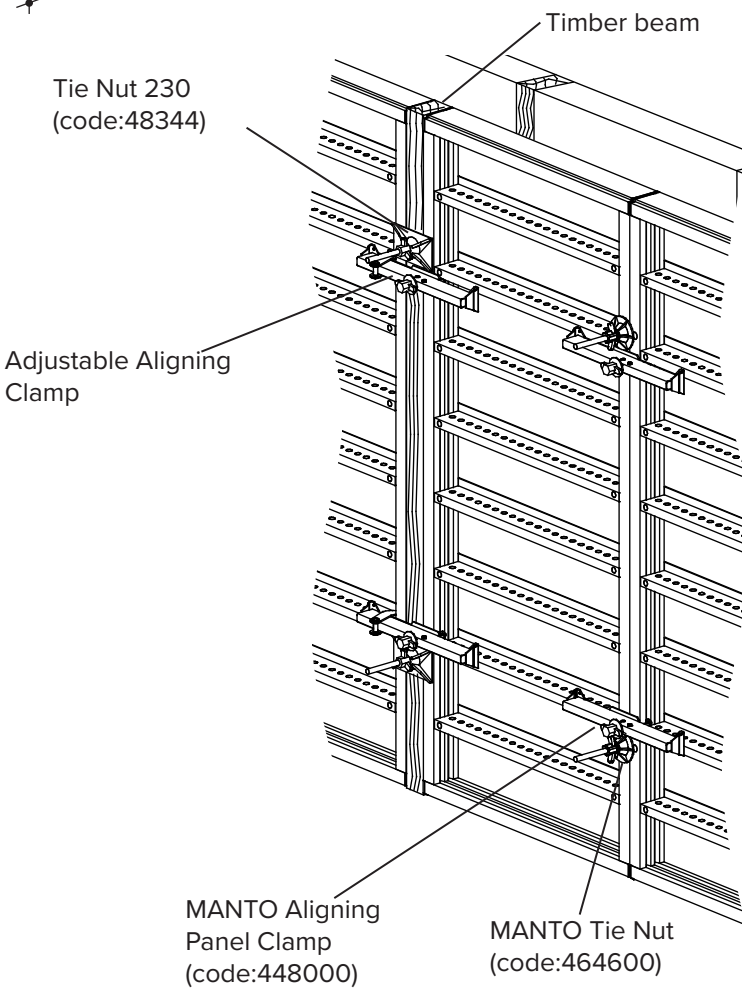
Step 1 Detach the Panel Connection Unit from the panel by reversing the steps described in Section 5.3.1 on page 67.

5.4 Using the Adjustable Aligning Clamp

The Adjustable Aligning Clamp is used to connect the vertical joints between MANTO panels when infills are placed in between panels. It connects the MANTO panels in the same way as the Aligning Panel Clamp does but due to its sliding claw, it allows for adjustments of up to 150 mm.

Adjustable Aligning Clamp
(code:467898)





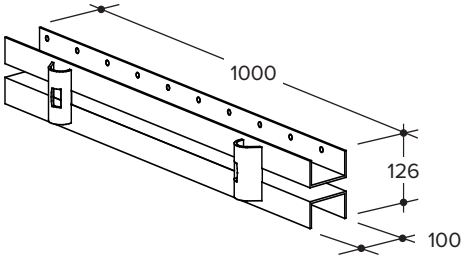
Unless stated otherwise, all dimensions are given in mm.

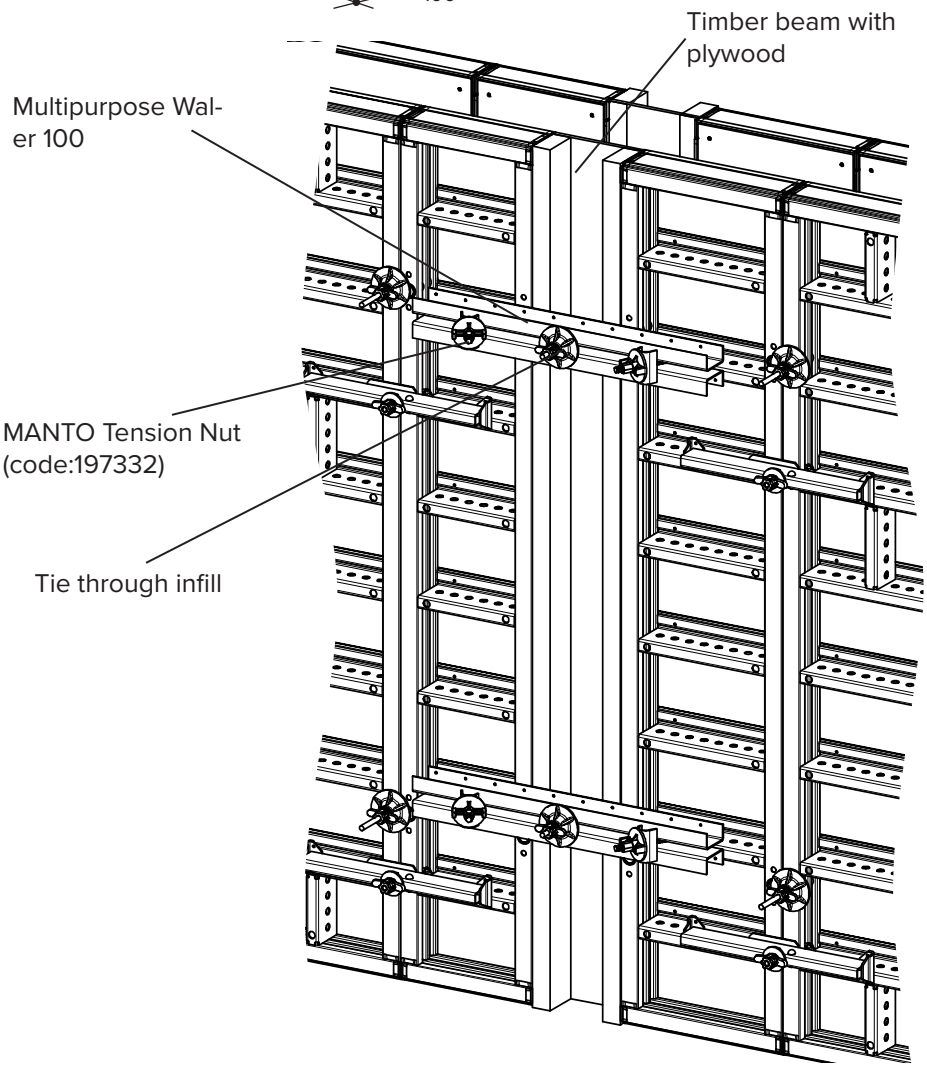
5.5 Using the Multipurpose Waler 100

Panels with vertical infills of up to 300 mm can be connected using the Multipurpose Waler 100. In this example 2no. Waler Spanners and 2no. Tension Nuts are used on the panel ribs to create an aligned and high-tensile infill. Alternately 2no. PLATINUM 100 Multi Bolts (code:605820) and 2no. MANTO Tie Nuts (code:464600) can be used.

Ties are placed through the infill as centred as possible.

Multipurpose Waler 100
(code:450764)





For rules regarding infill solutions, refer to page 75.

5.6 MANTO XXL panels

Typical arrangements

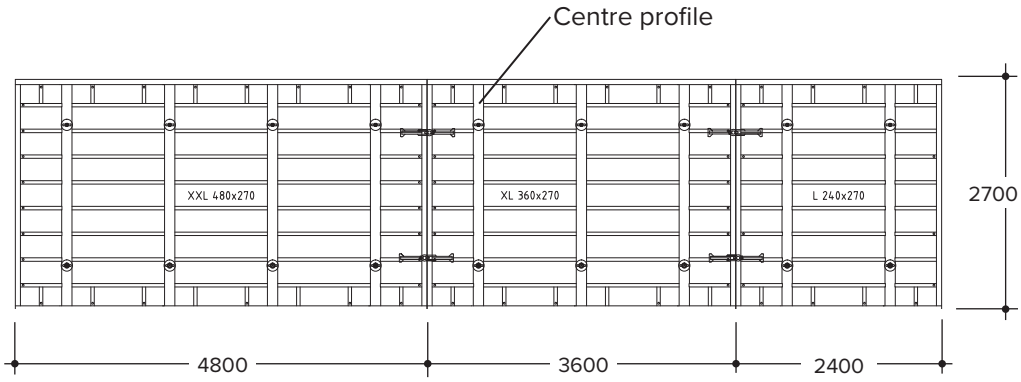
The following illustrations show typical connecting arrangements between MANTO XXL Panels when joining panels side-by-side.

For clarity, a legend of the components used is shown below.

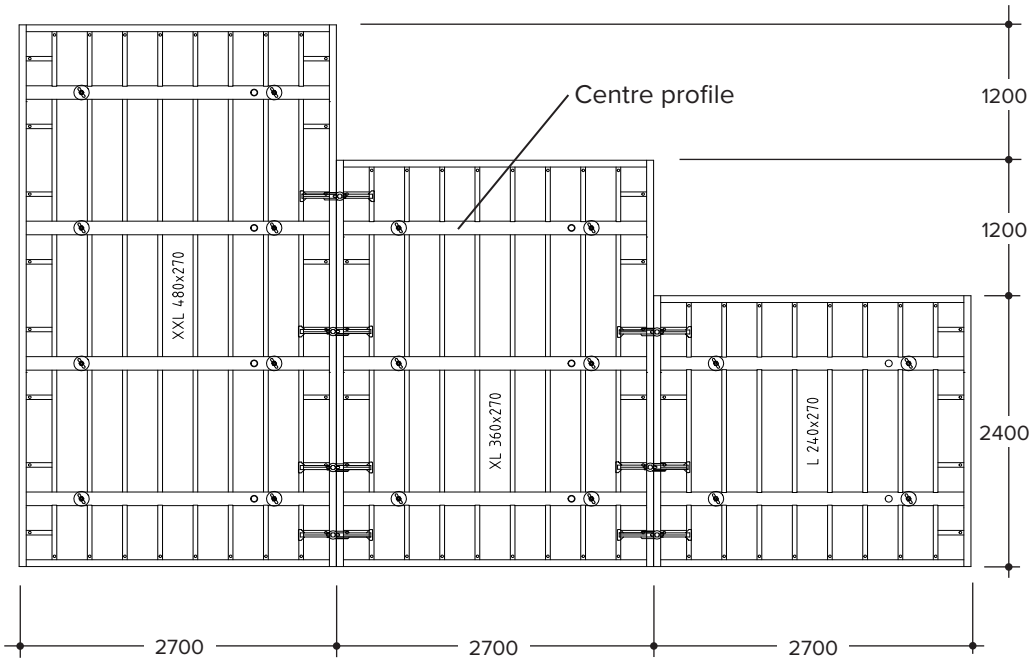
MANTO Aligning Panel Clamp (code:448000) or PM Aligning Wedge Clamp

MANTO Tie Nut (code:464600)

When used in the vertical position (main profile is vertical):



or when used in the horizontal position (main profile is horizontal):



The illustrations above show typical connections between MANTO XXL Panels using the MANTO Aligning Panel Clamp (code: 448000). Other arrangements and/or variations have to be designed according to the respective job requirements.

Unless stated otherwise, all dimensions are given in mm.

6 Infills (typical solutions)

This section shows different ways to construct infills.

For information on infills up to 60 mm, see below.

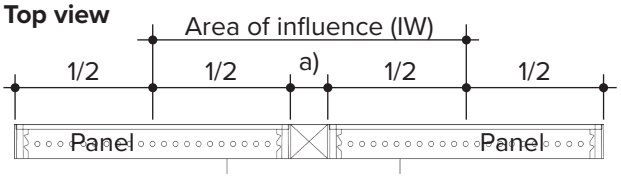
For information on infills up to 80 mm, see page 76.

For information on infills up to 150 mm, see page 76.

For information on infills up to 300 mm, see page 77.

The following illustration and table show information needed to select the proper infill.

Top view

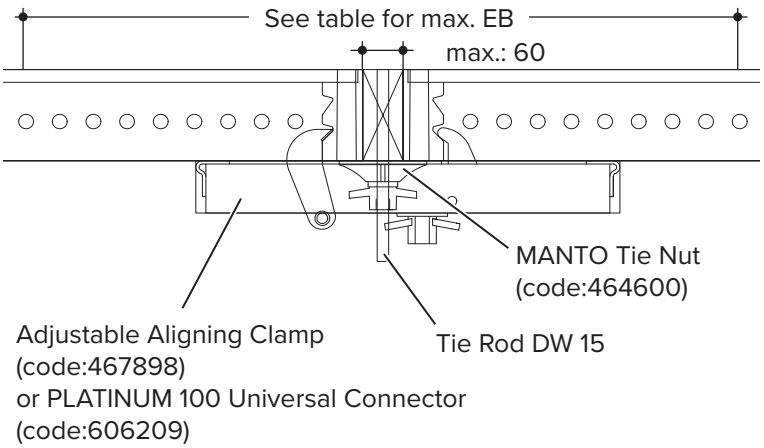


a) Infill

Max. area of influence (IW) for infill with a single tie (see solutions 6.1, 6.2, and 6.3)				
Panel height	Pressure profile	Max. EB		Connectors per panel*
		DW 15	DW 20	
2.70 m	Hydrostatic	1.30 m	1.50 m	2
	Constant	1.20 m	1.40 m	2
3.30 m	Hydrostatic	1.05 m	1.50 m	2
	Constant	1.00 m	1.20 m	2

Constant pressure for DW 15 = 60.00 kN/m^2, for DW 20 = 80.00 kN/m^2.
* Additional connectors might be required due to timber and joint capacity.

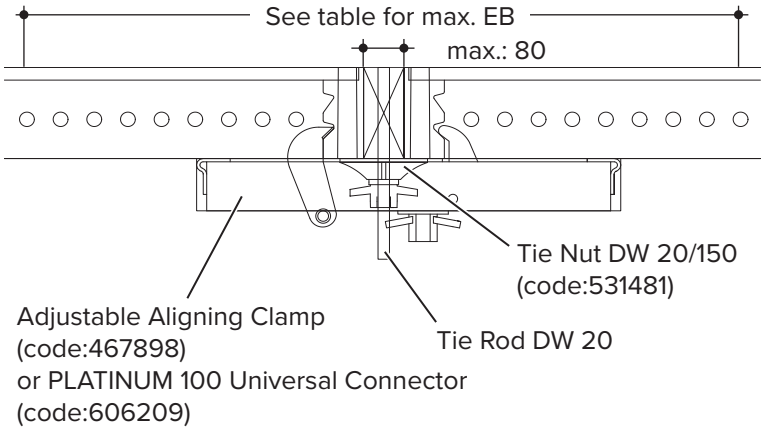
6.1 Infills up to 60 mm wide



Always centre the tie on the infill.

The tie washer must overlap the panels by at least 35 mm.

6.2 Infills up to 80 mm wide

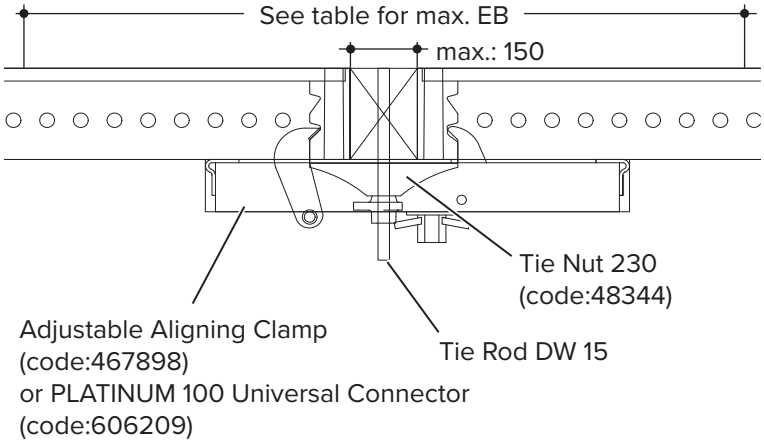


Always centre the tie on the infill.

The tie washer must overlap the panels by at least 35 mm.

6.3 Infills up to 150 mm wide

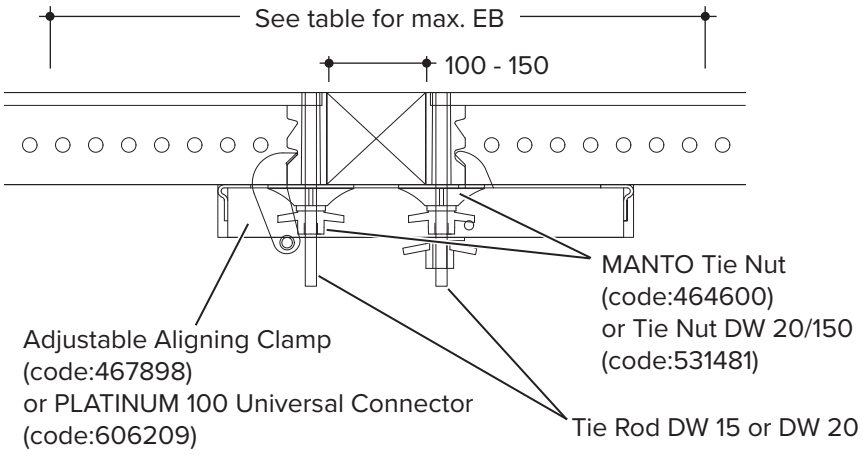
6.3.1 If area of influence (IW) ≤ maximum area of influence (max. IW)



Always centre the tie on the infill.

The tie washer must overlap the panels by at least 35 mm.

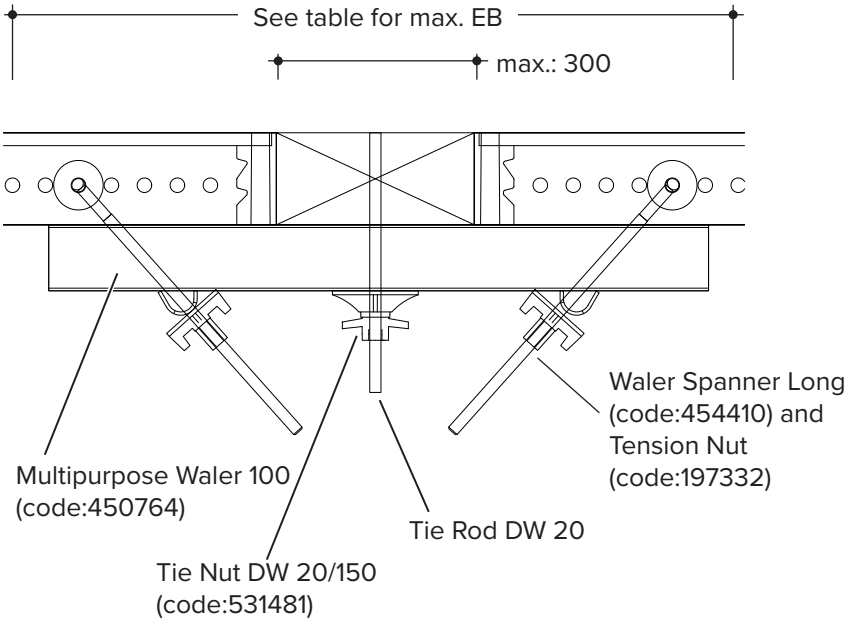
6.3.2 If area of influence (IW) > maximum area of influence (max. IW)



The tie washer must overlap the panels by at least 35 mm.

6.4 Infills up to 300 mm wide

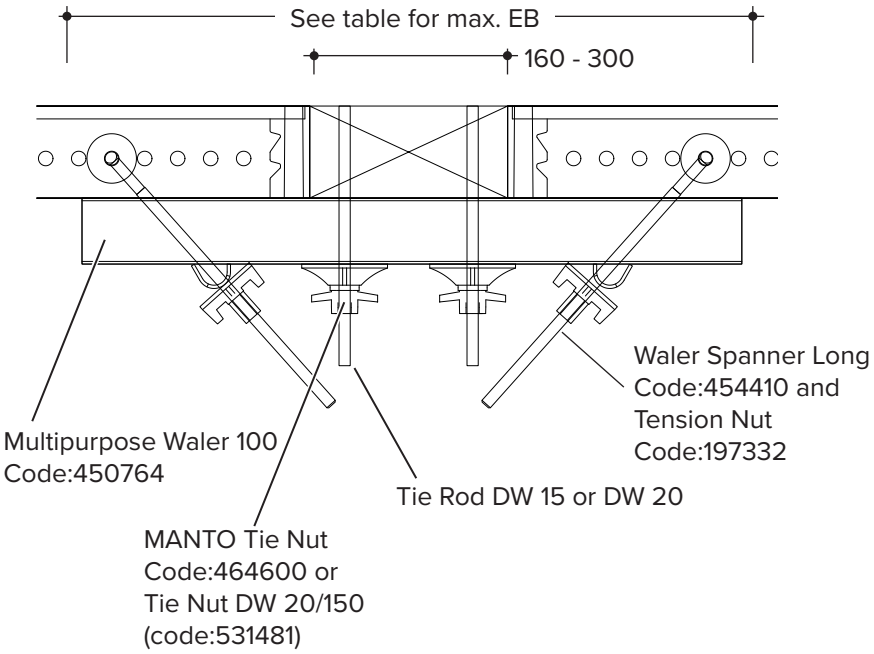
6.4.1 If area of influence (IW) ≤ maximum area of influence (max. IW)



Always centre the tie on the infill.

The tie washer must overlap the panels by at least 35 mm.

6.4.2 If area of influence (IW) > maximum area of influence (max. IW)



The tie washer must overlap the panels by at least 35 mm.

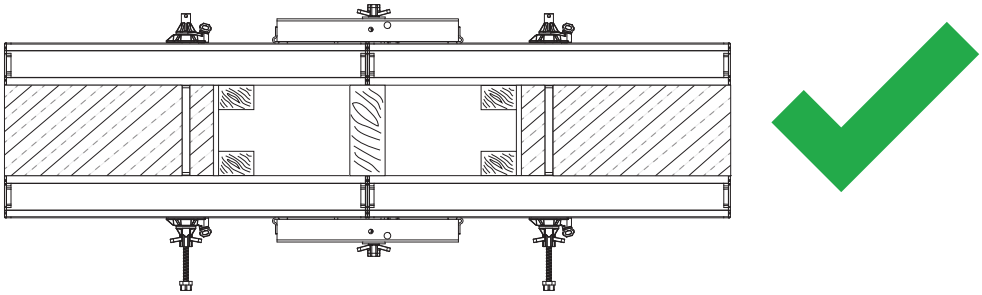
6.5 Openings for windows and doors

If the strain is asymmetric on panels tied in the centre near openings for doors and windows, e.g. because concrete is being poured from one side, pressure-resistant struts have to be added to the panel joints. Otherwise the joint may seesaw.

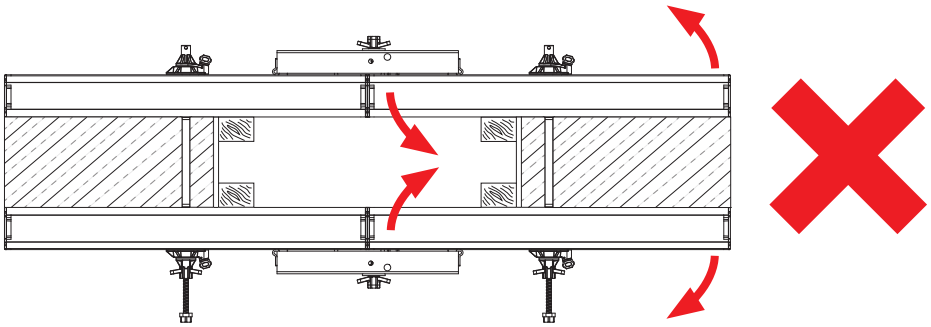
The strain will force the panels apart, and the panel joint that is not strained will force the panels together. The connectors at the panel joints are not designed to accommodate this force.

The struts provided on site have to be placed in the tie position and at the upper and lower edges of the panel.

Example of opening



Pressure-resistant strut provided on site, e.g. timber beam 80 mm / 100 mm



☞	Place the pressure-resistant struts (e.g. timber beam 80 mm / 100 mm) at the panel joint, one in each tie position as well as at the upper and lower edge of the element.

☞	This does not apply to MANTO panels that are tied at the edge profile.

7 Height extensions up to 500 mm on site

Should it be required, it is possible to create extensions in height of up to 500 mm on top of the MANTO Panels without the need for extra panels.

Should these extensions not provide enough extra height, it is also possible to join MANTO panels on top of each other to further increase the height of the formwork (height extension) (Refer to page 81).

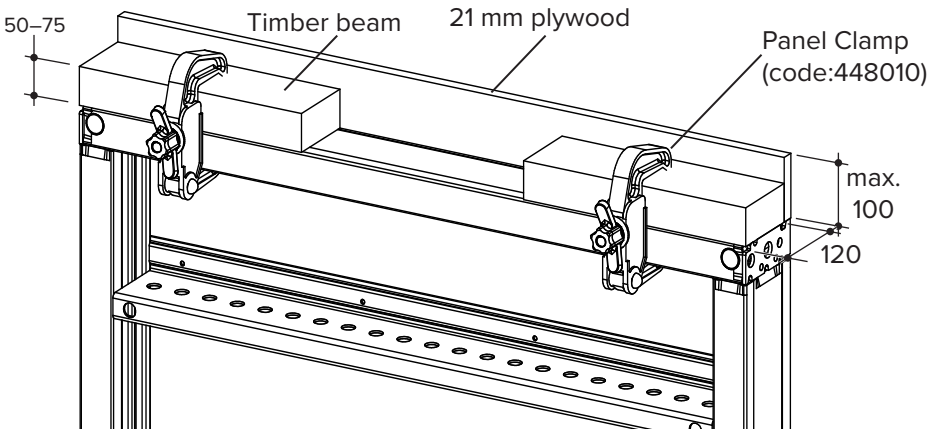
Extending panels vertically will increase the tie loads. Keep this in mind when planning the design.

Check that all connectors are tight and, if necessary, retighten before every use and every time they are moved.

7.1 Extensions up to 100 mm (with Panel Clamp)

Step 1 Use Panel Clamps to attach timber beams to the top edge profile of the panel to be extended.

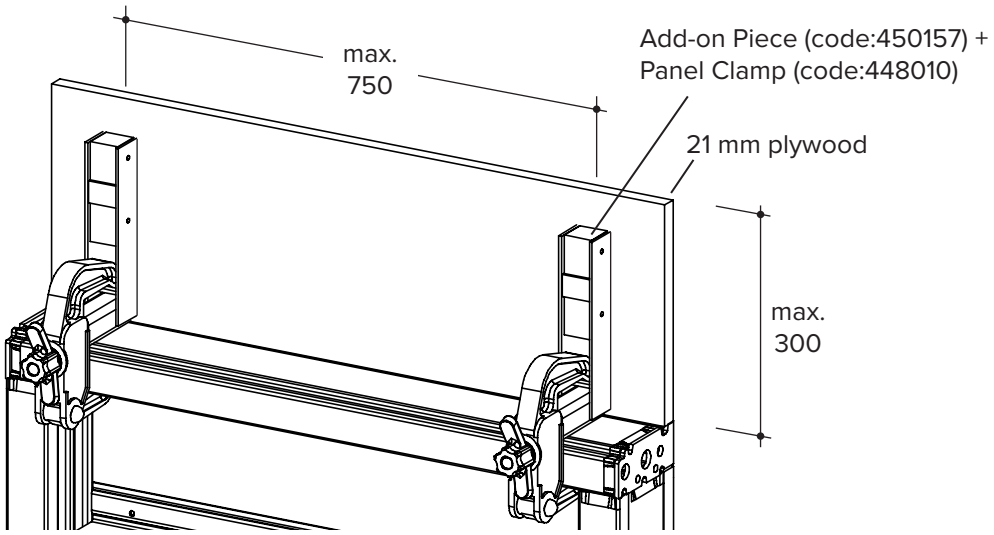
Step 2 Nail plywood, 21 mm thick and max. 100 mm high, to the timbers.



7.2 Extensions up to 300 mm (with Panel Clamp and MANTO Add-on Piece)

Step 1 Use Panel Clamps to attach MANTO Add-on Pieces to the top edge profile of the panel to be extended. Maximum between the MANTO Add-on Pieces: 750 mm.

Step 2 Nail plywood, 21 mm thick and max. 300 mm high, to the MANTO Add-on Pieces. The MANTO Add-on Pieces have a wooden strip for this purpose.

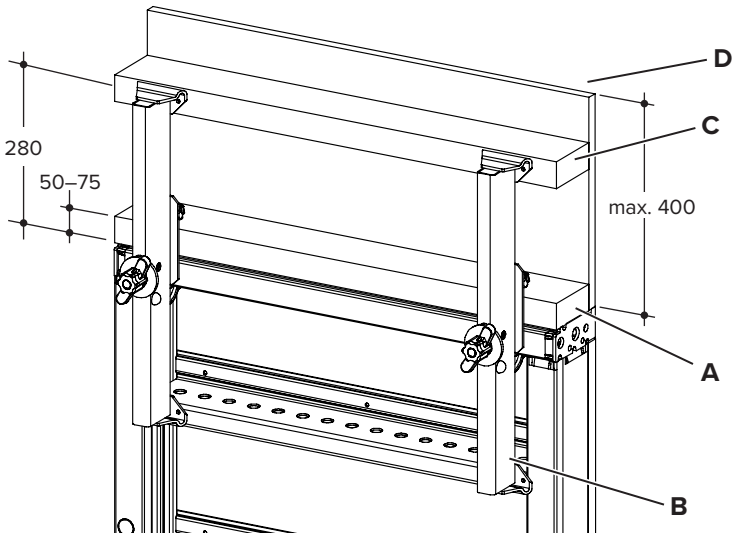


7.3 Extensions up to 400 mm (with MANTO Aligning Panel Clamp)

Step 1 Use 2no. MANTO Aligning Panel Clamps (**B,** code:448000) to attach a timber beam (**A**) to the top edge profile of the panel to be extended.

Step 2 Nail a second timber beam (**C**) to the upper arms of the MANTO Aligning Panel Clamps. There are nail holes at the ends of the arms of the MANTO Aligning Panel Clamp to accommodate the nails.

Step 3 Nail plywood (**D**), 21 mm thick and max. 400 mm high, to the timber beams.

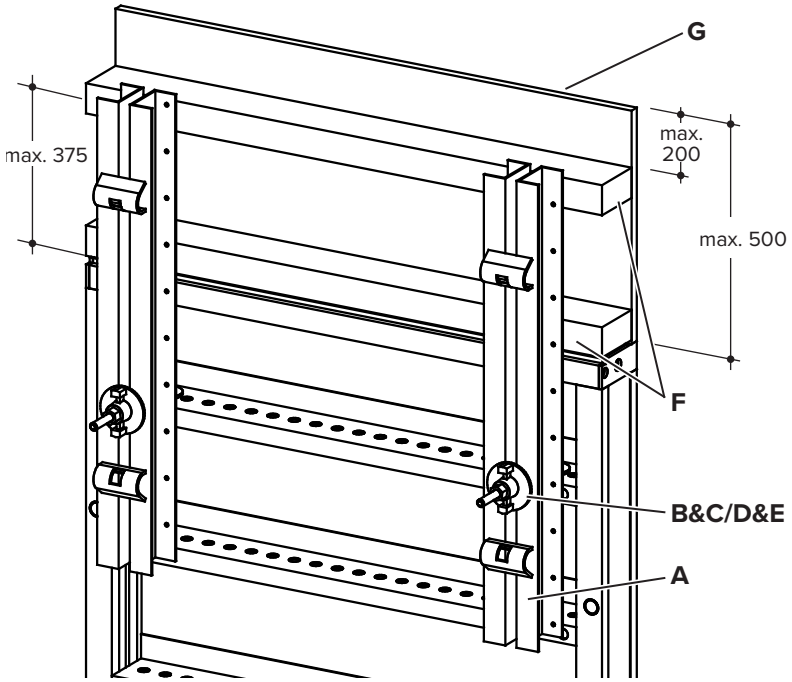


7.4 Extensions up to 500 mm (with Multipurpose Waler 100)

Step 1 Fasten the Multipurpose Waler 100 (**A**, code:450764) to the uppermost H-rib on the MANTO panels with the aid of Waler Spanners (**B**, code:452053) and Tension Nuts (**C**, code:197332) or with PLATINUM 100 Multi Bolts (**D**, code:605810) and MANTO Tie Nuts (**E**, code:464600).

Step 2 Nail 2no. timber beams (**F**) to the Multipurpose Waler 100. The Multipurpose Waler 100 has nail holes in the flanges.

Step 3 Nail plywood (**G**), 21 mm thick and max. 500 mm high, to the timber beams.



Unless stated otherwise, all dimensions are given in mm.

8 Connecting (extending) panels vertically

In situations where extensions of more than 500 mm in height are required, the MANTO formwork system allows the formwork to be extended by attaching MANTO Panels to the top edge of other MANTO panels.

The general rules for joining MANTO panels to one another are as follows:

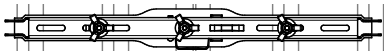
- The vertical joints of the lowermost MANTO panels are normally secured using 2no. MANTO Aligning Panel Clamps (code:448000).
- The vertical joint of MANTO panels of up to 0.90 m is secured using 1no. MANTO Aligning Panel Clamp (code:448000).
- The vertical joint of MANTO panels of more than 0.90 m is secured using 2no. MANTO Aligning Panel Clamps (code:448000).

The illustrations on the following pages show typical tie positions and connecting arrangements between stacked MANTO panels.

For clarity, a legend of the components used is shown below.


MANTO Aligning Panel Clamp (code:448000)


MANTO Tie Nut (code:464600) or Tie Nut 150 (code:531481)


PLATINUM 100 MANTO Extension Bar (code:607000)

Check that all connectors are tight and, if necessary, retighten before every use and every time they are moved.

The arrangements shown here take into account only the weight of the individual components. If additional components such as platforms are attached, the number of connectors must be adjusted to accommodate the actual weight.

When using a pouring platform with horizontally arranged extended panels, always place the tie rods at the top level or use a PLATINUM 100 Bulkhead Clamp (code:604328).

For the arrangements shown in this section, it is assumed that for the purpose of raising panels from the horizontal, the Safe Working Moment of the MANTO Aligning Panel Clamp is 1.20 kNm.

Negative bending capacity of the MANTO Aligning Panel Clamp (Refer to page 26) means that the plywood is facing the ground (downwards) during the process of lifting a panel assembly. The bending capacity of the MANTO Aligning Panel Clamp is greater due to the possibility that the cantilever arms of the MANTO Aligning Panel Clamp are in contact with the ribs of the panel.

Positive bending capacity means that the plywood is facing upwards during the lifting process. The capacity is less because only the claws of the clamp are in contact with the panels.

The number of horizontal joints subjected to bending may vary depending on the formwork height and the quantity of parts attached to the formwork.

The PLATINUM 100 Extension Bar can be used instead of Aligning Panel Clamps (Refer to section 8.3 on page 93). One Extension Bar is used in place of 4no. MANTO Aligning Panel Clamps. It offers the option of attaching alignment struts.

Note: Differences between MANTO generations when extending

All of the extensions described in this section can be constructed with the MANTO generations currently available. The quantity of connectors indicated here applies to all generations.

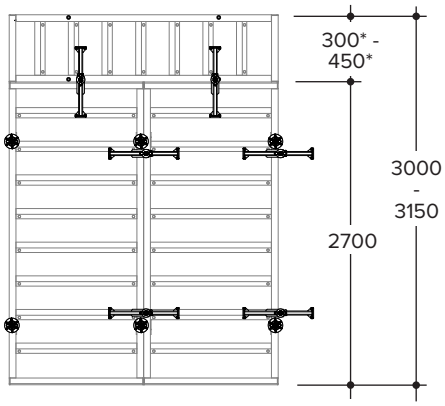
However, the new vertical profiles on MANTO G3 and MANTO G3 M panels expand the potential use of these panels. The PM Aligning Wedge Clamp can also be attached to the horizontal joint on MANTO G3 and MANTO G3 M panels. The PM Aligning Wedge Clamp always has to be placed over one of the vertical profiles. Thus no more than 2no. PM Aligning Wedge Clamps can be places on the horizontal joint of each panel.

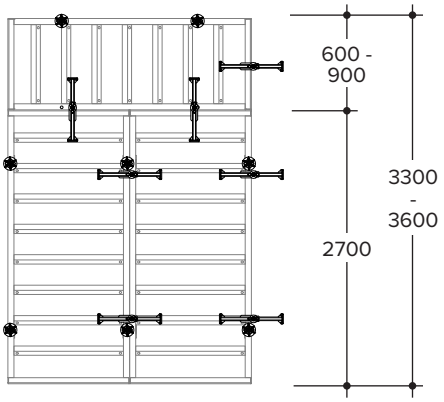
Always attach the PM Aligning Wedge Clamp such that it rests against the vertical profile on both panels.

If more than 2no. connectors are needed per panel, using the PM Aligning Wedge Clamp is not advisable. Using different types of connectors in one structure poses a risk of incorrect assembly. The exception to this rule is the PLATINUM 100 Extension Bar, which is usually attached with one additional connector per panel.

8.1 Using the MANTO Aligning Panel Clamp, ties and MANTO Panels 2.70 m

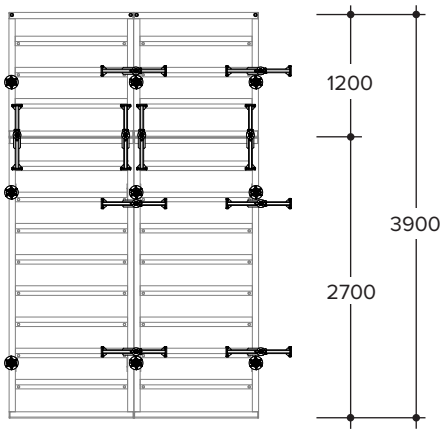
Formwork height: 3.30 m to 3.60 m

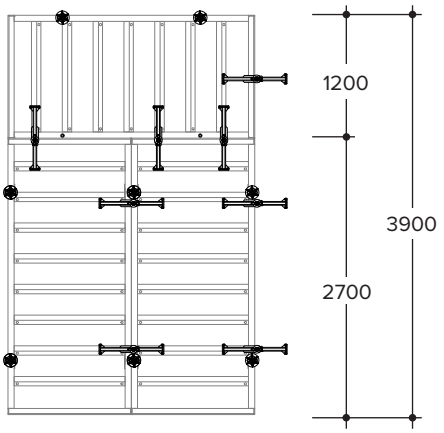




Panels marked with (*) do not represent the real panel width and are for illustration purposes only.

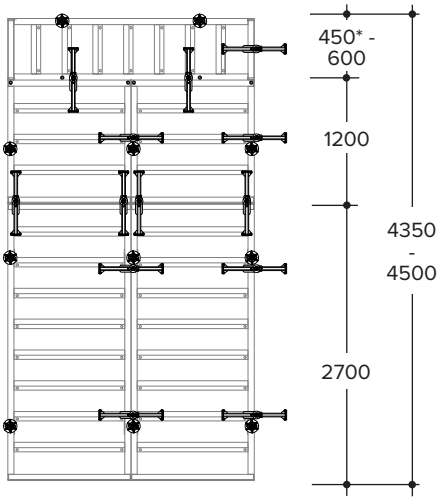
Formwork height: 3.90 m

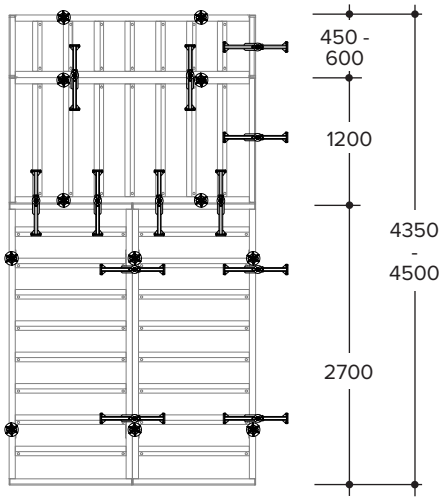




Unless stated otherwise, all dimensions are given in mm.

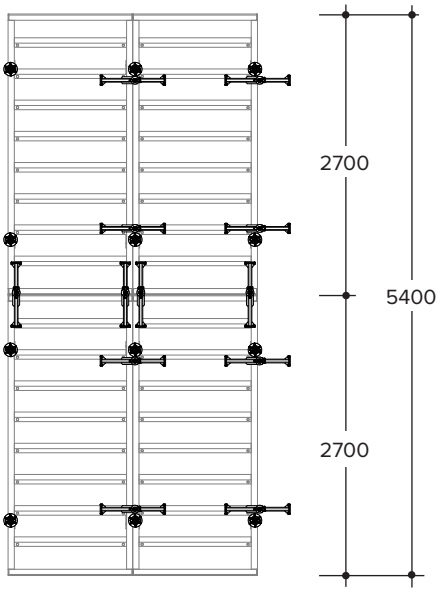
Formwork height: 4.35 m to 4.50 m

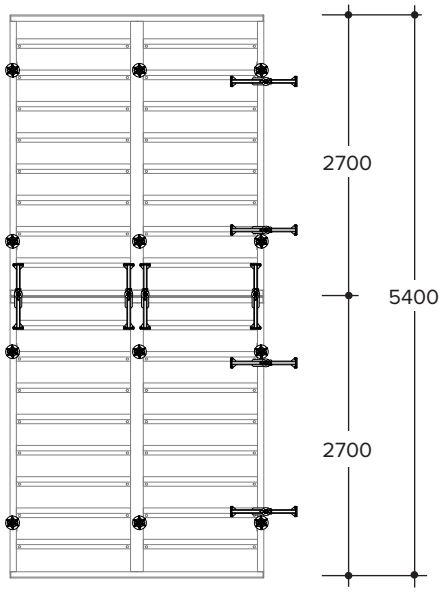




Panels marked with (*) do not represent the real panel width and are for illustration purposes only.

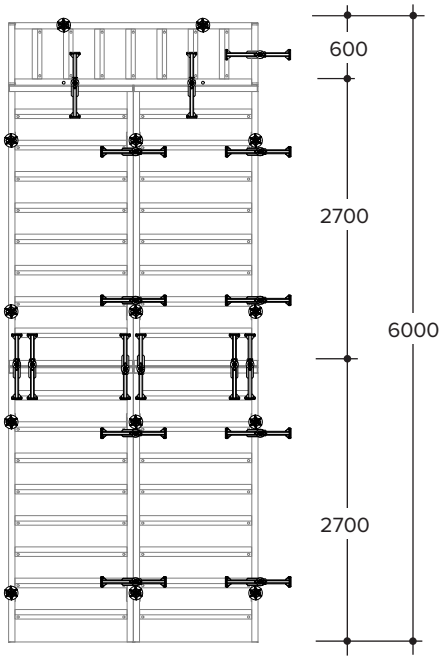
Formwork height: 5.40 m



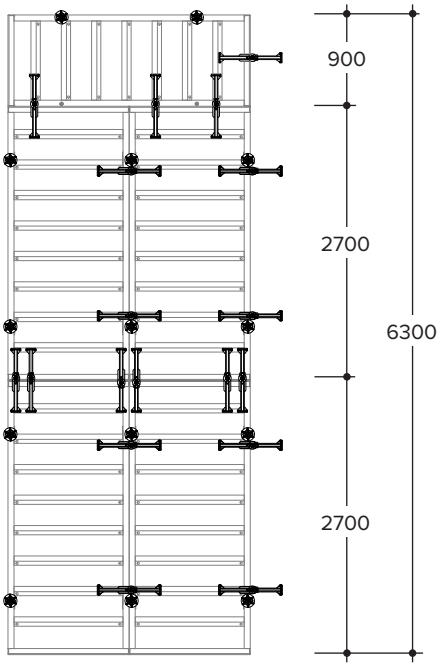


Connecting (extending) panels vertically

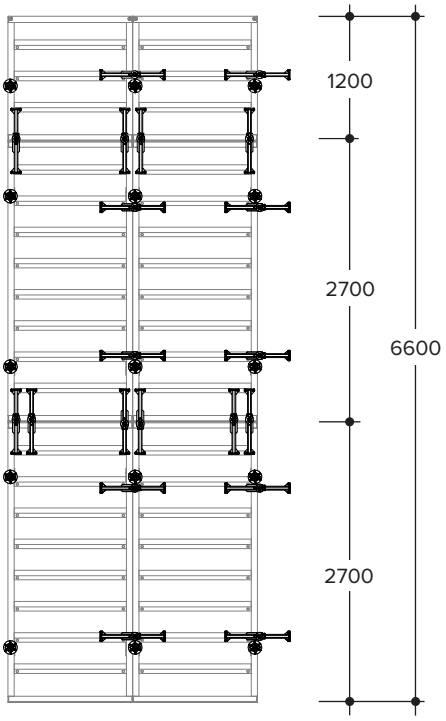
Formwork height: 6.00 m

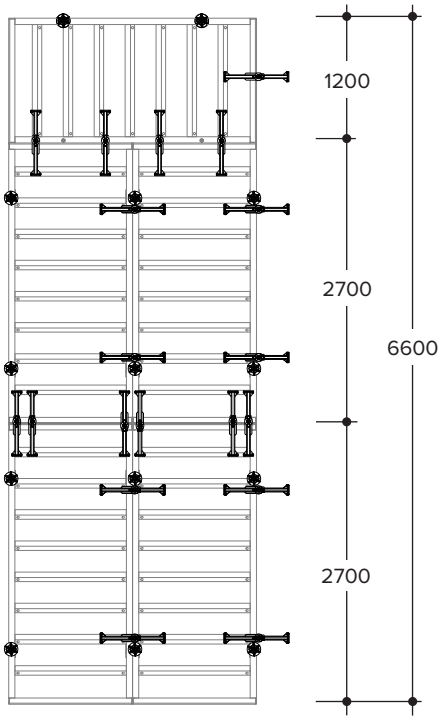


Formwork height: 6.30 m



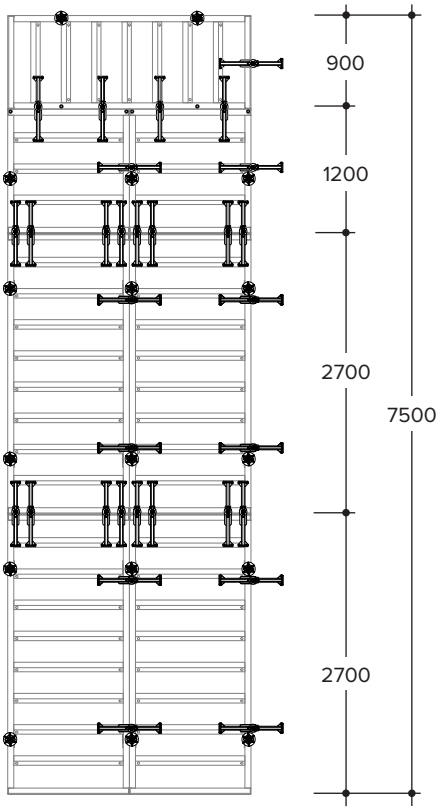
Formwork height: 6.60 m

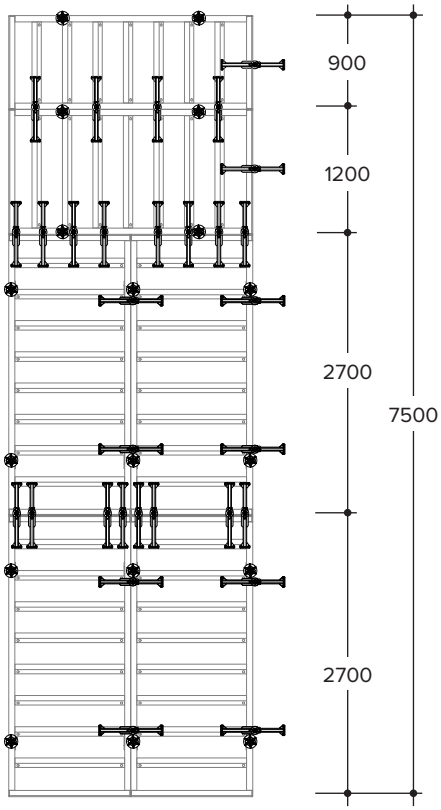




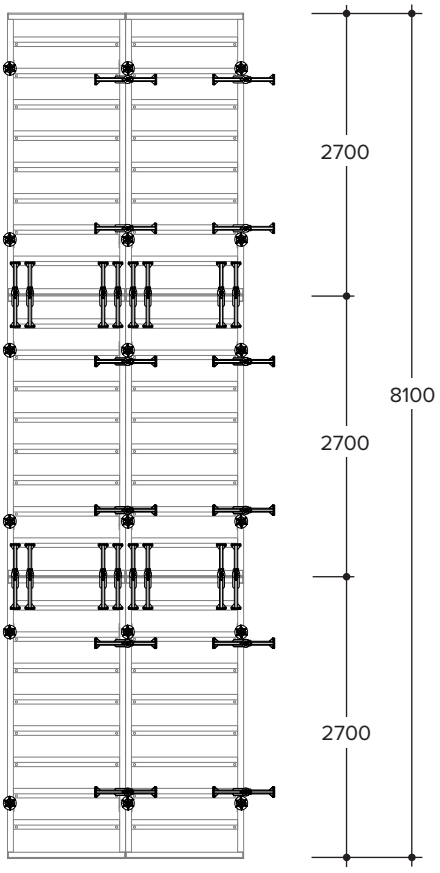
Unless stated otherwise, all dimensions are given in mm.

Formwork height: 7.50 m





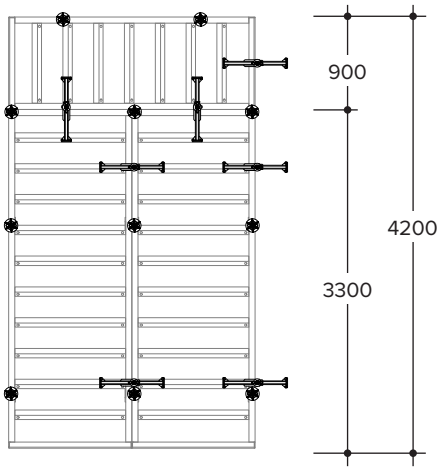
Formwork height: 8.10 m



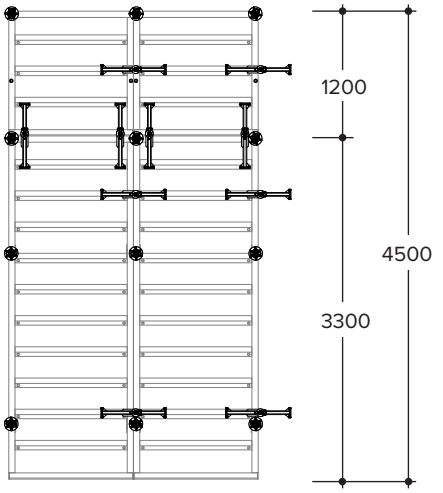
Unless stated otherwise, all dimensions are given in mm.

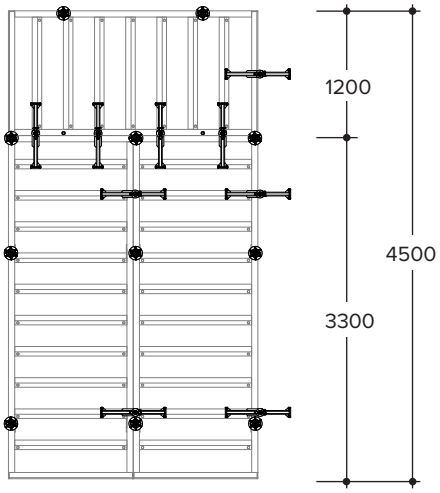
8.2 Using the MANTO Aligning Panel Clamp, ties and MANTO panels 3.30 m

Formwork height: 4.20 m

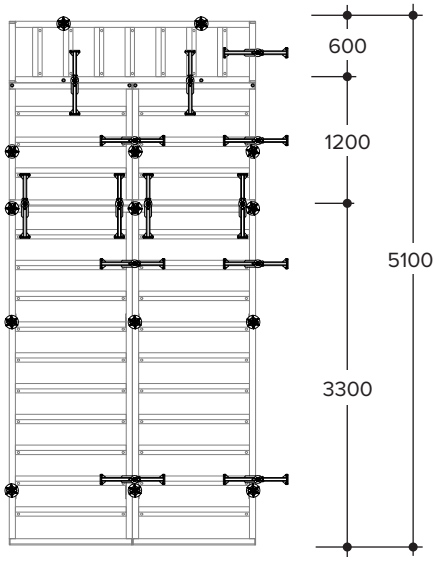


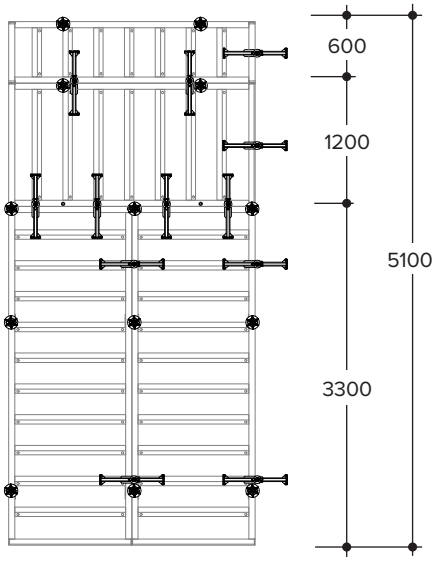
Formwork height: 4.50 m





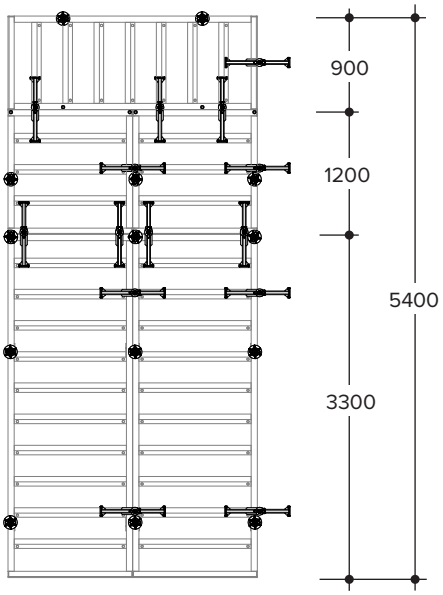
Formwork height: 5.10 m

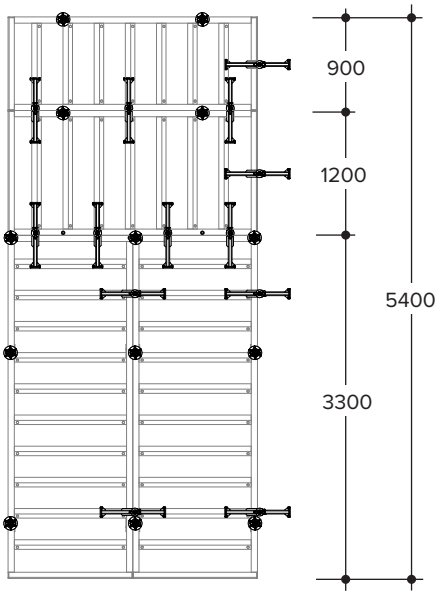




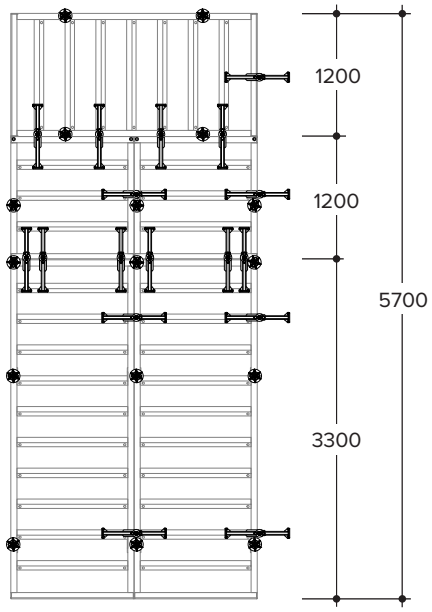
Unless stated otherwise, all dimensions are given in mm.

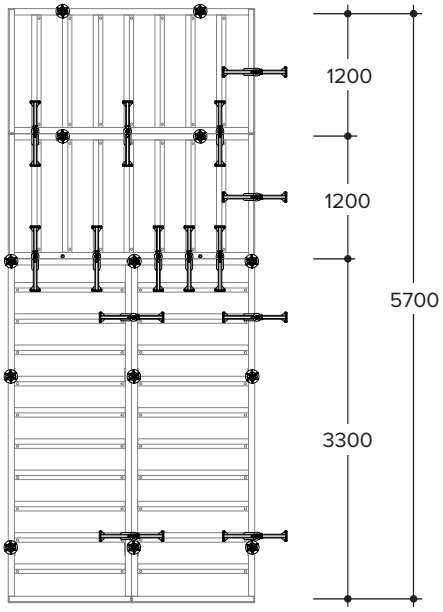
Formwork height: 5.40 m





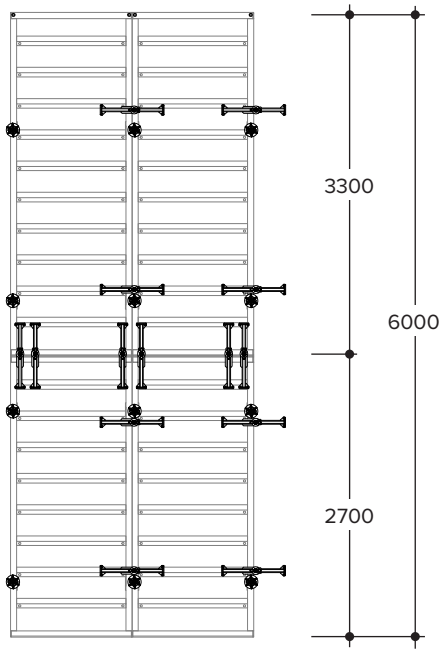
Formwork height: 5.70 m



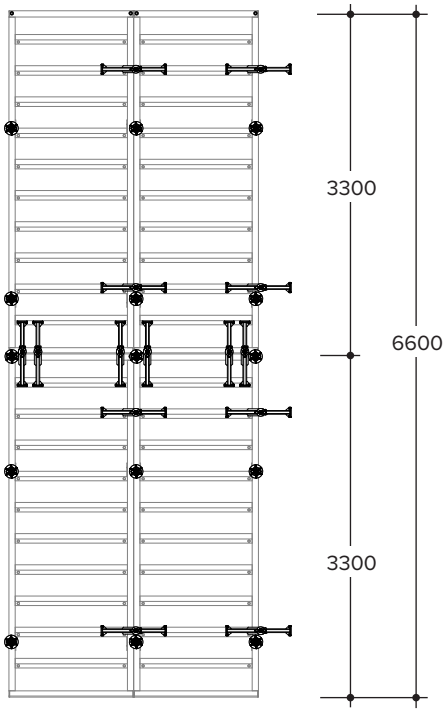


Connecting (extending) panels vertically

Formwork height: 6.00 m

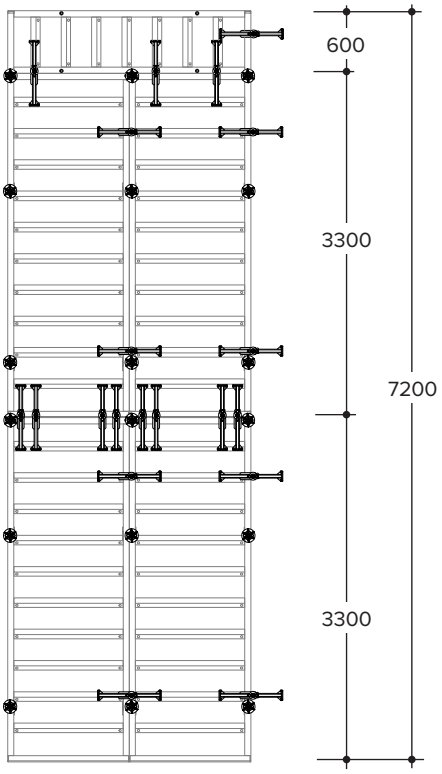


Formwork height: 6.60 m

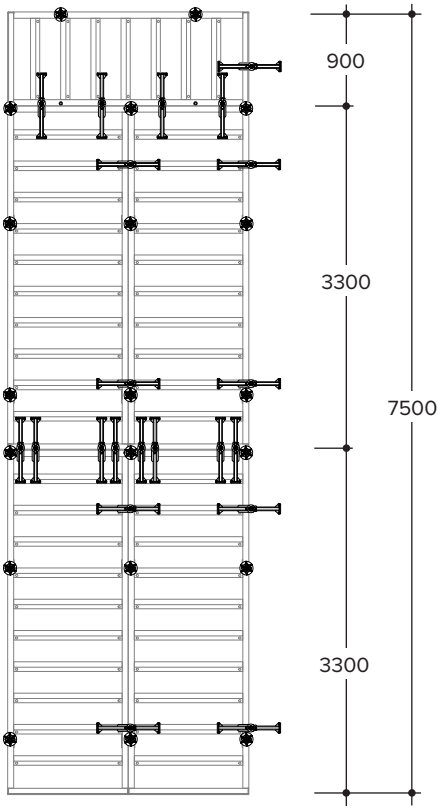


Unless stated otherwise, all dimensions are given in mm.

Formwork height: 7.20 m



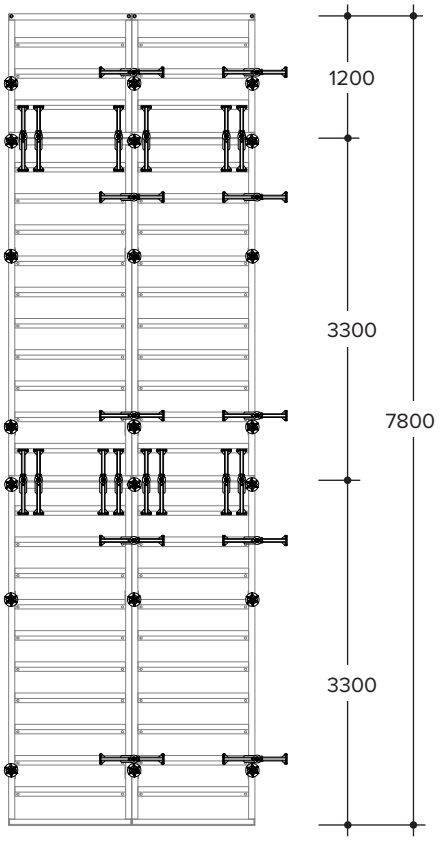
Formwork height: 7.50 m

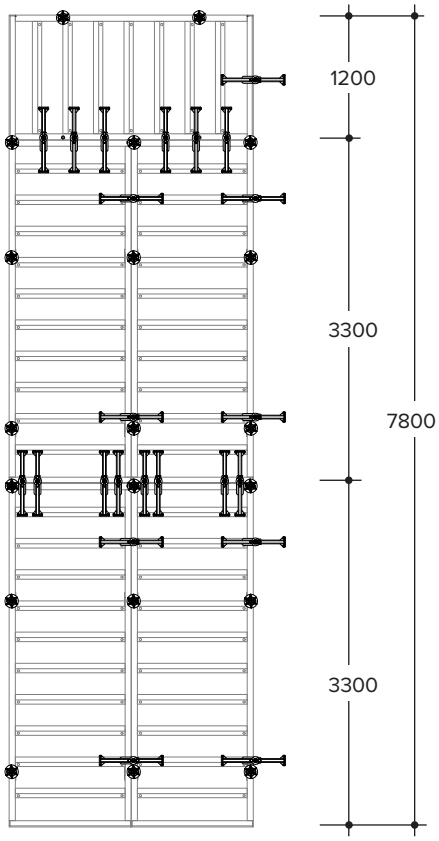


Unless stated otherwise, all dimensions are given in mm.

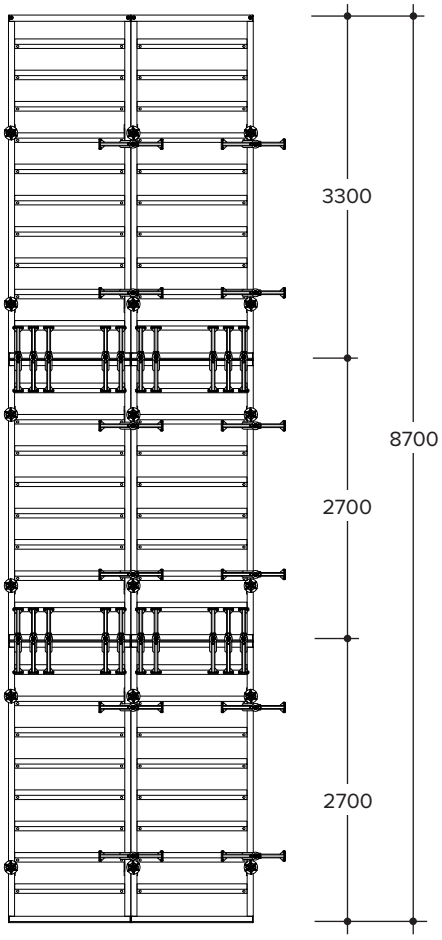
Connecting (extending) panels vertically

Formwork height: 7.80 m



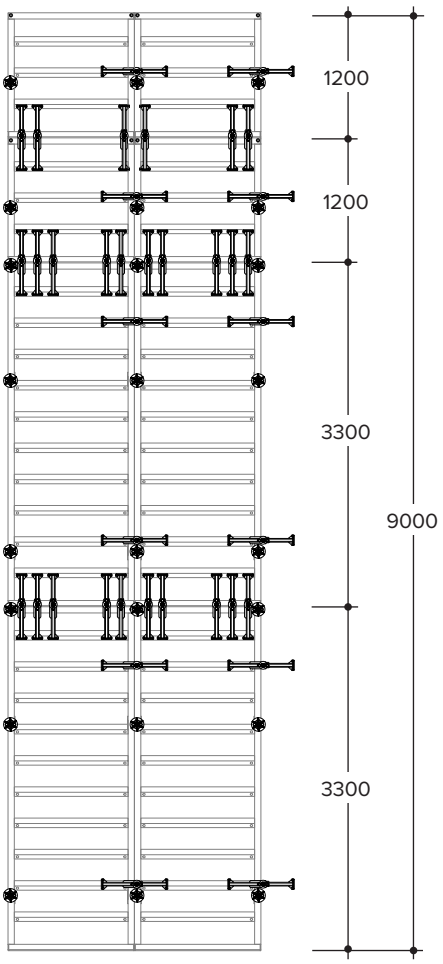


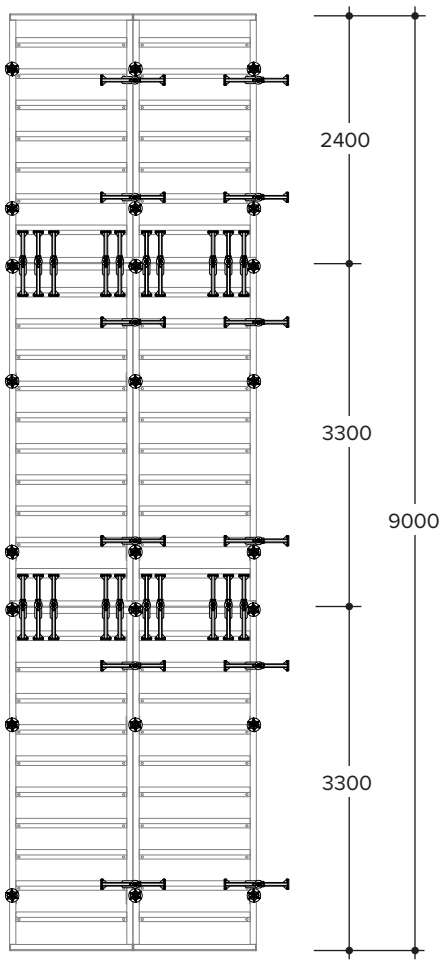
Formwork height: 8.70 m



Unless stated otherwise, all dimensions are given in mm.

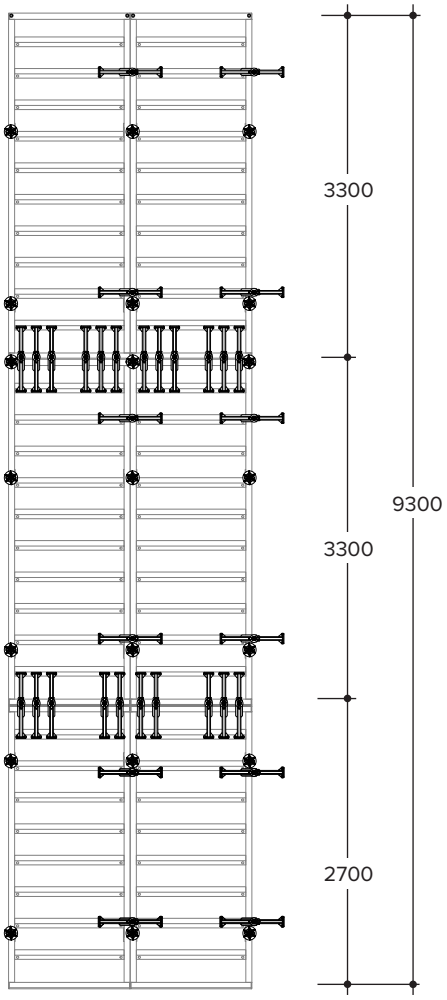
Formwork height: 9.00 m



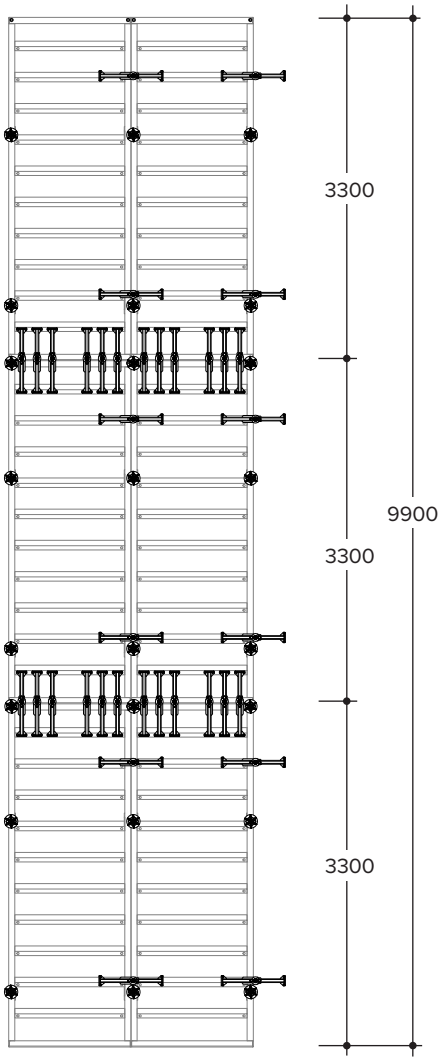


Connecting (extending) panels vertically

Formwork height: 9.30 m



Formwork height: 9.90 m

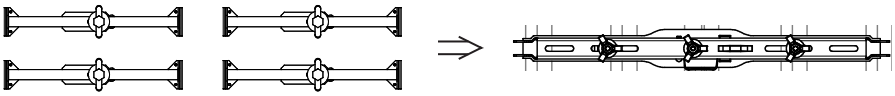


Unless stated otherwise, all dimensions are given in mm.

8.3 With the PLATINUM 100 Extension Bar

The PLATINUM 100 Extension Bar can be used instead of the MANTO Aligning Panel Clamp to stack panels. The Extension Bar is used to securely connect stacked panels at the panel joint and to align them. Alignment struts can also be attached to the Extension Bar.

Rule of thumb: 1no. Extension Bar replaces 4no. Aligning Panel Clamps!



At least 2no. connectors have to be used to attach a stacked panel to the panel below it. Never use just 1no. Extension Bar per panel.

The PLATINUM 100 Extension Bar cannot be used with horizontally aligned panels.

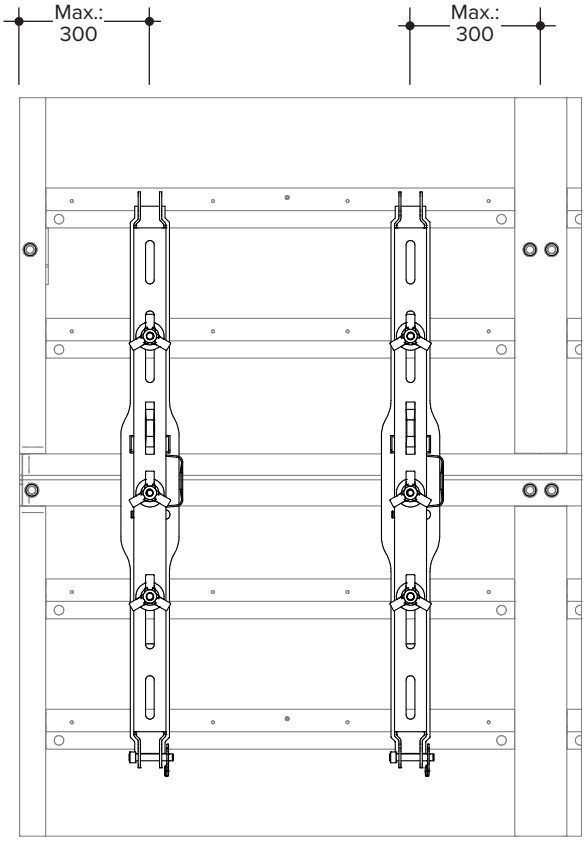
8.3.1 Attaching Extension Bars

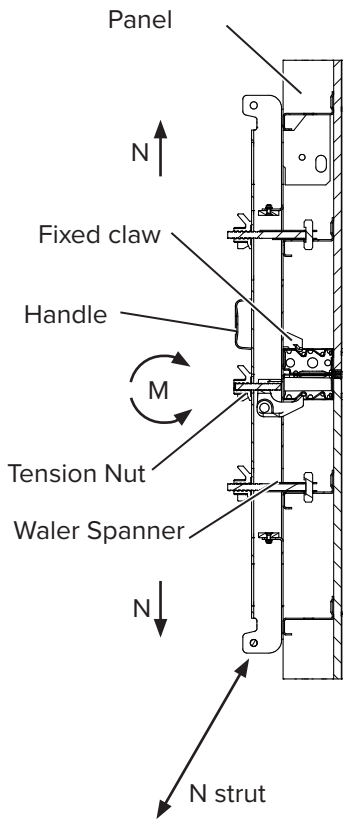
Place the PLATINUM 100 Extension Bars at a maximum distance of 300 mm from the panel edge or the centre profile. The loads stated on page 27 are only valid if the PLATINUM 100 Extension Bars are placed accordingly.

This applies when using 3.30 m MANTO panels as well.

Step 1 Hook the Extension Bar to the frame of the upper panel and secure it with the Tension Nut. The fixed claw should face upward.

Step 2 Hook the Waler Spanners to the walers. Secure the Extension Bar by tightening the Tension Nut.

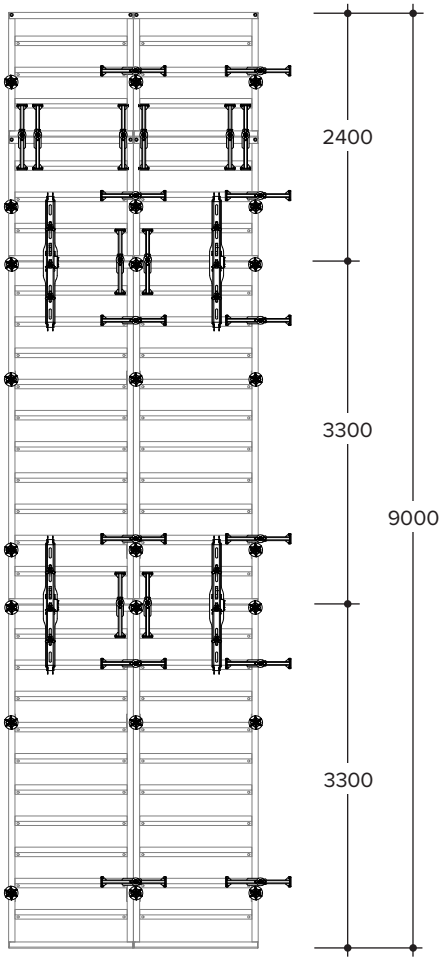




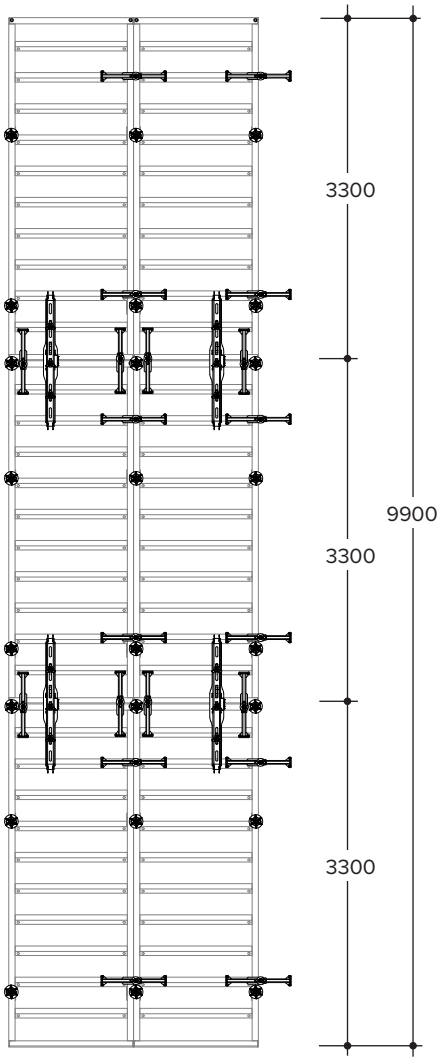
Connecting (extending) panels vertically

Example of application

Formwork height: 9.00 m



Formwork height: 9.90 m

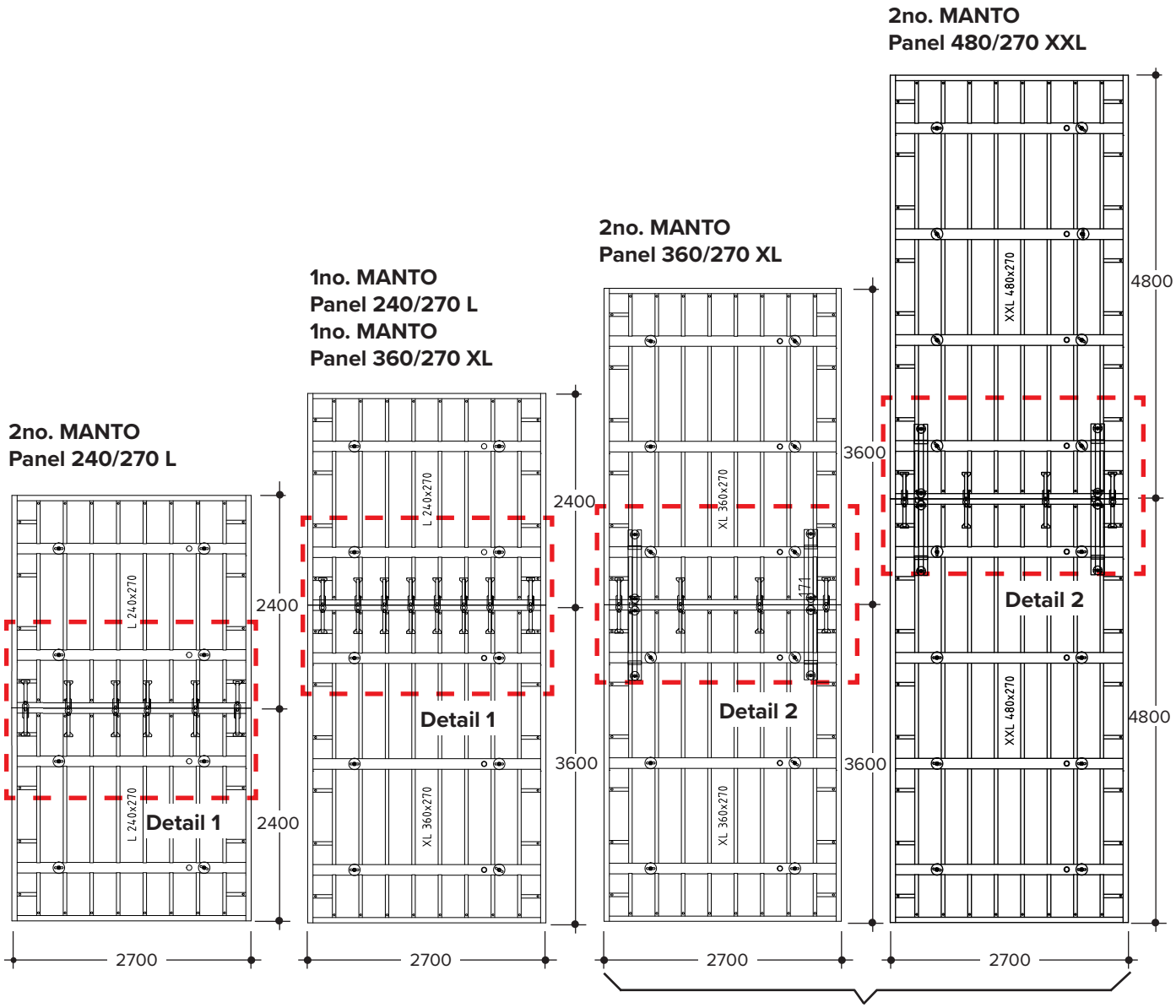


Unless stated otherwise, all dimensions are given in mm.

8.4 Using MANTO Aligning Panel Clamp, ties and MANTO XXL panels

Typical arrangements

The following illustrations show typical tie positions and connecting arrangements between MANTO XXL panels when joining panels in height.



6no. MANTO Aligning Panel Clamp

8no. MANTO Aligning Panel Clamp

4no. MANTO Aligning Panel Clamp
Steel Waler F 171
8no. Waler Spanner
8no. Tension Nut

The illustrations above show typical connections between MANTO XXL panels. Other arrangements and/or variations have to be designed according to the respective job requirements.

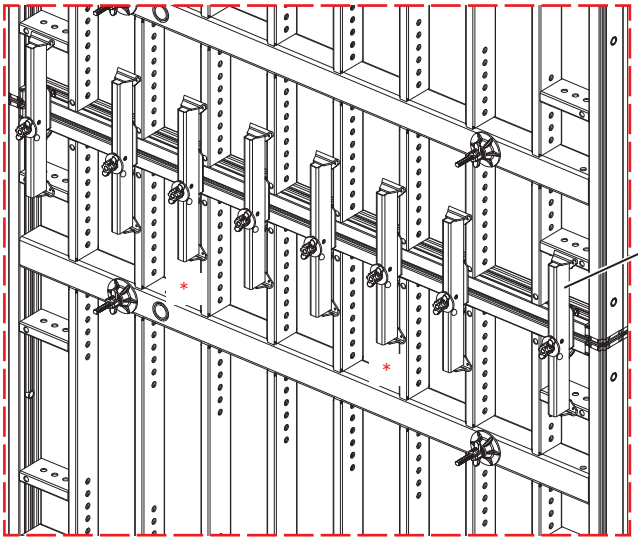
Connecting (extending) panels vertically

Typical arrangement

The following details show a typical vertical connection between MANTO XXL panels and one of the following panels:

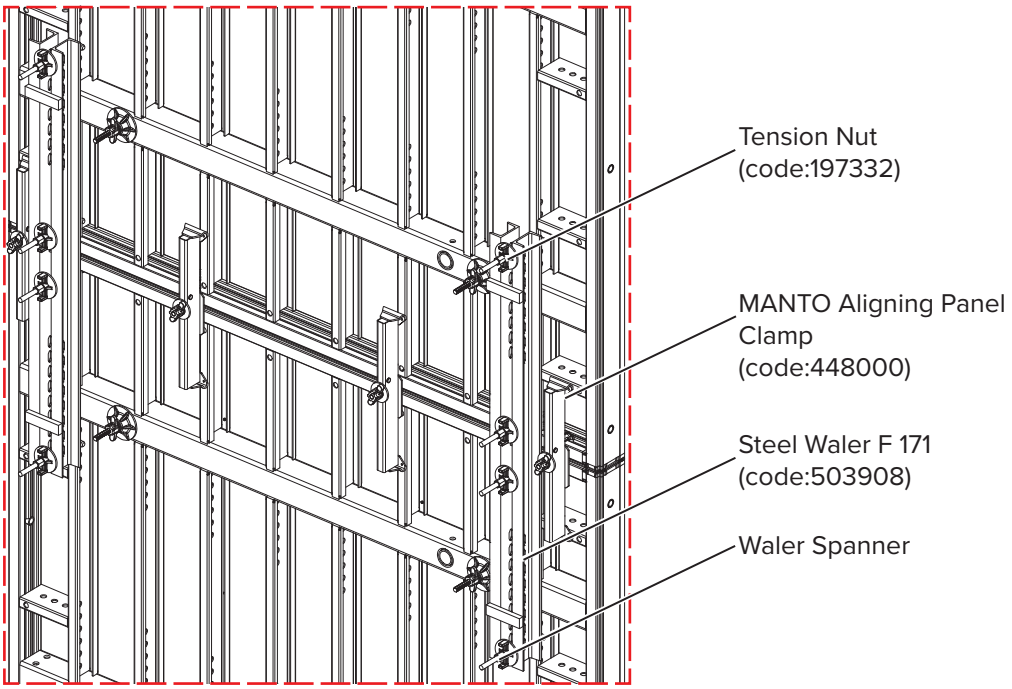
Detail 1

- Panel 240/270 L (code:600860) + Panel 240/270 L (code:600860)
  6no. MANTO Aligning Panel Clamp
- Panel 240/270 L (code:600860) + Panel 360/270 XL (code:600861)
  8no. MANTO Aligning Panel Clamp



Detail 2

- Panel 360/270 XL (code:600861) + Panel 360/270 XL (code:600861)
  4no. MANTO Aligning Panel Clamp
  2no. Steel Waler F 171
  2no. Waler Spanner
  8no. Tension Nut
- Panel 480/270 XXL (code:600862) + Panel 480/270 XXL (code:600862)
  Like above.



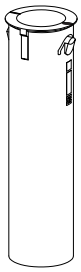
Unless stated otherwise, all dimensions are given in mm.

9 Tying

9.1 Using MANTO G3 plastic inserts

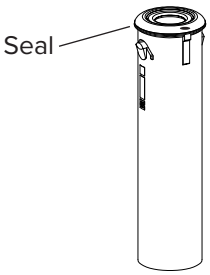
9.1.1 Selecting MANTO G3 plastic inserts

The MANTO G3 plastic inserts protect the tie hole from concrete and dirt, thus reducing the effort required for cleaning and repairs. Always use the MANTO G3 plastic inserts suitable for the respective tie.



MANTO G3 DW Insert (code:607915)

- One-side operated tie system MR Tie Rod DW 15 (code:607250).
- Standard DW 15 and DW 20 ties with Tie Sleeves and Sealing Cones.



MANTO G3 Sealing Insert (code:607925)

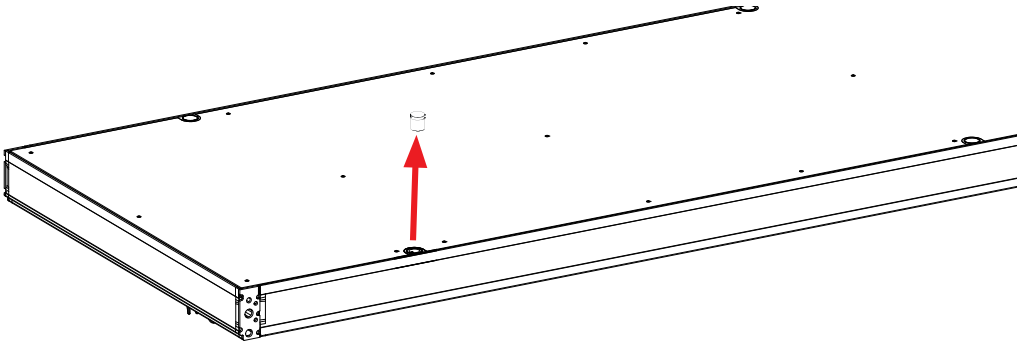
- One-side operated taper tie system DW 20 PLATINUM 100 Tie Rod (code:604300).
- MANTO Taper Tie DW 15 100 (code:608330).
- MANTO Taper Tie DW 20 100 (code:608331).
- MANTO Taper Tie DW 20 115 (code:608332).
- MANTO She Bolt DW 15 45 (code:608333).
- MANTO She Bolt DW 20 50 (code:608334).

9.1.2 Inserting MANTO G3 plastic inserts into MANTO panels

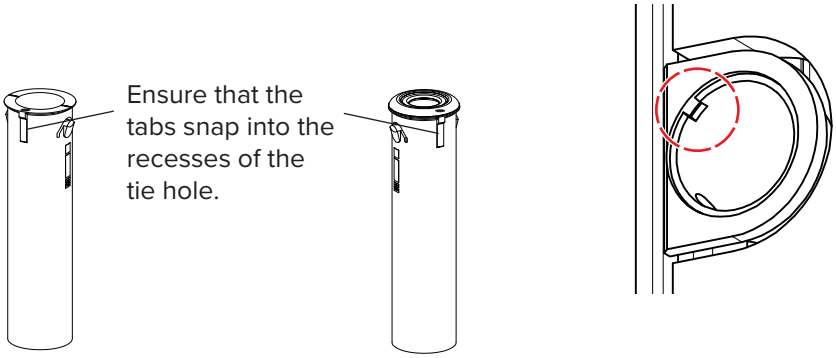
If there are no MANTO G3 plastic inserts in the tie holes on MANTO panels, MANTO G3 plastic inserts have to be placed in the tie holes before putting the panels into place.

☞	Place MANTO G3 plastic inserts in all of the tie holes. Use A-Plugs (code:602250) to seal MANTO G3 DW Inserts not in use. Use Plugs (code:197446) to seal MANTO G3 Sealing Inserts not in use.

Step 1 Remove the MANTO Plugs or A-Plugs from the MANTO panels and clean the tie holes.



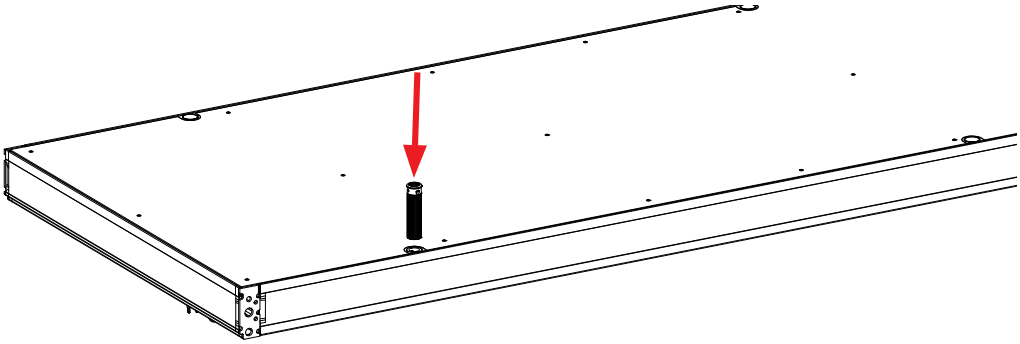
Step 2 Turn the MANTO G3 plastic insert such that the tabs line up with the recesses of the tie hole.



The tabs have to snap in completely and may not protrude. If the tabs do not snap into place properly, check the following:

- The plastic insert is pushed in far enough. Otherwise push the plastic insert in farther.
- The plastic insert is turned such that the tab lines up precisely with the recess in the tie hole. Otherwise turn the plastic insert to the proper position.
- The tie hole is clean and there is no concrete residue or coarse dirt in the tie hole. Otherwise remove the plastic insert and clean the tie hole.

Step 3 Fully insert the MANTO G3 plastic insert. The insert will lock into place.



Unless stated otherwise, all dimensions are given in mm.

9.1.3 Removing MANTO G3 plastic inserts

Use the MANTO G3 Replacement Tool to push out the MANTO G3 plastic inserts. Panels lying on the ground have to be placed e.g. on a timber beam (at least 140 mm high) so that the MANTO G3 plastic inserts can fall out. Removing the MANTO G3 plastic inserts destroys them, so they cannot be used again.

CAUTION

Risk of injury from flying metal splinters!

A ring may form around the striking surface of the MANTO G3 Replacement Tool over time.

This can cause metal splinters to detach, fly around and cause injury.

Wear gloves and safety glasses when using the MANTO G3 Replacement Tool. Grind off the ring or other damage to the striking surface.

CAUTION

Risk of crushing!

Wear suitable protective gloves when using the MANTO G3 Replacement Tool

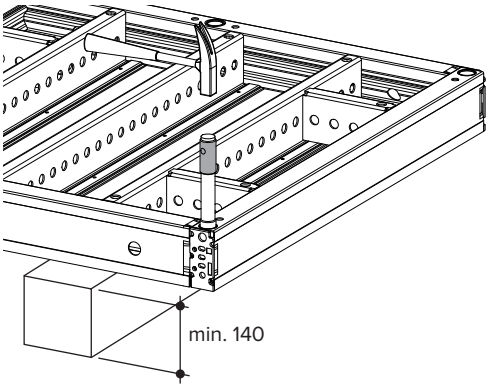
NOTE

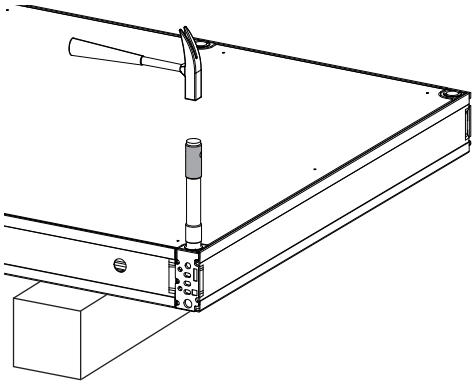
The MANTO Replacement Tool can damage the MANTO panels!

Always pound in with the MANTO G3 Replacement Tool carefully and straight.

The MANTO G3 Replacement Tool can also be used to remove concrete residue from the tie holes in the panels.

Step 1 Insert the MANTO G3 Replacement Tool in the MANTO G3 plastic insert and pound the insert out with a hammer. Plastic inserts can be struck out from the underside of the panel or from the form sheet side.

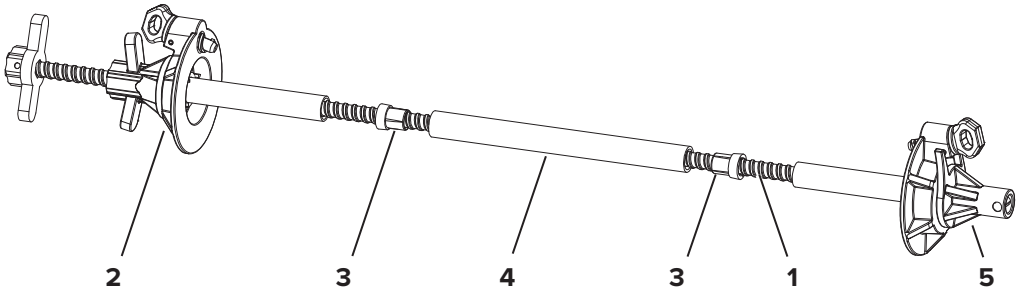




9.2 One-sided tying with the MR tie system

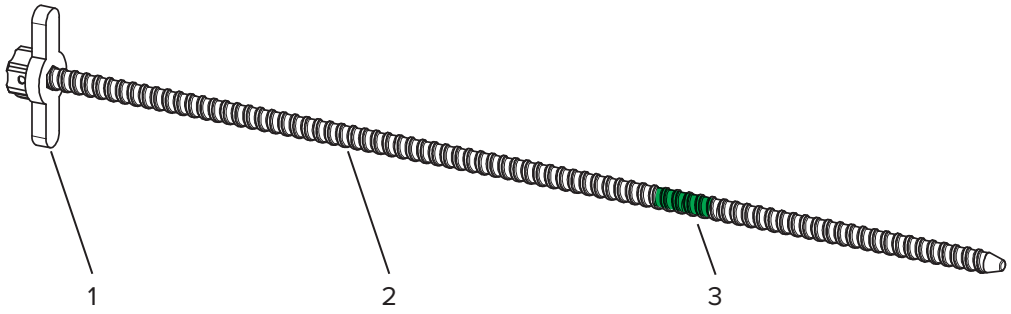
The MR tie system allows for the anchors to be fastened and fixed in place by just one person, working only from one side of the formwork. This system can only be used with MANTO panels G3 or G3 M.

9.2.1 Components of one-sided tie system



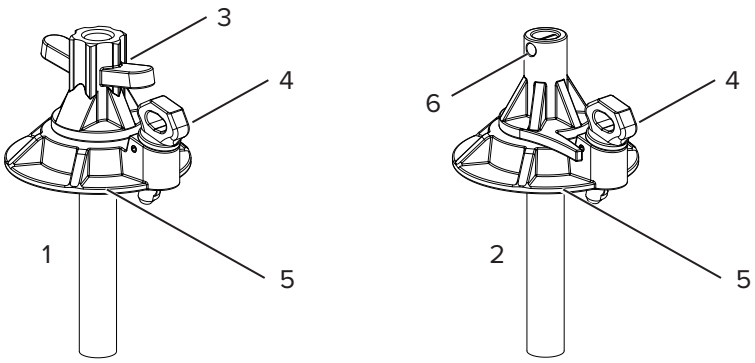
1 MR Tie Rod DW 15 (code:607250).
2 MANTO G3 Front Tie Nut (code:607230).
3 Sealing Cone (code:607122), reusable
4 Tie Sleeve DW15×2000 (Ø26/22) (code:605916)
5 MANTO G3 Rear Tie Nut (code:607240).

MR Tie Rod DW 15



1 Tie rod wing nut
2 Thread DW 15
3 Tie rod marking (coloured section).

MANTO G3 Front Tie Nut and MANTO G3 Rear Tie Nut



1 MANTO G3 Front Tie Nut (code:607230).
2 MANTO G3 Rear Tie Nut (code:607240).
3 Wing nut
4 Fixing screw
5 Washer
6 Locking pin

9.2.2 Attaching ties

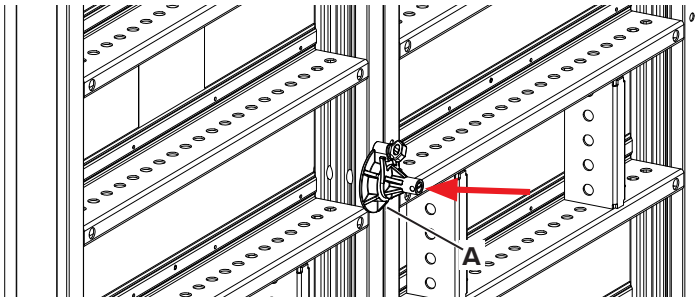
WARNING

Risk of injury from overturning formwork!

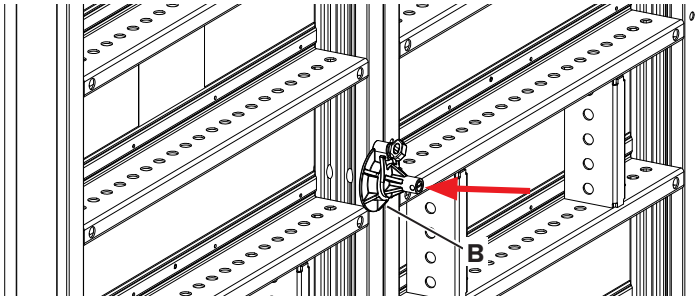
Do not allow access to platforms if the formwork is not secured against overturning.

Attaching Rear Tie Nut to MANTO panel

Step 1 Push the MANTO G3 Rear Tie Nut (**A,** code:607240) into the tie hole located on the profile of the MANTO panel until the washer rests against the profile.



Step 2 Insert the locking screw (**B**) in one of the holes at the tie position and tighten it.



Place MANTO G3 plastic inserts in all of the tie holes.

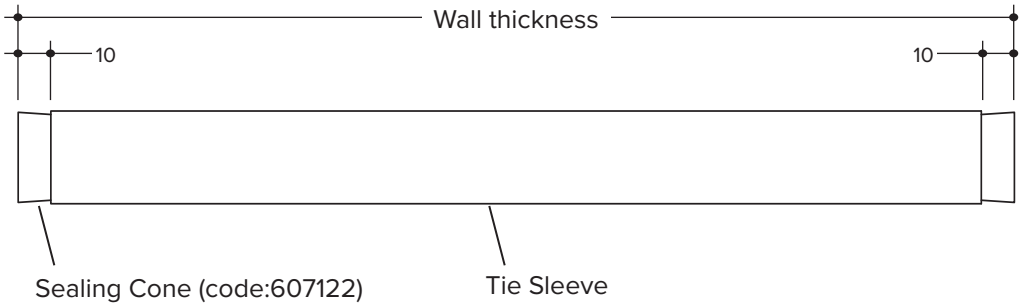
Use A-Plugs (code:602250) to seal MANTO G3 DW Inserts not in use.

Use Plugs (code:197446) to seal MANTO G3 Sealing Inserts not in use.

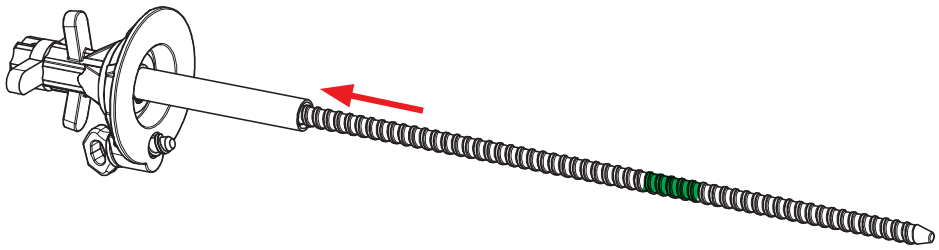
Preparing MR Tie Rod and MANTO G3 Front Tie Nut

The MR Tie Rod, MANTO G3 Front Tie Nut, Tie Sleeve and Sealing Cones form a unit that is operated from the closing side formwork.

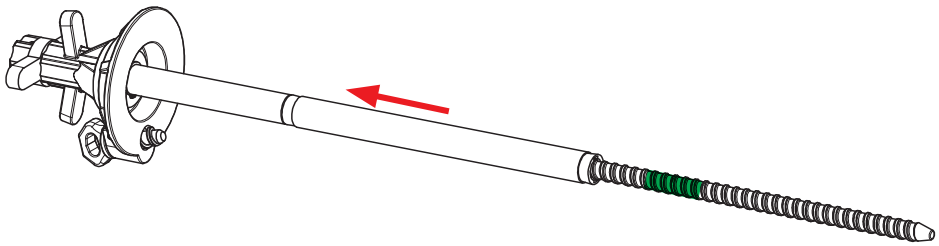
Step 3 Cut the Tie Sleeve to the required length. The length of the Tie Sleeve is the wall thickness minus 20 mm.



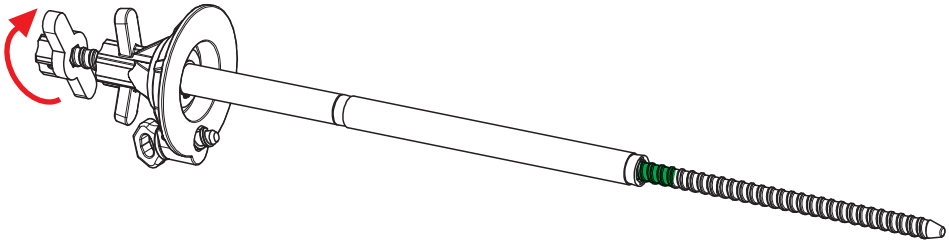
Step 4 Screw the MR Tie Rod into the MANTO G3 Front Tie Nut.



Step 5 Place the Tie Sleeve with the Sealing Cones on the Tie Rod.



Step 6 Unscrew the MR Tie Rod until the end of the Tie Sleeve is positioned at the tie rod marking.



Attaching MR Tie Rod and MANTO G3 Front Tie Nut to Advancing Side

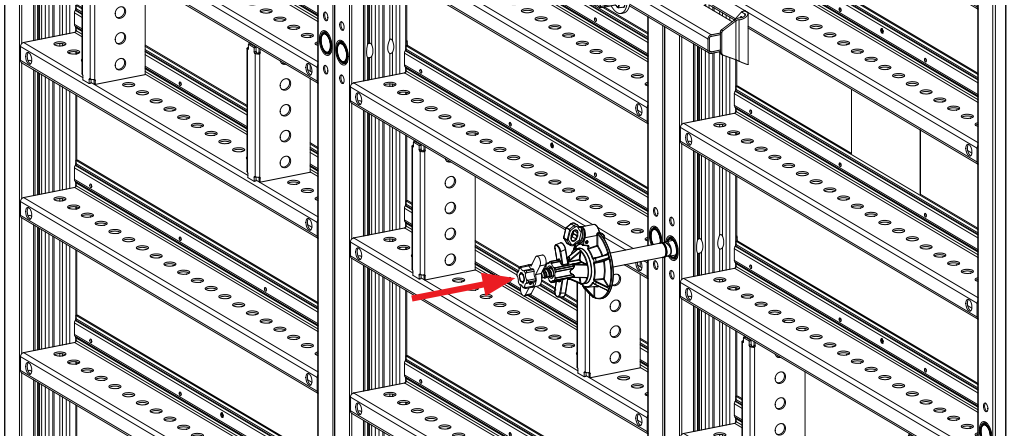
Step 1 Remove the plugs from the plastic inserts in the tie holes to be used.

Step 2 Close unused plastic inserts with plugs.

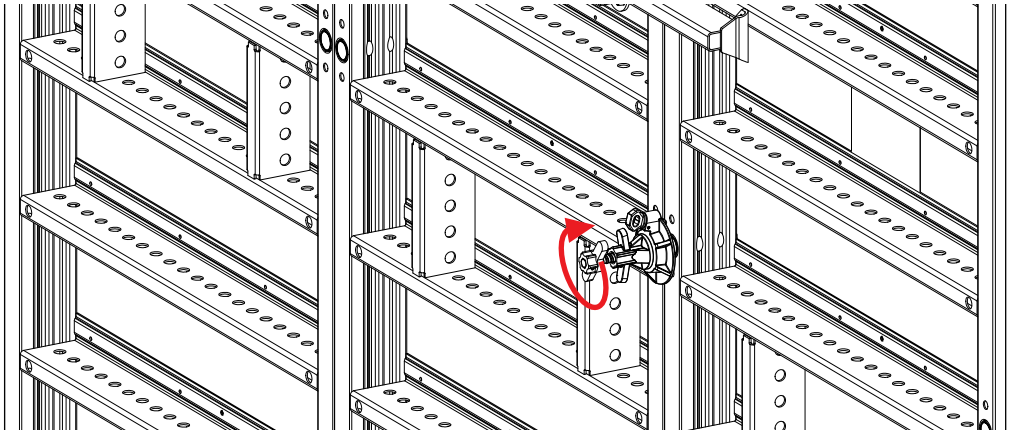
Step 3 Set up the formwork panels.

Unless stated otherwise, all dimensions are given in mm.

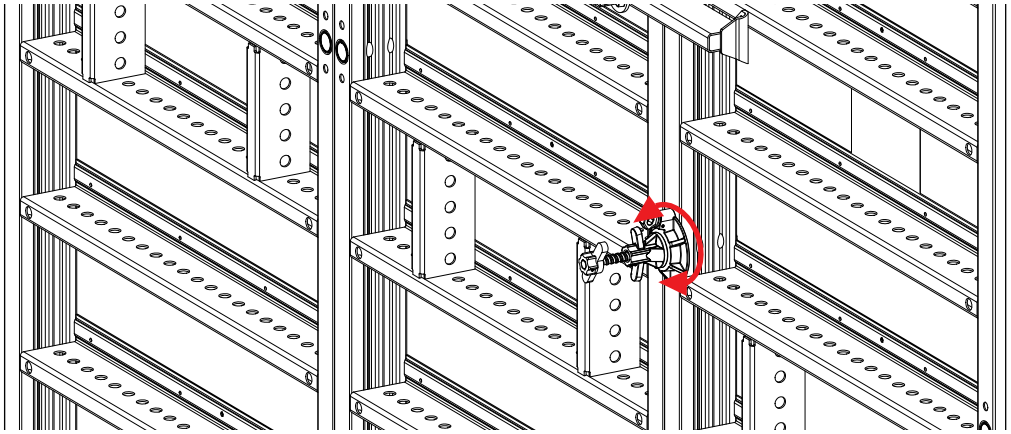
Step 4 Position the MANTO G3 Front Tie Nut with the Tie Rod, the Tie Sleeve and Sealing Cones assembled previously in the tie positions opposite the MANTO G3 Rear Tie Nuts installed in steps 1 and 2. Push the assembly through the tie holes of the opposing MANTO Panel.



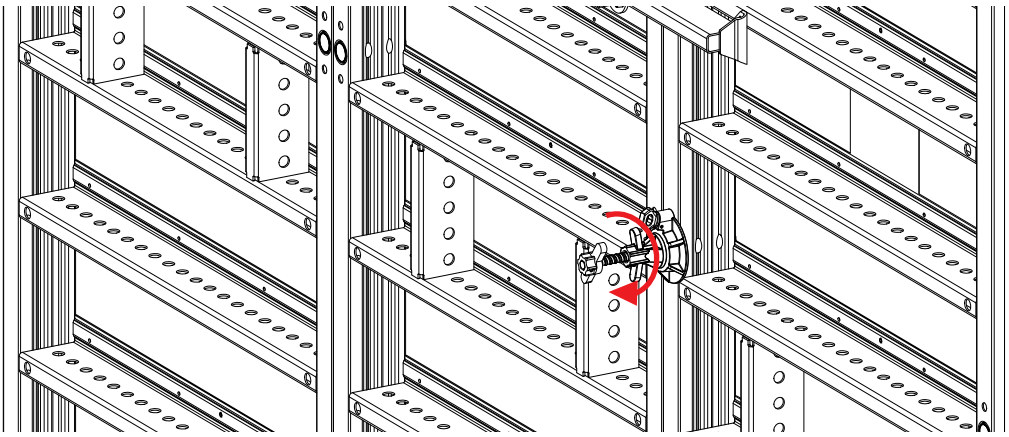
Step 5 Screw the Tie Rod all the way into MANTO G3 Rear Tie Nut until it touches the stopping pin of the MANTO G3 Rear Tie Nut and cannot be inserted any further.



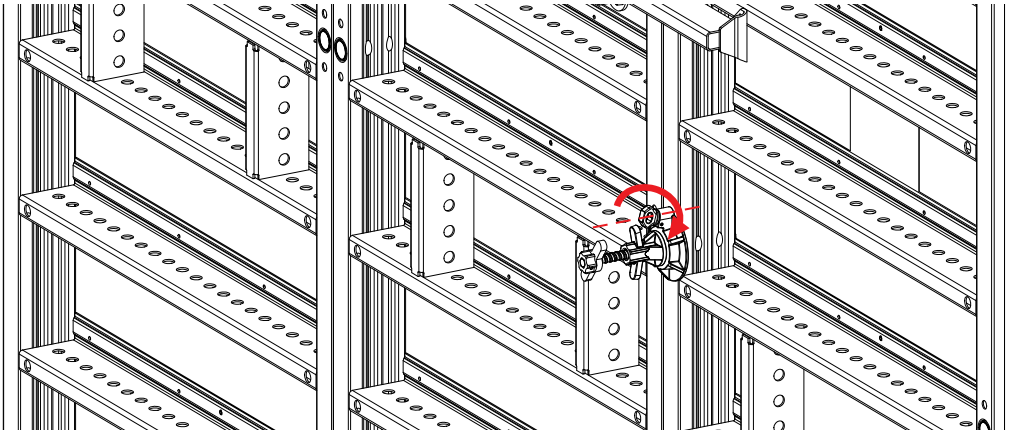
Step 6 Rotate the washer of the MANTO G3 Front Tie Nut until the locking screw is aligned with the smaller holes in the tie position.



Step 7 Screw the wing nut on the MANTO G3 Front Tie Nut as far in as possible.



Step 8 Insert the locking screw of the MANTO G3 Front Tie Nut and tighten.



Step 9 Install the remaining ties in the same way.

9.2.3 Removing MR Tie Rod

WARNING

Risk of injury from overturning formwork!

Do not allow access to platforms if the formwork is not secured against overturning.

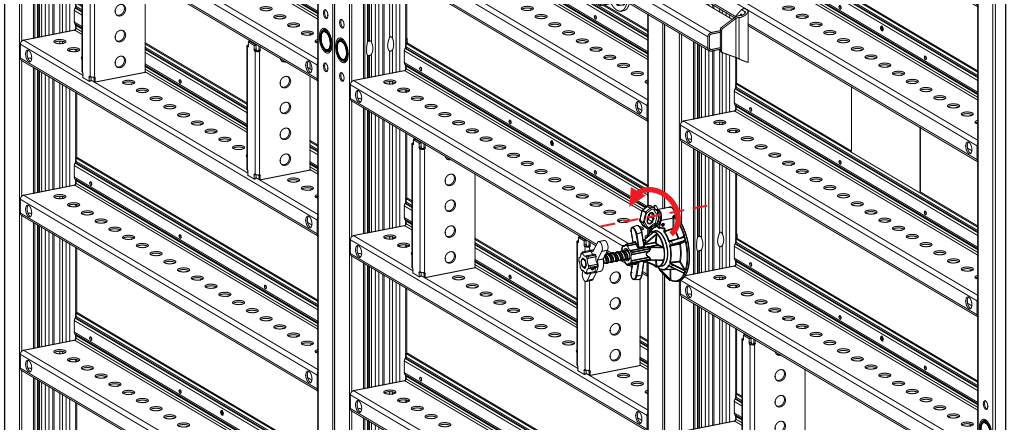
Do not remove the ties unless both sides of the formwork are secured against overturning.

NOTE

Note!

Do not move formwork until ties have been removed.

Step 1 Loosen the locking screw of the MANTO G3 Front Tie Nut and release it completely from the panel profile.



Step 2 Release the wing nut on the MANTO G3 Front Tie Nut.

Step 3 Unscrew the Tie Rod from the MANTO G3 Counter Nut (approx. 60 mm).

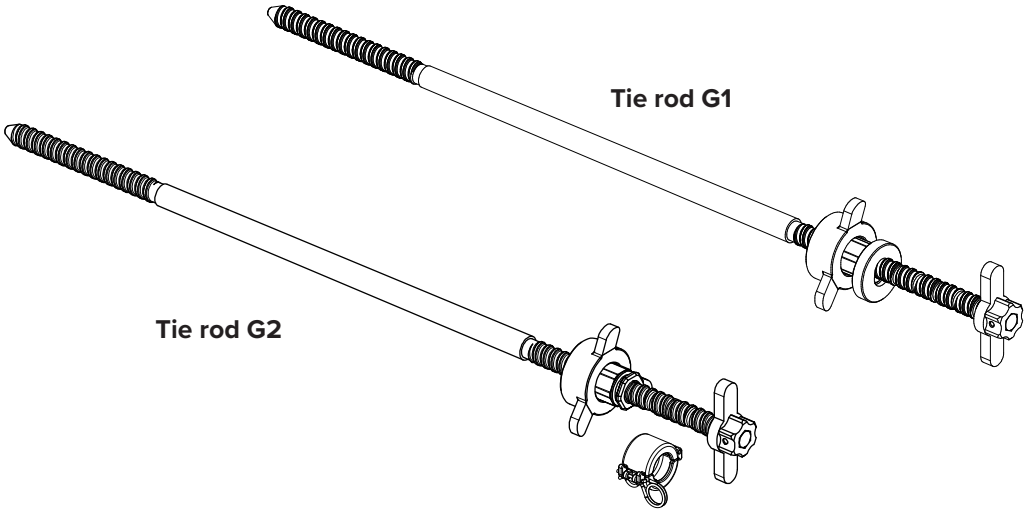
Step 4 Pull the MR Tie Rod and the MANTO G Front Tie Nut out of the formwork. The Tie Sleeve remains in the concrete. The Sealing Cones can be carefully removed after stripping and used again later.

9.3 One-sided tying with the PLATINUM 100 tie system

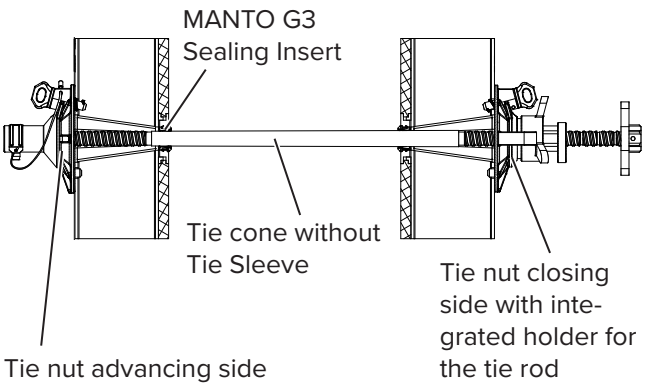
There are two versions of the PLATINUM 100 tie rod available, Generation 1 (G1) and Generation 2 (G2). The Tie Rod G2 has been modified and the adjusting washer for adjusting the wall thickness has been replaced by the hinged adjustment clip. This facilitates the adjustment of the wall thickness.

When formwork is not stacked (extended), tying can be done from the closing side in most cases. When using stacked formwork, it is advisable to install the platforms on the advancing side of the formwork and to tie from there.

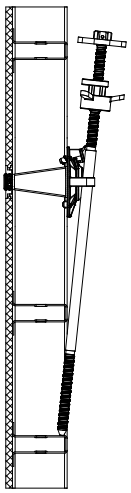
The operator always has to decide on site which side offers the safest position for operating the ties.



PLATINUM 100 tie system



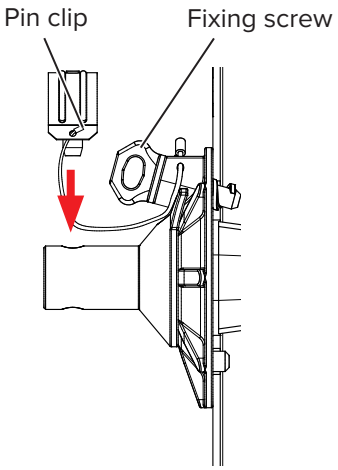
The PLATINUM 100 Tie Nut Closing Side is equipped with a unique tie rod holder for the PLATINUM 100 tie rods. This allows the tie rods to be safely stowed during transport. As a result, the number of loose parts on site and during material transport can be reduced, and assembly time can be saved.



Tie nut closing side with PLATINUM 100 Tie Rod in holder

9.3.1 Preparing advancing side

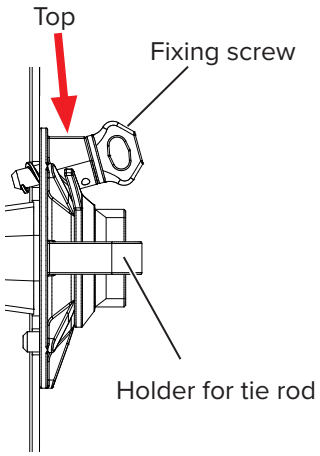
The PLATINUM 100 Tie Nut Advancing Side is hooked into the relevant tie point on the back of the formwork panel and screwed tightly with the fixing screw to the panel frame. Depending on the required wall thickness, it may be necessary to remove the pin clip from the tie nut on the advancing side (Refer to the tables on page 109 and page 112).



Fixing of the PLATINUM 100 Tie Nut Advancing Side

9.3.2 Preparing closing side

The PLATINUM 100 Tie Nut Closing Side is hooked into the relevant tie point on the back of the formwork panel and screwed tightly with the fixing screw to the panel frame.



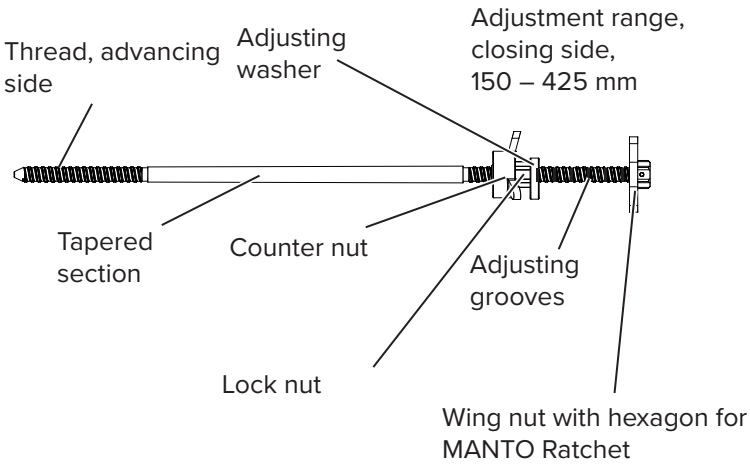
Fixing of the PLATINUM 100 Tie Nut Closing Side

Before assembling the formwork, the PLATINUM 100 tie rods can be adjusted to the correct length to suit the wall thickness.

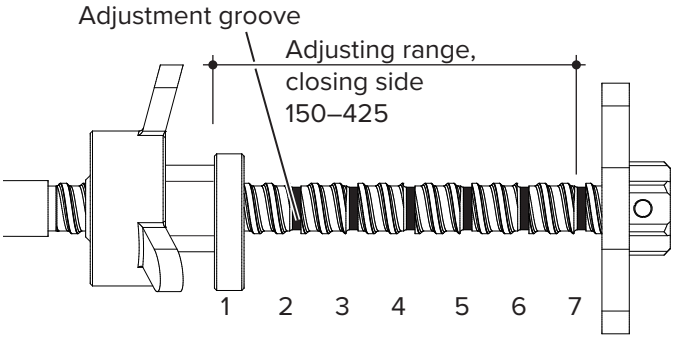
Preparing the tie rod differs depending on the generation of the tie rod. The preparation of the tie rod G1 is described below, after which the preparation of the tie rod G2 is shown.

Preparing Tie Rod G1

The PLATINUM 100 Tie Rod is delivered to the construction site as a set with integrated lock nut, counter nut and adjusting washer.



The PLATINUM 100 Tie Rod allows the required wall thickness to be set before installation. Common wall thicknesses can be selected by placing the adjusting washer in the appropriate groove without having to measure. Other wall thicknesses can be freely set, without using the predefined settings.



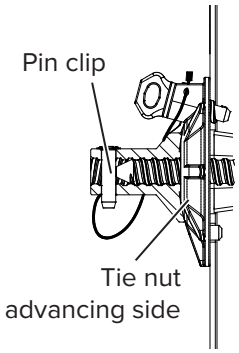
The predefined wall thicknesses can be set from 150 to 425 mm, in increments of 25 mm.

Decisive for the correct set-up of the PLATINUM 100 Tie Rod is to know if the tie nut on the advancing formwork side is equipped with a pin clip or not. (Refer to section 9.3.1 on page 106.)

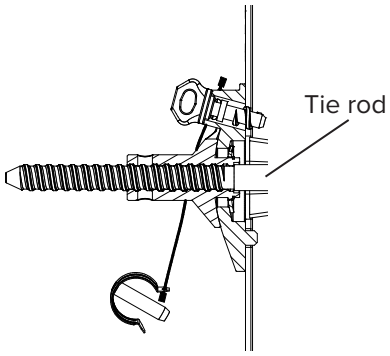
In the following step the PLATINUM 100 Tie Rod is screwed into the Tie Nut Advancing Side until it reaches the pin clip.

If the pin clip has been removed, the PLATINUM 100 Tie Rod has to be screwed completely into the tie nut on the advancing side.

With pin clip inserted



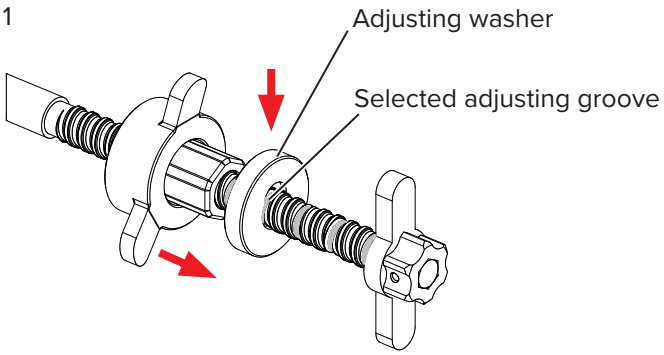
Without pin clip inserted



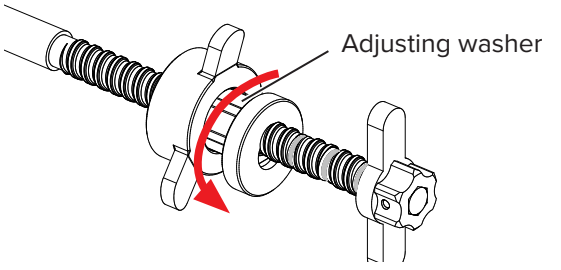
Depending on this, the following wall thicknesses can be preset without measuring:

PLATINUM 100 Tie Nut Advancing Side	Adjusting positions PLATINUM 100 tie rod/wall thickness [mm]						
	1	2	3	4	5	6	7
Without pin clip	150	175	200	225	250	275	300
With pin clip	275	300	325	350	375	400	425 (a)
(a) Only possible with the G1 clip.							

Step 1 To set the desired wall thickness, position the adjusting washer in the appropriate adjusting groove.

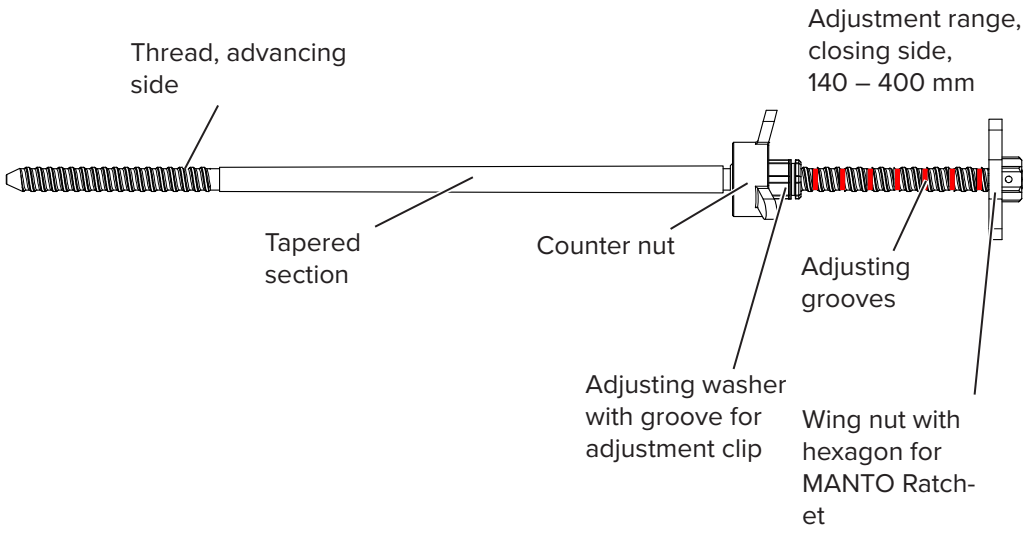


Step 2 Screw the adjusting washer on the tie into the adjusting washer to secure the pre-selected position.

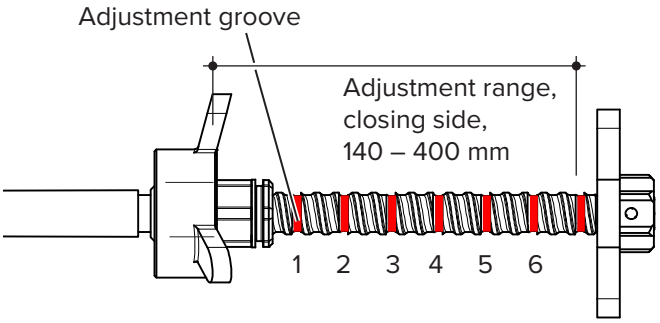


Preparing Tie Rod G2

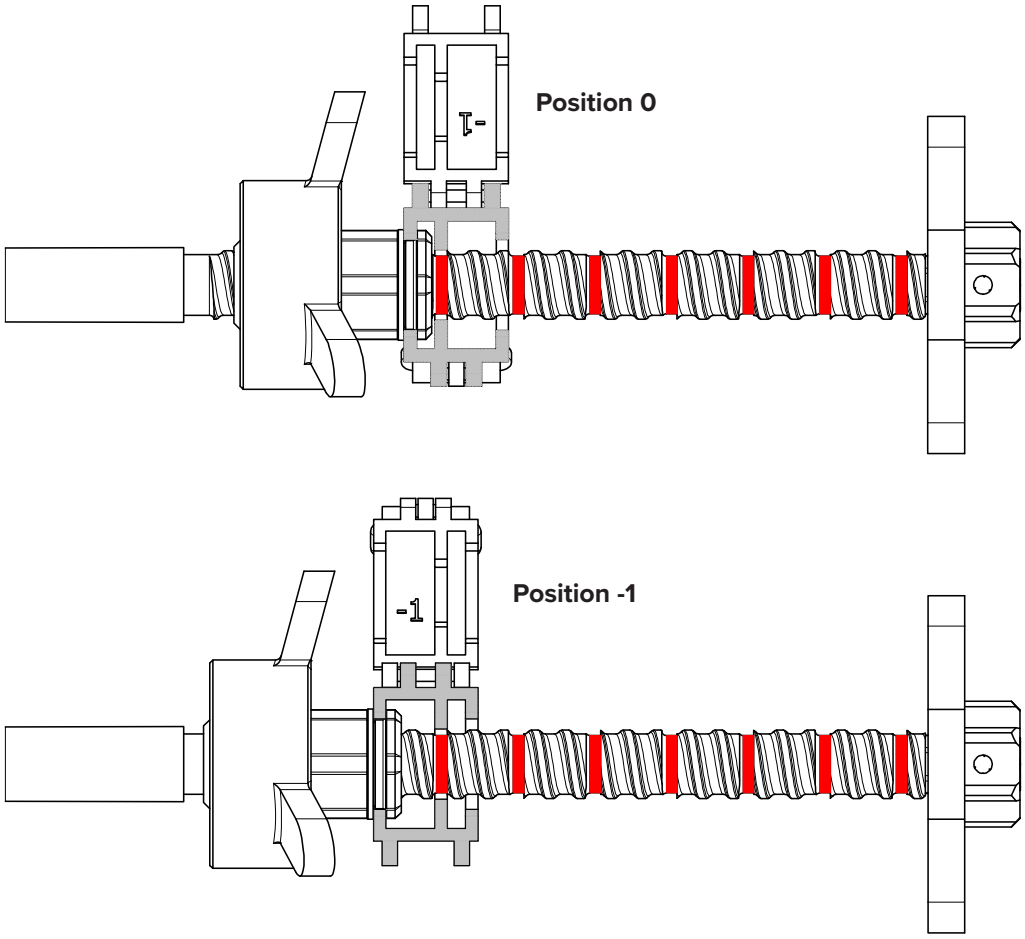
The PLATINUM 100 Tie Rod is delivered to the construction site as a set with integrated lock nut and counter nut.



The PLATINUM 100 Tie Rod allows for the required wall thickness to be set before installation. Common wall thicknesses can be selected by placing the adjustment clip in the appropriate groove without having to measure. The adjustment grooves 1–6 can be used (see below). Other wall thicknesses can be freely set, without using the predefined settings.



The predefined wall thicknesses can be set from 140 to 400 mm, in increments of 10 to 15 mm. The adjustment clip can be placed on the adjusting washer in two positions. Position 0 and position -1. Depending on the position different wall thicknesses can be set.



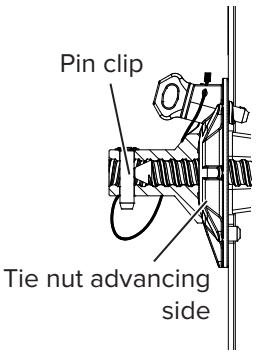
Decisive for the correct set-up of the PLATINUM 100 Tie Rod is to know if the tie nut on the advancing formwork side is equipped with a pin clip or not. (Refer to Section 9.3.1 on page 106.)

If the pin clip is installed, the tie rod stops at the pin clip when screwed into the tie nut.

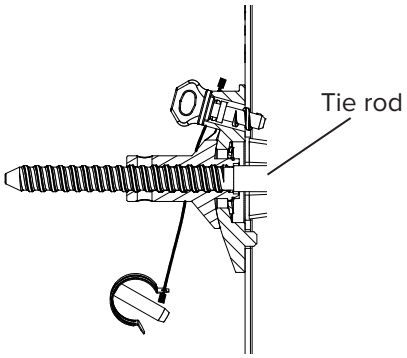
If the pin clip has been removed, the PLATINUM 100 Tie Rod has to be screwed completely into the tie nut on the advancing side.

This allows different wall thicknesses to be set (with pin clip 140 - 265 mm, without pin clip 275 - 400 mm).

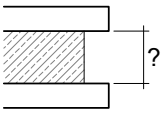
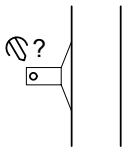
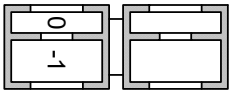
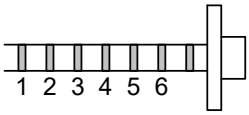
With pin clip

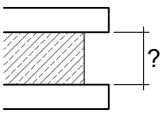
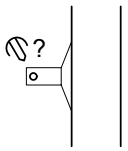
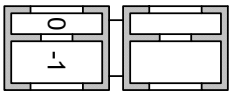
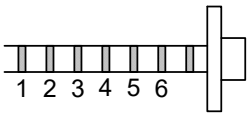


Without pin clip



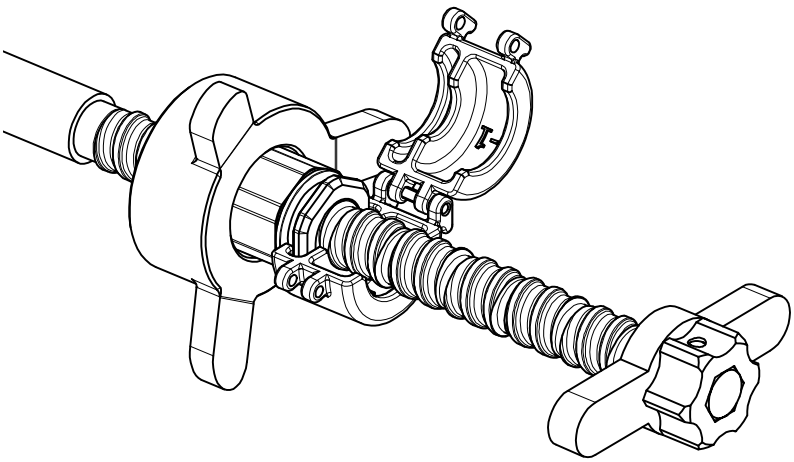
The following tables help to find the correct parameters for the required wall thickness.

Wall thickness [mm]	140	150	165	175	190	200	215	225	240	250	265		
Pin clip in tie nut advancing side	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	Ø	✓	
Position of the adjustment clip	-1	0	-1	0	-1	0	-1	0	-1	0	-1	-1	
Adjusting groove of tie rod	1	1	2	2	3	3	4	4	5	5	6	1	

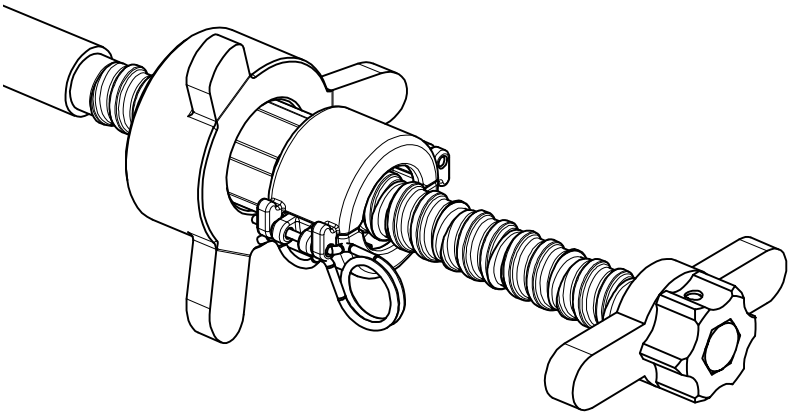
Wall thickness [mm]	275		290	300	315	325	340	350	365	375	390	400	
Pin clip in tie nut advancing side	Ø	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Position of the adjustment clip	0	0	-1	0	-1	0	-1	0	-1	0	-1	0	
Adjusting groove of tie rod	6	1	2	2	3	3	4	4	5	5	6	6	

Unless stated otherwise, all dimensions are given in mm.

Step 1 Place the adjustment clip at the desired position in the grooves of the tie rod and the lock nut.



Step 2 Close the adjustment clip and secure with the corresponding spring cotter pin.



9.4 Conventional (two-sided) tying

You can also use the MANTO Panels with conventional Tie Rods and MANTO Tie Nuts. In this case, both sides of the formwork have to be accessible.

WARNING

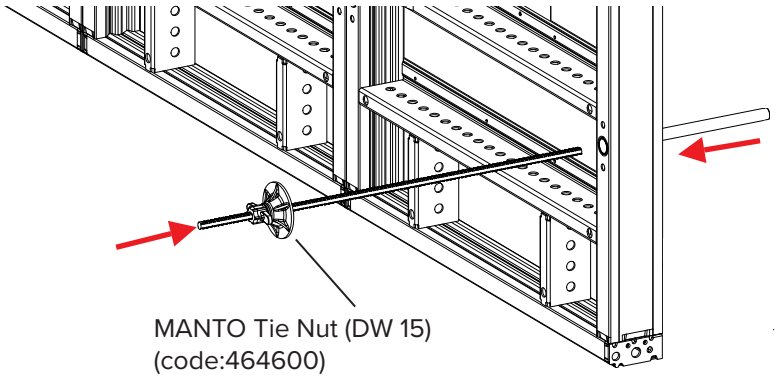
Risk of injury from overturning formwork!

Do not allow access to platforms if the formwork is not secured against overturning.

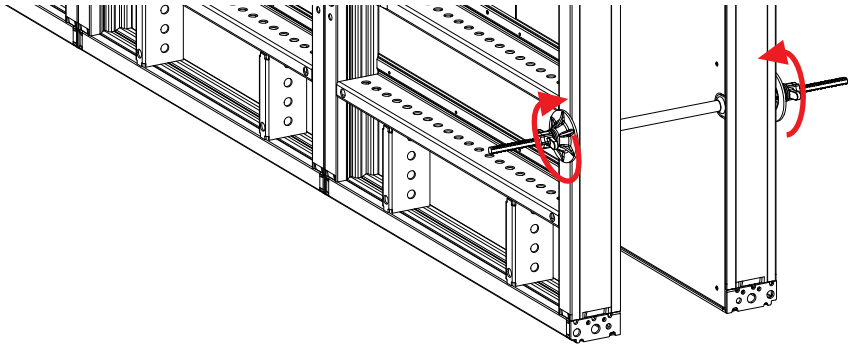
9.4.1 Attaching ties

Step 1 Remove the plugs from the tie holes to be used. Close unused tie holes with plugs.

Step 2 Push the Tie Rod through the tie hole sufficiently such that it protrudes into the Tie Sleeve.



Step 3 Set up the opposite panel and push the Tie Rod all the way through. Screw the MANTO Tie Nut onto the opposite side of the Tie Rod and tighten by rotating the opposite Tie Nut.



Step 4 Install the remaining ties in the same way.

9.4.2 Removing ties

The tie can be removed from the formwork by reversing the steps of the assembly sequence.

WARNING

Risk of injury from overturning formwork!

Do not allow access to platforms if the formwork is not secured against overturning.

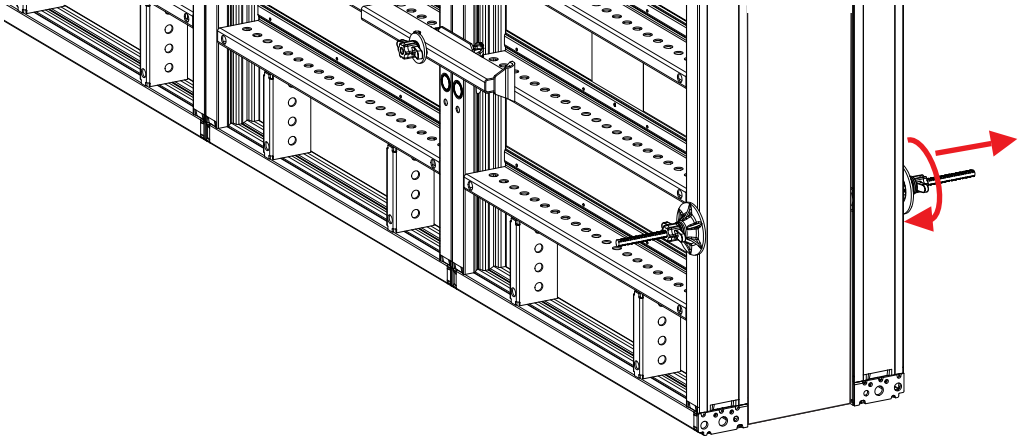
Do not remove the ties unless both sides of the formwork are secured against overturning.

NOTE

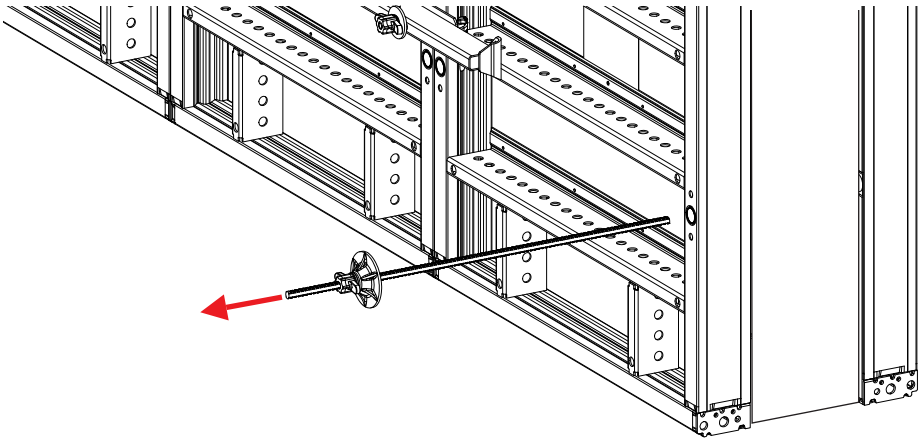
Note!

Do not move formwork until ties have been removed.

Step 1 Release the Tie Nut on one side of the formwork and remove it from the panel.

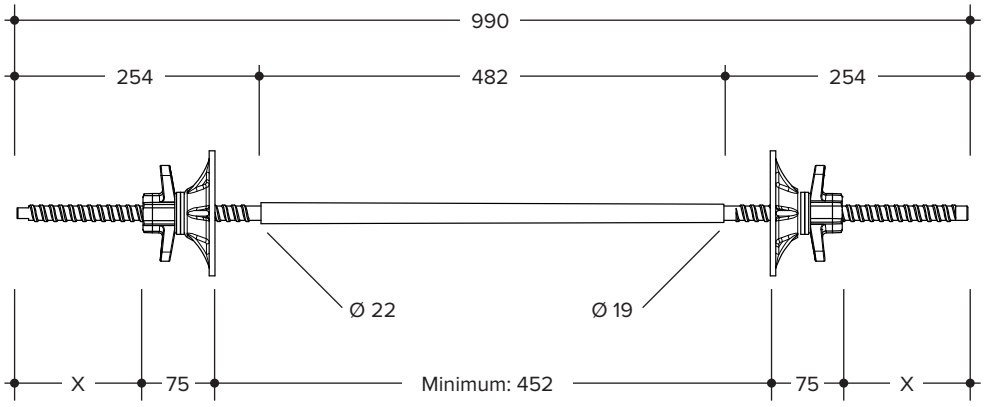


Step 2 Unscrew the Tie Rod with the Tie Nut from the opposite panel.



9.4.3 Using the MANTO Taper Tie

The MANTO Taper Tie can be used with the conventional tying system, however due to the dimensions of the component, several factors must be taken into account, such as the maximum and minimum wall thickness possible and the protruding end of the rod.



Protruding end of tie rod	
Wall thickness [mm]	**X [mm]**
200	181
240	161
250	156
300	131
350	106
360	101
400	81
450	56

Example for a 300 mm thick wall:

X = Total length - wall thickness - 2 x (MANTO Tie Nut height + MANTO panel thickness)

X = (990 - 300 - 2 x (75 + 140)) / 2

X = (990 - 300 - 2 x (214)) / 2

X = (990 - 300 - 428) / 2

X = 262 / 2

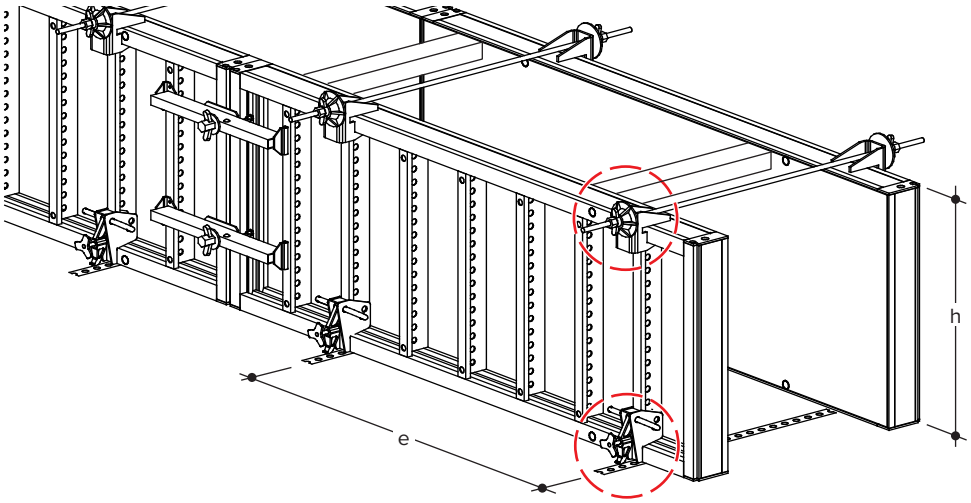
X = 130 mm

9.5 FU Tightener and Edge Tie Fastener MR

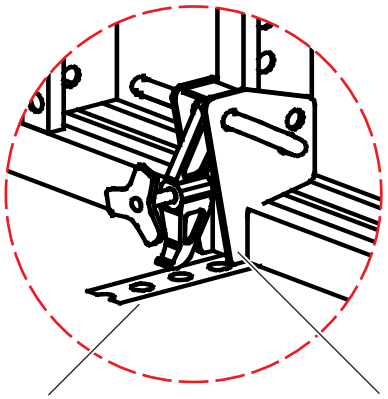
The FU Tightener and the Punched Steel Tape are an alternative solution for tying through, e.g. when panels are used for foundations.

The Safe Working Load (N) of the Edge Tie Fastener MR is 10.00 kN and of the FU Tightener is 12.00 kN. This lead to a maximum distance between ties of 1.75 m when used in a 0.90 m high formwork structure.

The Edge Tie Fastener MR can be placed anywhere along the edge profile of the panel. The tie fastener connects the Tie Rod to the edge profile of the MANTO panel.

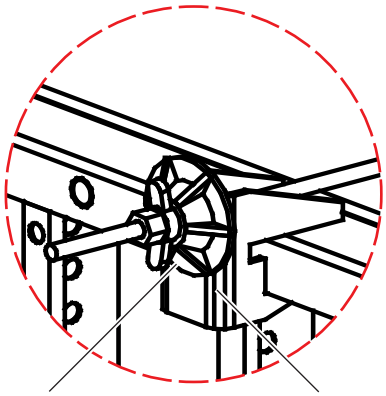


Permitted distance (e) of FU Tightener			
Height (h)	0.90 m	1.05 m	1.20 m
Distance (e)	1.75 m	1.30 m	1.00 m



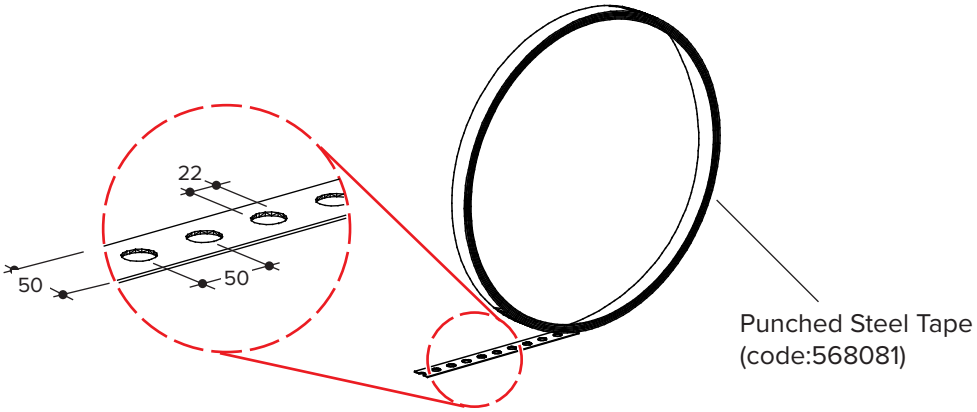
Punched Steel Tape (code:568081)

FU Tightener (code:568357)



MANTO Tie Nut (code:464600)

Edge Tie Fastener MR (code:566667)

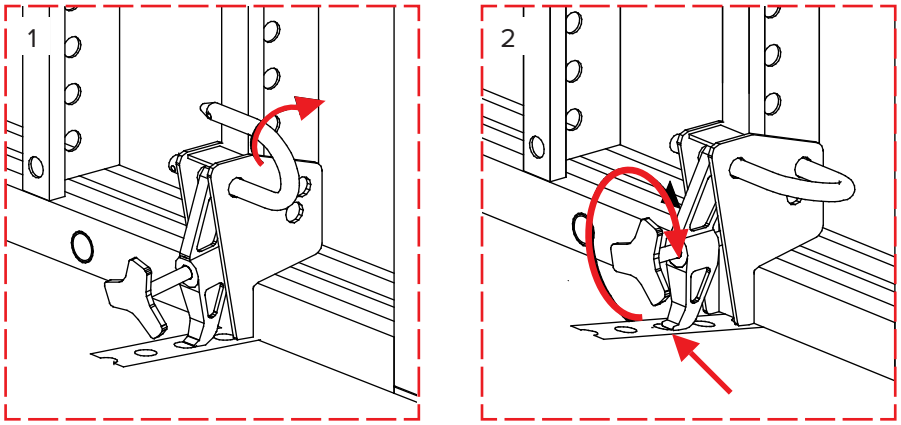


Punched Steel Tape (code:568081)

9.5.1 FU Tightener

Step 1 The FU Tightener is positioned on the lower edge profile of the MANTO Panel and secured to the rib by using the stirrup bolt.

Step 2 Cut a piece of the Punched Steel Tape to size and hook it to the FU Tightener. Tighten the tape by turning the threaded bolt of the FU Tightener.

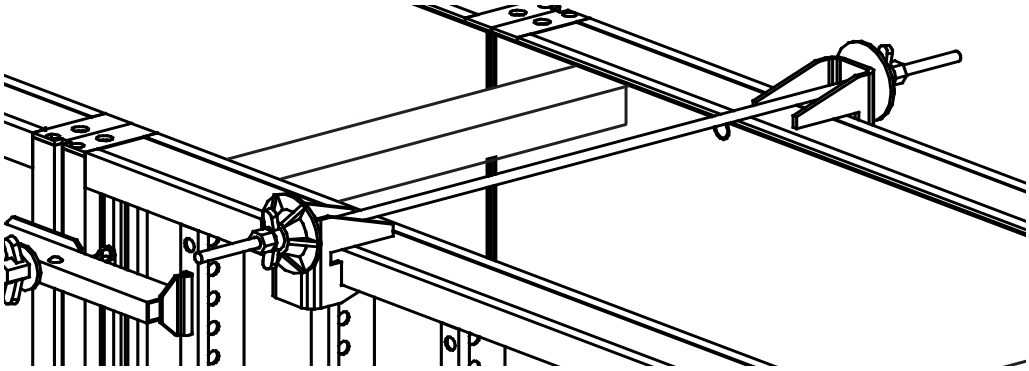


9.5.2 Edge Tie Fastener MR

Step 1 Slide the Edge Tie Fastener MR onto the edge profile of the MANTO panel.

Step 2 Place spreaders, e.g. timber beams, between the panels.

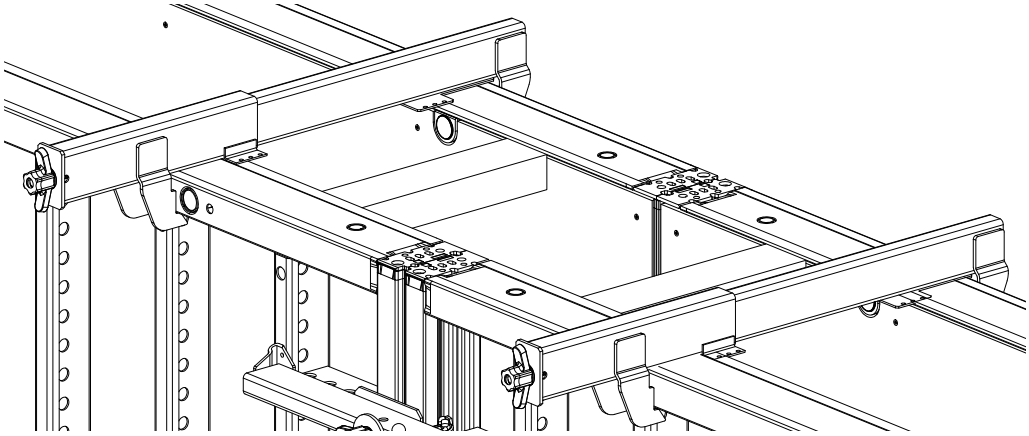
Step 3 Slide the tie rod through the Edge Tie Fastener MR and secure with MANTO Tie Nuts.



9.5.3 Alternative: PLATINUM 100 MANTO Bulkhead Clampdry tie (wall thickness 100 - 425 mm)

Step 1 Place spreaders, e.g. timber beams, between the panels.

Step 2 Attach the PLATINUM 100 MANTO Bulkhead Clamp to the edge profile on MANTO panels.



10 Corners

Many different constellations of corners can be built with the MANTO system components. In general, there is more strain on the formwork near the outer corners than along straight sections. This is why more connectors are needed near corners (Refer to page 125). This applies to the corners themselves as well as to the nearby panels:

- Up to 1.25 m from the corner when the wall is no more than 30 cm thick
- Up to 1.55 m from the corner when the wall is more than 30 cm thick

CAUTION

Risk of formwork collapsing!

If the permitted pressure is exceeded (Refer to the table on page 217), the formwork can collapse! Never exceed the permitted concrete pressure! If necessary, decrease the pouring rate!

10.1 90° corners

Create the interiors of 90° corners with the aid of the MANTO G3 Inner Corners, MANTO Inner Corners or MANTO Shaft Corners. Create the outer corners with the aid of MANTO G3 or MANTO panels and, when needed, the Corner Adjustment.

10.1.1 Planning corner

The following aspects are particularly important when planning the corners:

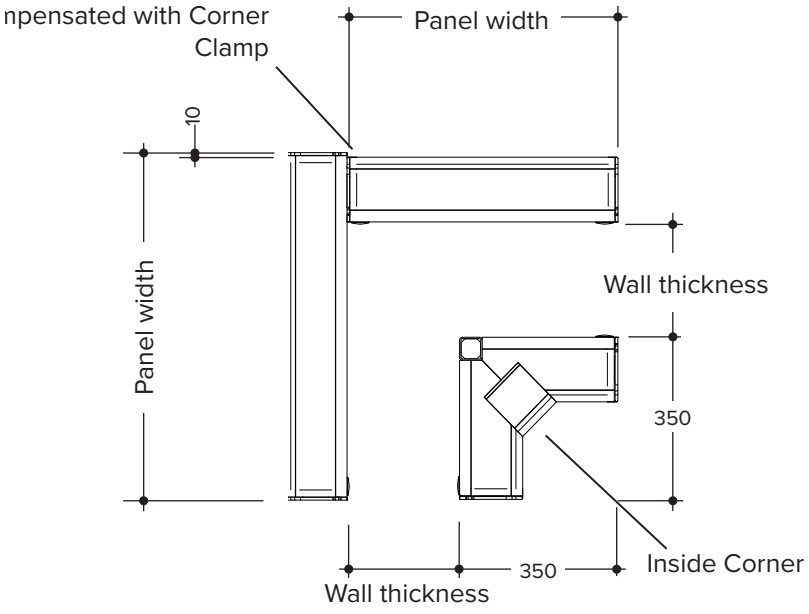
- The thickness of the wall to be concreted
- The panel widths available
- The position of the tie holes

When using MANTO G3 M panels, MANTO G3 panels usually have to be used to construct the outer corners.

MANTO G3 M panels can be used in outer corners only when the panel can be tied together with an adjacent MANTO G3 panel or with an infill (Refer to the example on page 122).

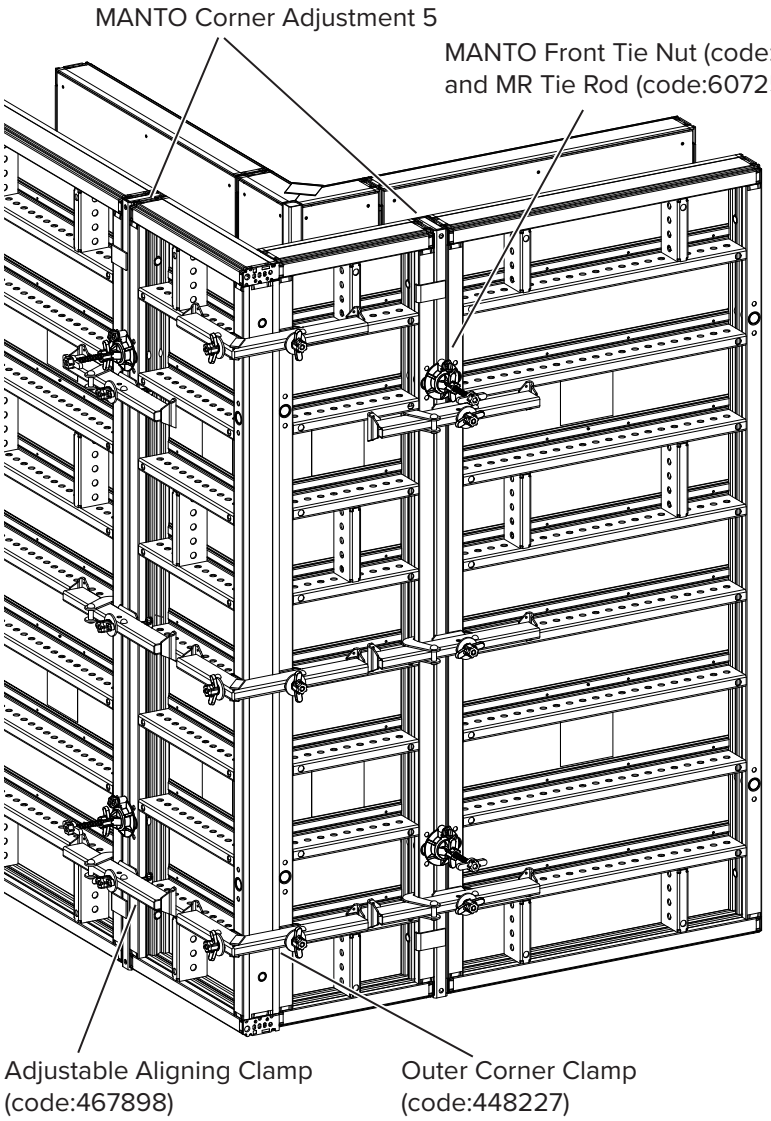
The following illustrations are intended to help plan the corners and select the proper components.

Typical 90° corner

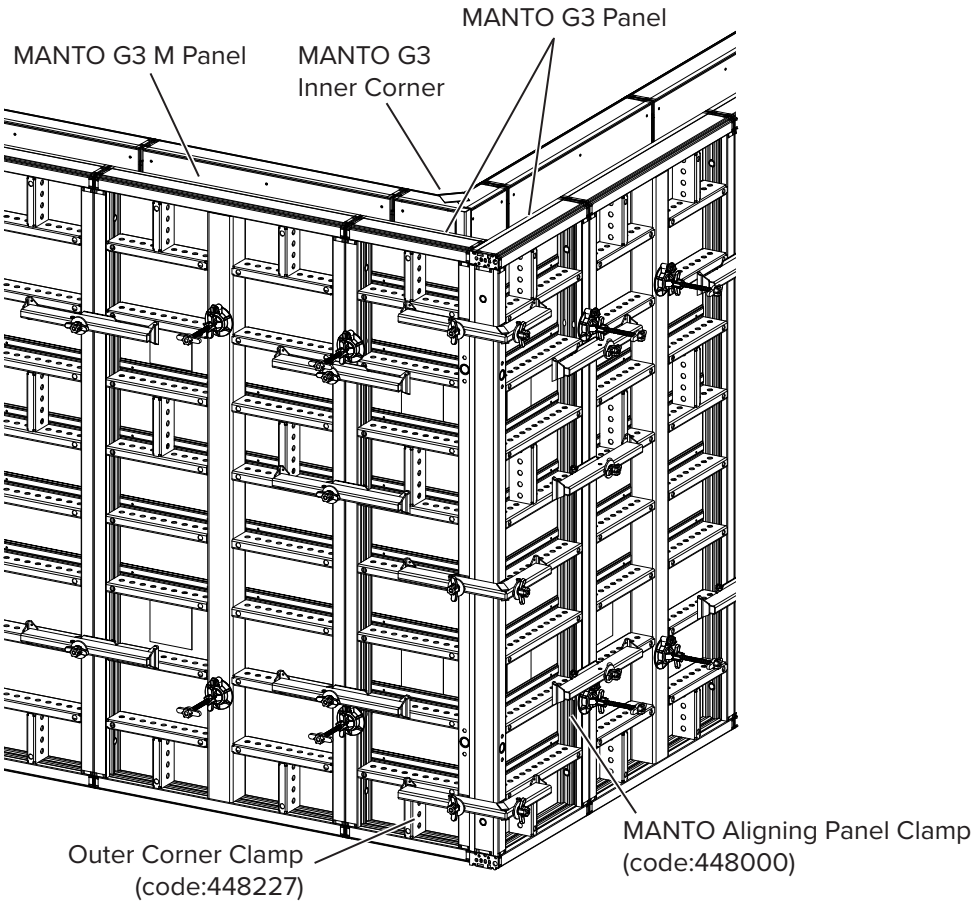


MANTO G3 Corner Adjustment 5

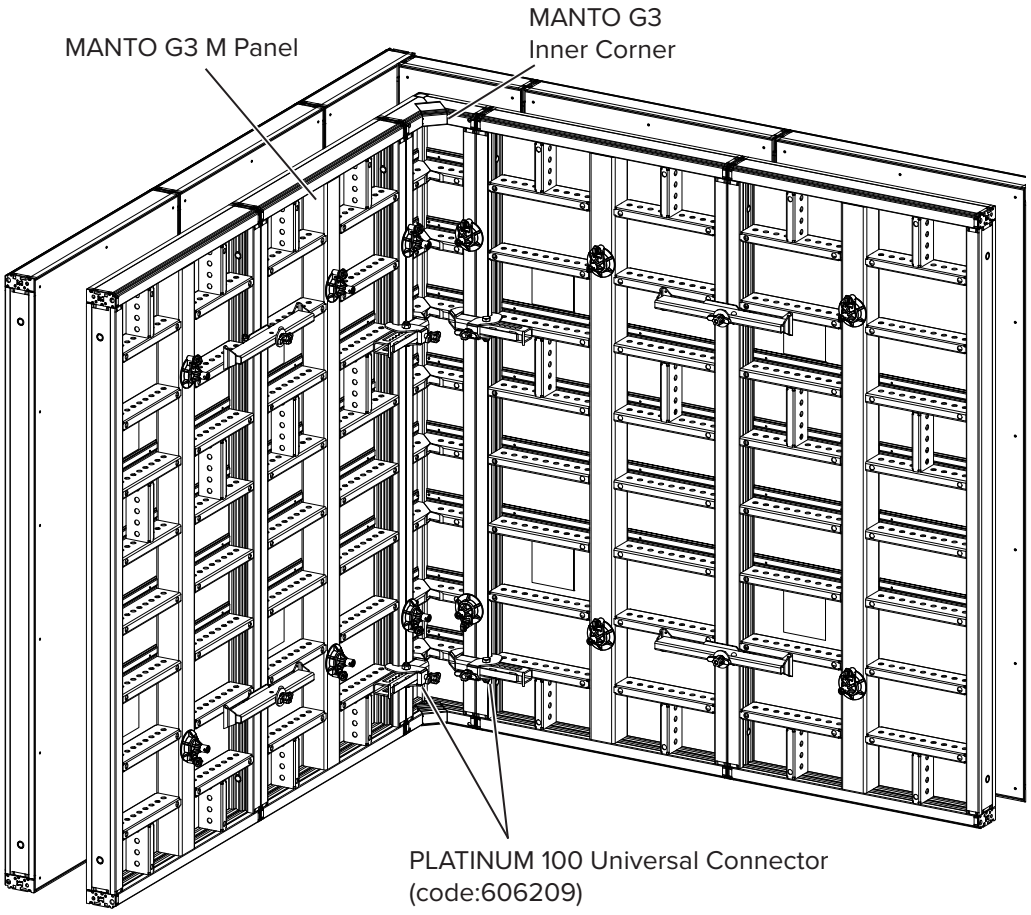
The 50 mm wide MANTO G3 Corner Adjustment 5 is needed for certain corner constellations.



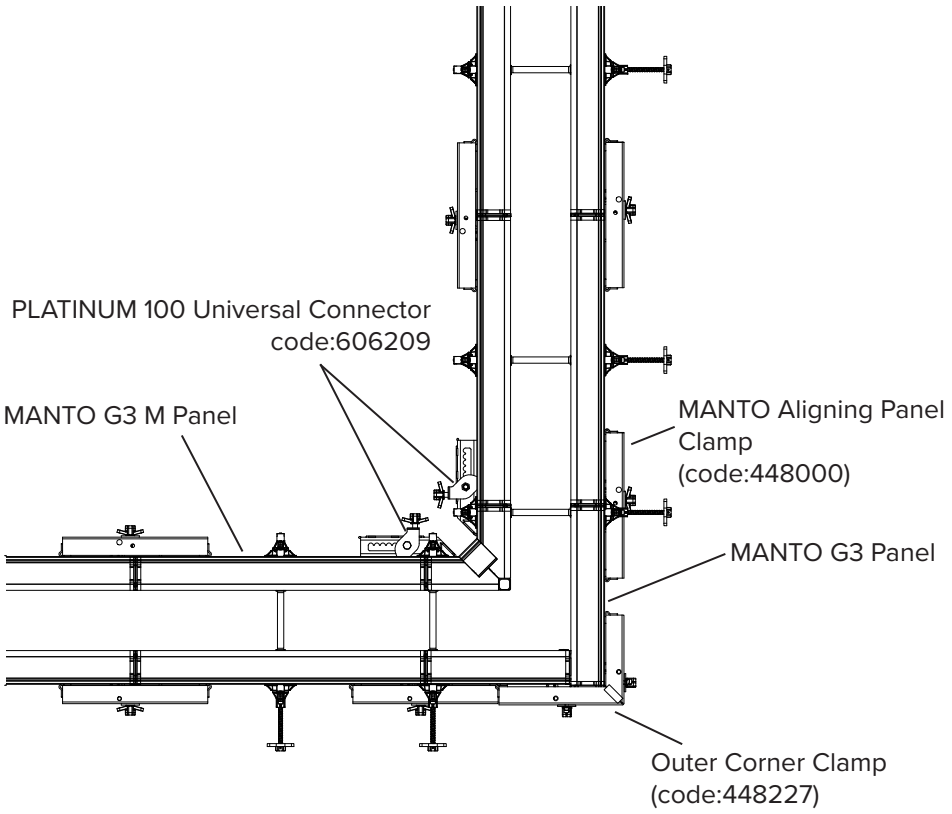
Example of application with MANTO G3 M / G3 – view of outer corner



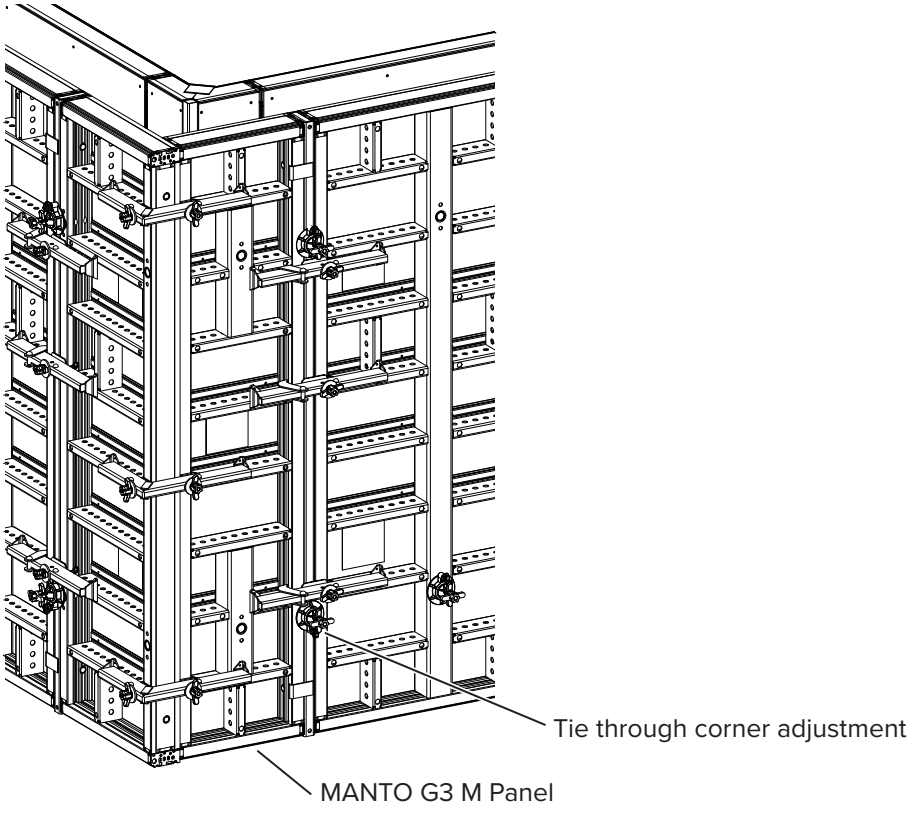
Example of application with MANTO G3 M / G3 – view of outer corner



Example of application with MANTO G3 M / G3 – view from above

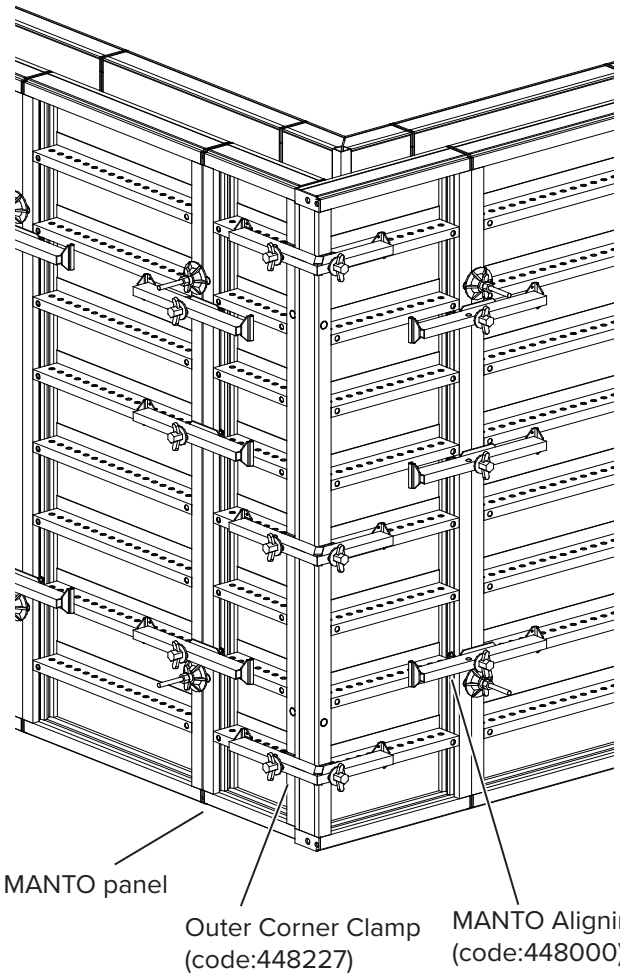


Example of application with outer corner connected to MANTO G3 M panels in the wall



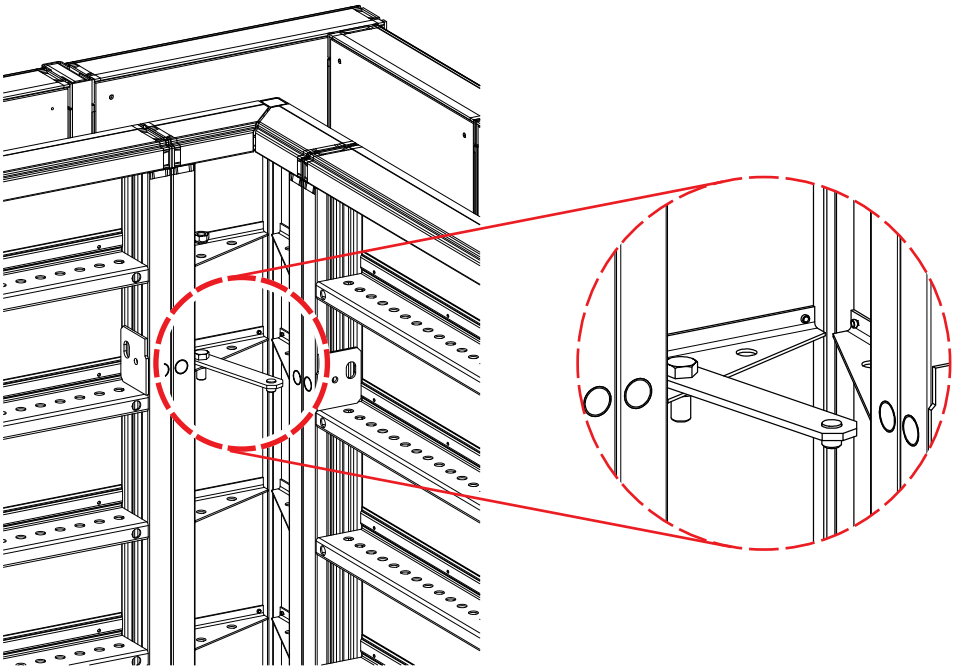
MANTO G3 M panels can be used in the outer corner only when ties can be placed through an adjacent infill!

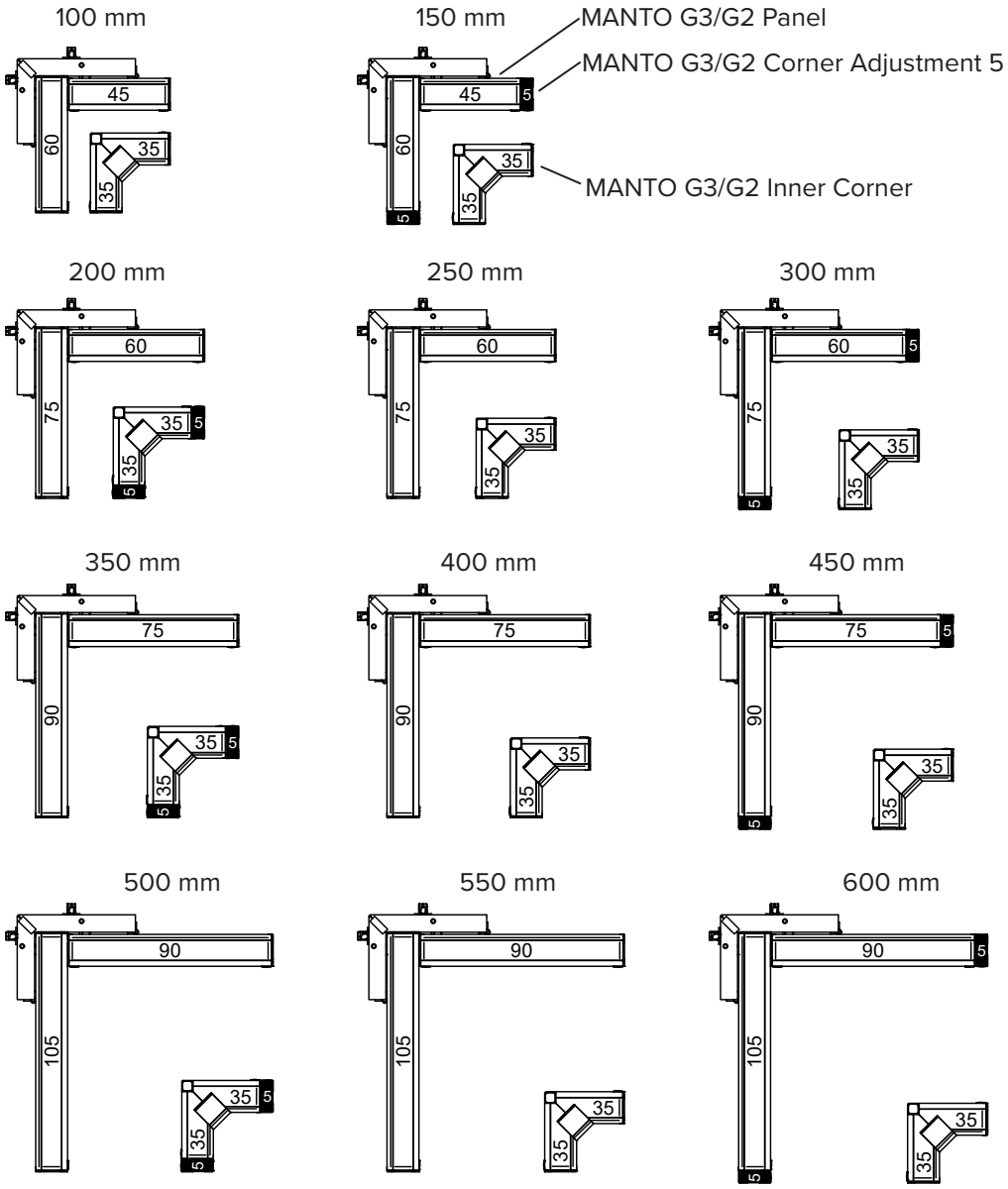
Example of application with MANTO G2



The number and arrangement of the Outer Corner Clamps and of the Aligning Panel Clamps on the first joint of the outer corner are a factor of the thickness and height of the wall (Refer to page 125).

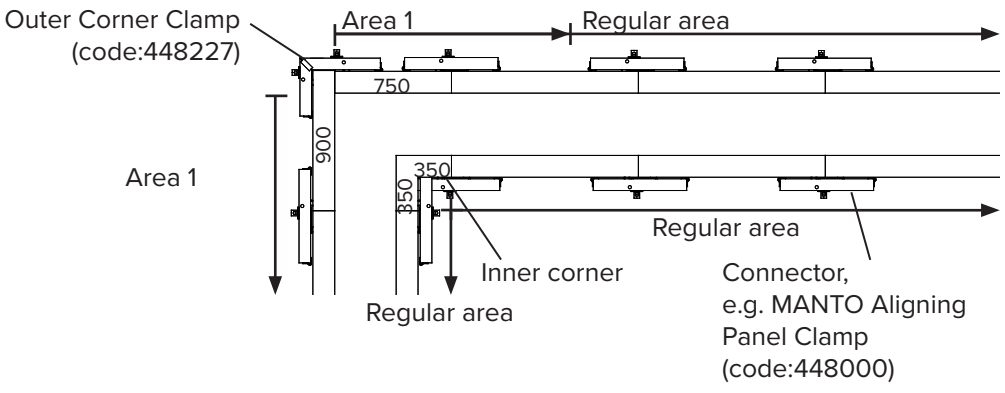
When striking, unlatching the Inner Corner stiffener will allow for the component to flex 2°. This makes it easier to separate the Inner Corner from the concrete.





Quantity and distribution of Outer Corner Clamps at 90° outer corners

The load to which the corner and the adjacent panels (section 1 in the illustration below) are subjected is greater than in the normal sections along straight walls. This is why more Aligning Corner Clamps are needed at the corners and in section 1. The following table and the illustrations are intended to help you connect the panels properly.



Unless stated otherwise, all dimensions are given in mm.

MANTO panel (Height)		Any wall thickness		Wall thickness ≤ 300 mm				Wall thickness ≤ 400 mm			
		Regular area		Corner		Area 1 < 1250 mm		Corner		Area 1 < 1550 mm	
		Req. no. of connectors		Req. no. of Corner Clamps		Req. no. of connectors		Req. no. of Corner Clamps		Req. no. of connectors	
2.70 m		2		3		3		3		3	
3.30 m		2		4		3		4		4	
2.70 m	1.20 m*)	2	2*)	3	2*)	4	1*)	4	2*)	4	2*)
3.30 m	1.20 m*)	2	2*)	4	2*)	4	1*)	5	2*)	5	2*)
2.70 m	2.70 m*)	2	2*)	4	3*)	4	3*)	5	3*)	5	4*)
2.70 m	3.30 m*)	2	2*)	4	4*)	5	3*)	5	5*)	5	5*)
3.30 m	3.30 m*)	2	2*)	5	4*)	5	3*)	6	4*)	6	5*)

*) Stacked panels
All values stated here apply to concrete of a normal consistency and assuming a coefficient of friction of μ = 0.20 between the concrete and the formwork. Special records must be kept for liquid concrete and concrete of a thinner consistency!

MANTO panel (Height)		Any wall thickness		Wall thickness ≤ 450 mm				Wall thickness ≤ 600 mm			
		Regular area		Corner		Area 1 < 1250 mm		Corner		Area 1 < 1550 mm	
		Req. no. of connectors		Req. no. of Corner Clamps		Req. no. of connectors		Req. no. of Corner Clamps		Req. no. of connectors	
2.70 m		2		4		3		4		3	
3.30 m		2		5		4		5		4	
2.70 m	1.20 m*)	2	2*)	5	2*)	4	2*)	6	2*)	4	2*)
3.30 m	1.20 m*)	2	2*)	6	2*)	5	2*)	7	2*)	5	2*)
2.70 m	2.70 m*)	2	2*)	5	4*)	5	4*)	6	4*)	5	4*)
2.70 m	3.30 m*)	2	2*)	5	5*)	5	5*)	6	5*)	5	5*)
3.30 m	3.30 m*)	2	2*)	6	5*)	6	5*)	7	5*)	6	5*)

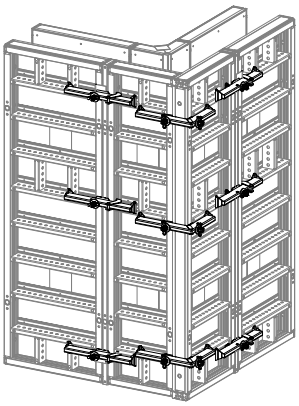
*) Stacked panels
All values stated here apply to concrete of a normal consistency and assuming a coefficient of friction of μ = 0.20 between the concrete and the formwork. Special records must be kept for liquid concrete and concrete of a thinner consistency!

Corners

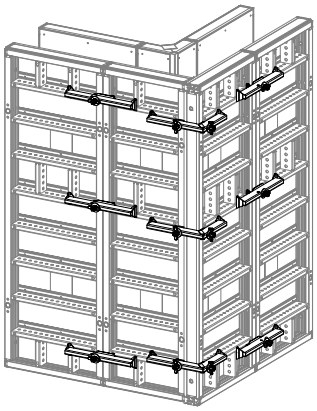
The illustrations below show the quantity and position of the connectors used in the combinations and wall thicknesses indicated in the tables above. For a clearer view, other components such as ties, access solutions or edge protection are not shown here.

Example: Panels 270

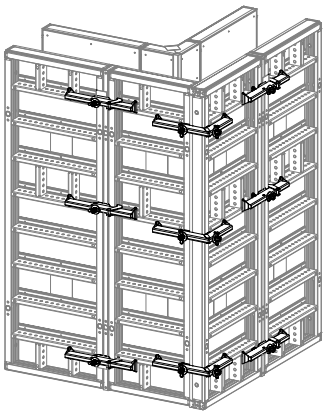
Wall thickness ≤ 300 mm



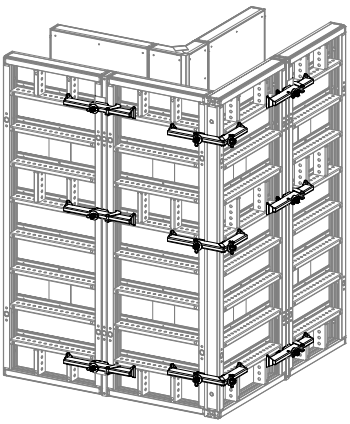
Wall thickness ≤ 400 mm



Wall thickness ≤ 450 mm

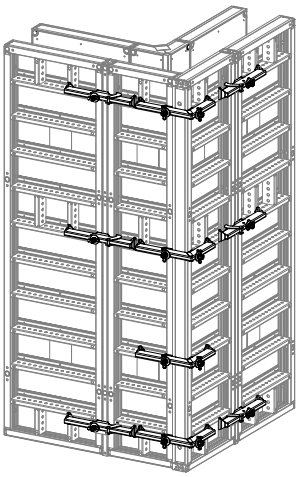


Wall thickness ≤ 600 mm

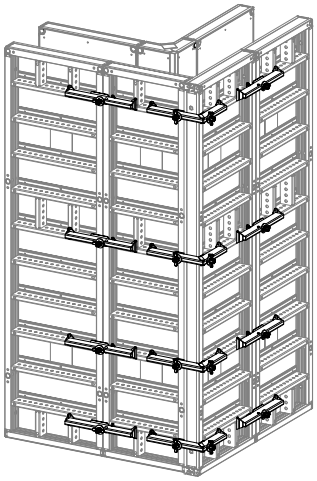


Example: Panels 330

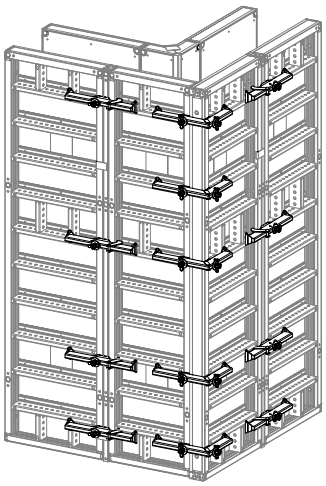
Wall thickness ≤ 300 mm



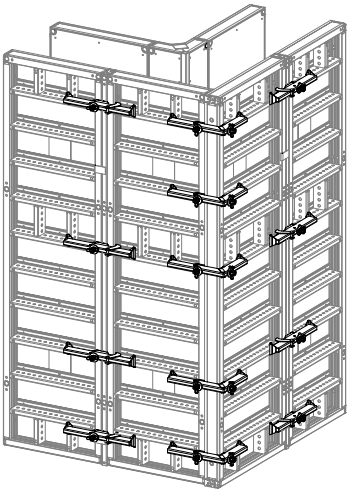
Wall thickness ≤ 400 mm



Wall thickness ≤ 450 mm

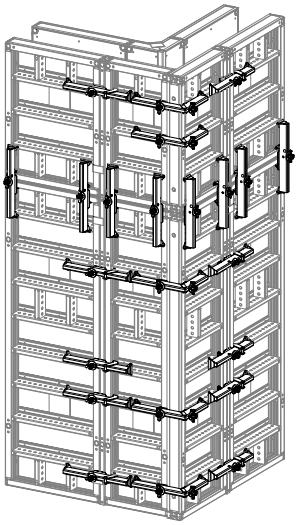


Wall thickness ≤ 600 mm

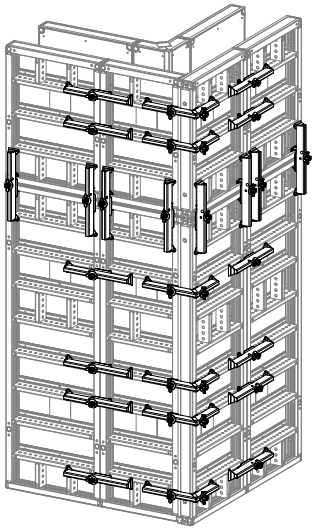


Example: Panels 270/120

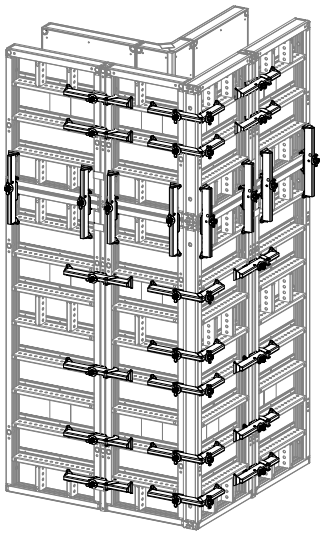
Wall thickness ≤ 300 mm



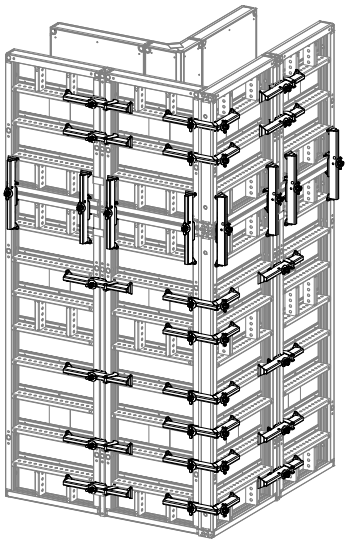
Wall thickness ≤ 400 mm



Wall thickness ≤ 450 mm



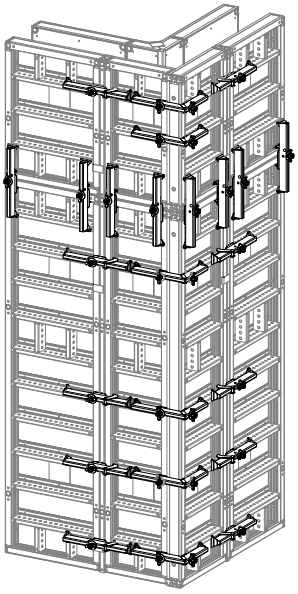
Wall thickness ≤ 600 mm



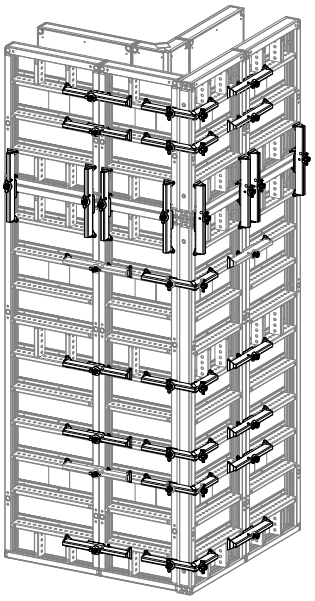
Unless stated otherwise, all dimensions are given in mm.

Example: Panels 330/120

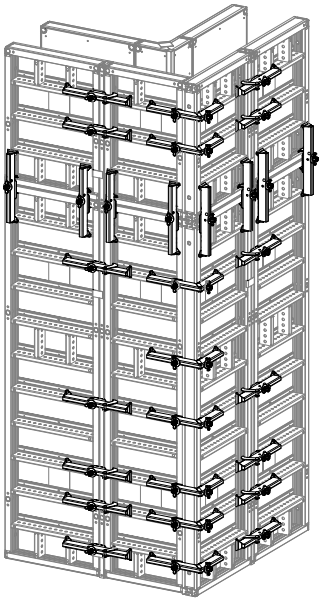
Wall thickness ≤ 300 mm



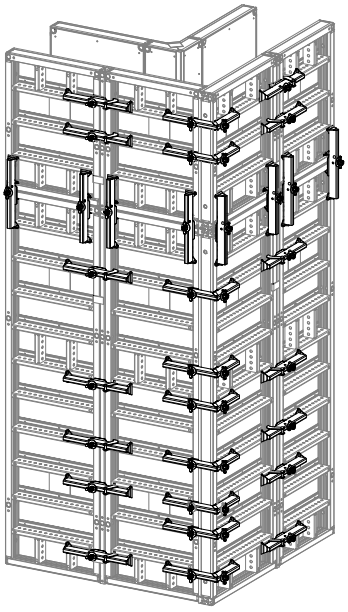
Wall thickness ≤ 400 mm



Wall thickness ≤ 450 mm



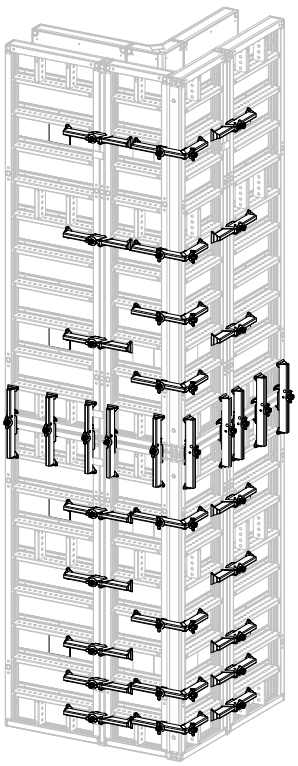
Wall thickness ≤ 600 mm



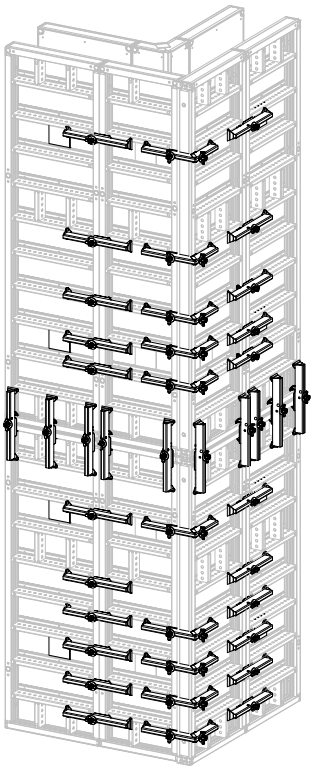
Example: Panels 270/270

Example: Panels 270/330

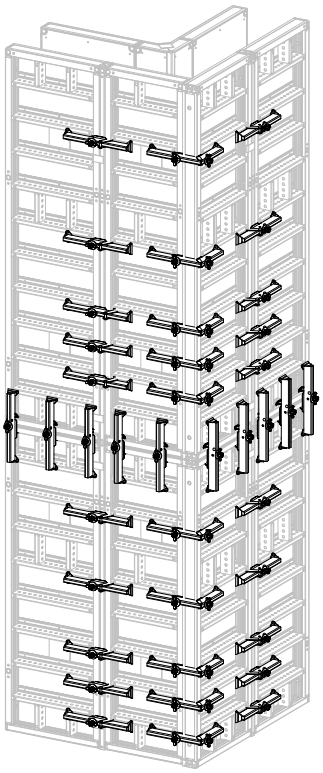
Wall thickness ≤ 300 mm



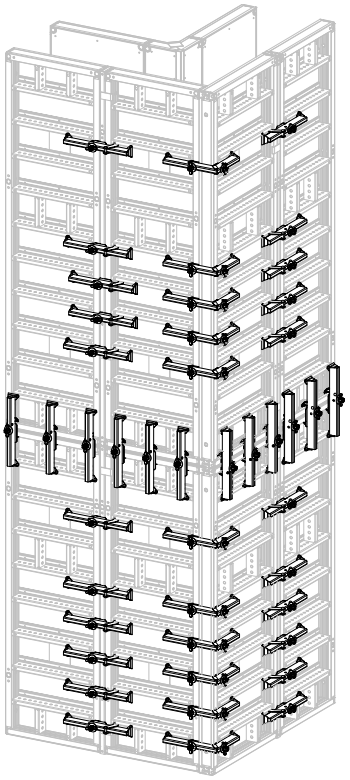
Wall thickness ≤ 400 mm



Wall thickness ≤ 450 mm



Wall thickness ≤ 600 mm

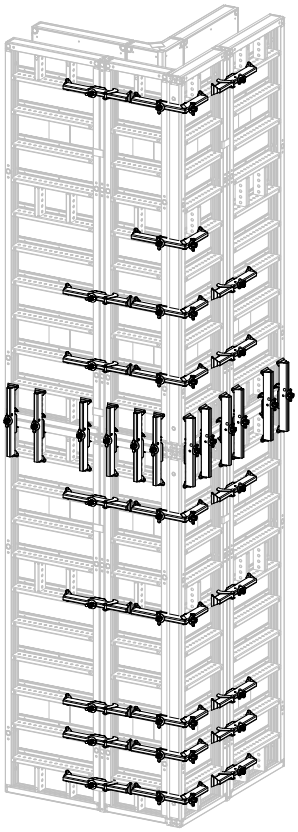


Unless stated otherwise, all dimensions are given in mm.

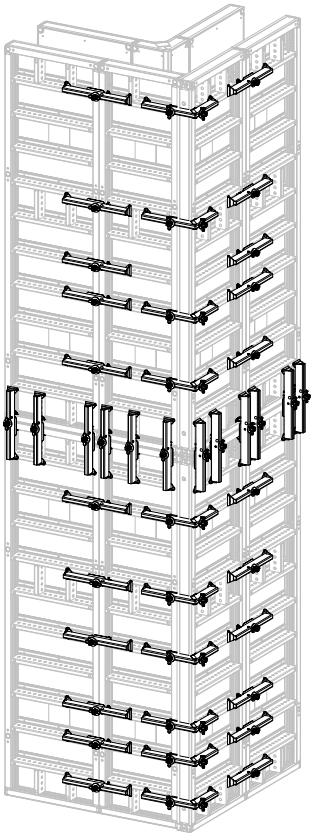
Corners

Example: Panels 330/330

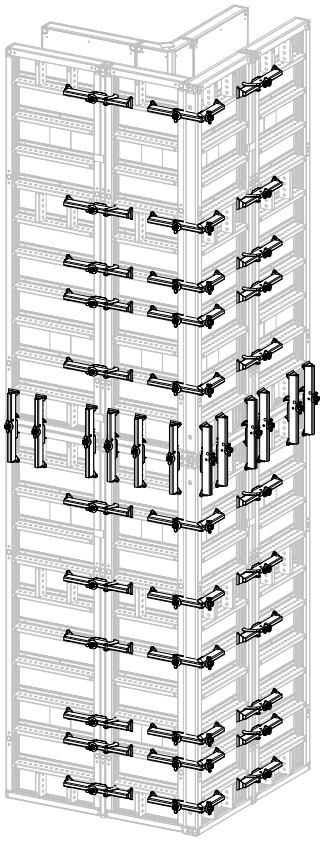
Wall thickness ≤ 300 mm



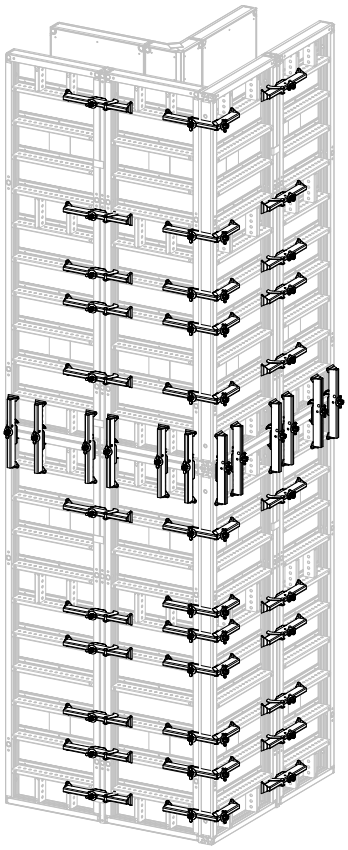
Wall thickness ≤ 400 mm



Wall thickness ≤ 450 mm



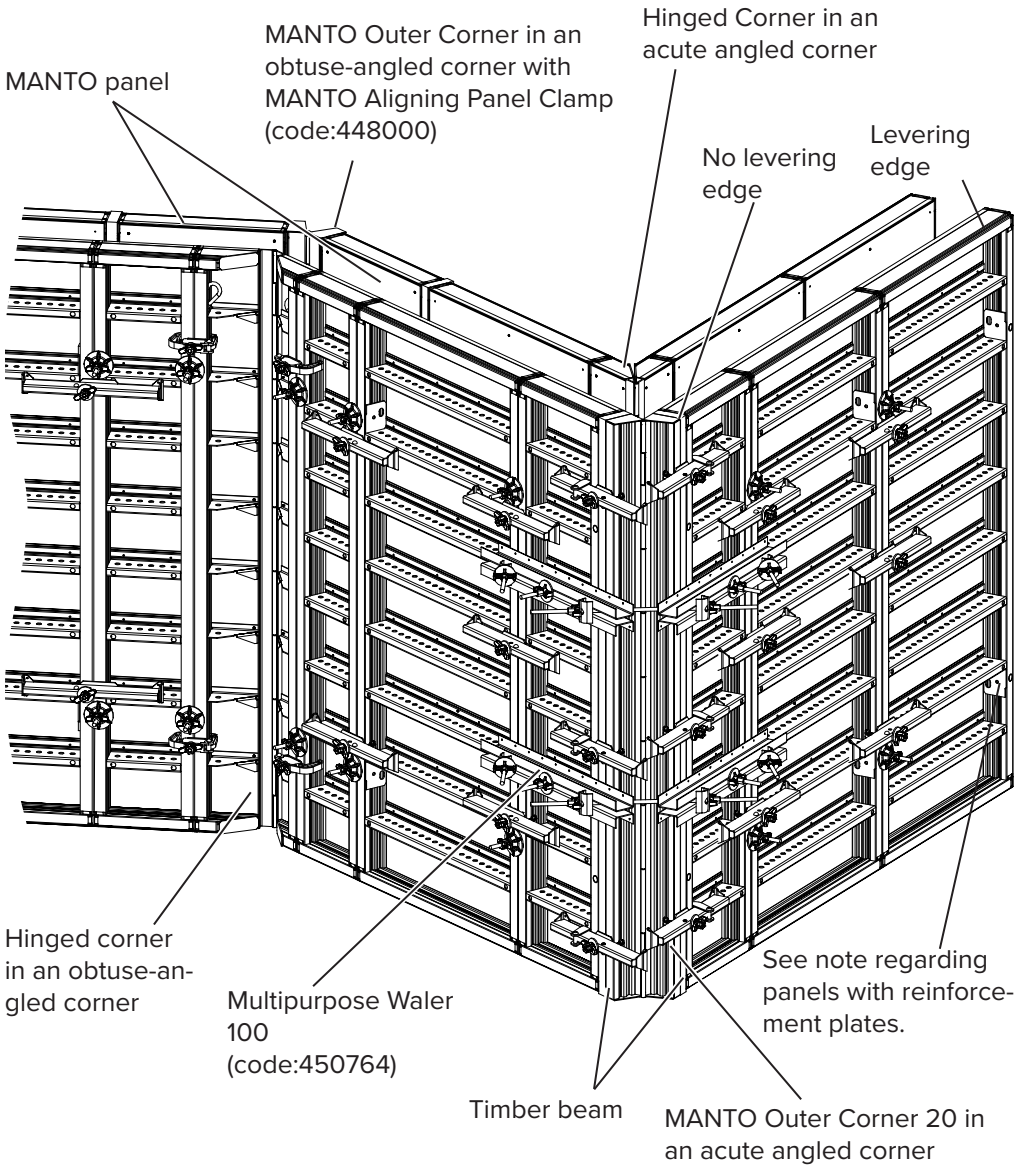
Wall thickness ≤ 600 mm



Unless stated otherwise, all dimensions are given in mm.

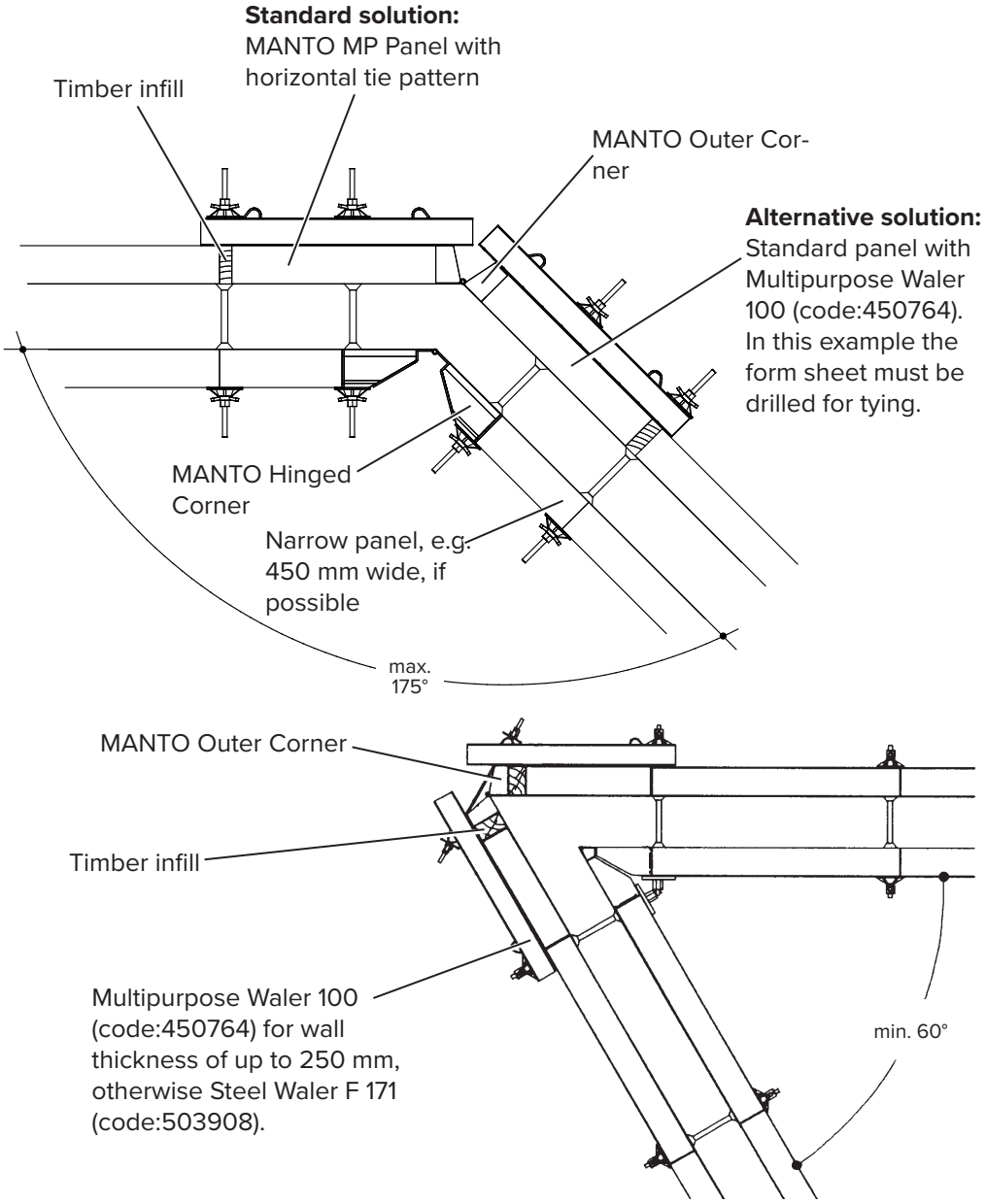
10.2 Oblique-angled corners

With the MANTO Outer Corner and the MANTO Hinged Corner it is possible to form oblique-angled corners (as well as right-angled ones), starting with a minimum of 60° and up to a maximum of 175°. Timber infills can be used to achieve the required wall thickness.



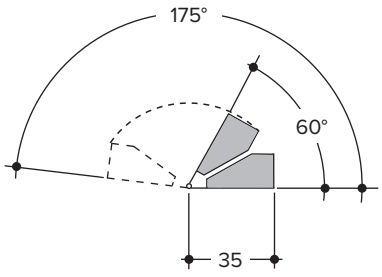
☞	Be aware that some sections are subjected to higher tensile loads (Refer to table on page 125)!

☞	The tie should normally be secured through the corner adjustment 5. At least 25 mm of the MANTO Tie Nut must rest against the adjacent panels.

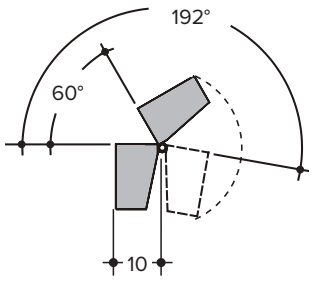


Adjustment ranges for the MANTO Hinged Corner and the MANTO Outer Corner.

MANTO Hinged Corner



MANTO Outer Corner



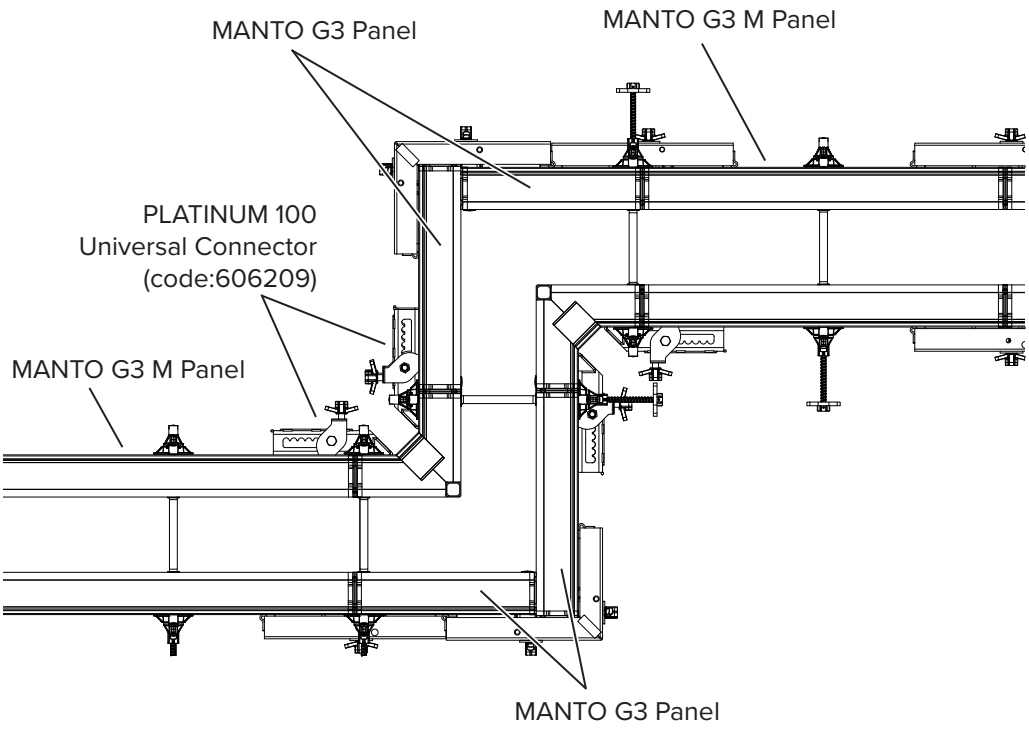
Unless stated otherwise, all dimensions are given in mm.

11 Wall offsets

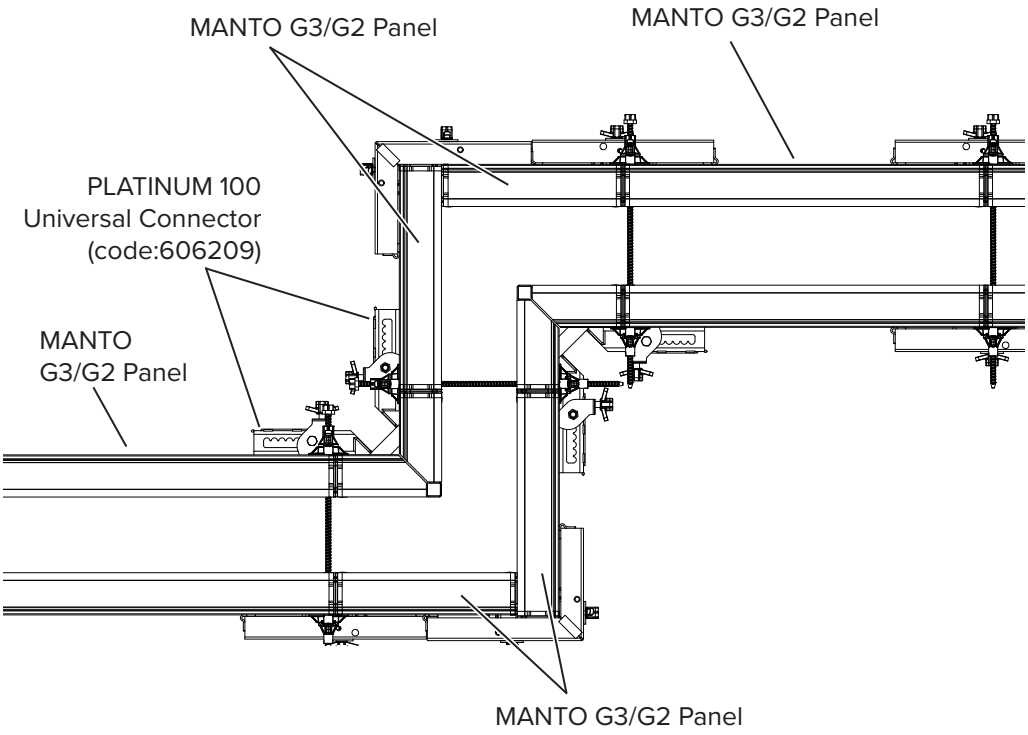
Below are some typical solutions to the most common types of wall offsets. Other solutions available upon request.

11.1 Wall offset

11.1.1 Wall offsets with MANTO G3 and G3 M



11.1.2 Wall offsets with MANTO G3/G2

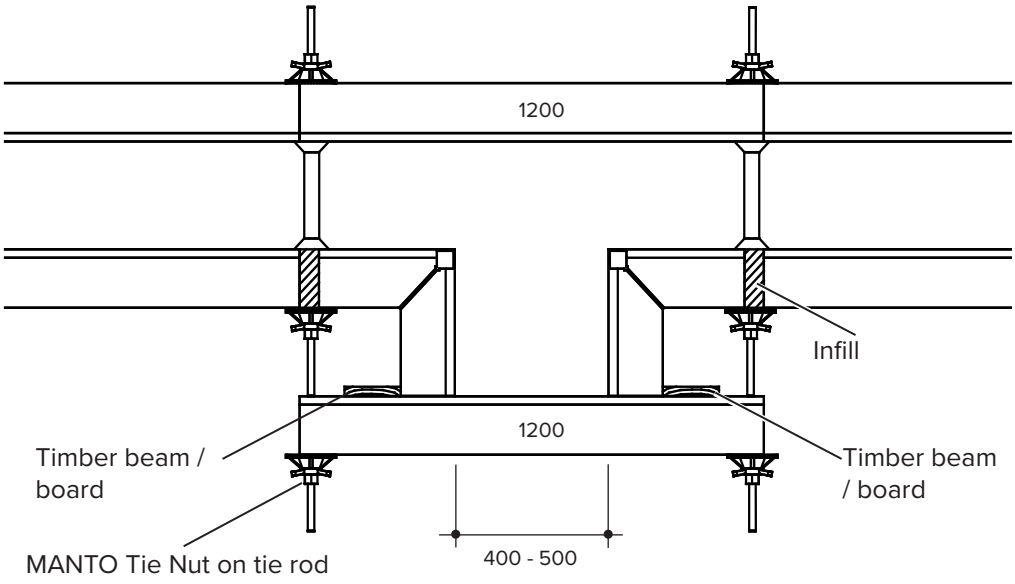


Be aware that some sections are subjected to higher tensile loads (Refer to table on page 125)!

11.2 Pilasters

400 mm to 500 mm wide pilasters

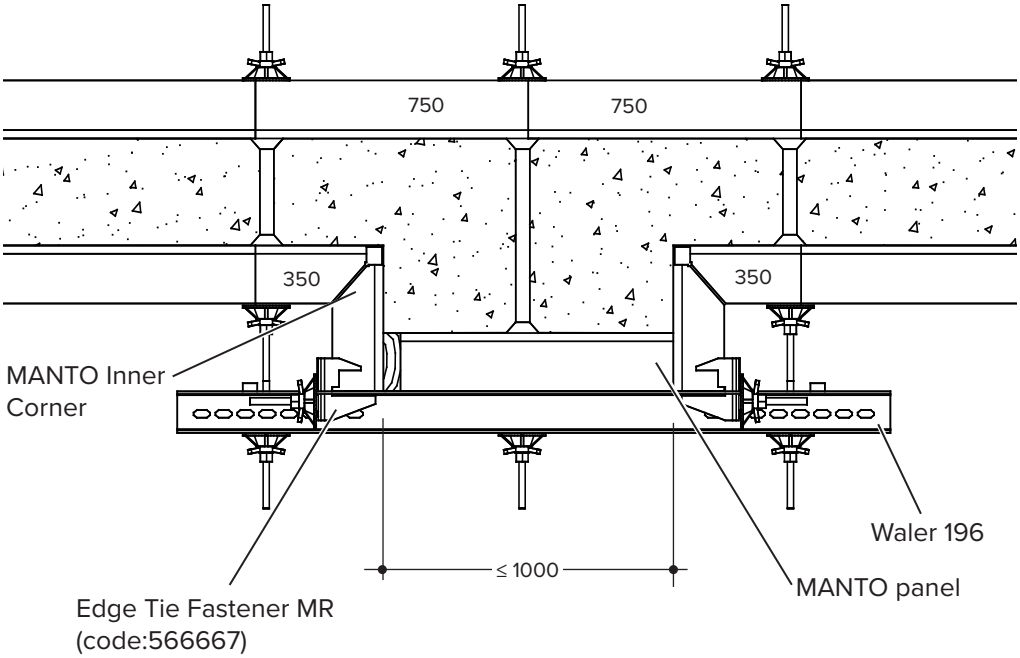
Forming of pilasters with a width between 400 mm to 500 mm is possible as shown below. An additional tie is not required.



Secure the timber beams and boards provided on site to withstand the anticipated concrete load.

500 mm to 1000 mm wide pilasters

Additional ties are needed for wider pilasters. In this case, attach a steel waler of adequate dimensions to the MANTO Inner Corner using the Edge Tie Fastener MR and Waler Spanners.

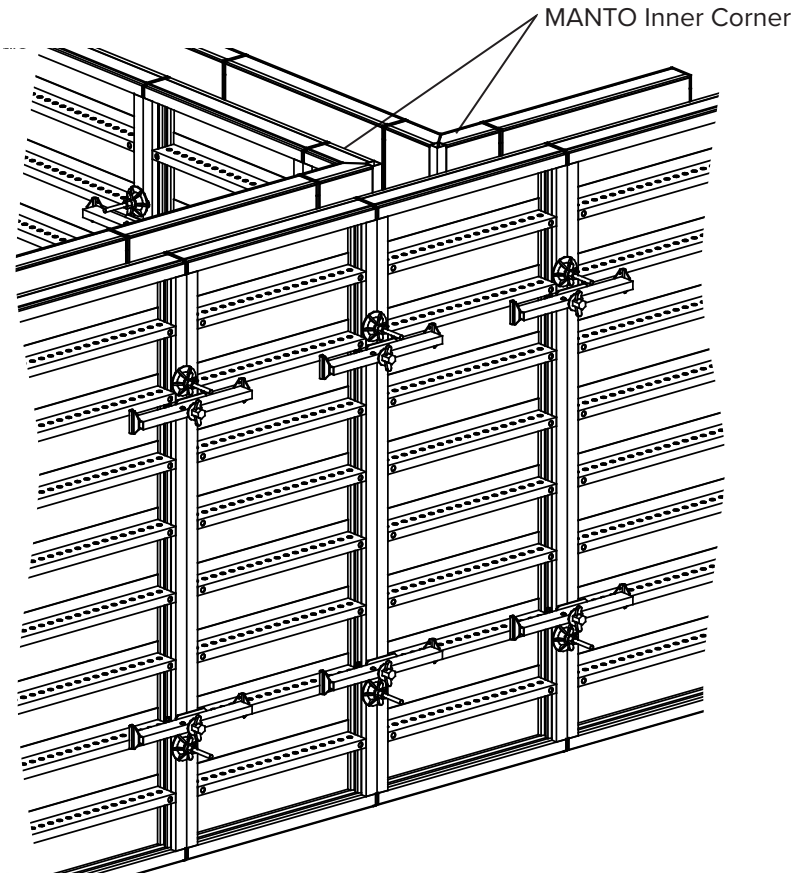


One Aligning Panel Clamp (code:448000) every meter is required in this position.

Unless stated otherwise, all dimensions are given in mm.

11.3 T-walls

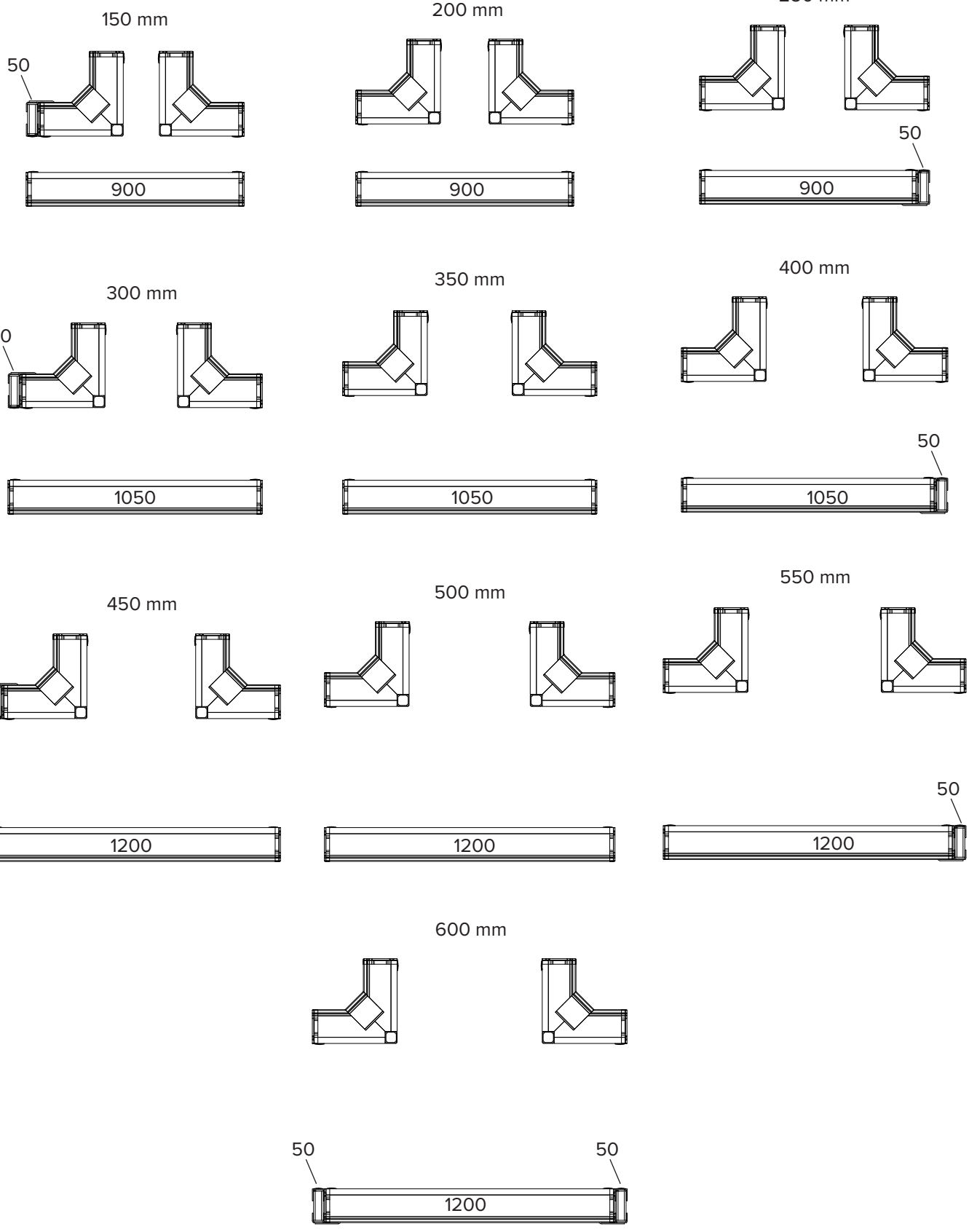
T-walls up to 600 mm thickness of 400mm can be formed with the MANTO can be formed with the MANTO system. Adjustments can be made using the various panel widths and the MANTO Corner Adjustment 5.



Typical arrangements

The following illustrations show typical T-wall configurations using MANTO G3/G2 panels, MANTO G3/G2 Inner Corners and MANTO G3/G2 Corner Adjustments 5. The wall thickness varies from 150 mm to 600 mm in 50 mm increments.

Wall offsets



Unless stated otherwise, all dimensions are given in mm.

11.4 T-wall connection

When pouring concrete against an existing wall, it is advisable to use the MANTO Corner Adjustment 5. This allows standard equipment to be used and the regular materials to be used for tying.

WARNING

Warning!

1. The existing wall must be capable of withstanding the additional load and, if required, it has to be braced adequately.

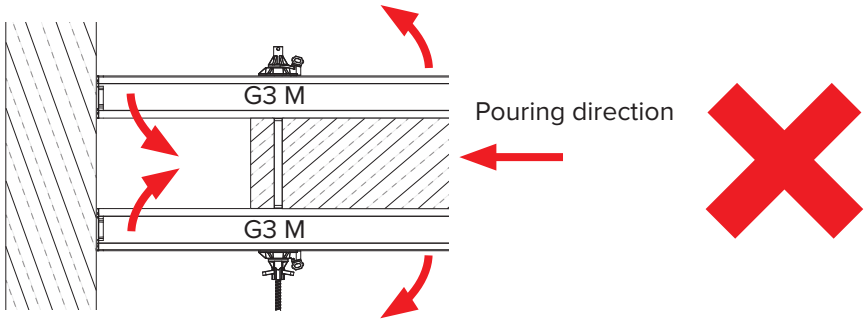
2. The formwork may have to be secured to prevent movement, e.g. by anchoring it to an existing structure.

NOTE

MANTO G3 M panels can seesaw!

Because the panels are tied in the middle, an asymmetric load can cause the panels to seesaw.

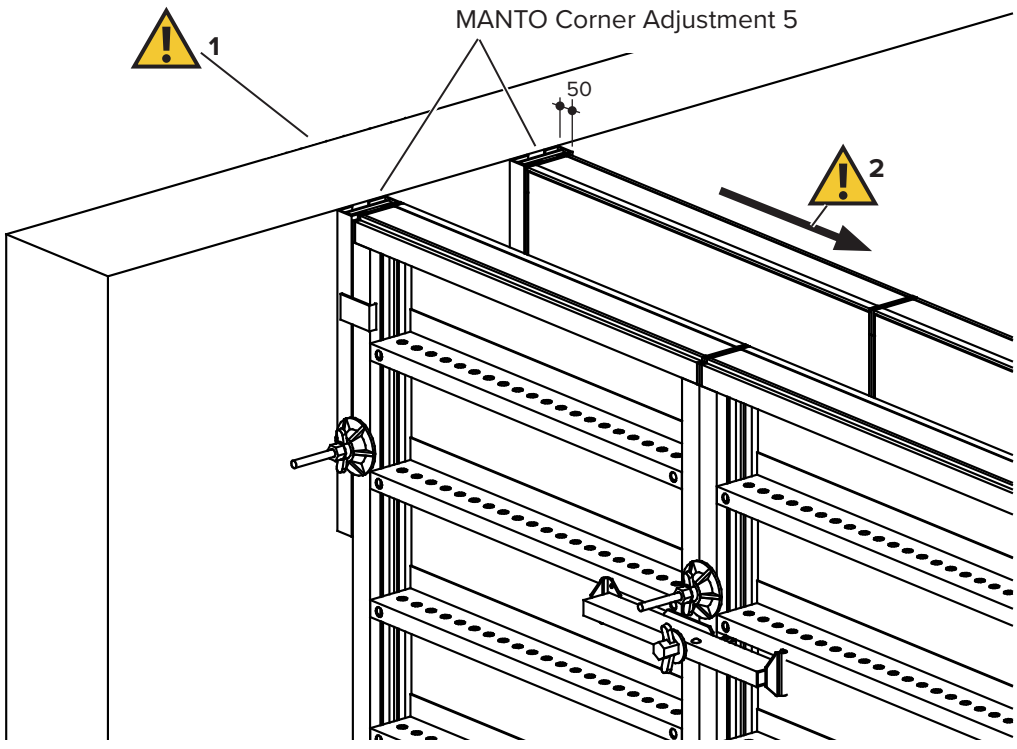
Use only MANTO G3 M panels ≤ 1.20 m for wall connections. Use MANTO G3 panels or MANTO G3 M panels 240 as an alternative for wall connections.



NOTE

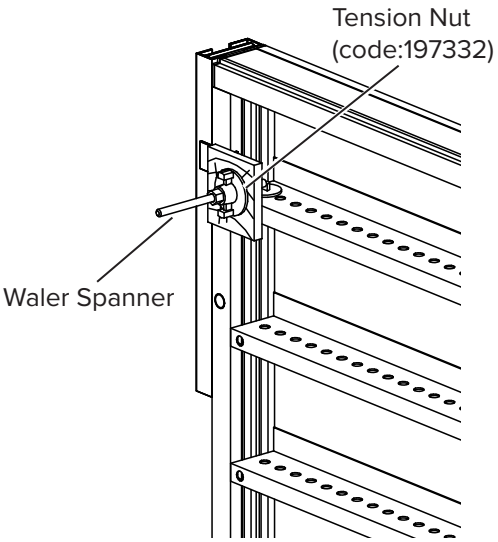
1. The existing wall must be capable of withstanding the additional load and, if required, it has to be braced adequately.

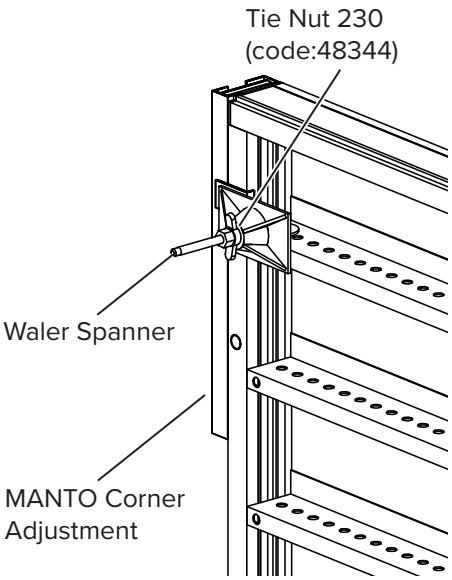
2. The formwork may have to be secured to prevent movement, e.g. by anchoring it to an existing structure.



Wall offsets

To connect the MANTO Corner Adjustment 5 to a MANTO Panel, the Tension Nut or the Tie Nut 230 with the Waler Spanner can be used as shown below. Connecting in either of these ways allows the MANTO Corner Adjustment 5 to remain attached to the MANTO Panels when lifting them by crane.





12 Stopends

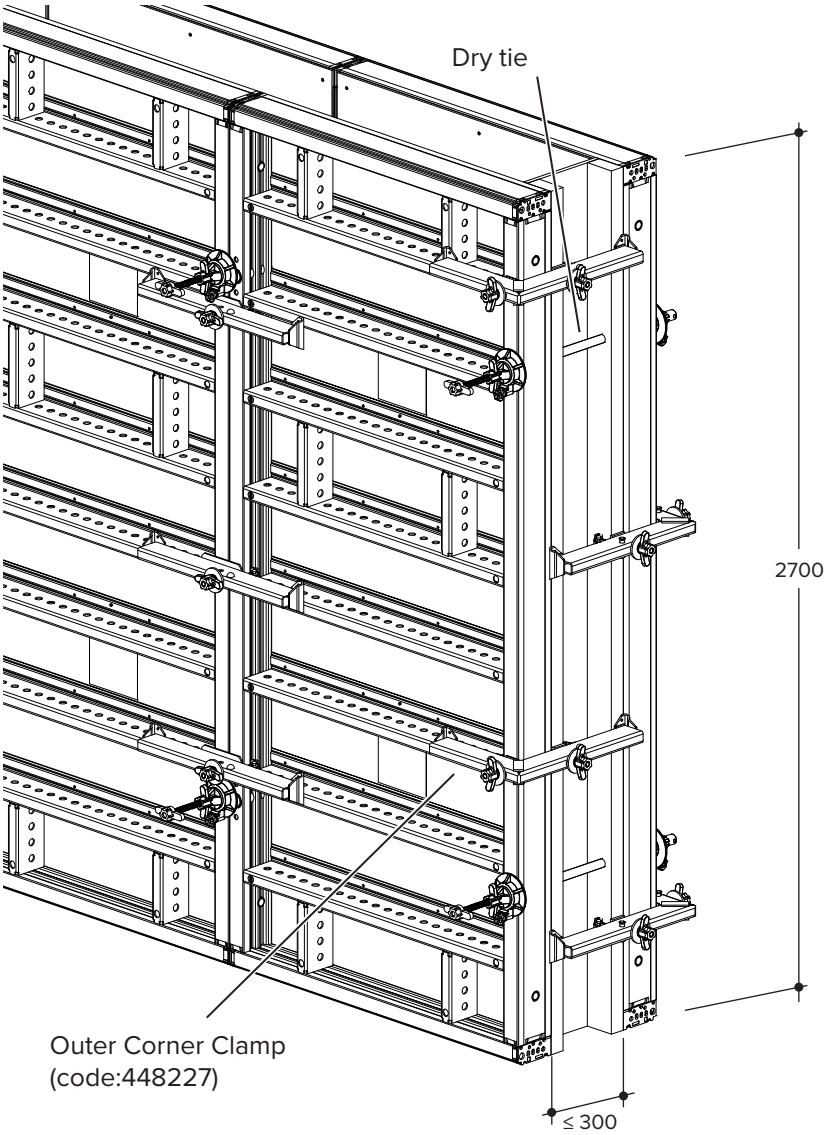
There are three ways to create stopends using the MANTO formwork system:

- For wall thicknesses up to 300 mm, use Outer Corner Clamps (code:448227, refer to section 12.1) to create the stopend.
- For wall thicknesses 100 - 425 mm, use the PLATINUM 100 Bulkhead Clamp (code:604328, refer to section 12.2) to create the stopend.
- For wall thicknesses > 425 mm, use the Multipurpose Waler 100 (code:450764, refer to section 12.3) to create the stopend.

12.1 With Outer Corner Clamps

Up to 300 mm wall thickness

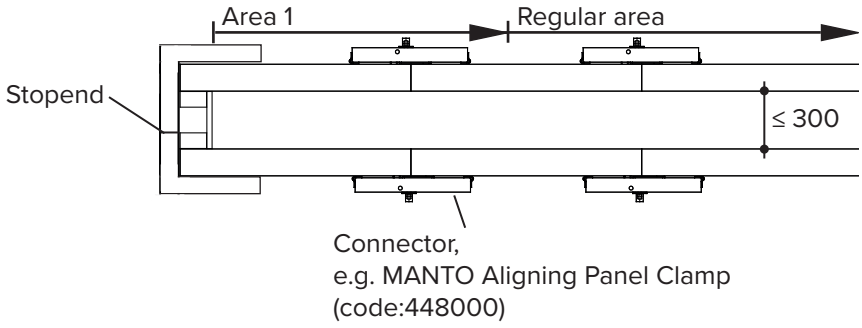
For wall thicknesses up to 300 mm, stopends can be created using the Outer Corner Clamp (code:448227, refer to section). The Outer Corner Clamps have to be attached to the end panels and attached as shown below.



Be aware that some sections are subjected to higher tensile loads (Refer to the table below)!

The following table shows the quantity of Outer Corner Clamps needed at the stopends and the connectors needed in the section 1, which is subjected to a higher tensile load.

Stopend		
MANTO panel (Height)	Wall thickness ≤ 300 mm	
	Stopend	Area 1 < 500 mm
	No. of Outer Corner Clamps	No. of Aligning Panel Clamps
2.70 m	4	2
3.30 m	5	2
2.70 m / 1.20 m	4/2	2/1
3.30 m / 1.20 m	5/2	2/2
2.70 m / 2.70 m	4/4	3/2
2.70 m / 3.30 m	4/4	3/2
3.30 m / 3.30 m	5/4	3/2



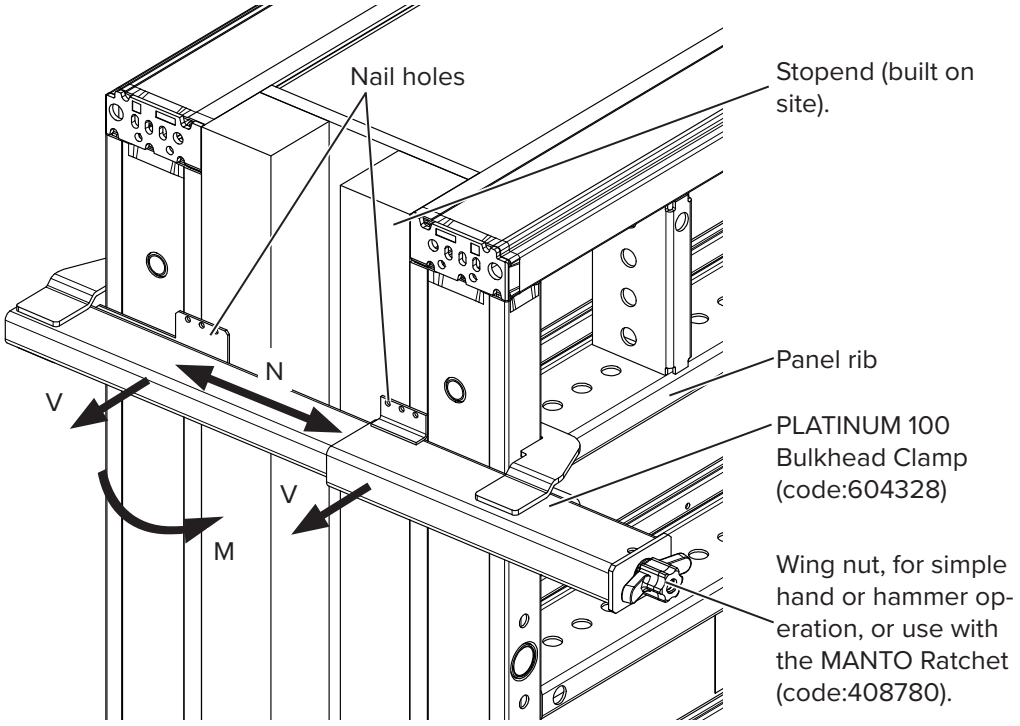
All information shown above is valid for concrete of normal consistency with an assumed coefficient of friction of μ = 0.20 between the concrete and formwork. Liquid concrete and concrete with low consistency must be checked separately.

Unless stated otherwise, all dimensions are given in mm.

12.2 Using the PLATINUM 100 Bulkhead Clamp

From 100 mm to 425 mm wall thickness

Stop-ends for wall thicknesses ranging from 100 mm to 425 mm can be formed with the PLATINUM 100 Bulkhead Clamps. The Bulkhead Clamps support the stop-end formwork and also act as tension-resistant dry ties. They can be attached at any height to MANTO panels assemblies either upright or lying on the ground. The nail holes in the PLATINUM 100 Bulkhead Clamps make it easy to secure the timber stopend formwork.

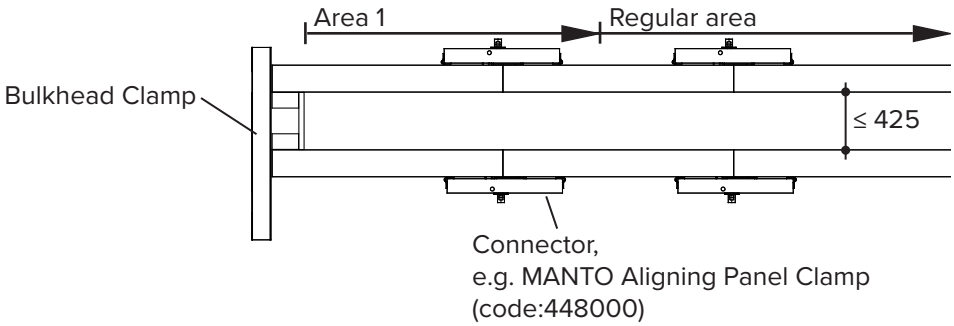


Safe Working Load of the PLATINUM 100 Bulkhead Clamp (code:604328)		
Tensile (N):	36.00	kN
Shear (V):	36.00	kN
Bending (M):	5.00	kNm

Be aware that some sections are subjected to higher tensile loads (Refer to the table below)!

The following table shows the quantity of Bulkhead Clamps needed at the stopends and the connectors needed in the section 1, which is subjected to a higher tensile load.

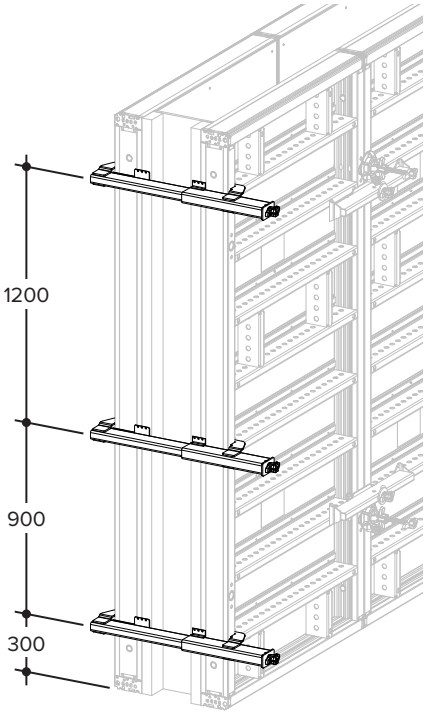
MANTO panel (Height)	Stopend			
	Wall thickness ≤ 300 mm		Wall thickness 300 mm - 425 mm	
	Stopend	Area 1 < 500 mm	Stopend	Area 1 < 850 mm
	No. of stop-end holders*	No. of Aligning Panel Clamps	No. of stop-end holders*	No. of Aligning Panel Clamps
2.70 m	3	2	3	2
3.30 m	3	2	3	2
2.70 m / 1.20 m	3/1	2/1	3/1	2/2
3.30 m / 1.20 m	4/1	2/2	4/1	3/2
2.70 m / 2.70 m	3/3	3/2	3/3	3/3
2.70 m / 3.30 m	3/4	3/2	3/4	3/3
3.30 m / 3.30 m	4/4	3/2	4/4	3/3



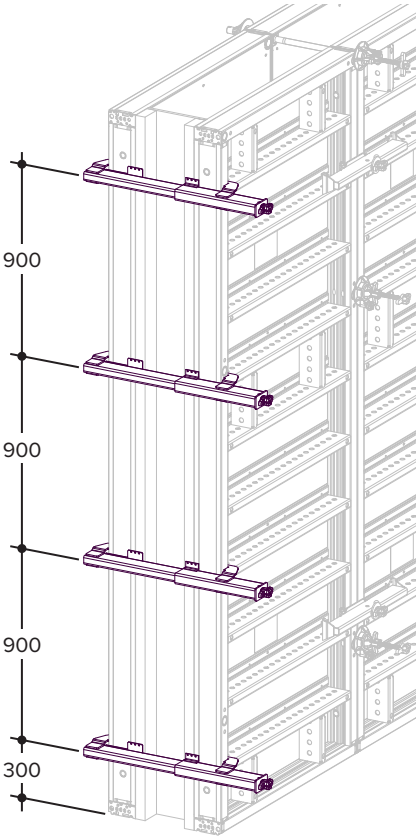
All information shown above is valid for concrete of normal consistency with an assumed coefficient of friction of μ = 0.20 between the concrete and formwork. Liquid concrete and concrete with low consistency must be checked separately.

12.2.1 Maximum spacing of PLATINUM 100 Bulkhead Clamps when formwork is not stacked

**Panels 270,
hydrostatic concrete pressure**



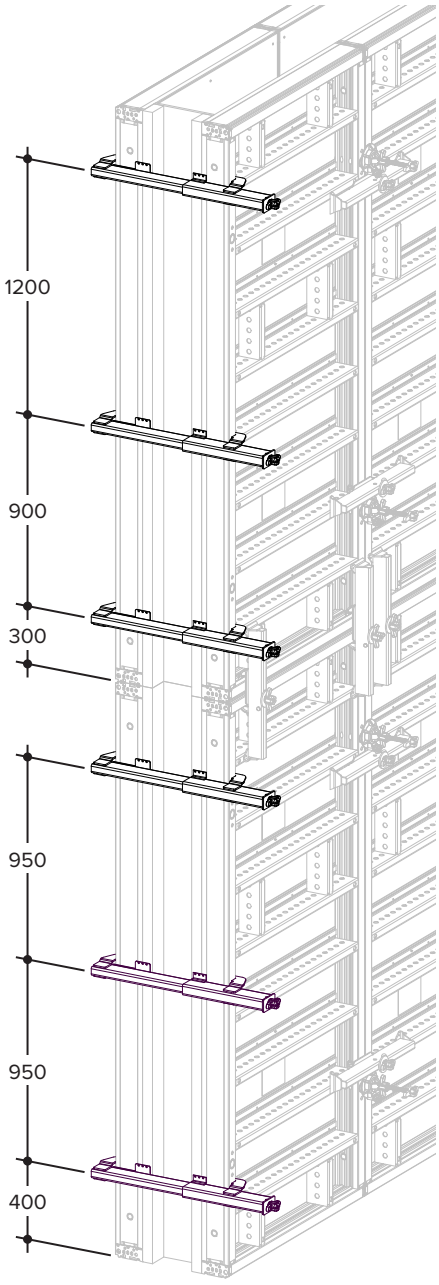
**Panels 330,
hydrostatic concrete pressure**



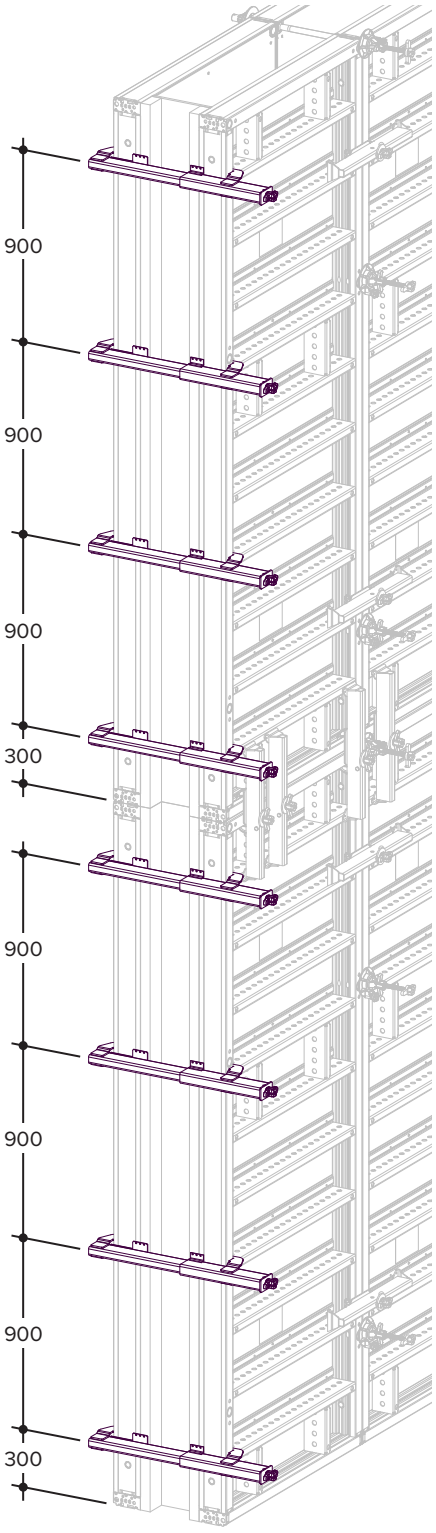
Unless stated otherwise, all dimensions are given in mm.

12.2.2 Maximum spacing of PLATINUM 100 Bulkhead Clamps with extended formwork (concrete pressure max. 80 kN, steady)

Panels 270, hydrostatic and steady concrete pressure

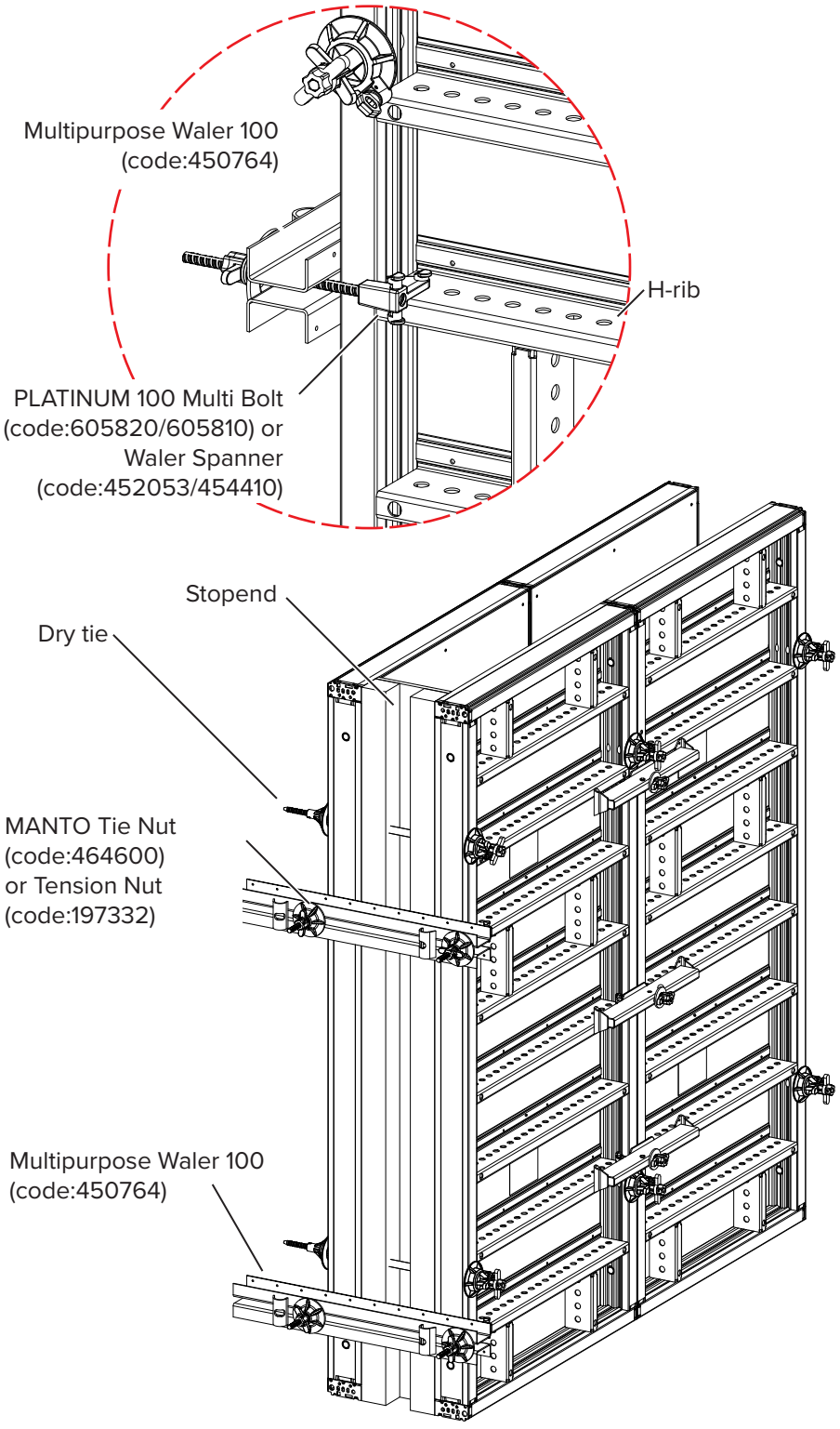


Panels 330, Hydroststic and steady concrete pressure



12.3 Using the Multipurpose Waler 100

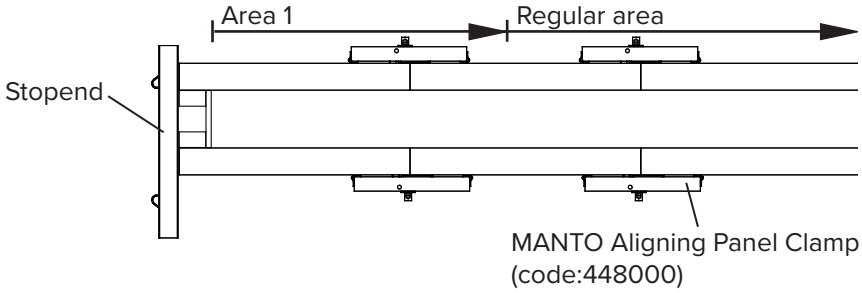
The Multipurpose Waler 100 (code:450764) is used to form a stopend for a wall thicker than 425 mm. It is fastened to the last MANTO Panels, tied in the usual manner, with 2no. PLATINUM 100 Multi Bolts or 2no. Waler Spanners.



Be aware that some sections are subjected to higher tensile loads (Refer to the table below)!

The following table shows the quantity of Multipurpose Walers 100 needed at the stopends and the connectors needed in the section 1, which is subjected to a higher tensile load.

MANTO panel (Height)	Stopend			
	Wall thickness ≤ 300 mm		Wall thickness 300 mm - 600 mm	
	Stopend	Area 1 < 500 mm	Stopend	Area 1 < 850 mm
	No. of Multipurpose Walers 100	No. of Aligning Panel Clamps	No. of Multipurpose Walers 100	No. of Aligning Panel Clamps
2.70 m	2	2	2	2
3.30 m	2	2	2	2
2.70 m / 1.20 m	2/1	2/1	2/1	2/2
3.30 m / 1.20 m	2/1	2/2	2/1	3/2
2.70 m / 2.70 m	2/2	3/2	2/2	3/3
2.70 m / 3.30 m	2/2	3/2	2/2	3/3
3.30 m / 3.30 m	2/2	3/2	2/2	3/3



All information shown above is valid for concrete of normal consistency with an assumed coefficient of friction of μ = 0.20 between the concrete and formwork. Liquid concrete and concrete with low consistency must be checked separately.

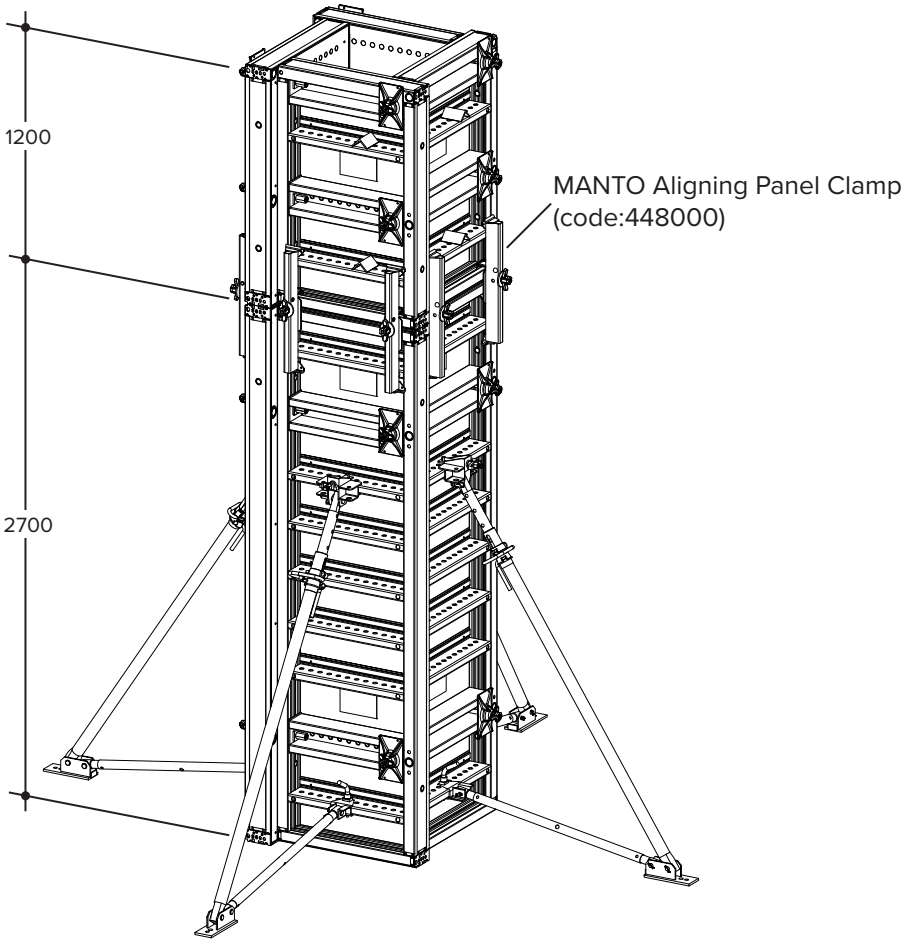
13 Column formwork

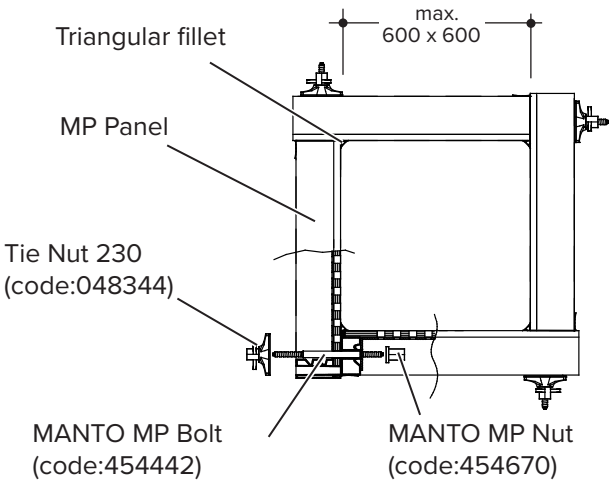
13.1 Using MANTO MP panels

With their tying holes in 50 mm increments and the transverse hole in the edge profile, MANTO MP panels are ideal for forming square and rectangular columns. The extension panels are connected using the MANTO Aligning Panel Clamp.

Maximum column size: 600 mm x 600 mm

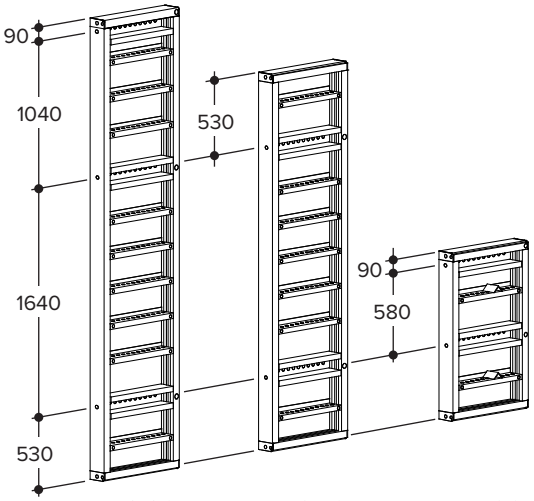
Permitted fresh concrete pressure: 80.00 kN/m^2.



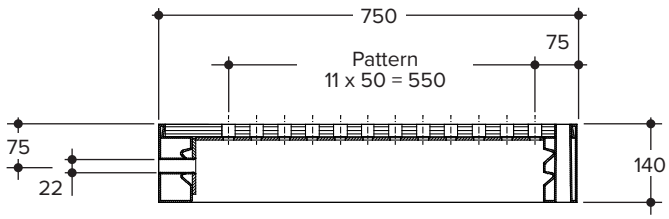


Unless stated otherwise, all dimensions are given in mm.

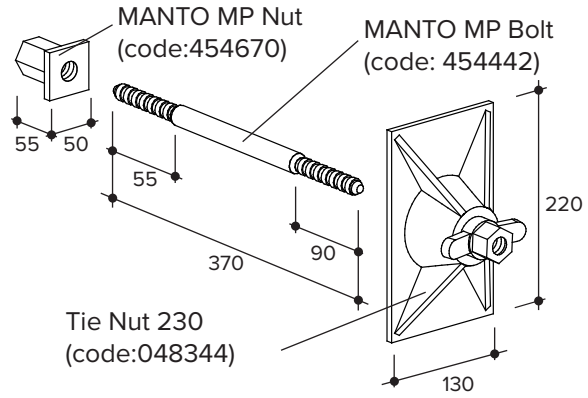
Three different panel heights are available.



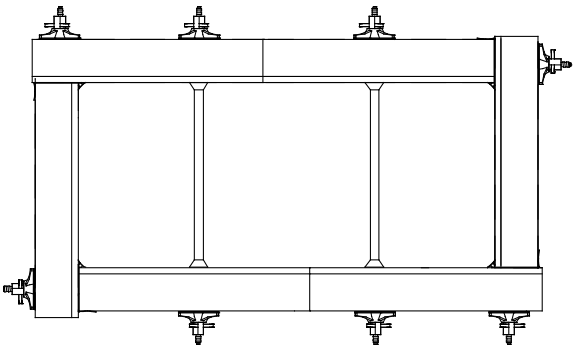
The available tie holes of the MP panels can be seen in the typical horizontal section shown below.



The panels are connected with the MP Bolt, the MP Nut and the Tie Nut 230. For formwork heights of up to 2.70 m, only 2no. connections per panel are required.



With additional ties and MP panels, larger column cross-sections can be formed.



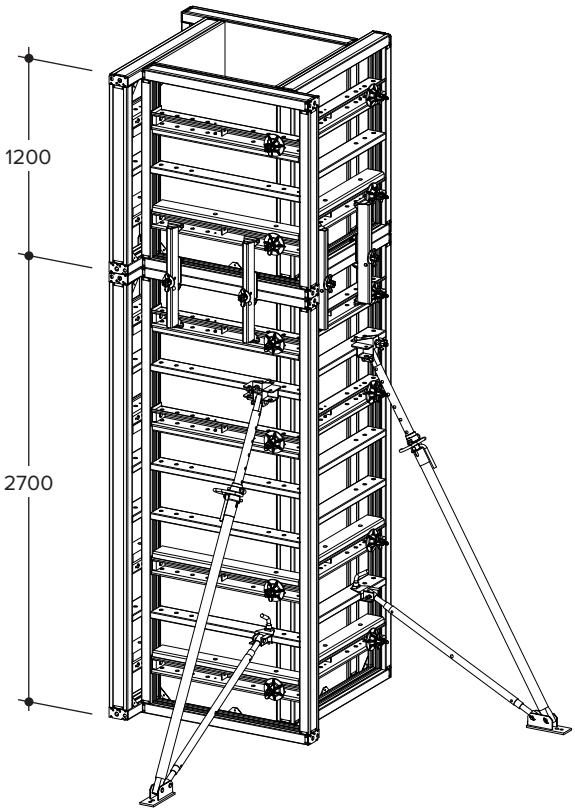
13.2 Using MANTO Column Frames

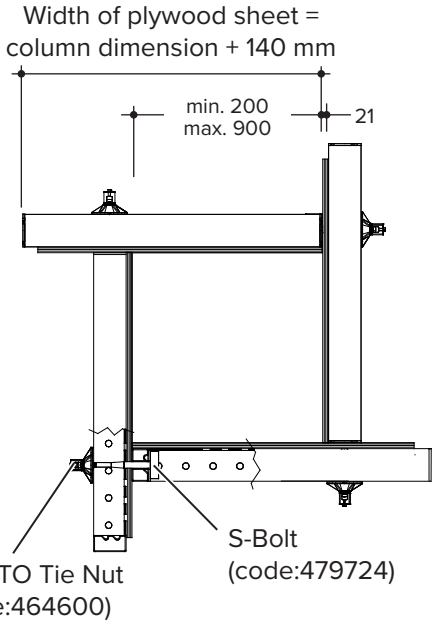
The MANTO Column Frames are supplied without the form sheet. They can be covered on site with a sturdy form sheet, using the built-in wooden strip.

Form sheets in cut-to-size shapes, with or without hole patterns, can be purchased from Hünnebeck.

Maximum column size: 900 mm x 900 mm

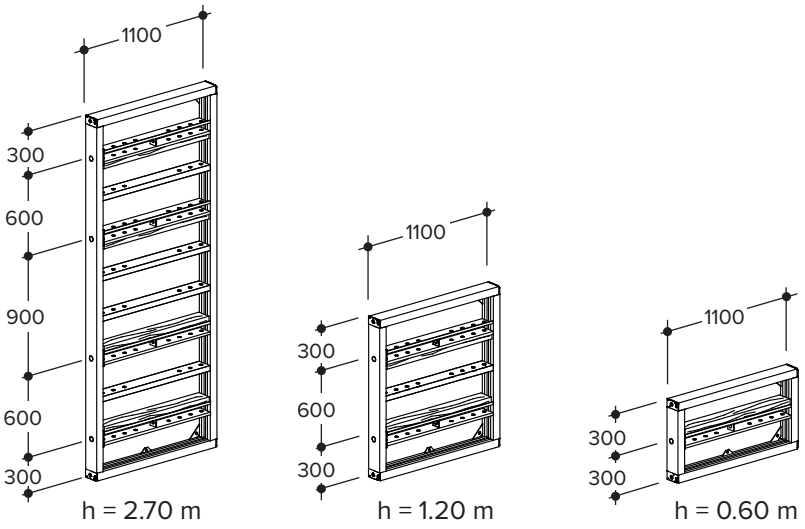
Permitted fresh concrete pressure: 100.00 kN/m^2.



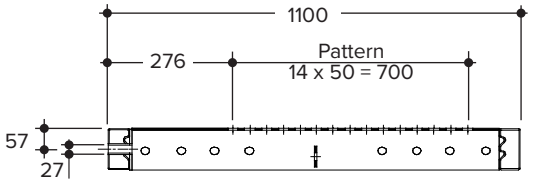


Unless stated otherwise, all dimensions are given in mm.

Three different MANTO Column Frame panels are available.

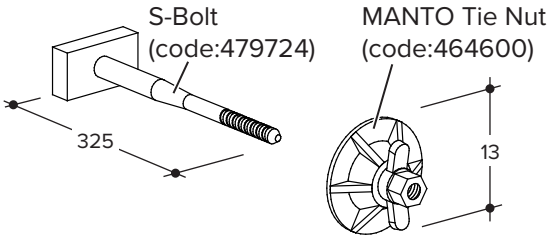


The available tie positions of the panels can be seen in the typical horizontal section shown below.



The panels are connected with a MANTO Tie Nut and an S-Bolt.

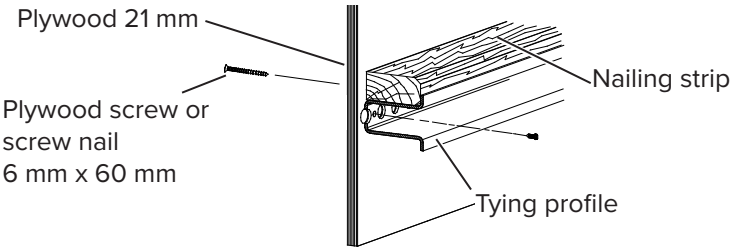
Column formwork of 2.70 m requires 16no. S-Bolts and 16no. MANTO Tie Nuts. An extension of 1.20 m requires 8no. S-Bolts and 8no. MANTO Tie Nuts. An extension of 0.60 m requires 4no. S-Bolts and 4no. MANTO Tie Nuts.



The form sheets must be fixed to the panels before the panels are tied.

Attaching plywood sheet

The plywood sheet can be screwed or nailed onto the nailing strip or screwed from the rear through the tying profile. There are also fasteners at the upper and lower edge profile of the MANTO Column Frames.



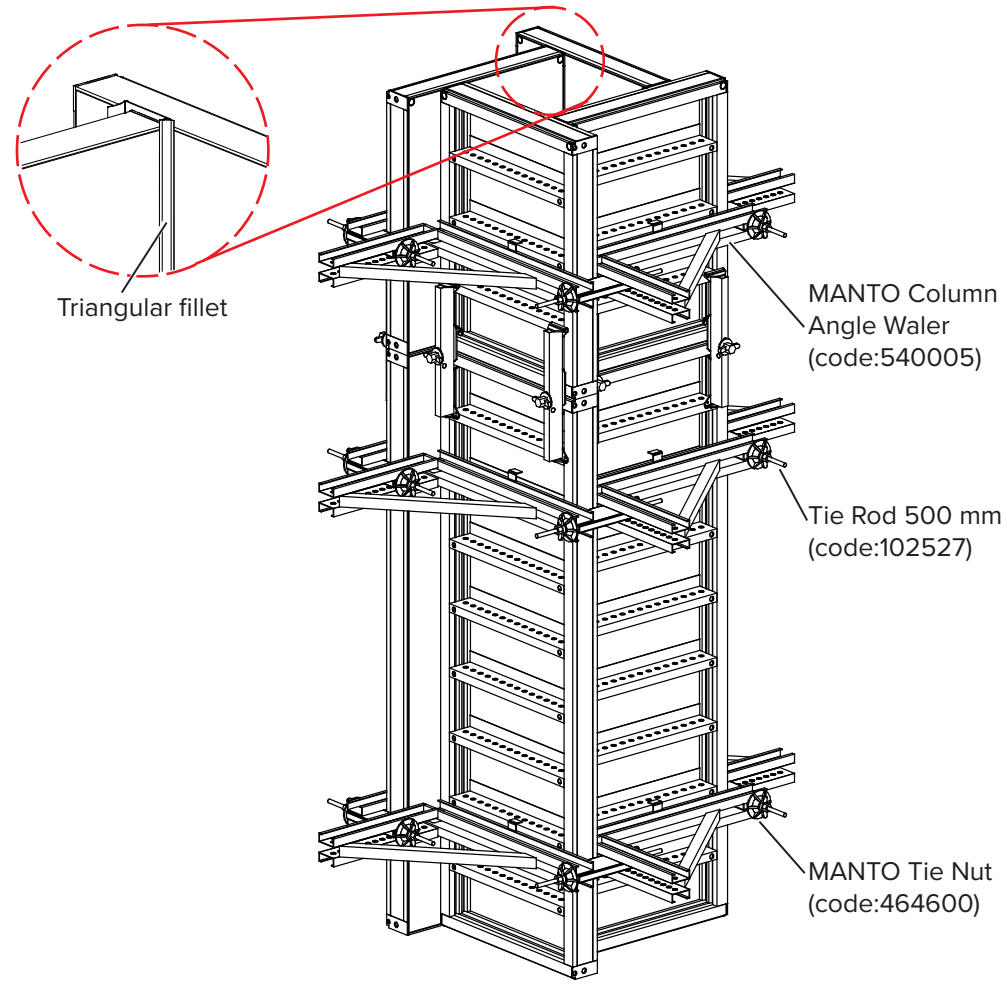
13.3 Using the MANTO Column Angle Waler

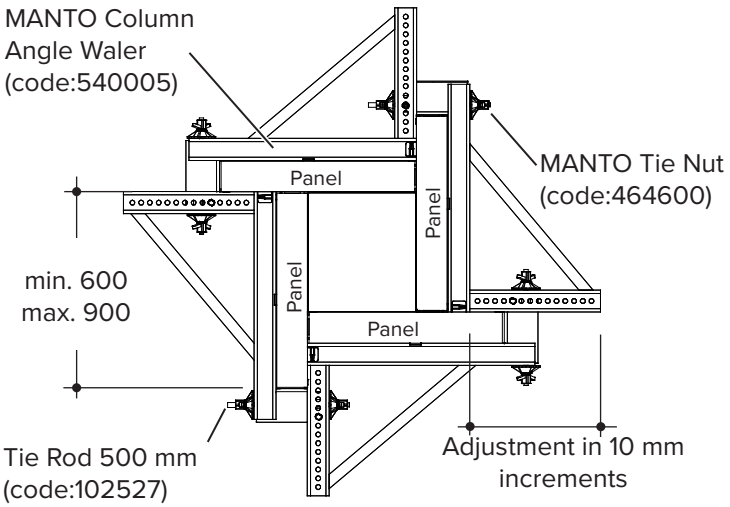
The MANTO Column Angle Waler allows columns to be formed without having to use special panels. Standard MANTO panels 600 mm to 900 mm wide are used for this solution.

The Triangular Column Fillet (simply attached to the edge of the MANTO Panel) assures a clean concrete edge.

Column edge length: 200 mm to mm (in mm increments)

Permitted fresh concrete pressure: 80.00 kN/m^2.

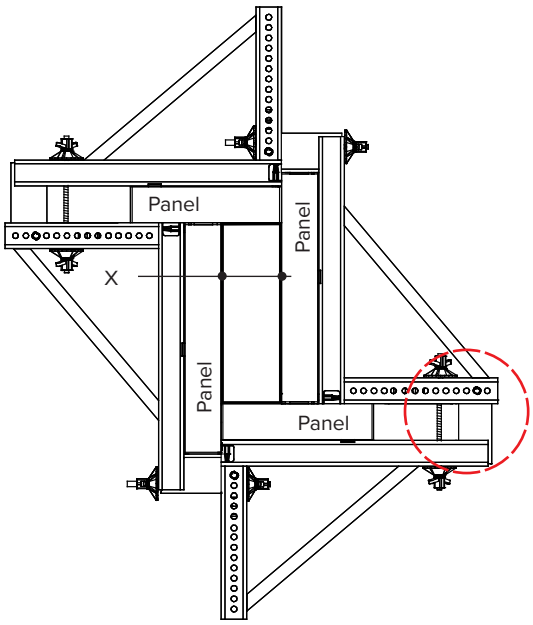




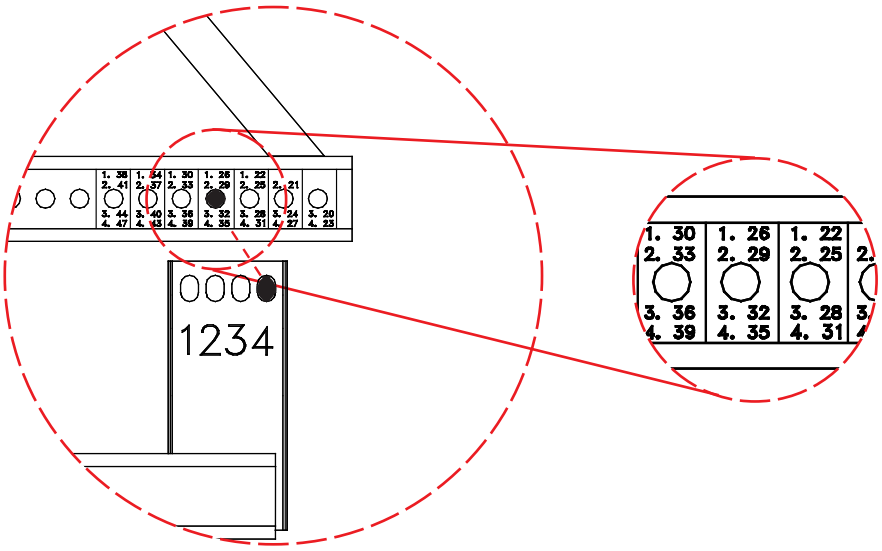
Unless stated otherwise, all dimensions are given in mm.

Panels ranging in width from 600 mm to 900 mm can be used to create non-square columns. The marking of the hole pattern allows easy adjustment to the desired column dimensions. Find the hole on the grid with the appropriate dimension and connect it to the hole with the number preceding the dimension (1 to 4).

The “X” distance is set with the markings on the Column Waler.

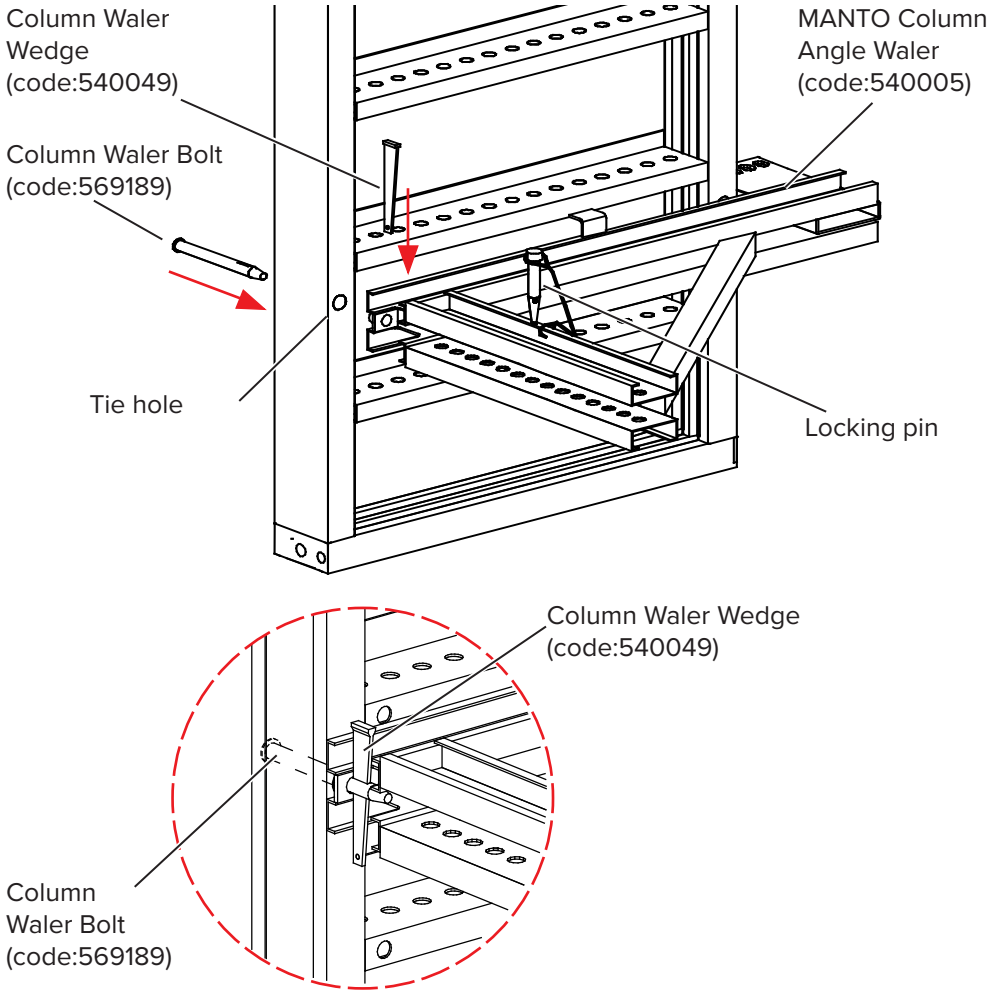


For a column with a cross-section of 350 mm for example, assemble as shown in the details below.



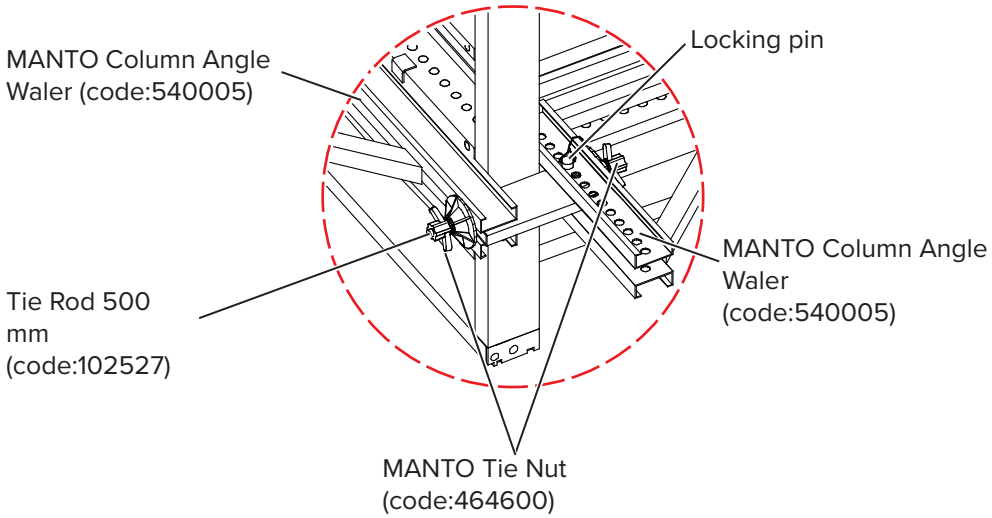
The values on the hole pattern of the MANTO Column Angle Waler are indicated in centimetres.

The MANTO Column Angle Walers must be fastened through the tie hole with a Column Waler Bolt and a Waler Wedge on each of the four panels. This determines the position and quantity of the walers.



After assembling the panels, the MANTO Column Angle Walers must be mounted. The spacing of the MANTO Column Angle Walers should be adjusted to the desired column dimension by using the captive safety pin.

Finally, by installing the tie (2no. MANTO Tie Nuts and 1no. Tie Rod DW 15, 500 mm) the column formwork is closed and ready to use.



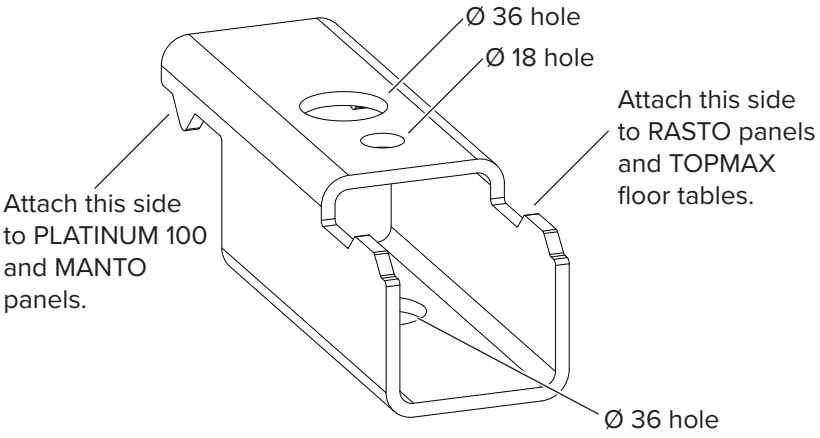
14 Formwork restraint

14.1 Tying panels to the ground

MANTO panels can be tied to the ground (concrete) with the Panel Anchor Bracket and the Anchor Bolt MM+SSK 16 × 130 mm. This secures the formwork against uplift, e.g. when it is windy.

14.1.1 Panel Anchor Bracket

The Panel Anchor Bracket (code:605999) is a multi-system component used to restrain panels. The Panel Anchor Bracket is designed to accommodate panels from different systems. The position/orientation depends on the respective panel.



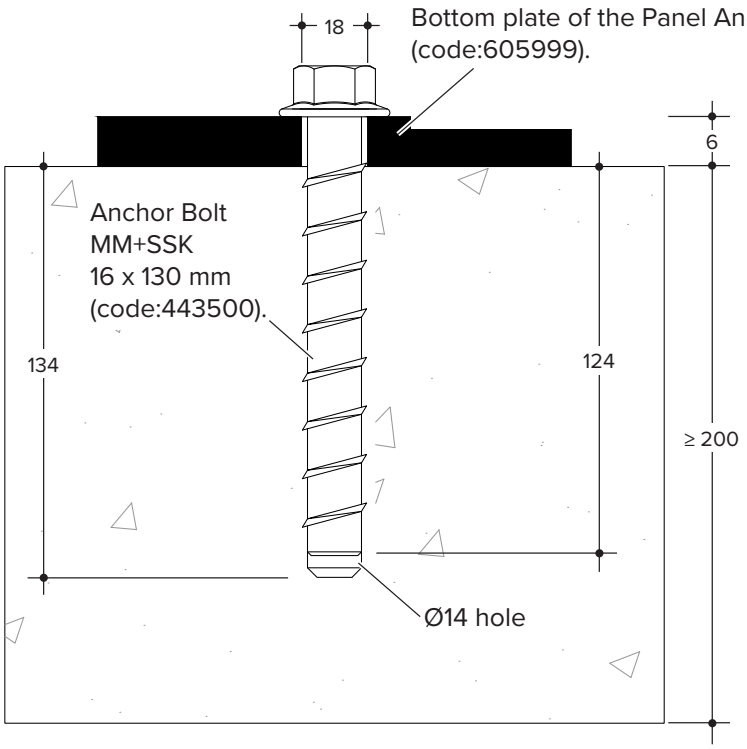
The Panel Anchor Bracket (code:605999) is secured using the Anchor Bolt MM+SSK 16 x 130 mm (code:443500). The Panel Anchor Bracket has 2no. staggered Ø18 holes on opposite faces for installing the Anchor Bolt. Two Ø36 holes are aligned with the smaller holes on the opposite face, allowing the Anchor Bolt to be passed through the holes.

Only one Anchor Bolt is required per Panel Anchor Bracket. To fasten the Anchor Bolt, tighten it with a 24 mm spanner with a spanner extension.

☞	The Panel Anchor Bracket is intended to protect formwork elements from uplift. The Panel Anchor Bracket does **not** eliminate the need to secure formwork elements against overturning, e.g. using MANTO Alignment Struts!

14.1.2 Anchor Bolt MM+SSK 16 x 130 mm

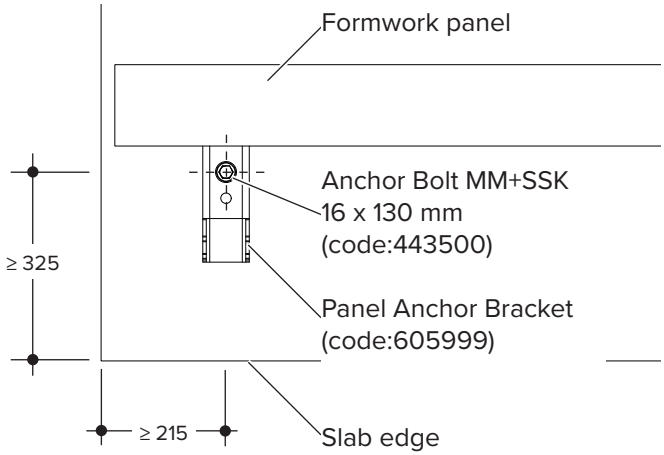
The Anchor Bolt MM+SSK 16 x 130 mm (code:443500) is used to temporarily secure components to the existing structure. The bolt can be tightened using a 24 mm spanner.



WARNING

Risk of injury from overturning formwork elements!

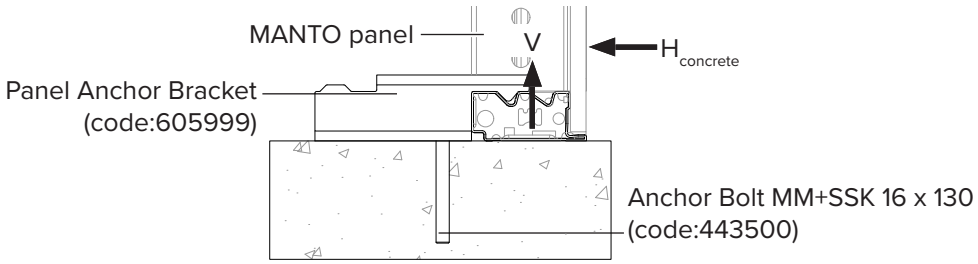
Ensure that the structure can withstand the additional load.



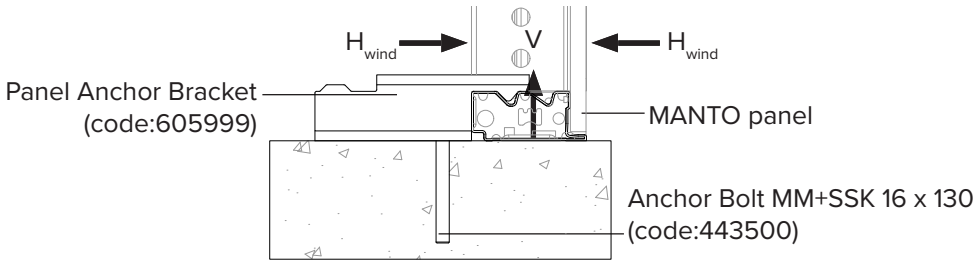
Anchor Bolt MM+SSK 16 x 130 mm (code:443500)		
Technical data		
Length	L	130 mm
Drill [Ø]	d0	14 mm

Unless stated otherwise, all dimensions are given in mm.

Anchor Bolt MM+SSK 16 x 130 mm (code:443500)		
Technical data		
Spanner size	W.a.f.	24 mm
Minimum hole spacing	s	≥ 645 mm
Minimum edge distance	c	215 / 325 mm
Minimum concrete thickness	d	≥ 200 mm



Panel Anchor Bracket (code:605999) + Anchor Bolt MM+SSK 16 x 130 (code:443500)				
with MANTO panels				
Concrete pressure - Safe Working Loads				
	Concrete strength			
	25 N/mm²	**20 N/mm²**	**15 N/mm²**	**10 N/mm²**
$H_{concrete}$ [kN]	**V [kN] panel uplift**			
0.00	10.58	9.46	8.18	6.68
2.50	10.20	9.07	7.77	6.25
5.00	9.65	8.48	7.14	5.53
7.50	8.91	7.68	6.24	4.46
10.00	7.95	6.62	5.01	2.83
12.50	6.73	5.22	3.24	0.00
15.00	5.14	3.25	0.00	
17.50	2.88	0.00		
19.50	0.00			

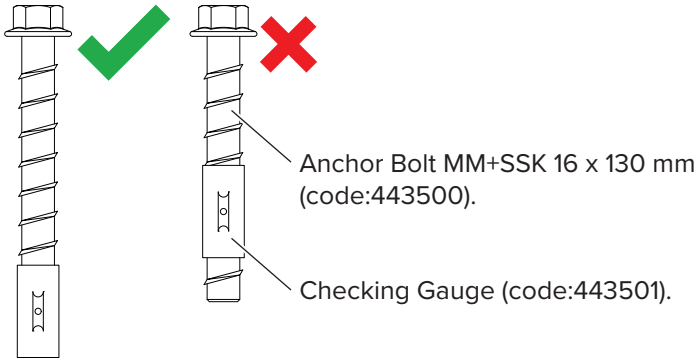


Panel Anchor Bracket (code:605999) + Anchor Bolt MM+SSK 16 x 130 (code:443500)				
with MANTO panels				
Wind load - Safe Working Loads				
	Concrete strength			
	25 N/mm²	**20 N/mm²**	**15 N/mm²**	**10 N/mm²**
H_{wind} [kN]	**V [kN] panel uplift**			
0.00	10.58	9.46	8.18	6.68
2.50	8.00	6.87	5.57	4.05
5.00	5.25	4.09	2.74	1.14
7.50	2.31	1.09		
9.50	0.00			

Unless stated otherwise, all dimensions are given in mm.

Re-using Anchor Bolts

When re-using Anchor Bolts check the bolt beforehand with the Checking Gauge (code:443501).

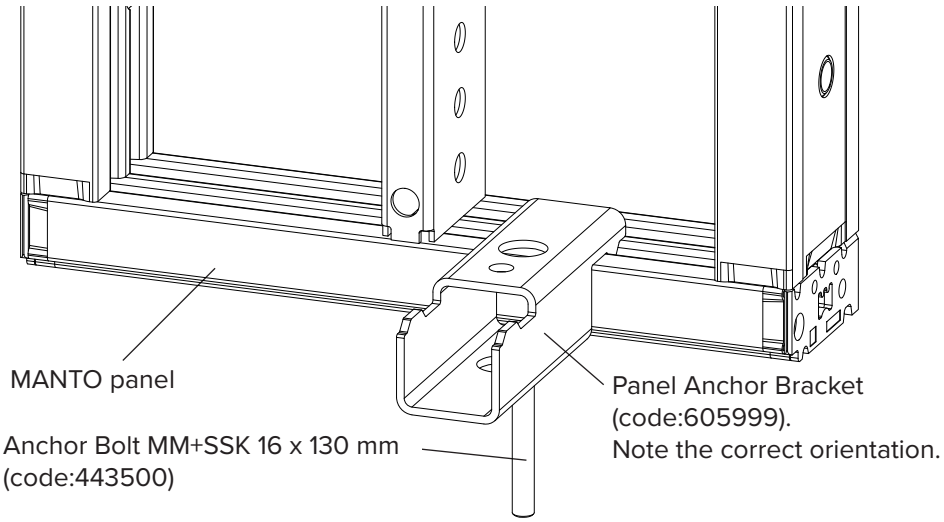


If a hole is drilled incorrectly, a new hole must be drilled at a distance equal to at least twice the actual depth of the incorrectly drilled hole.

Anchor Bolts can be re-used, but the same hole cannot be used a second time.

14.1.3 Tying panels to the ground with the Panel Anchor Bracket

The Panel Anchor Bracket (code:605999) can be attached to MANTO panels as shown below to secure MANTO panels against uplift.



WARNING

Risk of injury from overturning formwork elements!

The Customer is responsible for verifying that the concrete strength of the existing structure is in accordance with the specifications shown in section 4.

Installation

Step 1 Place the Panel Anchor Bracket (code:605999) at the edge profile of the MANTO panel at the location specified by the supplied scheme.

Step 2 Pass a Ø14 drill bit through the Ø18 hole of the Panel Anchor Bracket (code:605999) and mark where the hole should be drilled. Remove the Panel Anchor Bracket.

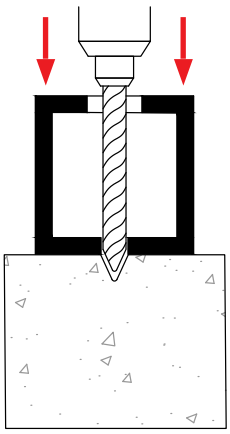
Step 3 Use a Ø14 drill bit to drill a 134 mm hole in the existing structure.

Step 4 Remove dust from the drilled hole.

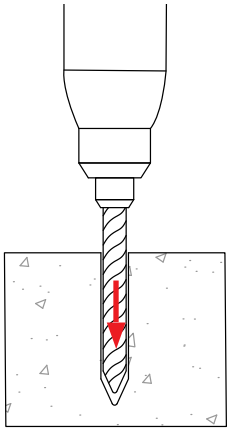
Step 5 Place the Panel Anchor Bracket at the edge profile again, insert the Anchor Bolt through the Ø36 hole and screw tight using a 24 mm spanner with an extension.

Step 6 Ensure that the Panel Anchor Bracket (code:605999) is securely bolted.

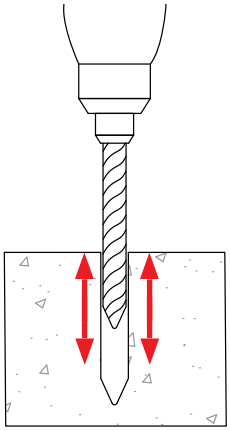
Step 2:



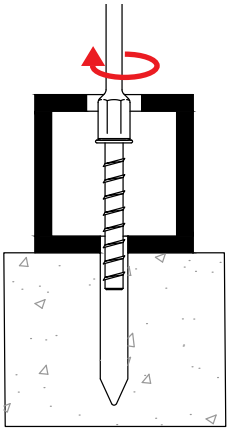
Step 3



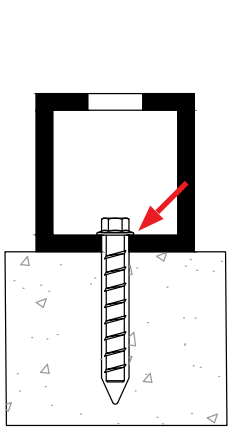
Step 4



Step 5



Step 6



Spacing

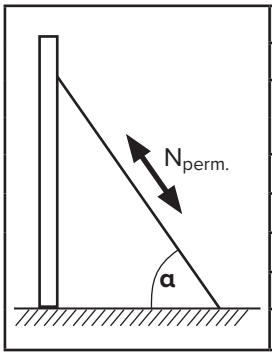
Spacing of the Panel Anchor Brackets (code:605999) is a factor of the conditions on site, such as formwork height and weight, wind load, etc. It has to be calculated individually for each application!

14.2 Bracing panels

14.2.1 MANTO Strut Head

The MANTO Strut Head (code:600035) can be connected to vertically or horizontally arranged MANTO panels.

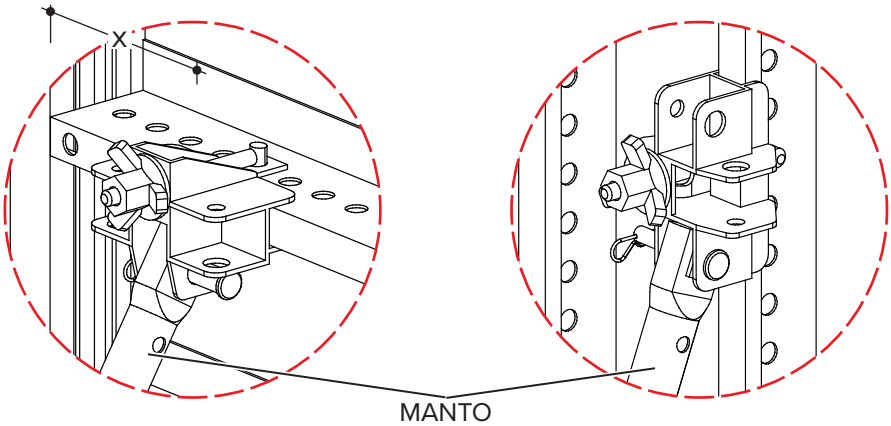
The following table shows the permitted strut loads.



Safe working load [kN] (strut load N_{perm})					
MANTO Strut Head with vertical panels (horizontal ribs)					
Strut angle α to the horizontal	**Distance to panel edge or centre profile**				
	200 mm	**300 mm**	**400 mm**	**500 mm**	**600 mm**
50°	8.25	6.16	5.19	4.73	4.63
55°	7.50	5.56	4.69	4.31	4.19
60°	6.87	5.13	4.31	3.98	3.85
MANTO Strut Head with horizontal panels (vertical ribs)					
10.00					

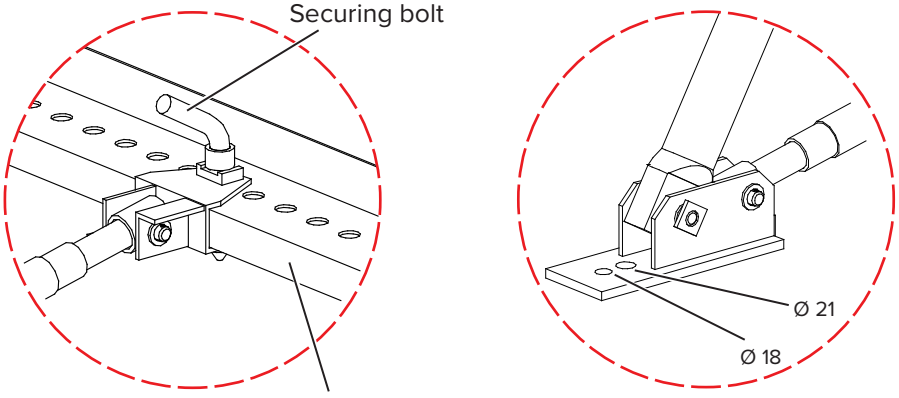
MANTO Strut Head (code:600035) to horizontal panel

MANTO Strut Head (code:600035) to vertical panel



Base connector of the Alignment Strut

Strut Base



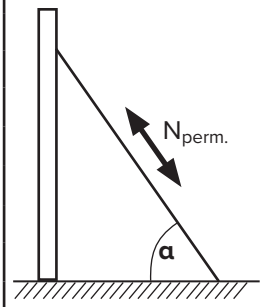
Unless stated otherwise, all dimensions are given in mm.

14.2.2 MANTO Strut Connector

The MANTO Strut Connector (code:565114) can be connected to vertically or horizontally arranged MANTO panels.

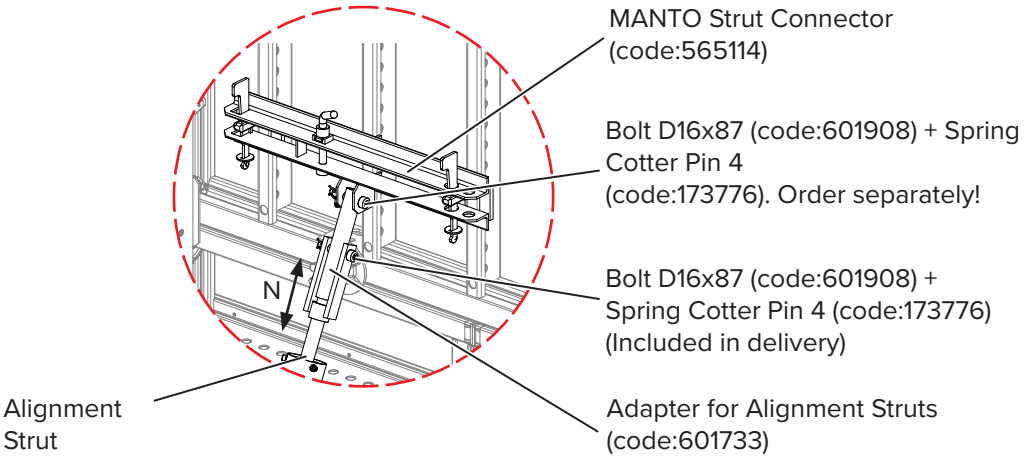
When using Alignment Struts, the Adapter for Alignment Struts (code:601733) is also needed. When using steel props, the Strut Adapter (code:565331), the Strut Base (code:566369) and 4no. Bolts M12×30 with Nut (code:5210) are also needed.

The following table shows the permitted strut loads.



Safe working load [kN] (strut load N_{perm})					
MANTO Strut Connector with vertical panels (horizontal ribs)					
Strut angle α to the horizontal	**Distance to panel edge or centre profile**				
	200 mm	**300 mm**	**400 mm**	**500 mm**	**600 mm**
50°	16.92	12.76	10.88	10.02	9.78
55°	16.65	12.61	10.75	9.89	9.65
60°	16.40	12.35	10.52	9.65	9.46
MANTO Strut Connector with horizontal panels (vertical ribs)					
50°	4.60				
55°	4.40				
60°	4.30				

When using horizontally arranged extension panels or horizontal panels, pay attention to the assembly direction of the panels. Panels must be assembled in such a way that the ribs are open from the right side. Otherwise the Strut Connector will be mounted in the wrong direction and the props cannot be attached.

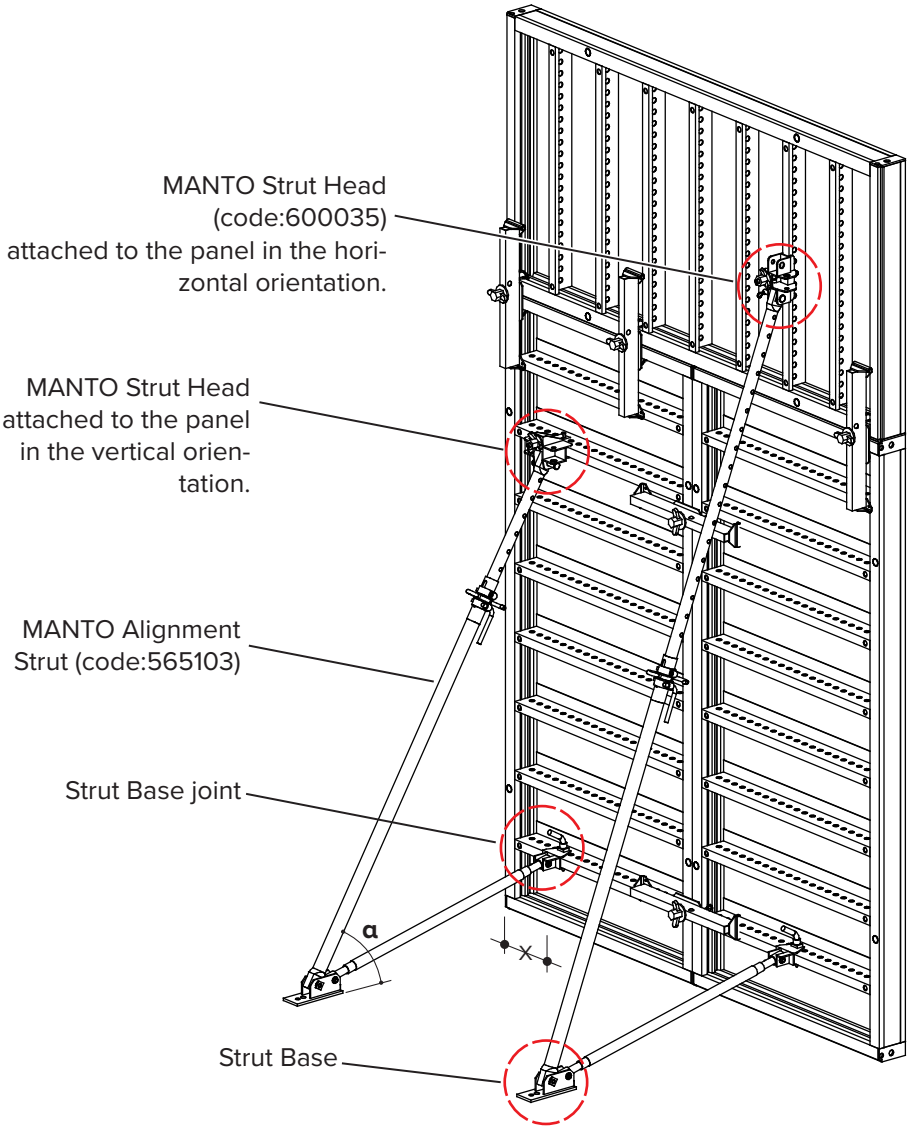


14.2.3 Struts for formwork heights up to 3.90 m

The MANTO Alignment Struts are used with formwork heights of up to 3.90 m. The strut is attached to a rib of the MANTO panel which can be either in a horizontal or vertical orientation.

Props must be placed as near as possible to the vertical panel joint or the centre profile.

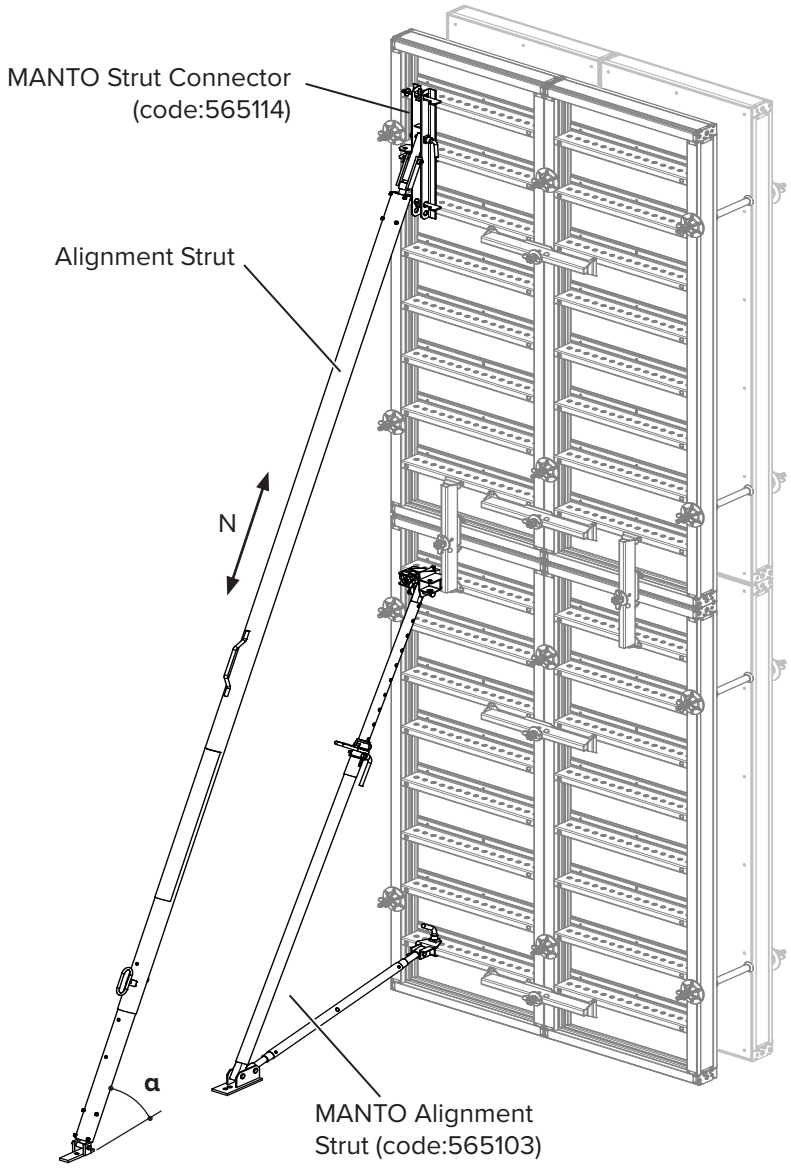
For information on the Safe Working Loads, please refer to pages 35 - 38 and 151.



Unless stated otherwise, all dimensions are given in mm.

14.2.4 Struts for formwork heights of more than 3.90 m

When additional struts are required to extend MANTO formwork in height (higher than 3.90 m), use alignment struts. All Alignment Struts can be telescoped and are lightweight. The encapsulated thread facilitates fine-tuning.



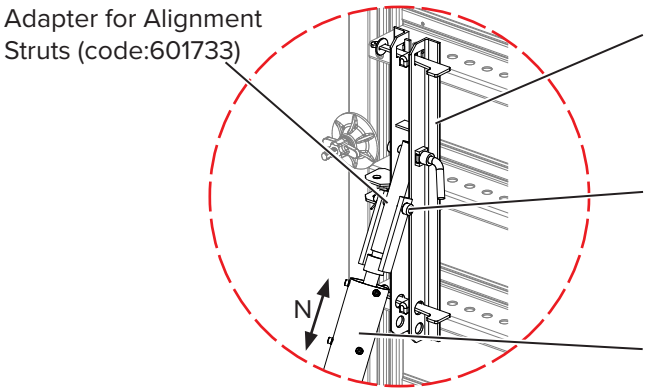
☞	The maximum strut loads for the connection to upright panels are a factor of the distance of the strut head to the panel edge (dimension X above) and the inclination of the struts (angle **α** in the illustration above).

☞	Props must be placed as near as possible to the vertical panel joint or the centre profile.

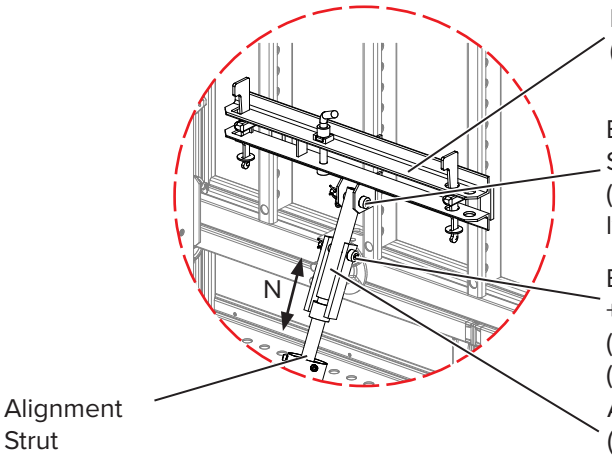
☞	For information on the Safe Working Loads, please refer to pages 35 - 38 and 151.

Connection for Alignment Struts

To connect the struts to **vertical panels** insert the Adapter for Alignment Struts into the head of the Alignment Strut and secure it with the Bolt D16x87 and the Spring Cotter Pin 4. Attach the MANTO Strut Connector to the panel rib using the integrated wedges. Then connect the assembled Strut with the Adapter to the MANTO Strut Connector.



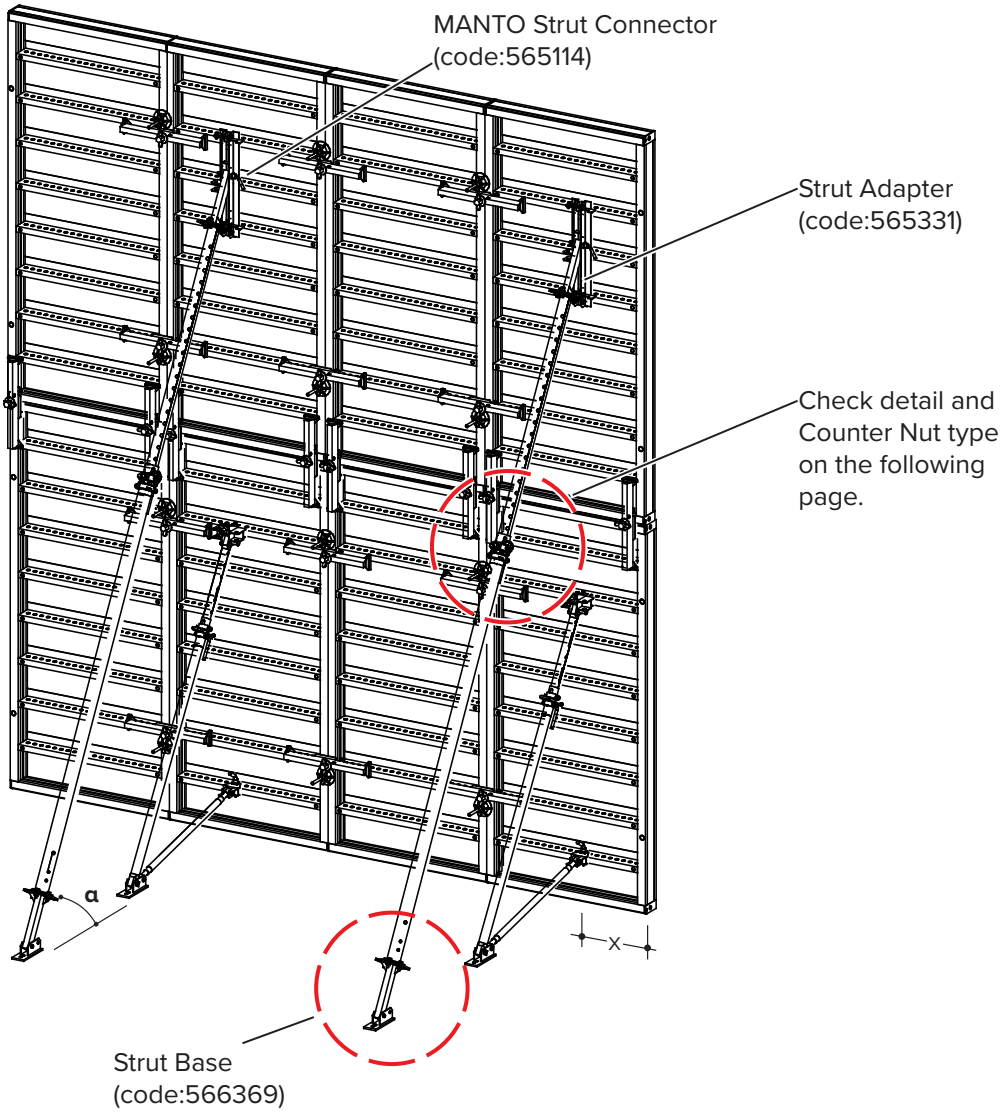
To connect the struts to **horizontal panels** insert the Adapter for Alignment Struts into the strut and secure using the an additional Bolt D16x87 and the Spring Cotter Pin 4. Attach the MANTO Strut Connector to the panel ribs using the integrated wedges. Then connect the assembled Strut with the Adapter to the MANTO Strut Connector.



Always follow the instructions in the user guide for the Alignment Struts.

14.2.5 Struts for formwork heights from 3.90 m to 6.00 m

Extended MANTO panels and formwork between 3.90 m and 6.00 m high can also be supported with EUROPLUSnew props in combination with the Strut Base, the Strut Adapter and a suitable Counter Nut



☞	The maximum strut loads for the connection to upright panels are dependant of the distance of the strut head to the panel edge (distance X) and the inclination of the struts (angle α above).
☞	Props must be placed as near as possible to the vertical panel joint or the centre profile. The correct type and size of the steel prop has to be selected according to the load, the formwork height and the extension length of the prop.
🕮	Image for reference only. Strut distance must be in accordance with the design scheme supplied. Always follow the instructions in the user guide for the Alignment Struts.

Connection for EUROPLUSnew Props

On the top, the tubular steel prop is connected to the Strut Adapter with 4no. M12x30 Bolts & Nuts 4.6.

Counter Nut

The permitted tension load of the steel prop is limited by the counter nut.

Permitted Tension: 15.00 kN.

Counter Nut A/260/300 (code:107107) EUROPLUS 260, 300 DB/DIN

EUROPLUSnew 20-250, 20-300

EUROPLUSnew 30-150

Counter Nut AS/350/410 (code:107118) for EUROPLUS 350 DB/DIN

EUROPLUSnew 20-350, 20-400

EUROPLUSnew 30-250, 30-300, 30-350

Counter Nut EC 400/DC 550 (code:587675 EUROPLUS 400 EC, 550DC

EUROPLUSnew 20-550, 30-400

Strut Base joint

The permitted pressure load of the steel prop is limited by the Strut Base joint. Permitted pressure: 34.00 kN. Note the maximum tensile load of the EUROPLUS*new* prop!

WARNING

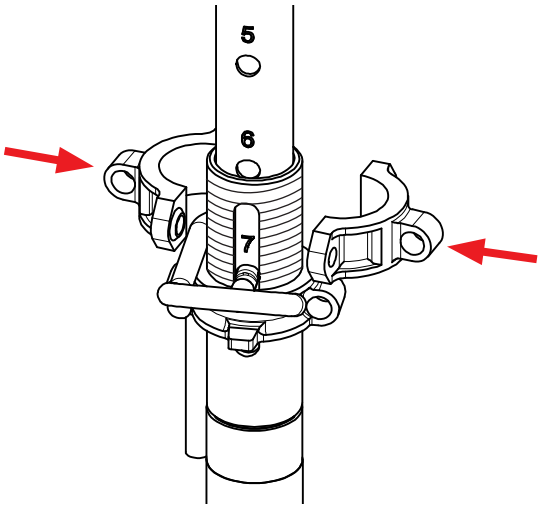
Formwork can overturn!

Without additional Counter Nuts, EUROPLUS Steel Props are not resistant to tension! If EUROPLUS Steel Props are used without additional Counter Nuts, the formwork can topple over towards the opposite side. Always attach an additional Counter Nut to each EUROPLUS Prop.

Attaching Counter Nuts to EUROPLUS*new* props

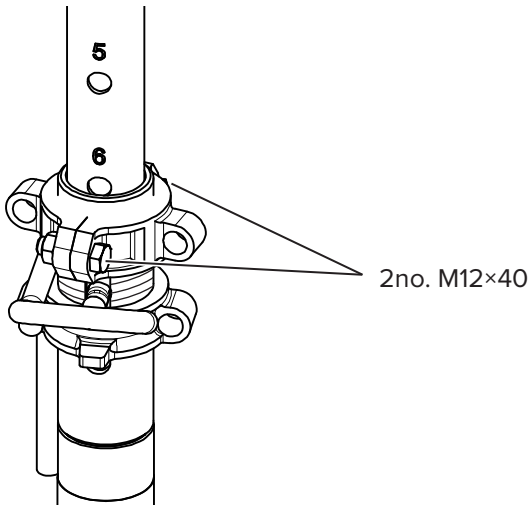
Depending on which prop is used, choose the matching Counter Nut from the list above and order separately.

Step 1 Place both halves of the Counter Nut on the thread of the EUROPLUS*new* Prop.



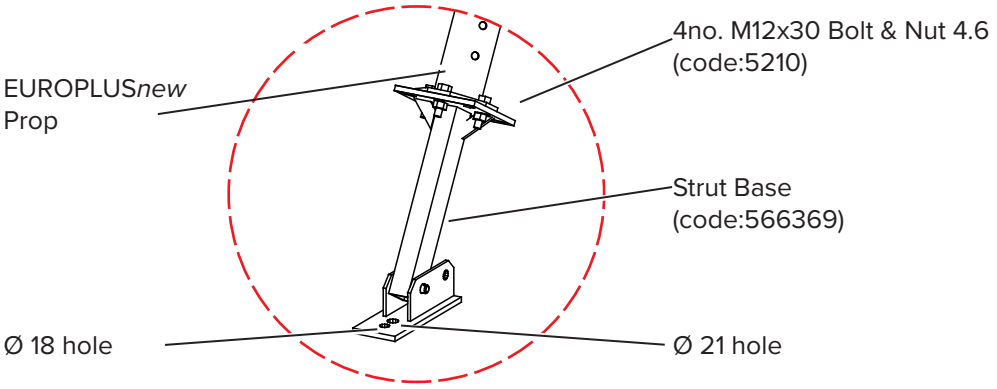
Unless stated otherwise, all dimensions are given in mm.

Step 2 Join the two halves of the Counter Nut using 2no. screws M12 x 40 and nuts.



Attaching Strut Base

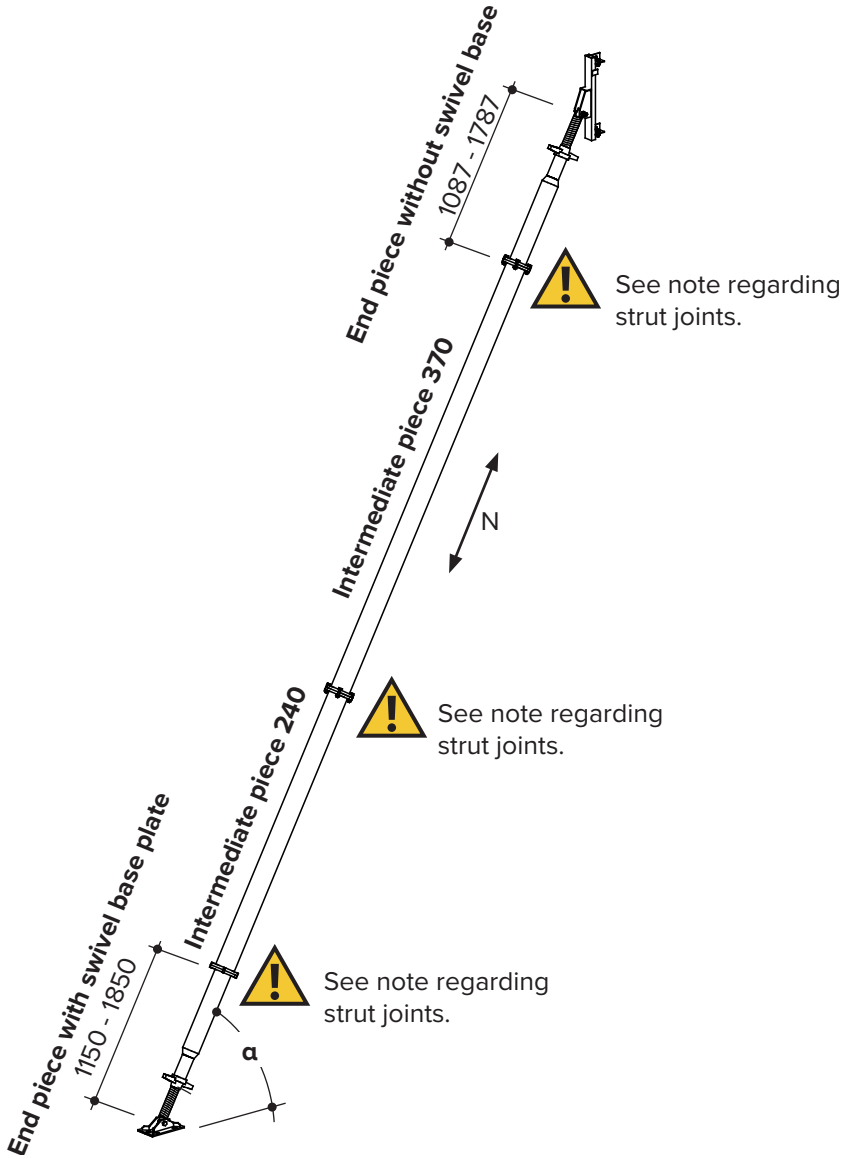
At the bottom, the Strut Base is connected to EUROPLUS*new* props with 4no. M12x30 Bolt & Nut 4.6.



Props must be placed as near as possible to the vertical panel joint or the centre profile. The correct type and size of the prop has to be selected according to the load, the formwork height and the extension length of the prop.

14.2.6 Struts for formwork heights of more than 6.00 m

The BKS Strut in combination with the BKS Strut Connector can provide support for formwork higher than 6.00 m.



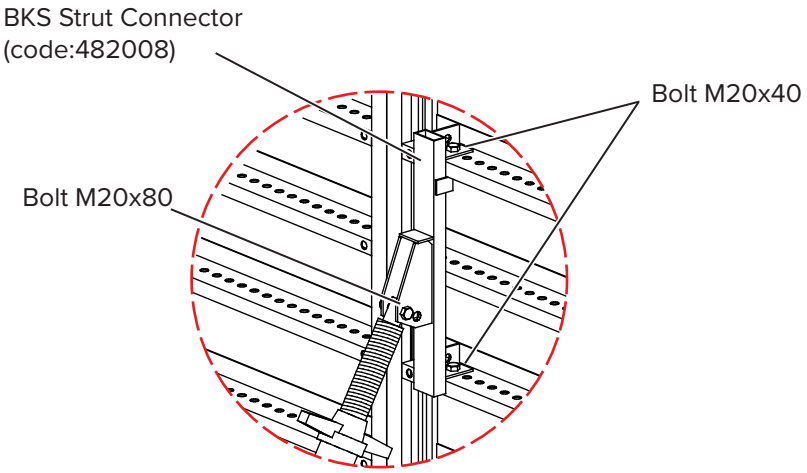
☞	Each strut joint requires 4no. M16x60 10.9.

☞	The maximum strut loads for the connection to vertical panels are dependant of the distance of the strut connector to the panel edge and the inclination of the struts (angle α above).

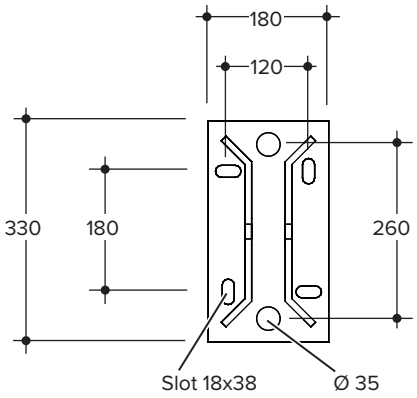
☞	Props must be placed as near as possible to the vertical panel joint or the centre profile. The correct type and size of the alignment strut has to be selected according to the load, the formwork height and the extension length of the alignment strut.

Connection for BKS Struts

To connect the struts at the top, use the BKS Strut Connector attached to the MANTO panel ribs using 2no. M20x40 Bolt & Nut and a M20x80 Bolt & Nut.



Swivel base plate of the end piece



BKS Strut Connector - Safe Working Load [kN]					
Depending on the distance to the edge of panel					
Strut angle α (to the horizontal plane)	Distance to panel edge or centre profile (G3 M)				
	200 mm	300 mm	400 mm	500 mm	600 mm
50°	29.30	19.10	15.30	13.70	13.20
55°	28.00	18.30	14.70	13.10	12.70
60°	27.10	17.70	14.20	12.70	12.20

BKS Struts - Safe Working Load						
Type	Length [m]	Safe Working Load [kN]	Number of end pieces		Number of intermediate pieces	
	min - max	fully extended	with part 489102	with part 489775	short (2.40 m) 489113	long (3.70 m) 489124
BKS 3	5.95 - 7.30	37.40	1 each	1 each	-	1
BKS 4	7.05 - 8.40	32.60			2	-
BKS 5	8.35 - 9.70	28.20			1	1
BKS 6	9.65 - 11.00	23.80			-	2
BKS 7	10.75 - 12.10	20.10			2	1

15 Constructing working platforms

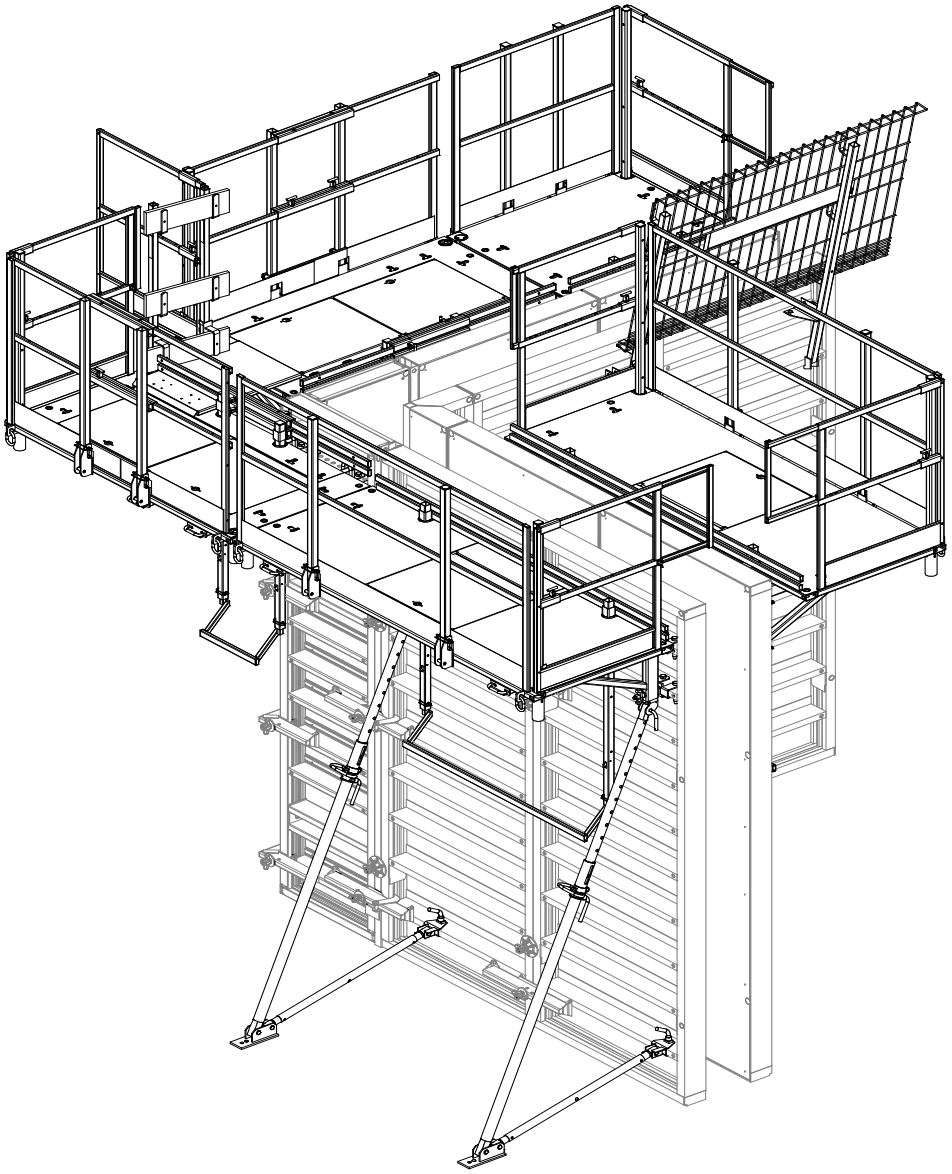
15.1 PLATINUM 100 platform and access system

The PLATINUM 100 platform and access system is fully compatible with MANTO wall formwork systems.

The PLATINUM 100 platform and access system permits safe access and allows safe execution of all work on the wall formwork, e.g. tying and connecting, and it is used as a pouring platform at the highest level of the formwork.

The PLATINUM 100 platforms are designed to meet the requirements of load class 2, DIN EN 12811, 150 kg/m^2).

They are equipped with integrated mesh front and side panels, temporary railings and self-locking hatches, infill decks, counter posts, ladders and useful accessories. Compatibility with the PROTECTO edge protection extends the platform capabilities and allows it to be adapted to each formwork situation. This allows for all work at the platform to be executed from a safe position.



For more information regarding PLATINUM 100 platform and access system, refer to the respective user guide.

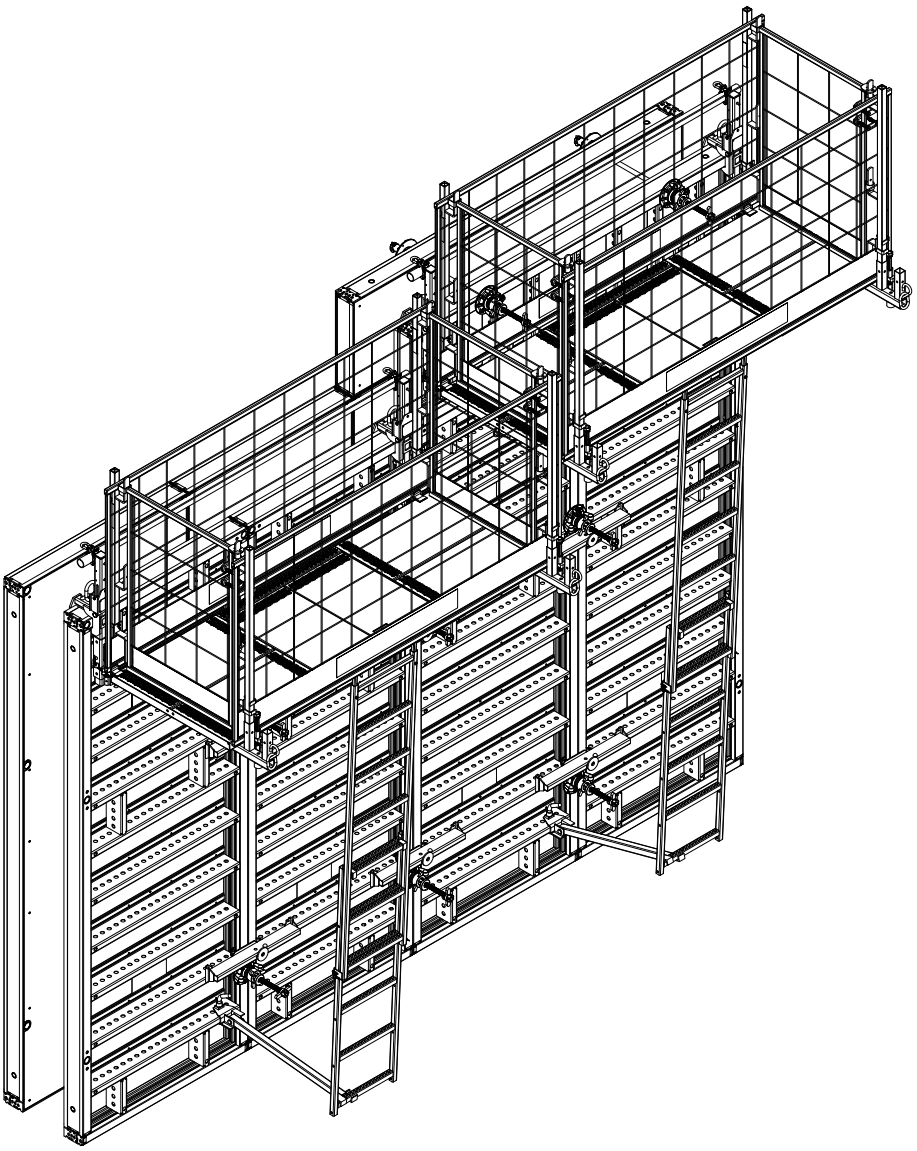
15.2 Universal Formwork Platform

With the Universal Formwork Platform, you can completely assemble a formwork platform with 360° side protection on panels lying flat and then raise the panels upright. The system ladders can then be used to safely ascend to the completely protected area.

Another option is to use a crane to hang the completely assembled Formwork Platform on the formwork.

The formwork platform can be secured to either the upper edge of the panels or to the profiles within the panels.

The SWL on the Formwork Platform complies with load class 2 (150 kg/ m^2) pursuant to DIN EN 12 811-1 and DIN 4420-1.



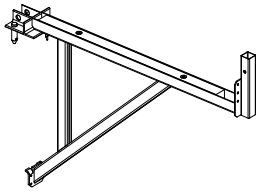
More information on the Universal Formwork Platform can be found in the respective user guide.

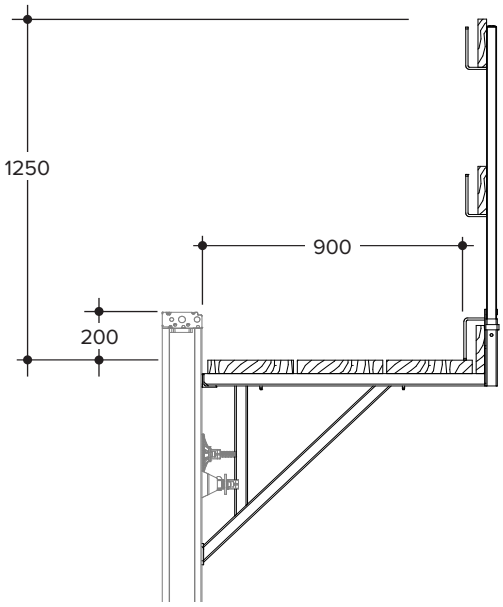
15.3 Walkway Brackets

MANTO P-Walkway Bracket and PROTECTO Railing Post

PROTECTO Railing Post
(code:601225)
Height of post 1.20 m

MANTO P-Walkway Bracket
(code:606240)





Attaching the Walkway Brackets to a vertical panel

Simply hang the Walkway Brackets, with the PROTECTO Railing Post inserted, with the pegs into the holes in the horizontal ribs of the panels. Always use a captive spring pin to secure the Walkway Bracket

WARNING

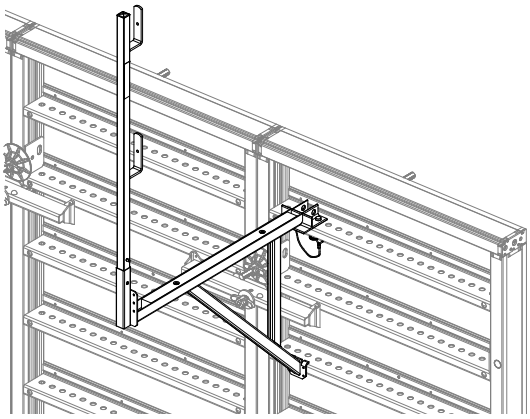
Risk of fall!

Check maximum span of planks and railings as well as the edge protection components being used.

Always secure the planks against uplift.

Always choose bracket spacing to comply with the design scheme supplied.

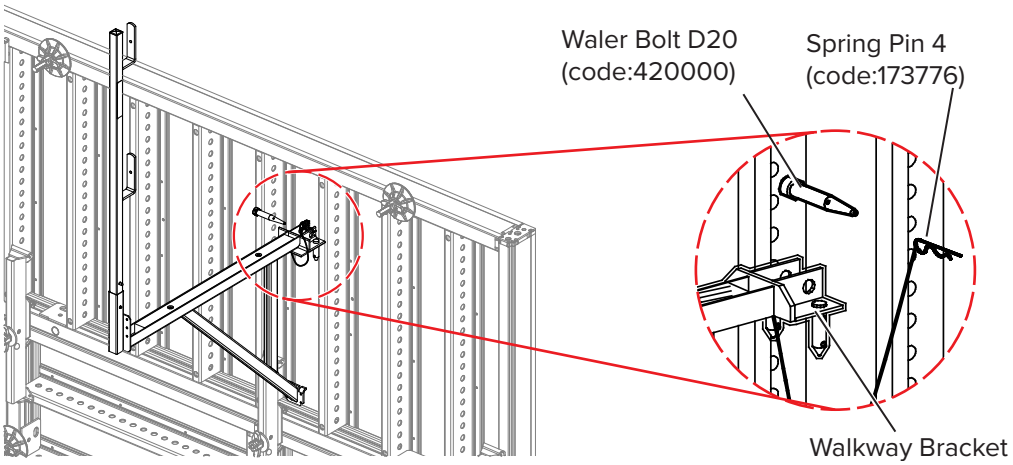
The walkway brackets are designed for load class 2 (150 kg/m^2), pursuant to DIN EN 12811-1:2004 and DIN 4420-1:2004-03.



Attaching the Walkway Bracket to a horizontal panel

Use a Waler Bolt D20 to secure the Walkway Brackets, with the PROTECTO Railing Post inserted, with the pegs into the holes in the horizontal ribs of the panels. Always use a Spring Cotter Pin 4 to secure the Waler Bolt D20.

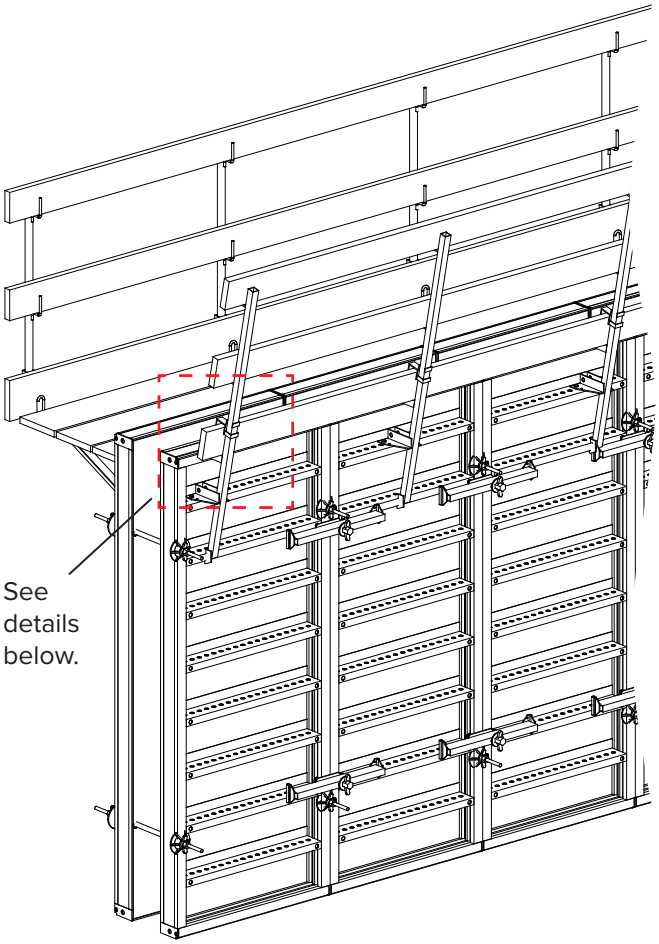
Unless stated otherwise, all dimensions are given in mm.


Waler Bolt D20
(code:420000)
Spring Pin 4
(code:173776)
Walkway Bracket

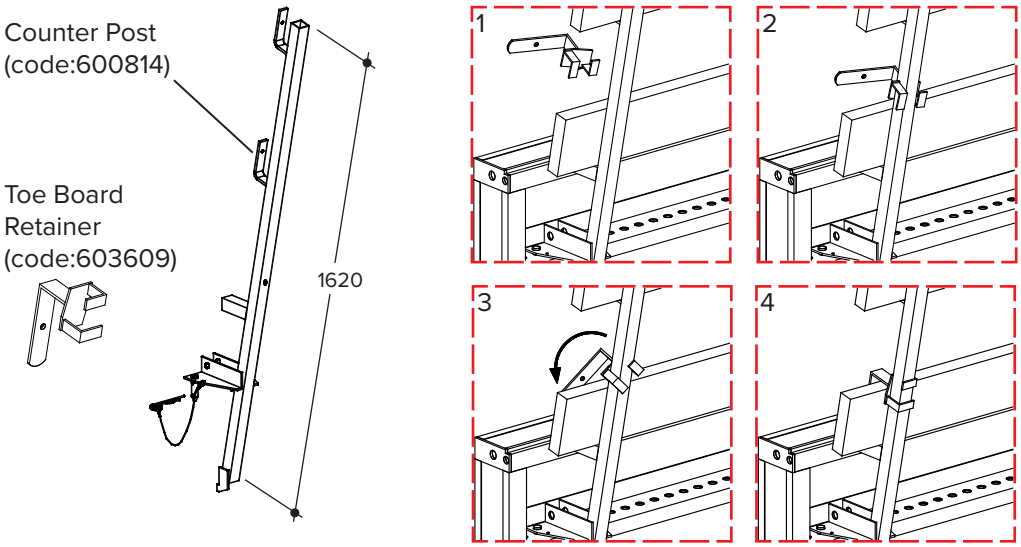
15.4 Counter Post

Use the Counter Post to erect edge protection on the opposite side of the platform. As with the Walkway Bracket, the Counter Post is secured to the top rib of the panel. Use the integrated Spring Cotter Pin 4 to secure the Counter Post.

The inclined position of the Counter Post means that the required clearance for pouring operations is achieved. The Counter Post can be fastened to panels lying flat when an additional Waler Bolt D20 is used.



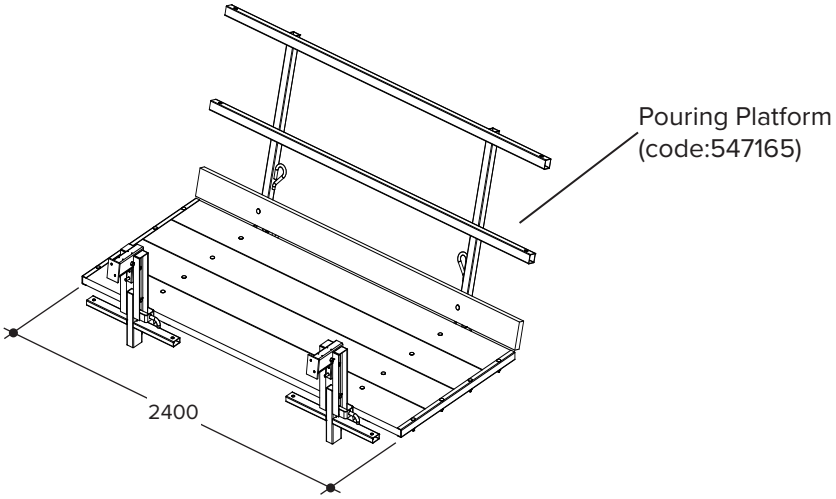
The Toe Board Retainer, marked with red paint, is attached to the Counter Post in the following way:



Unless stated otherwise, all dimensions are given in mm.

15.5 Pouring platform

The pouring platform is the top working platform on the MANTO formwork.



WARNING

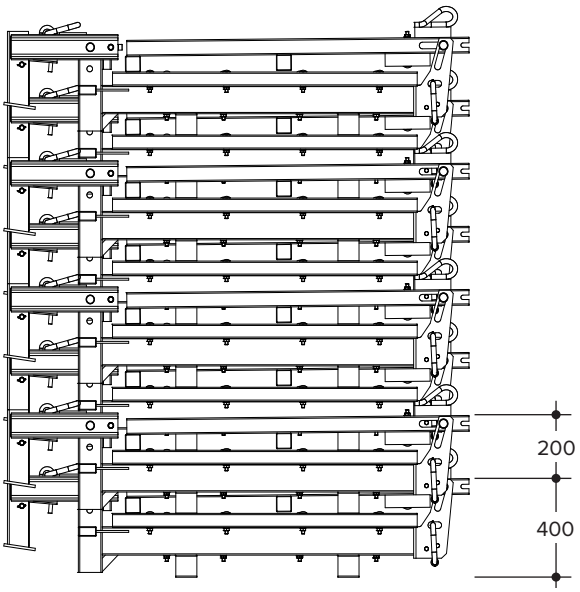
Risk of fall!

The pouring platforms are designed for load class 2 (150 kN/m^2), pursuant to DIN EN 12811-1:2004 and DIN 4420-1:2004-03.

Always choose platform spacing to comply with the design scheme supplied.

Stacking pouring platforms

The pouring platforms are collapsed upon delivery to the construction site. The stacking height is 400 mm for the lower platform and 200 mm for the other platforms.



WARNING

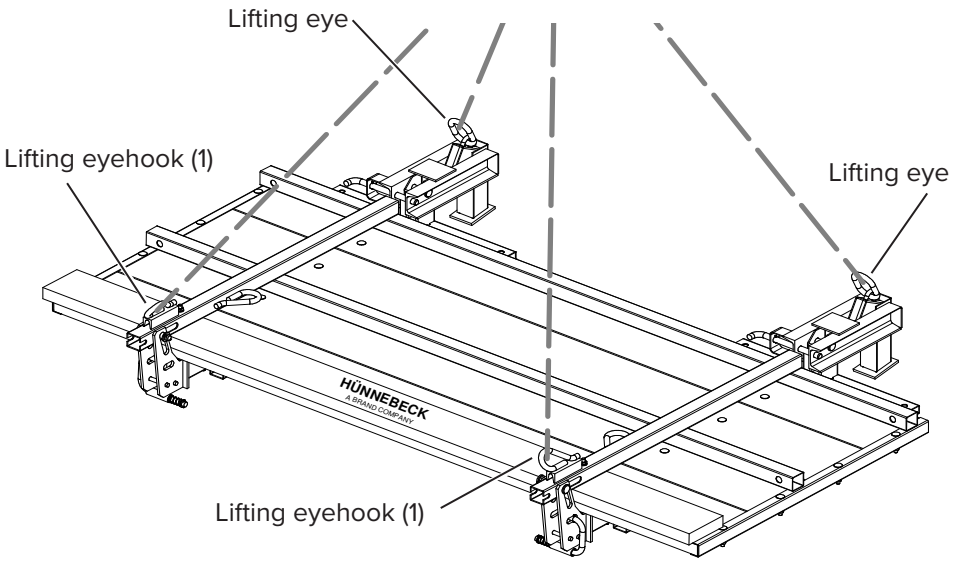
Risk of injury from stacks toppling over!

Maximum stacking height: 8no. units.

15.5.1 Installing pouring platform

Lifting from the storage position (guardrails collapsed)

In the collapsed position, the crane slings have to be attached to the lifting eyehooks (1) and to the lifting eyes. Refer to the following illustration.

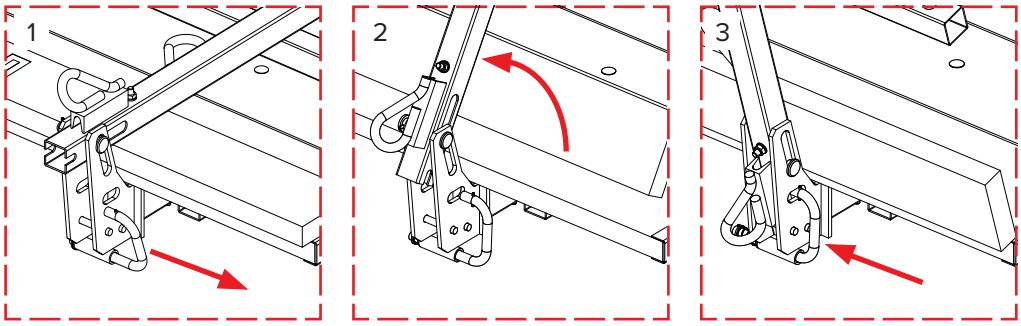


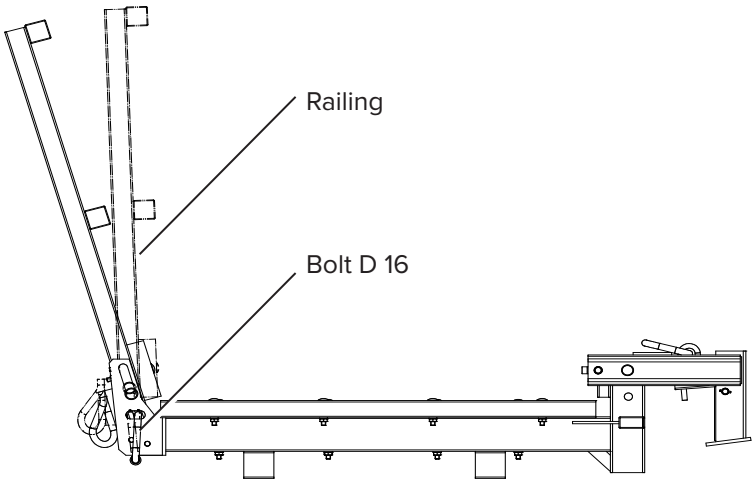
Unfolding the guardrails

Step 1 Unlock the railings by pulling out the Bolt D 16.

Step 2 Unfold the railing section to the upright position. The railing can be in a vertical or inclined position.

Step 3 Lock the railing by pushing the Bolt D 16 back in.

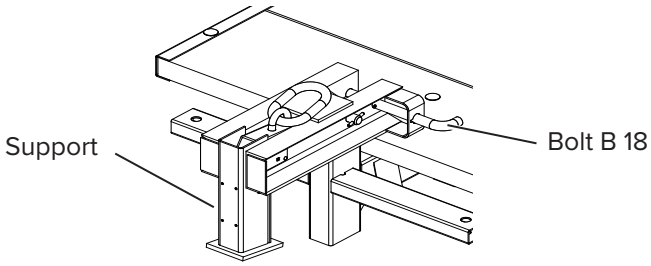


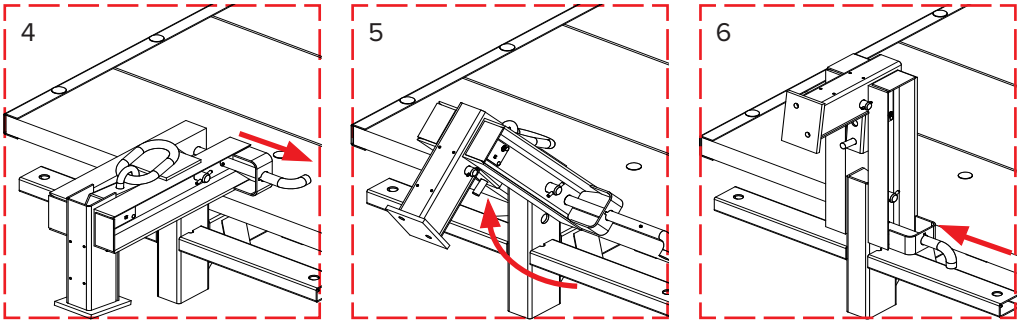


Step 4 Pull out Bolt B 18 to release the support.

Step 5 Rotate the support from the transport/storage position (horizontal) to the operational position (vertical).

Step 6 Once the support is in the vertical position, push the Bolt B 18 back in to lock the part.

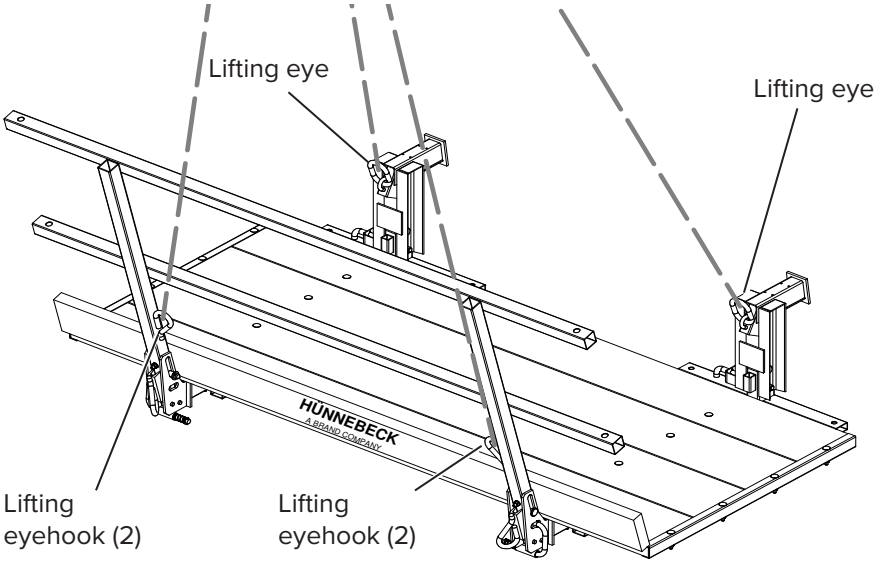




To prepare the platform for storage, simply reverse the order of the steps until the platform is completely collapsed and secured.

Lifting to working position (guardrails unfolded)

Attach the crane slings to the eyehooks (2), which are located higher up the railing posts in relation to the eyehooks (1) and to the lifting eyes.



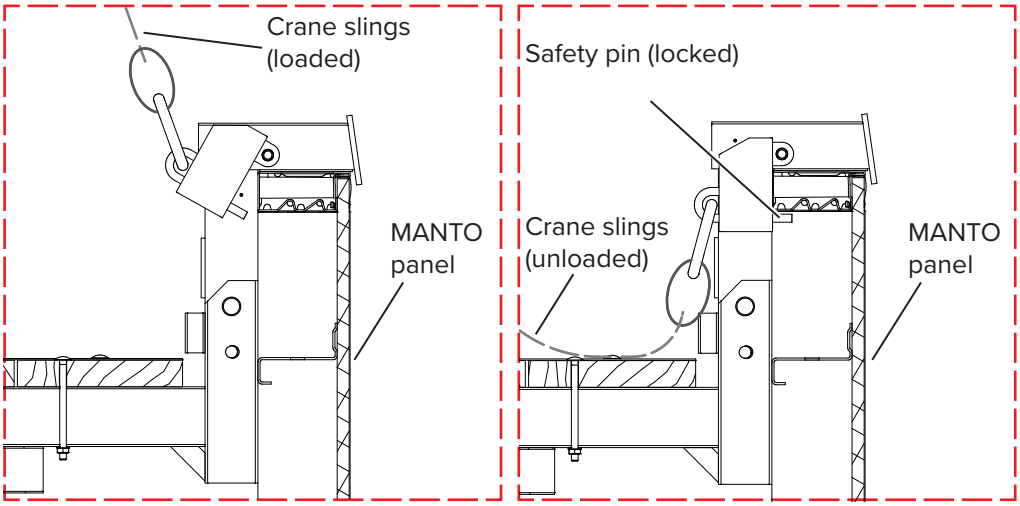
WARNING

Risk of injury from falling panels!

The lifting points on the platform may not be used to move the platform with formwork attached. Completely detach the platform from the panels before lifting it.

Securing to MANTO formwork

The pouring platform is equipped with a self-securing suspension that automatically locks after the tension on the crane slings is released.



WARNING

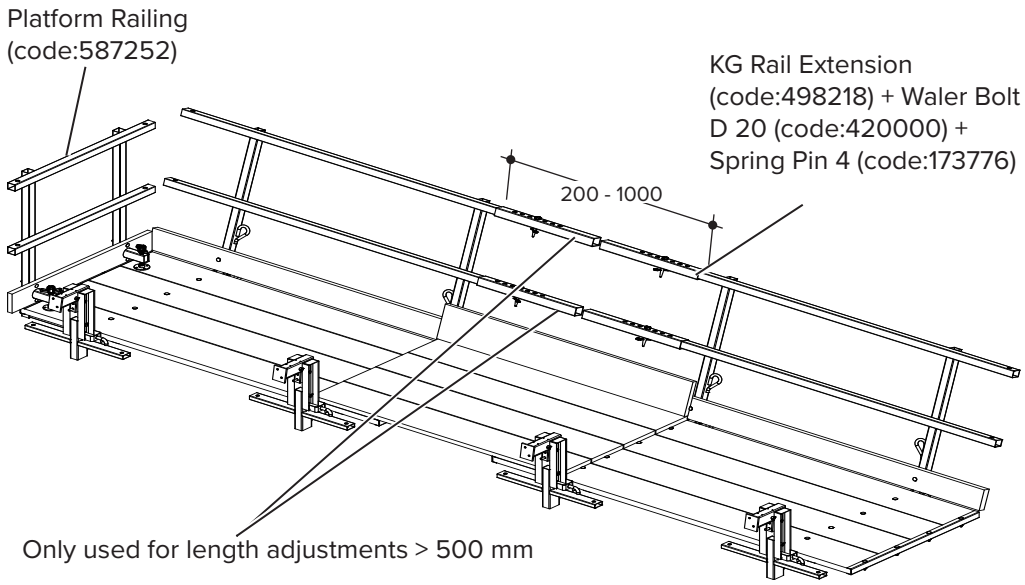
Risk of collapse!

The safety pin must be latched correctly.

Infills and Stopend

Extensions from 0.20 m to 1.00 m are created using on-site boards, toe boards and 2no. or 4no. KG Rail Extensions. The boards must overlap by 450 mm at both ends and they have to be properly restrained (e.g. nailed).

The Platform Railing secures the end of the platform. It is fastened with the integrated screws.



WARNING

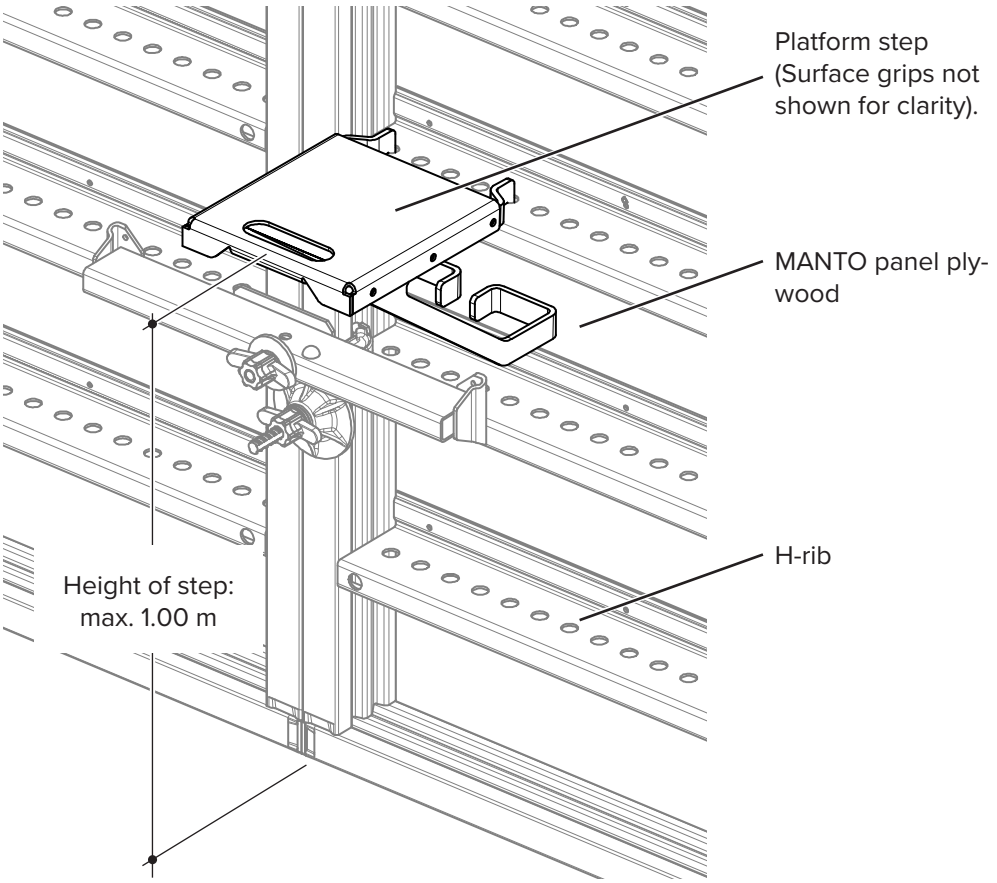
Risk of fall!

Use suitable safety equipment to install the platform until all edge protection around the platform is complete. Extension boards overlapping the pouring platform pose a tripping hazard. All tripping hazards should be eliminated by using suitable fillets.

Unless stated otherwise, all dimensions are given in mm.

15.6 PLATINUM 100 Platform Step

The PLATINUM 100 Platform Step is used as a climbing aid with the MANTO formwork to reach tie holes, Alignment Struts and other connectors. The Platform Step can be hooked to the three lowest ribs of the MANTO Formwork. The Platform Step can only be used with upright formwork panels.

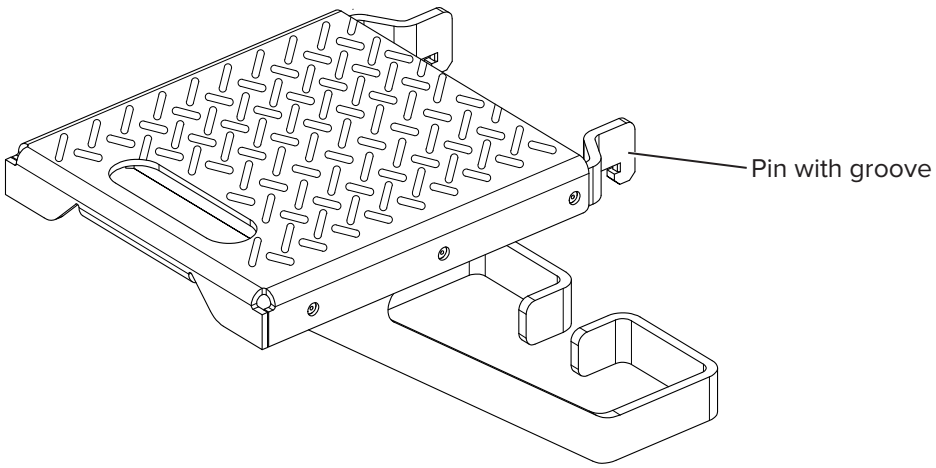


WARNING

Risk of fall!

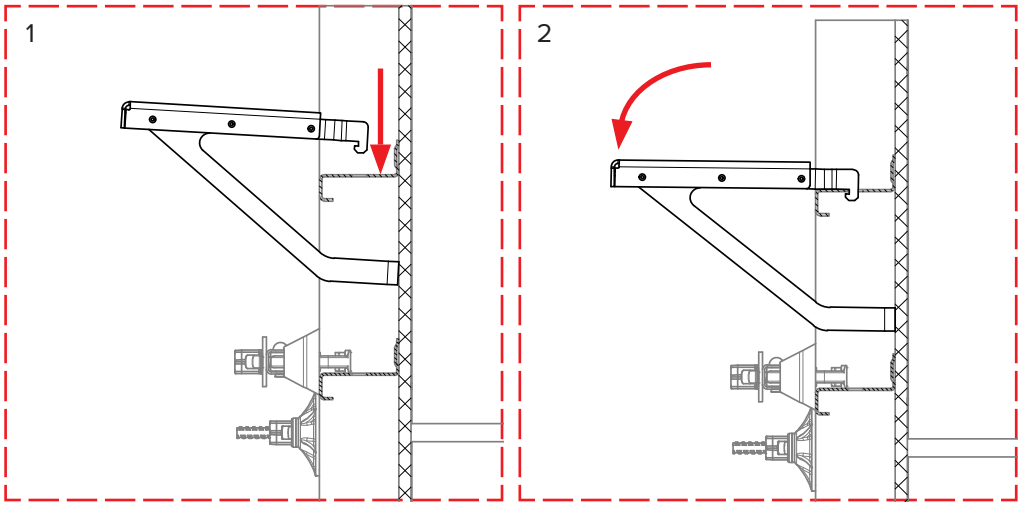
The maximum permitted height of the PLATINUM 100 Platform Step is 1.00 m in accordance with AGR A2.1. Other local regulations and variations must also be followed when working at height.

The SWL of the PLATINUM 100 Platform Step is 150.00 kg.



Attaching to MANTO panels

1. To attach the step, insert the pins of the Platform Step into the holes of a rib on the MANTO panel.
2. Swivel the step down. The grooves in the pin grip the rib profile and prevent the step from detaching.



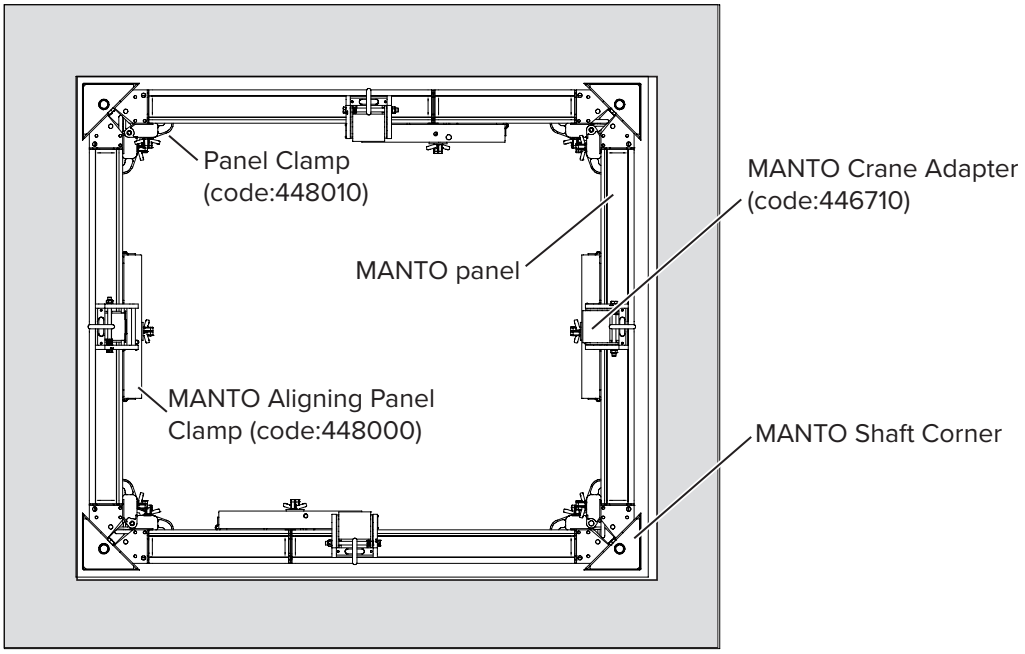
Unless stated otherwise, all dimensions are given in mm.

16 Shaft formwork

16.1 Using the MANTO Shaft Corner

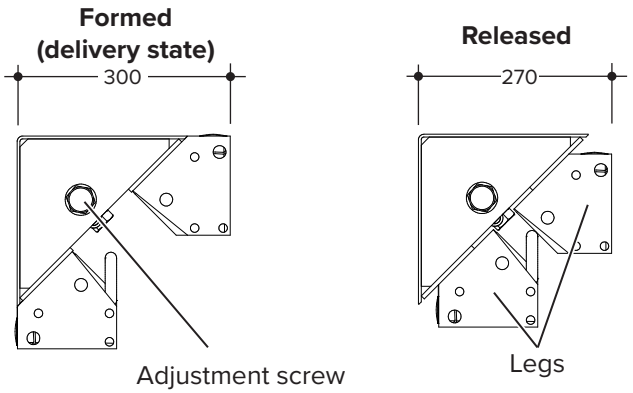
Shaft formwork can be easily assembled or dismantled using MANTO Shaft Corners. The MANTO Shaft Corners allows the complete inner wall formwork of the shaft to be released from the concrete simply by using a MANTO Ratchet.

After this, the shaft formwork can be lifted by crane using a 4-strand suspension.



Place any infills that may be required in the middle of the formwork and not near the corners.

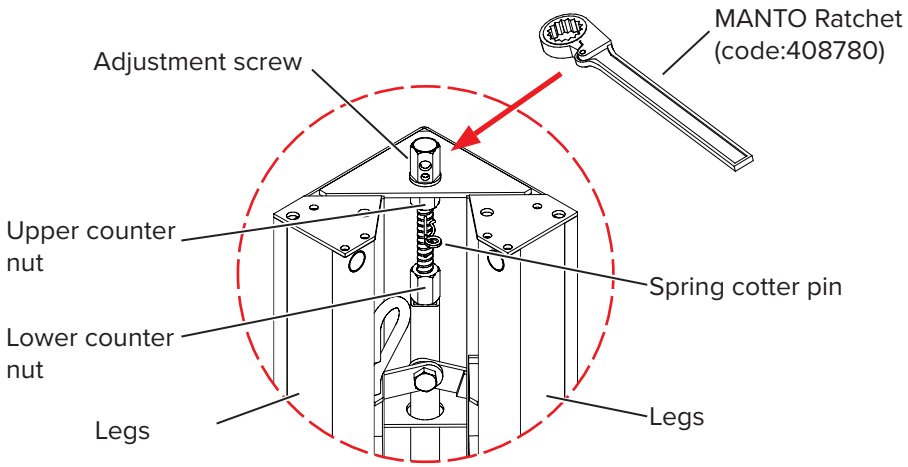
MANTO Shaft Corners have a side dimension of 300 mm when the legs are in the forming position and 270 mm in the stripped position.



If the MANTO Shaft Corner is extended in height, make sure that the legs on both corners are in the same position before connecting the next Shaft Corner.

Operating the mechanism

The mechanism is operated from above and is always accessible, even in narrow shafts. Turning the adjustment screw using a MANTO Ratchet (36 mm) causes the legs of the MANTO Shaft Corner to move diagonally, creating a stripping clearance of up to 30 mm.

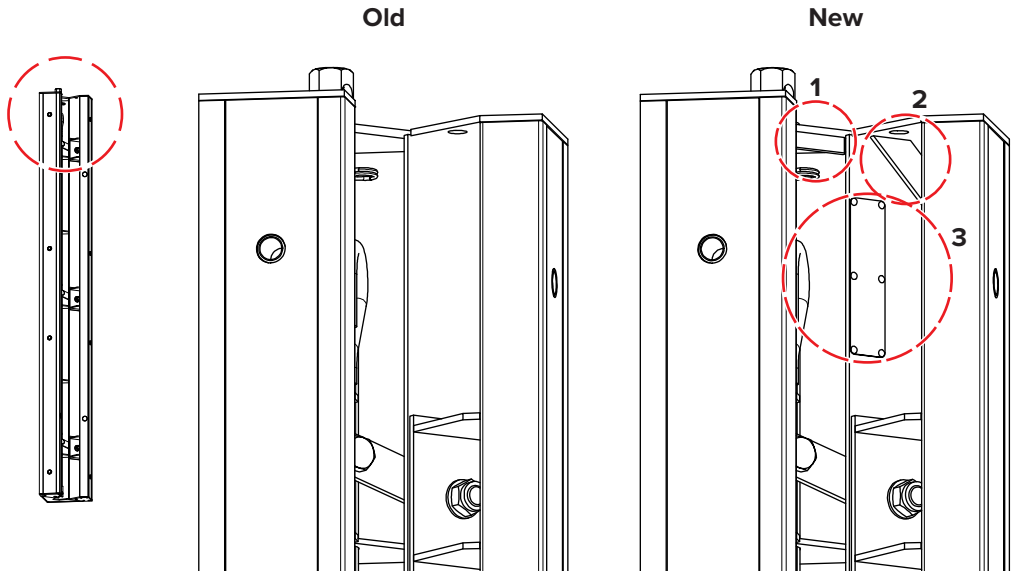


Extending the formwork in height

If you join MANTO Shaft Corners in height, you must connect the mechanics of the corners. This way you can operate both MATNO Shaft Corners simultaneously from above with the MANTO Ratchet (36 mm).

Before stacking, ensure that the legs of the MANTO Shaft Corners are in the outermost position (original position). Do this by turning the hexagon nut (w.a.f. 36) on the MANTO Shaft Corner counter-clockwise as far as it will go.

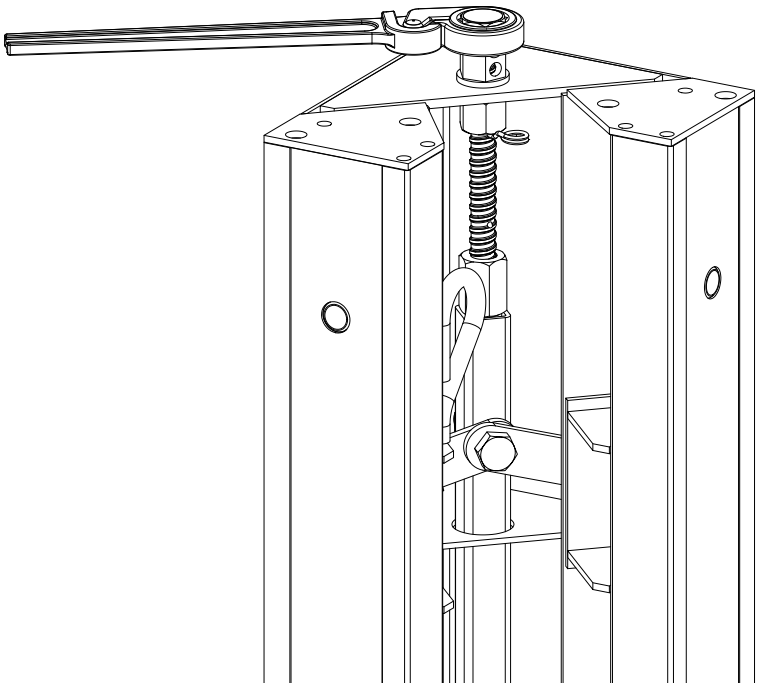
There are currently two versions of the MANTO Shaft Corner, an old and a new one. The MANTO Shaft Corners can be easily distinguished. The new MANTO Shaft Corner has reinforcements (1 and 2) at the top as well as a label (3) that describes the stacking process. Stacking is done differently with the old and new MANTO Shaft Corner!

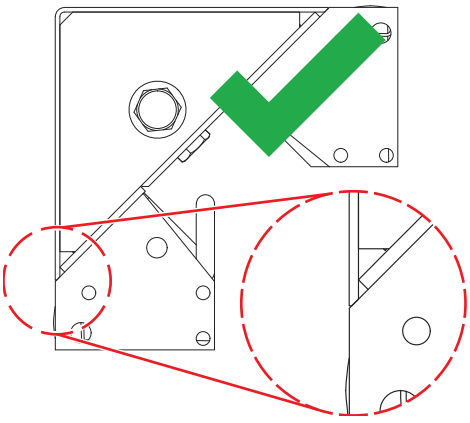


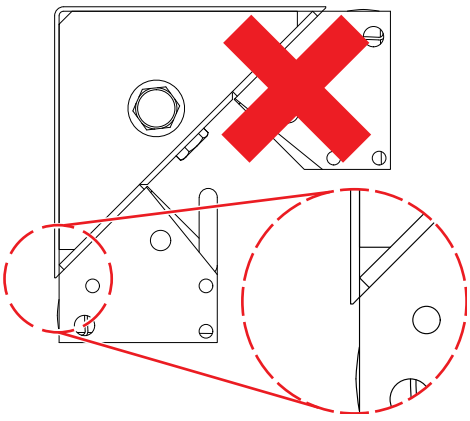
Unless stated otherwise, all dimensions are given in mm.

Stacking MANTO Shaft Corners (old version)

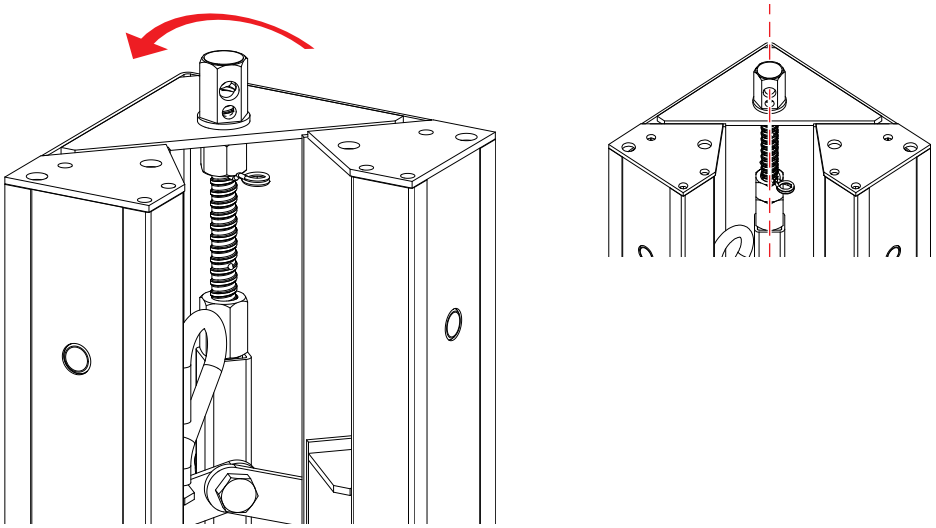
Step 1 Return both MANTO Shaft Corners to their original (formed) position. To do this, use the MANTO Ratchet (code:408780) to turn the hexagon nut (w.a.f. 36) on the MANTO Shaft Corner counter-clockwise until it stops. The legs of the MANTO Shaft Corner should be flush on the outside.



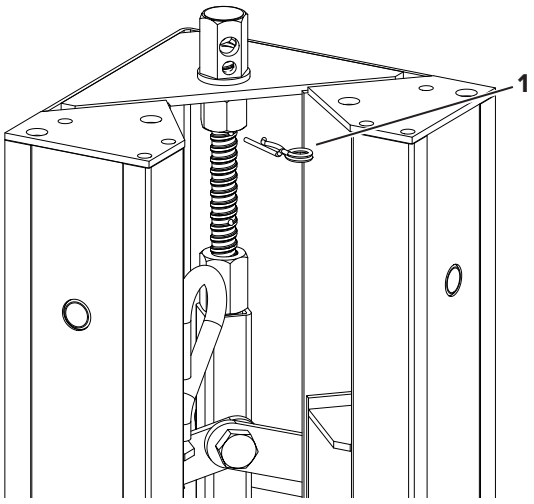




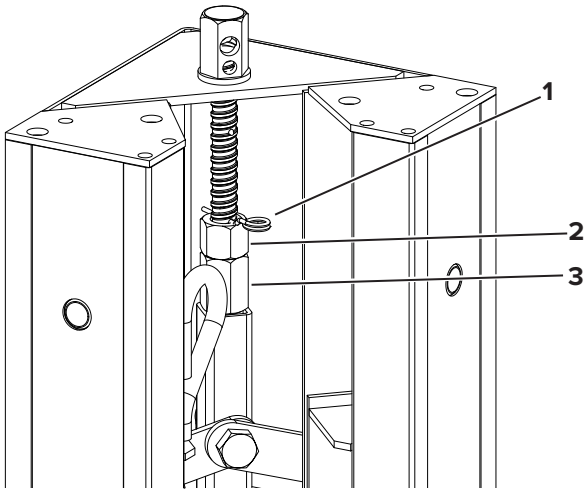
Step 2 Turn the adjustment screw, until the holes in the hexagon nut point to the top of the MANTO Shaft Corner.



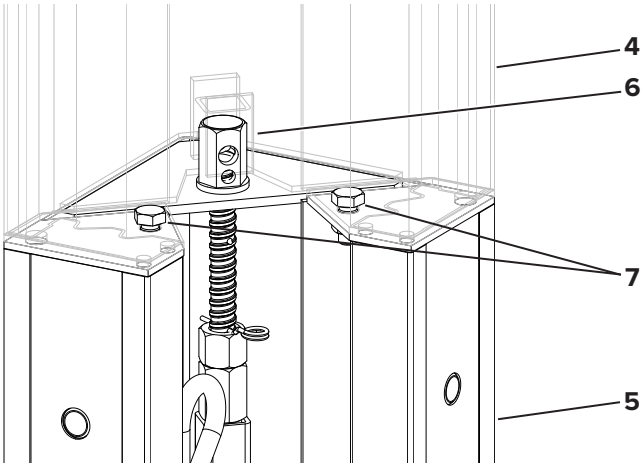
Step 3 Pull out the spring pin (**1**) from the lower MANTO Shaft Corner. The uppermost MANTO Shaft Corner remains in the original position.



Step 4 Screw the upper Counter Nut (**2**) downward until it reaches the lower Counter Nut (**3**). Insert the spring cotter pin (**1**) in the hole directly above the upper Counter Nut.

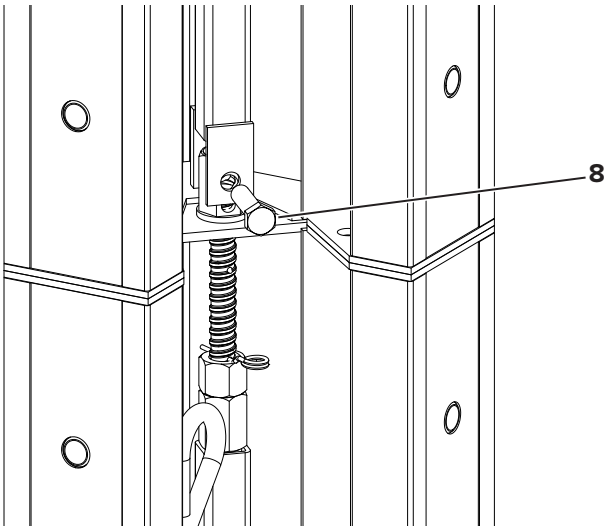


Step 5 Place the upper MANTO Shaft Corner (**4**) on the lower MANTO Shaft Corner (**5**). Make sure that the forkhead (6) fits over the adjustment nut of the lower MANTO Shaft Corner. Connect the legs of the MANTO Shaft Corners with 2no. Bolt M16x35 (with Nut) 8.8 (code:603623) (**7**). Tighten the bolts and nuts hand-tight.



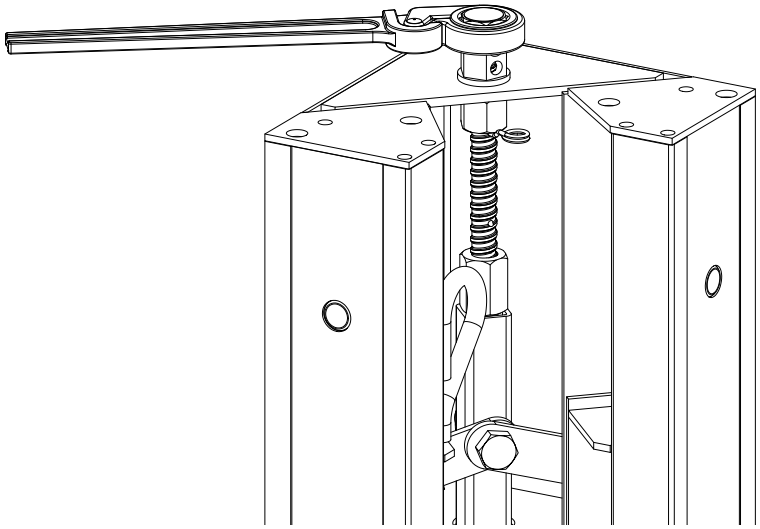
Ensure that the MANTO Shaft Corners lie on top of each other without any gaps and flush to each other.

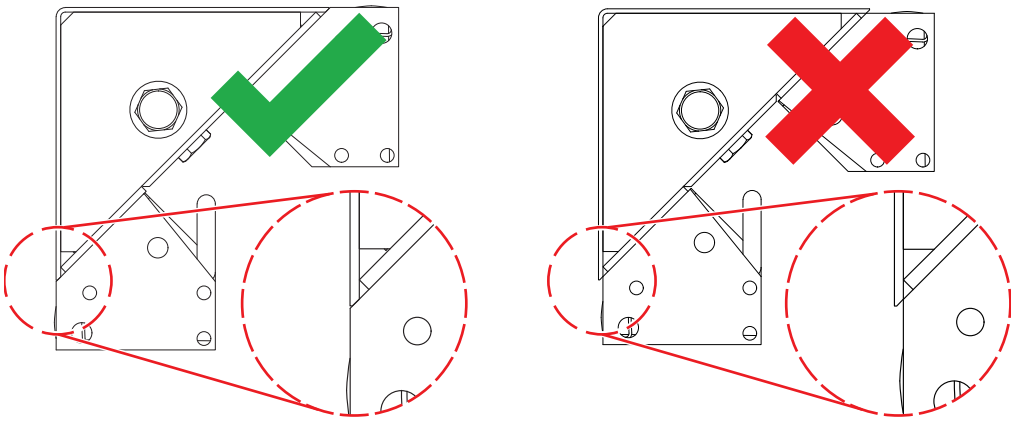
Step 6 Insert an M16 × 60 Bolt (**8**) through the hole in the head of the hexagon nut and tighten. Tighten the 2no. M16 × 35 bolts in the legs as well. The Shaft Corners are stacked.



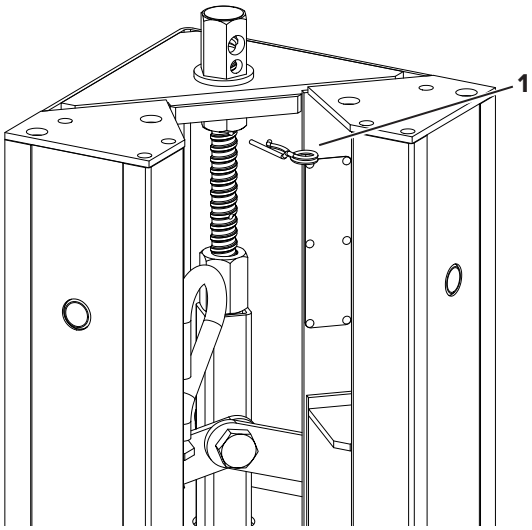
Stacking MANTO Shaft Corners (new version)

Step 1 Return both MANTO Shaft Corners to their original (formed) position. Do this by turning the hexagon nut (w.a.f. 36) on the MANTO Shaft Corner counter-clockwise as far as it will go. The legs of the MANTO Shaft Corner should be flush on the outside.



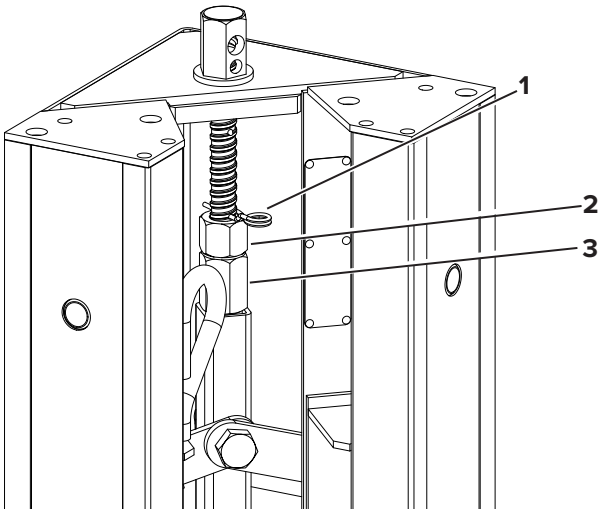


Step 2 Pull out the spring pin (**1**) from the lower MANTO Shaft Corner.

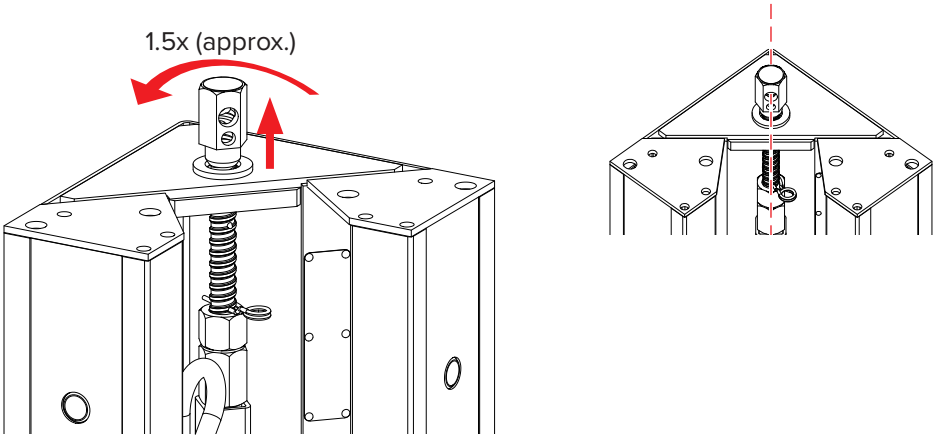


Unless stated otherwise, all dimensions are given in mm.

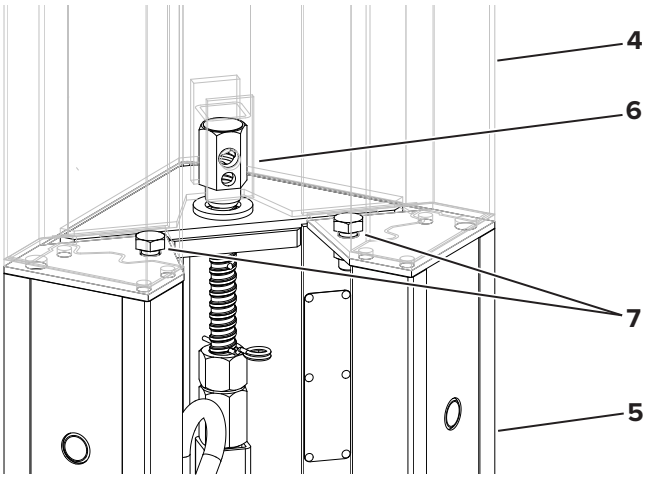
Step 3 Screw the upper Counter Nut (**2**) downward until it reaches the lower Counter Nut (**3**). Insert the spring cotter pin (**1**) in the hole directly above the upper Counter Nut.



Step 4 Turn the adjustment nut one and a half times (approximately) counter-clockwise. The holes in the hexagon nut should face the tip of the MANTO Shaft Corner.

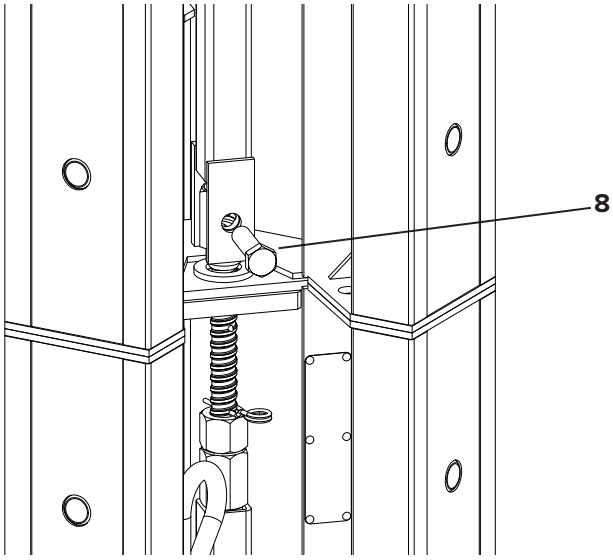


Step 5 Place the upper MANTO Shaft Corner (**4**) on the lower MANTO Shaft Corner (**5**). Make sure that the forkhead (6) fits over the adjustment nut of the lower MANTO Shaft Corner. Connect the MANTO Shaft Corners with 2no. M16 × 35 Bolt and Nut (code:603623) (**7**). Tighten the bolts and nuts hand-tight.



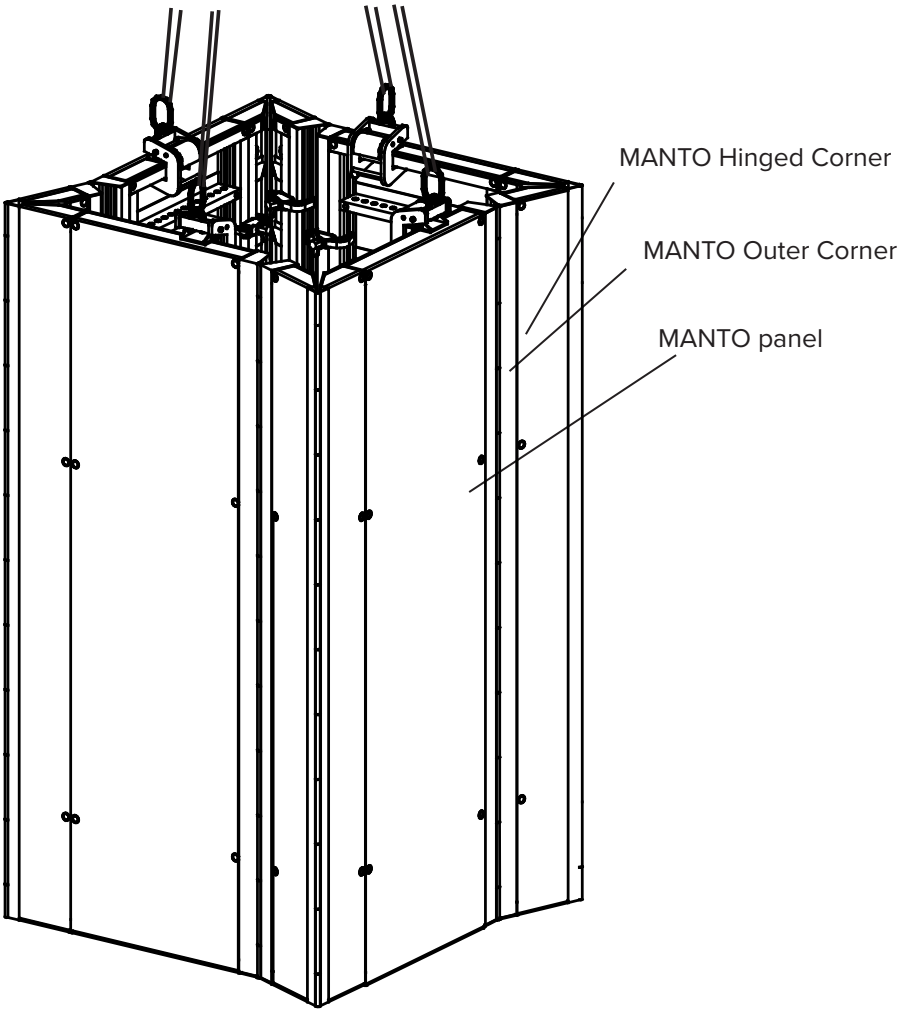
Ensure that the MANTO Shaft Corners lie on top of each other without any gaps and flush to each other.

Step 6 Insert an M16 × 60 Bolt (**8**) through the hole in the head of the hexagon nut and tighten. Tighten the 2no. M16 × 35 bolts in the legs as well.

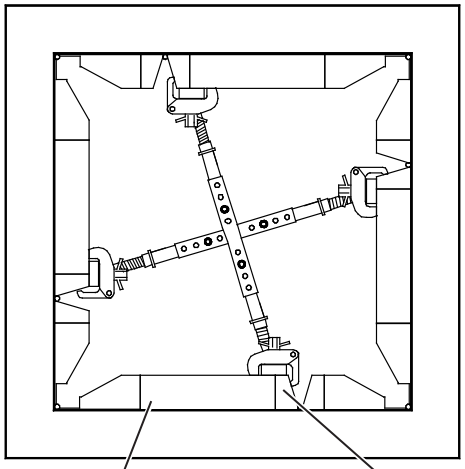


16.2 Using the MANTO Hinged Corner

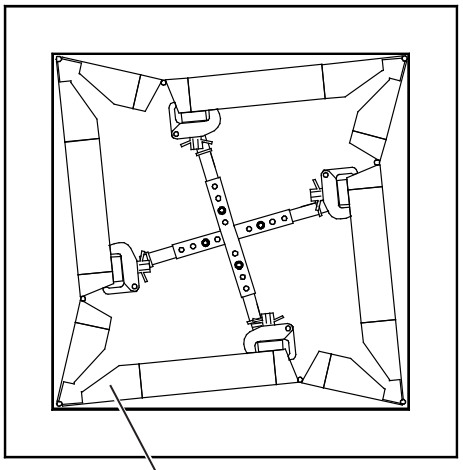
With the MANTO shaft formwork, the inner formwork of a shaft (or a room) can be shifted by crane with a single lift without having to release the panel connections. The formwork is released from the wall by retracting the shaft spindles. The retracted spindles and the hinged connections reduce the formwork to such an extent that it can be easily shifted.

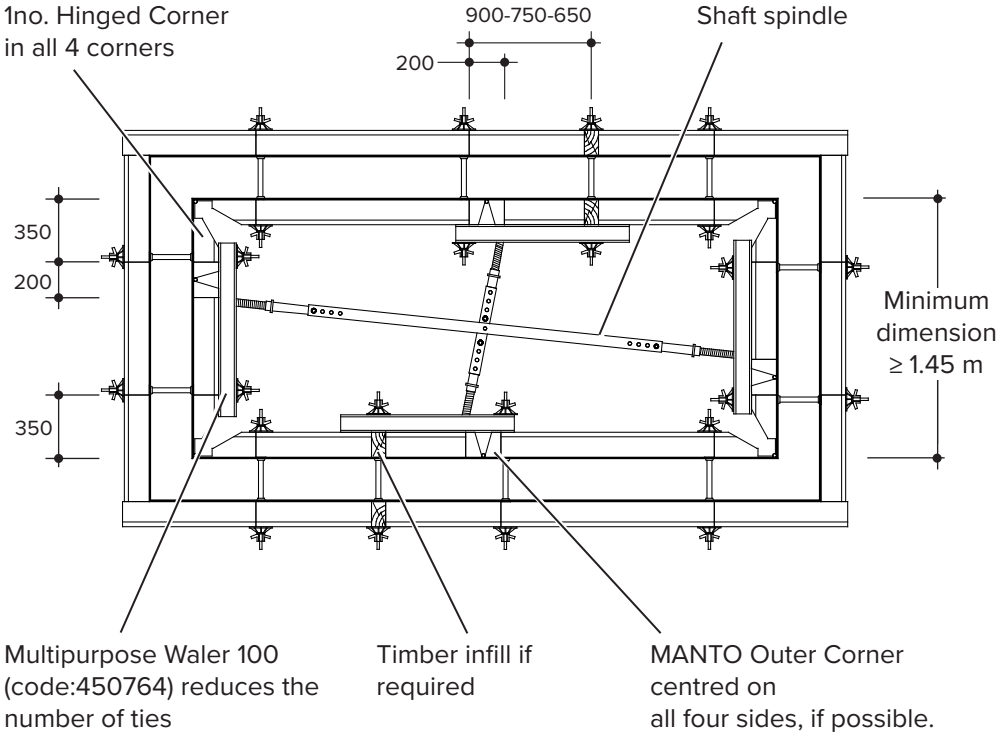


Formed



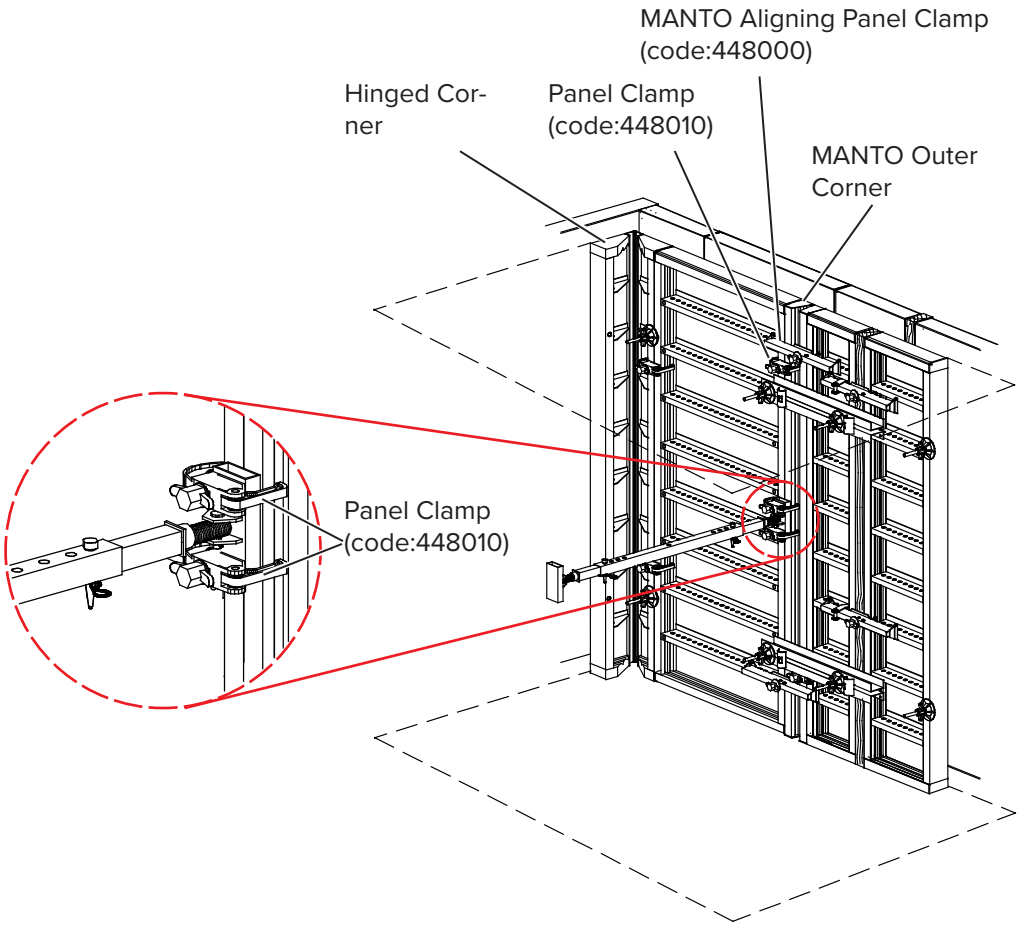
Stripped





Up to a formwork height of 3.30 m, one shaft spindle is positioned in every direction.

Connect the MANTO Outer Corner with a Panel Clamp and a MANTO Aligning Panel Clamp to the adjacent panel. The MANTO Aligning Panel Clamp serves as a stopper when closing the formwork.

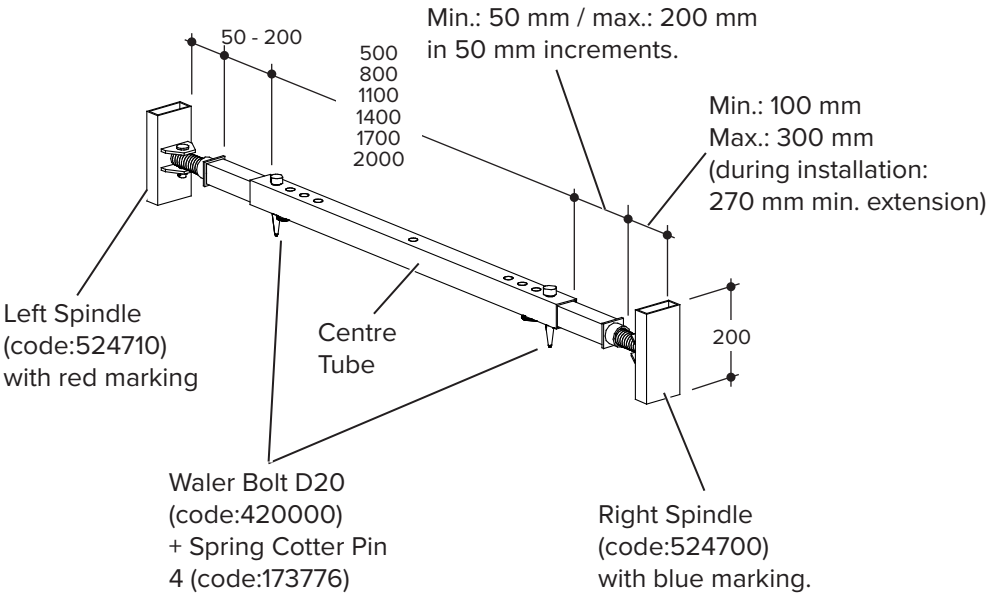


Unless stated otherwise, all dimensions are given in mm.

Shaft spindle

The shaft spindle consists of a Centre Tube, the Left and Right Spindle and 2no. Waler Bolts D20 with a Spring Cotter Pin 4.

The shaft spindle has to be fastened with two Panel Clamps each at the element joint of the Outer Corner.

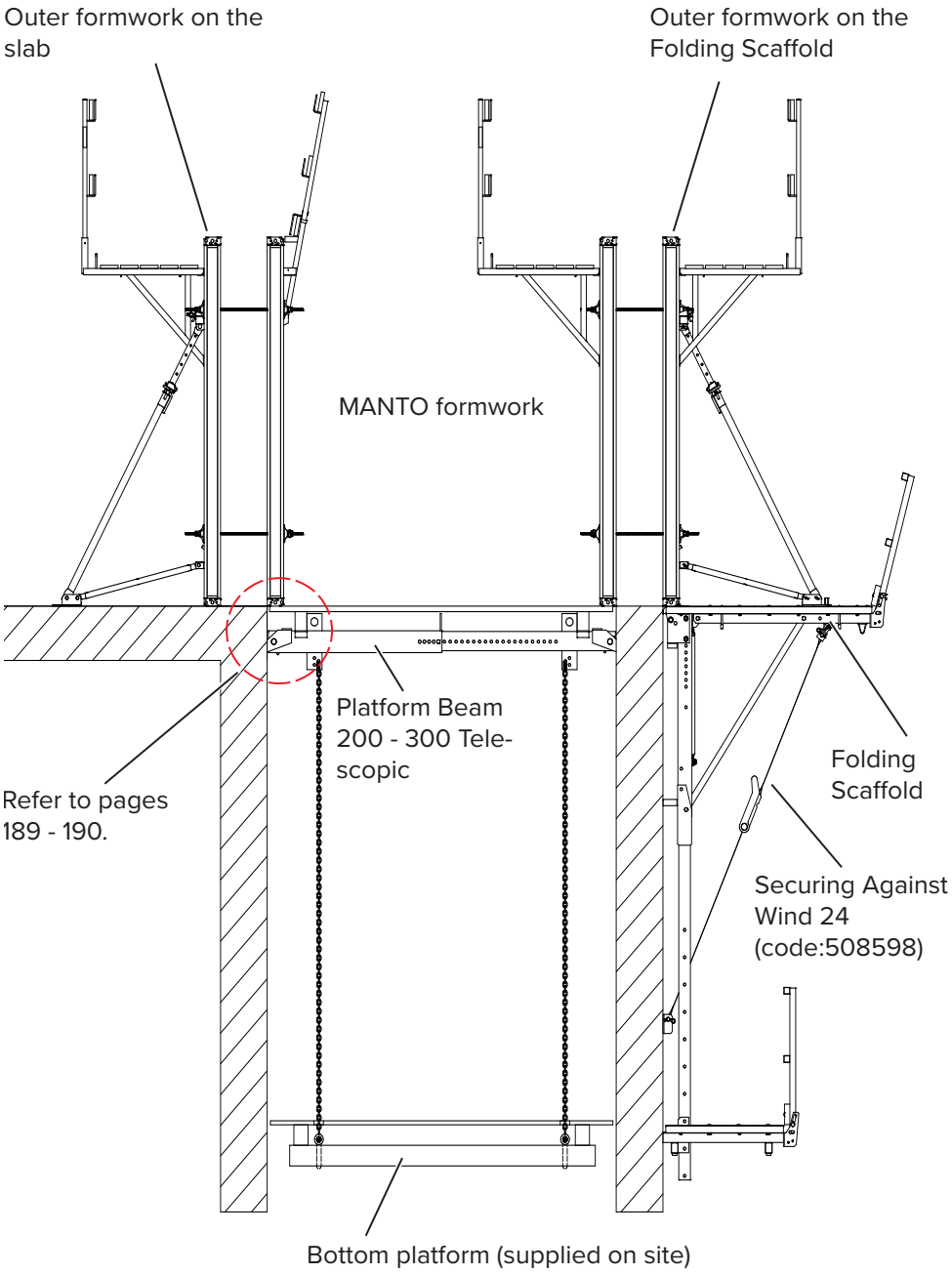


Always install the spindles in the extended condition (270 mm minimum) in order to obtain adequate spindle retraction for stripping.

Inside shaft dimension	Centre Tube	Product code
1.45 m - 1.75 m	0.50 m	524721
1.75 m - 2.05 m	0.80 m	524732
2.05 m - 2.35 m	1.10 m	524743
2.35 m - 2.65 m	1.40 m	524754
2.65 m - 2.95 m	1.70 m	524765
2.95 m - 3.25 m	2.00 m	524776

16.3 MANTO shaft formwork with an external and internal platform

The schematic cross-section below shows the MANTO shaft formwork combined with additional Hünnebeck components like the Folding Scaffold for the outer formwork and Platform Beam 200 - 300 Telescopic for the inner formwork.



WARNING

Risk of fall!

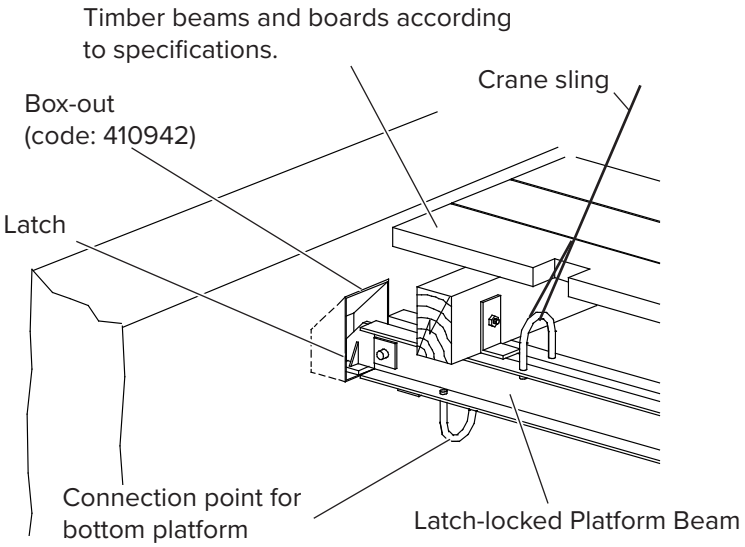
Secure timber boards adequately against uplift and horizontal displacement.

More information on the Folding Scaffold can be found in respective user guide.

16.4 Platform Beams

The latch-locked platform consists of Platform Beams with timber beams and boards on top.

Gravity latches are attached to both ends of the double U-channel. They engage automatically into the pockets created by the Box-outs or the KB Supporting Parts. The Box-outs can be released from the bottom platform after the latch-locked platform is moved and can be re-used.



The Platform Beam is produced specifically for each project.

For Safe Working Load, refer to the table on page 190.

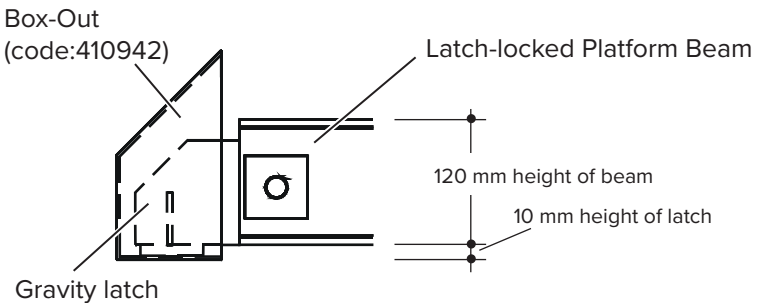
Configuration limits

The following specifications apply to the Platform Beam 400:

- Maximum spacing of Platform Beams: 2.50 m centres
- Maximum height of the MANTO formwork: 5.40 m
- WLL of the bottom platform chains: 10.00 kN (alternatively Ø 15 mm tie rods can be used)
- Permitted live load: Either for latch-locked or bottom platform P = 1.50 kN/m² (alternatively: N = 1,0 kN point load)
- Minimum concrete strength: 15.00 N/mm² (for the supporting latches of the Platform Beam).

Self-weights

- Formwork: 60.00 kg/m² (approx.)
- Latch-locked platform: 70.00 kg/m² (approx.)
- Bottom platform: 50.00 kg/m² (approx.)

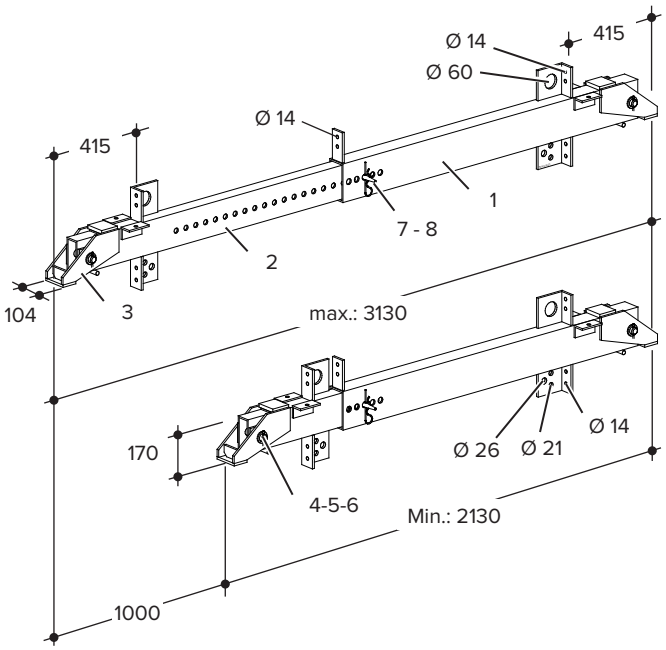


16.5 Using the Platform Beam 200 - 300 Telescopic

The Platform Beam is adjustable in steps of 10 mm within a range of 1.0 m and can cover openings in shafts. Depending on the support type of the platform beam, the possible clear width is between 2.00 m and 3.00 m when using the Box-out (code:410942) or between 2.24 m and 3.24 m, when the KB Supporting Part (code:600338) is used.

The latch of the Platform Beam 200 - 300 Telescopic locks into the pocket created by the Box-out or sits on the KB Supporting Part. The Box-out and the KB Supporting Part can be removed after use.

The Platform Beam 200 - 300 Telescopic is provided with connections for timber boards (supplied on site) and for a bottom platform if required.



List of (spare) parts:

1. KB Outer Beam 150 (code:600332)
2. KB Inner Beam 185 (code:600333)
3. KB Latch (code:600331)
4. Bolt 30 (code:600334)
5. Washer 30 (code:600335)
6. Split Pin 8 (code:600336)
7. Locking Pin (code:600337)
8. Spring Cotter Pin 4 (code:173776)

The Platform Beam 200 - 300 Telescopic (code:600330) is supplied as a full assembly, complete with components 1 to 8.

The Safe Working Load (SWL) of the Platform Beam 200 - 300 Telescopic vary according to the component used to support the beam on the wall. Two choices are available:

- KB Supporting Part
- Box-out

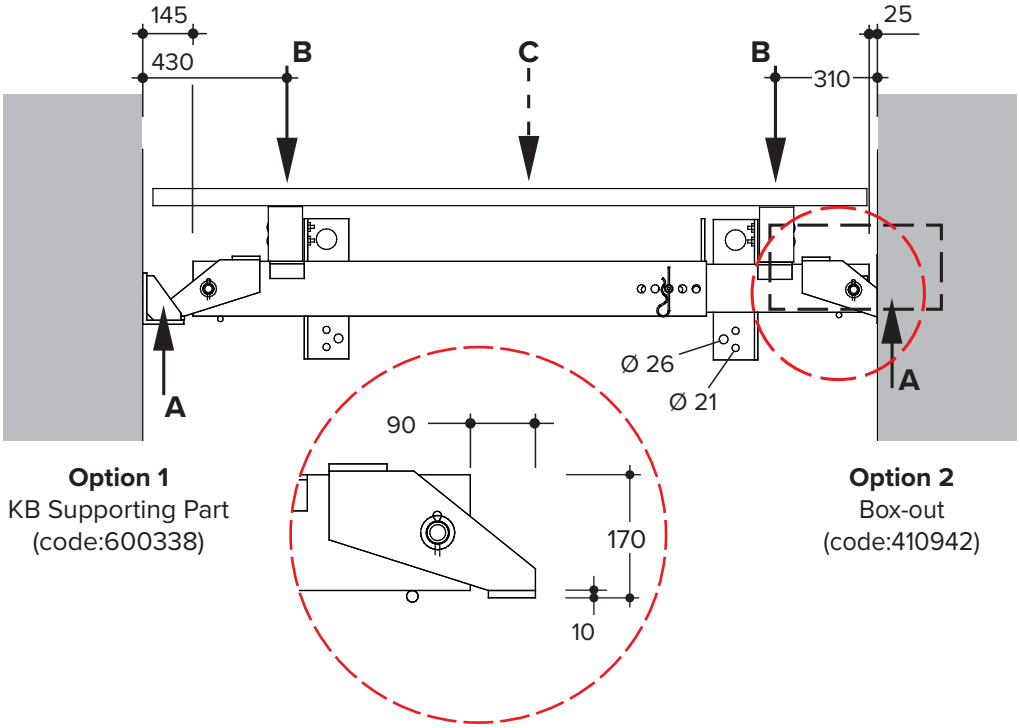
Safe Working Load (SWL)		
Platform Beam 200 - 300 Telescopic (code:600330) and Latch-locked Platform Beam		
Permitted structural values	End Support	
	KB Supporting Part (code:600338)	Box-out (code:410942)
Permitted Bending Moment (M)	12.50 kNm	
Permitted Support Reaction	22.50 kN	40.00 kN
SWL (edge of the shaft)	29.00 kN	
SWL (middle of the shaft)	20.40 kN	

WARNING

Warning!

Always use the same support at both ends of the beam and for all of the beams that make a platform.

Unless stated otherwise, all dimensions are given in mm.

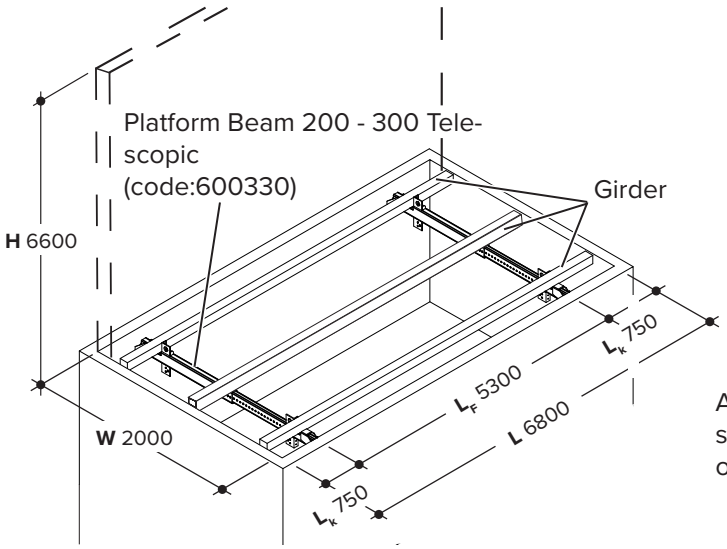


Option 1
KB Supporting Part
(code:600338)

Option 2
Box-out
(code:410942)

The required minimum concrete strength for the Platform Beam 200 - 300 Telescopic (code:600330) is 15.00 N/mm2.

Below is an example of a typical assembly for a shaft 2.00 m wide and 6.80 m long with 6.60 m high formwork.



Also refer to maximum shaft dimensions table on page 193.

WARNING

Risk of overturning!

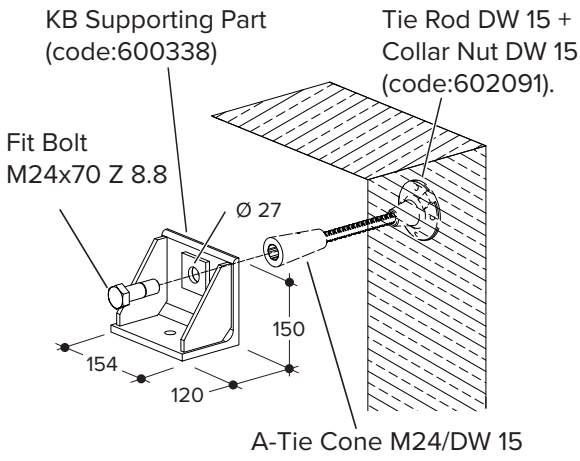
Do not begin assembly of the formwork over the cantilevered end.

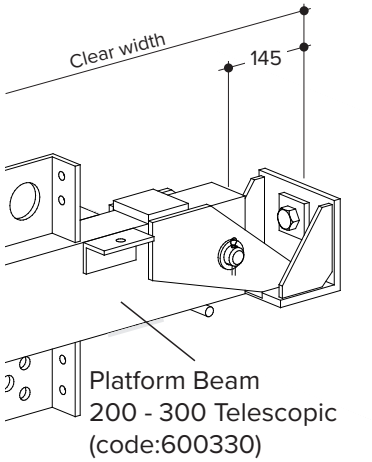
With option 1 keep in mind the load on the platform boards imposed by the weight of the formwork. The cantilevered planks may be overloaded by high formwork and must be reinforced accordingly.

16.5.1 Support option 1: Platform Beam 200 - 300 Telescopic

With support option 1 for the Platform Beam 200 - 300 Telescopic, both ends of the beam rest on a KB Supporting Part.

The required length of the beam is the clear width of the shaft minus 290 mm (2 x 145 mm).





WARNING

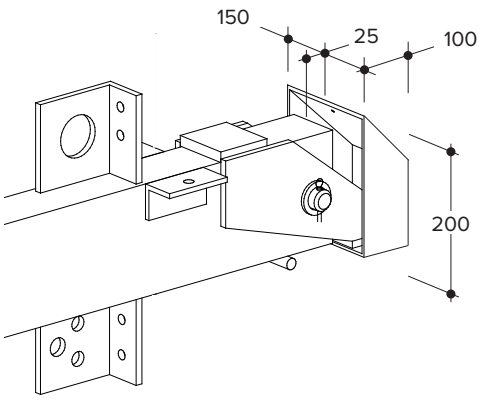
Risk of collapse!

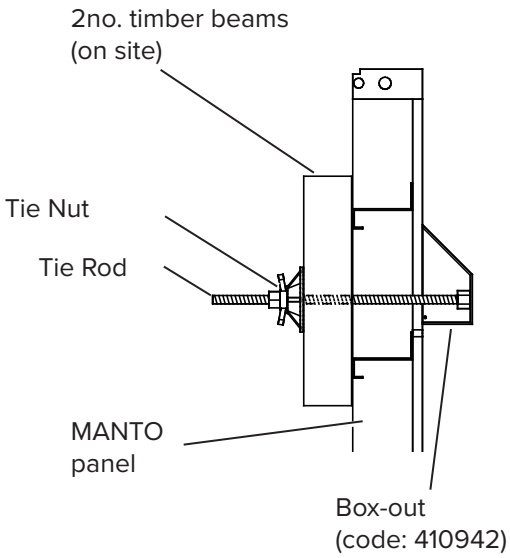
The Tie Cone has to be tied in a way that is suitable to the site conditions. Tie the Tie Cone according to approval no. Z-21.6-1854-2017-03-17 and/or other local regulations. Please check your local requirements and regulations.

16.5.2 Support option 2: Platform Beam 200 - 300 Telescopic

The latch of the Platform Beam engages in the Box-out. The Box-out can be removed and re-used after lifting the platform.

The required length of the beam is the clear width of the shaft minus 50 mm (2 x 25 mm).





The Box-out can be connected to the MANTO panel with a Tie Rod and a Tie Nut. The Box-out can also be nailed to the formwork using the nailing holes.

Unless stated otherwise, all dimensions are given in mm.

Maximum shaft dimensions: width and length												
Design	**KB Supporting Part**						**Box-out**					
Height of formwork H [m]	6.60	5.40	4.50	3.90	3.30	2.70	6.60	5.40	4.50	3.90	3.30	2.70
Girder* main platform [mm]	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120
Timber beam* bottom platform [mm]	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120	160/120
Bearing force max. A [kN]	22.5						40.0					
Width of shaft	**W = 3.00 m**											
Length of shaft L [m]	3.30	4.00	4.70	5.30	5.70	5.70	4.20	4.90	5.50	5.70	5.70	5.70
Length of field LF [m]	2.30	2.80	3.30	3.70	3.90	3.90	3.00	3.50	3.90	3.90	3.90	3.90
Length of cantilever Lk [m]	0.50	0.60	0.70	0.80	0.90	0.90	0.60	0.70	0.80	0.90	0.90	0.90
Width of shaft	**W = 2.50 m**											
Length of shaft L [m]	3.80	4.60	5.40	6.00	6.20	6.20	4.60	5.40	6.20	6.30	6.30	6.30
Length of field L_F [m]	2.60	3.20	3.80	4.20	4.40	4.40	3.20	3.80	4.40	4.50	4.50	4.50
Length of cantilever L_k [m]	0.60	0.70	0.80	0.90	0.90	0.90	0.70	0.80	0.90	0.90	0.90	0.90
Width of shaft	**W = 2.24 m**						**W = 2.00 m**					
Length of shaft L [m]	4.50	5.40	6.30	6.90	7.00	7.00	5.20	6.10	7.00	7.00	7.00	7.00
Length of field L_F [m]	3.10	3.80	4.50	4.90	4.80	4.80	3.60	4.30	4.80	4.80	4.80	4.80
Length of cantilever L_k [m]	0.70	0.80	0.90	1.00	1.10	1.10	0.80	0.90	1.10	1.10	1.10	1.10

***Timber beams of strength class C24 according to EN 338**

Do not exceed a formwork weight of 0.75 kN/m^2.

Live load (on one level only): Pouring or main platform 1.50 kN/m^2 or bottom platform 1.50 kN/m^2.

Board thickness main platform: 50 mm, regardless of board width.

Board thickness bottom platform: 45/200 or 40/240 according to table 3 of DIN 4420-1.

17 Assembling formwork

The following section shows the typical assembly of the MANTO wall formwork.

WARNING

Risk of injury from falling panels!

Do not stand or walk under suspended loads!

Apply release agent to the form sheets prior to lifting/pouring concrete. This makes it easier to separate the formwork elements from the concrete.

17.1 Assembling formwork with one-sided tie system

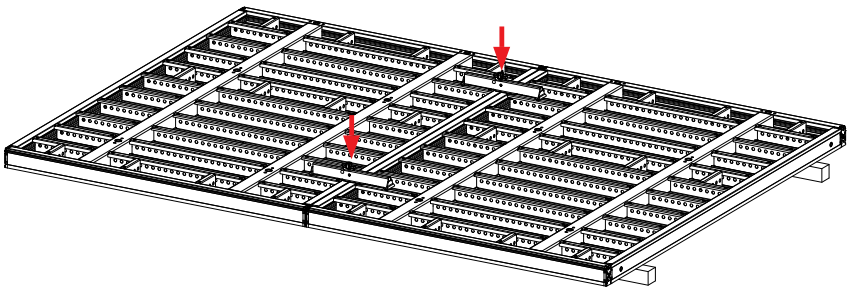
How to assemble wall formwork with a one-sided tie system is described here. The ties are operated from the advancing side.

When formwork is not stacked, tying can be done from the closing side in most cases. When using stacked formwork, it is advisable to install the platforms on the advancing side of the formwork and to tie from there.

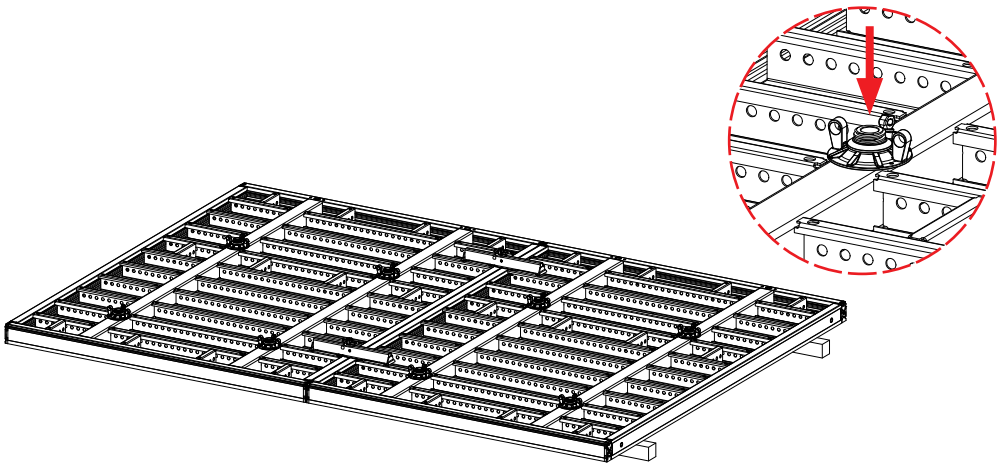
The operator always has to decide on site which side offers the safest position for operating the ties.

Assembling the formwork

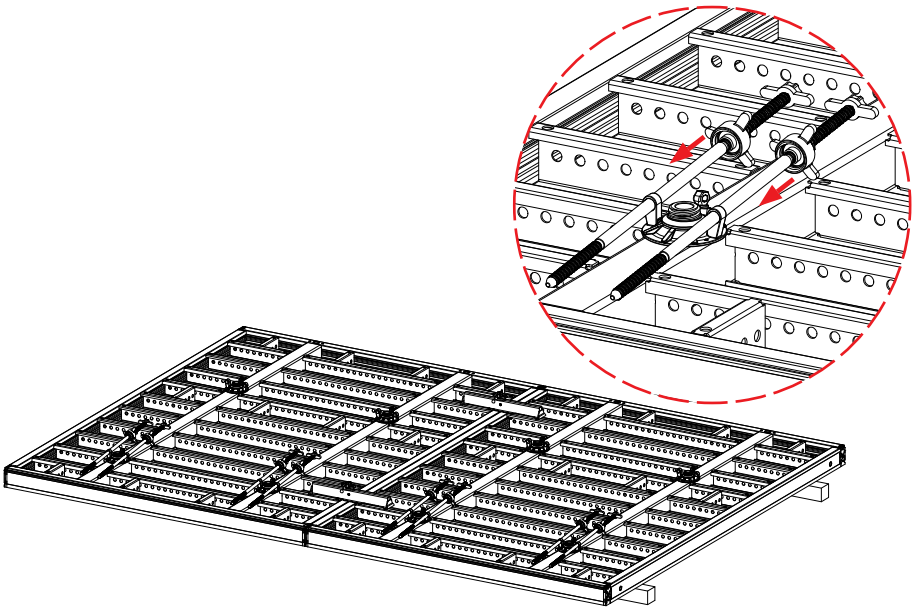
Step 1 Assemble the advancing formwork on the ground, using timber beams or trestles, to prevent damage to the components. Ensure enough clearance from the ground.



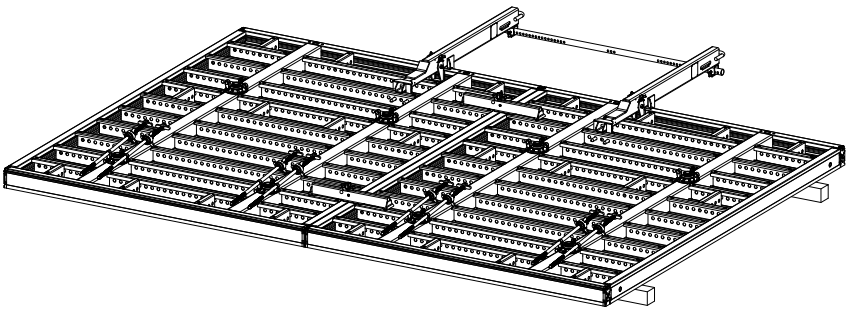
Step 2 Attach e.g. PLATINUM 100 Tie Nuts Closing Side (code:604197). Refer to section 8 or to the design scheme for the correct number and position.

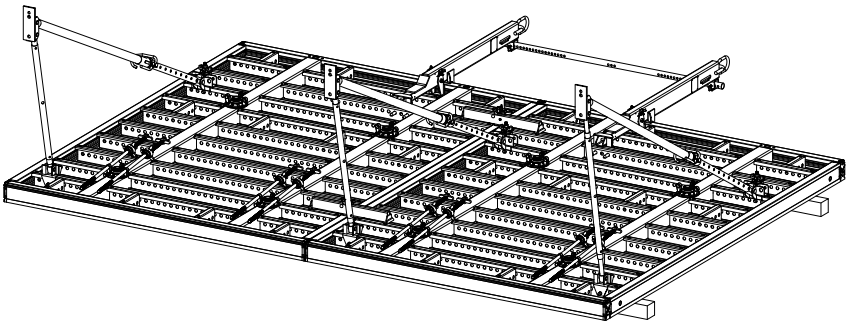


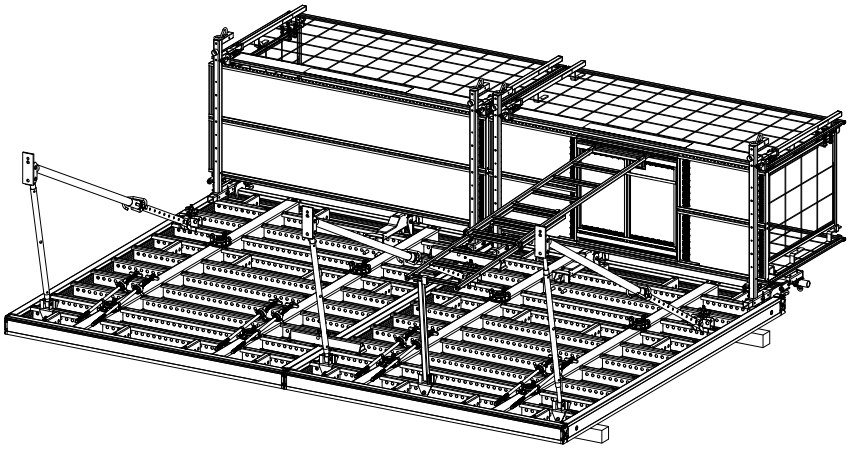
Step 3 Place the tie rods, which have been pre-adjusted as shown on page 105, in the tie nut holder.



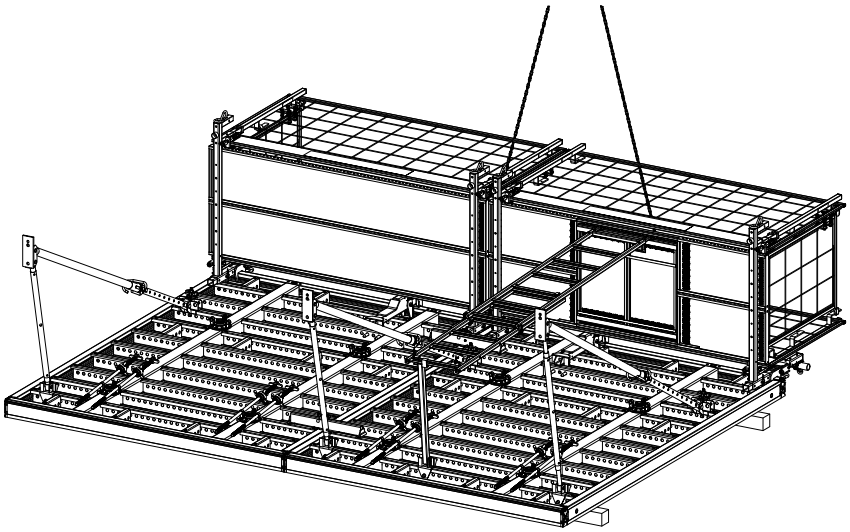
Step 4 Install lifting devices, struts and platforms, including inner guardrails, as per the design scheme.



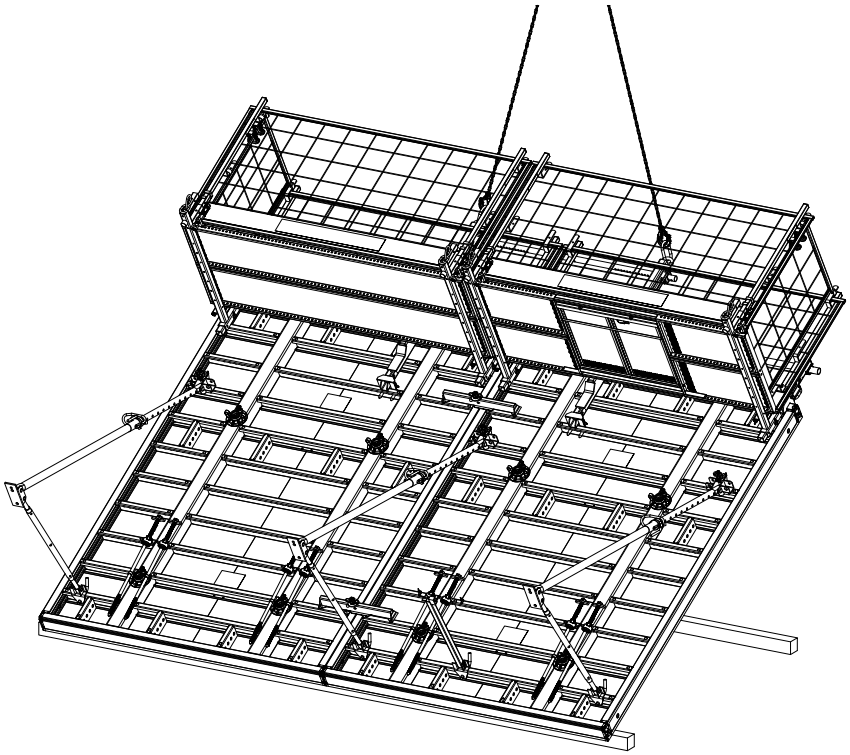




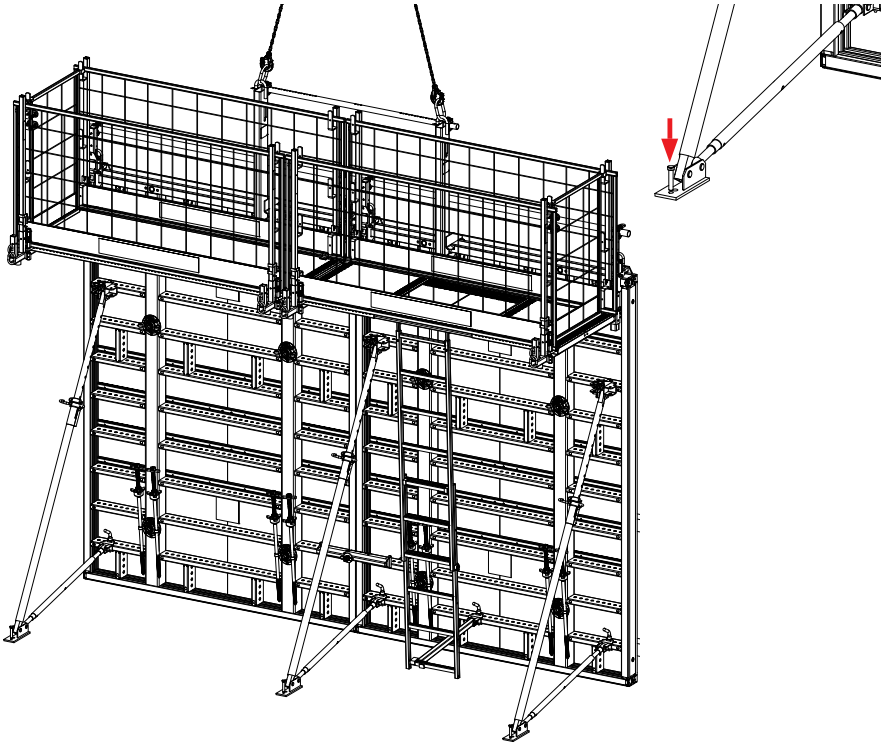
Step 5 Install the slings. Check that the slings do not damage other components or get tangled.



Step 6 Raise the formwork upright in a safe and controlled way.



Step 7 Place the formwork in position and secure the struts using suitable anchors.



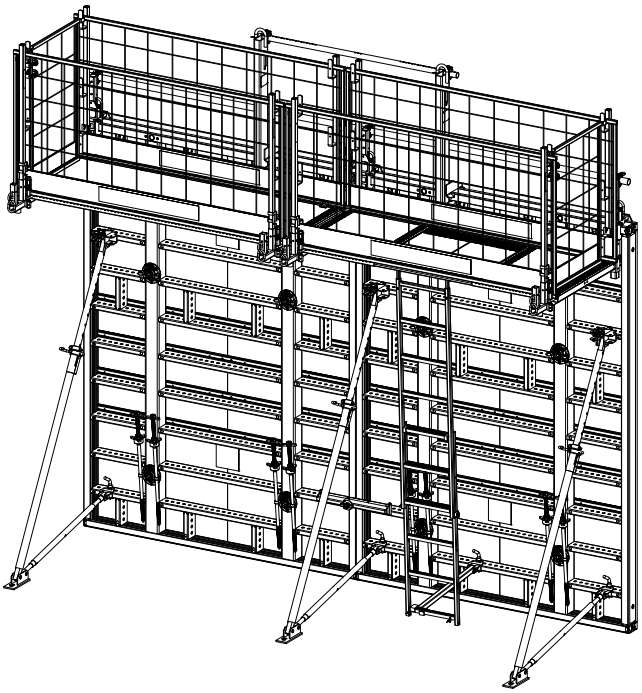
WARNING

Risk of injury from collapsing formwork!

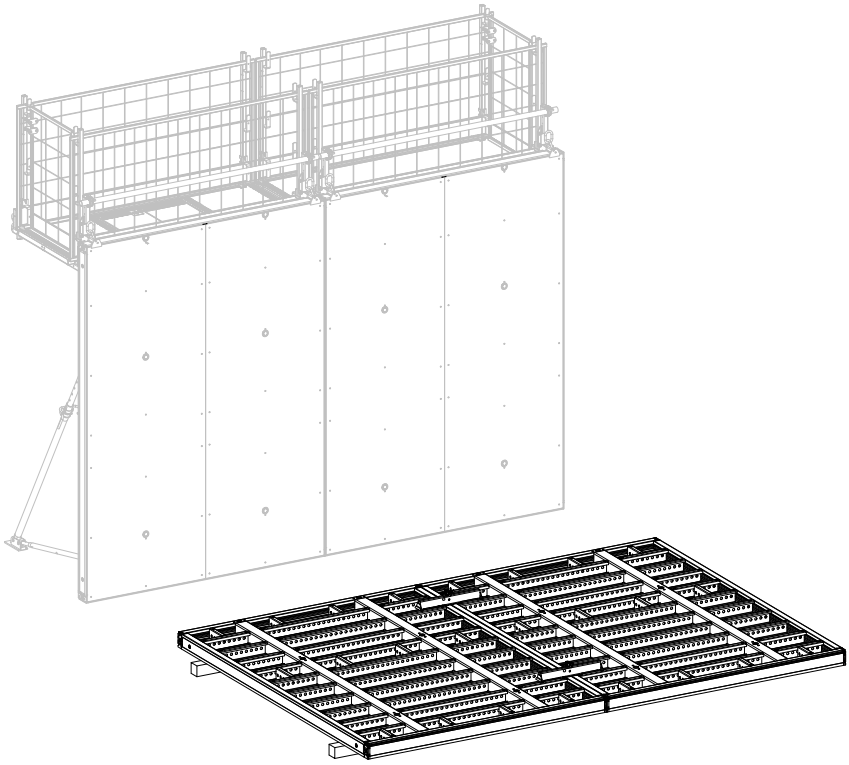
The formwork can topple over if the Alignment Struts are not anchored properly!

Appropriate anchors to suit the specific application must be selected by a competent person.

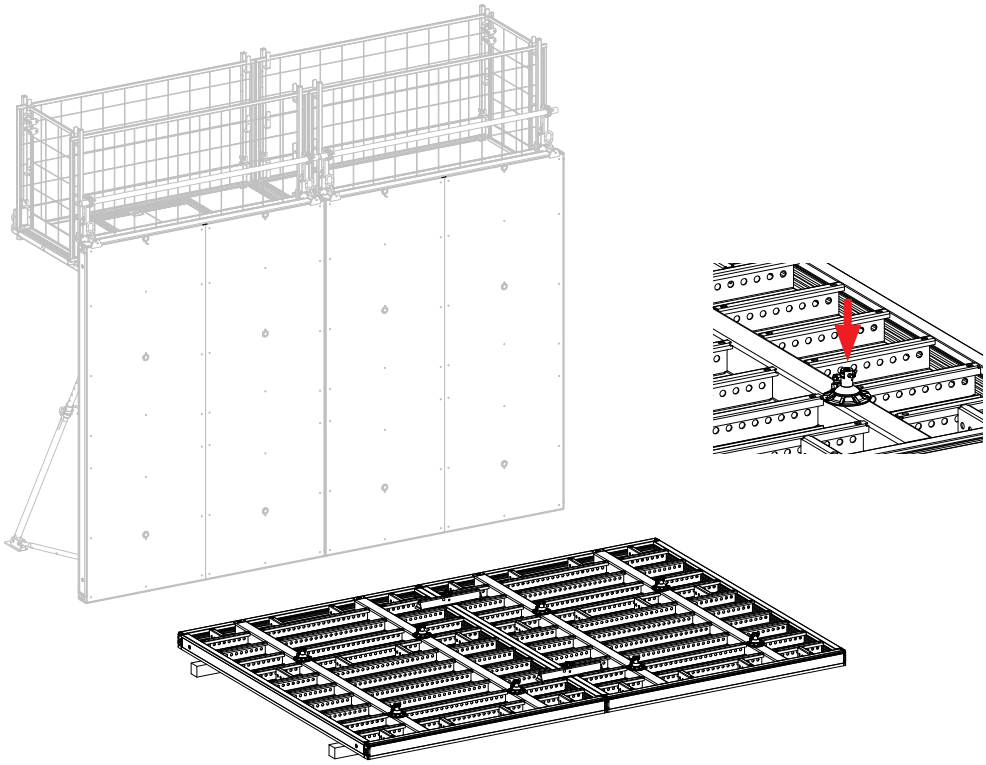
Step 8 Remove the lifting devices.



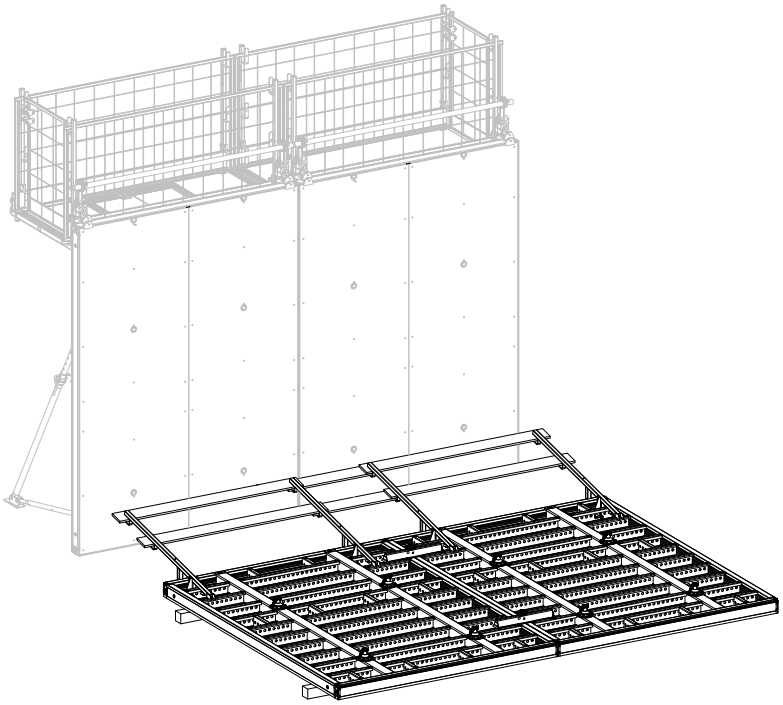
Step 9 Assemble the closing side on timber beams on the ground.



Step 10 Attach e.g. PLATINUM 100 Tie Nuts Advancing Side (code:604196). Refer to the design scheme for the correct number and position.

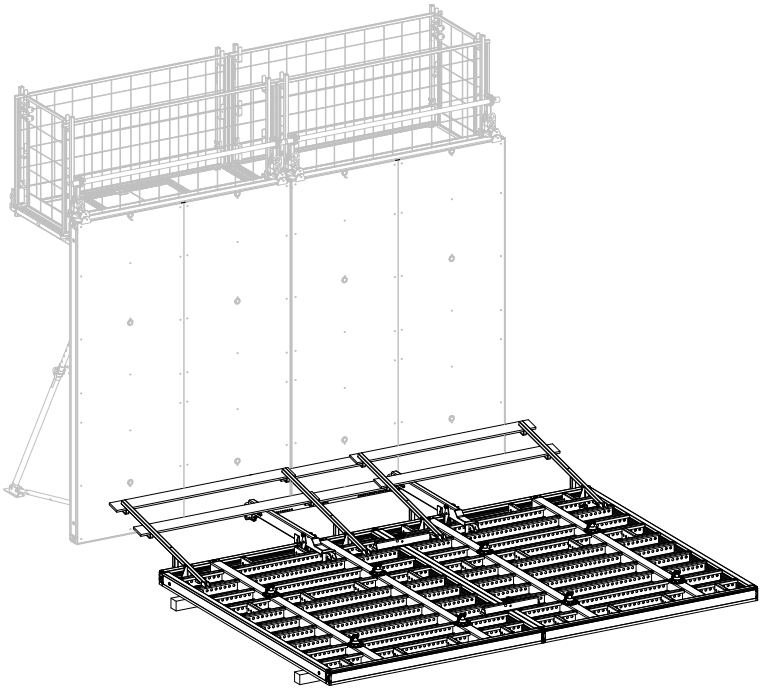


Step 11 Attach Counter Posts and guardrails.



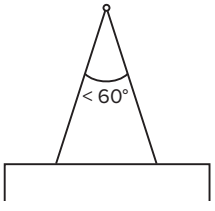
The assembly sequence shown uses timber boards as guardrails for illustration only. Other edge protection systems can be used to comply with local regulations.

Step 12 Install lifting devices.

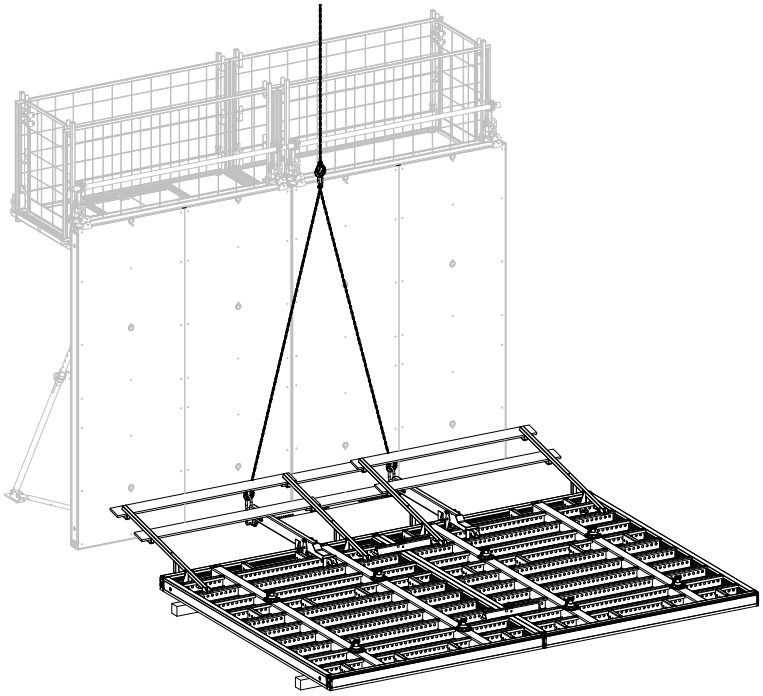


When transporting loads with two lifting points, the angle between the slings on the crane hook may not be greater than 60°.

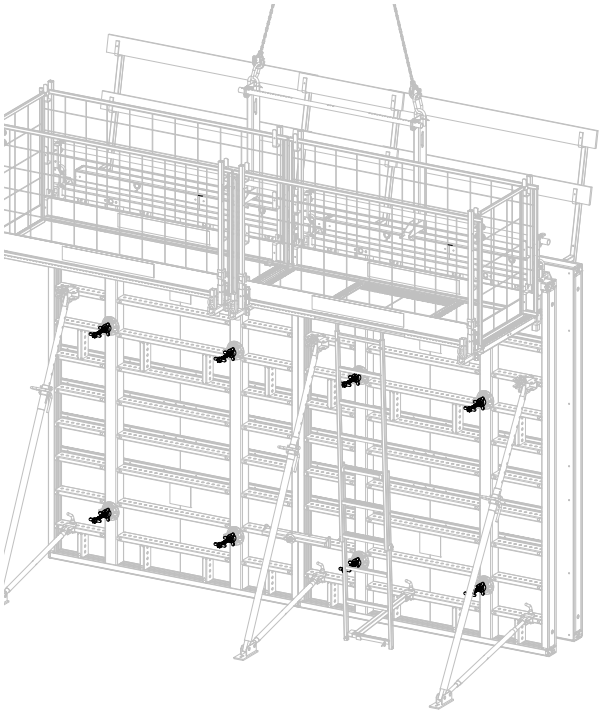
Otherwise the slings will be overloaded.

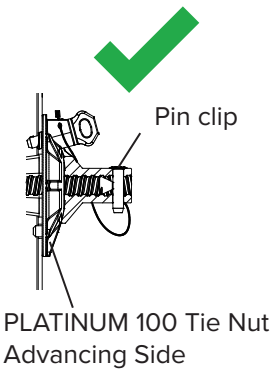


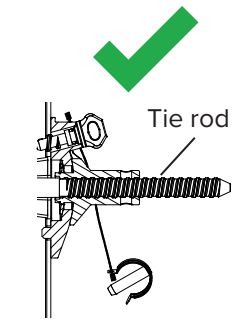
Step 13 Attach a suitable sling, e.g. a two-strand chain sling, to the lifting devices.



Step 14 Working from the advancing side, release the PLATINUM 100 Tie Rods G2 from the tie rod holder and slide them through the PLATINUM 100 Tie Nuts Closing Side. Screw the tie rods all the way into the PLATINUM 100 Tie Nuts Advancing Side on the opposite of the formwork. Screw the counter nut from the PLATINUM 100 Tie Rods G2 onto the thread of the PLATINUM 100 Tie Nut Closing Side.



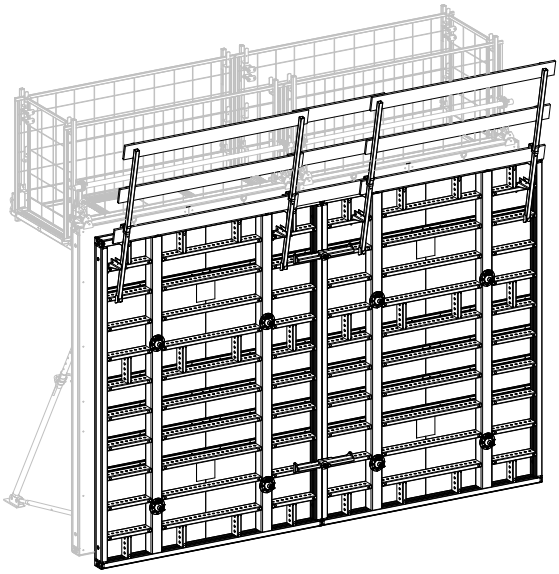




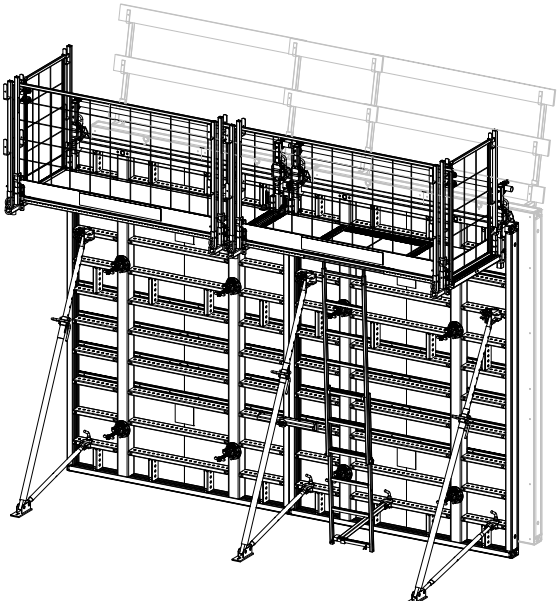
When the tie rods hit the pin clip of the opposing tie nuts, the tie is ready to take tension loads but not compression loads. The counter nut cannot resist both tension and compression loads until the counter nut is tightened.

Unless stated otherwise, all dimensions are given in mm.

Step 15 Release the lifting device and install any toe boards on the internal edge protection if required.



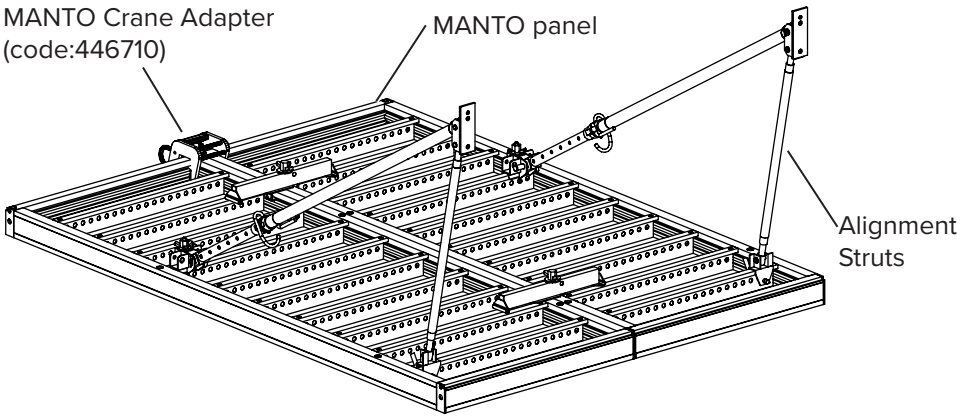
Step 16 Move the interior guardrail on the Universal Formwork Platform to the park position on the outside.



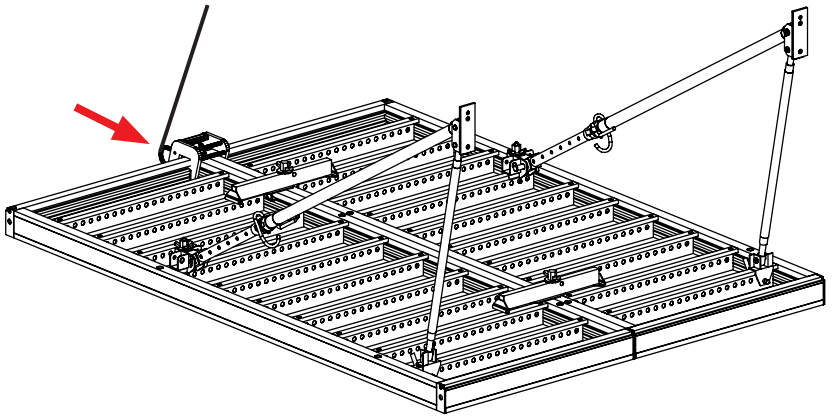
17.2 Assembling formwork with conventional tie method

Step 1 Pre-assemble the MANTO panels on timber beams on even ground.

Step 2 Attach 2no MANTO Alignment Struts to the first MANTO panels. This allows the formwork to be secured to the ground after it is raised upright, preventing it from collapsing.

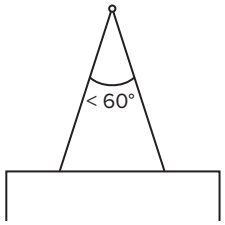


Step 3 If no pouring platforms are be attached, the MANTO formwork can now be transported with a crane to the point of use by using the MANTO Crane Adapter.



When transporting loads with two lifting points, the angle between the slings on the crane hook may not be greater than 60°.

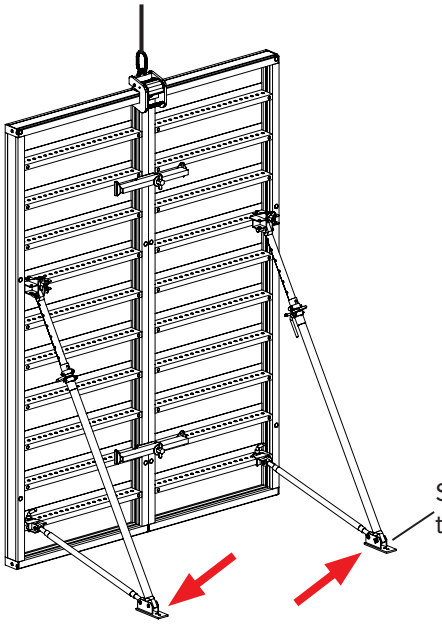
Otherwise the slings will be overloaded.



The WLL of the MANTO Crane Adapter (code:446710) is 1000 kg.

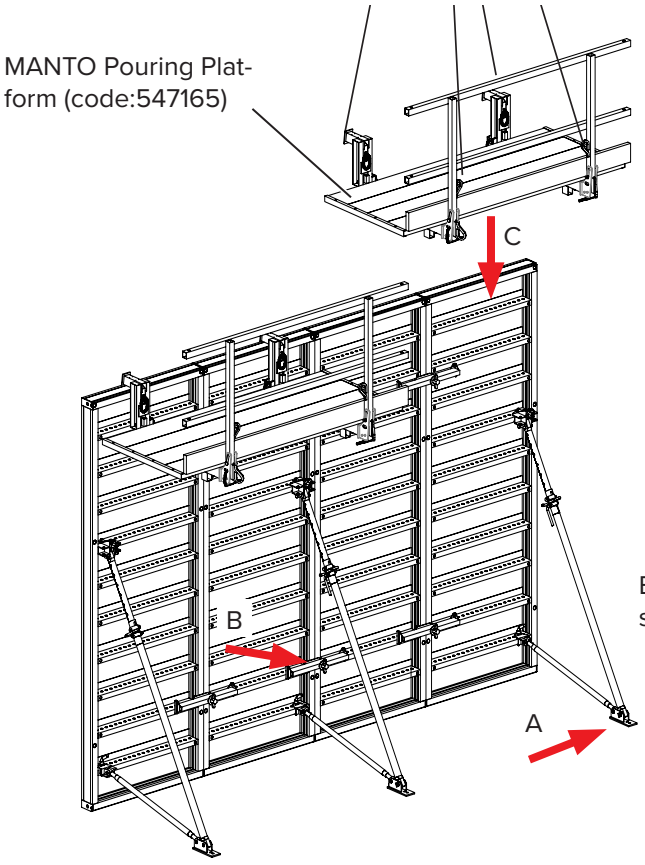
Unless stated otherwise, all dimensions are given in mm.

Step 4 Once the formwork is at the point of use, use suitable ties to anchor the alignment struts firmly to the ground.

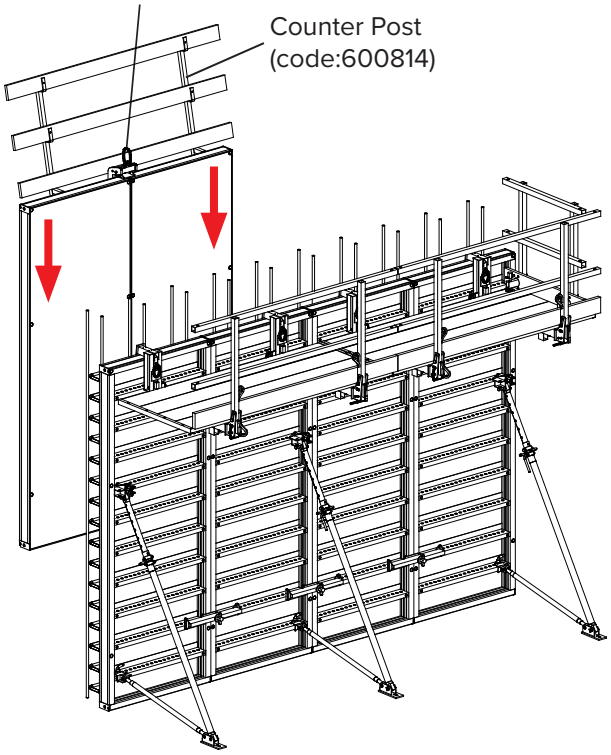


Step 5 If required, attach further MANTO panels, anchor to the ground (A) and connect to the first panels with Aligning Panel Clamps (B).

Step 6 Connect the proper platform, in this case the MANTO Pouring Platform, with the integrated railing to the formwork (C).



Step 7 Pre-assemble the closing side with the Counter Posts. Then transport the formwork panels to the place of use.



WARNING

Risk of injury from overturning formwork!

Do not release the Crane Adapter from panels which do not have Alignment Struts until all ties are securely fixed.

Step 8 Tie the closing side together using the specified ties.

Step 9 Release the MANTO Crane Adapter from the formwork.

Step 10 Repeat previous steps for further panels if required.

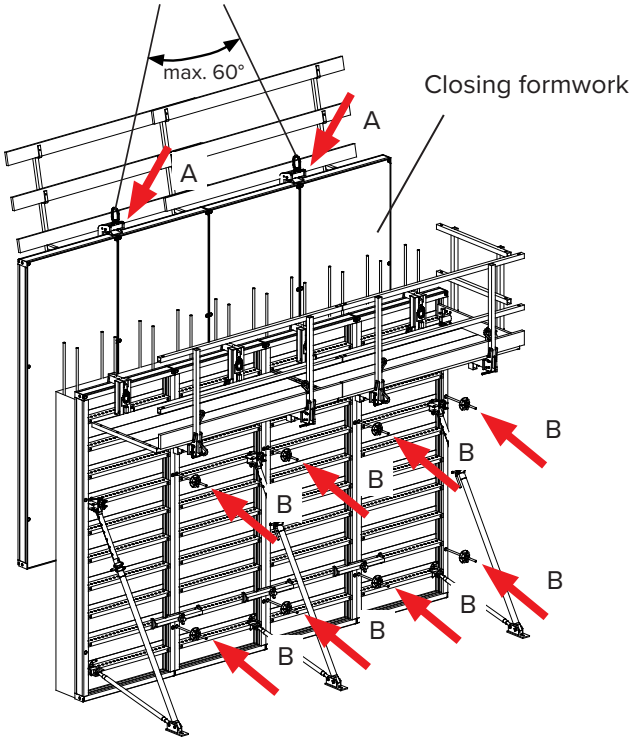
18 Stripping

Step 1 Remove loose items from the formwork.

Step 2 Attach the MANTO Crane Adapter (A) to the closing side of the formwork (opposite the MANTO Pouring Platform).

Step 3 Remove all ties (B) connecting the part of the formwork to be removed.

Step 4 Release the closing formwork from the wall. Lifting can now start.



WARNING

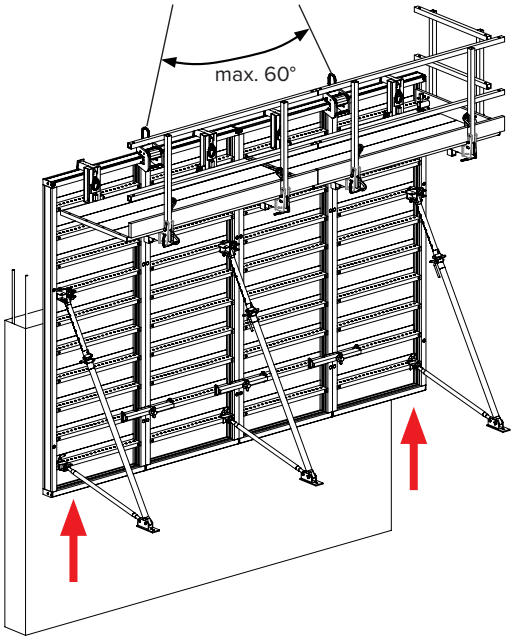
Risk of injury from overturning formwork!

Attach the closing formwork to a crane before removing the ties.

When lifting MANTO panels using 2no. lifting points, the internal angle of the crane slings should not exceed 60°.

Step 5 Clean the formwork to remove the remaining concrete.

Step 6 Release the advancing formwork from the wall and move it to the next place of use.



WARNING

Risk of injury from falling panels!

The lifting points on the platform may not be used to move the platform with formwork attached. Use only MANTO Crane Adapters to move formwork with a platform attached to it. Follow the operating instructions for the MANTO Crane Adapter.

19 Cleaning on-site

A flat scraper is the best tool for removing concrete residue from the form sheet. Use caution to ensure that the tool does not damage the form sheet.

A scraper or a hard brush is the best tool for cleaning the steel frame.

NOTE

Form lining can be damaged!

When using a pressure washer to clean the equipment, do not direct the spray towards the edges of the form sheet. This could cause the surface layer of the form sheet to peel off.

When using a pressure washer to clean the equipment, comply with the applicable regulations regarding waste water. The waste water may need to be collected and disposed of properly. Comply with the safety regulation pertaining to the formwork oil and other substances used.

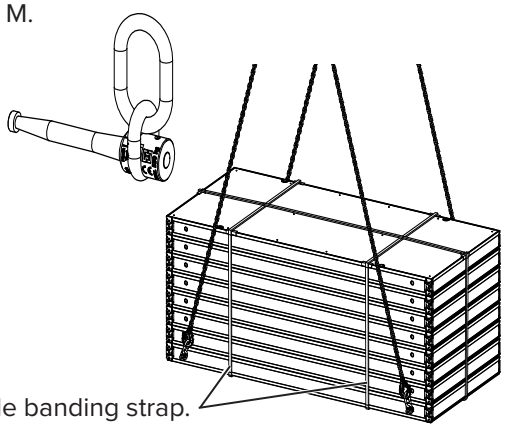
20 Storage and transport

20.1 MANTO panels

20.1.1 Bundled panels (only MANTO G3 and G3 M)

MANTO G3 Lifting Pins are used to transport bundles of MANTO G3 and G3 M panels by crane. The MANTO G3 Lifting Pin combined with 4-string suspensions allows bundles of 8no. panels or 5no. giant panels 240/270 or 240/330 to be moved. The SWL per MANTO G3 Lifting Pin is 550 kg.

MANTO G3 Lifting Pin (code:608295) for MANTO panels G3 and G3 M.

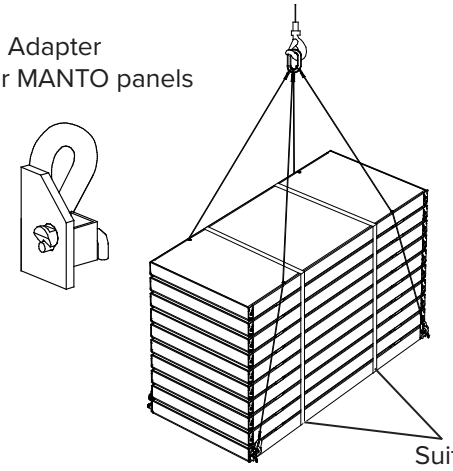


Suitable banding strap.

20.1.2 Bundled panels (only MANTO G1 and G2)

MANTO Loading Adapters are used to transport bundles of MANTO G1 and G2 panels by crane. The MANTO Loading Adapter combined with 4-string suspensions allows bundles of 10no. panels or 5no. giant panels 240/270 or 240/330 to be moved. The WLL per MANTO Loading Adapter is 500 kg.

MANTO Loading Adapter (code:461033) for MANTO panels G1 and G2.



Suitable banding strap.

WARNING

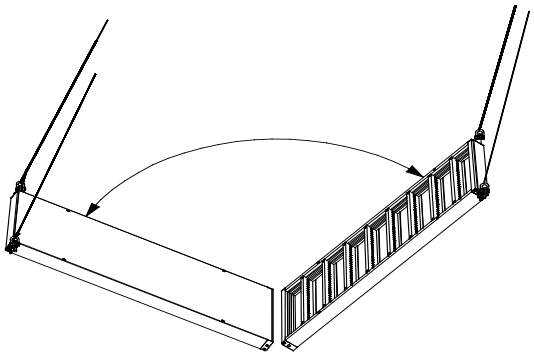
Risk of injury from falling formwork elements!

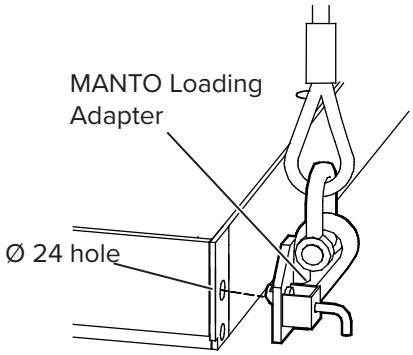
Adequately secure MANTO panels that are transported as a bundle with at least 2no. retaining bands to prevent panels from sliding out of the bundle.

When lifting MANTO panels the internal angle of the slings on the crane hook should not exceed 60°.

20.1.3 Single panels

Single MANTO panels can be turned over the long way with 2no. MANTO Loading Adapters (does not apply to MANTO panels G3). The Loading Adapters are connected at the corners of the panel by engaging the connecting pin in the hole (Ø 24 mm) in the panel.





Turning of the panels is only permitted as shown here. Lifting multiple connected MANTO panels with the MANTO Loading Adapter is not permitted.

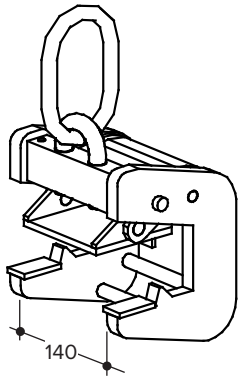
The separate operating instructions of the MANTO Loading Adapter have to be followed.

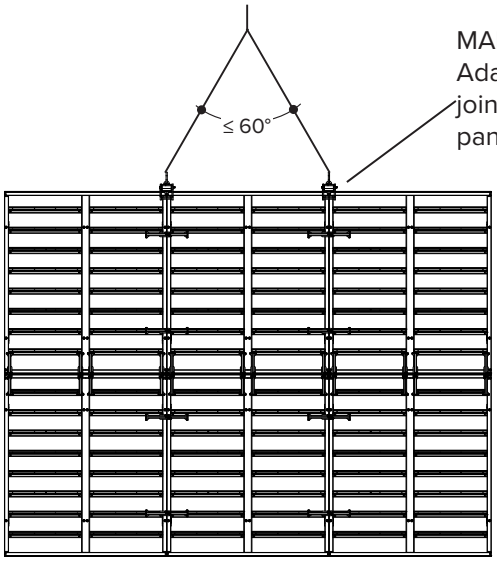
20.1.4 Assembled panels

MANTO Crane Adapter

MANTO formwork with an area of up to 30.00 m² can be transported with a pair of MANTO Crane Adapters.

MANTO Crane Adapter (code:446710)





WARNING

Risk of injury from falling formwork elements!

The internal angle of the slings on the crane hook should not exceed 60°.

Otherwise the slings and crane hook will be overloaded.

Unless stated otherwise, all dimensions are given in mm.

WARNING

Risk of injury from falling formwork elements!

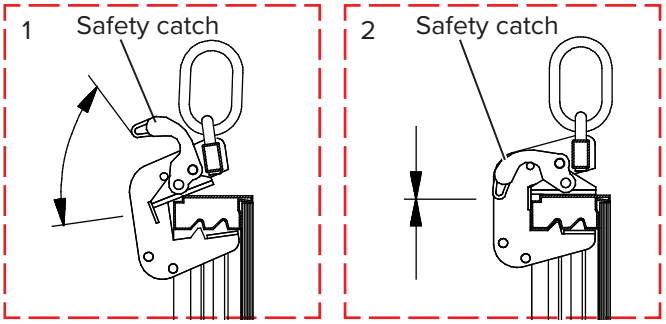
When connecting to the edge profile of the formwork, make sure that the safety catch on the MANTO Crane Adapter is completely engaged. Follow the instructions in the separate user guide for the MANTO Crane Adapter.

The MANTO Crane Adapters should be positioned at the panel joint or adjacent to a vertical profile in such a way that the Crane Adapter cannot slide inwards.

The maximum permitted load of the MANTO Crane Adapter (code:446710) is 10.00 kN.

Step 1 Open the safety catch of the MANTO Crane Adapter and push it onto the edge profile.

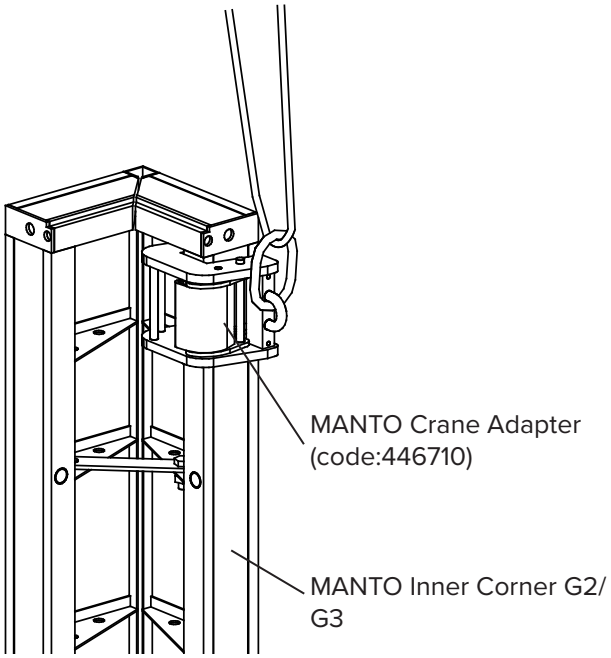
Step 2 Close the safety catch.



20.2 Corners

20.2.1 MANTO Inner Corners

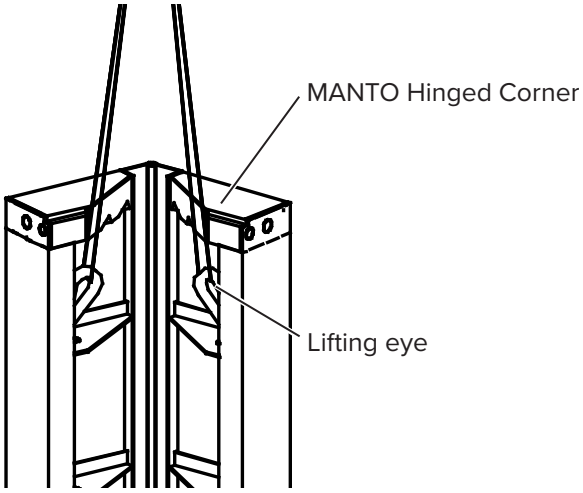
MANTO Inner Corners can be lifted individually using the MANTO Crane Adapter.



The WLL of the MANTO Crane Adapter (code:446710) is 10.00 kN

20.2.2 MANTO Hinged Corners

The MANTO Hinged Corners can be lifted individually by attaching a textile sling to the lifting eyes on the MANTO Hinged Corners.



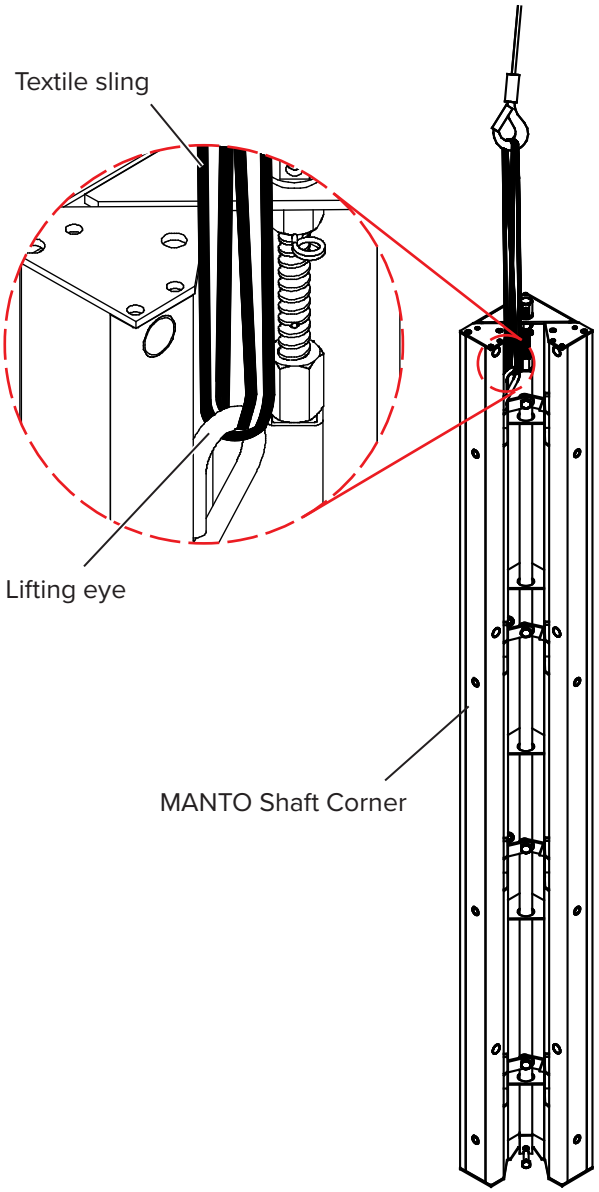
WARNING

Risk of injury from falling formwork elements!

When transporting/lifting single Hinged Corners without the MANTO Crane Adapter, a textile sling must be attached to both lifting eyes. For example, attaching a four-strand chain sling to a lifting eye is prohibited.

20.2.3 MANTO Shaft Corner

Each MANTO Shaft Corner is equipped with a fixed lifting eye. Attach a textile sling to the lifting eye to transport a single element.



WARNING

Risk of injury from falling formwork elements!

When transporting/lifting thread the textile sling through the lifting eye.

Attaching a MANTO Crane Adapter or the hook of a chain sling directly to the lifting eye is not permitted.

The lifting eye is intended to be used only to transport a single MANTO Shaft Corner, not to transport the entire shaft formwork!.

20.3 Shaft formwork

The MANTO shaft formwork can be lifted once the formwork is released from the concrete. The complete formwork can be lifted by crane by attaching the MANTO Crane Adapters to all four sides of the formwork.

WARNING

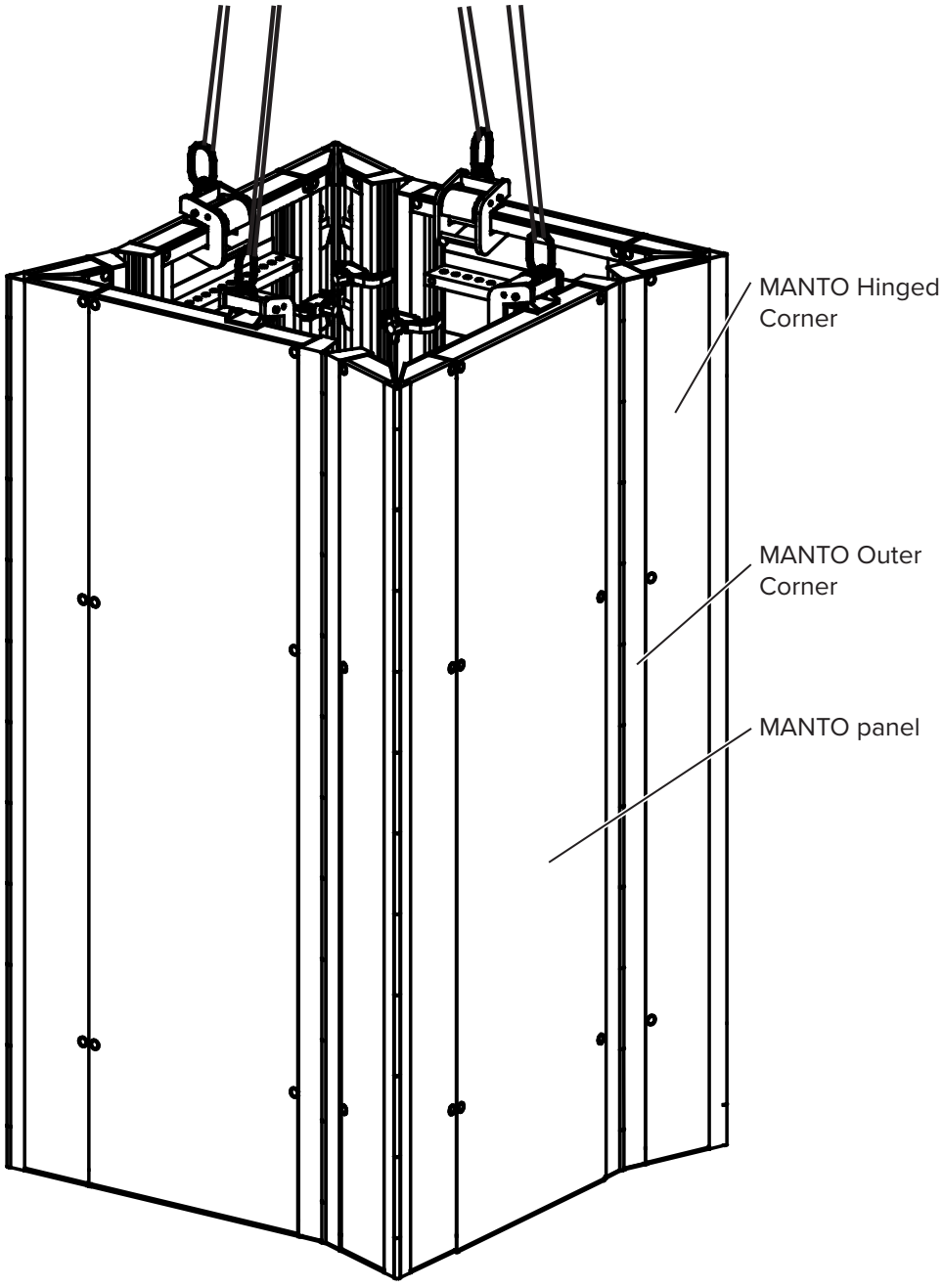
Warning!

When lifting MANTO shaft formwork the internal angle of the crane slings should not exceed 60°.

Do not exceed the WLL of the MANTO Crane Adapter.

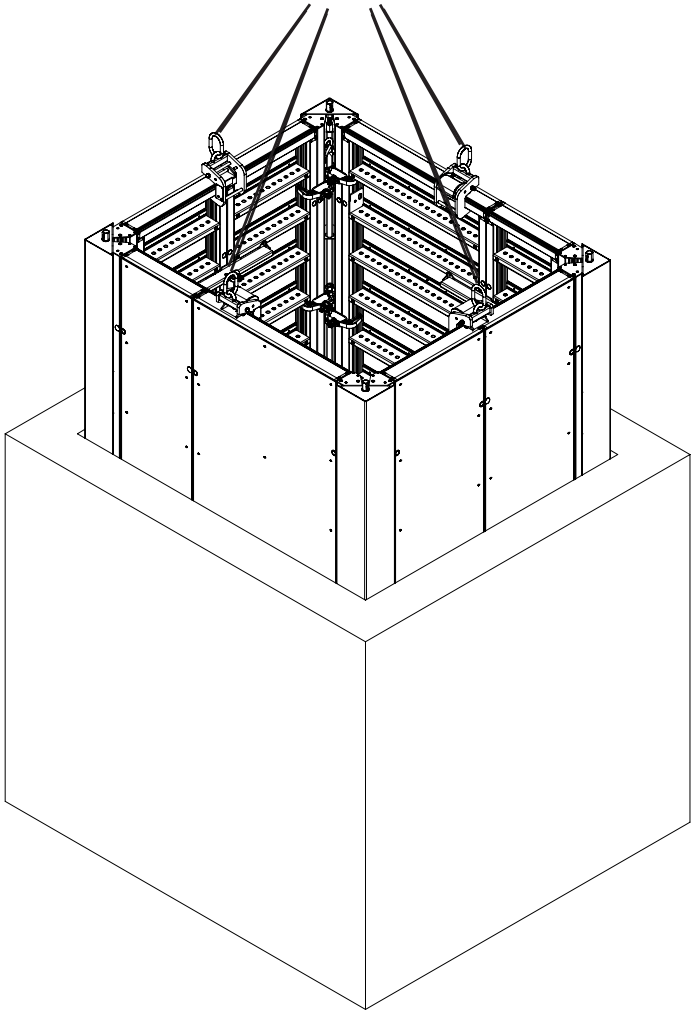
Centre the MANTO Crane Adapters on all four sides. Ensure the whole formwork assembly is adequately connected before lifting.

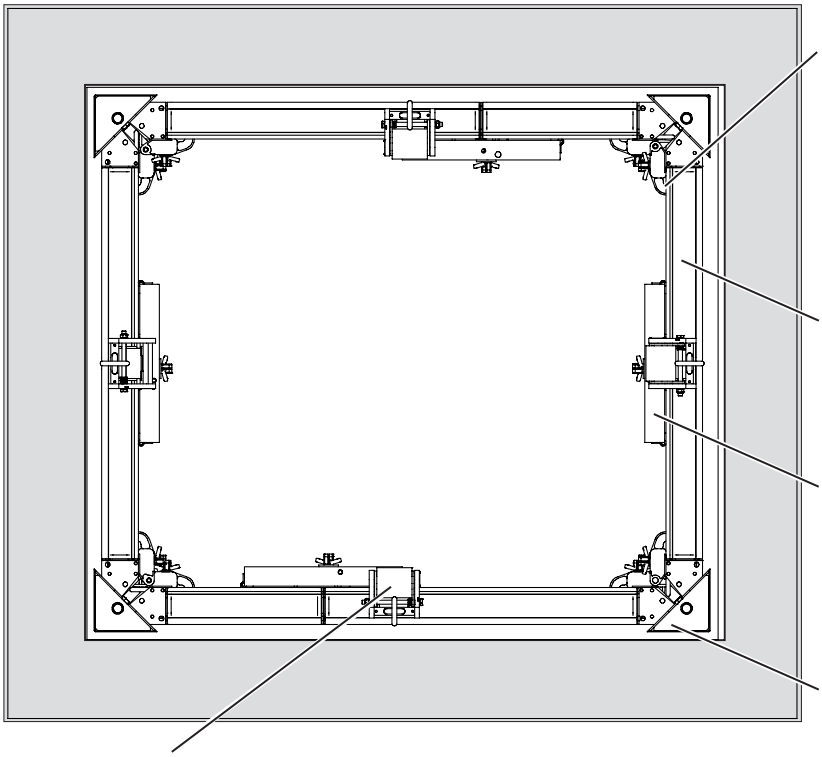
Example: Shaft formwork with MANTO Outer Corners and MANTO Hinged Corners



Unless stated otherwise, all dimensions are given in mm.

Example: Shaft formwork with MANTO Shaft Corners



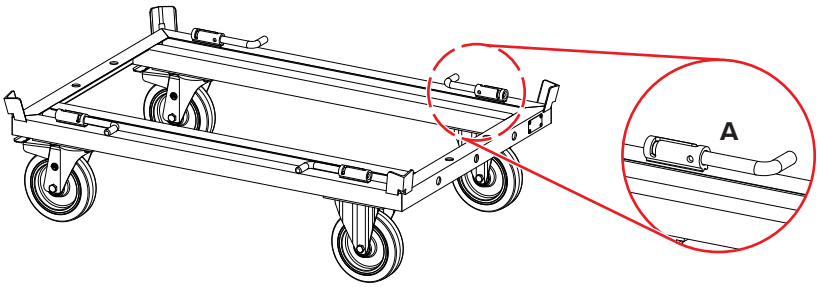


20.4 Other components

All of the components should be stored in the proper transport equipment. Most of the transport equipment can be moved with the Euro Trolley (code:607610) and transported with the crane on site.

Always follow the directions in the Euro Trolley operating instructions.

Always use the latch (**A**, shown opened here) on the Euro Trolley to secure the transport equipment.



20.4.1 Components < 1.00 m long and loose parts

Components < 1.00 m long and loose parts should be stored in the Euro Lattice Box (code:548480). The Euro Lattice Box can be moved with the Euro Trolley.

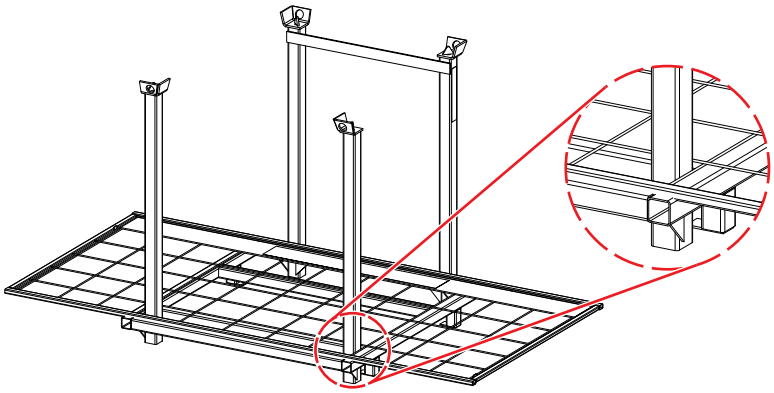
20.4.2 Components > 1.00 m long

Components > 1,00 m long such as EUROPLUS*new* Props, PROTECTO Railing Posts, etc. should be stored and transported on the Euro Stacking Frame 120/80 (code:553689). Always secure the components with straps or similar protection to prevent them from slipping when being transported. The Euro Stacking Frame can be moved with the Euro Trolley.

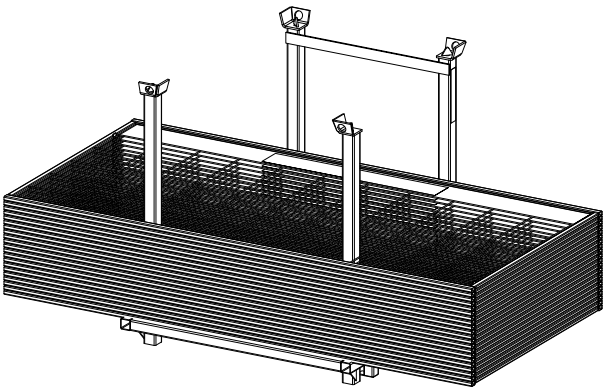
20.4.3 Uni mesh panels

Uni mesh panels should be stored and transported in the Uni Mesh Panel Rack (code:605558). The Uni mesh panels are secured in the rack to prevent them from slipping. The Uni Mesh Panel Rack can be moved with the Euro Trolley.

Step 1 Place the first Uni mesh panel in the Uni Mesh Panel Rack as shown in the illustration.



Step 2 Place additional Uni mesh panels (up to 50 panels, depending on the size) in the Uni Mesh Panel Rack.



Do not stack more than 2no. Uni Mesh Panel Racks on top of one another.

Always use a 4-strand chain sling to transport by crane!

20.4.4 PROTECTO mesh panels

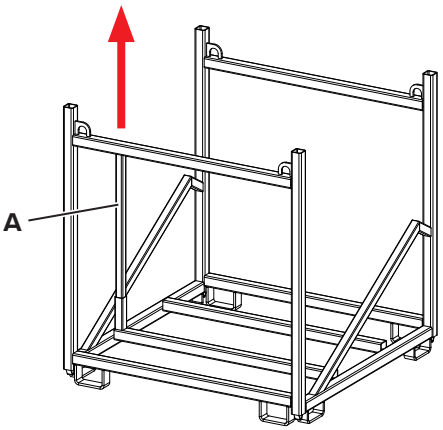
PROTECTO mesh panels should be stored in the PROTECTO Mesh Panel Rack. The PROTECTO mesh panels have to be secured with the insertion tube to prevent them from slipping during transport. The PROTECTO Mesh Panel Rack cannot be moved with the Euro Trolley.

The PROTECTO mesh panels must be place on top of one another without any gaps and flush to one another. Otherwise the PROTECTO mesh panels cannot be secured with the insertion tube. Transport is permitted only with the insertion tube in place.

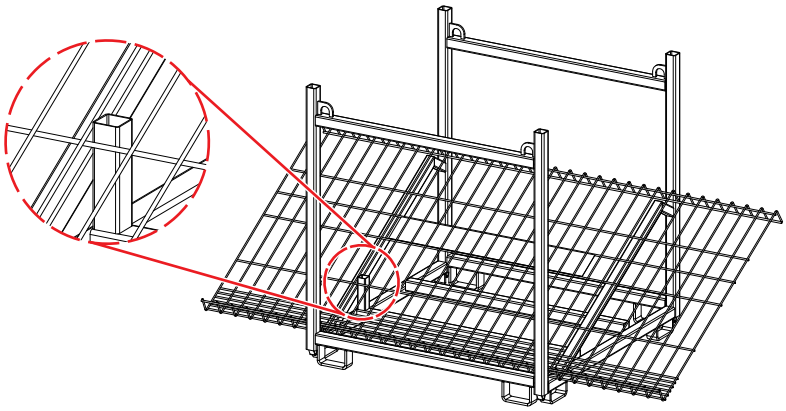
The following quantities of PROTECTO mesh panels can be stored and transported in the PROTECTO Mesh Panel Rack:

PROTECTO Mesh Panel 263:	49 pcs.
PROTECTO Mesh Panel 240:	54 pcs.
PROTECTO Mesh Panel 180:	60 pcs.
PROTECTO Mesh Panel 130:	60 pcs.

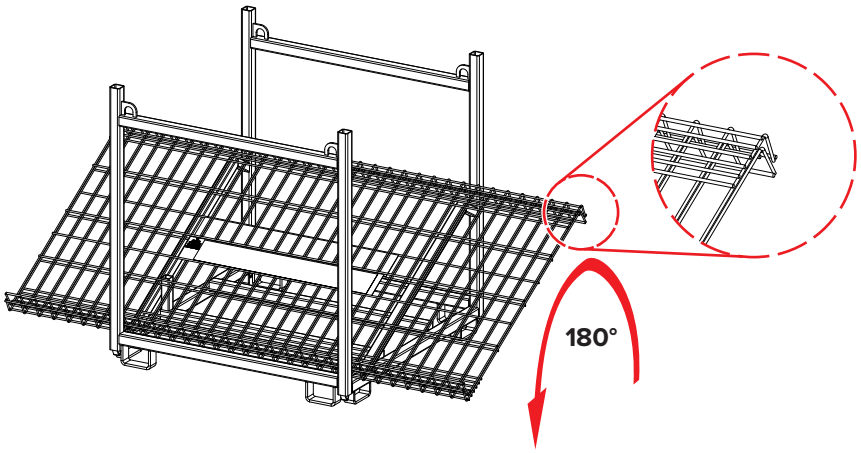
Step 1 Remove the insertion tube (**A**) from the PROTECTO Mesh Panel Rack.



Step 2 Place the first PROTECTO mesh panel in the Euro Stacking Frame. Check that the PROTECTO mesh panel is centred in the frame. The seat for the insertion tube has to be between two bars.

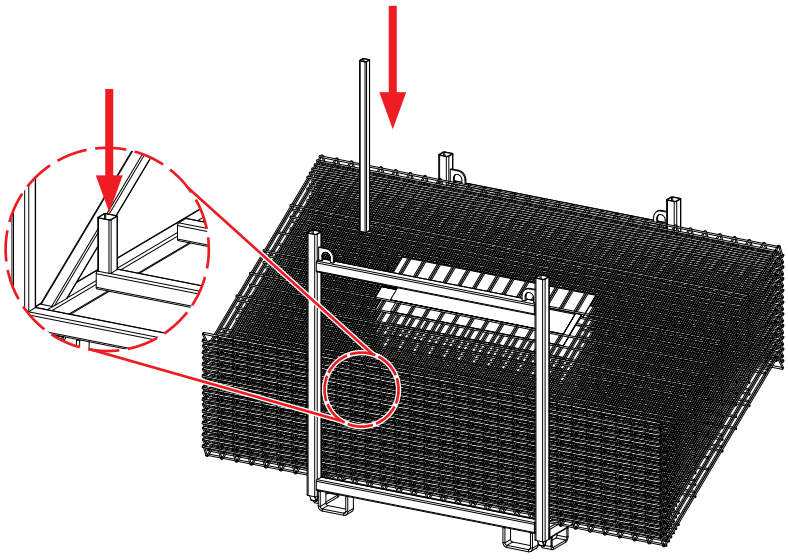


Step 3 Turn the second PROTECTO mesh panel 180° and place it on the first PROTECTO mesh panel. Align the PROTECTO mesh panels such that they are flush to one another.



Step 4 Continue to stack the PROTECTO mesh panels, turning each panel 180° from the previous panel. Align the PROTECTO mesh panels such that they are flush to one another.

Step 5 Pass the insertion tube through the PROTECTO mesh panels and insert it into the insertion tube seat.



Do not stack more than 2no. PROTECTO Mesh Panel Racks on top of one another.

Always use a 4-strand chain sling to transport by crane!

Unless stated otherwise, all dimensions are given in mm.

21 Disposal

Components that are destroyed or are beyond repair must be disposed of properly. The components should be handed over to a disposal specialist certified according to local regulations. Information on the materials used are available upon request.

Always ensure that destroyed or damaged components are not used again!

22 Technical data

22.1 Permitted fresh concrete pressure for MANTO

Tie Rod	Concrete pressure profile		Panel height [m]	Permitted fresh concrete pressure [kN/m²] Maximum deflection according to DIN 18202 Table 3 and tie load capacity Line	
				5, 6	7
DW 20	Hydrostatic (non-stacked panels)		All	Full hydrostatic pressure	
	Constant (stacked panels)		3.30	80.00	65.00
			2.70		63.00
			2.40	80.00	
			1.20		
DW 15	Hydrostatic (non-stacked panels)		All	Full hydrostatic pressure 3.30 m panels limited to 60.00	
	Constant (stacked panels)		3.30	46.00	
			2.70	60.00	
			2.40		
			1.20		

- Tie Rods DW 15 up to a maximum of 90.00 kN and Tie Rods DW 20 up to a maximum of 150.00 kN.
- The lowest of the above values apply top panels built before 1995 (Panels built before 1991 are equipped with a leverage edge at the vertical edge profile and panels built before 1995 do not have reinforcement plates by the tie holes). Refer to section 4 on page 49.
- A mixture of DW 15 and DW 20 tie rods on one site is not permitted.
- Warranty can only be granted for original tying equipment delivered by Hünnebeck.
- Compliance of the deformation limits refers to the deflection resulting from the concrete pressure. Unevenness of the panels is not considered.

23 Chronology

Changes since edition 2021-07		
Change	**Page**	**Date**
PLATINUM Tie Rod G2 and adjustment clip updated	105 ff.	2021-10
Table PLATINUM 100 Bulkhead Clamp updated	139 ff.	2021-10
Form strips removed.	39	2022-01
MANTO G3 Lifting Pin added.	45, 207	2022-01

Index

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1800 EN 2022-01-31-

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