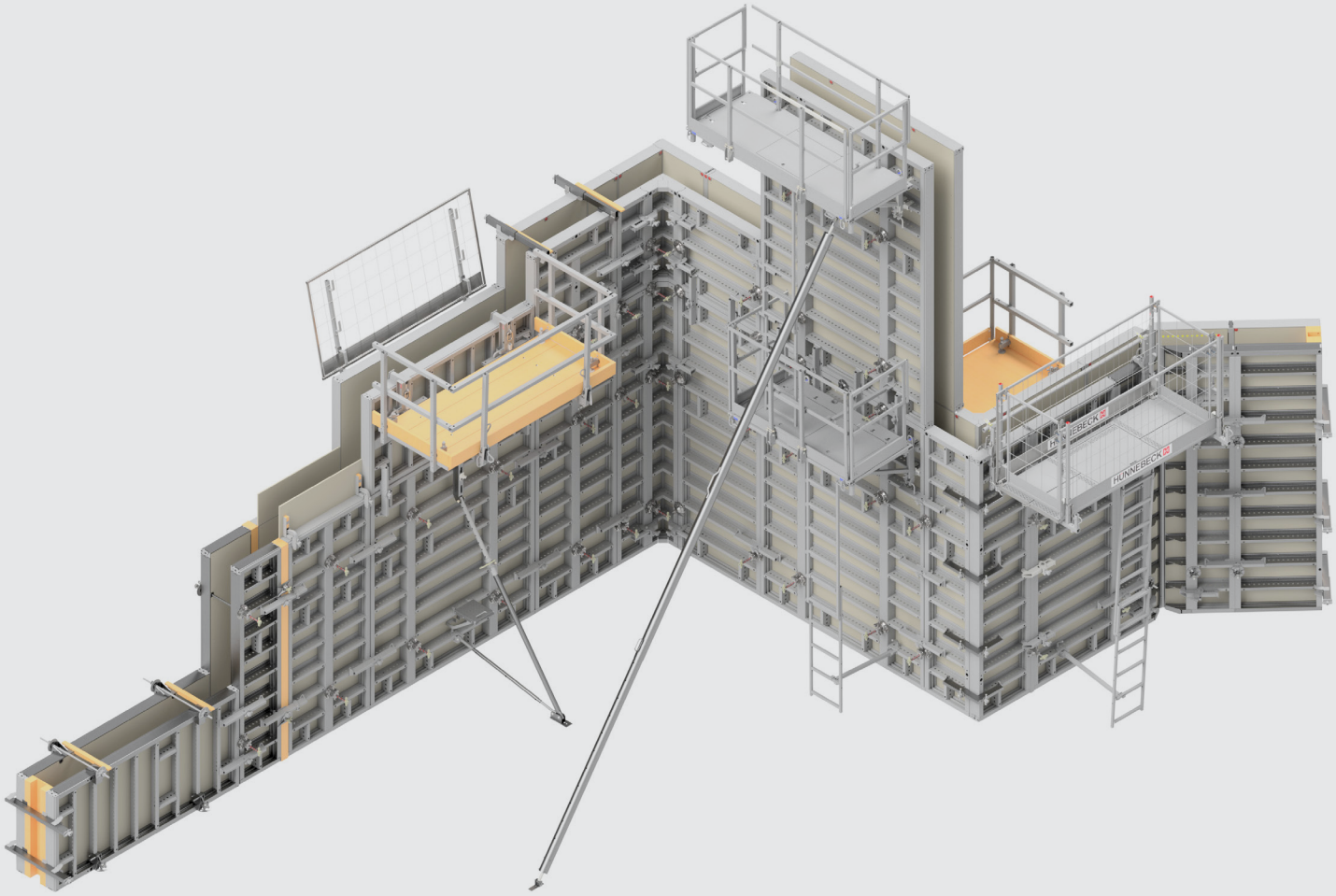
# MANTO®

## Large-frame panel formwork

## User guide



HÜNNEBECK
BY BRAND SAFWAY

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# 1 Product features

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. Eight to ten identical ribs offer several connection points for the accessories and support the 18 mm form sheet.

With the Aligning Panel Clamp, all vertical, horizontal and extended panel joints fit tightly together and the panels are aligned perfectly without any mismatch. The Aligning Panel Clamp also allows large-area formwork elements to be repositioned without having to install any additional stiffening walers. It 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) and also prevents the material from being damaged.

MANTO Giant Panel 240<br>Inner Corner 120 and 270<br>Hinged Corner 120 and 270

} built until 1991<br>permitted fresh concrete pressure 60 kN/m$^2$<br>(Refer to page 151).

## 1.1 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.

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.

HÜNNEBECK products are intended to be used only by properly trained persons and only for commercial purposes.



Unless stated otherwise, all dimensions in mm.

## 1.2 Safety instructions

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

The contractor is responsible for drawing up a comprehensive risk assessment and a set of assembly instructions.

Assembly instructions are not the same thing as a user guide.

- 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. At a minimum, 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 assembly instructions 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 provided by the manufacturer or the formwork supplier 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.
- Storage and transport
  Always comply with the requirements specifically applicable to transporting and storing the respective falsework. An example of such a requirement is the use of slings and other lifting gear.
- Material check
  Formwork and falsework 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 perfect condition and function correctly. Modifications to the formwork materials are not permitted.
- 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.
- Warnings, notes and visual inspection
  Observe all general warnings and notes, as well as those indicating that a visual inspection is required.

# Product features

| | |
|---|---|
| DANGER | **Danger!**<br>DANGER indicates a hazardous situation that, if not avoided, will cause death or serious injury. |
| WARNING | **Warning!**<br>WARNING indicates a hazardous situation that, if not avoided, can cause death or serious injury. |
| CAUTION | **Caution!**<br>Caution indicates a hazardous situation that, if not avoided, can cause minor or moderate injury. |
| NOTE | **Note!**<br>NOTE refers to practices not related to personal injury. |
| VISUAL CHECK | Visual inspection indicates that an additional inspection is required. |

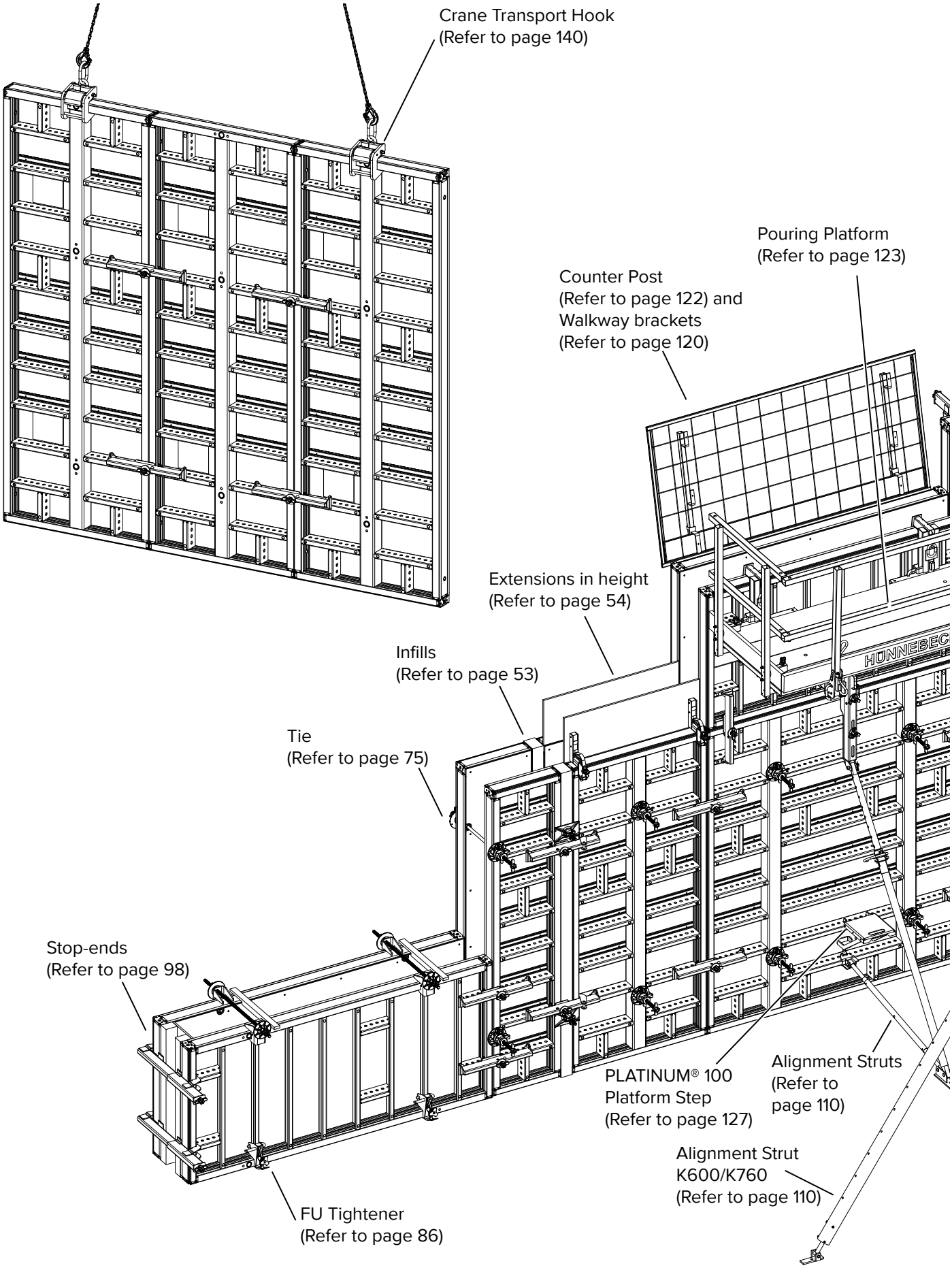
- Miscellaneous
  For the safety-related application and use of the products, all current country-specific laws, standards and other safety regulations are to be complied with without exception. They form a part of the obligations of employers and employees regarding occupational and industrial safety. This results in, among other things, the responsibility of the contractor to ensure the stability of the formwork and falsework constructions as well as the structure during all stages of construction.
  This also includes the basic assembly, dismantling and transport of the formwork and falsework along with their components. Inspect the entire structure during and upon completion of assembly.





Unless stated otherwise, all dimensions in mm.

## 2 Overview

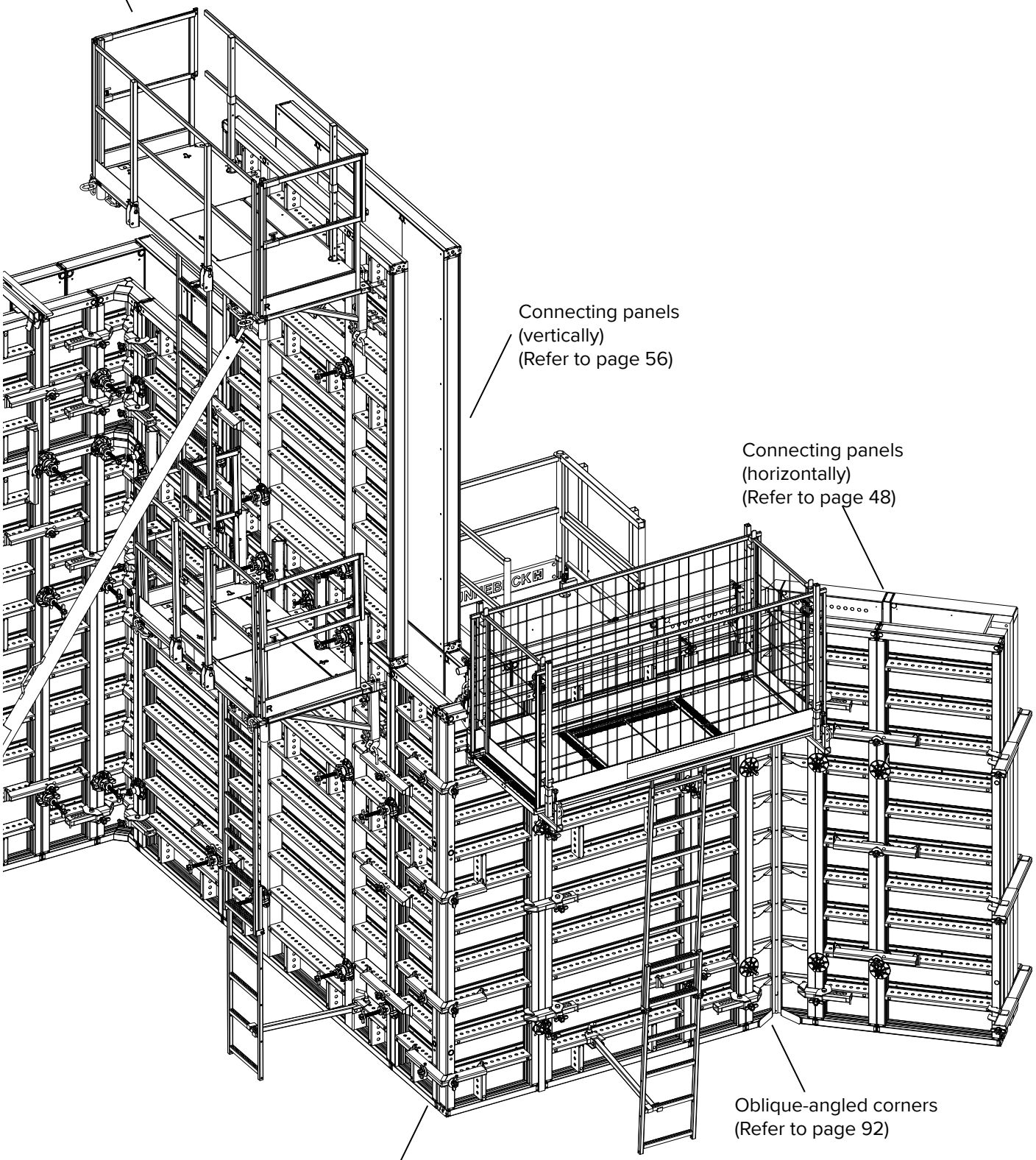





Unless stated otherwise, all dimensions in mm.

PLATINUM® 100
platform system
(Refer to page 119)

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



Connecting panels
(vertically)
(Refer to page 56)

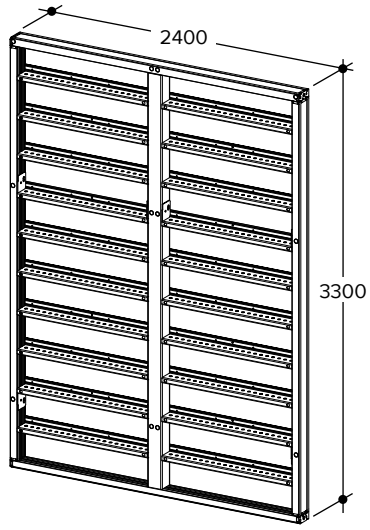
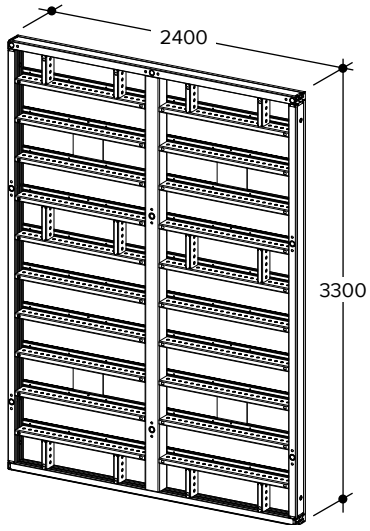
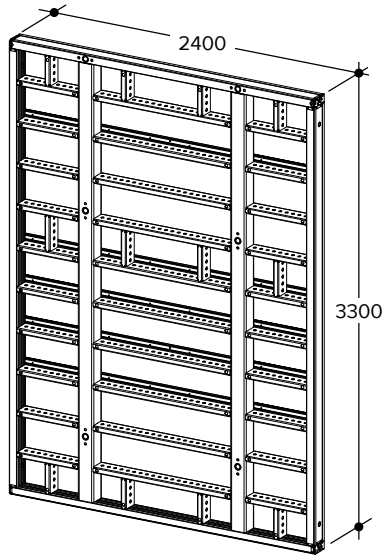
Connecting panels
(horizontally)
(Refer to page 48)

Oblique-angled corners
(Refer to page 92)

90° corners
(Refer to page 88)

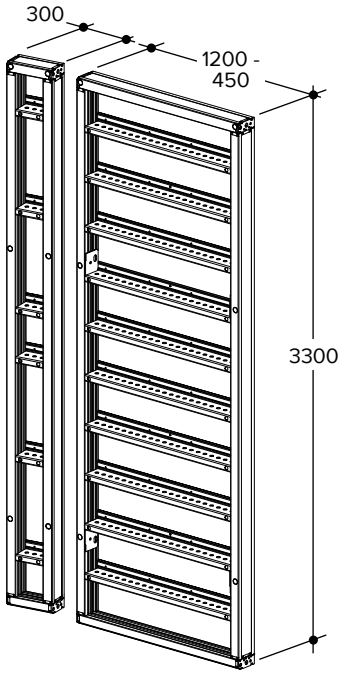
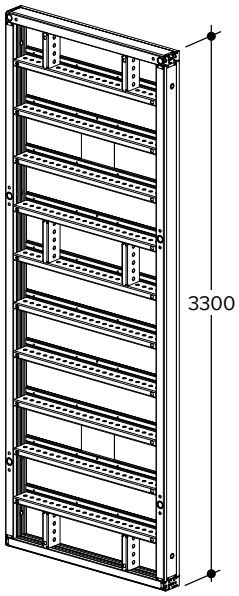
# 3 Components

## 3.1 Panels

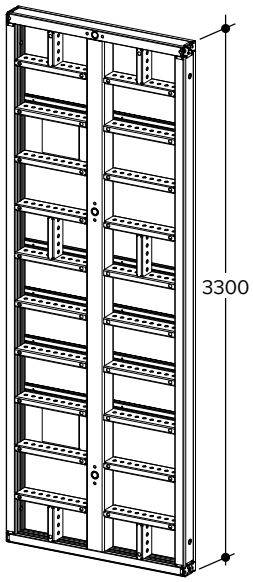
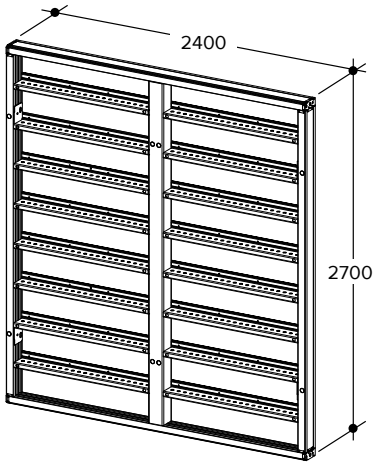
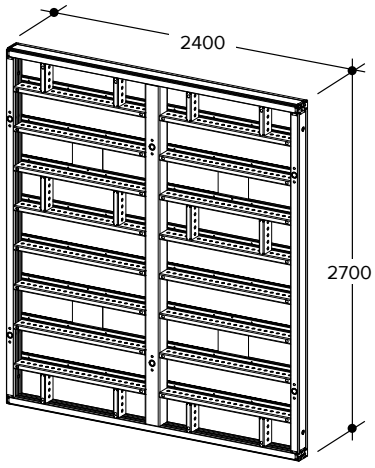
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Giant Panel 240/330 (7.92 m²)**<br>**Generation 2**<br>(Refer to page 42)<br>The largest panel with a height of 3.30 m.<br>The central profile is equipped with 4no. tie holes.<br>A MANTO Giant Panel can also be used with two opposing panels with a width of 1.20 m each.<br>Also available with the ECOPLY full plastic form sheet (19 mm). | **525759** | **371.18** |
|  | **MANTO G3 Giant Panel 240/330 (7.92 m²)**<br>**Generation 3**<br>(Refer to page 46)<br>Like the MANTO Giant Panel 240/330, but with stiffeners between the panel ribs, e.g. to connect Alignment Struts. | **608280** | **409.07** |
|  | **MANTO G3 M Giant Panel 240/330 (7.92 m²)**<br>**Generation 3**<br>(Refer to page 46)<br>The central profiles are equipped with 2no. tie holes each, and 2no. tie positions are located on the top edge profile. | **607820** | **439.44** |



Unless stated otherwise, all dimensions in mm.

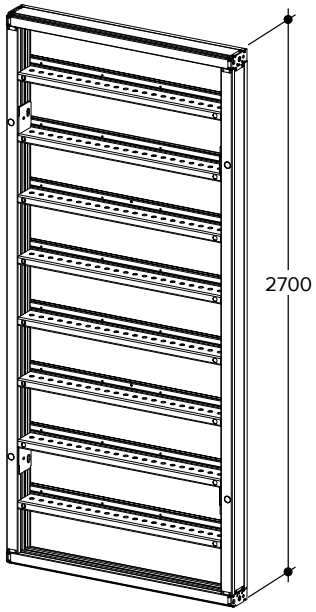
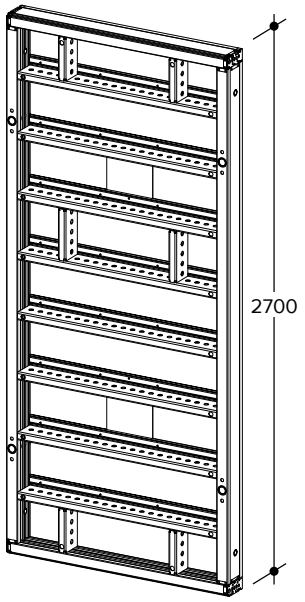
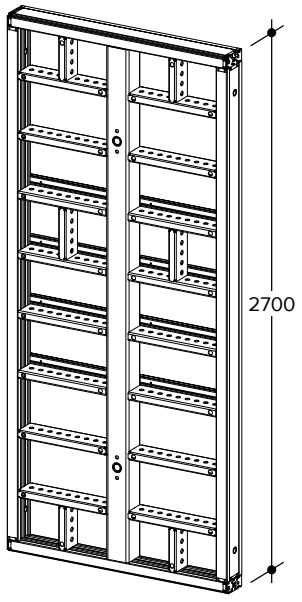
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Panel 120/330 (3.96 m²)** | **525760** | **179.56** |
| | **MANTO Panel 105/330 (3.47 m²)** | **525770** | **163.63** |
| | **MANTO Panel 90/330 (2.97 m²)** | **525781** | **146.14** |
| | **MANTO Panel 75/330 (2.48 m²)** | **525792** | **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**<br>(Refer to page 42)<br>Other panels in the 3.30 m height range.<br>Also available with the ECOPLY full plastic form sheet (19 mm). | | |
|  | **MANTO G3 Panel 120/330 (3.96 m²)** | **608015** | **187.61** |
| | **MANTO G3 Panel 105/330 (3.47 m²)** | **608020** | **180.24** |
| | **MANTO G3 Panel 90/330 (2.97 m²)** | **608025** | **163.57** |
| | **MANTO G3 Panel 75/330 (2.48 m²)** | **608030** | **140.63** |
| | **MANTO G3 Panel 60/330 (1.98 m²)** | **608040** | **123.41** |
| | **MANTO G3 Panel 45/330 (1.49 m²)** | **608045** | **101.57** |
| | **MANTO G3 Panel 30/330 (0.99 m²)** | **608050** | **88.83** |
| | **Generation 3**<br>(Refer to page 44) | | |

# Components

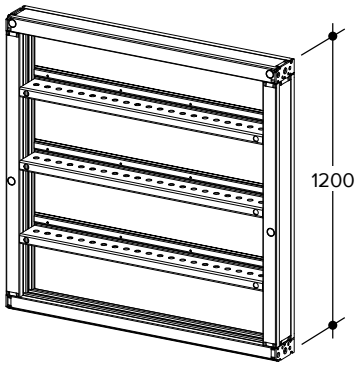
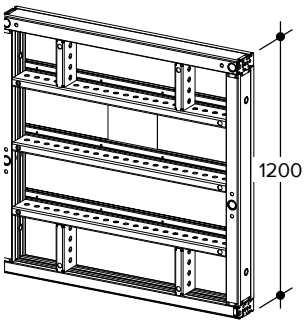
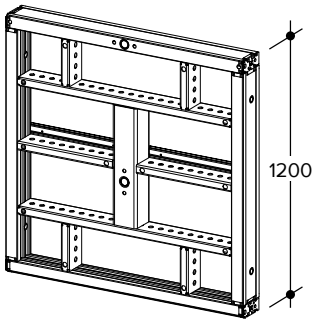
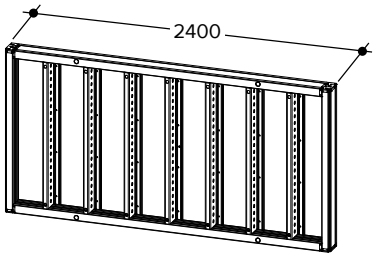
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO G3 M Panel 120/330 (3.96 m²)** | **607830** | **243.02** |
| | **MANTO G3 M Panel 90/330 (2.97 m²)** | **607840** | **196.56** |
| | **MANTO G3 M Panel 60/330 (1.98 m²)** | **607850** | **140.67** |
| | **Generation 3** | | |
| | (Refer to 46) | | |
|  | **MANTO Giant Panel 240/270 (6.48 m²)** | **534990** | **319.39** |
| | **Generation 2** | | |
| | (Refer to page 42) | | |
| | The central profile is equipped with 4no. tie holes. This allows the MANTO Giant Panel to be used with two opposing panels with a width of 1.20 m each. | | |
| | Also available with the ECOPLY full plastic form sheet (19 mm). | | |
|  | **MANTO G3 Giant Panel 240/270 (6.48 m²)** | **608290** | **356.13** |
| | **Generation 3** | | |
| | (Refer to page 46) | | |
| | Like the MANTO Giant Panel 240/270, but with stiffeners between the panel ribs, e.g. to connect Alignment Struts | | |



Unless stated otherwise, all dimensions in mm.

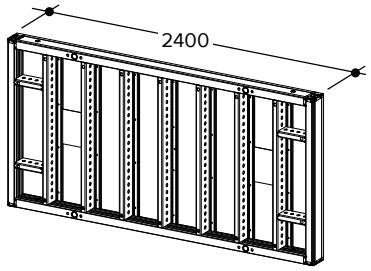
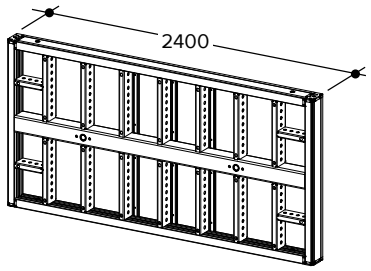
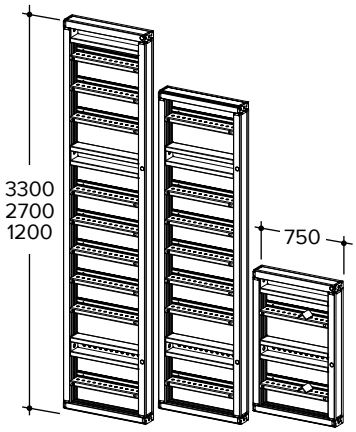
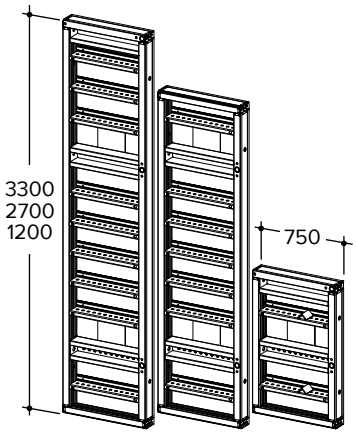
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Panel 120/270 (3.24 m²)** | **446000** | **162.61** |
| | **MANTO Panel 105/270 (2.84 m²)** | **446022** | **149.31** |
| | **MANTO Panel 90/270 (2.43 m²)** | **446033** | **120.08** |
| | **MANTO Panel 75/270 (2.03 m²)** | **446044** | **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** | | |
| | (Refer to page 42) | | |
| | Other panels in the 2.70 m height range. | | |
| | Also available with the ECOPLY full plastic form sheet (19 mm). | | |
|  | **MANTO G3 Panel 120/270 (3.24 m²)** | **608055** | **179.10** |
| | **MANTO G3 Panel 105/270 (2.84 m²)** | **608060** | **164.80** |
| | **MANTO G3 Panel 90/270 (2.43 m²)** | **608065** | **137.46** |
| | **MANTO G3 Panel 75/270 (2.03 m²)** | **608070** | **117.35** |
| | **MANTO G3 Panel 60/270 (1.62 m²)** | **608080** | **102.97** |
| | **MANTO G3 Panel 45/270 (1.22 m²)** | **608085** | **82.93** |
| | **MANTO G3 Panel 30/270 (0.81 m²)** | **608090** | **73.01** |
| | Generation 3 | | |
| | (Refer to page 44) | | |
|  | **MANTO G3 M Panel 240/270 (6.48 m²)** | **607860** | **368.66** |
| | **MANTO G3 M Panel 120/270 (3.24 m²)** | **607870** | **203.88** |
| | **MANTO G3 M Panel 90/270 (2.43 m²)** | **607880** | **162.61** |
| | **MANTO G3 M Panel 60/270 (1.62 m²)** | **607890** | **120.10** |
| | **Generation 3** | | |
| | (Refer to page 46) | | |

# Components

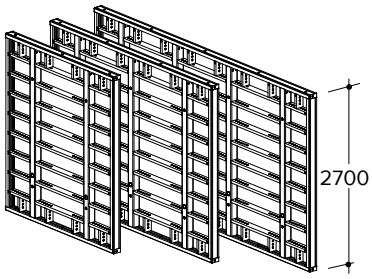
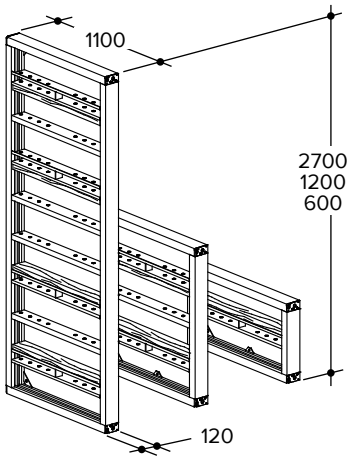
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Panel 120/120 (1.44 m²)** | **458175** | **72.86** |
| | **MANTO Panel 105/120 (1.26 m²)** | **458186** | **66.02** |
| | **MANTO Panel 90/120 (1.08 m²)** | **458197** | **59.21** |
| | **MANTO Panel 75/120 (0.90 m²)** | **458201** | **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** | | |
| | (Refer to page 42) | | |
| | Panels in the 1.20 m height range. | | |
| | Also available with the ECOPLY full plastic form sheet (19 mm). | | |
|  | **MANTO G3 Panel 120/120 (1.44 m²)** | **608095** | **82.43** |
| | **MANTO G3 Panel 105/120 (1.26 m²)** | **608100** | **72.67** |
| | **MANTO G3 Panel 90/120 (1.08 m²)** | **608105** | **69.17** |
| | **MANTO G3 Panel 75/120 (0.90 m²)** | **608110** | **58.29** |
| | **MANTO G3 Panel 60/120 (0.72 m²)** | **608120** | **50.98** |
| | **MANTO G3 Panel 45/120 (0.54 m²)** | **608125** | **40.84** |
| | **MANTO G3 Panel 30/120 (0.36 m²)** | **608130** | **35.23** |
| | **Generation 3** | | |
| | (Refer to page 44) | | |
|  | **MANTO G3 M Panel 120/120 (1.44 m²)** | **607900** | **93.44** |
| | **MANTO G3 M Panel 90/120 (1.08 m²)** | **607910** | **77.98** |
| | **MANTO G3 M Panel 60/120 (0.72 m²)** | **607920** | **60.17** |
| | **Generation 3** | | |
| | (Refer to page 46) | | |
|  | **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** | | |
| | (Refer to page 42) | | |
| | Range of extension panels that can be used as height extensions or as independent elements for smaller heights. | | |
| | Also available with the ECOPLY full plastic form sheet (19 mm). | | |



Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO G3 Panel 240/120 (2.88 m²)**<br>**MANTO G3 Panel 240/90 (2.16 m²)**<br>**MANTO G3 Panel 240/60 (1.44 m²)**<br>**Generation 3**<br>(Refer to page 44) | **608135**<br>**608140**<br>**608145** | **146.01**<br>**120.27**<br>**90.80** |
|  | **MANTO G3 M Panel 240/120 (2.88 m²)**<br>**MANTO G3 M Panel 240/90 (2.16 m²)**<br>**MANTO G3 M Panel 240/60 (1.44 m²)**<br>**Generation 3**<br>(Refer to page 46) | **607960**<br>**607970**<br>**607980** | **179.42**<br>**144.87**<br>**109.30** |
|  | **MANTO MP Panel 75/330 (2.48 m²)**<br>**MANTO MP Panel 75/270 (2.03 m²)**<br>**MANTO MP Panel 75/120 (0.90 m²)**<br>**Generation 2**<br>(Refer to page 42)<br>Multi-purpose panels with a horizontal tie hole grid.<br>The 50 mm tying increments allow even the most difficult of formwork tasks to be accomplished.<br>These panels can also be used for shuttering square and rectangular columns.<br>Because the panels are available in three different heights, the height of the structure can be easily adjusted.<br>Also available with the ECOPLY full plastic form sheet (19 mm). | **533561**<br>**454340**<br>**454946** | **151.50**<br>**123.30**<br>**67.23** |
|  | **MANTO G3 MP Panel 75/330 (2.48 m²)**<br>**MANTO G3 MP Panel 75/270 (2.03 m²)**<br>**MANTO G3 MP Panel 75/120 (0.90 m²)**<br>**Generation 3**<br>(Refer to page 44) | **608150**<br>**608155**<br>**608160** | **159.48**<br>**126.69**<br>**68.48** |

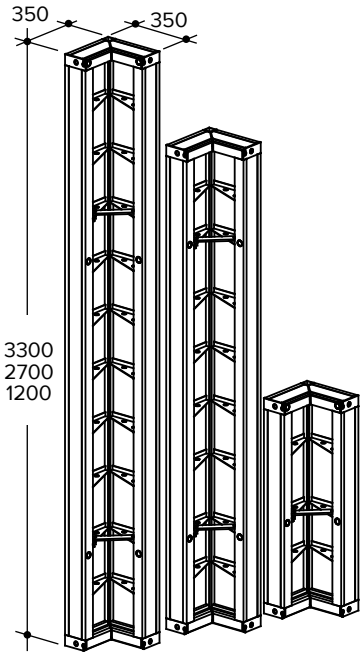
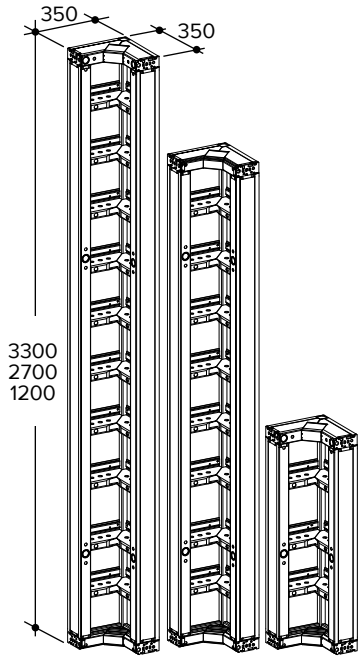
# Components

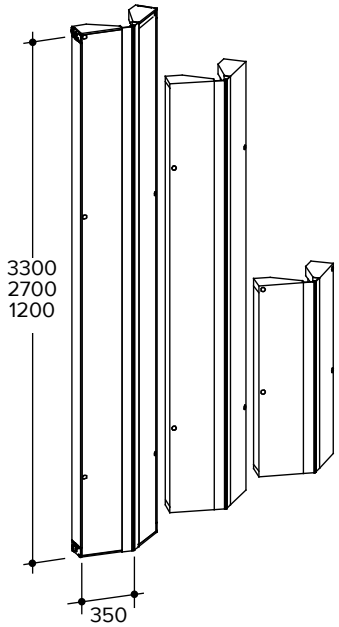
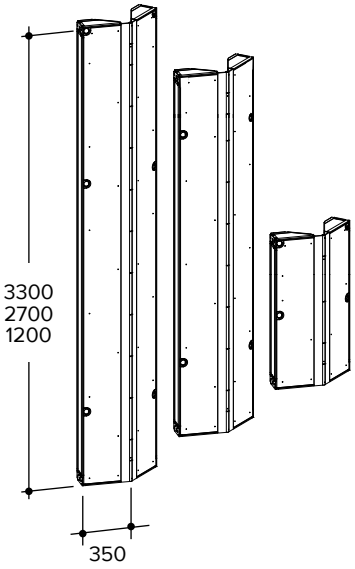
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Panel 240/270 L (6.48 m²)** | **600860** | **423.48** |
| | **MANTO Panel 360/270 XL (9.72 m²)** | **600861** | **616.78** |
| | **MANTO Panel 480/270 XXL (12.96 m²)** | **600862** | **810.29** |
| | **Generation 2** | | |
| | (Refer to page 42) | | |
| | 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 83. | | |
| | Also available with the ECOPLY full plastic form sheet (19 mm). | | |
|  | **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** | | |
| | (Refer to page 42) | | |
| | Special frames for column formwork, used to form columns with edge lengths ranging from 200 mm to 900 mm (in 5 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 | | |



Unless stated otherwise, all dimensions in mm.

## 3.2 Corners

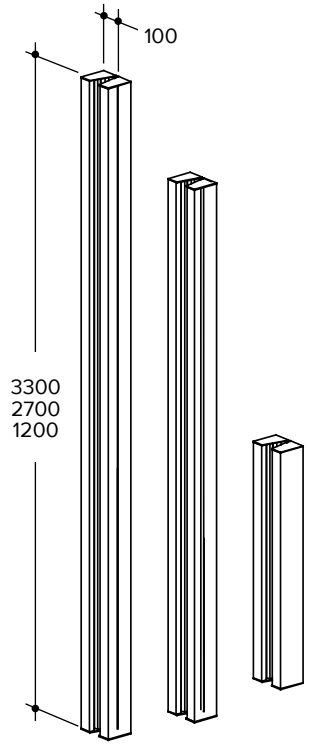
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Inner Corner 35/330 (2.31 m²)** | **525851** | **113.80** |
| | **MANTO Inner Corner 35/270 (1.89 m²)** | **535001** | **94.46** |
| | **MANTO Inner Corner 35/120 (0.84 m²)** | **535012** | **45.86** |
| | **Generation 2**<br>(Refer to page 42)<br>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. | | |
|  | **MANTO G3 Inner Corner 35/330 (2.31 m²)** | **607990** | **127.44** |
| | **MANTO G3 Inner Corner 35/270 (1.89 m²)** | **608000** | **105.24** |
| | **MANTO G3 Inner Corner 35/120 (0.84 m²)** | **608010** | **50.89** |
| | **Generation 3**<br>(Refer to page 44)<br>The 90° Inner Corner with tie positions operated from only one side of the formwork.<br>The left legs of the G3 Inner Corner can be latched to the formwork with aligning wedge clamps. | | |

| | 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**<br>(Refer to page 42)<br>Flexible 350 mm wide corner panels for inner corners with angles from 60° to 175°.<br>Corners with an angle less than 90° are connected with Panel Clamps. | | |
|  | **MANTO G3 Hinged Corner 35/330** | **608255** | **139.41** |
| | **MANTO G3 Hinged Corner 35/270** | **608265** | **115.20** |
| | **MANTO G3 Hinged Corner 35/120** | **608275** | **55.73** |
| | **Generation 3**<br>(Refer to page 44)<br>Flexible 350 mm wide corner panels for inner corners with angles from 60° to 175°.<br>Corners with an angle less than 90° are connected with Panel Clamps. | | |



Unless stated otherwise, all dimensions 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**

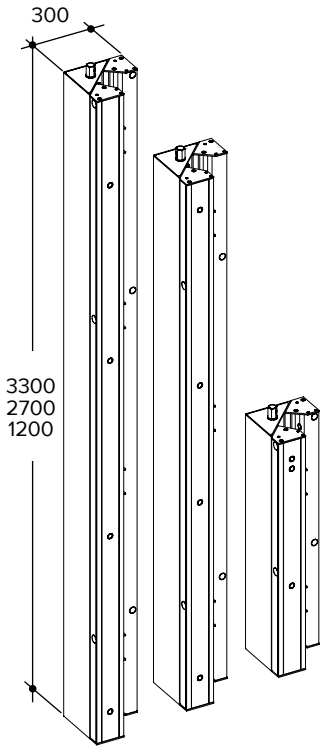
(Refer to page 42)

Used as an outer corner. The legs are 100 mm long.

Also used in shaft formwork with Hinged Corners.

Adjustable from 60° to 192°.

| | | |
|---|---|---|
| **MANTO Shaft Corner 330** | **602402** | **191.97** |
| **MANTO Shaft Corner 270** | **602400** | **156.09** |
| **MANTO Shaft Corner 120** | **602401** | **74.32** |



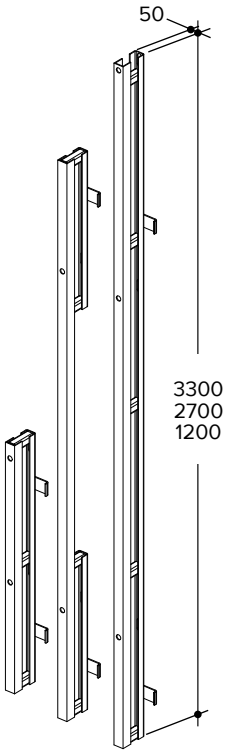
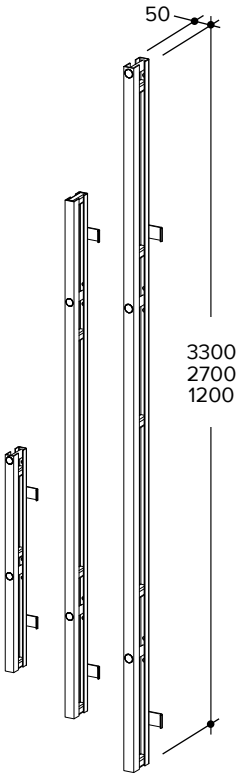

**Generation 2**

(Refer to page 42)

Shaft formwork can be easily designed, assembled and lifted when using the Shaft Corners.

The formwork is released from the concrete using the integrated mechanism.

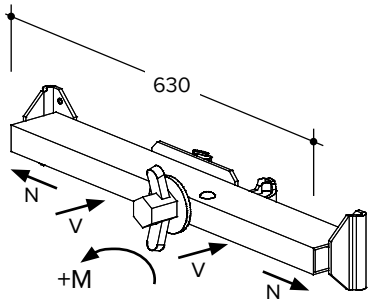
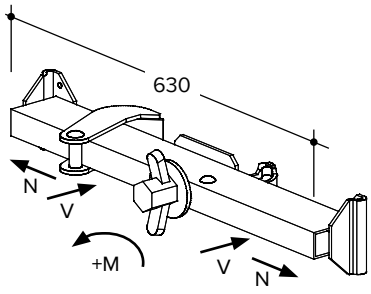
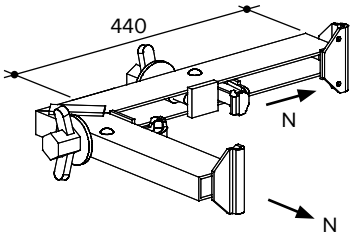
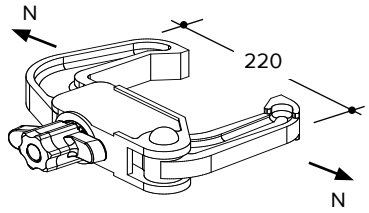
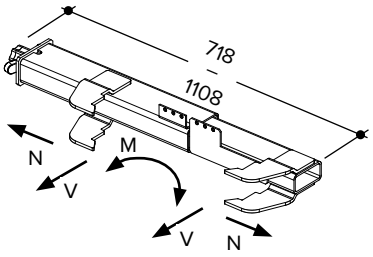
The whole shaft formwork can then be transported as a single unit by crane.

| | 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** | | |
| | (Refer to page 42) | | |
| | The Corner Adjustment is used for adapting differing wall dimensions in corners and T-wall connections. | | |
|  | **MANTO G3 Corner Adjustment 5/330** | **608165** | **31.49** |
| | **MANTO G3 Corner Adjustment 5/270** | **608170** | **25.72** |
| | **MANTO G3 Corner Adjustment 5/120** | **608175** | **12.54** |
| | **Generation 3** | | |
| | (Refer to page 44) | | |
| | The Corner Adjustment is used for adapting differing wall dimensions in corners and T-wall connections. | | |

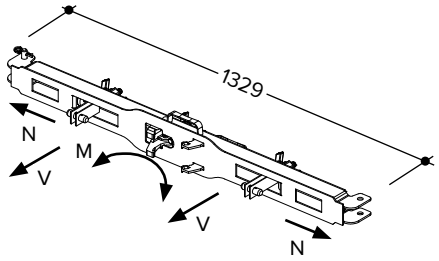
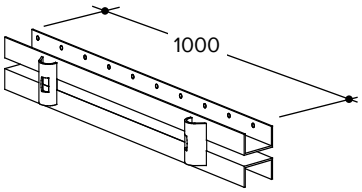
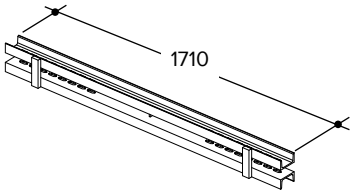
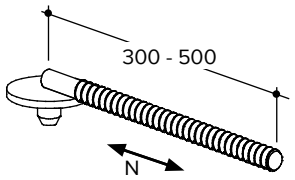
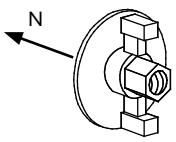


Unless stated otherwise, all dimensions in mm.

## 3.3 Connectors

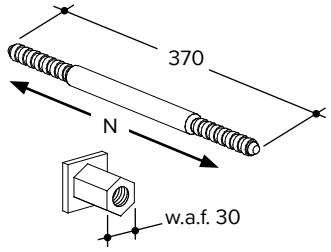
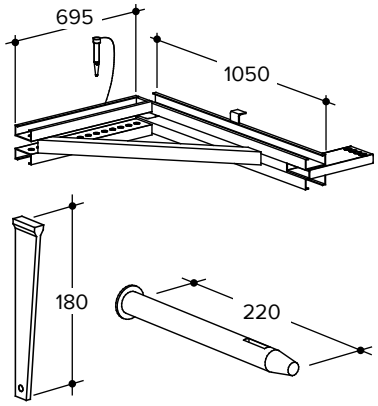
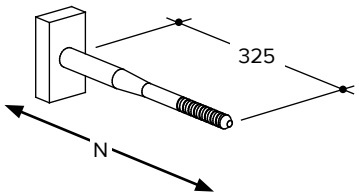
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Aligning Panel Clamp**<br>The Aligning Panel Clamp ensures that joints are closed securely and the panels are properly connected and aligned without offset, all in one process. This applies to both horizontal and vertical MANTO Panel connections.<br>Safe Working Moment (-M): 1.70 kNm<br>Safe Working Moment (+M): 1.20 kNm<br>Safe Working Load (N): 11.20 kN<br>Safe Working Load (V): 6.70 kN<br>Refer to page 48. | **448000** | **5.50** |
|  | **Adjustable Aligning Clamp**<br>Same as the Aligning Panel Clamp but allows for length adjustment of up to 150 mm.<br>Safe Working Moment (-M): 1.70 kNm<br>Safe Working Moment (+M): 1.20 kNm<br>Safe Working Load (N): 8.10 kN<br>Safe Working Load (V): 9.50 kN<br>Refer to page 50. | **467898** | **6.00** |
|  | **Outer Corner Clamp**<br>The Outer Corner Clamp connects and aligns MANTO Panels at right angles to create an outer corner.<br>Safe Working Load (N): 17.50 kN<br>Refer to page 88. | **448227** | **8.80** |
|  | **Panel Clamp**<br>Used to connect timber and plywood extensions as well as panels and shaft spindles.<br>Safe Working Load (N): 8.00 kN. | **448010** | **3.01** |
|  | **PLATINUM® 100 Bulkhead Clamp**<br>The Bulkhead Clamp is used to create a stop end without any additional anchors or other components, e.g. using square timbers and a form sheet.<br>Safe Working Moment (M): 5.00 kNm<br>Safe Working Load (N): 36.00 kN<br>Safe Working Load (V): 36.00 kN | **604328** | **11.02** |

# Components

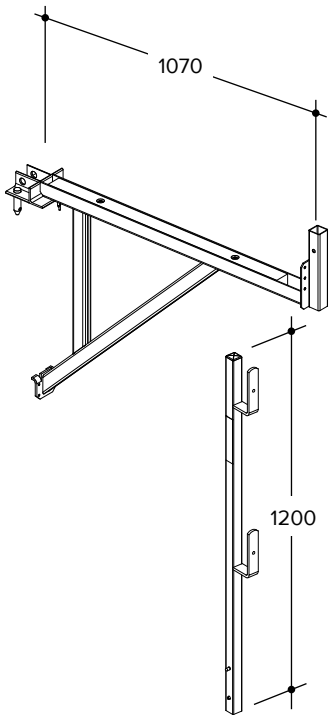
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **PLATINUM® 100 MANTO Extension Bar**<br>The PLATINUM® 100 MANTO Extension Bar is used to extend PLATINUM® 100 or MANTO panels. Extended panels are connected securely at the panel joint and are aligned this way.<br>Additional alignment struts can be connected directly to the Extension Bar.<br>Safe Working Moment (M): 4.50 kNm<br>Safe Working Load (N): 15.00 kN<br>Safe Working Load (V): 11.00 kN<br>Refer to page 68. | **607000** | **18.83** |
|  | **Multipurpose Waler 100**<br>The Multipurpose Waler spans length adjustments and transfers the loads into the MANTO panels. It is fastened with 2no. Waler Spanners. The result is a panel connection that is resistant to tension. It can also be used in stop ends and with height extensions.<br>The integrated nail holes facilitate shuttering work. | **450764** | **13.10** |
|  | **Steel Waler F 171**<br>The Steel Waler F 171 is required to connect MANTO XL panels and XXL panels that have been extended.<br>The Steel Walers are connected to the panels using 4no. Waler Spanners and 4no. Tension Nuts per waler. | **503908** | **38.86** |
|  | **Waler Spanner (300 mm)**<br>**Waler Spanner L (500 mm)**<br>Used to secure Multipurpose Walers 100 or any other walers and profiles. Simply hook the Waler Spanner into the grid holes of the panel ribs. An additional Tension Nut is required.<br>Safe Working Load (N): 16.50 kN. | **452053**<br>**454410** | **0.76**<br>**1.07** |
|  | **Tension Nut (DW15)**<br>Used in conjunction with the Waler Spanner.<br>Safe Working Load (N): 40.00 kN. | **197332** | **0.65** |



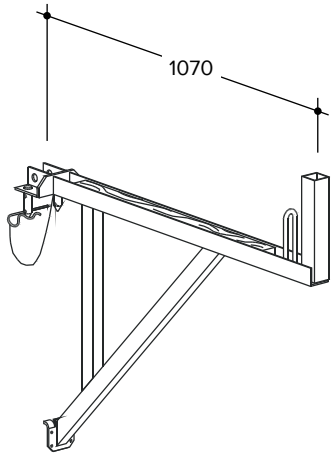
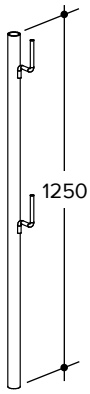
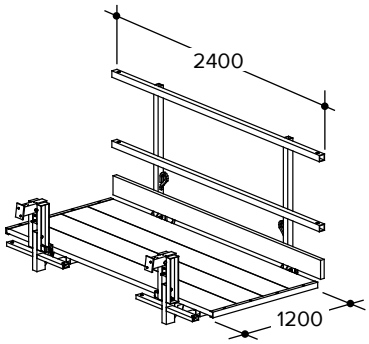
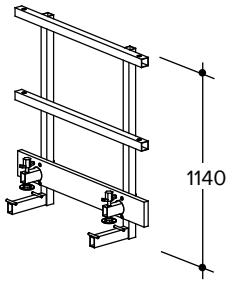
Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO MP Bolt** | **454442** | **0.80** |
| | **MANTO MP Nut** | **454670** | **0.34** |
| | For connecting MANTO MP Panels when used as column formwork. Always use in conjunction with the Tie Nut 230 (code: 48344).<br>Safe Working Load (N): 50.00 kN | | |
|  | **MANTO Column Angle Waler** | **540005** | **23.80** |
| | **Column Waler Wedge** | **540049** | **0.20** |
| | **Column Waler Bolt** | **569189** | **0.54** |
| | Used in conjunction with the MANTO Panels to form columns from 0.20 m to 0.65 m (in 10 mm increments).<br>The assembly is made of 4no. MANTO Column Angle Walers, which is attached to the MANTO Panels at the height of the tie holes. | | |
|  | **S-Bolt** | **479724** | **1.90** |
| | Used to connect MANTO Column Frames.<br>Always use in conjunction with the MANTO Tie Nut.<br>Safe Working Load (N): 60.00 kN. | | |

## 3.4 Brackets and Platforms

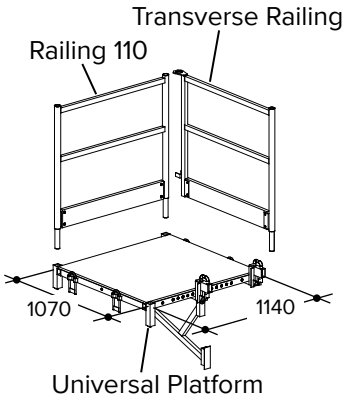
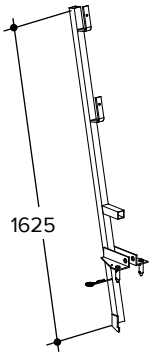
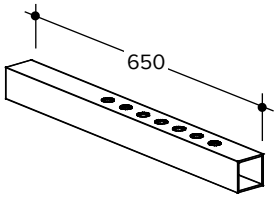
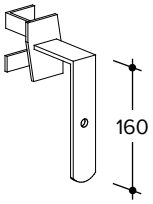
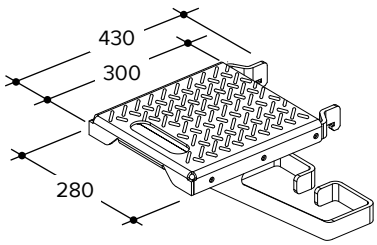
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO P-Walkway Bracket** | **606240** | **11.92** |
| | **PROTECTO Railing Post** | **601225** | **3.65** |
| | Used to install a 900 mm wide platform. Simply attach the Walkway Bracket at the required height to the MANTO Panel by inserting the pins into a rib of the panel and securing with the Spring Pin.<br>The Walkway Bracket can be tied either to an upright or a horizontal formwork panel (with an additional Waler Bolt D 20).<br>Planks provided on site have to be nailed to the integrated timber strip to secure against uplift and tilting.<br>The PROTECTO Railing Post for the edge protection is inserted into the MANTO P-Walkway Bracket.<br>Not available in all markets. | | |

# Components

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Walkway Bracket 90**<br>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.<br>The MANTO Walkway Bracket 90 can either be tied to an upright or a horizontal formwork panel (with an additional Waler Bolt D 20).<br>Planks provided on site have to be nailed to the integrated timber strip to secure against uplift and tilting.<br>Not available in all markets. | **448205** | **12.59** |
|  | **TK Railing Post**<br>Can be used only with MANTO Walkway Bracket 90. Measures to prevent uplift must be implemented on site. The Railing Post can be twisted only when no board railings are in place.<br>Not available in all markets. | **193220** | **4.50** |
|  | **MANTO Pouring Platform**<br>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. | **547165** | **140.79** |
|  | **Platform Railing**<br>Transverse railing for use on both ends of the MANTO Pouring Platform. It is fixed to the platform using the integrated clamping screws. | **587252** | **24.23** |

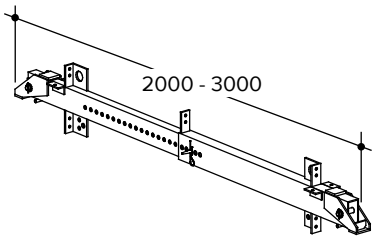
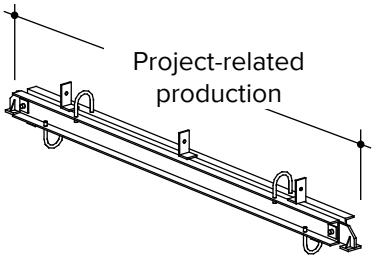
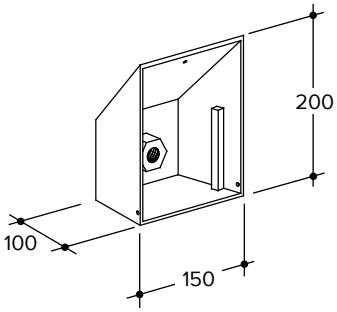
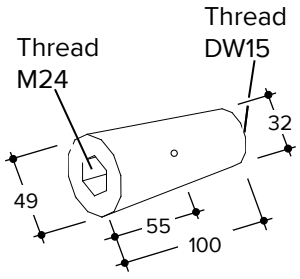


Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Universal Platform**<br>**Railing 110 cpl.**<br>**Transverse Railing cpl.**<br>These three components form the platform system. Load Class 2 (1.50 kN/m²) 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. | **562095**<br>**582867**<br>**582856** | **49.12**<br>**20.02**<br>**18.31** |
|  | **Counter Post**<br>The Counter Post is installed to the upper horizontal rib of the panel and secured with the attached spring pin. Installation is similar to the Walkway Bracket. With an additional Waler Bolt D 20, the Counter Post can also be mounted to horizontal panels. | **600814** | **9.20** |
|  | **KG Railing Extension**<br>Used with Waler Bolt D 20 and Spring Pin 4. | **498218** | **3.60** |
|  | **Toe Board Retainer**<br>Used to secure the toe boards to the Counter Post.<br>Marked with red paint for easy identification. | **603609** | **0.71** |
|  | **PLATINUM® 100 Platform Step**<br>The PLATINUM® 100 Platform Step can be installed at a maximum height above ground of 1.00 m and is used to access areas that are otherwise out of reach in height.<br>Safe Working Load: 150.00 kg. | **606480** | **5.95** |

Unless stated otherwise, all dimensions in mm.

# Components

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Platform Beam 200 - 300**<br>**Telescopic**<br>Main beam of a shaft platform, used to support secondary beams of a timber platform made to suit the enclosed space.<br>Includes gravity latches that automatically click into place during lifting operations.<br>Adjustable in 10 mm increments within a range of 1.00 m. | **600330** | **89.50** |
|  | **Platform Beam 350-400**<br>**Platform Beam 300-350**<br>**Platform Beam 250-300**<br>**Platform Beam 200-250**<br>**Platform Beam 150-200**<br>**Platform Beam 125-150**<br>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.<br>Platform Beams < 1.25 m are available on request.<br>Not for rental. | **410931**<br>**410920**<br>**410910**<br>**410909**<br>**410894**<br>**410883** | **122.20**<br>**108.80**<br>**95.40**<br>**82.00**<br>**68.60**<br>**55.20** |
|  | **Box-out**<br>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. | **410942** | **2.60** |
|  | **A-Tie Cone M24/DW15**<br>Steel cone for suspended scaffolds. The front connection is equipped with an M24 thread and the rear side with a DW15 connection for tie rods.<br>The cone is removed from the concrete using an Allen key w.a.f. 24. (code: 542471). | **496664** | **0.65** |

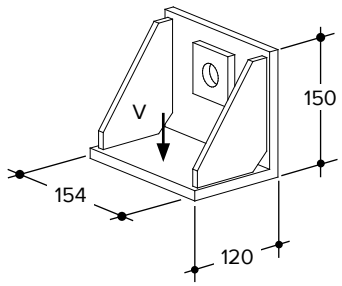
**WARNING**

**Warning!**

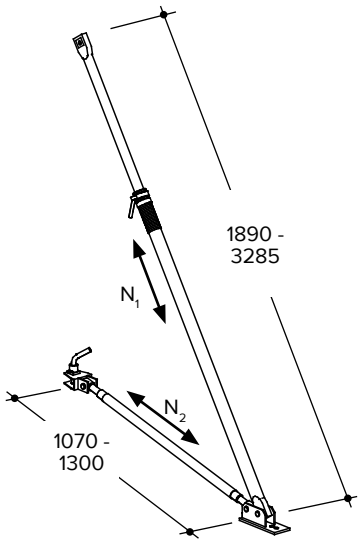
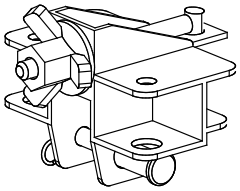
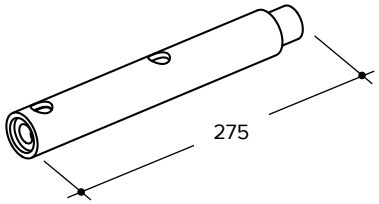
The A-Tie Cone M24/DW15 must be provided with an adequate anchoring design for the site conditions.

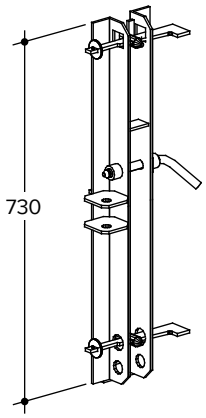
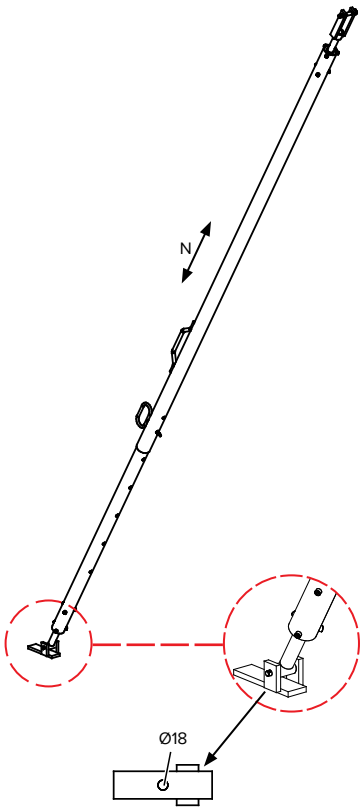


Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **KB Supporting Part**<br>The KB Supporting Part is used as support for the Platform Beams. The KB Supporting Part is secured with the Fit Bolt M24x70Z 8.8 and the A-Tie Cone M24/DW15.<br>Safe Working Load (V): 22.50 kN. | **600338** | **5.81** |

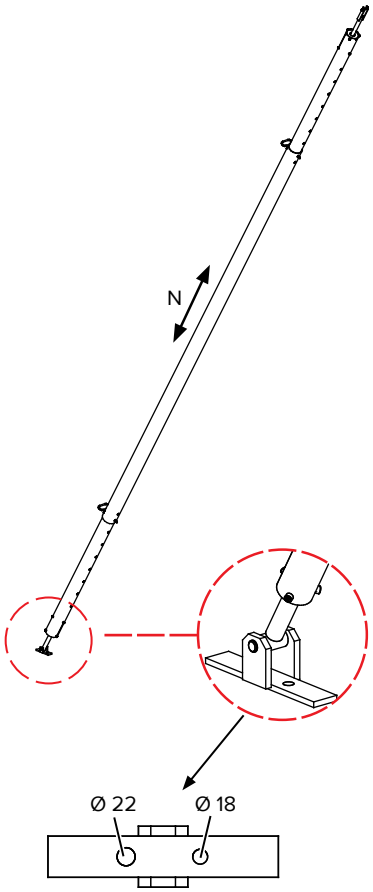
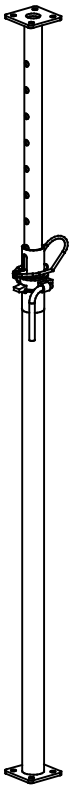
## 3.5 Struts and Props

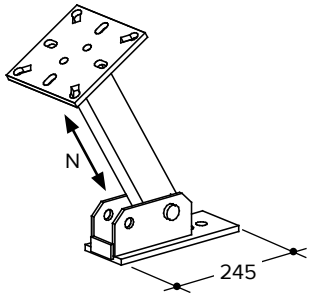
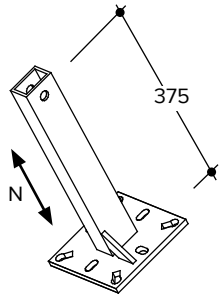
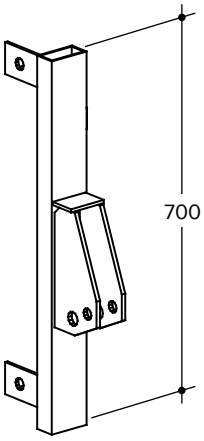
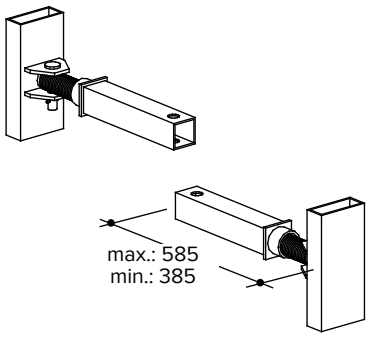
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Alignment Strut**<br>The Alignment Strut is used to brace and align formwork no higher than 3.90 m.<br>Each Alignment Strut must be ordered with one MANTO Strut Connector or a MANTO Strut Head.<br>Safe Working Load (N1)<br>Min. extension: 27.00 kN.<br>Safe Working Load (N1)<br>Max. extension: 8.00 kN.<br>Safe Working Load (N1) for other extensions can be interpolated.<br>Safe Working Load (N2): 7.50 kN | **565103** | **23.30** |
|  | **MANTO Strut Head**<br>Used with the Adapter for Alignment Struts to connect the Alignment Strut to the MANTO Panels. Also used with the MANTO Alignment Strut and the Strut Adapter for EUROPLUS Props.<br>For formwork heights up to 3.90 m.<br>For Safe Working Load, refer to page 110. | **600035** | **4.33** |
|  | Adapter for Alignment Struts<br>Used in conjunction with the MANTO Strut Head or the MANTO Strut Connector. | **601733** | **1.31** |

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Strut Connector**<br>Used with the MANTO Alignment Strut and with other alignment struts with the Strut Adapter for EUROPLUS Props.<br>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.<br>If fixed horizontally, an additional Bolt D16x87 and Spring Pin 4 are required.<br>For Safe Working Load, refer to page 110. | **565114** | **8.90** |
|  | **Alignment Strut K440**<br>Minimum extension: 3.25 m:<br>Safe Working Load (N): 20.00 kN.<br>Including Adapter for Alignment Struts (3.35 m):<br>Safe Working Load (N): 19.20 kN.<br><br>Maximum extension: 4.40 m:<br>Safe Working Load (N): 11.00 kN.<br>Including Adapter for Alignment Struts (4.50 m):<br>Safe Working Load (N): 9.90 kN. | **601208** | **23.42** |
| | **Alignment Strut K600**<br>Minimum extension: 4.80 m:<br>Safe Working Load (N): 20.00 kN.<br>Including Adapter for Alignment Struts (4.90 m):<br>Safe Working Load (N): 17.30 kN.<br><br>Maximum extension: 6.00 m:<br>Safe Working Load (N): 14.00 kN.<br>Including Adapter for Alignment Struts (6.10 m):<br>Safe Working Load (N): 11.60 kN. | **601210** | **35.79** |
| | **Alignment Strut K760**<br>Minimum extension: 5.30 m:<br>Safe Working Load (N): 20.00 kN.<br>Including Adapter for Alignment Struts (5.40 m):<br>Safe Working Load (N): 20.00 kN.<br><br>Maximum extension: 7.60 m:<br>Safe Working Load (N): 15.00 kN<br>Including Adapter for Alignment Struts (7.70 m):<br>Safe Working Load (N): 12.40 kN. | **601212** | **51.29** |



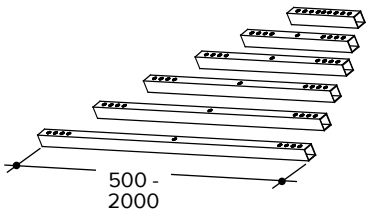
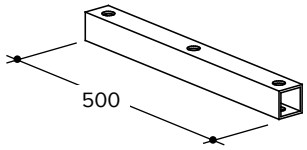
Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Alignment Strut Super 10**<br>Minimum extension: 7.05 m:<br>Safe Working Load (N): 27.00 kN.<br>Including Adapter for Alignment Struts (7.15 m):<br>Safe Working Load (N): 27.00 kN.<br><br>Maximum extension: 10.25 m:<br>Safe Working Load (N): 22.30 kN.<br>Including Adapter for Alignment Struts (10.35 m):<br>Safe Working Load (N): 18.30 kN. | **602095** | **84.03** |
|  | **EUROPLUSnew 30-150** | **601460** | **10.68** |
| | **EUROPLUSnew 20-250** | **601390** | **13.15** |
| | **EUROPLUSnew 30-250** | **601430** | **16.19** |
| | **EUROPLUSnew 20-300** | **601400** | **16.82** |
| | **EUROPLUSnew 30-300** | **601440** | **19.17** |
| | **EUROPLUSnew 20-350** | **601410** | **20.52** |
| | **EUROPLUSnew 30-350** | **601445** | **24.24** |
| | **EUROPLUSnew 20-400** | **601415** | **23.79** |
| | **EUROPLUSnew 30-400** | **601450** | **28.75** |
| | **EUROPLUSnew 20-550** | **601425** | **36.07** |

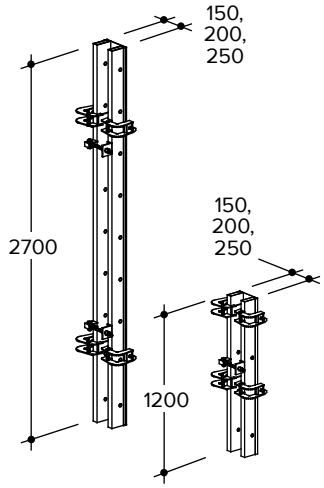
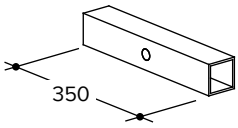
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Strut Base**<br>Used to convert EUROPLUS® Props into alignment struts. The base plate of the EUROPLUS® connects to the Strut Base with 4no. M12x30 Bolts and Nuts.<br>Safe Working Load (N): 34.00 kN. | **566369** | **7.70** |
|  | **Strut Adapter**<br>Used to convert EUROPLUS® Props into alignment struts. The upper plate of the EUROPLUS® 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.<br>Safe Working Load (N): 34.00 kN. | **565331** | **4.88** |
|  | **BKS Strut Connector**<br>Must be used with BKS Props longer than 8.00 m. For each connection 2no. M20x40 Bolts and Nuts as well as an M20x80 Bolt and Nut are required.<br>Safe Working Load (N): 34.00 kN. | **482008** | **9.10** |
|  | **Right Spindle Piece**<br>**Left Spindle Piece**<br>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**<br>**524710** | **4.70**<br>**4.70** |



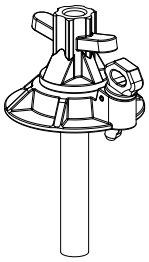
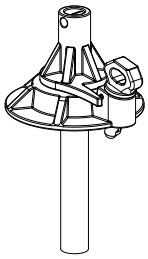
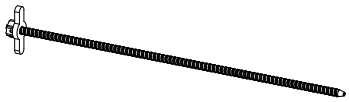
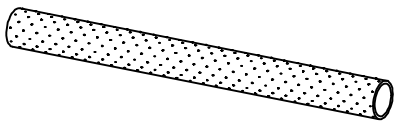
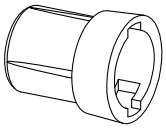
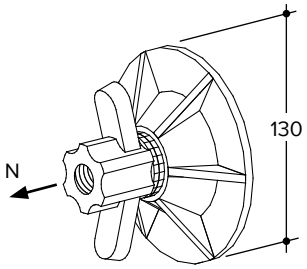
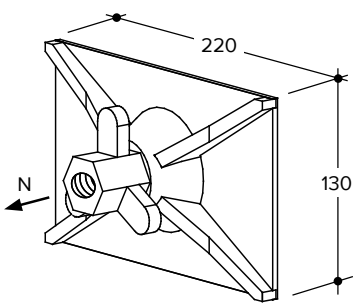
Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Centre Tube 50** | **524721** | **3.40** |
| | **Centre Tube 80** | **524732** | **5.40** |
| | **Centre Tube 110** | **524743** | **7.40** |
| | **Centre Tube 140** | **524754** | **9.40** |
| | **Centre Tube 170** | **524765** | **11.40** |
| | **Centre Tube 200** | **524776** | **13.40** |
| | 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. | | |
|  | **Connection Tube** | **533230** | **2.80** |
| | 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. | | |

## 3.6 Polygon-type circular formwork components

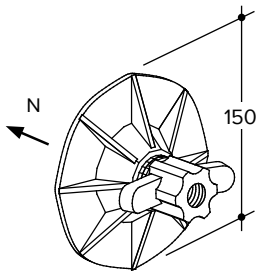
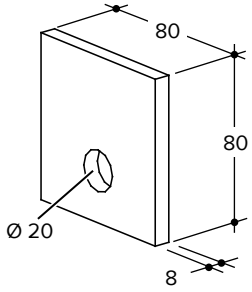
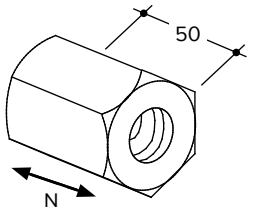
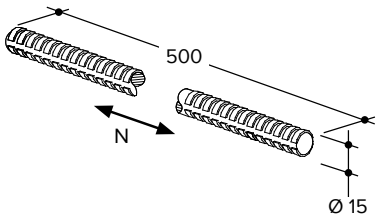
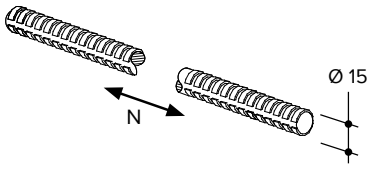
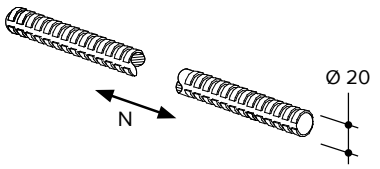
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Form Strip 15/270** | **478281** | **54.20** |
| | **Form Strip 20/270** | **478292** | **57.30** |
| | **Form Strip 25/270** | **478307** | **61.00** |
| | **Form Strip 15/120** | **478318** | **29.50** |
| | **Form Strip 20/120** | **478329** | **30.80** |
| | **Form Strip 25/120** | **478330** | **32.50** |
| | With the aid of the Form Strips located between the MANTO Panels, walls with a radius of more than 2.50 m can be formed polygonally. The Form Strips can be adjusted to the required radius by using the built-in adjusting bolts and are easily connected to the MANTO Panels using the built-in connectors. | | |
|  | **Tie Cross-bar** | **478579** | **2.60** |
| | Tying of the polygonal formwork has to be done through the Form Strips. The Tie Cross-bar transfers the loads from the panels to the ties. | | |

## 3.7 Tying components

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO G3 Front Tie Nut**<br>Part of the one-sided tie system. | **607230** | **2.51** |
|  | **MANTO G3 Rear Tie Nut**<br>Part of the one-sided tie system. | **607240** | **2.39** |
|  | **MR Tie Rod DW15**<br>Part of the one-sided tie system. | **607250** | **1.59** |
|  | **Tie Rod Sleeve 22/26, 25 pieces**<br>Inner diameter: 22 mm<br>Outer diameter: 26 mm<br>Length: 2.0 m | **48220** | **15.35** |
|  | **MR Sealing Cone**<br>**MR Sealing Cone (1000 pieces)** | **607122**<br>**607123** | **0.01**<br>**6.00** |
|  | **MANTO Tie Nut (DW15)**<br>Using a MANTO Ratchet or a hammer, the Tie Nut can be easily loosened due to the integrated rotating disk, even under full load.<br>Safe Working Load (N): 90.00 kN. | **464600** | **1.26** |
|  | **Tie Nut 230 (DW15)**<br>Tie nut with a large plate and a ball-type nut that allows for an inclination of up to 10°.<br>Safe Working Load (N): 90.00 kN | **48344** | **2.40** |



Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Tie Nut 150 (DW20)**<br>Easy to fasten tie nut to be used with Tie Rods DW20.<br>Safe Working Load (N): 150.00 kN. | **531481** | **1.51** |
|  | **Plate 8/8**<br>Used to allow the lower tie to be installed along with a Hexagonal Nut 15/50 in panels lying on the ground.<br>Not for rental. | **400214** | **0.40** |
|  | **Hexagonal Nut 15/50**<br>Used as a tie nut for the rigid plates without thread. The nut has to be operated with a wrench (w.a.f. 30).<br>Safe Working Load: 90.00 kN. | **164535** | **0.22** |
|  | **Tie Rod 0.50 m (DW15)**<br>Connects the MANTO Column Angle Walers in assembled condition. Always use with 2no. MANTO Tie Nuts.<br>Safe Working Load (N): 90.00 kN.<br>Not for rental. | **102527** | **0.72** |
|  | **Tie Rod 0.75 m (DW 15)**<br>**Tie Rod 1.00 m (DW15)**<br>**Tie Rod 1.30 m (DW15)**<br>**Tie Rod 1.75 m (DW15)**<br>**Tie Rod 6.00 m (DW15)**<br>Safe Working Load (N): 90.00 kN.<br>Not for rental. | **437660**<br>**24387**<br>**20481**<br>**20470**<br>**421829** | **1.08**<br>**1.44**<br>**1.87**<br>**2.52**<br>**9.00** |
|  | **Tie Rod 20/100 (DW20)**<br>**Tie Rod 20/130 (DW20)**<br>Safe Working Load (N): 150.00 kN.<br>Not for rental. | **531600**<br>**531610** | **2.56**<br>**3.33** |

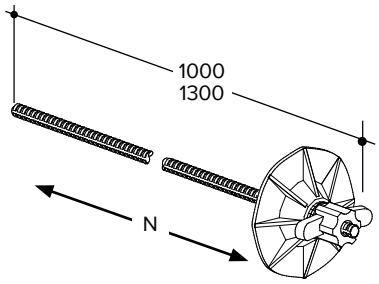
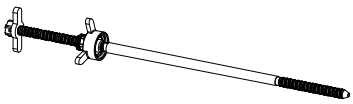
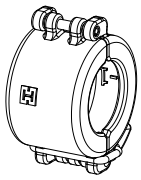
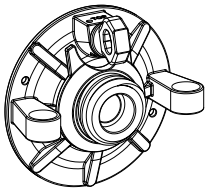
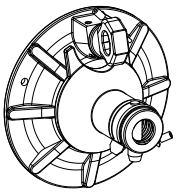
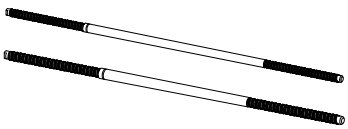
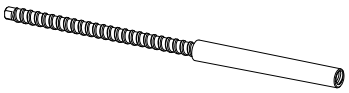
**WARNING**

**Warning!**

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

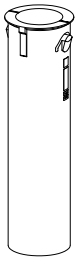
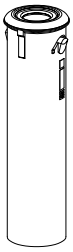
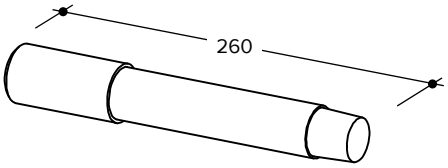
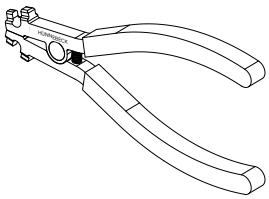
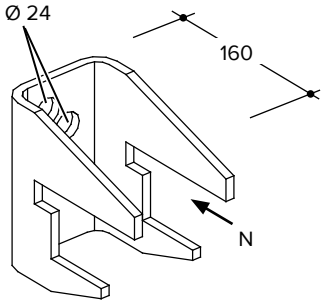
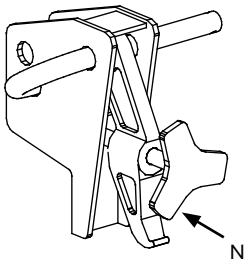
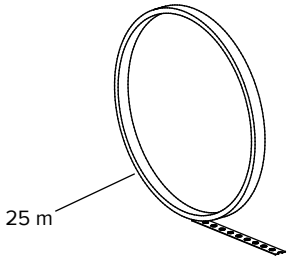
Unless stated otherwise, all dimensions in mm.

# Components

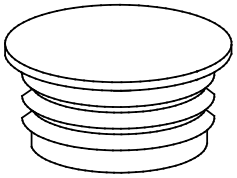
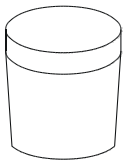
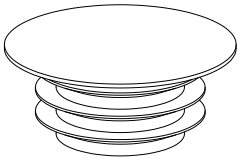
| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Tie Equipment 100/20 (DW20)**<br>**Tie Equipment 130/20 (DW20)**<br>Tie rod with a captive Tie Nut 150.<br>Safe Working Load (N): 150.00 kN.<br>Not for rental. | **534213**<br>**534224** | **4.10**<br>**4.80** |
|  | **PLATINUM® 100 Tie Rod** | **604300** | **4.07** |
|  | **PLATINUM® 100 Adjustment Clip** | **604021** | **0.26** |
|  | **PLATINUM® 100 Tie Nut Advancing Side** | **604196** | **2.79** |
|  | **PLATINUM® 100 Tie Nut Closing Side** | **604197** | **2.65** |
|  | **MANTO Taper Tie DW15 100** | **608330** | **2.10** |
|  | **MANTO Taper Tie DW20 100**<br>**MANTO Taper Tie DW20 115** | **608331**<br>**608332** | **3.60**<br>**4.60** |
|  | **MANTO She Bolt**<br>**DW15 45** | **608333** | **1.00** |
|  | **MANTO She Bolt**<br>**DW20 50** | **608334** | **1.30** |



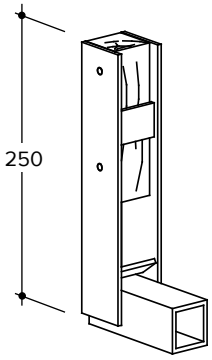
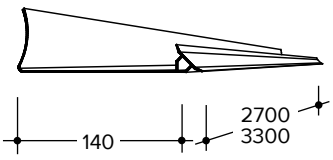
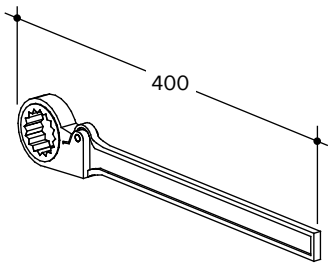
Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO G3 DW Insert** | **607915** | **0.05** |
| | **MANTO G3 DW Insert (20 pieces)** | **608320** | **0.94** |
| | Not for rental. | | |
|  | **MANTO G3 Sealing Cone** | **607925** | **0.05** |
| | **MANTO G3 Sealing Cone (20 pieces)** | **608325** | **1.00** |
| | Not for rental. | | |
|  | **MANTO G3 G3M Punch** | **608270** | **2.00** |
|  | **PLATINUM 100 Cone Gripper** | **604659** | **0.21** |
| | Used to extract MANTO G3 plastic inserts. | | |
|  | **Edge Tie Fastener MR** | **566667** | **2.40** |
| | Attached to the edge profile of the MANTO Panel to allow a tie to be placed above the panel and clear of the concrete. | | |
| | Safe Working Load (N): 10.00 kN. | | |
|  | **FU Tightener** | **568357** | **3.60** |
| | Used in conjunction with the Punched Steel Tape to tie across foundation formwork. | | |
| | Safe Working Load (N): 12.00 kN. | | |
|  | **Punched Steel Tape 25.00 m** | **568081** | **17.20** |
| | The FU Tightener and the Punched Steel Tape are used together in foundation formwork. | | |
| | Safe Working Load: 15.00 kN. | | |
| | Not for rental. | | |

Unless stated otherwise, all dimensions in mm.

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **A Plugs**<br>Used to close Ø 24 mm and Ø 27 mm (with collar) tie holes.<br>Supplied in bags of 100 units. | **602578** | **0.20** |
|  | **Plugs**<br>Used to close Ø 24 mm tie holes in the MANTO MP Panel.<br>Supplied in bags of 100 units. | **453253** | **0.20** |
|  | **TK Plugs**<br>Used to close MANTO G3 DW Sealing Insert.<br>Supplied in bags of 100 units. | **197457** | **0.16** |

## 3.8 Accessories

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Add-on Piece**<br>With integrated nailing strip: for on-site extensions of up to 300 mm with 21 mm plywood.<br>Each Add-on Piece is connected with a Panel Clamp. | **450157** | **1.55** |
|  | **Triangular Column Fillet 270**<br>**Triangular Column Fillet 330**<br>Used to create chamfers of 20 mm in rectangular outer corners and columns. It is pushed onto the edge of the panel. | **544952** | **1.40** |
|  | **MANTO Ratchet**<br>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** |

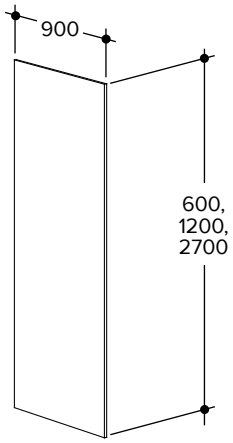
**WARNING**

**Warning!**

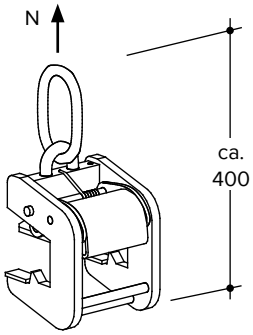
To prevent danger. do not extend the lever arm of the MANTO Ratchet!



Unless stated otherwise, all dimensions in mm.

| Component | Part code | Weight [kg] |
|---|---|---|
|  | | |
| **Plywood Sheet 90/270 Undrilled** | **479996** | **40.00** |
| **Plywood Sheet 90/120 Undrilled** | **480009** | **17.80** |
| **Plywood Sheet 90/60 Undrilled** | **490884** | **8.90** |
| 21 mm thick plywood sheets without tying holes for exposed concrete walls. Tying holes must be drilled on site as needed. | | |
| Not for rental. | | |

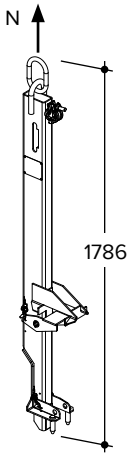
## 3.9 Load suspension equipment

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

**WARNING**

**Warning!**

Follow the instructions in the separate user guide for the MANTO Crane Adapter.

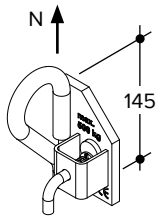
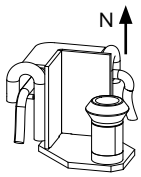
| | | |
|---|---|---|
|  | | |
| **PLATINUM 100 Lifting Device** | **606920** | **27.96** |
| Used to raise and move panel assemblies consisting of PLATINUM 100 and MANTO panels. | | |
| Safe Working Load (N): 15.00 kN. | | |

**WARNING**

**Warning!**

Follow the instructions in the separate user guide for the PLATINUM 100 Lifting Device.

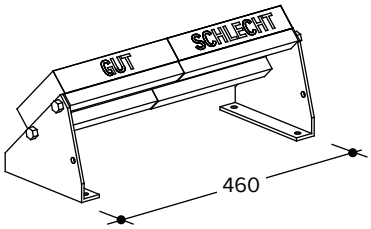
# Components

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **MANTO Loading Adapter**<br>For loading and unloading bundled panels.<br>Not for use with G3 or G3 M panels<br>Safe Working Load (N): 5.00 kN<br>Safe Working Load: 20.00 kN for a set of 4. | **461033** | **1.21** |
|  | **MANTO Lifting Device**<br>Used for loading and unloading G3 or G3 M panels.<br>Length of loop: 2.00 m.<br>Safe Working Load (N): 5.00 kN<br>Safe Working Load: 20.00 kN for a set of 4. | **608300** | **3.59** |

**WARNING**

**Warning!**

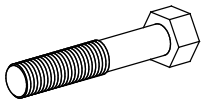
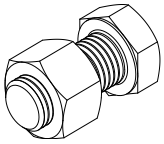
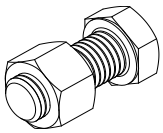
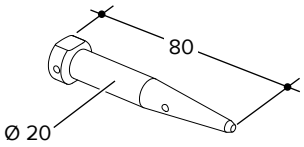
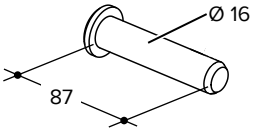
Follow the instructions in the separate user guide for the MANTO Loading Adapter or MANTO Lifting Device.

| | | | |
|---|---|---|---|
|  | **Hook Template**<br>Used to check the operating conditions of the MANTO Crane Adapter. | **548700** | **23.64** |



Unless stated otherwise, all dimensions in mm.

## 3.10 Fasteners

| | Component | Part code | Weight [kg] |
|---|---|---|---|
|  | **Screw M24x70Z 8.8**<br>Zinc bolt required for attaching the KB Supporting Part to the A-Tie Cone M24/DW15.<br>Not for rental. | **185635** | **0.47** |
|  | **Screw M16x35 (with Nut) 8.8**<br>Used with the extension of the MANTO Shaft Corner.<br>Not for rental. | **603623** | **0.13** |
|  | **Screw M12x30 (with Nut) 4.6**<br>Used to connect the EUROPLUSnew Prop to the Strut Base or Strut Adapter. Use 8no. per prop.<br>Not for rental | **5210** | **0.06** |
|  | **Waler Bolt D 20**<br>For connecting the MANTO Walkway Bracket to panels lying on the ground. | **420000** | **0.32** |
|  | **Bolt D16x87**<br>For connecting Alignment Struts to the MANTO Strut Connector when used horizontally. | **601908** | **0.19** |
|  | **Spring Pin 4**<br>Secures the Waler Bolt D 20 and the Bolt D16x87.<br>Not for rental. | **173776** | **0.02** |

# 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. All panels can be combined vertically and horizontally in any arrangement.

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.

For illustration purposes, most of the images in this document show only MANTO Panels G2. But unless specified otherwise, panels of the newer generations can be used for the applications shown here as well.

The general rules of using and/or mixing panels of different generations and the physical differences between them are shown on the following pages.

## 4.1 General rules for using MANTO panels of different generations

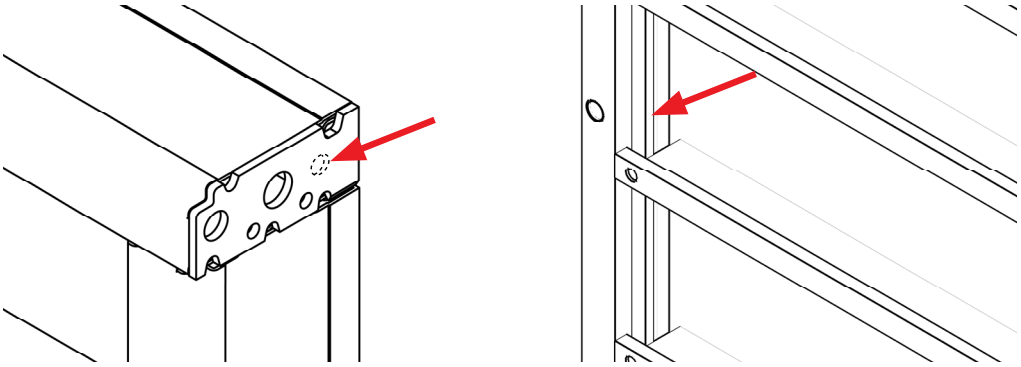
It is essential to follow these rules when using MANTO panels of different generations in the same formwork:

- All panels must be able to withstand the same fresh concrete pressure. Refer to MANTO Panel G1 on page 41.
- Panels of different generations can be connected horizontally (side-by-side).
- The rules of connecting panels horizontally apply to all generations of panels.
- Opposing panels (which face each other) must be of the same generation.
- Single-sided operated ties can only be used in MANTO panels G3 or G3 M.

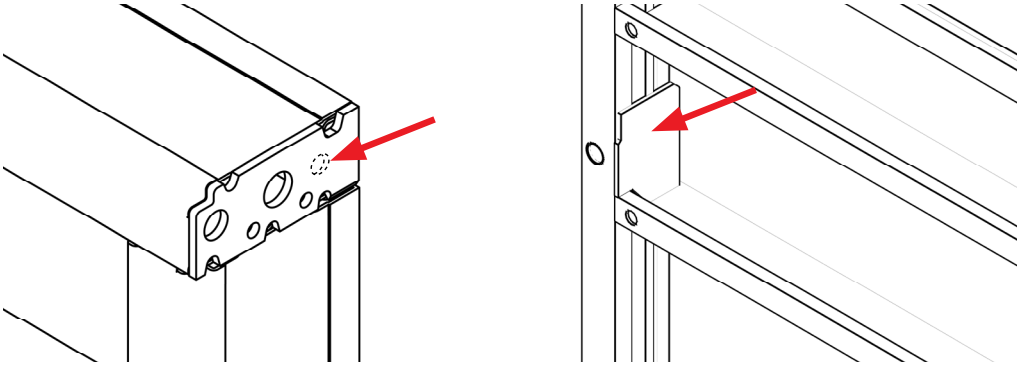
All other rules contained in this document apply to MANTO panels G1, G2, G3 and G3 M.

## 4.2 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:



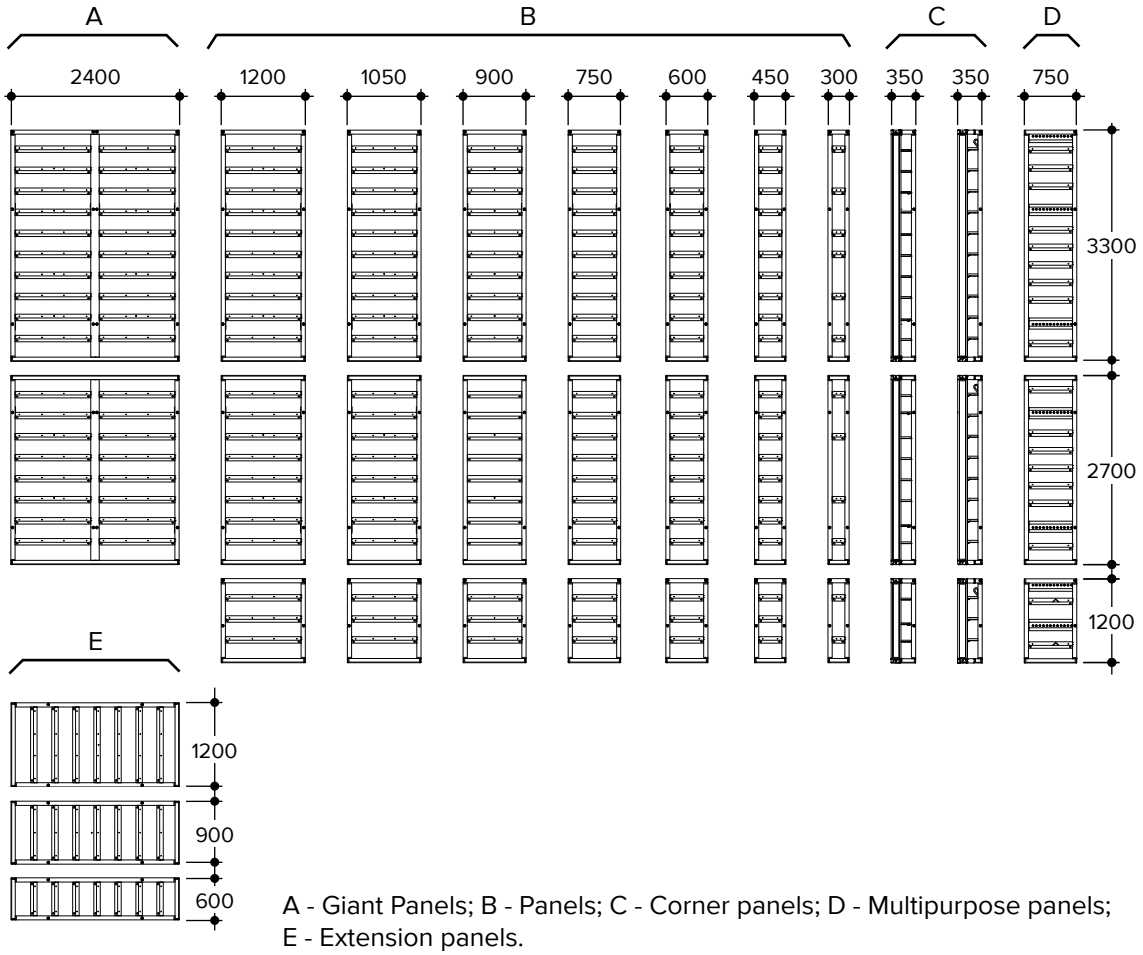
| NOTE | **Note!**<br>Safe Working Loads for MANTO Panels G1: 60.00 kN/m$^2$ with DW15 only.<br>MANTO Panels G1 are not suitable to use with DW20. |
|---|---|

| NOTE | **Note!**<br>MANTO Panels G1 share the same code numbers as MANTO Panels G2. |
|---|---|

## 4.3 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 positions
  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 14mm holes in the corner plates.




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

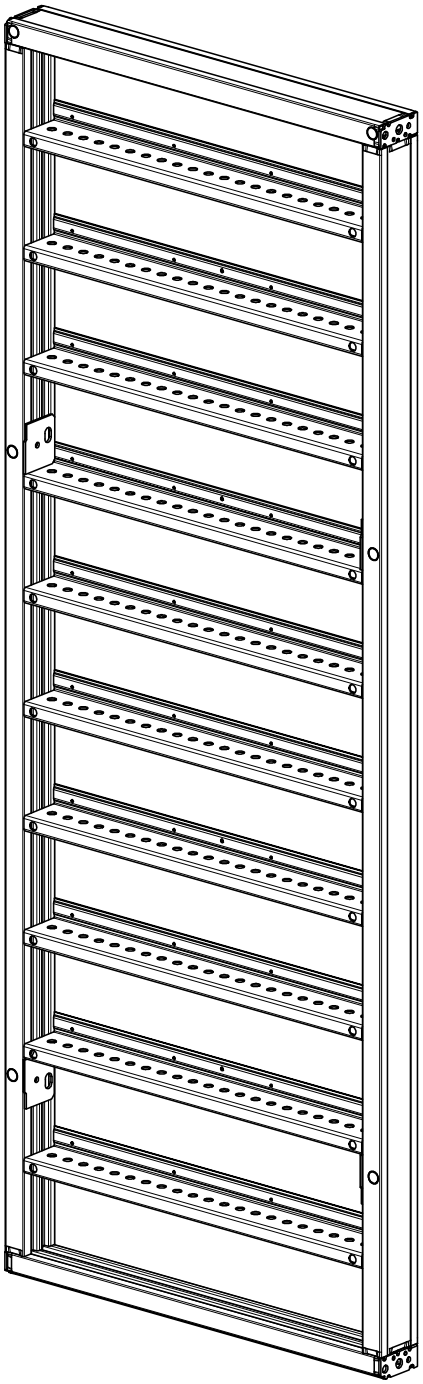
**NOTE**

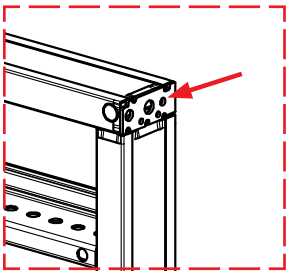
**Note!**

Safe Working Loads for MANTO Panels G2: Refer to table on page 151.

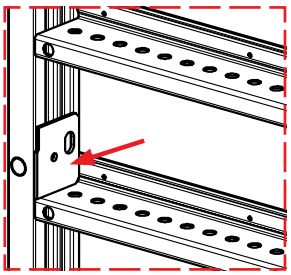


Unless stated otherwise, all dimensions in mm.

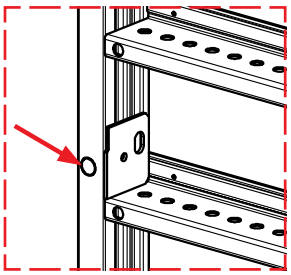




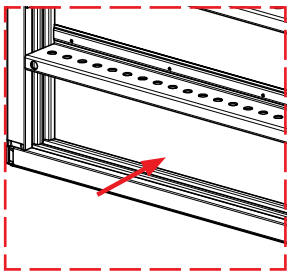
Ø14 mm holes in the corner plates.



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).

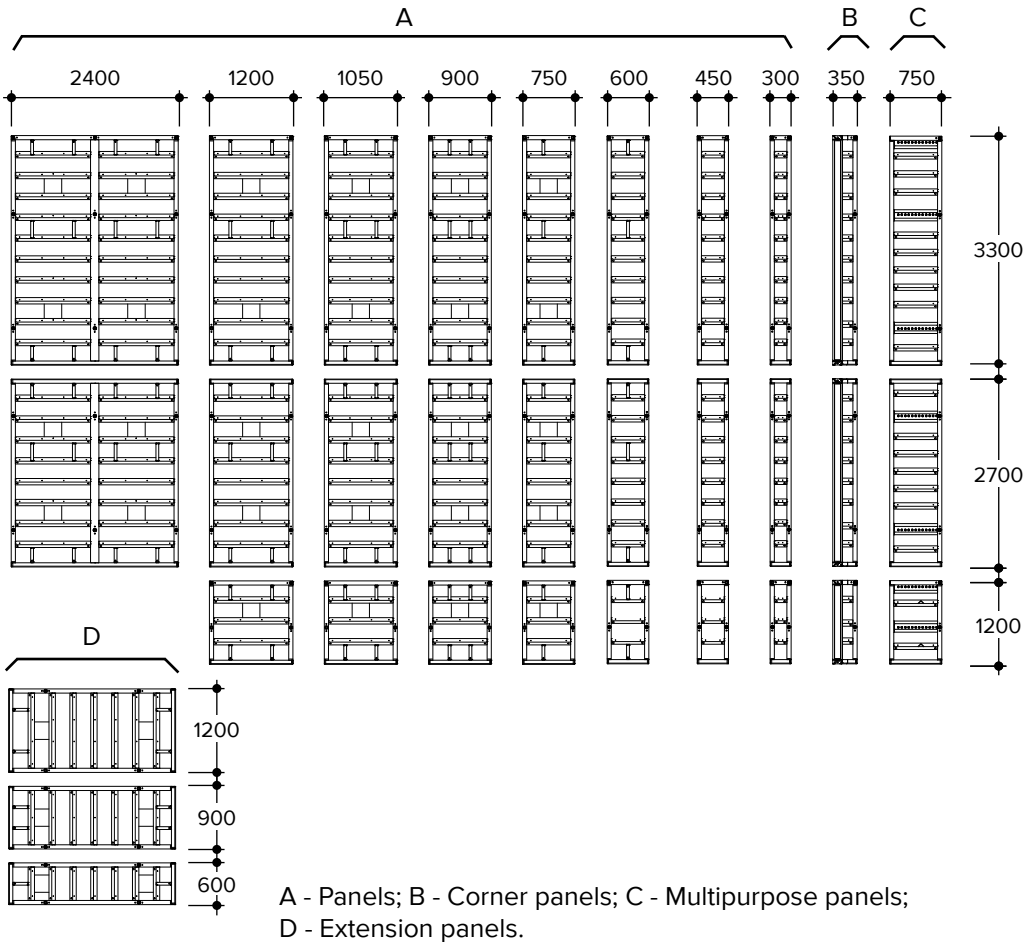


No stiffener elements between ribs and/ or between ribs and smaller edge profiles.

## 4.4 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 positions
- Tie position on the long edge profile with smaller holes above and below the tie hole, for the single-side operated anchors
- Stiffeners between ribs and/or between ribs and smaller edge profiles (in most panels).




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

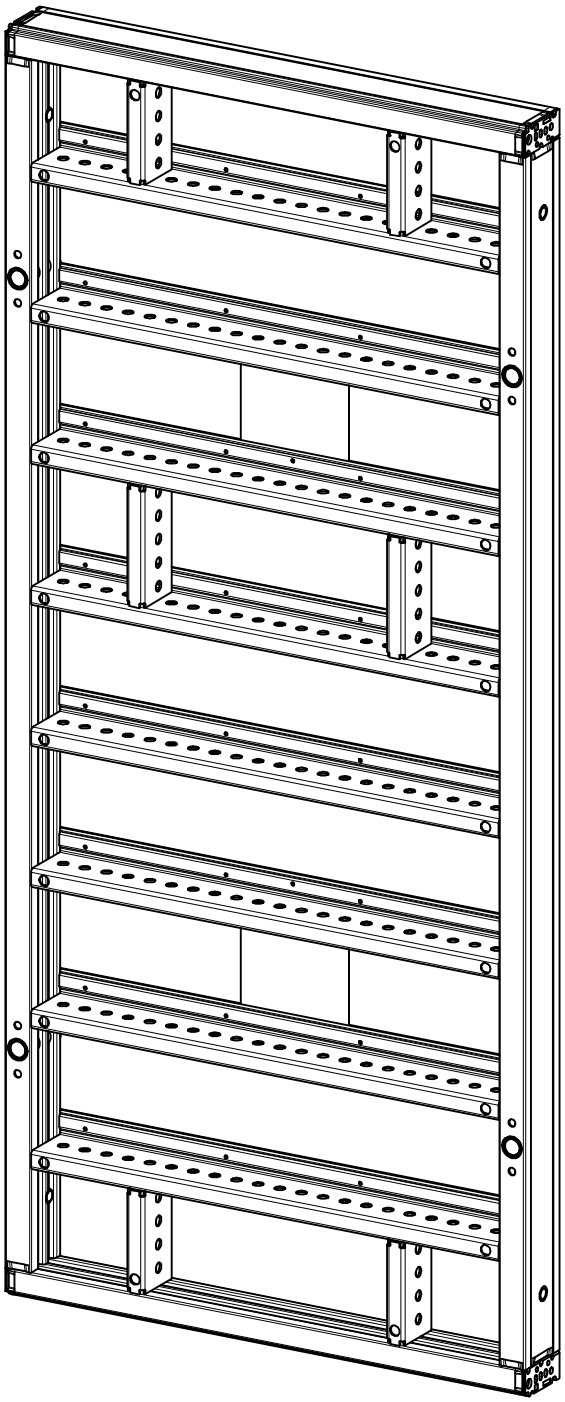
**NOTE**

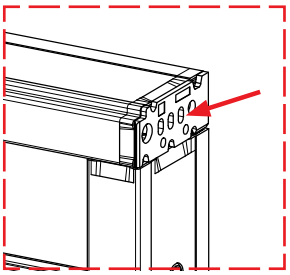
**Note!**

Safe Working Loads for MANTO Panels G3: see table on page 151.

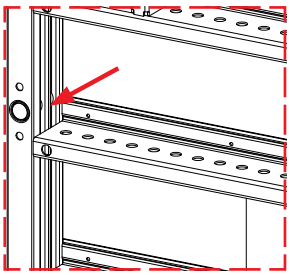


Unless stated otherwise, all dimensions in mm.

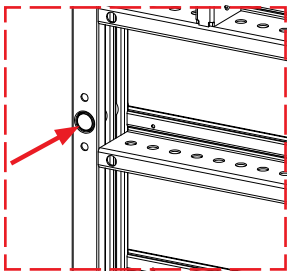




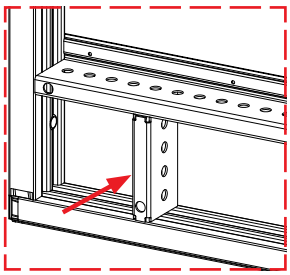
3no. slots in the corner plates



No reinforcement plates on the inside 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).

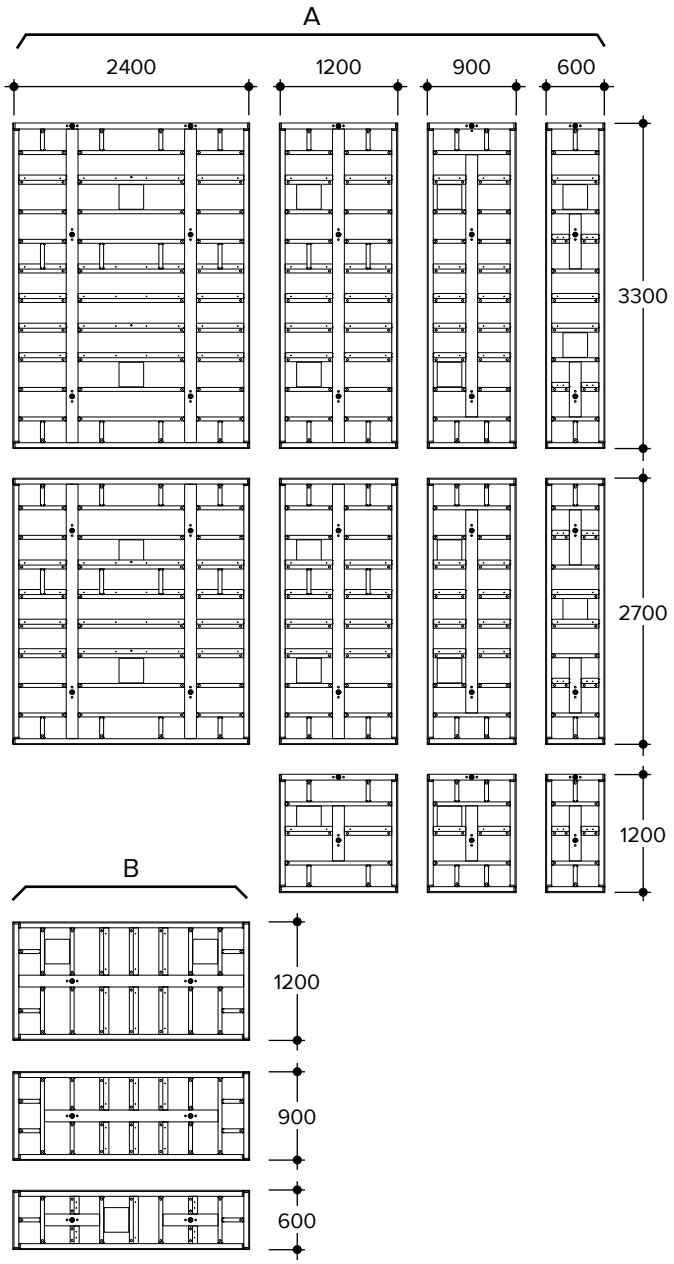
## 4.5 MANTO Panels G3 M

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

Central profile(s) on all panels with tie positions (with smaller holes above and below the tie hole, for the single-side operated anchor);

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.




A - Panels; B - Extension panels.

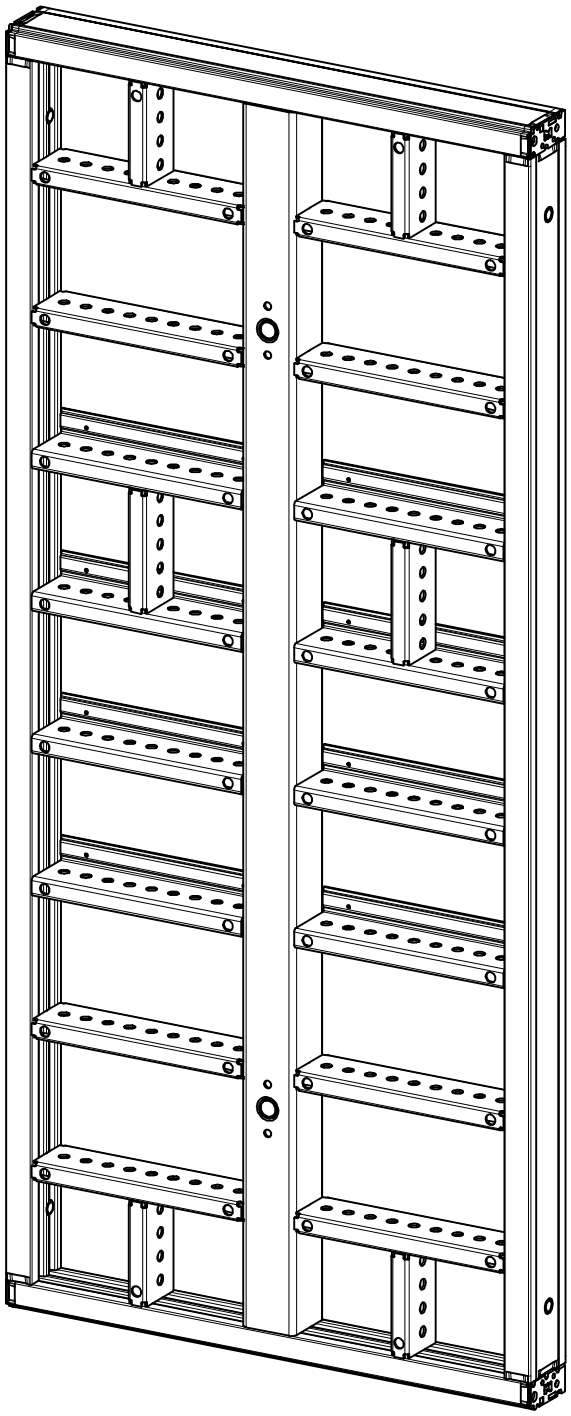
**NOTE**

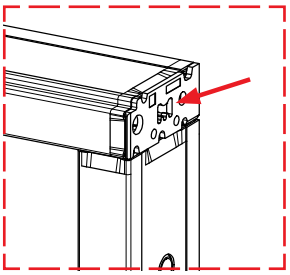
**Note!**

Safe Working Loads for MANTO Panels G3 M: Refer to table on page 151.

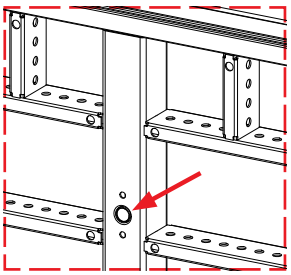


Unless stated otherwise, all dimensions in mm.

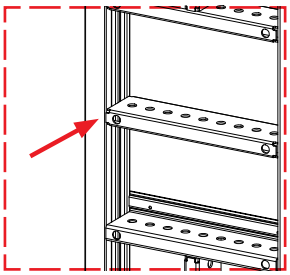




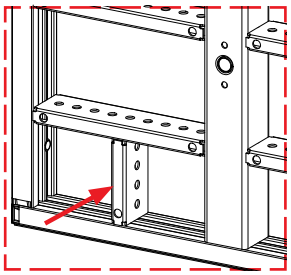
Stylised M in corner plates



Central 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.

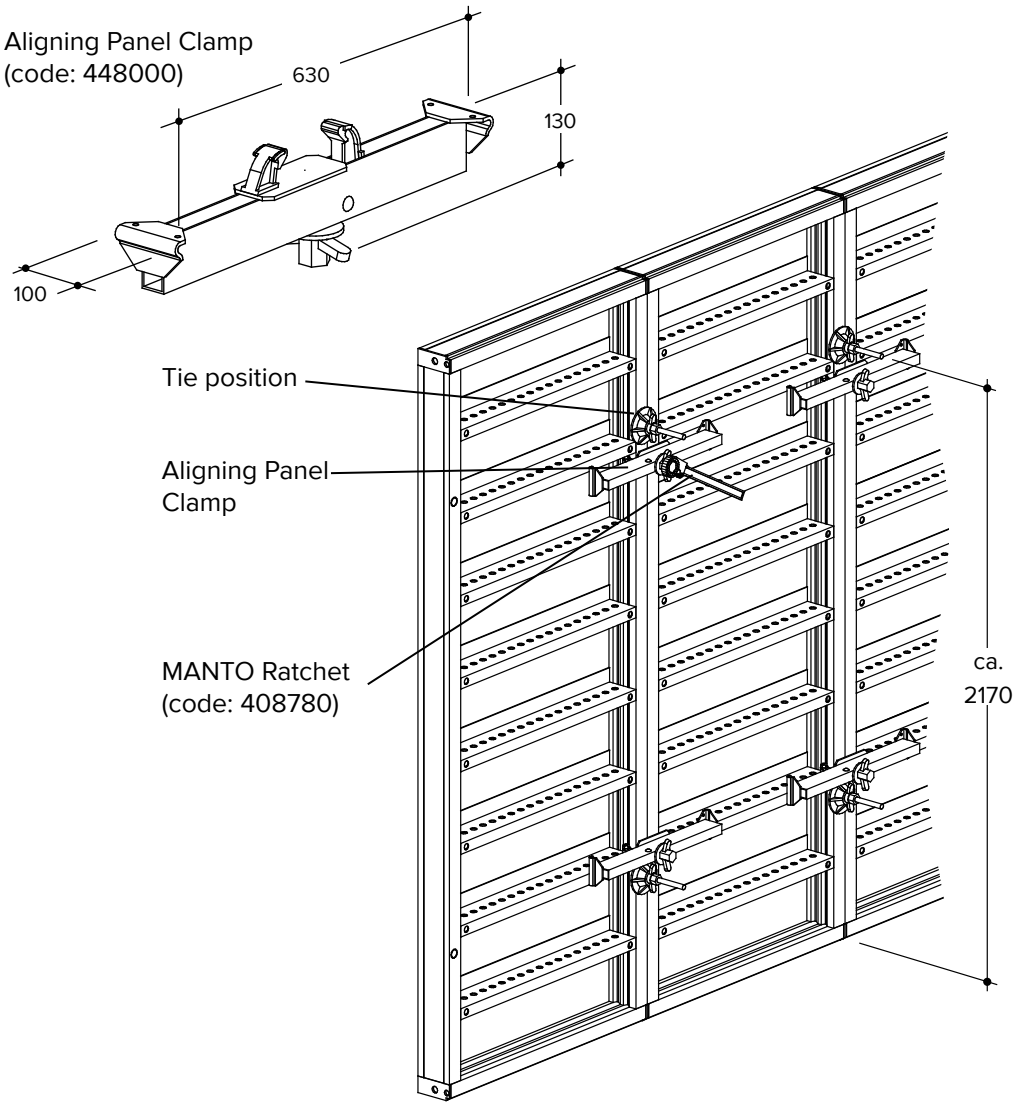


Stiffener elements between ribs and/ or between ribs and smaller edge profiles.

# 5 Connecting panels (horizontally)

## 5.1 Using the Aligning Panel Clamp

MANTO panels are typically connected using the Aligning Panel Clamp. It is used for all vertical and horizontal panel joints. The Aligning Panel Clamp, with its aligning profile of 630 mm long, provides an absolutely tight, flush-mounted and perfectly aligned panel joint when it is used correctly.




The Aligning Panel Clamps is easy to use for vertical joints when working at ground level (for single-storey formwork).

If possible, mount the Aligning Panel Clamps near the ties at the edge profiles of the panel frame. The supporting surfaces of the Aligning Panel Clamps must be seated well on the ribs of the panel. The Aligning Panel Clamps are then tightened using the MANTO Ratchet.

The MANTO Ratchet can be operated quickly, quietly and easily without damaging the material.



Unless stated otherwise, all dimensions in mm.

### Typical arrangements

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

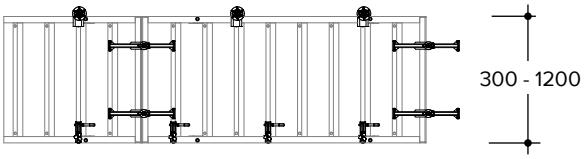
For clarity, a legend of the components used is shown below.

### Legend

Aligning Panel Clamp (code: 448000)

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

### Formwork height: 0.30 m up to 1.20 m

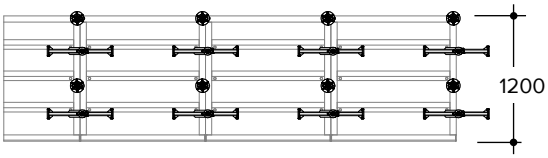



**NOTE**

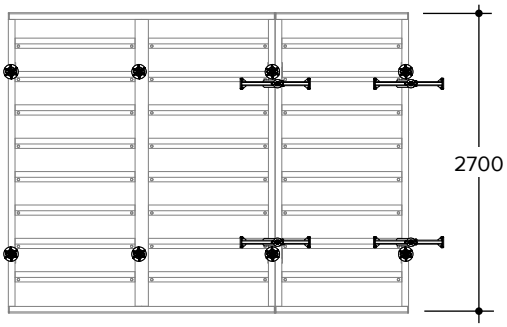
**Note!**

The above arrangement shows tying using the FU Tightener (code: 568357). For more information, refer to page 86.

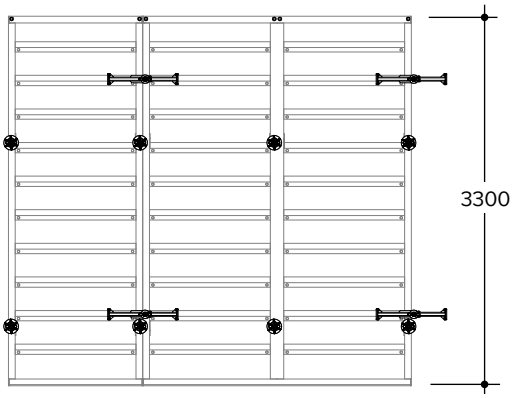
### Formwork height: 1.20 m




### Formwork height: 2.70 m




### Formwork height: 3.30 m

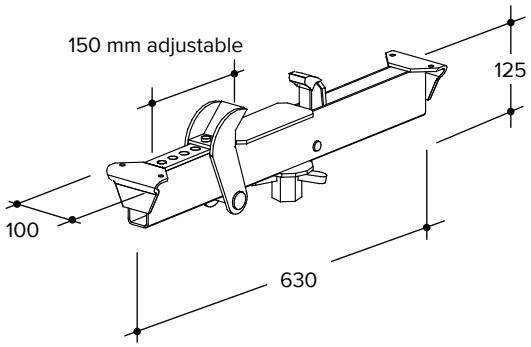


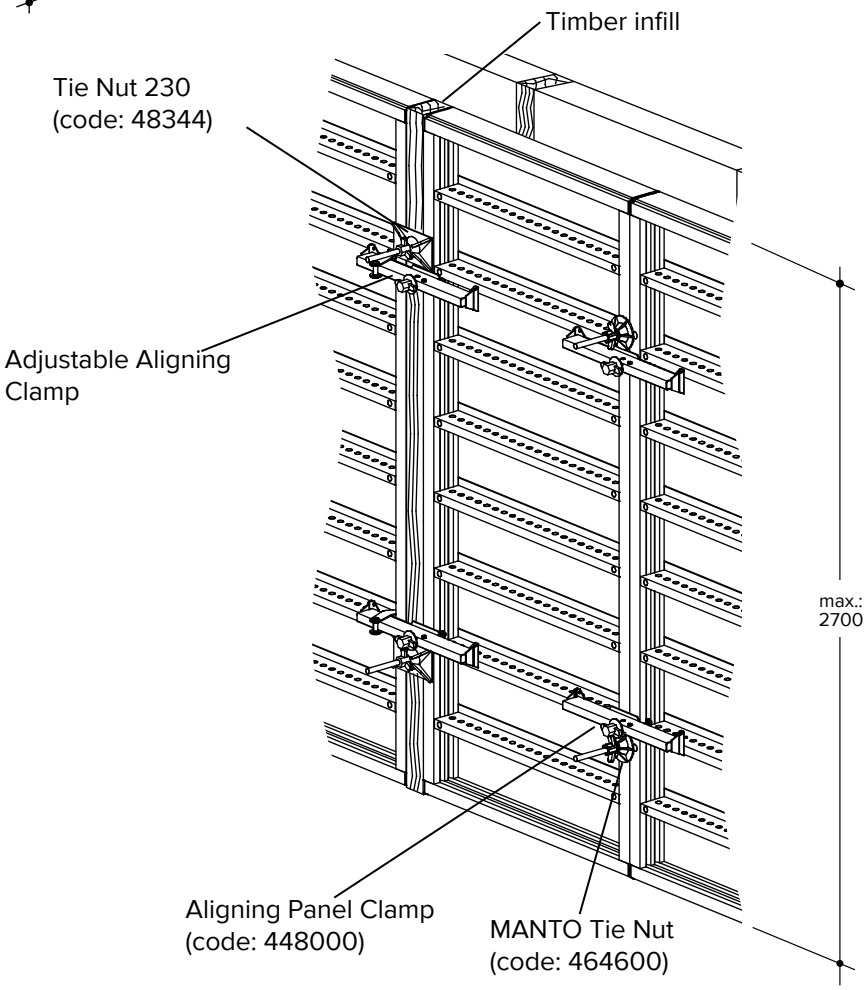

Unless stated otherwise, all dimensions in mm.

## 5.2 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)




| NOTE | **Note!**<br>The above connection applies only for hydrostatic load cases, without extension of the attached panels, for vertical joints between 2.70 m panels or smaller and infills up to 100 mm wide. For rules regarding infill solutions, refer to page 53. |
|---|---|



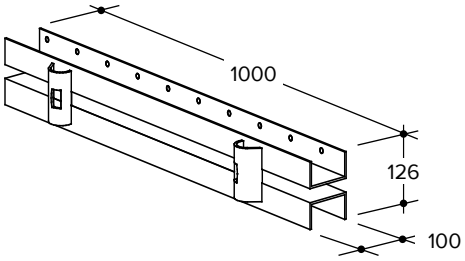
Unless stated otherwise, all dimensions in mm.

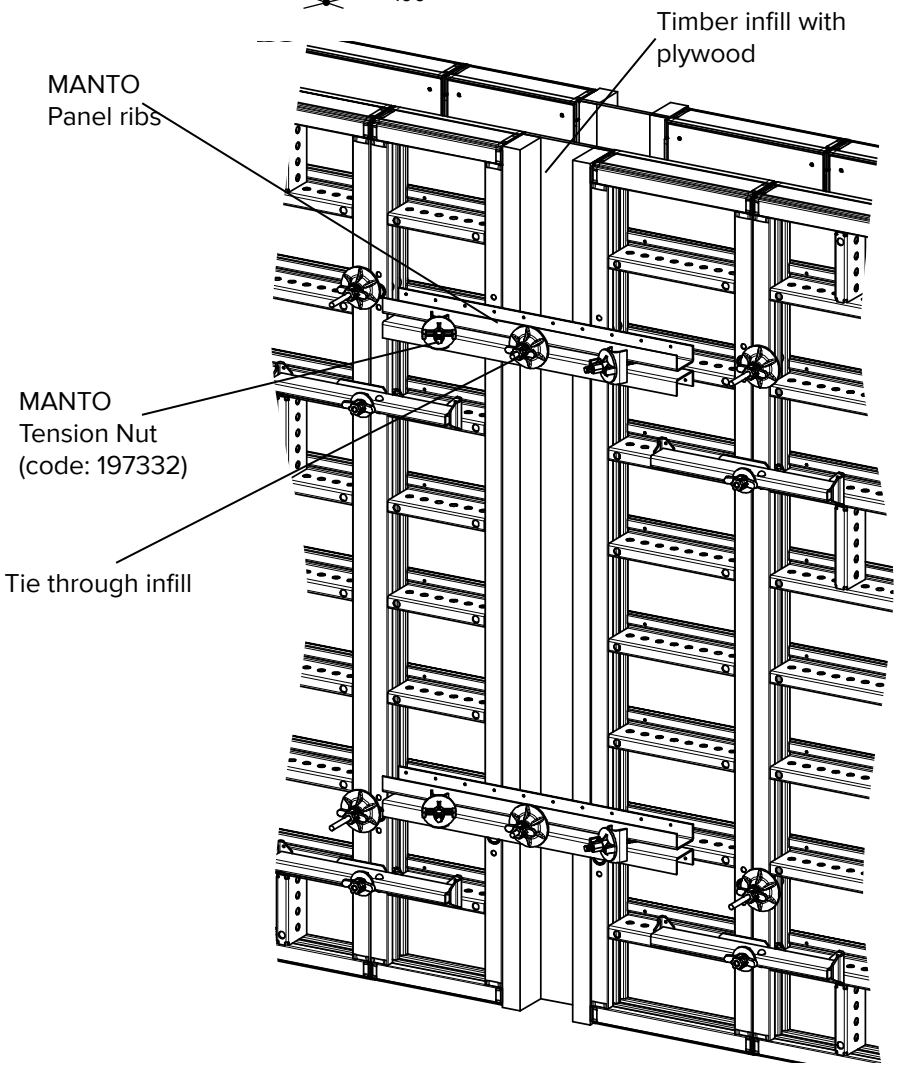
## 5.3 Using the Multipurpose Waler 100

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.

Ties are placed through the infill as centred as possible.

Multipurpose Waler
(code: 450764)




**NOTE**

**Note!**

For rules regarding infill solutions, refer to page 53.

## 5.4 MANTO XXL Panels

**Typical arrangements**

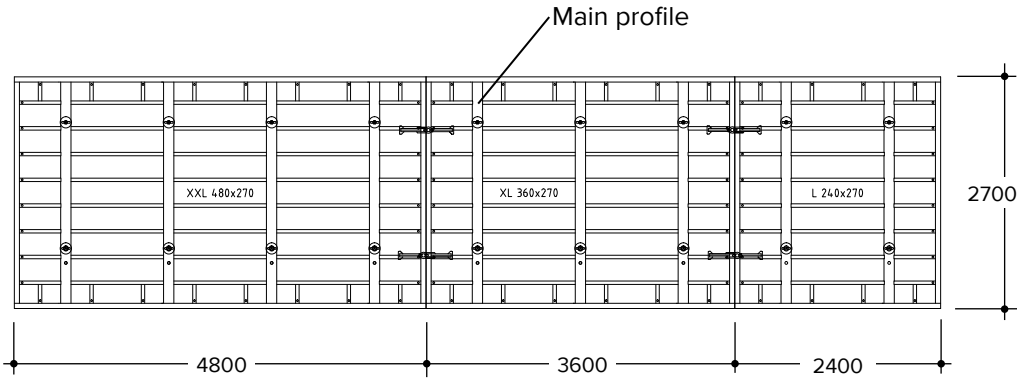
The following illustrations show typical connecting arrangements between MANTO XXL Panels when joining panels side-by-side.

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

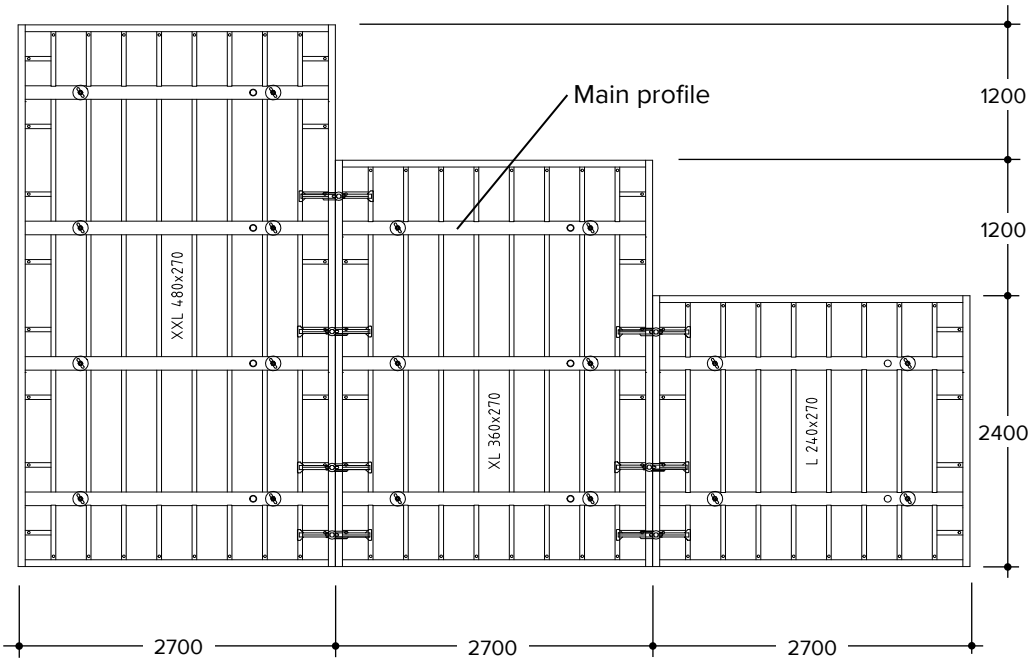
Aligning Panel Clamp (code: 448000)

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):




**WARNING**

**Warning!**

The illustrations above show typical connections between MANTO XXL Panels using the 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 in mm.

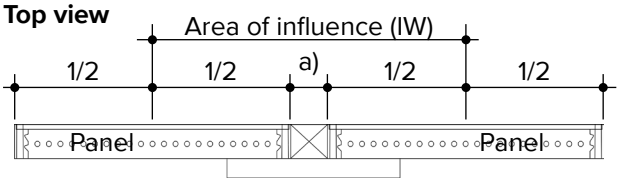
# 6 Infills (typical solutions)

Follow these rules when creating infills with MANTO formwork:

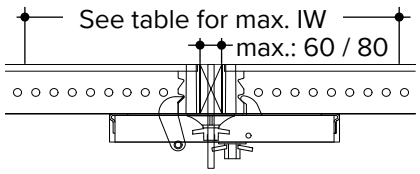
| Max. area of influence (IW) for infill with a single tie (see solutions A, B and C) | | | | |
|---|---|---|---|---|
| Panel height | Pressure profile | Max. IW | | Fasteners per panel * |
| | | DW15 | DW20 | |
| 2.70 m | Hydrostatic | 1.30 m | 1.50 m | 2 |
| | Constant | 1.20 m | 1.40 m | 2 |
| 3.30 m | Hydrostatic | 1.05 m | 1.50 m | 3 |
| | Constant | 1.00 m | 1.20 m | 3 |

Constant pressure for DW15 = 60.00 kN/m$^2$, for DW20 = 80.00 kN/m$^2$.
* - Additional fasteners might be required due to timber and joint capacity.

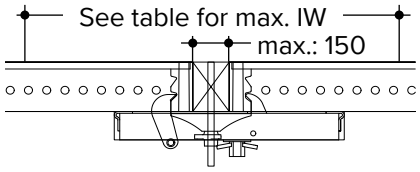
**Top view**



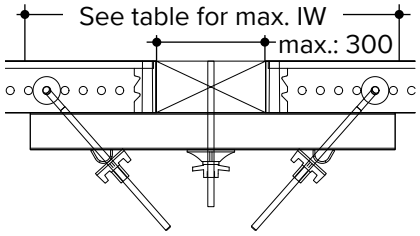

a) Infill




**Solution A: Single Tie + clamp** (see notes 1 & 2)
**Max. 60 mm infill:** MANTO Tie Nut + DW15 + Adjustable Aligning Clamp or PLATINUM Universal Connector
Max. 80 mm infill: Tie Nut 150 + DW20 + Adjustable Aligning Clamp or PLATINUM Universal Connector

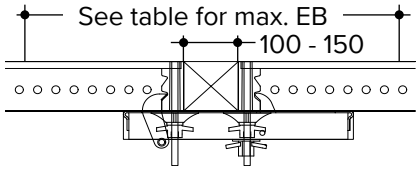



**<u>Solution B:</u> Single tie + clamp** (see notes 1 & 2)
**Max. 150 mm infill:** Tie Nut 230 DW15 + DW15 + Adjustable Aligning Clamp or PLATINUM Universal Connector

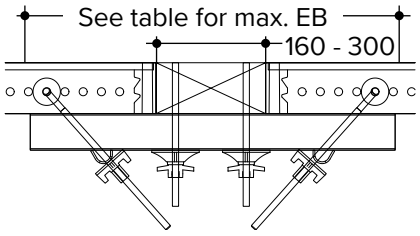



**Solution C: Single tie + waler** (see note 1)
**Max. 300 mm infill:** Multipurpose Waler 100 + Waler Spanner L + Tension Nut

**For cases when IW exceeds the values in the table above:**




**<u>Solution D:</u> Double tie + clamp**
**100 - 150 mm infill:** MANTO Tie Nut * DW15 or Tie Nut 150 + DW20 + Adjustable Aligning Clamp or PLATINUM Universal Connector




**<u>Solution E:</u> Double tie + waler**
**160Mm - 300 mm infill:** MANTO Tie Nut + DW15 + Multipurpose Waler 100 + Waler Spanner L + Tension Nut
**180 mm - 300 mm infill:** Tie Nut 150 + DW20 + Multipurpose Waler 100 + Waler Spanner L + Tension Nut

**NOTE**

**Note!**

1. Tie must be positioned centrally in the infills.
2. The tie washer must overlap the panels by at least 35 mm.

# 7 Extensions (in height)

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.

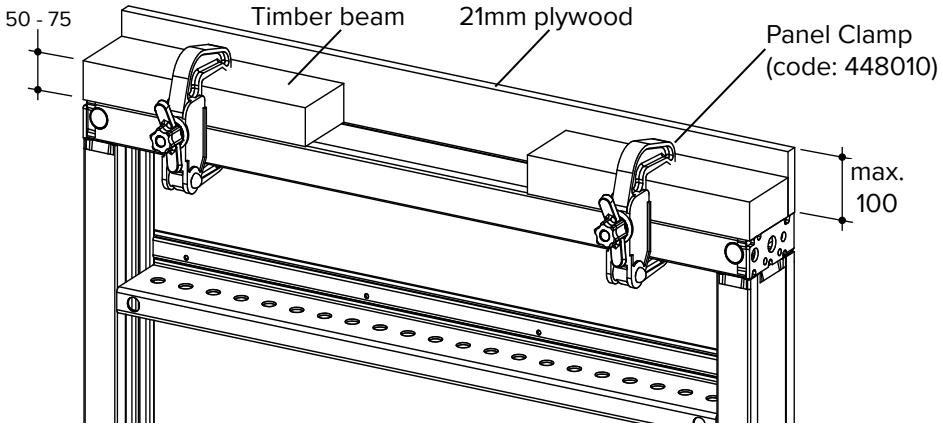
**WARNING**

**Warning!**

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

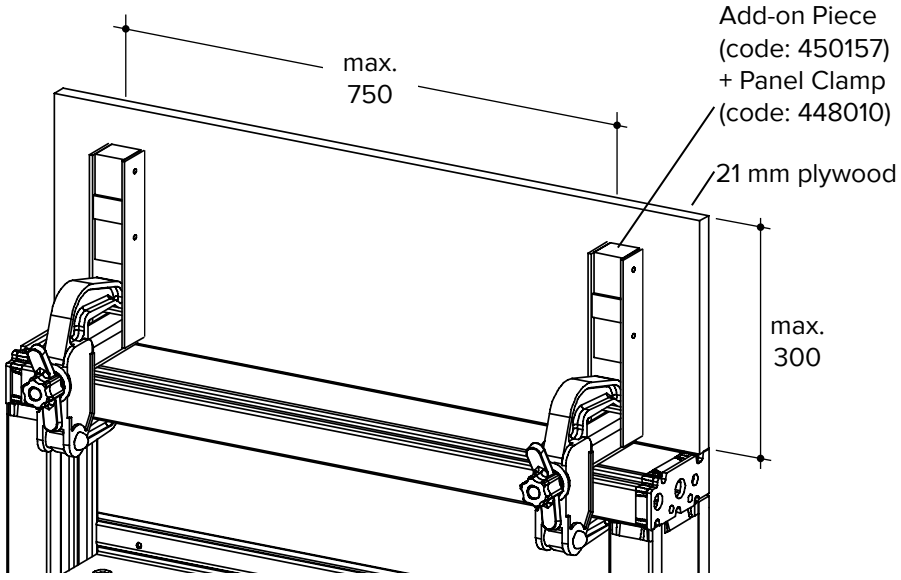
## 7.1 Extensions up to 100 mm

Timber beams can be secured to the top edge profile of the panel to be extended using Panel Clamps. Then nail 21 mm thick plywood to the timber beams.




## 7.2 Extensions up to 300 mm

For extensions of up to 300 mm and when using the Add-on Pieces, the 21 mm thick plywood can be fastened to the MANTO formwork without any additional timber beam. The plywood can be nailed directly to the timber infills in the Add-on Pieces. Secure the Add-on Pieces to the panels with Panel Clamps no further apart than 750 mm centres.

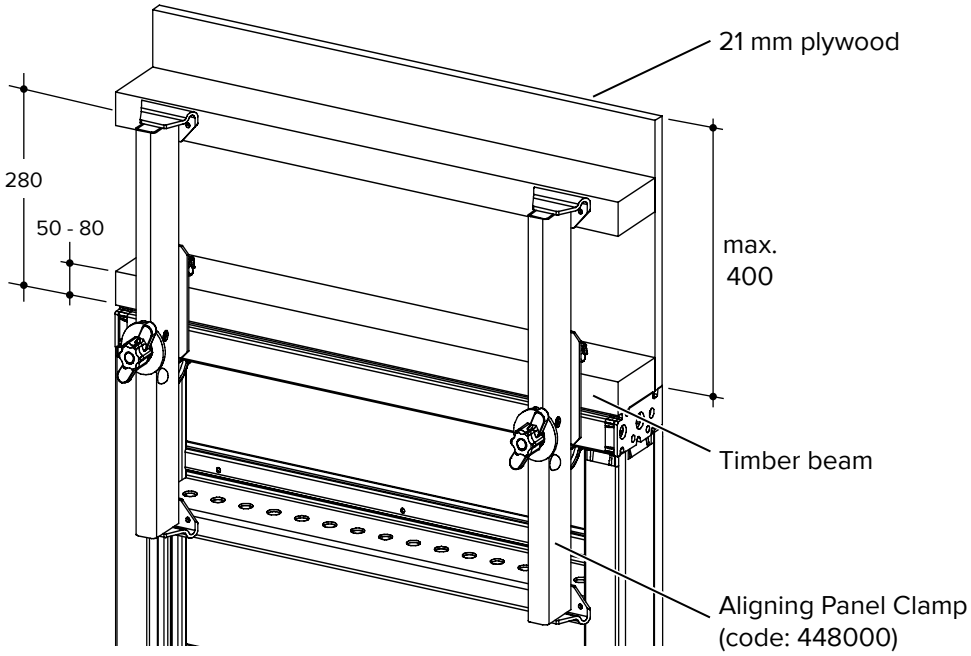





Unless stated otherwise, all dimensions in mm.

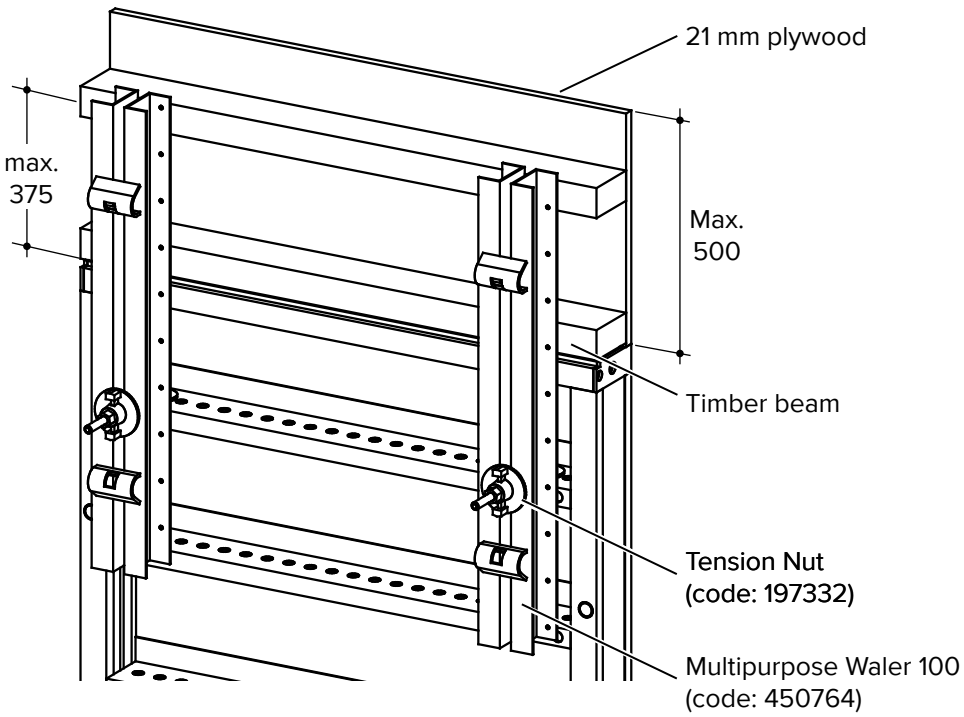
## 7.3 Extensions up to 400 mm

For an extension of up to 400 mm, an Aligning Panel Clamp can be used. A timber beam has to be fixed to the edge profile of the panels to be extended. Above that, nail a second timber beam to the Aligning Panel Clamp and then nail a 21 mm thick plywood sheet to the timer beam.




## 7.4 Extensions up to 500 mm

To add an extension of up to 500 mm to the top of MANTO Panels, a Multipurpose Waler 100 has to be used. The Multipurpose Waler 100 is fastened to the rib of the MANTO Panel using a Waler Spanner and a Tension Nut.



# 8 Connecting panels (vertically)

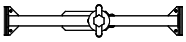
In situations where extensions of more than 500 mm in height are required, the MANTO formwork system allows the formwork to be extended by attaching MANTO Panels to the top edge of other MANTO Panels.

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. Aligning Panel Clamps (code: 448000).
- The vertical joint of MANTO Panels of up to 1.20 m is secured using 1no. Aligning Panel Clamp (code: 448000).
- The vertical joint of MANTO Panels of more than 1.20 m is secured using 2no. Aligning Panel Clamps (code: 448000).

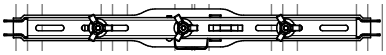
The illustrations on the following pages show typical tie positions and connecting arrangements between stacked MANTO Panels.

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



Aligning Panel Clamp (code: 448000)

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



PLATINUM 100 MANTO Extension Bar (code: 607000)

**WARNING**

**Warning!**

The illustrations contained in this section apply only to panel generations 1, 2 and 3. Separate verification is needed to attach the panels G3 M.

**WARNING**

**Warning!**

The number of horizontal joints subjected to bending may vary depending on the formwork height and the quantity of parts attached to the formwork.
For more information, refer to page 102.

**WARNING**

**Warning!**

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).

**WARNING**

**Warning!**

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 Aligning Panel Clamp is 1.20 kNm.

**NOTE**

**Note!**

Negative bending capacity of the Aligning Panel Clamp (Refer to page 21) means that the plywood is facing the ground (downwards) during the process of lifting a panel assembly. The bending capacity is greater due to the possibility that the cantilever arms of the clamp are in contact with the ribs of the panel.

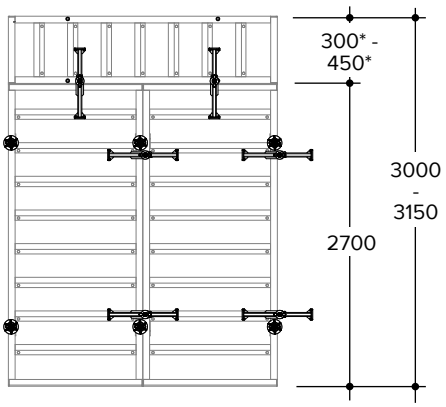
Positive bending capacity means that the plywood is facing the upwards during the lifting process. The capacity is less because only the claws of the clamp are in contact with the panels.

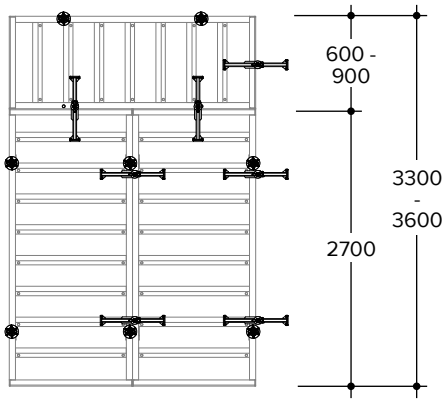


Unless stated otherwise, all dimensions in mm.

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

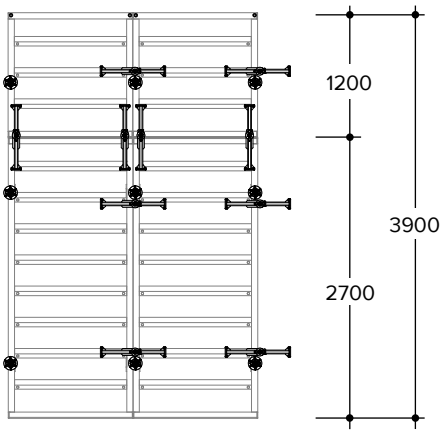
**Formwork height: 3.30 m to 3.60 m**

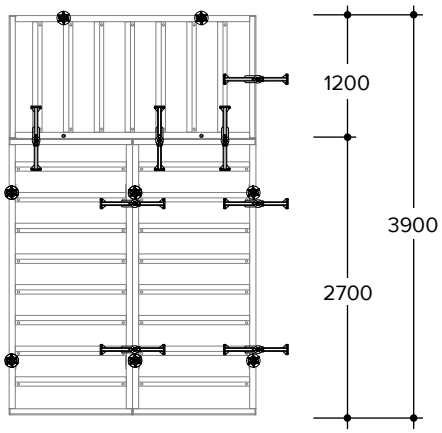


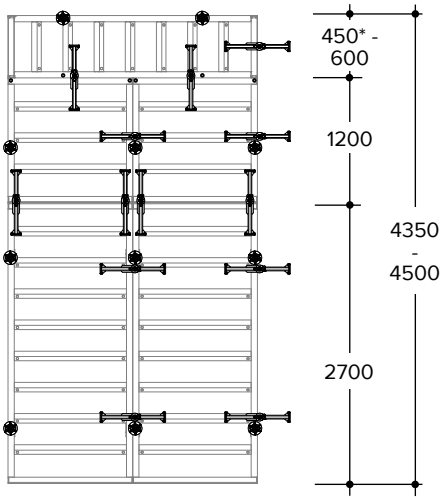

| NOTE | **Note!**<br>Panels marked with (*) do not represent the real panel width and are for illustration purposes only. |
|---|---|

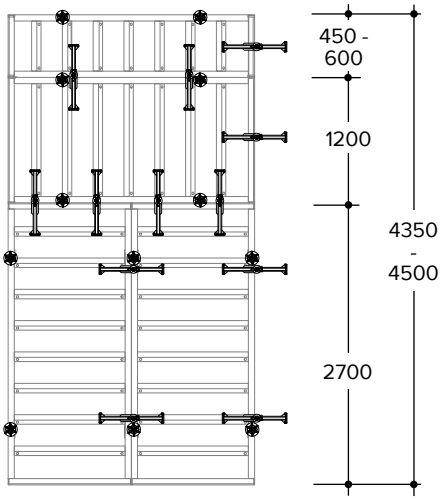
**Formwork height: 3.90 m**




**Formwork height: 4.35 m to 4.50 m**

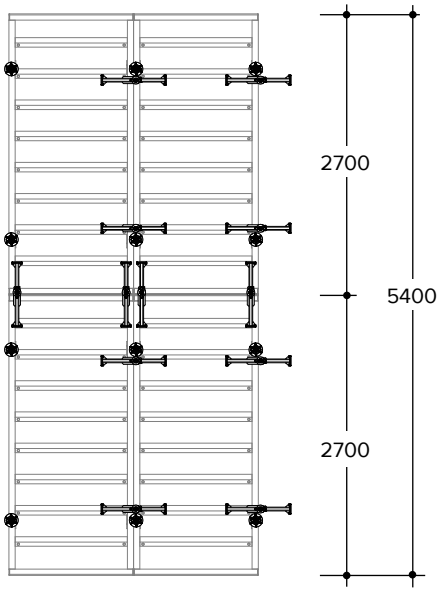


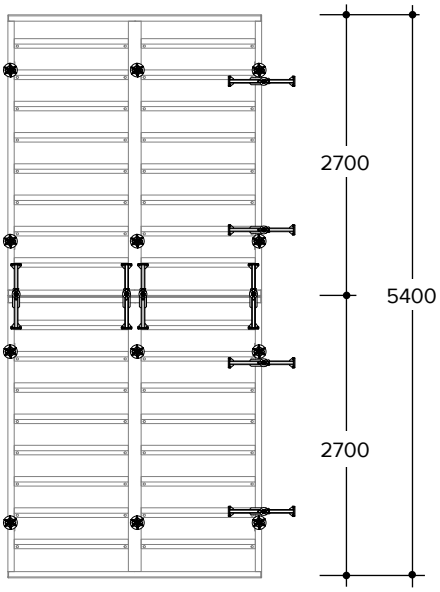




| NOTE | **Note!**<br>Panels marked with (*) do not represent the real panel width and are for illustration purposes only. |
|---|---|

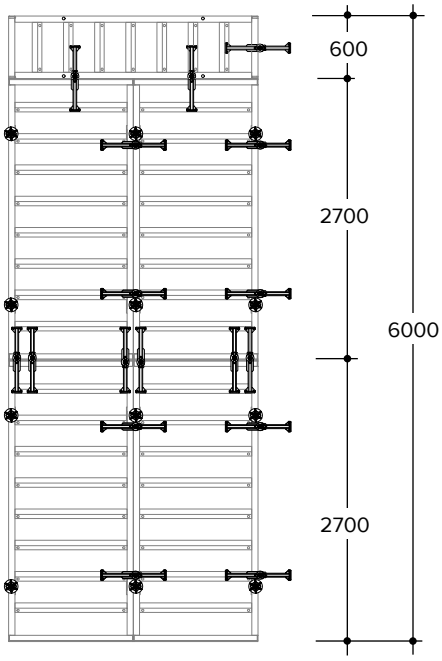
# Connecting panels (vertically)

**Formwork height: 5.40m**

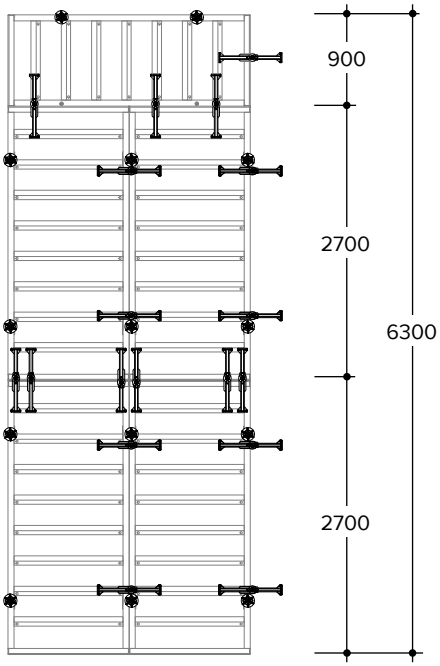



**Formwork height: 6.00 m**



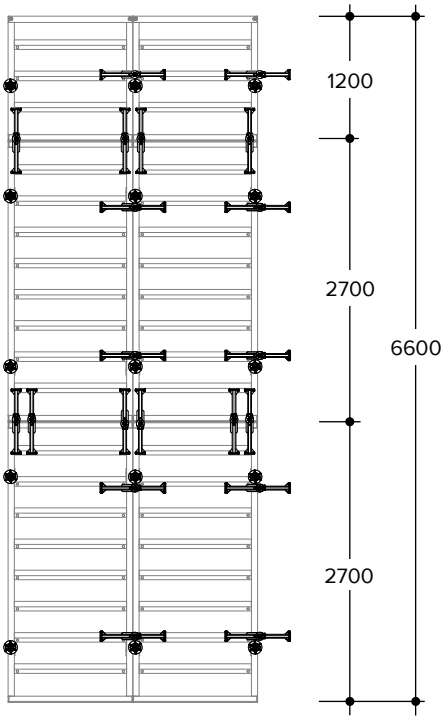

**Formwork height: 6.30 m**

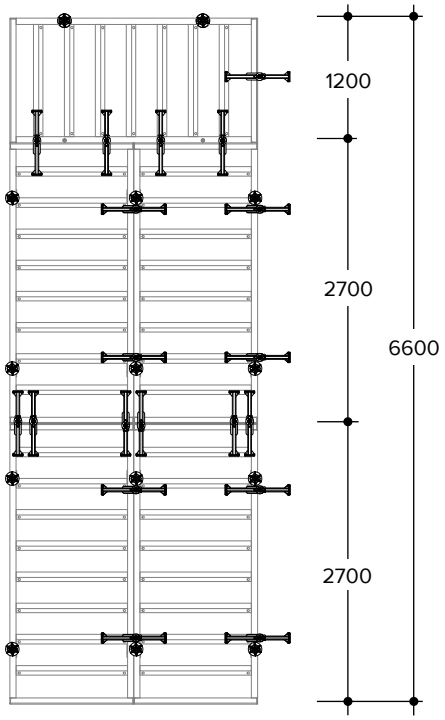




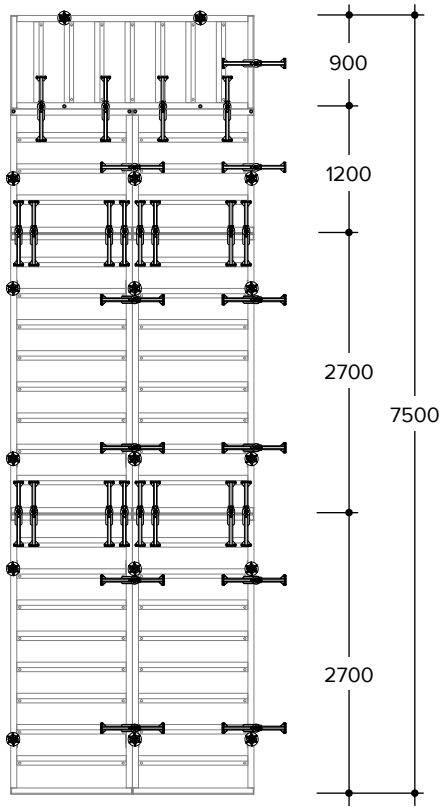

Unless stated otherwise, all dimensions in mm.

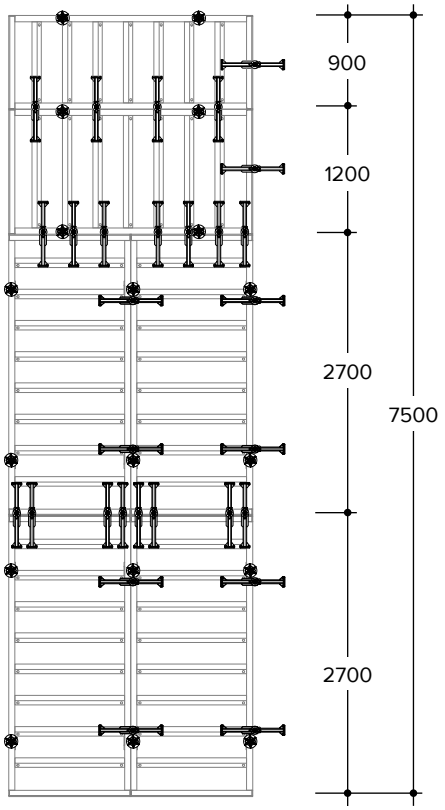
**Formwork height: 6.60 m**



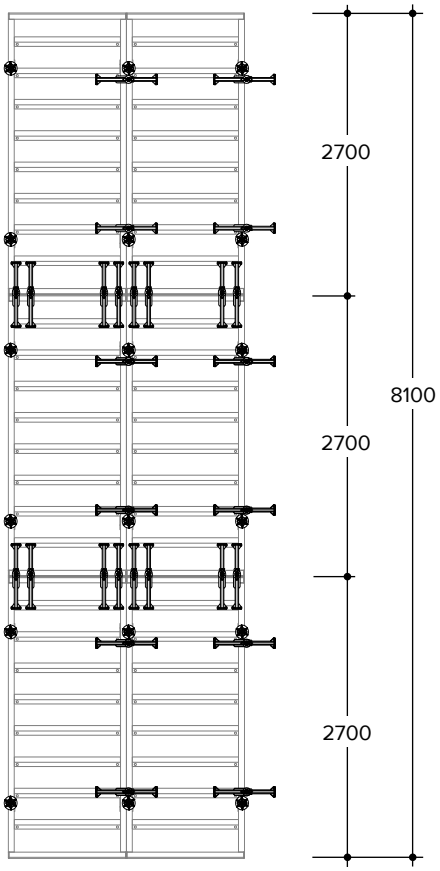




**Formwork height: 7.50 m**



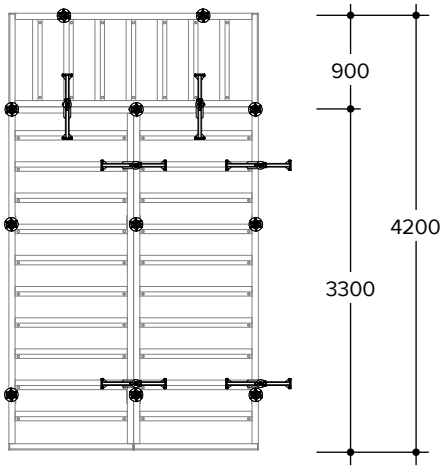



**Formwork height: 7.50 m**




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

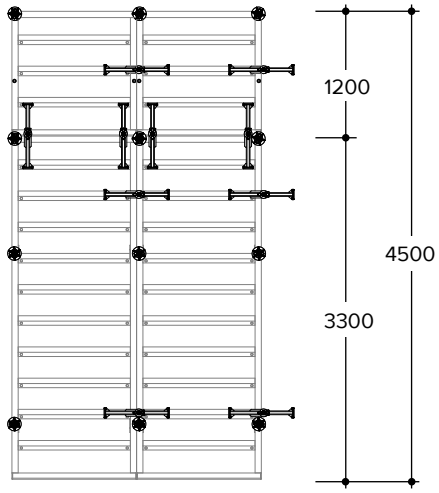
**Formwork height: 4.20 m**

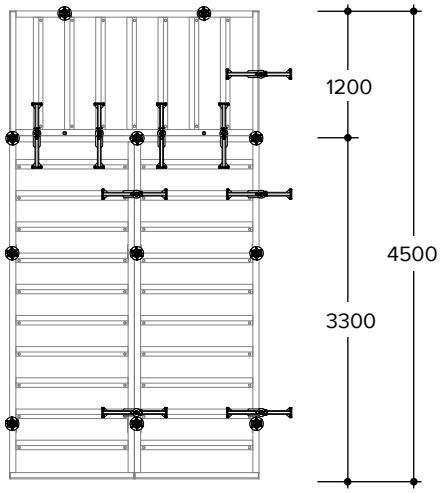




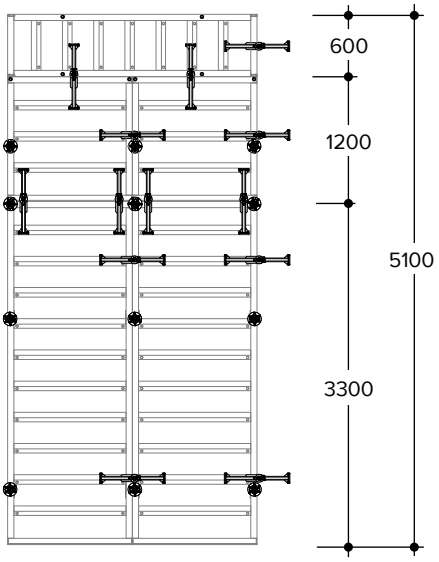

Unless stated otherwise, all dimensions in mm.

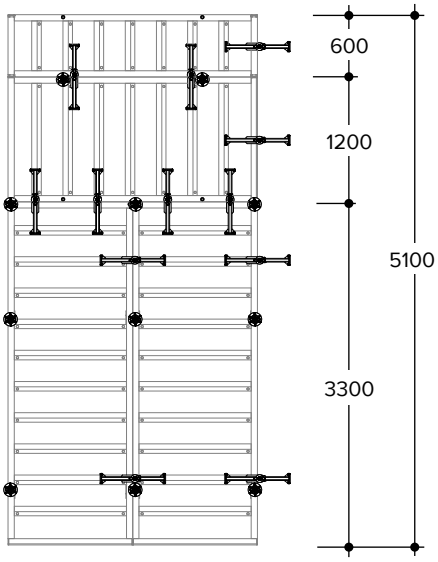
**Formwork height: 4.50 m**



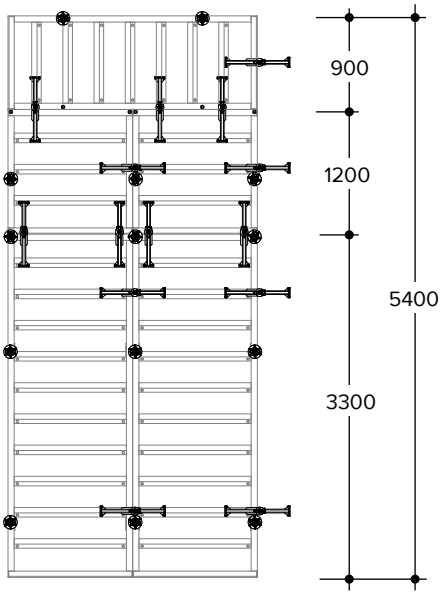



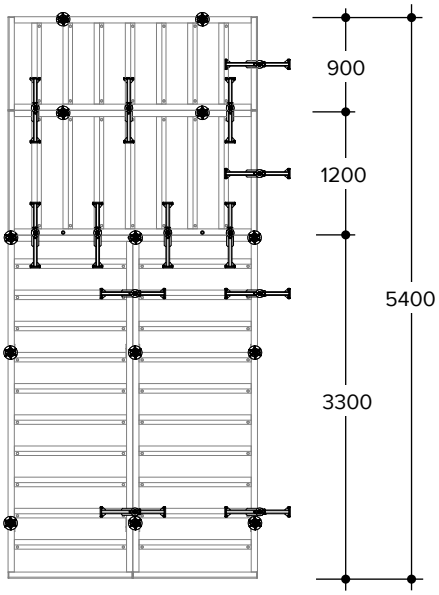

**Formwork height: 5.10 m**




**Formwork height: 5.40 m**

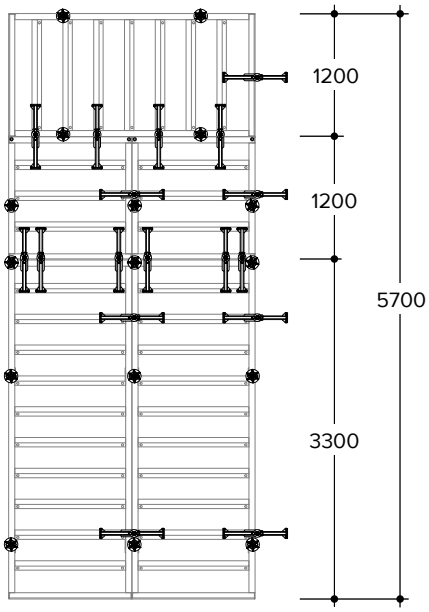


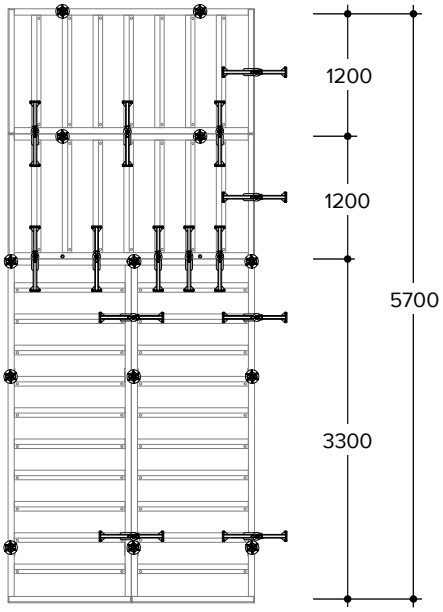




Unless stated otherwise, all dimensions in mm.

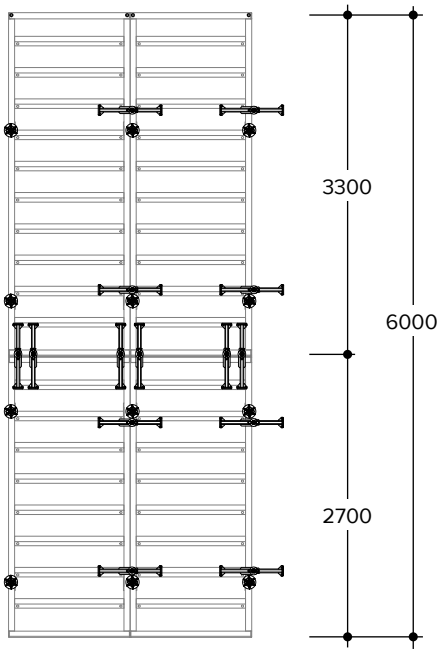
# Connecting panels (vertically)

**Formwork height: 5.70 m**



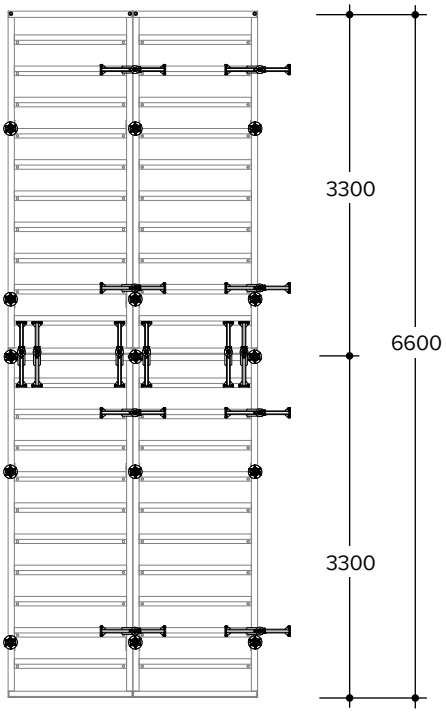

**Formwork height: 6.00 m**



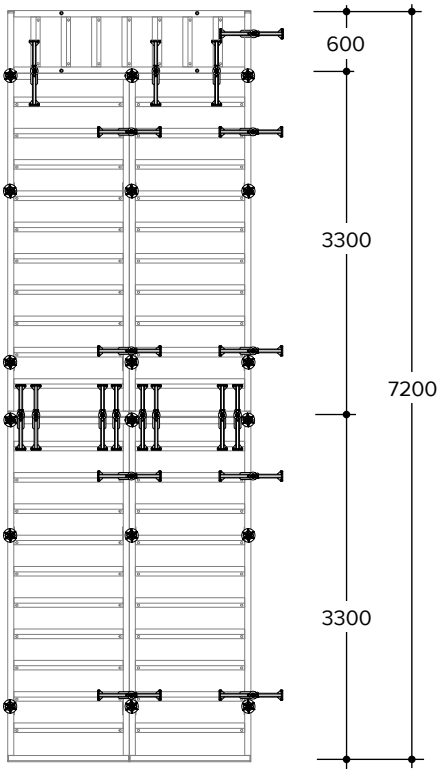



Unless stated otherwise, all dimensions in mm.

**Formwork height: 6.60 m**



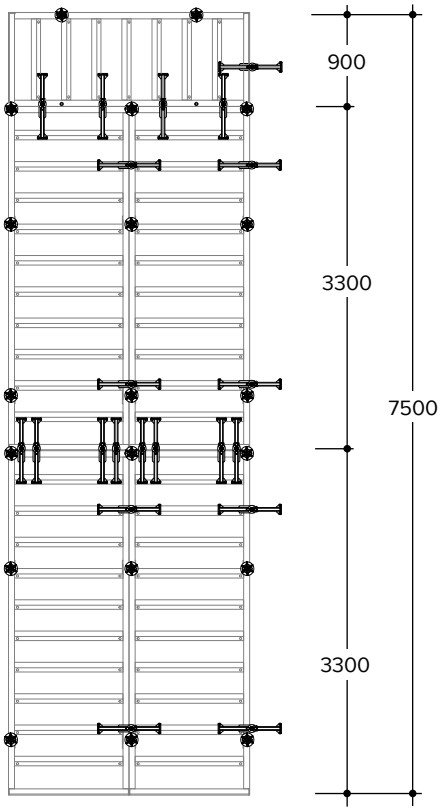

**Formwork height: 7.20 m**



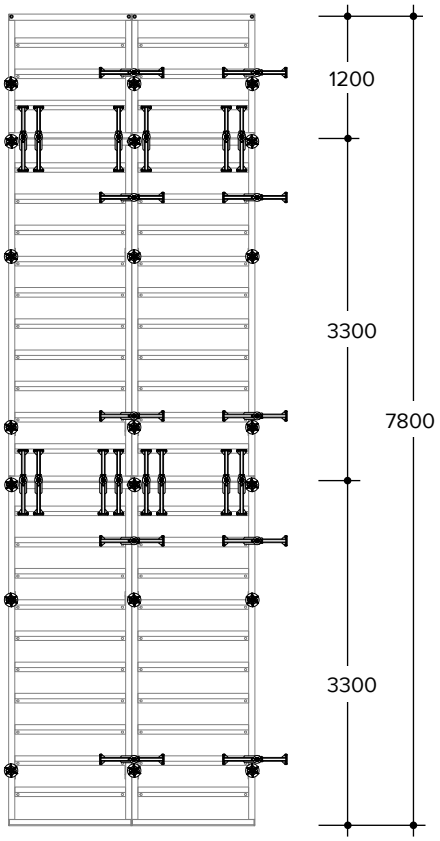

Unless stated otherwise, all dimensions in mm.

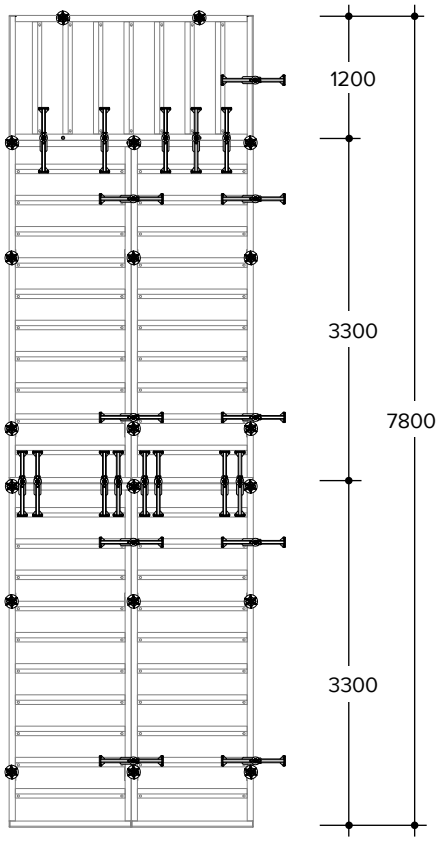
# Connecting panels (vertically)

**Formwork height: 7.50 m**




**Formwork height: 7.80 m**

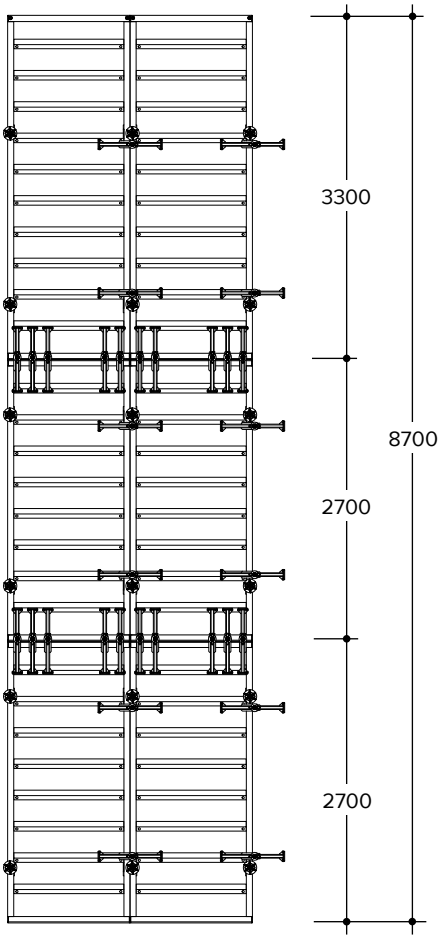





Unless stated otherwise, all dimensions in mm.

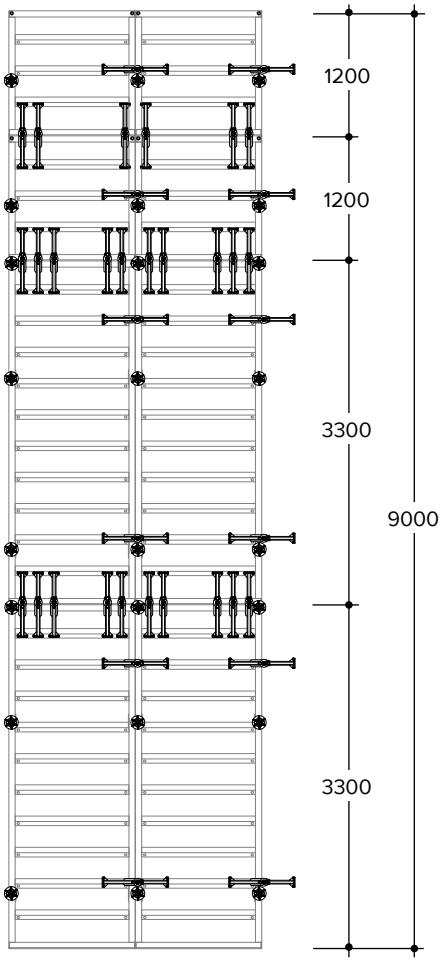
**Formwork height: 8.70 m**

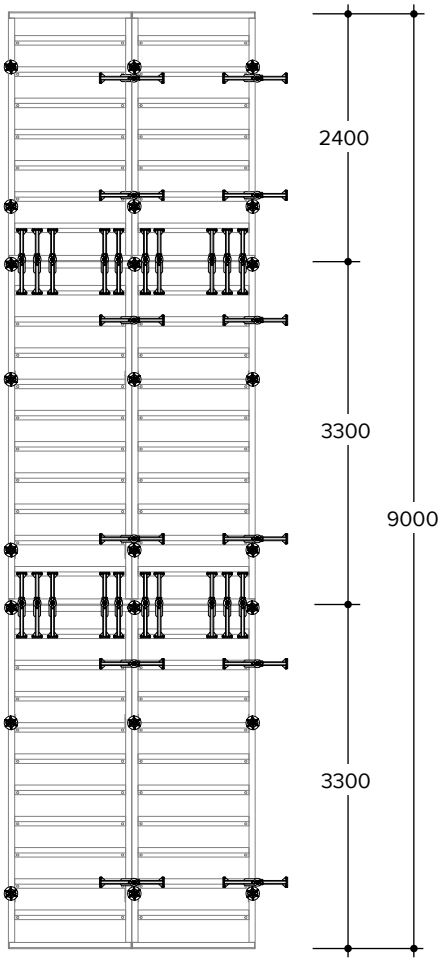



Unless stated otherwise, all dimensions in mm.

# Connecting panels (vertically)

**Formwork height: 9.00 m**

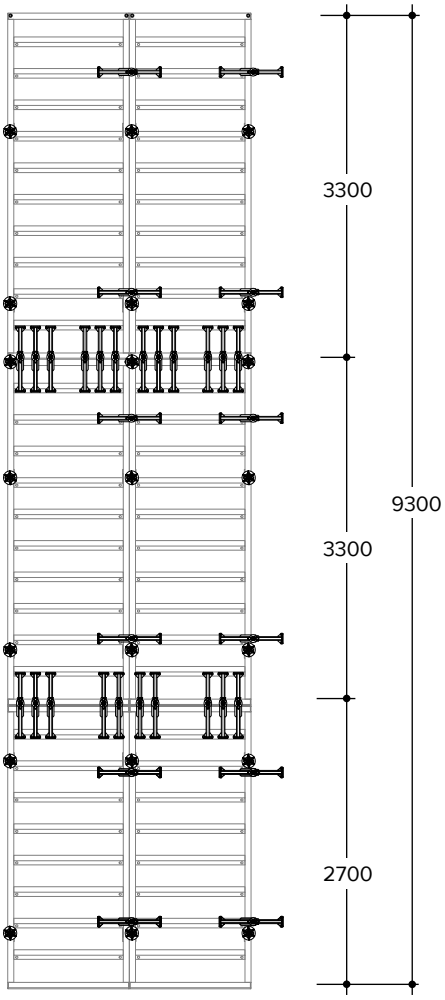


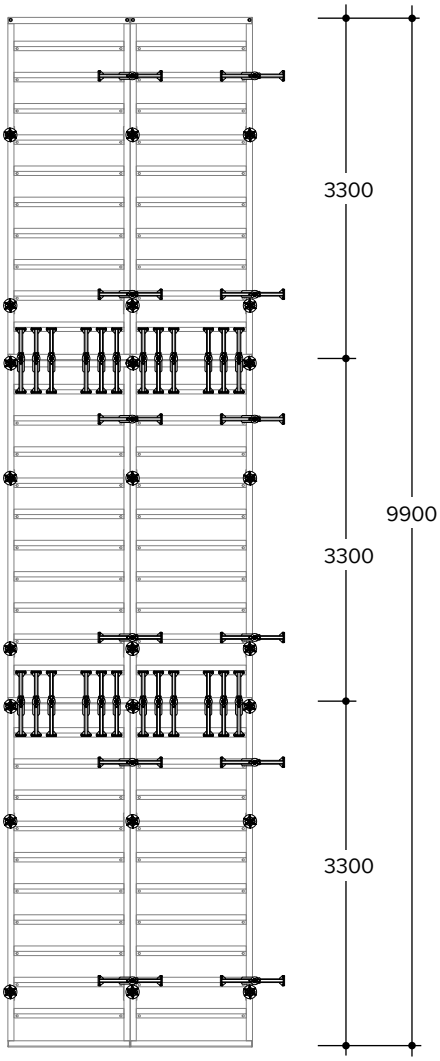



Unless stated otherwise, all dimensions in mm.

**Formwork height: 9.30 m**




**Formwork height: 9.90 m**

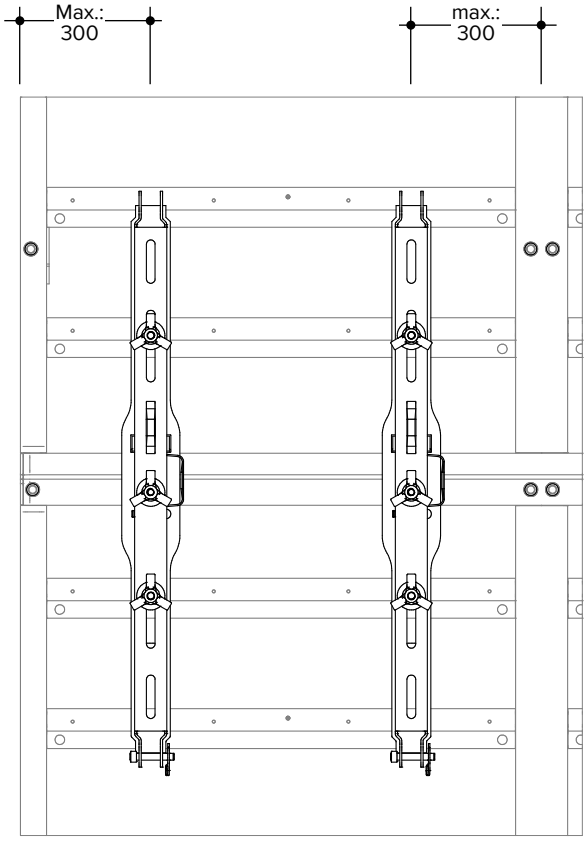


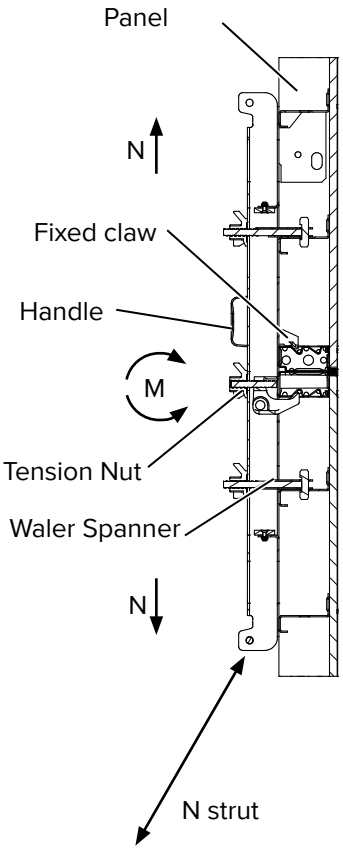
## 8.3 Using the Extension Bar, ties and MANTO Panels 2.70 m

The PLATINUM® 100 Extension Bar is used to extend MANTO Panels. Extended panels are connected safely at the panel joint and are aligned that way.

Additionally, alignment struts can be connected directly to the PLATINUM® 100 Extension Bar.

The Extension Bar is hooked to the frame of the upper panel and is fixed with the Tension Nut. The fixed claw should face upwards. The Waler Spanners are then hooked to the ribs of the panel and fixed by tightening the Tension Nut.



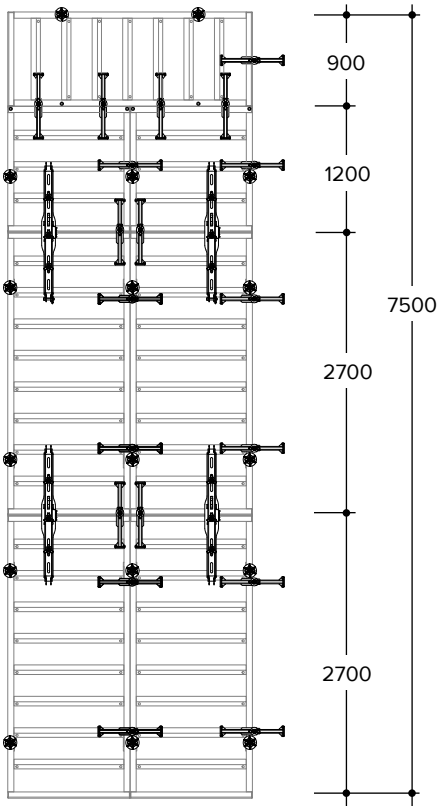




**WARNING**

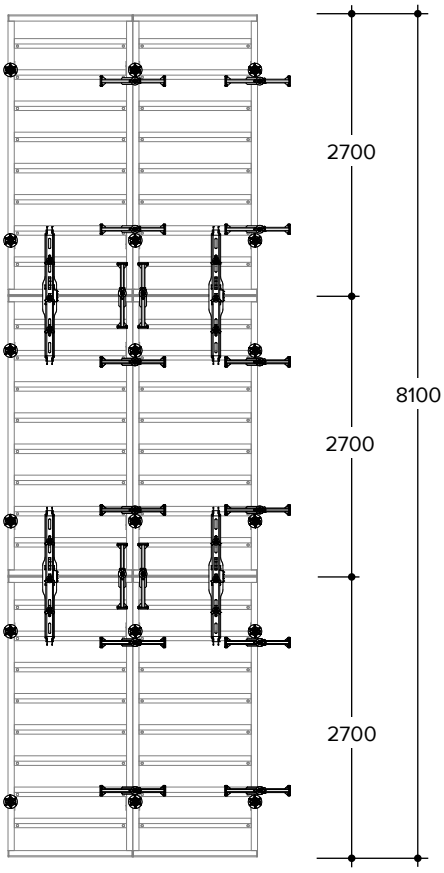
**Warning!**

Place the PLATINUM® 100 Extension Bars in a maximum distance of 300 mm from the panel edge or the main centre profile. The loads stated on page 22 are only valid if the PLATINUM® 100 Extension Bars are placed accordingly.
This applies when using 3.30 m MANTO Panels as well.

**Formwork height: 7.50 m**



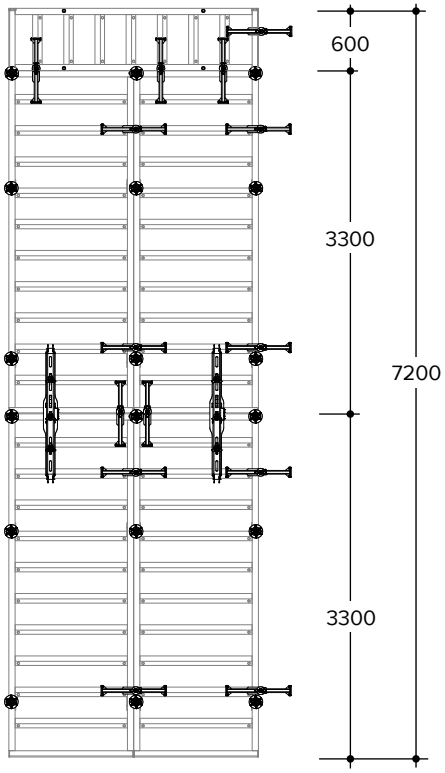

**Formwork height: 8.10 m**



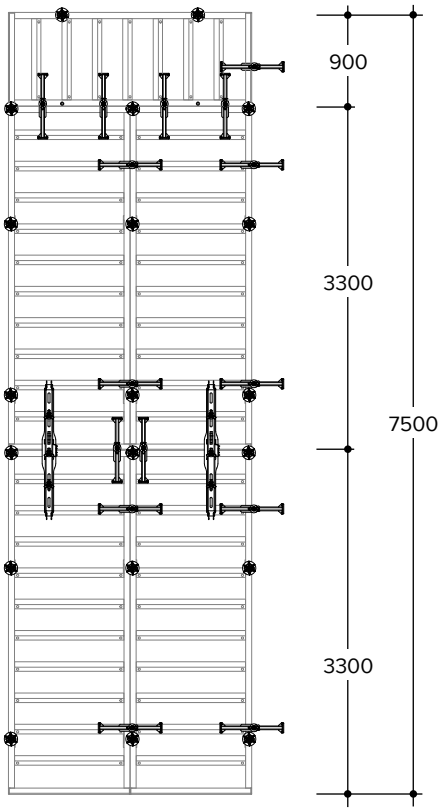

Unless stated otherwise, all dimensions in mm.

## 8.4 Using the Extension Bar, ties and 3.30 m MANTO Panels

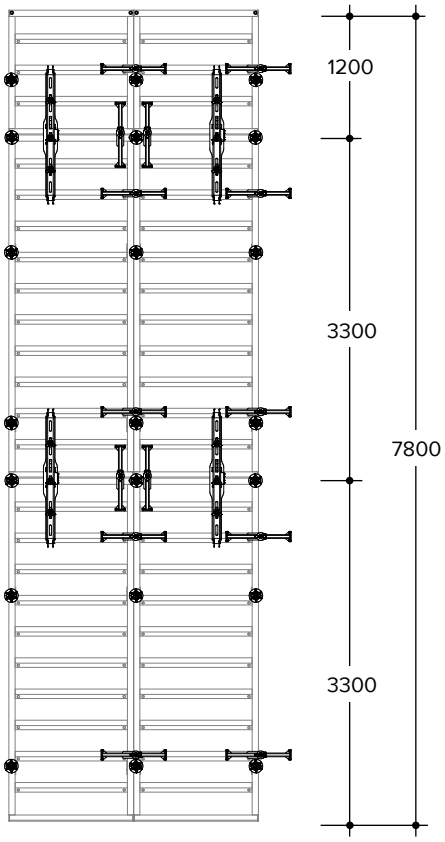
**Formwork height: 7.20 m**




**Formwork height: 7.50 m**



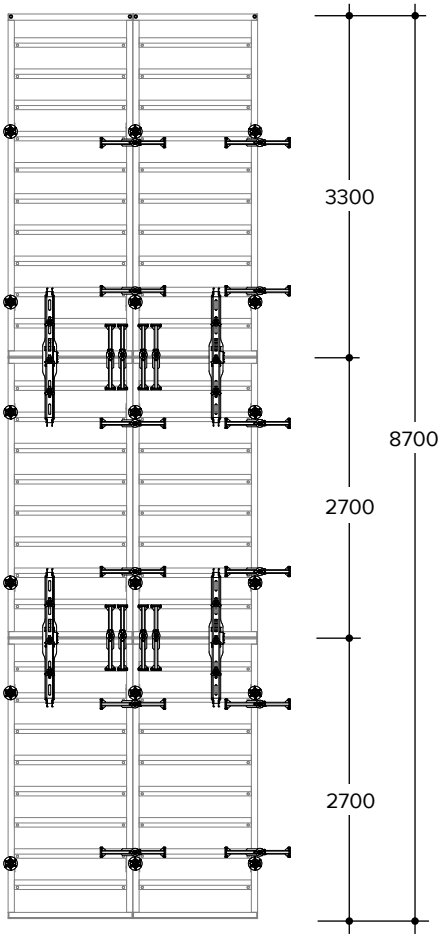

**Formwork height: 7.80m**



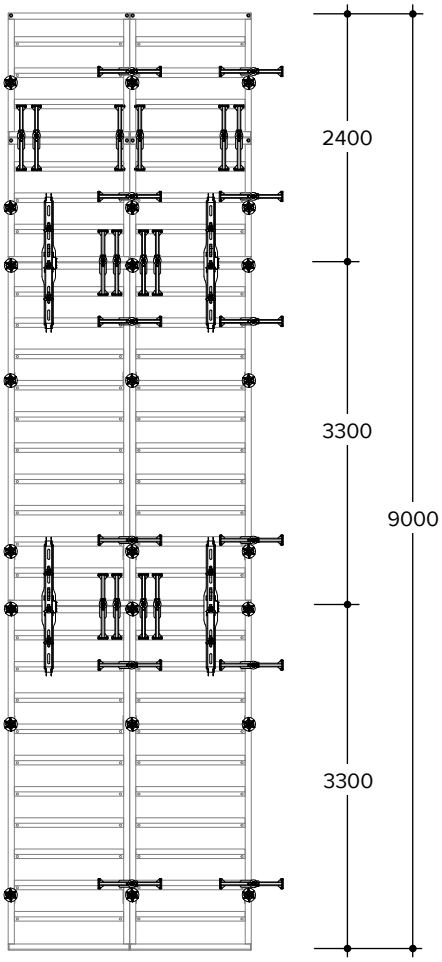



Unless stated otherwise, all dimensions in mm.

**Formwork height: 8.70 m**

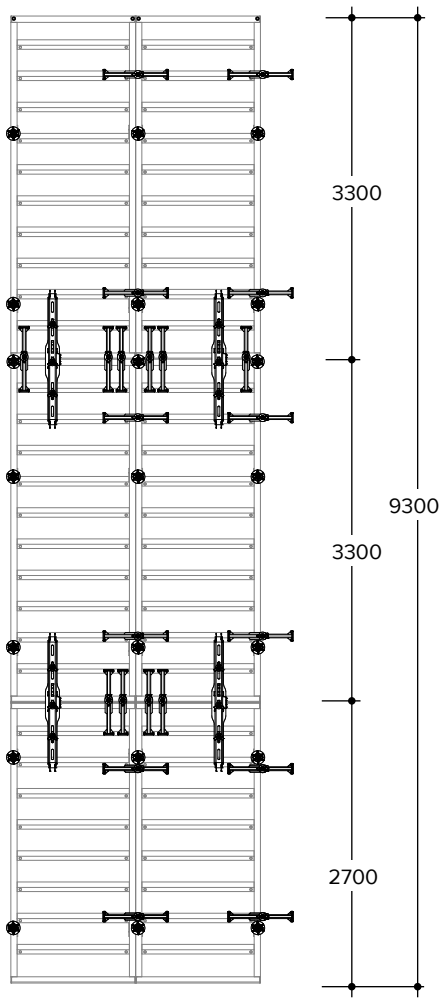



**Formwork height: 9.00 m**

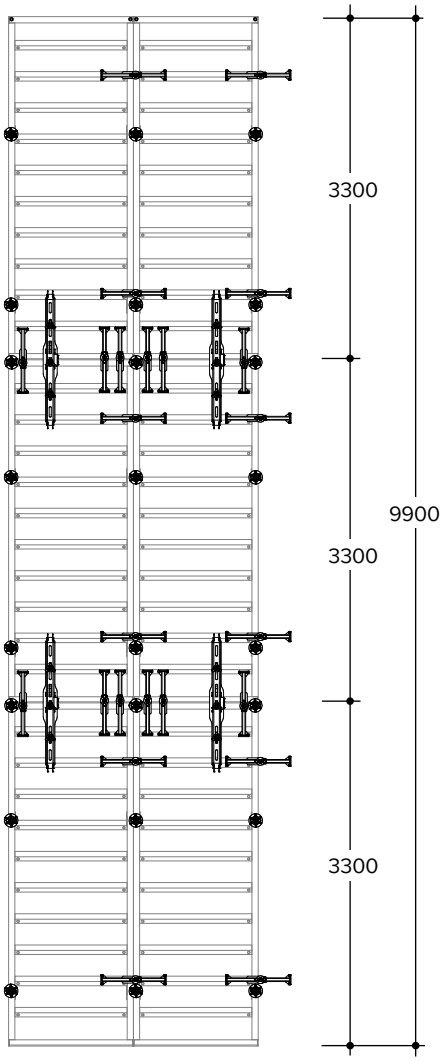


# Connecting panels (vertically)

**Formwork height: 9.30 m**




**Formwork height: 9.90 m**



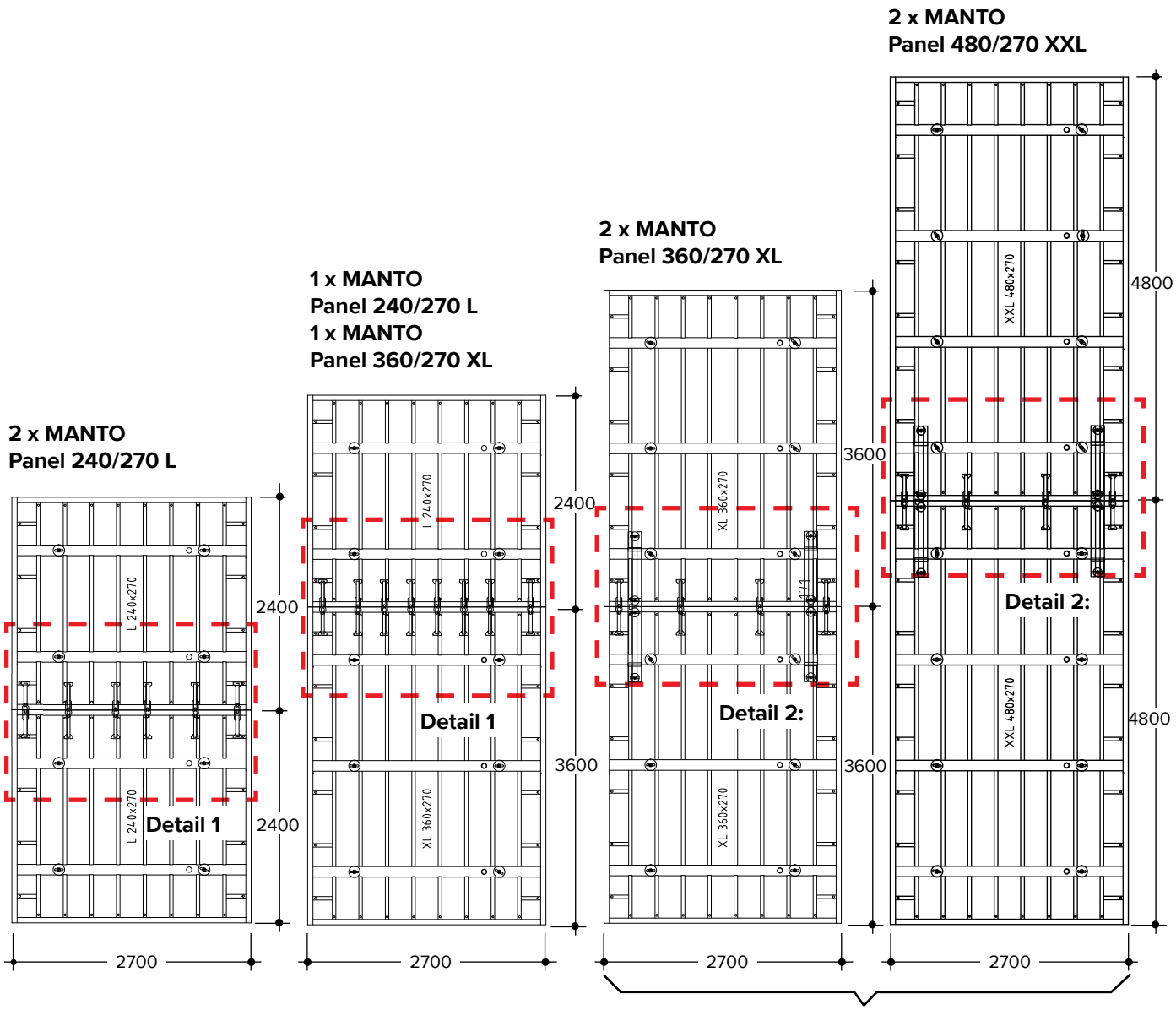



Unless stated otherwise, all dimensions in mm.

## 8.5 Using 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.




6 x Aligning Panel Clamp

8 x Aligning Panel Clamp

4 x Aligning Panel Clamp
2 x Steel Waler F 171
8 x Waler Spanner
8 x Tension Nut

**WARNING**

**Warning!**

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.

Unless stated otherwise, all dimensions in mm.

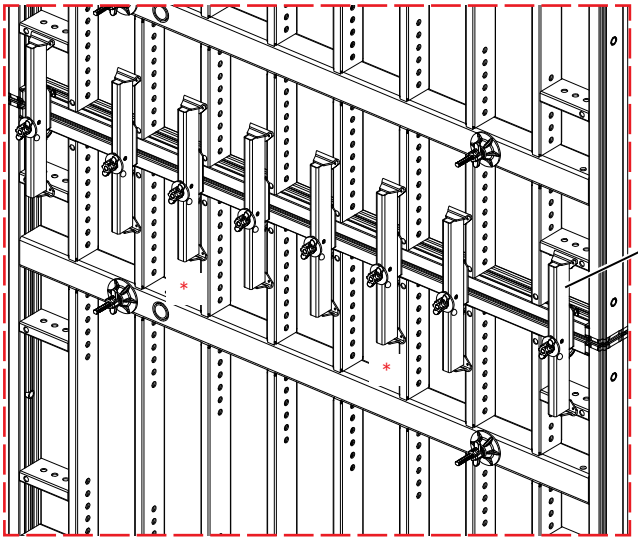
# Connecting panels (vertically)

**Typical arrangement**

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

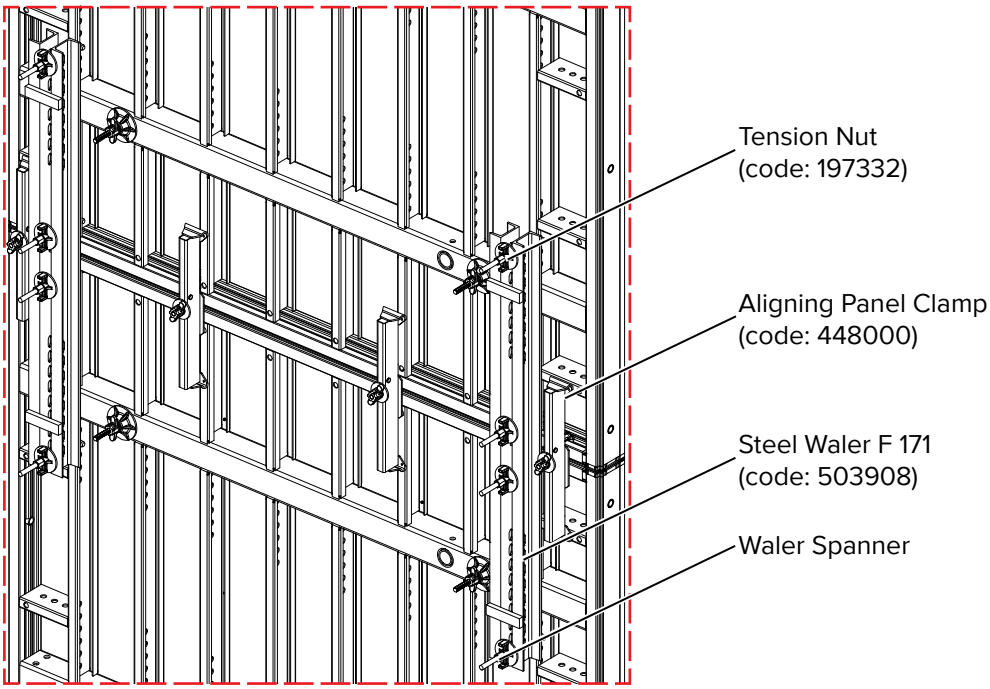
**Detail 1**

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




**Detail 2**

- Panel 360/270 XL (code: 600861) + Panel 360/270 XL (code: 600861)
  4no. 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.





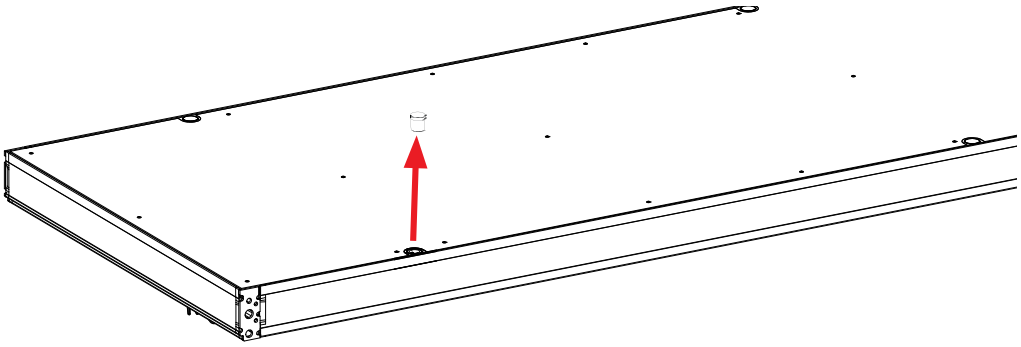

Unless stated otherwise, all dimensions in mm.

# 9 Ties

## 9.1 Plastic Insert System

When the Plastic Insert System is used, proceed as follows:

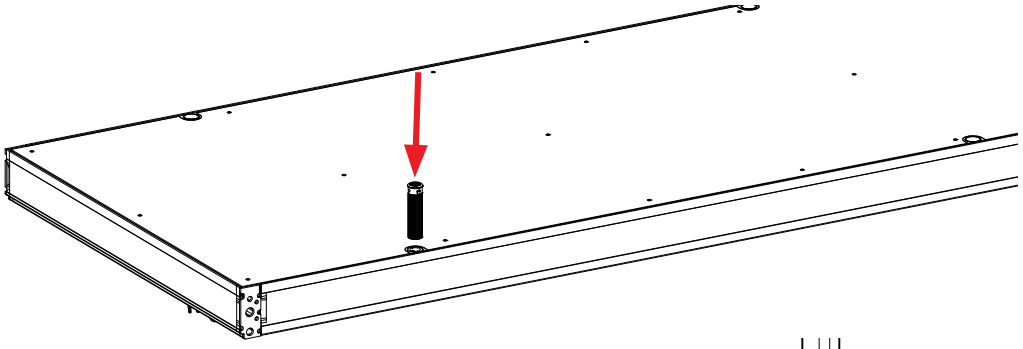
**Step 1** Remove the plastic plugs from the MANTO Panels and clean the tie holes.

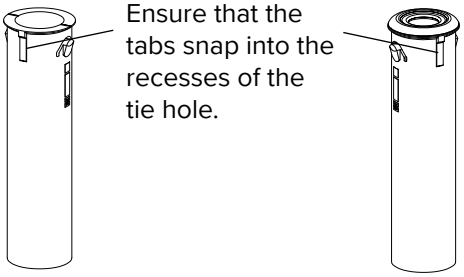


**WARNING**

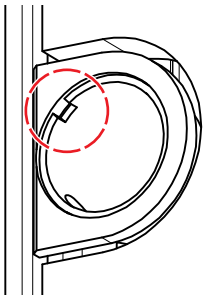
**Warning!**
All tie holes must be equipped with the Plastic Inserts.

**Step 2** Fully insert the MANTO G3 DW Insert. The insert will lock in place.





Ensure that the tabs snap into the recesses of the tie hole.



MANTO G3 DW Insert (code: 607915)

- One-side operated tie system MR Tie Rod DW15 (code: 607250).
- Standard DW15 and DW20 ties with Tie Rod Sleeves and Sealing Cones.

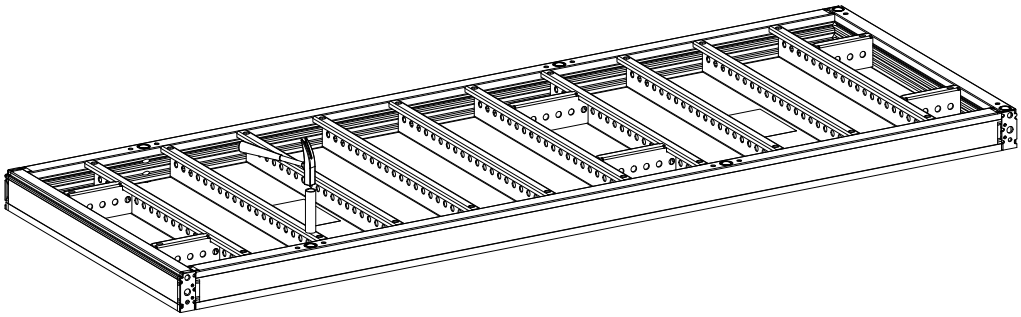
MANTO G3 Sealing Cone (code: 607925)

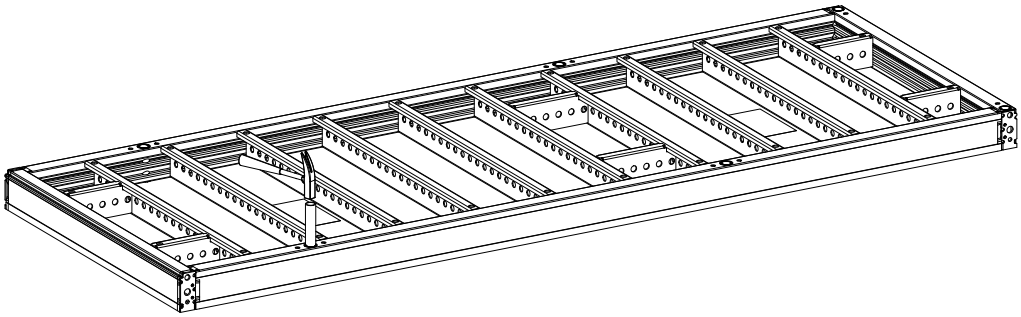
- One-sided operated taper tie system DW20 PLATINUM® 100 Tie Rod (code: 604300).
- MANTO Taper Tie DW15 100 (code: 608330).
- MANTO Taper Tie DW20 100 (code: 608331).
- MANTO Taper Tie DW20 115 (code: 608332).
- MANTO Taper Tie DW15 45 (code: 608333).
- MANTO Taper Tie DW20 50 (code: 608334).

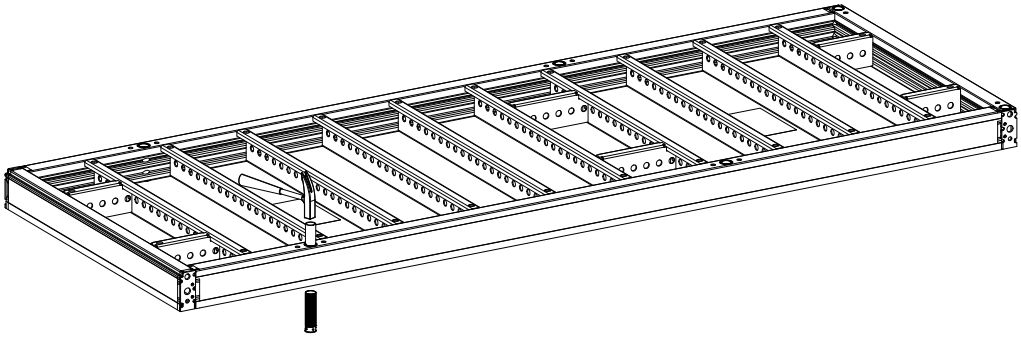
To remove the MANTO G3 Insert:

**Step 1** Remove the insert with the aid of the Punch. Position the sleeve against the Plastic Insert, from the back of the panel.

**Step 2** Use a hammer to tap the Punch and push the plastic insert out.







The Punch can also be used to remove concrete residue from the tie holes in the panels.

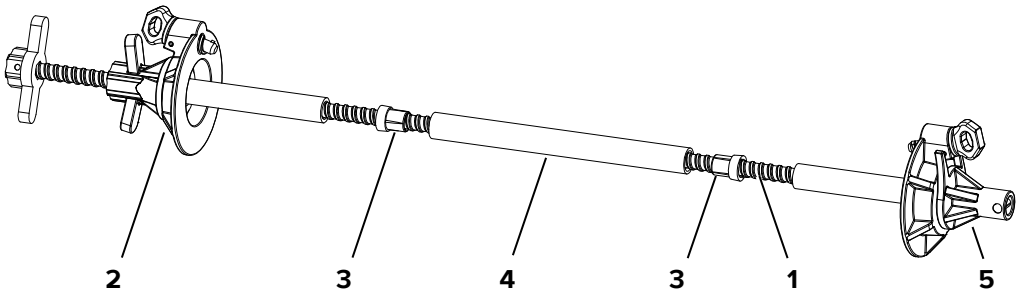
The insert can also be removed using a slotted screwdriver and the Cone Gripper. Use the screwdriver to press the tab in, then pull the insert out with the Cone Gripper.

## 9.2 One-sided tie system

This 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.

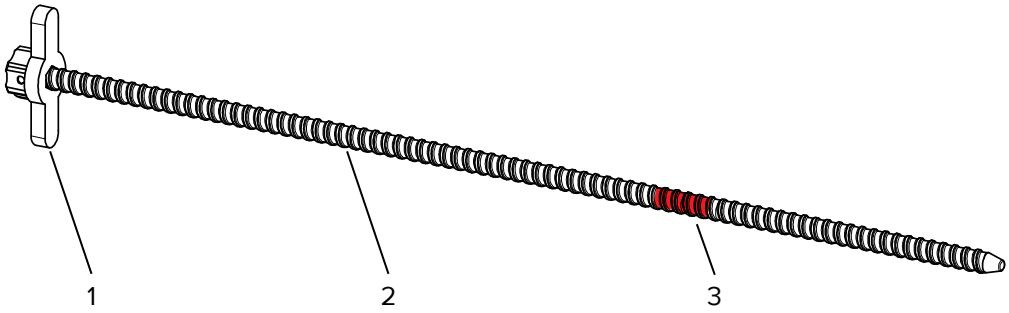
### 9.2.1 Components of one-sided tie system

The tie is made up of the following components:



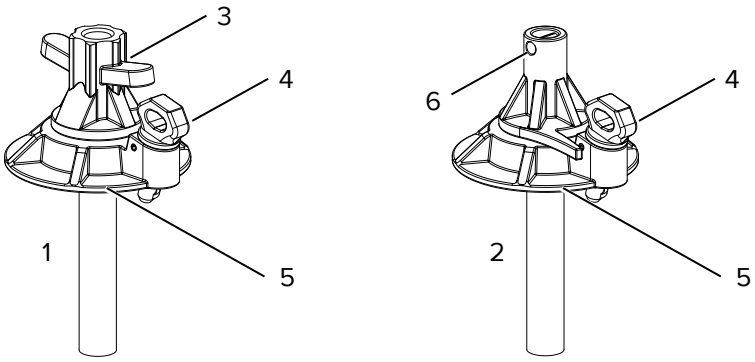

**1** MR Tie Rod DW15 (code: 607250).
**2** MANTO G3 Front Tie Nut (code: 607230).
**3** Sealing Cone (code: 607122).
**4** Tie Rod Sleeve
**5** MANTO G3 Rear Tie Nut (code: 607240).

Detail of the MR Tie Rod DW15:




**1** Tie rod wing nut
**2** Threaded rod DW15.
**3** Tie rod marking (colour marked area).

Detail of the MANTO G3 Front Tie Nut and MANTO G3 Rear Tie Nut:

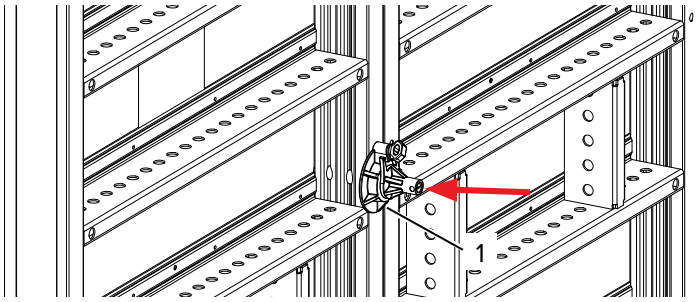



**1** MANTO G3 Front Tie Nut (code: 607230).
**2** MANTO G3 Rear Tie Nut (code: 607240).
**3** Front wing nut
**4** Fixing screw
**5** Washer
**6** Locking pin

### 9.2.2 Assembly of the tie

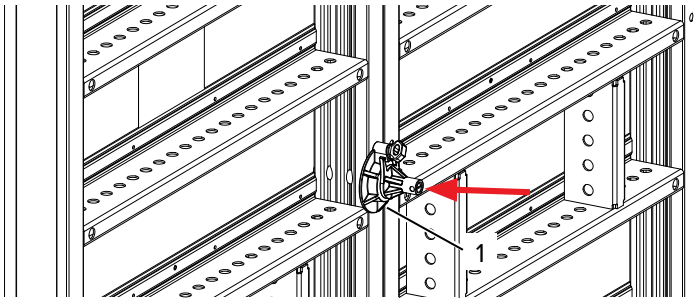
**Insert the MANTO G3 Rear Tie Nut in the tie positions of the MANTO Panels**

**Step 1** Push the MANTO G3 Rear Tie Nut (1) into the tie hole located on the profile of the MANTO Panel until the washer rests against the profile.




**1.** MANTO G3 Rear Tie Nut (code: 607240)

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




**1.** MANTO G3 Rear Tie Nut (code: 607240)

**NOTE**

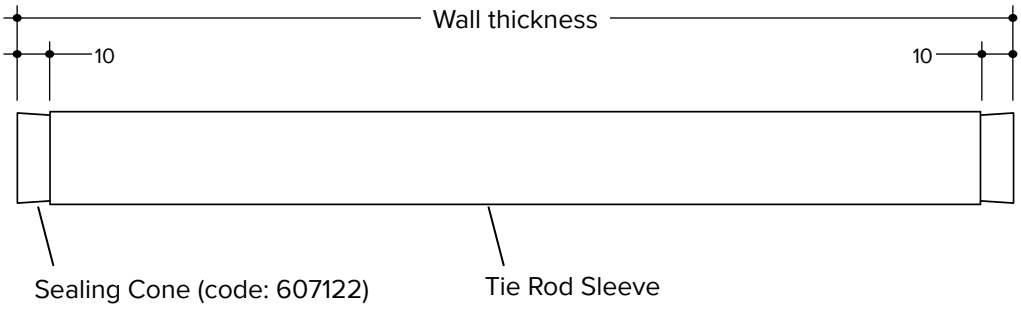
**Note!**

Close all unused tie holes, using either A Plugs (code: 602578), Plugs (code: 453253) or TK Plugs (code: 197457).

**Preparing MR Tie Rod and MANTO G3 Front Tie Nut**

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

**Step 3** Cut the Tie rod Sleeve to the required length.

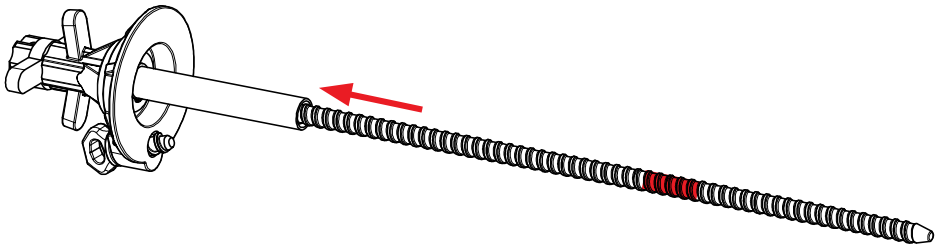



**NOTE**

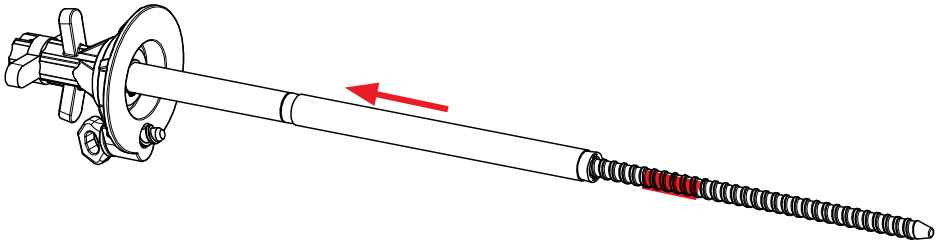
**Note!**

The length of the Tie Rod Sleeve is the wall thickness minus 20 mm.

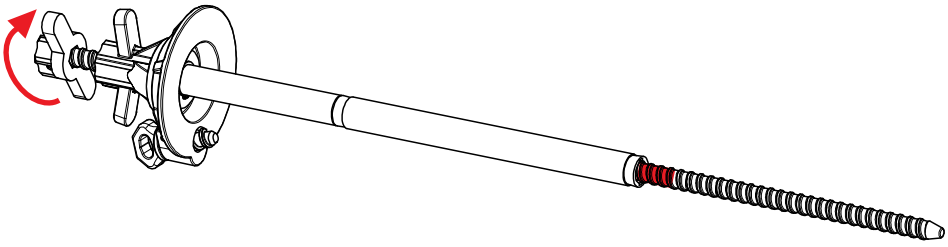
**Step 4** Screw the MR Tie Rod into the MANTO G3 Front Tie Nut.



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



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



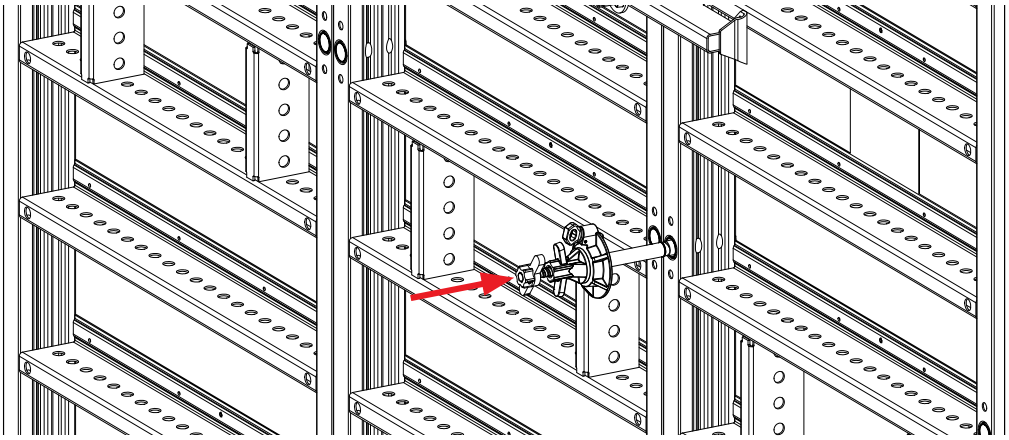
**Attaching MR Tie Rod and MANTO G3 Front Tie Nut to Advancing Side**

**Step 7** Remove the plugs from the tie holes to be used.

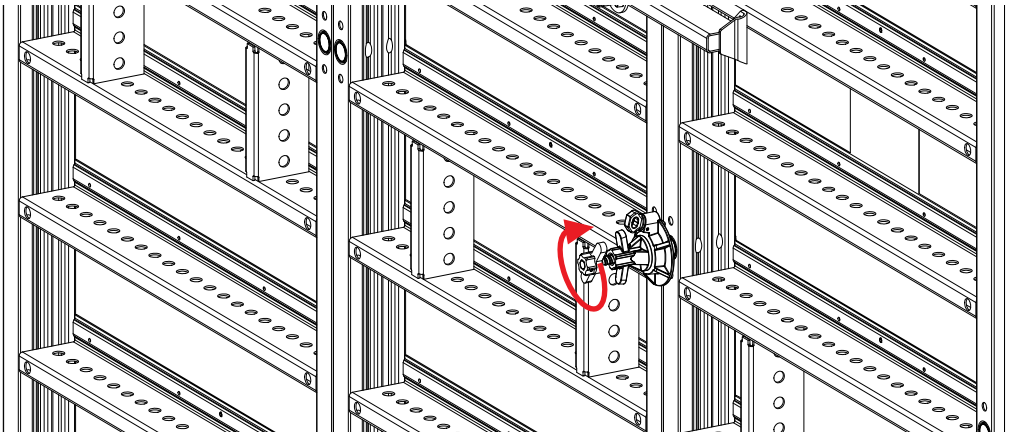
**Step 8** Close unused tie holes with plugs.

**Step 9** Set up the formwork panels.

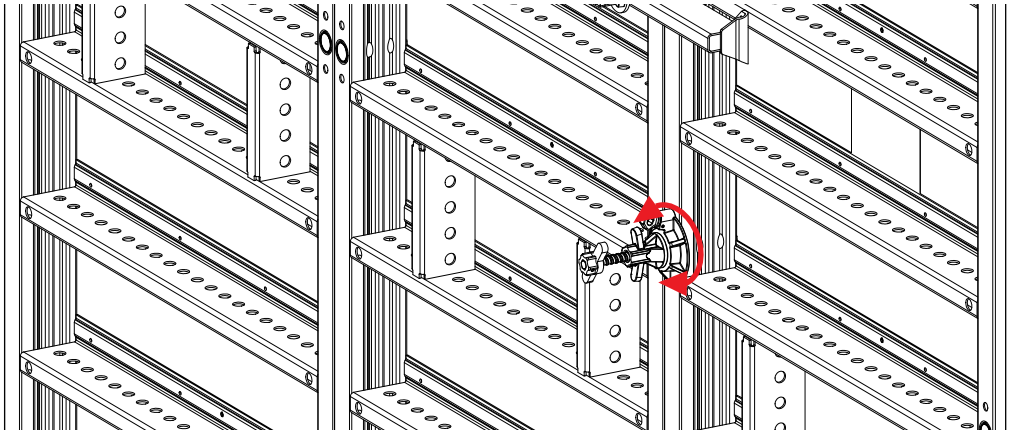
**Step 10** Position the MANTO G3 Front Tie Nut with the Tie Rod, the Tie Rod Sleeve and Sealing Cones assembled previously in the tie positions opposite the MANTO G3 Rear Tie Nuts installed in steps 1 and 2. Push the assembly through the tie holes of the opposing MANTO Panel.



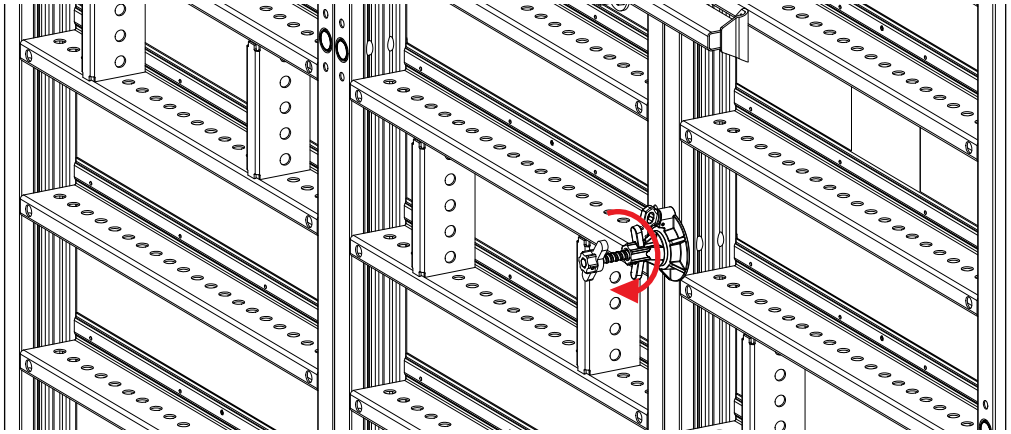
**Step 11** Screw the Tie Rod all the way into MANTO G3 Rear Tie Nut until it touches the stopping pin of the MANTO G3 Rear Tie Nut and cannot be inserted any further.



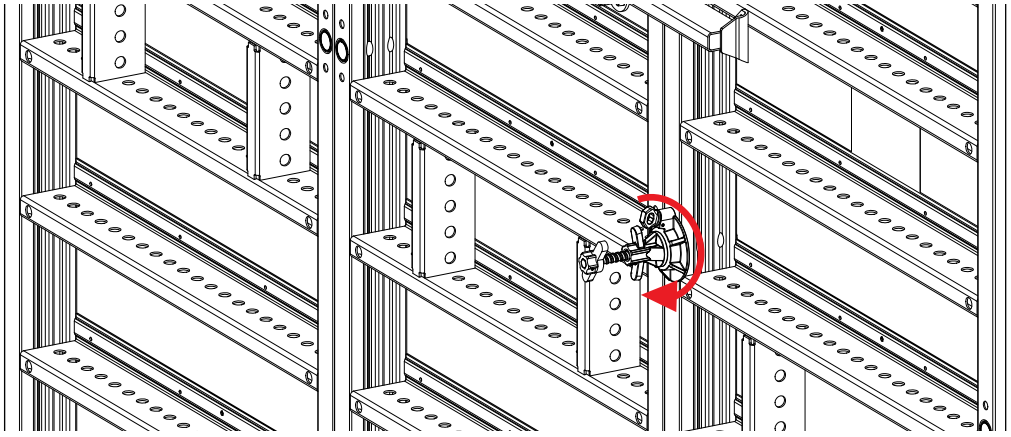
**Step 12** Rotate the washer of the MANTO G3 Front Tie Nut until the locking screw is aligned with the smaller holes in the tie position.



**Step 13** Screw the tie rod wing nut on the MANTO G3 Front Tie Nut as far in as possible.



**Step 14** Insert the locking screw of the MANTO G3 Front Tie Nut and tighten.



**Step 15** Complete the remaining ties by repeating steps 1 to 14.

| DANGER | **Danger!** |
|---|---|
| | Do not allow access to platforms if the formwork is not secured against overturning and/or tied as per design specifications. |

### 9.2.3 Dismantling the tie

**DANGER**

**Danger!**

Do not allow access to platforms during and after the dismantling of the ties.

**WARNING**

**Warning!**

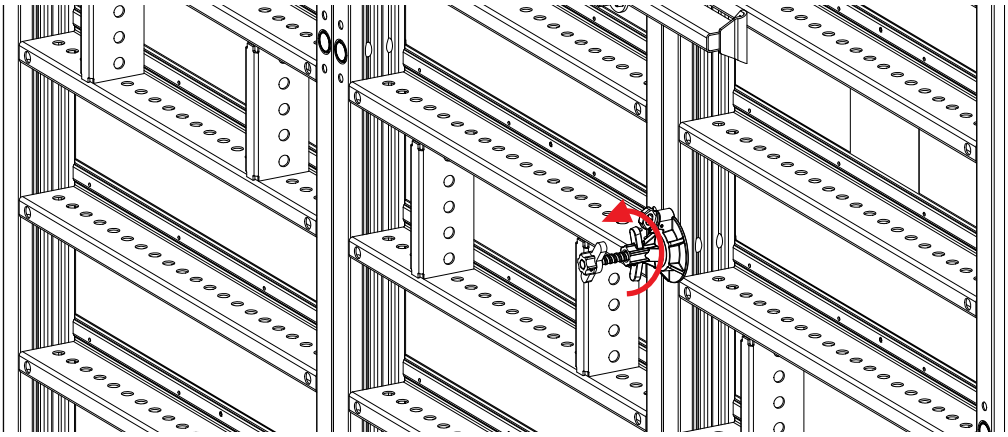
Do not remove the ties unless both sides of the formwork are secured against overturning.

**WARNING**

**Warning!**

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** Unscrew the MR Tie Rod from the MANTO G3 Rear Tie Nut using the tie rod wing nut (approx. 60 mm).

**Step 3** Pull the MR Tie Rod and the MANTO G Front Tie Nut out of the formwork. The Tie Rod Sleeve remains in the concrete. The Sealing Cones can be carefully removed after stripping and used again later.

## 9.3 Conventional tie method

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.

**NOTE**

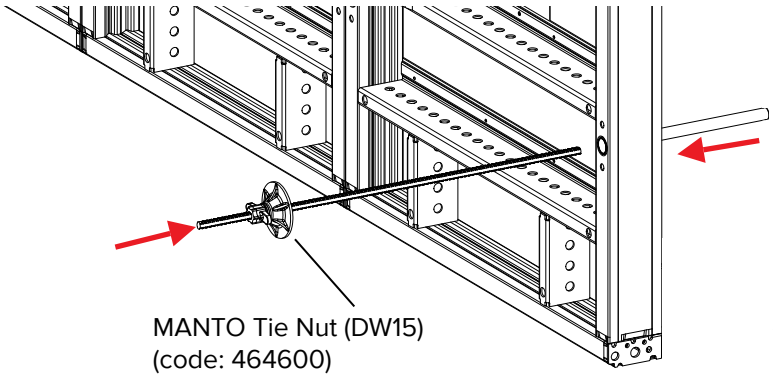
**Note!**

The above connection only applies for vertical joints between 2.70 m panels or smaller and infills up to 100 mm wide. For rules regarding infill solutions, refer to page 53.

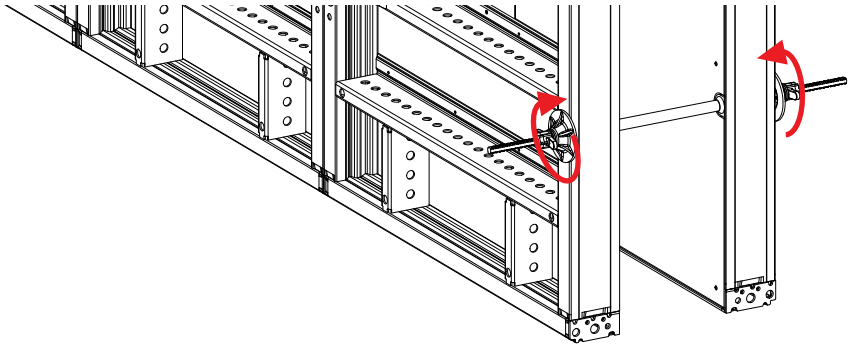
### 9.3.1 Assembling tie

**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 Rod 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.

**DANGER**

**Danger!**

Do not allow access to platforms until the formwork is secured against overturn and/or properly tied as per design specifications.

### 9.3.2 Dismantling tie

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

**DANGER**

**Danger!**

Do not allow access to platforms during and after the dismantling of the ties.

**WARNING**

**Warning!**

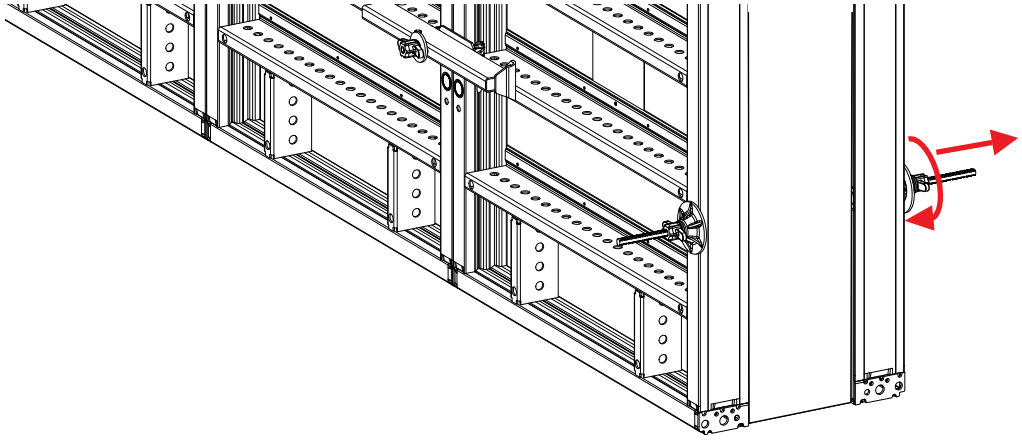
Do not remove the ties unless both sides of the formwork are secured against overturning.

**WARNING**

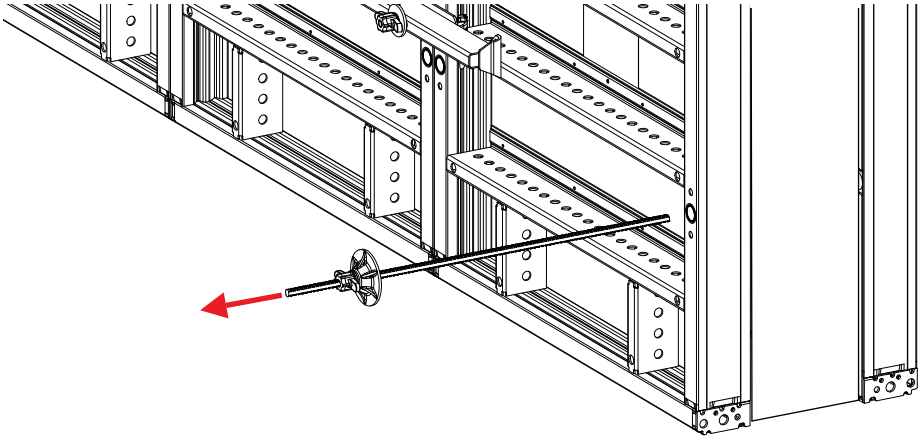
**Warning!**

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.

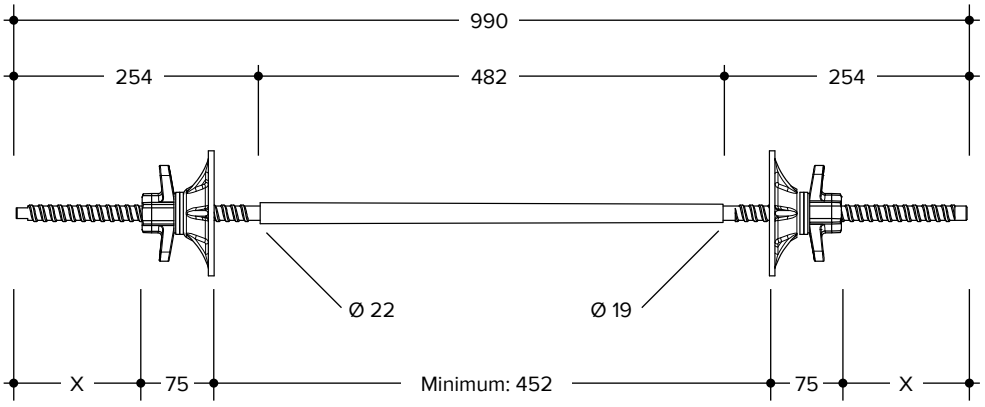




Unless stated otherwise, all dimensions in mm.

### 9.3.3 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 (nut height + MANTO Panel width)

X = (990 - 300 - 2 x (75 + 139)) / 2

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

X = (990 - 300 - 428) / 2

X = 262 / 2

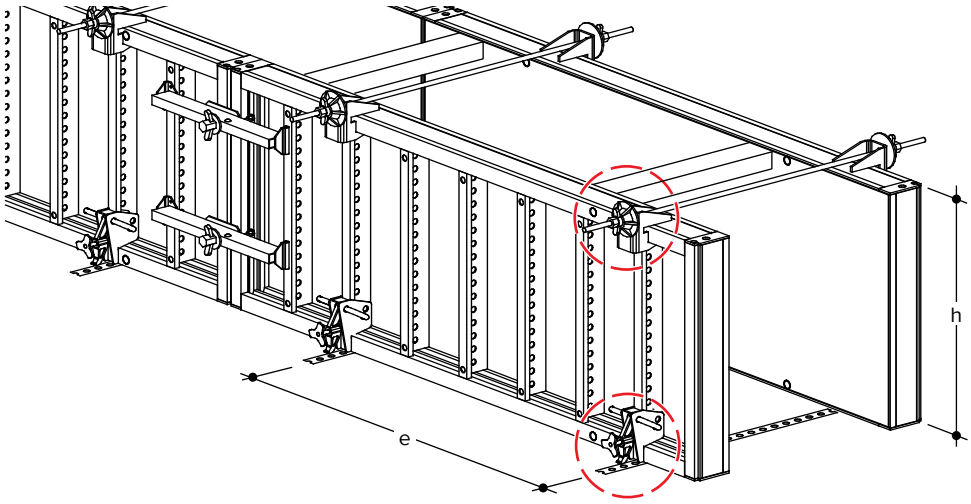
X = 131 mm

## 9.4 FU Tightener and Edge Tie Fastener MR

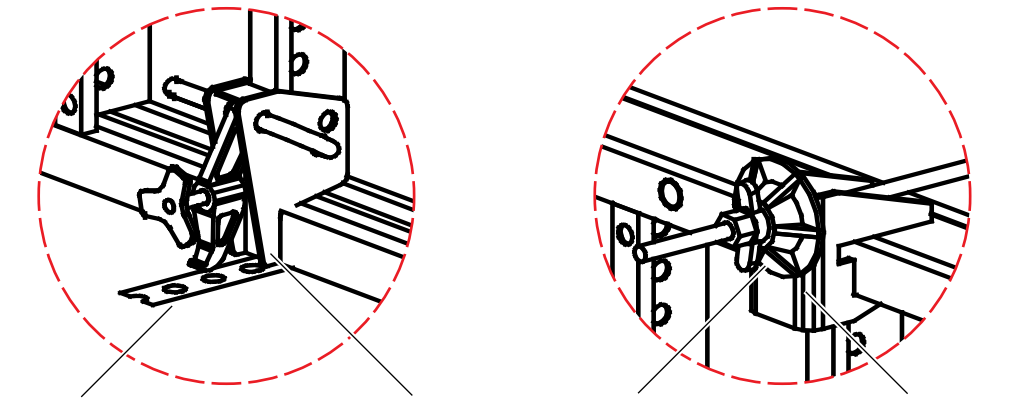
The FU Tightener and the Punched Steel Tape are an alternative solution for tying through, e.g. when panels are used for foundations.

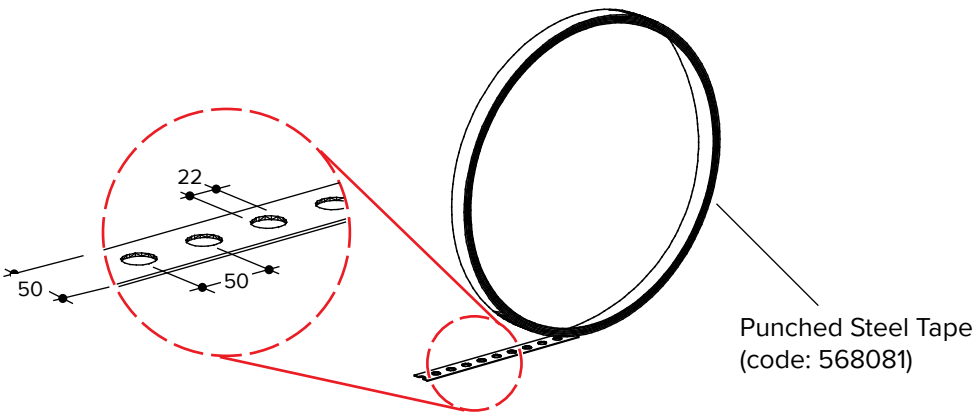
The Safe Working Load (N) of the Edge Tie Fastener MR is 10.00 kN and of the FU Tightener is 12.00 kN. This lead to a maximum distance between ties of 1.75 m when used in a 0.90 m high formwork structure.

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 |



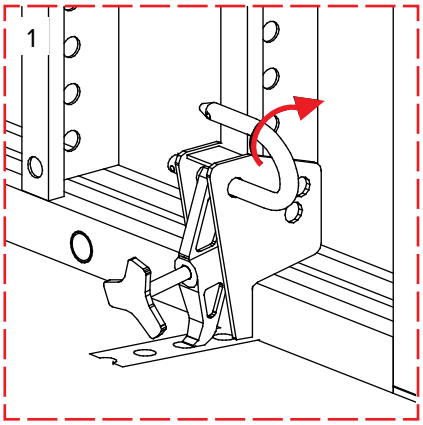


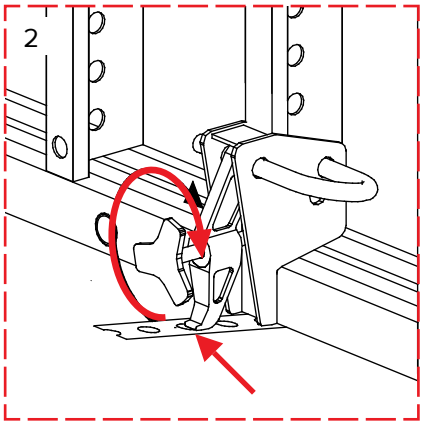

Unless stated otherwise, all dimensions in mm.

### 9.4.1 Assembly of 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.

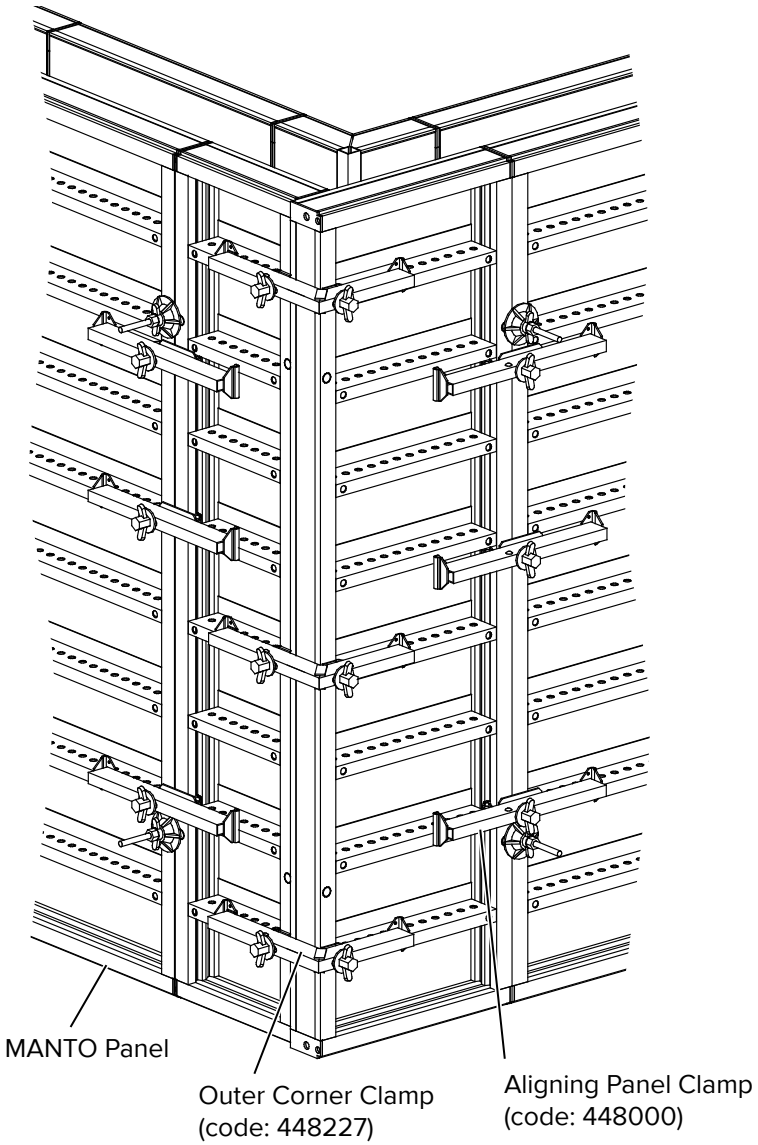


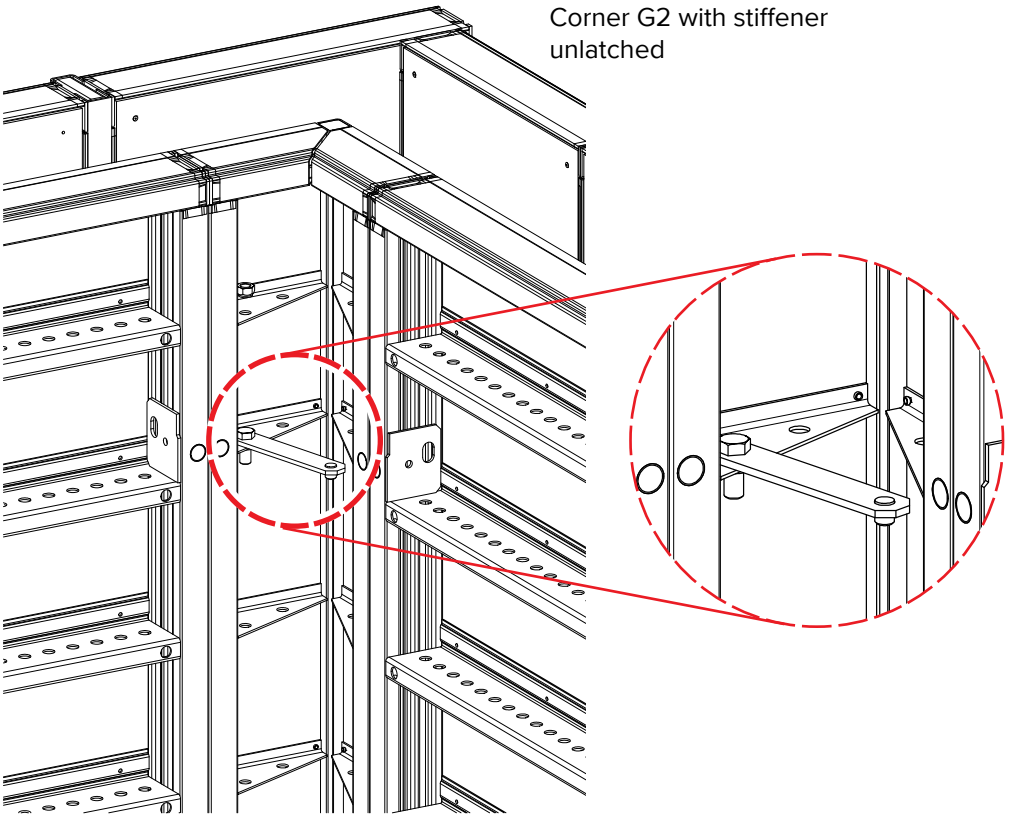
# 10 Corners

## 10.1 90° corners

90° wall corners and T-walls should be formed with the MANTO Inner Corners. Adjusting to the desired wall thickness is done with standard panels, Outer Corner Clamps, and where required MANTO Corner Adjustment 5 / timber infill.




When striking, unlatching the Inner Corner stiffener will allow for the component to flex 2°. This facilitates the release of the Inner Corner without damaging the material.



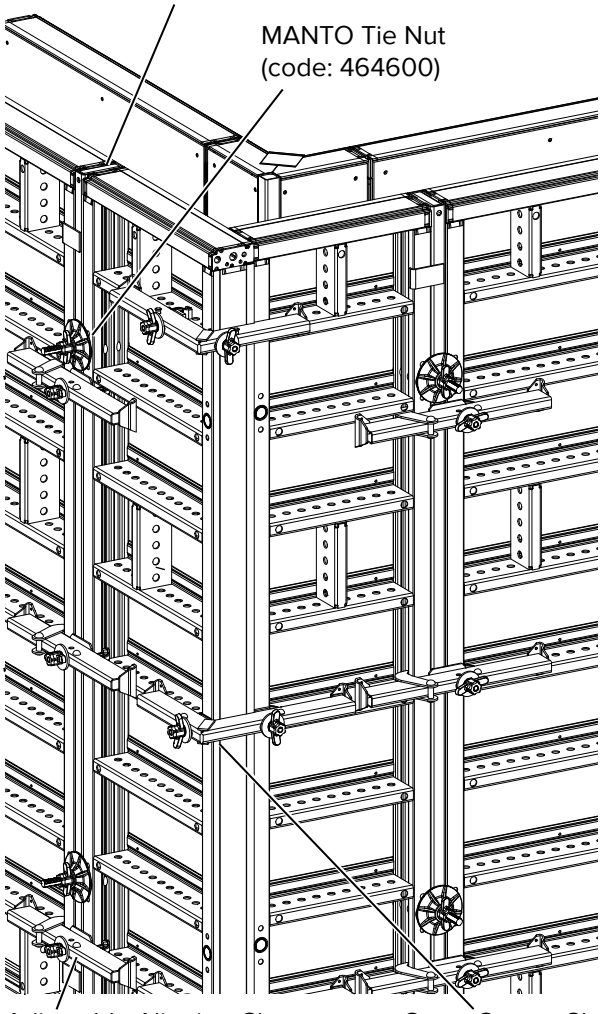
Corner G2 with stiffener unlatched

The right-angled outer corner is always made of 2no. MANTO Panels aligned and connected with Outer Corner Clamps. The desired wall thickness can be achieved using the available elements of 300 mm to 900 mm and the MANTO Corner Adjustment.

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 (Also refer to page 102).

**Using the MANTO Corner Adjustment 5**

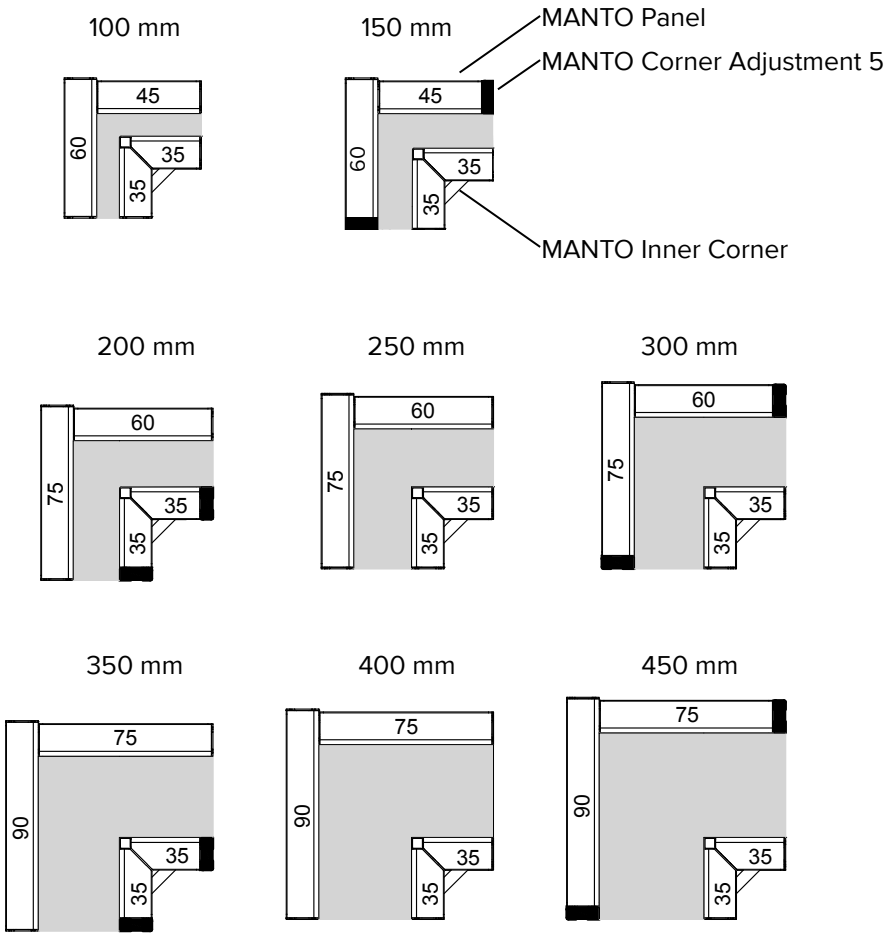
The MANTO Corner Adjustment 5 is used to achieve the 50 mm increments shown on the following pages.



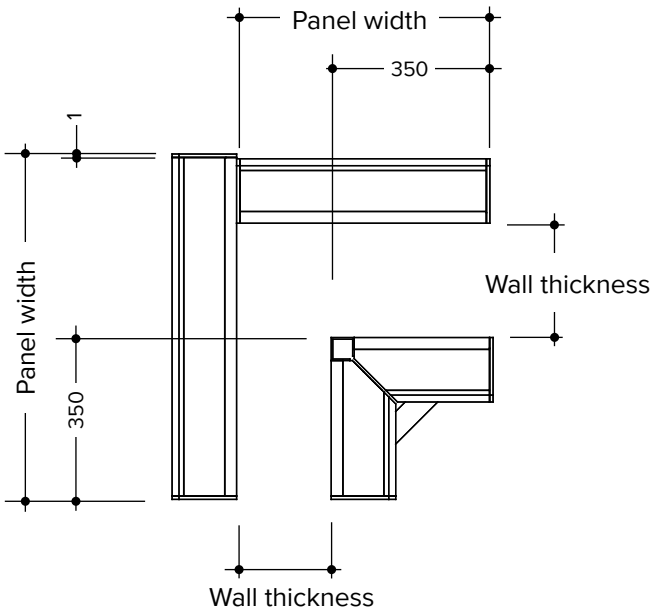

| NOTE | **Note!** |
|---|---|
| | Ties must be placed through the MANTO Corner Adjustment 5. The MANTO Tie Nut can be used for infills up to 60 mm. |

### Typical arrangements

The following illustrations show typical corner configurations using MANTO Panels, MANTO Inner Corners and MANTO Corner Adjustments 5. The wall thickness varies from 100 mm to 450 mm in 50 mm increments.

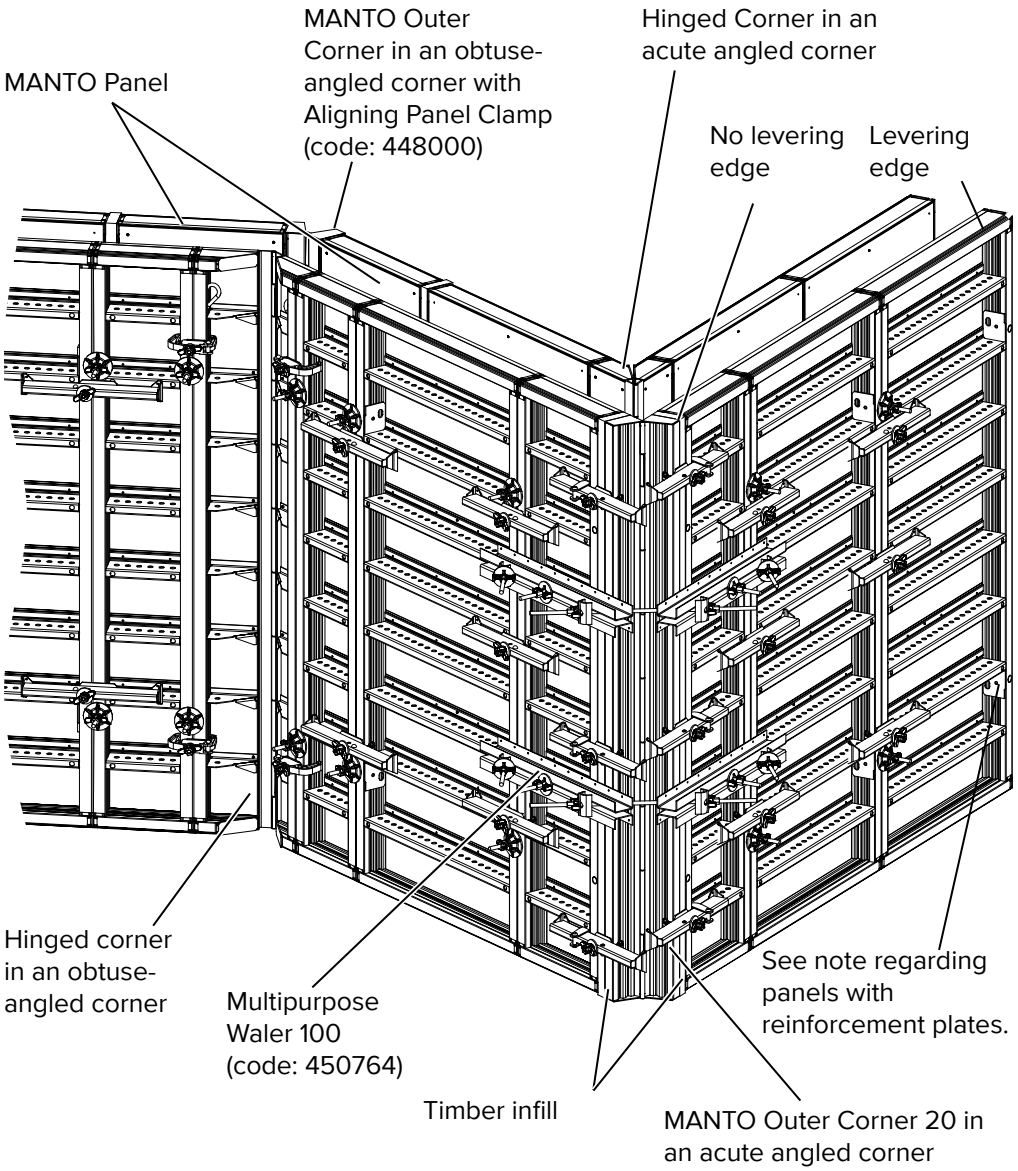



### System dimensions of the typical MANTO corner arrangement



## 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.




**WARNING**

**Warning!**

The number of horizontal connections subjected to high tensile loads varies depending on the formwork height and wall thickness.
For more information, refer to page 102.

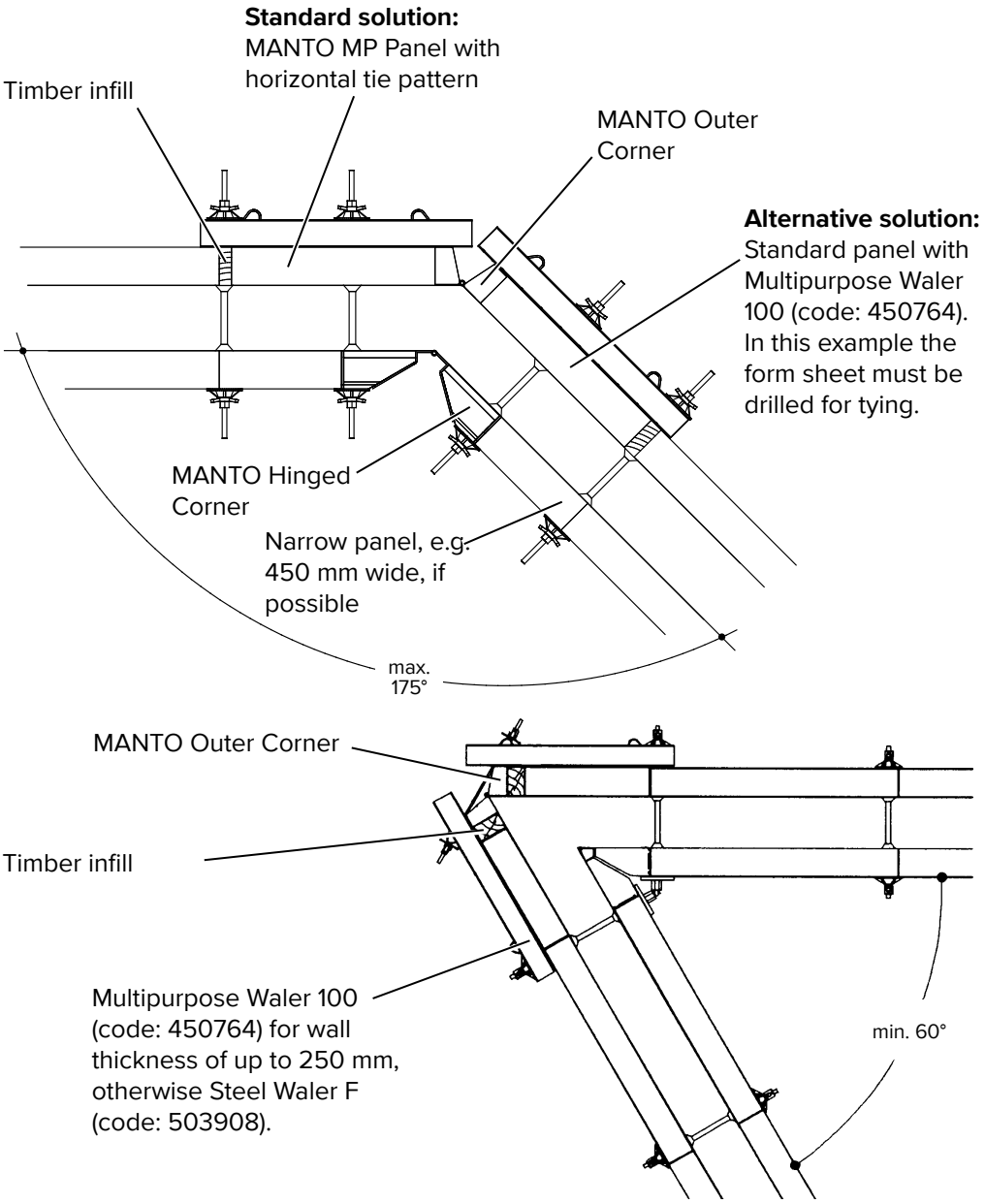
**NOTE**

**Note!**

Ties must be placed through the MANTO Corner Adjustment 5. The MANTO Tie Nut can be used for infills up to 60 mm.

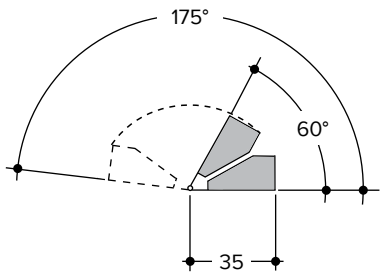


Unless stated otherwise, all dimensions in mm.

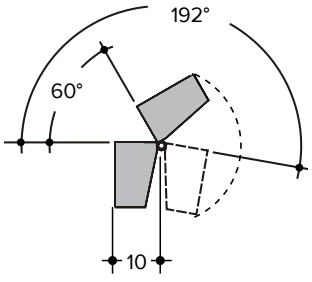



Adjustment ranges for the MANTO Hinged Corner and the MANTO Outer Corner.

MANTO Hinged Corner




MANTO Outer Corner



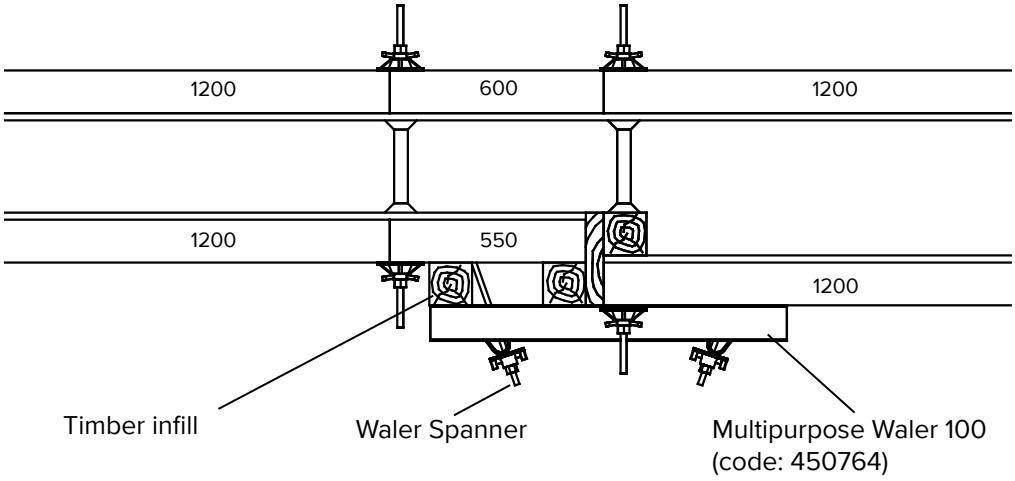
# 11 Wall offsets

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

## 11.1 Wall offset

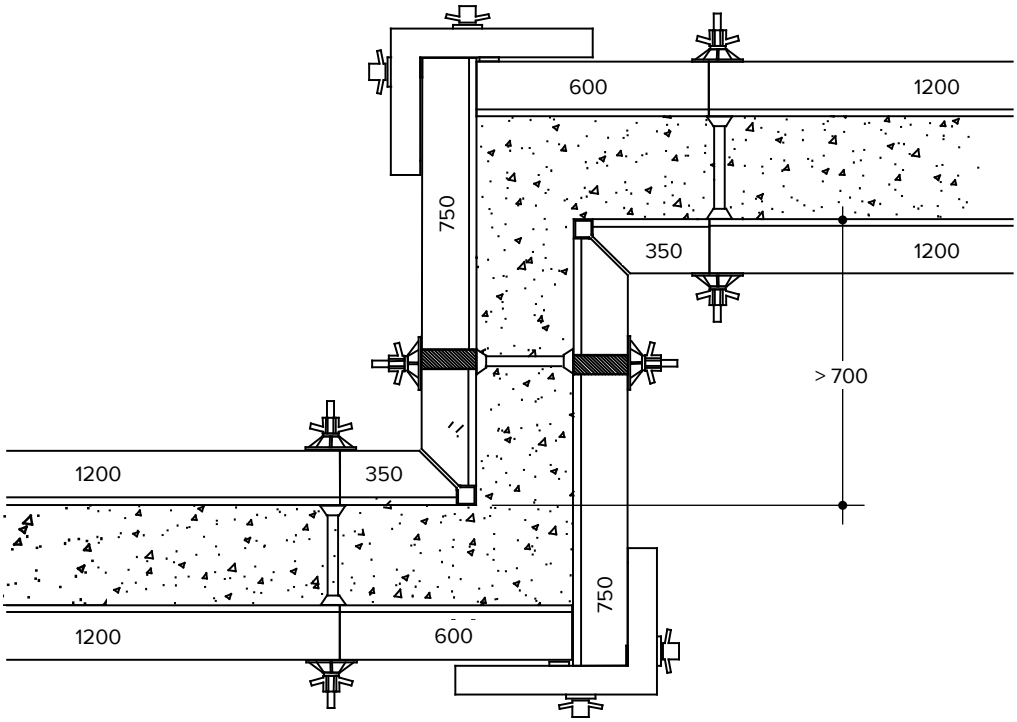
### Small wall offsets

Variations of the wall thickness can be formed using the Multipurpose Waler 100, Waler Spanners and additional timber infills supplied on site.




### Wall offsets greater than 1000 mm

For wall offsets greater than 1000 mm, tie in this area as shown here.




**WARNING**

**Warning!**

The number of horizontal connections subjected to high tensile loads varies depending on the formwork height and wall thickness.
For more information, refer to page 102.

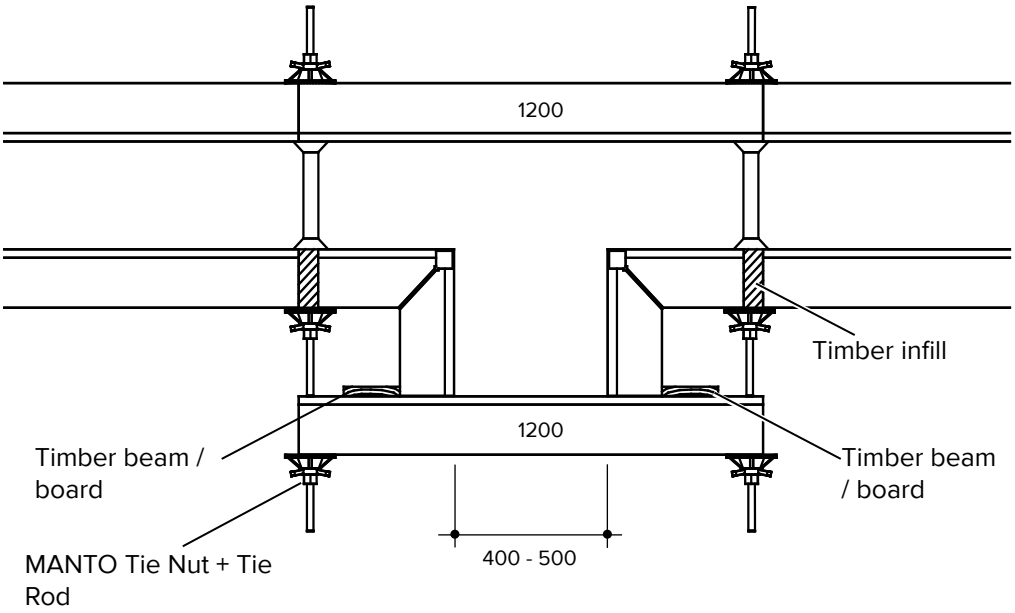


Unless stated otherwise, all dimensions in mm.

## 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.



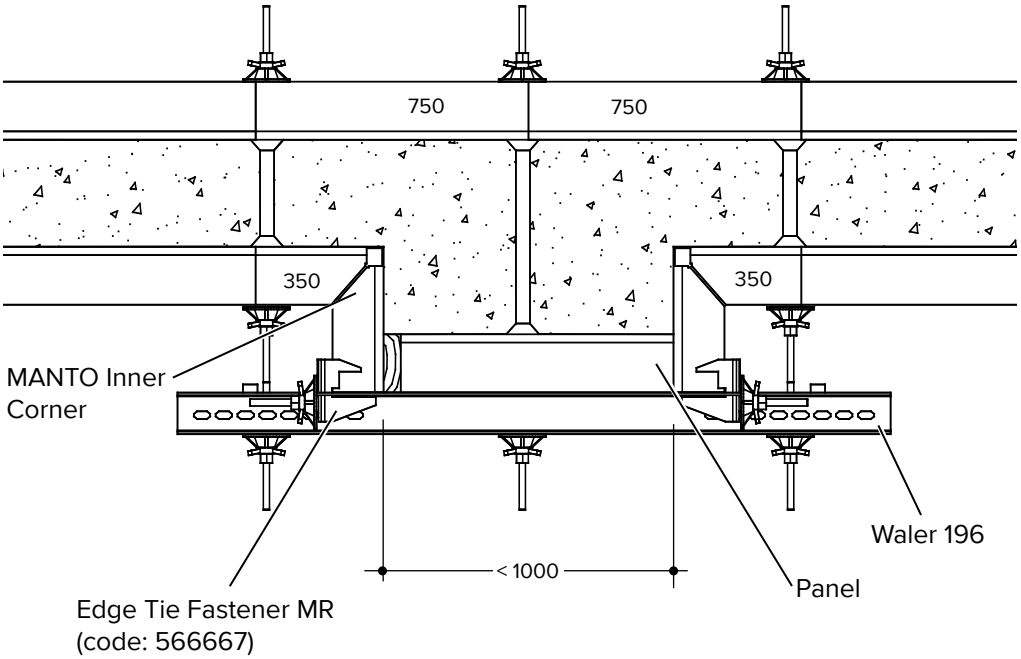

**WARNING**

**Warning!**

The timber beams / boards supplied on site must be properly secured.

### 500 mm to 1000 mm wide pilasters

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



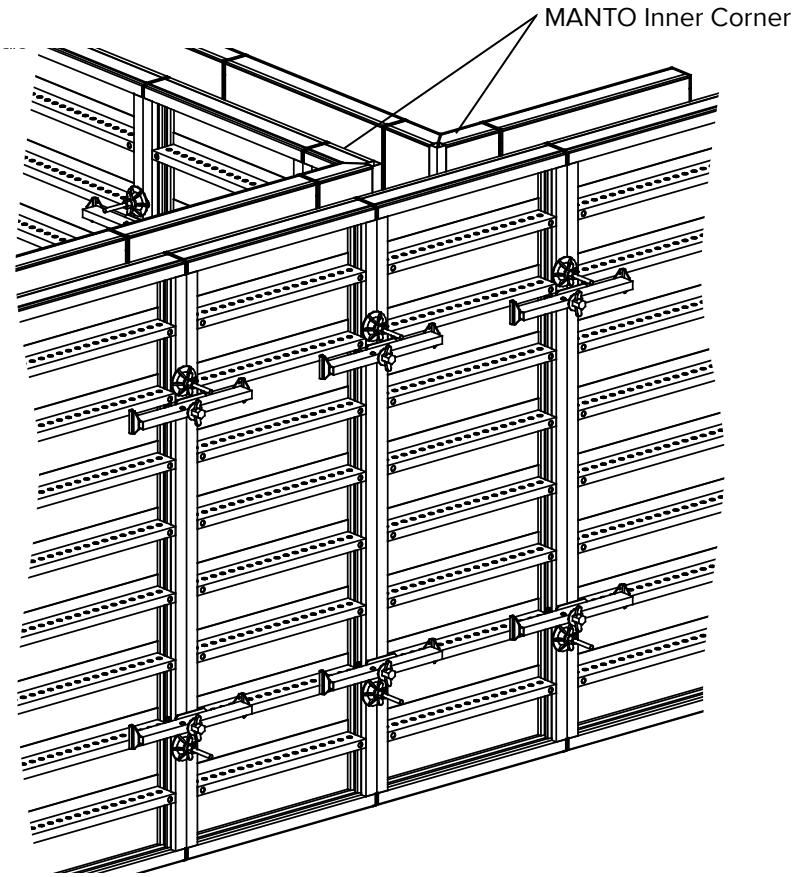

**NOTE**

**Note!**

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

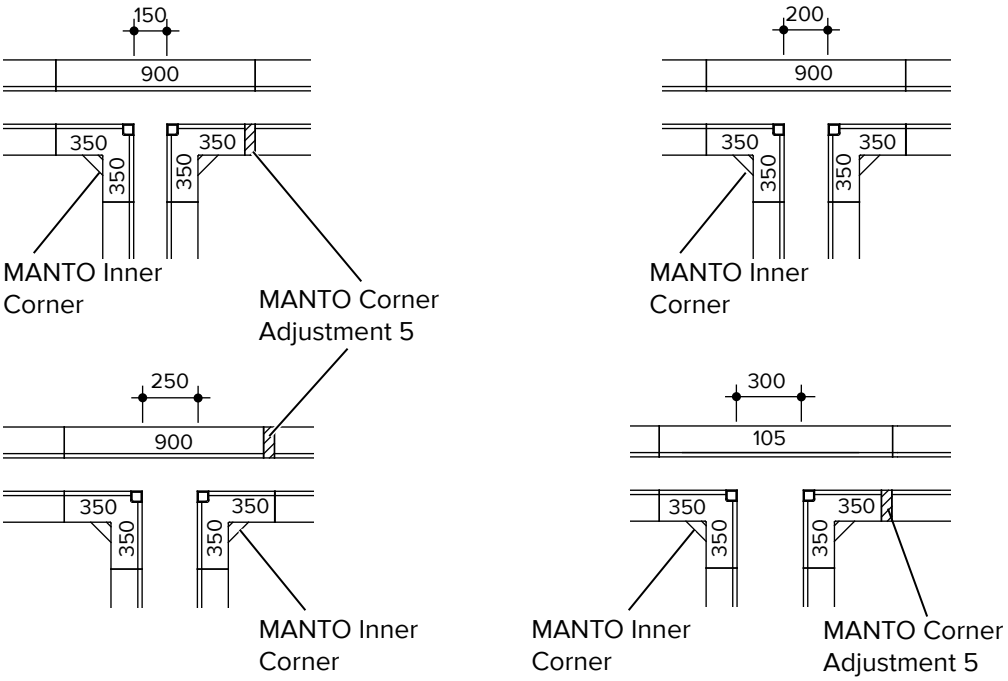
## 11.3 T-walls

T-walls up to 400 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 Panels, MANTO Inner Corners and MANTO Corner Adjustment 5. The wall thickness varies from 150 mm to 300 mm in 50 mm increments.

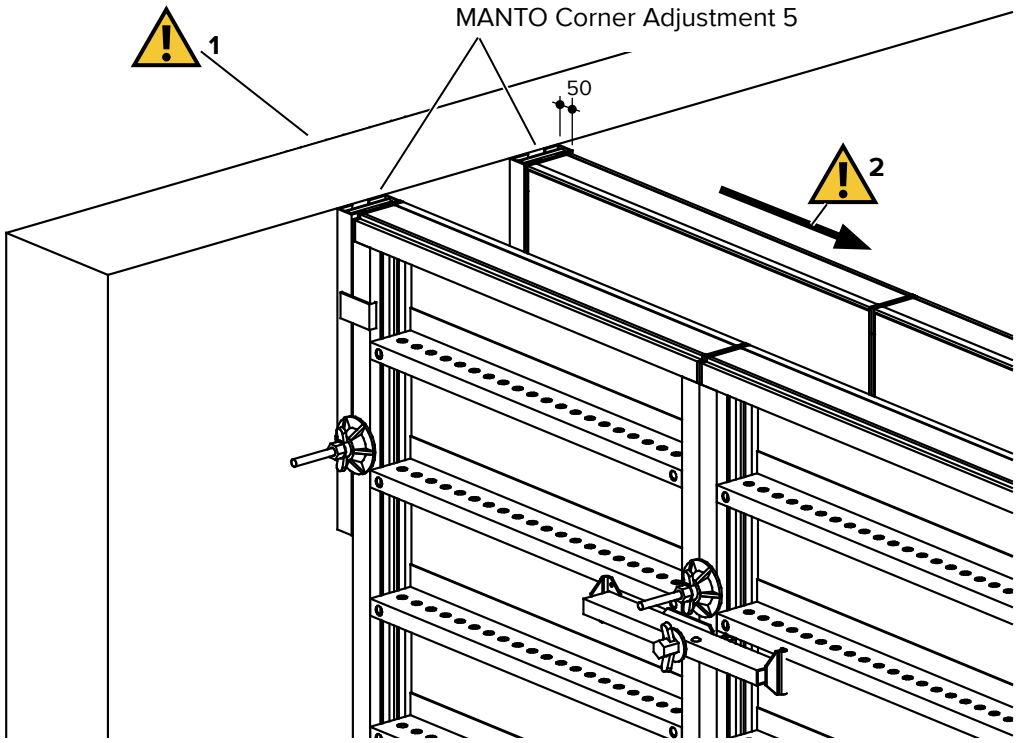





Unless stated otherwise, all dimensions in mm.

## 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.

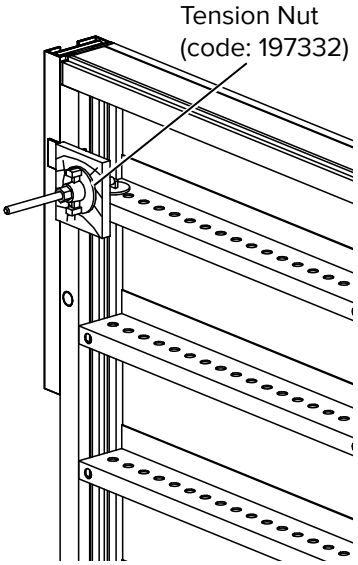


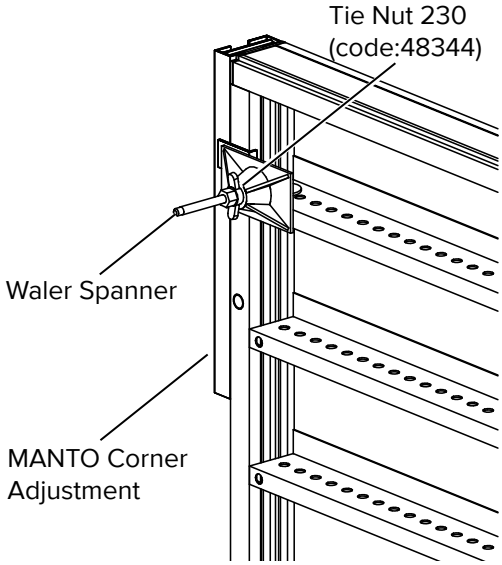

**WARNING**

**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.

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.



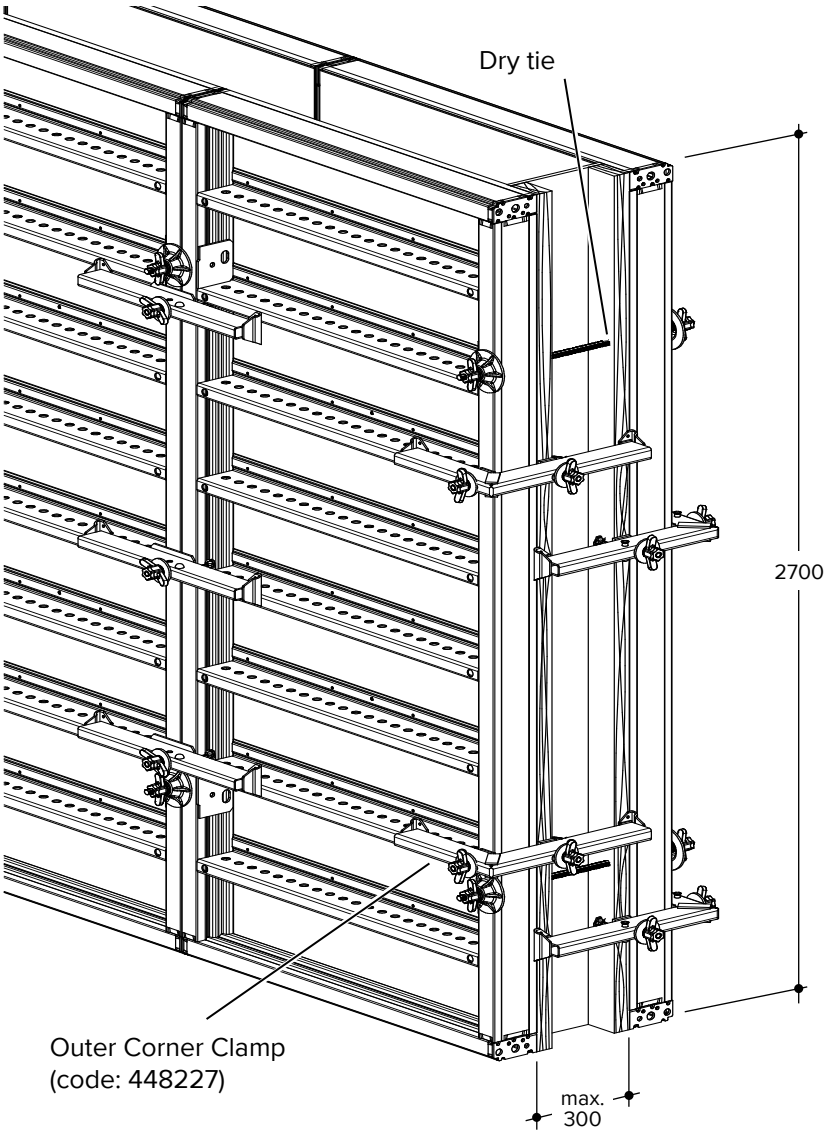
# 12 Stop-ends

There are three ways to create stop-ends using the MANTO formwork system.

## 12.1 Using the Outer Corner Clamps

**Up to 300 mm wall thickness**

Stop-ends can be formed for walls up to 300 mm thick using the Outer Corner Clamp. The Outer Corner Clamps have to be attached to the end panels and attached as shown below.




| NOTE | **Note!** |
|---|---|
| | Bulkhead Clamps and dry ties should also be attached to the last panel in the position and quantity shown. |

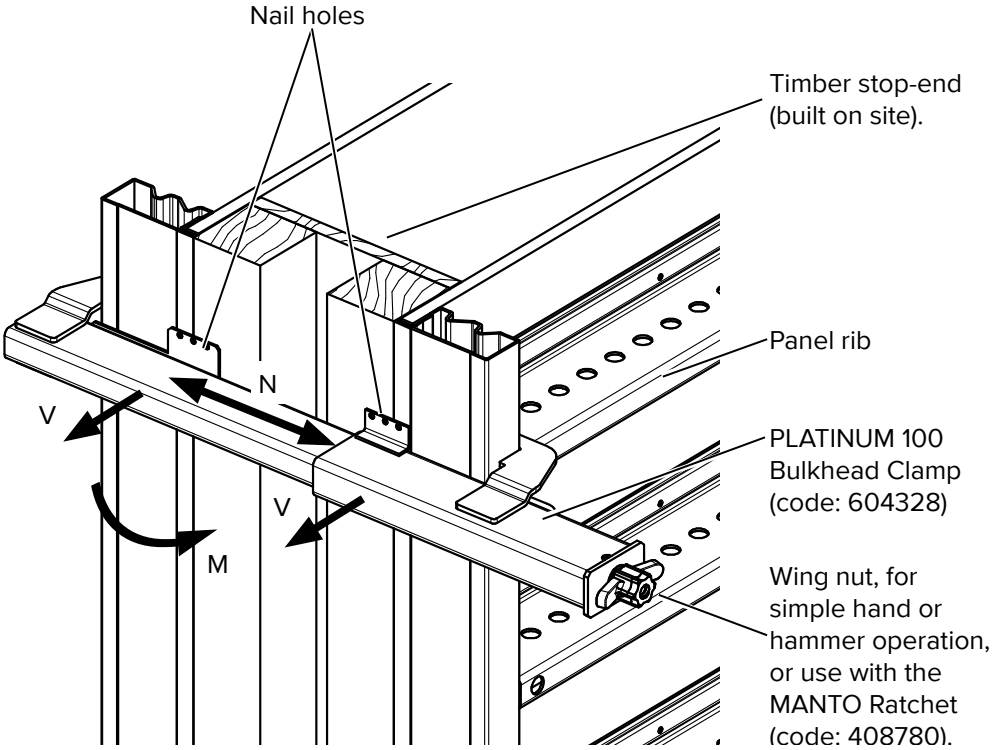


Unless stated otherwise, all dimensions in mm.

## 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 for 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 stop-end formwork.




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

**WARNING**

**Warning!**

It is advisable to attach the PLATINUM® 100 Bulkhead Clamps over the panel ribs as shown above.

**WARNING**

**Warning!**

The number of horizontal connections subjected to increased tensile loads varies depending on the formwork height and wall thickness.
For more information, refer to page 102.

**Maximum spacing of PLATINUM® 100 Bulkhead Clamps for a formwork height of 2.70 m.**

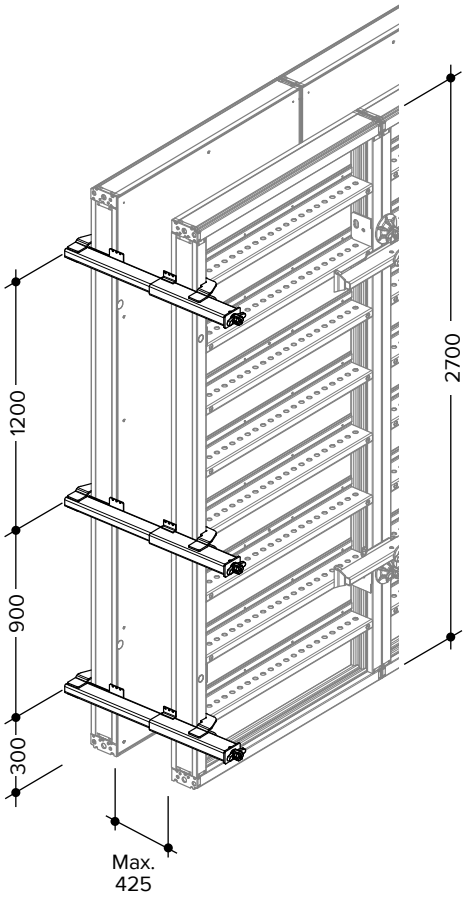
Starting from the bottom, the first PLATINUM® 100 Bulkhead Clamp is positioned 300 mm above the base of the panel. The second Bulkhead Clamp is then placed 900 mm above the first Bulkhead Clamp. The third is attached 1.20 m above the second one.

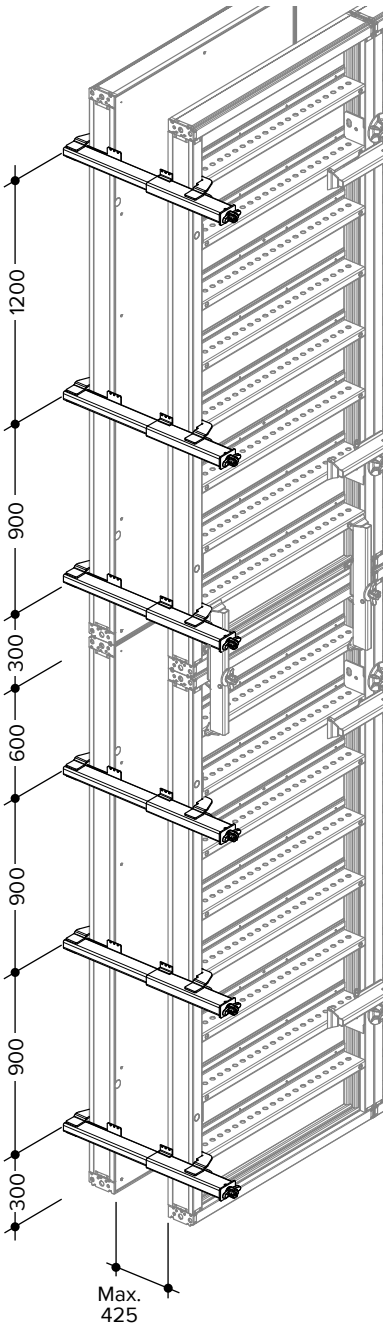
**Maximum spacing of PLATINUM® 100 Bulkhead Clamps with extended formwork**

Starting from the bottom, the first PLATINUM® 100 Bulkhead Clamp is positioned 300 mm above the base of the panel. The remaining Bulkhead Clamps are then attached at intervals of 900 mm, with the exception of the top Bulkhead Clamp, which should be placed 300 mm from the top.

Configuration:

- 80.00 kN/m$^2$, 425 mm wall thickness
- At least 3no. Blukhead Clamps for each 2.70 m or 3.30 m upright panel.



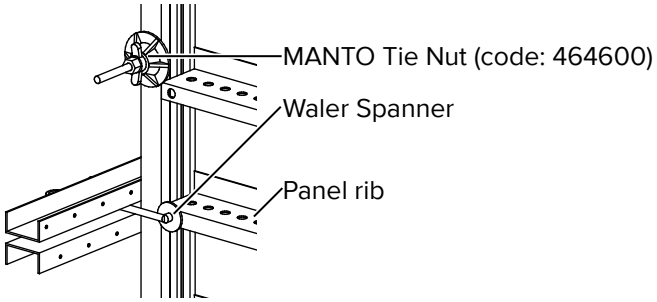



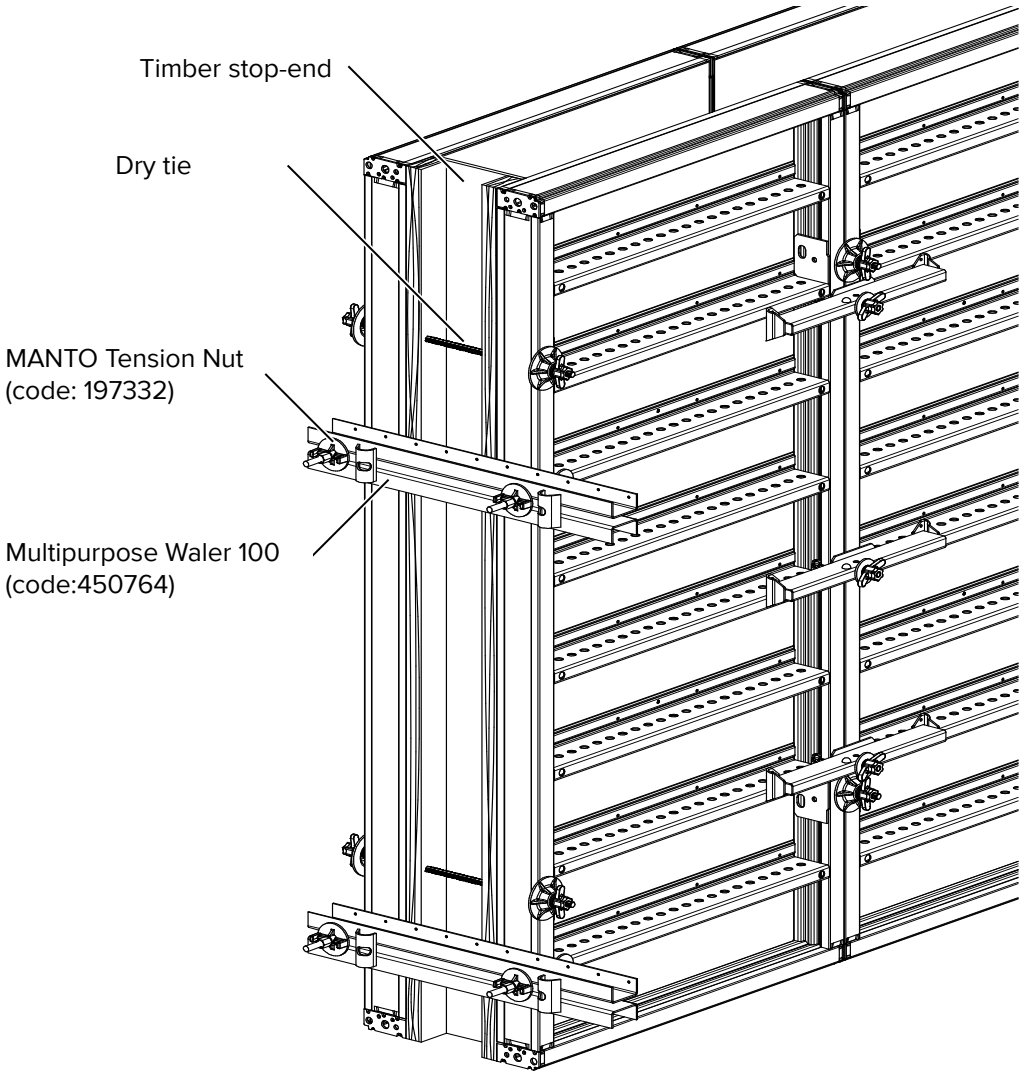



Unless stated otherwise, all dimensions in mm.

## 12.3 Using the MANTO Multipurpose Waler 100

The Multipurpose Waler 100 can also be used to form a stop-end for a wall thicker than 425 mm. It is fastened to the last MANTO Panels, tied in the usual manner, with 2no. Waler Spanners. Bulkhead Clamps and dry ties should also be attached to the last panel in the position and quantity shown.



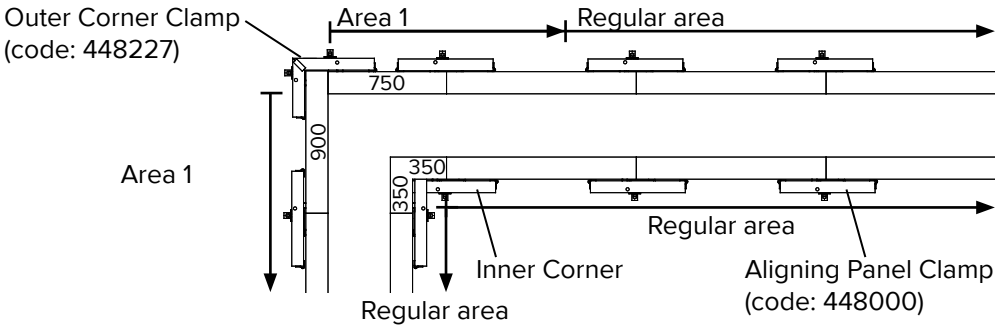

**WARNING**

**Warning!**

The number of horizontal connections subjected to increased tensile loads varies depending on the formwork height and wall thickness.
For more information, refer to page 102.

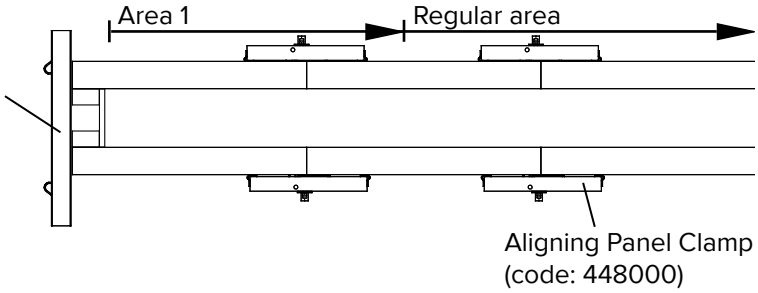
## 13 Horizontal connections with increased tensile loads

| Outer corner | | | | |
|---|---|---|---|---|
| MANTO Panel (Height) | Wall thickness ≤ 300 mm | | Wall thickness > 300 mm | |
| | Corner | Area 1 < 1250 mm | Corner | Area 1 < 1550 mm |
| | No. of Outer Corner Clamps | No. of Aligning Panel Clamps | No. of Outer Corner Clamps | No. of Aligning Panel Clamps |
| 2.70 m | 3 | 3 | 3 | 3 |
| 3.30 m | 4 | 3 | 4 | 4 |
| 2.70 m / 1.20 m | 3/2 | 4/1 | 5/2 | 5/1 |
| 3.30m / 1.20 m | 4/2 | 4/1 | 6/2 | 7/1 |
| 2.70m / 2.70 m | 4/3 | 4/3 | 6/3 | 6/3 |
| 2.70 m / 3.30 m | 4/4 | 5/3 | 6/4 | 6/4 |
| 3.30m / 3.30 m | 5/4 | 5/3 | 7/4 | 7/4 |




| Stop-end | | | | |
|---|---|---|---|---|
| MANTO Panel (Height) | Wall thickness ≤ 300 mm | | Wall thickness 300 mm - 600 mm | |
| | Stop-end | Area 1 < 500 mm | Stop-end | 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 | 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 | 2/2 | 3/2 |
| 2.70 m / 2.70 m | 2/2 | 3/2 | 3/2 | 3/3 |
| 2.70 m / 3.30 m | 2/2 | 3/2 | 3/2 | 3/3 |
| 3.30 m / 3.30 m | 3/2 | 3/2 | 3/2 | 3/3 |

* - Stop-end holder.
For Bulkhead Clamps (code: 604328) refer to page 99.




**WARNING**

**Warning!**

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 in mm.

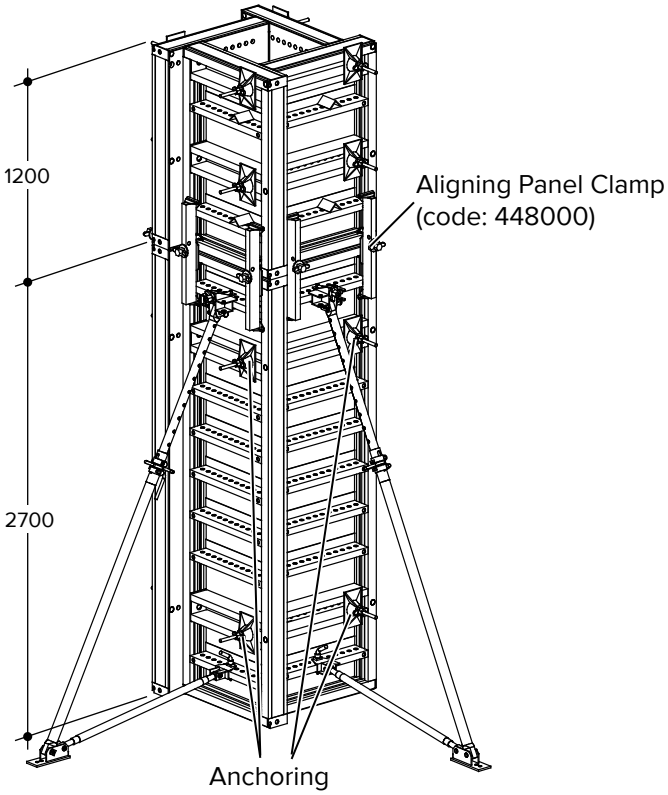
# 14 Column formwork

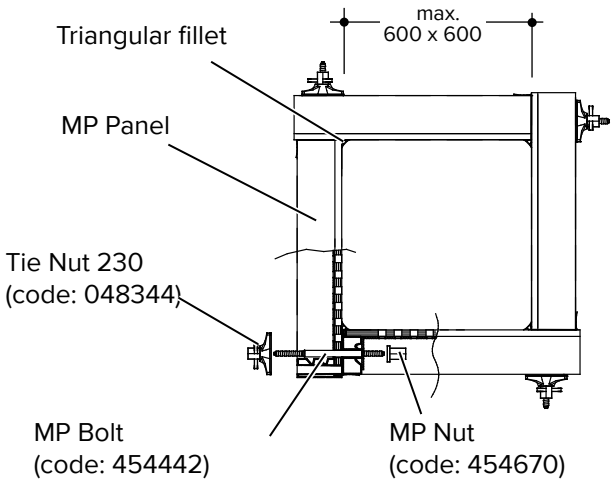
## 14.1 Using MANTO MP Panels

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 Aligning Panel Clamp.

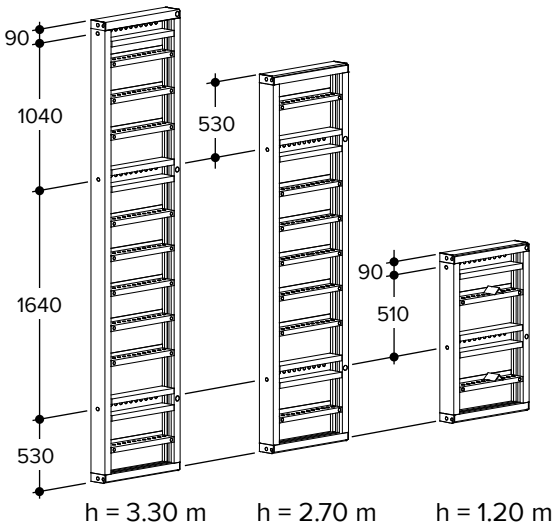
Maximum column size: 600 mm x 600 mm

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

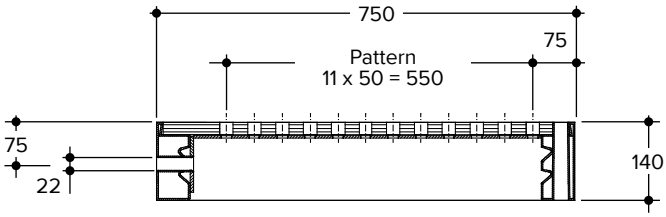


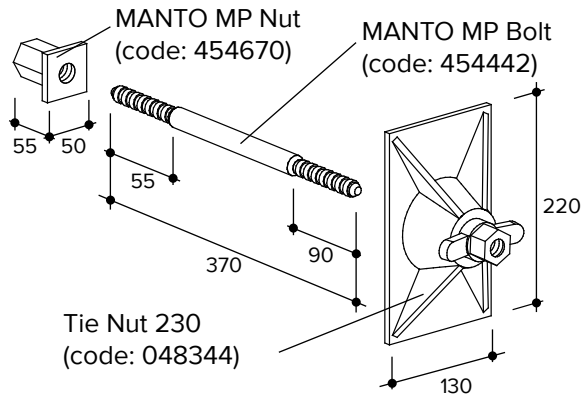
Three different panel heights are available.



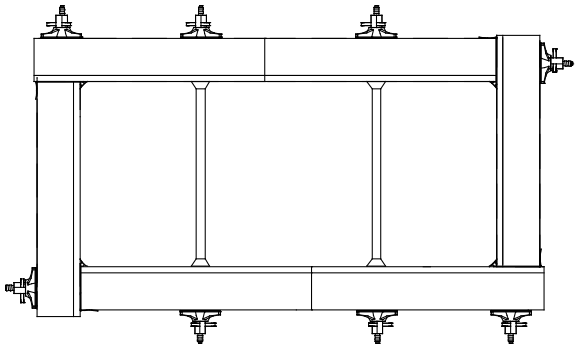

The tie holes of the MP Panels can be seen in the typical cross-section shown below.




The panels are connected with the MP Bolt, the MP Nut and the Tie Nut 230. For forming 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.





Unless stated otherwise, all dimensions in mm.

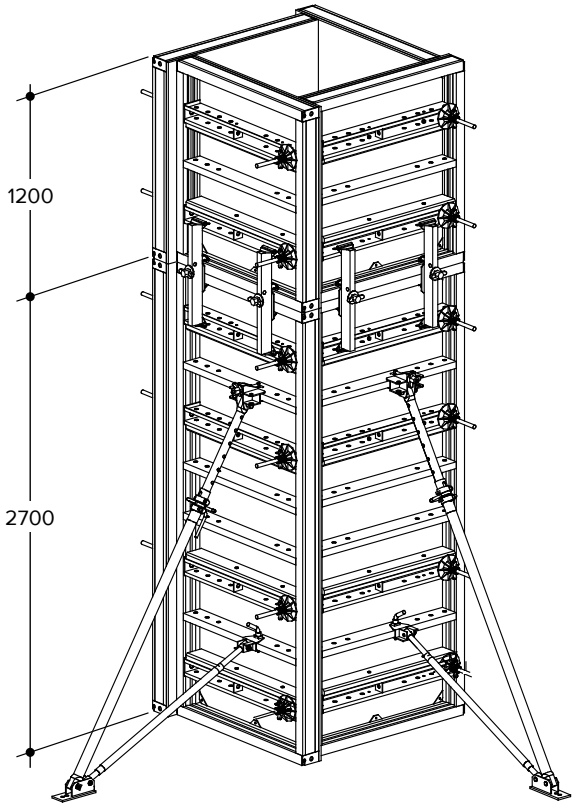
## 14.2 Using MANTO Column Frames

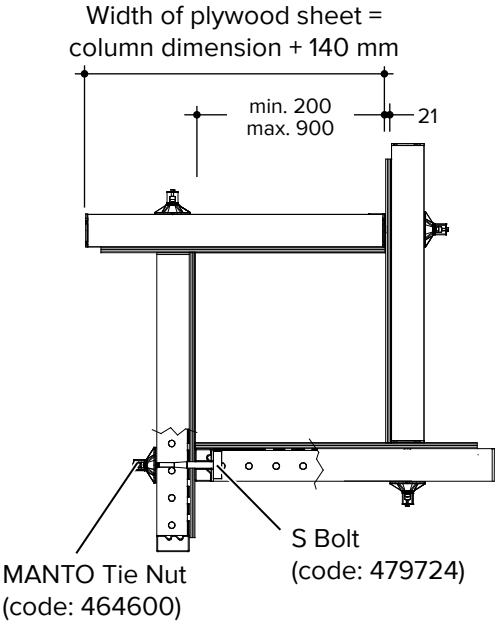
The MANTO Column Frames are supplied without the form sheet. They can be covered on site with a sturdy form sheet, using the built-in wooden strip.

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

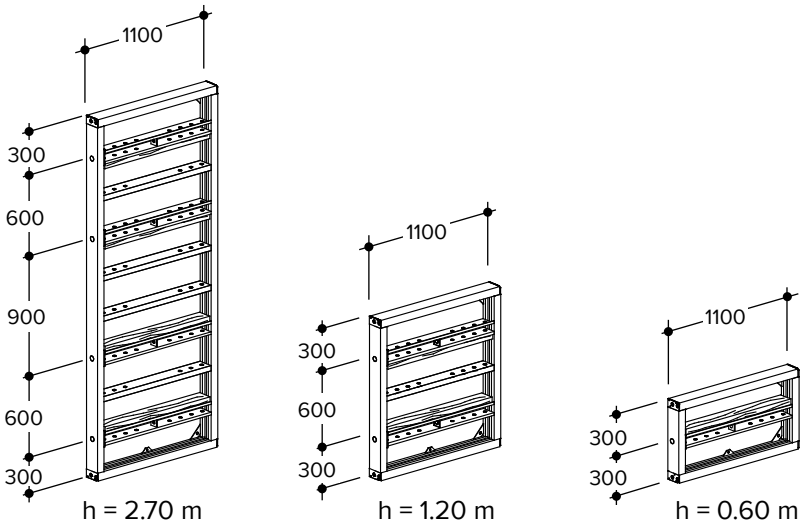
Maximum column size: 900 mm x 900 mm

Permitted concrete pressure: 100.00 kN/m$^2$

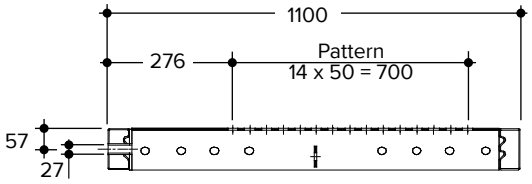


Three different MANTO Column Frame panels are available.

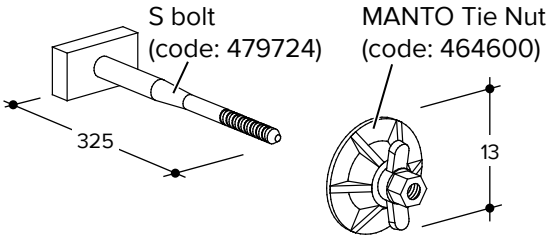



The available tie positions of the panels can be seen in the typical horizontal section shown below.




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.



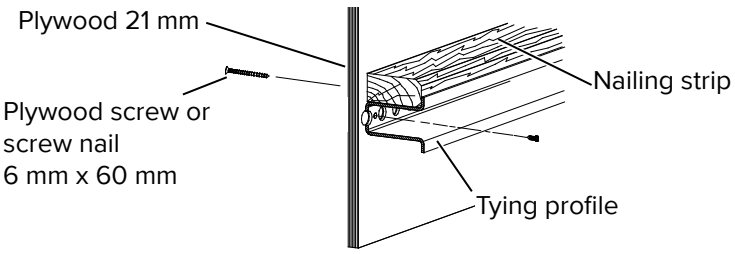

**NOTE**

**Note!**

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.






Unless stated otherwise, all dimensions in mm.

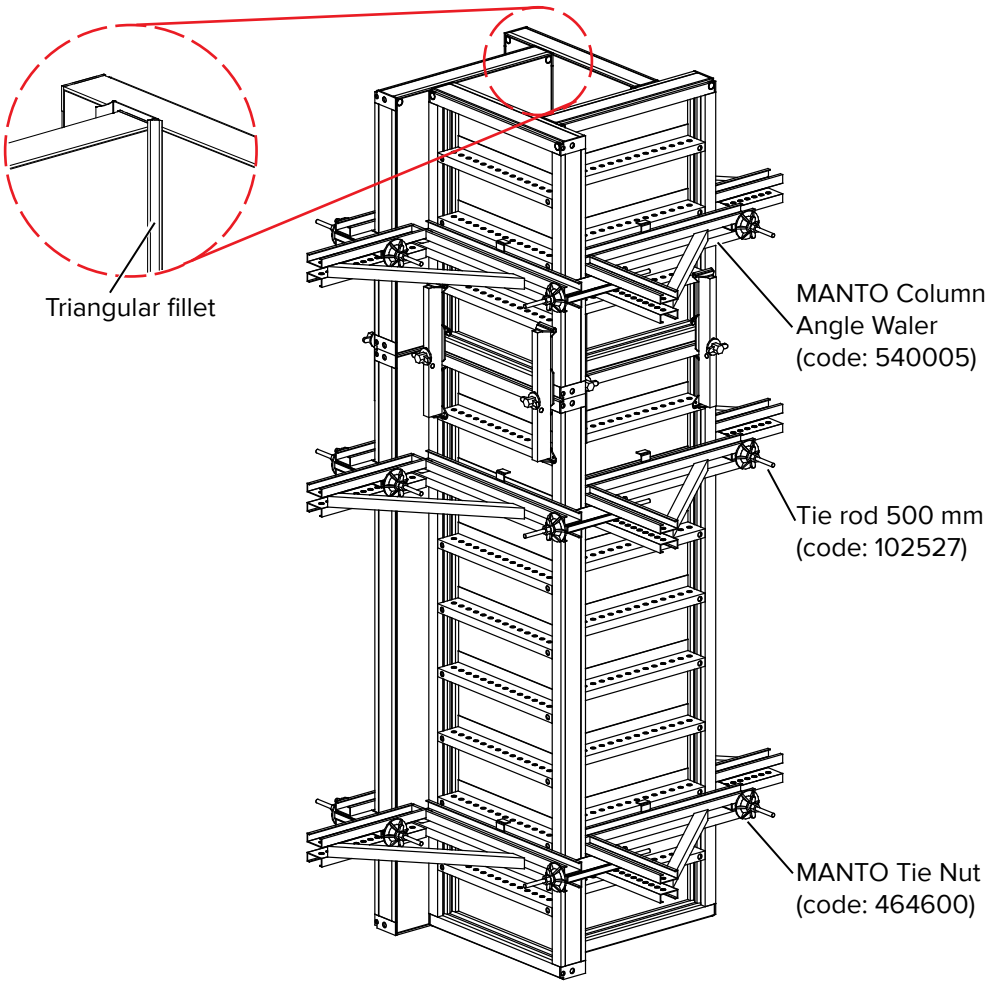
## 14.3 Using the MANTO Column Angle Waler

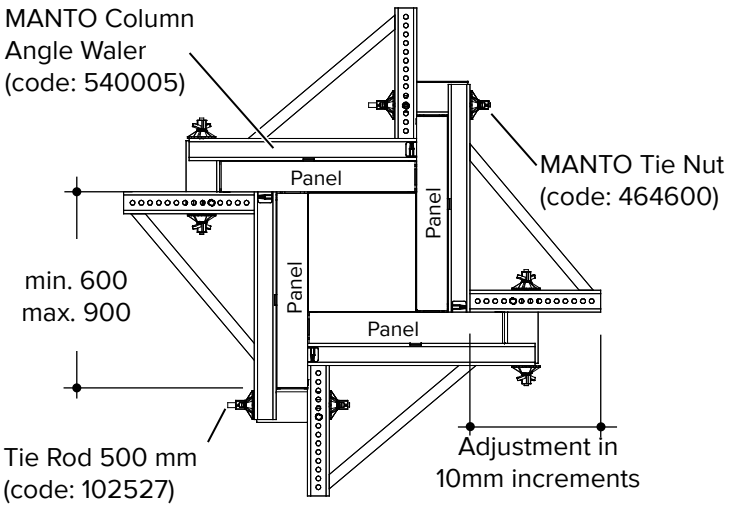
The MANTO Column Angle Waler allows columns to be formed without having to use special panels. Standard MANTO panels 600 mm to 900 mm wide are used for this solution.

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)

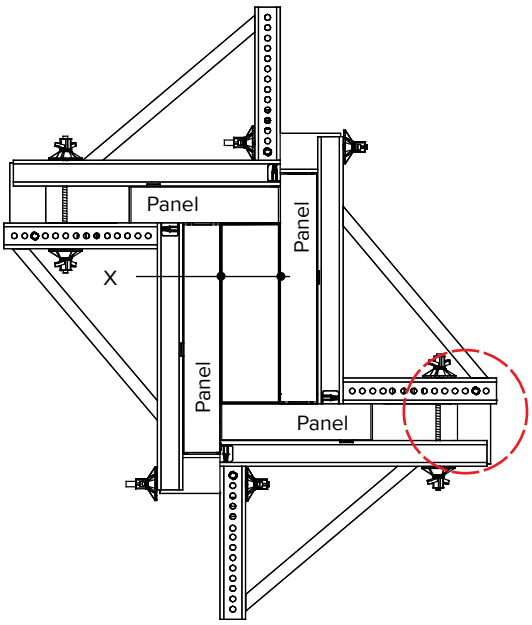
Permitted fresh concrete pressure: 80.00 kN/m$^2$.



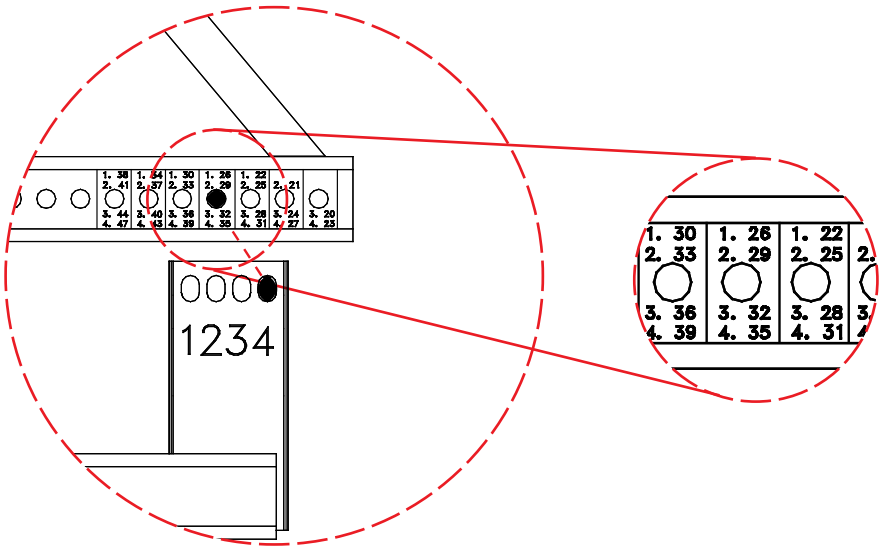



Panels ranging in width from 600 mm to 90 mm can be used to create non-square columns. The marking of the hole pattern allows easy adjustment to the desired column dimensions. Find the hole on the grid with the appropriate dimension and connect it to the hole with the number preceding the dimension (1 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.

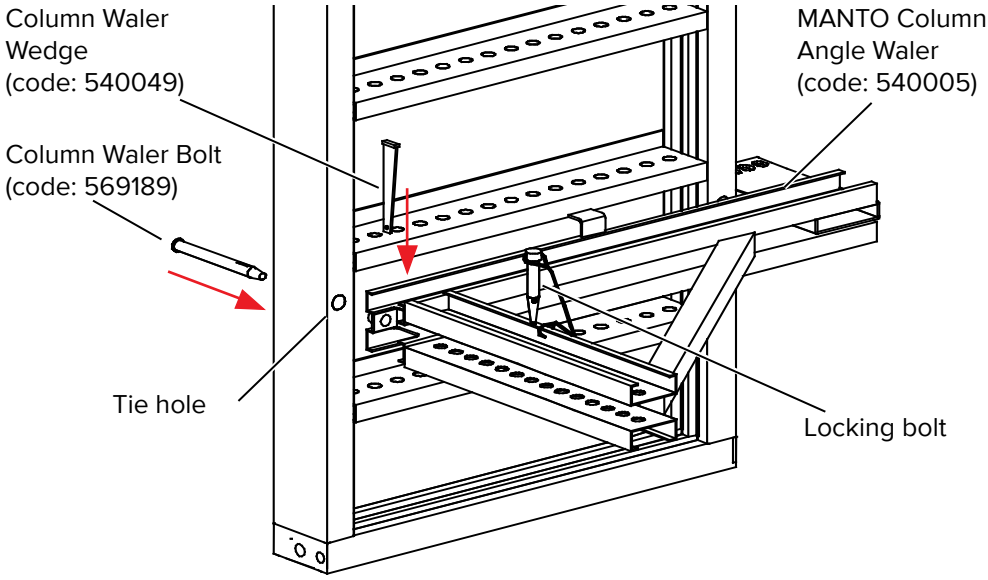


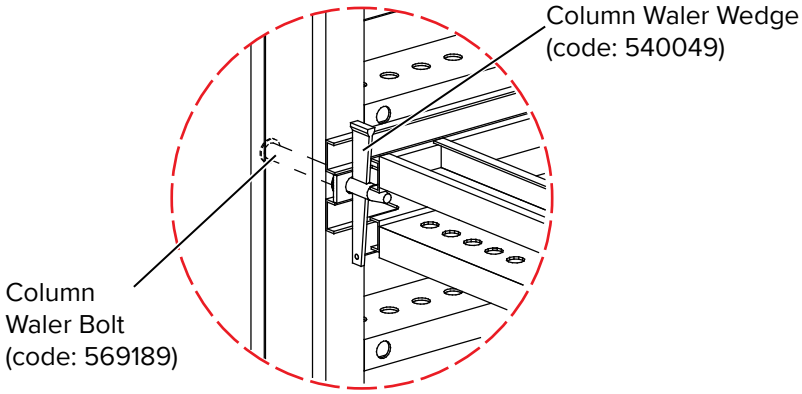

| NOTE | **Note!**<br>The values on the hole pattern of the MANTO Column Angle Waler are indicated in centimetres. |
|---|---|



Unless stated otherwise, all dimensions in mm.

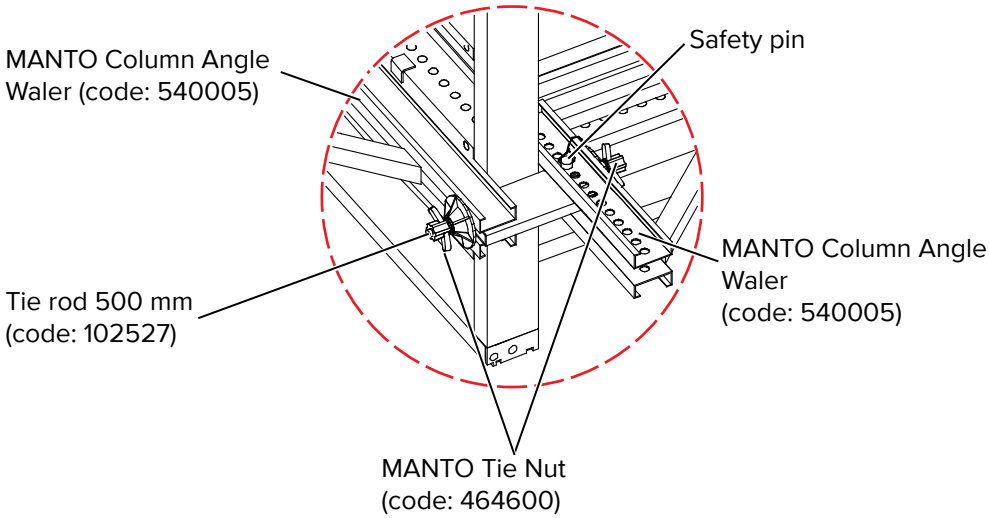
The MANTO Column Angle Walers must be fastened through the tie hole with a Column Waler Bolt and a Waler Wedge on each of the four panels. This determines the position and quantity of the walers.




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 DW15 500 mm) the column formwork is closed and ready to use.



# 15 Struts

## 15.1 MANTO Strut Head

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

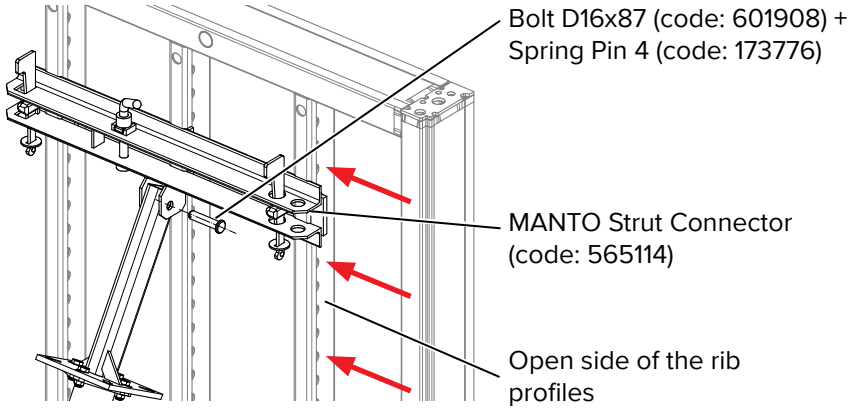
| Safe Working Loads [kN] | | | | | |
|---|---|---|---|---|---|
| **MANTO Strut Head with vertical panels (horizontal ribs)** | | | | | |
| **Strut angle α (to the horizontal plane)** | **Distance to panel edge** | | | | |
| | **200 mm** | **300 mm** | **400 mm** | **500 mm** | **600 mm** |
| 50° | 9.76 | 6.36 | 5.10 | 4.56 | 4.40 |
| 55° | 9.33 | 6.10 | 4.90 | 4.36 | 4.23 |
| 60° | 9.03 | 5.90 | 4.73 | 4.23 | 4.06 |
| **MANTO Strut Head with horizontal panels (vertical ribs)** | | | | | |
| 10.00 | | | | | |

## 15.2 MANTO Strut Connector

The MANTO Strut Connector (code: 565114) can be connected to vertically or horizontally arranged MANTO panels. Additionally, the Strut Adapter is required when using tubular steel props. The allowable strut loads can be taken from the following tables.

| Safe Working Loads [kN] | | | | | |
|---|---|---|---|---|---|
| **MANTO Strut Connector with vertical panels (horizontal ribs)** | | | | | |
| **Strut angle α (to the horizontal plane)** | **Distance to panel edge** | | | | |
| | **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 |
| **MANTO Strut Connector with horizontal panels (vertical ribs)** | | | | | |
| 50° | 4.42 | | | | |
| 55° | 4.34 | | | | |
| 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.

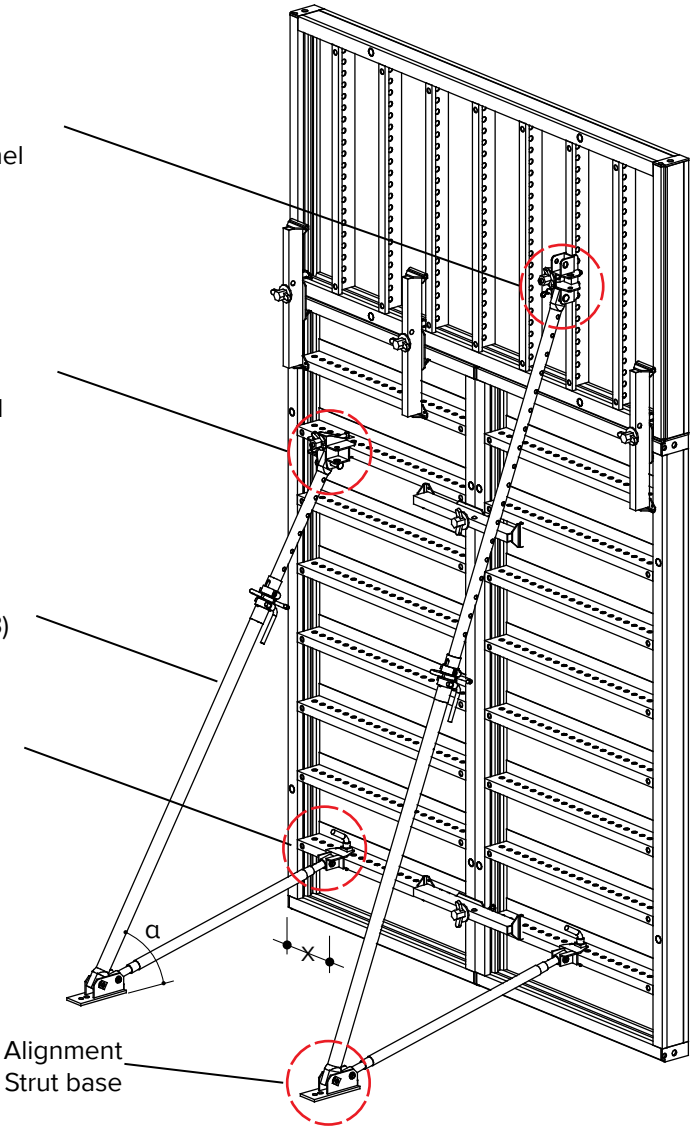





Unless stated otherwise, all dimensions in mm.

## 15.3 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.




**WARNING**

**Warning!**

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 above).

**WARNING**

**Warning!**

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.

**NOTE**

**Note!**

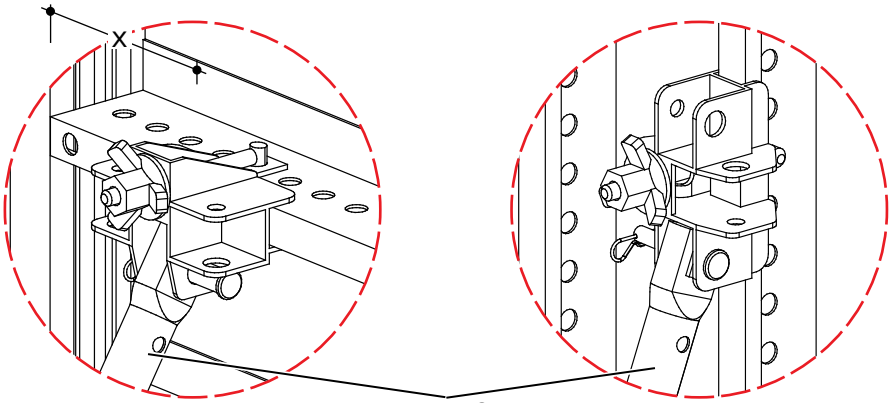
For information on the Safe Working Loads, please refer to pages 28 - 30 and 110.

**Connections for Alignment Struts**

The head of the strut can be attached to the MANTO panels using the MANTO Strut Head as well as the MANTO Strut Connector (code: 565114).

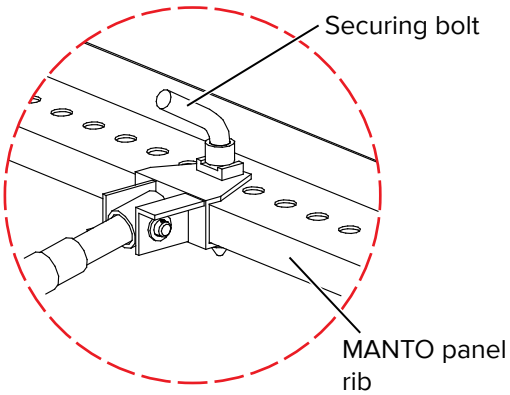
MANTO Strut Head
(code: 600035) to horizontal panel

MANTO Strut Head
(code: 600035) to vertical panel

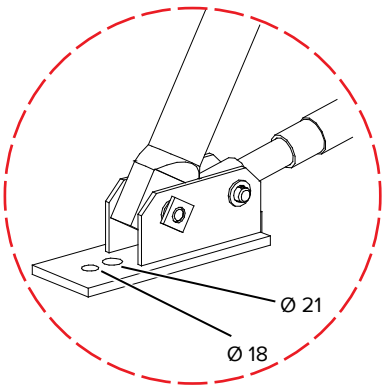



MANTO
Alignment Strut
(code: 565103)

Base connector of the Alignment Strut




Alignment Strut base

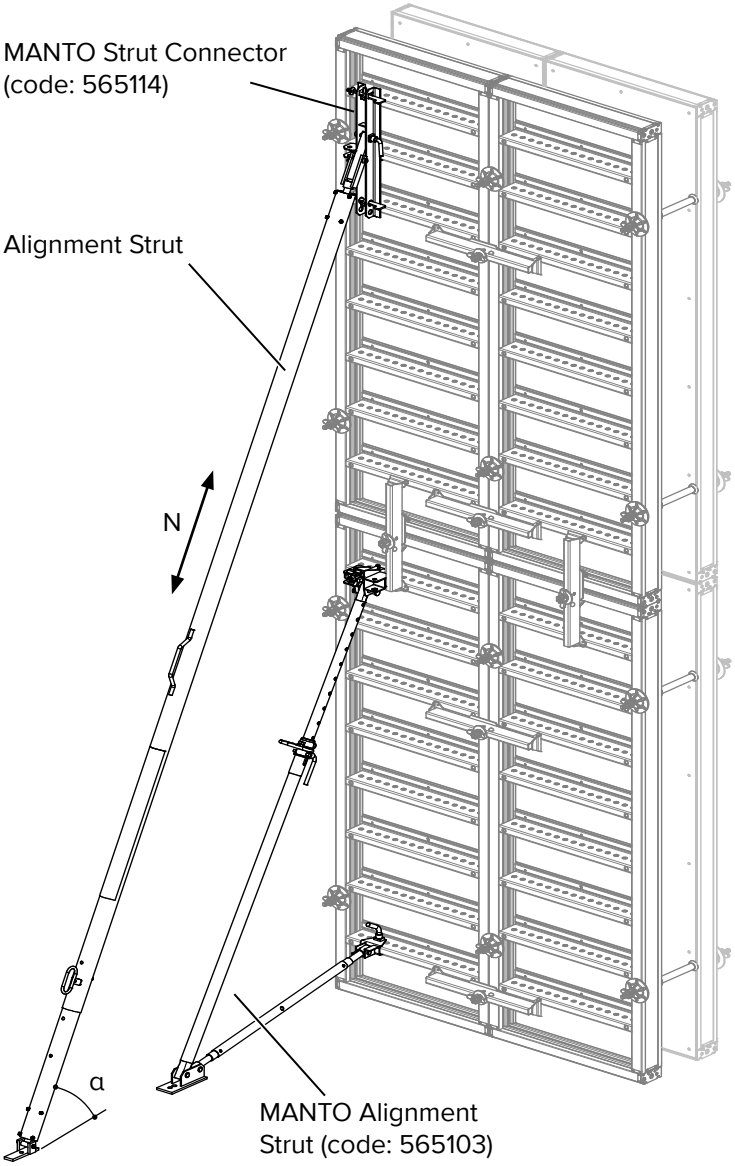





Unless stated otherwise, all dimensions in mm.

## 15.4 Struts for formwork heights of more than 3.90 m

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




**WARNING**

**Warning!**

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

**WARNING**

**Warning!**

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.

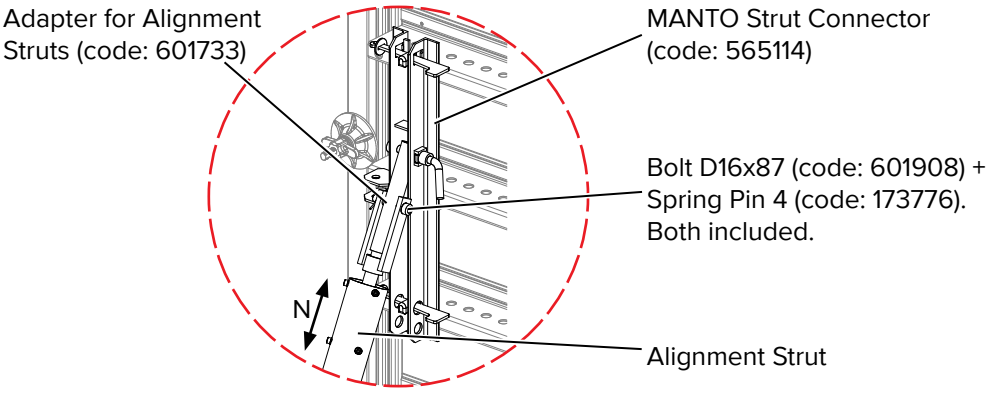
**NOTE**

**Note!**

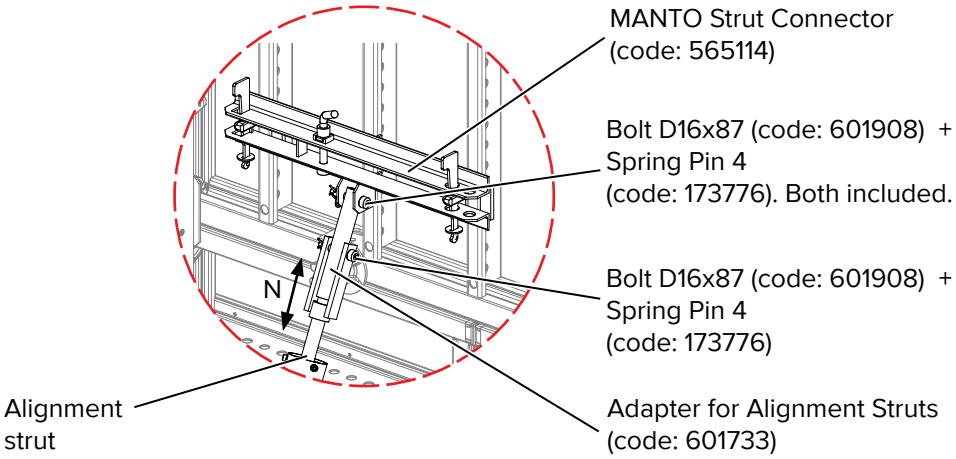
For information on the Safe Working Loads, please refer to pages 28 - 30 and 110.

### 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 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 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.



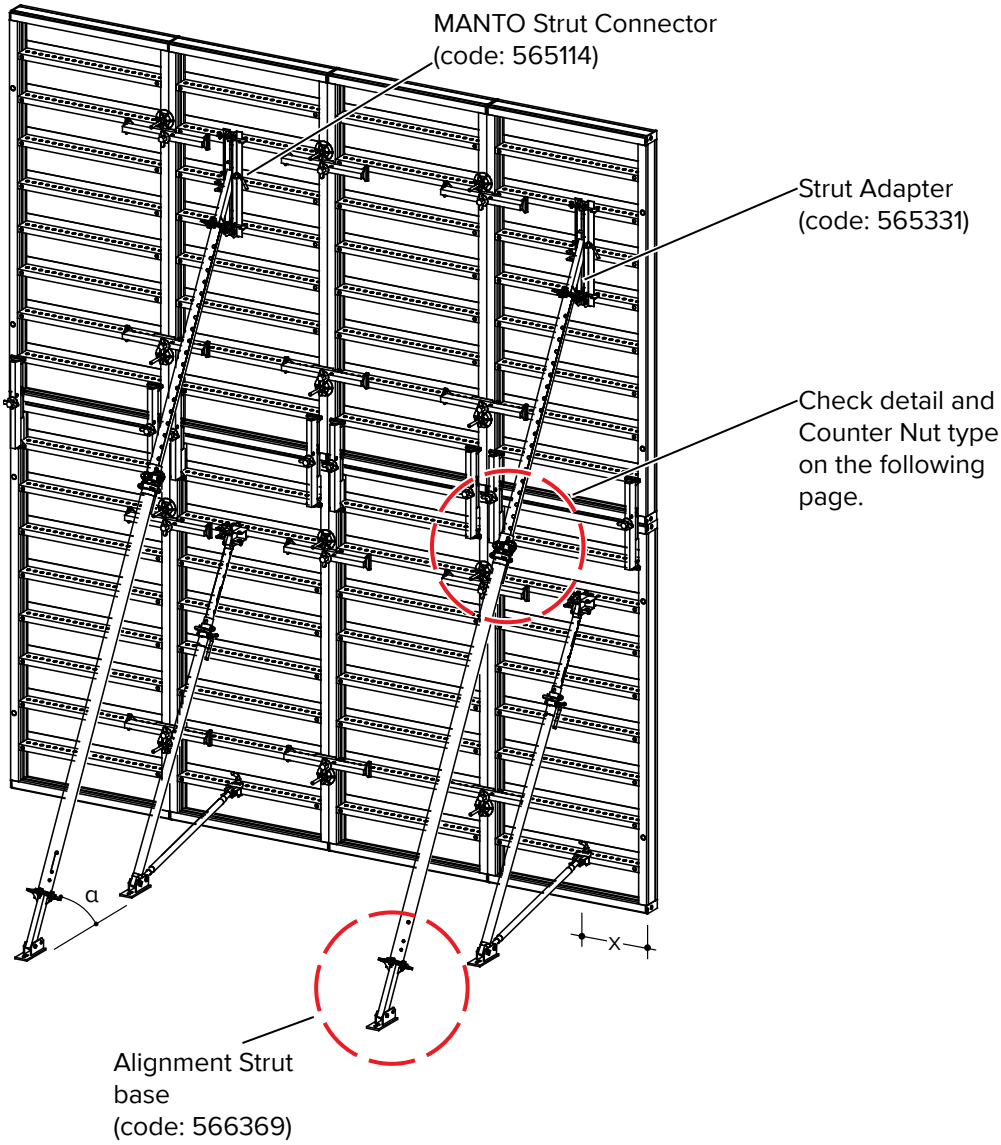

**NOTE**

**Note!**

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

## 15.5 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 be supported with EUROPLUSnew props in combination with the Strut Base, the Strut Adapter and a suitable Counter Nut




**WARNING**

**Warning!**

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).

**WARNING**

**Warning!**

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.

**NOTE**

**Note!**

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.

**Strut Base joint**

The permitted pressure load of the steel prop is limited by the Strut Base joint.
Permitted pressure: 34.00 kN.

**Counter Nut** A/AD 260/300 (code: 107107) for EUROPLUS® 260, 300 DB/DIN

EUROPLUS®new 20-250, 20-300

EUROPLUS®new 230-150

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

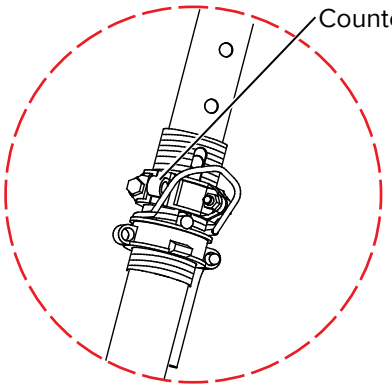
EUROPLUS®new 20-350, 20-400

EUROPLUS®new 30-250, 30-300, 30-350

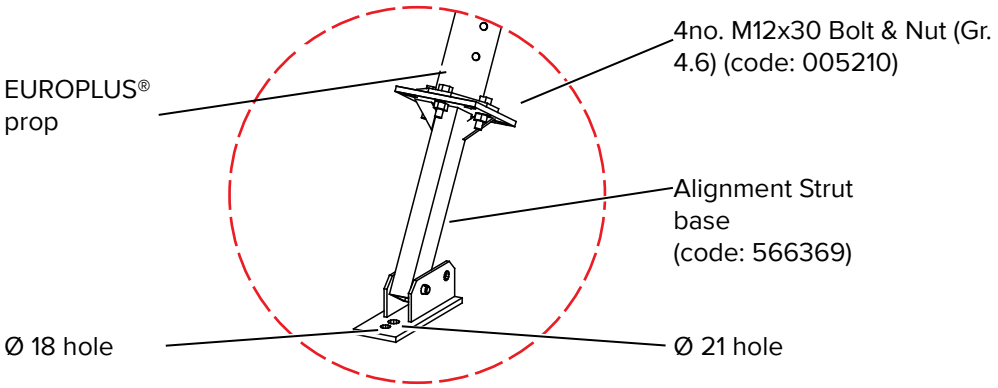
**Counter Nut** EC 400/DC 550 (code: 587675 for EUROPLUS® 400 EC, 550DC

EUROPLUS®new 20-550, 30-400

The matching Counter Nut must be chosen in accordance with the list above and ordered separately.




At the bottom, the Strut Base is connected to tubular steel props with 4no. M12x30 Bolt & Nut 4.6.




**WARNING**

**Warning!**

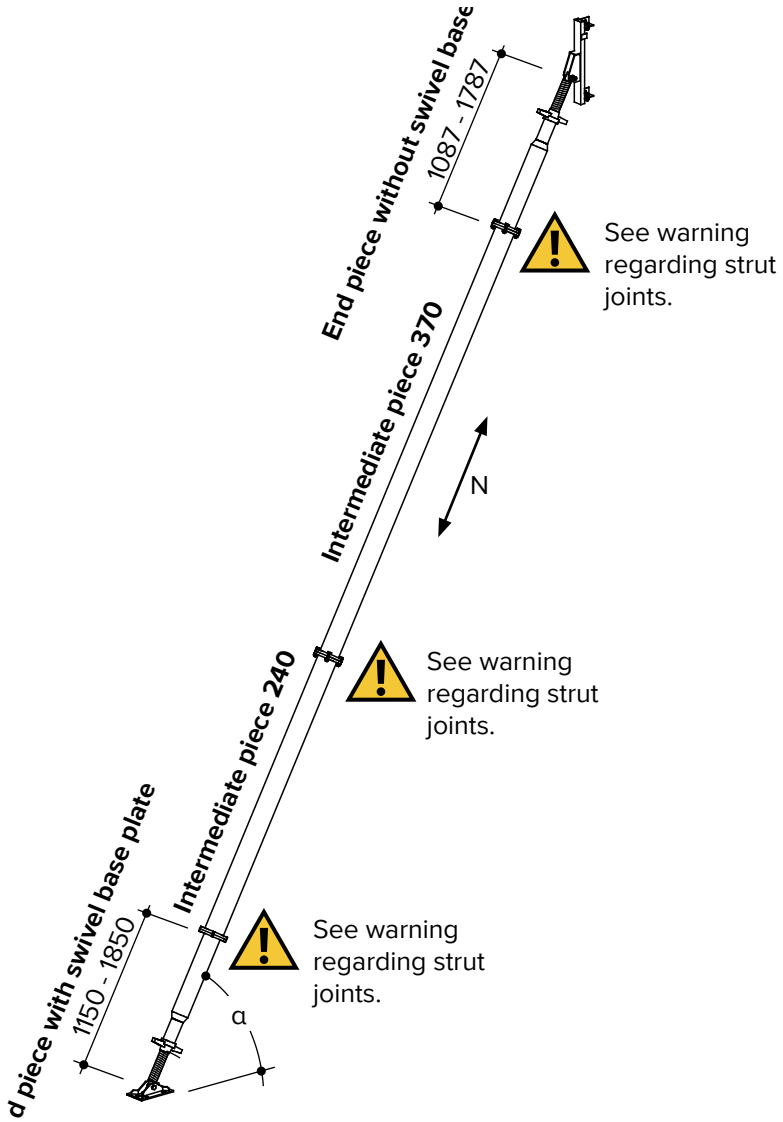
When using EUROPLUS® steel props for alignment, the props must be equipped with an additional Counter Nut to make them tension proof.



Unless stated otherwise, all dimensions in mm.

## 15.6 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.




**WARNING**

**Warning!**
Each strut joint requires 4no. M16x60 10.9.

**WARNING**

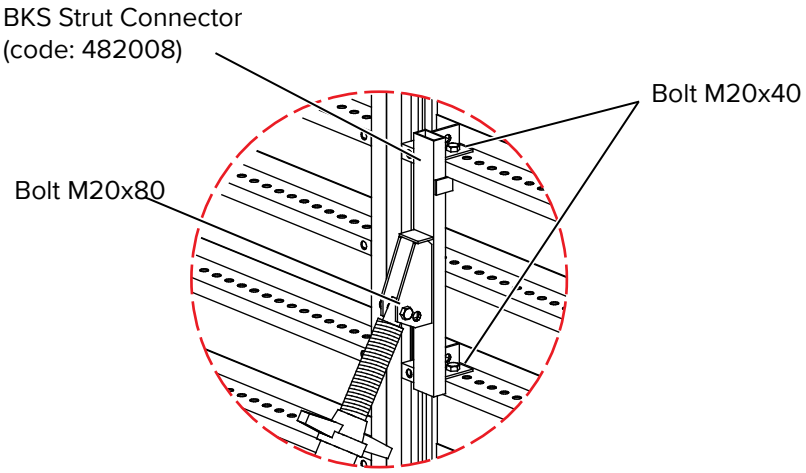
**Warning!**
The maximum strut loads for the connection to vertical panels are dependant of the distance of the strut head to the panel edge and the inclination of the struts (angle α above).

**WARNING**

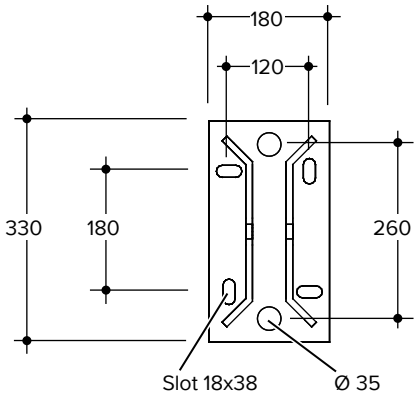
**Warning!**
Props must be placed as near as possible to the vertical panel joint or the centre profile. The correct type and size of the steel prop has to be selected according to the load, the formwork height and the extension length of the prop.

### 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 Loads [kN] | | | | | |
|---|---|---|---|---|---|
| Depending on the distance to the edge of panel | | | | | |
| Strut angle α (to the horizontal plane) | Distance to panel edge | | | | |
| | 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 Loads | | | | | | |
|---|---|---|---|---|---|---|
| Type | Length [m] min - max | SWL [kN] fully extended | Number of end pieces | | Number of intermediate pieces | |
| | | | 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 |



Unless stated otherwise, all dimensions in mm.

# 16 Access

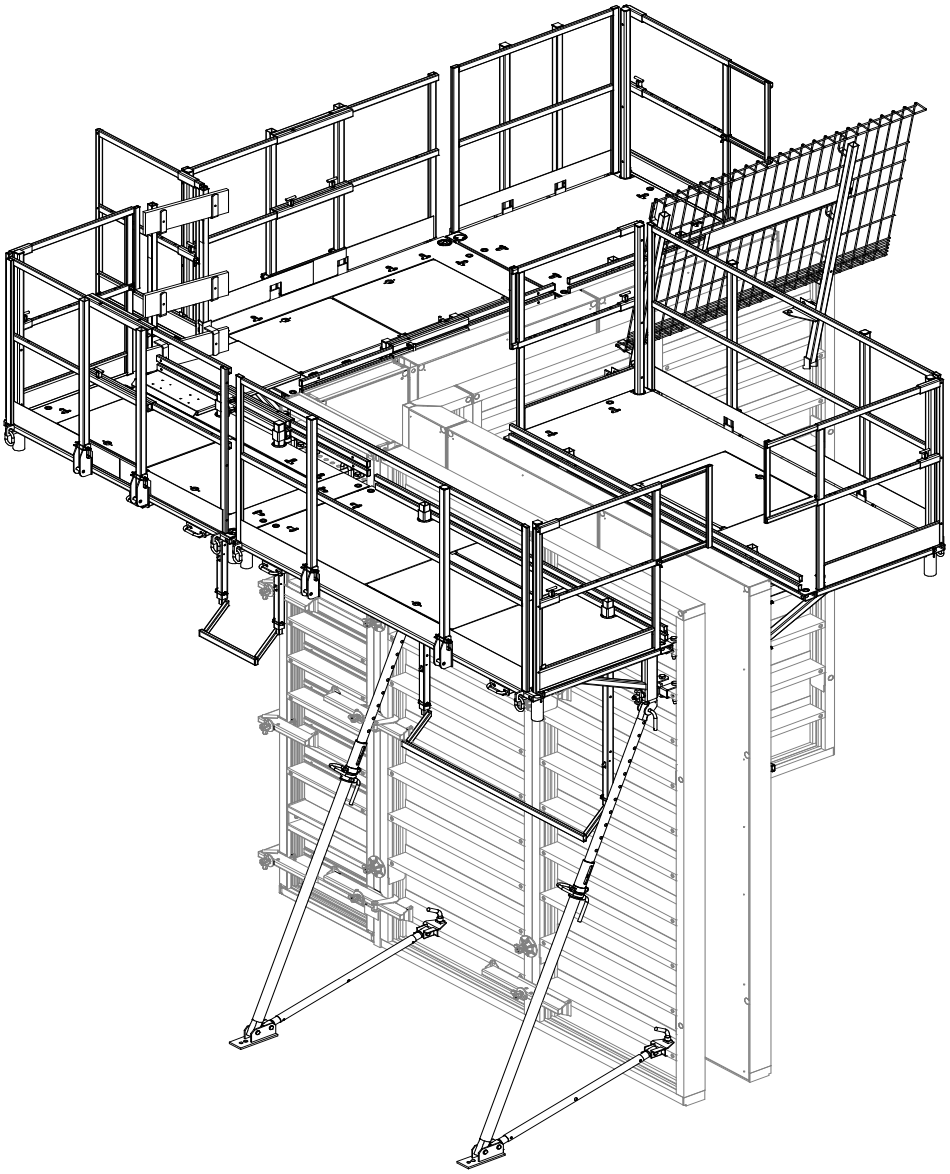
## 16.1 PLATINUM® 100 Platform and access system

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 (1.50 kN/m$^2$) pursuant to DIN EN 12811.

They are equipped with integrated guardrails as well as side guardrails, 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 on the platform to be executed from a safe position.

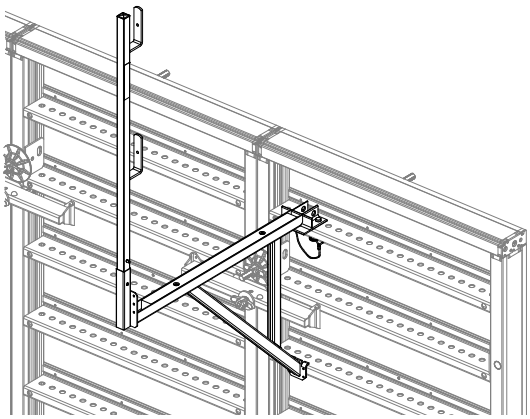


| NOTE | **Note!**<br>For more information regarding the PLATINUM® 100 Platform and access system, refer to the respective user guide. |
|---|---|

## 16.2 Walkway brackets

**Attaching the walkway brackets to a vertical panel**

The walkway bracket and the inserted railing post form the bracket assembly. Simply hang the brackets with the pegs into the holes in the horizontal ribs of the panels. Then secure the bracket with the captive spring pin.



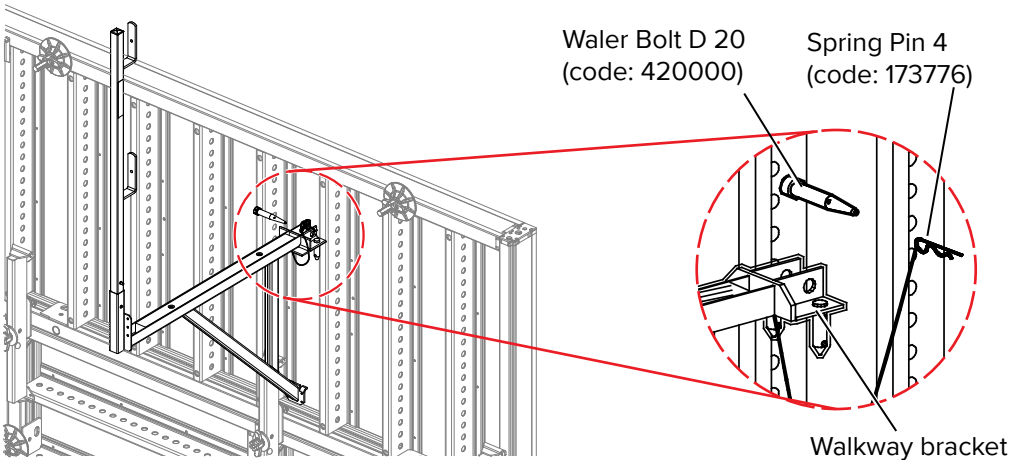
**WARNING**

**Warning!**

Check maximum span of planks and railings as well as the edge protection components being used.
The planks must be secured against uplift.
Bracket spacing should always comply with the design scheme supplied.

**Attaching the walkway brackets to a horizontal panel**

The walkway brackets are attached to a horizontal panel using the Waler Bolt D 20 and Spring Pin 4. They are connected to the ribs of the panels, which are now in a vertical orientation.




**WARNING**

**Warning!**

Check maximum span of planks and railings as well as the edge protection components being used.
The planks must be secured against uplift.
Bracket spacing should always comply with the design scheme supplied.

**NOTE**

**Note!**

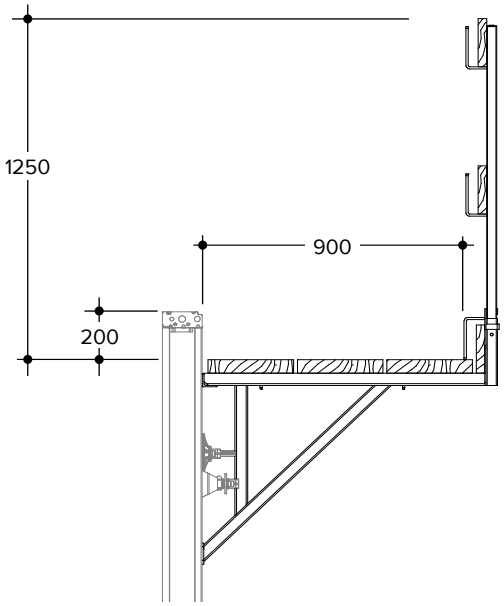
The walkway brackets are designed for load class 2 (1.50 kN/m$^2$), pursuant to to DIN EN 12811-1:2004 and DIN 4420-1:2004-03.



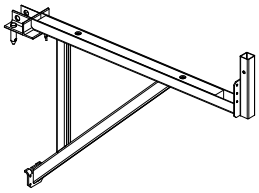
Unless stated otherwise, all dimensions in mm.

### 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)

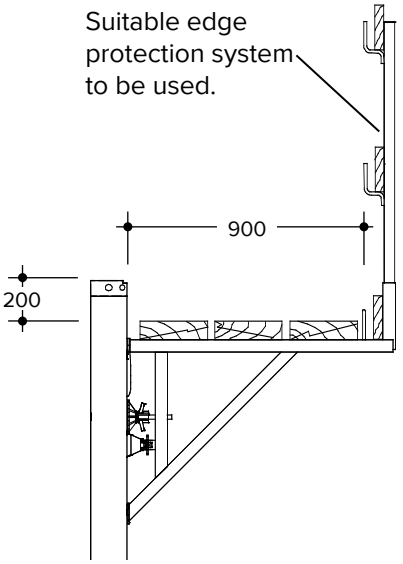


**WARNING**

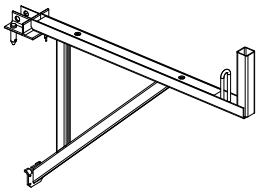
**Warning!**

Check maximum span of planks and railings as well as the edge protection components being used.
The planks must be secured against uplift.
Bracket spacing should always comply with the design scheme supplied.

### MANTO Walkway Bracket 90




MANTO Walkway Bracket 90
(code: 448205).



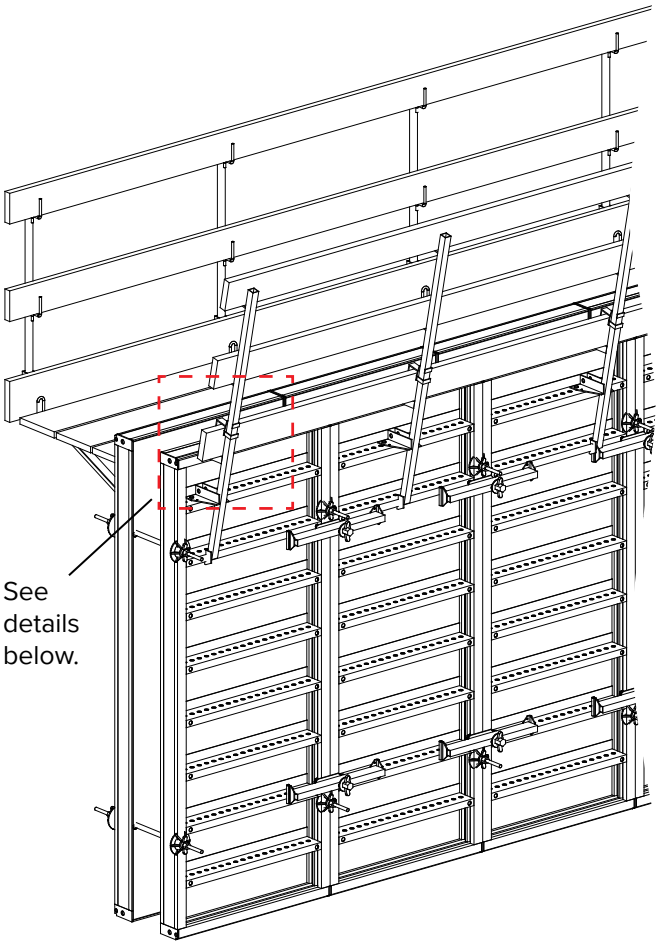
**WARNING**

**Warning!**

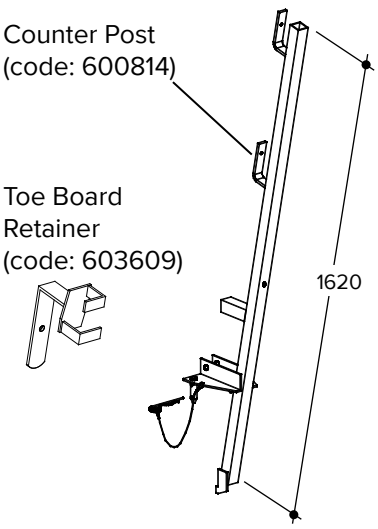
Check maximum span of planks and railings as well as the edge protection components being used.
The planks must be secured against uplift.
Bracket spacing should always comply with the design scheme supplied.

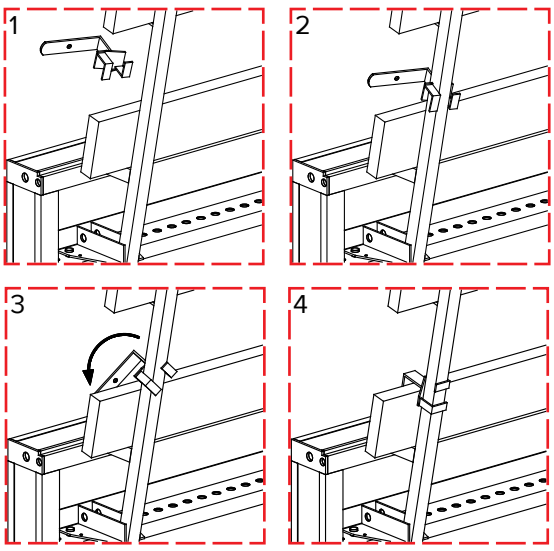
## 16.3 Counter Posts

The Counter Post provides edge protection on the opposite side of the walkway brackets, ensuring that operating personnel are safe from all sides when working on the pouring platform. Like the Walkway Bracket, he Counter Post is hooked to the upper horizontal rib of the panels and secured with the Spring Pin 4. The inclined position of the Counter Post means that the required clearance for pouring operations is achieved. Using an additional Waler Bolt D 20, the Counter Post can also be attached to horizontal panels.




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



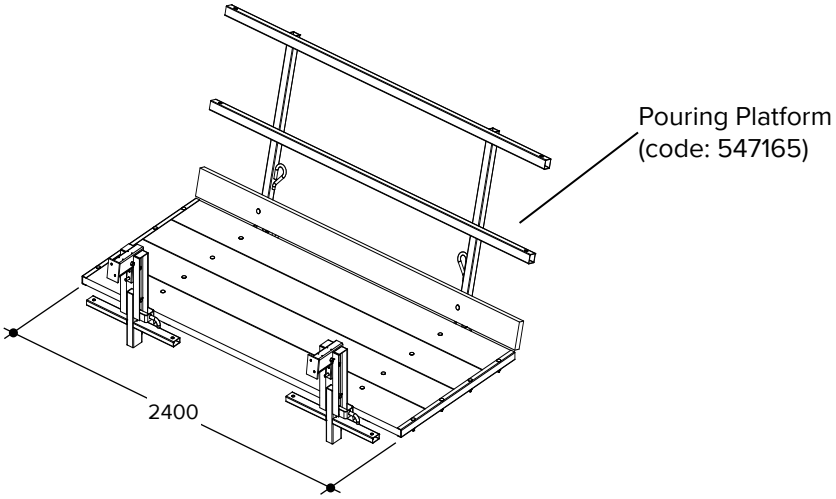






Unless stated otherwise, all dimensions in mm.

## 16.4 Pouring platform

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




**WARNING**

**Warning!**

Check maximum span of planks and railings as well as the edge protection components being used.
The planks must be secured against uplift.
Bracket spacing should always comply with the design scheme supplied.

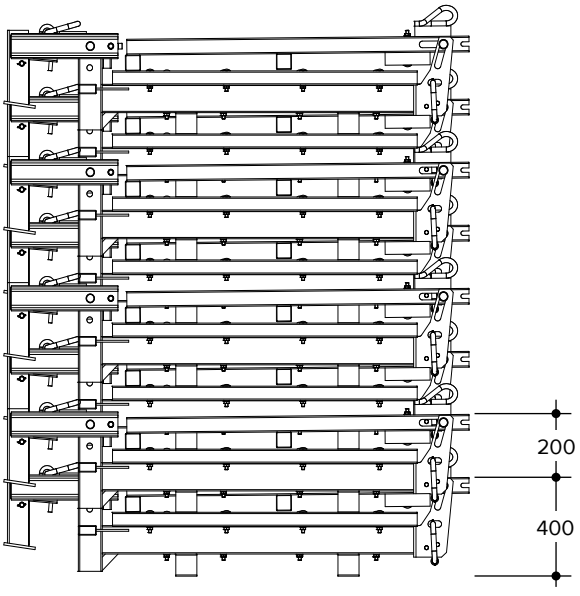
**NOTE**

**Note!**

The walkway brackets are designed for load class 2 (1.50 kN/m$^2$), pursuant to to DIN EN 12811-1:2004 and DIN 4420-1:2004-03.

### 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**

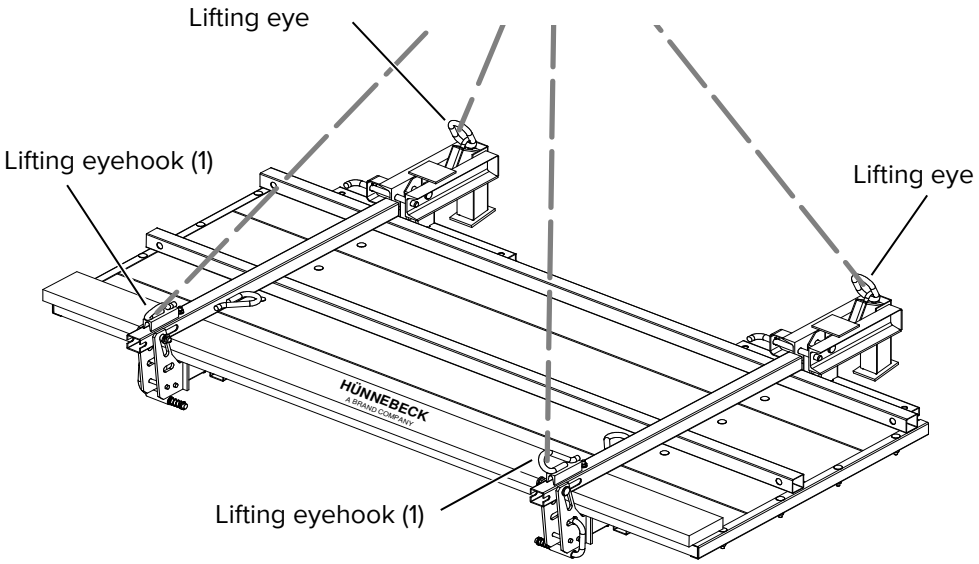
**Warning!**

Maximum stacking height: 8no. units.

### 16.4.1 Assembly of the 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.

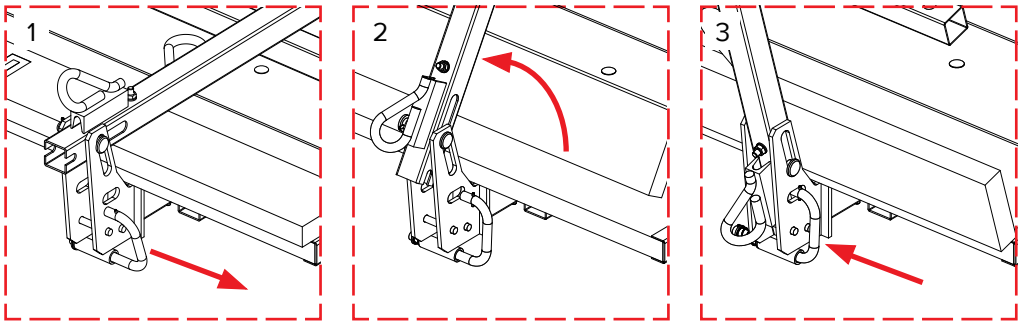


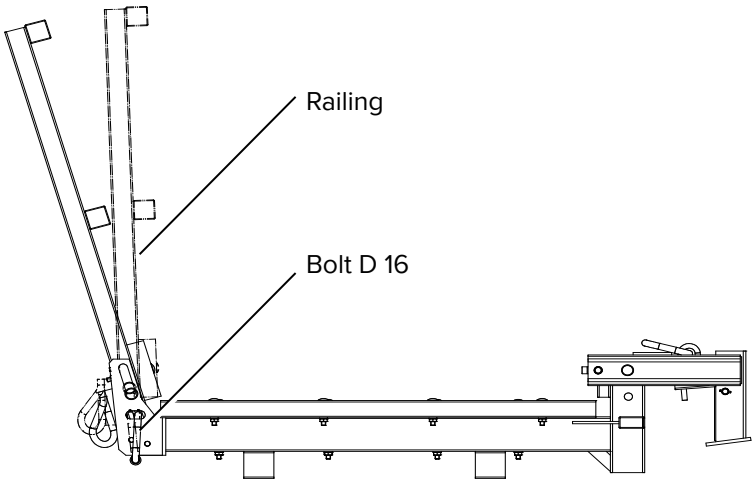

**Unfolding the guardrails**

**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.



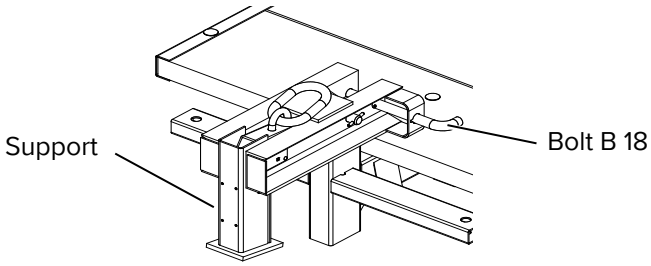


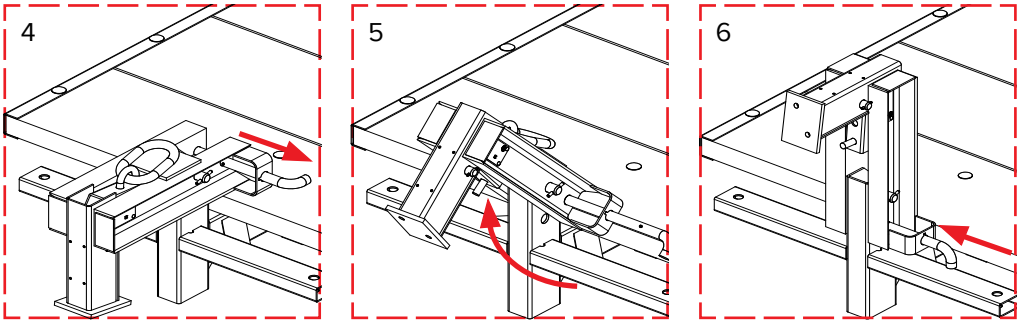

Unless stated otherwise, all dimensions in mm.

**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.

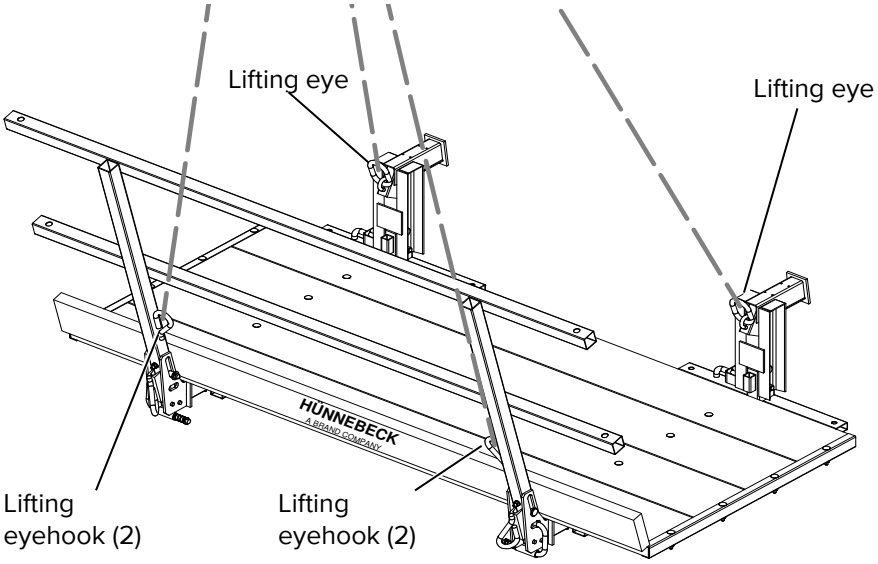



To prepare the platform for storage, simply reverse the order of the steps until the platform is completely collapsed and secured.

**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.



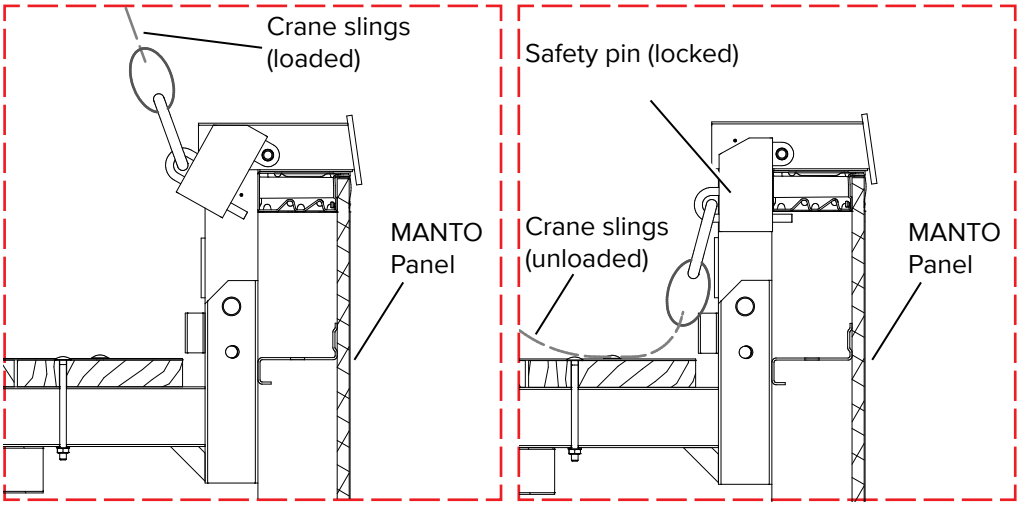

**WARNING**

**Warning!**

Do not lift the platform with the MANTO panels still attached. The platform must be completely disconnected before any lifting can occur.

### Attaching to the MANTO formwork

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




**DANGER**

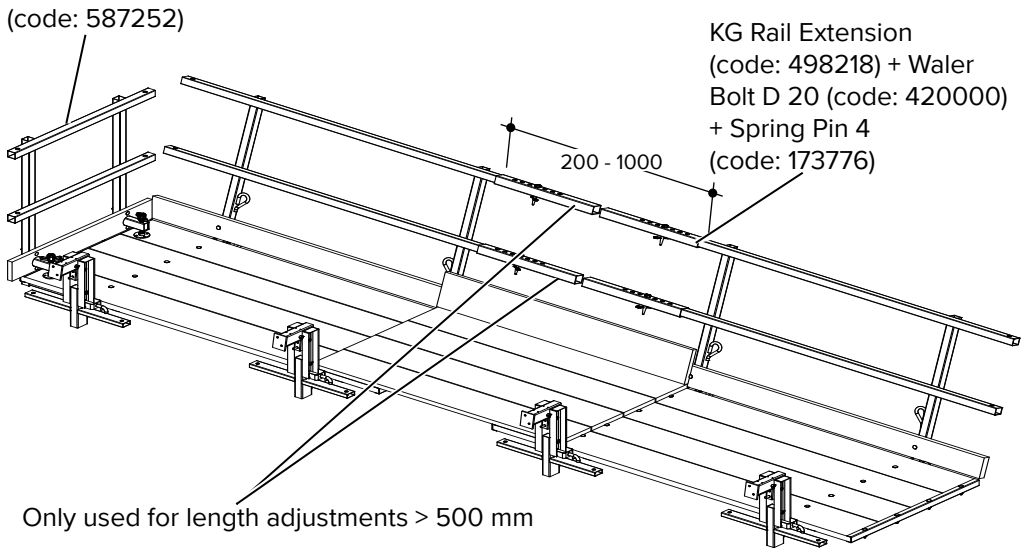
**Danger!**

The safety pin must be latched correctly.

### Extension and end protection

Extensions from 0.20 m to 1.00 m are created using on-site boards, toe boards and 2 or 4 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.




**DANGER**

**Danger!**

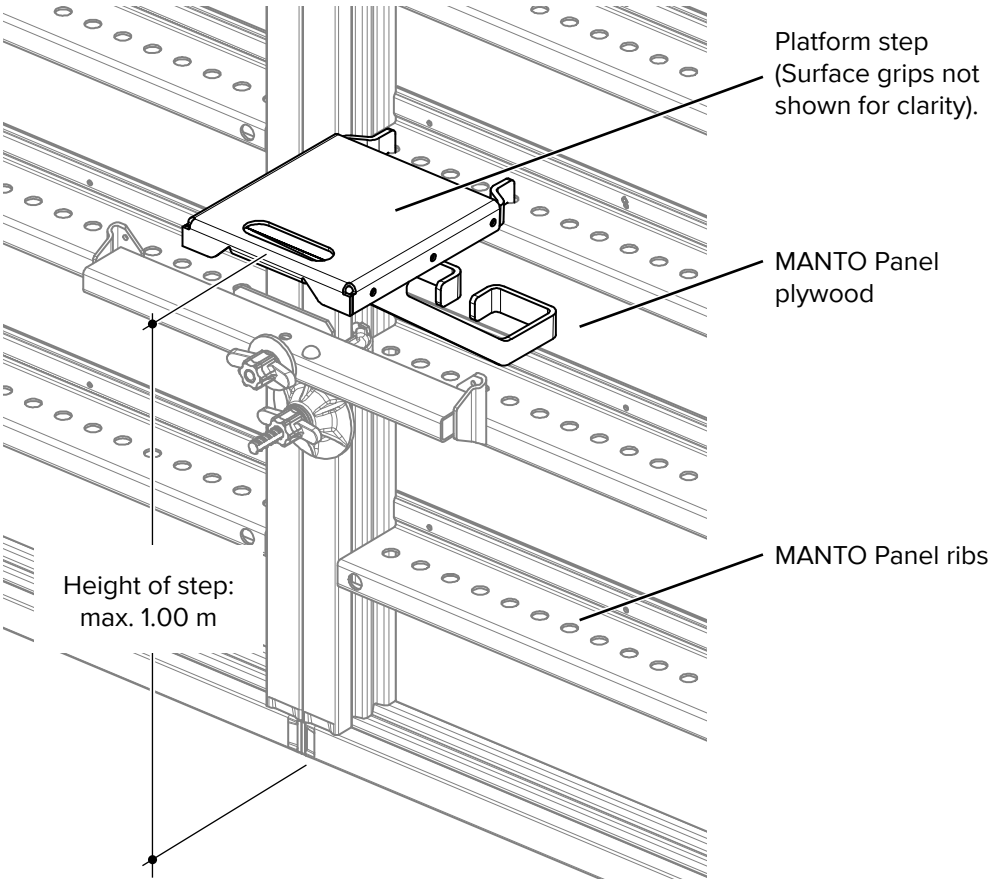
Use suitable safety equipment to install the platform until all edge protection around the platform is complete. Extension boards overlapping the pouring platform pose a tripping hazard. All tripping hazards should be eliminated by using suitable fillets.



Unless stated otherwise, all dimensions in mm.

## 16.5 PLATINUM® 100 Platform Step

The PLATINUM® 100 Platform Step is used as a climbing aid with the MANTO formwork to reach tie locations, 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**

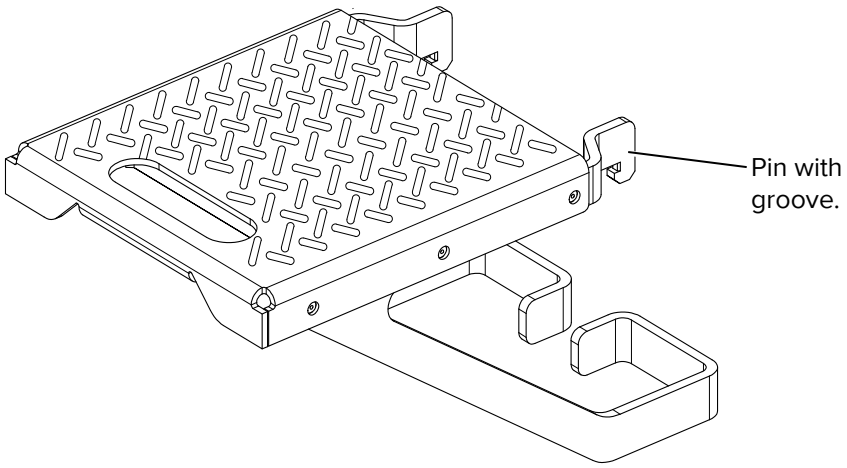
**Warning!**

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.

**NOTE**

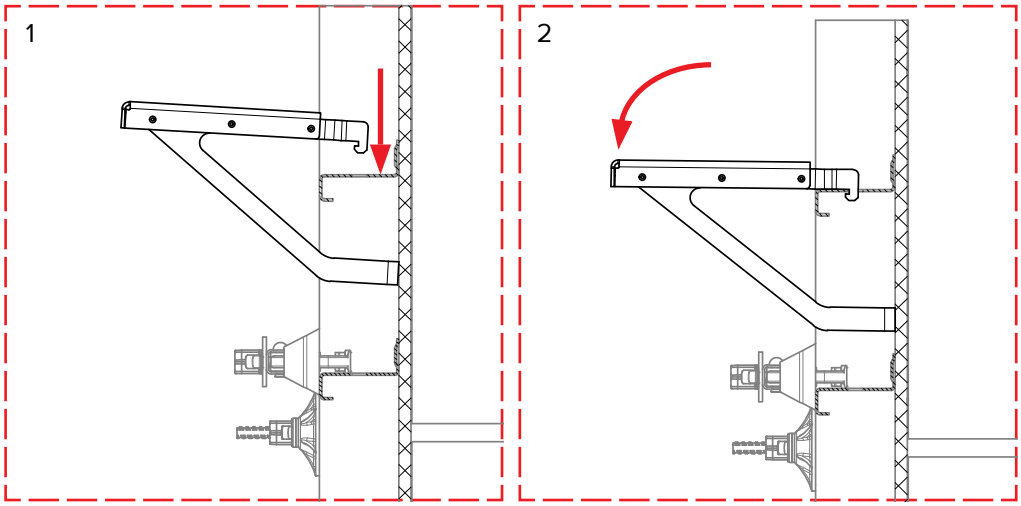
**Note!**

The maximum load to which the PLATINUM® 100 Platform Step may be subjected is 150.00 kg.



**Attaching to the 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.

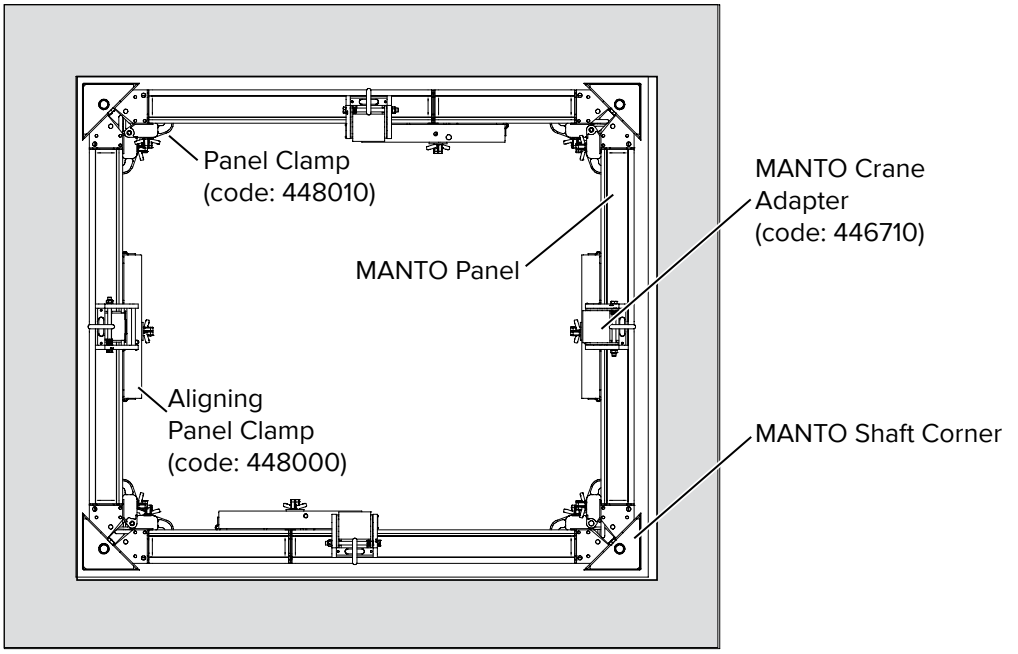


# 17 Shaft formwork

## 17.1 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.

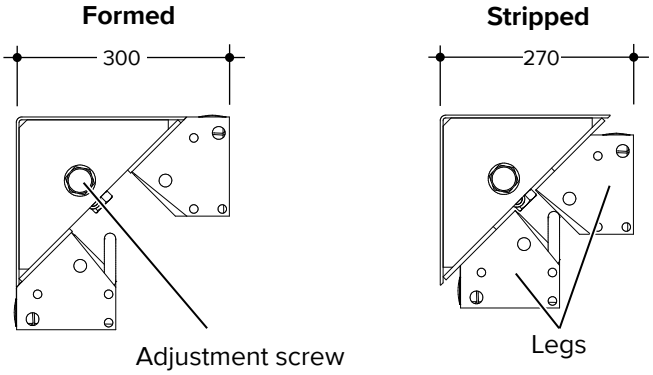



**WARNING**

**Warning!**

Any timber infills that may be required should be placed 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.



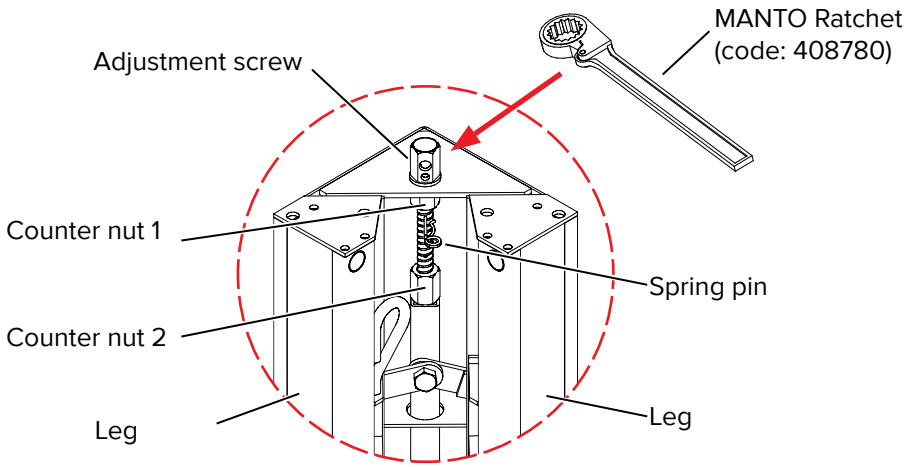

**NOTE**

**Note!**

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

With extended shaft corners, the movable tension elements of the corners have to be connected.

**Step 1** Pull the spring pin out of the adjustment screw of the lower MANTO Shaft Corner.

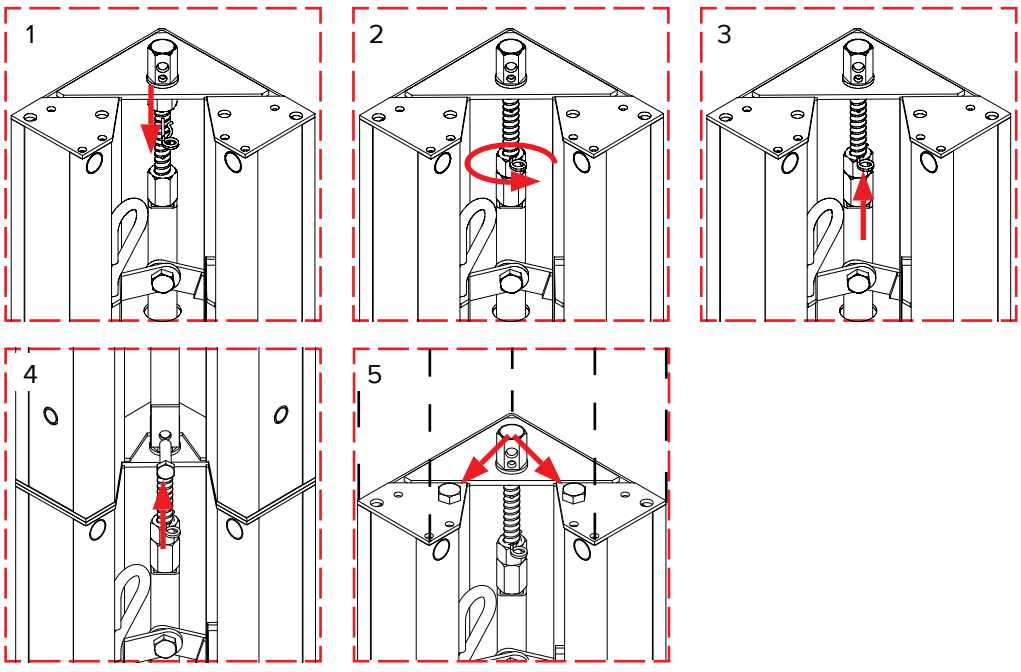
**Step 2** Screw down the counter nut 1 until it is fixed with the counter nut 2.

**Step 3** Insert the spring pin into the lower hole, located directly above the counter nut 1.

**Step 4** Place the upper MANTO Shaft Corner onto the lower MANTO Shaft Corner and insert the M16x60 Bolt & Nut into the hole in the head of the adjustment screw.

**Step 5** Insert two M16x35 Bolts & Nuts 8.8 (code: 603623) in the holes shown below. The Shaft Corner is then correctly aligned (upper MANTO Shaft Corner removed in the illustration below for clarity).

The extension is now complete.

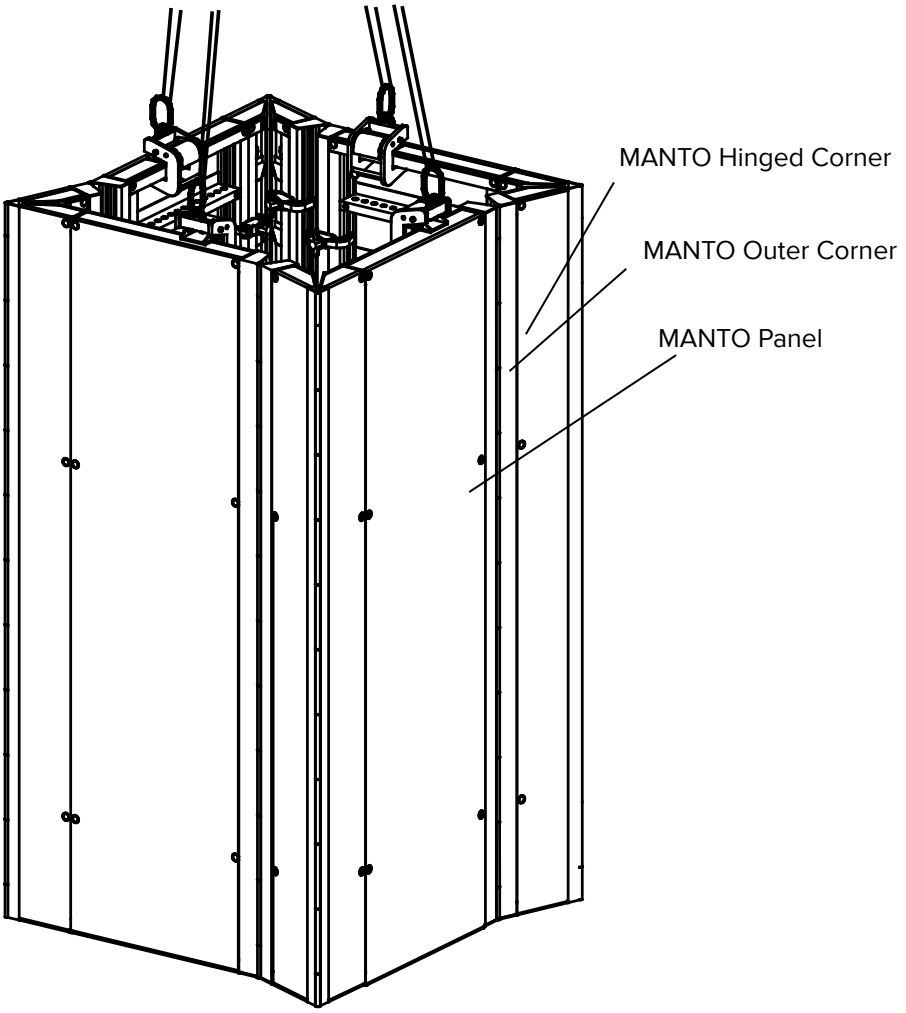




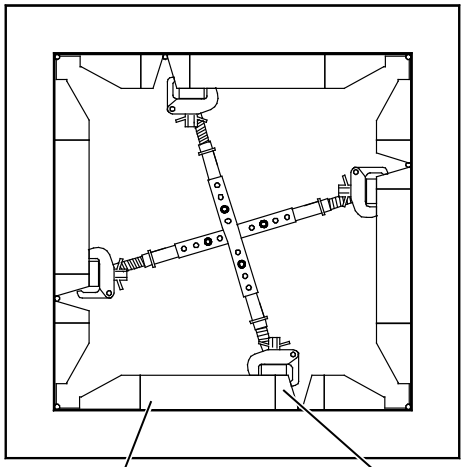

Unless stated otherwise, all dimensions in mm.

## 17.2 Using the MANTO Hinged Corner

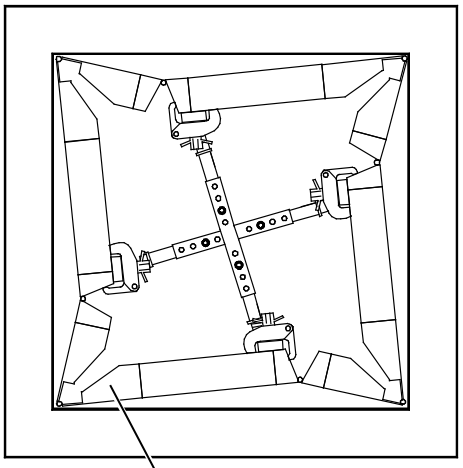
With the MANTO shaft formwork, the inner formwork of a shaft (or a room) can be shifted by crane with a single lift without having to release the panel connections. The formwork is released from the wall by retracting the shaft spindles. The retracted spindles and the hinged connections reduce the formwork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

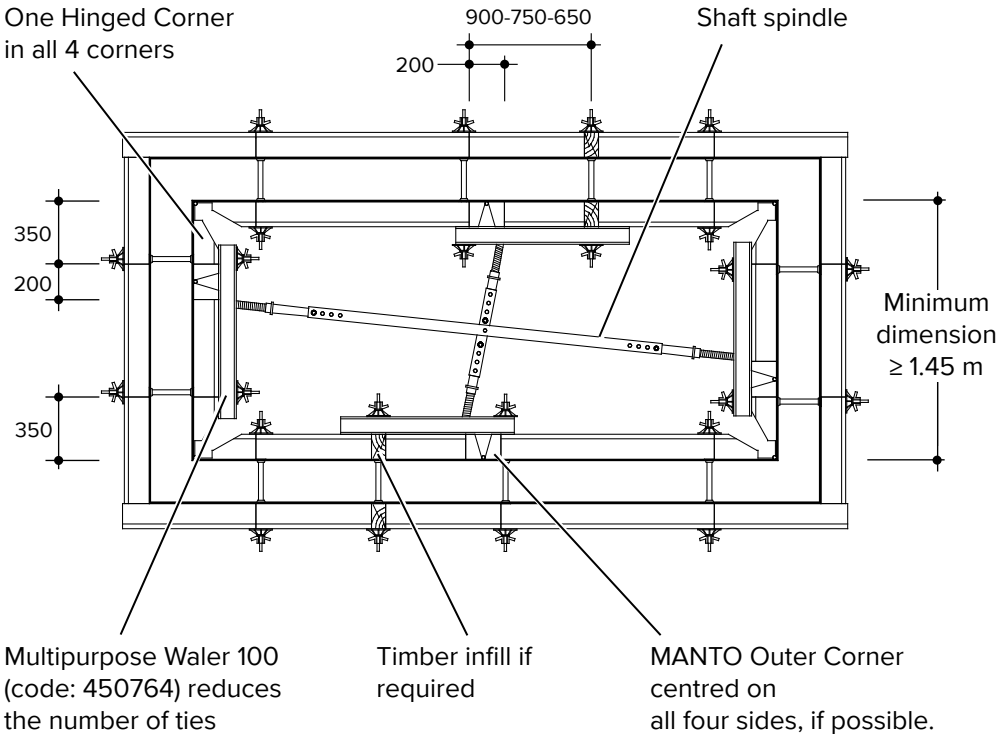



**Formed**



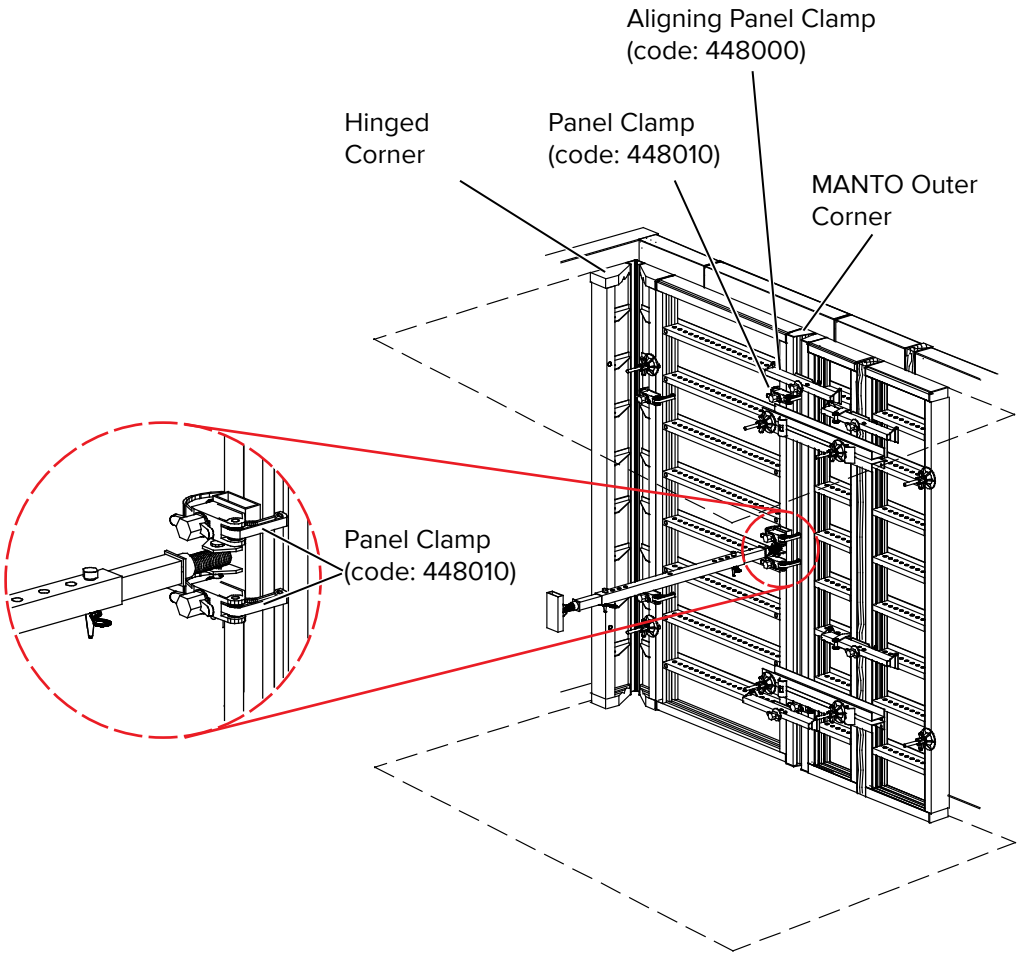

**Stripped**






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 an Aligning Panel Clamp to the adjacent panel. The Aligning Panel Clamp serves as a stopper when closing the formwork.



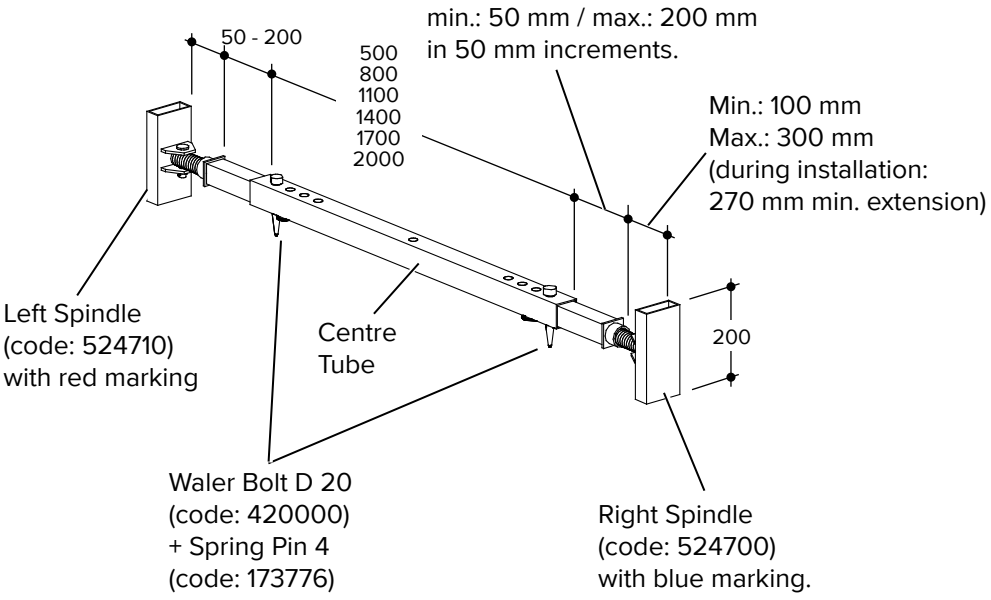



Unless stated otherwise, all dimensions in mm.

**Shaft spindle**

The shaft spindle consists of a Centre Tube, the Left and Right Spindle and 2no. Waler Bolts D 20 with a Spring Pin 4.

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




**NOTE**

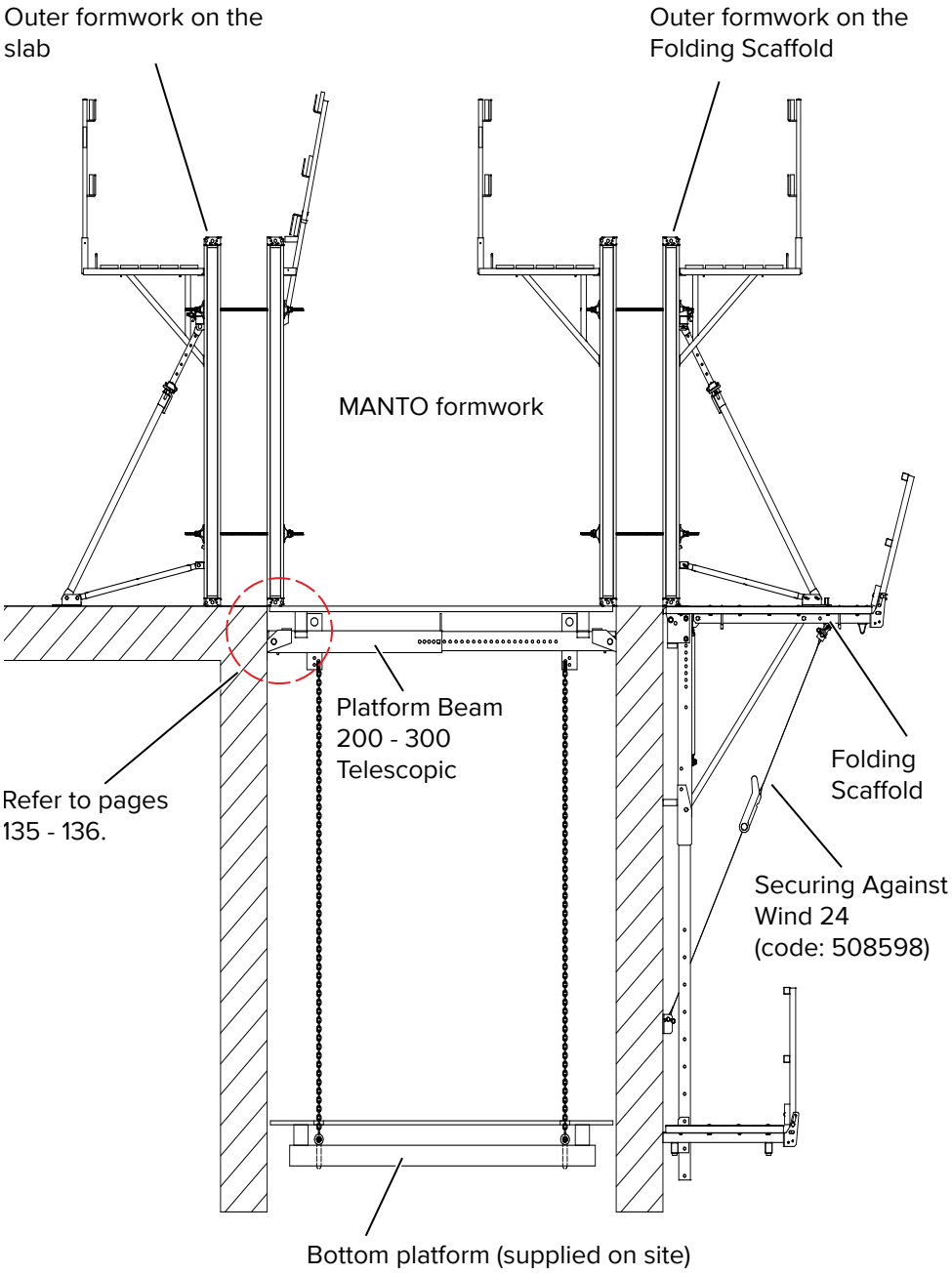
**Note!**

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 |
| 2.65m - 2.95m | 1.70 m | 524765 |
| 2.95 m - 3.25 m | 2.00 m | 524776 |

## 17.3 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**

**Warning!**

Timber boards must be adequately secured in place against uplift and horizontal displacement.

**NOTE**

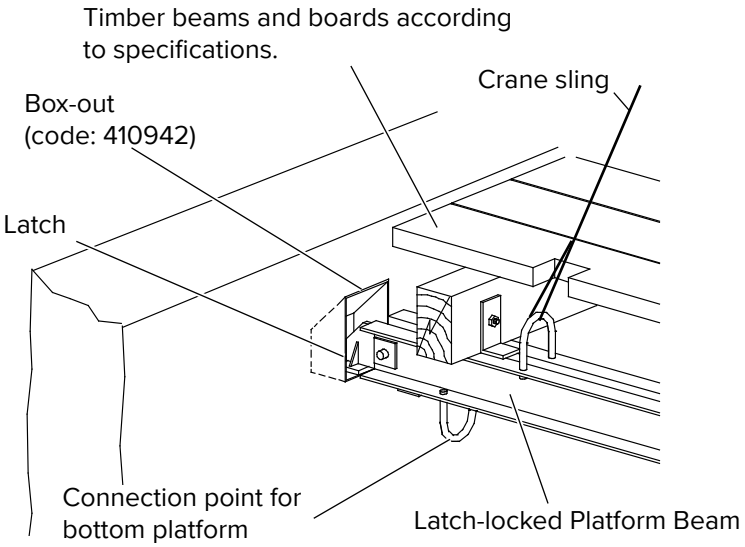
**Note!**

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

## 17.4 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 pocket 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.




**NOTE**

**Note!**

The Platform Beam is produced specifically for each project.
For Safe Working Loads refer to the table on page 136.

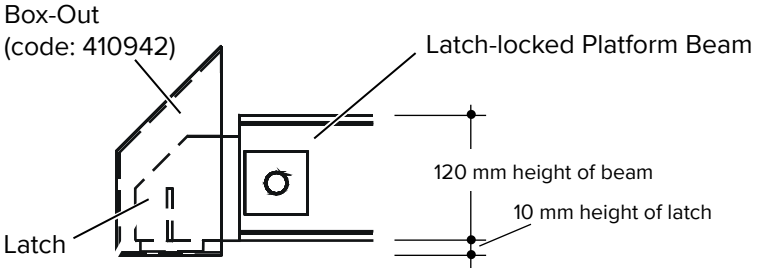
### Configuration limits

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
- Load bearing capacity 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/m$^2$ (alternatively: N = 1,0 kN point load)
- Minimum concrete strength: 15.00 N/mm$^2$ (for the supporting latches of the Platform Beam).

### Self-weights

- Formwork: 60.00 kg/m$^2$ (approx.)
- Latch-locked platform: 70.00 kg/m$^2$ (approx.)
- Bottom platform: 50.00 kg/m$^2$ (approx.)

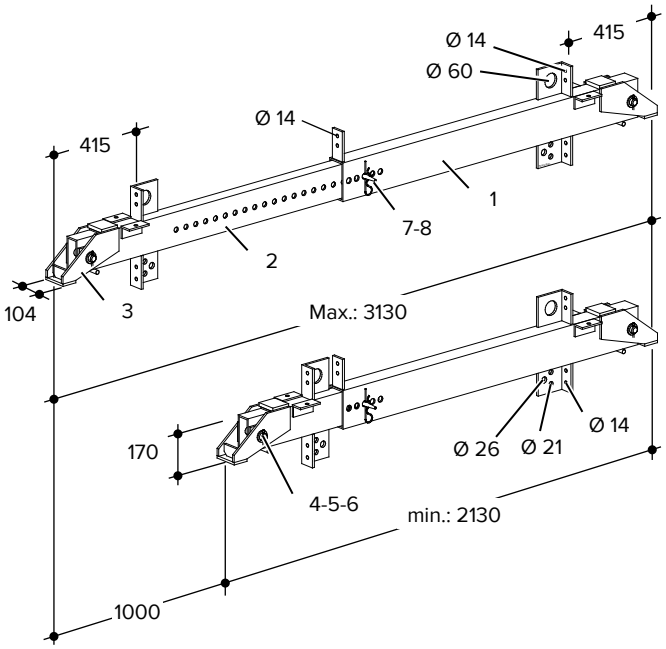


## 17.5 Using the Platform Beam 200 - 300 Telescopic

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 2.05 m and 3.05 m when using the Box-out (code: 410942) or between 2.29 m and 3.29 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 Pin 4 (code: 173776)

**NOTE**

**Note!**

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

The capabilities 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 Loads [SWL] | | |
|---|---|---|
| **Platform Beam 200 - 300 Telescopic (code: 600330) and Latch-locked Platform Beam** | | |
| **Permitted static 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 |
| Permitted Load (edge of the shaft) | 29.00 kN | |
| Permitted Load (middle of the shaft) | 20.40 kN | |

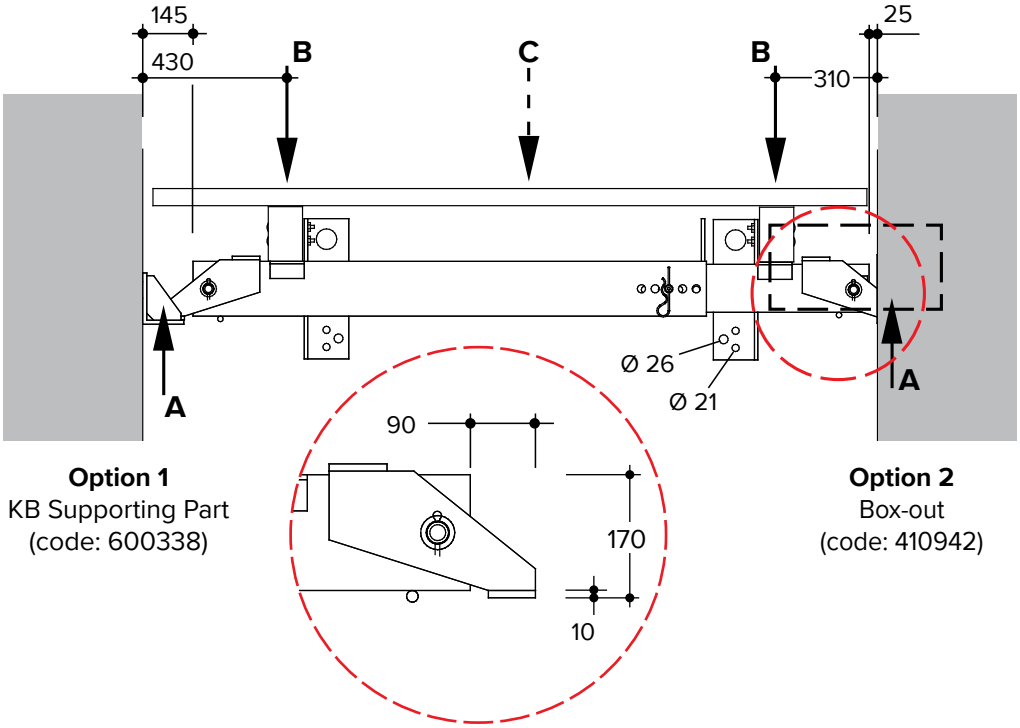
**WARNING**

**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 in mm.



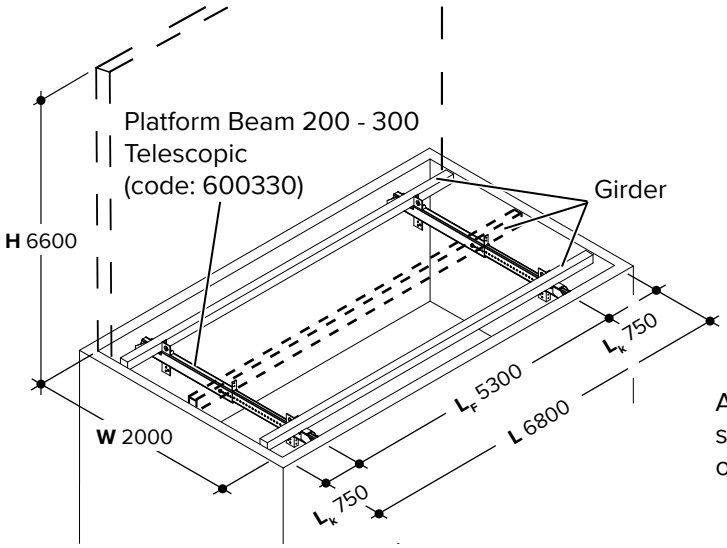

**Option 1**
KB Supporting Part
(code: 600338)

**Option 2**
Box-out
(code: 410942)

**WARNING**

**Warning!**
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 139.

**WARNING**

**Warning!**
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.

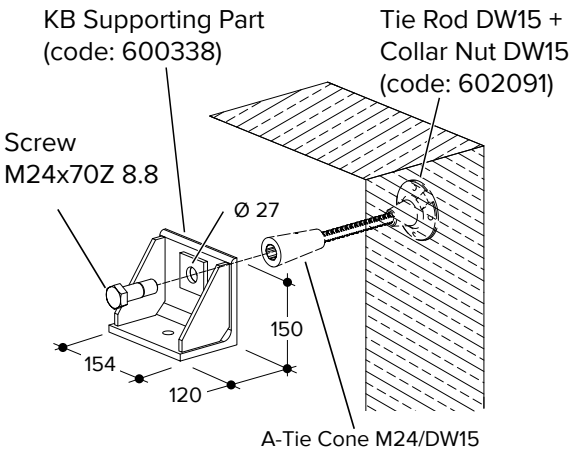
**WARNING**

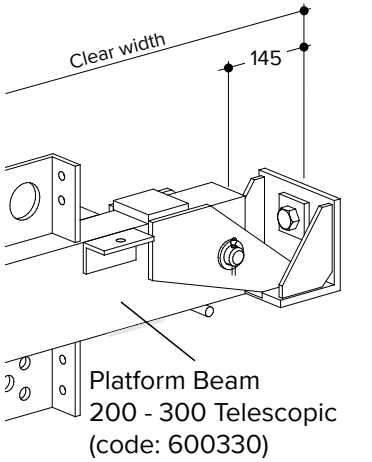
**Warning!**
Do not begin assembly of the formwork over the cantilevered end. Danger of overturning!

### 17.5.1 Platform Beam 200 - 300 Telescopic option 1

With support option 1 for the Platform Beam 200 - 300 Telescopic there is a KB Supporting Part at both ends of the beam.

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




**WARNING**

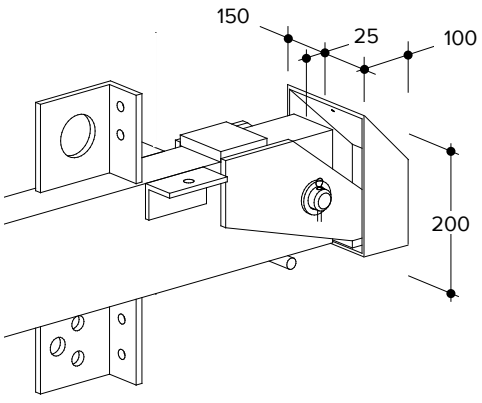
**Warning!**

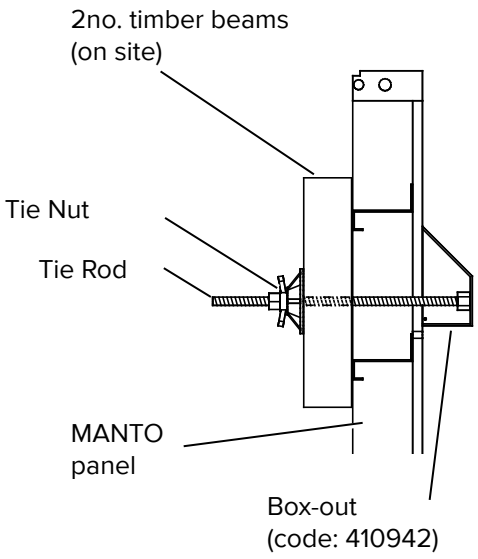
The Tie Cone has to be tied in a way that is suitable to the site conditions. Tie the Tie Cone according to approval no. Z-21.6-1854-2017-03-17 and/or other local regulations. Please check your local requirements and regulations.

### 17.5.2 Platform Beam 200 - 300 Telescopic option 2

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 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 |
| Square* timber 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** | **B = 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): Walkway 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.

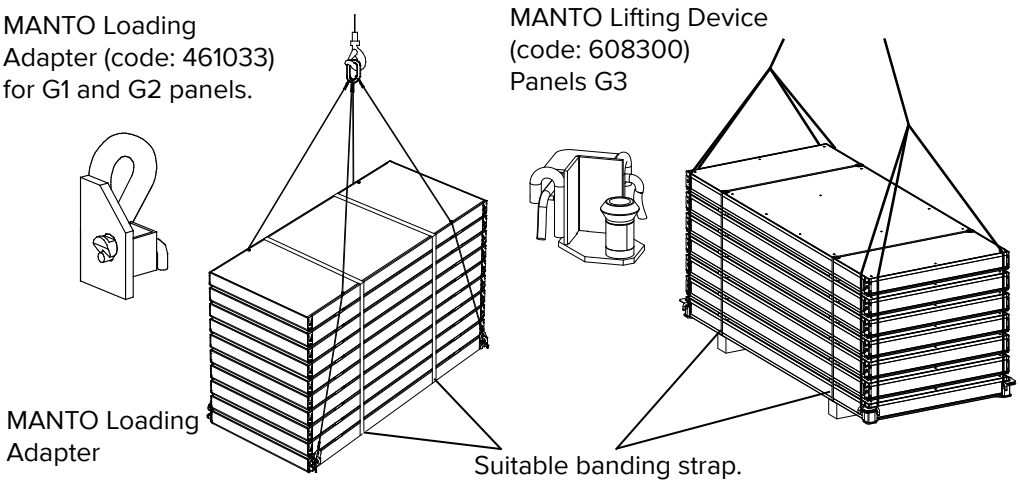
Board thickness bottom platform: 45/200 or 40/240 according to table 3 of DIN 4420-1.

# 18 Transporting by crane

## 18.1 MANTO Panels

### 18.1.1 Bundled panels

When handling bundles of panels by crane, use the MANTO Loading Adapters. The MANTO Loading Adapter combined with 4-string suspensions allow bundles of 10 panels to be moved.



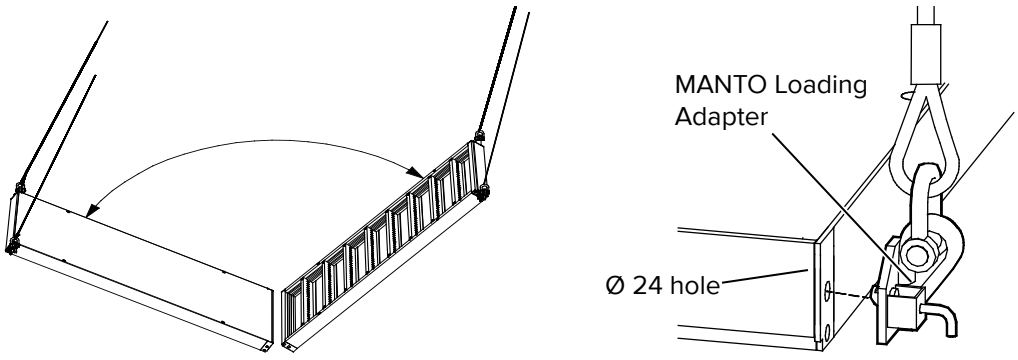

**WARNING**

**Warning!**

MANTO panels that are transported as a bundle have to be adequately secured with at least 2no. retaining bands to prevent panels from sliding out of the bundle.
When using the MANTO Lifting Device, 2no. crane hooks have to be used. Clearance of 100 mm from the ground is required to secure the Lifting Device.
When lifting MANTO panels the internal angle of the crane slings should not exceed 60°.

### 18.1.2 Single panels

Single MANTO panels can be turned over the long way with two 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.




**WARNING**

**Warning!**

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.

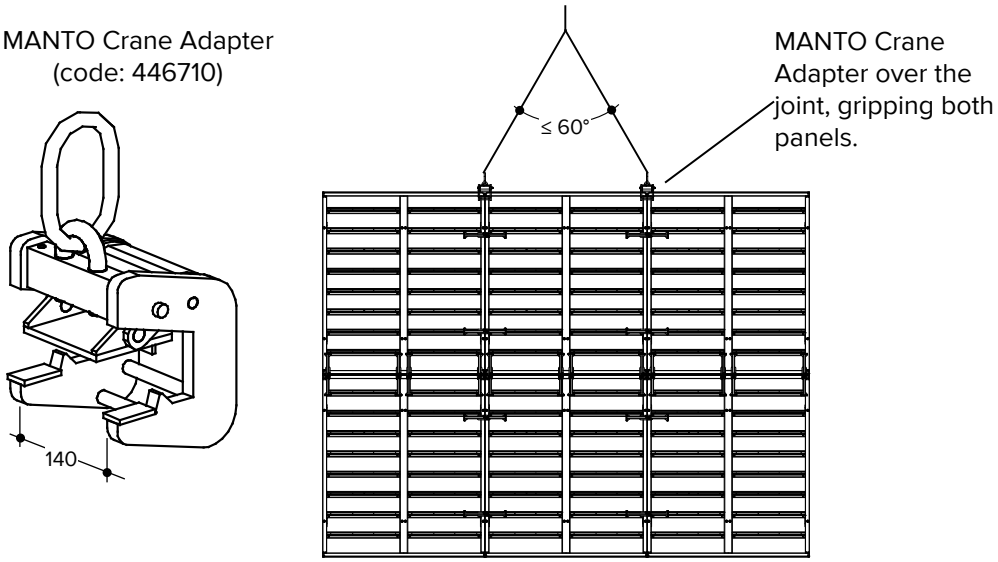


Unless stated otherwise, all dimensions in mm.

### 18.1.3 Assembled panels

**Using the MANTO Crane Adapter**

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




**WARNING**

**Warning!**

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.

**WARNING**

**Warning!**

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

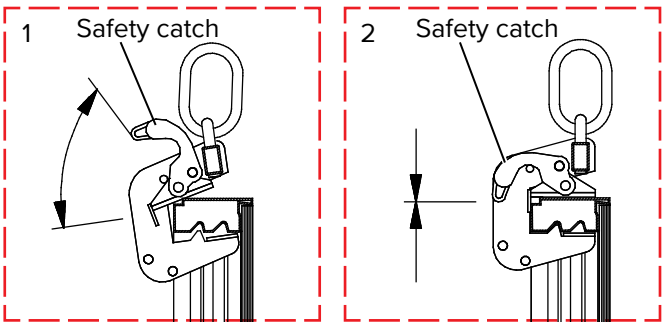
**NOTE**

**Note!**

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.




**WARNING**

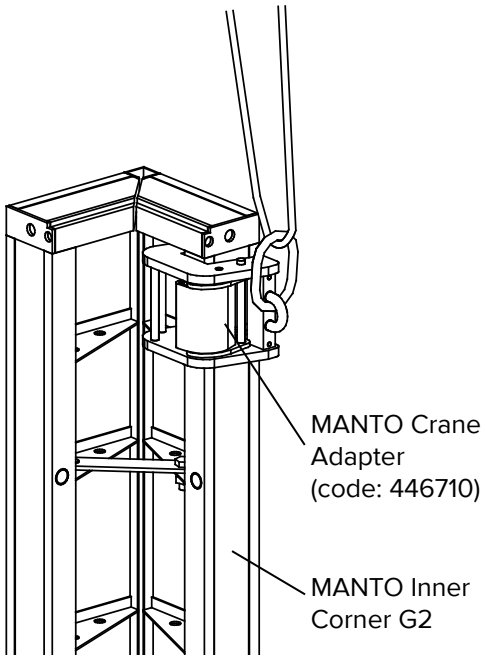
**Warning!**

When connecting to the edge profile of the formwork, make sure that the safety catch on the MANTO Crane Adapter is correctly engaged. The separate operating instructions for the MANTO Crane Adapter have to be followed.

## 18.2 Corners

### 18.2.1 MANTO Inner Corners

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



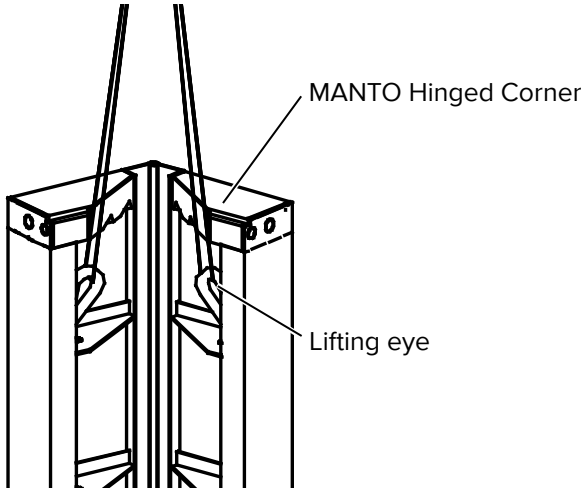

**NOTE**

**Note!**

The Safe Working Load of the MANTO Crane Adapter (code: 446710) is 10.00 kN.

### 18.2.2 MANTO Hinged Corners

The MANTO Hinged Corners can be lifted individually by attaching the crane slings to the lifting eyes on the MANTO Hinged Corners.



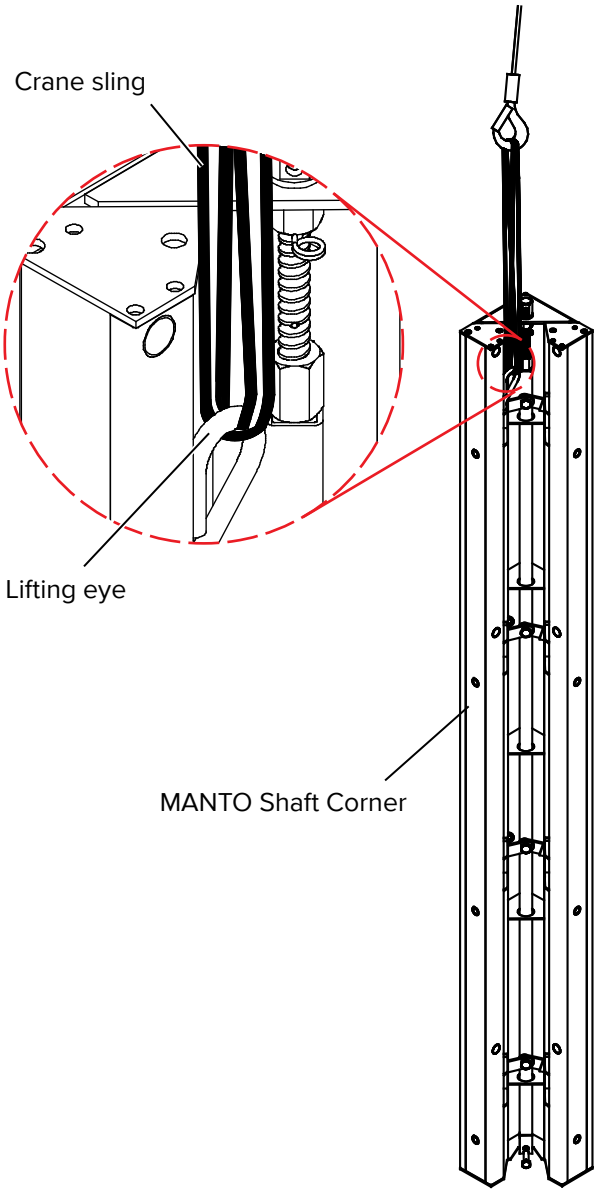

**WARNING**

**Warning!**

When transporting/lifting single Hinged Corners without the MANTO Crane Adapter, a crane sling must be attached to both lifting eyes.

### 18.2.3 MANTO Shaft Corner

Each MANTO Shaft Corner is equipped with a fixed lifting eye. Attach the crane sling to this lifting eye for the transport of single elements.



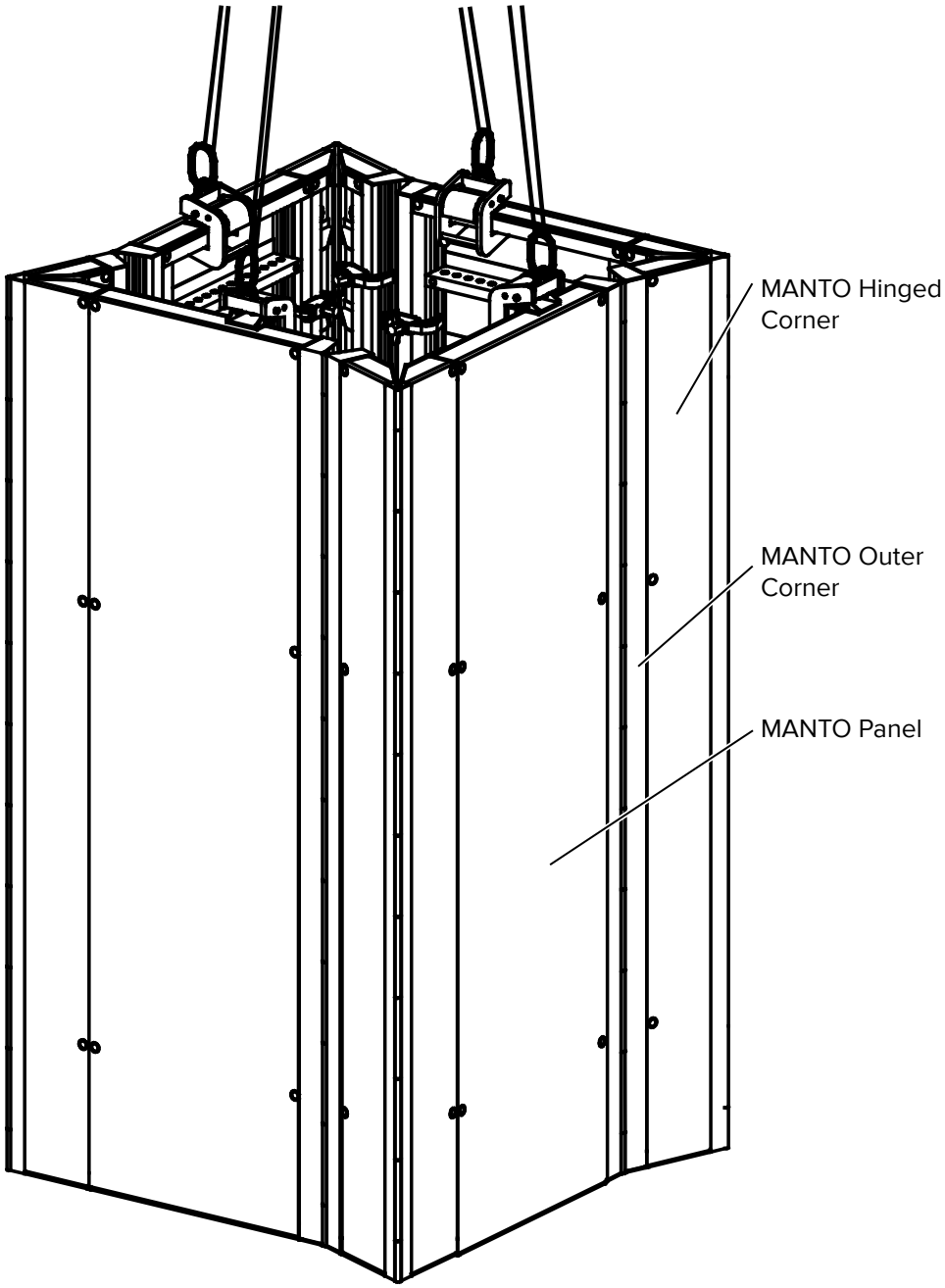

**WARNING**

**Warning!**

When transporting/lifting thread the crane sling through the lifting eye.
Attach a MANTO Crane Adapter or slings with hooks 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!.

## 18.3 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.






Unless stated otherwise, all dimensions in mm.

**WARNING**

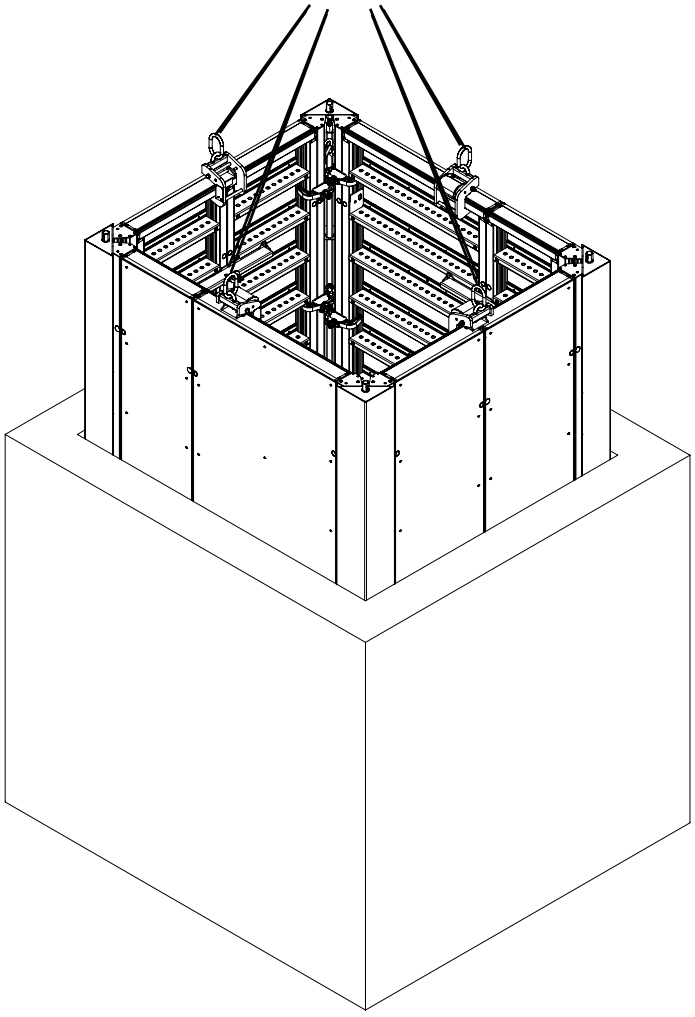
**Warning!**

The MANTO Crane Adapters have to be centred on all four sides. A maximum of 40.00 $m^2$ of formwork can be moved with one crane hook. Ensure the whole formwork assembly is adequately connected before lifting.

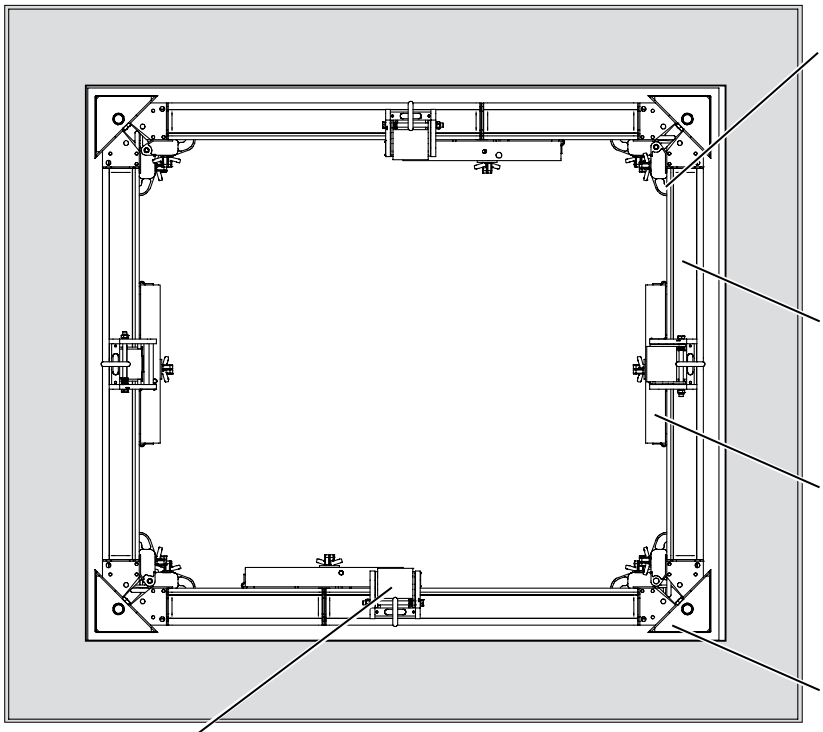
**WARNING**

**Warning!**

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



# Transporting by crane






Unless stated otherwise, all dimensions in mm.

# 19 Assembly

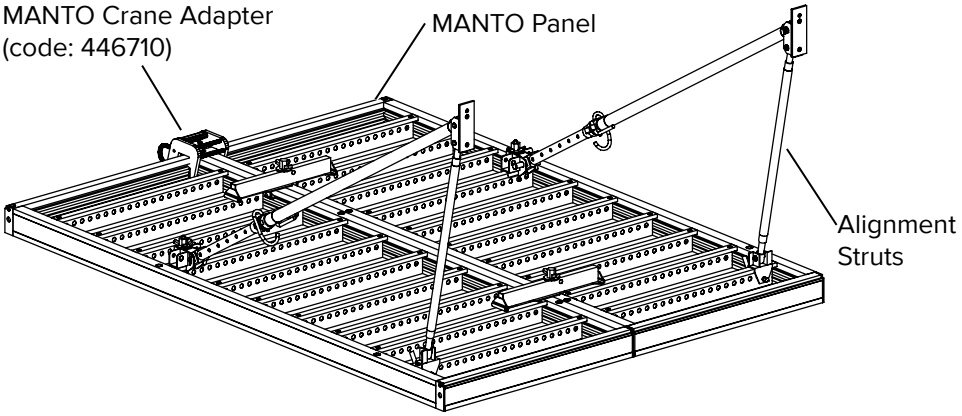
The following sequence shows the typical assembly of the MANTO wall formwork.

| NOTE | **Note!**<br>Release agent to be applied to the form sheets prior to lifting/pouring concrete. |
|---|---|

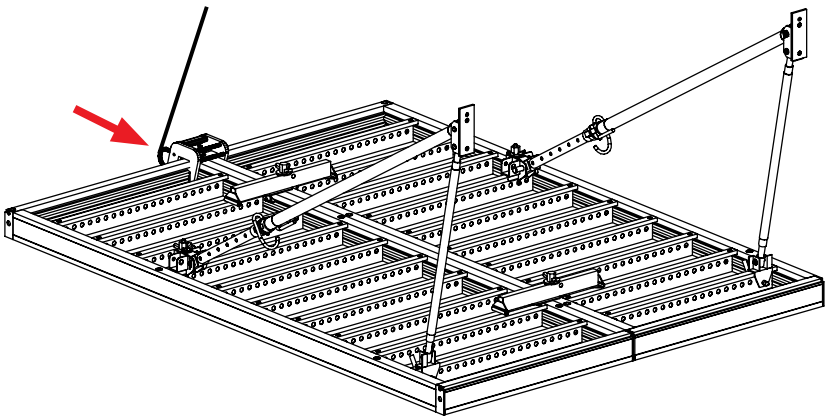
## 19.1 Assembling

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

**Step 2** The first two panels must have 2no. MANTO Alignment Struts secured to them to fix the assembly to the ground, preventing the formwork from tipping over when lifted into the vertical position.



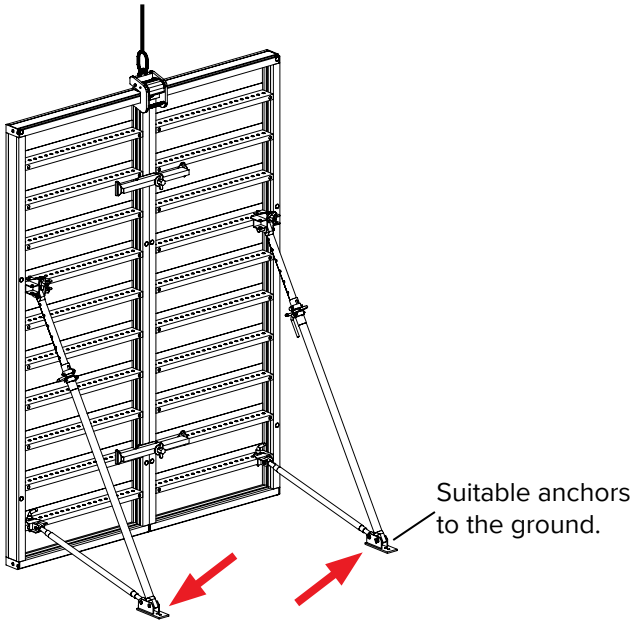

**Step 3** If no pouring platforms are be attached, the MANTO formwork can now be transported with a crane to the point of use by using the MANTO Crane Adapter.



| WARNING | **Warning!**<br>When lifting MANTO panels using 2no. lifting points, the internal angle of the crane slings should not exceed 60°. |
|---|---|

| NOTE | **Note!**<br>The maximum permitted load of the MANTO Crane Adapter (code: 446710) is 10.00 kN. |
|---|---|

**Step 4** Once the formwork is at the point of use, anchor the struts adequately to the ground.



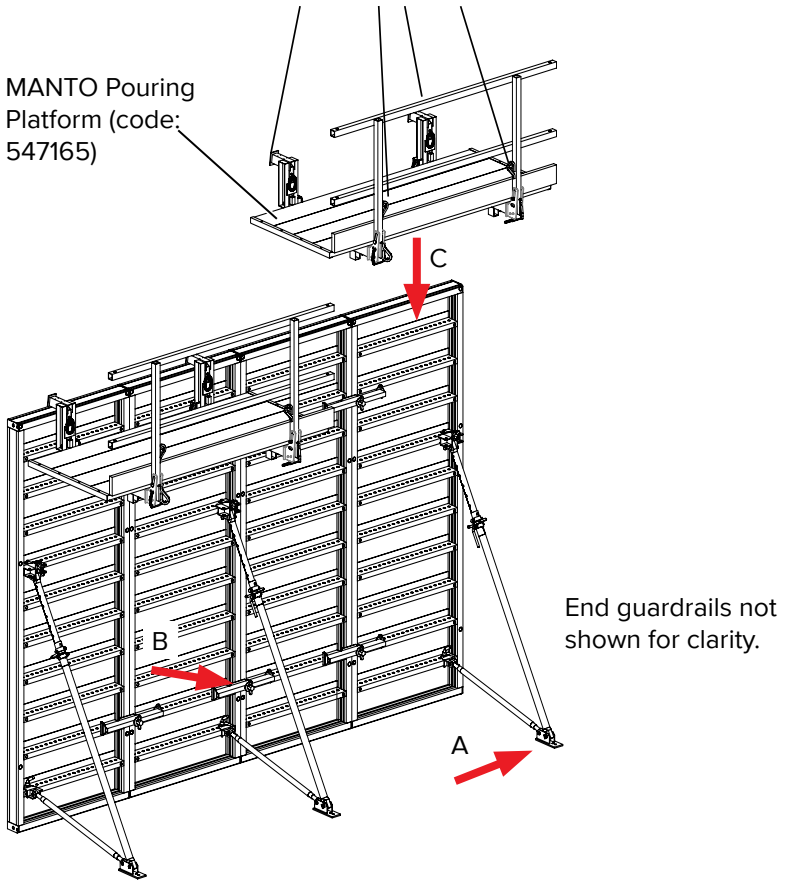

**WARNING**

**Warning!**

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

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

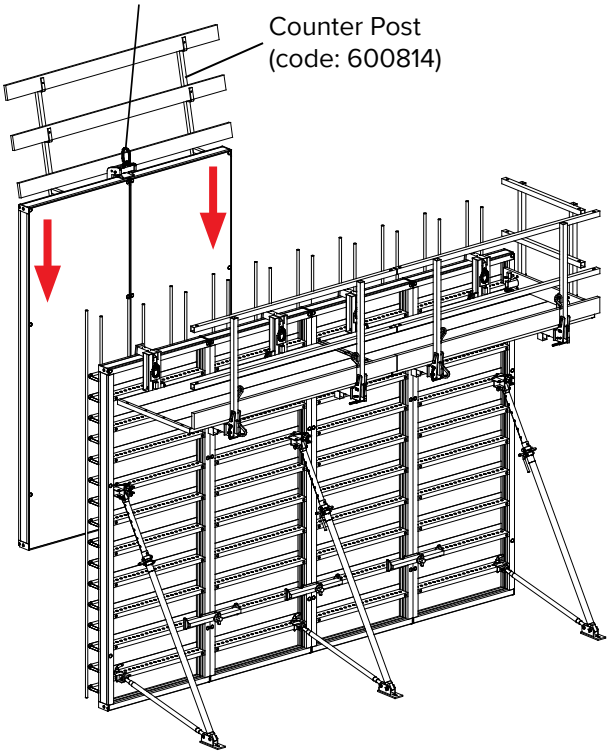
**Step 6** Connect the MANTO Pouring Platform with the corresponding railing to the formwork (C).






Unless stated otherwise, all dimensions in mm.

**Step 7** Pre-assemble the opposite shutter with the Counter Posts. Then transport the formwork panels to the place of use.




**WARNING**

**Warning!**

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

**Step 8** Tie the opposite shutters 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.

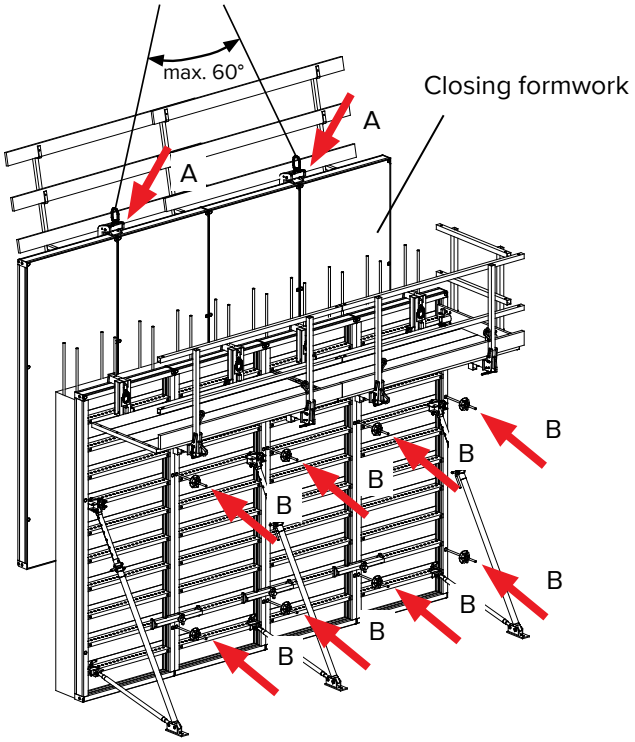
## 19.2 Striking

**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.



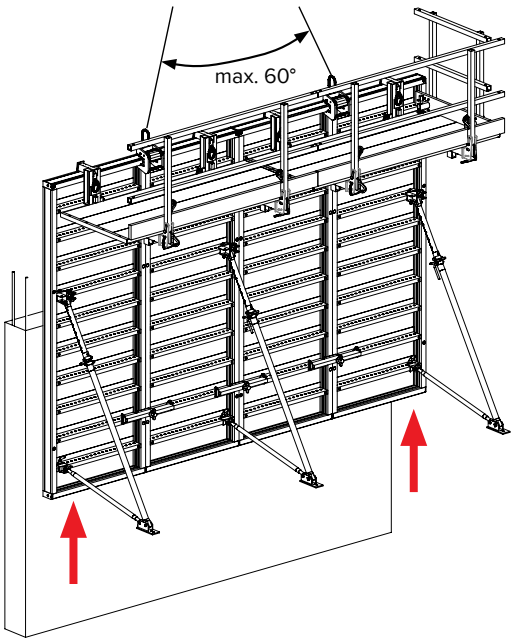

**WARNING**

**Warning!**

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** It is advisable to strike the remaining panels immediately and transport them directly to the next point of use.

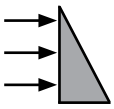
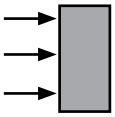
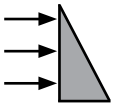
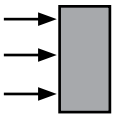
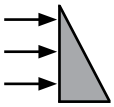
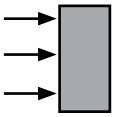





Unless stated otherwise, all dimensions in mm.

# 20 Technical data

## 20.1 Permitted fresh concrete pressure for MANTO

| Panel height | Concrete pressure profile | Tie rod | Permitted fresh concrete pressure [kN/m²] Maximum deflection according to DIN 18202 Table 3 and tie load capacity | | |
|---|---|---|---|---|---|
| | | | Line | | |
| | | | 5 | 6 | 7 |
| 3.30 m |  | DW15 | 70.00 | 70.00 | 70.00 |
| | | DW20 | 82.50 | 82.50 | 82.50 |
| |  | DW15 | 46.00 | 46.00 | 46.00 |
| | | DW20 | 80.00 | 80.00 | 65.00 |
| 2.70 m |  | DW15 | 67.50 | 67.50 | 67.50 |
| | | DW20 | 67.50 | 67.50 | 67.50 |
| |  | DW15 | 60.00 | 60.00 | 60.00 |
| | | DW20 | 80.00 | 80.00 | 63.00 |
| 2.40 m |  | DW15 | 60.00 | 60.00 | 60.00 |
| | | DW20 | 80.00 | 80.00 | 80.00 |
| 1.20 m |  | DW15 | 70.00 | 70.00 | 70.00 |
| | | DW20 | 80.00 | 80.00 | 80.00 |

**WARNING**

**Warning!**

- Ø 15mm Tie Rods up to a maximum of 90.00 kN and Ø20 mm Tie Rods up to a maximum of 150.00 kN.
- The lowest of the above values apply top panles 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 40.
- A mixture of DW15 and DW20 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.

# 21 Chronology

| Changes since edition 2019-03 | | |
|---|---|---|
| **Change** | **Page** | **Date** |
| MANTO G3 Giant Panels added | various | 2019-11 |
| PLATINUM 100 Transport Hook Plus removed | various | 2019-11 |
| MANTO G3 Inserts, Sealing Cones and front plates for Panels G3 and G3 M updated | various | 2019-11 |
| Illustration in section Components updated | 10 ff. | 2019-11 |

Unless stated otherwise, all dimensions in mm.

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The illustrations contained in this document reflect normal operation at a construction site and are not always correct in regard to safety issues.

**Last modified December 2019**
**Keep for later use!**

1800 EN 2020-01-29-

Printing standard