

Technical Data Sheets

Metric Specification



European Technical Office



Brickyard Road, Aldridge, Walsall WS9 8BW, UK.

Telephone: +44 1922 743743

Email: info@rmdkwikform.com




Website: www.rmdkwikform.com

Contents





Ref	Description	Hyperlink	Page
	Contents		2-7
	Contents		2-6
	Introduction		7
1.0	Components		
	Minima Standard Panels		8-13
MMX21290	Minima Panel 1200 x 900mm - Plywood		8-9
MMX21275	Minima Panel 1200 x 750mm - Plywood		8-9
MMX21260	Minima Panel 1200 x 600mm - Plywood		8-9
MMX21245	Minima Panel 1200 x 450mm - Plywood		8
MMX21230	Minima Panel 1200 x 300mm - Plywood		8
MMX71290	Minima Panel 1200 x 900mm - Composite		8
MMX71275	Minima Panel 1200 x 750mm - Composite		8
MMX71260	Minima Panel 1200 x 600mm - Composite		8
MMX71245	Minima Panel 1200 x 450mm - Composite		8
MMX71230	Minima Panel 1200 x 300mm - Composite		8
MMX21590	Minima Panel 1500 x 900mm - Plywood		10
MMX21575	Minima Panel 1500 x 750mm - Plywood		10
MMX21565	Minima Panel 1500 x 650mm - Plywood		10
MMX21560	Minima Panel 1500 x 600mm - Plywood		10
MMX21555	Minima Panel 1500 x 550mm - Plywood		10
MMX21550	Minima Panel 1500 x 500mm - Plywood		10
MMX21545	Minima Panel 1500 x 450mm - Plywood		10
MMX21530	Minima Panel 1500 x 300mm - Plywood		10
MMX71590	Minima Panel 1500 x 900mm - Composite		10
MMX71575	Minima Panel 1500 x 750mm - Composite		10
MMX71565	Minima Panel 1500 x 650mm - Composite		10
MMX71560	Minima Panel 1500 x 600mm - Composite		10
MMX71555	Minima Panel 1500 x 550mm - Composite		10
MMX71550	Minima Panel 1500 x 500mm - Composite		10
MMX71545	Minima Panel 1500 x 450mm - Composite		10
MMX71530	Minima Panel 1500 x 300mm - Composite		10
MMX22790	Minima Panel 2700 x 900mm - Plywood		11
MMX22775	Minima Panel 2700 x 750mm - Plywood		11
MMX22765	Minima Panel 2700 x 750mm - Plywood		11
MMX22760	Minima Panel 2700 x 600mm - Plywood		11
MMX22755	Minima Panel 2700 x 550mm - Plywood		11
MMX22750	Minima Panel 2700 x 500mm - Plywood		11
MMX22745	Minima Panel 2700 x 450mm - Plywood		11
MMX22730	Minima Panel 2700 x 300mm - Plywood		11
MMX72790	Minima Panel 2700 x 900mm - Composite		11
MMX72775	Minima Panel 2700 x 750mm - Composite		11
MMX72765	Minima Panel 2700 x 750mm - Composite		11
MMX72760	Minima Panel 2700 x 600mm - Composite		11

Note: Clicking the RMDK logo in the top right hand corner of any page will bring you back to this Contents page







Contents

Ref	Description	Hyperlink	Page
MMX72755	Minima Panel 2700 x 550mm - Composite		11
MMX72750	Minima Panel 2700 x 500mm - Composite		11
MMX72745	Minima Panel 2700 x 450mm - Composite		11
MMX72730	Minima Panel 2700 x 300mm - Composite		11
MMX73390	Minima Composite Panel 3300 x 900mm		12
MMX73375	Minima Composite Panel 3300 x 750mm		12
MMX73360	Minima Composite Panel 3300 x 600mm		12
MMX73345	Minima Composite Panel 3300 x 450mm		12
MMX73330	Minima Composite Panel 3300 x 300mm		12
MMA72724	Minima Composite Panel 2700 x 2400mm		13
MMA22724	Minima Plywood Panel 2700 x 2400mm		13
	Minima Multi-Purpose Panels		14-15
MMX42770	Minima Multi Panel 2700 x 700mm - Plywood		14-15
MMX41570	Minima Multi Panel 1500 x 700mm - Plywood		14-15
MMX41270	Minima Multi Panel 1200 x 700mm - Plywood		14-15
MMX93370	Minima Multi Panel 3300 x 700mm - Composite		14-15
MMX62770	Minima Multi Panel 2700 x 700mm - Composite		14-15
MMX61570	Minima Multi Panel 1500 x 700mm - Composite		14-15
MMX61270	Minima Multi Panel 1200 x 700mm - Composite		14-15
	Minima Column Panels		16-18
MMM41870	Minima Multi Panel 1800x700mm Composite		16
MMX63070	Minima 3000 x 700mm Plywood Column Panel		17
MMX63370	Minima 3300 x 700mm Composite Column Panel		18
MMX43390	Minima Plywood Column Panel 3300 x 900mm		19
MMX41290	Minima Plywood Column Panel 1200 x 900mm		20
	Minima Corner Panels		21-26
MMX33330	Minima Inner Corner 3300		21
MMX32730	Minima Inner Corner 2700		21
MMX31570	Minima Inner Corner 1500		21
MMX31230	Minima Inner Corner 1200		21
MMX93300	Universal Stripping Corner 3300 x 300mm		22
MMX92700	Universal Stripping Corner 2700 x 300mm		22
MMX91500	Universal Stripping Corner 1500 x 300mm		22
MMX91200	Universal Stripping Corner 1200 x 300mm		22
MMX90001	Universal Stripping Corner Top Hat Unit		22
MMX53330	Minima Hinge Corner 3300 x 300mm		23-24
MMX52730	Minima Hinge Corner 2700 x 300mm		23-24
MMX51530	Minima Hinge Corner 1500 x 300mm		23-24
MMX51230	Minima Hinge Corner 1200 x 300mm		23-24
MMX53315	Minima Hinge Corner 3300 x 150mm		25
MMX52715	Minima Hinge Corner 2700 x 150mm		25
MMX51515	Minima Hinge Corner 1500 x 150mm		25
MMM61800	Minima External Corner Angle 1800mm		26
MMM61500	Minima External Corner Angle 1500mm		26
MMM61200	Minima External Corner Angle 1200mm		26

Contents

Ref	Description	Hyperlink	Page
	Minima Circular Formwork Panels		27
MMX82730	Minima Flex Panel 2700 x 300mm		27
MMX82725	Minima Flex Panel 2700 x 250mm		27
MMX82720	Minima Flex Panel 2700 x 200mm		27
MMX81530	Minima Flex Panel 1500 x 300mm		27
MMX81525	Minima Flex Panel 1500 x 250mm		27
MMX81520	Minima Flex Panel 1500 x 200mm		27
MMX80001	Minima Flex Waler		27
	Minima Clamps & Connections		28-35
MMX10001	Minima Outer Corner Clamp		28
MMX10002	Minima Adjustable Clamp		28
MMX10003	Minima Aligning Panel Clamp		29
MMX10028	Minima Wedge Clamp		29
MMX10040	Minima Short Adjustable Clamp		30
MXX10007	Maxima Alignment Rail 1500mm		31
MXX10008	Maxima Alignment Rail 750mm		31
MXX10009	Maxima Corner Alignment Rail		31
MMX10009	Minima Multi-purpose Waler 100		32
MMX10008	Minima Waler 80		32
MMX10010	Minima Waler Tie 300mm		33
MMX10031	Minima Waler Tie 500mm		33
MMX10011	Minima Tension Nut		33
MMX10012	Minima Tension Bolt 190		34
MMU10000	Minima Short Tension Bolt		34
MMX10013	Minima Centering Nut		34
MMX10014	Minima MP Bolt		35
MMX10015	Minima Multi Purpose Nut		35
	Rapid Tie Bar & Accessories		36
MXX10043	Maxima Tie Plate 15		36
MMX10022	Minima Waler Plate 220		36
BTX10050	Rapid Tie Bar 15mm x 0.5m		36
BTX10100	Rapid Tie Bar 15mm x 1.0m		36
BTX10150	Rapid Tie Bar 15mm x 1.5m		36
BTX10200	Rapid Tie Bar 15mm x 2.0m		36
BTX10600	Rapid Tie Bar 15mm x 6.0m		36
BTX30015	Rapid Tie Bar per m 15mm		36
BTX20015	Rapid Tie Bar 15mm per cut		36
BTX10011	Ribbed Water Bar Connector		36
BTX10018	Plastic Cone 10mm		36
BTX10019	Plastic Tube 2m		36
	Foundation Formwork Accessories		37-38
MMX10023	Minima Edge Tie Bearing		37
MMX10012	Maxima Ground Plate		37
BTX10017	Nut - Hexagon 50mm		37
MMX10044	Minima Uplift Bracket		38

Contents

Ref	Description	Hyerlink	Page
	Alignment Props		39-40
MMX10017	Minima Alignment Prop - Short		39
MMX10005	Minima Medium Adjusting Prop		39
MMA20005	Minima Propping Bracket		40
	Access Brackets & Accessories		41-42
MMX10006	Minima Access Bracket		41
SAX11200	Ultraguard Post 1.2m		42
SAX12550	Ultraguard Barrier 2550mm		42
SAX13150	Ultraguard Barrier 3150mm		42
SFX20240	Scaffold Board 2.4m - No. 2		42
SFX20300	Scaffold Board 3.0m - No. 3		42
SFX20395	Scaffold Board 3.95m		42
SFX10026	Toe Board Clip		42
TUX80060	Scaffold Tube 0.6m (4mm)		42
TUX80150	Scaffold Tube 1.5m (4mm)		42
TUX80210	Scaffold Tube 2.1m (4mm)		42
TUX80300	Scaffold Tube 3.0m (4mm)		42
TUX80360	Scaffold Tube 3.6m (4mm)		42
TUX80480	Scaffold Tube 4.8m (4mm)		42
TUX80540	Scaffold Tube 5.4m (4mm)		42
TUX80640	Scaffold Tube 6.4m (4mm)		42
SFX10002	Coupler 90 Deg 2"x2"		42
SFX10003	Coupler Swivel 2"x2"		42
	Lifting Accessories		43-44
MMX10021	Minima Crane Hook		43
MMA10020	Minima Lifting Bar		44
2.0	Applications		
	Allowable Working Loads		45
	Minima System - Allowable Working Loads		45
	Panel Connections		46-60
	Minima Panel Connections		46-47
	Stacked Minima Connections Using 1200mm High Base Panels		48
	Stacked Minima Connections Using 1500mm High Base Panels		49-50
	Stacked Minima Connections Using 2700mm High Base Panels		51-53
	Stacked Minima Connections Using 3300mm High Base Panels		54-56
	Stacked Minima Connections Using 2700 x 2400mm Panels		57
	Minima Connections - Mixed Panel Heights		58
	Alternative Arrangement to Clamping Using Bolted Joints		59
	Minima Panel Infill Connections		60
	Corners		61-64
	Minima Corner Arrangements		61
	Clamping Joints at Outer Corners		62
	Clamping Joints Adjacent to Outer Corners		62
	Clamping Joints at Inner Corners With Timber Infill of 0-50mm		63


Contents

Ref	Description	Hyperlink	Page
	Corners.....continued		61-64
	Clamping Joints at Inner Corners With Timber Infill of 0-150mm		63
	Obtuse and Acute Angled Corners Using Hinged Corner Panels		64
	Stop-Ends		65
	Stop-Ends		65
	Clamping Joints Adjacent to Stop-Ends		65
	Wall Junctions		66-69
	Abutting Existing Walls		66
	Lapping Onto Existing Walls		66
	Abutting Existing Walls at Corners		67
	Global Stability of Butted or Lapped Formwork		67
	Stepped Corners		68
	Acute External Corners Where Hinge Corners Will Not Fit		68
	Minima T-Junction Arrangements		69
	Allowable Tie Angles		70
	Battered Formwork		70
	Skewed Tie on Plan		70
	Single Sided Formwork		71-78
	Minima Single Sided Formwork - Standard Solutions for Laying Panels		71-73
	Minima Single Sided Formwork - Standard Solutions		74-76
	Connection of Superslim Soldiers to Minima Panels		77-78
	Gang Forms		79-80
	Gang Forms 5.4m - 6.6m		79
	Gang Forms 6.6m and Above		80
	Radiused Formwork		81-83
	Radiused Formwork Using Timber Infills		81
	Radiused Formwork Using Minima Flex Panels		82-83
	Column Formwork		84-86
	Column Forms Using Standard Minima Panels		84
	Column Forms Using Multi Purpose Panels 1200 / 1500 / 2700 / 3300mm		85
	Column Forms Using Minima 1800x700mm Multi-Purpose Panels		85
	Column Forms Using Minima 3000 / 3300 x 700mm Composite Column Panels		86
	Propping Shutters		87-88
	Minima Propping Bracket - Maximum Permitted Angles		87-88
	Access Platforms & Handrailing		89-90
	Minima Access Platform Materials		89
	Remote Side Fall Protection		90
3.0	Contact Details		91
	Contact Details: International Offices		91

Introduction

Minima is a versatile and comprehensive modular wall formwork panel system for concrete pressures up to 60kN/m². Panels are manufactured in close tolerance jigs and consist of a hot-dip galvanised frame and a choice of either a 12mm thick phenolic faced plywood or 13mm thick composite face material. Minima panels are supplied in four different heights and up to nine different widths. Most panel sizes can be erected and dismantled by hand with larger panels and gang forms requiring use of lifting equipment. It is the customer's responsibility to assess the weight of all lifts and ensure compliance with all local manual handling and lifting equipment regulations.

Health and Safety

Designers should make themselves familiar with the contents of Equipment Guidance Notes UIX10103-Minima Panel Wall Formwork and Application Risk Assessment UIX20100-Formwork. These documents are available to customers via hyperlinks embedded in PDF scheme drawings. Residual risks pertaining to design issues are marked in this document with the symbol  and, if relevant to the scheme being prepared, should be highlighted on the RMDK scheme drawing.

Design to EN Standards

The RMD Kwikform Minima System has been designed in accordance with EN1993-1-1: Eurocode 3: Design of Steel Structures augmented by non-linear finite element analysis with manufacturing procedures certified in accordance with BS EN ISO 9001: Quality Management Systems.

To facilitate a simplified scheme design using established permissible load methods, load performance data in this document is displayed as an 'Allowable Working Load'. Should Limit State Design be required, the Design Resistance may be obtained by multiplying the Allowable Working Load values by 1.5.



MINIMA

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Minima 1200mm High Panels

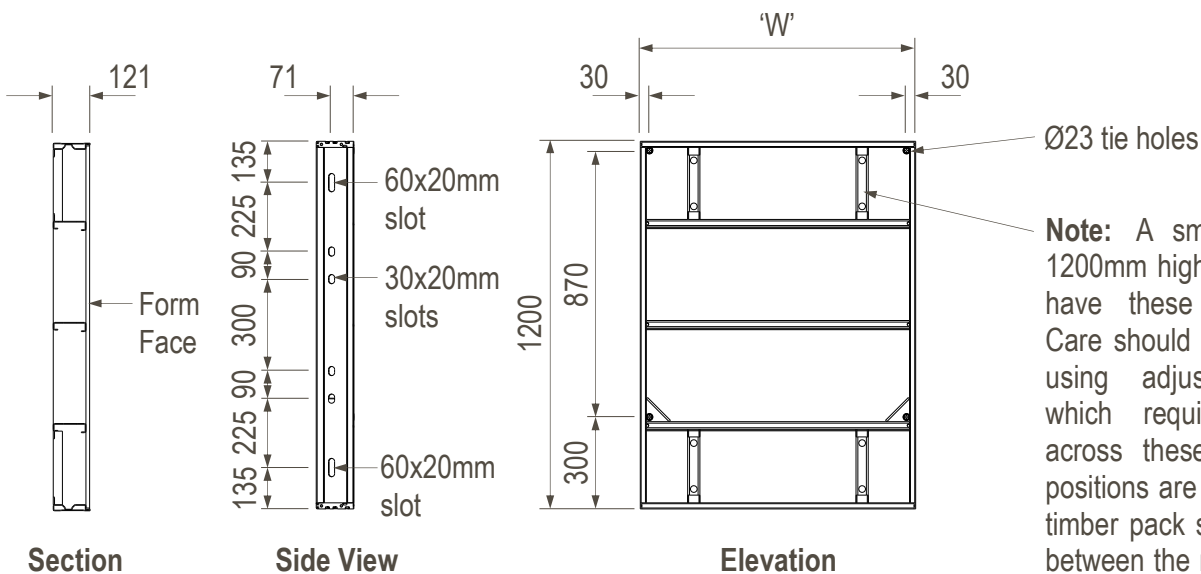
With a choice of either a 12mm thick phenolic faced plywood or 13mm thick composite face material, Minima 1200mm high panels are designed either for hand-set use or lifting by crane.

Allowable Design Pressure = 60kN/m²

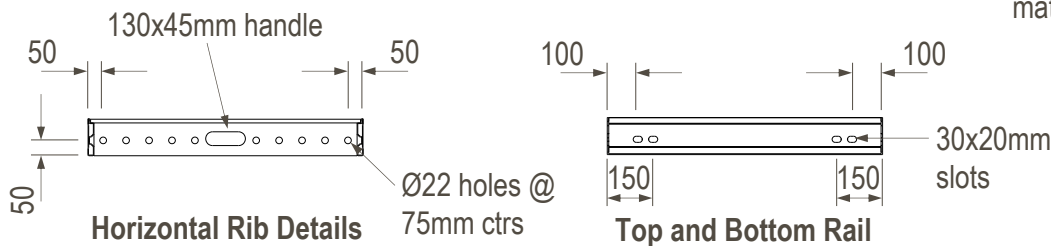
Note: These panels are not symmetrical. The orientation of the panel during erection is important.



60x20mm slotted holes at each end of panel sides are not to be used for connection of propping brackets.



Note: A small number of 1200mm high panels do not have these internal ribs. Care should be taken when using adjustable clamps which require positioning across these ribs. If rib positions are not available a timber pack should be used between the rear of the face material and the clamp.



Code		Description (Length x 'W')	Weight	
Plywood	Composite		Plywood	Composite
MMX21290	MMX71290	Minima Panel 1200 x 900mm	37.8 kg	40.0 kg
MMX21275	MMX71275	Minima Panel 1200 x 750mm	33.4 kg	35.2 kg
MMX21260	MMX71260	Minima Panel 1200 x 600mm	29.0 kg	30.5 kg
MMX21245	MMX71245	Minima Panel 1200 x 450mm	23.8 kg	24.9 kg
MMX21230	MMX71230	Minima Panel 1200 x 300mm	18.6 kg	19.3 kg

MINIMA

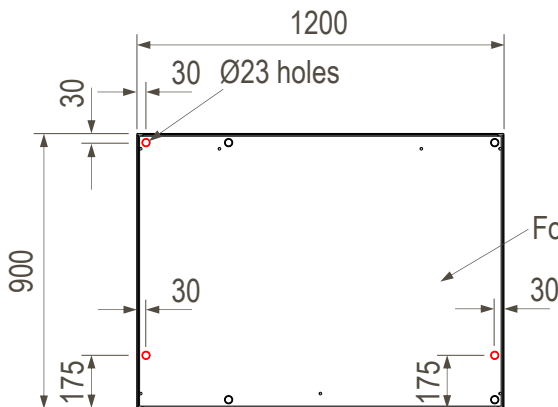
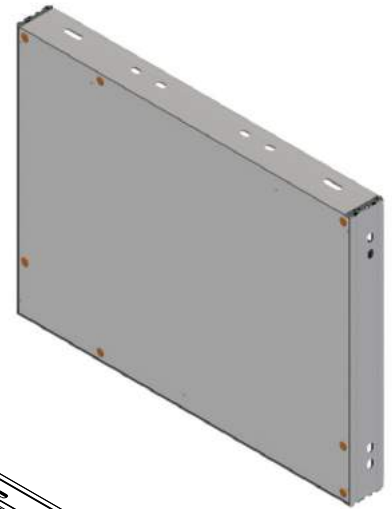
HANDSET PANEL SYSTEM

Minima 1200mm High Panels - Additional Holes

Some (not all) 900mm, 750mm and 600mm wide x 1200mm high Minima Panels have three additional Ø23mm holes to better accommodate tying above the kicker when the panels are used horizontally. All new panels will be manufactured with these additional holes.

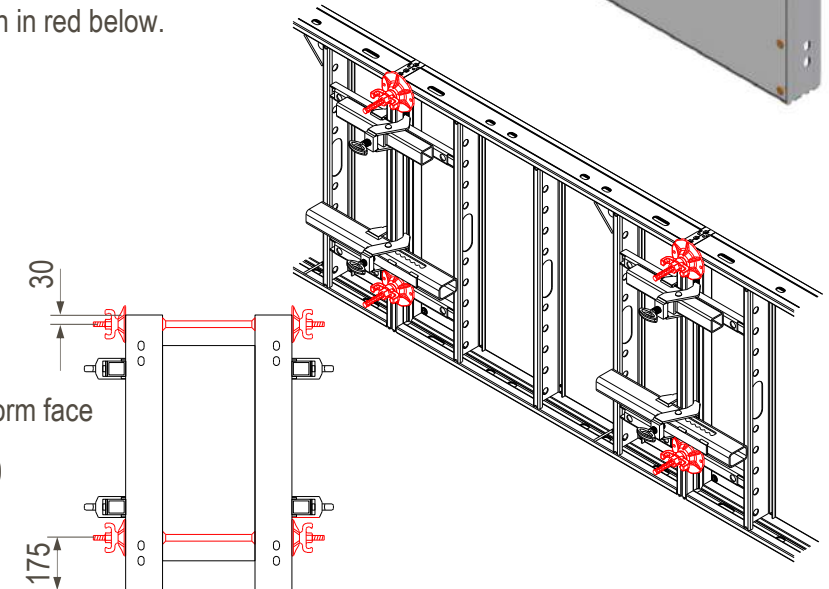
For designs that require these additional holes, it may be necessary to specify for the face material to be drilled accordingly before the panels are delivered to site. All tie holes must be plugged prior to panels being dispatched from RMDK branches.

The positions of these additional holes are shown in red below.

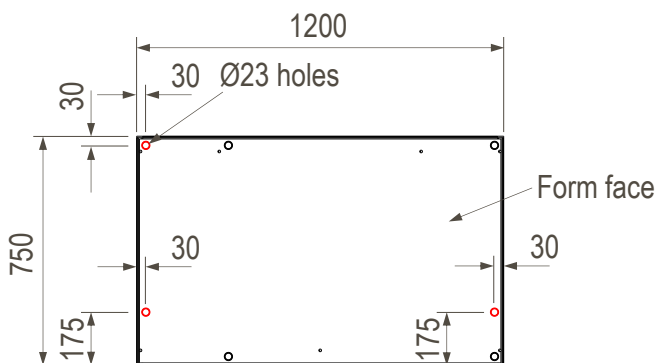


Minima Panel 1200x900mm
(MMX21290 / MMX71290)

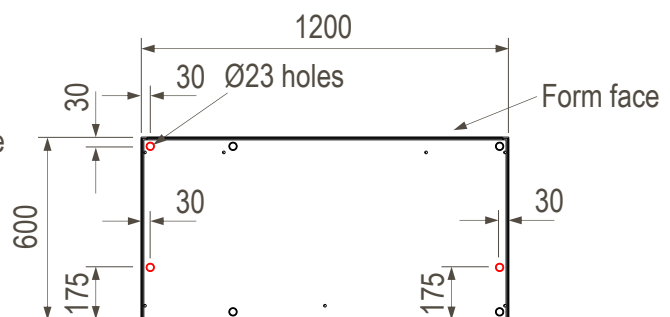
Dimensions are specified from panel edges
not from edge of face material



Typical Section Showing Laying
Panels in Use with Kicker



Minima Panel 1200x750mm
(MMX21275 / MMX71275)



Minima Panel 1200x600mm
(MMX21260 / MMX71260)

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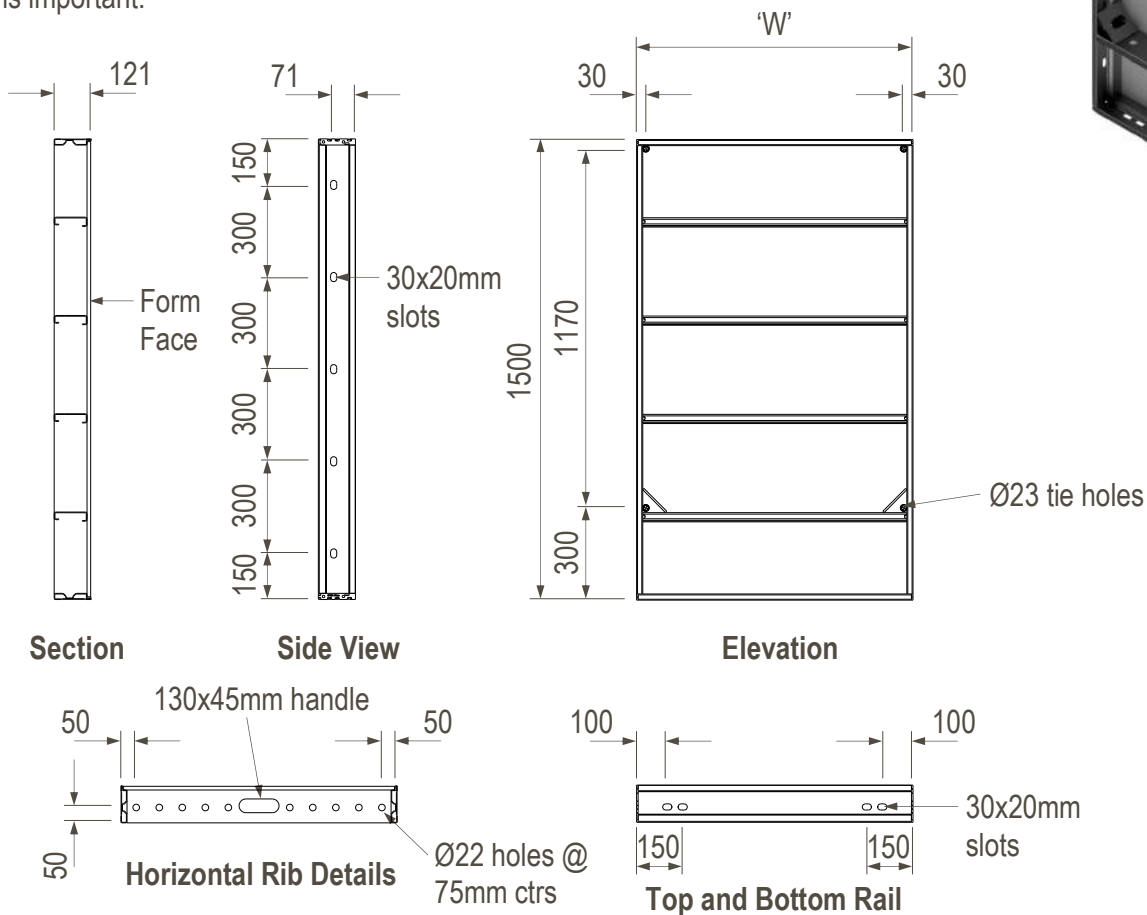
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Minima 1500mm High Panels

With a choice of either a 12mm thick phenolic faced plywood or 13mm thick composite face material, Minima 1500mm high panels are designed either for hand-set use or lifting by crane.

Allowable Design Pressure = 60kN/m²

Note: These panels are not symmetrical. The orientation of the panel during erection is important.



Code		Description (Length x 'W')	Weight	
Plywood	Composite		Plywood	Composite
MMX21590	MMX71590	Minima Panel 1500 x 900mm	43.0 kg	46.6 kg
MMX21575	MMX71575	Minima Panel 1500 x 750mm	37.9 kg	40.9 kg
MMX21565*	MMX71565*	Minima Panel 1500 x 650mm	34.5 kg	37.1 kg
MMX21560	MMX71560	Minima Panel 1500 x 600mm	32.8 kg	35.2 kg
MMX21555*	MMX71555*	Minima Panel 1500 x 550mm	31.1 kg	33.3 kg
MMX21550*	MMX71550*	Minima Panel 1500 x 500mm	29.4 kg	31.4 kg
MMX21545	MMX71545	Minima Panel 1500 x 450mm	27.7 kg	29.5 kg
MMX21530	MMX71530	Minima Panel 1500 x 300mm	22.6 kg	23.8 kg

* Non preferred sizes with low stock

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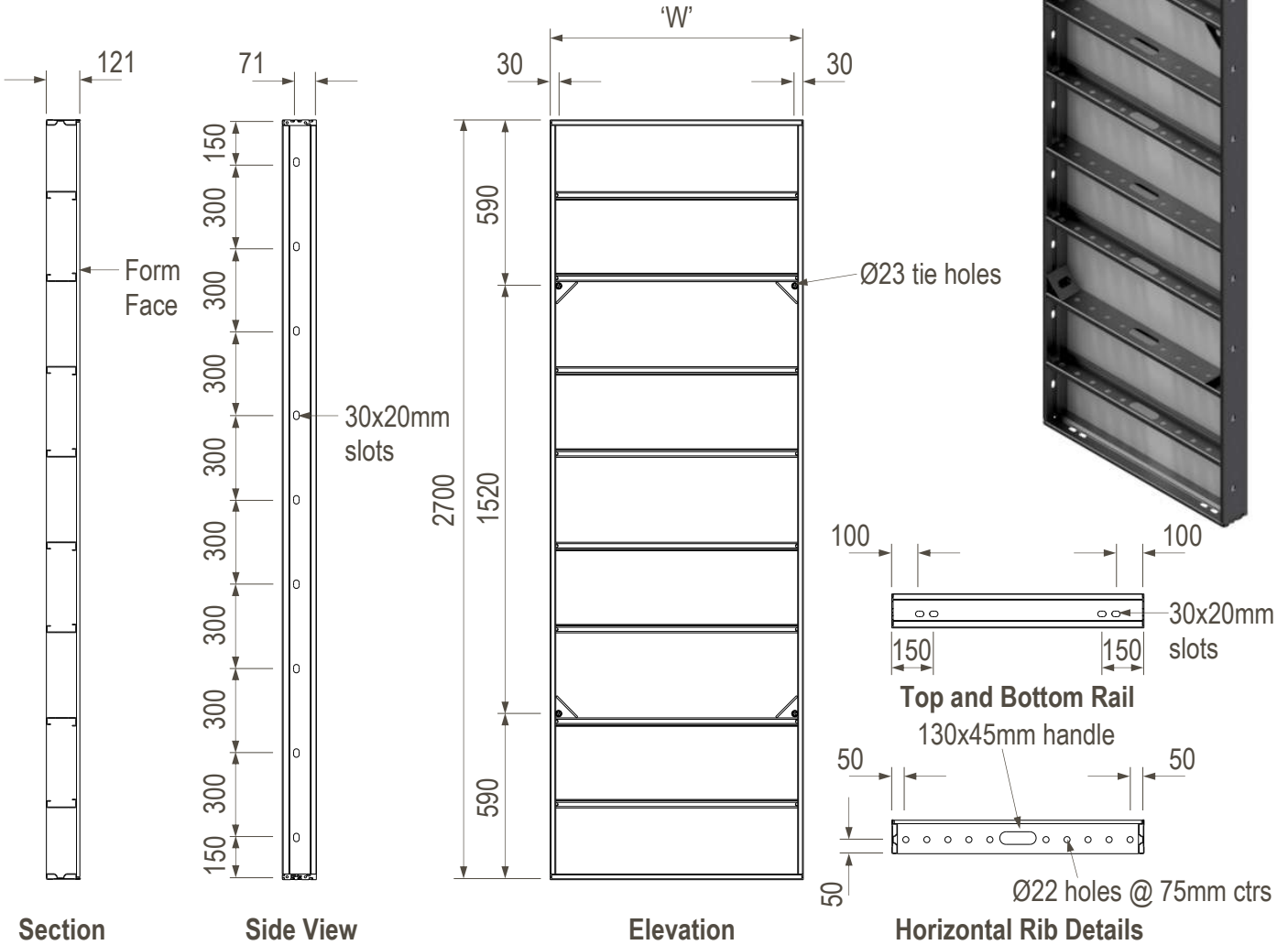
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Minima 2700mm High Panels

With a choice of either a 12mm thick phenolic faced plywood or 13mm thick composite face material, Minima 2700mm high panels are designed primarily for lifting by crane.

Allowable Design Pressure = 60kN/m²



Code		Description (Length x 'W')	Weight	
Plywood	Composite		Plywood	Composite
MMX22790	MMX72790	Minima Panel 2700 x 900mm	73.5 kg	80.0 kg
MMX22775	MMX72775	Minima Panel 2700 x 750mm	65.0 kg	70.4 kg
MMX22765*	MMX72765*	Minima Panel 2700 x 650mm	59.3 kg	64.1 kg
MMX22760	MMX72760	Minima Panel 2700 x 600mm	56.5 kg	60.8 kg
MMX22755*	MMX72755*	Minima Panel 2700 x 550mm	53.7 kg	57.7 kg
MMX22750*	MMX72750*	Minima Panel 2700 x 500mm	50.8 kg	54.5 kg
MMX22745	MMX72745	Minima Panel 2700 x 450mm	47.9 kg	51.2 kg
MMX22730	MMX72730	Minima Panel 2700 x 300mm	39.5 kg	41.6 kg

* Non preferred sizes with low stock

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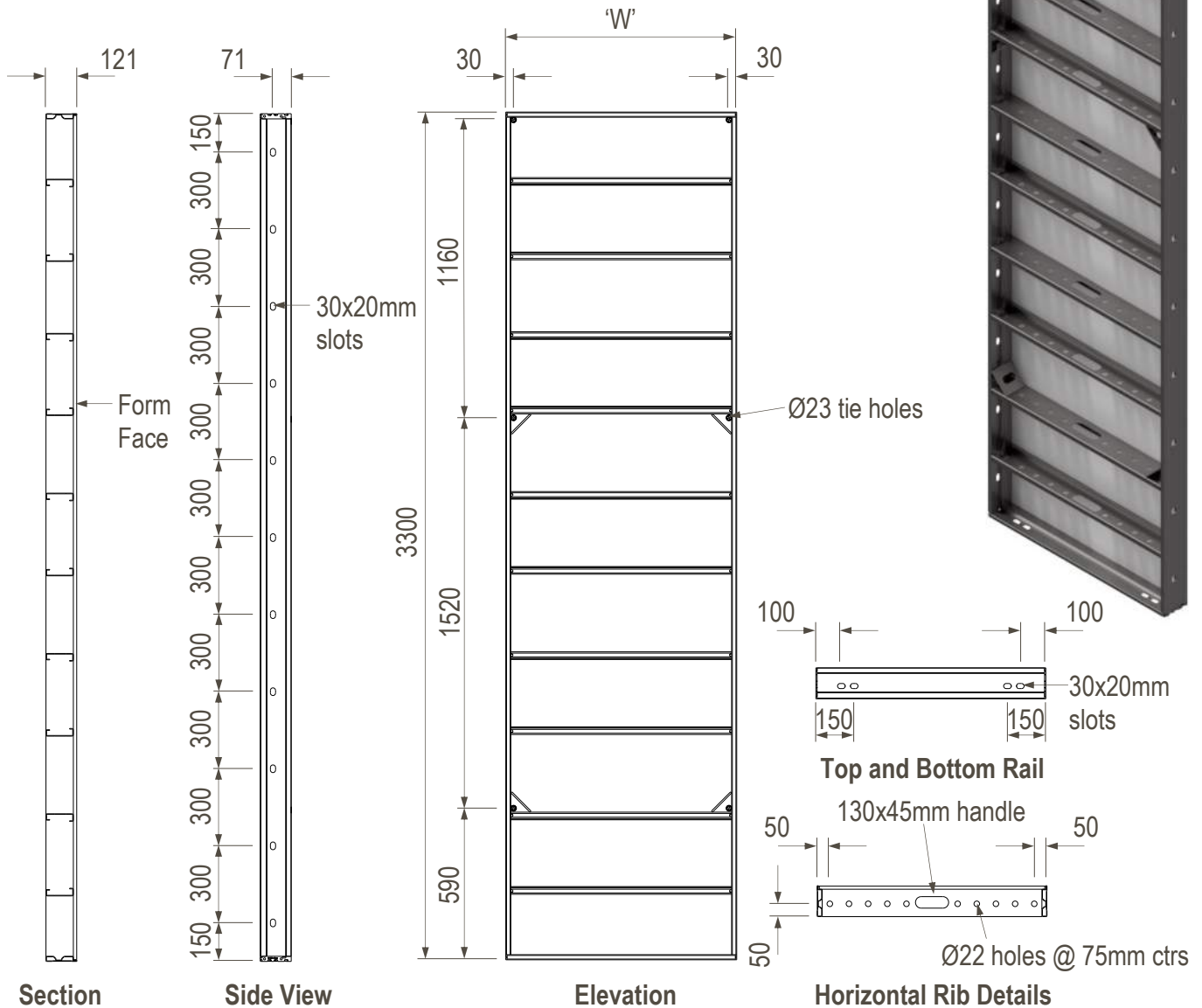
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Minima 3300mm High Panels

With a 13mm thick composite face material, Minima 3300mm high panels are designed for lifting by crane.

Allowable Design Pressure = 60kN/m²



Note: These panels are not symmetrical. The orientation of the panel during erection is important.

Code	Description (Length x 'W')	Weight
MMX73390	Minima Composite Panel 3300 x 900mm	96.5 kg
MMX73375	Minima Composite Panel 3300 x 750mm	85.0 kg
MMX73360	Minima Composite Panel 3300 x 600mm	73.4 kg
MMX73345	Minima Composite Panel 3300 x 450mm	61.9 kg
MMX73330	Minima Composite Panel 3300 x 300mm	50.3 kg

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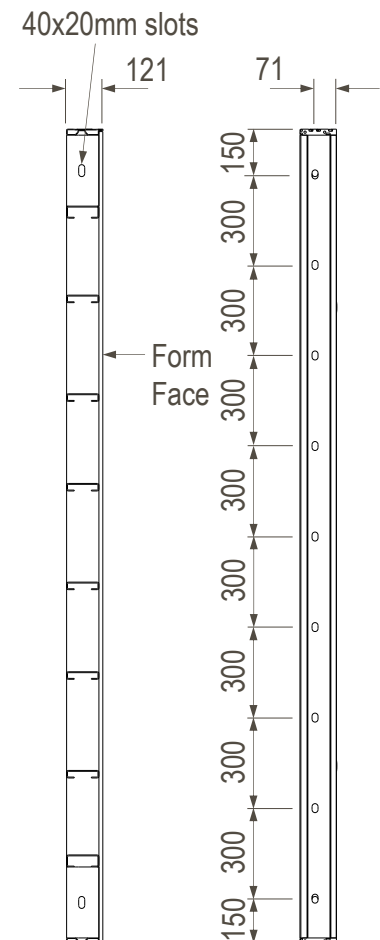
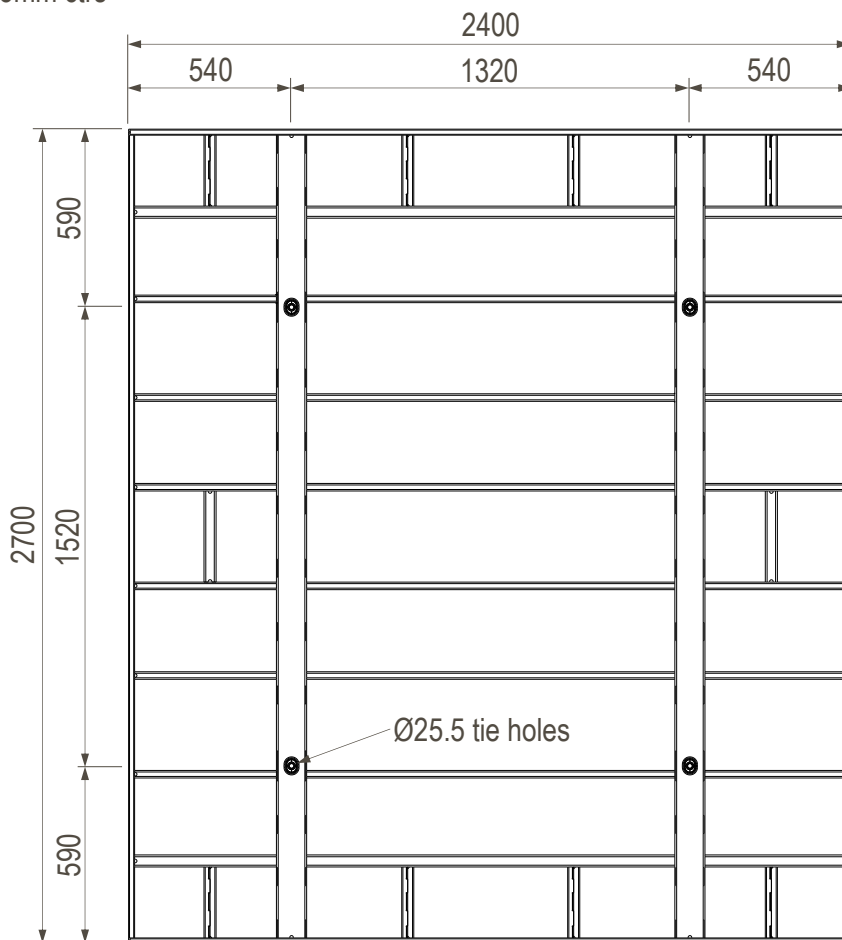
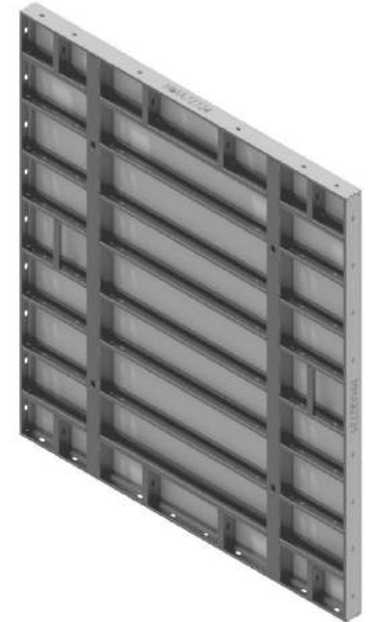
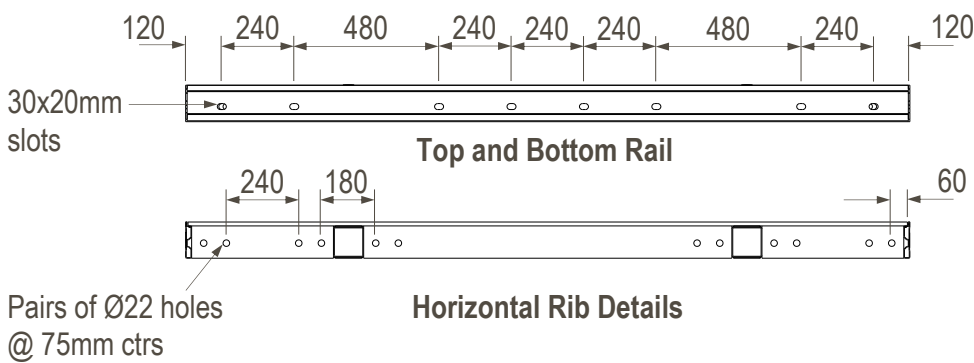


Minima Composite Panel 2700 x 2400mm (MMA72724) weight 274kg

Minima Plywood Panel 2700 x 2400mm (MMA22724) weight 261kg

With a choice of either a 12mm thick phenolic faced plywood or 13mm thick composite face material, Minima 2700 x 2400mm panels are designed for large area formwork applications that are lifted by crane.

Allowable Design Pressure = 60kN/m²



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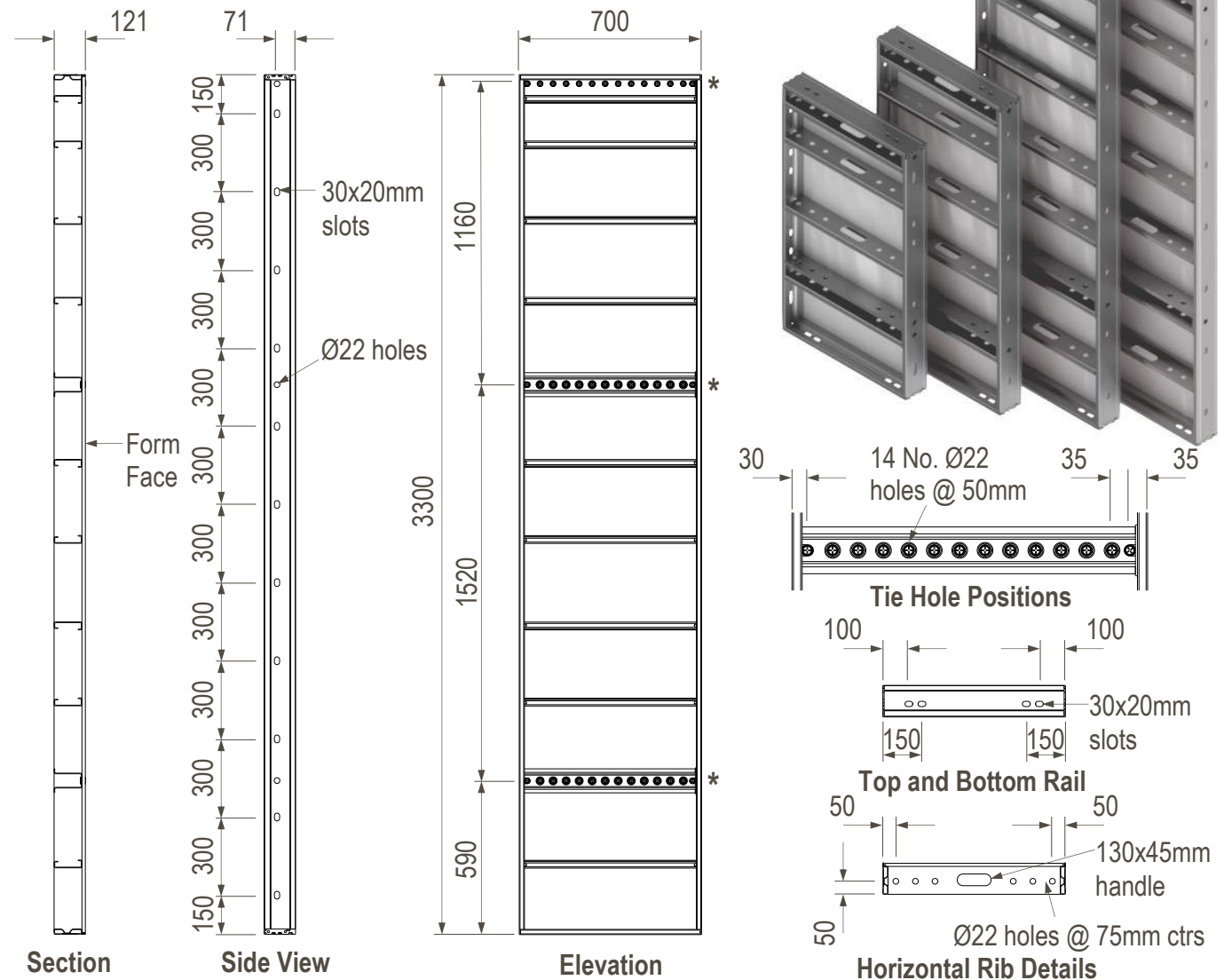
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Minima Multi-Purpose Panels

With a choice of either a 12mm thick phenolic faced plywood or 13mm thick composite face material, Minima Multi-Purpose Panels are designed for use on external corners, wall steps, columns and pilasters.

Note: These panels are not symmetrical. The orientation of the panel during erection is important. **Allowable Design Pressure = 60kN/m²**

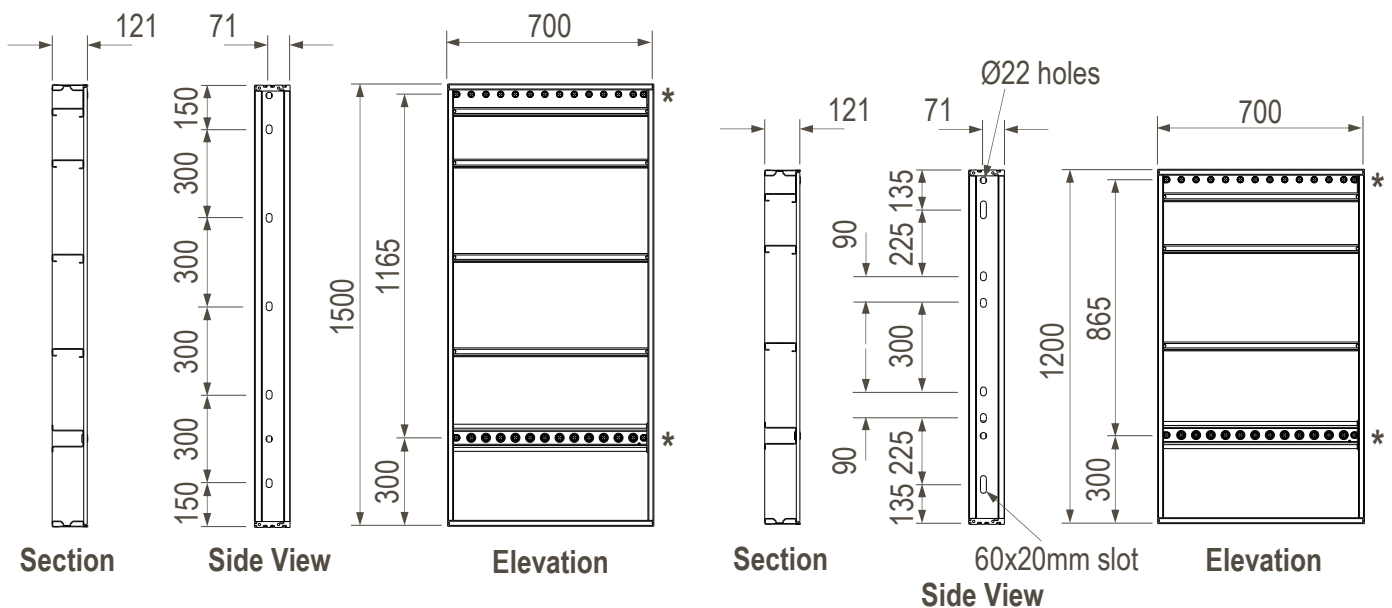
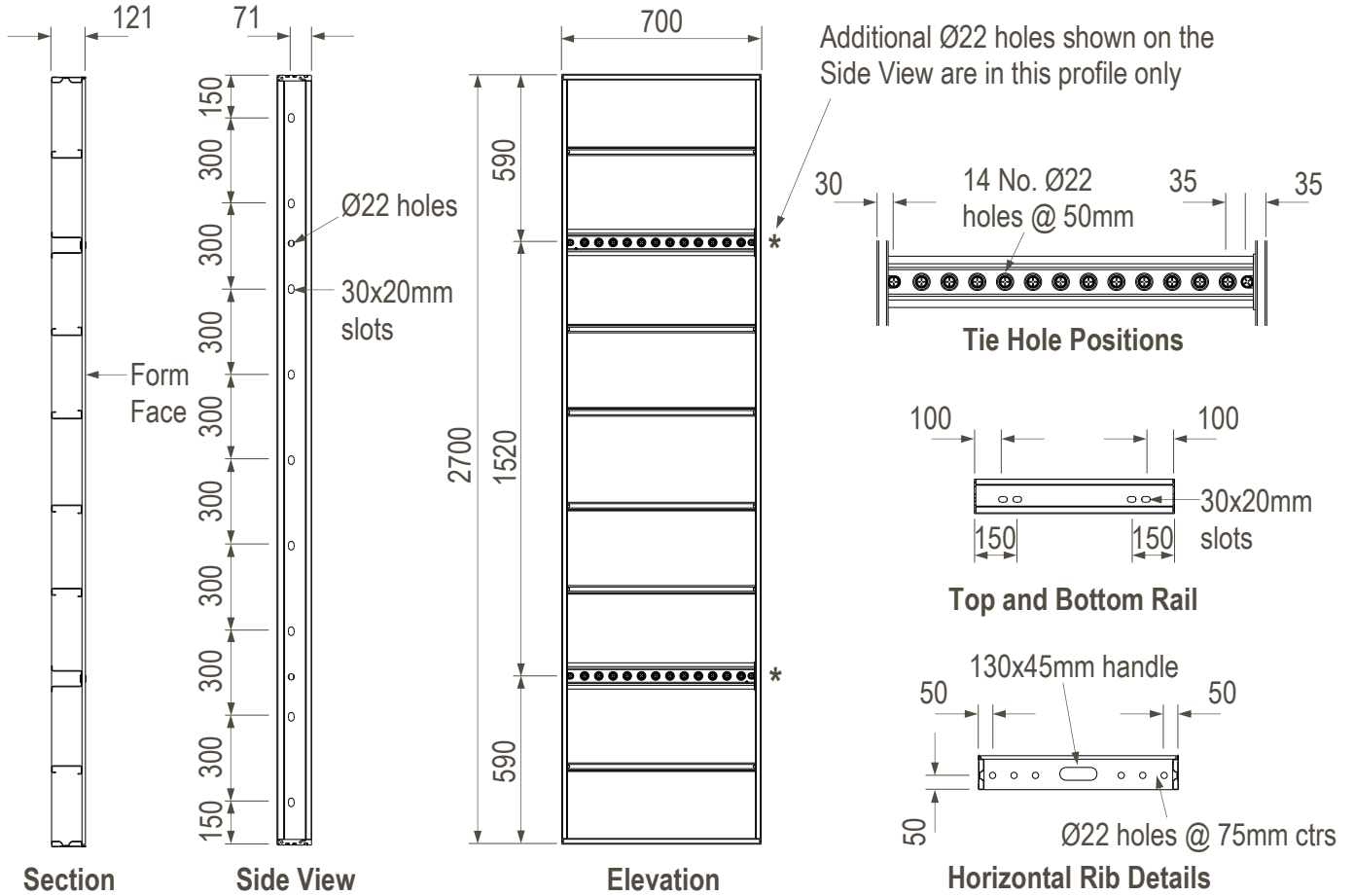


Additional Ø22 holes shown on the 'Side View' are in the profile marked thus * only

Code		Description	Weight	
Plywood	Composite		Plywood	Composite
MMX43370	MMX93370	Minima Multi Panel 3300 x 700mm	80.5 kg	86.7 kg
MMX42770	MMX62770	Minima Multi Panel 2700 x 700mm	64.9 kg	70.0 kg
MMX41570	MMX61570	Minima Multi Panel 1500 x 700mm	40.5 kg	43.3 kg
MMX41270	MMX61270	Minima Multi Panel 1200 x 700mm	33.9 kg	36.2 kg

Minima Multi-Purpose Panels....continued

Note: These panels are not symmetrical. The orientation of the panel during erection is important.



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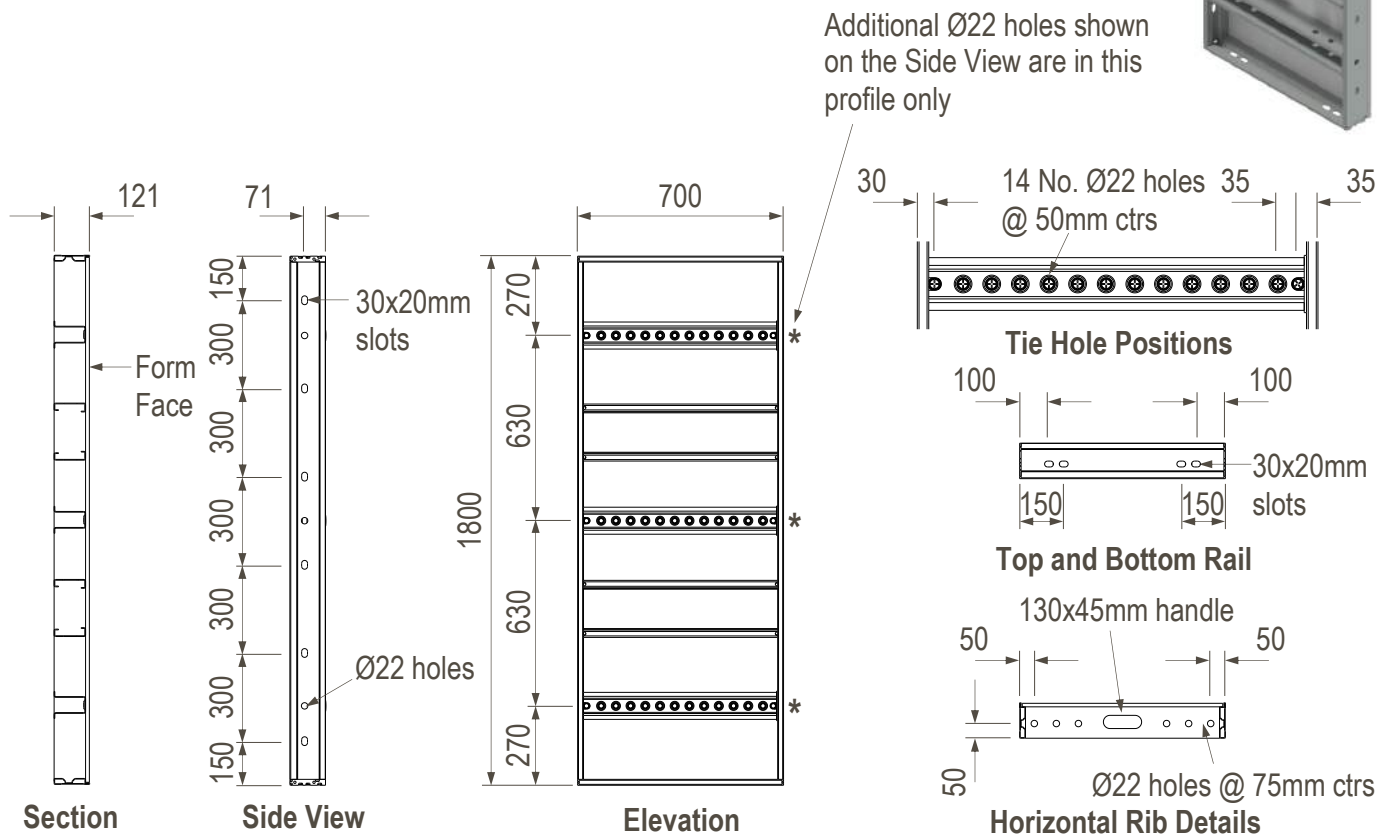
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Minima Multi Panel 1800x700mm Composite (MMM41870) weight 56.3kg

With a 13mm thick Alkus composite face material, Minima Multi Panels 1800x700 are designed for use at the bottom of taller column forms where higher concrete pressures are expected.

Note: These panels are not symmetrical. The orientation of the panel during erection is important.

Allowable Design Pressure = 90kN/m²



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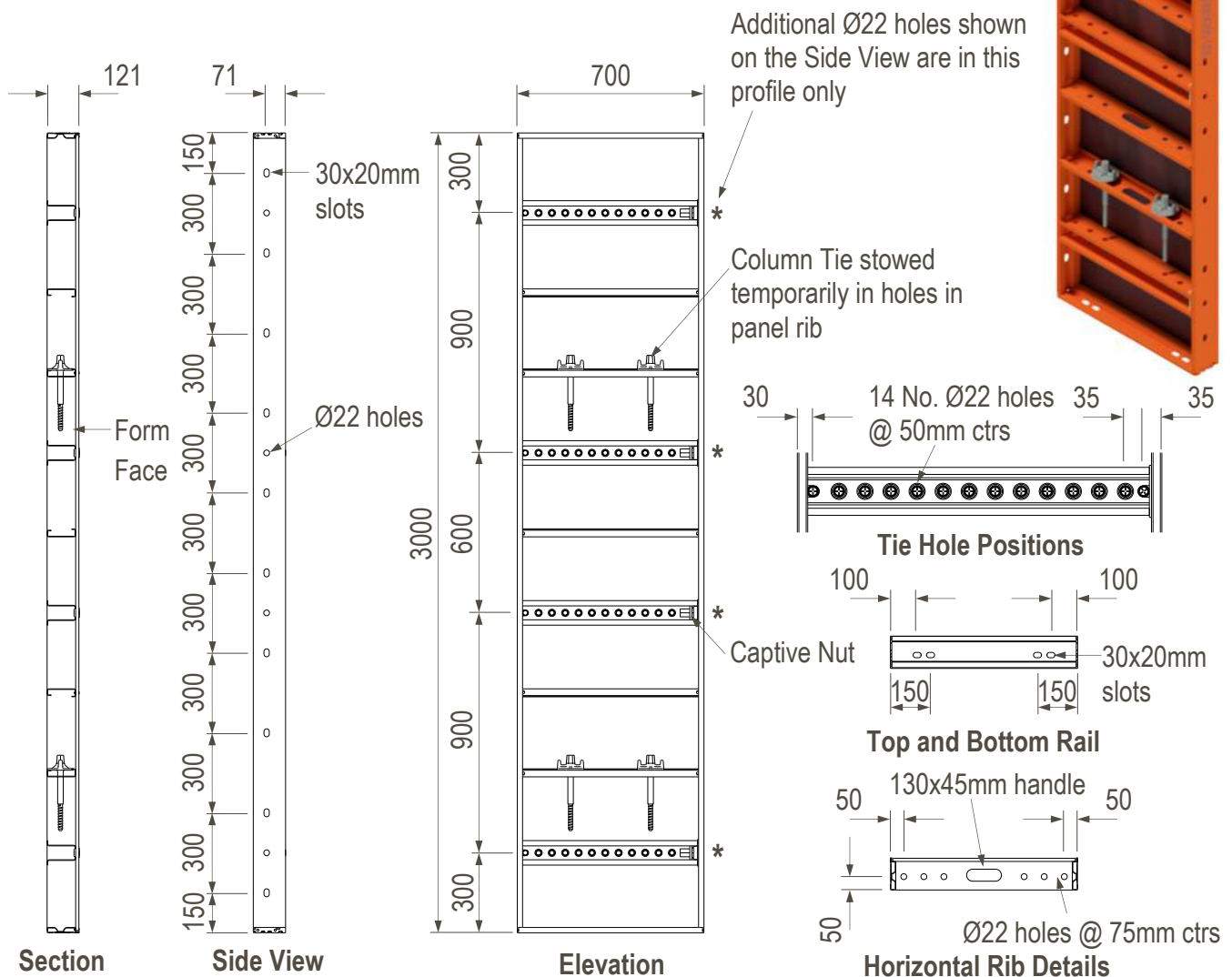
Minima 3000 x 700mm Plywood Column Panel (MMX63070) weight 77.8kg*

*weight with stowed ties 82.9kg

A powder coated steel framed panel with 12mm thick phenolic faced plywood used in 'windmill' configuration to form square or rectangular columns with plan dimensions up to 600x600mm in 50mm increments. Fully compatible with all existing Minima accessories, each panel is supplied with four captive nuts and column ties that can be neatly stowed in the horizontal ribs during transport & storage.

Maximum Allowable Design Pressure = 80kN/m²

Note: This is a sale only item.



MINIMA

HANDSET PANEL SYSTEM

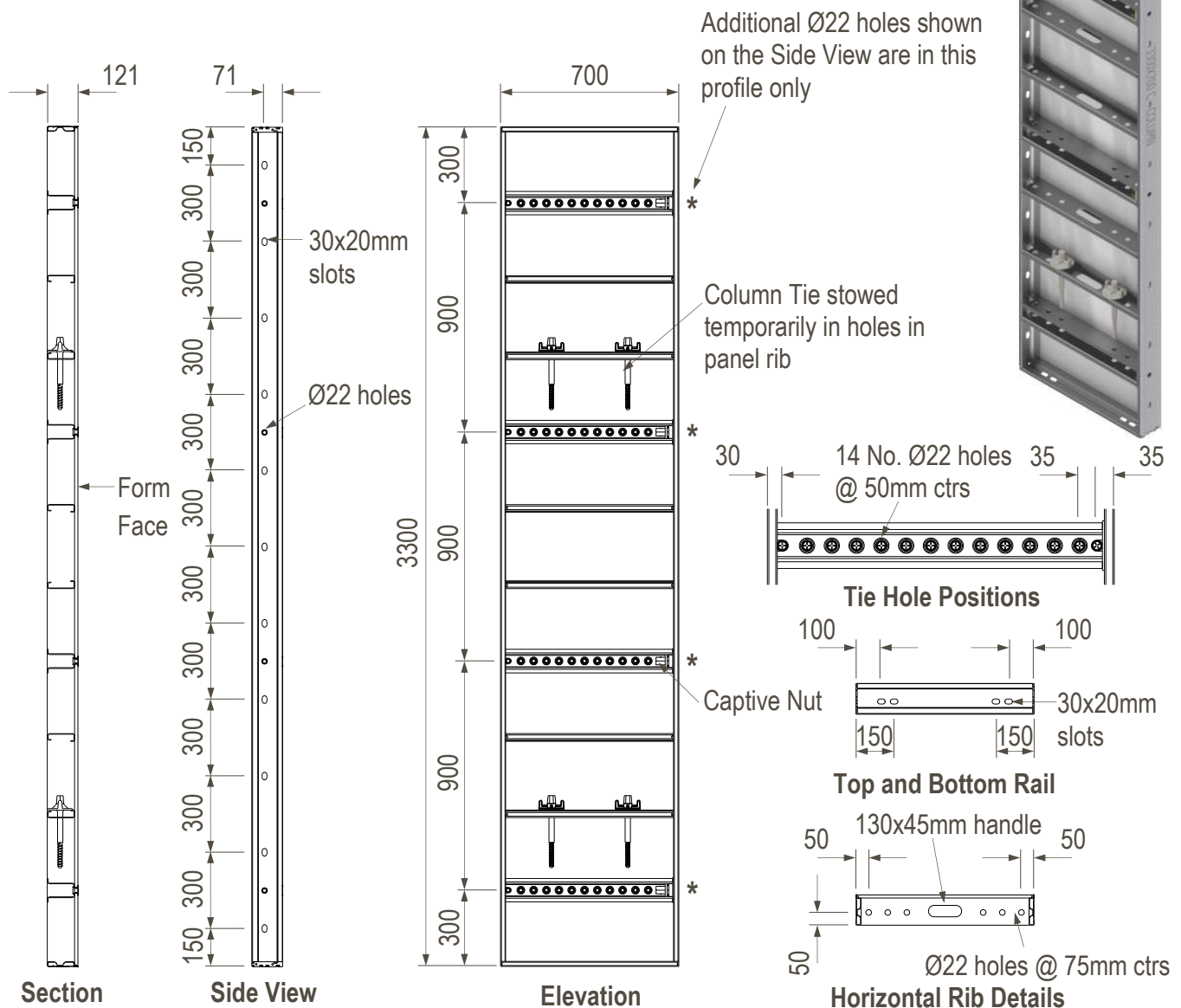
R·M·D
KWIKFORM

Minima 3300 x 700mm Composite Column Panel (MMX63370) weight 90.6kg*

*weight with stowed ties 95.7kg

A hot dipped galvanised, steel framed panel with 13mm thick Alkus composite face used in 'windmill' configuration to form square or rectangular columns with plan dimensions up to 600x600mm in 50mm increments. Fully compatible with all existing Minima accessories, each panel is supplied with four captive nuts and column ties that can be neatly stowed in the horizontal ribs during transport & storage.

Maximum Allowable Design Pressure = 80kN/m²



MINIMA

HANDSET PANEL SYSTEM

R·M·D
KWIKFORM

Minima 900mm Wide Plywood Column Panels

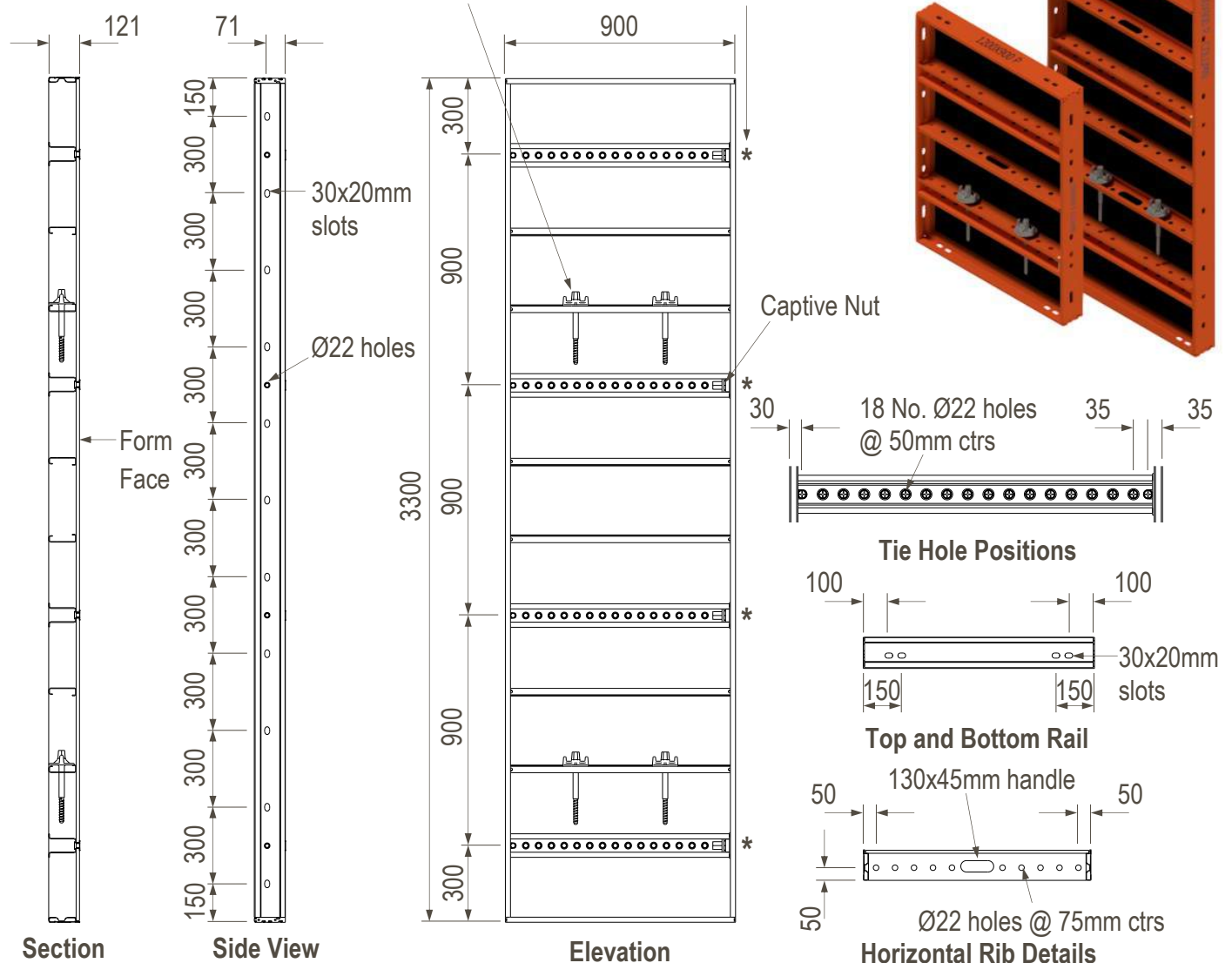
Powder coated steel framed panels with 12mm thick phenolic faced plywood used in 'windmill' configuration to form square or rectangular columns with plan dimensions up to 800x800mm in 50mm increments. Fully compatible with all existing Minima accessories, each panel is supplied with captive nuts and column ties that can be neatly stowed in the horizontal ribs during transport & storage.

Maximum Allowable Design Pressure = 60kN/m²

Note: These are sale only items.

Column Tie stowed temporarily in holes in panel rib

Additional Ø22 holes shown on the Side View are in this profile only



Note: These panels are not symmetrical. The orientation of the panel during erection is important.

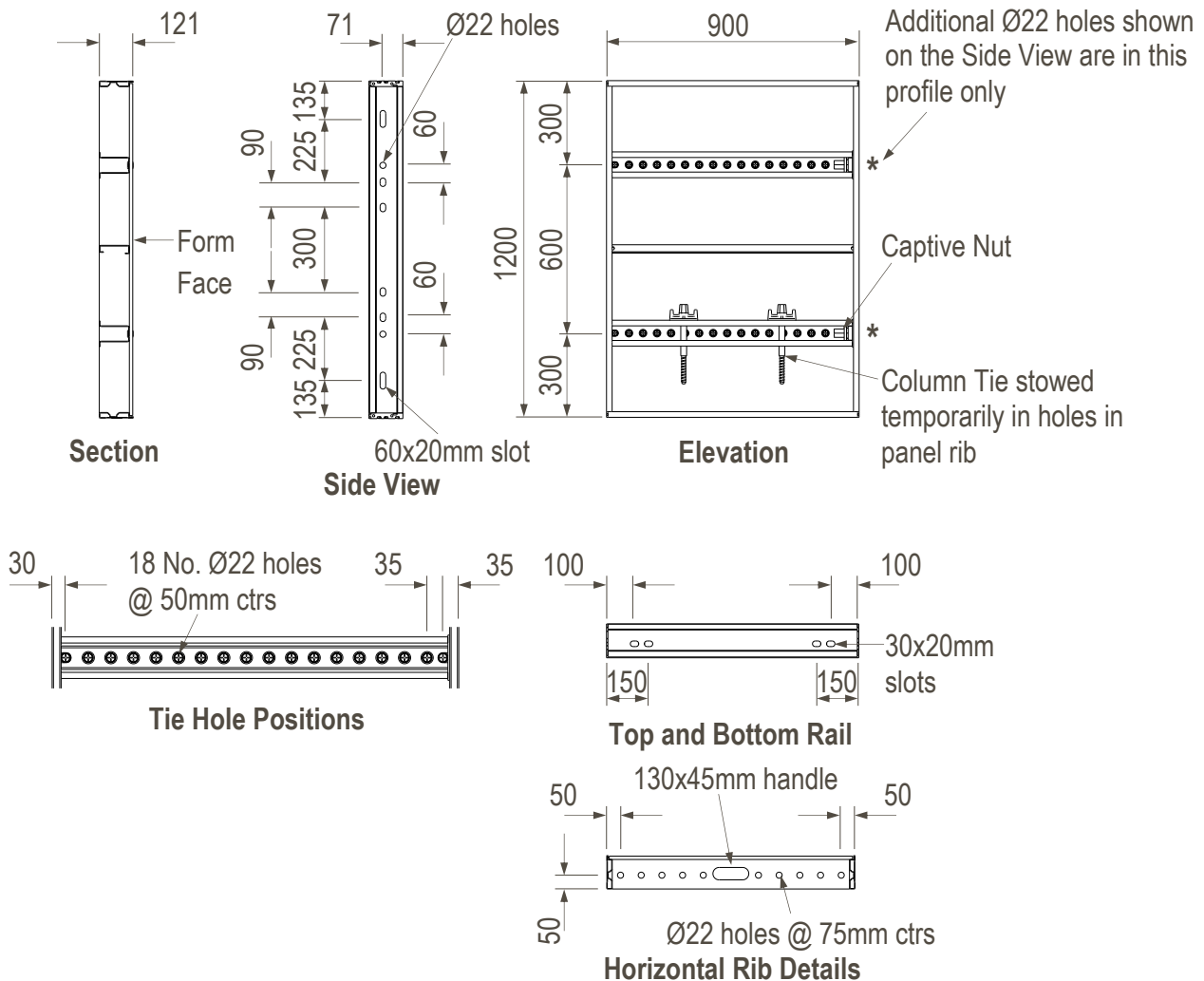
Code	Description (Length x 'W')	Weight
MMX43390	Minima Plywood Column Panel 3300 x 900mm	101 kg
MMX41290	Minima Plywood Column Panel 1200 x 900mm	42.0 kg

MINIMA

HANDSET PANEL SYSTEM

Minima 900mm Wide Plywood Column Panels....continued

Note: These panels are not symmetrical. The orientation of the panel during erection is important.



MINIMA

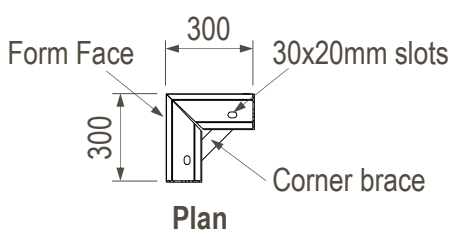
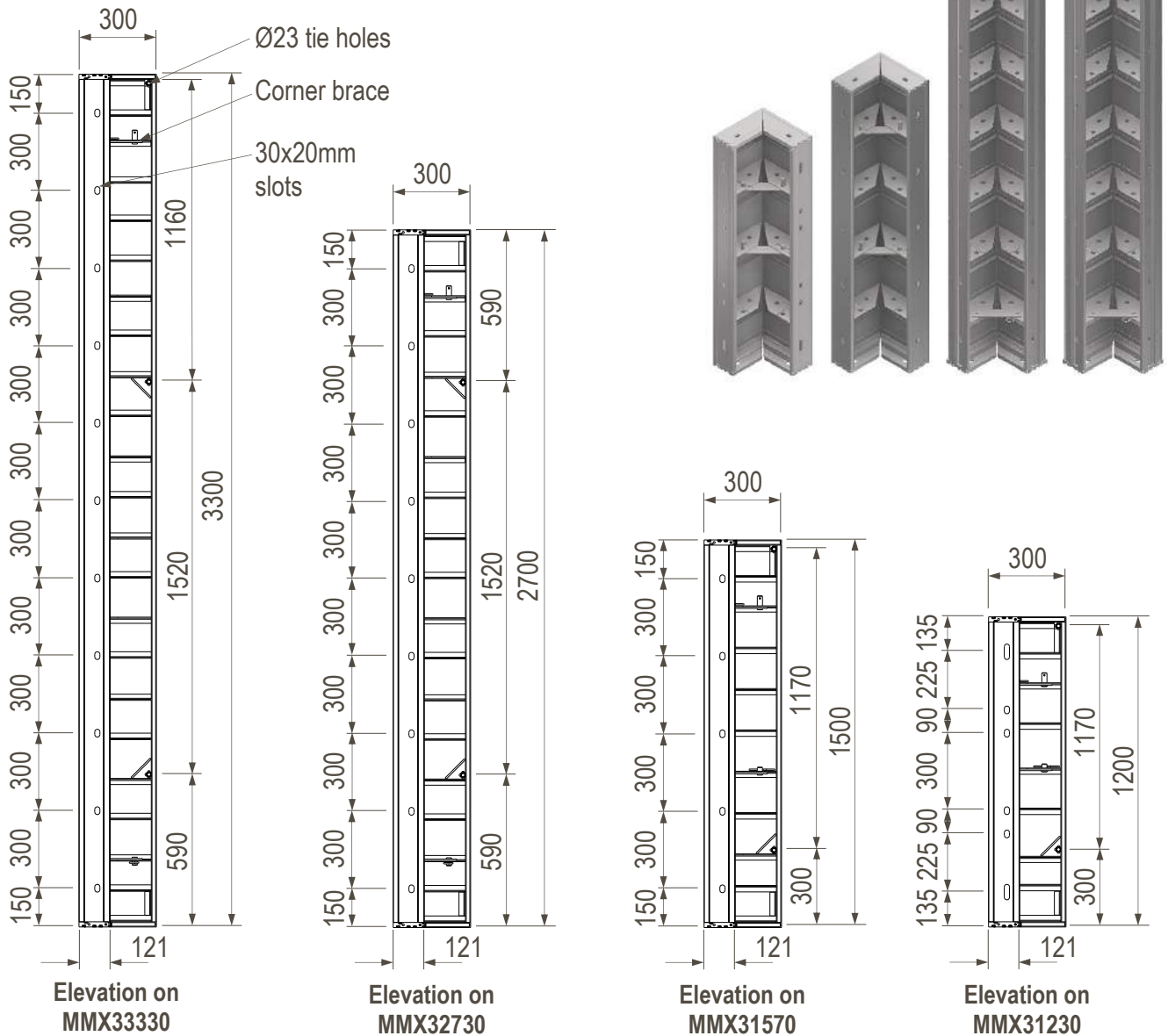
HANDSET PANEL SYSTEM

R·M·D
KWIKFORM

Minima Inner Corner Panels

Comprising a hot-dipped galvanised steel frame and either a 3mm thick steel face, 12mm thick phenolic faced plywood or 13mm thick composite face material, Minima Inner Corner Panels are designed for use on 90 degree internal corners only. When the corner braces are disengaged the panel can be flexed by 2° to facilitate stripping.

Note: These panels are not symmetrical. The orientation of the panel during erection is important. **Allowable Design Pressure = 60kN/m²**



Code	Description	Weight
MMX33330	Minima Inner Corner 3300	105 kg
MMX32730	Minima Inner Corner 2700	86.5 kg
MMX31570	Minima Inner Corner 1500	50.0 kg
MMX31230	Minima Inner Corner 1200	40.1 kg

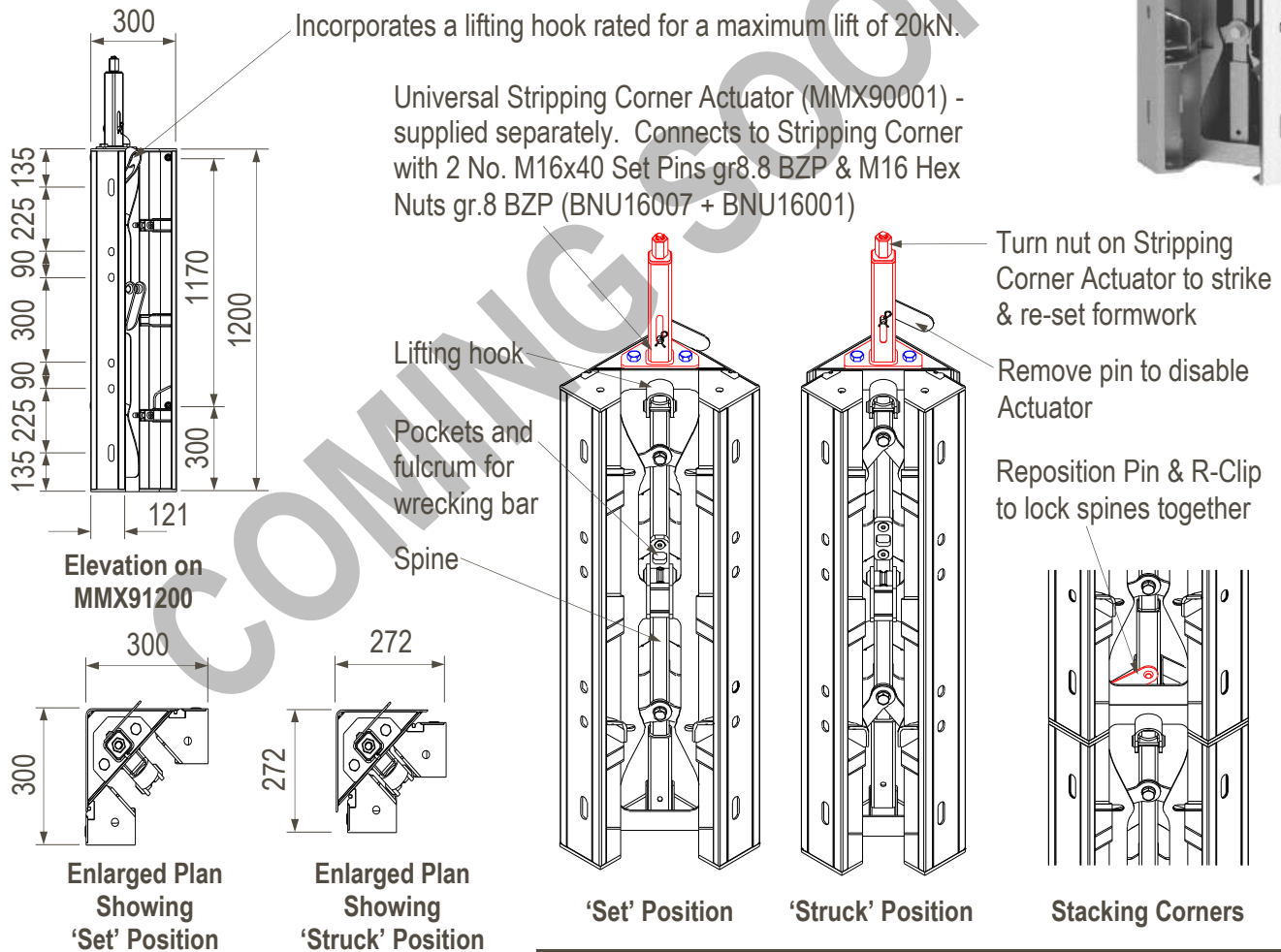
MINIMA

HANDSET PANEL SYSTEM

Universal Stripping Corner Panels

Comprising a hot-dipped galvanised steel frame with a 4mm thick steel face material and incorporating seals to prevent grout entering the sliding surfaces, Minima Universal Stripping Corner Panels are designed to facilitate easy striking of inner core-wall formwork. The unit can be struck and reset using the Universal Stripping Corner Actuator, by use of a wrecking bar engaged with the dedicated pockets or by a combination of the two. When stacking Stripping Corners connect with four M16x40 Set Pins gr8.8 BZP & M16 Hex Nuts gr.8 BZP (BNU16007 + BNU16001) & connect spines together using the integral Pin and R-Clip. Can also be used with Maxima and Superslim systems, refer to system specific datasheets.

Note: These panels are not symmetrical. The orientation of the panel during erection is important.
Allowable Design Pressure = 60kN/m²



Important: If a wrecking bar alone is used to strip and re-set the unit, the actuator must either not be present or should be disconnected from the spine by removing the Pin and R-Clip.

Code	Description	Weight
MMX93300	Universal Stripping Corner 3300 x 300mm	187 kg
MMX92700	Universal Stripping Corner 2700 x 300mm	156 kg
MMX91500	Universal Stripping Corner 1500 x 300mm	90.6 kg
MMX91200	Universal Stripping Corner 1200 x 300mm	74.7 kg
MMX90001	Universal Stripping Corner Actuator	2.74 kg

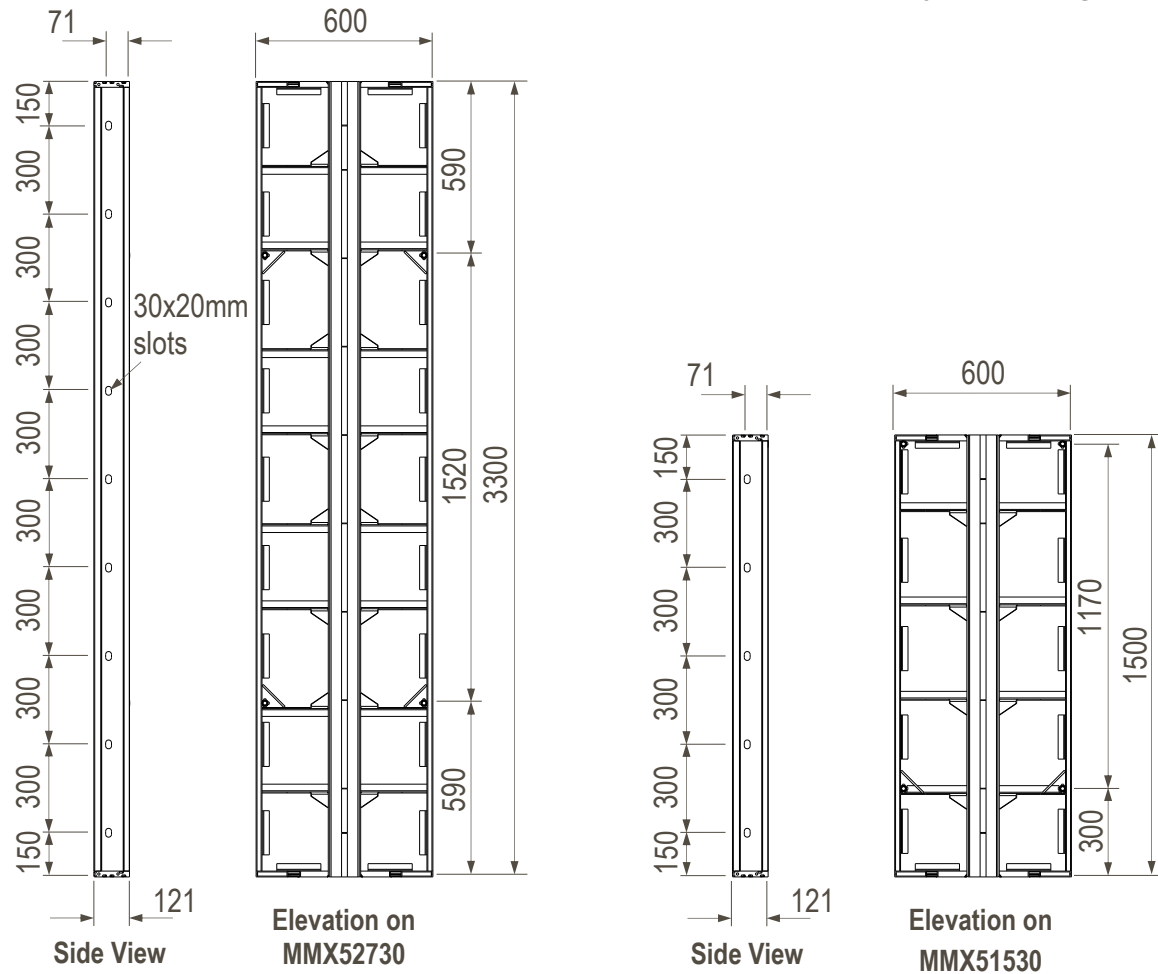
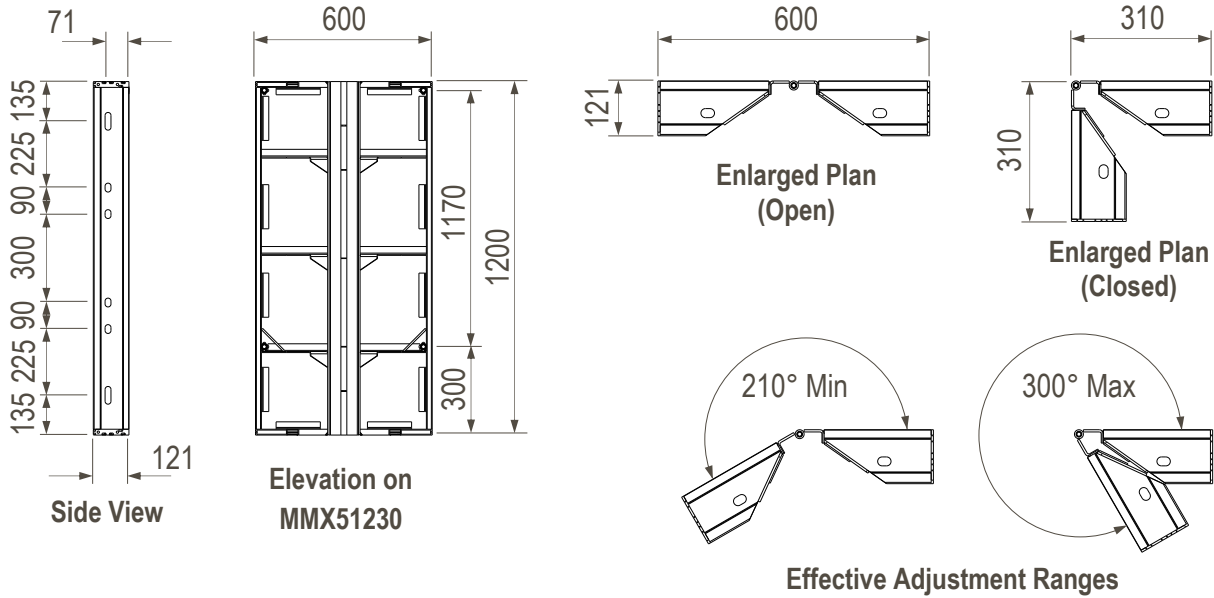
MINIMA

HANDSET PANEL SYSTEM

R·M·D
KWIKFORM

Minima 300mm Hinged Corner Panels....continued

Note: These panels are not symmetrical. The orientation of the panel during erection is important.

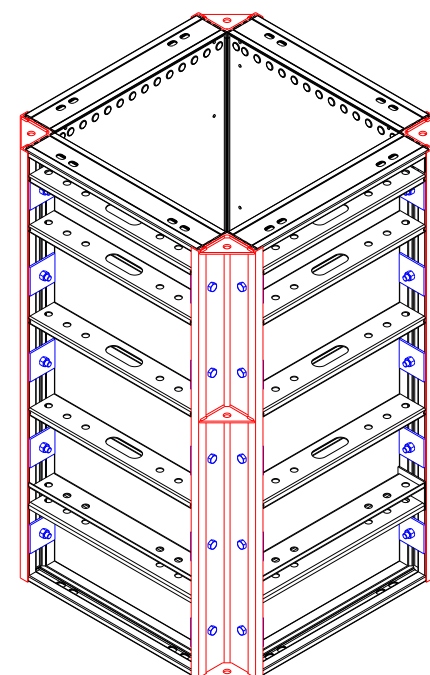
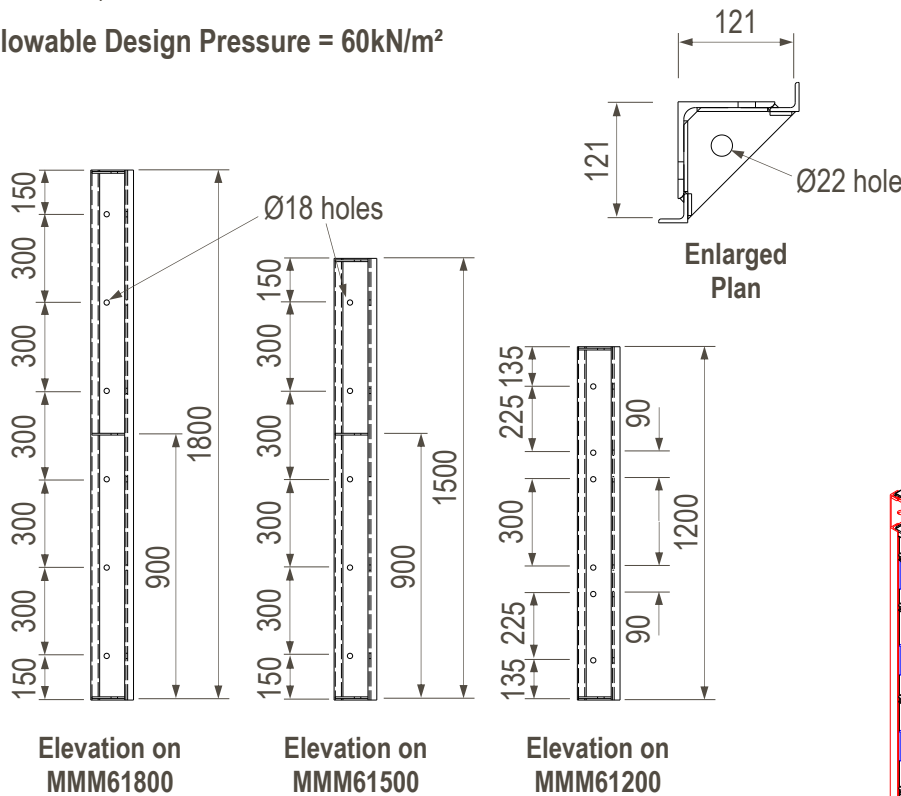


Minima External Corner Angles

Used to join external corners of column or wall formwork at right angles where Minima corner clamps cannot be utilised. Fix to Universal Panel or Standard Panel edge profiles with M16x60 gr8.8 Bolts BZP, 100x100x6xØ22mm Plate Washers and M16 Hexagon Nuts gr.8 BZP (BNU16009 + BNX20003 + BNU16001).

Alternatively, use Minima Tension Bolt 190 and Knock On Wing Nut (MMX10012 + BTX10001)

Allowable Design Pressure = 60kN/m²



Code	Description	Weight
MMM61800	Minima External Corner Angle 1800mm	93.1 kg
MMM61500	Minima External Corner Angle 1500mm	52.6 kg
MMM61200	Minima External Corner Angle 1200mm	42.6 kg

Square and rectangular columns can be constructed using this method. Column widths and lengths on plan are dictated by available panel sizes: 900mm, 750mm, 700mm, 650mm*, 600mm, 550mm*, 500mm*, 450mm, 300mm.

* Denotes low stock panel widths.

MINIMA

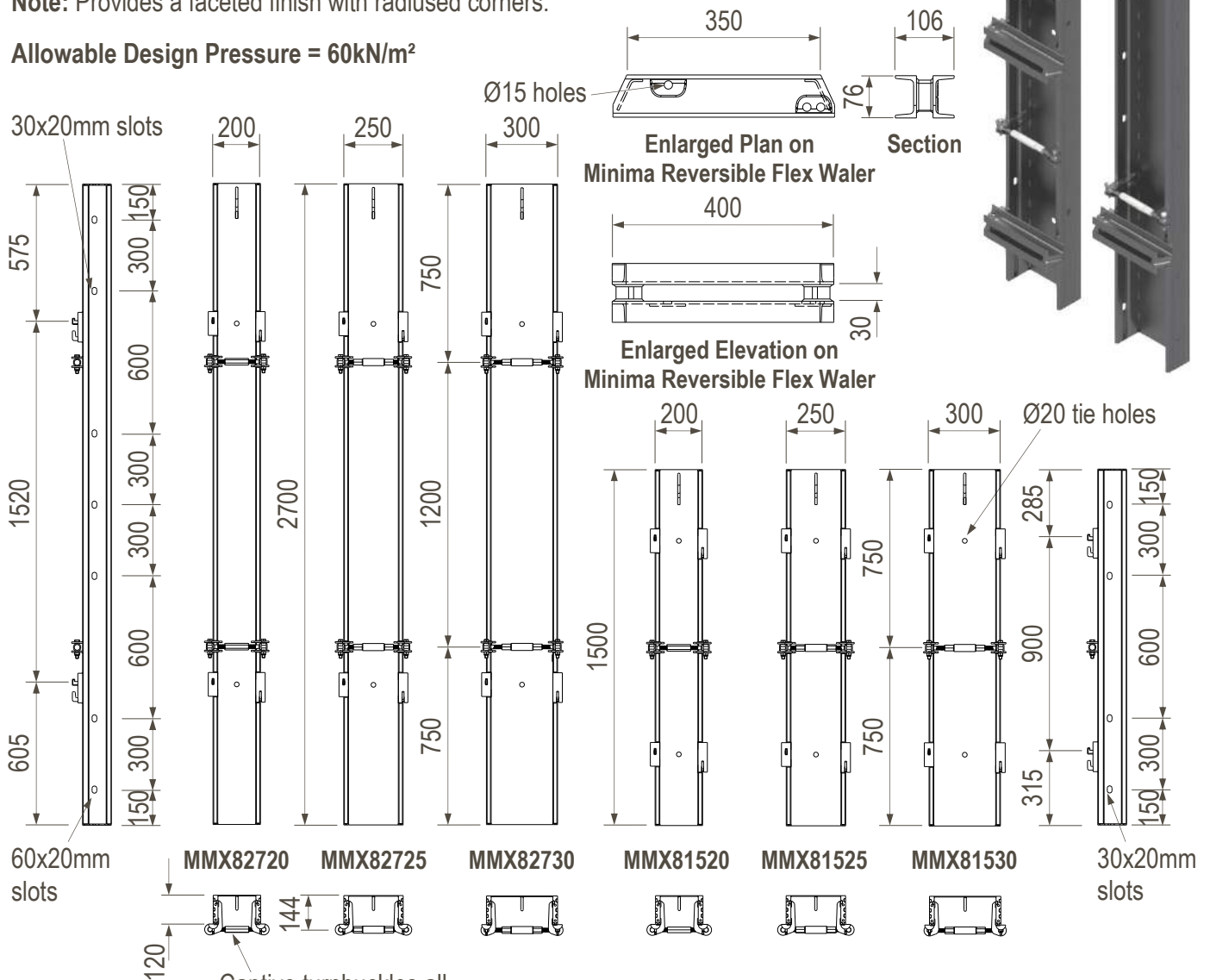
HANDSET PANEL SYSTEM

Minima Flex Panels

A galvanised steel faced adjustable radius infill panel used in conjunction with standard Minima panels to facilitate simple construction of curved walls. Flex panels are radiused by adjusting the length of their captive Turnbuckles and connect to adjacent panels using Minima Tension Bolts 190 & Centering Nuts (MMX10012 + MMX10013) and / or Minima Profile Clamps (MMX10047).

Note: Provides a faceted finish with radiused corners.

Allowable Design Pressure = 60kN/m²



Code	Description	Weight
MMX82730	Minima Flex Panel 2700 x 300mm	50.4 kg
MMX82725	Minima Flex Panel 2700 x 250mm	47.3 kg
MMX82720	Minima Flex Panel 2700 x 200mm	43.7 kg
MMX81530	Minima Flex Panel 1500 x 300mm	28.9 kg
MMX81525	Minima Flex Panel 1500 x 250mm	27.2 kg
MMX81520	Minima Flex Panel 1500 x 200mm	25.3 kg
MMX80001	Minima Reversible Flex Water	5.16 kg

MINIMA

HANDSET PANEL SYSTEM

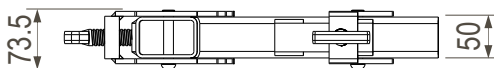
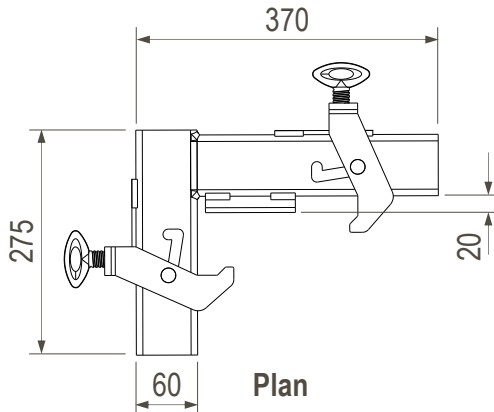
R·M·D
KWIKFORM

Minima Outer Corner Clamp (MMX10001) weight 6.61kg

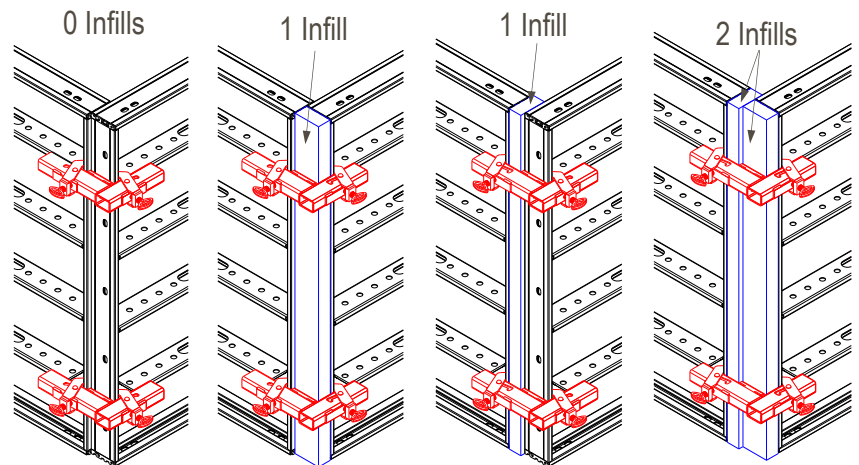
Used at rib positions and / or fitted over the joint between four panels to join and align the outer 90 degree corners of wall formwork or to join the four corners of a Minima column shutter. Permits the use of 50mm timber infills for length / thickness adjustments on outer corners.



AWL = 8kN in any direction in the plane of the clamp



Elevation



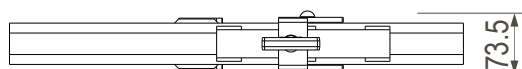
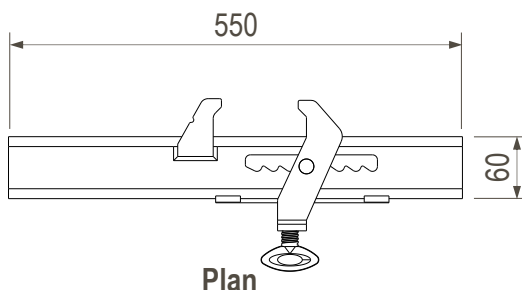
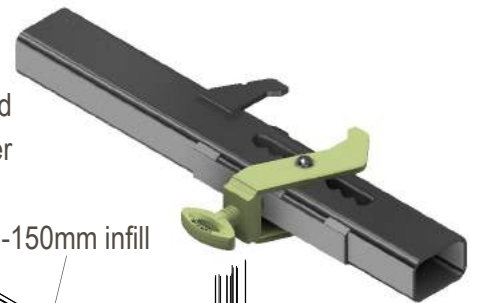
Detail Showing Various Timber Infill Configurations

Minima Adjustable Clamp (MMX10002) weight 5.18kg

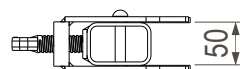
Used to connect two panels together edge to edge, tightly closed and aligned flush on both horizontal and vertical joints. Accommodates up to 150mm timber packing between panel joints.

AWL = 8kN in any direction in the plane of the clamp

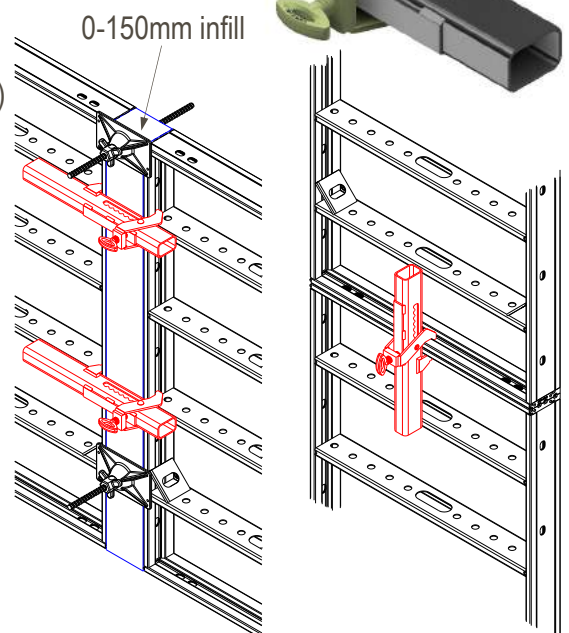
Allowable BM = 1.13kNm (when ribs are bearing on horizontal profiles)



Elevation



Section



MINIMA

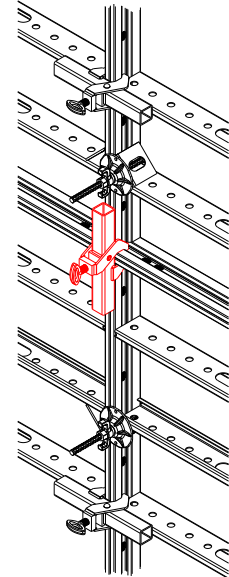
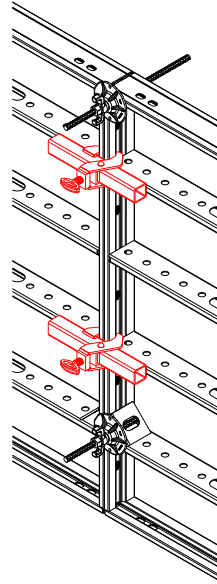
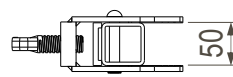
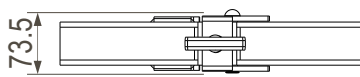
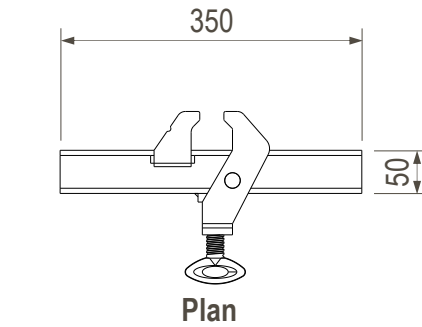
HANDSET PANEL SYSTEM

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Minima Aligning Panel Clamp (MMX10003) weight 3.36kg

Used at rib positions to connect two panels together edge to edge, tightly closed and aligned flush on vertical joints and on horizontal joints at the intersection of four panels. Does not accommodate timber packing between panel joints.

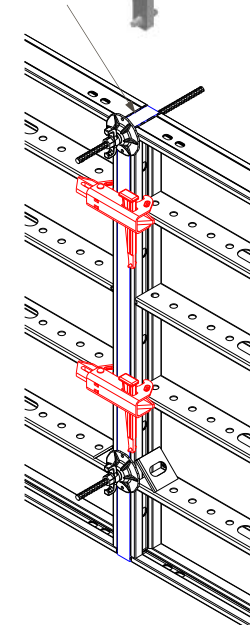
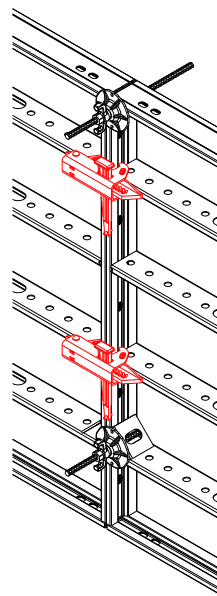
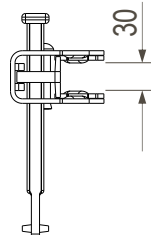
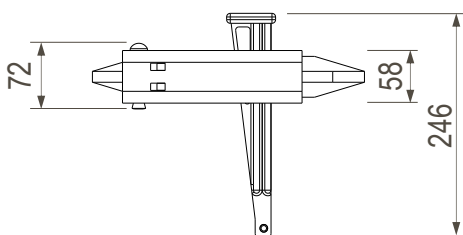
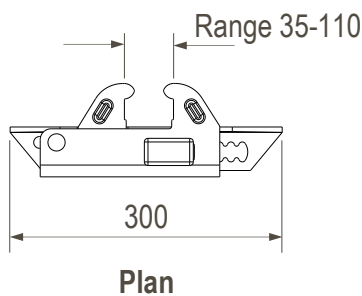
AWL = 8kN in any direction in the plane of the clamp



Minima Wedge Clamp (MMX10028) weight 3.44kg

Used at rib positions to connect two panels together edge to edge, tightly closed and aligned flush. Accommodates up to a 50mm timber infills between panel joints. Does not fit at the joint between four panels.

AWL = 8kN in any direction in the plane of the clamp



MINIMA

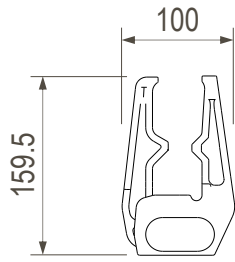
HANDSET PANEL SYSTEM

R·M·D
KWIKFORM

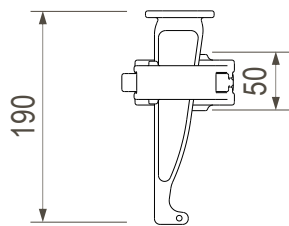
Minima Profile Clamp (MMX10047) weight 1.79kg

Used anywhere between rib positions on vertical joints to connect two panels together edge to edge, tightly closed and aligned flush. Allows panels to be stepped in height relative to each other for walls with sloping bases. Does not accommodate timber packing between panel joints.

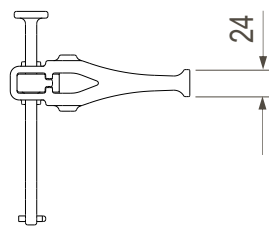
AWL = 8kN in any direction in the plane of the clamp



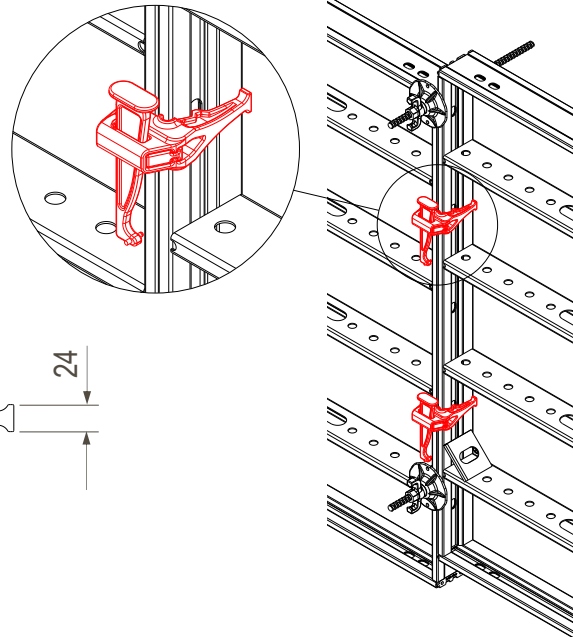
Plan



Elevation



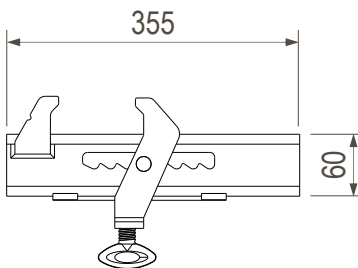
Section



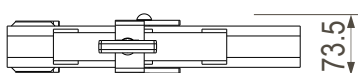
Minima Short Adjustable Clamp (MMX10040) weight 3.80 kg

Used at or between rib positions to connect a standard panel to either an Inner Corner or a Universal Stripping Corner. Accommodates up to 150mm timber infill between panel joints.

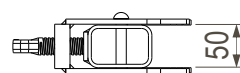
AWL = 8kN in any direction in the plane of the clamp



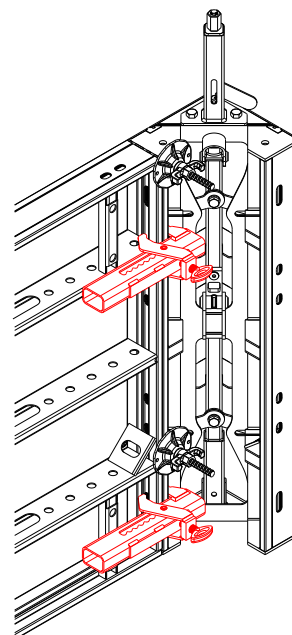
Plan



Elevation

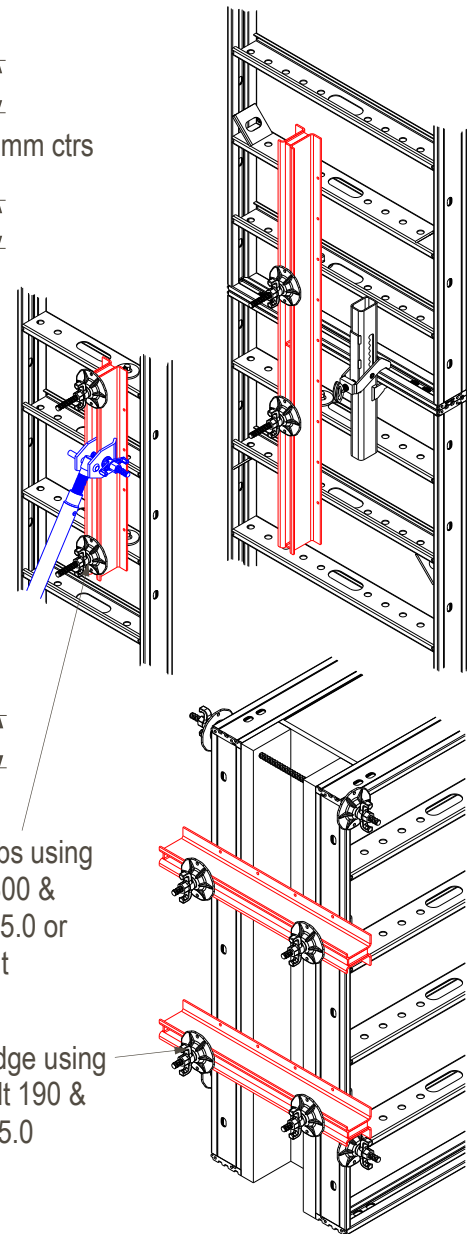
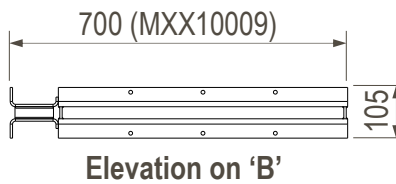
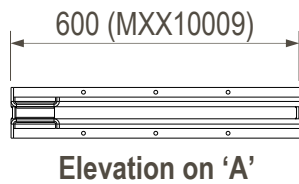
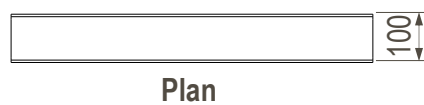
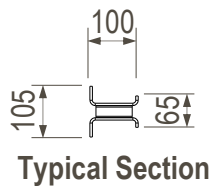
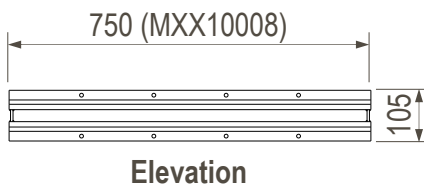
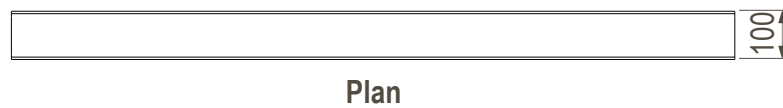
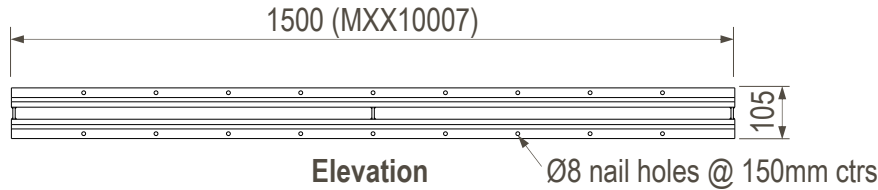


Section



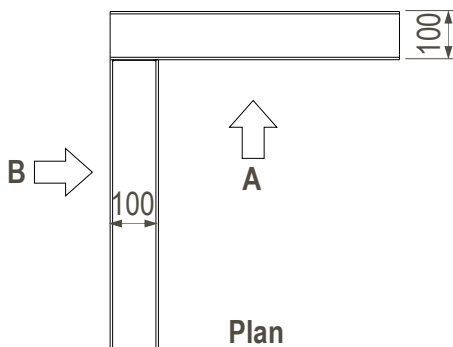
Maxima Alignment Rails

Used to support stop-end formwork, to strengthen horizontal panel joints when crane handling and to facilitate the connection of alignment props. Corner Alignment Rails are used to restrain timber infills positioned both sides of a 90 degree Minima Inner Corner or to restrain stepped wall shutters where a tie cannot be positioned - refer to sheet 68 for details.



Connect to panel ribs using
Minima Waler Tie 300 &
Maxima Tie Plate 15.0 or
Minima Tension Nut

Connect to panel edge using
Minima Tension Bolt 190 &
Maxima Tie Plate 15.0



Section Properties	
Gross Area	14.2cm ²
Second Moment of Area I _{xx}	172cm ⁴
Flexural Rigidity EI _{xx}	361kNm ²
Section Modulus Z _{xx}	30.4cm ³
Maximum Bending Moment _{xx}	6.25kNm

Code	Description	Weight
MXX10007	Maxima Alignment Rail 1500mm	17.0 kg
MXX10008	Maxima Alignment Rail 750mm	8.54 kg
MXX10009	Maxima Corner Alignment Rail	13.7 kg

MINIMA

HANDSET PANEL SYSTEM

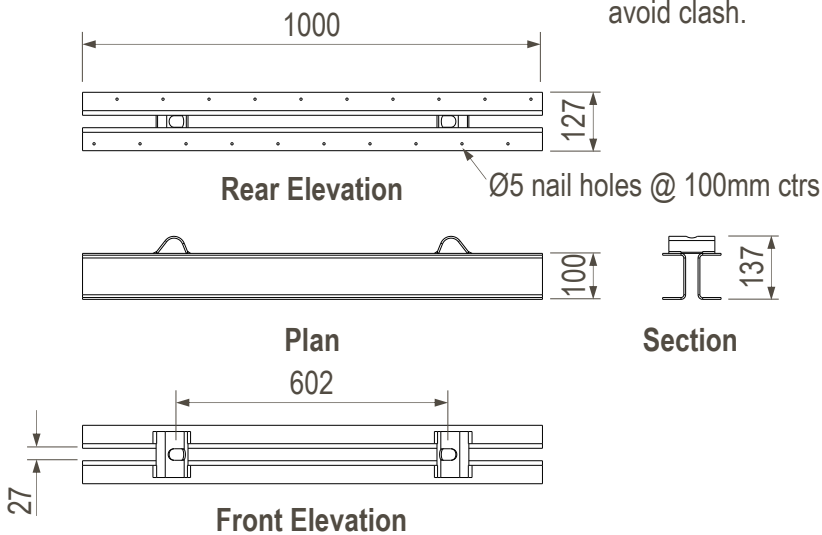
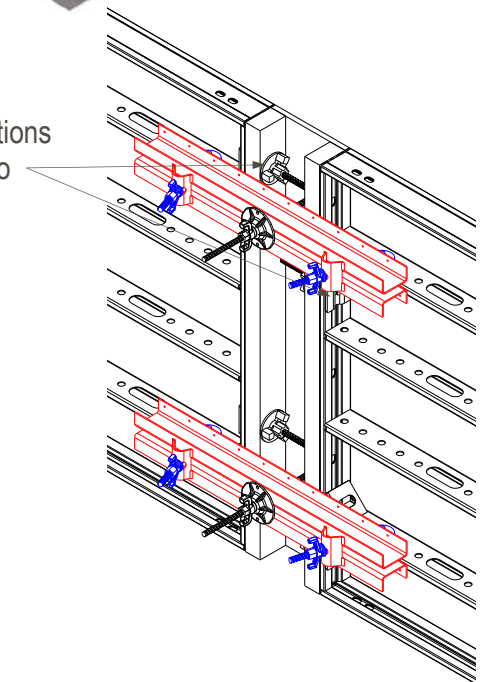
Minima Multi Purpose Waler 100 (MMX10009) weight 13.1kg

Used to support stop-end formwork, to strengthen horizontal panel joints when crane handling and to facilitate the connection of alignment props. The two integral curved plates facilitate the connection of angled Waler Ties and Knock on Wing Nuts, either side of timber to support infills 150-300mm wide.



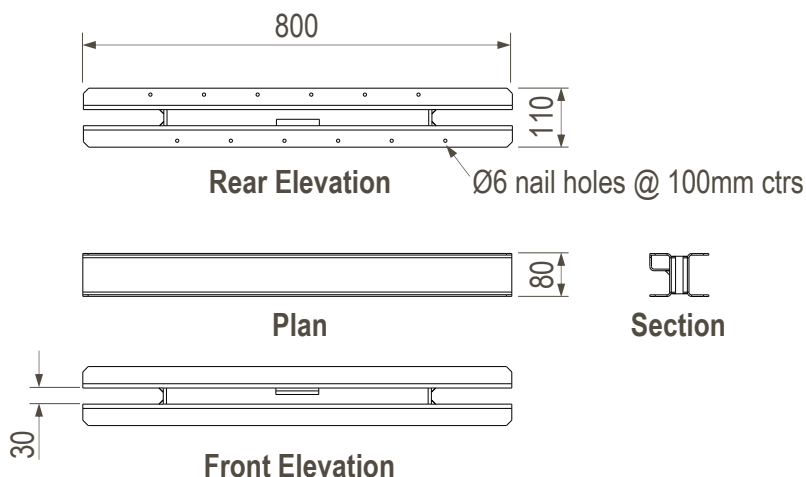
Section Properties	
Gross Area	14.8cm ²
Second Moment of Area I xx	223cm ⁴
Flexural Rigidity EI xx	468kNm ²
Section Modulus Z xx	44.6cm ³
Maximum Bending Moment xx	10.3kNm

Tension Bolt connections staggered in height to avoid clash.



Minima Waler 80 (MMX10008) weight 5.98kg

A lighter duty unit used as an alternative to Maxima Alignment Rail 750 (MX10008) for stop-ends, to align panels for crane handling and to facilitate the connection of alignment props - refer to sheet 29 for typical applications.



Section Properties	
Gross Area	8.9cm ²
Second Moment of Area I xx	86cm ⁴
Flexural Rigidity EI xx	181kNm ²
Section Modulus Z xx	21.5cm ³
Maximum Bending Moment xx	5.0kNm

MINIMA

HANDSET PANEL SYSTEM

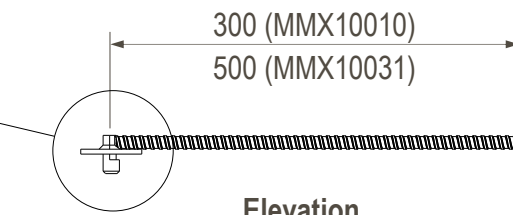
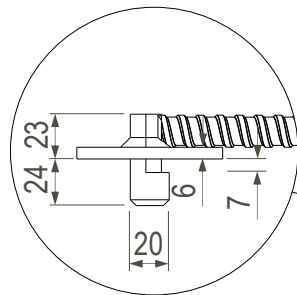
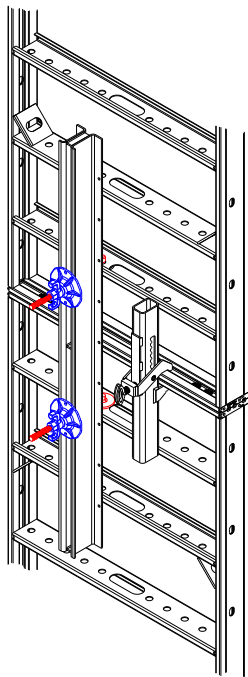
R·M·D
KWIKFORM

Minima Waler Ties

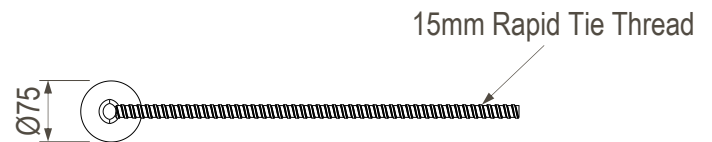
Used with a Maxima Tie Plate 15 (MXX10043) or Minima Tension Nut (MMX10011) for connecting either Maxima Alignment Rails, Minima Walers or Superslim Soldiers to panel ribs.

AWL = 12kN tension when engaged in hole in panel rib (rib limits)

AWL = 19kN tension when engaged with the Minima panel edge profile from the outside of the panel or with the 21mm web hole of a Superslim Soldier



Elevation



Plan

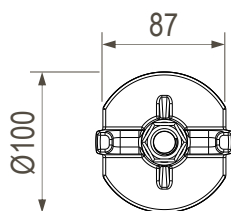
Code	Description	Weight
MMX10010	Minima Waler Tie 300mm	0.71 kg
MMX10031	Minima Waler Tie 500mm	1.00 kg

Minima Tension Nut (MMX10011) weight 0.64kg

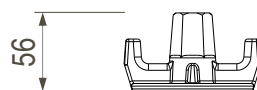
Used with Minima Waler Ties for connecting either Maxima Alignment Rails, Minima Walers or Superslim Soldiers to panel ribs.

AWL = 12kN tension when engaged in hole in pane rib (rib limits)

AWL = 19kN tension in other applications



Elevation



Plan

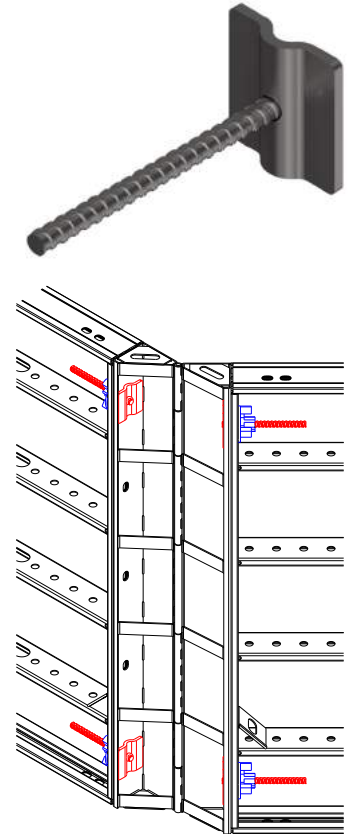
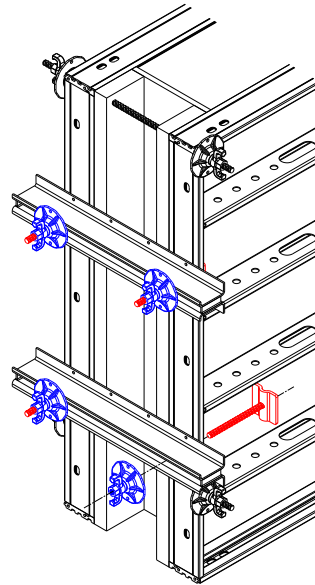
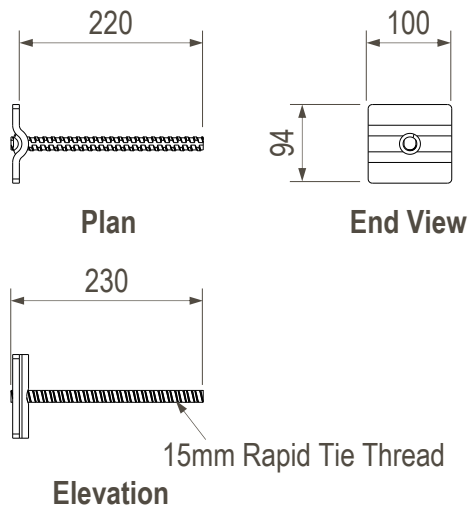
MINIMA

HANDSET PANEL SYSTEM

R·M·D
KWIKFORM

Minima Tension Bolt 190 (MMX10012) weight 1.04kg

Used with a Maxima Tie Plate 15 (MXX10043) in stop-end applications and with a Minima Centering Nut (MMX10013) or 75x75x6x22mm Plate Washer and Rapid Tie Hexagon Nut 50mm (BNX20018 + BTX10017) for joining Standard and Multi panels to Hinged Corner panels. **AWL = 8kN tension (Minima edge profile limits)**



Minima Short Tension Bolt (MMU10000) weight 0.75kg

A shorter version of the Minima Tension Bolt 190 used with a Minima Centering Nut (MMX10013) for joining Standard panels to Universal Stripping Corners where timber infills are not required.

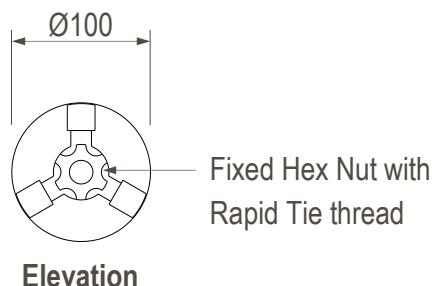
AWL = 8kN tension (Minima edge profile limits)



Minima Centering Nut (MMX10013) weight 0.82kg

Used in conjunction with a Minima Tension Bolt 190 (MMX10012) for joining Standard and Multi panels to Hinged Corner panels. See above right.

AWL = 8kN tension (Minima edge profile limits)



MINIMA

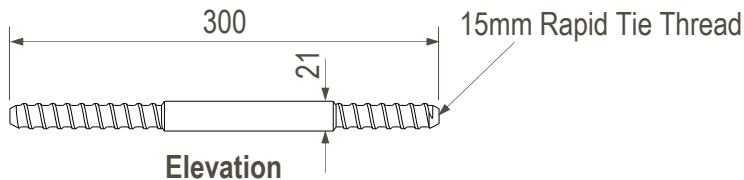
HANDSET PANEL SYSTEM

R·M·D
KWIKFORM

Minima MP Bolt (MMX10014) weight 0.61kg

Used in conjunction with a Minima Multi Purpose Nut (MMX10015) and Maxima Tie Plate 15 (MXX10043) for joining Multi panels at 90 degrees to one another in column applications.

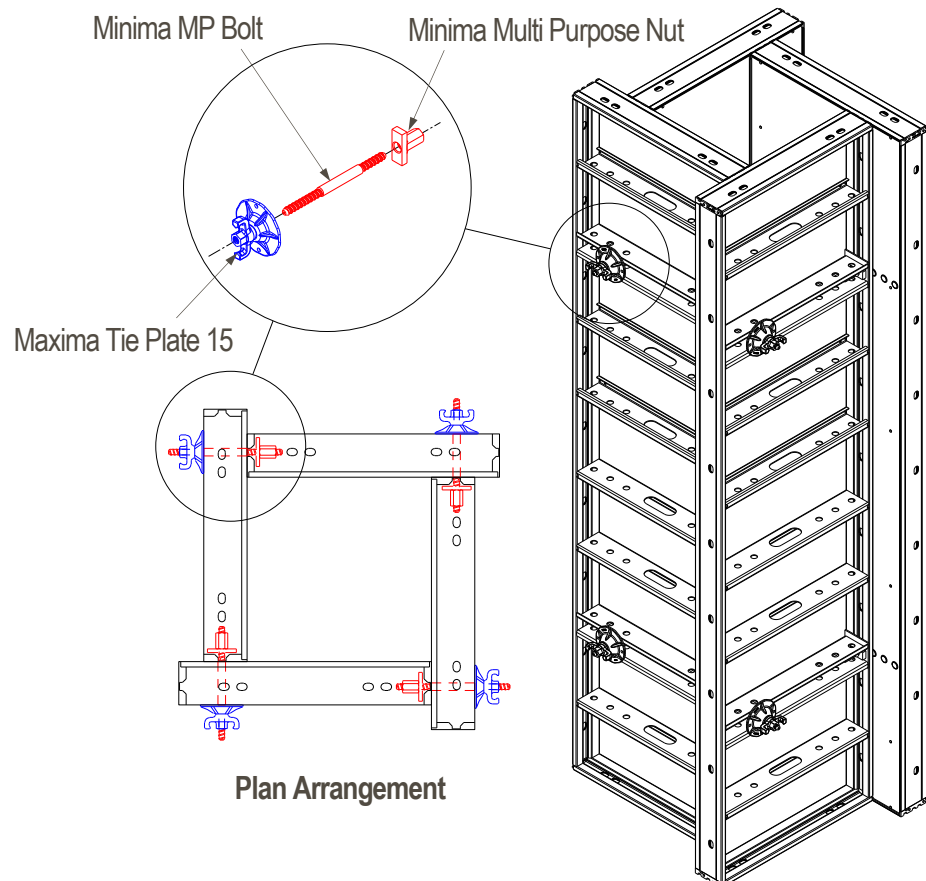
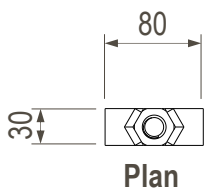
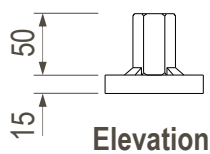
AWL = 22.2kN



Minima Multi Purpose Nut (MMX10015) weight 0.46kg

Used in conjunction with a Minima MP Bolt (MMX10014) and Maxima Tie Plate 15 (MXX10043) for joining Multi panels at 90 degrees to one another in column applications.

AWL = 22.2kN



MINIMA

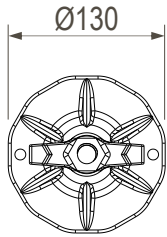
HANDSET PANEL SYSTEM

R·M·D
KWIKFORM

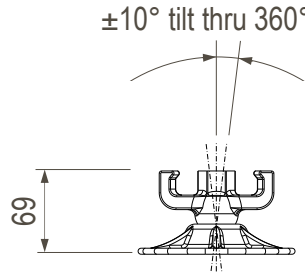
Maxima Tie Plate 15 (MXX10043) weight 1.08kg

Used with form ties and to secure Minima Waler Ties and Minima Tension Bolts.

AWL = 110kN



Elevation



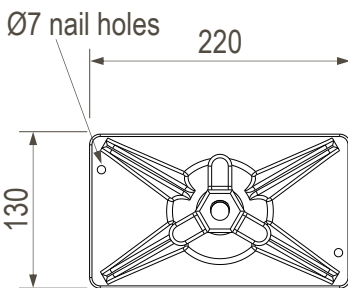
Plan



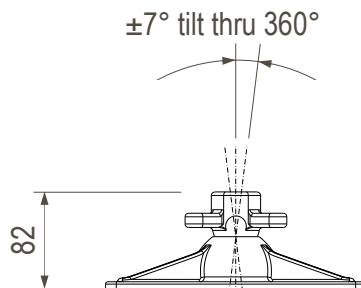
Minima Waler Plate 220 (MMX10022) weight 2.37kg

Used with 15mm Rapid Tie Bar in place of the Maxima Tie Plate 15 (MXX10043) where the form tie passes centrally through a timber infill measuring between 60 - 150mm.

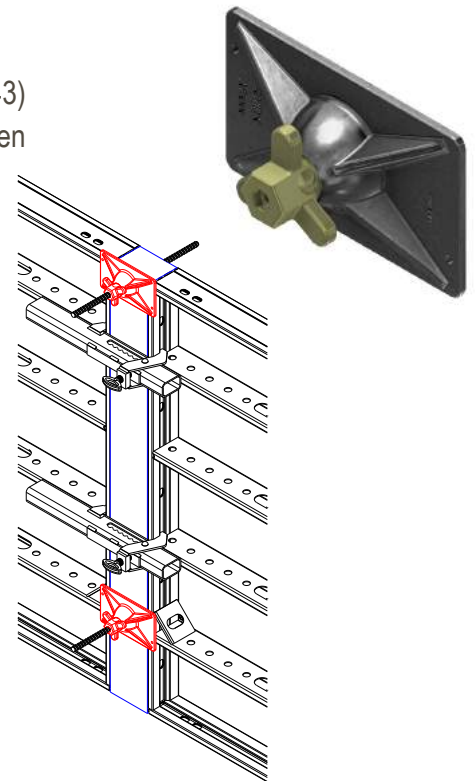
AWL = 80kN with timber infills up to 125mm wide, 60kN with 150mm infill



Elevation



Plan



Rapid Tie Bar 15mm System

Used as form ties with the Minima Handset Panel System.

Code	Description	Weight
BTX10050	Rapid Tie Bar 15mm x 0.5m	0.72 kg
BTX10100	Rapid Tie Bar 15mm x 1.0m	1.44 kg
BTX10150	Rapid Tie Bar 15mm x 1.5m	2.12 kg
BTX10200	Rapid Tie Bar 15mm x 2.0m	2.83 kg
BTX10600	Rapid Tie Bar 15mm x 6.0m	8.80 kg
BTX30015	Rapid Tie Bar per m 15mm	1.44 kg
BTX20015	Rapid Tie Bar 15mm per cut	-
BTX10011	Ribbed Water Bar Connector	0.63 kg
BTX10018	Plastic Cone 10mm	0.01 kg
BTX10019	Plastic Tube 2m	0.45 kg

MINIMA

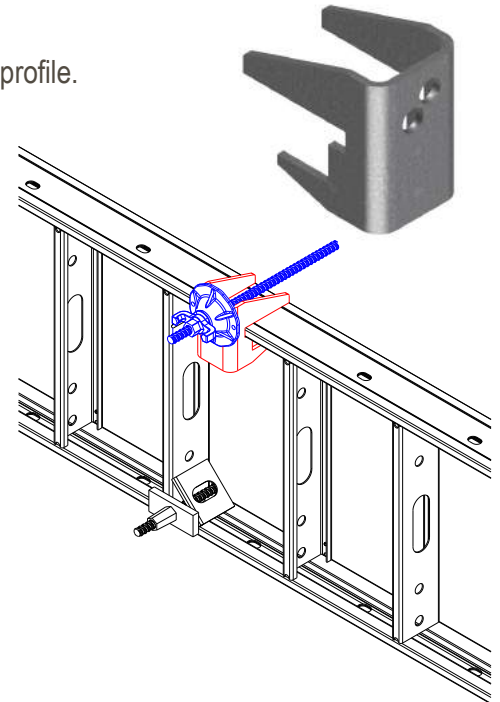
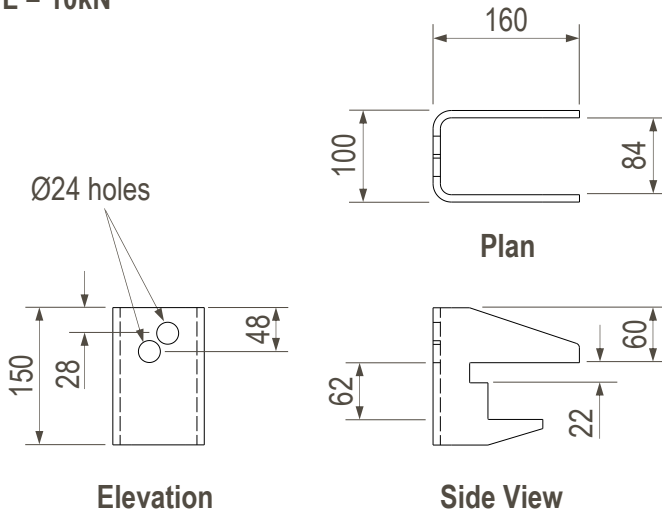
HANDSET PANEL SYSTEM

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Minima Edge Tie Bearing (MMX10023) weight 2.28kg

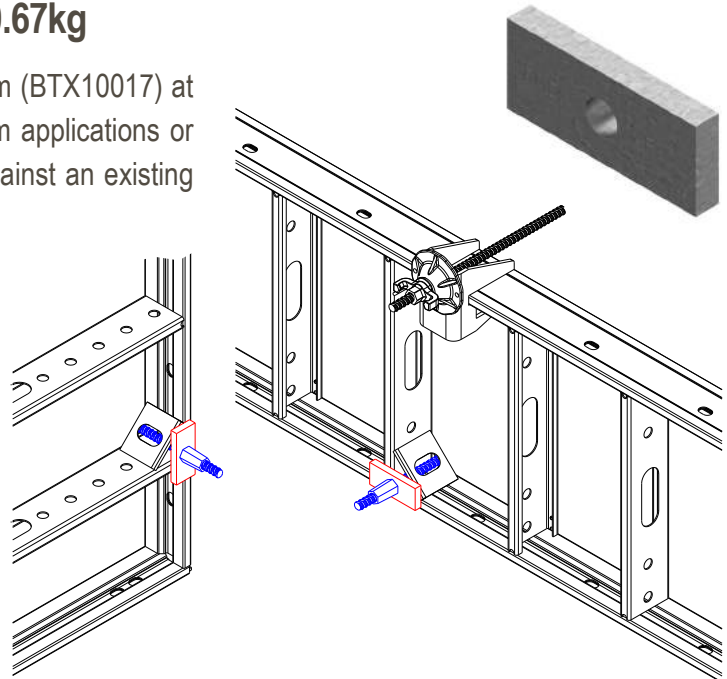
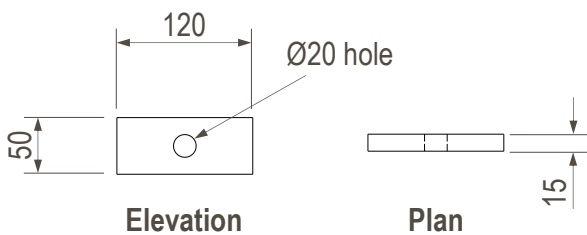
Used in ground beam applications to position form ties above the panel edge profile.

AWL = 10kN



Maxima Ground Plate (MXX10012) weight 0.67kg

Used with 15mm Rapid Tie Bar and Hexagon Nut 50mm (BTX10017) at tie hole positions nearest the base slab in ground beam applications or where the side of the Minima panel butts up directly against an existing structure. AWL = 65kN



Rapid Tie Hexagon Nut 50mm (BTX10017) weight 0.16kg

Used with 15mm Rapid Tie Bar and Maxima Ground Plate (MXX10012) at tie hole positions nearest the base slab in ground beam applications or where the side of the Minima panel butts up directly against an existing structure. See detail above.

AWL = 110kN



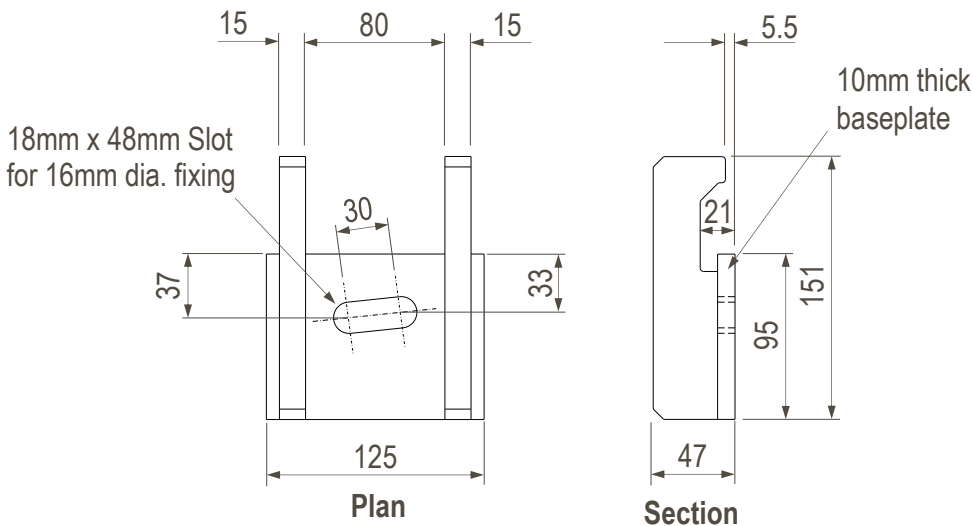
MINIMA

HANDSET PANEL SYSTEM

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KWIKFORM

Minima Uplift Bracket (MMX10044) weight 2.12kg

Used to hold down and laterally restrain Minima panels to a concrete base. Ideal for base and slab edge formwork and anchoring down low height single sided forms, the bracket's twin prongs allow it to be used anywhere along the panel profile and at the joint between 2 panels (see below).

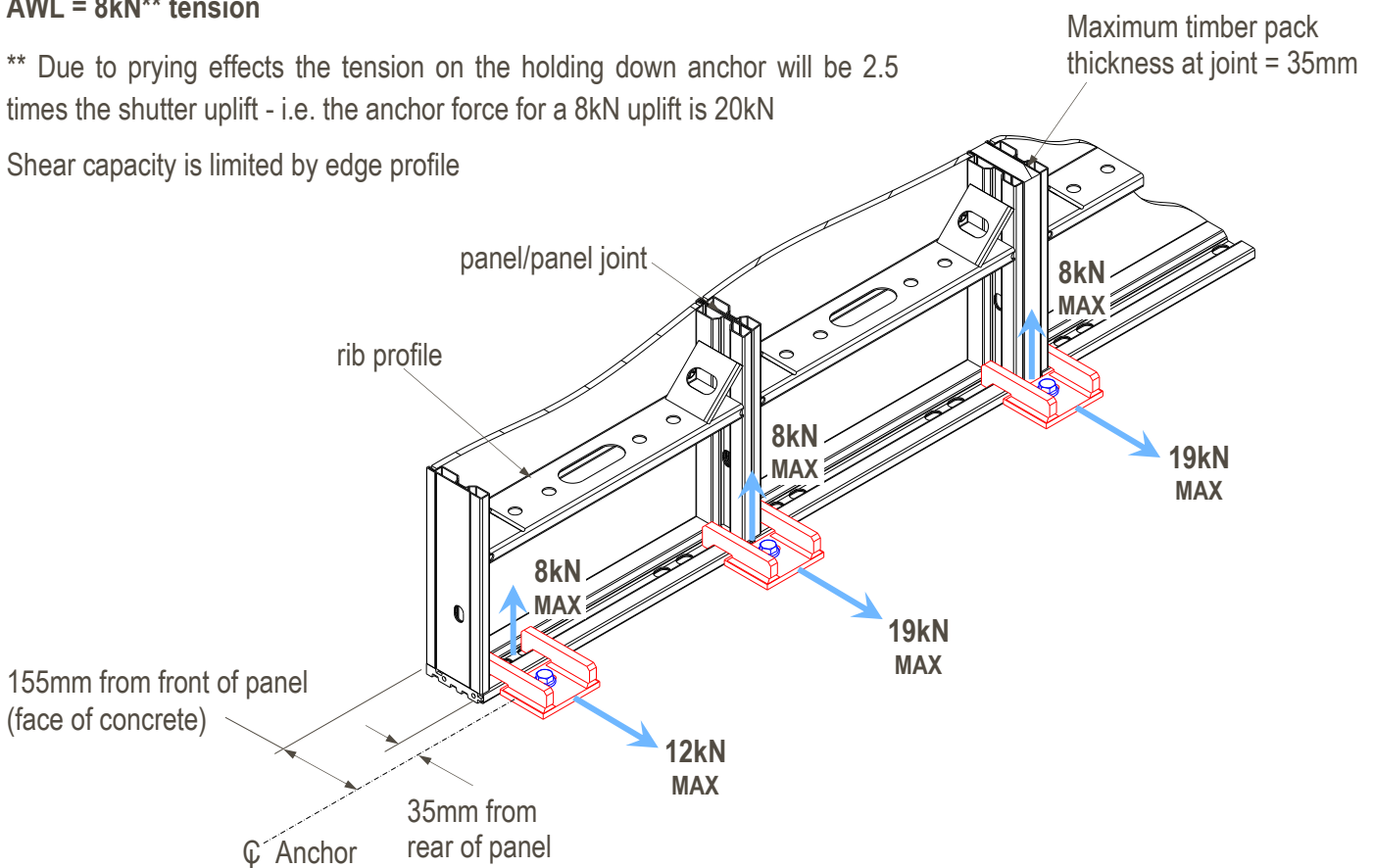


Anchorage of Panels Using Minima Uplift Bracket

AWL = 8kN** tension

** Due to prying effects the tension on the holding down anchor will be 2.5 times the shutter uplift - i.e. the anchor force for a 8kN uplift is 20kN

Shear capacity is limited by edge profile



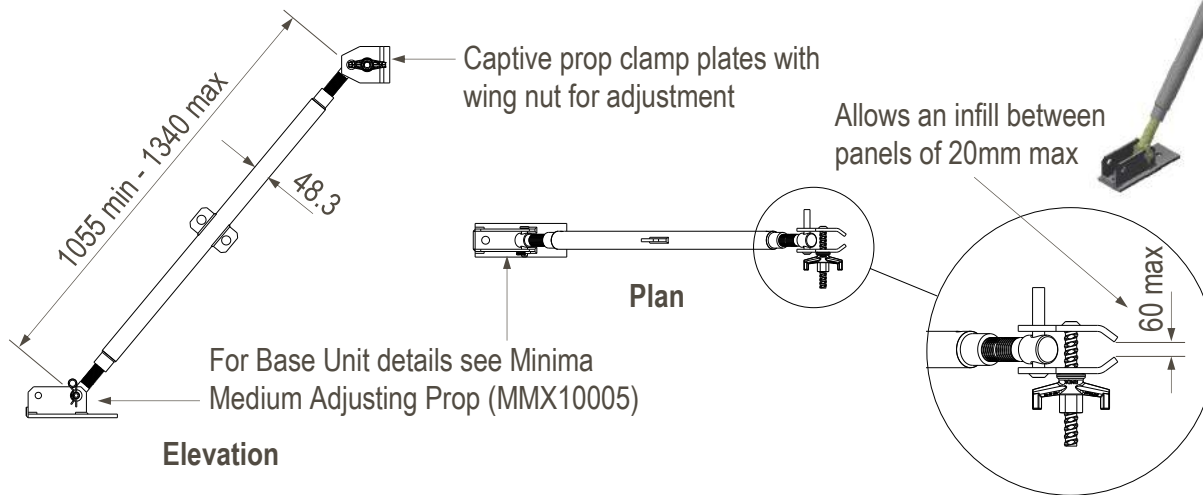
MINIMA

HANDSET PANEL SYSTEM

Minima Alignment Prop - Short (MMX10017) weight 12.7kg

A shorter, single strut prop used for plumbing and restraining low height Minima panels from overturning. Connection details to Minima panels are as per the Minima Medium Adjusting Prop - see below.

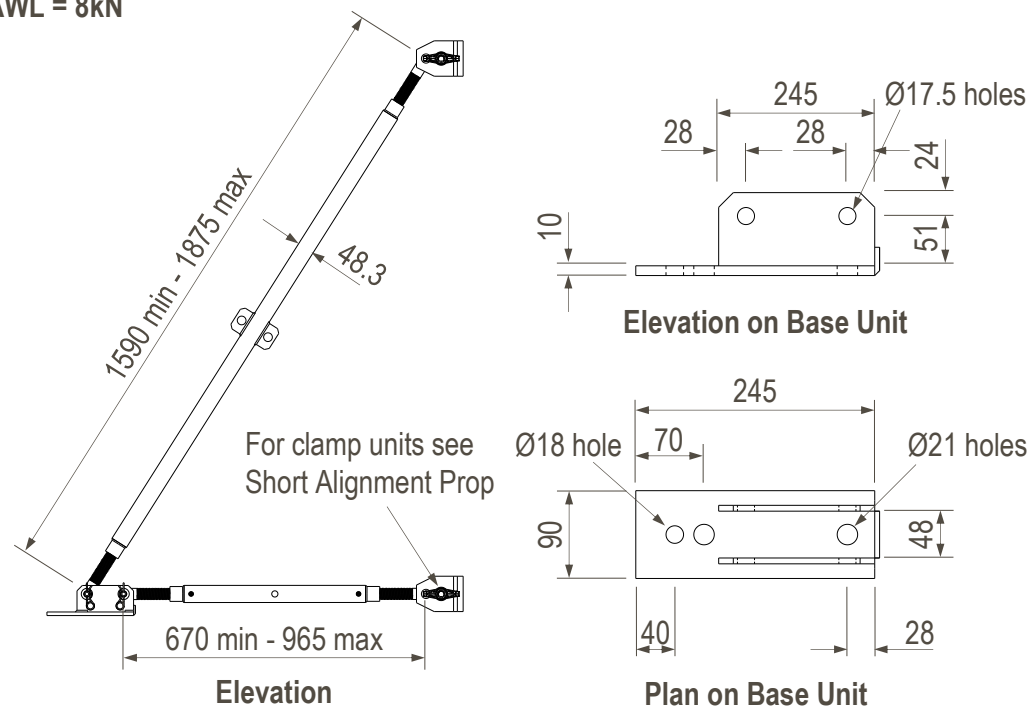
AWL = 8kN



Minima Medium Adjusting Prop (MMX10005) weight 23.0kg

Used for aligning and supporting Minima panels. Supplied assembled, including clamps, props and base unit, props can be clamped to the joint between panels at any height. If propping is required at positions other than at panel joints then additional accessories will be required to facilitate the connection - refer to sheets 31-33.

AWL = 8kN



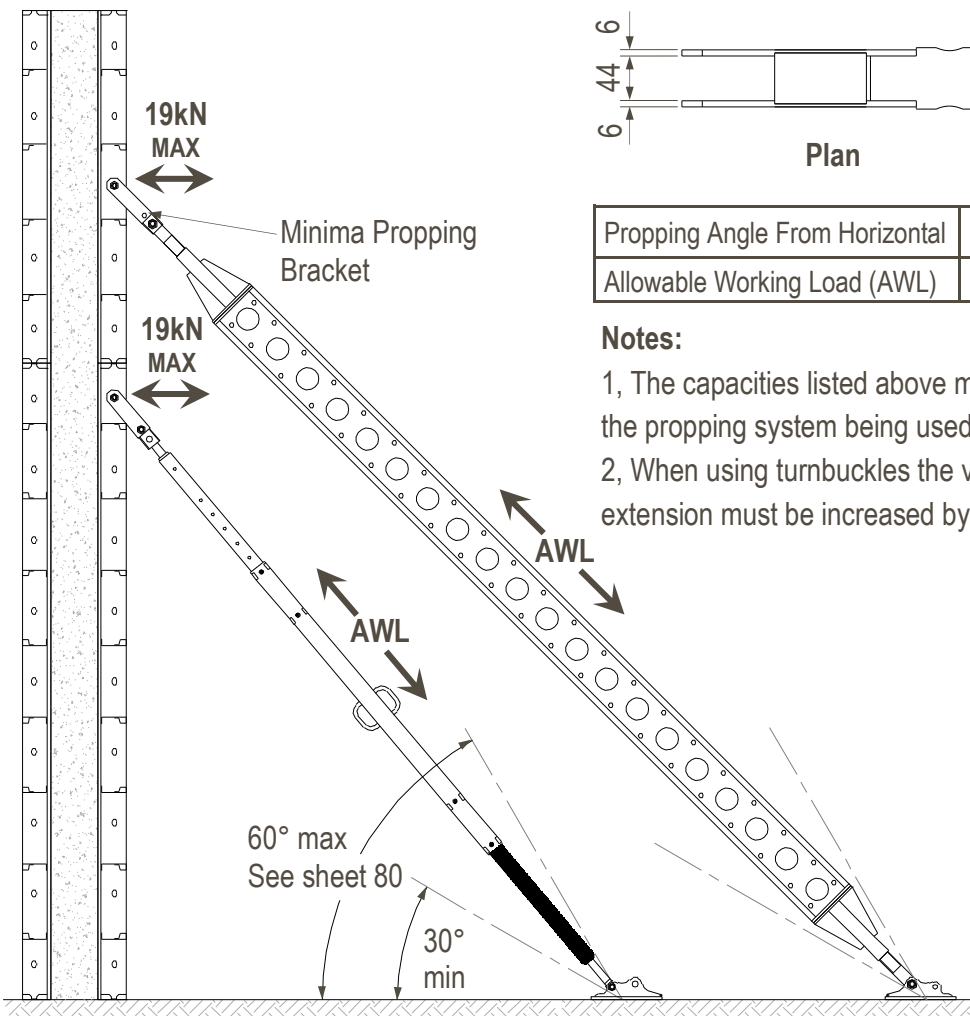
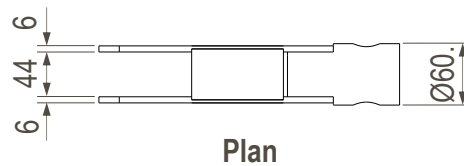
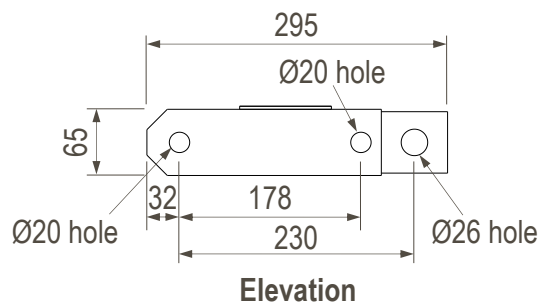
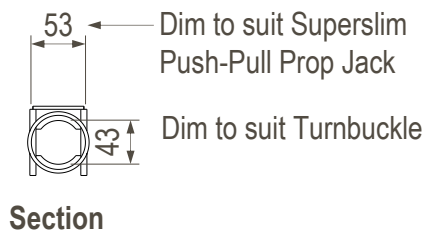
MINIMA

HANDSET PANEL SYSTEM

Minima Propping Bracket (MMA20005) weight 2.06kg

Used primarily with Superslim Push-Pull Props or Turnbuckles for aligning and supporting tall Minima panels against overturning, the Propping Bracket can also be used in single sided applications with low loads.

Fit the unit at the vertical joint position between two Minima panels using Superslim 19mm Pin & R-Clips (SSX10046). Allowable Working Loads for this application are listed below right. For low height single sided applications using laying panels the allowable working loads on the edge profiles or ribs may limit.



Propping Angle From Horizontal	30°	45°	60°
Allowable Working Load (AWL)	22kN	27kN	38kN

Notes:

- 1, The capacities listed above may be limited by the AWL of the propping system being used.
- 2, When using turnbuckles the value stated for minimum extension must be increased by 45mm.

MINIMA

HANDSET PANEL SYSTEM

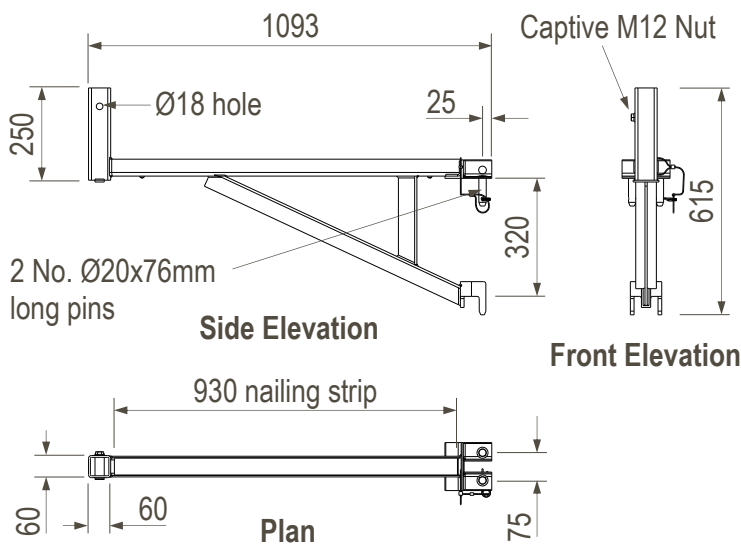
R·M·D
KWIKFORM

Minima Access Bracket (MMX10006) weight 9.73kg

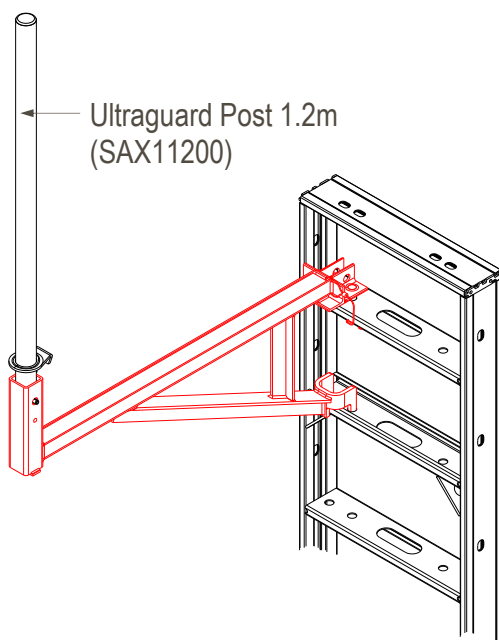
Used to provide access for placing concrete, fixing ties etc. and can be connected to both vertical and horizontal Minima panels. A single Superslim 19mm Pin & R-Clip (SSX10046) should be used to facilitate connection to a horizontal panel - see detail below right.



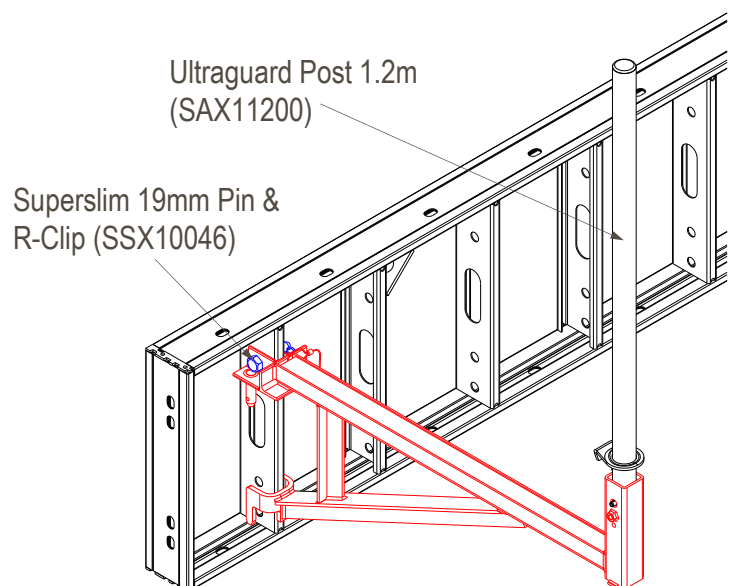
AWL = 5.0kN evenly distributed including self weight of boards



Note: A vertical scaffold tube handrail post can be used instead of the Ultraguard Post. In this case, the vertical tube should be secured in place using a M12 Uni-fix Bolt (AFX20022) fixed in the captive M12 Hex Nut.



Vertical Minima Panel Application



Horizontal Minima Panel Application

Standard Access Equipment

Used in conjunction with Minima Access Brackets to provide access for placing concrete, fixing ties etc.



Code	Description	Weight
SAX11200	Ultraguard Post 1.2m	5.51 kg
SAX12550	Ultraguard Barrier 2550mm	17.3 kg
SAX13150	Ultraguard Barrier 3150mm	25.0 kg
SFX20240	Scaffold Board 2.4m - No. 2	11.0 kg
SFX20300	Scaffold Board 3.0m - No. 3	14.0 kg
SFX20395	Scaffold Board 3.95m	17.7 kg
SFX10026	Toe Board Clip	0.19 kg
TUX80060	Scaffold Tube 0.6m (4mm)	2.62 kg
TUX80150	Scaffold Tube 1.5m (4mm)	6.55 kg
TUX80210	Scaffold Tube 2.1m (4mm)	9.17 kg
TUX80300	Scaffold Tube 3.0m (4mm)	13.1 kg
TUX80360	Scaffold Tube 3.6m (4mm)	15.7 kg
TUX80480	Scaffold Tube 4.8m (4mm)	21.0 kg
TUX80540	Scaffold Tube 5.4m (4mm)	23.6 kg
TUX80640	Scaffold Tube 6.4m (4mm)	28.0 kg
SFX10002	Coupler 90 Deg 2"x2"	1.35 kg
SFX10003	Coupler Swivel 2"x2"	1.48 kg

Note: Ultraguard Barrier provides edge protection for operatives in accordance with EN13374:2004 Class A

MINIMA

HANDSET PANEL SYSTEM

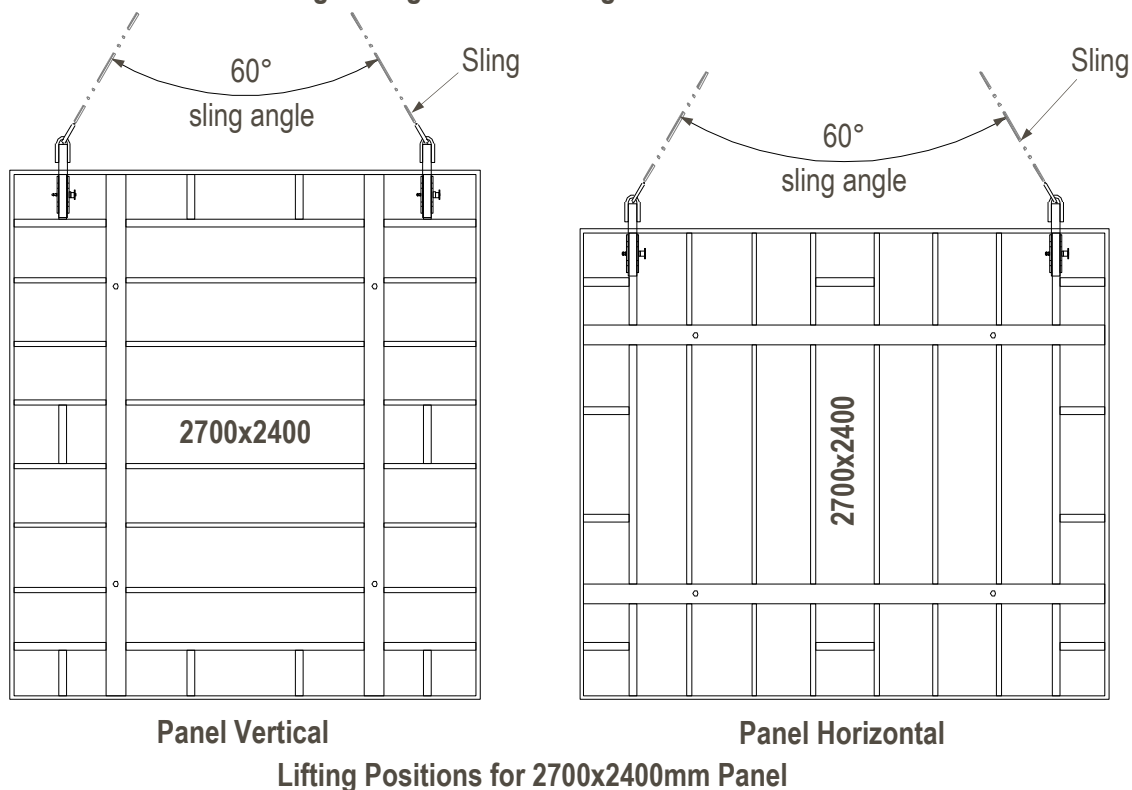
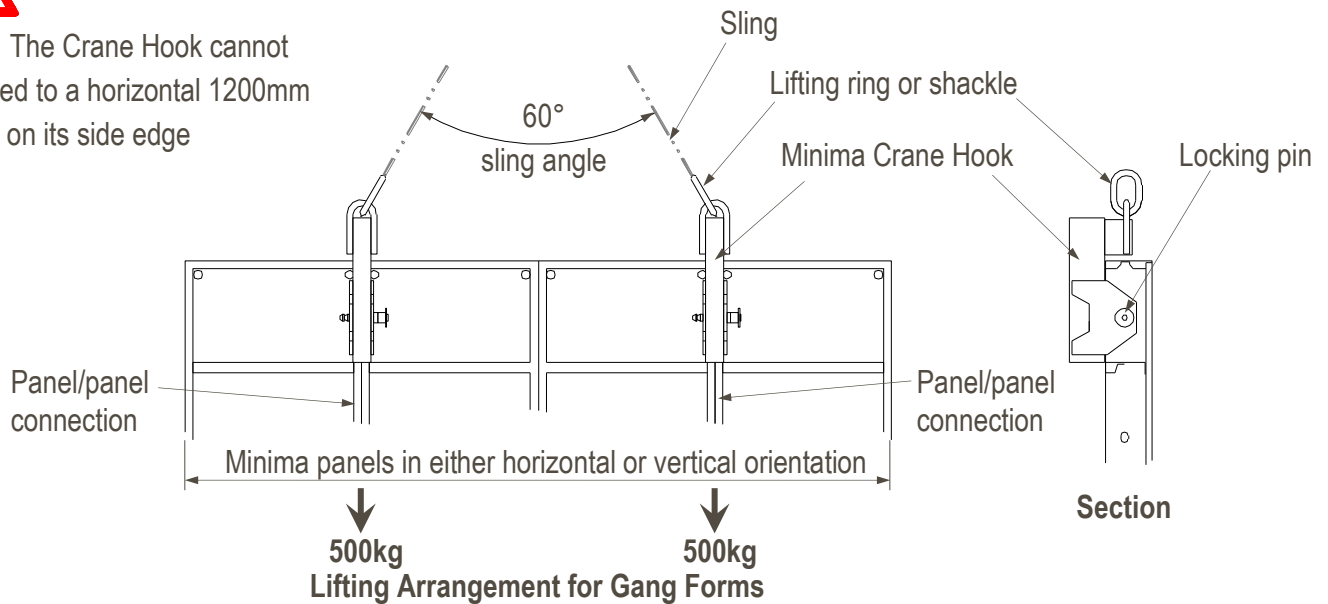
Minima Crane Hook (MMX10021) weight 7.46kg

Used in pairs for lifting single Minima panels or larger assembled gang forms, the Minima Crane Hook shall be engaged over the intersection between vertical ribs or edge sections and the top rail of the assembly being lifted. Secure the unit in position using the captive locking pin through the holes in the panel rib or edge section. Attach to the lifting equipment via the integral shackle or lifting ring using suitable slings of a length such that the included angle between slings does not exceed 60 degrees. **AWL 500kg**



Two Minima Crane Hooks **MUST** be used at all times.

Note: The Crane Hook cannot be fitted to a horizontal 1200mm panel on its side edge



MINIMA

HANDSET PANEL SYSTEM

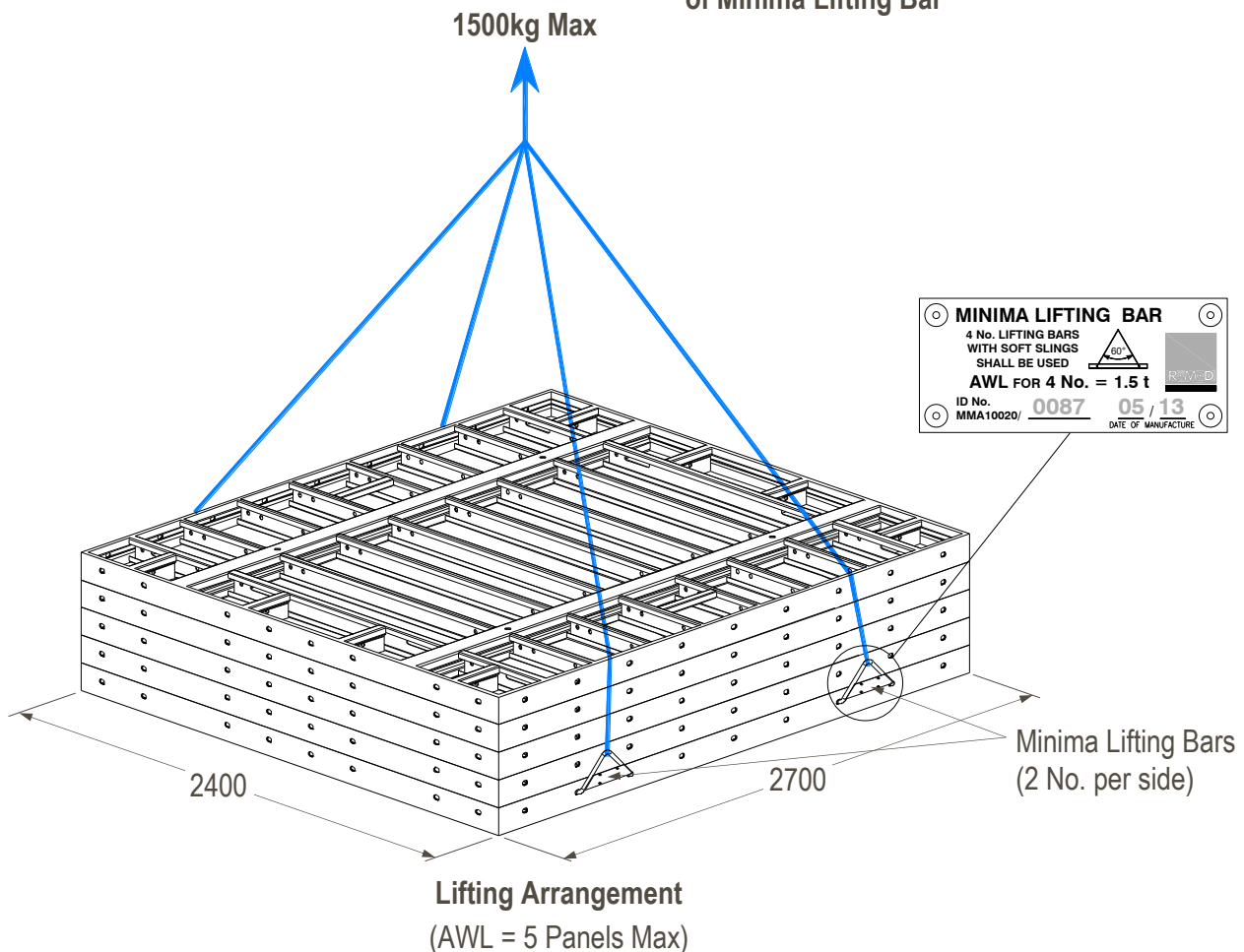
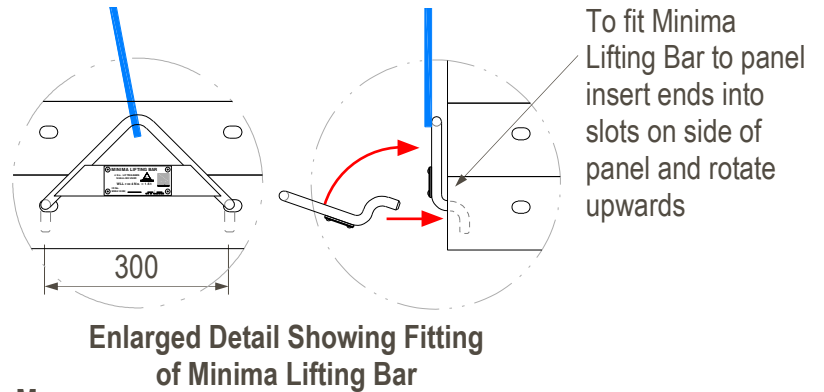
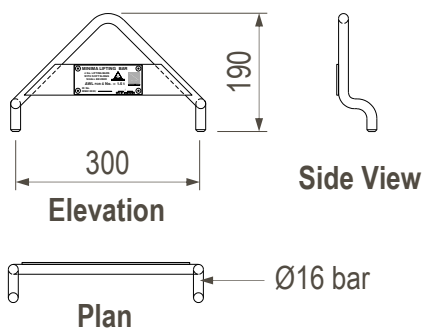
R·M·D
KWIKFORM

Minima Lifting Bar (MMA10020) weight 1.35kg

Used in sets of four engaged with the panel edge profile holes to lift stacks of Minima Panels up to 1500kg. Ensure that all four units are engaged with the same panel and are placed equal distances from the panel centreline before attaching the 4 legged lifting slings. The length of the slings shall be such that the maximum included angle at the master link is 60°.



AWL = 1500kg (Lifting Capacity for a set of four Lifting Bars)



Minima System - Allowable Working Loads

MINIMA PANELS

Maximum design concrete pressure = 60kN/m²

AWL at tie points on an individual edge section = 40kN

Edge profile (Parallel to face material) = 8kN

Edge profile maximum AWL between tie points and acting perpendicular to the face material = 19kN

Rib profile maximum AWL acting perpendicular to the face material = 12kN

MINIMA 3300x700mm COLUMN PANELS

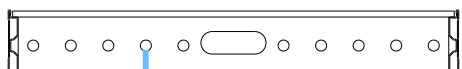
Maximum design concrete pressure = 80kN/m²

MINIMA 1800x700mm MULTI-PURPOSE PANELS

Maximum design concrete pressure = 90kN/m²

MINIMA ACCESSORIES

Minima Waler Tie = 12kN (when engaged in a hole in the rib profile - rib limits)



12kN (one hole position only)

Minima Clamps (MMX10001, MMX10002, MMX10003, MMX10028, MMX10040) = 8kN in the plane of the clamp

Minima Tension Bolt 190 = 12kN (edge profile limits)

Minima MP Bolt & Nut:

- Minima Multi-Purpose Panels 2700x700mm & 3300x700mm = 22.2kN
- Minima Multi-Purpose Panel 1500x700mm = 15.4kN

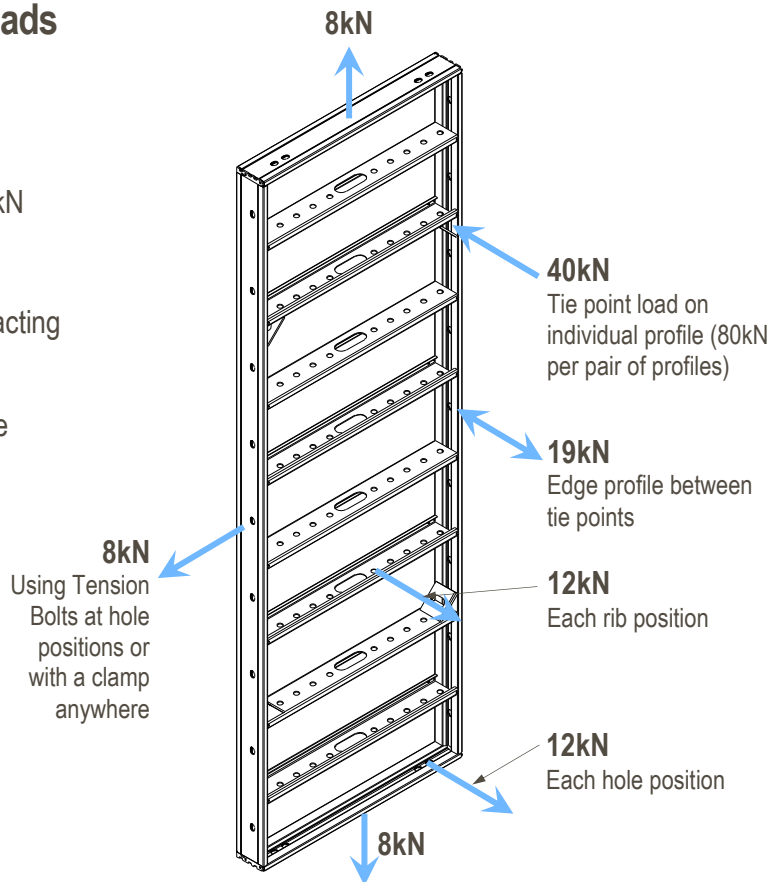
Minima Walkway Bracket = 5kN total UDL (including self weight of boards)

Minima Alignment Prop Medium & Short = 8kN

Minima Crane Hook = 500kg

Minima Crane Lifting Bar = 1500kg (AWL for a set of four)

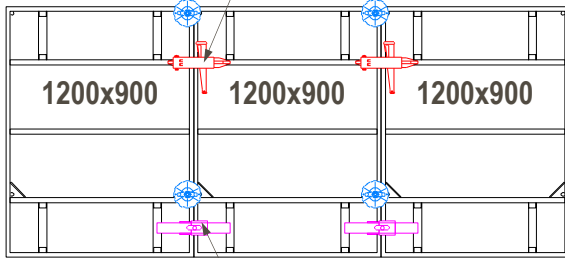
Minima Edge Tie Bearing = 10kN



Minima Panel Connections

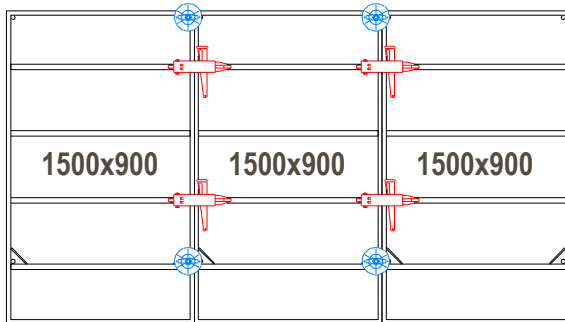
The details below show the standard clamping positions for single height panels and the tie loads per linear metre. To arrive at actual tie loads multiply these values by the influence width of the ties on plan. A concrete density of 23.5kN/m³ has been used in the calculation of concrete pressures.

Minima Wedge Clamp

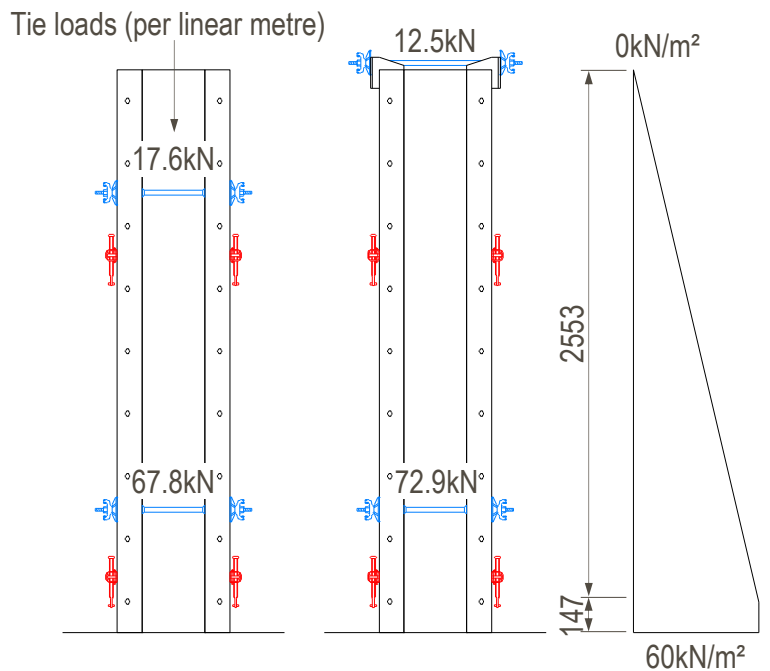
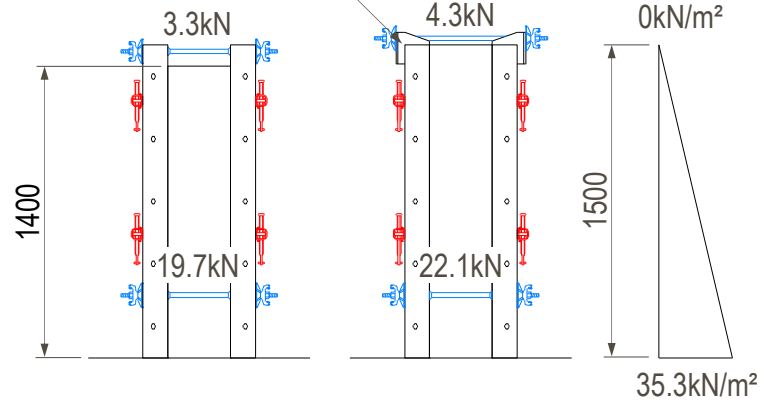
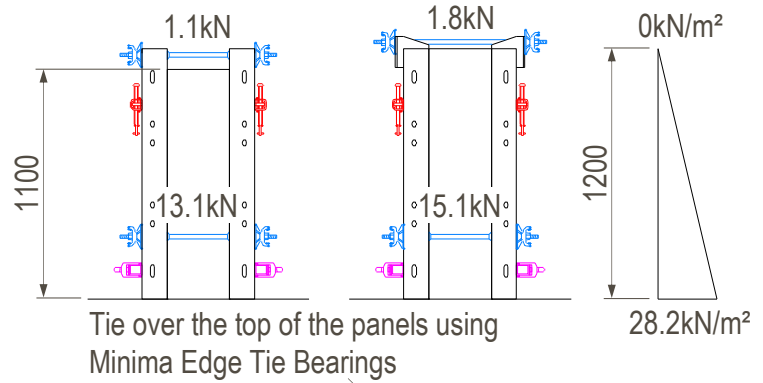
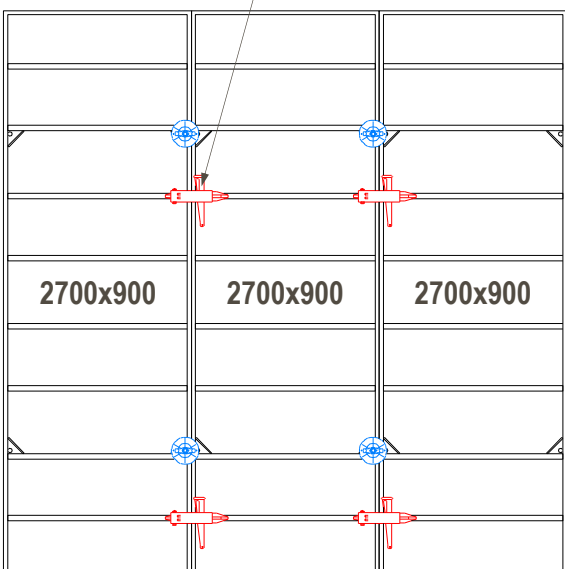


Minima Panel Aligning Clamp

Note: Wedge Clamps do not work here



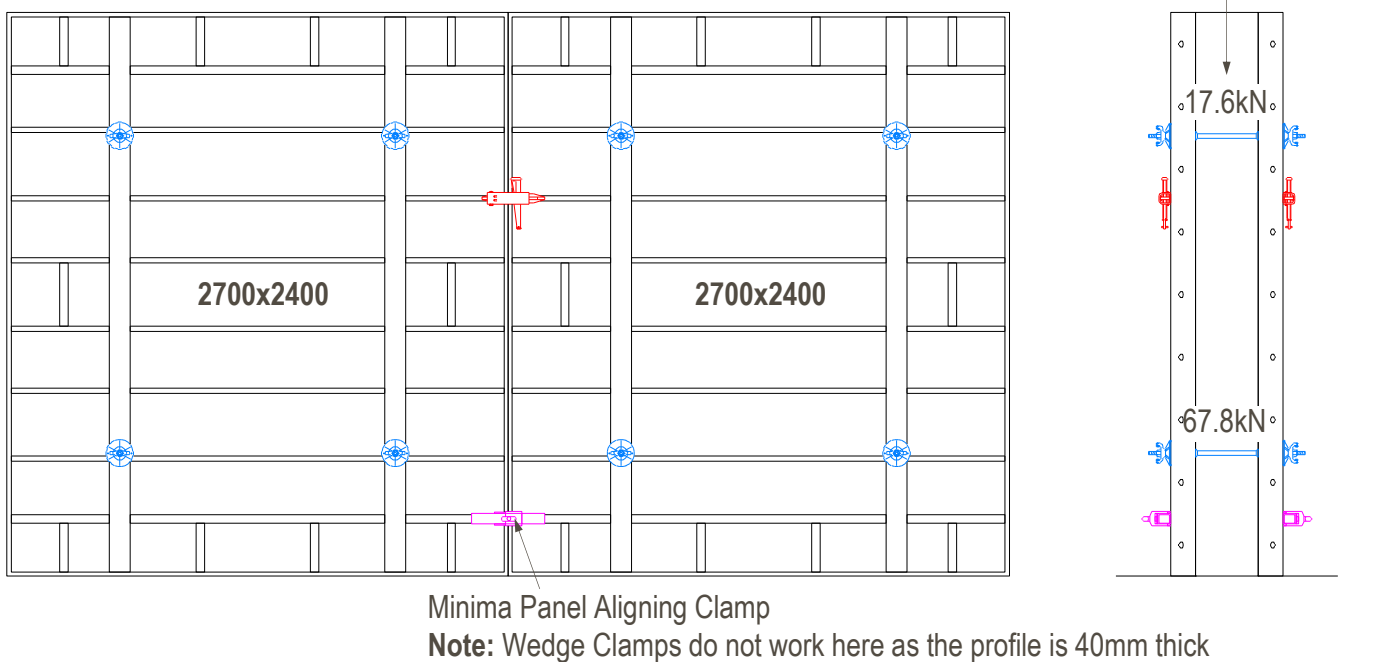
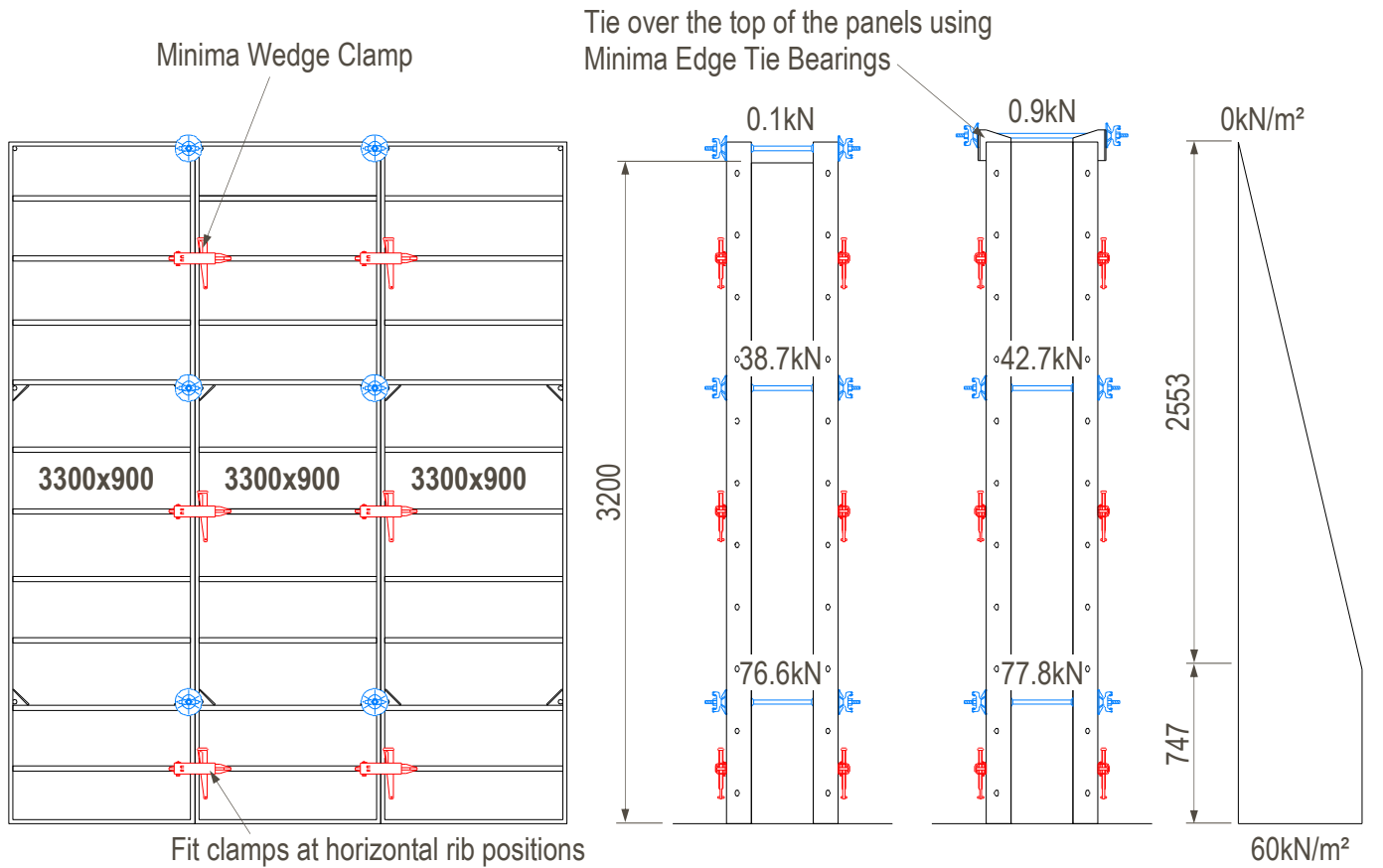
Fit clamps at horizontal rib positions



Note: If the clamps on the vertical joints are not fitted at horizontal rib positions the alignment of the panels is likely to be compromised.

Minima Panel Connections....Continued

The details below show the standard clamping positions for single height panels and the tie loads per linear metre. To arrive at actual tie loads multiply these values by the influence width of the ties on plan.



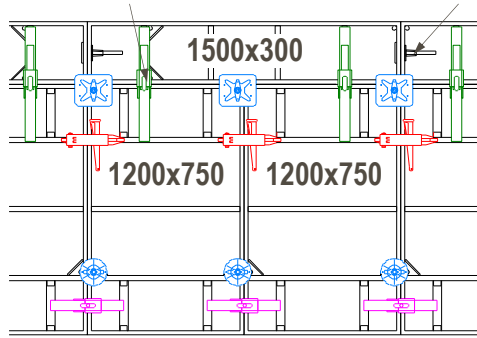
Stacked Minima Connections Using 1200mm High Base Panels

The details below show the standard clamping positions for stacked panels and the tie loads per linear metre. To arrive at actual tie loads multiply these values by the influence width of the ties on plan.

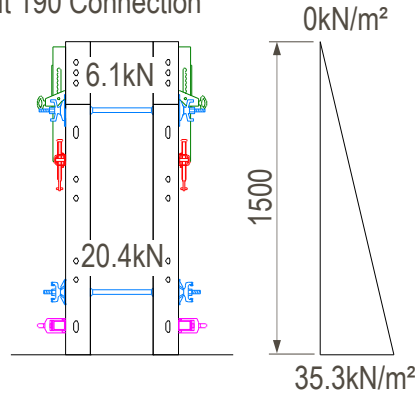
Note: Horizontal joints between panels have been modelled as a pinned. Density of concrete taken as 23.5kN/m^3 .

Minima Adjustable Clamp

Tension Bolt 190 Connection

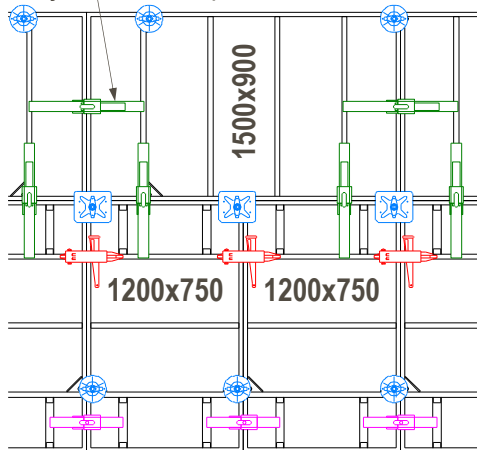


Stacked 300mm Laying Panels

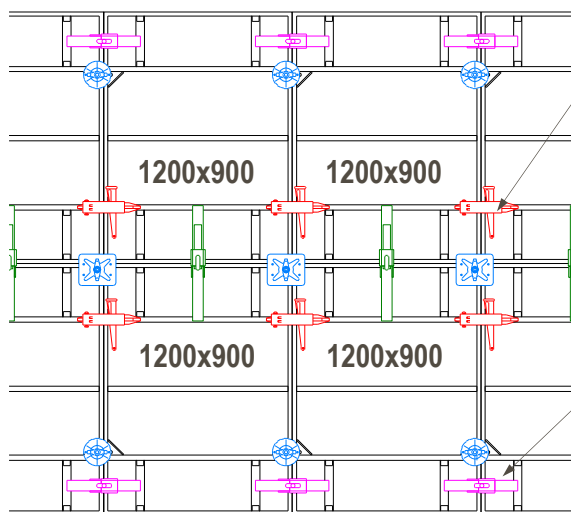
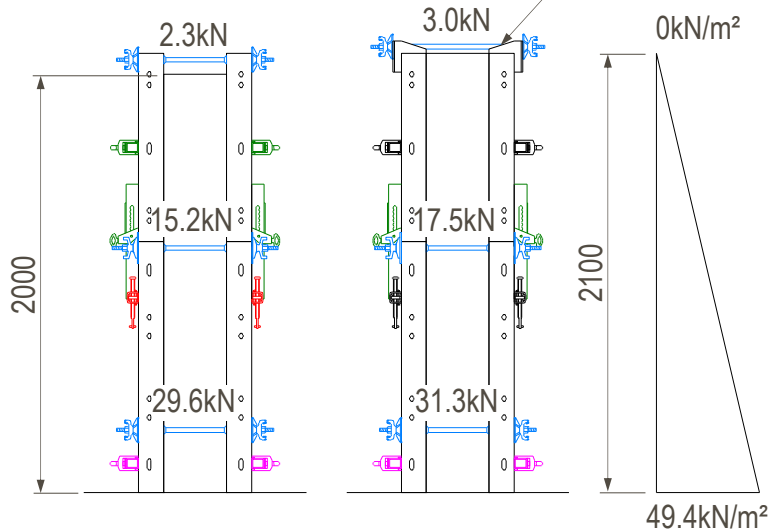


Tie over the top of the panels using Minima Edge Tie Bearings

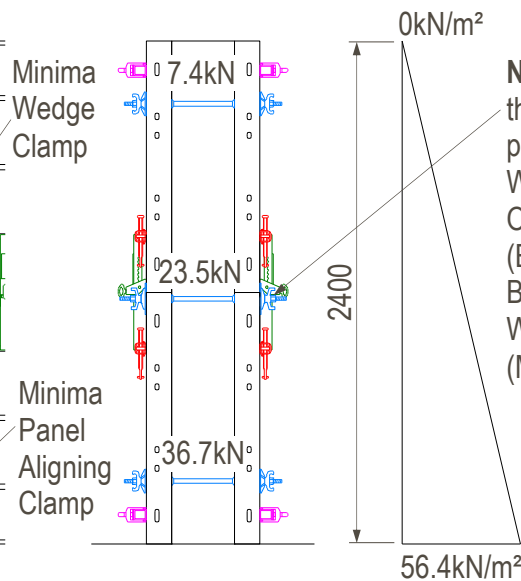
Minima Adjustable Clamp



Stacked 450mm-900mm Laying Panels



Stacked 1200mm Upright Panels



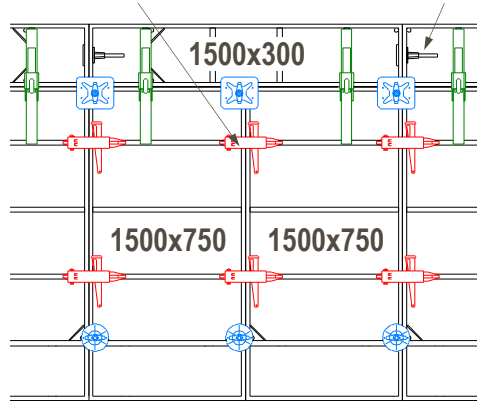
Note: Where tying at the intersection of 4 No. panels use Standard Walers Plates & Knock On Wing Nuts (BTX10021 + BTX10001) or Minima Waler Plate 220 (MMX10022).

Stacked Minima Connections Using 1500mm High Base Panels

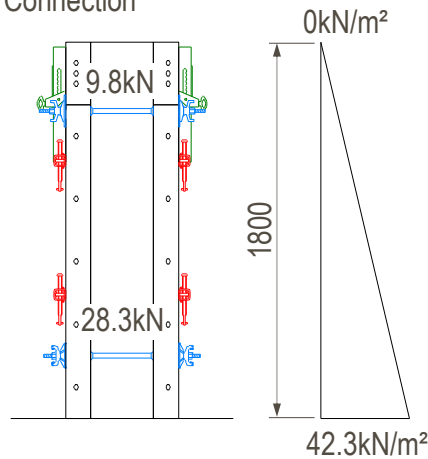
The details below show the standard clamping positions for stacked panels and the tie loads per linear metre. To arrive at actual tie loads multiply these values by the influence width of the ties on plan.

Minima Wedge Clamp

Tension Bolt 190 Connection



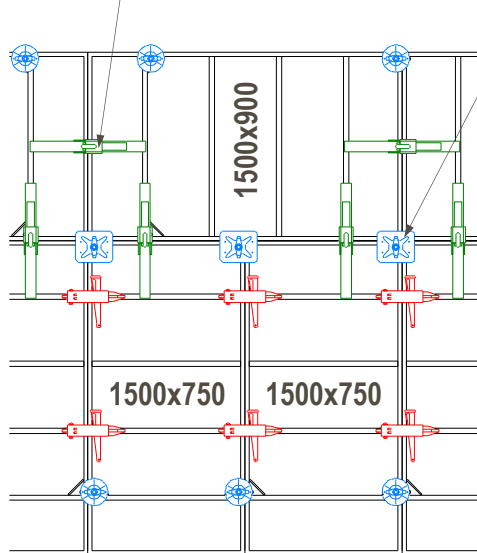
Stacked 300mm Laying Panels



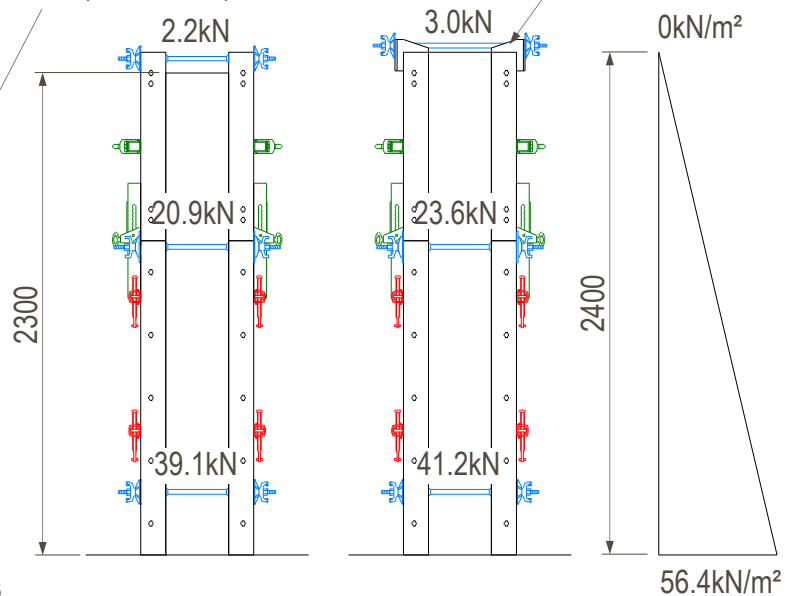
Note: Where tying at the intersection of 4 No. panels use Standard Waler Plates & Knock On Wing Nuts (BTX10021 + BTX10001) or Minima Waler Plate 220 (MMX10022).

Tie over the top of the panels using Minima Edge Tie Bearings

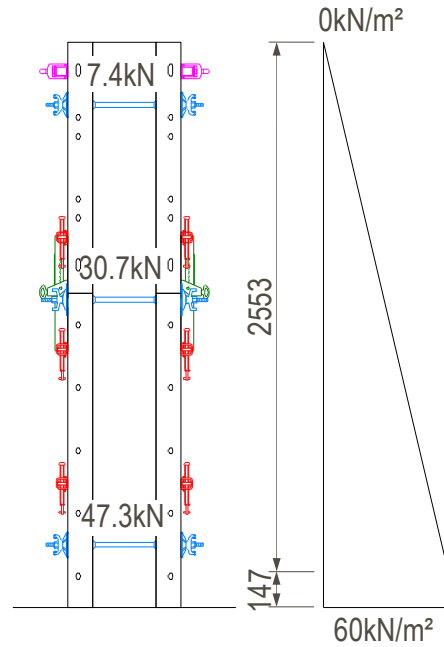
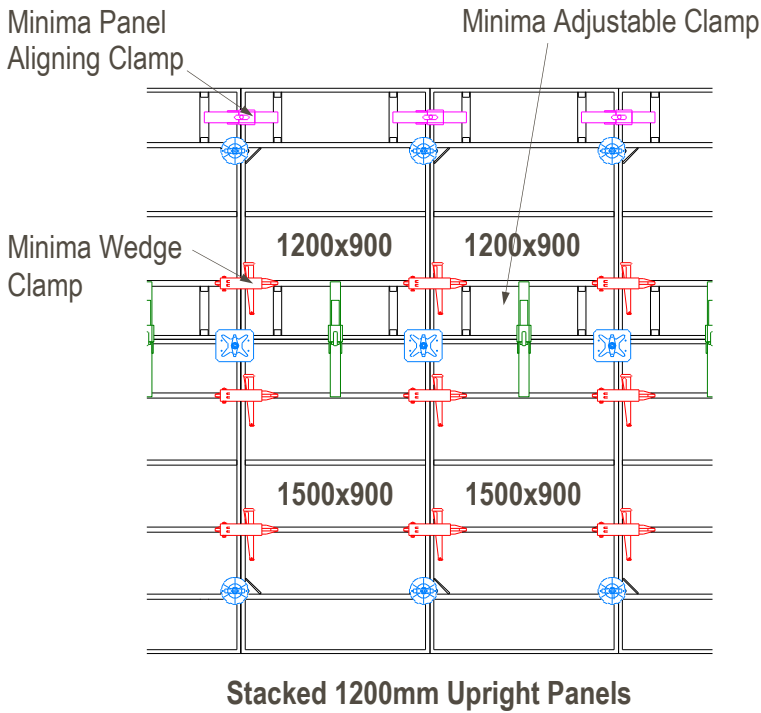
Minima Adjustable Clamp



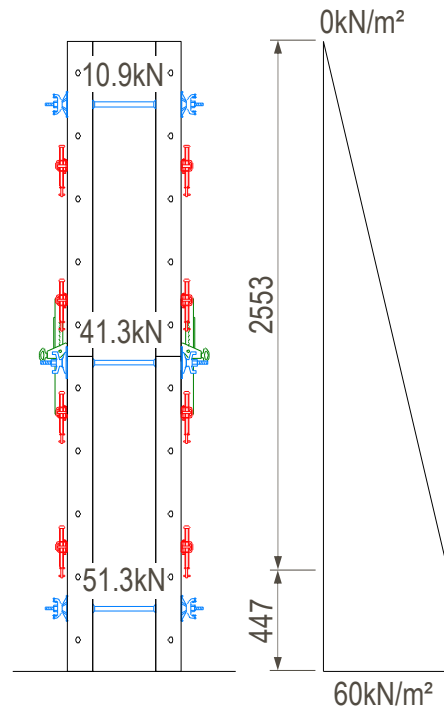
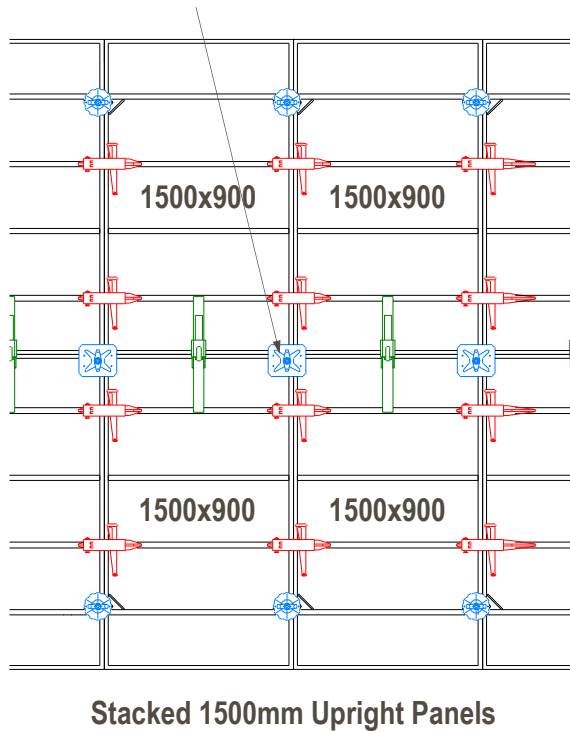
Stacked 450mm-900mm Laying Panels



Stacked Minima Connections Using 1500mm High Base Panels...Continued

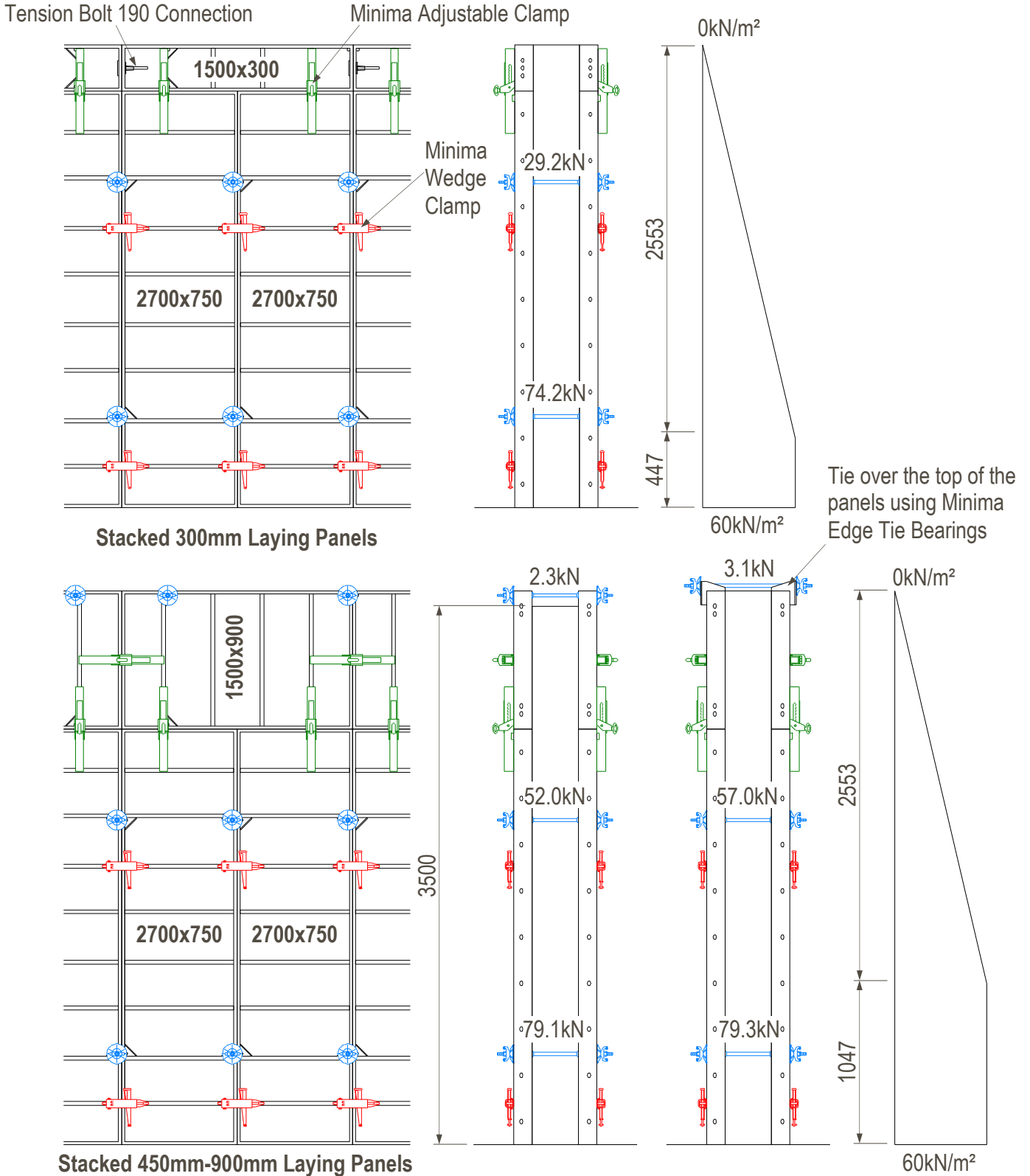


Note: Where tying at the intersection of 4 No. panels use Standard Waler Plates & Knock On Wing Nuts (BTX10021 + BTX10001) or Minima Waler Plate 220 (MMX10022).

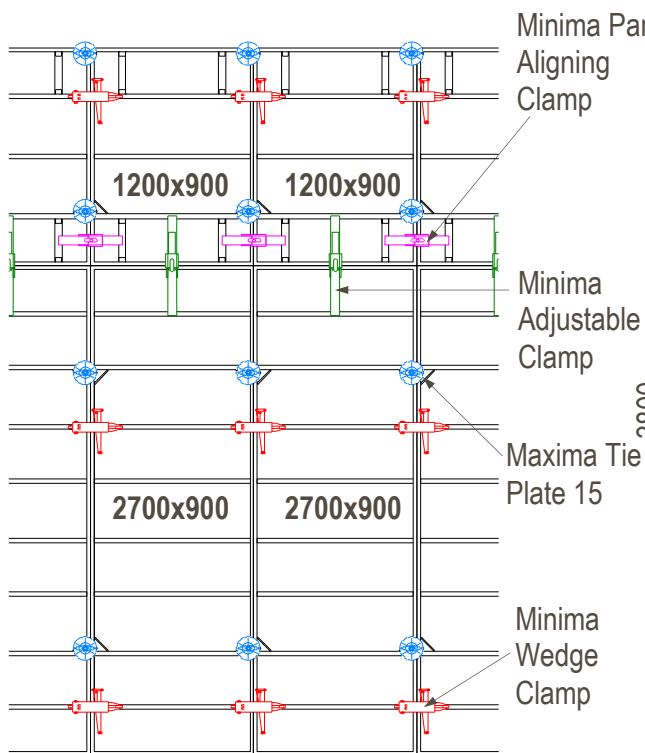


Stacked Minima Connections Using 2700mm High Base Panels

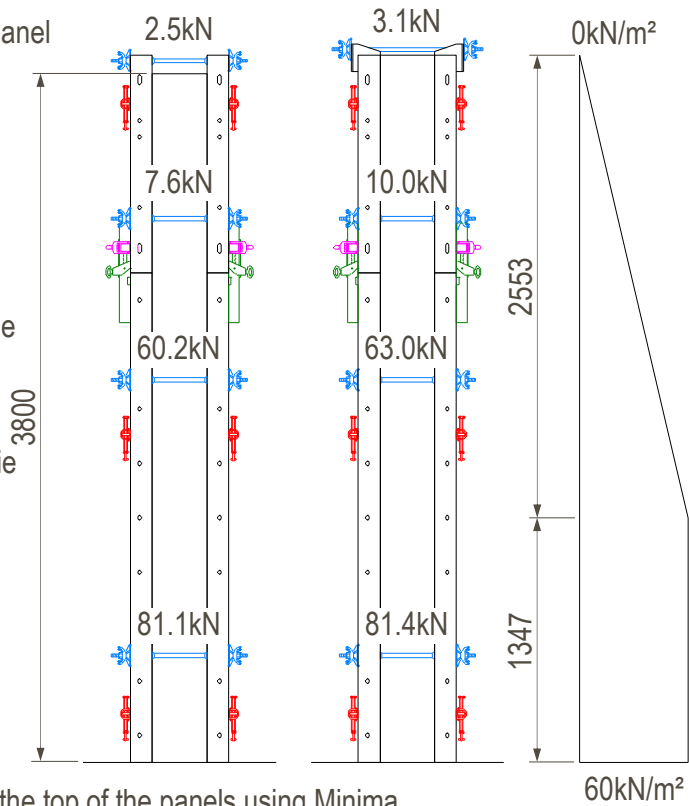
The details below show the standard clamping positions for stacked panels and the tie loads per linear metre. To arrive at actual tie loads multiply these values by the influence width of the ties on plan.



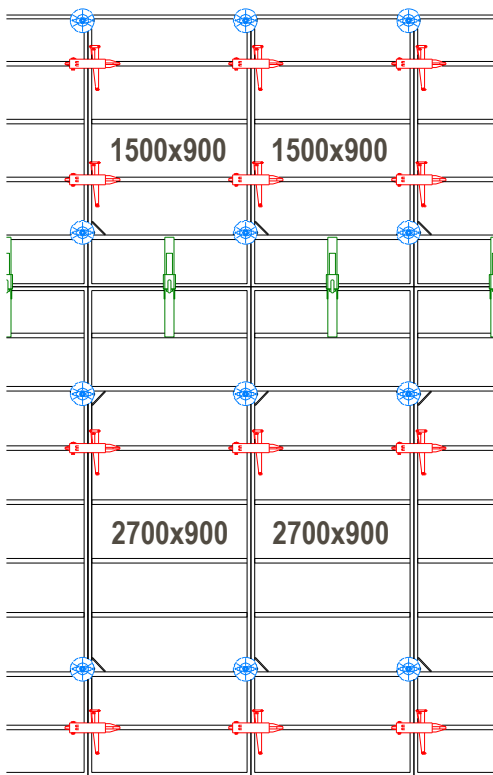
Stacked Minima Connections Using 2700mm High Base Panels...Continued



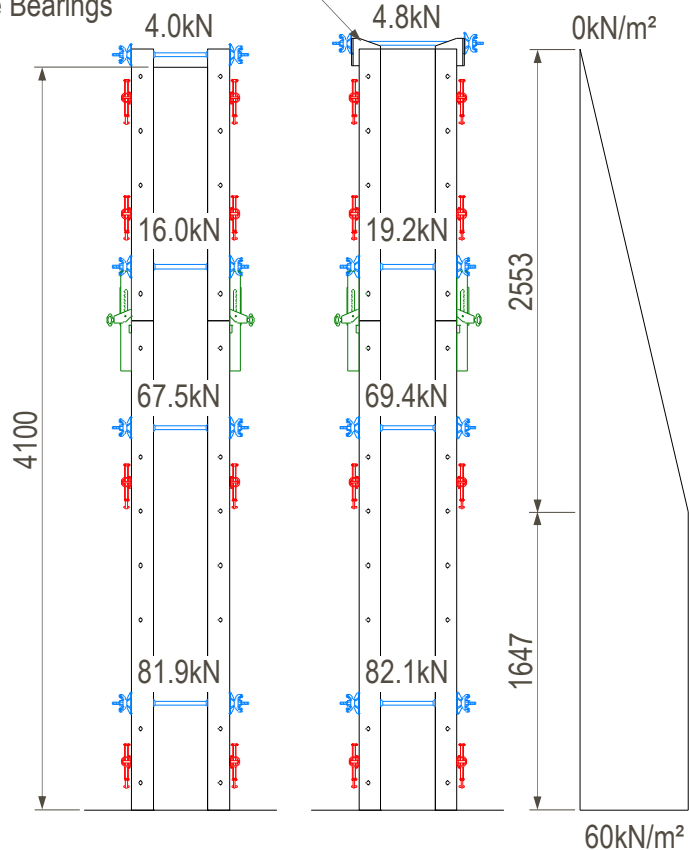
Stacked 1200mm Upright Panels



Tie over the top of the panels using Minima Edge Tie Bearings

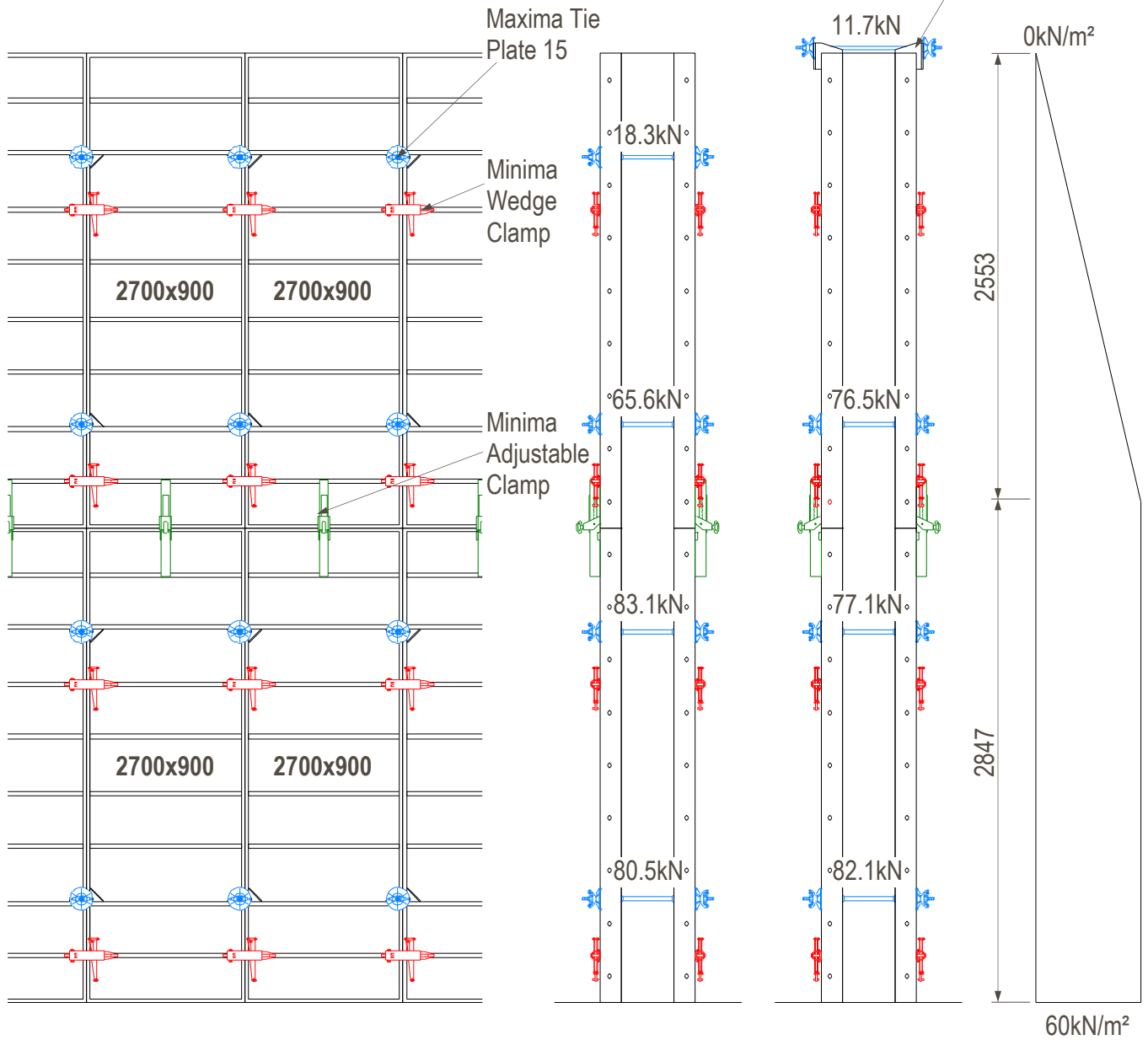


Stacked 1500mm Upright Panels



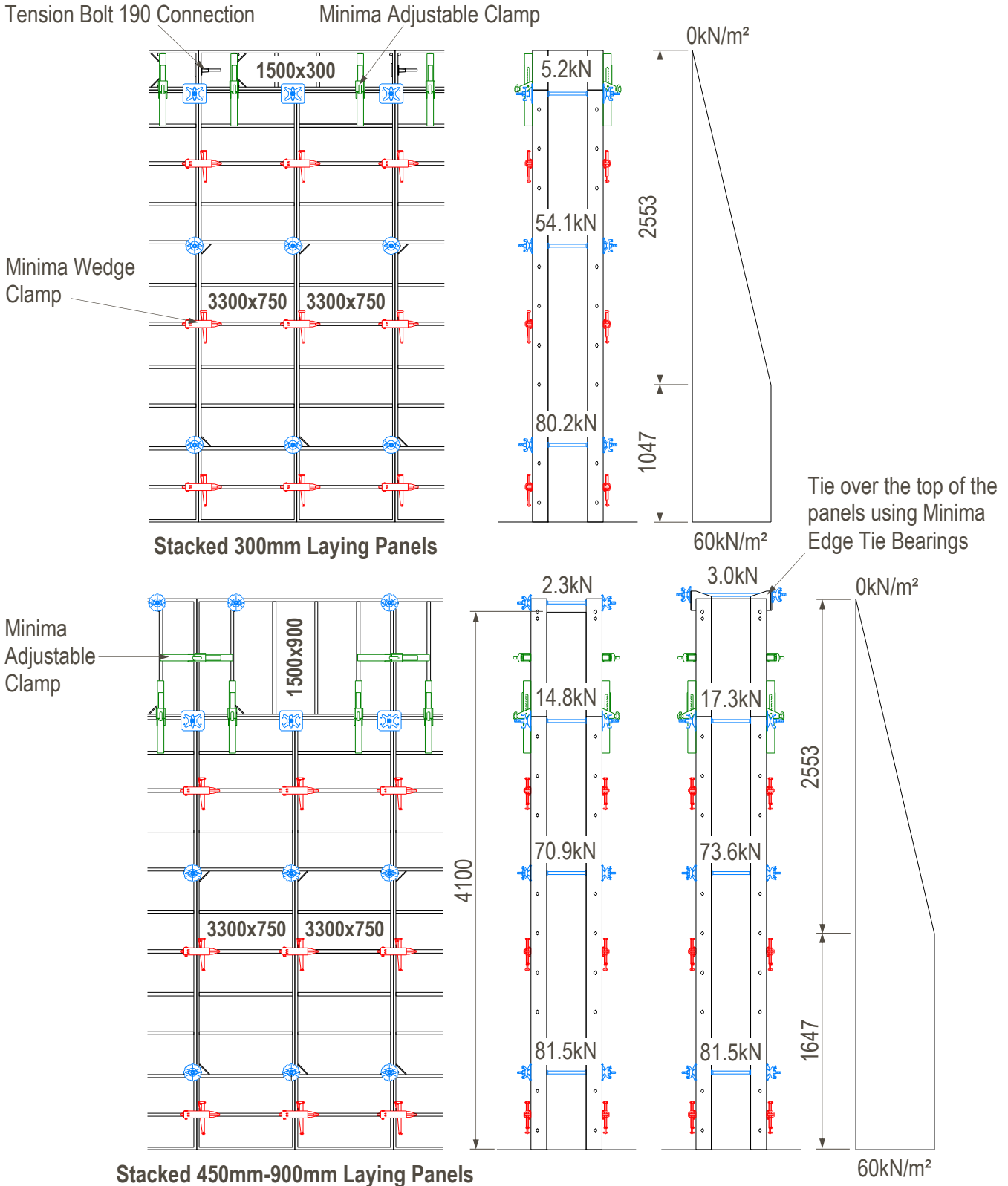
Stacked Minima Connections Using 2700mm High Base Panels...Continued

Tie over the top of the panels using Minima Edge Tie Bearings



Stacked Minima Connections Using 3300mm High Base Panels

The details below show the standard clamping positions for stacked panels and the tie loads per linear metre. To arrive at actual tie loads multiply these values by the influence width of the ties on plan.

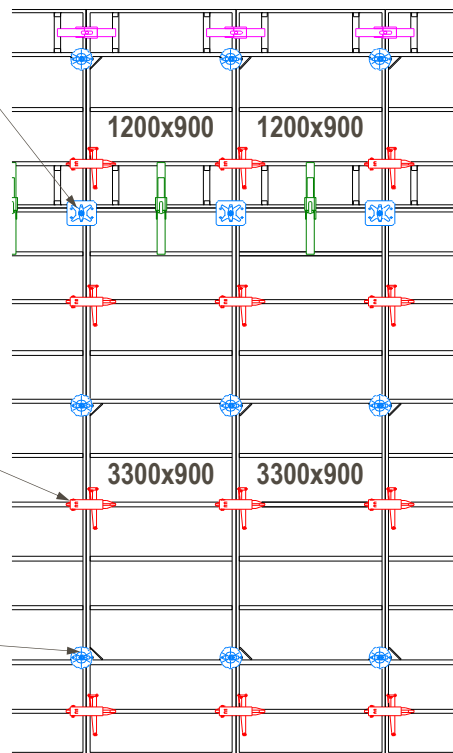


Stacked Minima Connections Using 3300mm High Base Panels...Continued

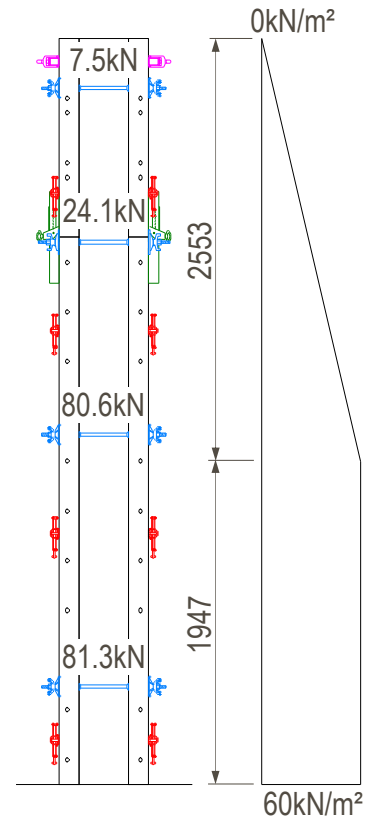
Note: Where tying at the intersection of 4 No. panels use Standard Walers Plates & Knock On Wing Nuts (BTX10021 + BTX10001) or Minima Waler Plate 220 (MMX10022).

Minima Wedge Clamp

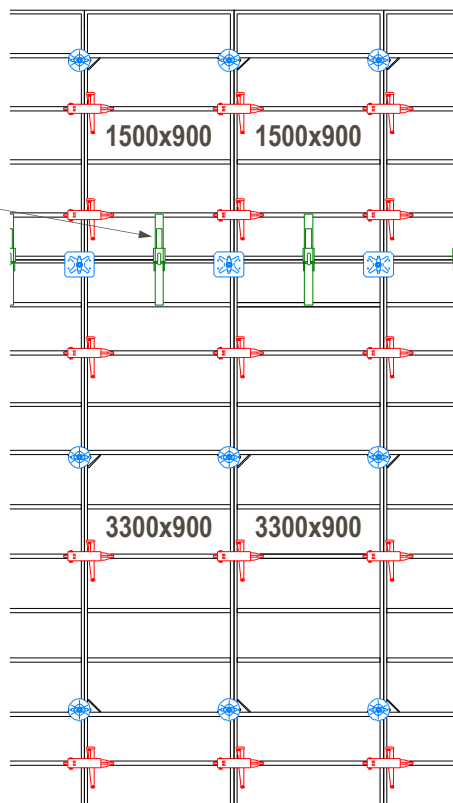
Maxima Tie Plate 15



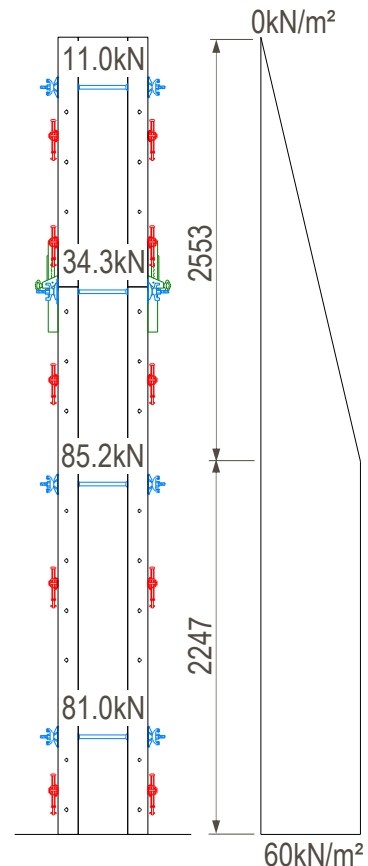
Stacked 1200mm Upright Panels



Minima Adjustable Clamp



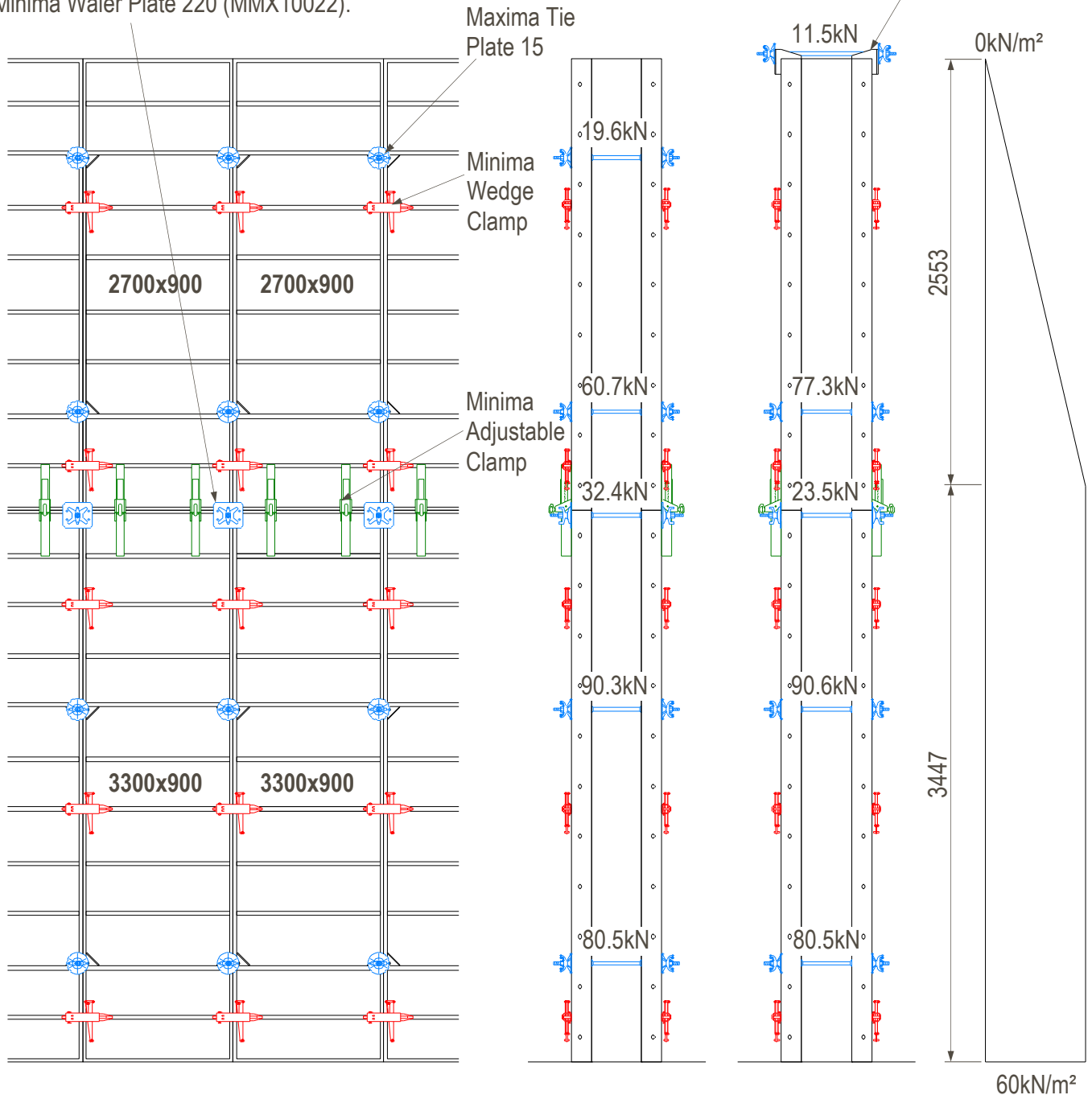
Stacked 1500mm Upright Panels



Stacked Minima Connections Using 3300mm High Base Panels...Continued

Note: Where tying at the intersection of 4 No. panels use Standard Walers Plates & Knock On Wing Nuts (BTX10021 + BTX10001) or Minima Waler Plate 220 (MMX10022).

Tie over the top of the panels using Minima Edge Tie Bearings

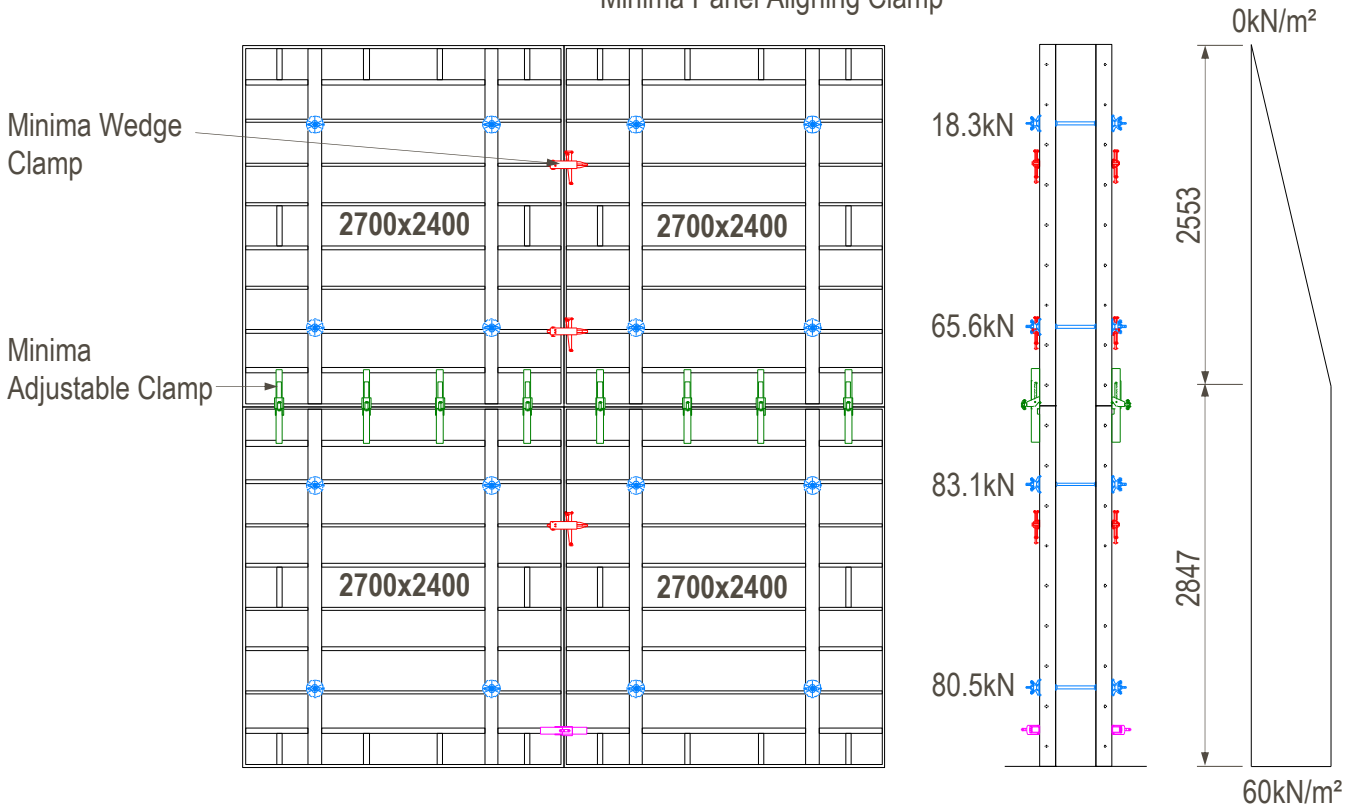
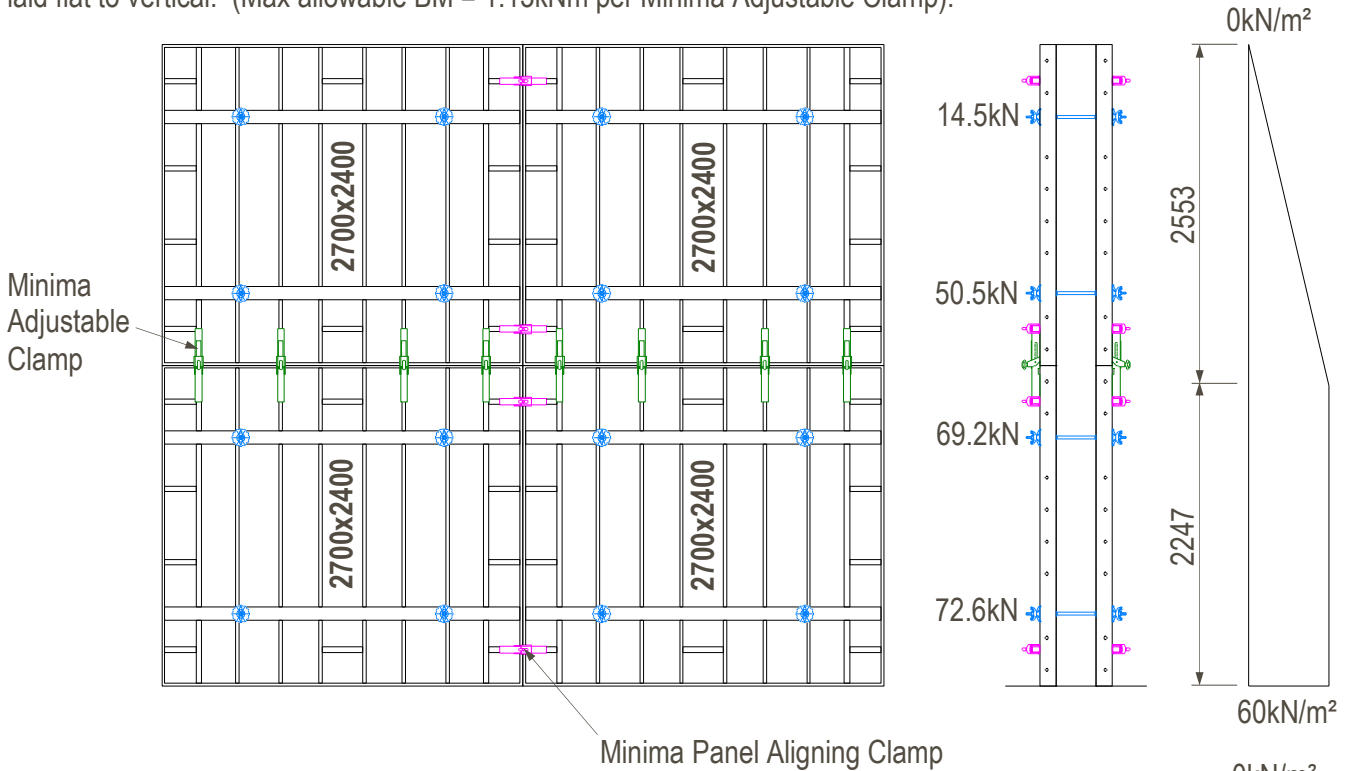


Additional measures are required to stiffen and strengthen the horizontal panel joints if gang forms are to be laid down form-face upwards - refer to sheet 77

Stacked Minima Connections Using 2700 x 2400mm Panels

The details below show the standard clamping positions for stacked 2700 x 2400mm panels and the tie loads per linear metre. To arrive at actual tie loads multiply these values by the influence width of the ties on plan.

Note: Additional vertically orientated clamps may be required across the horizontal joint if lifting shutters >5.4m from laid flat to vertical. (Max allowable BM = 1.13kNm per Minima Adjustable Clamp).



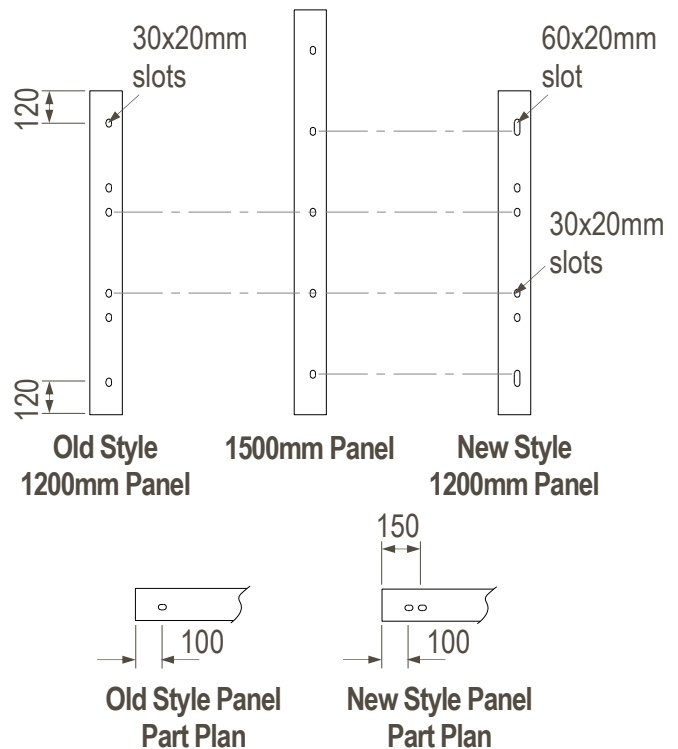
Minima Connections - Mixed Panel Heights

Care should be taken when mixing panel heights due to the potential mis-alignment of connecting holes and ribs.

Mis-alignment of Connecting Holes

If using Tension Bolts to connect 'old style' 1200mm high panels to 1500mm high panels or hinge corners only the two mid-position holes line up which may or may not be adequate for the design. If not suitable, newer panels with long slots must be specified for the application.

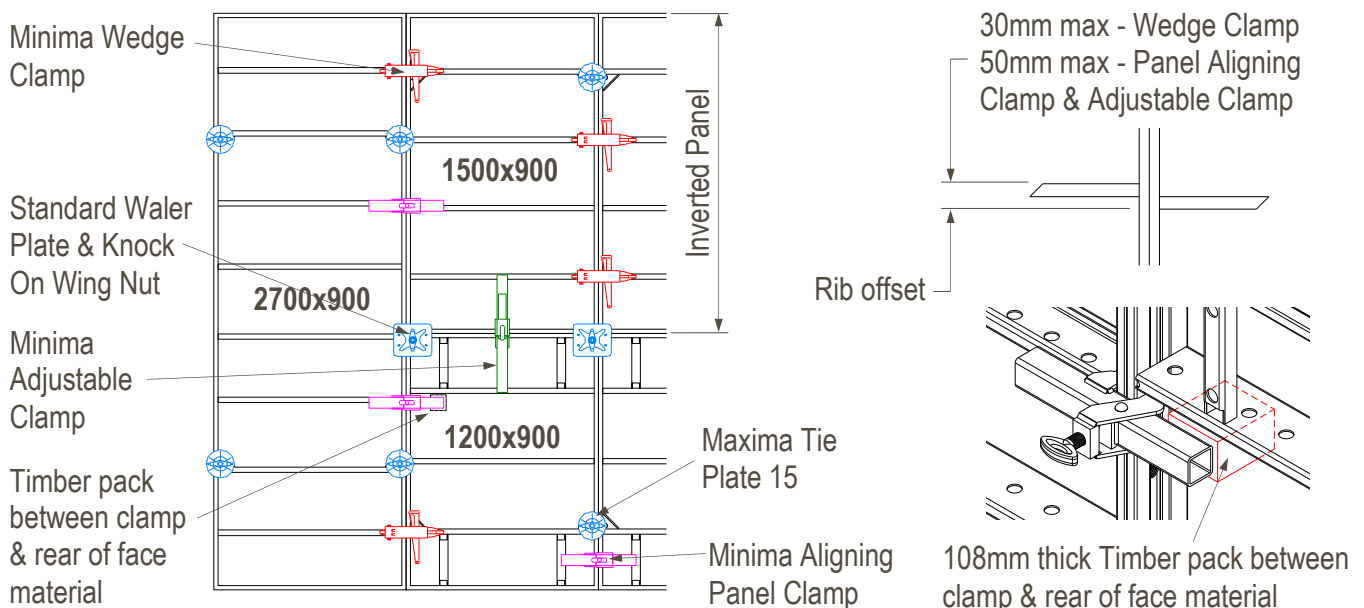
Likewise, on plan, care should be taken to ensure that hole positions are compatible. Some old style panels have single holes both sides whereas new style panels have twin holes.



Mis-alignment of Panel Ribs

When different height panels are clamped side by side, ribs may not line up, causing a 'rib offset'. Minima Wedge Clamps (MMX10028) are capable of clamping across ribs with a maximum 30mm offset. Minima Aligning Panel Clamps (MMX10003) and Minima Adjustable Clamps (MMX1002) are capable of clamping across ribs with a maximum 50mm offset. Where the ribs are offset by more than 50mm a timber pack can be used on one side of the clamp between the clamp body and the rear of the face material - see below right.

Note: As a rule of thumb, all panels should be restrained by four tie plates (with the exception of stacked laying 300mm high panels).



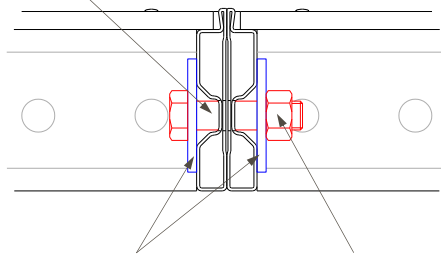
Alternative Arrangement to Clamping Using Bolted Joints

An economical alternative to clamping panel joints, this solution is ideal for large projects where Minima formwork is to be re-used for multiple pours with the same panel configuration.

Fix bolts at 600mm centres vertically. A minimum of two bolts should be used per vertical panel joint.

Note: Horizontal Joints can also be bolted but panels will require Alignment Rails and accessories to stiffen the horizontal joint if gang forms are to be raised / lowered from / to horizontal. A minimum of two bolts should be used per horizontal panel joint except for 300mm wide panels when a single bolt can be used.

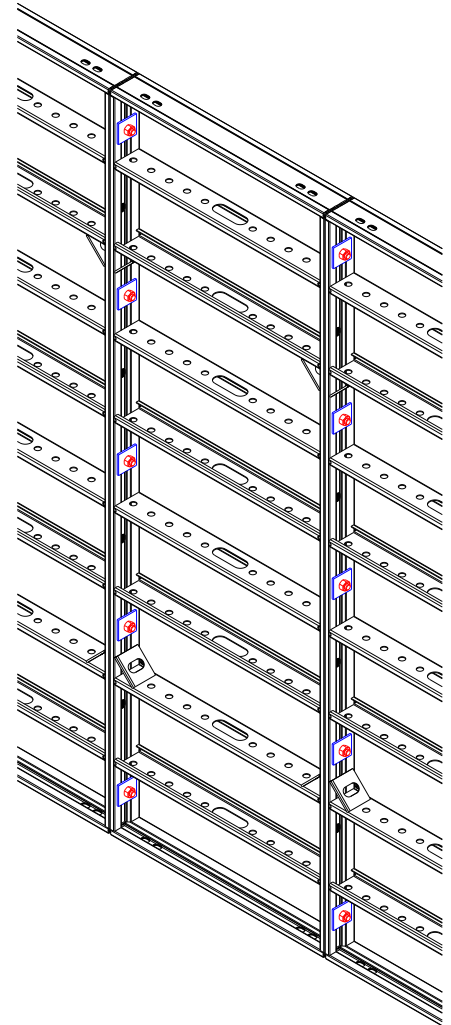
3/4" x 3" UNC Bolt gr.8.8 BZP
(MMX10045)



2 No. Washer - Plate
75x75x6xØ22 (BNX20018)

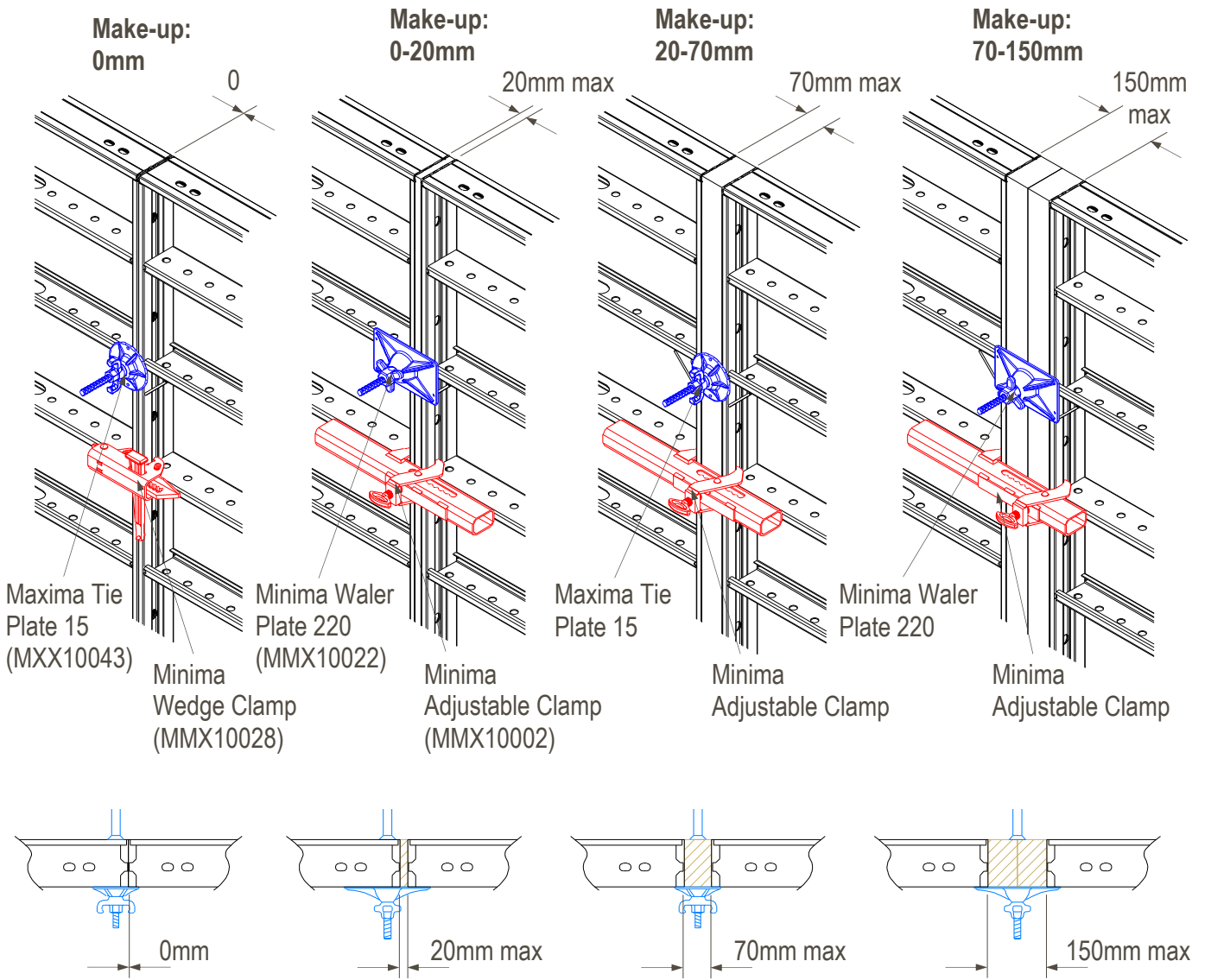
3/4" UNC Nut gr.8
BZP (MMX10046)

Plan on Typical Bolted Joint

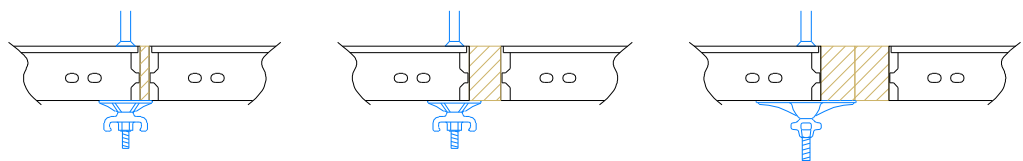


Minima Panel Infill Connections

Fine adjustment of formwork length is achieved by the use of timber infills placed between panel edge profiles in accordance with the clamping and tying rules below. For infills >150mm use the detail shown on sheet 32.



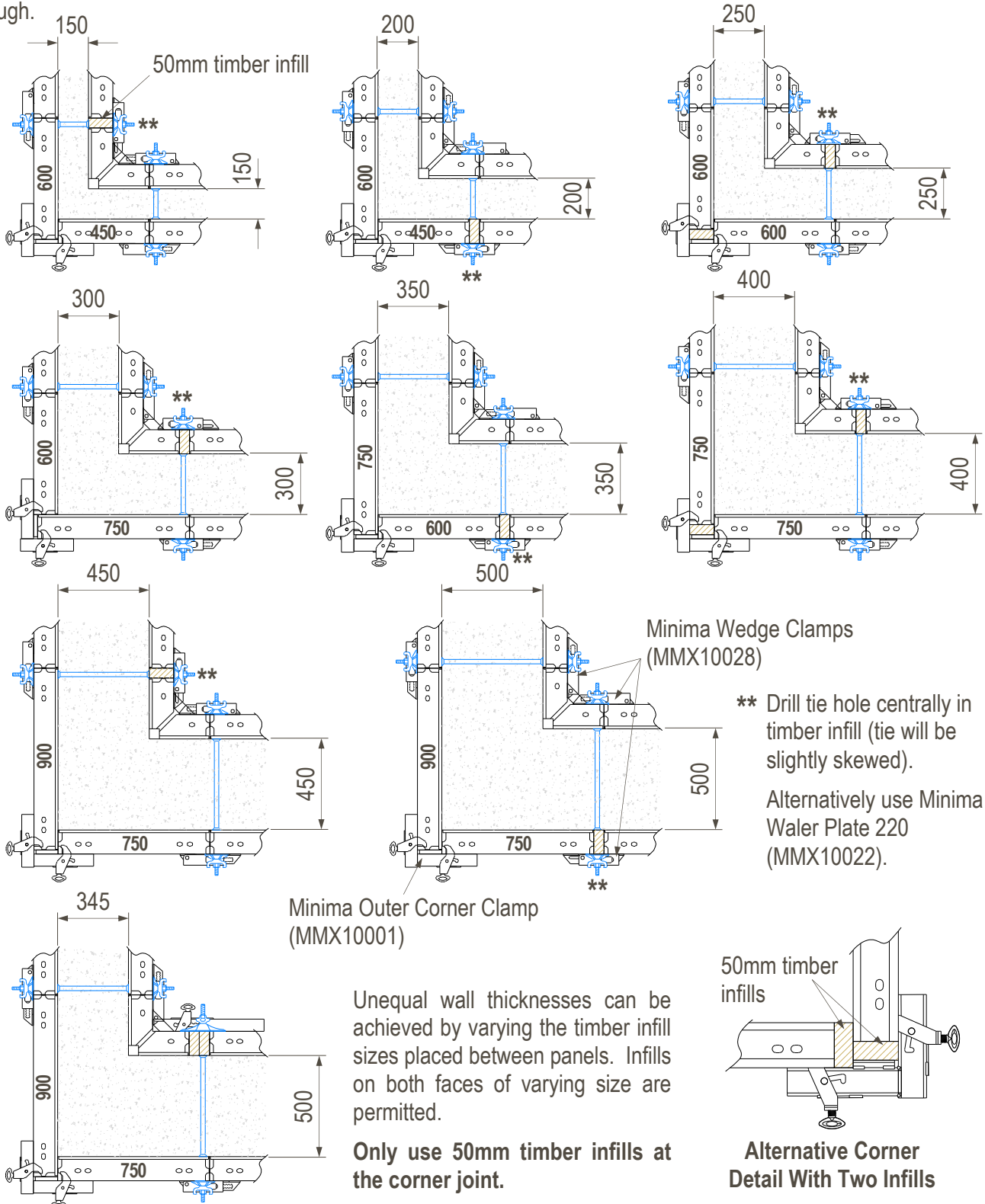
Part Plans Showing Infills With Correctly Fitted Tie Plates



Part Plans Showing Infills With Incorrectly Fitted Tie Plates

Minima Corner Arrangements

Corner arrangements can be made neatly in 50mm increments to form wall thicknesses between 150mm and 500mm. Some corners will require a 50mm infill within the Minima Outer Corner Clamp (MMX10001) or between the adjacent connecting panel. It is important that panel ends oppose one another where possible to allow for the tie holes to line through.




Clamping Joints at Outer Corners

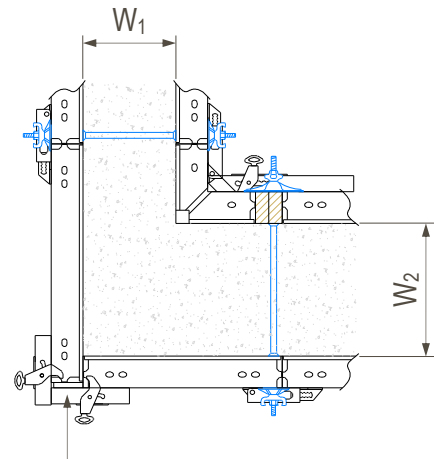
The maximum vertical spacing 'S' of the Minima Outer Corner Clamps is determined using the following formula:

$$S = \frac{16}{P(0.3+W)}$$

Where P is the concrete pressure in kN/m²
W is the width of the wall in metres

Note: Where the two adjoining wall widths vary use the maximum wall width.

 A Minima Outer Corner Clamp should be positioned at the lowest available rib in all instances.



Minima Outer Corner Clamp (MMX10001)

Clamping Joints Adjacent to Outer Corners

The forces generated at outer corners are transferred into the adjacent formwork. These forces are transmitted through the panel to the adjacent panel joints which may therefore need additional clamps. The maximum vertical spacing 'S' of the Minima Clamps at these adjacent joints is determined using the following formula:

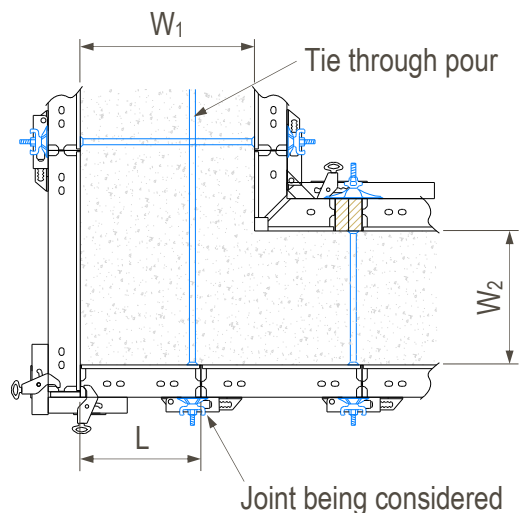
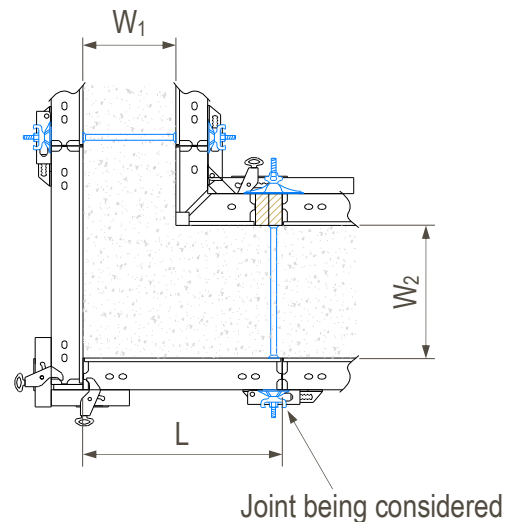
$$S = \frac{40}{P(2.5(W+0.3) - L)}$$

Where P is the concrete pressure in kN/m²
W is the width of the wall in metres
L is the distance from the corner in metres

Note: Placing wider panels nearer the outside corner will reduce the number of clamps required at each joint.

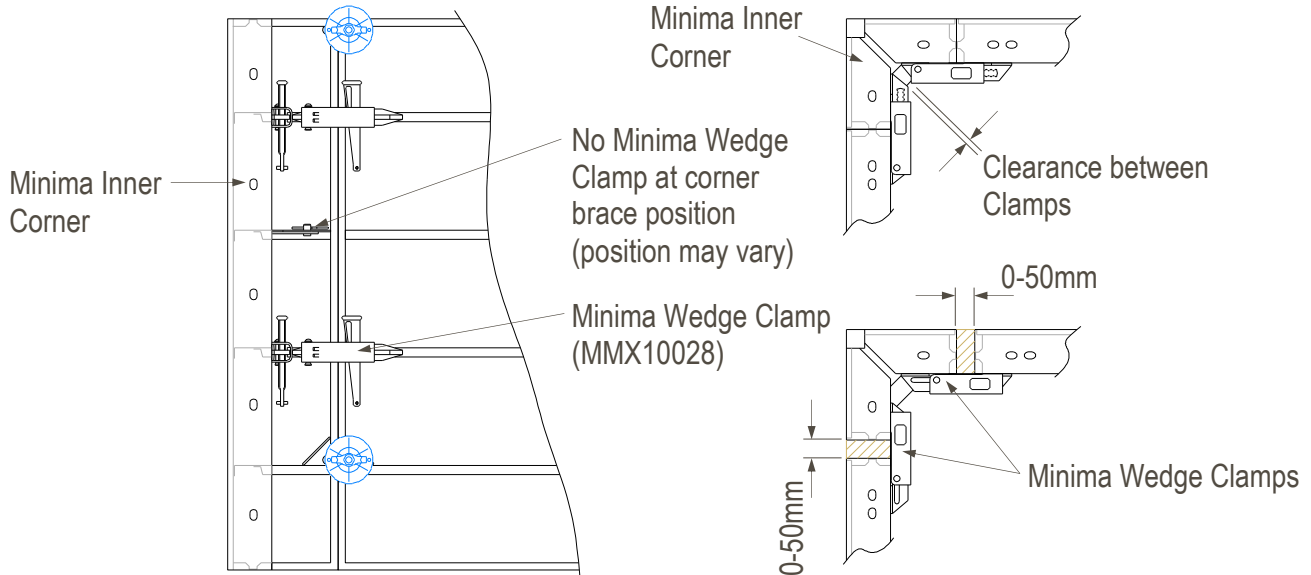
A minimum of two clamps should be used to connect the vertical joint between each pair of panels.

For walls where W₁ and / or W₂ are wider than 500mm thick an additional panel will need to be introduced with the joint restrained by a long tie through the pour.



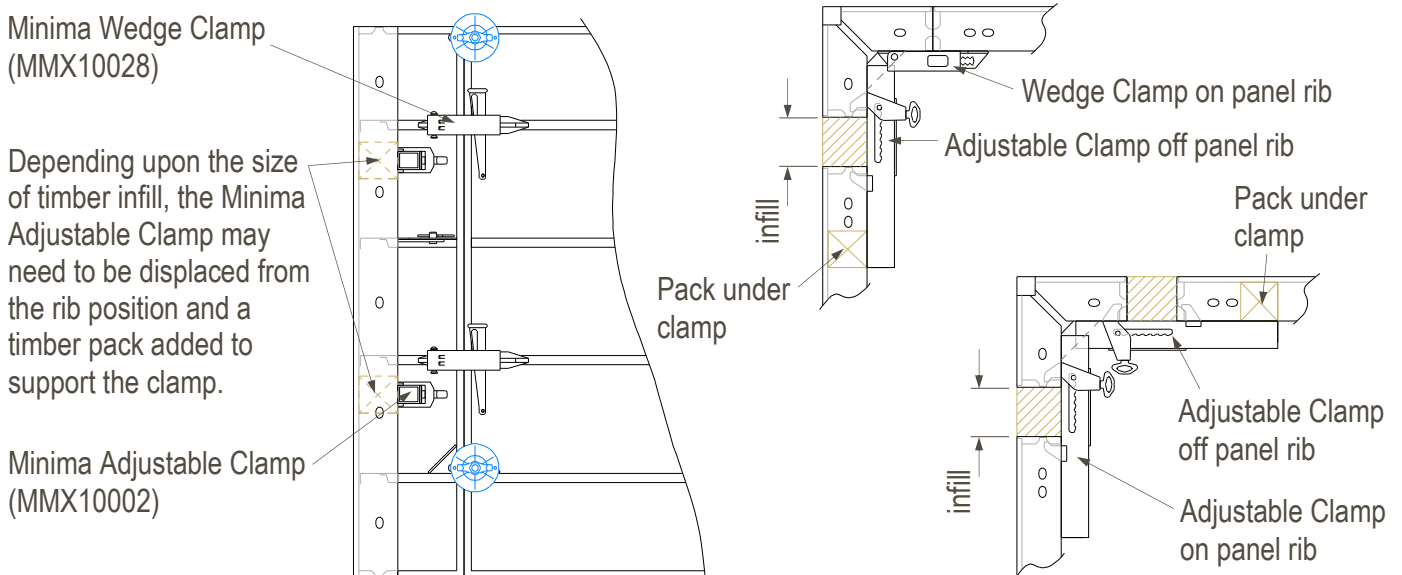
Clamping Joints at Inner Corners With Timber Infill of 0-50mm

Standard clamping arrangement.



Clamping Joints at Inner Corners With Timber Infill of 0-150mm

It is always preferable to fit both the Adjustable Clamps and Wedge Clamps on the panel ribs. However, depending upon the size of the timber infill(s) there may be insufficient room to accommodate both clamps on the ribs. In this situation, one clamp will need to be displaced from the rib position to clamp the panel joint. Where this occurs it is recommended that a timber pack is inserted between the clamp and the rear of the form face.



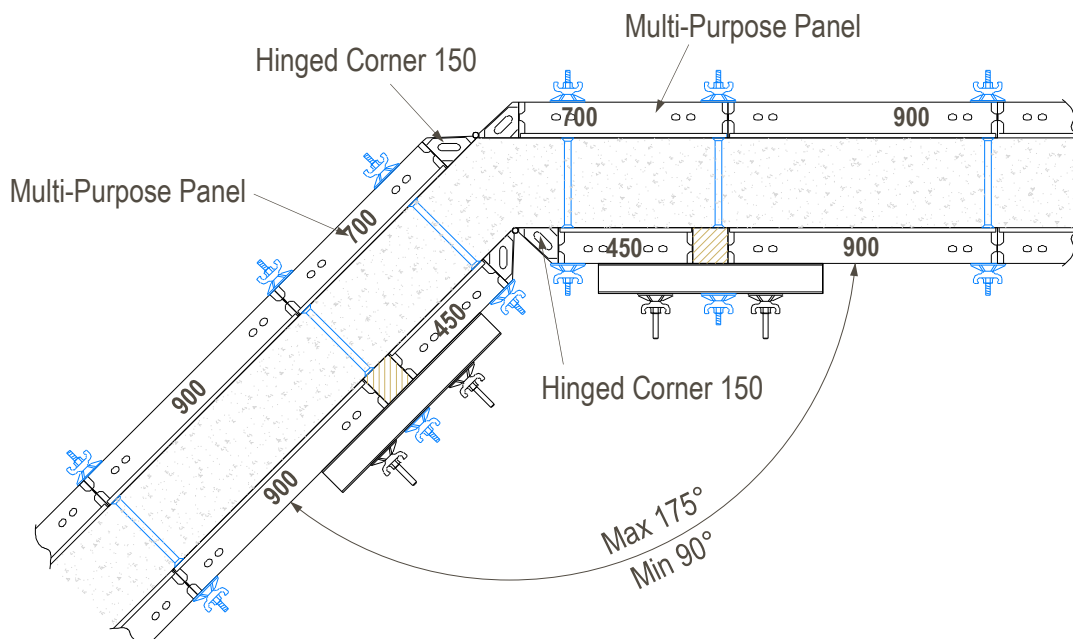
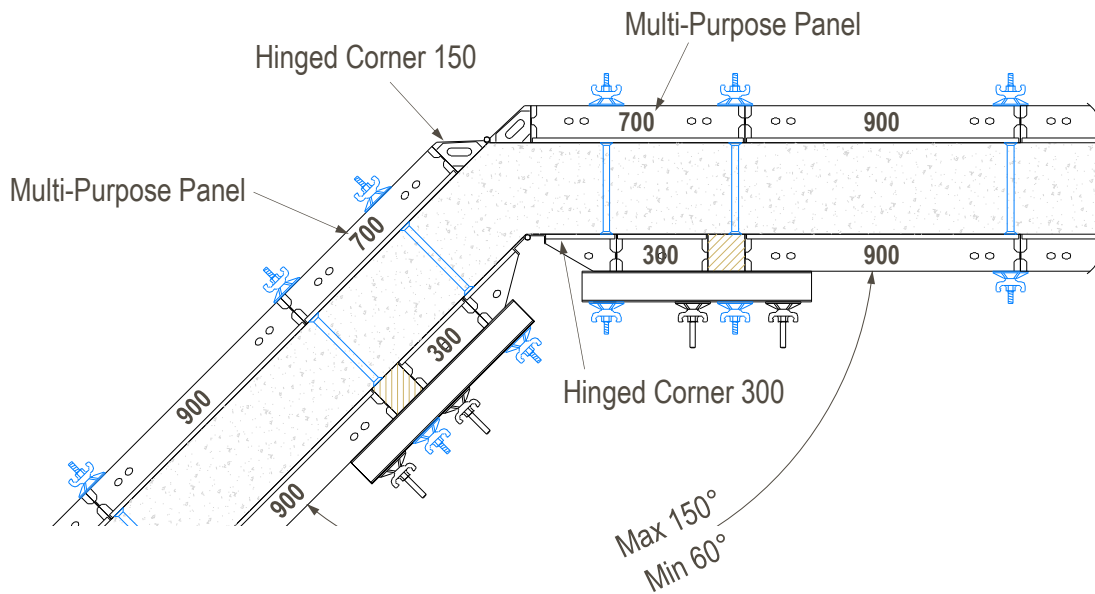
Note: Adjustable Clamps will not fit at rib positions where the timber infill is between 50mm and 100mm.

Obtuse and Acute Angled Corners Using Hinged Corner Panels

Using Hinged Corners 150 and 300 it is possible to form non-right angled corners.

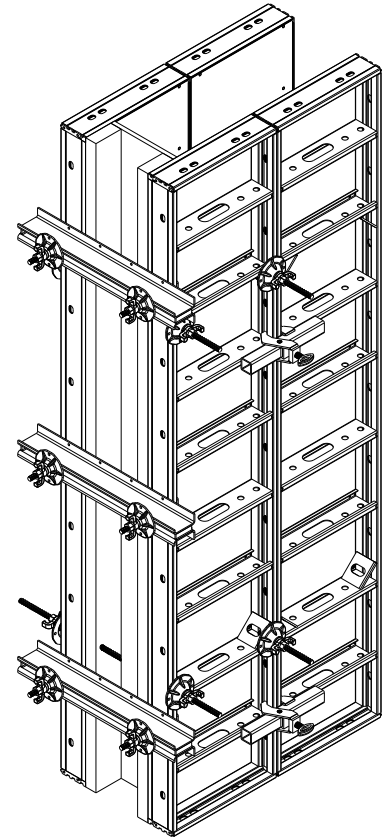
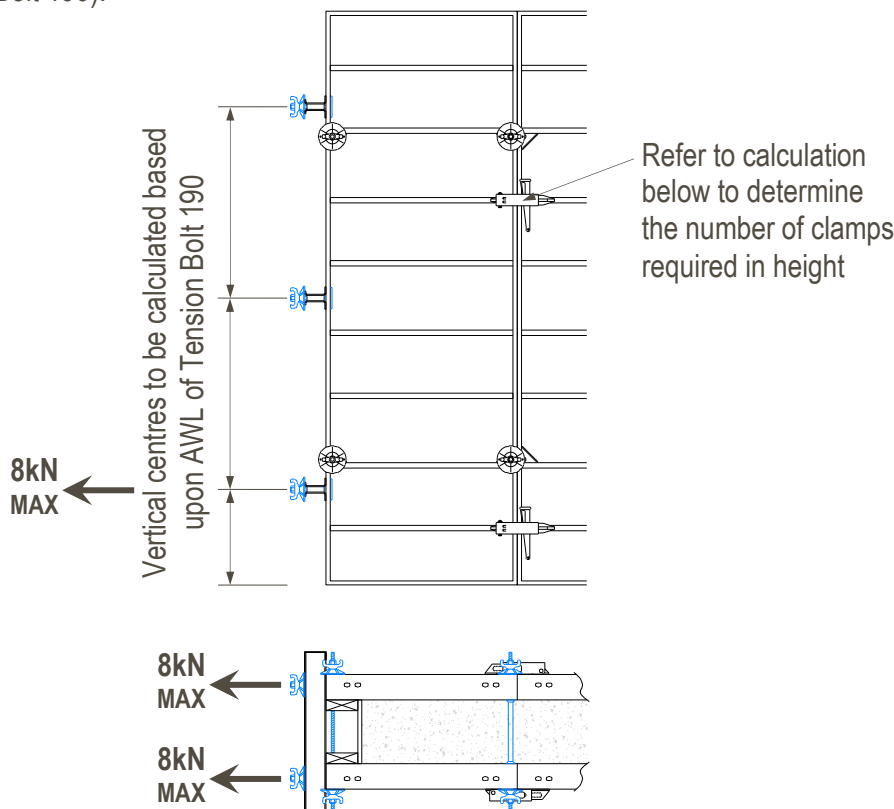
A Hinged Corner 300 can only be used as an internal corner. Standard Minima Clamps are used to connect it to adjacent panels.

A Hinged Corner 150 can be used as an internal or an external corner and is connected to adjacent panels using Minima Tension Bolts 190 (MMX10012) with Minima Centering Nuts (MMX10013) or 100x100x6xØ22mm Plate Washers and Rapid Tie Hexagon Nuts 50mm (BNU16009 + BTX10017).



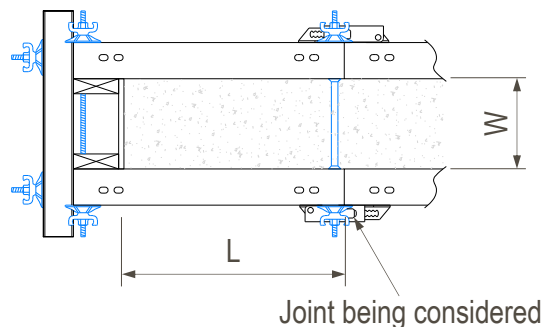
Stop-Ends

Holes in the ends of the Minima panels facilitate the connection of stop-end formwork using Tension Bolts and Maxima Tie Plates (or Rapid Tie Bar, 100x100x6xØ22mm Plate Washer and Rapid Tie Hexagon Nut 50mm in lieu of Tension Bolt 190).



Clamping Joints Adjacent to Stop-Ends

The forces generated at stop-ends are transferred into the adjacent formwork. These forces are transmitted through the panel to the adjacent panel joints which may therefore need additional clamps. The maximum vertical spacing 'S' of the Minima Clamps at these adjacent joints should be determined using the following formula:



$$S = \frac{40}{P(2.5W - L)}$$

When $L > 2.5W$ negative values indicate that sufficient friction is provided such that the minimum number of clamps can be used per panel joint.

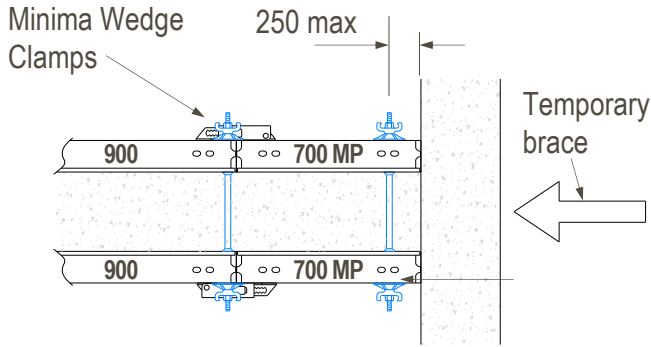
Where P is the concrete pressure in kN/m^2
 W is the width of the wall in metres
 L is the distance from the corner in metres

Note: Placing wider panels nearer the stop-end will reduce the number of clamps required at each joint.

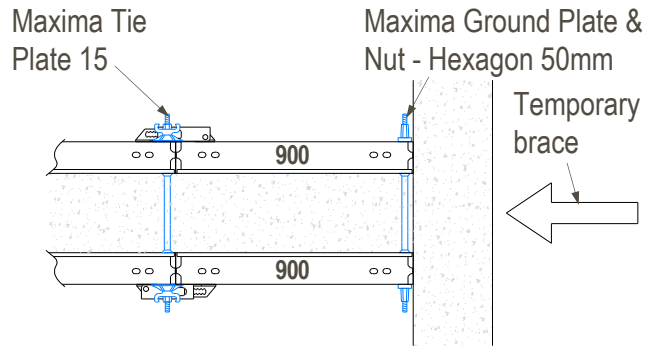
A minimum of 2 No. clamps should be used to connect the vertical joint between each pair of panels - refer to sheets 46-58 for standard clamping positions.

Abutting Existing Walls

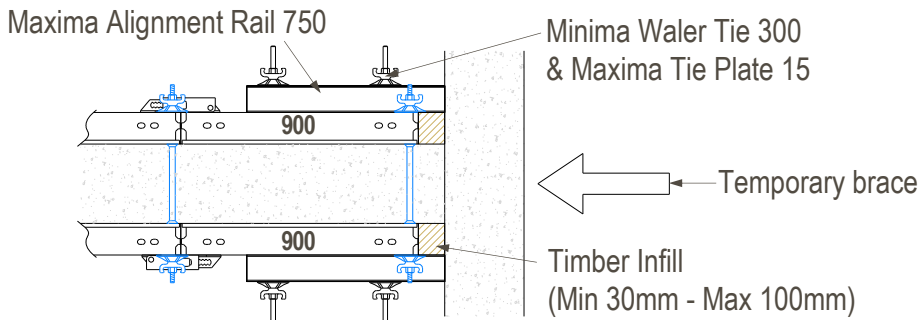
The details below show various arrangements for abutting existing walls using either Standard or Multi-Purpose Minima Panels. A temporary brace may be required to shore the rear of the existing wall.



Option 1 - Using Multi-Purpose Panels



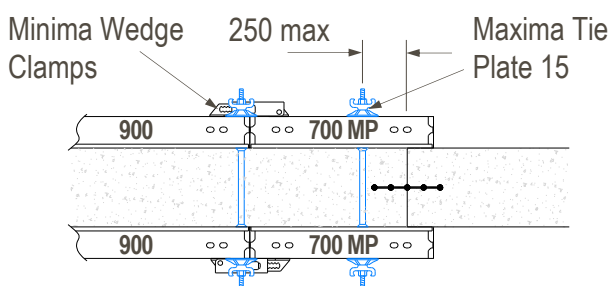
Option 2 - Using Standard Panels



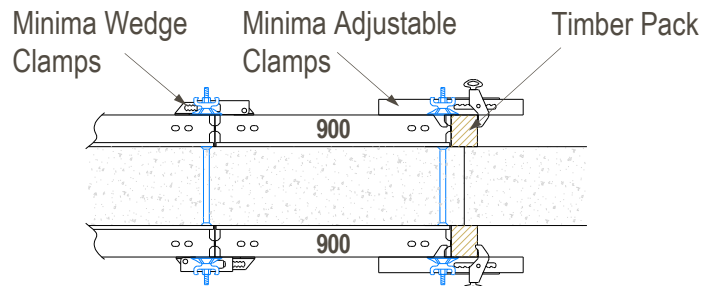
Option 3 - Using Standard Panels

Lapping Onto Existing Walls

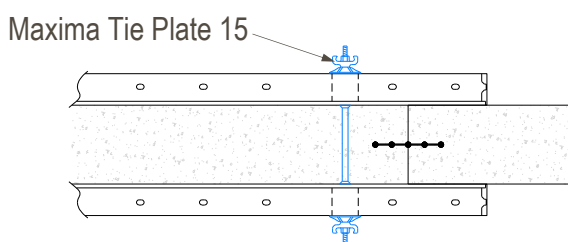
The details below show various arrangements for lapping onto existing walls using either Standard or Multi-Purpose Minima Panels.



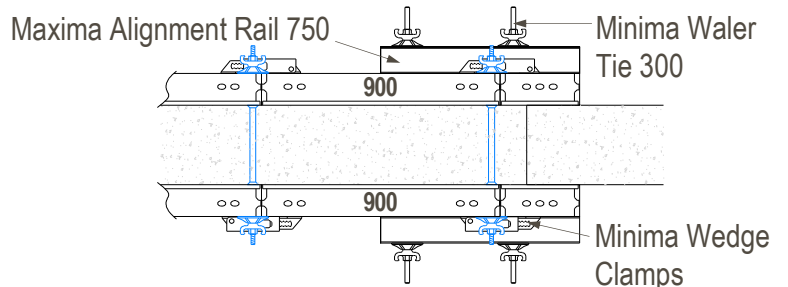
Option 1 - Using Multi-Purpose Panels



Option 2 - Using Standard Panels



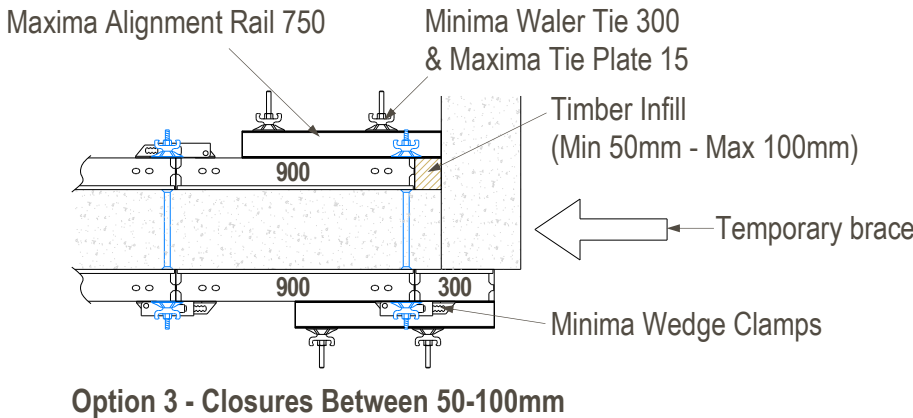
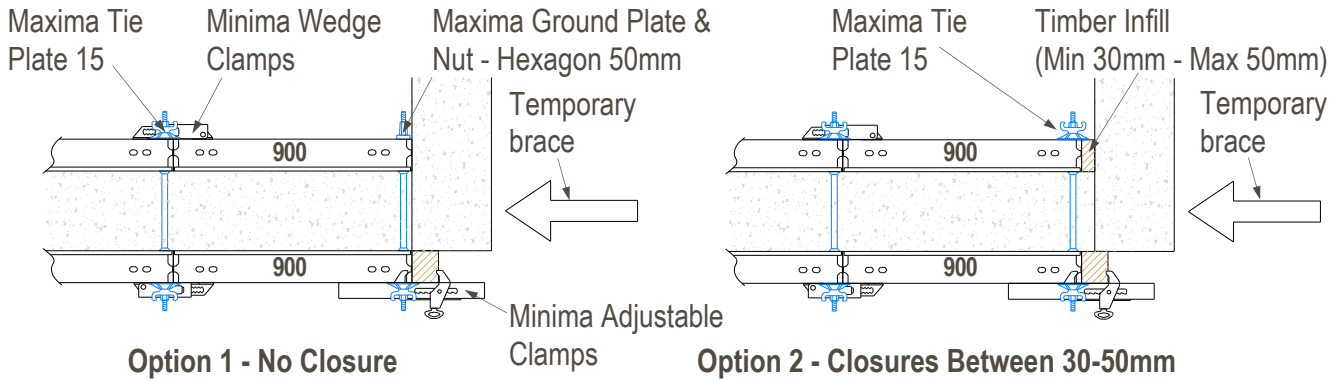
Option 3 - Using 2700x2400mm Standard Panels



Option 4 - 300mm Wide Panels

Abutting Existing Walls at Corners

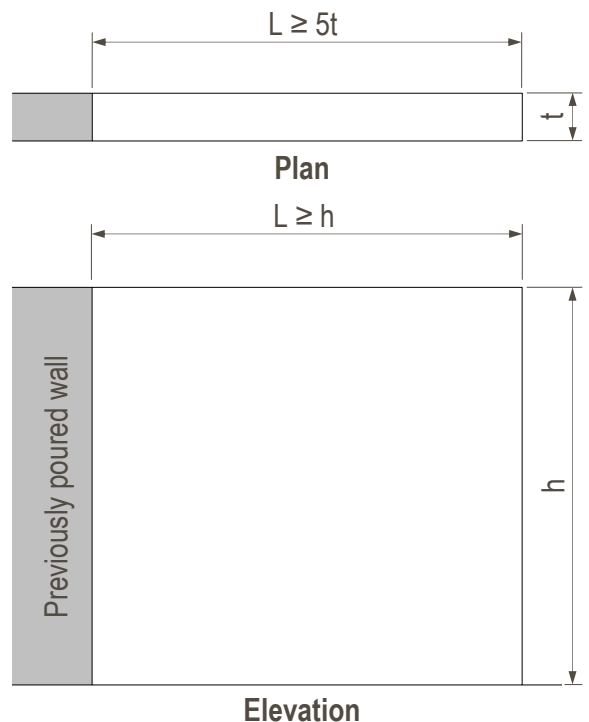
The details below show various arrangements for forming corners at the ends of existing walls using Standard Minima Panels. **Note:** A temporary brace may be required to shore the rear of the existing wall.



Global Stability of Butted or Lapped Formwork

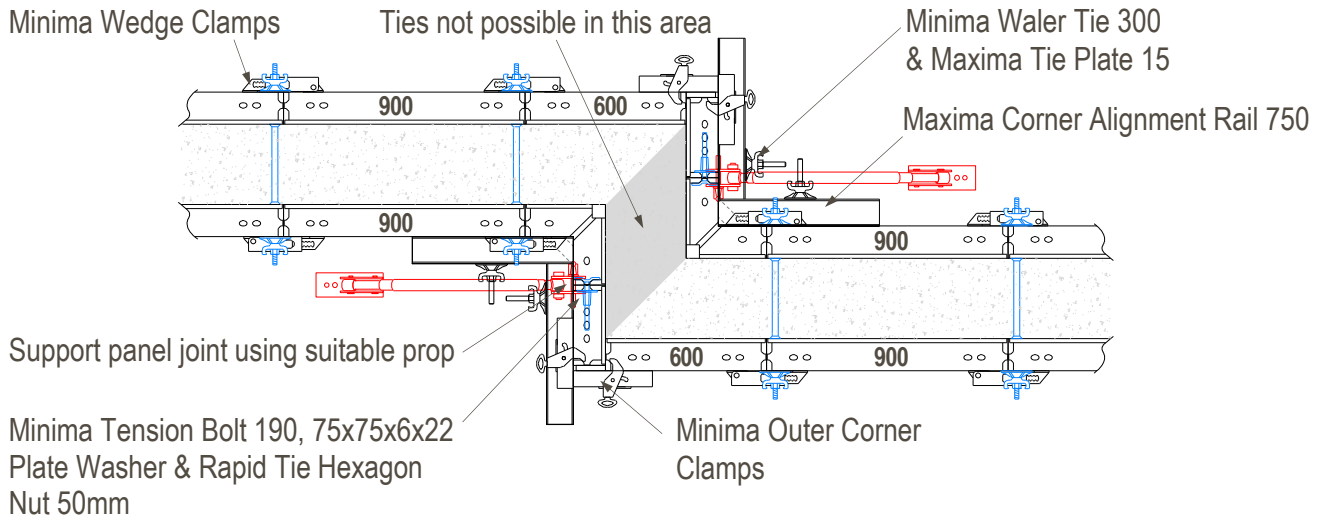
When abutting or lapping onto previously poured walls, the minimum conditions that need to be satisfied such that no horizontal restraint is required to wall formwork carrying a single stop end are shown right. Where these two conditions cannot be met, the formwork should be tied back to the existing wall with a suitable connection or the stop-end propped accordingly.

Examples of methods for abutting and lapping onto previous pours are shown on sheets 66-67.



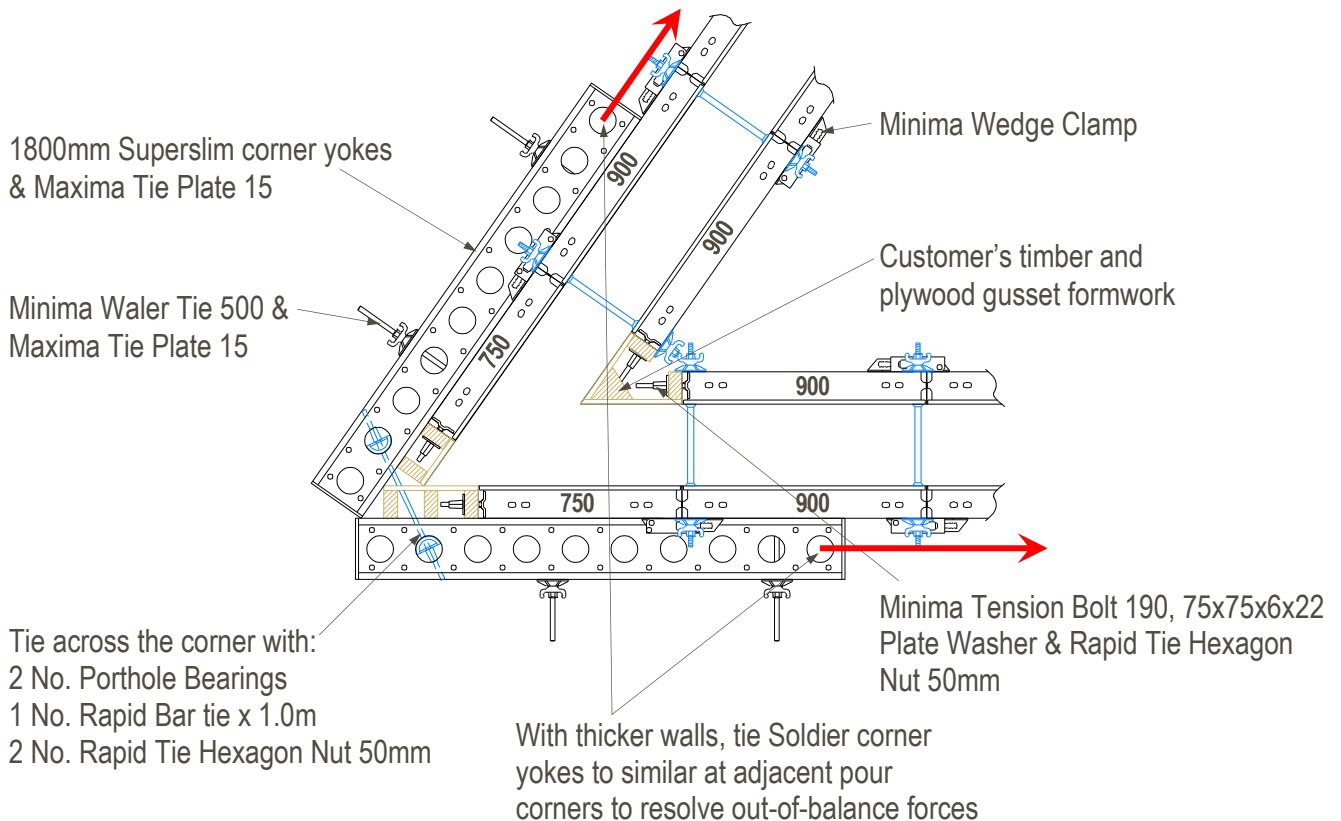
Stepped Corners

The detail below shows a solution for forming stepped corners where it is not possible to place a tie due to the length of the return.



Acute External Corners Where Hinged Corners Will Not Fit

Provide Superslim corner yokes at the same vertical centres as Minima Outer Corner Clamps in right angle corners.

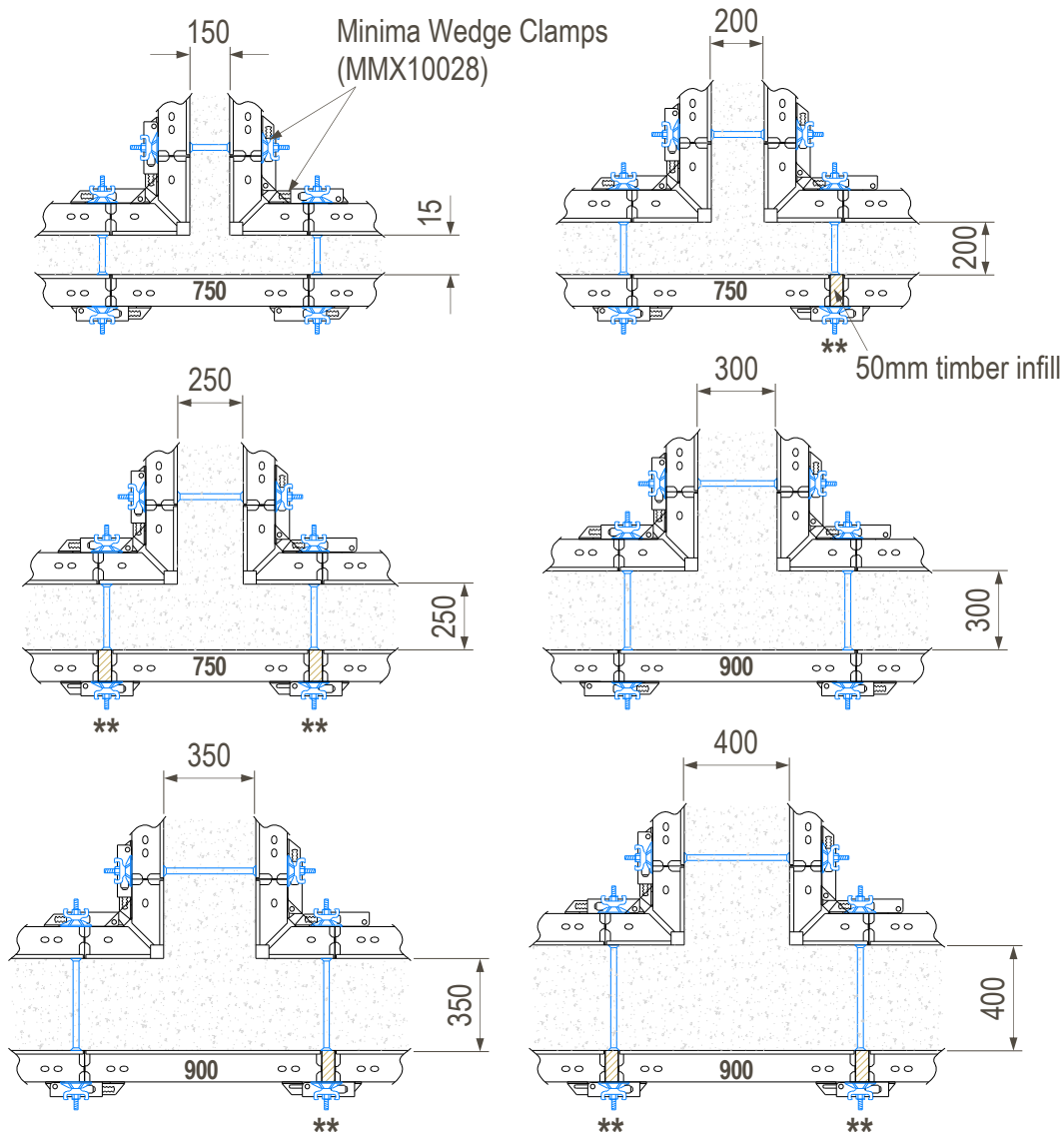


Minima T-Junction Arrangements

T-Junctions can be made neatly in 50mm increments to form wall thicknesses between 150mm and 400mm. Different wall thicknesses can be achieved by varying the timber infill sizes placed between panels. Infills on both faces of varying size are permitted. It is important that panel ends oppose one another where possible to allow for the tie holes to line through.

** Drill tie hole centrally in timber infill (tie will be slightly skewed).

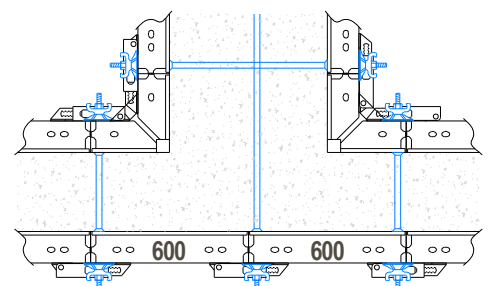
Alternatively use Minima Water Plate 220 (MMX10022).



T-Junctions for thicker walls can be accommodated by adding an additional panel with the joint restrained by long ties through the pour to the stop-end of the T-wall.

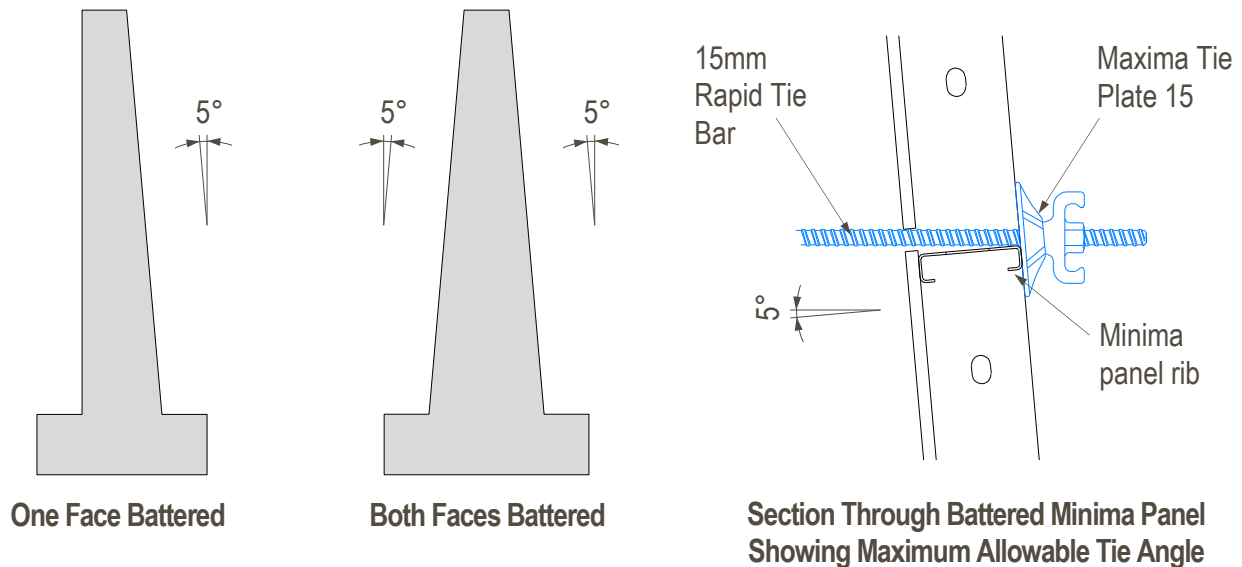


Do not use laying panels opposite the T to gain the additional formwork width unless these long ties are used.



Battered Formwork

Maximum batter angles without tying down Minima panels are shown below. The maximum achievable angle for tying through battered Minima panels before the Rapid Tie Bar clashes with the panel rib is also 5°.

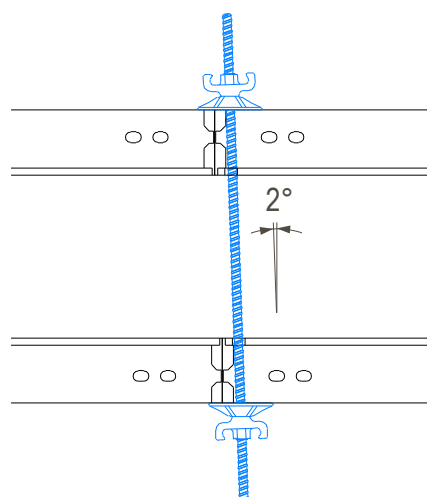


Section Through Battered Minima Panel Showing Maximum Allowable Tie Angle

Note: 2700x2400mm Minima Panels have a maximum achievable tie angle of 8° (Angles specified above do not apply to laying panels)

Skewed Ties on Plan

The maximum achievable angle for tying through Minima panels whose tie holes do not oppose one another is 2°.



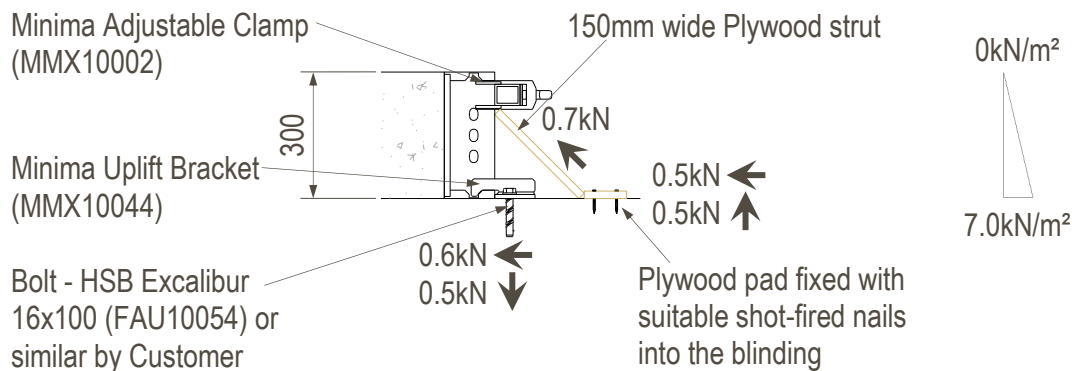
Plan on Misaligned Minima Panels Showing Maximum Allowable Tie Angle

Minima Single Sided Formwork - Standard Solutions for Laying Panels

The details below show the standard propping arrangements for Minima panels in single sided formwork applications and the prop & base restraint reactions per linear metre. To arrive at actual reactions multiply these values by the influence width of the props and / or base restraints on plan. **Note:** Density of concrete has been taken as 23.5kN/m^3 .

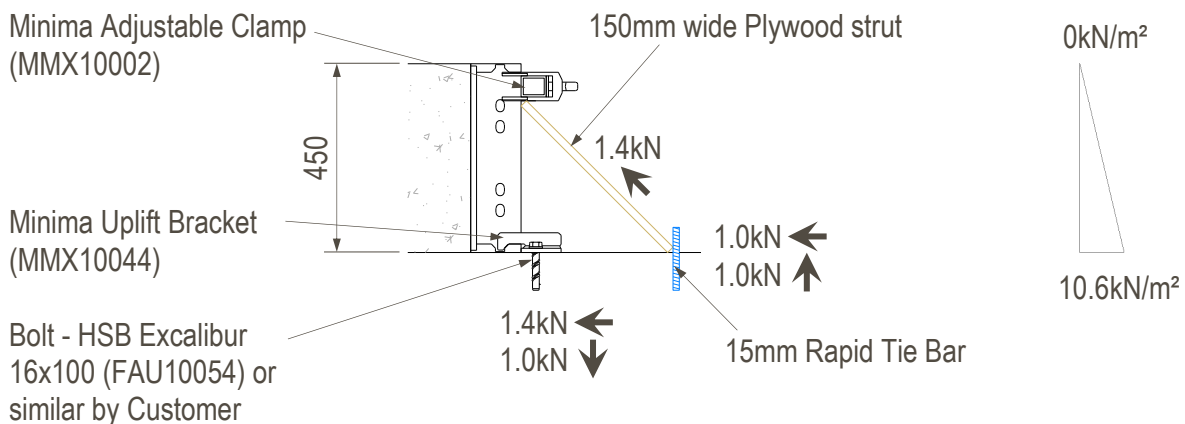
Laying 300mm Panels

Place a single Minima Adjustable Clamp right at the top of the vertical joint between panels and wedge a 150mm wide x 280mm long plywood strut at an angle of 45 degrees underneath it, bearing against the vertical panel edge sections. The bottom of the ply strut should bear against a plywood pad fixed with suitable shot-fired nails into the blinding. For all panel lengths up to 3300mm, use a Minima Uplift Bracket with a suitable fixing to restrain the base of the shutters positioned at the vertical joint between panels only.



Laying 450mm Panels

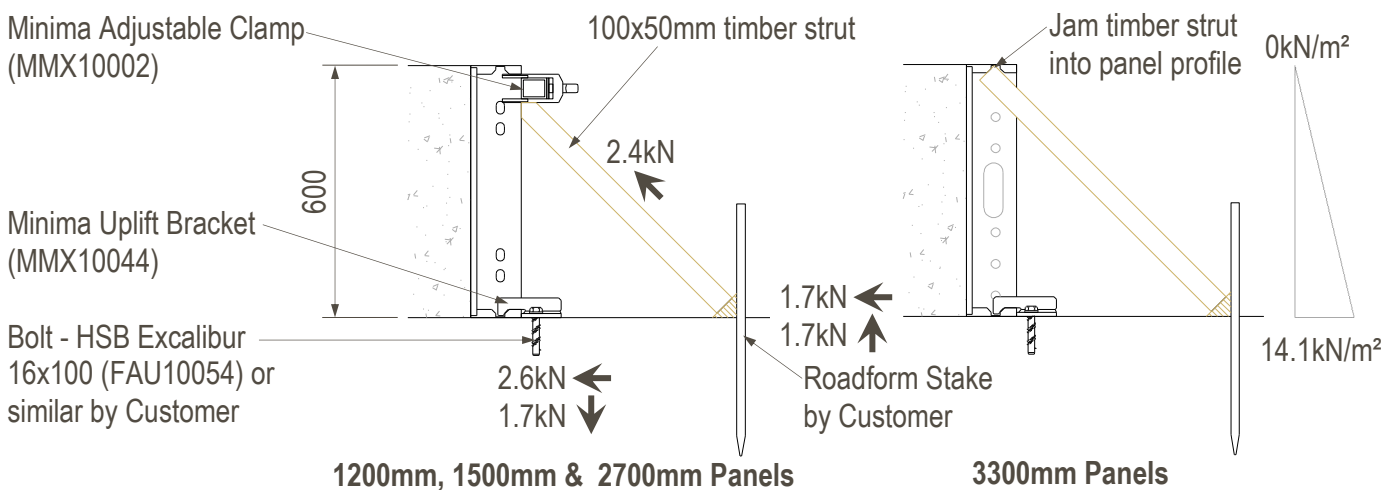
Place a single Minima Adjustable Clamp right at the top of the vertical joint between panels and wedge a 150mm wide x 495mm long plywood strut at an angle of 45 degrees underneath it, bearing against the vertical edge sections. The bottom of the ply strut should bear against a short section of 15mm Rapid Tie Bar in an 18mm diameter drilled hole in the blinding. For all panel lengths up to 2700mm, use a Minima Uplift Bracket with a suitable fixing to restrain the base of the shutters positioned at the vertical joint between panels only. For 3300mm panels, two Minima Uplift Brackets per panel are required, positioned 650mm from the panel ends.



Minima Single Sided Formwork - Standard Solutions for Laying Panels....Continued

Laying 600mm Panels

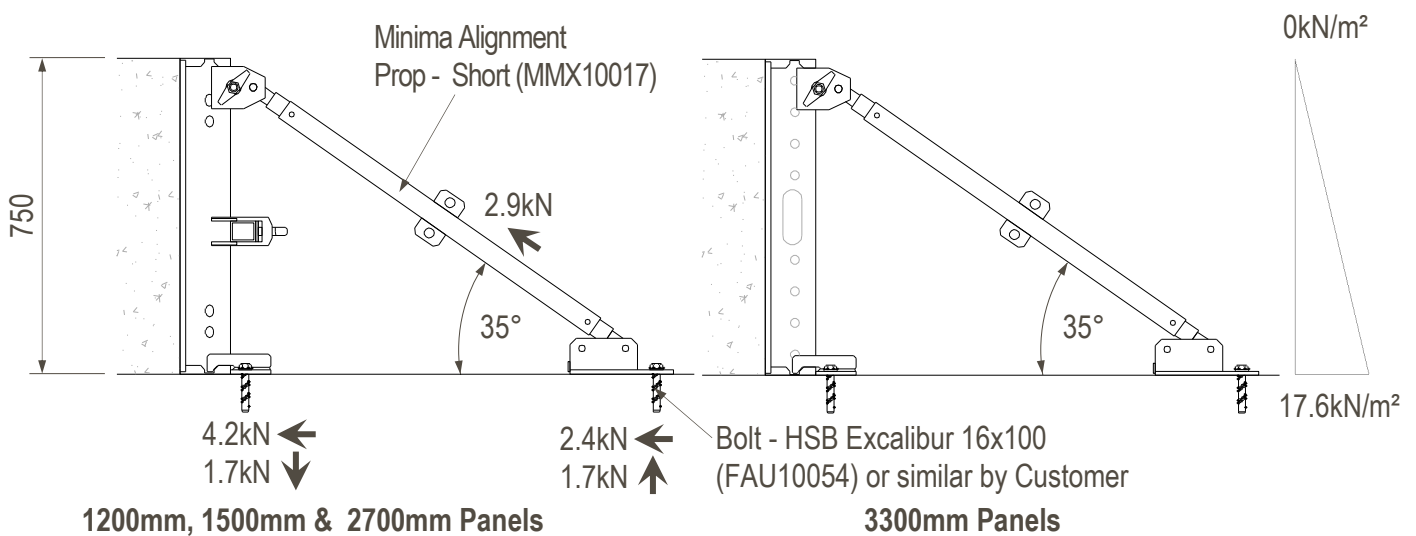
Connect all panels together at the vertical joint using a single Minima Adjustable Clamp placed as high as possible. For 1200mm & 1500mm panel lengths, wedge 100x50mm timber struts at an angle of 45 degrees under them cutting the top end of the struts so that they bear on the vertical edge sections and the underside of the clamp. The bottom of the timber strut should bear against a wedge of timber restrained by a Roadform Stake driven through pre-drilled holes in the blinding. Use a Minima Uplift Bracket with a suitable fixing to restrain the base of the shutters positioned at the vertical joint between panels only. For 2700mm panels, two Minima Uplift Brackets per panel are required 650mm from the panel ends (with a single timber strut remaining at the panel joint). For 3300mm panels, both the Uplift Brackets and the timber struts should be positioned 650mm from the panel ends. The timber struts in these cases should be cut with the ends square and jammed into the shaped groove on the inside of the Minima panel edge profile.



Minima Single Sided Formwork - Standard Solutions for Laying Panels....Continued

Laying 750mm Panels

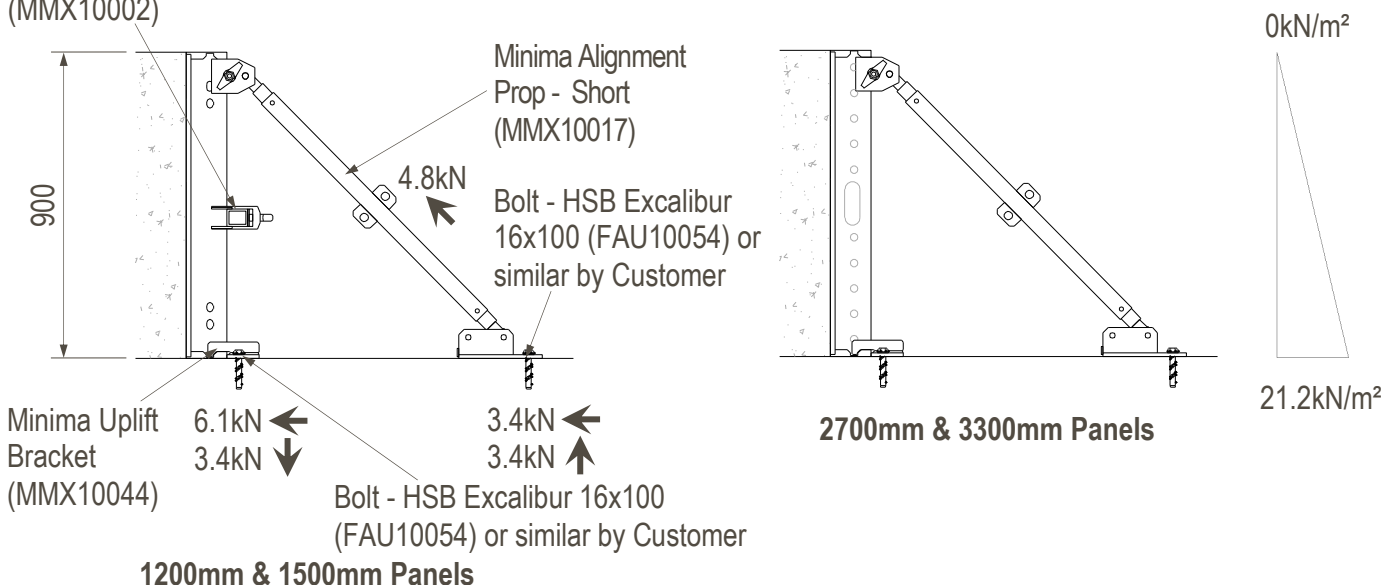
Connect all panels together at the vertical joint using a single Minima Adjustable Clamp. For 1200mm & 1500mm panel lengths, use a Short Alignment Prop to restrain the top of the shutter (jammed up against the edge profile) and a Minima Uplift Bracket to restrain the base of the shutter, both with suitable fixings positioned at the vertical joint between panels only. For 2700mm panels, two Minima Uplift Brackets per panel are required at the second vertical rib position - approx. 550mm from the panel ends (with a single Short Alignment Prop remaining at the panel joint). For 3300mm panels, both the Uplift Brackets and the Alignment Props should be positioned 550mm from the panel ends.



Laying 900mm Panels

The rules for laying 900mm panels are as per laying 750mm panels shown above except for both 2700mm and 3300mm panels, both the Uplift Brackets and the Alignment Props should be positioned 550mm from the panel ends.

Minima Adjustable Clamp (MMX10002)

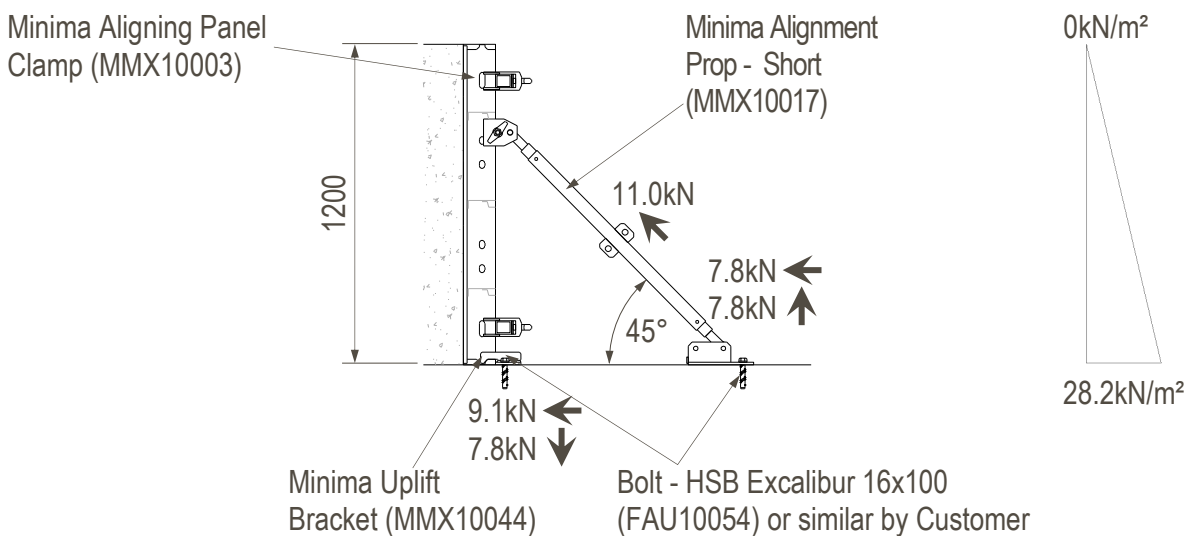


Minima Single Sided Formwork - Standard Solutions

The details below show the standard propping arrangements for Minima panels in single sided formwork applications and the reactions per linear metre. To arrive at actual reactions multiply these values by the influence width of the supports on plan. **Note:** Density of concrete taken as 23.5kN/m³.

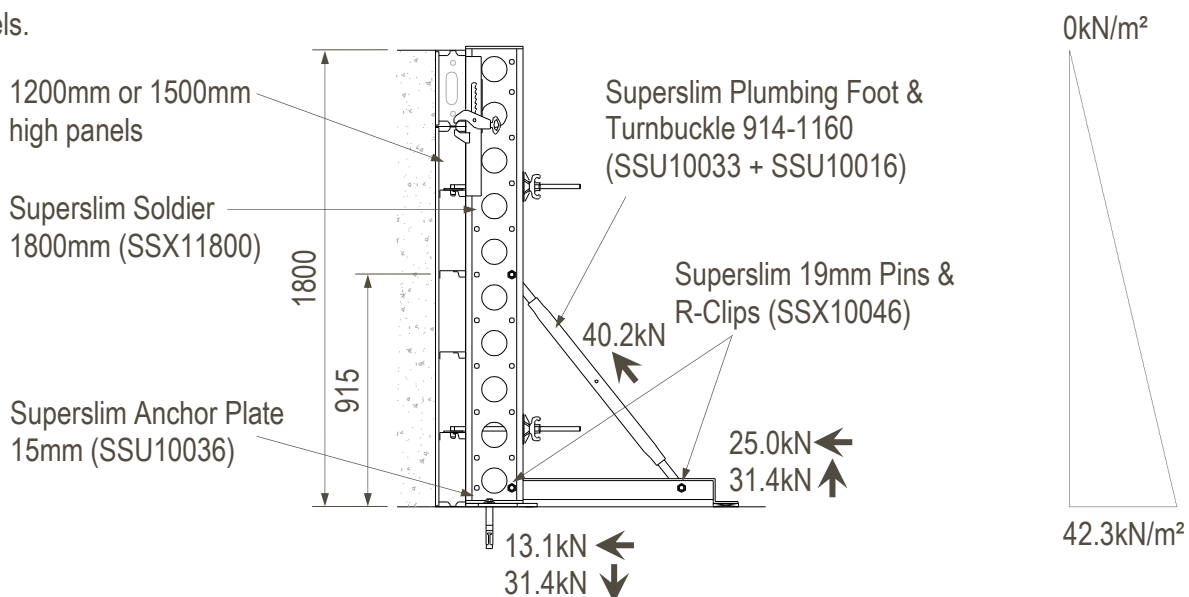
1200mm High Formwork

For all panel widths, use a Short Alignment Prop and Minima Uplift Bracket with suitable fixings to restrain the shutters at each vertical joint between panels. **Note:** The clamping plate of the Short Alignment Prop must be jammed up against the underside of the top panel rib - in this case the allowable load in the prop can be increased to 11kN.



1500mm & 1800mm High Formwork

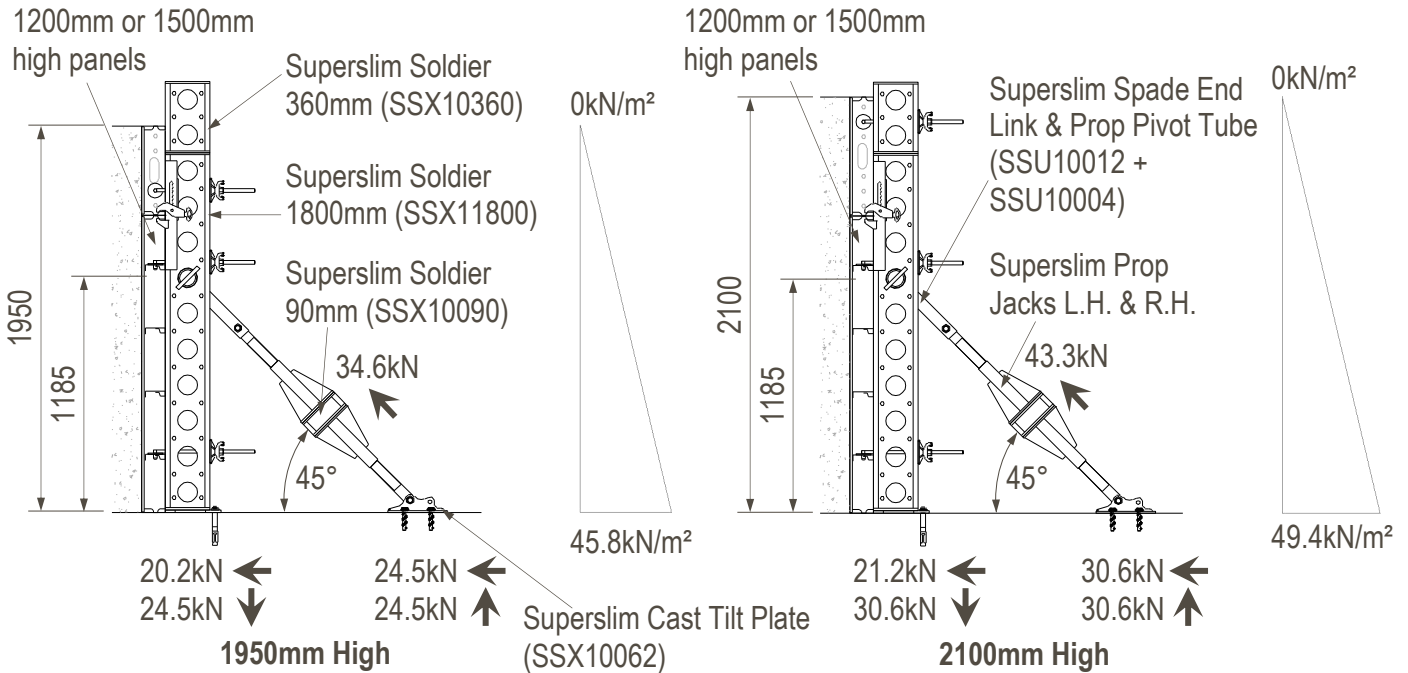
When using upright panels at the base of the shutter, for all panel widths use a vertical Superslim Soldier connected centrally (where possible) with Anchor Plate, Plumbing Foot and Turnbuckle secured to an adequate foundation with suitable fixings to restrain the shutters - refer to sheet 77 for possible connections of Superslim Soldiers to Minima Panels.



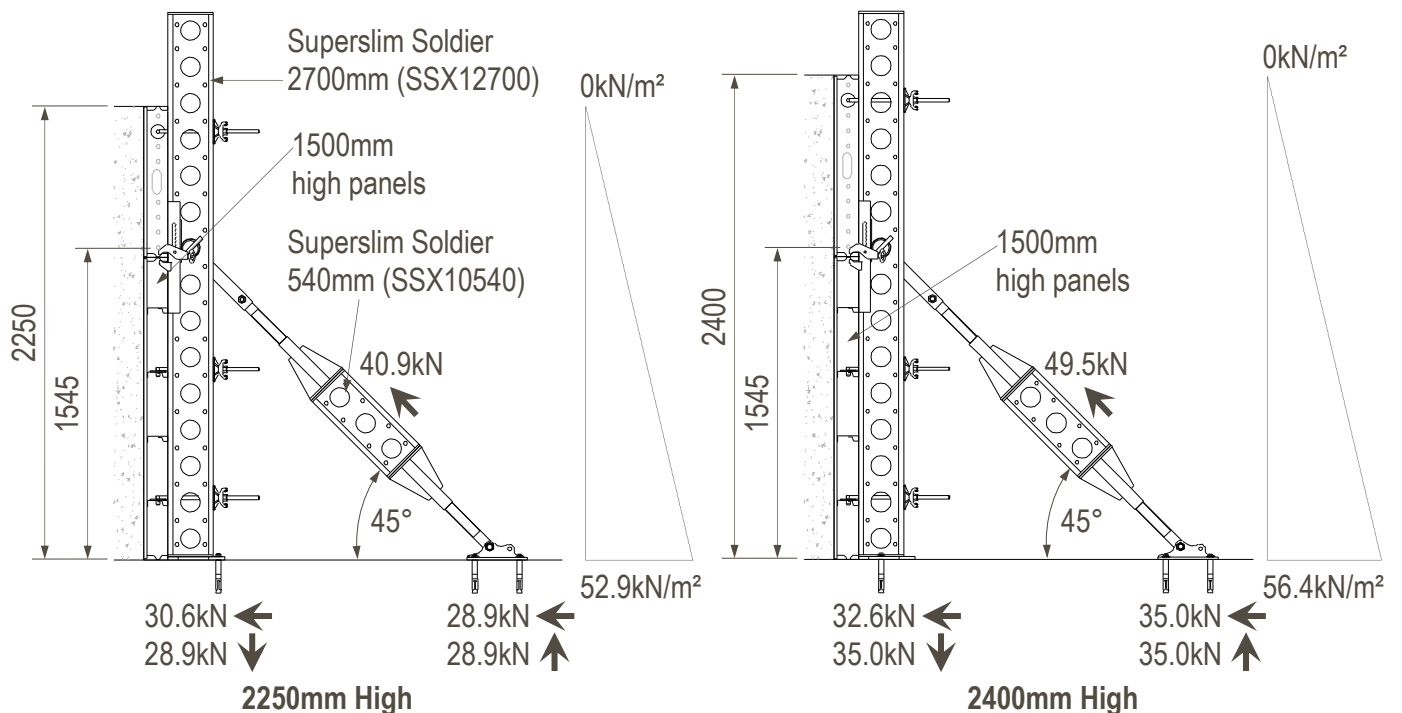
Minima Single Sided Formwork - Standard Solutions....Continued

1950mm & 2100mm High Formwork

When using upright panels at the base of the shutter, for all panel widths use a vertical Superslim Soldier connected centrally (where possible) with Anchor Plate and Superslim Push-Pull Prop secured to an adequate foundation with suitable fixings to restrain the shutters - refer to sheet 75 for possible connections of Superslim Soldiers to Minima Panels.

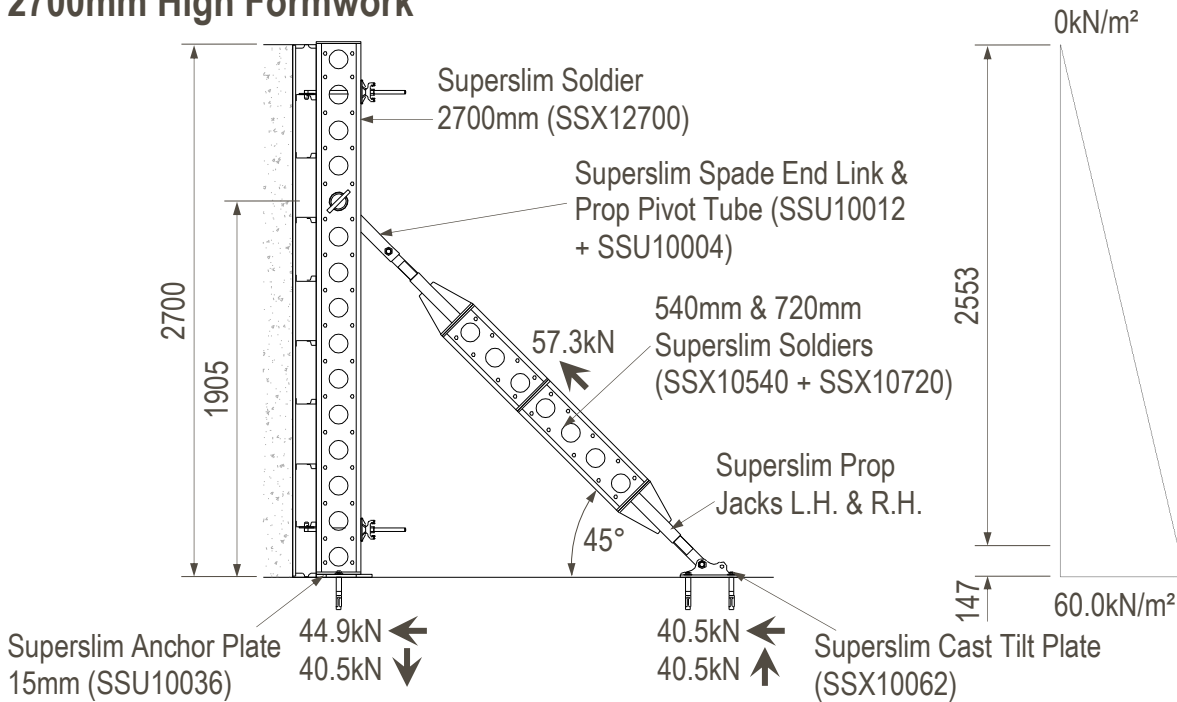


2250mm & 2400mm High Formwork



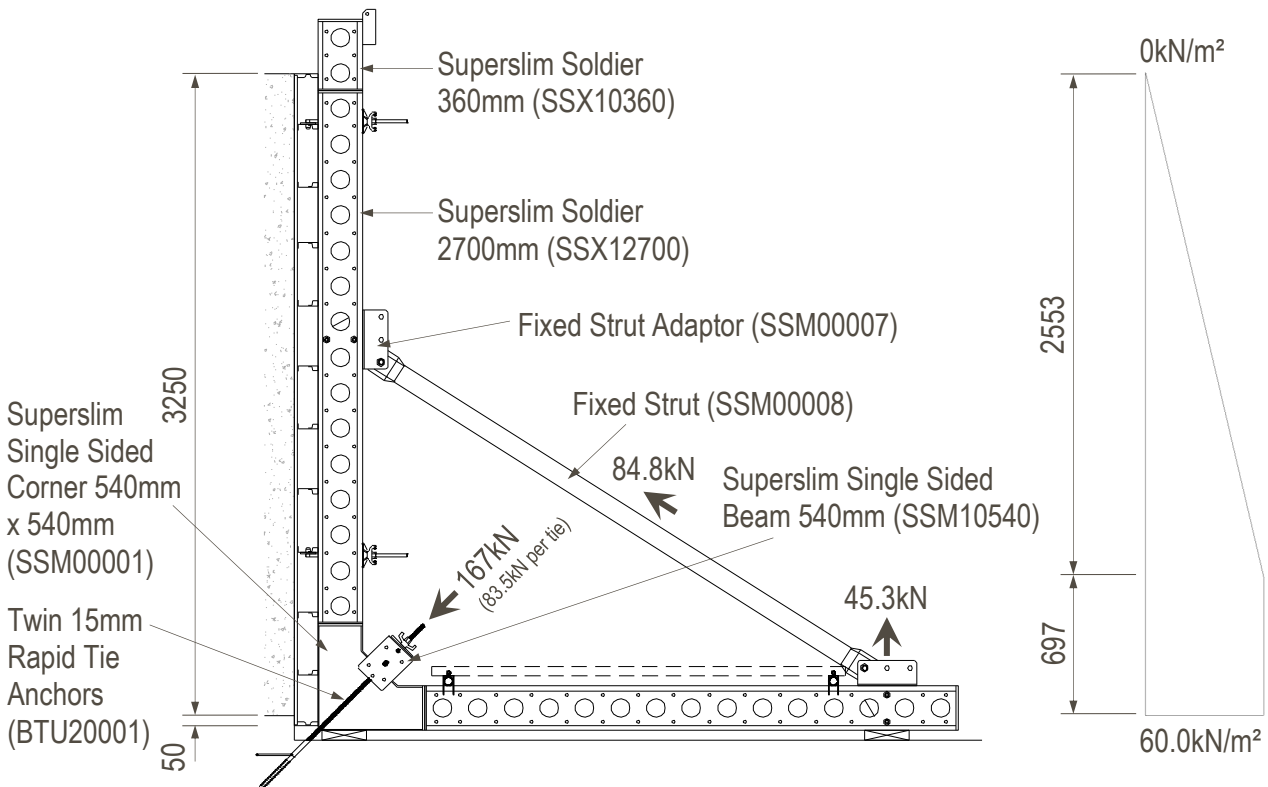
Minima Single Sided Formwork - Standard Solutions....Continued

2700mm High Formwork



3300mm High Formwork

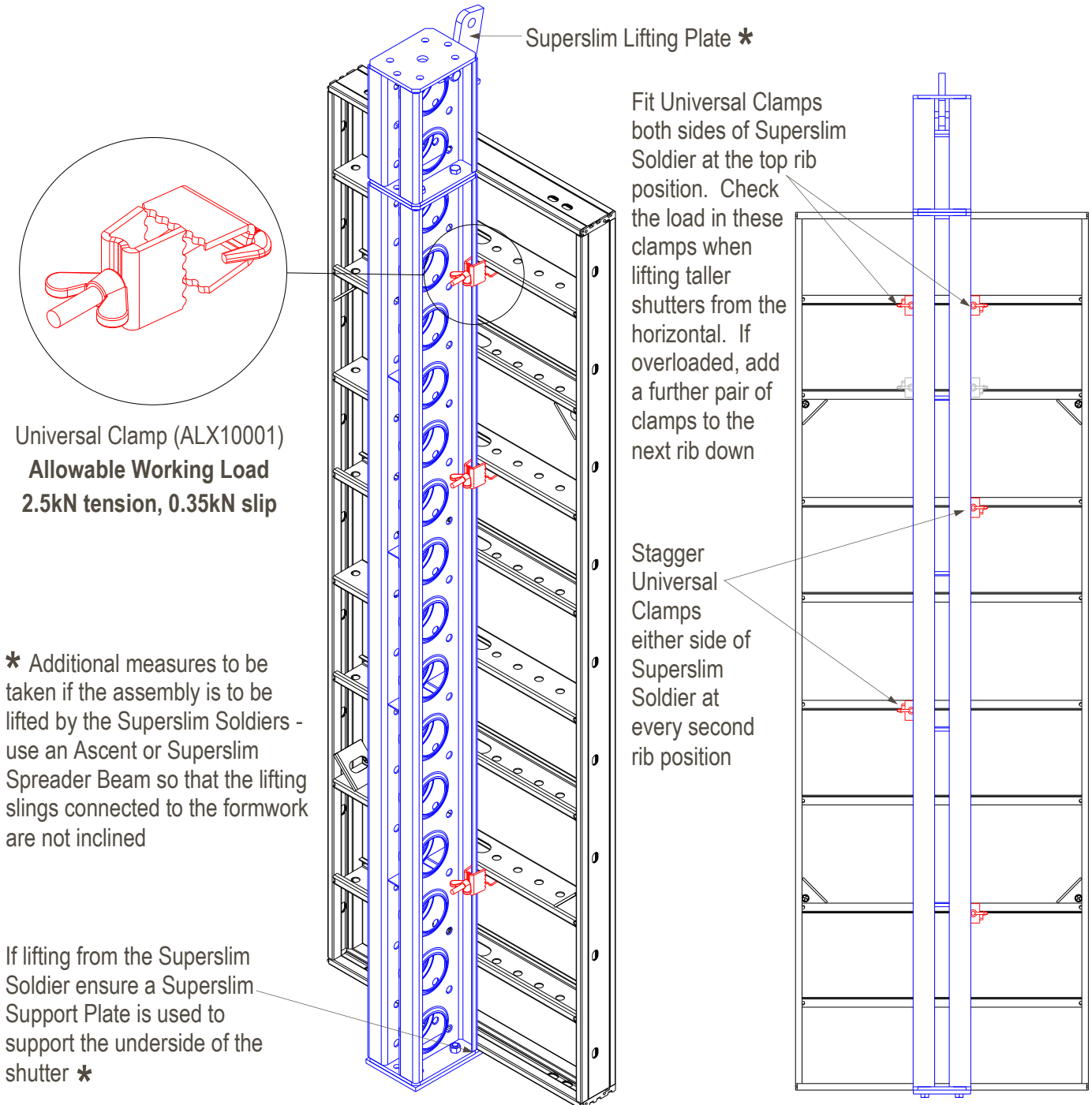
For all panel widths above 600mm, use a vertical Superslim Single Sided Frame connected centrally (where possible) secured to an adequate concrete foundation with Twin 15mm Rapid Tie Anchors to restrain the shutters - refer to sheet 77 for possible connections of Superslim Soldiers to Minima Panels.



Connection of Superslim Soldiers or Alform Beams to Minima Panels

Superslim Soldiers can be connected to the rear face of Minima panels using Universal Clamps (ALX10001) at the intersection with the horizontal panel ribs (staggered either side of the soldier).

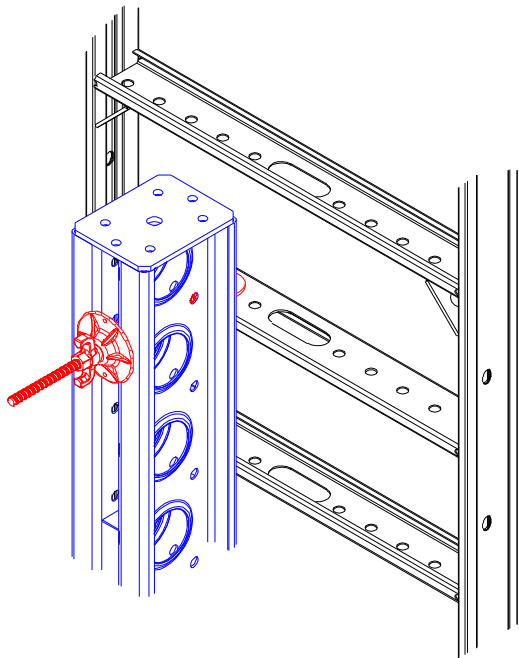
Note: This connection will not fit at the panel edge profile therefore no connection is possible to laying panels.



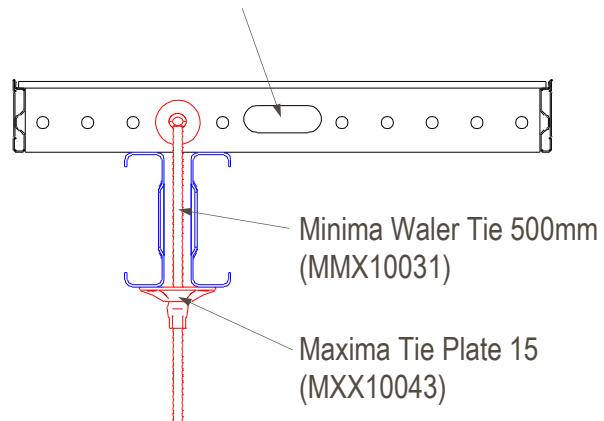
Note: When designing Superslim Soldiers on the rear face of Minima panels care should be taken to ensure that there is room to fit clamps at adjacent vertical panel joints. If necessary a Tension Bolt 190 can be substituted.

Connection of Superslim Soldiers to Minima Panels....continued

When the Superslim Soldier is not required to be fixed in the middle of a Minima Panel, it can be secured in place using a Minima Waler Tie 500mm and Maxima Tie Plate 15. **AWL 12kN (rib limits)**

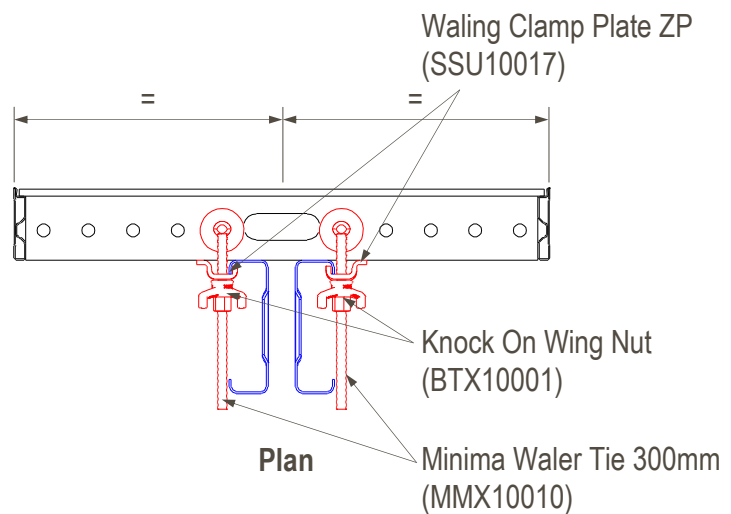
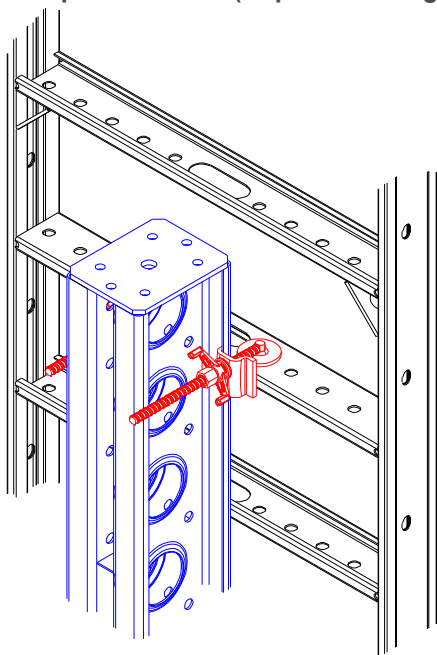


If the Minima Waler Tie 500mm is located at the central handle position, the Soldier must not be crane lifted with the Minima Panel.



Plan

Due to the central location of the 130x45mm slot in the horizontal ribs, when fixed in the middle of a Minima Panel, using Waler Ties vertical Superslims can be secured in place using a Minima Waler Tie 300mm, Waling Clamp Plate and Knock On Wing Nut either side of the Soldier (located in the nearest Ø22mm holes either side of the slot). **AWL 2.5kN per Waler Tie (Superslim flange limits)**



Plan

Note: When designing Superslim Soldiers on the rear face of Minima panels care should be taken to ensure that there is room to fit clamps at adjacent vertical panel joints. If necessary a Tension Bolt 190 can be substituted.

Gang Forms 5.4m - 6.6m

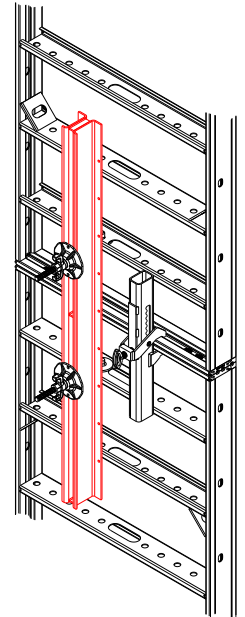
Multi-use Minima gang forms are generally laid flat on the ground for cleaning (with the plywood or composite sheet facing **upwards**) before being lifted to the next location.

For shutters 5.4m - 6.6m, horizontal joints between panels need to be stiffened with Maxima Alignment Rails to reduce self weight deflection at these joints during lifting.

Allowable bending moment of each connection made using a Maxima Alignment Rail = 3.6kNm

Recommended stiffening measures:

- At least 2 Alignment Rails per gang form, placed near the edges of the gang.
- One Alignment Rail per 2400mm or 2700mm wide panel placed centrally
- One Alignment Rail for every 3 narrower panels
- No Alignment Rails are required for laying panels placed at the top of the formwork



Note: For applications where the site team will not lay down the gang with the form face upwards, for instance when the gang is assembled for single use or cleaning and application of release agent onto multi-use forms will be carried out with the gang in the vertical plane, the standard clamping arrangements outlined on sheets 53-57 can be used without the requirement of additional stiffening from Maxima Alignment Rails. In these cases the RMDK scheme drawing must contain the following residual risk note:



This scheme shows a Minima gang form greater than or equal to 5.4m high intended for assembly with the form face downwards, lifting to the vertical for use followed by lowering to the ground with the form face downwards for dismantling. If the formwork is to be laid down with the form face upwards, additional alignment rails will be required to stiffen the horizontal panel joints; refer to RMDK Technical Office.



If the weight of the assembled Minima Panels and accessories weighs more than 10kN, the Minima Crane Hooks can not be used to lift the assembly. Replace Alignment Rails with full height Superslim Soldiers on the rear of the formwork - see sheet 80.

Minima gang form lifted from flat (ply face up) without stiffened horizontal joints

Plumb shutters using Superslim Push Pull Props connected to the vertical joint between Minima Panels using Minima Propping Brackets (MMA20005) - refer to sheet 40 for details.

Note: The shutter may need holding down due to the vertical component of the force in these Push Pull Props incurred from wind loading on the gang form. Refer to sheet 38 for uplift restraint solution.

Gang Forms 6.6m and Above

Multi-use Minima gang forms are generally laid flat on the ground for cleaning (with the plywood or composite sheet facing **upwards**) before being lifted to the next location.

For shutters 6.6m and above, the straightness and flexural stiffness/strength of the gang during lifting shall be ensured by use of continuous Superslim Soldiers that run from the top to the bottom of the shutter. Ensure that a Support Plate is fitted at the bottom of each soldier to take the vertical weight of the shutter when the gang form is upright and suspended from the crane.



Only lift these tall gang forms from the Superslim Soldiers and use an Ascent or Superslim Spreader Beam so that the lifting slings connected to the formwork are not inclined - do not use Minima Crane Hooks

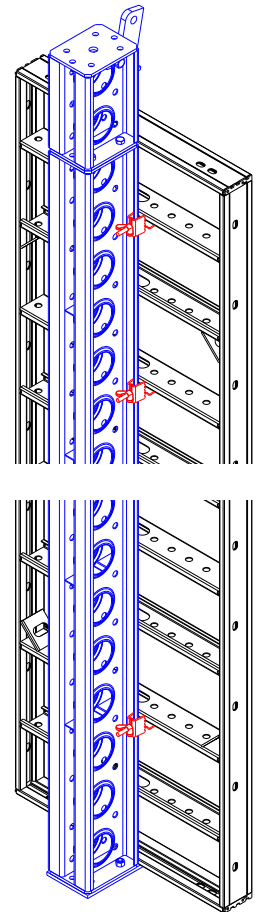
Recommended stiffening measures:

- At least 2 Superslim Soldiers per gang form, placed near the edges of the gang and equi-spaced either side of the centre of gravity of the gang to ensure even lifting.
- One Superslim Soldier per 2400mm or 2700mm wide panel placed centrally

Refer to Sheet 77 for connection of Superslim Soldier to Minima Panels.

Plumb shutters using Superslim Push Pull Props connected directly into the continuous vertical Superslim Soldiers used to stiffen the gang form horizontal joints.

Note: The shutter may need holding down due to the vertical component of the force in these Push Pull Props incurred from wind loading on the gang form. If this is the case, replace the Superslim Support Plates for Superslim Anchor Plates and suitable fixings at the vertical soldier positions that have raking Superslim Props connected.

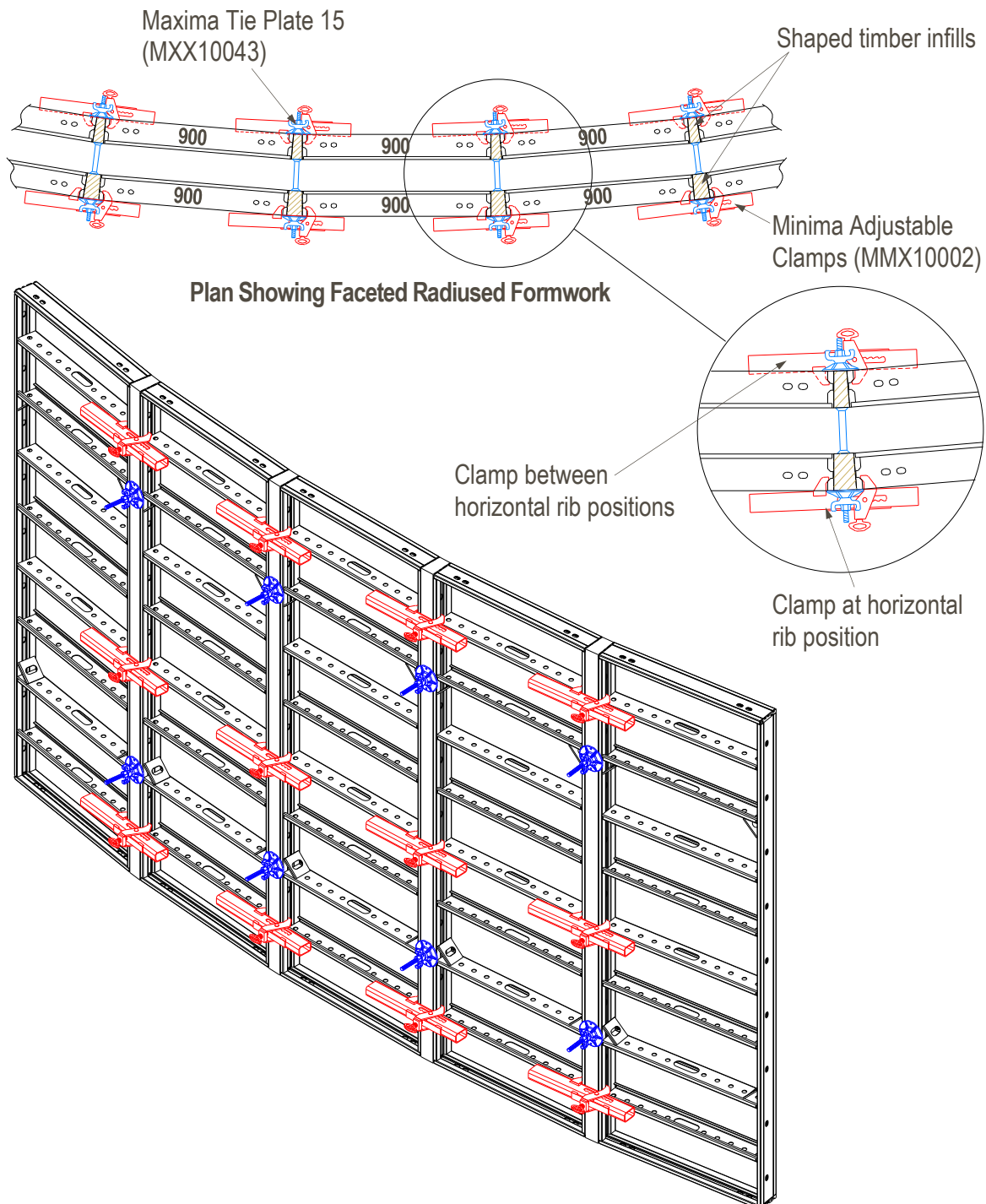


Radiused Formwork Using Timber Infills

A 'faceted' radiused formwork can be constructed using Minima Standard Panels and shaped timber infills. Minima Adjustable Clamps can be fitted at rib positions on external (convex) faces but must be placed between the ribs on internal (concave) faces.



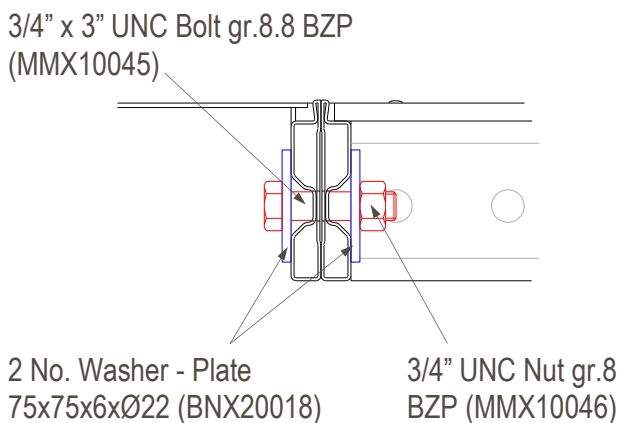
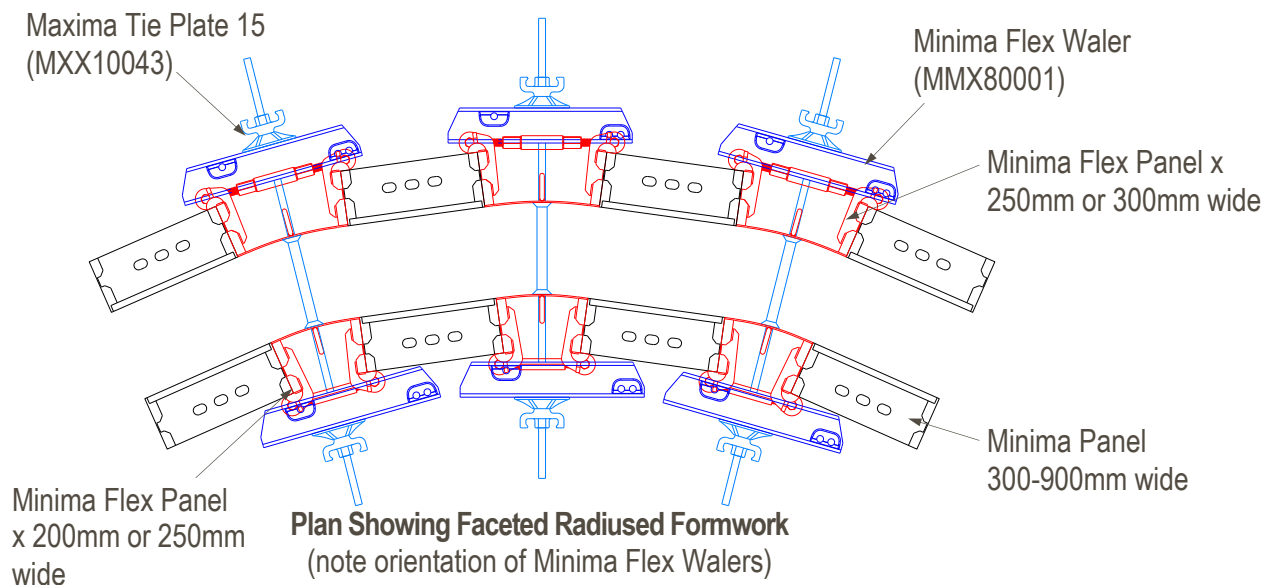
Ties must pass through the centre of the timber infills. For infills up to 70mm wide use Maxima Tie Plate 15 and for infills between 70mm - 150mm wide use Minima Tie Plate 220.



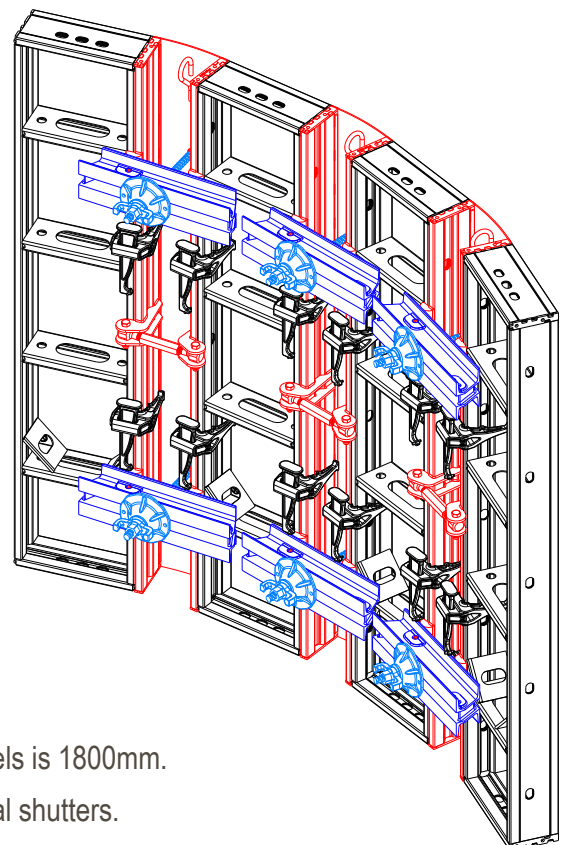
Radiused Formwork Using Minima Flex Panels

A 'rounded and faceted' radiused formwork can be constructed using Minima Standard Panels and Minima Flex Panels. Adjacent panel profiles can either be connected together using a minimum of two Minima Profile Clamps or 3/4" x 3" UNC Bolts gr.8.8 BZP, 2 No. Washer - Plate 75x75x6xØ22 and 3/4" UNC Nut gr.8 BZP (MMX10045 + BNX20018 + MMX10046) at a maximum of 600mm vertical centres.

Ties must pass through the 20mm holes in the centre of the Minima Flex Panels. Timber infills are not permitted between Flex Panels and Minima Panels.



**Plan on Bolted Joint
Alternative Panel Connection**

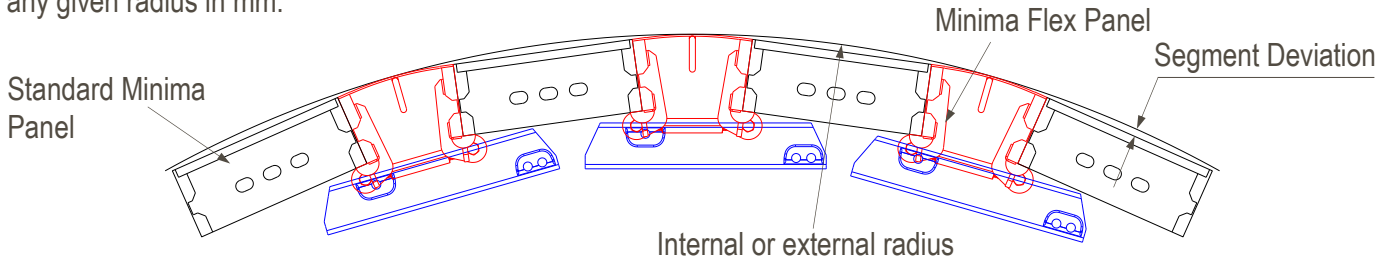


Notes:

- 1, Minimum achievable mean internal radius using Minima Flex Panels is 1800mm.
- 2, Minima Flex Panels x 200mm wide should only be used for internal shutters.

Radiused Formwork Using Minima Flex Panels....continued

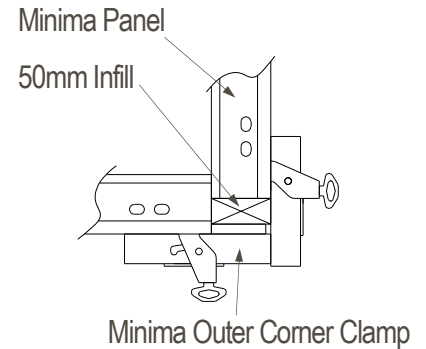
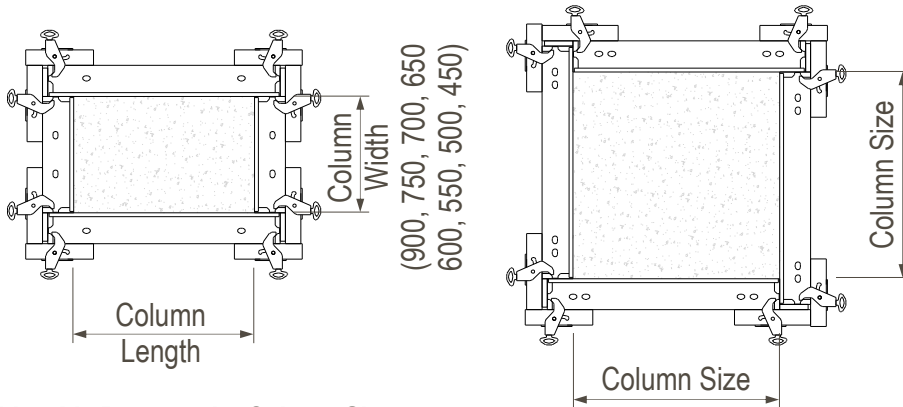
The table shown below indicates the segment deviation standard Minima Panels used between Minima Flex Panels for any given radius in mm.



Mean Radius (m)	Segment Deviation from Circular Arc (mm)				
	300mm Panel	450mm Panel	600mm Panel	750mm Panel	900mm Panel
1.8	12.1	-	-	-	-
2.0	10.9	-	-	-	-
2.4	9.0	16.9	27.1	-	-
2.8	7.7	14.4	23.2	-	-
3.2	6.8	12.6	20.3	29.7	-
3.6	6.0	11.2	18.0	26.4	-
4.0	5.4	10.1	16.2	23.7	32.7
4.4	4.9	9.2	14.7	21.6	29.7
4.8	4.5	8.4	13.5	19.7	27.2
5.2	4.2	7.8	12.4	18.2	25.1
5.6	3.9	7.2	11.6	16.9	23.3
6.0	3.6	6.7	10.8	15.8	21.7
6.4	3.4	6.3	10.1	14.8	20.4
6.8	3.2	5.9	9.5	13.9	19.2
7.2	3.0	5.6	9.0	13.1	18.1
7.6	2.9	5.3	8.5	12.5	17.1
8.0	2.7	5.0	8.1	11.8	16.3
9.0	2.4	4.5	7.2	10.5	14.5
10.0	2.2	4.0	6.5	9.5	13.0
11.0	2.0	3.7	5.9	8.6	11.8
12.0	1.8	3.4	5.4	7.9	10.9
13.0	1.7	3.1	5.0	7.3	10.0
14.0	1.6	2.9	4.6	6.8	9.3
15.0	1.4	2.7	4.3	6.3	8.7
16.0	1.4	2.5	4.0	5.9	8.1
17.0	1.3	2.4	3.8	5.6	7.7
18.0	1.2	2.2	3.6	5.3	7.2
19.0	1.1	2.1	3.4	5.0	6.9
20.0	1.1	2.0	3.2	4.7	6.5
21.0	1.0	1.9	3.1	4.5	6.2
22.0	1.0	1.8	2.9	4.3	5.9

Column Forms Using Standard Minima Panels

Standard Minima Panels can be used to form both square and rectangular columns up to a maximum height of 3300mm using the Minima Outer Corner Clamp (MMX10001). Column sizes on plan range between 300mm to 850mm in 50mm increments. The number of corner clamps required depends upon both the height and width of the column forms.



Typical Corner With Infill
(Alternative corner with two infills should not be used)

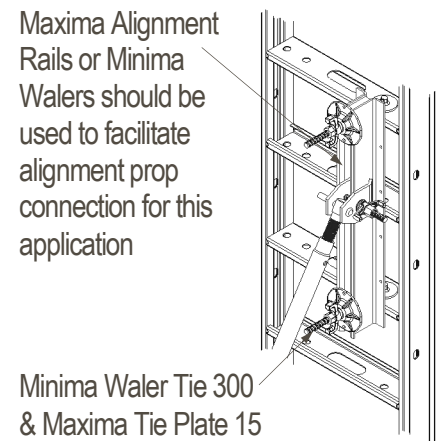
Achievable Rectangular Column Sizes (Column width defined by panel width)

Column Length (mm)	Panel Size (mm)	Packing Required*
800	900	100mm
750	900	50mm
700	900	-
650	750	100mm
600	750	50mm
550	750	-
500	600	100mm
450	600	50mm
400	600	-
350	450	100mm
300	450	50mm
250	450	-

Achievable Square Column Sizes

Column Size (mm)	Panel Size (mm)	Packing Required*
850x850	900	50mm
800x800	900	-
700x700	750	50mm
650x650	750	-
600x600	700	-
550x550	650	-
500x500	600	-
450x450	550	-
400x400	500	-
350x350	450	-

* See corner detail with infill.



Plumbing Minima Column Shutters

* See corner detail with packing.
(100mm infill requires 50mm each end of panel).

Number of Clamps Required

Form Height (mm)	Panel Width (mm)	
	≤600	>600
1500	3	3
2700	4	5
3000 (1500x2)	5	6
3300	6	7

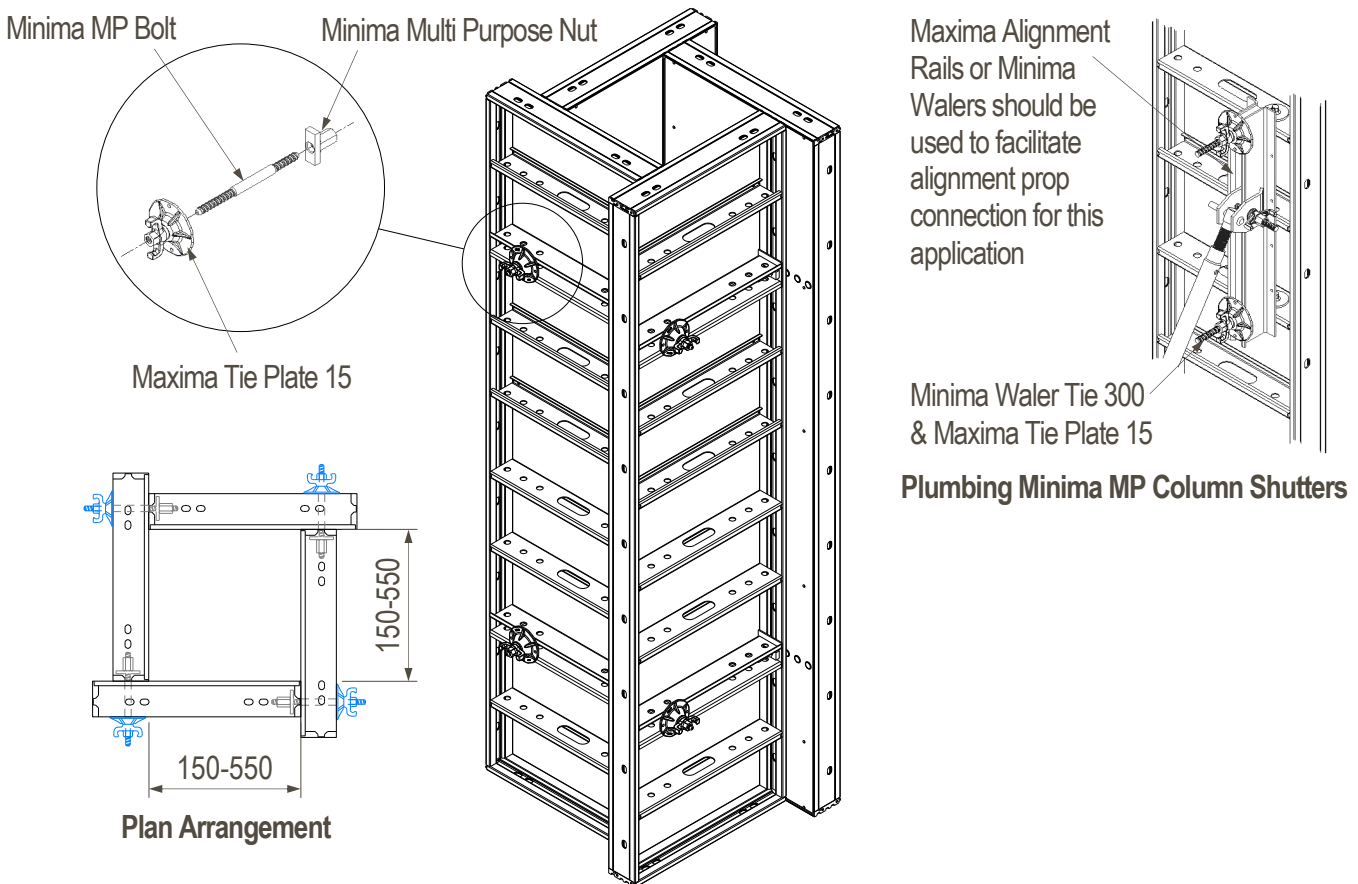
Column Forms Using Minima Multi-Purpose Panels 1200 / 1500 / 2700 / 3300mm

Minima Multi-Purpose Panels have rows of tie holes which facilitate a 'side to face' connection of panels at 90 degrees to one another in a windmill arrangement using Minima MP Bolts, Minima Multi Purpose Nuts and Maxima Tie Plates 15 (MMX10014 + MMX10015 + MXX10043).

The single arrangement shown below can be used to form both square and rectangular columns whose dimensions vary between 150mm and 550mm on plan.

Note: Only one edge profile of the Multi-Purpose Panel has tie holes and so the windmill arrangement can only be built in one direction - with right hand edge profile abutting the face of the adjacent panel.

Allowable Design Pressure = 60kN/m²



Column Forms Using Minima 1800x700mm Multi-Purpose Panels

The Minima 1800x700mm Multi-Purpose Panel is a heavier duty MP panel designed for a **Maximum Allowable Design Pressure of 90kN/m²** - allowing unlimited pour rates for columns up to 3.60m high.

1200mm, 1500mm, and 2700mm Multi Purpose Panels can be attached to the top of these 1800mm panels to create taller column forms. Where this is the case, checks must be made to ensure that the Maximum Design Pressure for the Upper 60kN/m² panels is not exceeded.

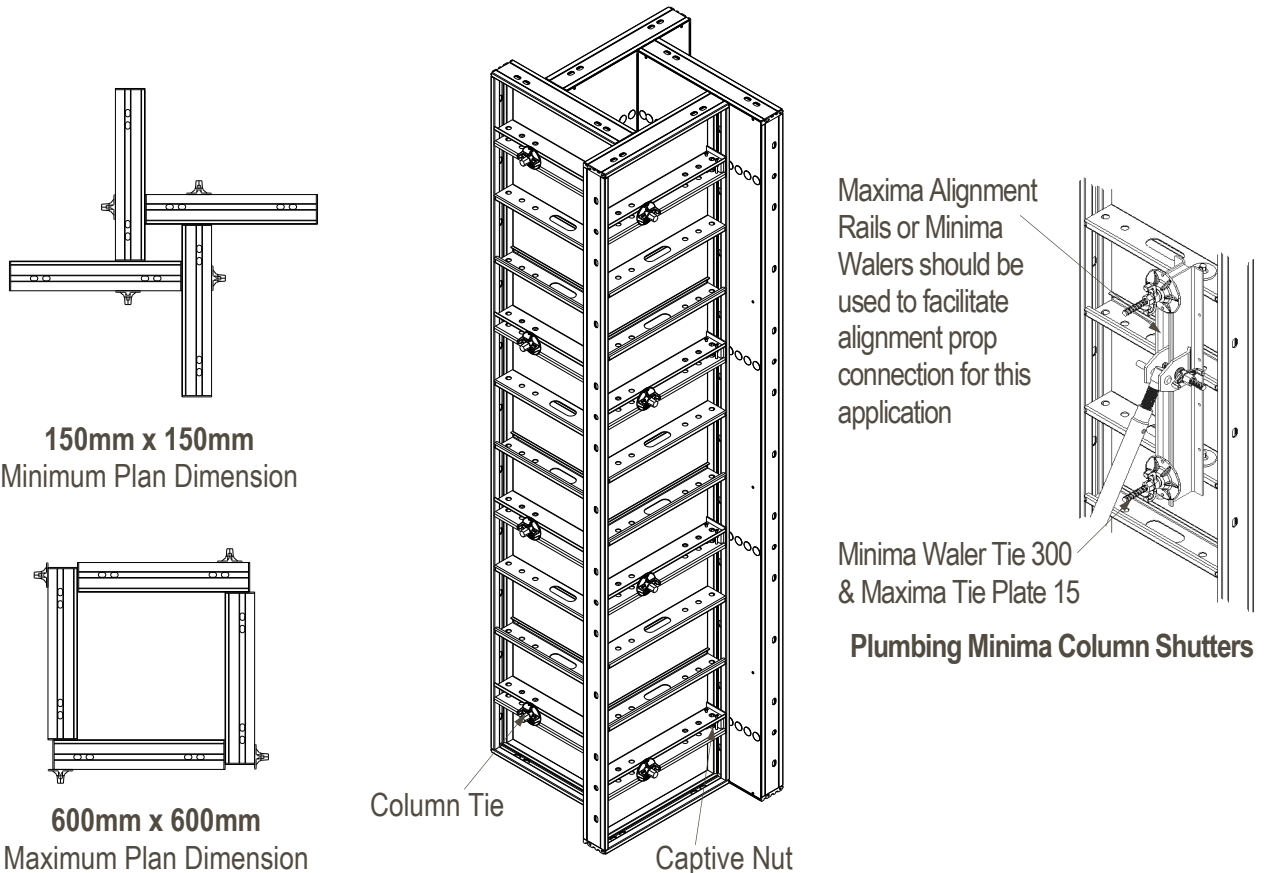
Column Forms Using Minima 3000 / 3300 x 700mm Composite Column Panels

Minima Composite Column Panels have rows of continuous tie holes at non-standard tie positions in height. These holes facilitate a 'side to face' connection of panels at 90 degrees to one another in a windmill arrangement using with four captive nuts and column ties that can be neatly stowed in the horizontal ribs during transport & storage

The arrangement shown below creates a flexible formwork for both square and rectangular columns whose dimensions vary between 150mm and 600mm on plan.

Note: Only one edge profile of the Composite Column Panel has corresponding tie holes with captive nuts, however as the panel is symmetrical the windmill arrangement can be built in both directions - with left or right hand profiles abutting the face of the adjacent panel depending upon which way up the shutter is built. As this panel can be stacked beneath standard Multi-purpose panels for columns up to 6.0m high care should be taken to build the shutter with right hand profiles abutting the face of the adjacent panel for height extended forms.

Allowable Design Pressure = 80kN/m²



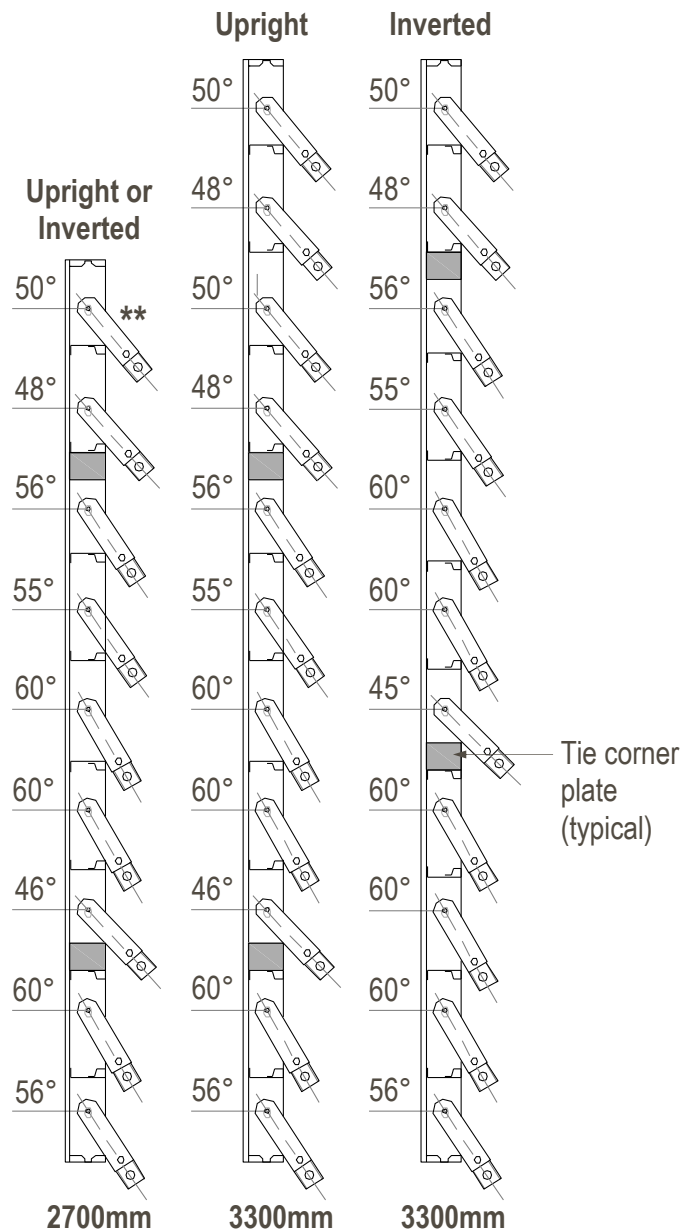
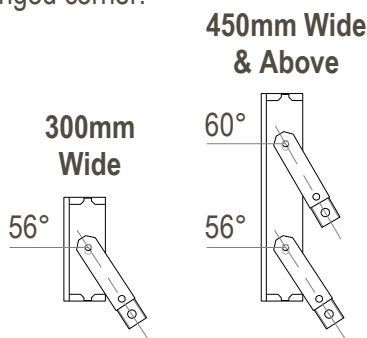
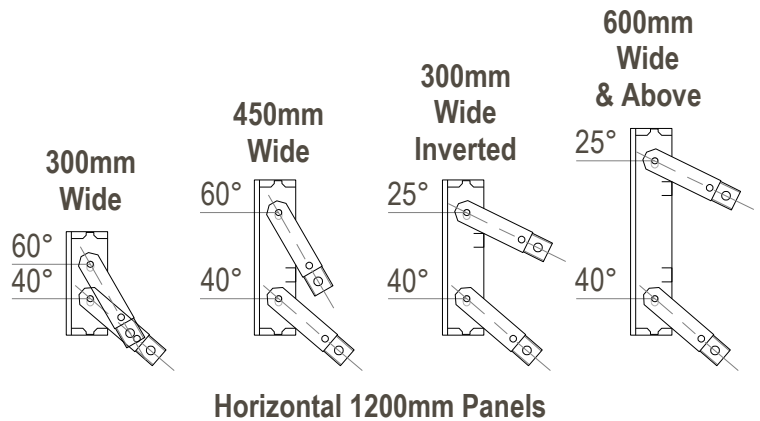
Where height extended forms are used, checks must be made to ensure that the Maximum Design Pressure for the Upper 60kN/m² panels is not exceeded.

Minima Propping Bracket - Maximum Permitted Angles

The maximum achievable angle for the Minima Propping Bracket to the vertical joint between two panels is determined by the pin hole location and the orientation of the panel.

Design Notes:

- 1, The permitted maximum angles from horizontal shown on this sheet should not be exceeded.
- 2, The Minima Propping Bracket cannot be used on the vertical joint between a laying 1200mm and 1500mm Multi Panel if the tops of these panels are aligned flush. This connection prevents the fitting of the Superslim 19mm Pin & R-clip.
- 3, Positions marked **are not suitable for the Minima Propping Bracket if the vertical panel connection is to a 300mm hinged corner.

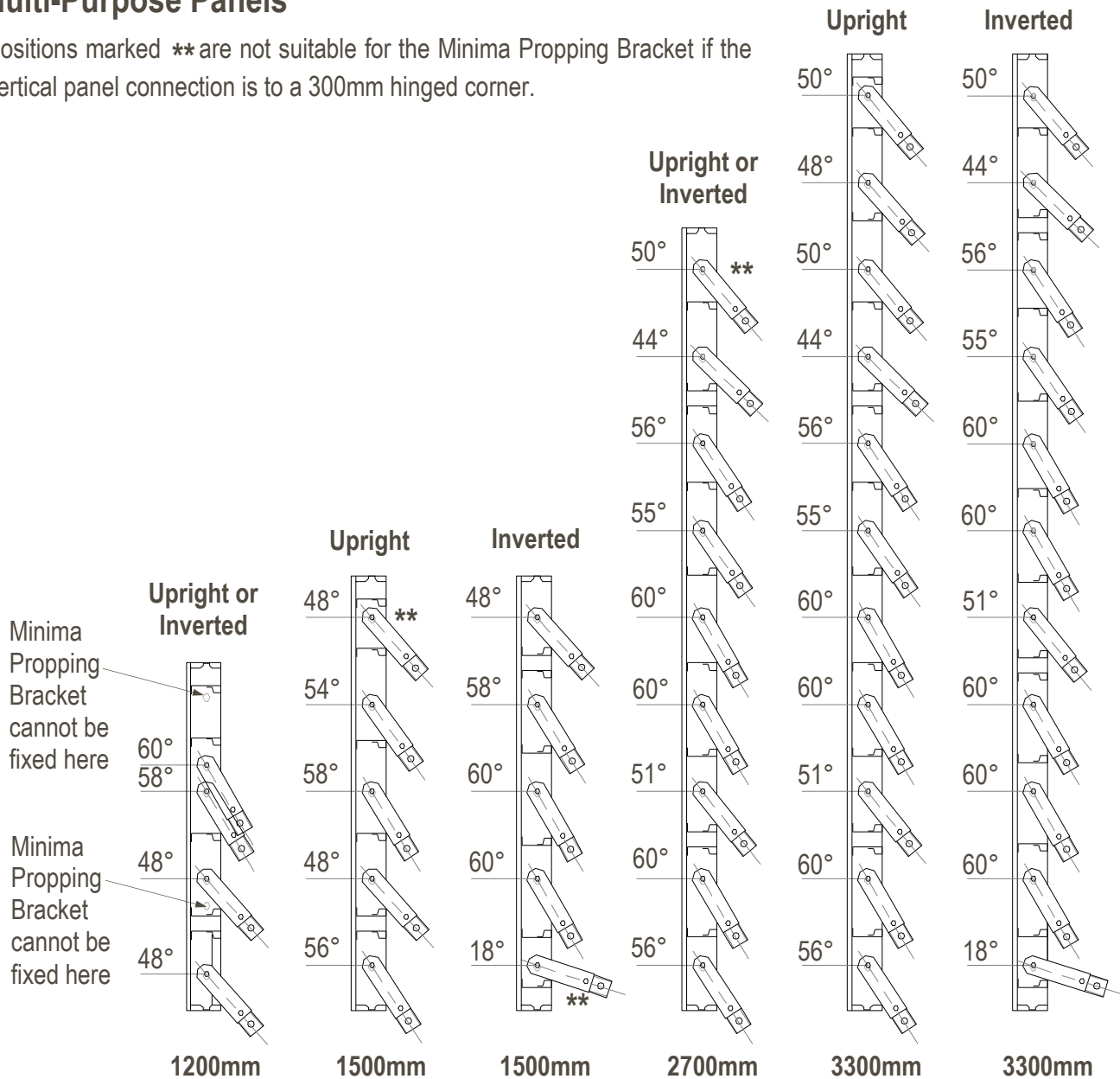


Minima Propping Bracket cannot be fixed here

Minima Propping Bracket - Maximum Permitted Angles...Continued

Multi-Purpose Panels

Positions marked ** are not suitable for the Minima Propping Bracket if the vertical panel connection is to a 300mm hinged corner.



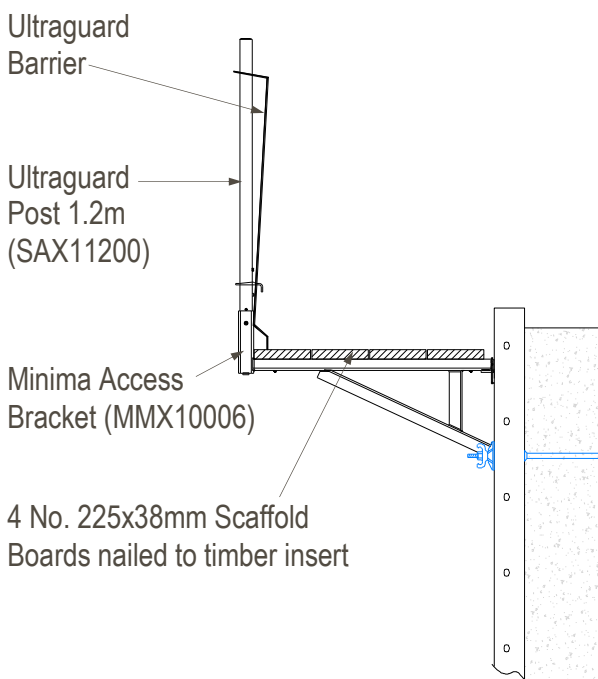
Minima Access Platform Materials

The Minima Access Bracket (MMX10006) can be used with either four 225x38mm Scaffold Boards (option 1 below) or Alform Beams and Plywood (option 2 below).

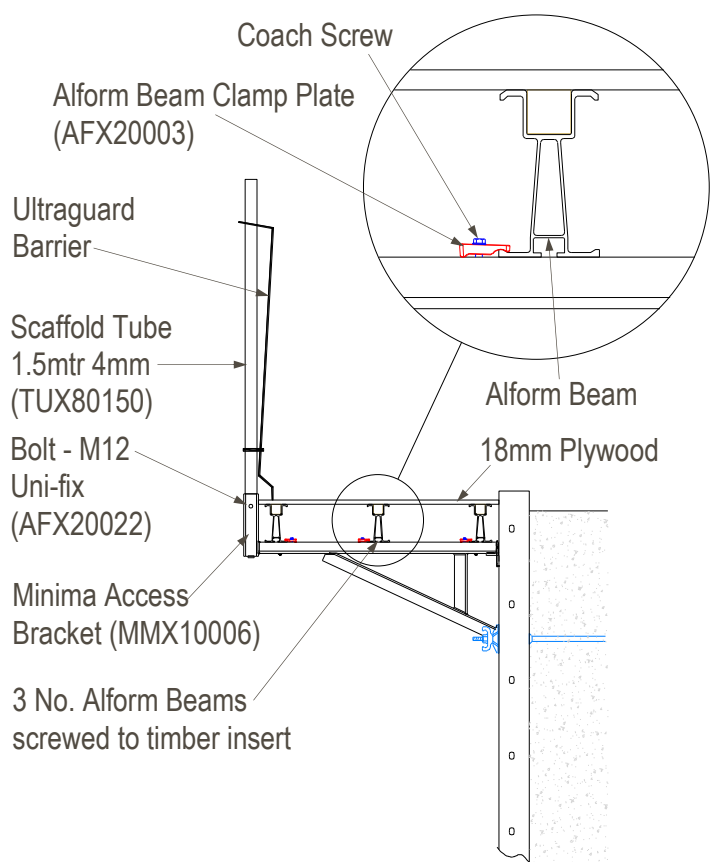
When using scaffold boards they should be nailed to the timber insert on the Access Bracket and brackets should be positioned not more than 1500mm apart (although this may be limited to 1200mm by the allowable span of some scaffold boards). If possible try not to lap scaffold boards as this creates a trip hazard. Boards should not cantilever past an access bracket by more than 150mm unless they are secured to the access bracket using coach screws in which case this can be increased to 300mm.

When using Alforms & Plywood they should be secured to the Access Brackets by their bottom flange using Alform Beam Clamp Plates coach screwed to the timber inserts.

Note: GTX Beams can be used in lieu of Alform Beams - these should be banded directly to the Minima Access Bracket.



Option 1 - Using Scaffold Boards



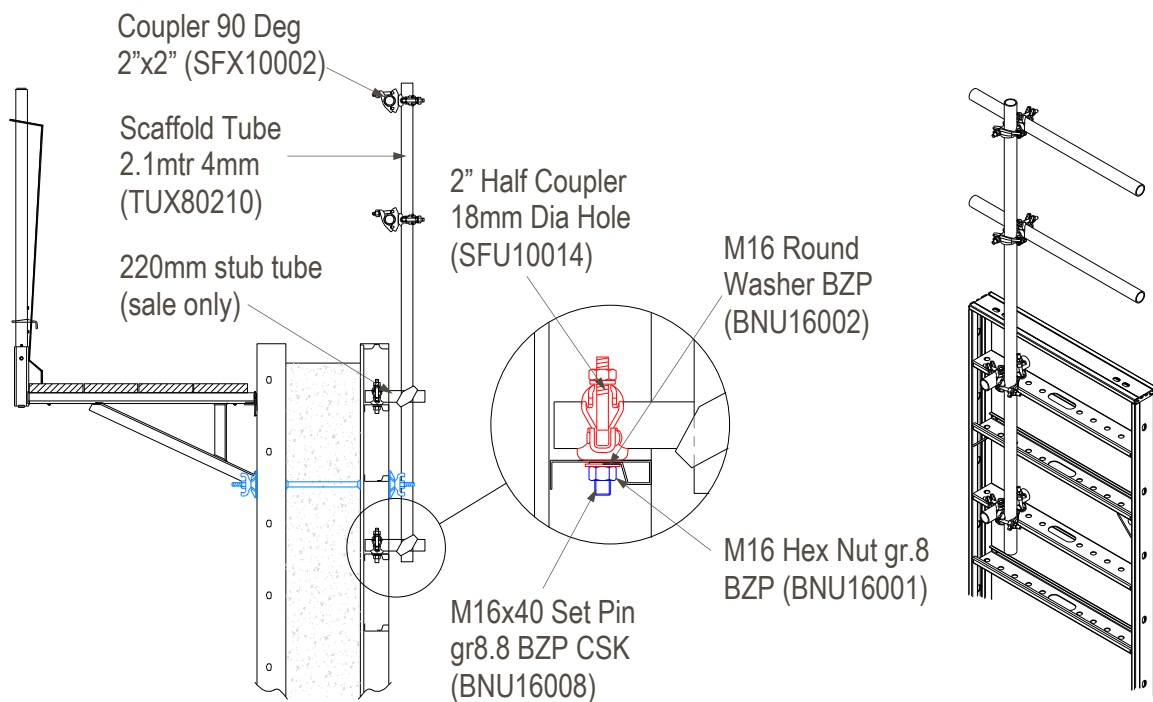
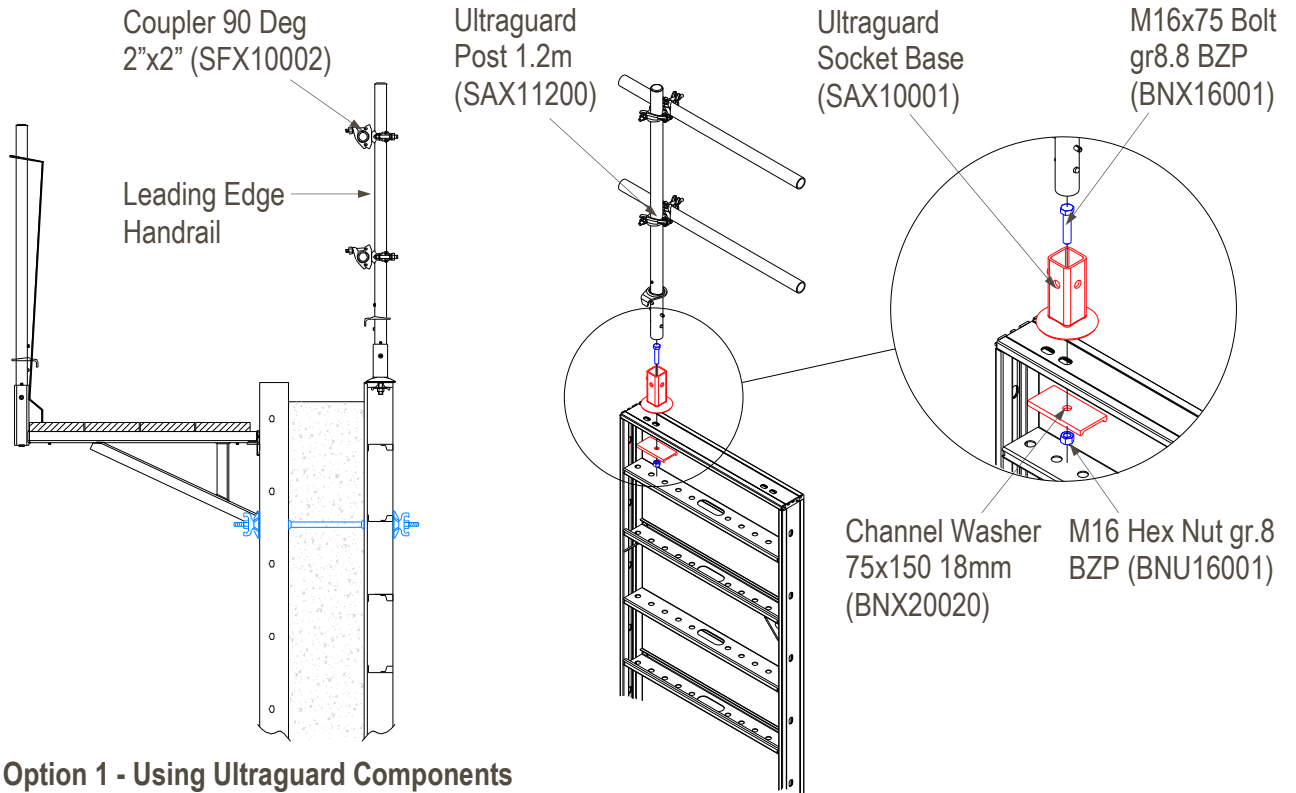
Option 2 - Using Alforms & Plywood

Important Design Notes:

- 1, Care should be taken when determining the positions of Minima Access Brackets to avoid accessories which may prevent them from being fixed in that place, such as alignment rails and clamps.
- 2, Minima Access Brackets cannot be fixed to a laying panel such that the lower strut fixes into an upright panel. They must be either fully fixed in a laying panel OR fully fixed in an upright panel.
- 3, Minima Access Brackets can not be fitted to the rib immediately above the bottom of an upright panel.

Remote Side Fall Protection

Where access platforms and / or projecting rebar cannot be positioned such that they provide sufficient remote side fall protection, remote side guardrails can be supplied as per the options below.



Contact Details: International Offices

Europe

Head Office – United Kingdom

RMD Kwikform, Brickyard Road,
Aldridge, Walsall WS9 8BW, UK.
Tel: +44 1922 743743
Email: info@rmdkwikform.com

Ireland

RMD Kwikform,
Ballyboggan Road,
Finglas, Dublin 11, Ireland.
Tel: +353 1 830 2500
Email: rmd.dublin@rmdkwikform.com

South America

Chile

RMD Kwikform,
La Estera 811,
Parque Industrial Ville Grande,
Lampa, Santiago, Chile.
Tel: +56 2 747 1414
Email: rmd.chile@rmdkwikform.com

America

USA

9351 Grant Street,
Suite 200,
Thornton, Colorado, 80229
Tel: +1 303 252 7000
Email: usa@rmdkwikform.com

South Africa

RMD Kwikform South Africa (Pty) Ltd
26 Venturi Crescent, Hennospark X5,
Pretoria, South Africa
Tel: +27 (0)12 681 0360
Email: info.sa@rmdkwikform.com

Middle East

UAE

RMD Kwikform,
PO Box 5801, Sharjah,
United Arab Emirates.
Tel: +971 6502 5888
Email: rmd.uae@rmdkwikform.com

Qatar

RMD Kwikform,
PO Box 405, Doha, Qatar.
Tel: +974 4465 3034
Email: rmd.qatar@rmdkwikform.com

Bahrain

RMD Kwikform,
C/O CGH ,
Building 829, Flat 11,
Block 408, Sanabis,
Kingdom of Bahrain.
Tel: +973 1738 2724
Email: rmd.bahrain@rmdkwikform.com

Oman

RMD Kwikform Oman LLC
PO Box 889
Post Code 115
Muscat
Sultanate of Oman
Tel: +968 2413 6448
Email: rmd.oman@rmdkwikform.com

India

RMD Kwikform,
No.28/2, 1st Floor, AMG Towers,
Lawyer Jagannathan Street, G.S.T. Road,
Alandhur, Chennai—60016, Tamil Nadu, India
Tel: +91 44 6693 3300
Email: rmd.india@rmdkwikform.com

Saudi Arabia

PO Box 921, Entrance 1, North 2nd Floor, Room 4A
Gulf Star Building, Prince Turki Abdulaziz Street,
Comiche, Al Khobar 31952, Kingdom of Saudi Arabia
Tel: +966 13 896 8665
Email: rmd.ksa@rmdkwikform.com

Asia Pacific

Australia

RMD (Australia) Pty. Ltd.
PO Box 169, Melrose Park,
South Australia, 5039.
Tel: +61 8 8179 8200
Email: rmd.australia@rmdformwork.com

Hong Kong

RMD Kwikform,
22/F Excel Center,
483A Castle Peak Road,
Cheung Sha Wan, Kowloon, Hong Kong.
Tel: +852 2415 4882
Email: rmd.hongkong@rmdkwikform.com

New Zealand

RMD (New Zealand) Ltd.
PO Box 22-316, 101-105 Station Road,
Otahuhu, Auckland 6, New Zealand.
Tel: +64 9 276 5955
Email: rmd.auckland@rmdformwork.com

Philippines

RMD Kwikform,
Units 2406-2409,
Raffles Corporate Center,
F. Ortigas Jr. Road,
Ortigas Center,
Pasig City,
Philippines.
Tel: +632 696 7635
Email: rmd.manila@rmdkwikform.com

Guam

RMD Kwikform.
321 East Harmon Industrial Park Road,
Unit F, Tamuning, Guam.
Tel: +671 647 7635
Email: rmd.guam@rmdkwikform.com