User's Guide

ENKOFLEX

03J017M

ULMA

IMPORTANT:

The current safety provisions of the state or professional organisations in each country must be followed when using our products.

The pictures in this document are snapshots of situations at different stages of assembly, and therefore are not complete images for safety purposes and should not be deemed as definitive.

All instructions regarding safety and operation contained in this document, as well as the data on stress and loads, must be respected. Any changes or unusual assembly will require a special solution or calculation.

The weights featured in this document, related to the basic product parts, are approximate.

Our equipment is designed to work with accessories and components produced by our company. Combining such equipment with other brands without having made all the corresponding checks can be dangerous.

The company reserves the right to introduce any modifications deemed necessary for the technical development of the product.

Safety sign

Control sign

Warning sign

Information sign

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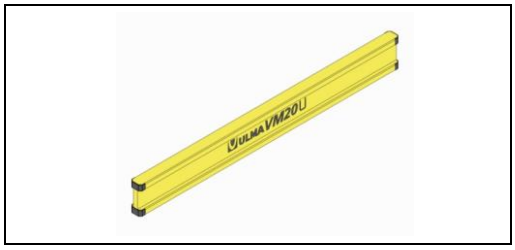
1. PRODUCT DESCRIPTION

ENKOFLEX is a horizontal formwork system designed for making any kind of slab, both solid and lightened, as well as hanging beams or other items.

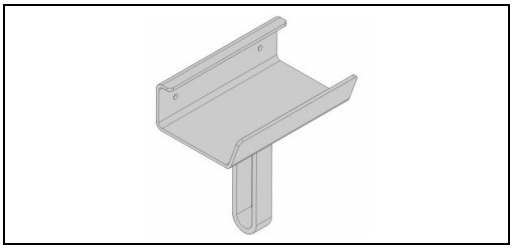
Because this formwork is composed of independent beams, the system has great flexibility, allowing it to be adapted properly for irregular slabs.

It is also the ideal complement for infilling and areas not covered with other formwork systems, such as Table VR or CC-4.

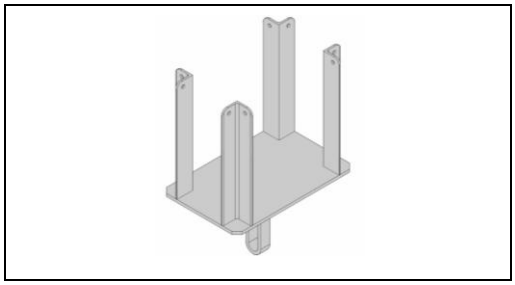
The main features of the system are as follows:



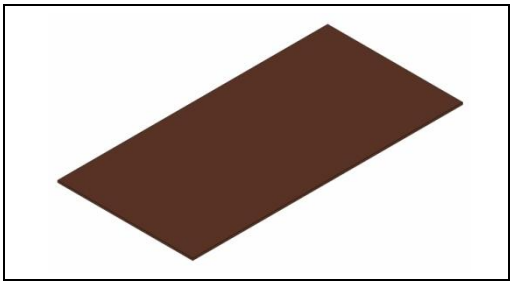
Timber Beam VM 20



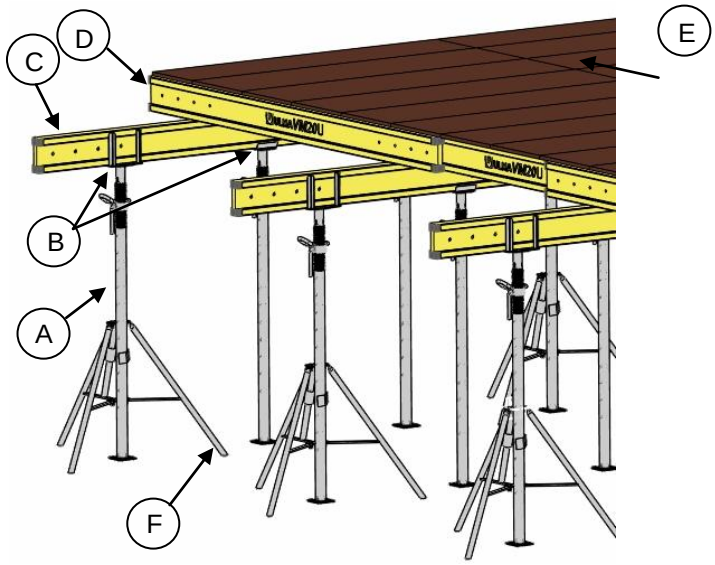
Simple Head VR



Double Head VR



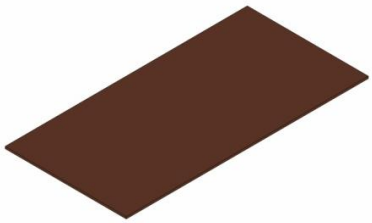
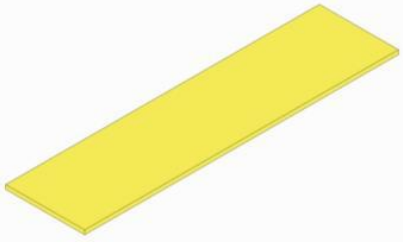
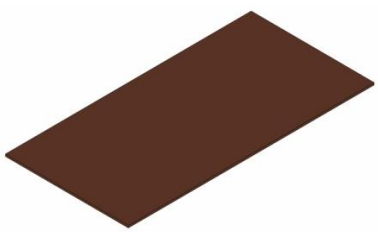
Plywood

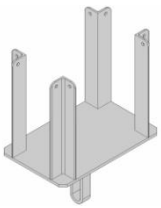
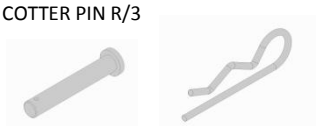
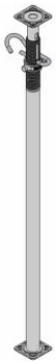
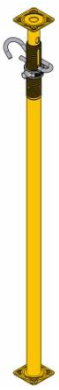


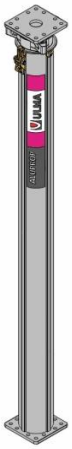
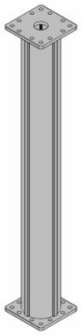
A	Prop
B	Heads
C	VM 20 Main beam
D	VM 20 Secondary beam
E	Board
F	Tripod

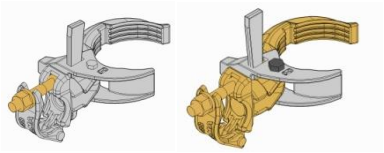
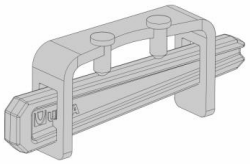
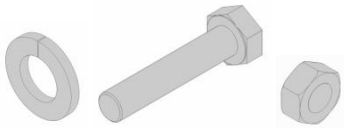
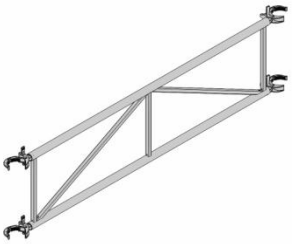
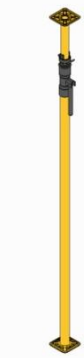
2. COMPONENTS AND ACCESSORIES

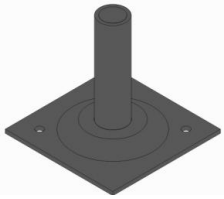
2.1. GRAPHIC DESCRIPTION

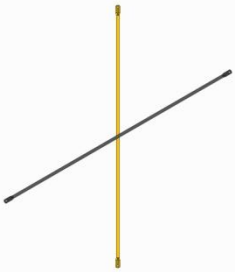
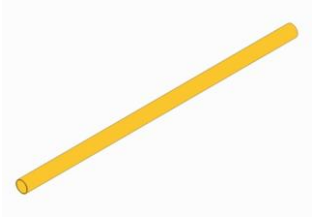
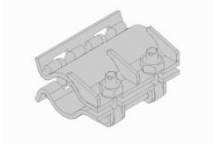
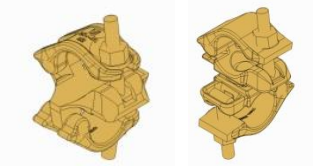
Item number	Weight kg.	Name
		TIMBER BEAMS
1940191	7.3	TIMBER BEAM VM 20/1.45
1940172	9.5	TIMBER BEAM VM 20/1.9
1940197	10.8	TIMBER BEAM VM 20/2.15
1950129	12.3	TIMBER BEAM VM 20/2.45
1940196	13.3	TIMBER BEAM VM 20/2.65
1940144	14.5	TIMBER BEAM VM 20/2.9
1950130	16.5	TIMBER BEAM VM 20/3.3
1940146	18	TIMBER BEAM VM 20/3.6
1950112	19.5	TIMBER BEAM VM 20/3.9
1940178	22.5	TIMBER BEAM VM 20/4.5
1950113	24.5	TIMBER BEAM VM 20/4.9
1940149	29.5	TIMBER BEAM VM 20/5.9
		BOARDS
1940198	34.9	PLYWOOD 1.25 x 2.5 x 0.018 BETO
1940166	40.7	PLYWOOD 1.25 x 2.5 x 0.021 BETO
		
7251131	11.4	3 LAYER PLYWOOD 2000 x 503 x 21
7251132	15	3 LAYER PLYWOOD 2000 x 503 x 27
		
1940155	38.2	PLYWOOD 1.25 x 2.5 x 0.018 BIRCH
1940151	44.6	PLYWOOD 1.25 x 2.5 x 0.021 BIRCH
		

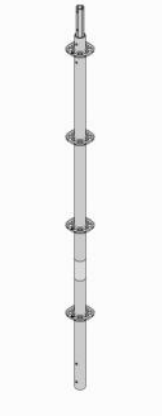
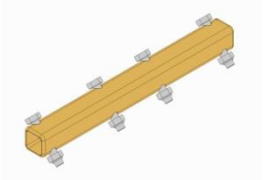
Item number	Weight kg.	Name
		HEADS
2211003	2.5	DOUBLE HEAD VR
		
		Galvanized steel
2211000	0.73	SIMPLE HEAD VR
		Galvanized steel
1861627	0.17	PIN 16x100
9370571	0.015	COTTER PIN R/3
		
		PROPS
2170030	11.2	SP-30 PROP
2170035	15.2	SP-35 PROP
2170040	16.6	SP-40 PROP
2170050	23.8	SP-50 PROP
		
		Galvanized steel
2170300	10.7	SP-30 PROP P
2170135	14.5	SP-35 PROP P
2170400	15.8	SP-40 PROP P
2170500	22.7	SP-50 PROP P
		
		Yellow - coated steel

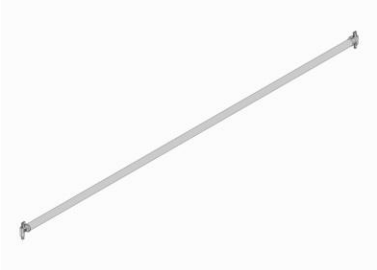
Item number	Weight kg.	Name
2200048	14.7	EP C25
2200000	16.6	EP C+D30
2200068	21.3	EP C+D35
2200012	23.7	EP C+D40
2200084	29.1	EP C+D45
2200057	31.7	EP C+D50
2200023	19	EP C+E30
2200033	26.4	EP C+E40
		Galvanized steel
2220010	17.6	ALUPROP 1.65-2.8
2220020	21.6	ALUPROP 2.2-3.7
2220030	25.4	ALUPROP 3.3-4.8
2220040	29.6	ALUPROP 4.5-6.0
		 Aluminium
2220200	5.8	ALUPROP SPINDLE
		Aluminium
2220055	4.5	SUPPLEMENT 1M
		 Aluminium

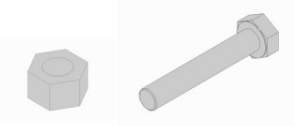
Item number	Weight kg.	Name
2220075	2.2	FIX BRACING HOOK
2220100	2.3	SWIVEL BRACING HOOK
		 Galvanized Steel - Bichromate-treated
2220080	1.1	ALUPROP CLAMP
		 Galvanized steel
9000001	0.001	SPRING WASHER B10 DIN127
9521592	0.044	HEXAGONAL SCREW M10x50 DIN933 8.8
0241000	0.01	NUT M10 DIN 934-5.6
		
2220140	10.2	BRACING FRAME 0.75
2220125	15	BRACING FRAME 1.5
2220130	15.4	BRACING FRAME 1.57
2220145	18.1	BRACING FRAME 2.075
2220120	19.4	BRACING FRAME 2.32
		 Galvanized steel
2150000	10	NORMAL PROP 1.75/3.1
2150500	10.6	NORMAL PROP 2.1/3.5
2154300	13.6	STRONG PROP 2.1/3.65
2159333	15.1	STRONG PROP 2.35/4
2154400	18.8	STRONG PROP 3.65/5.25
		 Yellow - coated steel

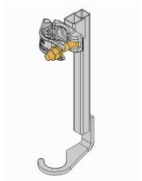
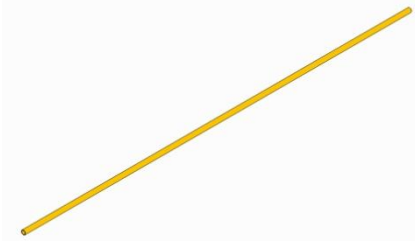
Item number	Weight kg.	Name
2770050	4.7	ECO PROP 0.8/1.25
2770037	5.9	ECO PROP 1.1/1.7
2160300	7.9	ECO PROP 1.75/3
2770026	7.9	ECO PROP 1.75/3 W/HANDLES
2161500	8.9	ECO PROP 2.1/3.5
		Yellow - coated steel
2220090	11.2	UNIVERSAL TRIPOD
2170355	7	TRIPOD 42-87mm
		Galvanized steel
		G SHORING
2000300	1.2	BASE PLATE G
		
		Black - coated steel
2000600	4.2	BASE JACK G0.5
2000700	7.8	BASE JACK G1
		Bichromate - treated Steel
2013900	2.2	HEAD 80
2013800	2.2	HEAD 160
		Black-coated steel

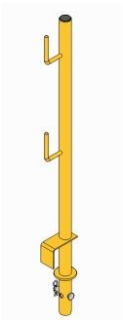
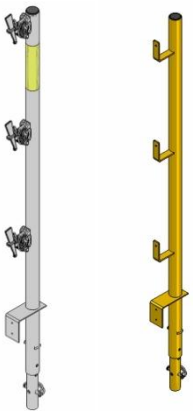
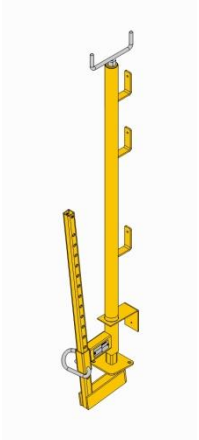
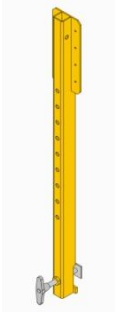
Item number	Weight kg.	Name
2003300	12.5	FRAME G-100 1
2003500	13.4	FRAME G-100 1.55
2003600	15.5	FRAME G-100 1.85
		Yellow - coated steel
1860507	3.9	TWO-COLOURED CROSSBRACE 1
1860101	4.8	TWO-COLOURED CROSSBRACE 1.5
1860107	5.8	TWO-COLOURED CROSSBRACE 2
1860098	4.2	TWO-COLOURED CROSSBRACE 1.5/0.75
1860104	5.4	TWO-COLOURED CROSSBRACE 2/0.75
		
		Black and yellow-coated steel
2033300	1	TUBE 42/0.5
2033500	2	TUBE 42/1
2033700	3	TUBE 42/1.55
2033800	4.2	TUBE 42/2.1
2034000	6.2	TUBE 42/3.1
		
		Yellow - coated steel
2013100	1.7	TENSION COUPLER 42
		
		Zinc-coated steel
2012600	1.2	RIGHT ANGLE COUPLER 42/42
2012400	1.3	SWIVEL COUPLER 42/42
		
		Bichromate-treated steel

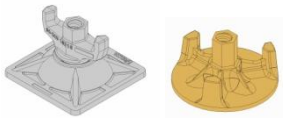
Item number	Weight kg.	Name
		BRIO SHORING
2127973	8.8	ADJUSTABLE HEAD 0.5
2127960	12.9	ADJUSTABLE HEAD 1
		Bichromate-treated steel
2127500	4.6	STANDARD 1
2127501	7.4	STANDARD 1.5
2127502	9.4	STANDARD 2
2127503	13.5	STANDARD 3
2127956	17.8	STANDARD 4
		
		Galvanized steel
2127958	2.2	STANDARD 0.5 WITHOUT SPIGOT
2127605	4.4	STANDARD 1 WITHOUT SPIGOT
2127859	6.6	STANDARD 1.5 WITHOUT SPIGOT
2127860	8.5	STANDARD 2 WITHOUT SPIGOT
2127981	12.5	STANDARD 3 WITHOUT SPIGOT
		Galvanized steel
2127825	1.1	DOUBLE SPIGOT
		
		Bichromate - treated steel

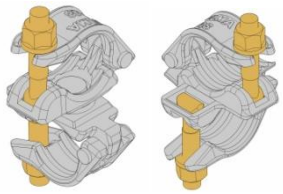
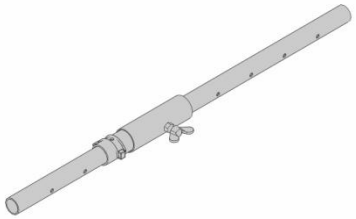
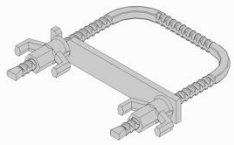
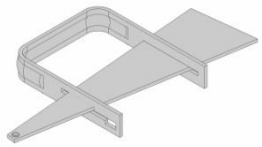
Item number	Weight kg.	Name
2127540	7.2	DIAGONAL BRACE 0.7x2
2127541	8.7	DIAGONAL BRACE 1.02x2
2127617	10.2	DIAGONAL BRACE 1.5x2
2127542	11.8	DIAGONAL BRACE 2x2
2127618	13	DIAGONAL BRACE 2.5x2
2127543	14.2	DIAGONAL BRACE 3x2
		(width x height)
		Galvanized steel
2127896	6.5	DIAGONAL BRACE 0.7x1
2127897	7.2	DIAGONAL BRACE 0.7x1.5
2127898	7	DIAGONAL BRACE 1.02x1
2127899	7.6	DIAGONAL BRACE 1.02x1.5
2127900	7.6	DIAGONAL BRACE 1.5x1
2127901	8.8	DIAGONAL BRACE 1.5x1.5
2128241	8.9	DIAGONAL BRACE 2x0.5
2127902	9.2	DIAGONAL BRACE 2x1
2127903	10	DIAGONAL BRACE 2x1.5
2127904	10.9	DIAGONAL BRACE 2.5x1
2127905	12.2	DIAGONAL BRACE 2.5x1.5
2127906	12.9	DIAGONAL BRACE 3x1
2127907	13.7	DIAGONAL BRACE 3x1.5
		(width x height)
		Galvanized steel
2127920	6.6	HORIZONTAL DIAGONAL 2x2
		
		Galvanized steel
2129541	5.4	HORIZONTAL DIAGONAL 2x3
2129539	5.4	HORIZONTAL DIAGONAL 2.5x2.5
2129542	5.8	HORIZONTAL DIAGONAL 2.5x3
2129540	6.2	HORIZONTAL DIAGONAL 3x3
		Galvanized steel

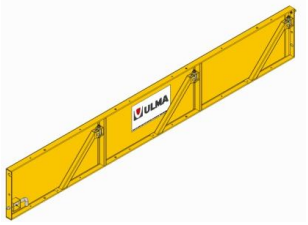
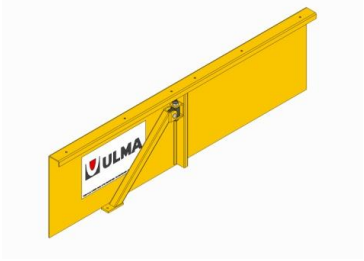
Item number	Weight kg.	Name
2127522	3.2	LEDGER 0.7
2127523	4.4	LEDGER 1.02
2127524	6	LEDGER 1.5
2127525	7.6	LEDGER 2
2127526	9.4	LEDGER 2.5
2127527	11.7	LEDGER 3
		Galvanized steel
9056600	0.01	NUT HEXAGONAL M10 SELF LOCKING
9050901	0.1	BOLT M10X60 8.8 DIN931
9045200	0.1	BOLT M10X80
		
2124902	4.9	ADJUSTABLE BASE 0.5
2124907	8.7	ADJUSTABLE BASE 1
		Bichromate - treased steel
2127766	7.8	ADJUSTABLE SWIVEL BASE
		Bichromate-treated steel
2127510	1.4	BASE COLLAR
		Galvanized steel

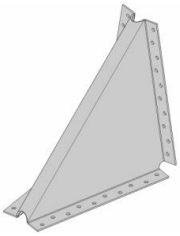
Item number	Weight kg.	Name
2129485	1.6	HANDLE LOCK
		 Galvanized steel
		SAFETY ITEMS
2211165	6.9	VM HANDRAIL SUPPORT
		Yellow - coated steel
1861122	0.39	PANEL BOLT
		Zinc - coated steel
7238001	0.22	HEXAGONAL NUT 15
1860516	3.9	SAFETY HANDRAIL S-V
		Yellow - coated steel
2023800	8.4	TUBE 42x4070 WITH SOCKET
2033600	8.4	TUBE 42/4.1
2053000	12.2	TUBE 42/5
		 Yellow - coated steel

Item number	Weight kg.	Name
1902210	3.4	SAFETY HANDRAIL POST  Yellow - coated steel
2211156 2211185	9.5 8.1	HANDRAIL POST 1.5 HANDRAIL POST 1.5 WOOD  Galvanized Steel - yellow-coated steel
2211200	11.7	CLAMP HANDRAIL 1.3  Yellow - coated steel
2211256	10.2	WALL HANDRAIL SUPPORT  Yellow - coated steel

Item number	Weight kg.	Name
0230100 1900256 7238000	1.7 1.4 0.73	TIE ROD 15/1 PLATE WASHER NUT 15 PLATE NUT 15 Zinc-coated steel  Geomet steel - Bichromate-treated steel
2211240	6	CLAMP HANDRAIL 1m Bichromate-treated steel
1860723	5.6	CLAMP SAFETY HANDRAIL Bichromate-treated steel
2125648 2125290 2125291 2125647 2125249 2125648 2125230 2125231 0200600	13.1 5.5 7 8.7 11.4 12.1 14.5 18 20	TUBE 48x4100 WITH SOCKET TUBE 48/1.6 TUBE 48/2.1 TUBE 48/2.6 TUBE 48/3.1 TUBE 48/3.6 TUBE 48/4.1 TUBE 48/5 TUBE 48/6 Galvanized steel

Item number	Weight kg.	Name
2125147	1.3	SWIVEL COUPLER 48/48
2125148	1.2	RIGHT ANGLE COUPLER 48/48
		 Galvanized steel
2211172	3.2	EXTENDING LEDGER
		 Zinc-coated steel
2211225	16.8	TOE BOARD 4000x200x50
		Wood
2170526	2.3	PROP BRACING CLAMP
		 Zinc-coated steel
2170356	1.6	CLAMP SP-EP
		 Galvanized steel
2128152	13.5	TRAPDOOR PLATFORM 1.5
		Aluminium wood

Item number	Weight kg.	Name
2211750	6.3	CHAIN VR 7.5 kN
2211035	2.9	CHAIN VR
9165400	0.3	EYEBOLT SCREW M16
		MISCELLANEOUS AND AUXILIAR ITEMS
9371772	0.18	RING 12x120
9371778	0.22	RING 12x160
9371779	0.29	RING 12x230
1860676	12.5	STOPEND B 1x0.3
1860690	22.6	STOPEND B 2x0.3
1860696	14.4	STOPEND B 1x0.4
1860705	25.9	STOPEND B 2x0.4
		 Yellow - coated steel
1860709	10.5	FILLER STOPEND 0.3
1860712	13.2	FILLER STOPEND 0.4
		 Yellow - coated steel
2211670	7.4	VM HANGING BEAM SUPPORT
		Galvanized steel

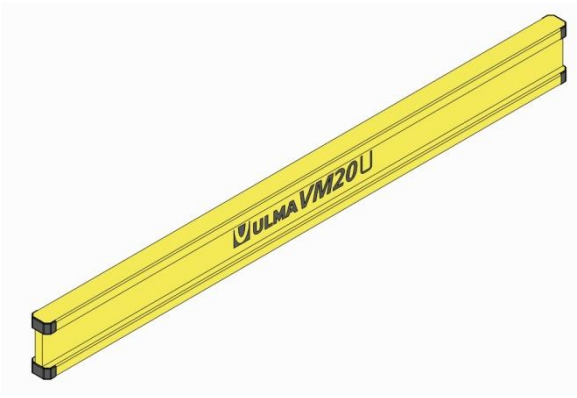
Item number	Weight kg.	Name
2211660	4.8	VM20 HANGING BEAM SUPPLEMENT Galvanized steel
2170358	1.1	STOP-END CORNER  Galvanized steel
2170365 2170360	3.7 3.7	CROSS PROP SP-30 CROSS PROP SP 35-40 Galvanized steel
		CONSUMABLES AND SPARE PARTS
1860533 1904100	0.1 0.007	PLASTIC HANDRAIL SUPPORT PLUG 42 BAG (250 units)
9850530 9371777 9371774 9371773	0.9 0.01 0.01 0.01	HKD HILTI PLUG M16 PLASTIC PLUG 14X70 PLASTIC PLUG 14X100 PLASTIC PLUG 14X140

2.2. DESCRIPTION OF ITEMS

Item dimensions are measured in millimetres unless otherwise indicated.

2.2.1. TIMBER BEAMS VM 20

These form the ENKOFLEX system press grid.



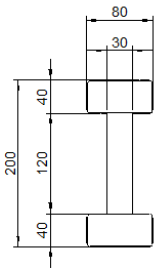
The timber beam VM 20 is used as a main or secondary beam.

It is made in accordance with Standard EN13377.

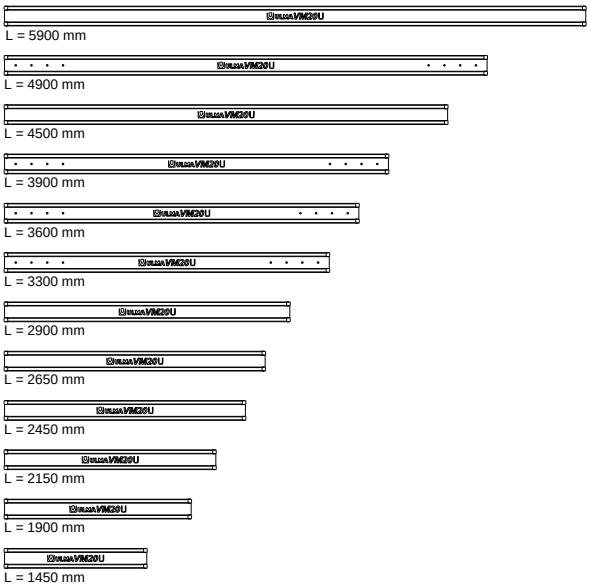
The technical features are:

- Permissible shear force Q=11 kN
- Permissible flexion M=5 kNm
- Stiffness EI=450 kNm^2

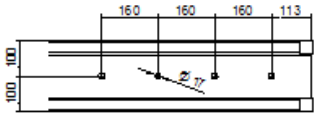
Section of the timber beam VM 20:



There is a wide range of standard lengths, reaching up to 5.9 m. There are special beams available of up to 12 m in length.



The 4.9 m, 3.9 m, 3.6 m and 3.3 m beams have holes incorporated into the ends.



2.2.2. BOARDS

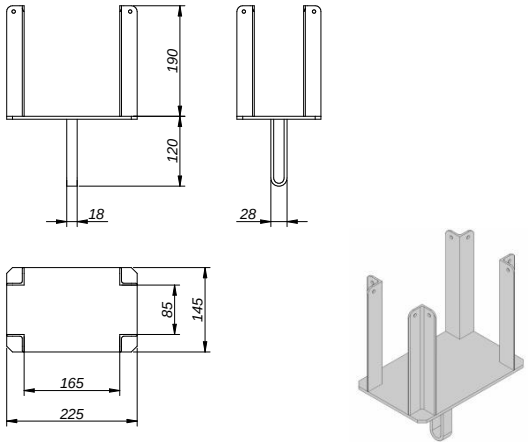
For high-end architectural requirements and/or smooth concrete surfaces with good finish, phenolic plywood panels can be used.

- Plywood 1.25 x 2.5 x 0.018 BETO
- Plywood 1.25 x 2.5 x 0.021 BETO
- Plywood 1.25 x 2.5 x 0.018 BIRCH
- Plywood 1.25 x 2.5 x 0.021 BIRCH

Other types of wood can also be used, such as 3-layer plywood.

2.2.3. DOUBLE HEAD

This is used to shore main beams, for both simple and double beams. It is mounted at beam ends and overlaps.



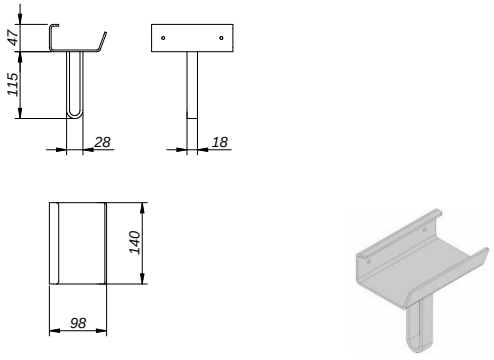
The head has four L profiles with holes for fixing to the beam with nails.

It can be fixed to the prop with 16x100 pins (item number 1861627) and R/3 cotter pins (item number 9370571).

2.2.4. SIMPLE HEAD

This is used to shore single main beams.

This head can be assembled with all Ulma props.



The open profile allows the assembly head to be fixed and released from the prop without loosening the prop's thread.

It can be fixed to the prop with 16x100 pins (item number 1861627) and R/3 cotter pins (item number 9370571).

2.2.5. PROPS

Wide range of props to conform with construction shapes and utilisation criteria in the different countries where it is used.

- SP props

ITEM NUMBER	NAME	EXTENSION (m)	
		MIN	MAX
2170030	SP-30 PROP	1.75	3
2170035	SP-35 PROP	2	3.5
2170040	SP-40 PROP	2.5	4
2170050	SP-50 PROP	3.9	5
2170300	SP-30 PROP P	1.75	3
2170135	SP-35 PROP P	2	3.5
2170400	SP-40 PROP P	2.5	4
2170500	SP-50 PROP P	3.9	5

- EP props (in accordance with standard EN 1065).

ITEM NUMBER	NAME	EXTENSION (m)	
		MIN	MAX
2200048	EP C25	1.5	2.5
2200000	EP C+D30	1.7	3
2200068	EP C+D35	2	3.5
2200012	EP C+D40	2.2	4
2200084	EP C+D45	2.5	4.5
2200057	EP C+D50	2.7	5
2200023	EP C+E30	1.7	3
2200033	EP C+E40	2.2	4

- ALUPROP props (in accordance with standard EN 16031).

ITEM NUMBER	NAME	EXTENSION (m)	
		MIN	MAX
2220010	ALUPROP 1.65-2.8	1.65	2.8
2220020	ALUPROP 2.2-3.7	2.2	3.7
2220030	ALUPROP 3.3-4.8	3.3	4.8
2220040	ALUPROP 4.5-6	4.5	6

- Normal and Strong Props.

ITEM NUMBER	NAME	EXTENSION (m)	
		MIN	MAX
2770050	NORMAL PROP 1.75/3.1	1.75	3.1
2770037	NORMAL PROP 2.1/3.5	2.1	3.5
2160300	STRONG PROP 2.1/3.65	2.1	3.65
2770026	STRONG PROP 2.35/4	2.35	4
2161500	STRONG PROP 3.65/5.25	3.65	5.25

- ECO props

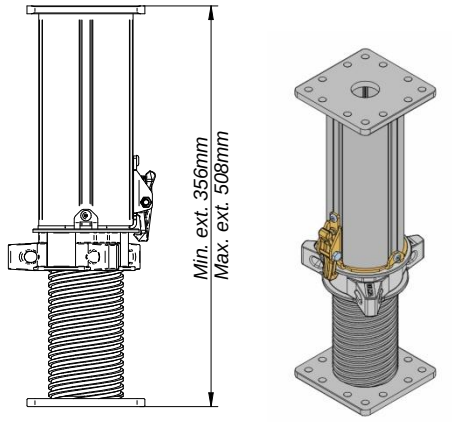
ITEM NUMBER	NAME	EXTENSION (m)	
		MIN	MAX
2770050	ECO PROP 0.8/1.25	0.8	1.25
2770037	ECO PROP 1.1/1.7	1.1	1.7
2160300	ECO PROP 1.75/3	1.75	3
2770026	ECO PROP 1.75/3 W/HANDLES	1.75	3
2161500	ECO PROP 2.1/3.5	2.1	3.5

All these props are fixed to the wooden beams using the heads which support the wooden beams.

2.2.6. ALUPROP SPINDLE

The aluprop spindle is designed for ALUPROP configurations where a double adjustment in height is required. In addition, this configuration facilitates the stripping of the system through the placement of the aforementioned prop at the base of the assembly.

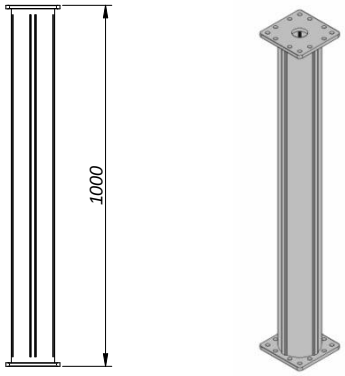
The outer tube is fixed to the prop's outer tube by means of four bolts, nuts and washers or by means of two aluprop clamps.



2.2.7. SUPPLEMENT 1M

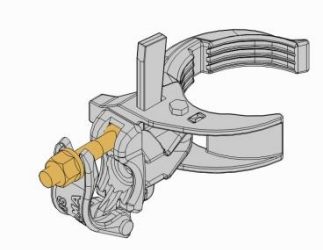
The supplement 1M allows the ALUPROP prop's range of dimensions to be extended.

It is fixed to the ALUPROP prop's outer tube by means of four bolts, nuts and washers or by means of two aluprop clamps.

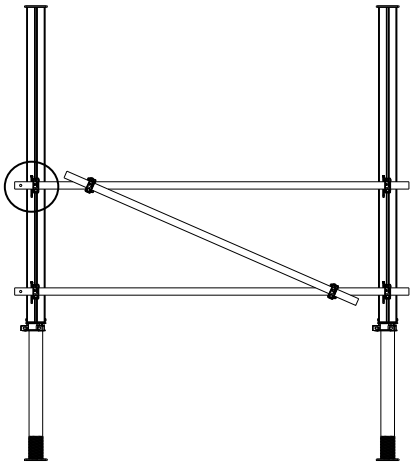


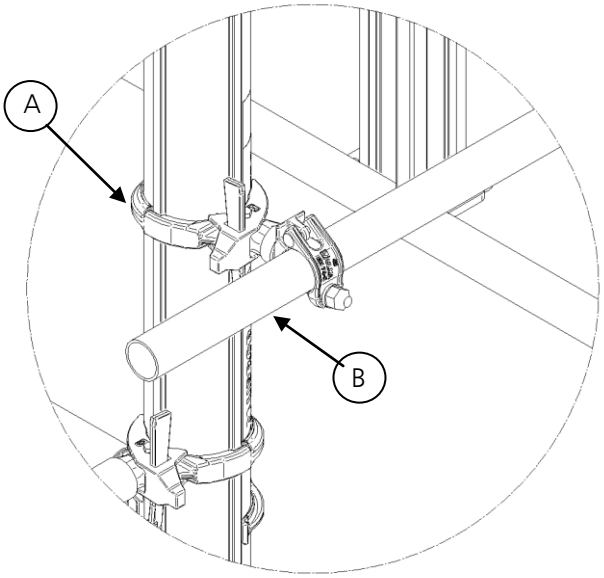
2.2.8. FIX BRACING HOOK

It allows two props with different towers to be braced increasing their strength and stability.



It is used to connect the outer tube of the ALUPROP prop to a 48 mm tube by means of the hook and 48 mm coupler. This makes it possible to then install safety handrails in the towers.



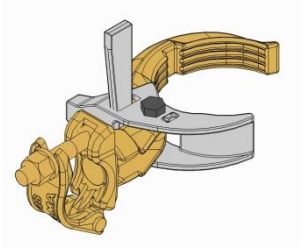


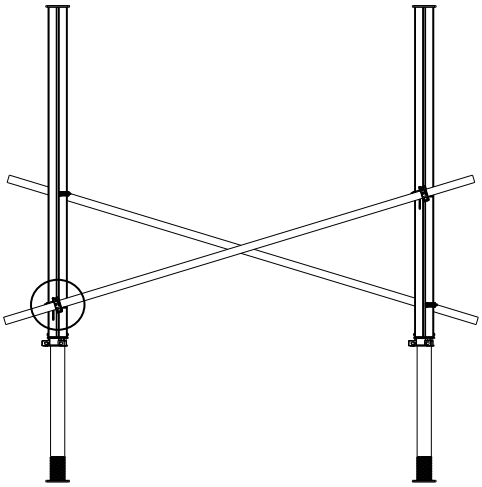
A	Fix bracing hook
B	Tube ø48

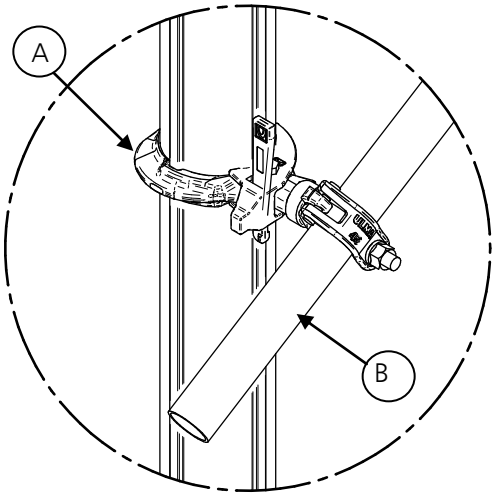
2.2.9. SWIVEL BRACING HOOK

This allows the outer tube of the ALUPROP to be connected to a 48 mm tube, forming any angle between the hook and the 48 mm swivel coupler.

It makes it possible to horizontally and vertically brace the ALUPROP towers and install safety handrails in the towers.





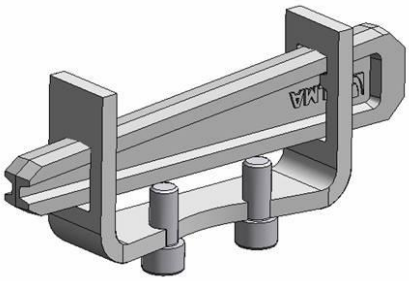


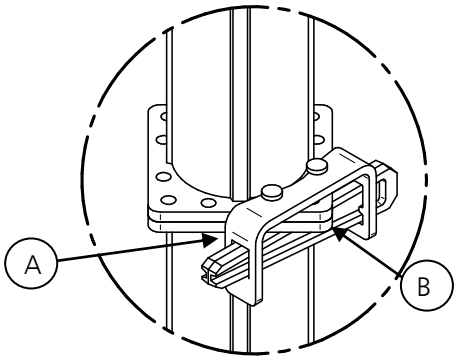
A	Swivel bracing hook
B	Tube ø48

2.2.10. ALUPROP CLAMP

Designed to quickly join the supplement 1m or aluprop spindle to the ALUPROP prop, as well as to fix the outer tubes of the ALUPROP props. It is fixed using two aluprop clamps.

The aluprop clamp has two guide pins to locate in the ALUPROP prop end plate and a wedge to join the props.



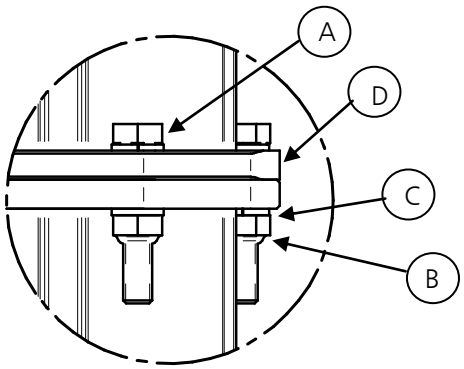


A	Aluprop clamp
B	End plate

2.2.11. NUTS AND BOLTS

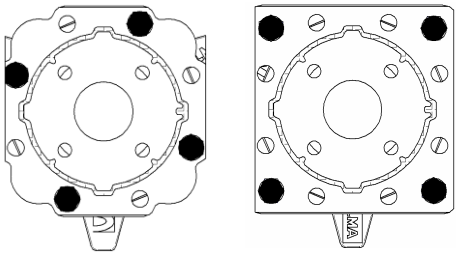
Connecting elements between ALUPROP end plates, supplements 1m or aluprop spindel. The elements are:

- Hexagonal bolt M10X50 DIN 933 8.8
- Nut M10 DIN934 5.6
- Spring washer B10 DIN 127



A	Bolt
B	Nut
C	Washer
D	End plate

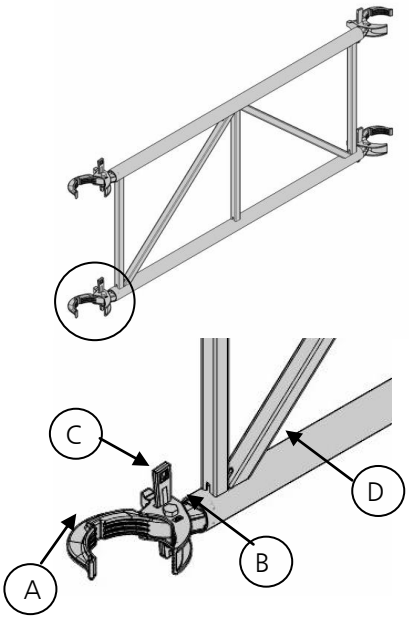
Nuts and bolts fixing position depending on the shapes of the ALUPROP end plate.



2.2.12. BRACING FRAME

Formed by steel tubes and four hooks with wedges to embrace the ALUPROP outer tube.

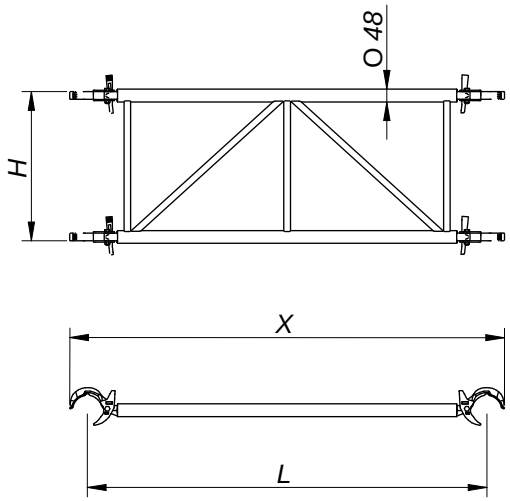
The bracing frame allows the joining of props, supplement 1m and aluprop spindle to form shoring towers.



A	Fixed hook
B	Mobile hook
C	ALUPROP wedge
D	Tube ø48

The fixed hook and the ALUPROP outer tube being the same shape allows the prop's outer tube to be embraced, adjusting it by means of tightening the wedge of the mobile hook

The tubular structure of the frame is steel and is formed by two 48 mm diameter horizontal tubes. These horizontal tubes, spaced at 530 mm, allows couplers and tubes to be braced and the 1.5 m steel platforms to be used as working platforms.



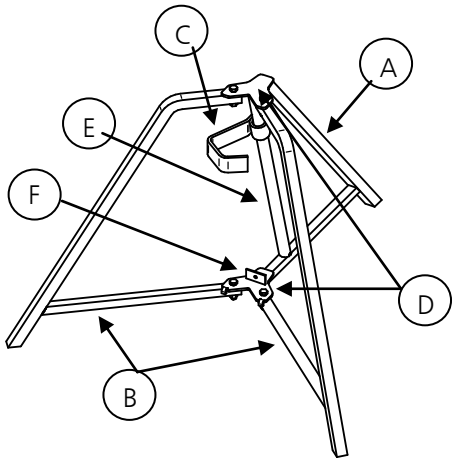
BRACING FRAME	Weight (Kg)	L (mm)	X (mm)	H (mm)
2.32 m	17.7	2320	2451	558
2.075 m	18.1	2075	2212	558
1.5 m	13.6	1500	1631	558
1.57 m	13.8	1570	1701	558
0.75 m	8.7	750	881	558

2.2.13. UNIVERSAL TRIPOD

Designed to stabilise and ensure the correct assembly of ULMA props with diameters of between 40 and 120 mm.

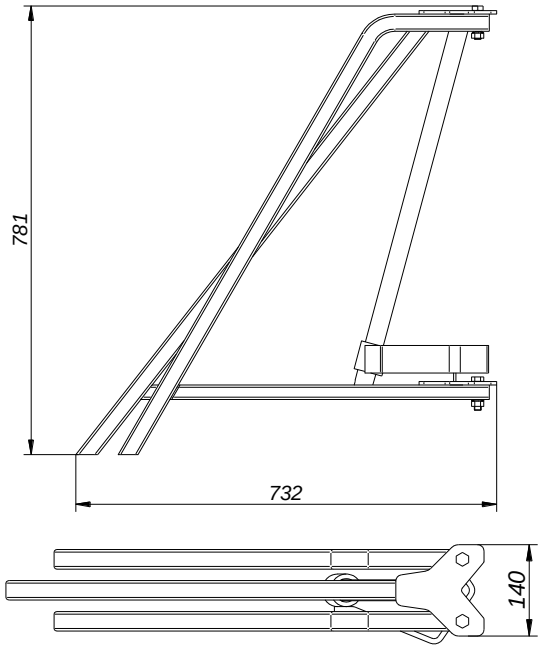
It consists of two mobile supports that allow its correct positioning, a restraint bearing that includes a base frame to hold the prop and a clamp that slides on a tilted tube to fix the props.

The lower base frame has a plate that allows a piece of wood to be attached and compensates for the difference in diameter in cases where the tripod is holding tubes of different diameter.



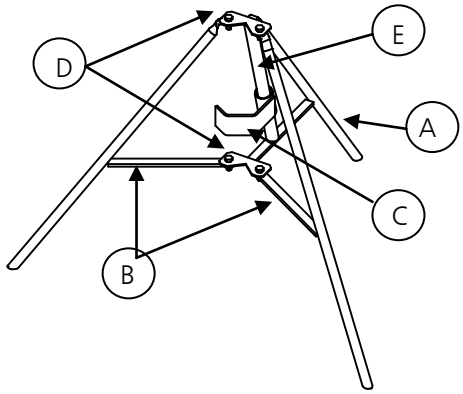
A	Restraint bearing
B	Swivel support
C	Clamp
D	Base frame support
E	Clamp guide
F	Nailing stop

Dimensions of folded tripod:



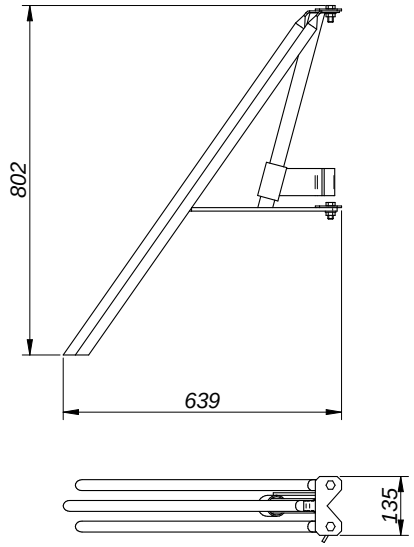
2.2.14. TRIPOD 42-87 mm

Designed to stabilise and ensure the correct assembly of ULMA props with diameters of between 42 mm and 87 mm. It consists of two mobile supports that allow its correct positioning, a restraint bearing that includes supports to hold the prop and a clamp that slides on a tilted tube to fix the props.



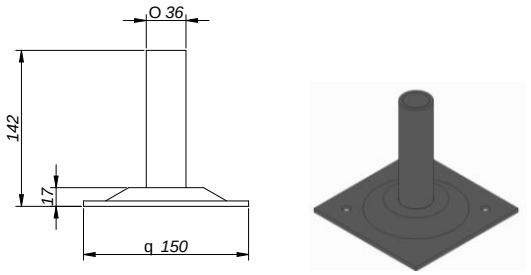
A	Restraint bearing
B	Swivel support
C	Clamp
D	Base frame support
E	Clamp guide

Dimensions of folded tripod:



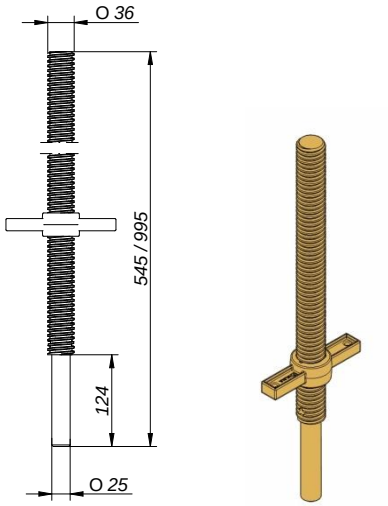
2.2.15. BASE PLATE G

This is placed in the initial phase of assembly, when the layout is implemented based on the project plan. It provides a stable support to the shoring.



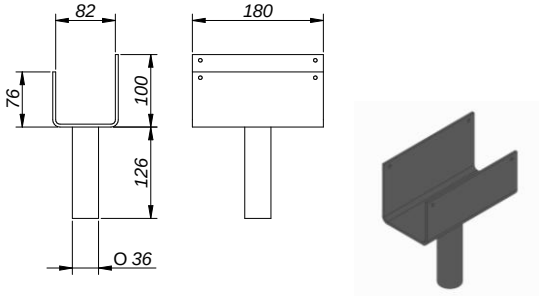
2.2.16. BASE JACK

This is used to level the structure and to adjust the shoring to the required dimension. It is placed in the initial assembly phase by inserting it into the base plate, and in the final phase by inserting it into the supplement without spigot.

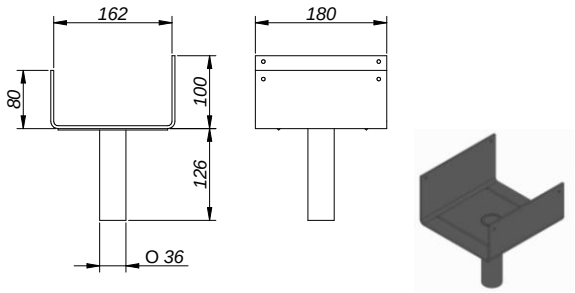


2.2.17. HEAD 80 and 160

Item for using formwork with the traditional system, being the sufficient size for housing a plank on its side.



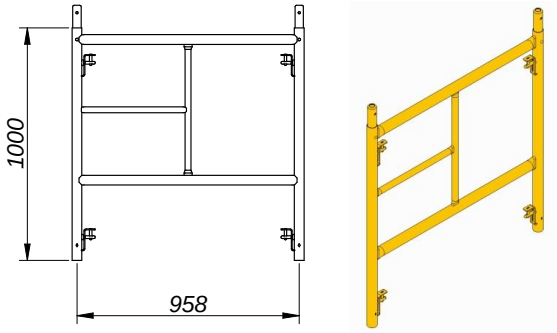
Head 80



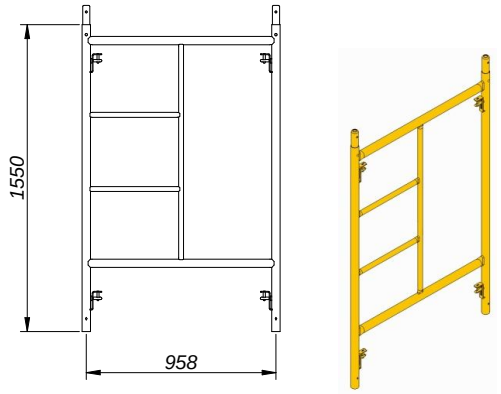
Head 160

2.2.18. FRAME G-100

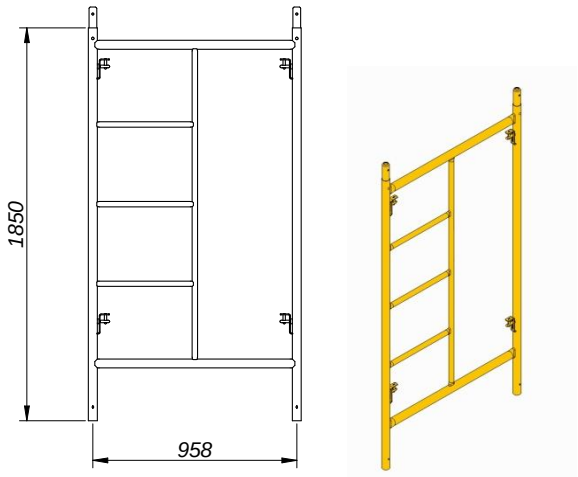
Item formed by a two-part frame. There is a series of horizontal tubes in one of these parts which can be used as a ladder.



FRAME G-100 1



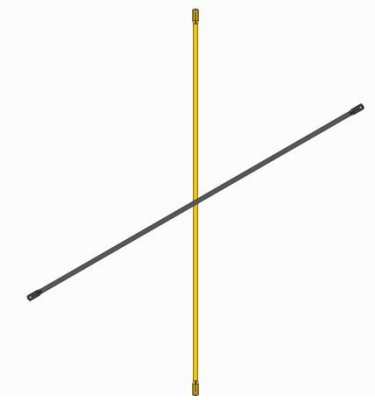
FRAME G-100 1.55



FRAME G-100 1.85

2.2.19. CROSSBRACES

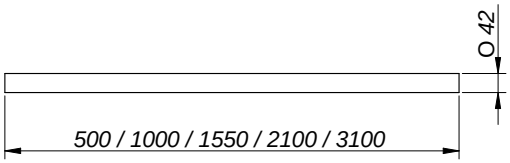
Tubes of identical size joined by means of a rivet which allows turning from one side to the other. Once assembled, they are the shape of a tick.

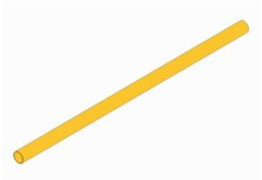


The cross members provide exact spacing between supplements.

2.2.20. TUBES ø42

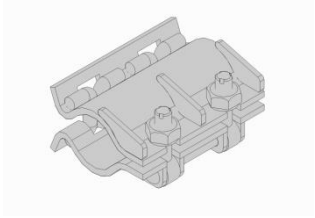
Items of different lengths. They have many and varied uses such as joining chained items, tying towers, etc.





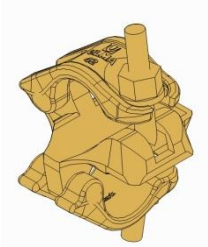
2.2.21. TENSION COUPLER 42

This is designed to connect two 42 mm diameter tubes. It consists of two semi-couplers joined to allow two continuous tubes to be connected with an axial joint.



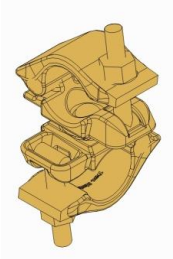
2.2.22. RIGHT ANGLE COUPLER 42/42

Item that allows different 42 mm diameter components to be joined with an orthogonal connection.



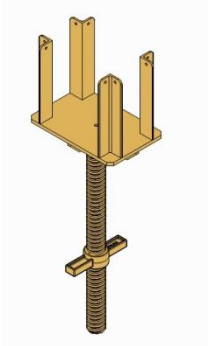
2.2.23. SWIVEL COUPLER 42/42

Item that allows different 42 mm diameter components to be joined with a swivel connection.

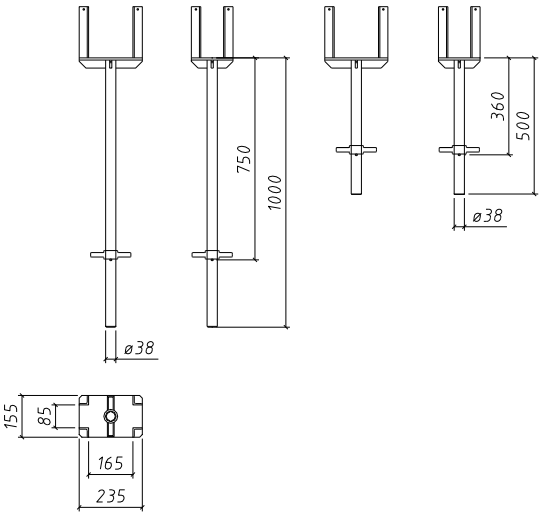


2.2.24. ADJUSTABLE HEAD

This item is used in shoring applications when joining scaffolding to formwork.



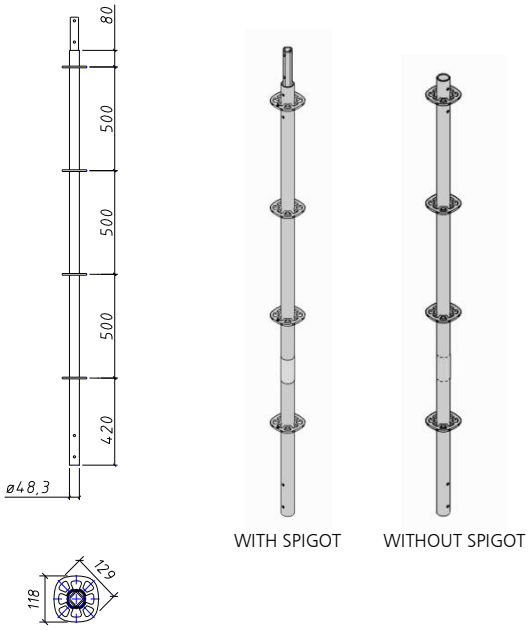
The adjustable head is composed of a 38 mm diameter solid bar with its corresponding nut and with a maximum adjustment of 350 mm for the 500 mm adjustable head and 750 mm for the 1m adjustable head. It has a welded plate with four L profiles at the four ends to fix the formwork.



2.2.25. STANDARD

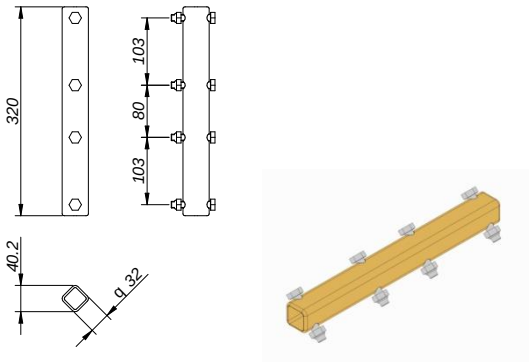
Structural item that transmits the loads supported by the scaffolding.

It comprises a steel tube with joint collars every 500 mm. The collars allow the horizontal and diagonal items to move in eight different directions. The standard can be finished with a spigot, allowing it to be linked with the following standard, or it can be finished without a spigot for an ending without obstructions. The existing dimensions are 0.5, 1, 1.5, 2 and 3 m.



2.2.26. DOUBLE SPIGOT

Item that can be bolted to a standard without spigot to convert it to a standard with spigot. It is bolted to the standard without spigot with two bolts.



2.2.27. DIAGONAL BRACE

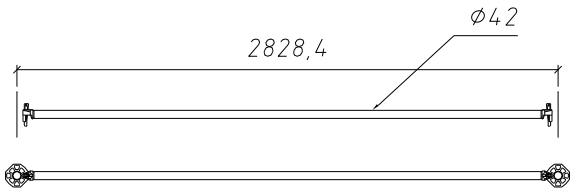
Structural scaffolding item that ensures the bracing of the vertical and/or perpendicular planes to the front. It is also used for creating suspended structures.

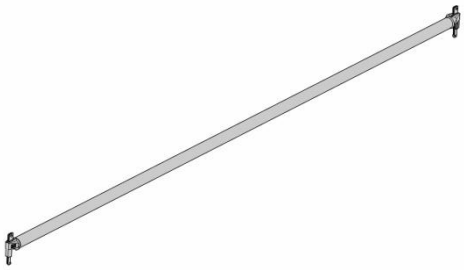
They comprise a tube with flattened ends and each has bolted on supports. Along with the wedges, they allow these to be fixed to the standards by means of the holes in the collars.

2.2.28. HORIZONTAL DIAGONAL

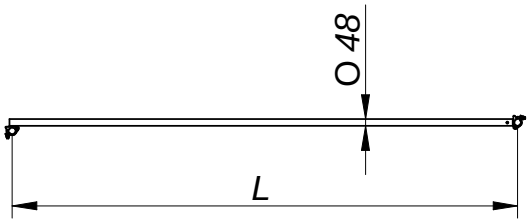
Scaffolding item that secures bracing on the horizontal plane.

The 2x2 horizontal diagonal has supports, each of which are welded to the ends, which together with the wedges allow these to be fixed to the standard collars.





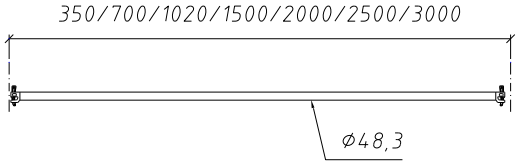
The other horizontal diagonals have semi-couplers at the ends instead of supports.



2.2.29. LEDGER

Structural scaffold component on the horizontal plane. This can also be used as a safety handrail by placing two units at 0.5 and 1 m.

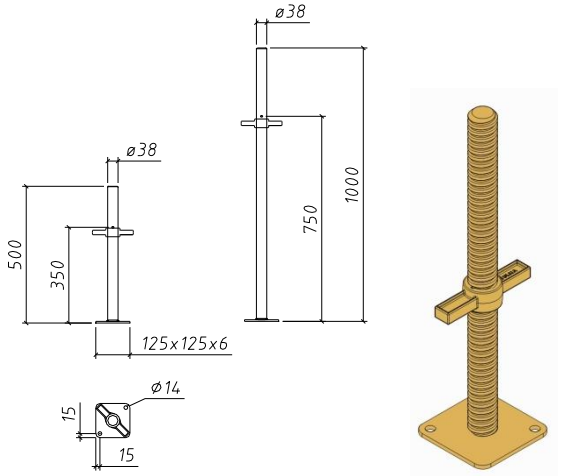
Casting supports are welded to the ends which, together with the wedges, allow them to be fixed to the standard by means of holes in its collars.



2.2.30. ADJUSTABLE BASE

This item's function is to level the structure, to adjust the required dimension and to transmit vertical loads produced in the scaffolding to the ground.

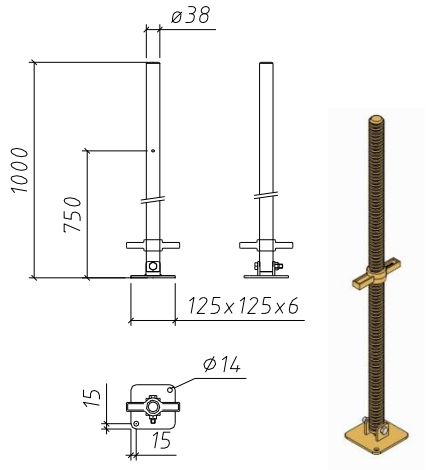
It has a nut for adjustment, upon which the base collar is supported and with which the scaffolding can be adjusted to the required height. The maximum adjustment are 0.75 m for the 1 m adjustable base and 0.35 m for the 0.5 m adjustable base.



2.2.31. ADJUSTABLE SWIVEL BASE

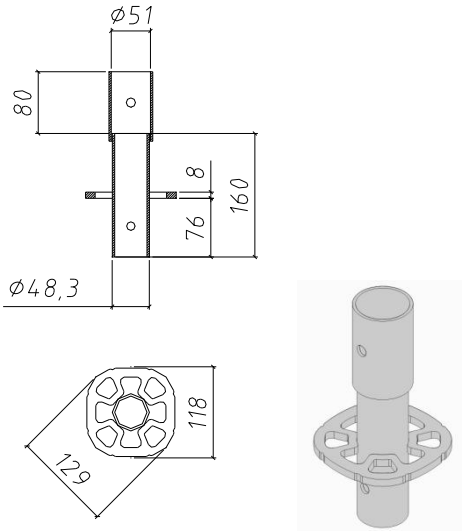
This item's function is to level the structure on surfaces with different slopes, to adjust the required dimension and to transmit vertical loads produced in the scaffolding to the ground.

The maximum adjustment is 0.75m.



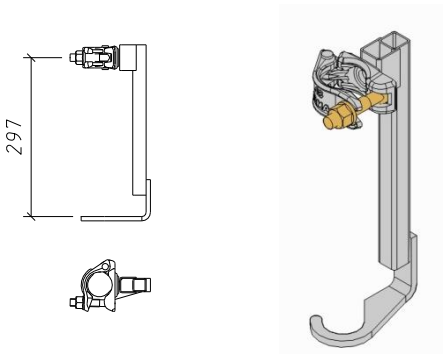
2.2.32. BASE COLLAR

Item that is placed directly over the nut of the adjustable base and to which the standards, ledgers and diagonals of the first level are joined.



2.2.33. HANDLE LOCK

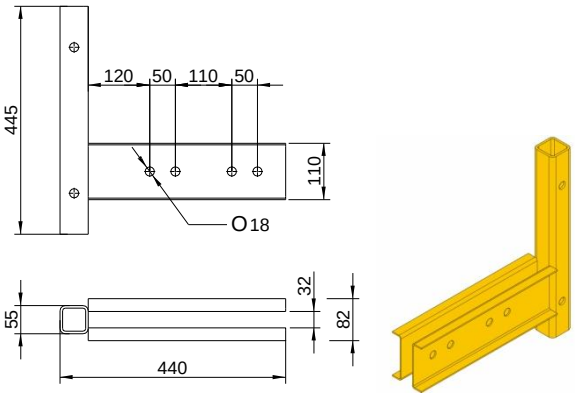
Item that is used to fix the adjustable base to the standard when scaffolding is lifted.



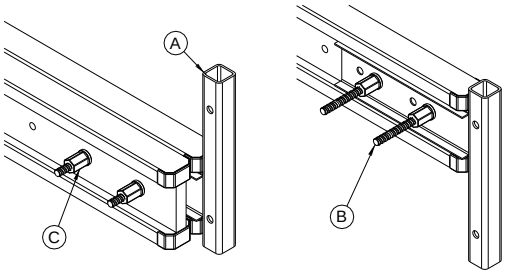
2.2.34. VM HANDRAIL SUPPORT

Safety accessory that is fixed to the timber beam and into which the safety handrail post is inserted.

This solution is certified by AIDICO in accordance with EN13374 with Handrail Post 1.5 (item number 2211156)



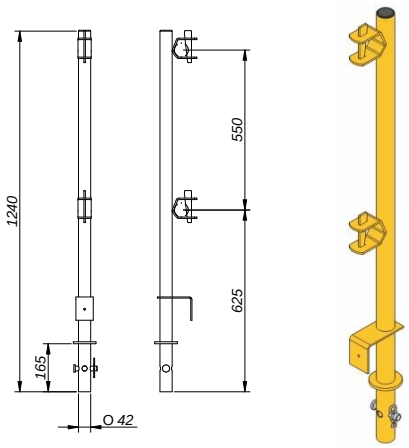
There are two possible assembly positions:



On the Main Beam *On the Secondary Beam*

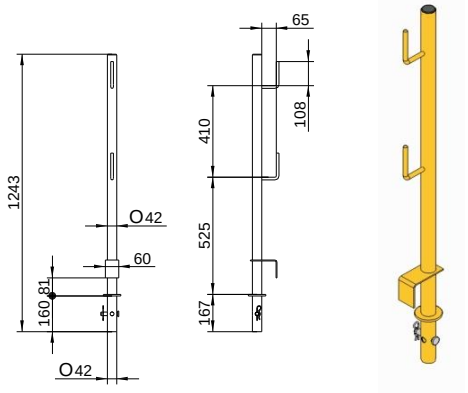
2.2.35. SAFETY HANDRAIL S-V

When placed over a base frame, this forms the regulatory handrail with ø42 mm tubes and wooden plank for the toeboard.



2.2.36. SAFETY HANDRAIL POST

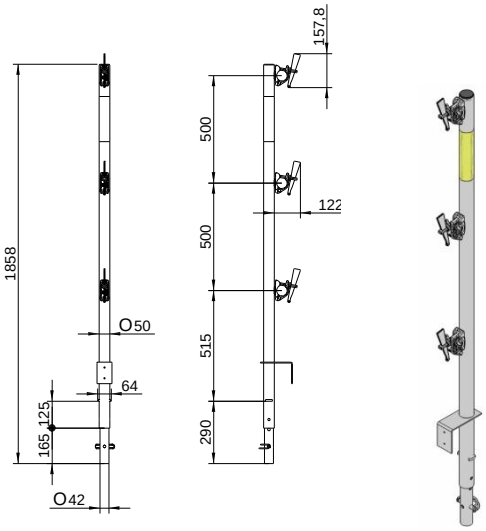
When placed over a base frame, this forms the regulatory handrail with wooden planks. The wooden plank is also used for the toeboard.



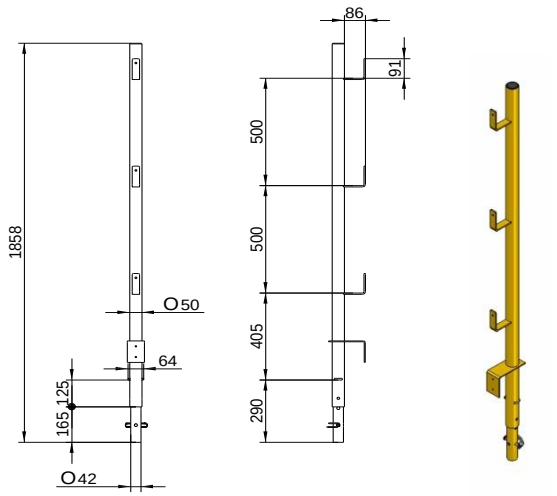
2.2.37. 1.5 m HANDRAIL POST - 1.5 m HANDRAIL POST POST

The 1.5 m Handrail Post placed over a base frame serves to form the regulatory handrail with a ø48 mm or ø50 mm tube and wooden plank for the toeboard.

	QUANTITY	NAME	ITEM NUMBER
A	1	VM HANDRAIL SUPPORT	2211165
B	2	PANEL BOLT	1861122
C	2	HEXAGONAL NUT 15	7238001



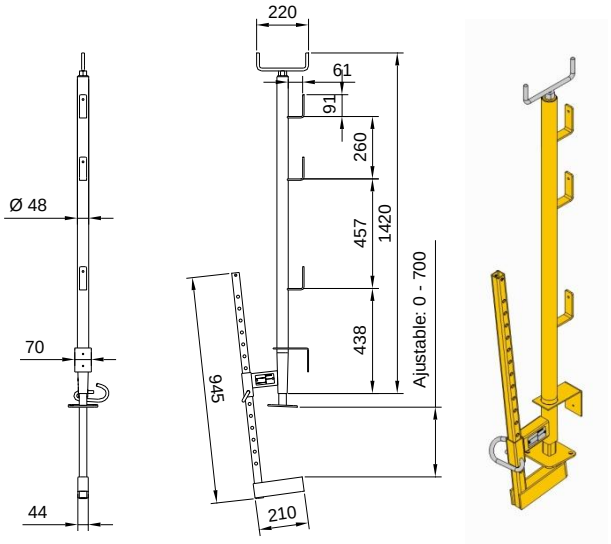
When placed over a base frame, the 1.5 m Handrail Post Wood forms the regulatory handrail with wooden planks. The wooden plank is also used for the toeboard.



2.2.38. CLAMP HANDRAIL 1.3

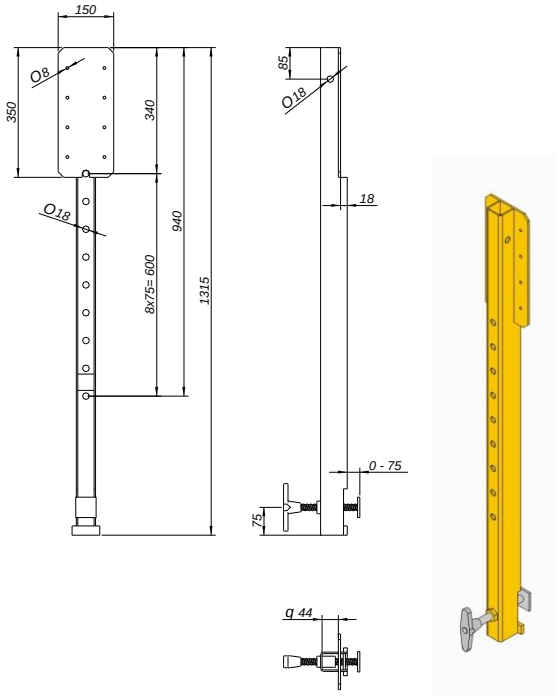
This is designed in accordance with EN13374.

The clamp is height-adjustable from 0 to 700 mm. It is used for the 30x150 mm European wooden plank and Ø48 mm tube.

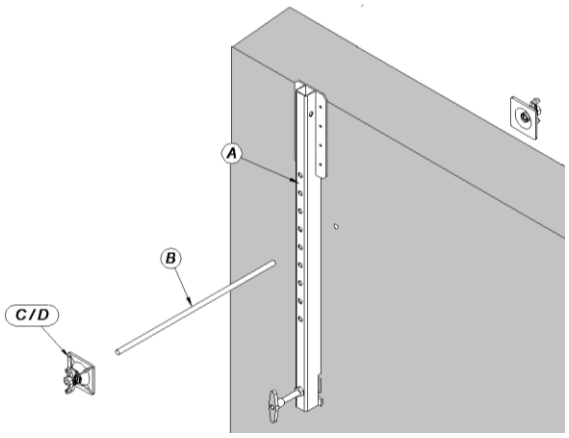


2.2.39. WALL HANDRAIL SUPPORT

Accessory for fixing a handrail to the outermost surface of an existing wall and/or to stopend the formwork.



It is fixed to the wall using the tie rod hole created during the concrete pouring for the wall, in the central part. To do this, a tie rod and two plate nuts are inserted into any of the ø18 mm holes spaced at every 75 mm, with the distance between the first and last hole being 600 mm.



	QUANTITY	NAME	ITEM NUMBER
A	1	WALL HANDRAIL SUPPORT	2211256
B	1	TIE ROD 15/1	0230100
C	2	PLATE WASHER NUT 15	1900256
D	2	PLATE NUT 15	7238000

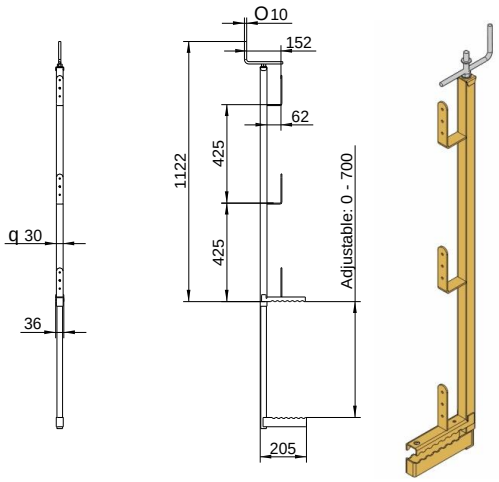
The upper part of this item has holes for fixing the part to the board and the lower part has a threaded crank to put pressure on the board.

For more information, see the Wall Handrail Support User's Guide.

2.2.40. CLAMP HANDRAIL 1m

This is designed in accordance with EN13374.

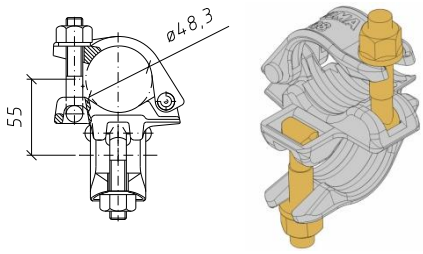
The clamp is height-adjustable from 0 to 700 mm. It is used with the 30x150 mm European plank.



2.2.41. RIGHT ANGLE COUPLER 48

Accessory for the orthogonal joining of two ø48mm tubes.

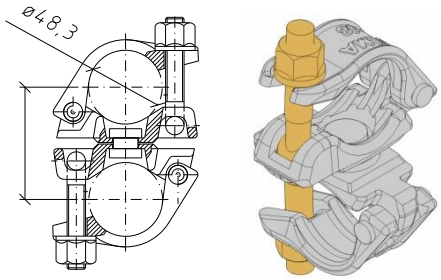
It complies with standard EN 74-1 and is certified.



2.2.42. SWIVEL COUPLER 48

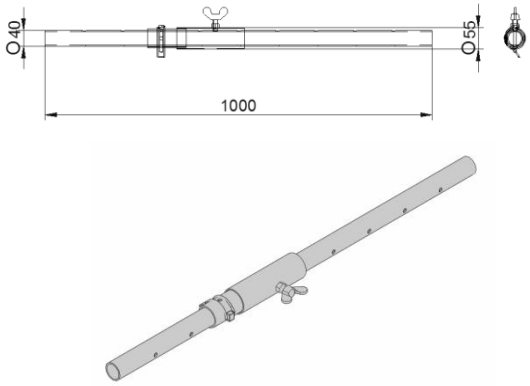
Accessory for joining two ø48mm tubes at any angle.

It complies with standard EN 74-1 and is certified.



2.2.43. EXTENDING LEDGER

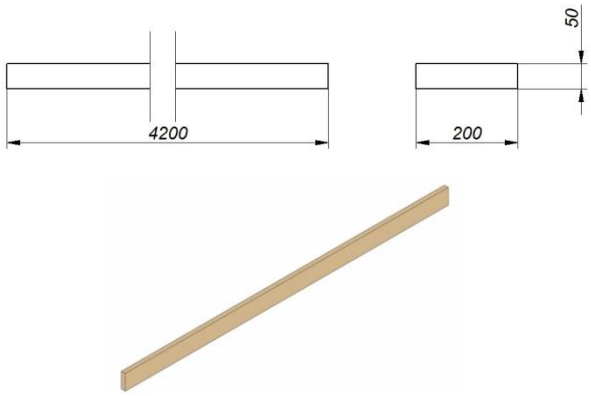
Removable handrail supplement for the ø48 mm tube, with which the handrail is supplemented, only exceptionally, up to 1 m extra (in 10 cm extensions).



It is assembled by fixing and connecting the ø55 mm tube to the ø48 mm tube of the handrail ledger to be supplemented. Next the butterfly screw is tightened; once this has been done, the cotter pin is released and the 40 mm circular tube is extended until it is placed in the final position, when the cotter pin can be placed in its corresponding hole.

2.2.44. TOE BOARD 4000x200x50

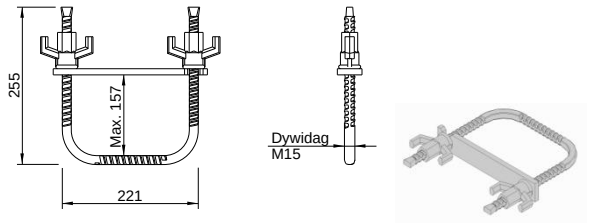
This is a 4 m x 0.2 m x 0.05 m wooden plank with a quality of at least C-24 at in accordance with standard EN 338:2003. This is the standard toeboard that can be used in all edge protection systems.



2.2.45. PROP BRACING CLAMP

This stiffens and stabilises any ULMA Prop with wooden planks. It has a sheet and nuts for fixing.

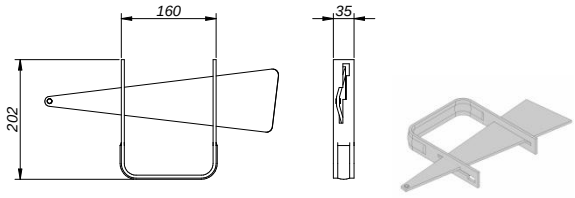
The maximum board thickness is 150mm.

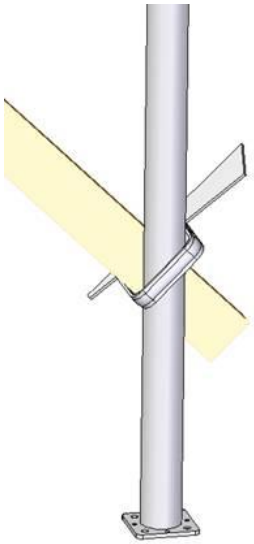


For more information, see Instructions for Use of prop bracing clamps.

2.2.46. CLAMP SP-EP

This stiffens and stabilises ULMA SP and EP Props with wooden planks. It has a wedge for fixing. The maximum board width is 120mm.



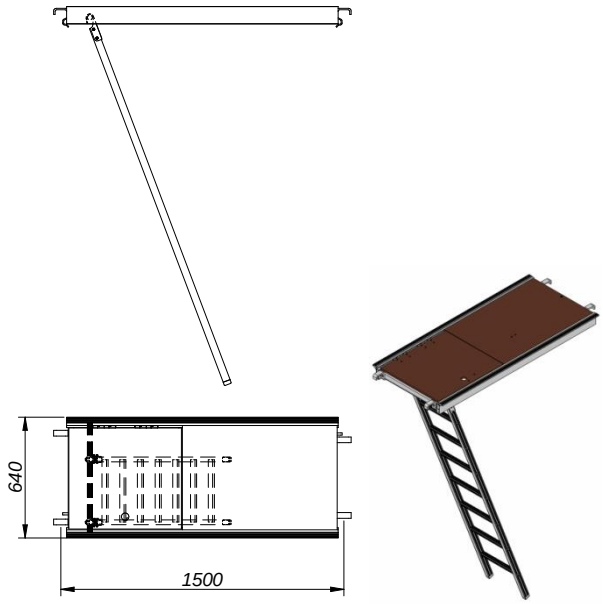


2.2.47. TRAPDOOR PLATFORM 1.5

This is a working platform for workers. It allows vertical access to the structure thanks to the built in ladder and trapdoor.

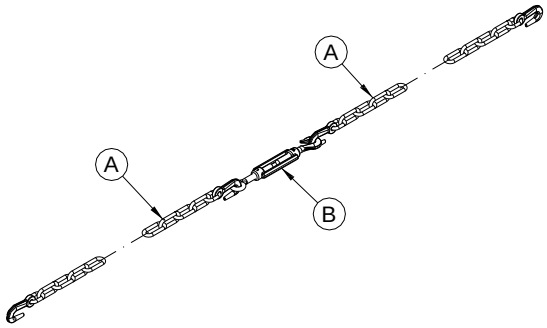
The wooden surface is class 3 fire resistant.

The 1.5 trapdoor platform is class 6 (600 daN/m^2) in accordance with EN12811-1.



2.2.48. CHAIN VR 7.5 kN

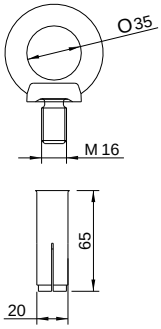
This is an anchoring system to prevent overturning. It is formed by two metal chains (DIN 763) with two hooks at the ends of each chain. These chains are joined by means of an M-12 hook-type push-pull prop and ring (DIN 1480).



	QUANTITY	NAME	ITEM NUMBER
A	2	CHAIN DOUBLE HOOK	2211751
B	1	EYEBOLT/HOOK PUSH-PULL PROP M/14	9371857

Includes:

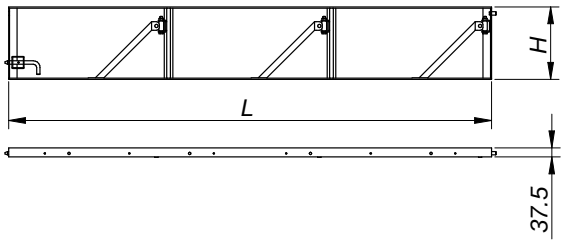
- Eyebolt Screw M16 (item number 9165400).
- HKD HILTI Plug M16 (item number 9850530).

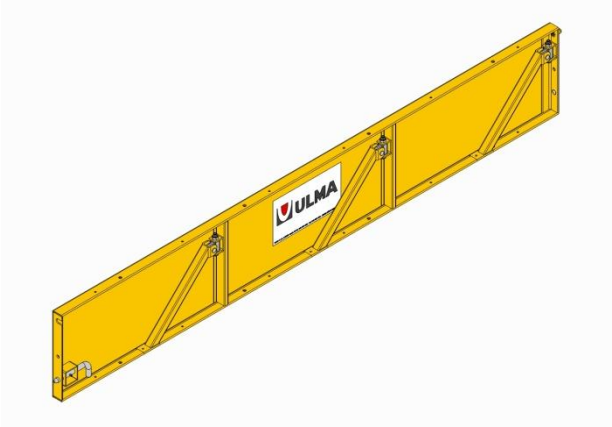


For more information see VR Chain instructions for use.

2.2.49. STOPEND

Steel structure for making slab edges. This is composed of a steel structure with a frame shape to which reinforcements have been welded and to which legs have been joined to support loads from the pressure of the concrete.



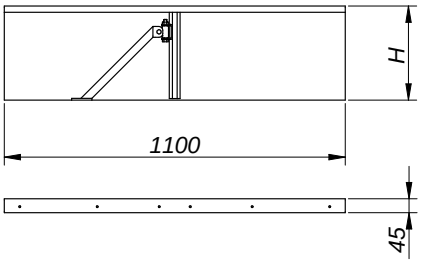


NAME LxH	ITEM NUMBER
STOPEND B 1x0.3	1860676
STOPEND B 2x0.3	1860690
STOPEND B 1x0.4	1860696
STOPEND B 2x0.4	1860705

For more information, see the Stop-ends User's Guide.

2.2.50. FILLER STOPEND

Reinforced sheet to compensate the dimensions of the slab boards that are made with the stopend. The maximum compensation possible is 1m.



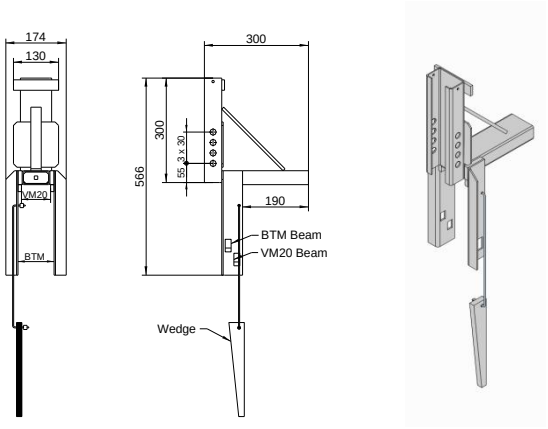
NAME	ITEM NUMBER
Filler stopend 0.3	1860676
Filler stopend 0.4	1860696

The reinforced sheet has a central reinforcement welded to an articulated leg that allows the plumbing of the stop-end and supports the pressure of the concrete.

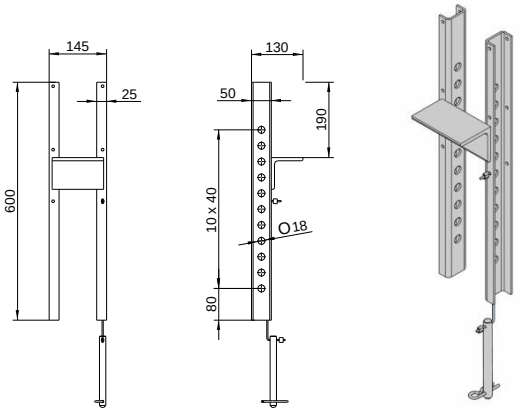
For more information, see the Stopends User's Guide.

2.2.51. VM HANGING BEAM SUPPORT AND VM20 HANGING BEAM SUPPLEMENT

Items for making hanging beams and slab edges. They are designed for VM 20 beams.



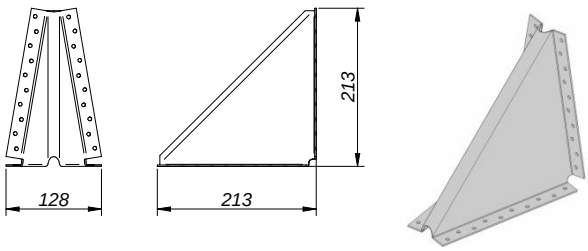
The VM 20 hanging beam supplement is an accessory to combine with the support for hanging beams up to 90 cm.



For more information see the User's Guide VM 20 HANGING BEAM SUPPORT.

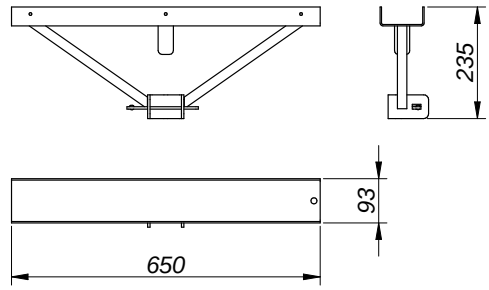
2.2.52. STOP-END CORNER

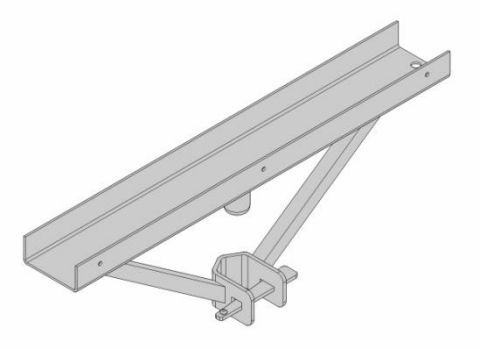
Steel item for making slab edges. It is nailed to the formwork.



2.2.53. CROSS PROP

Steel item for using with hanging beams.





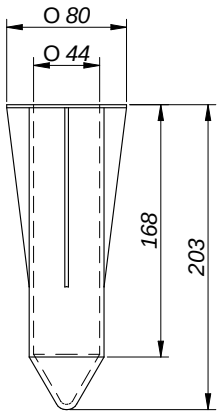
NAME	ITEM NUMBER
Cross Prop SP-30	2170365
Cross Prop SP 35-40	2170360

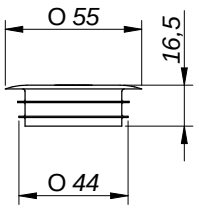
The difference between the two cross braces is the tie clamp. The SP-30 prop cross brace has a narrower clamp to tie to the SP-30 prop tube (ø45). And the SP 35-40 cross brace is for use with the SP-35 prop (ø54) and the SP-40 prop (ø54).

2.2.54. PLUG 42 AND PLASTIC PLUG

These are two parts which are assembled together in the fresh concrete as sockets for the positioning (after the concrete has set and the plug has been removed) of the handrail post as edge protection.

The plug 42 has been tested with the 1.5m Handrail Post and the set complies with the requirements of EN 13374.





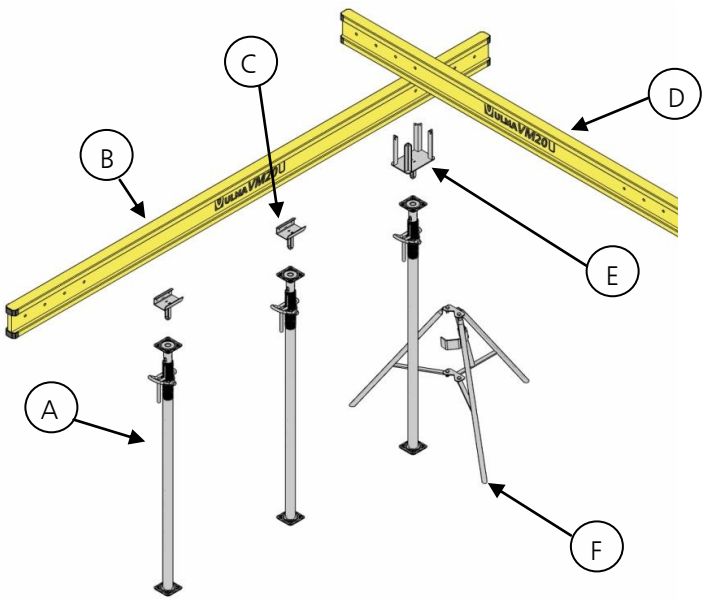
3. ASSEMBLY, USE AND DISMANTLING

3.1. BASIC ASSEMBLY

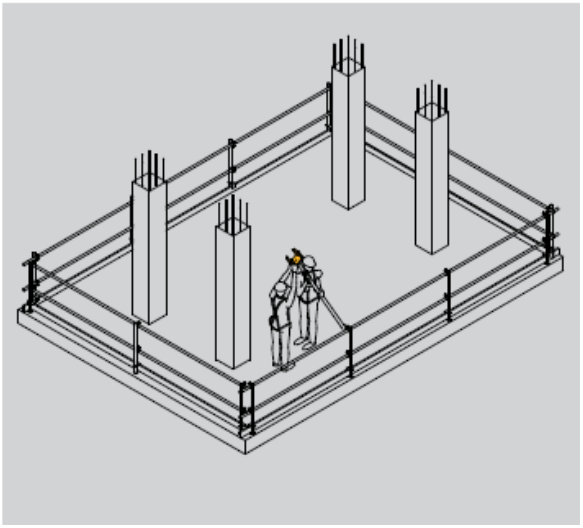
The basic assembly of the ENKOFLEX system comprises VM 20 beams forming a double arrangement, resting on double head VR and simple heads VR. The board rests on the VM 20 secondary beams.

The double heads are assembled at the beginning and at the end of each main beam, on the overlaps of the VM 20 main beams.

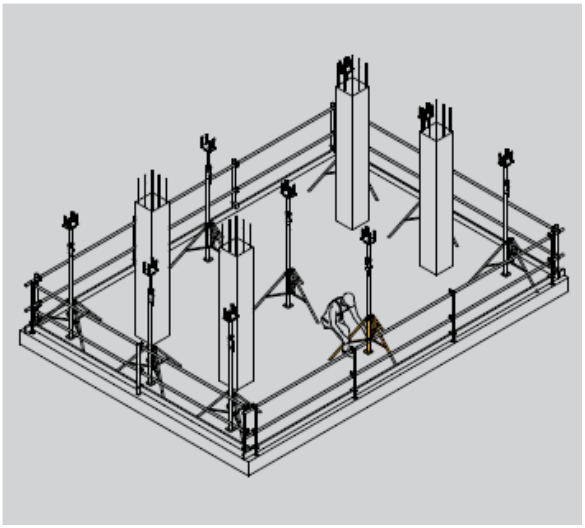
The props that go on the double heads VR are assembled with tripods to provide the system with stability.



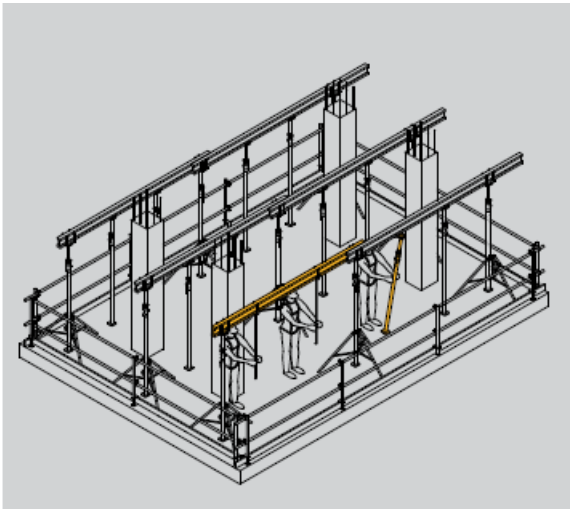
A	Prop
B	VM20 Main beam
C	Simple head VR
D	VM20 Secondary beam
E	Double head VR
F	Tripod



1. Insert the Head into the top part of the Prop.

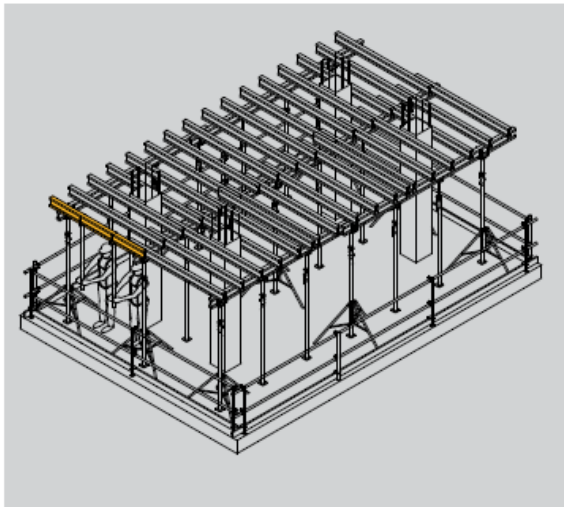


2 Make a layout of the main beams following the drawing. Position the props, stabilised by means of tripods, following these layout lines.



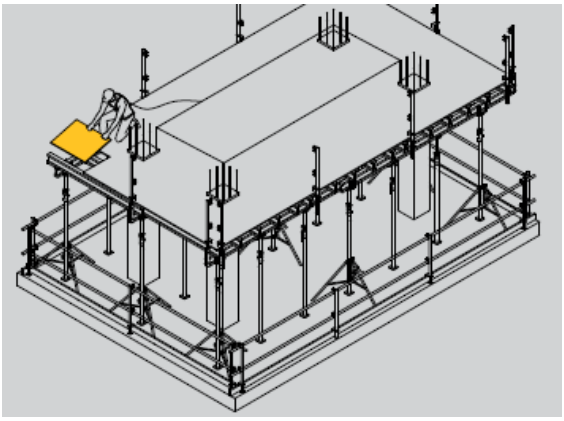
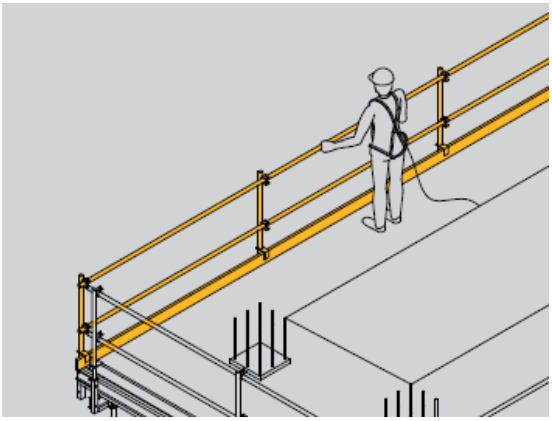
3. Place the main beams, propping up each one of them with two props at the ends and double heads. Stabilise them using the tripods. Place the intermediate props with the simple head.

The main beams are assembled with the help of specific items, or by auxiliary equipment if these are not available.



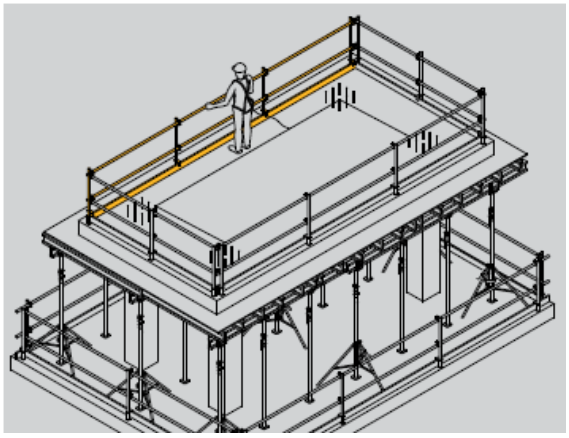
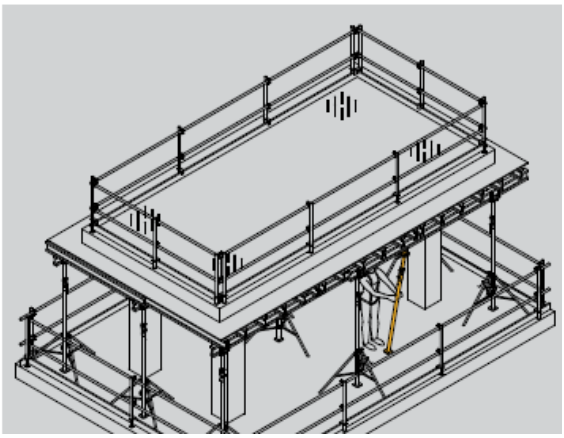
4. Space the secondary beams at the distance indicated in the assembly drawings.

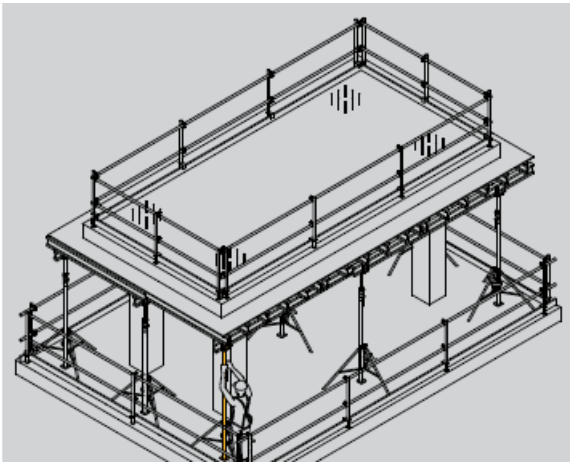
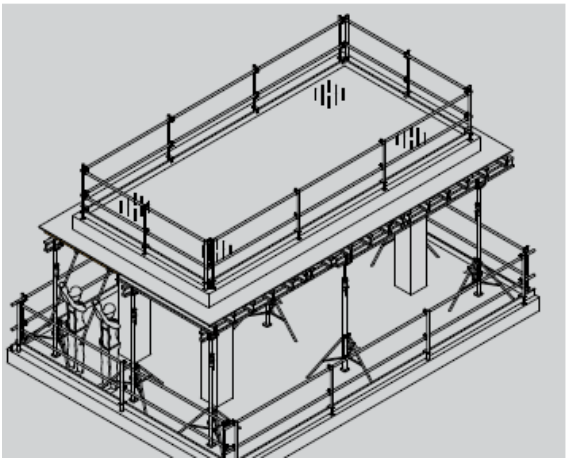
The same auxiliary equipment is used for the assembly of the secondary beams as for the main beams.

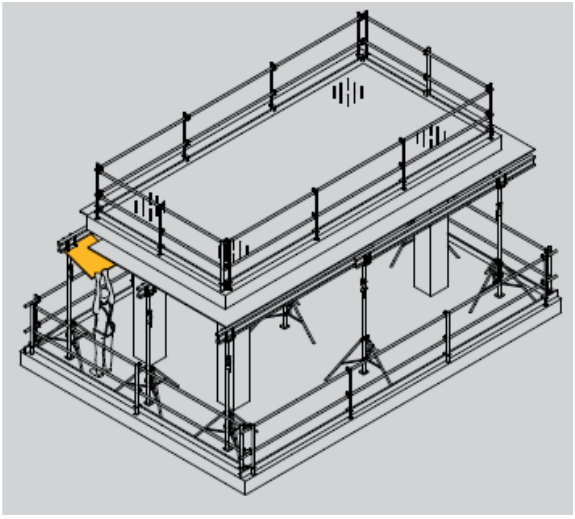
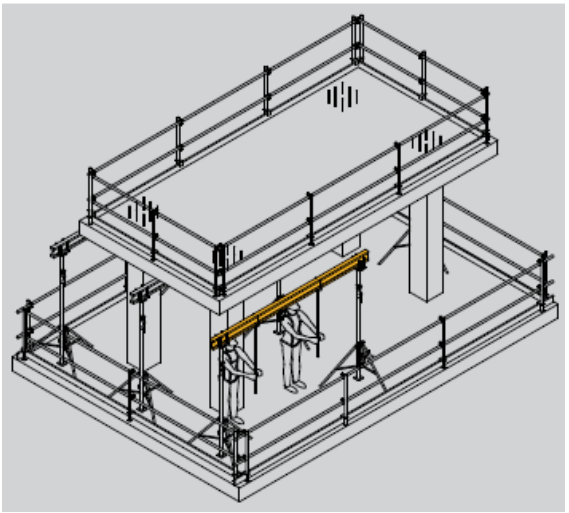
	
5. Place the boards in a secure manner. At all times the worker should remain tied from the securing shackle of the harness to the life lines installed between the columns or use auxiliary equipment.	6. Close the perimeter by means of handrails and toeboards.

3.2. BASIC DISMANTLING

Stripping should always be carried out from the centre of the span towards the ends. Equally, in the case of the cantilevers, stripping should begin at the end of the cantilever towards the interior. Based on the construction time scales, layout of the formwork, slab thickness and free height, the falsework should be removed when the slab is able to support the forces to which it is submitted, beginning from the central props towards the columns.

	
1. Remove the perimeter protection and place it on the prepared forged slab.	2 Then unload the intermediate props with the simple heads. Study the stripping process to avoid overloading the props. To remove the props, you do not need to completely remove the simple head from the prop. Loosening it and turning it sideways will suffice.

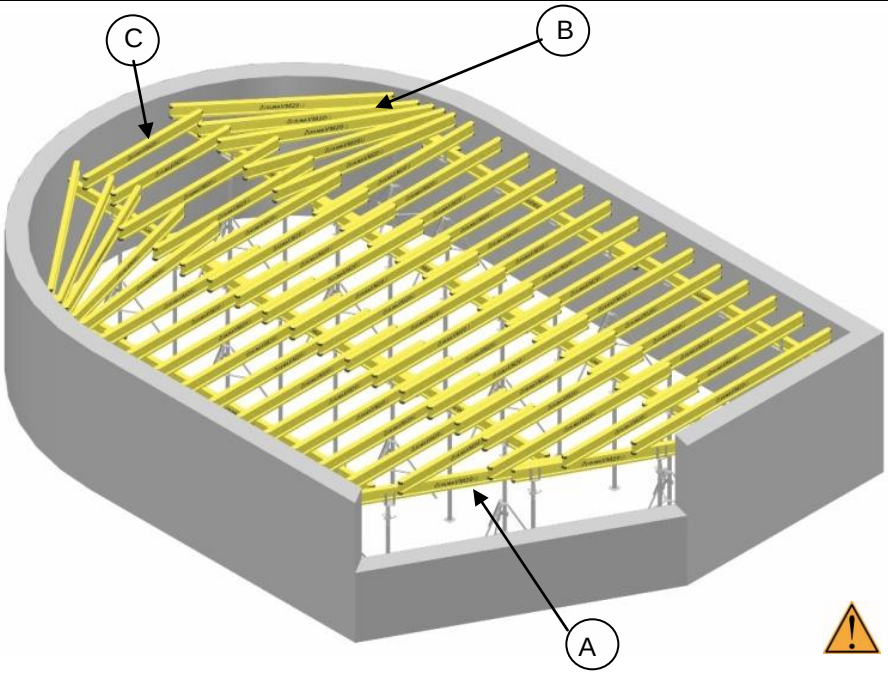
<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>3. Loosen the remaining props by approximately 5 cm so that the main beams descend.

⚠ Take the necessary precautions to avoid items falling.</td><td>4. Lay the secondary beams over the main beams to take them out, leaving those that go in the panel connections.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>5. Remove the panels along with the secondary beams that they are shored on.</td><td>6. Finish dismantling the rest of the formwork: main beams, props, double heads and tripods.</td></tr>
</table>

4. SOLUTIONS

4.1. FLEXIBLE SYSTEM

The ENKOFLEX system can be easily adjusted to different geometries.

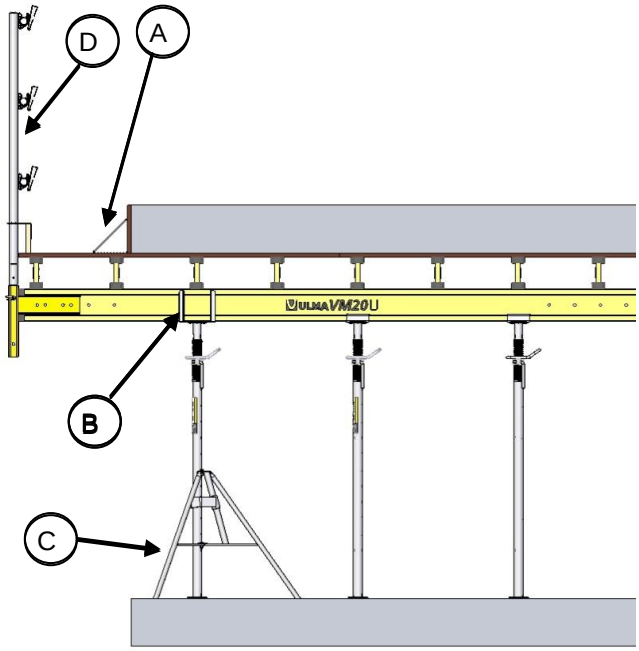


A	Position of the main beam tilted with the wall.
B	Secondary beams tilted so they cover the curved zone of the wall well.
C	Shorter secondary beams so they can be adjusted better.

Infilling zones never exceed the maximum distances of the layout.

4.2. SLAB EDGE SOLUTIONS

4.2.1. WITHOUT HANGING BEAM



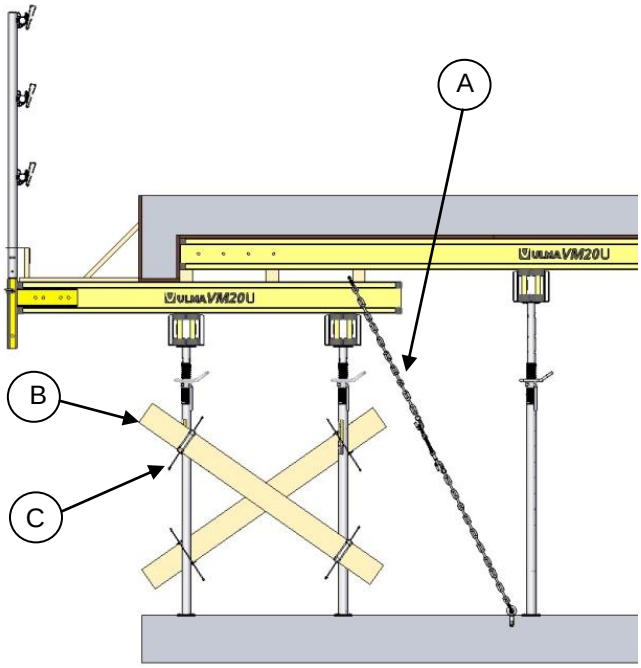
A	Stopend corner (item No. 2170358)
B	Double VR head (item No. 2211003)
C	Tripod (item No. 2170355)
D	Handrail post

Place the tripod with the prop that is used with the double head.

Solution for slab edge with stop-end corner. This can also be done with a stopend or VM hanging beam support.

The stability of the formwork must be ensured.

4.2.2. WITH HANGING BEAM



A	Chain VR (item No. 2211750)
B	Plank
C	Clamp SP-EP (item No. 2170356)

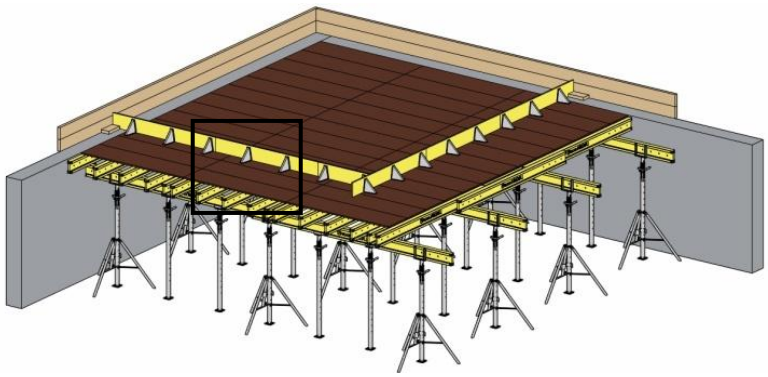
Brace the corner props in a cross with the prop brace and plank.

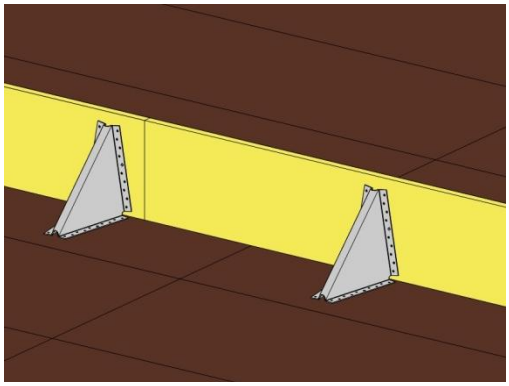
Special care must be taken when the hanging beam is on the perimeter of the slab, due to danger of the assembly overturning. Using the chain VR is recommended.

The VR chain is attached to the slab by means of a ring or bolt previously placed in the slab. It has a length of 5.2 m and a **load-bearing capacity of 7.5 kN**.

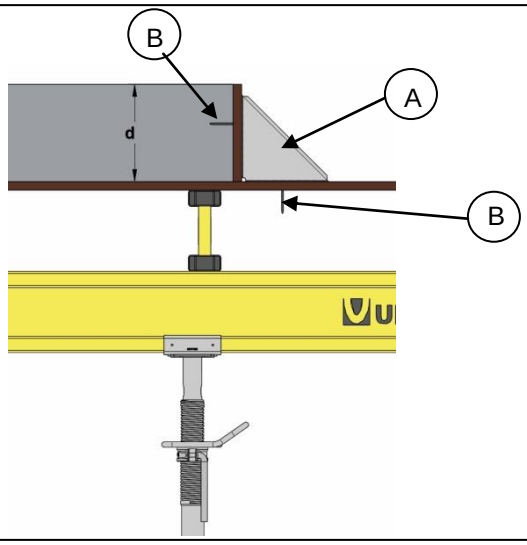
4.3. STOP-END SLAB SOLUTION

4.3.1. WITH STOP-END CORNER





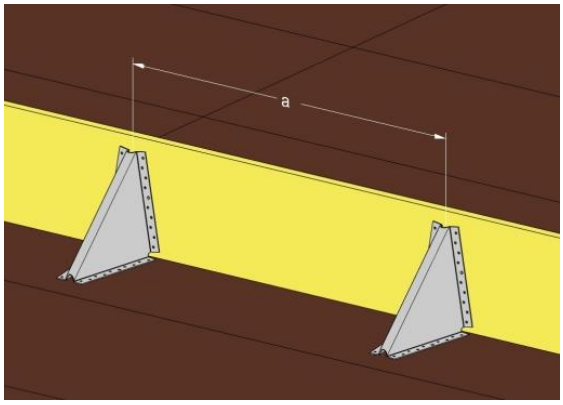
The stop-end corner panel is nailed to the board.



Maximum slab thickness of **30 cm**

A	Stop-end corner (item No. 2170358)
B	Nail ø4.3

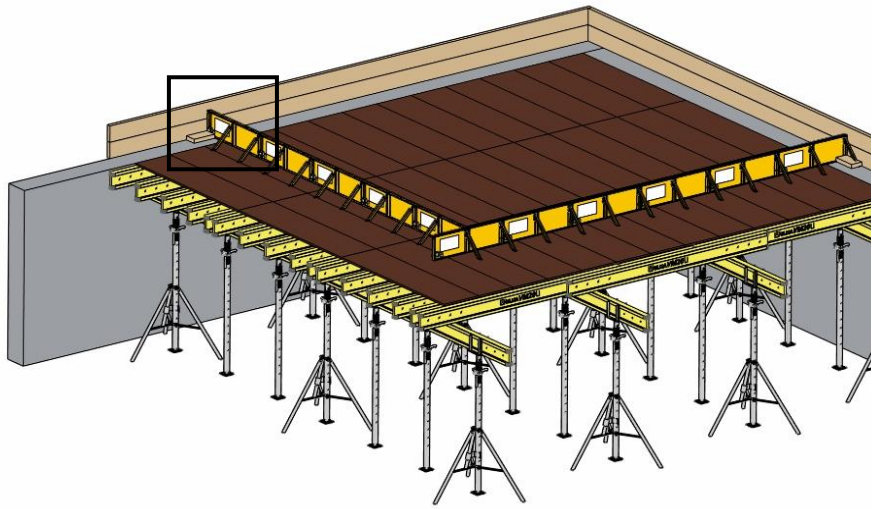
Permissible differences between stop-end corner panels:



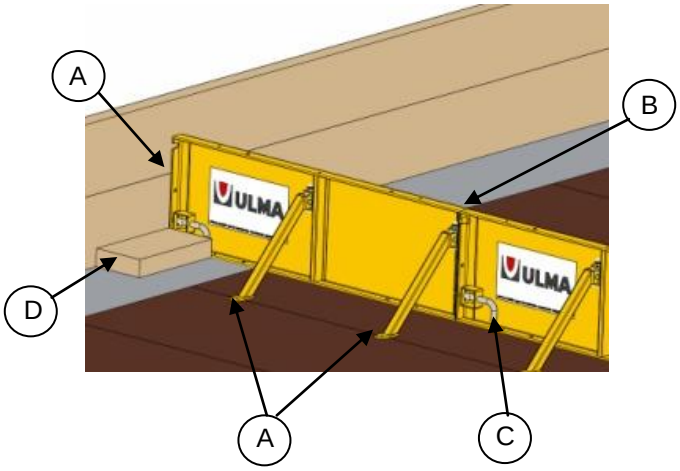
	Maximum width of influence 'a' with slab thickness [m]		
	0.2	**0.25**	**0.3**
Four units ø4.3mm nails	2	1.8	1.6

4.3.2. WITH FILLER STOPEND

To achieve the desired slab edge length, there are different stop-end dimensions as well as the compensating stop-end. The maximum compensation length of the compensating stop-end is 1m.

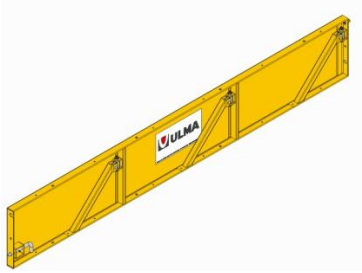


⚠ The stopend is nailed to the board.



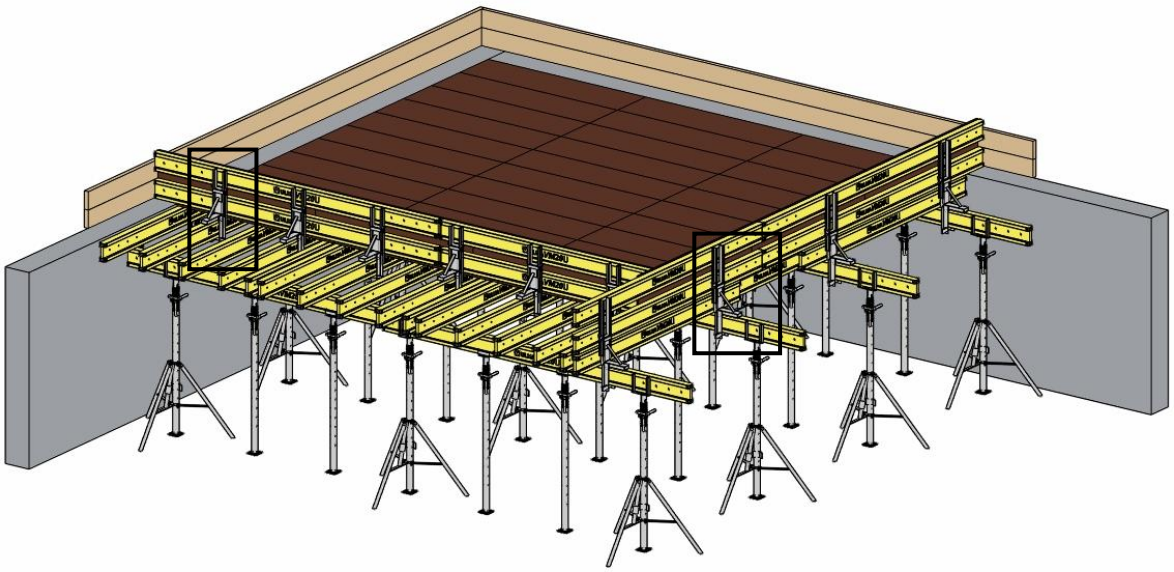
A	Fix to the wood
B	Positioning of the panels using integrated pin.
C	Fixing the panels
D	Wooden block to secure the position of the last stopend

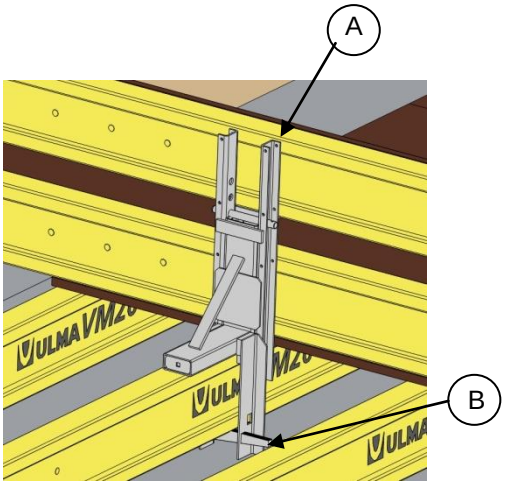
The maximum possible slab thickness is 30 to 40cm, depending on the stopend.



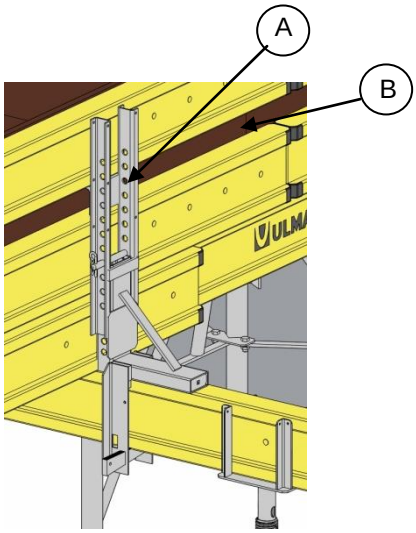
ITEM NUMBER	NAME	MAXIMUM SLAB (cm)
1860676	Stopend B 1x0.3	30
1860690	Stopend B 2x0.3	30
1860696	Stopend B 1x0.4	40
1860705	Stopend B 2x0.4	40

4.3.3. WITH HANGING BEAM SUPPORT





A	Fix the VR hanging beam support (item No. 2211670) to the wood.
B	Fixing the Hanging Beam Support with wedge

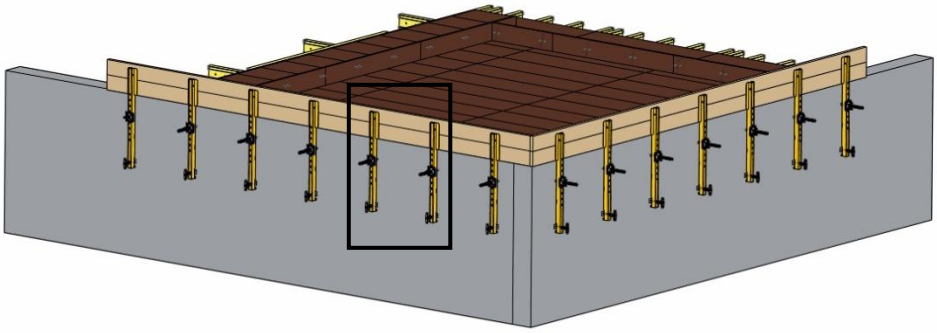


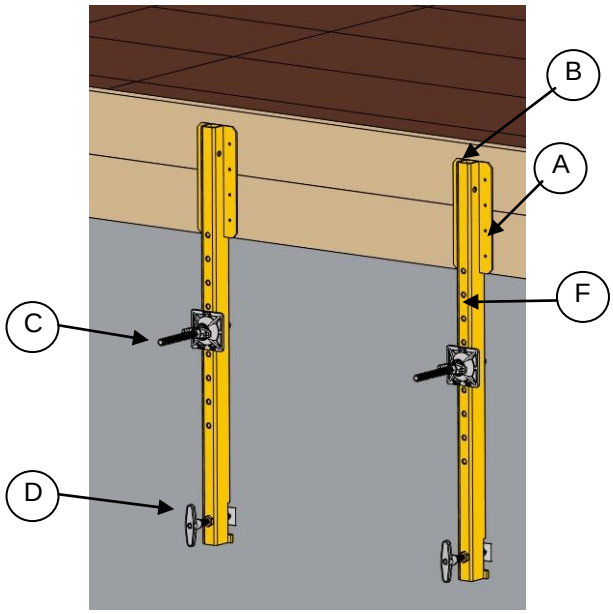
A	The beam supported by the VM20 Hanging Beam Supplement (item No. 2211660)
B	Board fixed to the beams

For more information see features chapter

4.3.4. WITH WALL HANDRAIL SUPPORT

The wall handrail support is fixed to the wall, the holes that were made when the wall was concreted may be used to stopend the formwork or fix a handrail to the outermost surface of an existing wall.





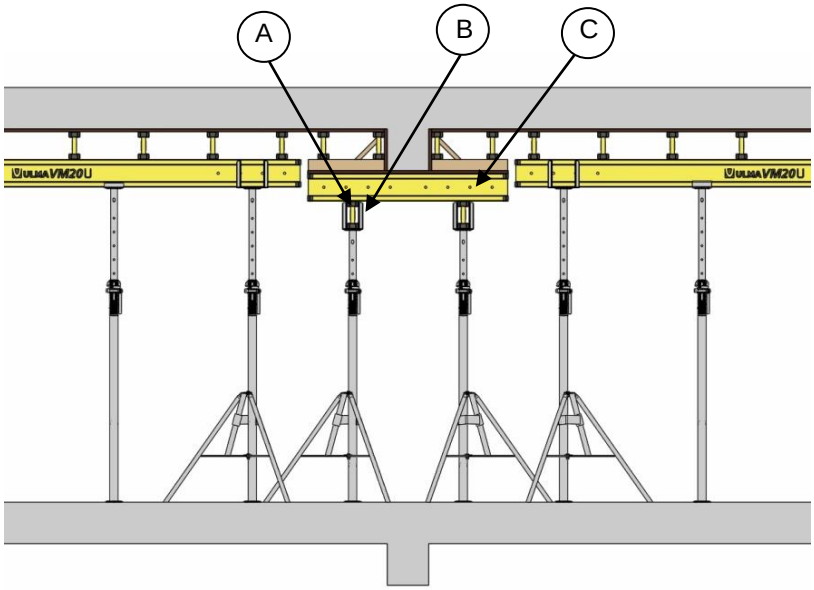
A	Fix the wall handrail support (item No. 2211256) to the wood.
B	Hole to insert the safety handrail
C	Fixing with tie rod and two nuts
D	Threaded handle to fix it to the wall
F	ø18mm holes spaced at 75mm

For more information see features chapter

4.4. HANGING BEAM

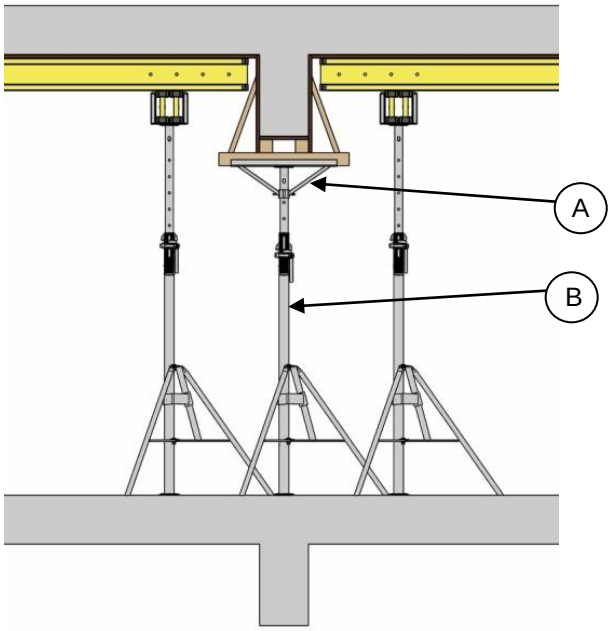
To shore the hanging beams, the main beam is placed longitudinally to the beam, and the secondary beams are supported on these.

4.4.1. WITH TIMBER BEAM



A	Main VM beam
B	Double VR head
C	Secondary VM beam

4.4.2. WITH CROSS BRACE PROP



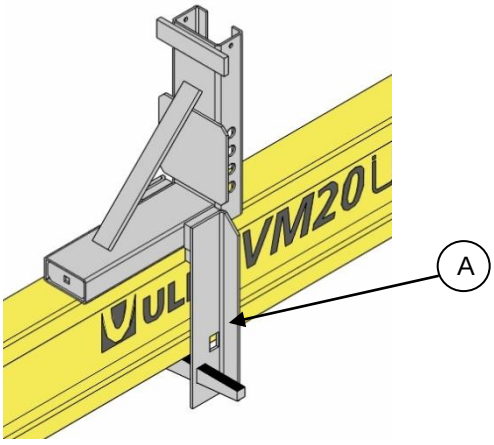
A	SP-30 (item No. 2170365) cross prop
B	SP-30 prop (item No. 2170030)

For more information see features chapter

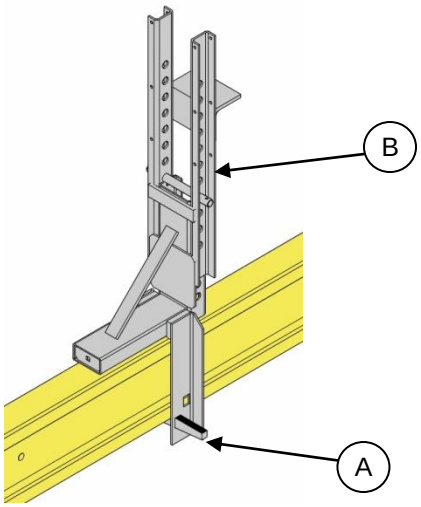
4.4.3. WITH HANGING BEAM SUPPORT

The construction of the hanging beam can be carried out with the hanging beam support for slabs of up to 40 cm. The hanging beam support is placed on the VM 20 timber beam, making it possible to stopend the sides and it is fixed with the wedge.

For slabs of between 40cm and 90cm, add the hanging beam supplement.



A	Hanging beam support (item No. 2211670)

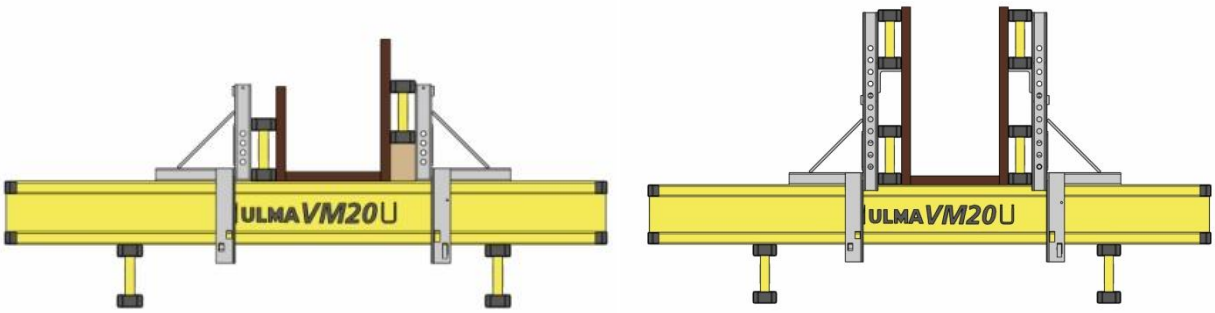


A	Hanging beam support
B	Hanging beam supplement (item No. 2211660)

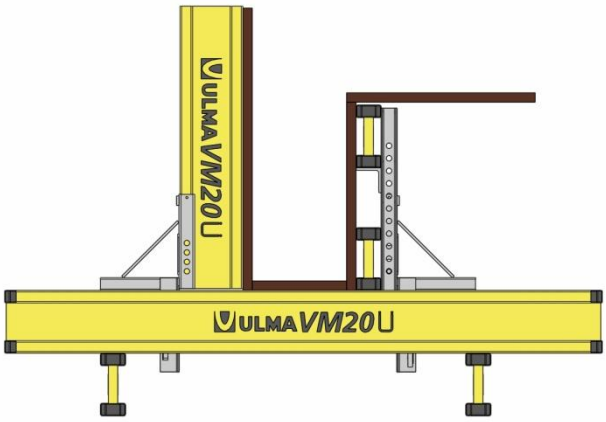
ASSEMBLY EXAMPLES

The following structures are only recommendations, other configurations are possible.

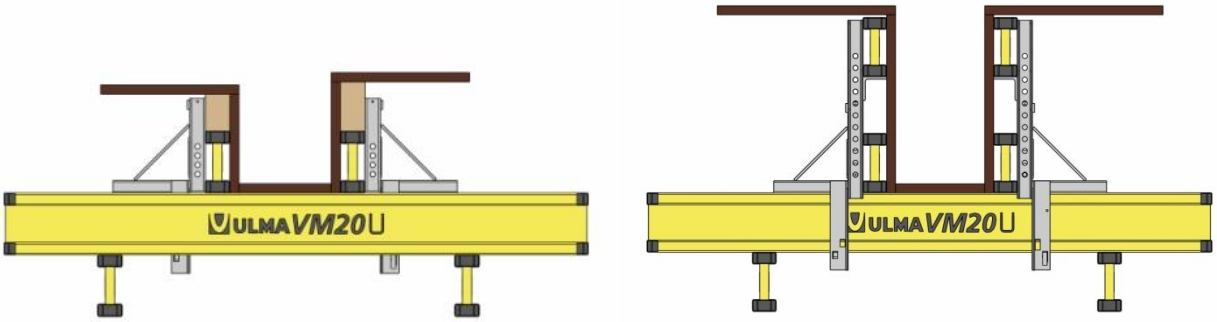
***Hanging beam solution**



***Hanging beam and slab edge solution**



***Hanging beam and slab solution**

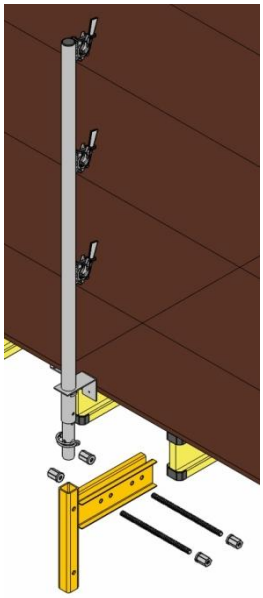


For more information see features chapter

4.5. PERIMETER PROTECTION

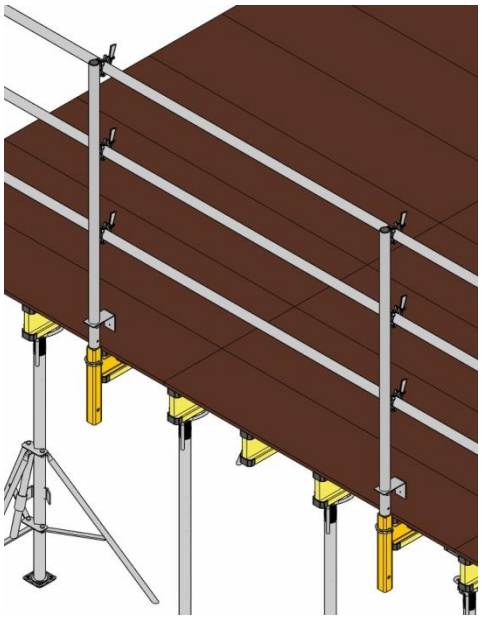
4.5.1. HANDRAIL SUPPORT

The handrail support acts as support for placing the front and side handrails. It can be mounted over the main beam, as well as over the secondary beam.



The handrail support is fixed with a ø14mm pin and another cotter pin in R-3 to the timber beam. The safety handrail is inserted into the vertical tube of the support. The safety handrail, except for the clamp handrail, has an L sliding element on the bottom part for placing the toeboard.

On the other side, ledgers are used to protect the perimeter of the slab. These are horizontal elements formed by tubes or planks, and are fixed to the safety handrail by means of clamps with wedges.

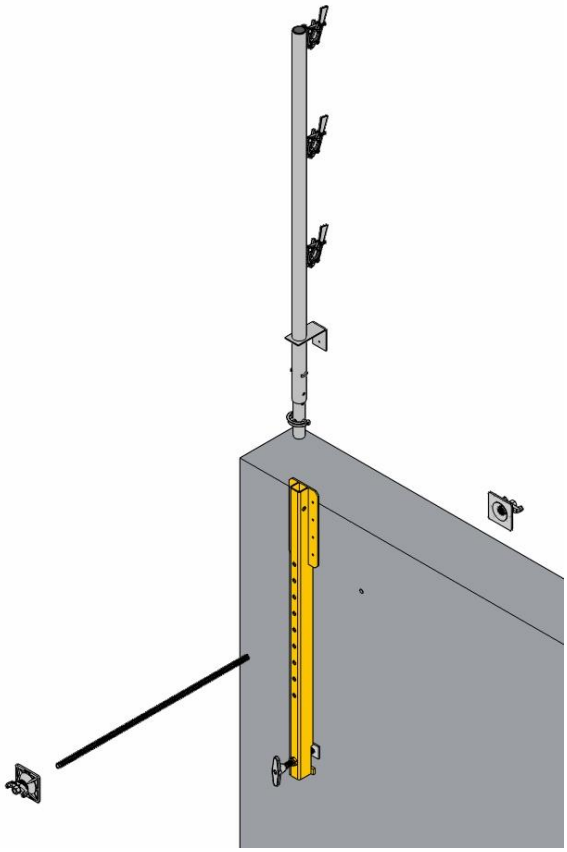


4.5.2. WALL HANDRAIL SUPPORT

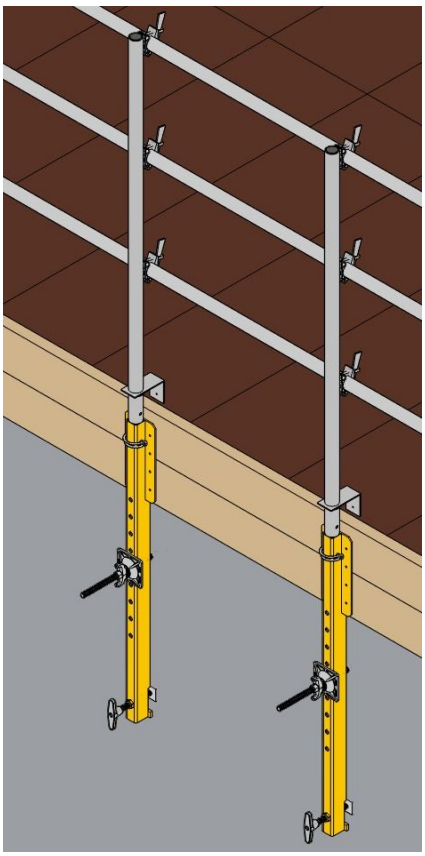
Used for fixing a handrail to the outermost surface of an existing wall and/or to stopend the formwork.

To fix this item to the wall, the tie rod hole created during the concrete placement of the wall is used. To do this, a tie rod 15 and two plate nuts are inserted into any of the ø18 mm holes spaced at every 75 mm, with the distance between the first and last hole being 600 mm.

A wooden block is used to stopend the formwork and/or toeboard and is nailed to the upper plate. Thanks to the levelling device, any type of wood can be used as long as the thickness is greater than or equal to 18 mm.

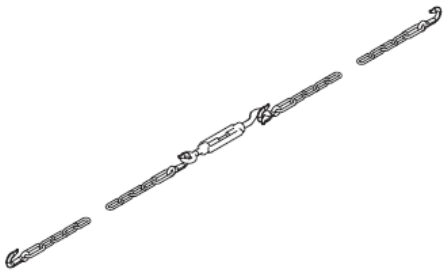


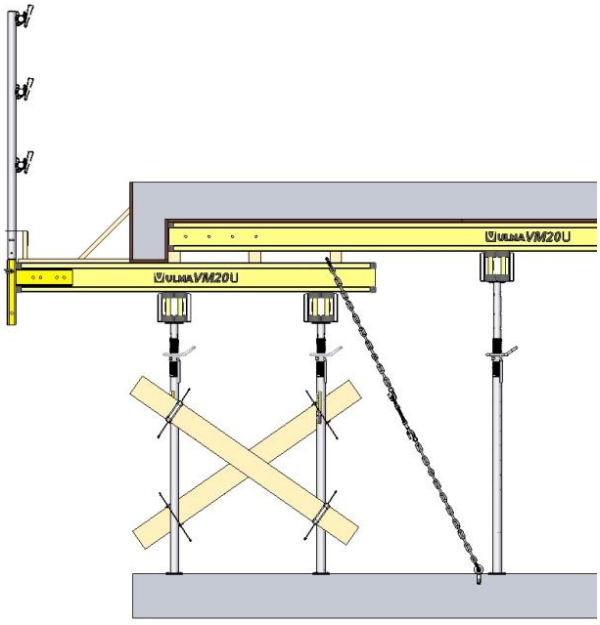
The handrail is inserted into the profile in a U shape and is fixed with a cotter pin. Any of the ULMA 1 m and 1.5m handrails can be used with both tubes and planks with the wall handrail support.



4.5.3. CHAIN VR

Item used to tie the ENKOFLEX system VM 20 beams (especially the cantilever beams) to the slab and so avoid the possibility of them tilting towards the exterior and being lifted by strong gusts of wind.





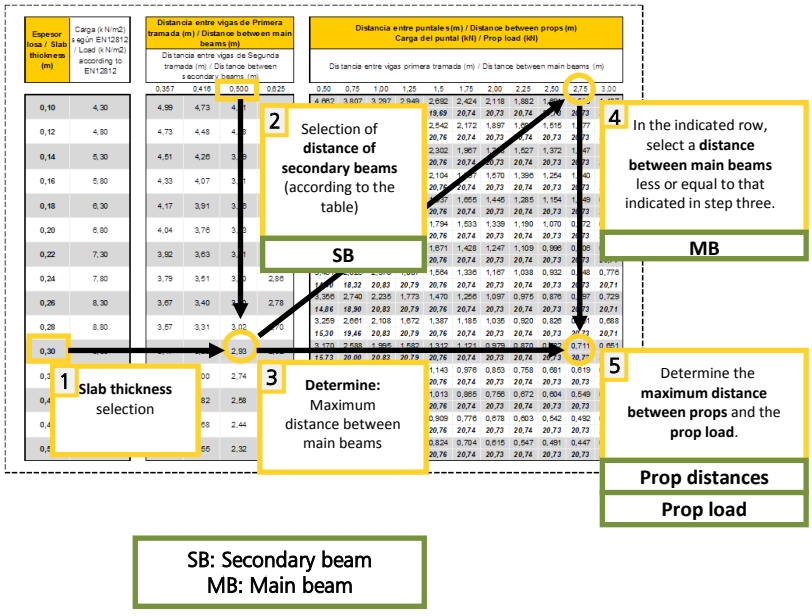
The VR chain is attached to the slab by means of a ring or bolt previously placed in the slab. It has a length of 5.2 m and a **load-bearing capacity of 7.5 kN**.

5. FEATURES

5.1. APPLICATION TABLES

Espesor losa / Slab thickness (m)	Carga (kN/m2) según EN12812 / Load (kN/m2) according to EN12812	Distancia entre vigas de Primera tramada (m) / Distance between main beams (m) — Distancia entre vigas de Segunda tramada (m) / Distance between secondary beams (m)				Distancia entre puntales (m) / Distance between props (m) — Carga del puntal (kN) / Prop load (kN) — Distancia entre vigas primera tramada (m) / Distance between main beams (m)										
		0,357	0,416	0,500	0,625	0,50	0,75	1,00	1,25	1,5	1,75	2,00	2,25	2,50	2,75	3,00
0,10	4,30	4,99	4,73	4,31	3,86	4,662	3,807	3,297	2,949	2,692	2,424	2,118	1,882	1,691	1,538	1,407
						10,69	***13,60***	***15,92***	***17,91***	***19,69***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,12	4,80	4,73	4,48	4,08	3,65	4,413	3,603	3,120	2,791	2,542	2,172	1,897	1,686	1,515	1,377	1,261
						11,30	***14,37***	***16,82***	***18,92***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,14	5,30	4,51	4,26	3,89	3,47	4,199	3,429	2,969	2,656	2,302	1,967	1,718	1,527	1,372	1,247	1,142
						11,87	***15,10***	***17,67***	***19,88***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,16	5,80	4,33	4,07	3,71	3,32	4,014	3,278	2,838	2,537	2,104	1,797	1,570	1,396	1,254	1,140	1,043
						12,42	***15,80***	***18,49***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,18	6,30	4,17	3,91	3,56	3,19	3,852	3,145	2,723	2,336	1,937	1,655	1,445	1,285	1,154	1,049	0,960
						12,95	***16,46***	***19,27***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,20	6,80	4,04	3,76	3,43	3,07	3,707	3,027	2,621	2,164	1,794	1,533	1,339	1,190	1,070	0,972	0,890
						13,45	***17,10***	***20,02***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,22	7,30	3,92	3,63	3,31	2,96	3,578	2,921	2,530	2,016	1,671	1,428	1,247	1,109	0,996	0,906	0,829
						13,93	***17,72***	***20,74***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,24	7,80	3,79	3,51	3,20	2,86	3,461	2,826	2,378	1,887	1,564	1,336	1,167	1,038	0,932	0,848	0,776
						14,40	***18,32***	***20,83***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,26	8,30	3,67	3,40	3,10	2,78	3,356	2,740	2,235	1,773	1,470	1,256	1,097	0,975	0,876	0,797	0,729
						14,86	***18,90***	***20,83***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,28	8,80	3,57	3,31	3,02	2,70	3,259	2,661	2,108	1,672	1,387	1,185	1,035	0,920	0,826	0,751	0,688
						15,30	***19,46***	***20,83***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,30	9,30	3,47	3,22	2,93	2,62	3,170	2,588	1,995	1,582	1,312	1,121	0,979	0,870	0,782	0,711	0,651
						15,73	***20,00***	***20,83***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,35	10,68	3,24	3,00	2,74	2,45	2,959	2,365	1,738	1,379	1,143	0,976	0,853	0,758	0,681	0,619	0,567
						16,85	***20,98***	***20,83***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,40	12,05	3,05	2,82	2,58	2,30	2,785	2,095	1,539	1,221	1,013	0,865	0,756	0,672	0,604	0,549	0,502
						17,90	***20,98***	***20,83***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,45	13,43	2,89	2,68	2,44	2,18	2,638	1,880	1,382	1,096	0,909	0,776	0,678	0,603	0,542	0,492	0,451
						18,90	***20,98***	***20,83***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***
0,50	14,80	2,75	2,55	2,32	2,08	2,513	1,706	1,253	0,994	0,824	0,704	0,615	0,547	0,491	0,447	0,409
						19,84	***20,98***	***20,83***	***20,79***	***20,76***	***20,74***	***20,73***	***20,74***	***20,73***	***20,73***	***20,71***

Calculation example:



CALCULATION EXAMPLE		
1	**Slab thickness**	0.30 m
2	**Board** and **SB** selection	BIRCH 21 (1250x2500) 5 Spans→ SB= 500mm (2500/5)
3	**Maximum MB** distances	2.93m
4	Determine **MB** distances	≤2.93m --> e.g.: MB=2.75m
5	**Maximum distance** between **props + prop load**	Props maximum distance=0.711 prop load=20.73kN

5.2. PROPS

5.2.1. SP PROP

SP props - working load (kN)				
Height (m)	SP-30	SP-35	SP-40	SP-50
1.75	30,00			
1.80	30,00			
1.90	30,00			
2.00	30,00	30,00		
2.10	30,00	30,00		
2.20	30,00	30,00		
2.30	30,00	30,00		
2.40	30,00	30,00		
2.50	28,00	30,00	30,00	
2.60	26,00	30,00	30,00	
2.70	24,00	30,00	30,00	
2.80	22,00	29,00	30,00	
2.90	21,00	28,00	30,00	
3.00	20,00	27,00	30,00	
3.10		26,00	30,00	
3.20		25,50	30,00	
3.30		25,00	29,00	
3.40		24,50	28,00	
3.50		24,00	27,00	
3.60			26,00	
3.70			24,50	
3.80			23,00	
3.90			21,50	26,00
4.00			20,00	26,00
4.10				26,00
4.20				26,00
4.30				26,00
4.40				26,00
4.50				25,00
4.60				24,00
4.70				23,00
4.80				22,00
4.90				21,00
5.00				20,00

5.2.2. EP PROP

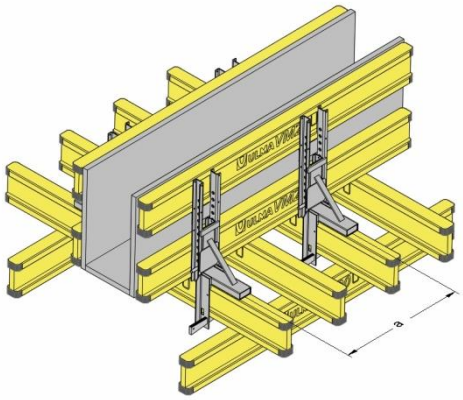
EP props - Working load (kN) with inner tube above								
Height (m)	**C25**	**C+D30**	**C+E30**	**C+D35**	**C+D40**	**C+E40**	**C+D45**	**C+D50**
1.50	35.00							
1.60	35.00							
1.70	35.00							
1.80	35.00	35.00	35.00					
1.90	35.00	35.00	35.00					
2.00	35.00	35.00	35.00	35.00				
2.10	34.00	35.00	35.00	35.00				
2.20	31.00	35.00	35.00	35.00	35.00	35.00		
2.30	28.36	34.03	34.03	35.00	35.00	35.00		
2.40	26.04	31.25	31.25	35.00	35.00	35.00		
2.50	24.00	28.80	30.00	33.60	35.00	35.00	35.00	
2.60		26.63	30.00	31.07	35.00	35.00	35.00	
2.70		24.69	30.00	28.81	32.92	32.92	35.00	
2.80		22.96	30.00	26.79	30.61	30.61	34.44	35.00
2.90		21.40	30.00	24.97	28.58	30.00	32.10	35.00
3.00		20.00	30.00	23.33	26.67	30.00	30.00	33.33
3.10				21.85	24.97	30.00	28.10	31.22
3.20				20.00	23.44	30.00	26.37	29.30
3.30				20.00	22.04	30.00	24.79	27.55
3.40				20.00	20.76	30.00	23.36	25.95
3.50				20.00	20.00	30.00	22.04	24.49
3.60					20.00	30.00	20.83	23.25
3.70					20.00	30.00	20.00	21.91
3.80					20.00	30.00	20.00	20.78
3.90					20.00	30.00	20.00	20.00
4.00					20.00	30.00	20.00	20.00
4.10							20.00	20.00
4.20							20.00	20.00
4.30							20.00	20.00
4.40							20.00	20.00
4.50							20.00	20.00
4.60								20.00
4.70								20.00
4.80								20.00
4.90								20.00
5.00								20.00

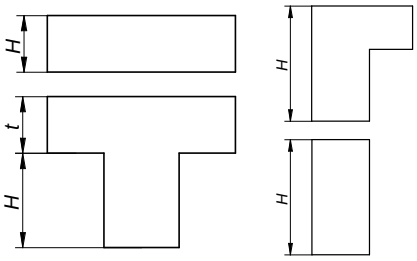
INNER TUBE ABOVE

5.3. FEATURES OF THE MAIN ITEMS

5.3.1. HANGING BEAM

The maximum slab thickness that can be used with the hanging beam support is 40cm. For bigger slabs, up to 90cm, add the hanging beam supplement to the hanging beam.





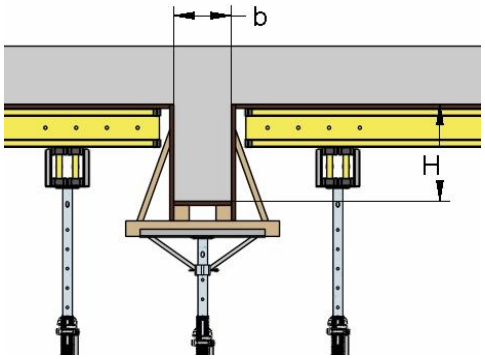
	PERMISSIBLE DISTANCES BETWEEN 'a' HANGING BEAMS		
	SOLID SLAB OR STRAIGHT BEAM	HANGING BEAM WITH SLAB	
H (cm)	Spacing (m)	Spacing (m) with t=20cm	Spacing (m) with t=30cm
30	2.25	1.50	1.25
35	2.00	1.25	1.00
40	1.75	1.05	0.90
45	1.50	0.95	0.80
50	1.35	0.85	0.70
55	1.30	0.75	0.60
60	1.05	0.65	0.50
65	0.90	0.50	0.40
70	0.80	0.40	0.35
75	0.60	0.30	
80	0.55		
85	0.45		
90	0.35		

This table does not include checking the board, main beams and props, which should be checked separately.

5.3.2. CROSS PROP

Each cross prop is to use, as its name indicates, with an SP prop:

* Cross Prop SP-30 with Prop SP-30
* Cross Prop SP 35-40 with Prop SP-35 and Prop SP-40

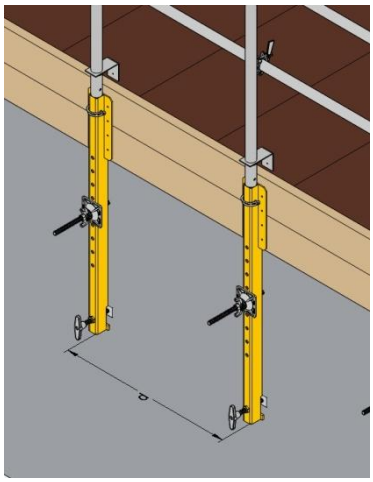


Recommended spacing distances:

* Maximum width (b): 0.4m
* Maximum Height (H): 0.8m
* The cross prop halves the working load of the prop.
* Distance between cross braces: 1.2m (check loads of beams and props).

5.3.3. WALL HANDRAIL SUPPORT

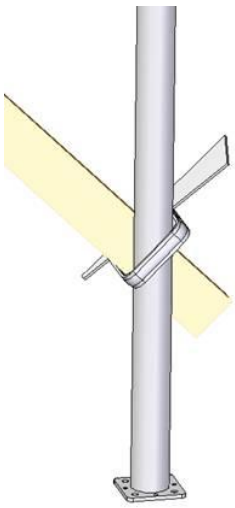
The following table defines the maximum distance (m) between the supports based on slab thickness (m) (if used as formwork stopend) and the type of handrail used.



		Maximum distance 'd' between standards (m) based on slab height (m)										
		0	0.15	0.2	0.25	0.3	0.35	0.4	0.45	0.5	0.55	0.6
2211156	HANDRAIL POST 1.5	3.30	3.30	3.30	3.30	3.30	3.20	2.80	2.40	2.00	1.70	1.50
2211185	HANDRAIL POST 1.5 WOOD	2.30	2.30	2.20	2.10	1.90	1.80	1.60	1.50	1.30	1.20	1.10
1860516	SAFETY HANDRAIL S-V	3.30	3.30	3.30	3.30	3.30	3.30	3.20	2.70	2.30	1.90	1.60
1902210	SAFETY HANDRAIL POST	2.30	2.30	2.30	2.30	2.30	2.30	2.20	1.90	1.70	1.50	1.30
	WITHOUT HANDRAIL	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.10	2.50	2.10

5.3.4. CLAMP SP-EP

The clamp SP-EP is wedged in the prop assembly plus plank. The maximum dimensions of the plank can be a width of 120mm and thickness of 60mm.



6. CONDITIONS OF USE

6.1. GENERAL SAFETY ADVICES

- It is recommended to strictly follow the instructions of the project plan.
- The general instructions of the manufacturer must be followed.
- Internal safety standards must be fulfilled.

6.1.1. Personal and collective protective equipment

- The personal protective equipments should comprise at least protective helmet, safety footwear, protective gloves and tool holder belt. Additionally, it is useful to incorporate an anti-fall harness with lifeline.
- If necessary, goggles or protective masks, hearing protection, breathing masks, reflective jackets and any other required item to fulfil the health and safety guidelines on the building site should be used.
- The safety handrail, the mobile tower, the nets under formwork and the perimeter scaffolding are means of collective protection equipment.

6.1.2. General aspects

- Openings shall be protected by covers, handrails, nets or mesh to prevent falls from different level.
- Statutory handrails are provided with the lateral formwork or perimeter scaffolding.
- Toe Boards are used with the handrails fulfilling with the laws of each country.
- Check the formwork parts and safety items. Replace them whenever necessary. Check:
    - That the parts have no dents which have diminished their section.
    - That they are not bent.
    - That their fixings are correctly working and efficient.
- For wood or plastic parts the following is to confirm:
    - That there are no dents, cracks or knot holes which might diminish their strength.
    - That they are correctly fixed to their supports.
    - Replace them whenever necessary.
- To access the formwork, statutory ladders, mobile towers or pedestrian bridges shall be used.
- Working on mobile scaffolding towers only when brakes put on. Do not move the towers while the worker is still standing on it.
- For the assembly and dismantling of the perimeter formwork, strictly obey the specific procedures.
- The working area is to be kept clean and tidy at all times. Leave the material organised and stacked. Do no leave the material untidily lying about on the formwork or on the ground.
- Do not leave any part half-assembled or half-dismantled.
- Once assembled, brace the structure correctly.
- Working with wind speeds of more than 60 km/h is strictly forbidden.
- If the building site is located nearby high voltage power lines, it is recommended to work without power supply. If this is not possible, the appropriate measures according to the respective reference standard should be taken.
- The statutory auxiliary equipment for lifting has to be appropriate to bear the loads to lift and must be

checked before each use and discardit, if it is not working properly.

- Use adequate anchors for lifting as well as certified slings and lifting hooks.
- Slings attached to the material are to be fastened properly during shipment.
- No crossing below suspended loads, not even in the machinery working areas.
- Demarcate and prevent pedestrian traffic below the working areas.
- Under the circumstances that the crane operator has no visual control of the entire trajectory of the load, the crane operations are guided by a signaller who is communicating with the crane operator by means of a previously agreed sign code.
- Use of tool holder belt with pockets for small parts.
- Provide the team with mechanical means for lifting.
- Walk on marked areas only.
- Train manual handling of loads.
- Once the erection is finished, the formwork assembly shall be checked.

6.1.3. Handling and maintenance conditions

- A safe erection of assembly is assured by using mobile towers, nets under formwork or lifelines.
- The Props shall be used correctly, i.e. respecting their load limits, plumbing them to the ground and with stable support.
- For the installation of the handrail, it is necessary to place the handrail support.
- In perimeter areas, the part which prevent from overturning, Chain VR, must be placed.
- To assure a proper assembly is necessary to check between uses the cleanness of plywood sides and contact areas.
- The plywood surface is cleaned after each use with a cloth or a brush coated with some release agent. Wire brushs are not suitable for cleaning as they are damaging the fenolic film on the plywood.

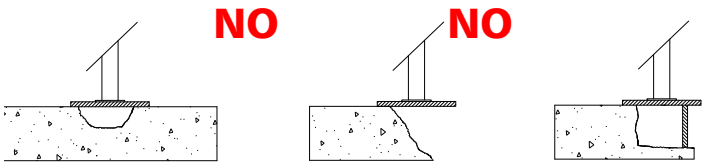
The formwork parts should not be thrown down to the ground during their assembly, handling and dismantling in order to avoid damages.

6.1.4. Concrete pouring

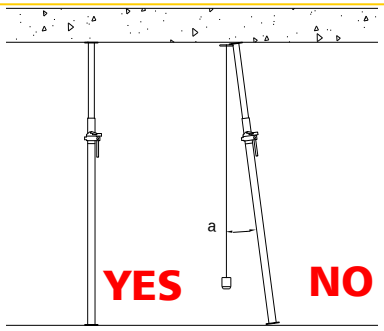
- Before pouring, the following must be checked:
    - The proper support of end plate of the prop on resistant and flat surfaces.
    - The correct formwork erection according to the approved layout.
    - Formwork levelling.
    - The shuttering face is impregnated with release agent.
    - Eventually, Plastic Handrail Supports are placed along the perimeter of the freshly poured slab to later place the handrail post onto the slab.
- During vibration, the vibrator must not get in contact with the formwork, otherwise the calculated loads and live loads for the slab might be exceeded.
- Avoid improper material stocks as well as accumulations and abrupt concrete pouring.
- It is recommended to pour in layers in cases in which the maximum permissible thickness for the used grid might get exceeded.
- The sudden emptying of the concreting bucket on the formwork is to be avoided. Pouring has to be done from heights which do not cause strong shaking of the formwork.
- The stripping is done when the concrete strength is sufficiently high.
- Before starting any dismantling operation, the state of the formwork has to be checked.

6.1.5. Safety instructions

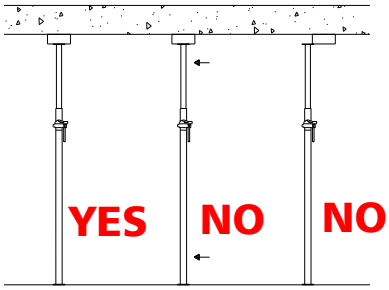
The Prop support must be horizontal, on a plane surface and with a stable base.

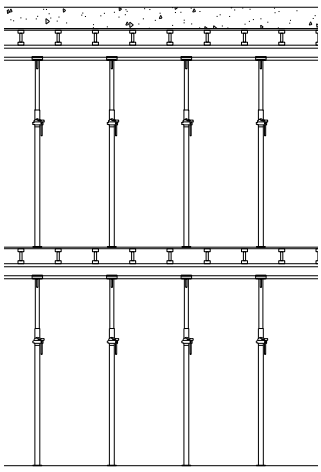


The Prop must be plumbed.



The load acting on the Prop is vertical and centred. No horizontal loads act on the Prop.





NO

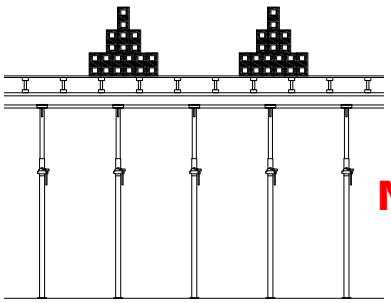
The Props must be used between support and load. Do not put a Prop directly on top of another, as it might cause the collapse of the structure due to effective loss of load bearing

Additional to this safety notices, it is advised to take preventive measures such as:

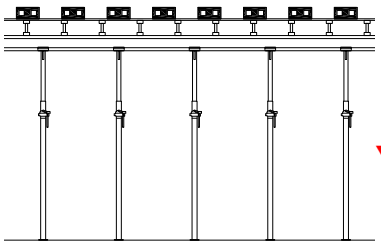
- Do not use damaged Props, with torn holes or weldings, nor with signs of deep corrosion.
- Do not overlap nor add or weld strange parts to the Prop to extend it.

Do not dismantle the Prop nor replace Prop parts by others strange to the product.

Do not hit the Prop base to strip the formwork.



NO

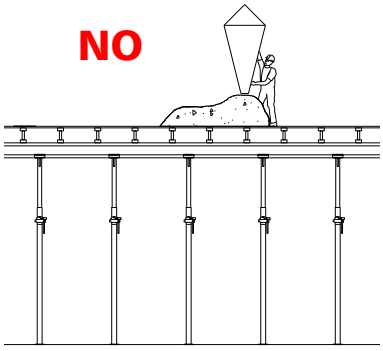


YES

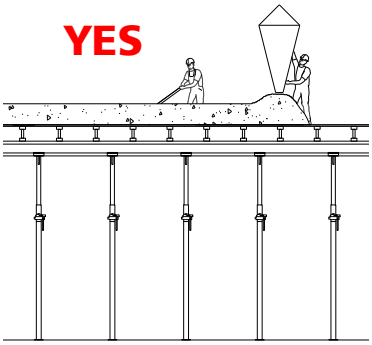
Do not stock material on the formwork, not even temporarily. Always assure a uniform load distribution.

Do not leave objects fall on, nor jump on the formwork plywood.

NO



YES



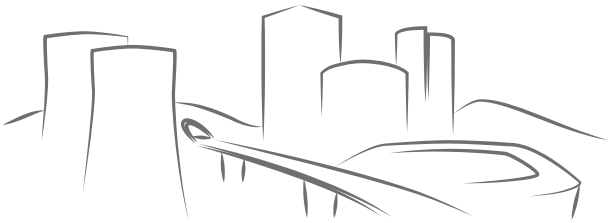
Pour the concrete in layers or steps with uniform thickness and vibrate it continuously, thus avoiding concrete accumulations.

7. LEGAL REFERENCES

- **Council Directive 89/391/EEC** of 12 June 1989 on the introduction of measures to encourage improvements in workers' occupational health and safety.
- **Council Directive 89/654/EEC** of 30 November 1989 on the minimum safety and health requirements for the workplace.
- **Council Directive 89/656/EEC** of 30 November 1989 on the minimum occupational health and safety requirements for workers' use of personal protective equipment in the workplace.
- **Council Directive 90/269/EEC** of 29 May 1990 on the minimum occupational health and safety requirements for the manual handling of loads where there is a risk, particularly of back injury, to workers.
- **Council Directive 92/57/EEC** of 24 June 1992 on the implementation of minimum health and safety requirements at temporary or mobile construction sites.
- **Council Directive 92/58/EEC** of 24 June 1992 on the minimum requirements for the provision of health and safety signs at work.
- **Directive 89/655/EEC - Directive 95/63/EC - Directive 2001/45/EC** of the European Parliament and of the Council of 27 June 2001 amending the Council Directive 89/655/EEC concerning the minimum health and safety requirements for the use of work equipment by workers at work.
- **Directive 2002/44/EC** of the European Parliament and of the Council of 25 June 2002 on the minimum occupational health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration).
- **Directive 2003/10/EC** of the European Parliament and of the Council of 06 February 2003 on the minimum occupational health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration).
- **Directive 2006/42/EC** of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (revision).

Standards:

- EN 13374:2004 Temporary edge protection systems. Product specifications, test methods.
- EN 1065 adjustable steel telescopic props. Product specifications, design and evaluation by calculations and tests.
- EN 12812_Falsework. Performance requirements and general design.
- EN 13377_Prefabricated wooden joists for formwork. Requirements, classification and evaluation.



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