



LGR Column Formwork

The new range of panels: light and handset

IMPORTANT:

Any safety provisions as directed by the appropriate governing agencies must be observed when using our products.

The pictures in this brochure are snapshots of situations at different stages of assembly, and therefore are not complete images. For the purpose of safety, they should not be deemed as definitive.

All of the indications regarding safety and operations contained in this brochure, and the data on stress and loads should be respected. ULMA Construction's Technical Department must be consulted anytime that field changes alter our equipment installation drawings.

Our equipment is designed to work with accessories and elements made by our company only. Combining such equipment with other systems is not only dangerous but also voids any or all our warranties.

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

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National Book Catalogue Number: SS-854-2009

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LGR COLUMN FORMWORK

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Safety note



Control note



Warning note



Information note

▶ Product description

Bet for new materials

The **LGR** is a **light vertical formwork** system created for framing **rectangular columns**, and it is focused toward residential building. This system is comprised of a range of **handset panels** in all existing sizes.

The constant research of ULMA Construction has led to bet for new materials like plastic. This type of product used in LGR formwork offers advantages to the customer-operator and environment: increases durability and the life of the formwork, reduces weight and facilitates its manipulation, is recyclable ...

■ Main features:

- ▶ Rectangular columns framing system composed of light **handset panels**.
- ▶ **The panel's shuttering face is made of plastic. The board is riveted to the metal frame, providing lightweight to the panels and excellent finishing.**
- ▶ **Fixing elements are integrated** in the panel and they cannot be lost. These elements solve the union between panels in a simple way.
- ▶ Reduced number of components.
- ▶ Permits pouring **dwarf walls** joining laterally the panels using clamps.
- ▶ **Robust system**, metallic frame with reinforced corners, which guarantees a longer useful life for the panels.
- ▶ Maximum allowable concrete pressure: **80 kN/m²**. Up to a height of 3 m, it is not necessary to control the pouring speed.
- ▶ **Range of system:**
 - Panel heights: 3 m, 1 m and 0.5 m.
 - Width range: 0.7 m and 0.5 m.



ULMA Construction has developed the ideal product for **maximum efficiency and economy of work** in the implementation of columns and dwarf walls: **LGR Column Formwork**.

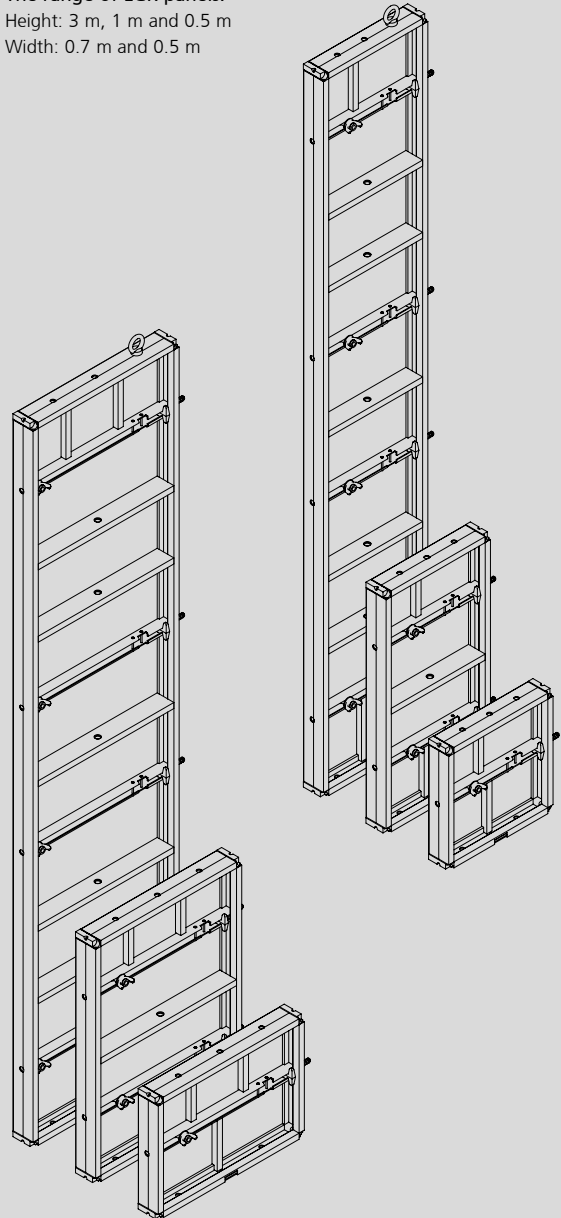
■ Panels:

A product with long life

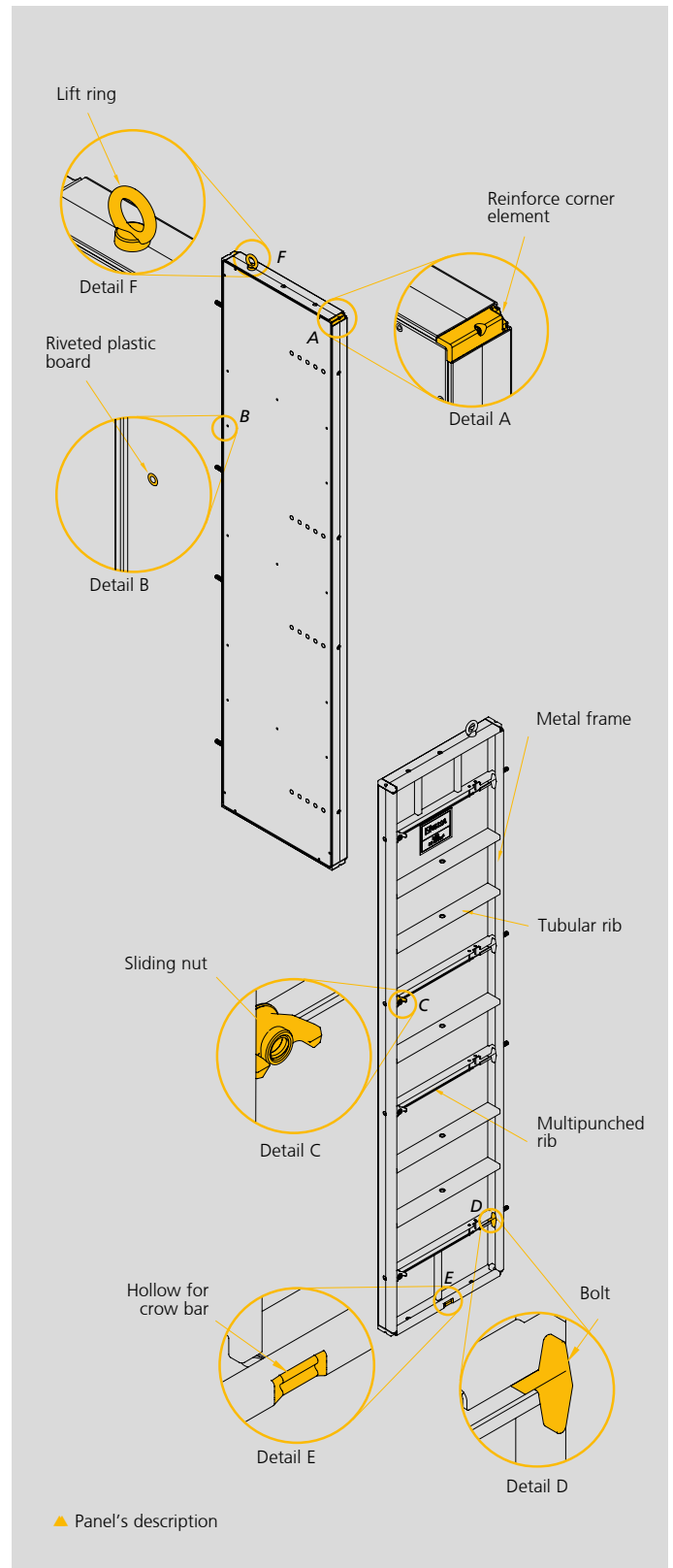
The panels are the main elements on column forming. They are positioned and fixed in mill cross shape.



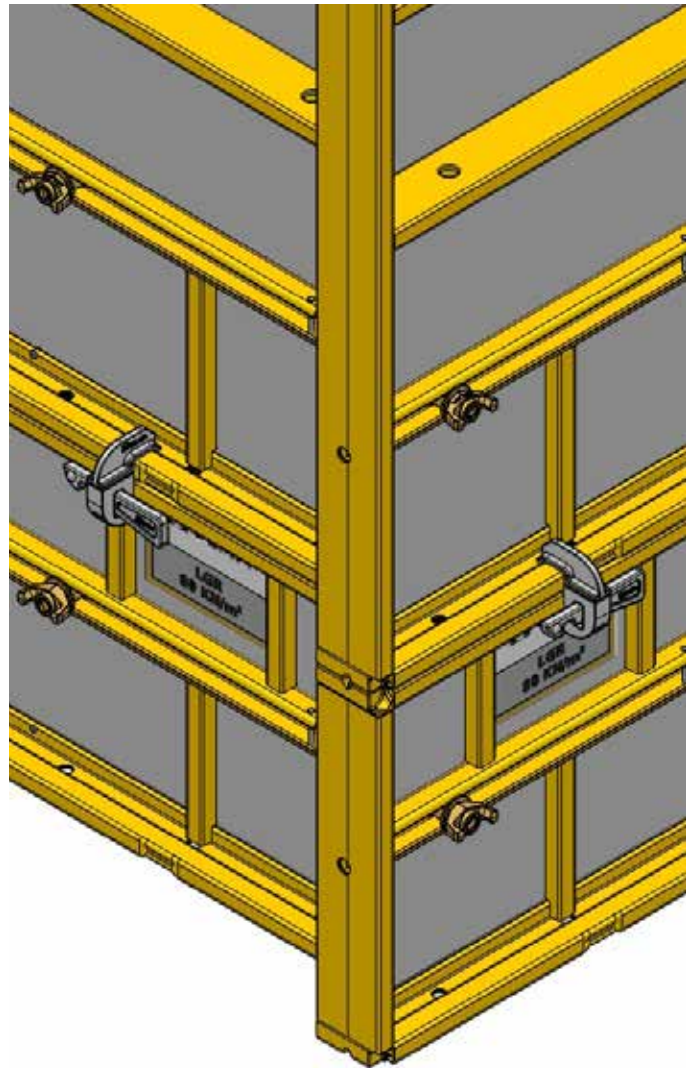
▼ The range of LGR panels:
Height: 3 m, 1 m and 0.5 m
Width: 0.7 m and 0.5 m



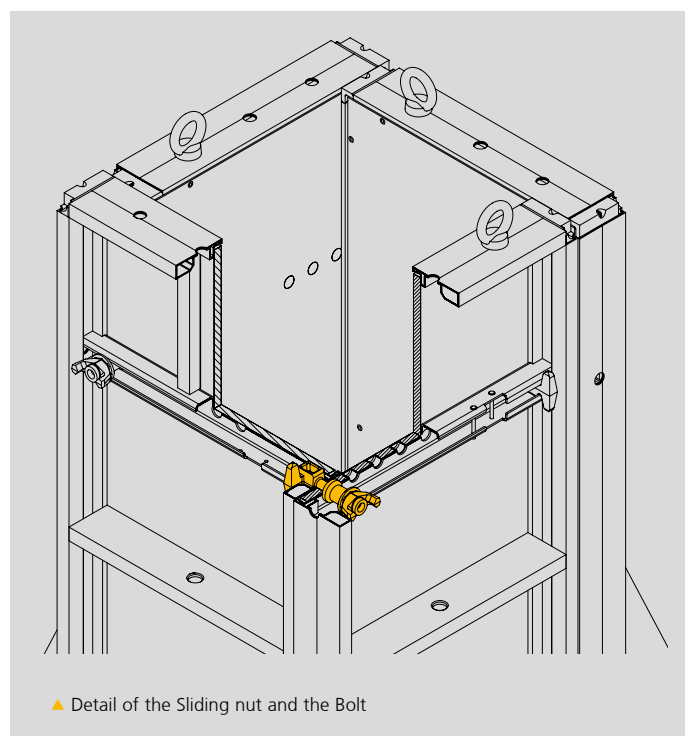
- The frame has **reinforced corners**. These panels have a perimeter frame made of steel profile, which can be used with lateral joint clamps.
- Two different profiles are used to make **the ribs** that are welded to the frame to provide frame stiffness:
 - Multipunched steel profile rib supports the safety tie system.
 - Rectangular tube, that has a reinforced hole with bushing, permits assembling different formwork accessories.
- **The shuttering face is made of 16 mm thick plastic plywood** that fits in the steel frame to which it is riveted. The plywood edge is protected by the perimeter profile.
- **Fixing elements are included in the panel, they cannot be lost and are removable.**



- The **tying system**, which is comprised of a Sliding nut and a Bolt, is part of the panel. These complements are inside the multipunched and they can slide along the rib. Both components are **safely locked** in the rib so that they cannot be lost, but they are **removable in case of damage**.



- The frame's four **corners are reinforced** with casting elements that are welded to the profiles, which also provide notches that can be used in conjunction with a lever to position the panel.



■ Lifting:

Elevation with security and safety

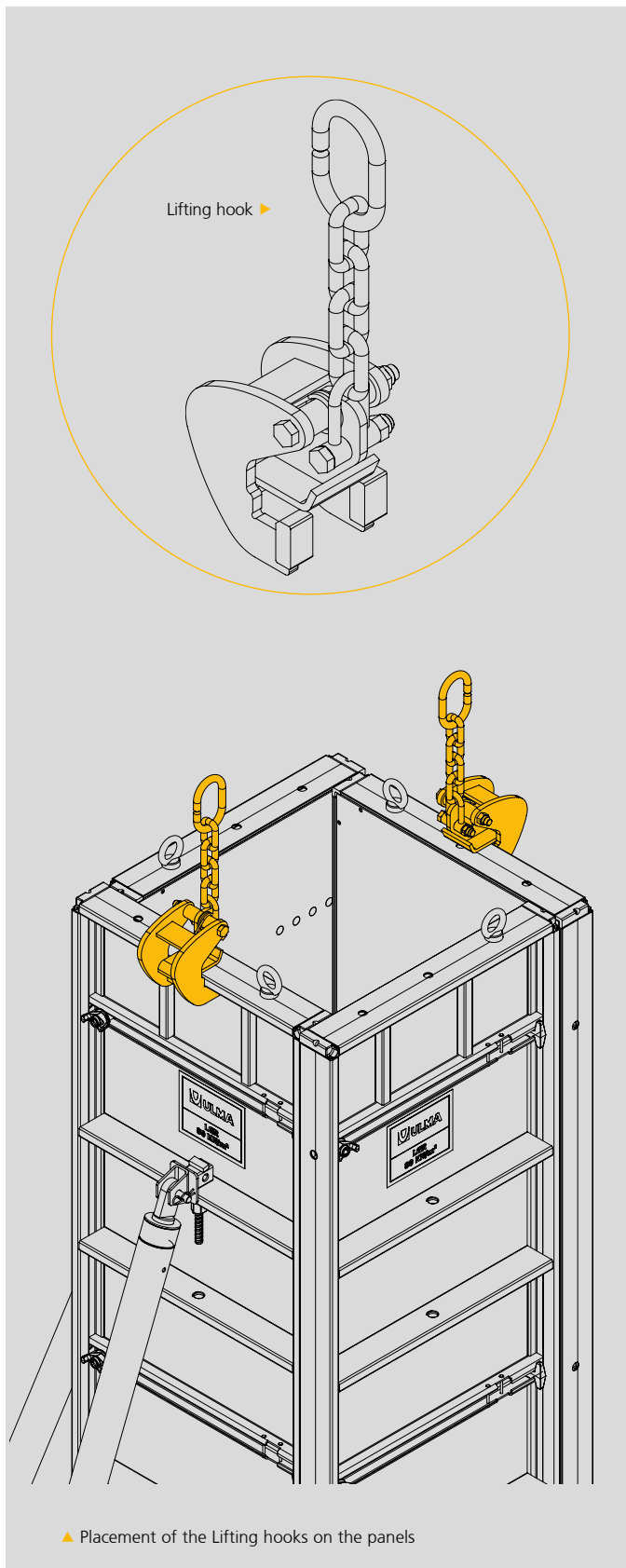
The Lifting hook is an auxiliary component used for lifting single panels or gangs with a crane.

It is designed to lift a **maximum load of 1,200 kg** with a maximum sling angle of 30° with respect to the vertical. Two hooks will be used for lifting a full pillar.

The hook is stamped with the **"CE" mark** in compliance with the European directive 98/37/CE on machinery.



▲ The Lifting hook must be used following the advices and instructions of
▼ ULMA Construction



▲ Placement of the Lifting hooks on the panels

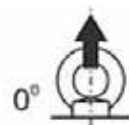
In addition, 3 m height panels have an **eye bolt** ▶ instead of using the lifting hook.



♦ The lifting elements must be inspected before each use



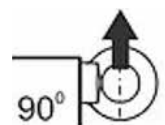
The use of these elements is limited by the load capacity in use according to the case:



1200 kg.

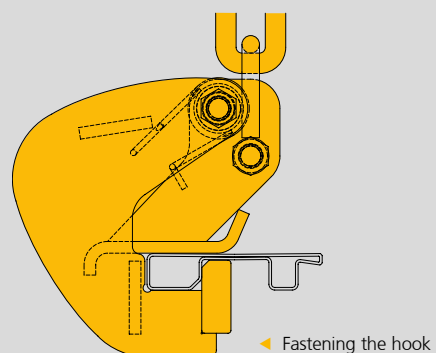
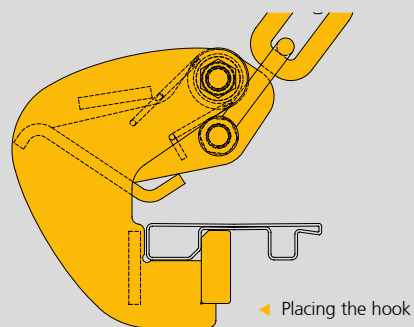
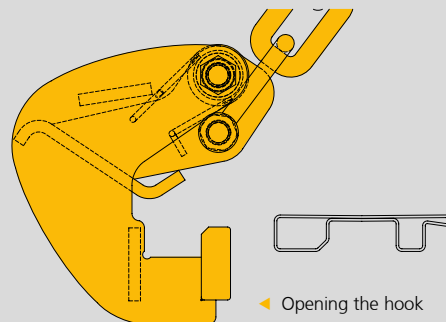


860 kg.



600 kg.

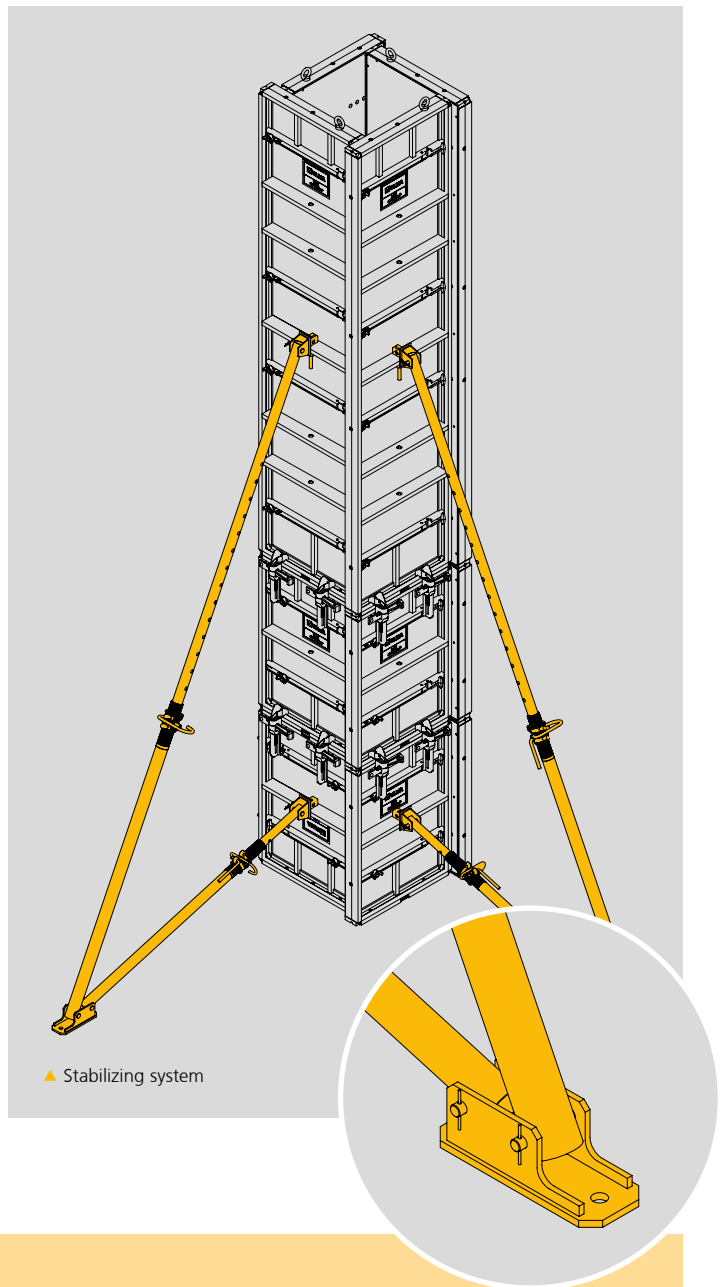
Basic hook's assembly



■ Stabilizing system:

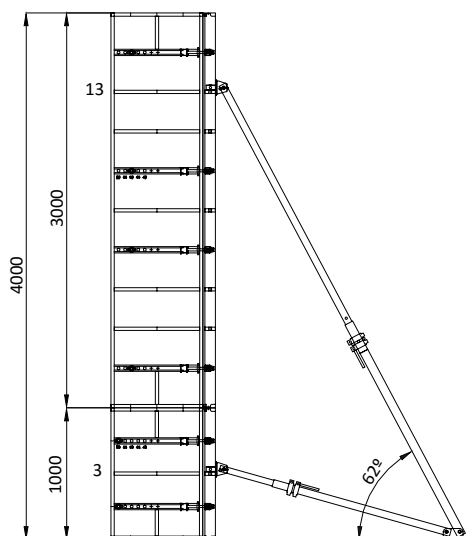
Guaranteed balance

Elements used during panel assembly to stabilize them against wind loads and to plumb the formwork once it is assembled. The system uses adjustable props to support both tensile and compression stresses.



· It is comprised of the following:

- **Push-pull prop:** tubular body that is adjustable sliding the inner tube to acquire the proper length. The final adjustment is made by a nut. The range of Push-pull prop:
 - Push-pull prop 1.55-2.5
 - Push-pull prop 2.5-3.85
- **Push-pull prop head:** an element that joins the panel and the Push-pull prop. It is tied with a Panel bolt and a nut through the hole in the ribs.
- **Push-pull prop shoe:** this element is incorporated in the main push-pull prop 2.5-3.85 and it is used to anchor push-pull props to the foundation through the holes include on it. It's recommended to use HSA M20X125 Hilti anchors.

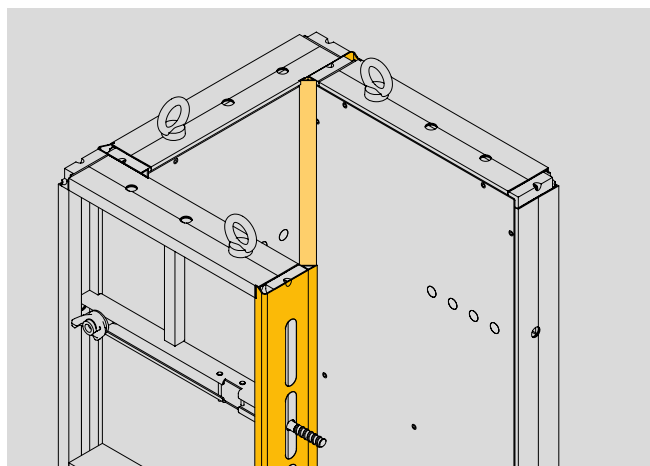


LGR		
PANEL HEIGHT	PUSH -PULL PROPS	JOINING RIBS
2,5 m	PUSH-PULL PROP 1,55-2,5 PUSH-PULL PROP 2,5-3,85	RIB 3 RIB 9
3 m	PUSH-PULL PROP 1,55-2,5 PUSH-PULL PROP 2,5-3,85	RIB 3 RIB 9
3,5 m	PUSH-PULL PROP 1,55-2,5 PUSH-PULL PROP 2,5-3,85	RIB 5 RIB 11
4 m	PUSH-PULL PROP 1,55-2,5 PUSH-PULL PROP 2,5-3,85	RIB 3 RIB 13
4,5 m	PUSH-PULL PROP 1,55-2,5 PUSH-PULL PROP 2,5-3,85	RIB 3 RIB 12
5 m	PUSH-PULL PROP 1,55-2,5 PUSH-PULL PROP 2,5-3,85	RIB 3 RIB 14

Note: For heights below 3.5 m, it is possible to use a single push pull prop as long as the formwork is fastened from the bottom part.

Chamfer strip

Sharp edges on the columns can be avoided by using **Chamfer strips**. This is a plastic component that is placed between two panels joined together at 90° angles; it is not necessary to nail it to the plywood because its special shape allows it to brace the profile. It also has slotted holes necessary to permit passing the Bolt through the lateral holes of the panel.



▲ Chamfer strip placing on column



▲ The positioning of the Chamfer strip to the panel is made without any additional element



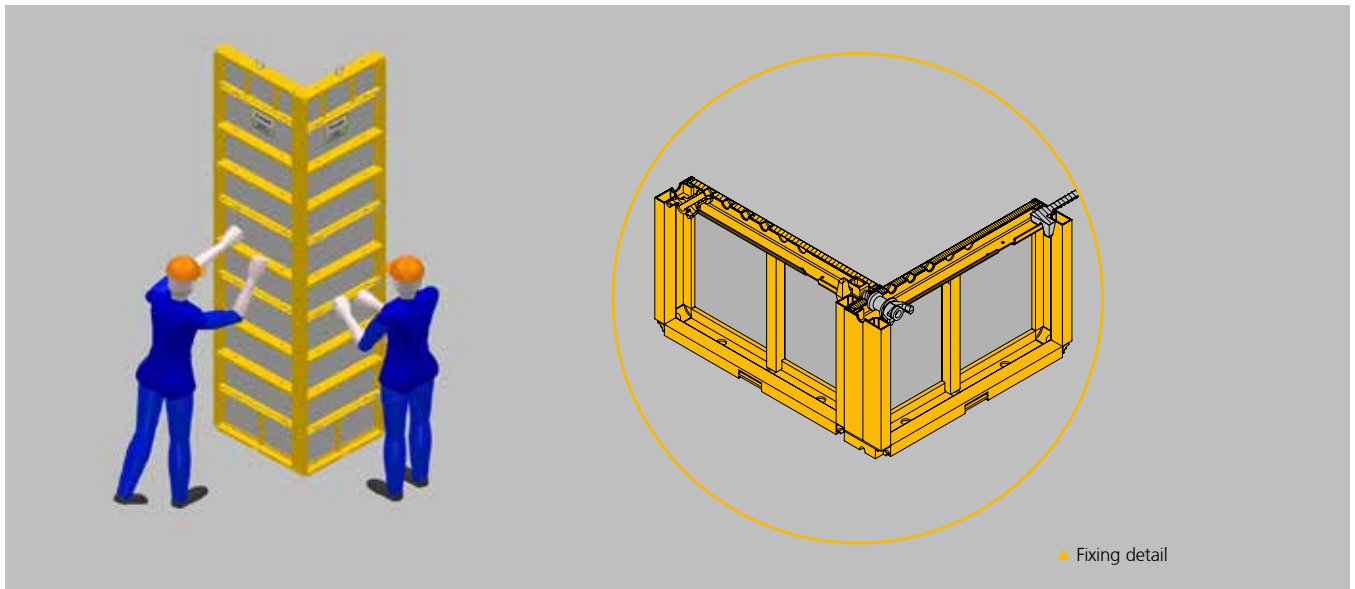
▲ Column finishing with chamfered corners

► Assembly, use and disassembly

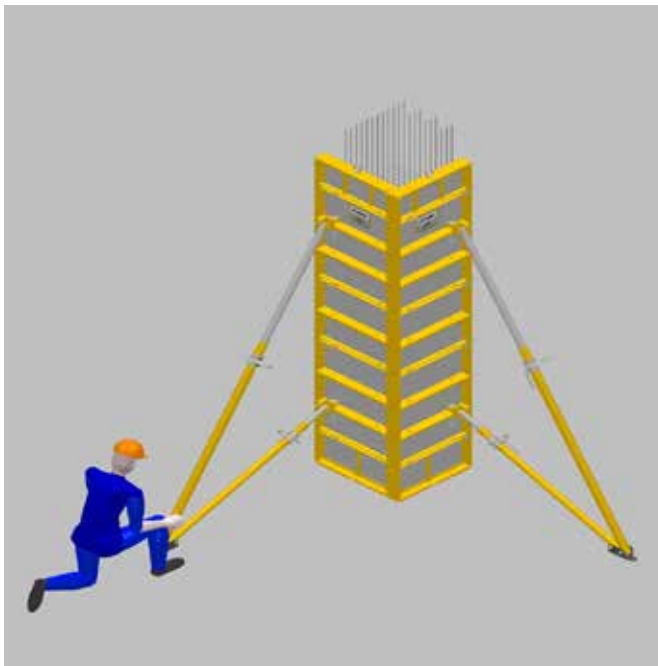
LGR column formwork system, for its lightness, allows manual and crane assembly and disassembly.

■ Manual assembly

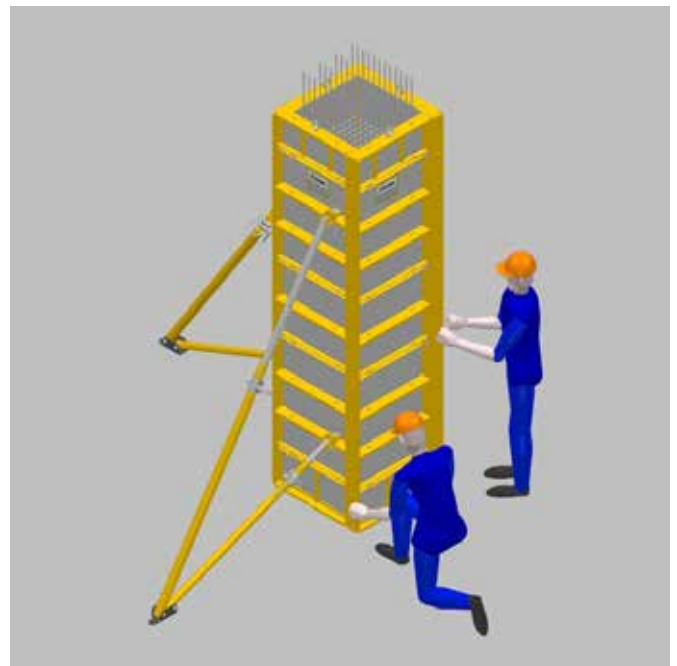
The assembly process described below refers to a column formwork assembly manipulated without crane. It may vary depending on the required geometry:



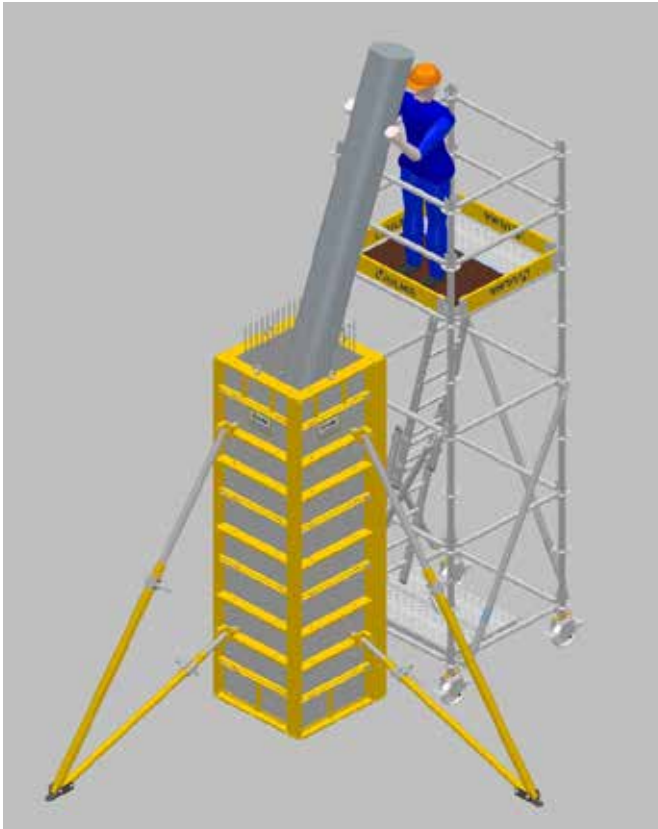
- 1 · Position one panel perpendicular to another (in an L shape), facing the lateral profile holes to the multipunched rib holes.
- Insert the bolts in the panel holes in accordance with the column dimensions to be obtained. Tighten the nuts.



- 2 · Assemble the Push-pull prop heads and the Push-pull props on the panels.
- Anchor the Push-pull prop shoes using Hilti HSA M20x125 anchors.
- Place reinforcement, if this was not done previously.



- 3 · Assemble the other L gang as explained in the previous points without stabilizing system, or join the rest of the panels one by one with the LGR Bolts and nuts with the column dimensions.



- 4 · Pour the concrete using the appropriate auxiliary equipment.

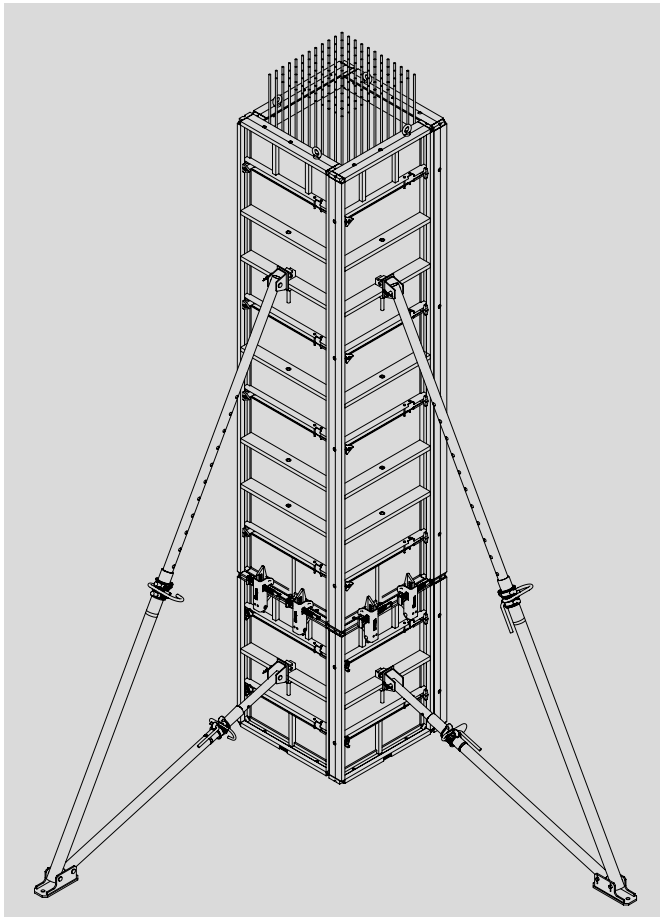


- 5 · Once the concrete has cured completely, stripping can begin.
- Release the Bolts and the nuts to dismantle the panels.
 - Perform maintenance work and cleaning on the panels.

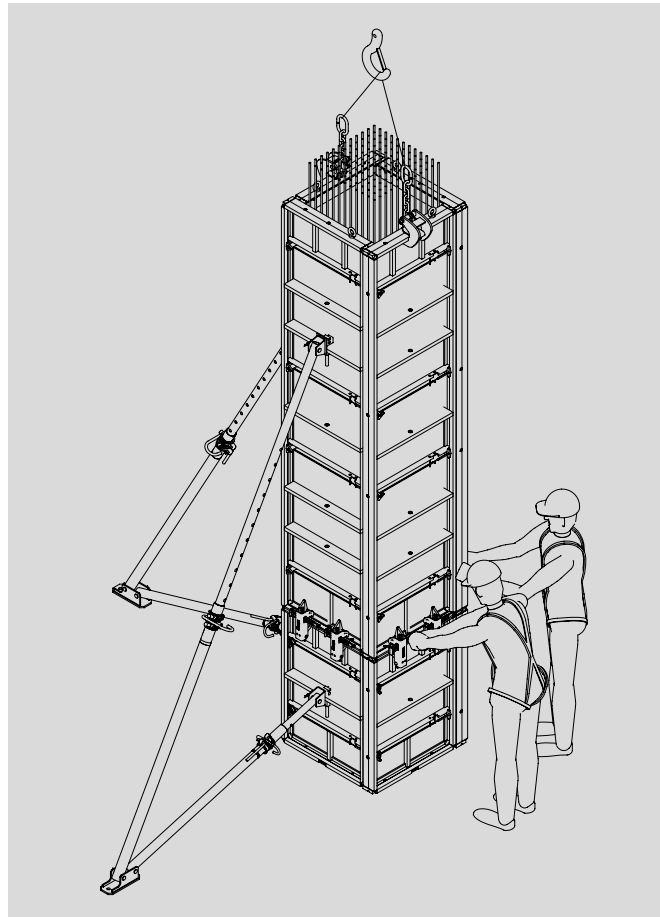


■ Disassembly basic process

➤ Disassembly with crane



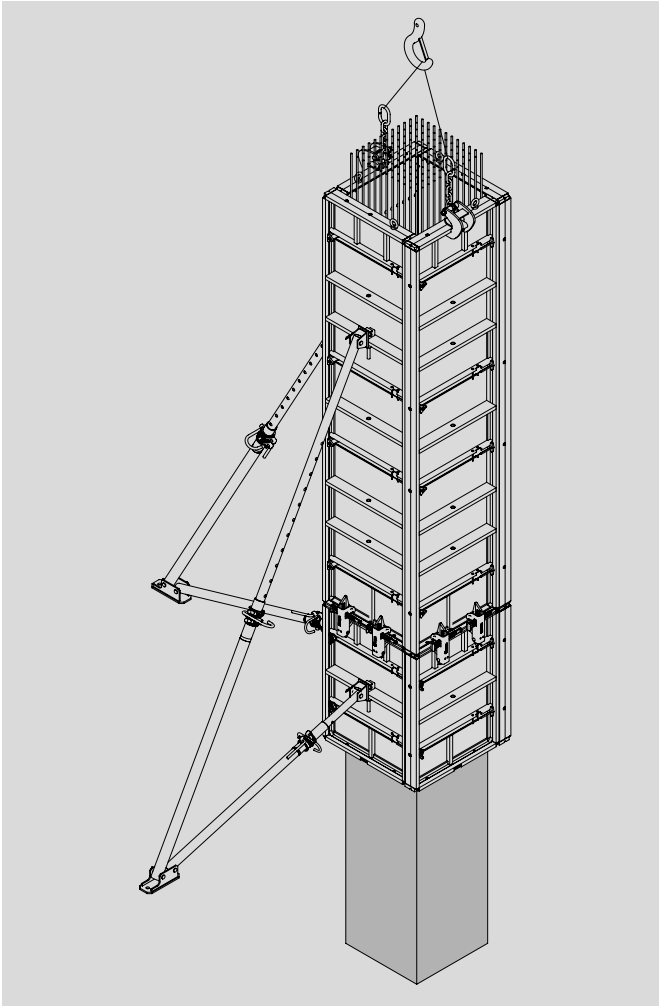
1 · Start with the column formed and forged.



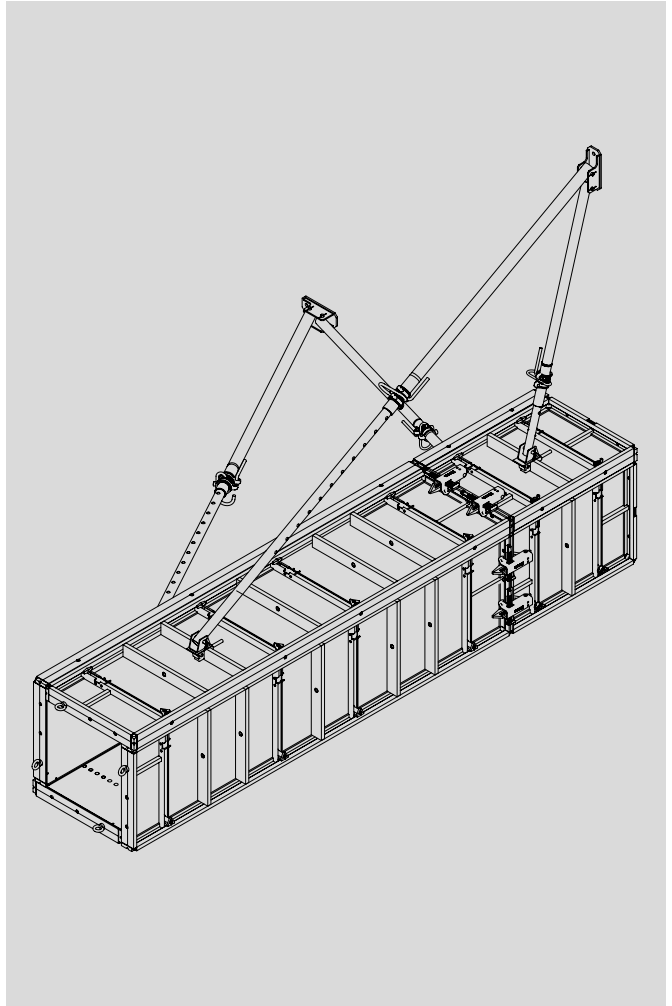
2 · Using reglamentary auxiliary equipment, place the Lifting hooks on the panels or connect the slings to the rings.

- Release the nuts and disconnect the panels without dropping.
- Remove the panels from the concreted column with a lever.





- 3 · Remove panel gang with the crane, for following uses or pours in the implementation of the following pillars.



- 4 · Once all the columns are executed, down panel gangs on the ground and disassemble them.
· Perform any maintenance and cleaning work on the panels.



► Solutions

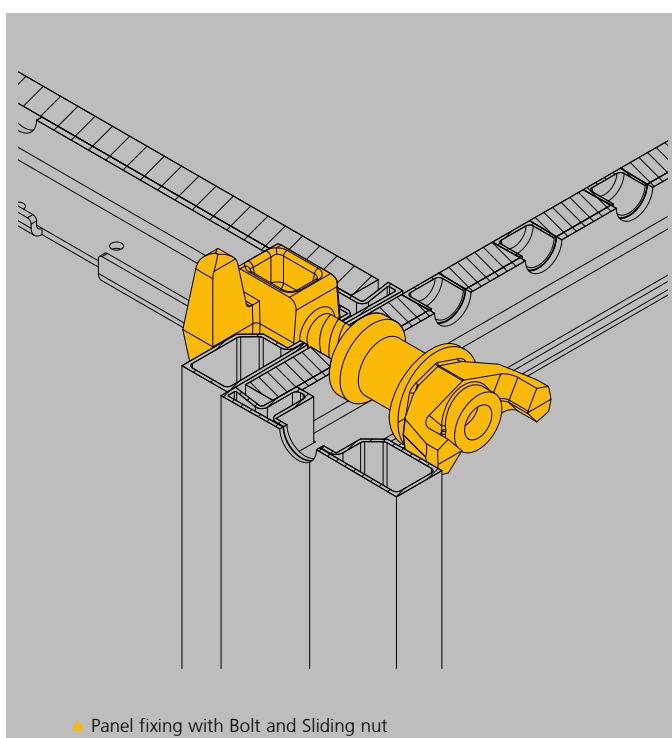
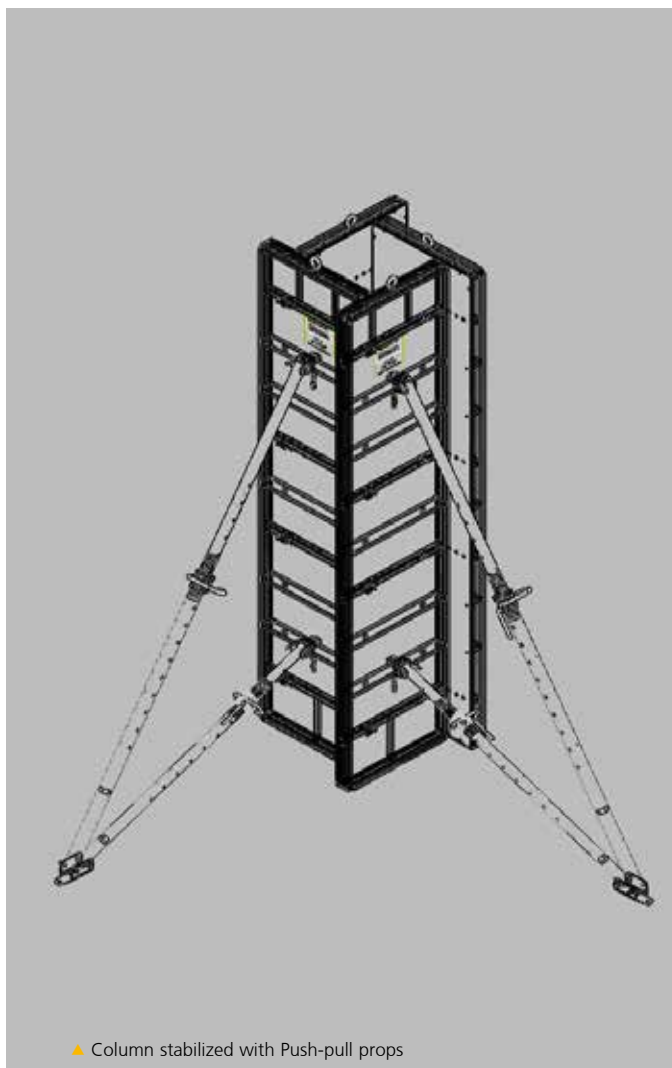
The right product for column geometries

■ Columns

The LGR panel can be used to frame columns of varying cross sections (from 15 cm to 60 cm per side), it is adjustable up to 5 cm.

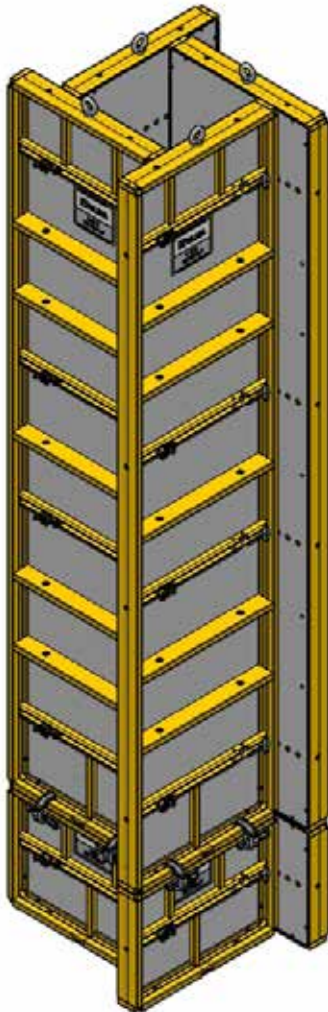
These column panels have several ribs with holes, punched every 5 cm, through which the bolts are inserted. Depending on the hole used, the column dimensions will vary.

PANEL WIDTH	0.7 m Panel	0.5 m Panel
Minimum column (mm)	300 x 300	150 x 150
Maximum column (mm)	600 x 600	400 x 400



■ Vertically connecting panels

To execute high columns (taller than 3 m), two panels must be vertically joined together, **always positioning the small panel below** to facilitate and ensure the assembly from the ground.

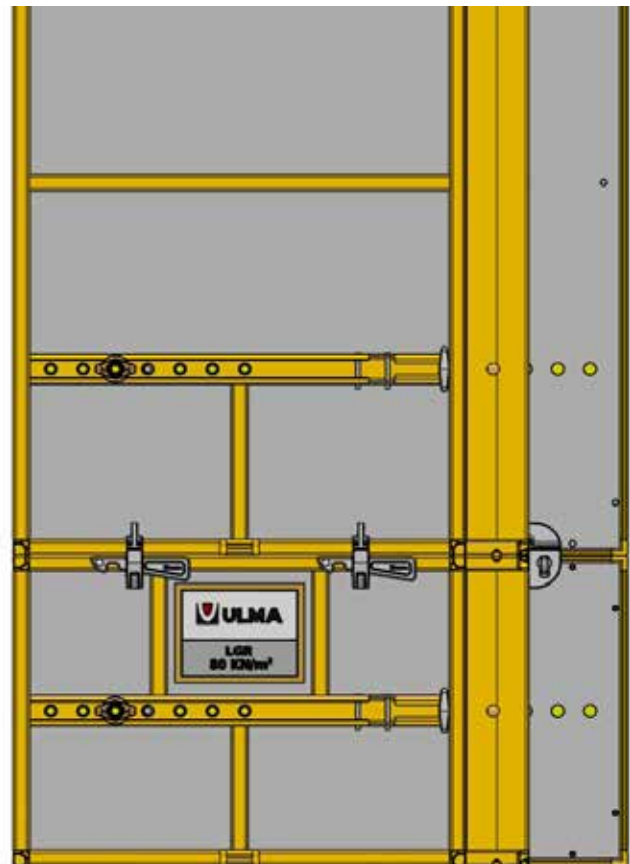
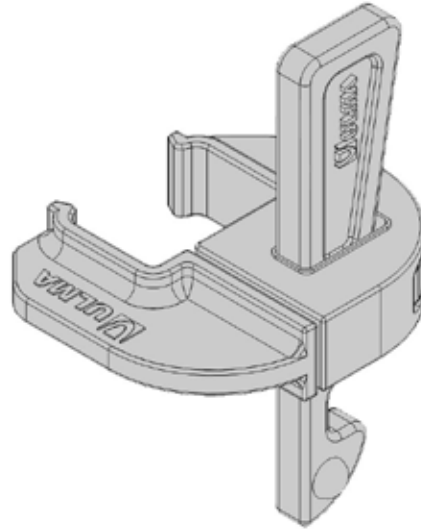


▲ The smaller panel must be placed at the bottom

The join between two panels is preferably done with two MEGALITE clamps.

In these cases, **the maximum allowable column height is 5 m**, always positioning the small panel below.

The concrete pouring speed is limited based on a **panel resistance of 80 kN/m²**.



▲ Panels join with two clamps

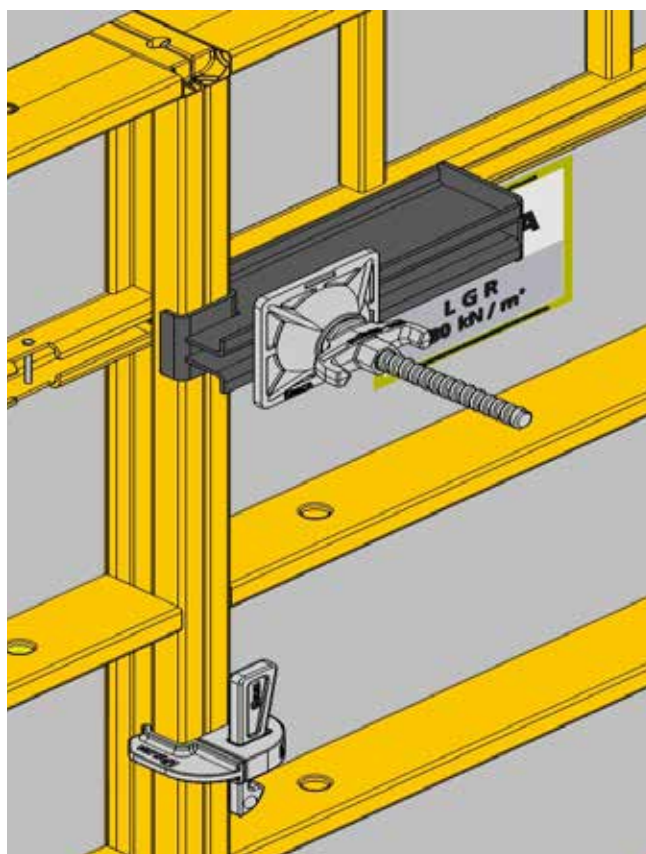
■ Dwarf walls

Columns with a cross section larger than 60 cm, need clamps and LGR waler to join both panels.

In these cases, the height of the dwarf walls is limited to a maximum of 5 m (always positioning the small panels below). The panels must be joined face to face using intermediate **Ø15 Tie rods**.

The tying of the tie rods is carried out by the LGR waler together with the plate washer nut 15.

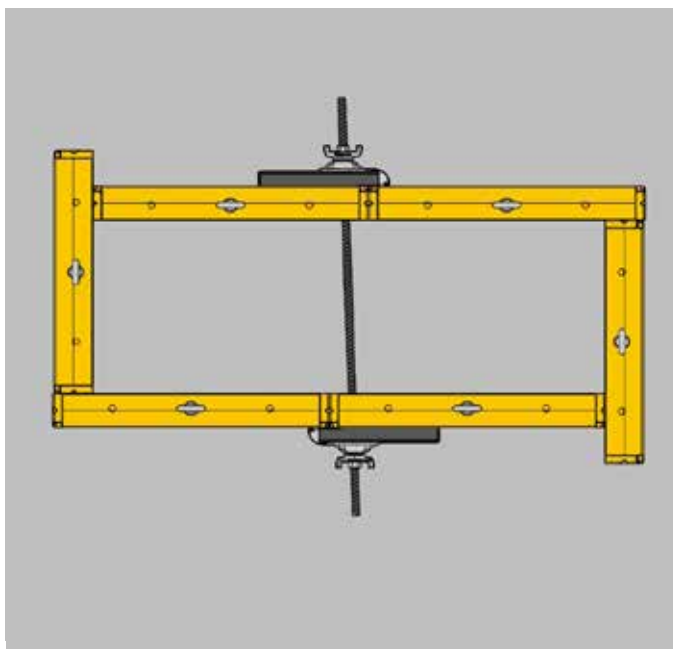
PANELS WIDTH	0.7 + 0.7 m	0.7 + 0.5 m	0.5 + 0.7 m	0.5 + 0.5 m
Minimum dwarf walls (mm)	1000	850	800	650
Maximum dwarf walls (mm)	1300	1100	1100	900



▲ Panel's tied with clamp and LGR waler



▲ Dwarf wall joined with clamps and LGR waler.



▲ Dwarf wall's top view



▲ The characteristics and qualities of the panel provide excellent finishes

Work at high elevations, such as pouring concrete, should be carried out from **safe and stable work platforms** that prevent workers from falling.

It can be used independent lifting platforms or working platforms integrated in the formwork.

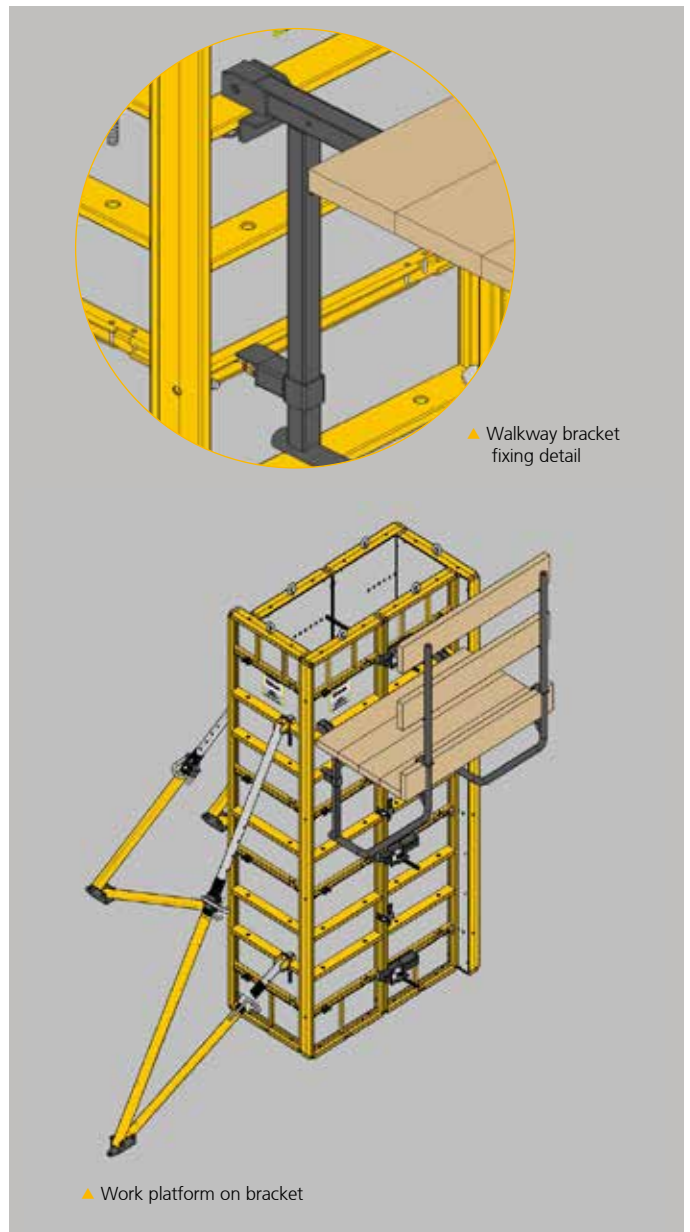
The **walkway bracket** is installed by inserting its pin in the ribs' tie hole and the stop is supported on the lower ribs to provide stability.

The platform is created by nailing the wooden planks to the plastic strip on the walkway bracket and installing handrails and toeboards using planks.

Walkway bracket load capacity: 150 Kg/m².

The lateral union for dwarf wall solutions, is made according to next criteria:

LGR panel dim.	Nº clamps in height
LGR panel 3 m	5 clamps
LGR panel 1 m	2 clamps
LGR panel 0.5 m	1 clamps



► Handling and maintenance conditions

■ Use conditions



► General use conditions

- Follow the instructions for the project in execution at all times.
- Follow the general manufacturer's instructions at all times.
- Formwork shall be put up and stripped by qualified personnel, who are supervised, overseen and managed by a competent person.
- If working close to high voltage power lines, power should be shut off while work is in progress. If this is not possible, take the necessary protective measures recommended in the current applicable standard.
- Work will not be done on the formwork when wind speeds are in excess of 60 km/h or when there is ice or snow.
- The crane used must be strong enough for the handling and assembly of the gangs.
- The auxiliary lifting elements should be appropriate for the loads to be lifted. They should be checked before each use and discarded if found to be faulty.
- If the Lifting hook is used, it should be used following the instructions provided by the manufacturer.
- If due to conditions of the work environment, the crane operator does not have the capacity to view the whole trajectory over which the load is moved, the transport operations will be guided by a signaller, who will communicate with the crane operator using predefined signals.
- Under no circumstances shall people loiter beneath or in the path of elevated loads.

Formwork

- For stacking formwork panels on the ground, frames will be placed on planks or similar materials and distributed to avoid any damage, facilitating organization, cleanliness and posterior distribution of the panels to their assembly positions.
- All gang positioning and assembly processes will be performed following safe work procedures.
- They will be levelled and stabilized properly depending on the terrain and/or weather conditions.
- New gang shall not be mounted in the working area until the previous gang has been properly secured.
- Do not leave any element partially assembled.
- The working platforms should never be overloaded. Only elements required for fluid work flow should be stacked on them.

- Assure proper tying between the nut and the bolt so as to make sure that no grout is lost through the joints.
- Make sure that all the plate washer nuts are properly tightened, the push-pull props are properly placed and tightened and the push-pull prop shoes are correctly tied to the ground.
- Respect the maximum pressures of the formwork system (according to product instructions).
- The formwork surfaces should be checked and cleaned before pouring concrete.
- Release agent should be applied to a cloth or brush and used to clean the panels after each use. Do not use wire brushes that could damage the film on the plywood.
- In general, it is not recommended to use nails, screws or similar fasteners.
- Panels should always be stored after their last use at the construction site. Before stacking the panels, they must be cleaned. Then, they should be stacked by placing a wooden piece between one panel and the next. They should be kept off the ground by stacking them on supports that are levelled, and they should be stored under a roof.

Release agent

- Release agent should be used to keep concrete from sticking to the formwork, thus increasing number of times a panel can be used.
- The release agent plays an important role in assuring the quality of the concrete surface. It serves the purpose of assuring there are no surface holes and that colour is uniform.
- It should be applied uniformly and in thin coats at all times. Usage and correct use guidelines should be taken into account at all times.
- The panel surfaces should be cleaned carefully before applying the release agent.
- It is recommended to clean the metal frame and apply the release agent to the frame every 4 or 5 pourings.

Pouring

- It is recommended to pour the concrete from the lowest possible height; never higher than 2 m if it is not poured through a conduit, pipe or other pouring accessory. It is convenient to pour as close as possible to the base, without pouring directly against the formwork at a single point.
- The condition of the formwork will be overseen while pouring concrete. Pouring will be stopped if any incident is detected.
- Do not permit concrete to splash on the high sides of the panels so as to assure that it does not cause stains.
- If concrete is poured from a bucket, special care should be taken to avoid hitting the formwork with the bucket and to avoid exceeding the crane's load limit.





- The appropriate compacting system should be used based on the concrete specifications. This should be appropriate for the vibrator used.
- Internal needle vibrators are better for compacting the concrete on site, and the external vibrators, which vibrate through the panels, should not be used. The needle vibrator should penetrate the concrete by 10 to 15 cm.
- The needle vibrator should never come in contact with the formwork surface to assure the expected loads are not exceeded. The vibrator should penetrate the concrete quickly, and be held still, vertical or slightly inclined for 10 to 30 seconds or until the concrete flows back to the surface.
- Remove the vibrator slowly and carefully.



Stripping and curing

- Before stripping, the concrete must comply with a minimum resistance to avoid losing concrete next to the surface since this would affect the surface resistance and durability of the concrete.
- The time before beginning the dismantling process should be increased when there are low temperatures or strong winds that could result in quickly drying the surface.
- The same time interval should be respected while stripping other elements from the construction area. From the surface quality point of view, this is justified since the surface quality is directly linked to and influenced by the time over which the surface is isolated from the surrounding environment.
- While stripping, check that there are no people near and verify that there is no loose material that can fall from the platforms.
- Vertical elements should be stripped from top to bottom.
- Once the gang is stripped, it will be supported on the frames where it will then be cleaned and totally disassembled if no more concrete is going to be poured.
- Before using any material, it should be checked to confirm that all components are in proper working conditions.



Personal and collective protective equipment

- Regulatory safety equipment should be used when working, or working platforms with their corresponding safety handrails should be used (collective safety equipment).
- Personal Protective Equipment to be used should include at least: helmet, safety footwear, gloves and a tool belt.
- Other Personal Protective Equipment should be used depending on the site guidelines, based on risk assessments.

Handling conditions

- Proper storage of components is a fundamental necessity for their preservation.
- Optimal storage conditions are the following:
 - Place the pieces of the same type and dimensions on or in elements that have been exclusively designed for them (baskets, pallets, boxes, etc.).
 - In order to avoid part deformation, do not strap the metal strips too tightly.
 - Apply the metal strips sufficiently tight to assure the parts cannot move.
 - Use protectors to guard the components from the excessive pressure exerted by the metal strips.
 - Do not permit parts to hit against one another while the material is being moved.



Repairing

- ULMA Construction has specific equipments for cleaning, repairing panels and replacing board.



✦ Lifting hook

- The Lifting hook should be used in a way it does not put in danger the integrity of people.
- The Lifting hook cannot be used in applications not described in the User's Guide.
- The Lifting hook can only be used to raise panels and gangs for systems specifically designed by ULMA Construction, LGR in this case. It will never be used for other applications or other formwork systems.
- In case the Lifting hook does not work properly, it will have to be taken back immediately to be repaired.
- The Lifting hook must not suffer strong knocks and excessive crushing during its handling, storage, transport and, mainly, when shifting the Panel from these Brackets.
- The Lifting hook will remain in a place protected from the atmospheric and aggressive agents to avoid its deterioration.
- In case anyone who manipulates the Lifting hook notices any deterioration in it, he/she will immediately take it back to have it repaired.
- The revision and reparation of the Lifting hook will be carried out by the staff authorised by the manufacturer.

- Make sure that the used wire rope slings to raise the panels are placed in a symmetric way.
- Check visually the state of the Lifting hook before any use, discarding it if any problem.
- In long term jobsites the components will be revised periodically (every six months) by qualified personnel.
- Never stay under the lifted load.
- Panels will be raised slowly, avoiding sudden movements. When raising the panel do not stay near it. Lift it some centimetres and check the correct placement of the slings.
- If the Lifting hooks are not working properly, the panel will be placed on the ground and all the mistakes will be corrected.
- If the load has to be guided, cords and other auxiliary means will be used. These means will be placed in the panel in advance.
- If the crane operator does not have visual control of the whole course, the displacement labours of the panels will be guided by someone qualified to do it. Never guide the load with the hand.
- Gloves and safety boots with metallic toecap will always be used for hand and feet protection when placing Lifting hook and raising panels. A helmet will always be used to protect the head.
- Handlings will be carried out in places with enough visibility (more than 100 Lux).



Checking instructions

- The hook must be verified at least once a year by qualified personnel from ULMA Construction or, by someone that has been previously qualified and authorised by ULMA Construction.
- For the overhaul of the Lifting hook check the parts specified in the next table:

CONTROL TYPE	COMPONENT	FAULT	REVISION FREQUENCY	CRITICAL YES / NO	REPAIR
Visual	Fixed and mobile parts	Fissured welding, broken or with an important corrosion	Every use and every time it goes out from the store to the jobsite	Yes	Scrap
	Staple	Deflection or excessive erosion	Every use and every time it goes out from the store to the jobsite	Yes	Scrap
	Hexagonal screw nut	Check the bundle of the components. Deflections. Missing component.	Every use and every time it goes out from the store to the jobsite	Yes	Replace components
	Spring	Missing component	Every use and every time it goes out from the store to the jobsite	No	Replace components
	Identification plate	Missing component	Every use and every time it goes out from the store to the jobsite	No	Replace components
	Surface appearance	Dirt that impedes the functioning and mobility of moving components	Every use and every time it goes out from the store to the jobsite	No	Clean



The self-blocking nut and hexagonal screw are for single use, so long as these elements are released, these should be replaced by new ones.

▶ Legal and standard references on health and safety in the workplace and environmental risks

- Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work
- Council Directive 89/654/EEC on the minimum safety and health requirements for the workplace
- Council Directive 92/57/EEC on the implementation of minimum safety and health requirements at temporary or mobile construction sites
- Council Directive 92/58/EEC on the minimum requirements for the provision of safety and/or health signs at work
- Directives 89/655/EEC- 95/63/EC - 2001/45/EC concerning the minimum safety and health requirements for the use of work equipment by workers at work

- Council Directive 89/656/EEC on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace
- Council Directive 90/269/EEC on the minimum health and safety requirements for the manual handling of loads where there is a risk particularly of back injury to workers
- Directive 2002/44/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibrations)
- Directive 2003/10/EC on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise)
- UNE-EN 13374 Temporary border protection systems, product specifications, test methods

■ Agreement statement NEVI Lifting hook

AGREEMENT STATEMENT

According to Directive 98/37/CE concerning machines

Hereby **ULMA C y E, S. Coop.** declares that the product whose code and name are mentioned below complies with the design and manufacturing aspects concerning people's safety required by the corresponding European directive concerning the machines 98/37/CE, the standard UNE EN 13155 and UNE EN 729, being this the valid statement until the product suffers any modification.

Code: **1920835**
Name: **NEVI LIFTING HOOK**

Oñati, 23th January 2009

■ Agreement statement Lifting ring

AGREEMENT STATEMENT

According to Directive 98/37/CE concerning machines

Hereby **ULMA C y E, S. Coop.** declares that the product whose code and name are mentioned below complies with the design and manufacturing aspects concerning people's safety required by the corresponding European directive concerning the machines 98/37/CE, the standard UNE EN 13155 and UNE EN 729, being this the valid statement until the product suffers any modification.

Code: **9165401**
Name: **EYE BOLT SCREW M20 DIN580**

Code: **9057200**
Name: **HEXAGONAL NUT M20 DIN985-8 ZINC COATED**

Oñati, 26th January 2009

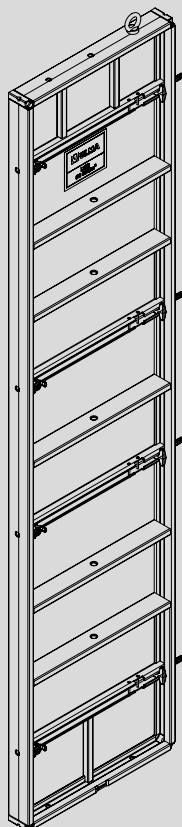
Components and accessories

Basic elements

LGR Panel

LGR Panel 3 x 0.7
LGR Panel 3 x 0.5

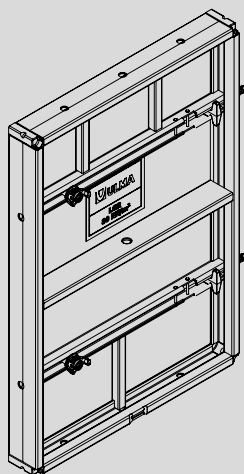
WEIGHT (kg)	CODE
74.26	1856050
58.4	1856065



LGR Panel

LGR Panel 1 x 0.7
LGR Panel 1 x 0.5

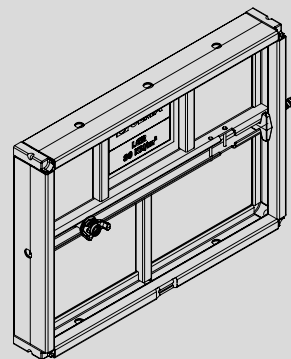
29.5	1856060
22.6	1856070



LGR Panel

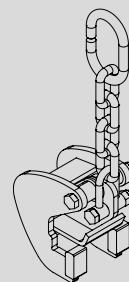
LGR Panel 0.5x0.7
LGR Panel 0.5x0.5

WEIGHT (kg)	CODE
16.9	1856075
12,9	1856080



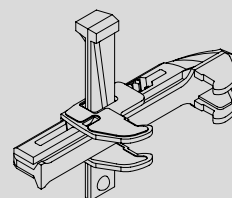
NEVI Lifting hook

8	1920835
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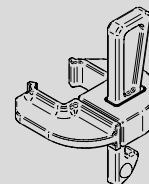
NEVI Clamp

3.96	1920851
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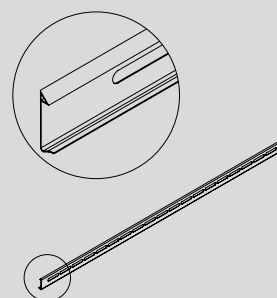
MEGALITE Clamp

2.2	1920818
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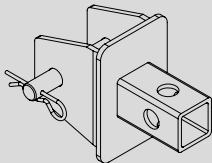
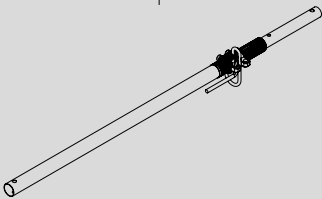
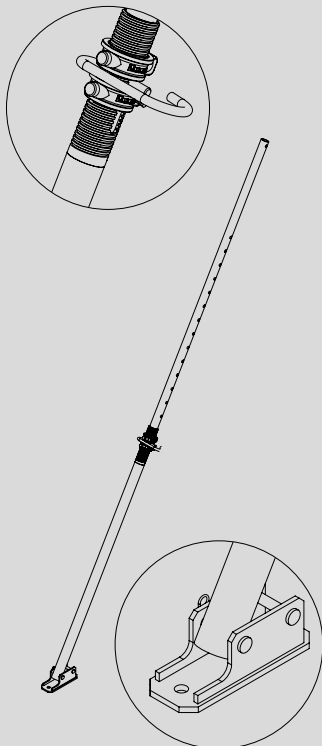
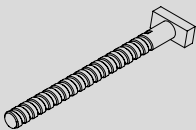
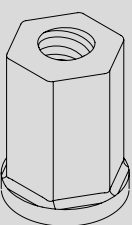


Chamfer strip LGR 3 m (16 units)

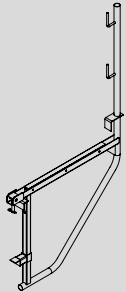
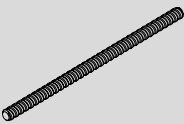
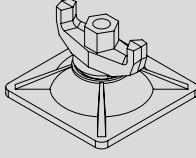
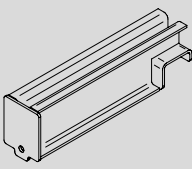
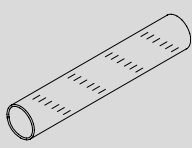
0.45	1856061
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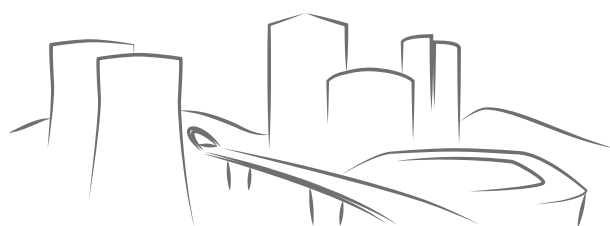


Stabilizing

	WEIGHT (kg)	CODE
Push-pull prop head	1.5	1856140
		
Push-pull prop 1.55 - 2.5	10.3	1856130
		
Push-pull prop 2.5 - 3.85	19.7	1856120
		
Panel bolt	0.4	1861122
		
Hexagonal nut 15	0.22	7238001
		

Work Platforms - Anchors - Consumables

	WEIGHT (kg)	CODE
ORMA Walkway bracket	12.2	1861094
		
Tie rod 15/1	1.7	0230100
		
Plate washer nut 15	1.4	1900256
		
LGR Waler	2.5	1856100
		
Spacer tube 22/25 (75 ml)	0.3	7230455
		
Cone 22 (250 units)	0.006	7230264
		
Eye bolt screw M20 DIN580	0.3	9165401
		
Hexagonal nut M20 DIN985-8 zinc coated	0.06	9057200
		



From the beginning of your projects

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