ORMA MODULAR FORMWORK

Vertical formwork: strong, versatile and suitable to be used in many applications

Construcción

ULMA

IMPORTANT:

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

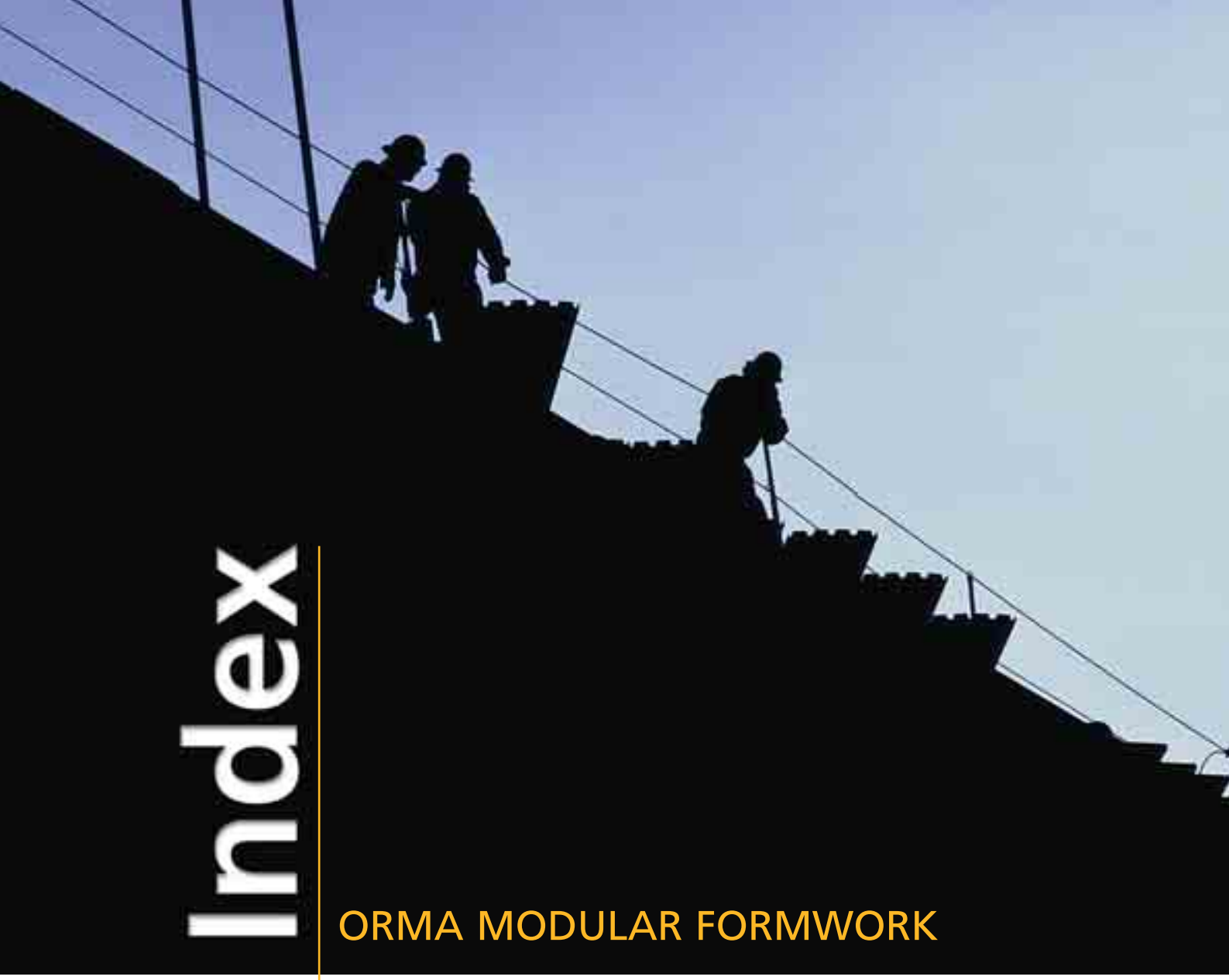
The pictures in this document are snapshots of situations at different stages of assembly, and therefore are not complete images. For the purpose of safety, they should not be deemed as definitive.

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

The loads featured in this document, related to the basic elements of the product, are approximate.

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 warrantees.

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



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ORMA MODULAR FORMWORK

Product description

Safety and special features

The **ORMA Modular Formwork system** provides solutions for the execution of any type of vertical structure, no matter how risky it may seem: **walls, columns, abutments, foundations...** It is suitable for framing any geometrical shape.

The high performance of this system is guaranteed for any type of construction job, whether constructing buildings or other civil engineering projects.

The system is comprised mainly of panels, joined by clamps, available in gangs that make up the formwork. ORMA has elements or accessories that **efficiently and safely provide solutions for all types of geometries.**

Primary characteristics:

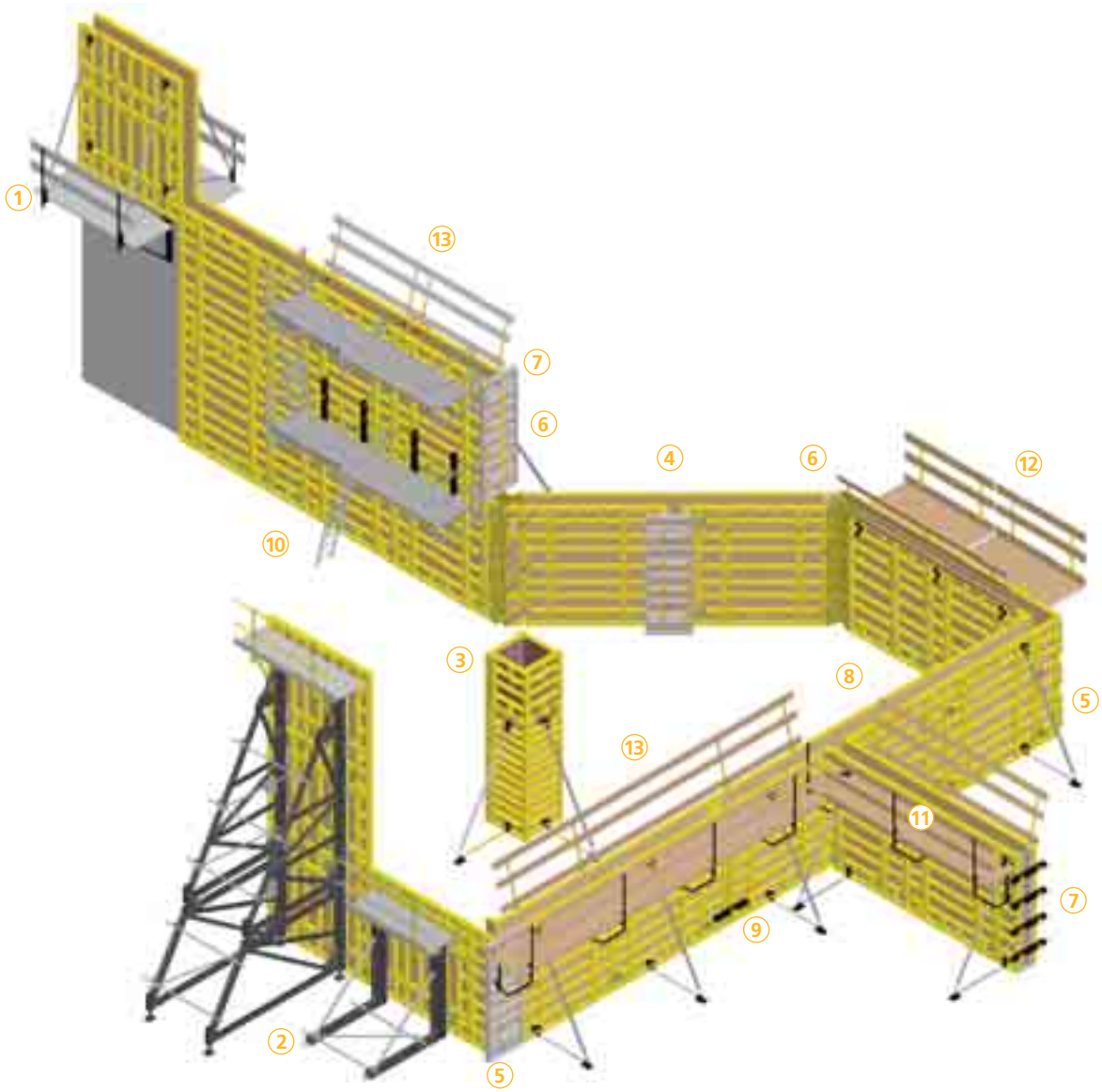
- System certified by the German organization **GSV*** according to established guidelines and requirements.
- System designed to support **high concrete pressures.**
- **Wide range** of panels, the largest being 3.3x2.4m (7.92m²).
- **Robust panel** formed by a metal frame with reinforced corners.
- **Highly versatile system** due to **lateral holes** that allow quickly framing typical solutions, such as bulkheads, corners and columns.
- The plywood shuttering face provides **excellent surface finishes.**
- Panels are joined by **clamps** with the strike of a hammer to form large gangs, which can then be lifted.
- The wide range of **Column Panels** provides solutions for columns of any dimension and height.
- **Safety elements** are easily fastened to panels, thus always guaranteeing safe system use.

***GSV:** World renowned international organization that is constituted of major formwork manufacturers. GSV establishes strict design, manufacturing and control requirements, thus guaranteeing product quality.

More information:
www.gsv-betonschalungen.de

Possibilities of the ORMA system: Features and Solutions

1 Climbing systems	8 90° wall intersections
2 One face formwork support	9 Fillers
3 Columns	10 ORMA-BRIO Bracket
4 Pilasters	11 Walkway bracket
5 90° corners	12 ORMA Platform
6 Hinged corners	13 Post bracket
7 Bulkheads	



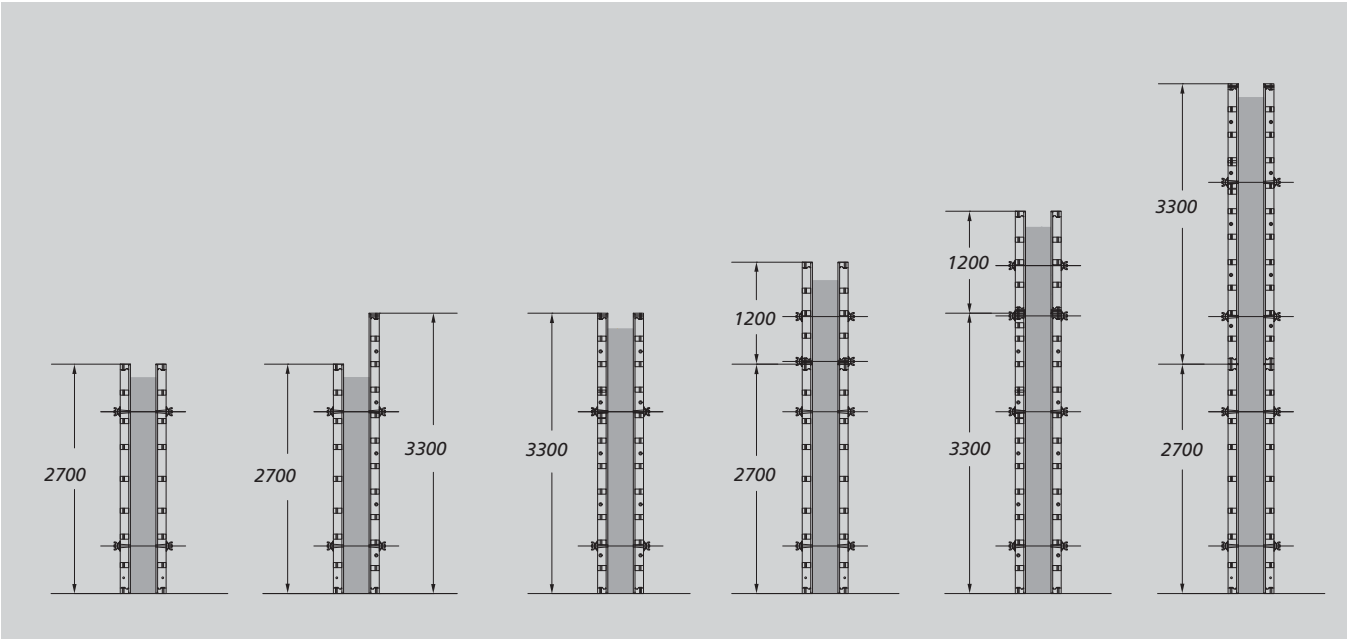
Basic system components

Versatile and capable of adapting to all ULMA Construcción vertical systems

ULMA Construcción is committed to making versatile products with the objective of **maximizing product performance and minimizing costs of construction.** Accordingly, the ORMA Modular Formwork system is comprised of a series of components that, for the most part, can be used in conjunction with different ULMA Construcción vertical formwork systems.

Panels:

A perfect custom concrete finishing

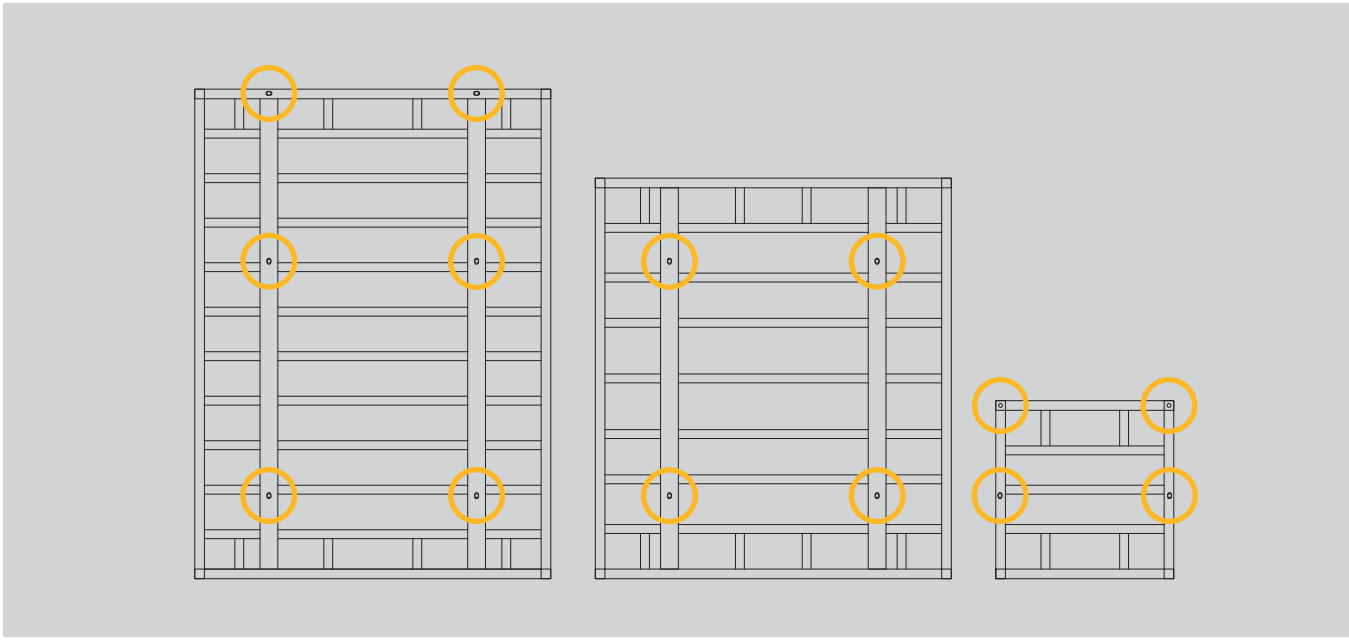


GSV certification:

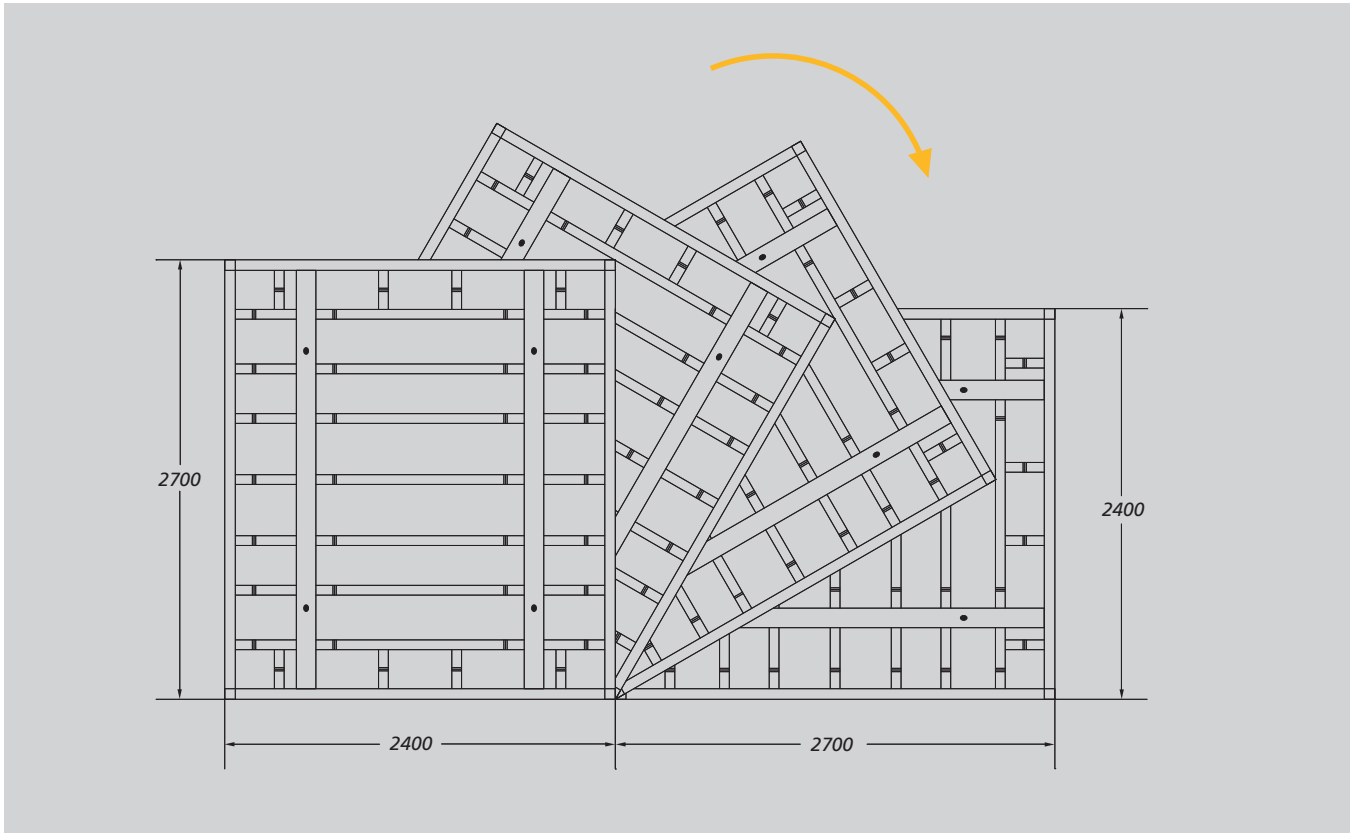
- Maximum load pressure:
  - 3.3m range: 80 kN/m²
  - 2.7m range: 74 kN/m²
- Maximum deflections:
  - 60 kN/m² (line 7, tab.3 DIN 18202)
  - 80 kN/m² (line 6, tab.3 DIN 18202)

Pouring concrete:

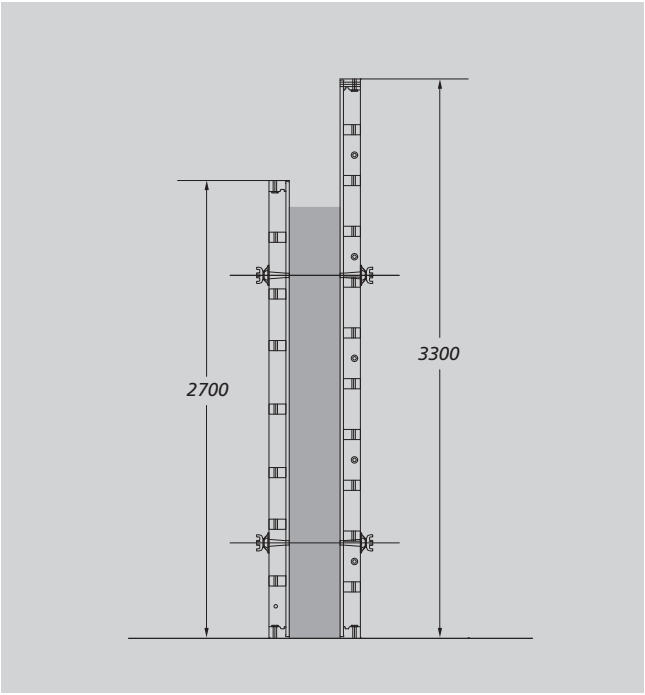
- For pouring height ≤ 3.3m, only 2 ties are necessary.
- For pouring height > 3.3m, 3 ties are necessary.



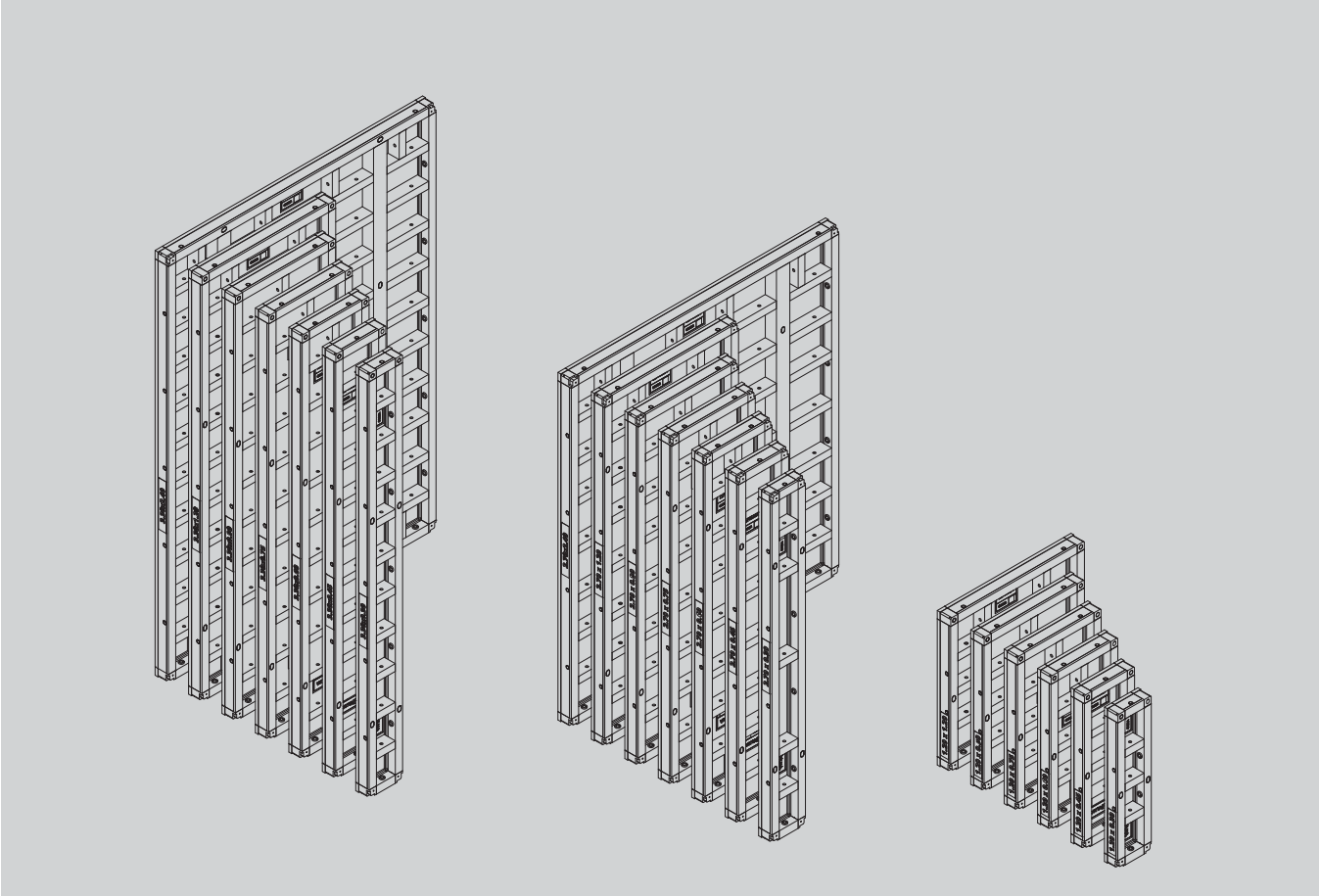
- Large panel **3.3x2.4m (7.92m²)** with 3 tying points **in height.**
- Big Panel **2.7x2.4m (6.48m²)** with 2 tying points **in height.**
- Three **ranges of panel heights:** 3.3m 2.7m and 1.2m panels. These are completely compatible and can be assembled in vertical or horizontal position.



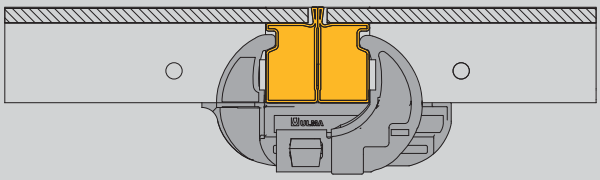
- The 3.3 and 2.7 Panel ranges can be assembled face to face and are compatible.



- **Width range:**
  0.3 / 0.45 / 0.6 / 0.75 / 0.9 / 1.2 and 2.4m.
  Gangs can be laid out every 15cm by combining different panels.

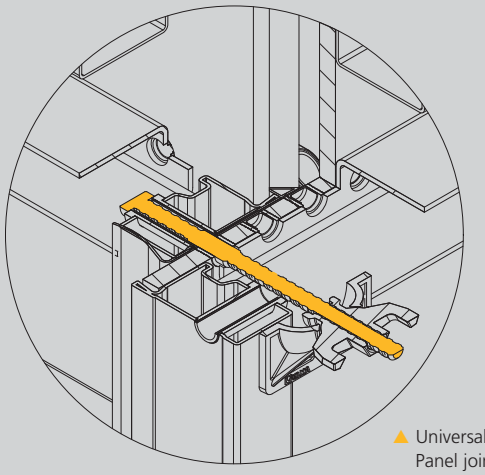


- The metal frame is formed by a perimeter profile and reinforced corners capable of absorbing impacts and avoiding breakage due to incorrect use. Besides, these corners reinforcement include a hollow to introduce the crow bar.

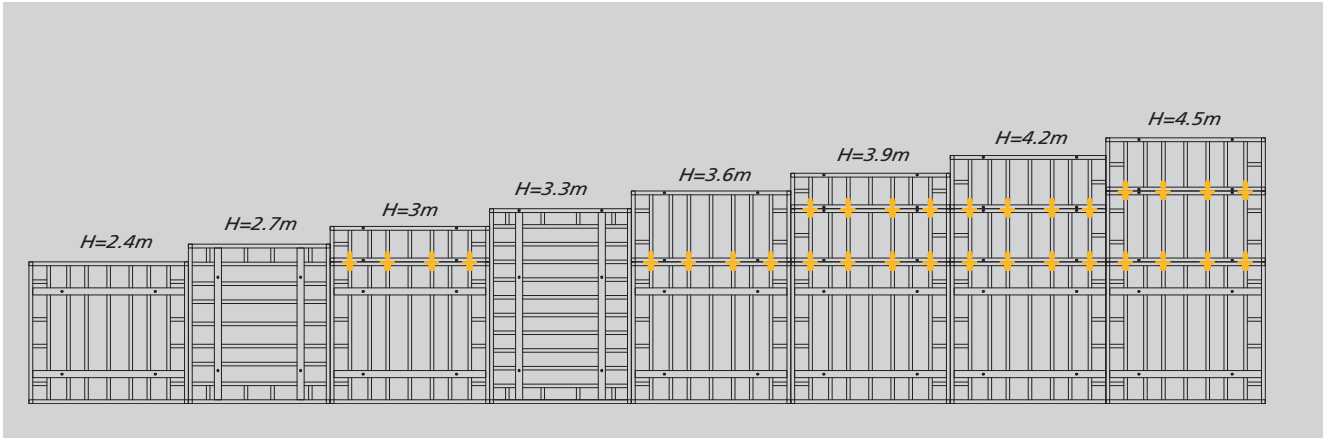


▲ Adjustable Clamp Section

- The panels have **lateral holes** that are reinforced on the profiles for providing bulkhead, corner and pilaster solutions, thus making the system highly **versatile.**

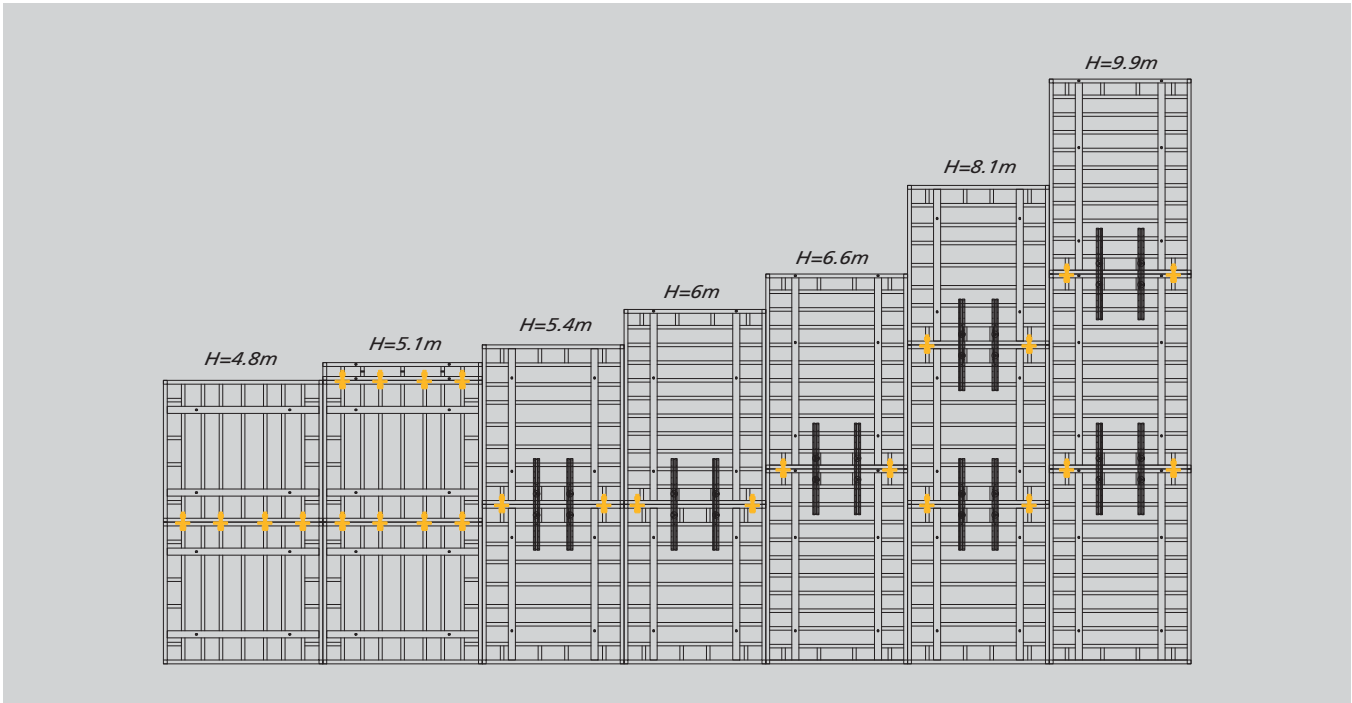


▲ Universal Panel-Wall Panel joint



▲ ORMA Panel's height range (from 2.4m to 4.5m)

The shuttering face of the 18mm **thick plywood** is riveted to the metal structure. Its edges and tie holes are protected against impact and moisture.

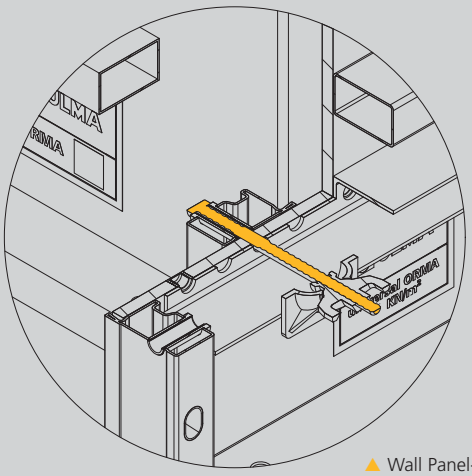


▲ ORMA Panel's height range (from 4.8m to 9.9m)

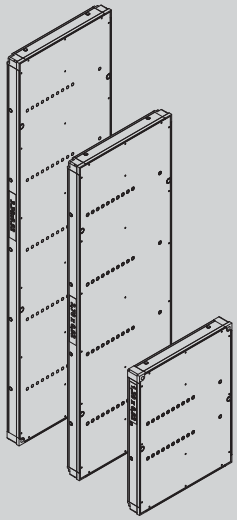
Universal Panel

Multiple applications

The Universal Panel has U-shaped ribs with multipunched holes. Thus, these holes permit quickly framing corners, bulkheads and pilasters combining Universal and wall panels.



▲ Wall Panel-Universal Panel joint



◀ Range Of Universal Panels
3.3x0.92 Panel
2.7X0.92 Panel
1.2X0.92 Panel

Universal Panels can also be used as wall panels, so they have tie holes in the perimeter profile where Tie Rods can be inserted.

Clamps:

Fast and simple connection

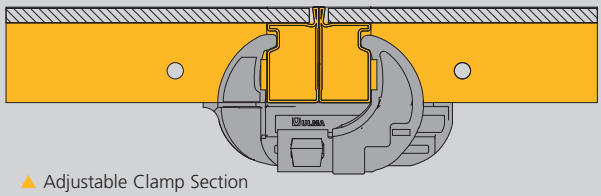
Adjustable Clamp

Guaranteed strong joints and fast assembly

This is the main component used to **join panels. With one single strike of the hammer,** it can be used to make gangs **that are assured to be tight joint, no any concrete leak.**

· It has three basic functions:

- Joining
- Aligning
- Stiffening



▲ Adjustable Clamp Section

▲ Ease of installation

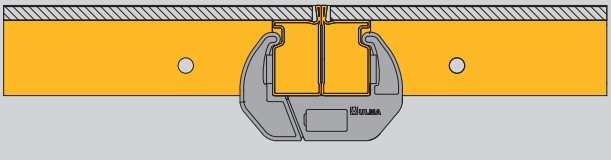
▲ The tightness of the joint is assured

▲ This clamp can cover fillers **between panels up to 10cm wide**

Fixed Clamp

Guaranteed tight joint

Panel joint component that cannot be used in conjuction with compensation. Just as with the Adjustable Clamp, all panel joints can be formed with this clamp.



▲ Fixed Clamp Section

▲ The clamp joins panels in the edge

Waler:

Fixing for lifting

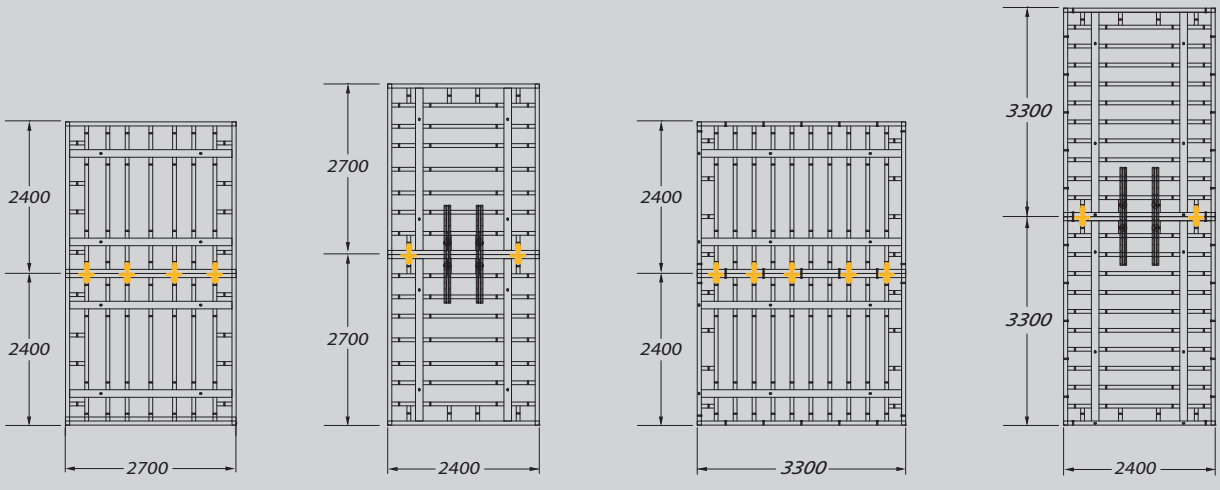
Auxiliary part used to lift gangs and align compensation.

Two Waler Hooks are used to fix these elements to the panel.

▲ Waler Hook detail

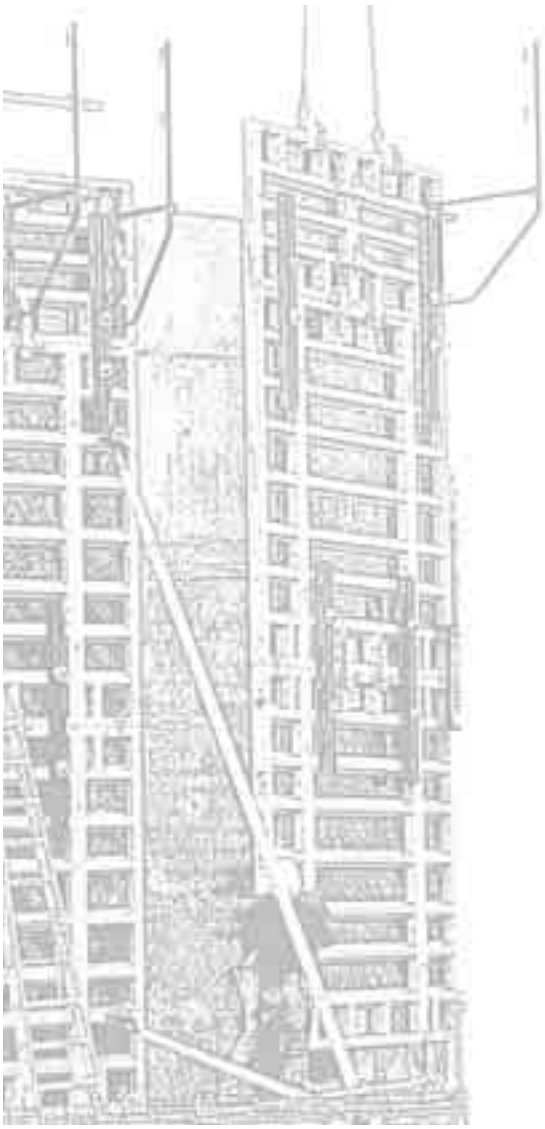
▲ These pieces provide rigidity and stability in hoisting

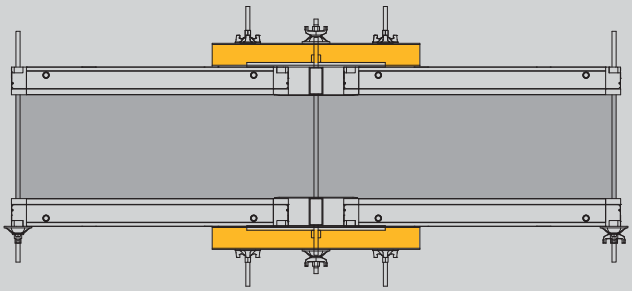
▲ Anchor of the Waler Hook in ORMA´s Panel



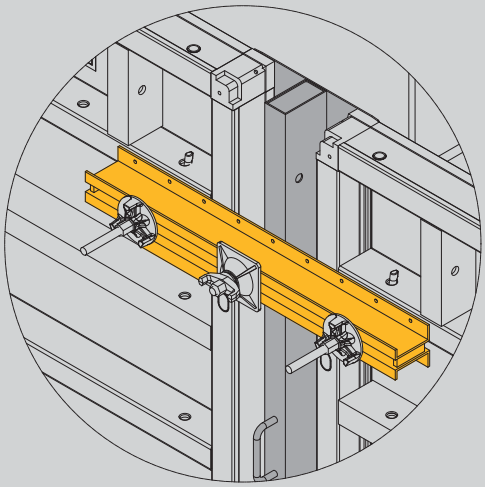
▲ Stiffness system

▲ Walers in fillers





▲ Filler detail using Walers



▲ Filler detail using Walers

Tying System:

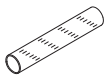
This tying system is strong enough to support the high pressures exerted when concrete is poured

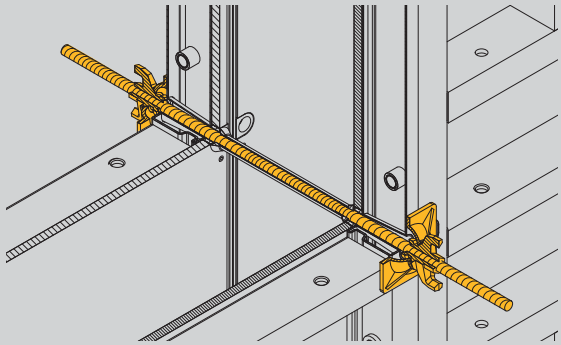
This is an assembly formed by Tie Rods and nuts specially designed to support high concrete pressures. **The ORMA system joins panels face-to-face using Tie Rods and their respective tying elements.**

To permit recovering material and reusing it, the rods are protected by plastic tubes that are inserted between face-to-face panels. In addition, they maintain the proper spacing and thickness of the wall to be executed.

Ø15mm and Ø20mm Tie Rods can be used with the ORMA system.

▲ **The Plate Washer Nut is the tying system's anchoring component. It is capable of supporting small inclinations in the rods**

NAME 15mm Tie		NAME 20mm Tie
Spacer Tube 22/25		Spacer Tube 32/36
Cone 22		Cone 32
Tie Rod 15		Tie Rod 20
Plate Washer Nut 15		Plate Washer Nut 20



▲ Tying System Section

▲ The nut design allows the entering of Tie Rod

Lifting:

Completely safe and resistant gang lifting

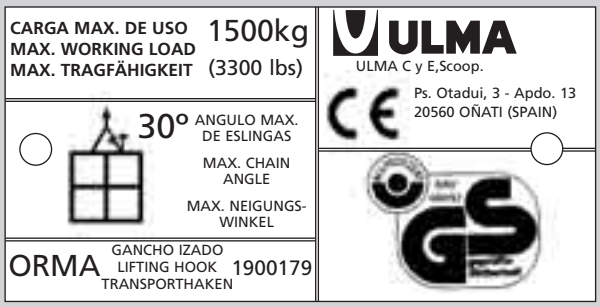
The ORMA Lifting Hook is an auxiliary component used in conjunction with a crane to lift single panels or gangs of panels.

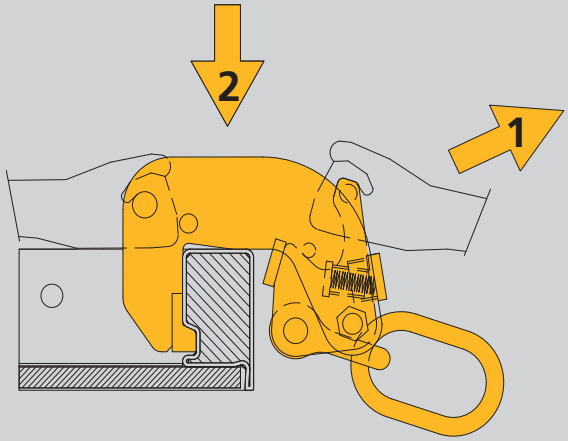
With maximum load capacity of **1500kg** per unit, it is recommended to use two lifting hooks when lifting.

The following certifications guarantee that it is a safe component:

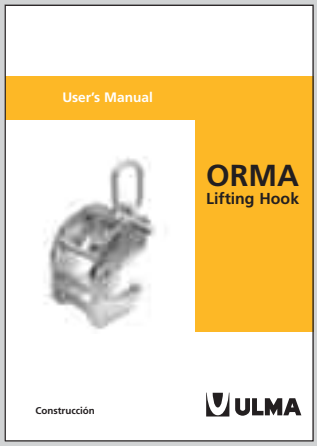
- The **"CE"** mark corresponds to European Directive 98/37/CE on machinery, and the maintenance control plate is provided to verify when maintenance work has been performed.
- The **"GS"** seal means that the system has been inspected by the Construction Committee of the "Office for Testing and Certifications" of BG-PRÜFZERT in Germany.

▲ It is recommended to use two lifting hooks when lifting





▲ Detail of the Lifting Hook fixed to the Panel



◀ For further information, read the **ORMA Lifting Hook User's Manual**

▲ Lifting gangs including working platform in different levels

▲ ORMA Lifting Hook

Safety Elements:

Everyday safety

ULMA Construcción strives daily to assure c**omplete, personal and collective protection for workers and third parties alike.** The company provides the same care for its products as it does for its professionals, always seeking to obtain the pertinent certifications from accredited companies. All of its systems incorporate **safety elements to protect personnel when assembling and using** the system.

Work Platforms:

Stable and safe working area

Work at high elevations, such as those reached when pouring concrete or installing different elements on top of the formwork, should be carried out from **safe and stable** work platforms that prevent workers from falling.

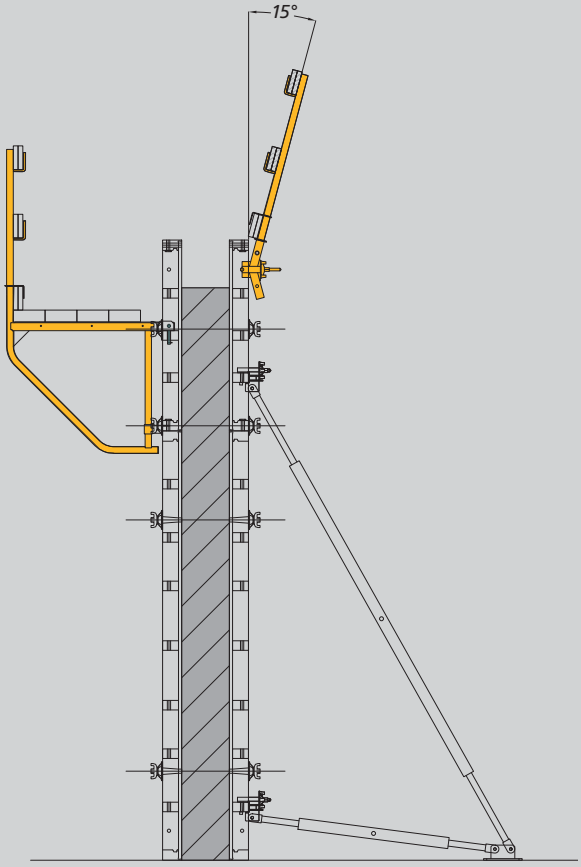
The ORMA system provides different solutions to build working platforms:

Walkway bracket:

Safe support at high elevations

This accessory, support for the working platform, is fixed by passing the rods through the tie holes on the horizontal ribs or by tying them to the vertical tubes. The abutment is supported by the lower ribs.

This component can also be used with other ULMA Construcción vertical formwork systems.



▲ Walkway bracket and Post Guardrail

▲ Detail: fixed to a vertical rib

▲ Detail: fixed to a horizontal rib

▲ Safety pin in bracket

It includes elements that allow precisely **installing handrails and toeboards** using planks.

The work platform is created by nailing various planks to the top of the plastic block on the walkway bracket.

The same bracket system can be assembled on the opposite panel, or a safety handrail, using the **Post Bracket and the Safety Handrail Post.**

The lateral sides of the platform can be covered using **Clamps Safety Handrail.**

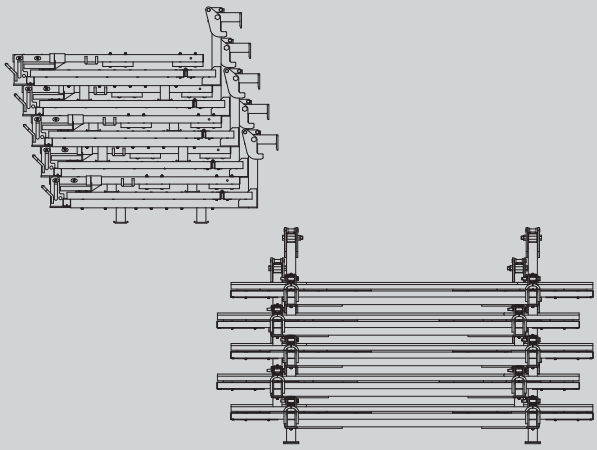
ORMA Platform 2.4x1.2

The integral and fast solution

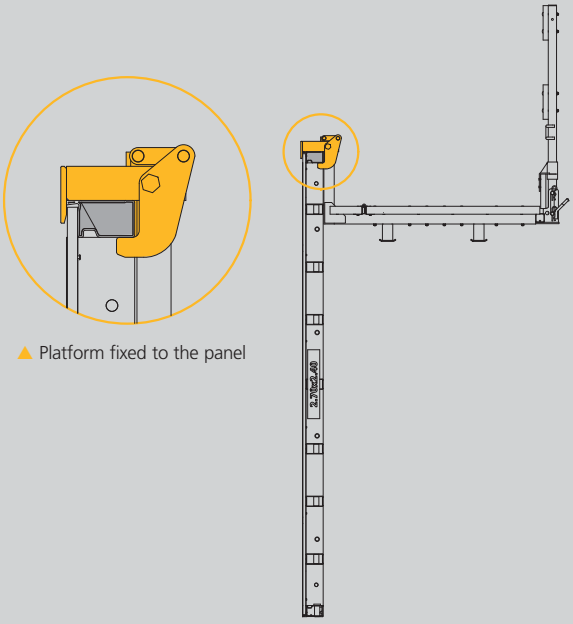
This working platform, which **includes all the necessary elements,** is always placed on the upper part of the formwork panels.

To install the platform, just unfold the handrail and lift it with a crane using the lifting rings. The final step of this simple assembly is to use the hooks to place the platform on top of the last panel's profile.

Transporting and storing the platform is simple since the handrails fold up on top of it, which makes it easier to stack.



▲ Stacked platforms

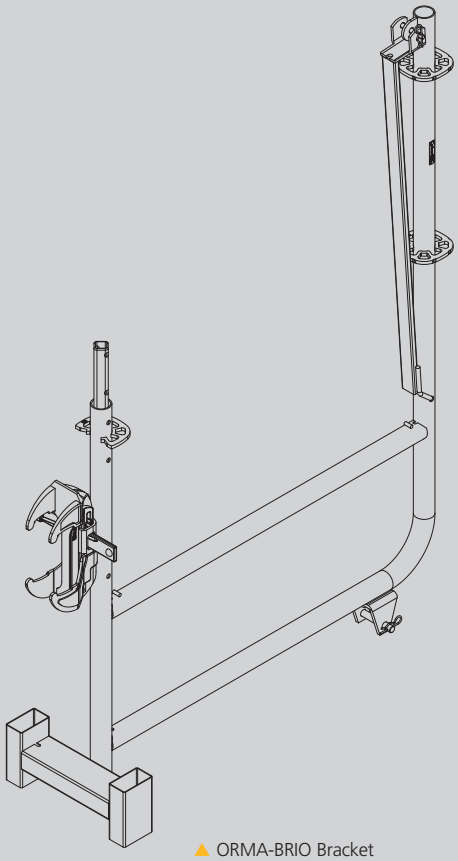


▲ Platform fixed to the panel

ORMA-BRIO Bracket

Complete safety for high elevation jobs

The ORMA-BRIO bracket has a welded clamp which is used to fix the bracket to the formwork on any point on the exterior profile along the panel joint, on the top of the formwork or even in intermediate positions

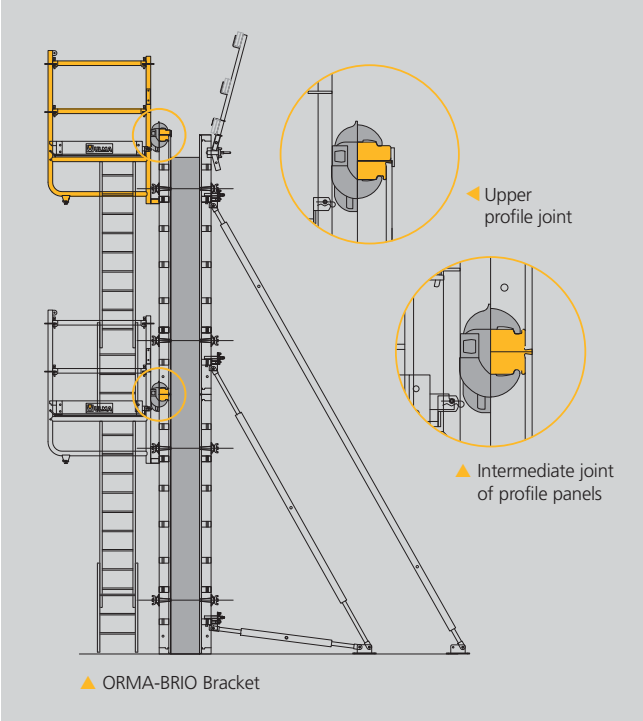


▲ ORMA-BRIO Bracket

This bracket uses **BRIO Multidirectional Scaffolding standard elements, thus guaranteeing the versatility and safety provided by this certified scaffolding.**

The metal platforms, either with or without trapdoor, are installed on top of the **Bracket** in the same way as the elements for the **handrail** and **toe board.**

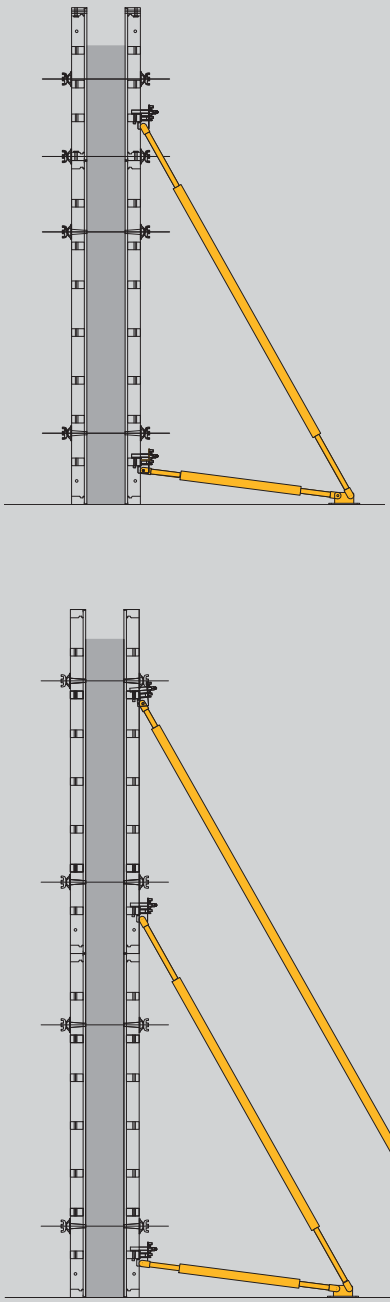
The trapdoor platform includes a ladder to access to different working levels.



Stabilizing System:

Constant 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 jacks to support both tensile and compression stresses.



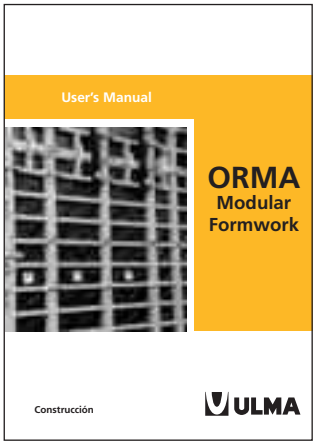
▲ Stabilizing System

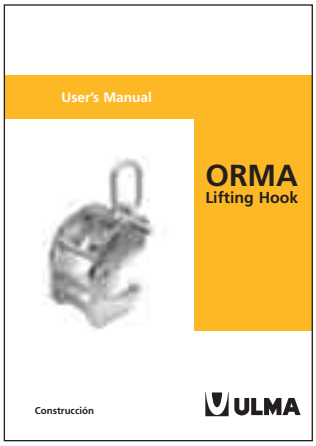
It is comprised of the following:

- **Push-pull prop:** a tube over which two jacks slide to acquire the proper length. More than one type of push-pull prop may be used to stabilize the formwork based on the height of the formwork. Push-pull props range in length from 1.1 to 10m.
- **Head 60:** an element that joins the panel and the Push-pull prop. It can be placed over both the vertical and horizontal ribs.
- **Push-pull prop shoe:** component used to anchor push-pull props to the foundation through the holes includes on it. It's recommended to use HSA M20X125 Hilti anchors.

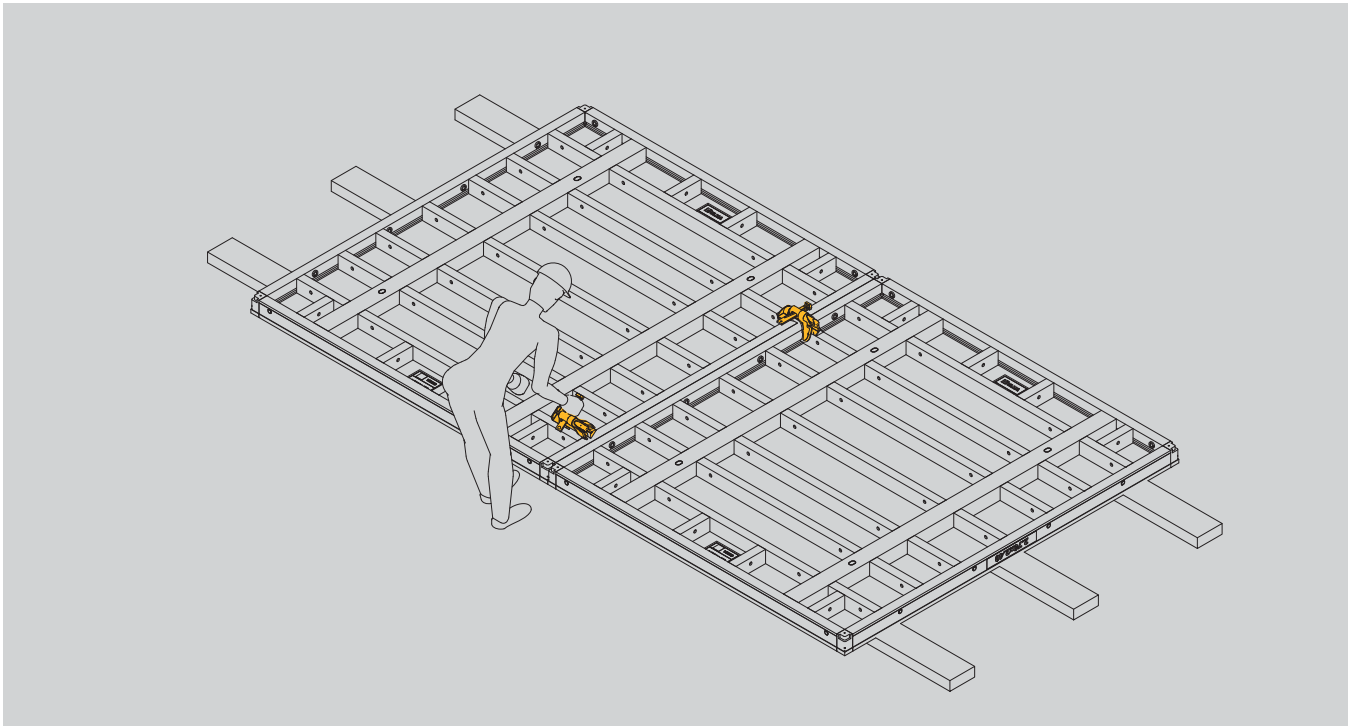
Basic assembly process

The work process described below may vary depending on the geometry required. Work at high elevations should be executed safely from working platforms or using reglamentary auxiliary equipment that guarantees the operator's safety.

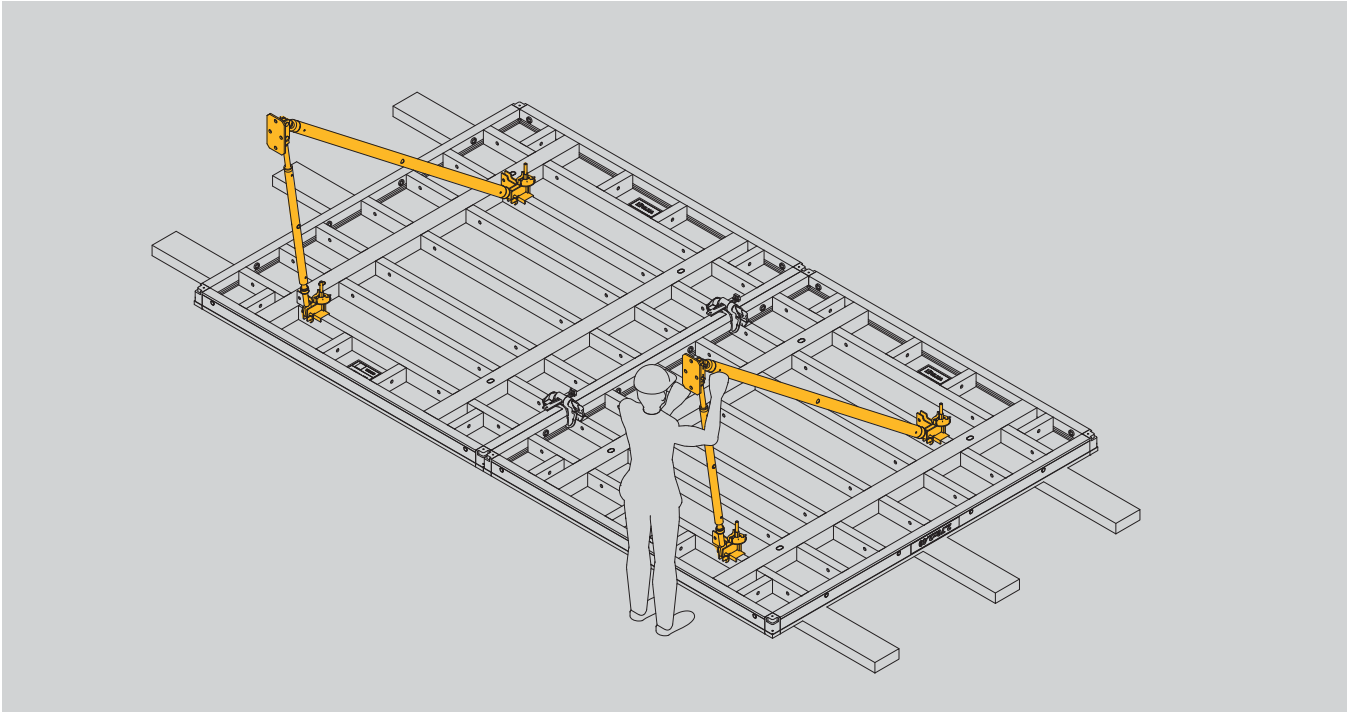




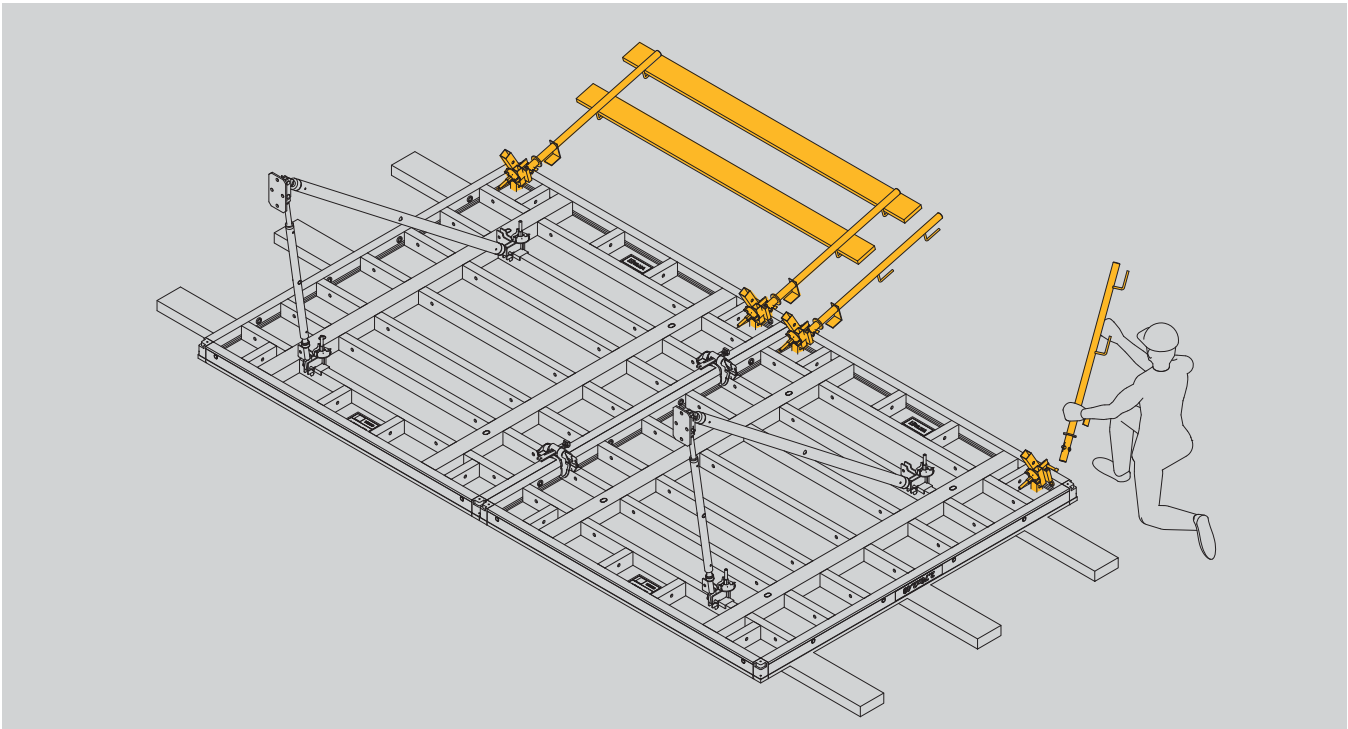
▲ For further information, read the **ORMA Modular Formwork User's Manual** and the **ORMA Lifting Hook User's Manual**



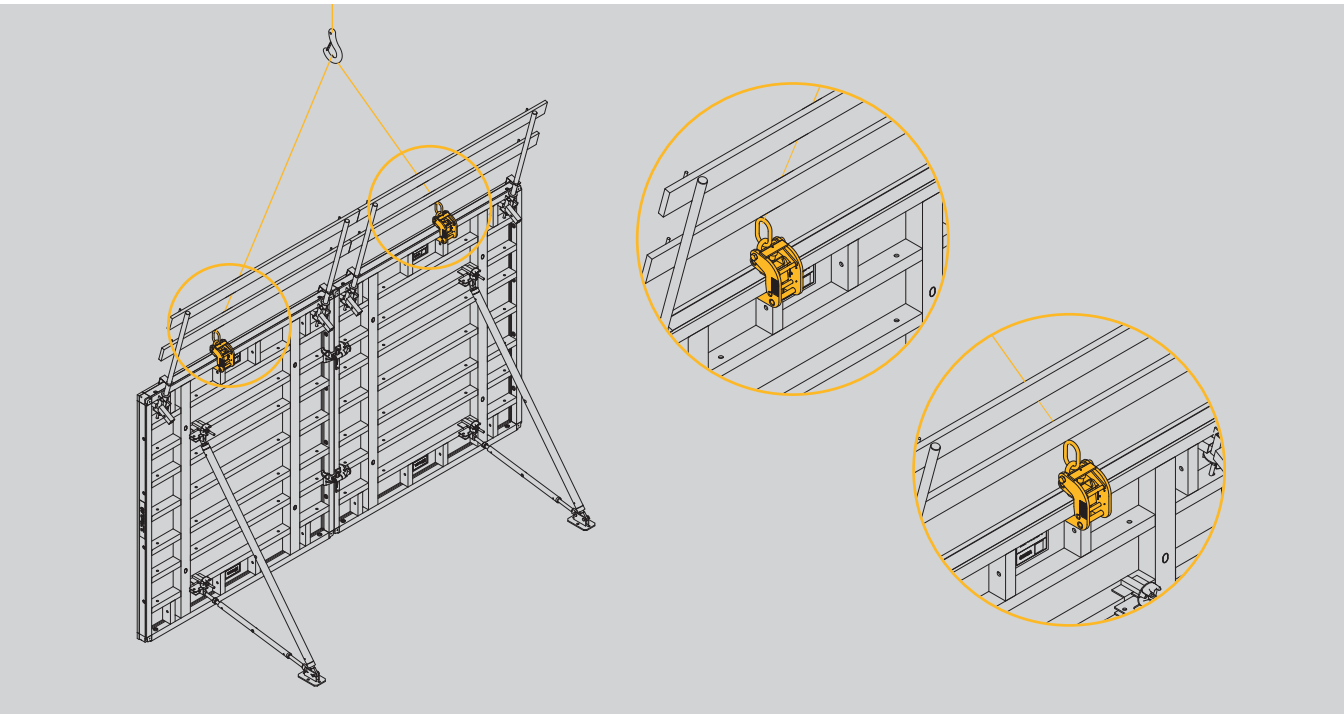
1 · Place the formwork Panels on top of the wood sills with the metal frame facing upward.
· Join the panels with two Adjustable Clamps on the vertical joint.



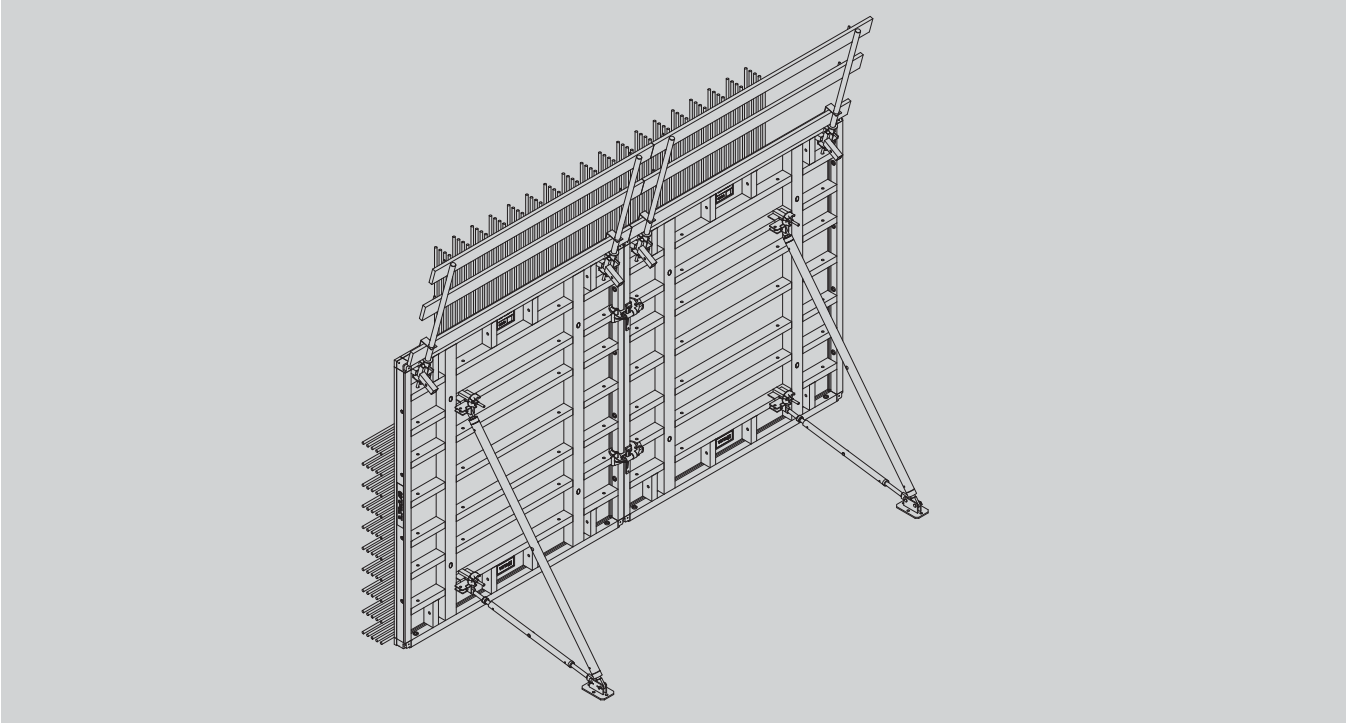
2 · Assemble the stabilizing equipment with Push-pull Props, Heads and Push-pull Prop Shoes.



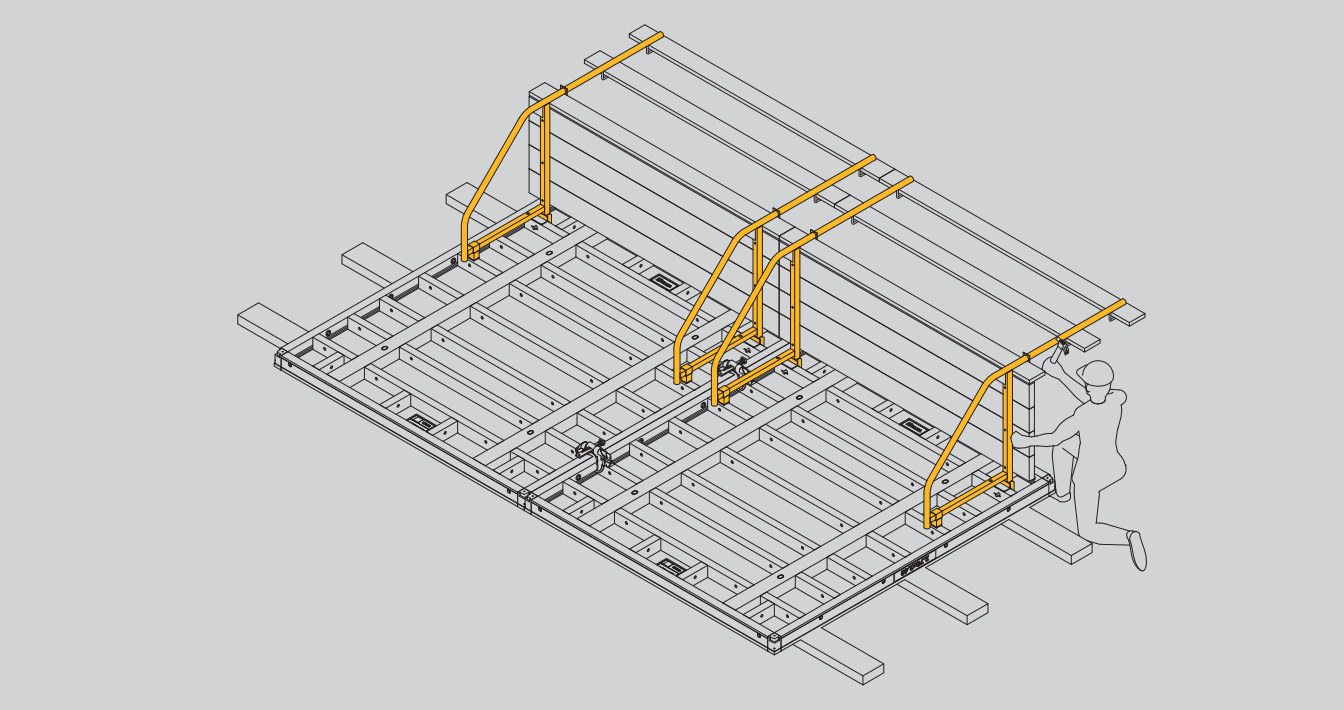
3 · Install the Handrails over the Panels using the Post Bracket, Safety Handrail Post and the planks or tubes.



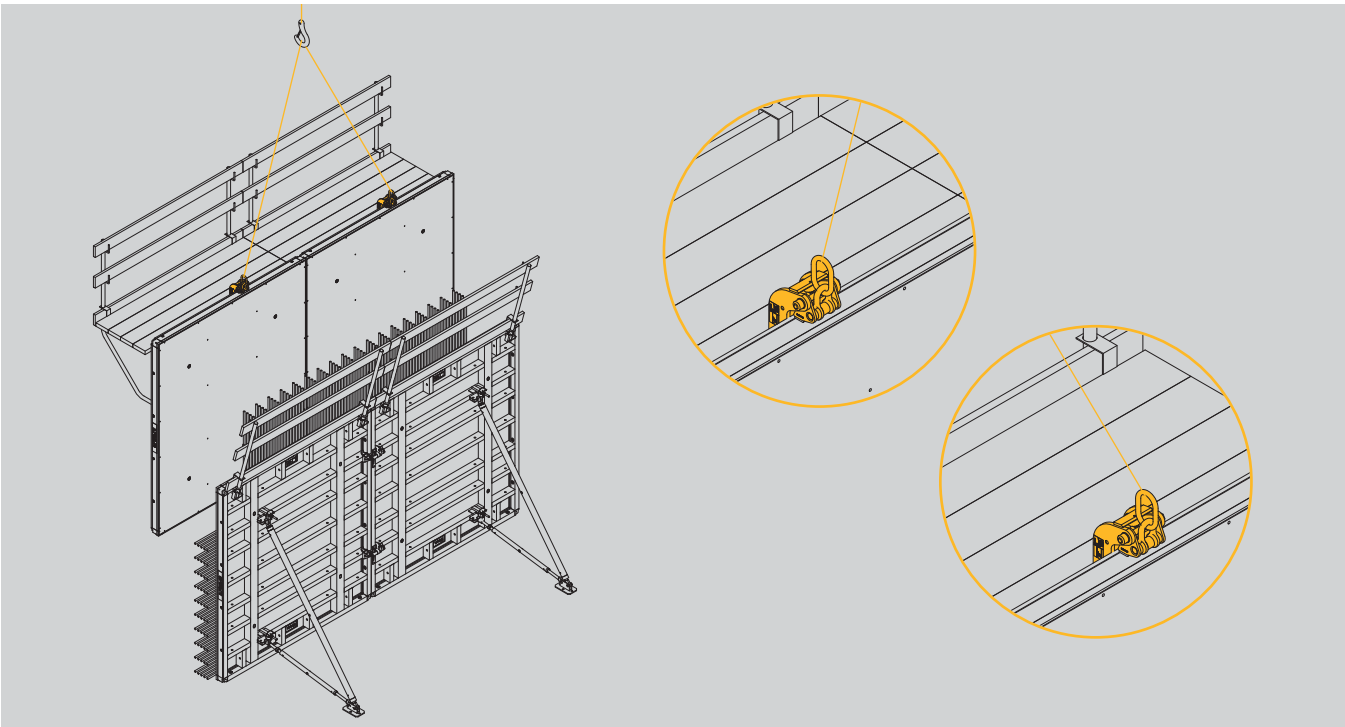
4 · Install the Lifting Hooks.
· Lift to the desired final position.
· Anchor to the ground.



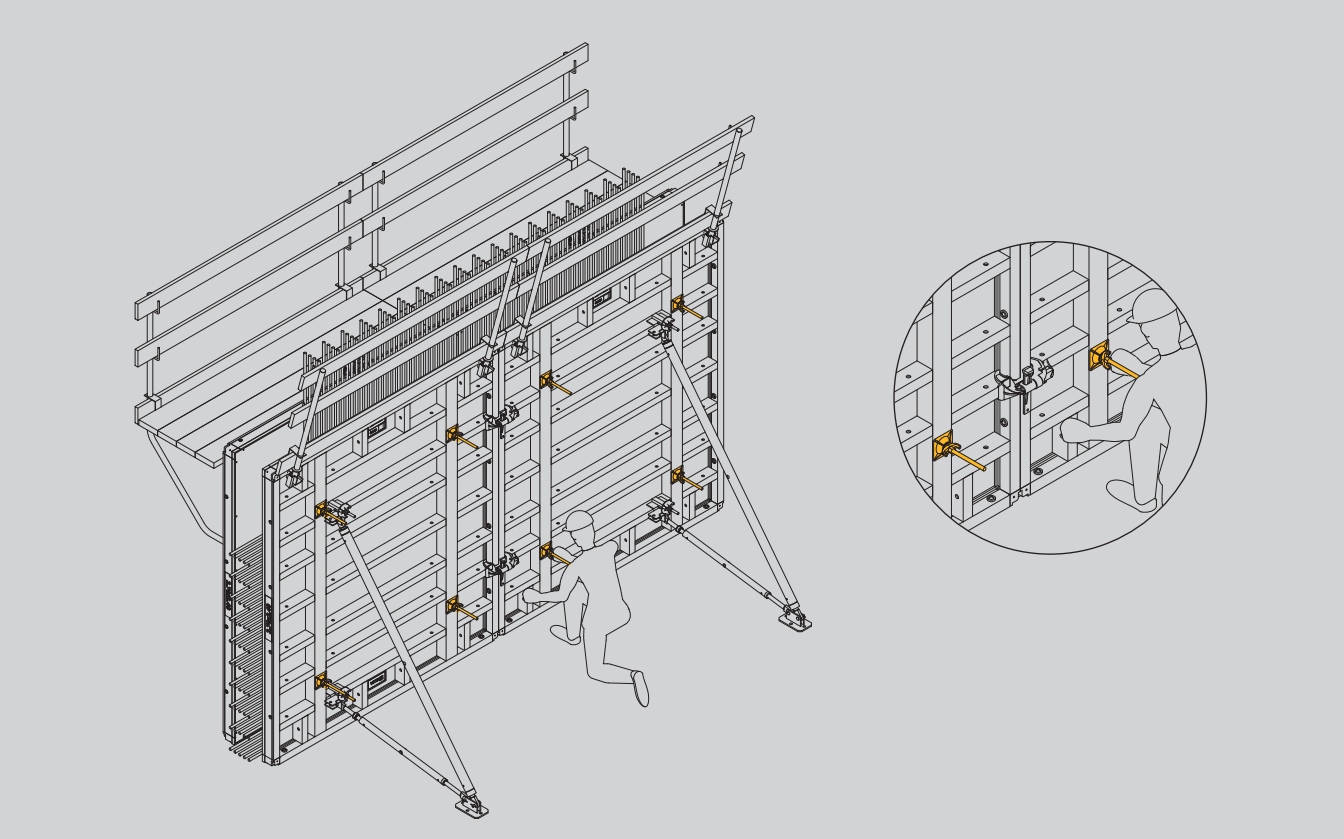
5 · Reinforce.



6 · Repeat the gang assembly process on the opposite side, building the working Platform using Walkways Brackets, handrails and planks.



7 · Lift the gang by the Lifting Hooks and position it face to face to the push-pull prop gang.



8 · Insert the Tie Rods and fix them using the Plate Washer Nuts.
· Install the lateral Handrails.
· Concrete can be poured after the bulkheads have been installed.

Technical solutions

All wall geometries imaginable can be made with this system

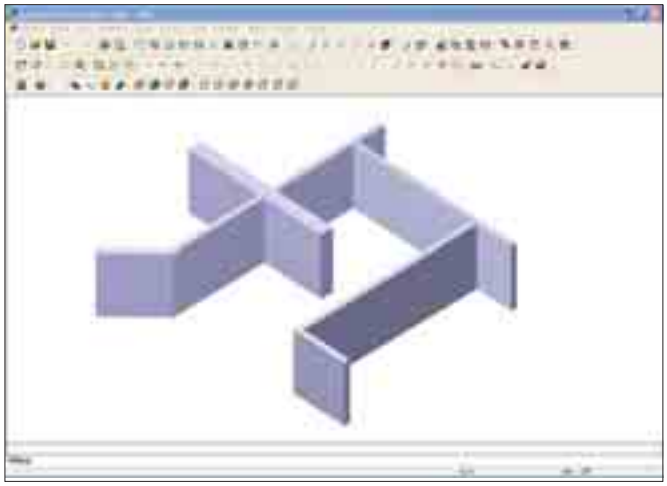
grafsystem:

Application software

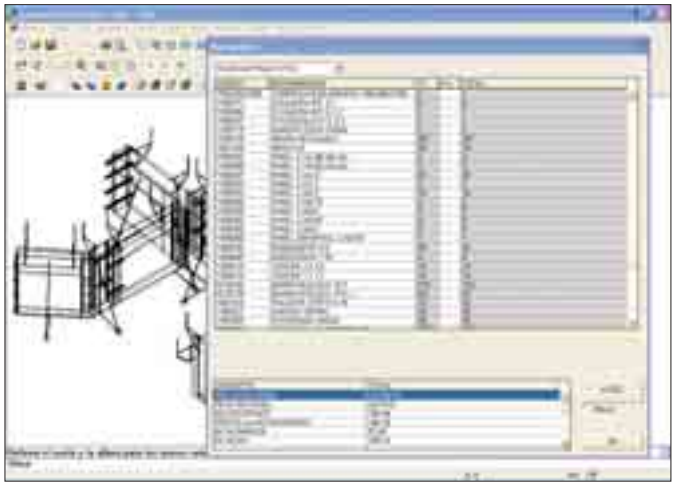
This software was developed by ULMA Construcción, and it facilitates the design of all construction site solutions that can possibly be solved with any product in the ULMA portfolio. **grafsystem obtains, quickly and easily, the assembly drawings and a detailed budget of the materials required for each project.**

With the project drawings, ULMA Construcción Technical Department can solve every problem imaginable for any construction job, when building vertical or horizontal structures.

In short, by simply entering the desired structure geometry, this software provides the best solution for any case.



▲ Jobsite geometry



▲ List of materials - budget

▲ Solution - 3D framed wall

▲ The ORMA Modular Formwork system is capable of providing solutions for different geometries encountered when erecting vertical structures

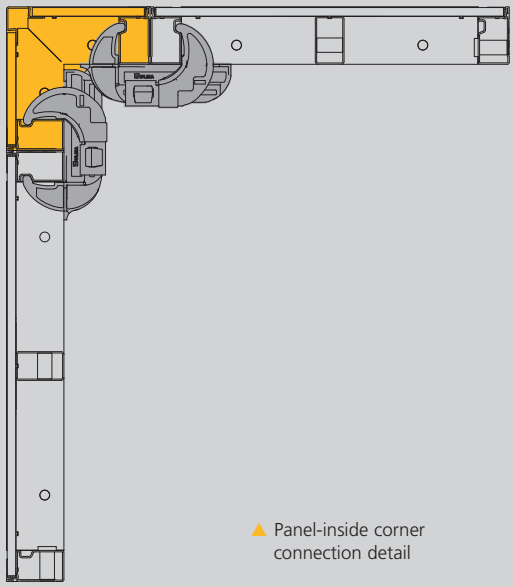
90º Corners

The inside face of 90º corners is framed using the **Inside Corner.**

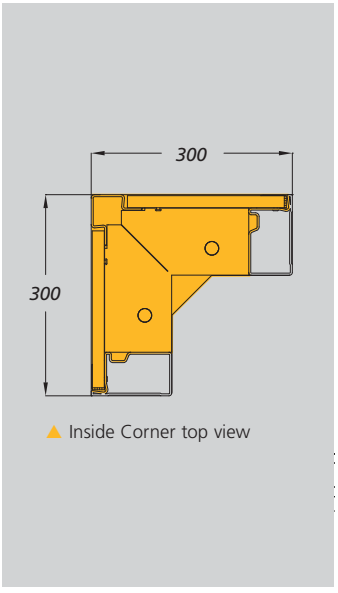
These corners provide a solution for wall thicknesses between 15cm and 60m, with a standard deviation of 5cm. They also provide solutions for all wall dimensions, whether without compensation or with maximum compensation thickness of only 5cm using Plate Nut Washers so Walers are not required.

· **There are various solutions used to frame the outside face of 90º wall corners:**

- Outside Corner
- Universal Panel
- Panel in the edge



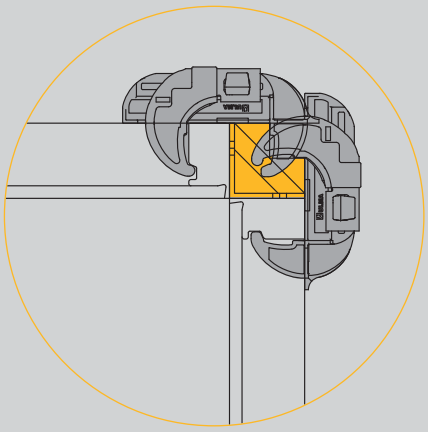
▲ Panel-inside corner connection detail



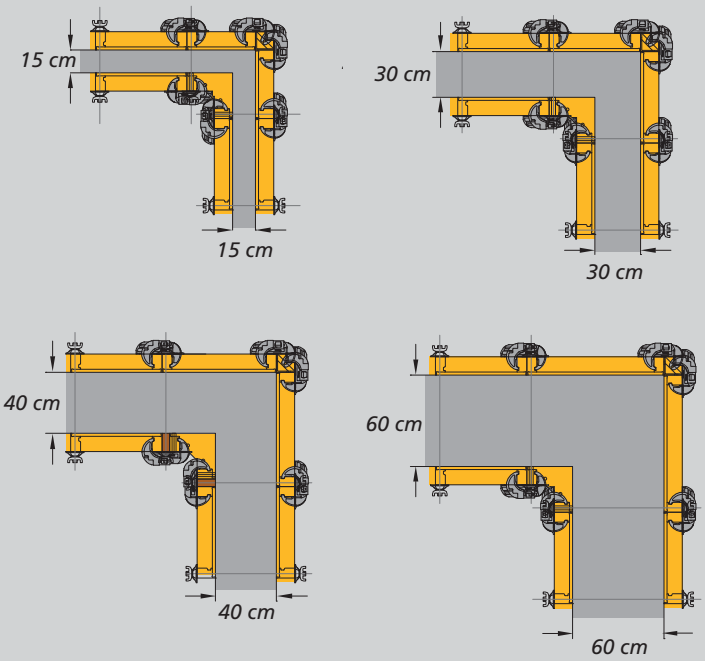
▲ Inside Corner top view

With Outside Corner

The outside face of 90° corners is framed with the **Outside Corner,** joining it to the adjacent Panels with Clamps in both directions.



▲ Panel-Outside corner connection detail



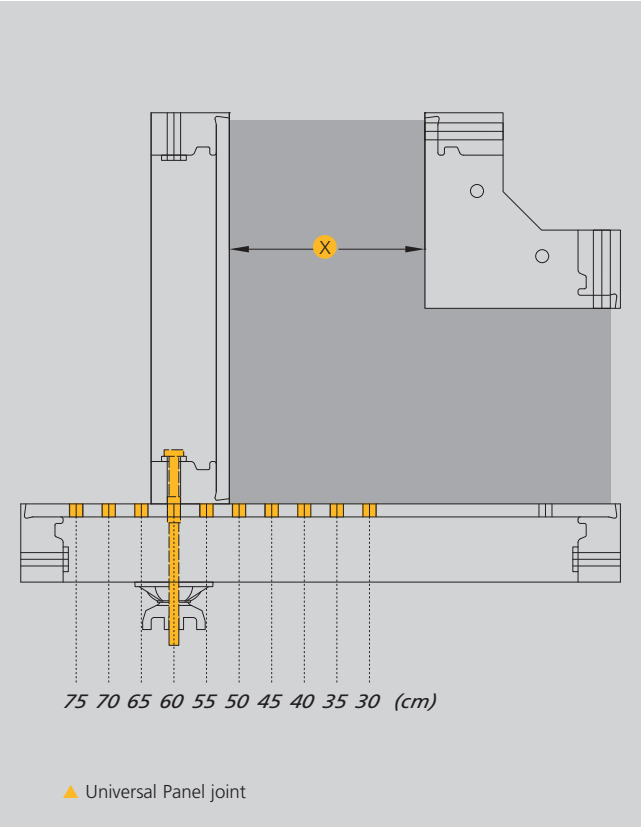
▲ Examples of 90° corners with Outside Corner

With Universal Panel

Combining the Universal Panel with different wall panels facilitates **obtaining the desired thicknesses in every case.** It also reduces the need to use compensation.

Both the lateral holes of the wall panels and the holes of the Universal Panel's multipunched ribs provide a wide range wall dimensions in increments that are multiples of 5cm.

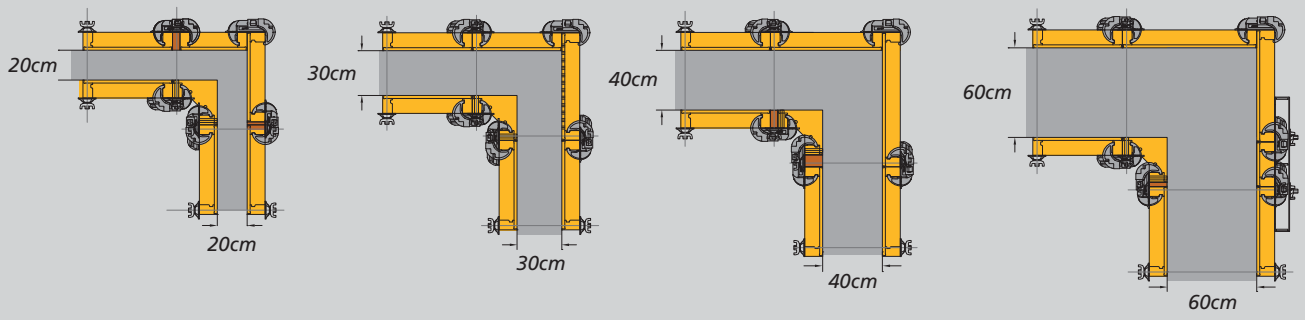
The joint is tied using the **Universal Panel Bolt and Plate Washer Nut 15.**



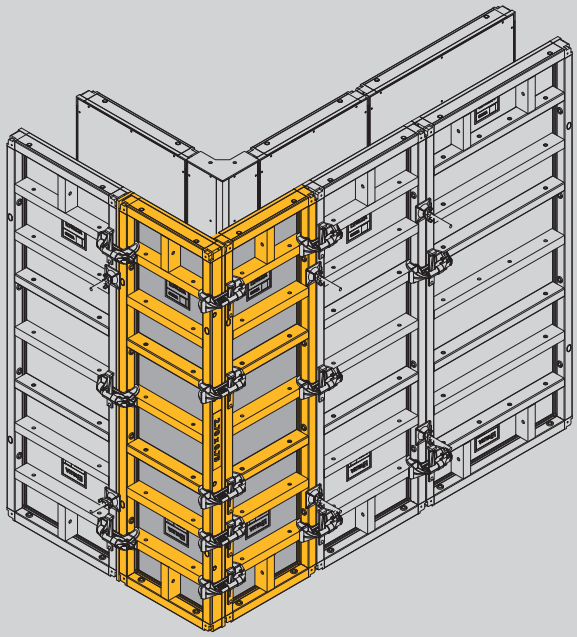
▲ Universal Panel joint

Panel in the edge

This solution consists of placing one panel perpendicular to another exactly in the edge, joining them with Adjustable Clamps.



▲ Examples of 90º corners with panel in the edge



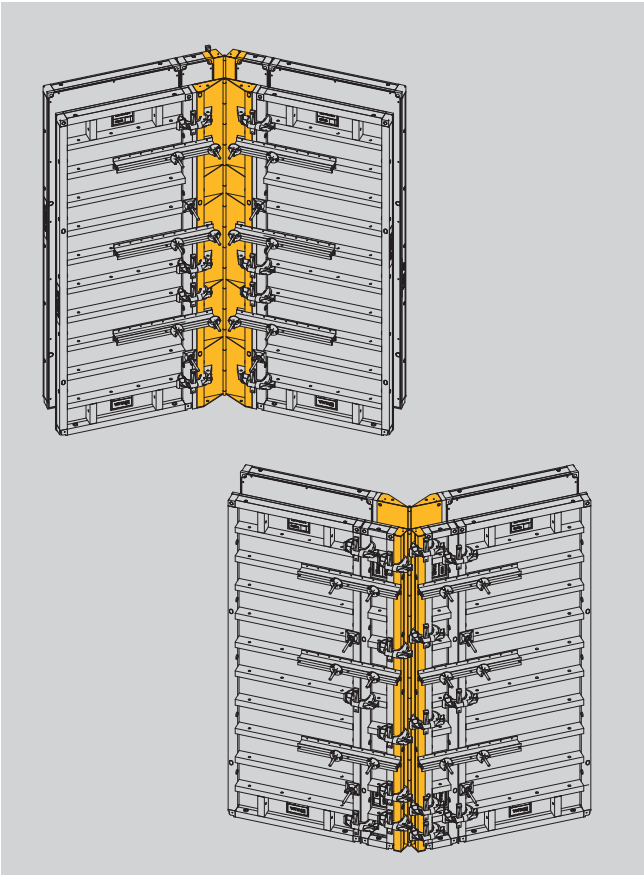
▲ Corners forming with panel in the edge

Hinged corners

Vertical formwork systems come with different elements that allow them to be adapted to any type of angle, whether 90º or an angle other than 90º.

To do this, combine outside and inside **Hinged Corners** with panels that are joined laterally with clamps.

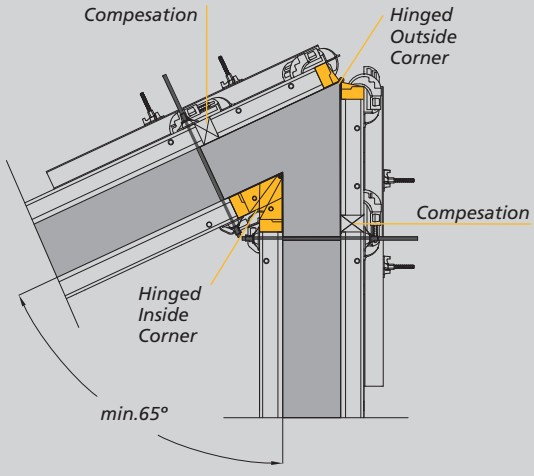
The range of angles covered is from 65º to 180º.



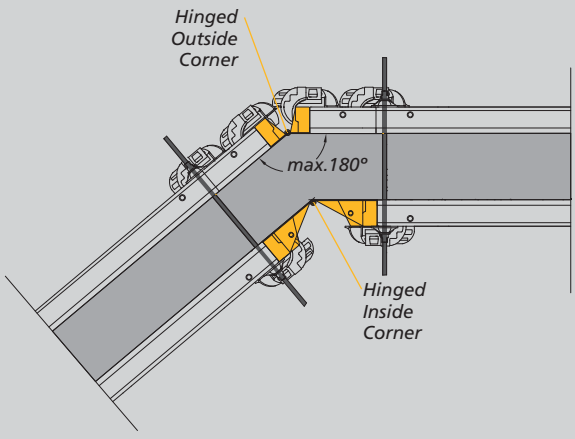
Between 65º and 180º:

Combine Outside and Inside Corners.

To obtain the minimum angle of 65º, join the panels and the Inside Hinged Corner with the **Fixed Clamp.**



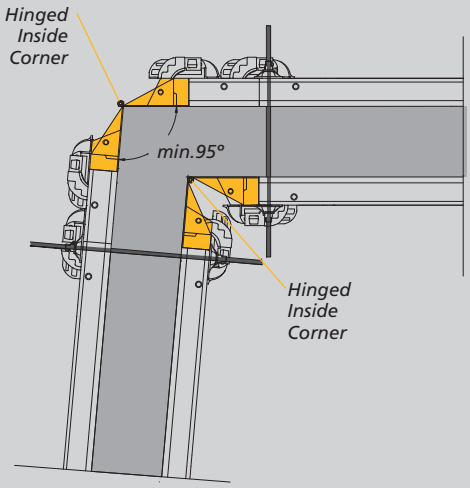
▲ Minimun angle with **Hinged Corners**



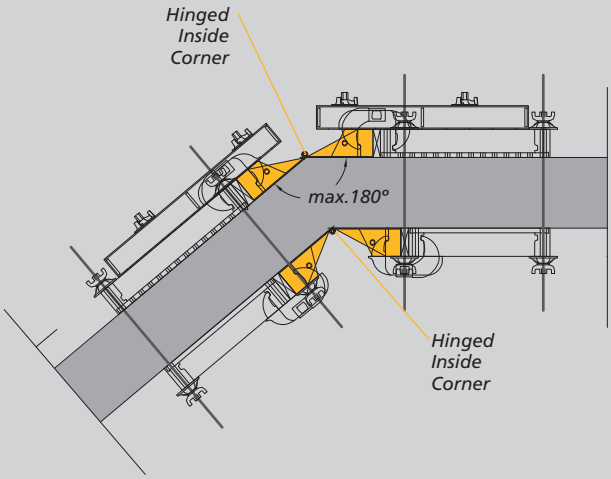
▲ Maximun angle with **Hinged Corners**

Between 95º and 180º:

Use the Inside Corner on the inside and outside face.



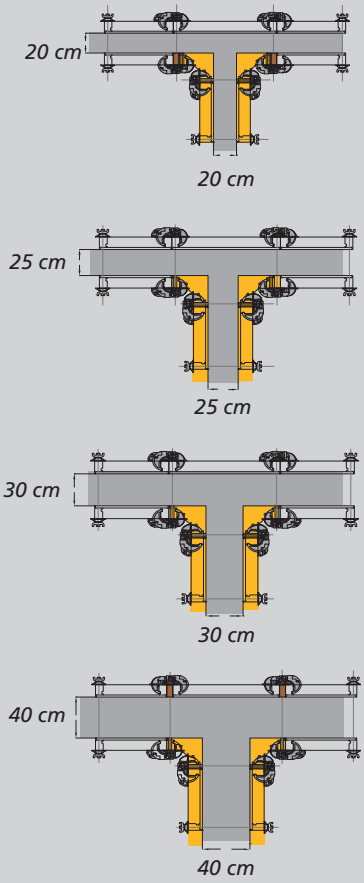
▲ Minimun angle with **Hinged Inside Corner**



▲ Maximun angle with **Hinged Inside Corner**

90° Wall intersections

Combining the **Inside Corner** with the different panel widths, it can be solved various wall thicknesses; thus it is possible to greatly reduce the use of compensations.



▲ Examples of 90° wall intersections

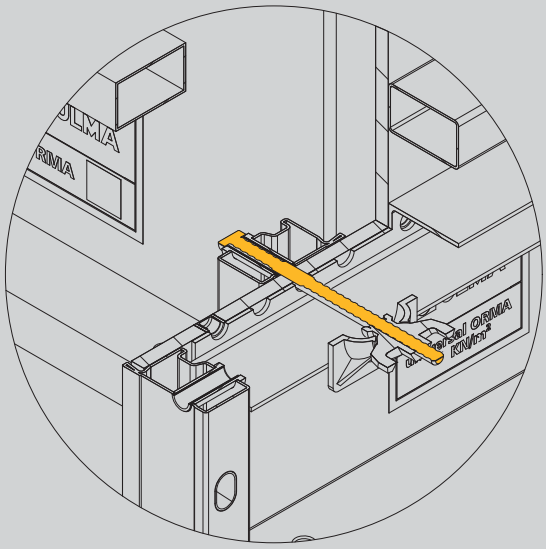
Bulkheads

There are different options for solving bulkheads:

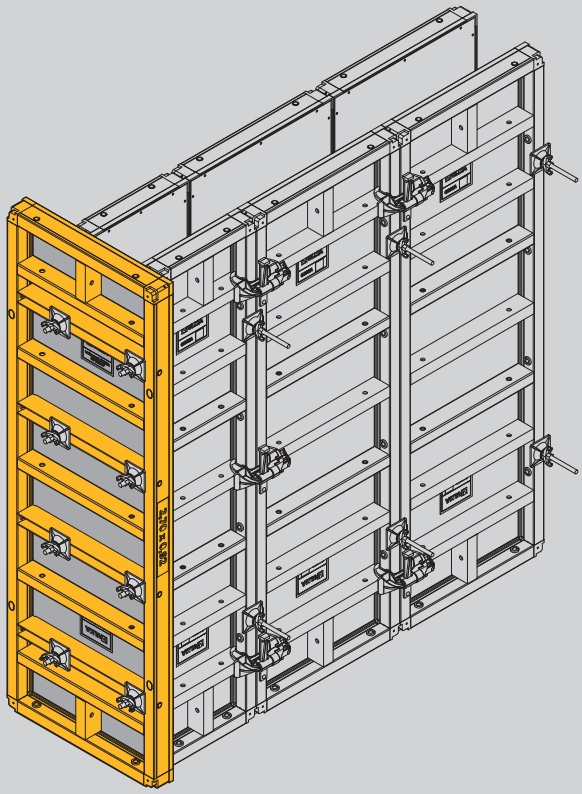
With Universal Panel

Fast and safe solution with no need of infillings.

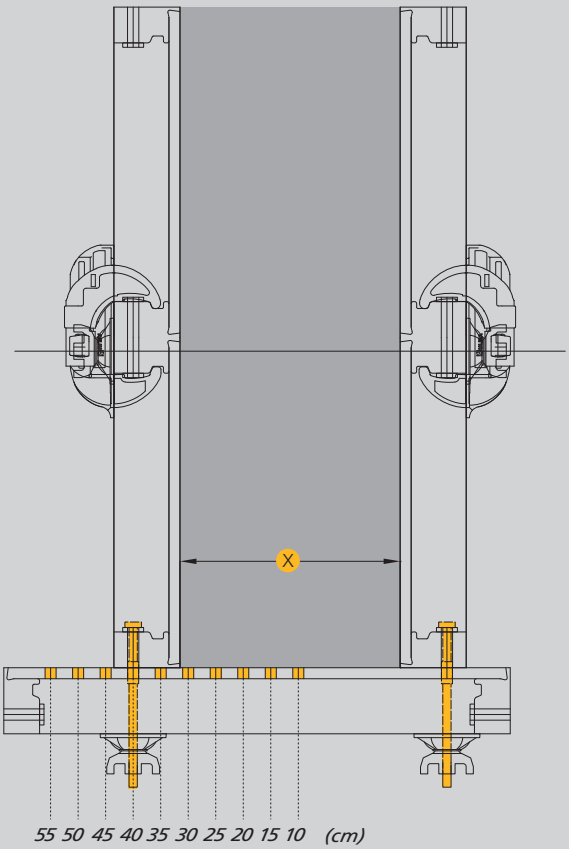
The **Universal Panel** is fixed to the standard panels using the **Universal Panel Bolt** and the **Plate Washer Nut.**



▲ Wall panel- Universal Panel joint



▲ Fast and safe solution with no need of infillings



▲ The wall thicknesses vary between 10 and 55 cm

With Waler

The Walers are fixed to the Panels by passing the Universal Panel Bolts through the lateral holes in the profile. The bulkhead plywood is nailed and supported on the Walers.

▲ Fixing the Waler to the Panel using Bulkhead Hooks tied to the profile

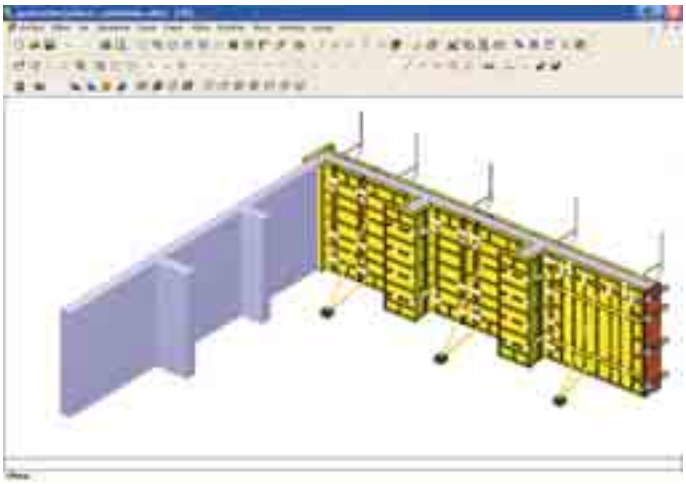
▲ Fixing the Waler to the panel using Universal Panel Bolt

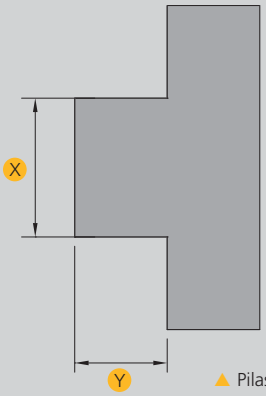
Other types of bulkheads:

With panel in the edge

With Outside Corner

Pilasters

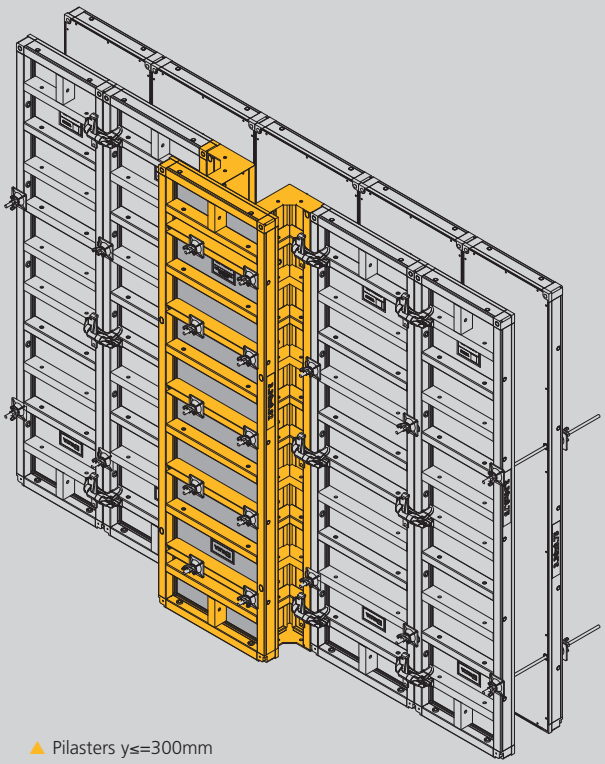




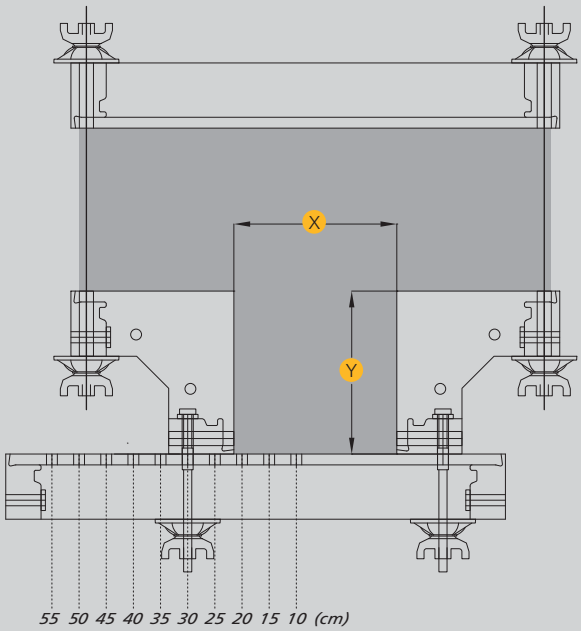
▲ Pilaster geometry

With Universal Panel

- Inside corner with Universal Panel: y≤=300mm



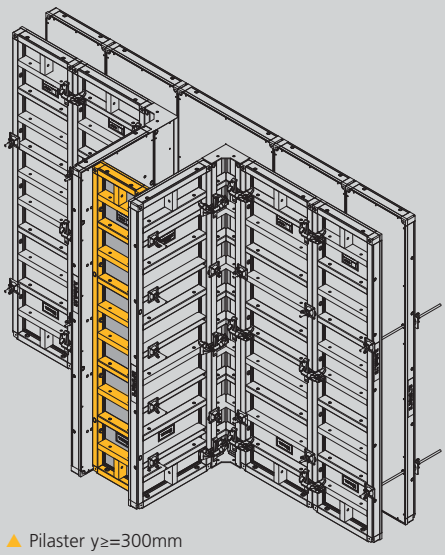
▲ Pilasters y≤=300mm



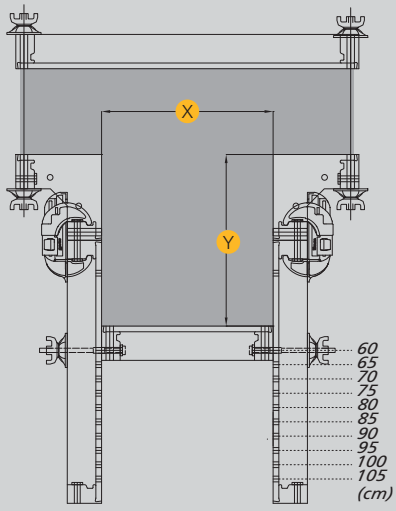
▲ Width (x) from 10 to 55cm

Universal Panel with standard Panel: y≥=300mm

The pilaster width (x) should be the same as the panel width and the pilaster length (y) can be from 60cm to 105cm.



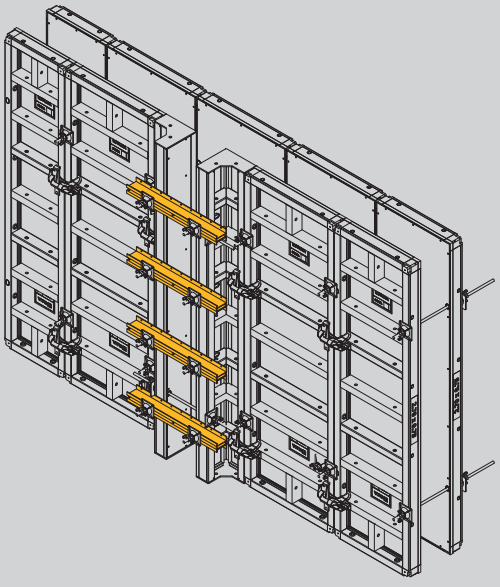
▲ Pilaster y≥=300mm



▲ Length (y) can be from 60cm to 105cm

With Waler

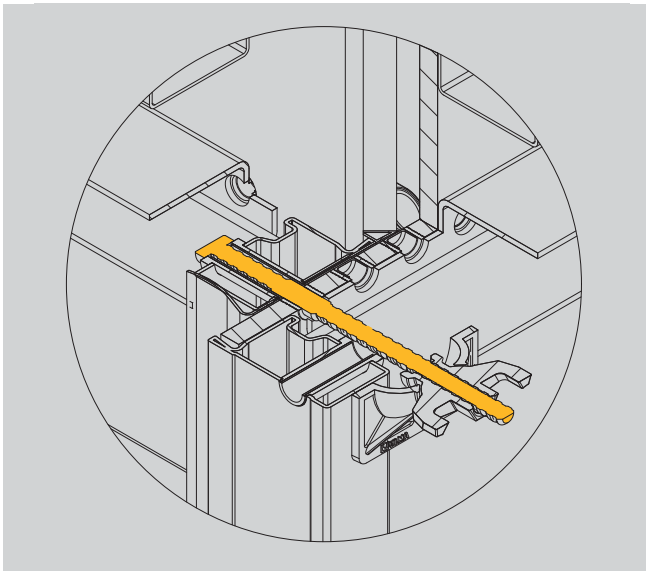
It is possible to make any kind of pilaster with this element.



Columns

The Column Panel characteristics and different combinations of these panels provide the desired column dimensions.

- There is a wide range of **Columns Panel** that provides solutions for the following geometries: columns from 30x30cm to 120x120cm with the option to adjust every 5cm.
- The range of heights for this type of panel is as follows: 2.7m; 1.2m; 0.6m.
- The range of **Column Panel** widths follows: 0.72m; 0.92m and 1.32m.
- These support **80kN/m²** of concrete pressure.
- Panels are joined with a Universal Panel Bolt and a Plate Washer Nut 15, using the tie holes spaced every 5cm on the panels.
- At high columns, the panels are vertically joined using the Adjustable Clamp or Clamp and Waler.



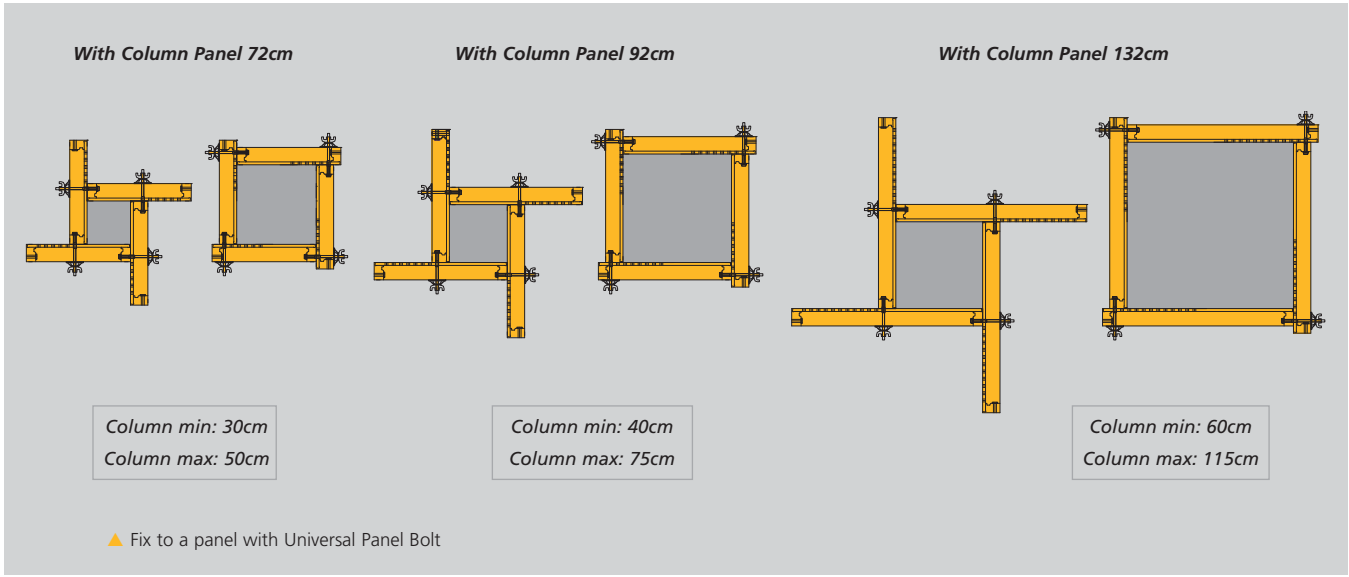
Panel columns can be joined as follows:

- **Universal Panel Bolt**

  With this component it is possible to obtain a maximum Column size of 1.15m x 1.15m with a standard deviation of 5cm.

Sharp edges on the columns can be avoided by using **Chamfer strips.**

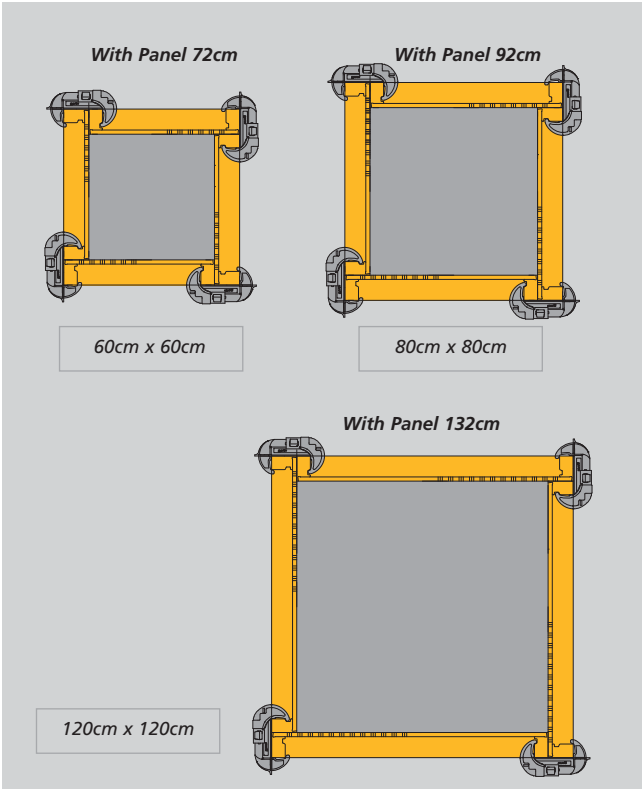
This is a plastic component that is placed between two panels joined together at 90° angles; it is not necessary to nail it to the plywood because **its special shape allows it to brace the profile.** It also has slotted holes necessary to permit passing the Universal Panel Bolt through the lateral holes of the Column Panel.



Panel in the edge

This particular solution is possible only for columns with the following dimensions: 60cm x 60cm; 80cm x 80cm and 120cm x 120cm. Panels are joined using the Adjustable Clamp.

Panel in the edge solution using the Adjustable Clamp can be applied only for heights of up to 3.3m.



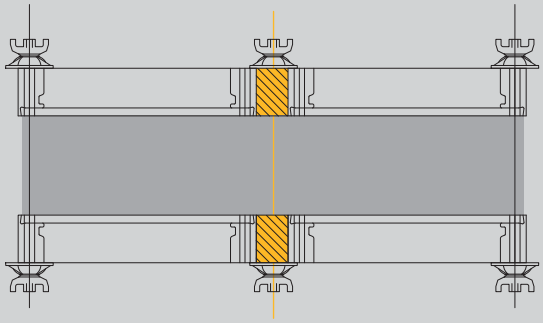
Filler between panels

Fillers up to 10cm:
Due to their size, these permit joining panels with Adjustable Clamps.

Tie Rods through compensation + Plate Washer Nut 15

It is also possible to use metal compensation with holes for passing Tie Rods.

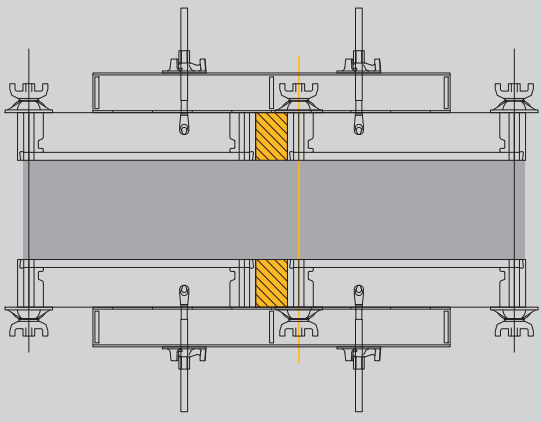
▲ Wood compensation



▲ Tie Rods through compensation

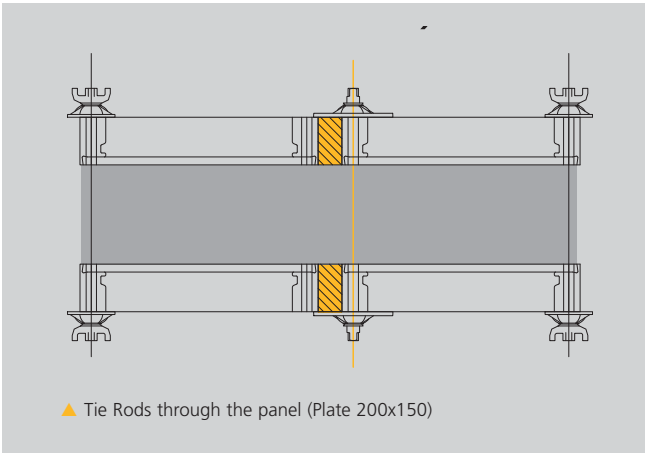
Tie Rods through the panel:

▸ With Waler



▲ Tie Rods through the panel (Waler)

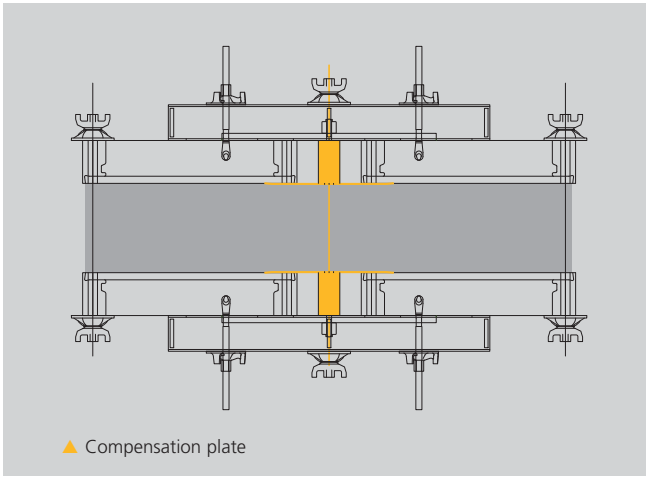
▸ With Plate Nut 200x150
Solution valid for fillers up to 7cm of compensation.



▲ Tie Rods through the panel (Plate 200x150)

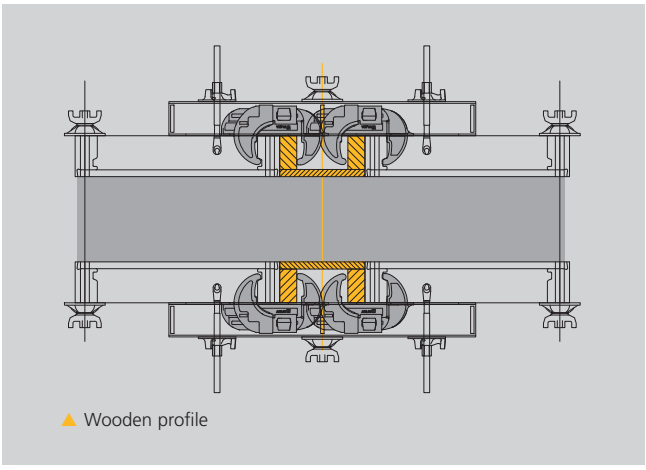
Filler wider than 10cm:
Due to their size, these do not permit joining panels with Adjustable Clamps.

▸ Compensation plate



▲ Compensation plate

▸ Wooden profile



▲ Wooden profile

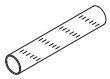
Tanks - Water stop solutions

There are two ways to provide water stop solutions for walls:

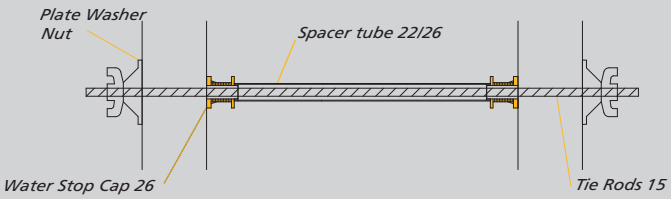
Water Stop System 26

Valid for pressures up to the equivalent of a 10m height of water.

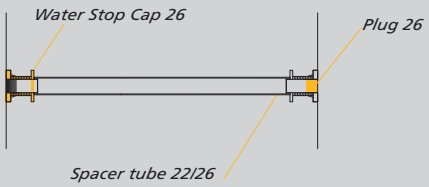
System components:

NAME	
Water Stop Cap 26	
Spacer tube 22/26	
Plug 26	

These components are placed on Tie Rods rather than the standard tube and cone.



▲ Elements disposition for pouring

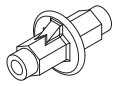
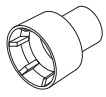
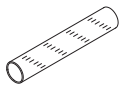


▲ Elements disposition after pouring

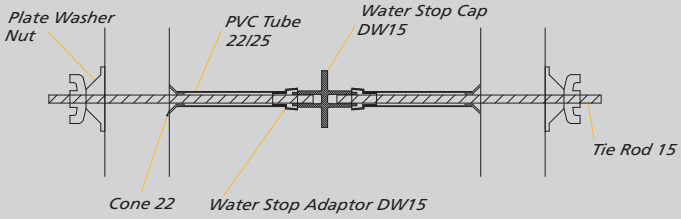
Water Stop System DW15

This component can support a hydrostatic pressure up to the equivalent of a 70m height of water.

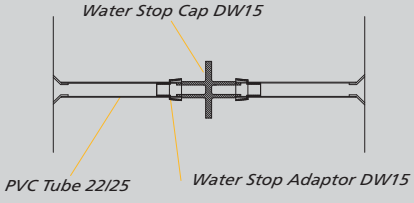
System components:

NAME	
Water Stop Cap DW15	
Water Stop Adaptor DW15	
Spacer tube 22/25	

In this case, the **Water Stop DW15** and the **Water Stop Adaptor DW15** are installed in the middle of the wall and are used to connect the Tie Rods and corresponding standard consumable parts on both sides. These components remain in the concrete.



▲ Elements disposition for pouring



▲ Elements disposition after pouring

One face formwork

For cases in which it is not possible to place Panels face-to-face, and thus it is impossible to use Tie Rods to support the pressure of the concrete, it is necessary to use exterior structures to support said forces.

ULMA Construcción has two types of one-face formwork depending on the height of the formwork: **Walers UCAB and Trusses EUC.**

- The Walers UCAB provide solutions for walls at a maximum height of 3.6m.
- The Trusses EUC are used for higher elevations, combining them to adjust to the required wall height.

It is quick and easy to anchor the panels to the trusses using heads. However, at the base, the trusses must be anchored to the ground by rods that were previously installed in the sills or foundation. These rods should support the concrete pressure.

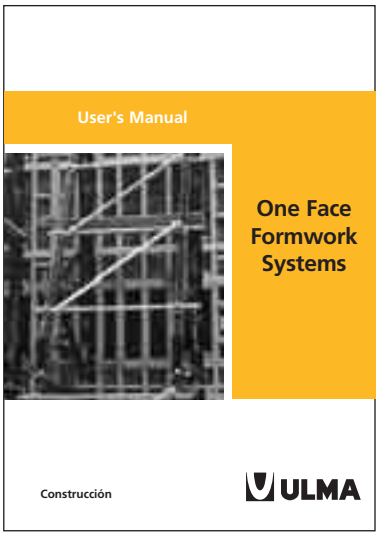
▲ Walers UCAB

▲ Trusses EUC

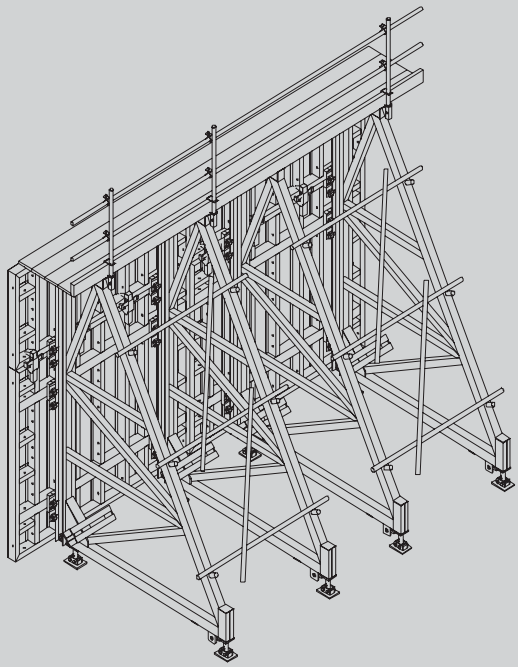
After assembly or installation, these systems, panels and trusses together, can be lifted and moved to be used in different positions or pourings.

For safety, when working at high elevations is required, working platforms can be incorporated into these systems.

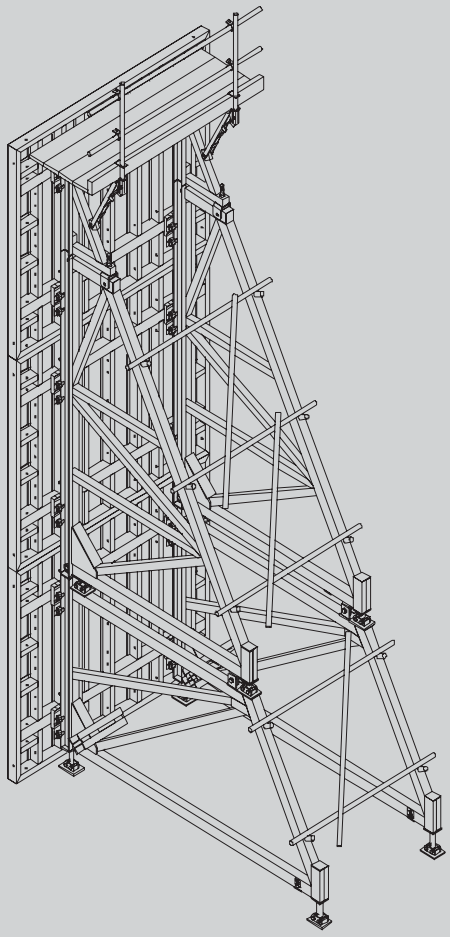
These one face formwork systems are compatible with other ULMA Construcción vertical formwork systems.



▲ For further information, see the **One Face Formwork Systems User's Manual**



▲ UCAB-EUC Gangs



▲ UCAB-EUC Gangs

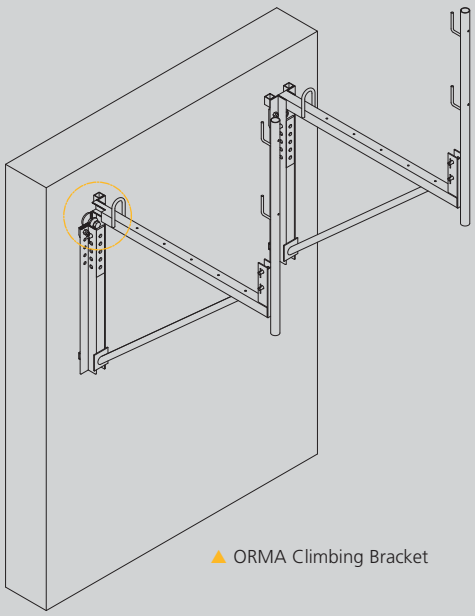
Climbing

Climbing formwork rises vertically by stages to build walls that cannot be completed in a single pouring due to their height. Accordingly, a working platform is built at the required height, and the formwork is supported on it.

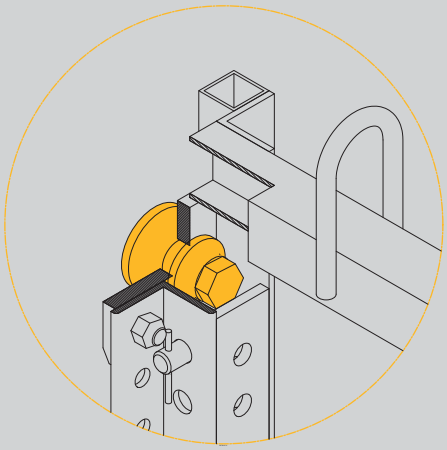
The **ORMA Climbing Bracket** supports the platform and the formwork.

ORMA Climbing Brackets are used for walls up to 20m height where maximum pouring height should be 3.9m. If it is necessary to build higher walls, where pouring height is also higher than 3.9m, ULMA Construcción has other climbing systems appropriate for these specific needs.

ORMA Brackets and ORMA Formwork are moved and lifted separetely, connecting the brackets with bracing tubes.



▲ ORMA Climbing Bracket



▲ ORMA Climbing Bracket support elements (Climbing Rings NT15 and screw)

The climbing bracket support on the **Climbing Rings NT15** should be screwed in to **Cones DW15/M24** embedded that remain in the wall since the previous pouring level.

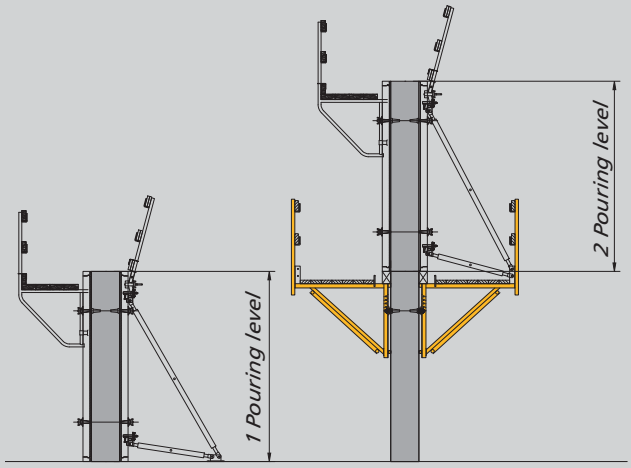
For architectural walls, it is also possible to use a smaller cone: **Cone AWF**, which is assembled and used in the same way as the Cone DW15/M24.

The cone can be assembled without having to perforate the plywood, by placing it in the panel tie hole position. If the geometrical shape to be executed (holes, windows, etc.) requires fixing the cone at a different height, then the plywood can be perforated.

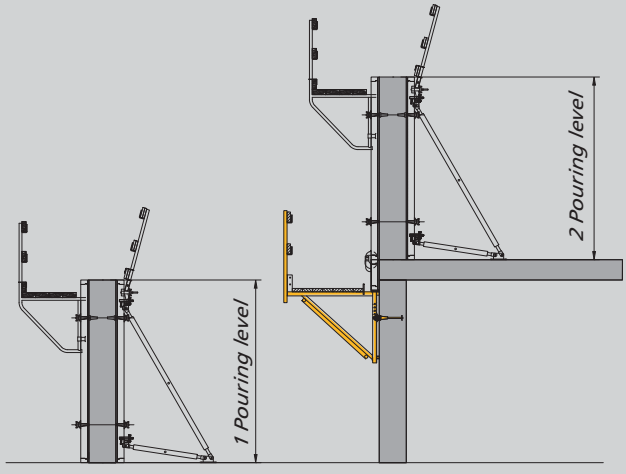
It is possible to climb on either one or two sides of the wall. If climbing on one face, the inside formwork will be supported by the interior slab. If climbing on both sides of the wall, brackets can be used on both sides, or interior platforms can be directly supported on the wall with gravity pawls (inside elevator shafts, stairs, etc.).

If climbing is required for higher walls and also higher pouring heights, other brackets, that allows moving and lifting together brackets and formwork, should be used because this way **assembling time can be considerably reduced.**

▲ Climbing Bracket support system

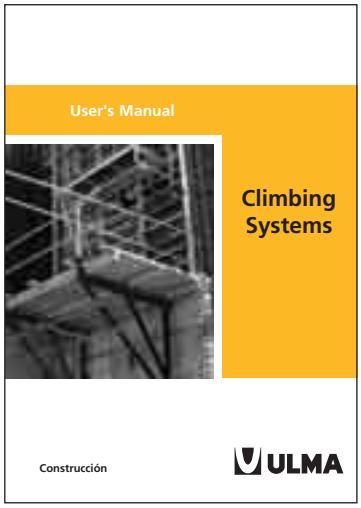


▲ Climbing formwork on two sides of a wall



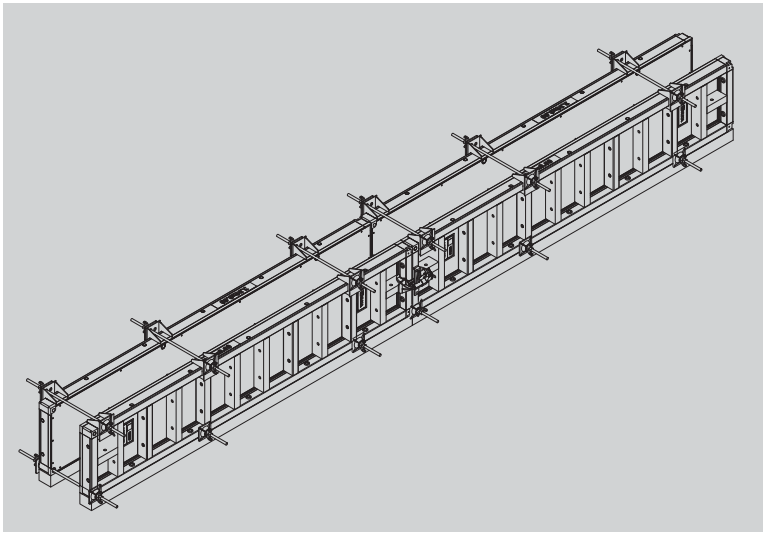
▲ Climbing on the outside of a wall

Among ULMA Construcción's **wide range of brackets,** the proper mode can be selected based on the following criteria: platform width, formwork surface, cone recovering platform and roll-back system, etc.



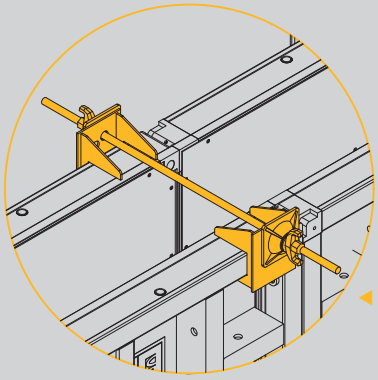
◀ For further information refer to the **Climbing Systems User's Manual.**

Foundations

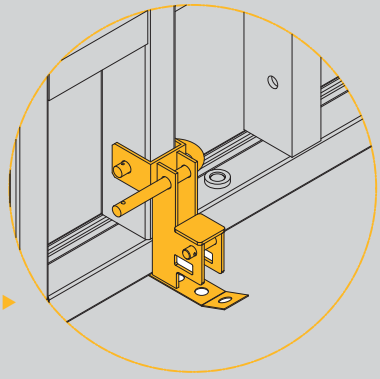


Foundations can be framed tying the panels in a variety of ways.

When it is not possible to use standard tie rods in the foundation:

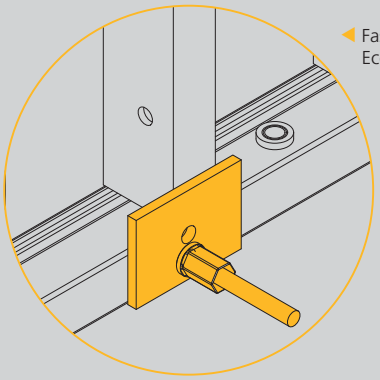


Fasten the upper part of panels with Tie Rods using Top Tie Bracket 65



Fasten the lower part of panels with foundation plate and foundation head

Tie panels horizontally in longitudinal foundations:



Fasten tie rods with Eccentric Plate

Fasten the lower tie rod with Plate Washer Nut. In these cases, it is also necessary to chock the panel

Other solutions

Elevator shafts

Polygonal walls

Inclined walls

Compatibility with BIRA circular formwork for obtaining straight and curved walls

Compatibility with the ENKOFORM V-100 vertical formwork

Solution for ORMA column to be fixed with Walers DU-100 as a collar

Large gangs of ORMA panels with Walers DU-100

Handling and repair

An easy to use system

Shipping and handling

Material should be handled and transported with the proper auxiliary equipment, after marking off the work area and stopping the flow of pedestrian traffic in the area.

Transport small elements in crates or boxes to avoid losing them.

Stacking

Stack the plywood panels in such a way as to avoid damaging them.

Place the panels on top of frames in order to maintain order, cleanliness and distribution. At this point, store the panel packets, alternating a block between them after use.

Lifting

Individual panels or gangs of panels always have to be lifted using ORMA Lifting Hook. It is recommended to use two hooks with the proper fixing to the panel.

Assembly

Assemble the panels horizontally after placing planks or wood sills on the ground.

Before pouring, steep the plywood surface with release agent.

Disassembly

Once materials have been stripped, clean the panels and store them properly.

Maintenance

Different components have to be cleaned and scraped on the jobsite as soon as they have been stripped. Before any pouring, steep the plywood with release agent as previously explained.

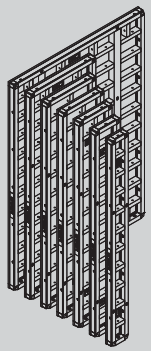
Repairing

ULMA Construcción has specific equipments for cleaning, repairing panels and replacing plywood.

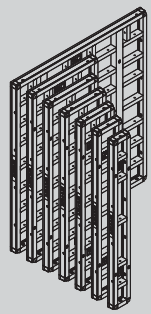
Components and accessories

Main panels

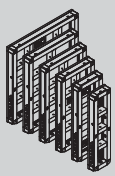
	WEIGHT (kg)	ITEM NO.
Range 3.30		
Panel 3.3x2,4 (7.92m²)	450	1908247
Panel 3.3x1.2 (3.96m²)	208	1908250
Panel 3.3x0.9 (2.97m²)	167	1908253
Panel 3.3x0.75 (2.47m²)	148	1908256
Panel 3.3x0.6 (1.98m²)	130	1908259
Panel 3.3x0.45 (1.48m²)	107	1908262
Panel 3.3x0.3 (0.99m²)	88	1908265



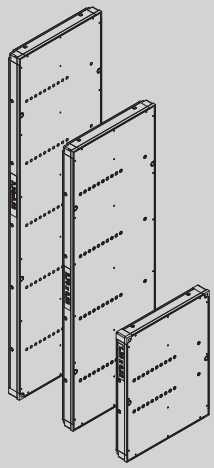
Range 2.70		
Panel 2.7x2.4 (6.48m²)	363	1900002
Panel 2.7x1.2 (3.24m²)	167	1900005
Panel 2.7x0.9 (2.43m²)	134	1900008
Panel 2.7x0.75 (2.03m²)	120	1900487
Panel 2.7x0.6 (1.62m²)	105	1900011
Panel 2.7x0.45 (1.21m²)	86	1900020
Panel 2.7x0.3 (0.81m²)	69	1900029



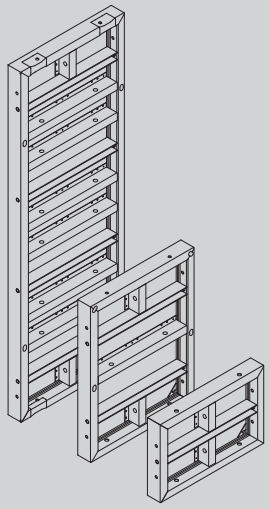
Range 1.20		
Panel 1.2x1.2 (1.44m²)	89	1900032
Panel 1.2x0.9 (1.08m²)	70	1900035
Panel 1.2x0.75 (0.9m²)	62	1900490
Panel 1.2x0.6 (0.72m²)	54	1900038
Panel 1.2x0.45 (0.54m²)	42.3	1900047
Panel 1.2x0.3 (0.36m²)	34.5	1900056



	WEIGHT (kg)	ITEM NO.
Universal Panel		
Universal Panel 3.3x0.92 (3.03m²)	184	1908268
Universal Panel 2.7x0.92 (2.48m²)	154	1908372
Universal Panel 1.2x0.92 (1.1m²)	79	1908381

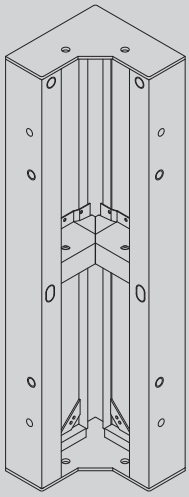


Column Panel		
Column Panel 2.7x1.32 (3.56m²)	213	1900341
Column Panel 2.7x0.92 (2.48m²)	159	1900509
Column Panel 2.7x0.72 (1.94m²)	134	1900354
Column Panel 1.2x1.32 (1.58m²)	100	1900344
Column Panel 1.2x0.92 (1.1m²)	74	1900515
Column Panel 1.2x0.72 (0.86m²)	62	1900357
Column Panel 0.6x1.32 (0.79m²)	58	1900347
Column Panel 0.6x0.92 (0.55m²)	43.3	1900518
Column Panel 0.6x0.72 (0.43m²)	35	1900360

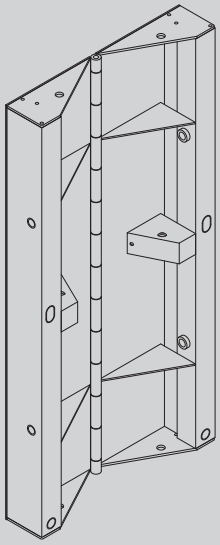


Corners

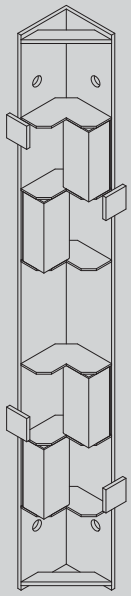
	WEIGHT (kg)	ITEM NO.
Inside Corners		
Inside Corners 3.3 (1.98m²)	124	1908271
Inside Corners 2.7 (1.62m²)	100	1900089
Inside Corners 1.2 (0.72m²)	48.7	1900156



	WEIGHT (kg)	ITEM NO.
Inside Hinged Corners		
Inside Hinged Corners 3.3 (1.98m²)	145	1908346
Inside Hinged Corners 2.7 (1.62m²)	118	1900096
Inside Hinged Corners 1.2 (0.72m²)	55	1900164



	WEIGHT (kg)	ITEM NO.
Outside Corners		
Outside Corners 3.3	61	1908973
Outside Corners 2.7	51	1900932
Outside Corners 1.2	22.9	1900936



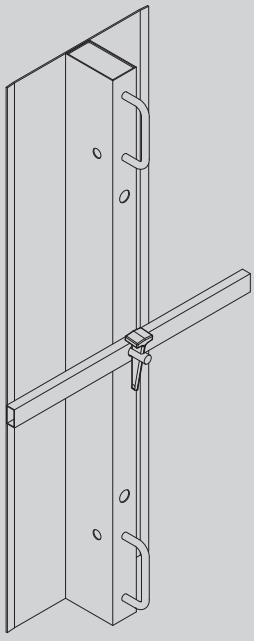
	WEIGHT (kg)	ITEM NO.
Outside Hinged Corners		
Outside Hinged Corners 3.3 (0.33m²)	93	1908357
Outside Hinged Corners 2.7 (0.27m²)	77	1900110
Outside Hinged Corners 1.2 (0.12m²)	34.8	1900194

Compensations

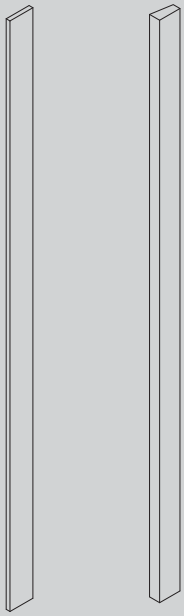
	WEIGHT (kg)	ITEM NO.
Compensation Tube		
Compensation Tube 3.3 (0.16m²)	25.3	1908460
Compensation Tube 2.7 (0.14m²)	20.2	1900216
Compensation Tube 1.2 (0.06m²)	9	1900217

	WEIGHT (kg)	ITEM NO.
Wooden Profile		
Wooden Profile 3.3	11.4	1908505
Wooden Profile 2.7	10.8	1900439
Wooden Profile 1.2	5.3	1900440

Compensation Plate		
Compensation Plate 3.3 (0.99m²)	49.2	1908483
Compensation Plate 2.7 (0.81m²)	39.8	1900423
Compensation Plate 1.2 (0.36m²)	18.8	1900428

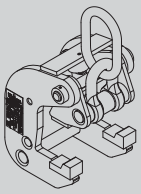


Wooden Compensation		
Wooden Compensation 3.3x0.05	11	1908508
Wooden Compensation 3.3x0.03	6.6	1908507
Wooden Compensation 3.3x0.02	4.4	1908506
Wooden Compensation 2.7x0.05	8.3	1900443
Wooden Compensation 2.7x0.03	6.2	1900442
Wooden Compensation 2.7x0.02	4	1900441
Beveled Wood ((Half piece 1900444)	9.1	1900494

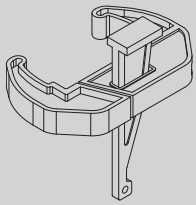


Tying Elements – Lifting

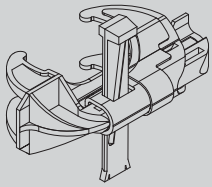
	WEIGHT (kg)	ITEM NO.
Lifting Hook	10.6	1900179



Fixed Clamp	2.9	1900894

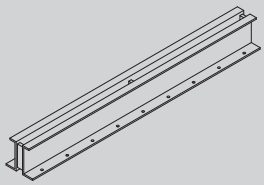


Adjustable Clamp	5.5	1900170

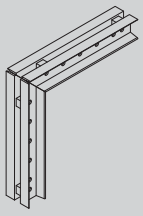


Gang

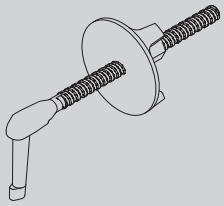
	WEIGHT (kg)	ITEM NO.
Waler		
Waler 0.9	10.9	1900193
Waler 1.55	18.6	1900445



L Waler	24.6	1900538

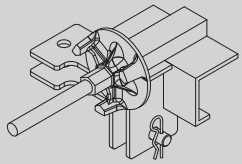


Waler Hook	1.4	1900448

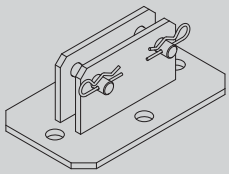


Push-pull props - Stabilizing

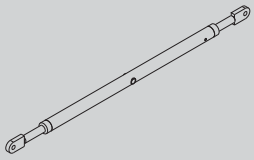
	WEIGHT (kg)	ITEM NO.
Head 60	4.5	1900119



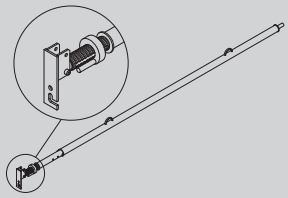
Push-pull prop shoe	4.3	1900144



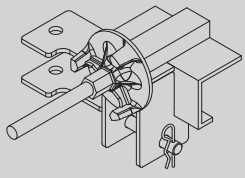
Push-pull prop		
Push-pull prop 1.1-1.7	7.8	1900134
Push-pull prop 2.4-3.5	24.2	1900123
Push-pull prop 3.6-4.8	43.3	1908168
Push-pull prop 5-6	51	1900147



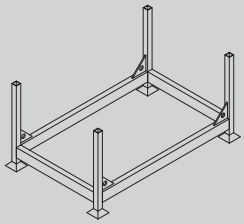
Push-pull prop 6-10	99	1900207



Push-pull prop head 6-10	4.6	1902219

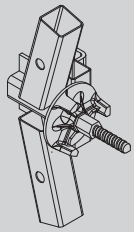


Push-pull prop pallet	61.5	1900411

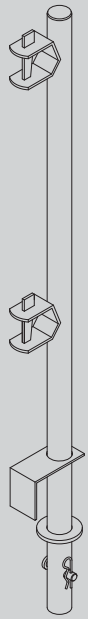


Work Platforms - Safety

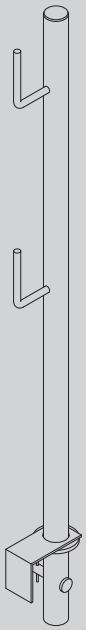
	WEIGHT (kg)	ITEM NO.
Post Bracket	3.5	1900941



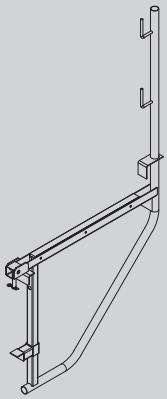
Safety Handrail Post S-V	3.9	1860516



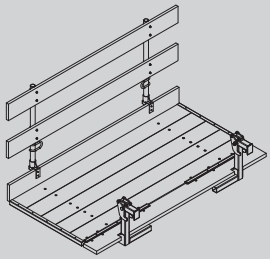
Handrail Post	3.4	1902210



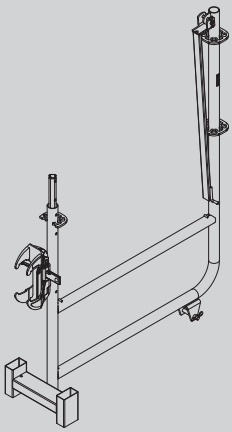
	WEIGHT (kg)	ITEM NO.
Walkway Bracket	14.8	1861094



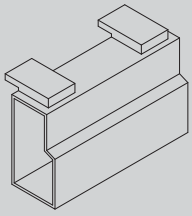
ORMA Platform 2.4x1.2	163	1908171



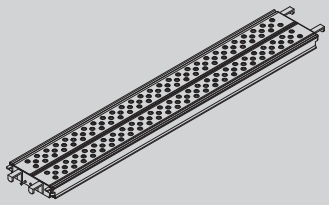
ORMA-BRIO Bracket	27.1	1900908



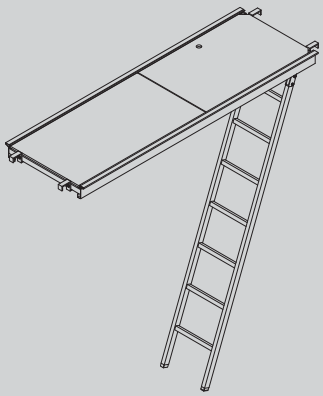
Tying Profile	2.3	1900890



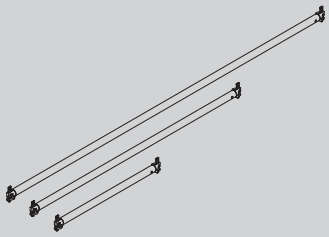
	WEIGHT (kg)	ITEM NO.
Platform		
Platform 3	22.2	2127713
Platform 2.5	20.2	2127714
Platform 2	17	2127715
Platform 1.5	12.4	2127716
Platform 1.02	9	2127717
Platform 0.7	6.6	2127718



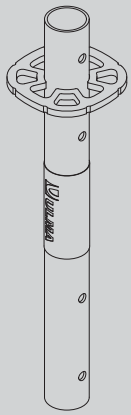
Trapdoor platform		
Trapdoor platform 3	31	2127712
Trapdoor platform 2.5	25.8	2127867
Trapdoor platform 2	18.6	2127868
Trapdoor platform 1.5	13.5	2128152
Trapdoor platform 1.02	7.9	2129617



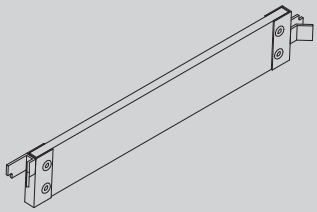
Ledger		
Ledger 3	11.6	2127527
Ledger 2.5	9.4	2127526
Ledger 2	7.6	2127525
Ledger 1.5	6	2127524
Ledger 1.02	4.4	2127523
Ledger 0.7	3.2	2127522



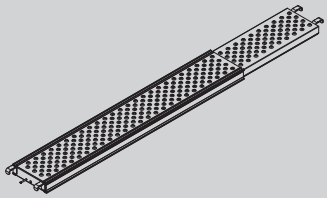
	WEIGHT (kg)	ITEM NO.
Standard 0.5 w/Socket	2.2	2127958



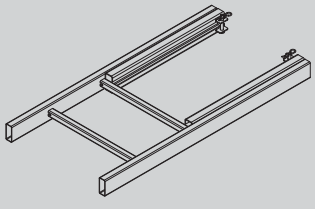
Toeboard		
Toeboard 3	6.8	2124997
Toeboard 2.5	6	2124996
Toeboard 2	5.2	2124995
Toeboard 1.5	4.2	2124994
Toeboard 1.02	3.2	2124999
Toeboard 0.7	2.6	2124998



Extensible Platform		
Extensible Platform 2-2.5	20.5	2067043
Extensible Platform 1.5-2.35	17.3	2067048
Extensible Platform 1-1.5	12.5	2067035

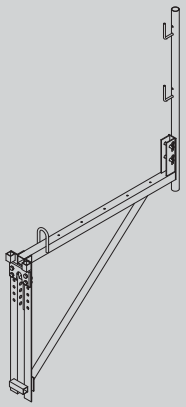


Telescopic ladder Supplement	12.2	1908363

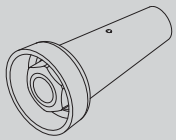


Climbing

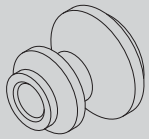
	WEIGHT (kg)	ITEM NO.
ORMA Climbing Bracket	36.5	1900386



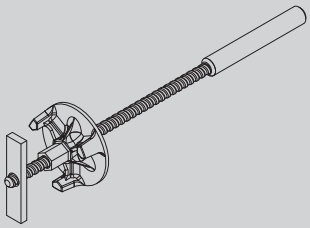
Cone DW 15/M24	1	1901080



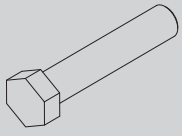
Climbing Ring NT 15	0.8	1901083



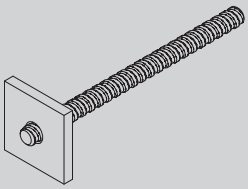
Cone-Waler Connector	1.95	1901245



Hexagonal screw M24x120 DIN931-10.9	0.54	9053013

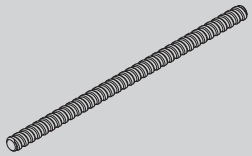


Lost Tie 15/0.25	0.7	1900738

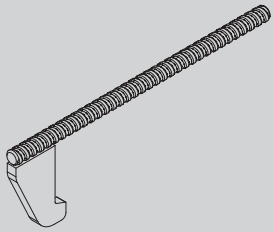


Anchors

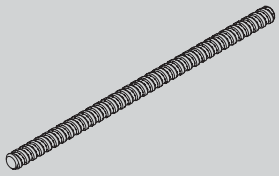
	WEIGHT (kg)	ITEM NO.
Tie Rod		
Tie Rod 15/1	1.4	0230100
Tie Rod 15/1.2	2	0230120
Tie Rod 15/1.5	2.5	0230150
Tie Rod 15/2	3.3	0230200
Tie Rod 15/6	10	0230600
Tie Rod 20/1	2.9	0234100
Tie Rod 20/1.2	3.4	0234120
Tie Rod 20/1.5	4.3	0234150
Tie Rod 20/2	5.2	0234200
Tie Rod 20/6	17.2	0234600



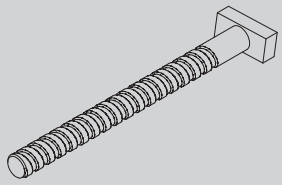
Bulkhead Hook	0.91	1900227



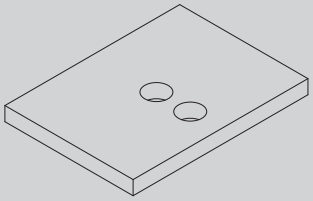
Pin		
Pin 0.35	0.6	1861033
Pin 0.55	0.8	1861034



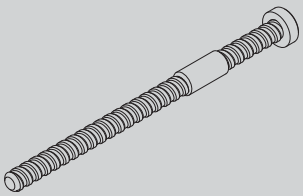
Panel Bolt	0.39	1861122



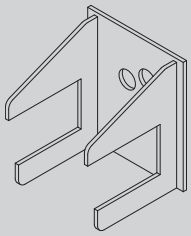
Eccentric Plate	1.4	1861692



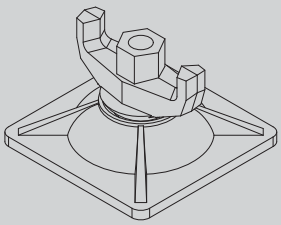
	WEIGHT (kg)	ITEM NO.
Universal Panel Bolt	0.6	1900265



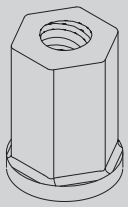
	WEIGHT (kg)	ITEM NO.
Top Tie Bracket 65	1.8	1900929



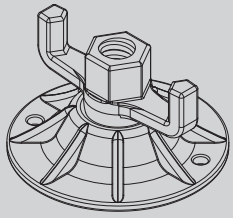
	WEIGHT (kg)	ITEM NO.
Plate Washer Nut 15	1.2	1900256



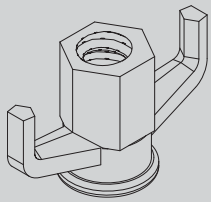
	WEIGHT (kg)	ITEM NO.
Hexagonal Nut 15	0.22	7238001



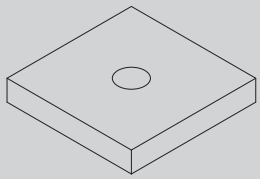
	WEIGHT (kg)	ITEM NO.
Plate Washer Nut 20	1.2	1905160



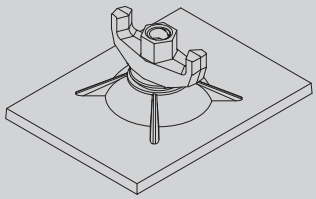
	WEIGHT (kg)	ITEM NO.
Wing Nut 20	0.37	1905046



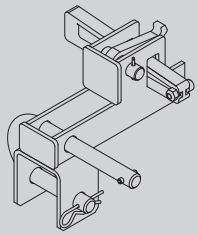
	WEIGHT (kg)	ITEM NO.
Base Plate D20	2.2	1905047



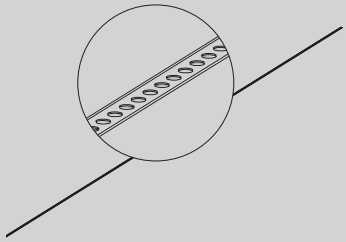
	WEIGHT (kg)	ITEM NO.
Plate Nut D15 200x15	2.6	1908158



	WEIGHT (kg)	ITEM NO.
Foundation Head	3.4	1908229

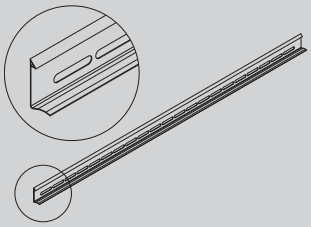


	WEIGHT (kg)	ITEM NO.
Foundation Plate 25	16.6	1850453

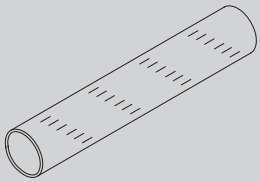


Consumabile parts

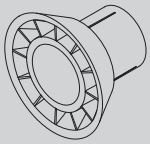
	WEIGHT (kg)	ITEM NO.
Chamfer Strip- **3,3m (16 units)**	0.51	1908535



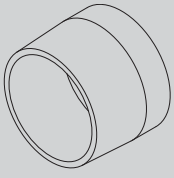
Spacer Tube		
Spacer Tube 22/25 (75ml) (for 15 Tie Rod)	0.3	7230455
Spacer Tube 22/26 (100ml) (for 15 Tie Rod with Water Stop Cap)	0.4	7238047
Spacer Tube 26/29 (50ml) (for Fix Anchor DW15)	0.25	1905814
Spacer Tube 32/36 (50ml) (for 20 Tie Rod/ Fix Anchor DW15)	0.3	9371968



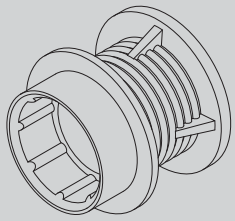
Cone		
Cone 22 (250 units)	0.006	7230264
Cone 26 (250 units)	0.007	7238048
Cone 32 (250 units)	0.03	9371967



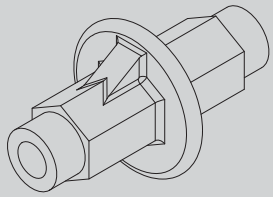
Plug		
Plug 20 (250 units) (for ORMA, Versat, Comain, LGR Columns)	0.003	1861799
Plug 22 (250 units)	0.003	1900159
Plug 25/30 (250 units) (for ORMA Panels)	0.003	1900213
Water stop Plug 26 (250 units)	0.004	7238050
Plug 30 (250 units)	0.004	7238046



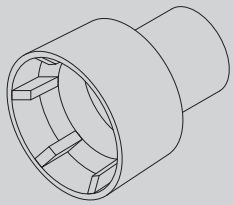
	WEIGHT (kg)	ITEM NO.
Water Stop Cap 26 **(250 units)**	0.009	7238049



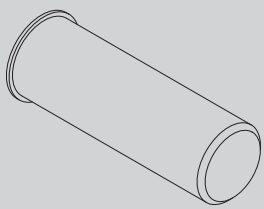
Water Stop DW15	0.61	0230004



Water Stop **Adapter DW15**	0.1	9371966



Lateral Plastic Sleeve	0.008	1908298



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  Centro-Oeste Branch
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