product
guide

fa-48
system

1st version/february 2009

CATARI - Indústria de Equipamento Metálicos, Lda

1

SCAFFOLDING FAÇADE
FA-48®

The FA-48 ® scaffold facade was developed to think in the different situations faced by the technical construction and public works. Based on concepts of safety, flexibility and versatility we have designed a device role, which joins a variety of combinations and a unique quality that responds precisely to the needs of professionals demanding.

ADVANTAGES AND BENEFITS

1.1 SECURITY

FA-48® Scaffolding is fully implemented in the European standards of manufacture and use of scaffolding and accessories. Made with premium materials and equipped with multiple accessories, to ensure all the required reliability, the scaffolding FA-48 ® consists of a few basic elements and designed taking into account the lowest possible weight.

1.2 FLEXIBILITY

This scaffolding system is adaptable to any type of use, responding effectively to the most specific cladding.

1.3 VERSATILITY

The FA-48® allows covering facades geometrically complex with total security. This is the reason that many professionals consider essential for rehabilitation and maintenance of buildings and structures, application of coatings and construction in general.

1.4 MULTIPLE SOLUTIONS

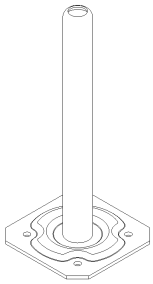
At the conception time of the FA-48 ® scaffolding system it has been taken into diverse requests that a scaffold may be subject in work. A range of accessories, such as railings, consoles, support beams, outside stairs, etc.., allows dealing with all the security assembly difficulties.

1.5 QUALITY

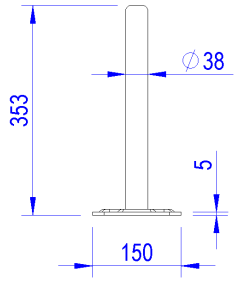
All metal parts of FA-48 ® scaffolding system are made of dip-hot galvanized steel*, giving them a high degree of corrosion resistance, significantly increasing their life time.
Besides all this, the GUARANTEE of CATARI brand is the best certificate of quality that a professional may require.

* As shown in the following pages, for reasons of ease handling and reduced weight of the equipment, some elements are made of aluminium.

2.1 INITIATION BASE

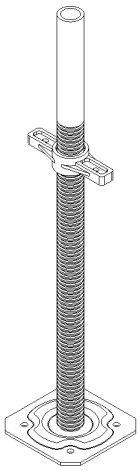


Element that serves to create a stable support in scaffolding. Consisting of a steel tube S235 with 38mm diameter, welded into a steel base DD-11, with 150x150x5 mm.

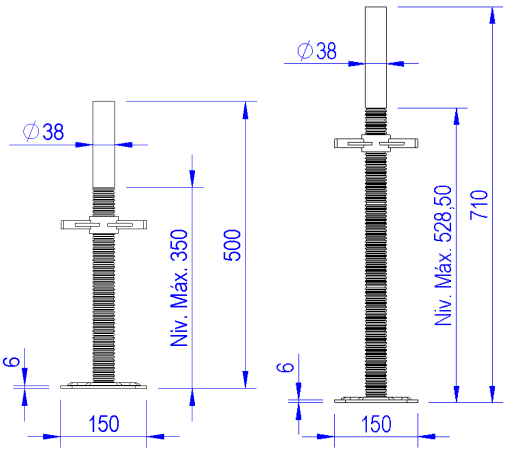


Code	Height (m)	Weight (kg)
AA.BI	0,35	2,2
GALVANIZED		

2.2 LEVELLING BASES

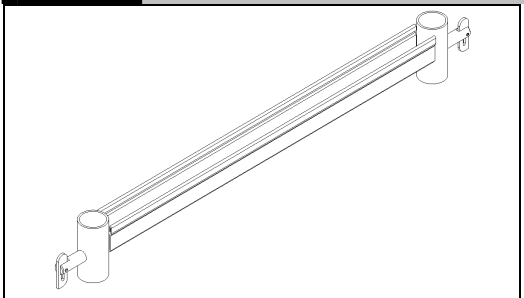


Whenever working in unlevelled grounds it should be used this component as it allows the levelling in height.
The levelling is done by a screwed assemblage allowing infinite refining. The base has the dimensions 150x150x6 mm.

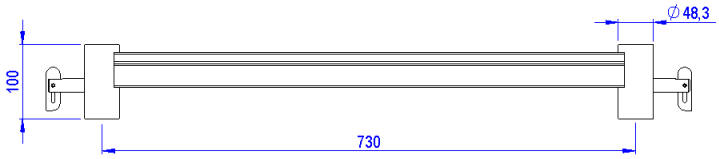


Code	Height (m)	Weight (kg)
AA.BN.500	0,50	3,3
AA.BN.700	0,70	4,5
GALVANIZED		

2.3 INITIATION BRACKET

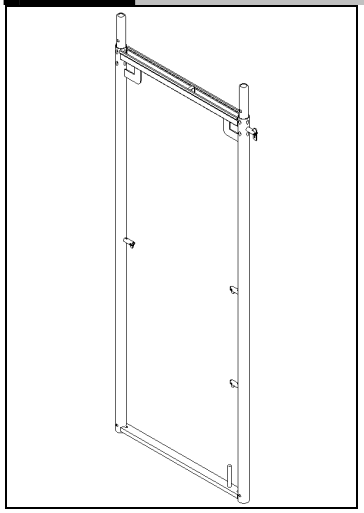


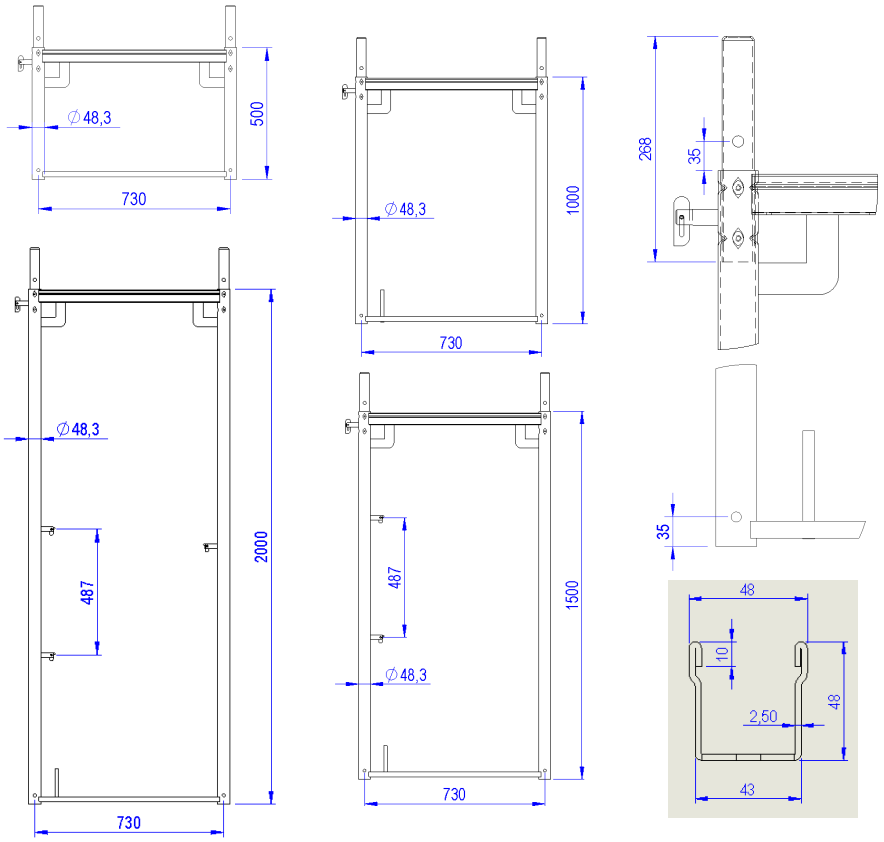
This part is used as a connection between the initiation bases, the scaffolding module and the initial locking.
It is made in S235 steel, as the vertical tubes, as the central transom in U profile.



Code	Height (m)	Width (m)	Weight (kg)
FA.SI.730	0,10	0,73	2,8
GALVANIZED			

2.4 SCAFFOLDING MODULES

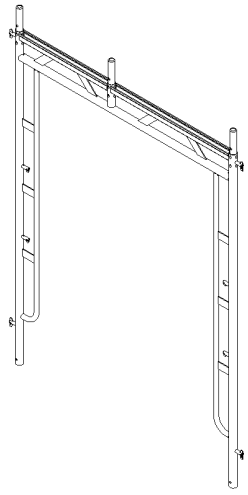




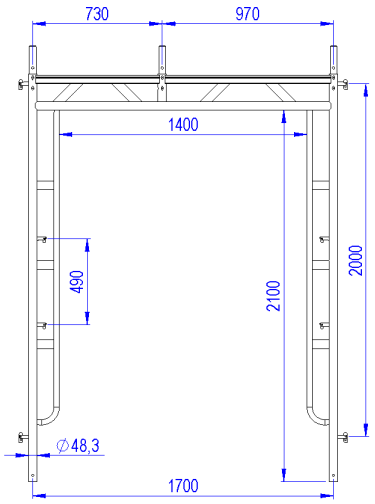
This is the basic element of the scaffolding and should be attached vertically, perpendicular to the façade.
The FA-48® scaffolding module is composed by two vertical steel tubes with 48,3x3mm thickness, S235, by a superior transom in U profile and by a transom in inferior rectangular tube.

Code	Height (m)	Width (m)	Weight (kg)
FA.MD.730.500	0,50	0,73	7,5
FA.MD.730.1000	1,00	0,73	9,5
FA.MD.730.1500	1,50	0,73	15,0
FA.MD.730.2000	2,00	0,73	17,5
GALVANIZED			

2.5 PASSAGE MODULE

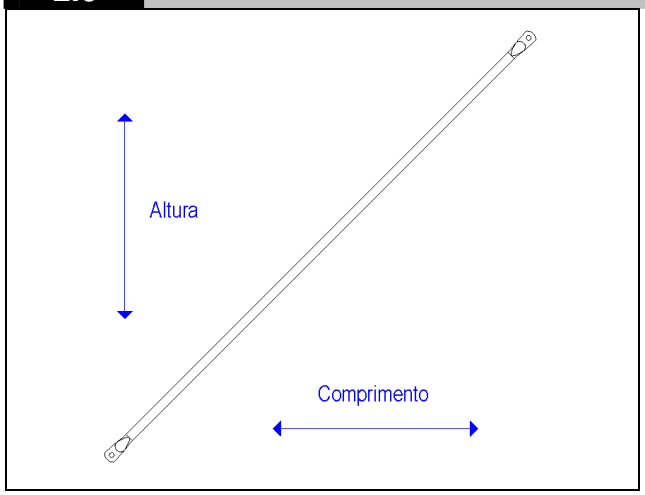


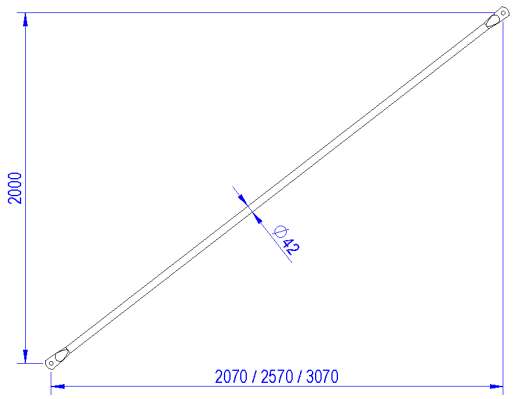
It is used whenever the scaffolding is assembled in places where is necessary to limit pedestrian passages (ex. pedestrian sidewalks).
It is made of steel tube with 48,3x3mm diameter, S235, essentially U profile and S275 steel bar.



Code	Height (m)	Width (m)	Weight (kg)
FA.MP.1500	2,20	1,50	27,5
GALVANIZED			

2.6 DIAGONALS

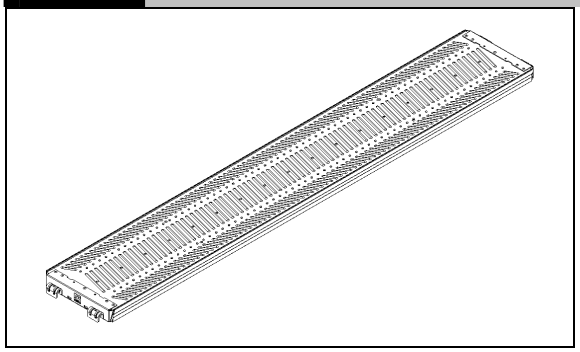


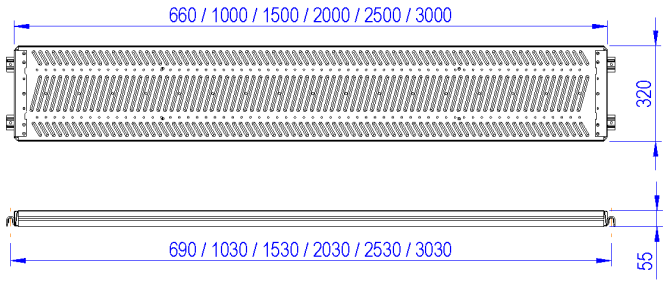


This component's function is to make the structure diagonally stable towards its vertical plan. Diagonals should be used according to the assembly scheme (see on the following pages).
It is made of steel tube 42x2mm diameter, DX51D.

Code	Height (m)	Length (m)	Weight (kg)
FA.DG.2070	2,00	2,07	5,0
FA.DG.2570	2,00	2,57	5,7
FA.DG.3070	2,00	3,07	6,4
GALVANIZED			

2.7 STEEL DECKS

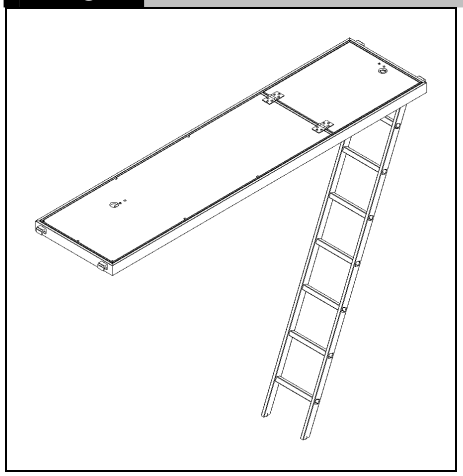


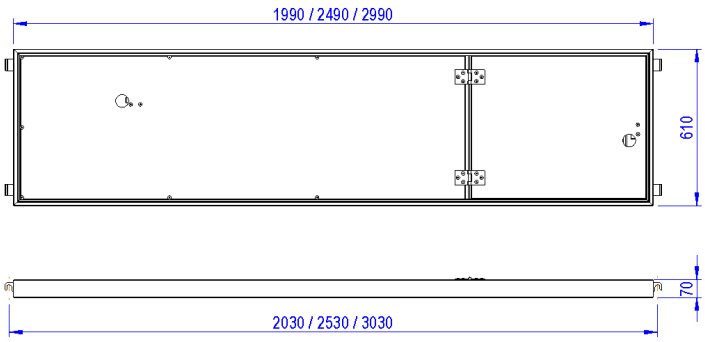


The exclusive FA-48® decks were conceived in order to assure a simple and easy assembly (due to its attachment hook system) and high level of security to the user.
Made of DX51D high quality steel plates (with anti slip surface), and drawn to be resistant and light at the same time.

Code	Load Class	Height (m)	Width (m)	Length (m)	Weight (kg)
FA.PL.320.0730	6 (6,00 kN/m^2)	0,06	0,32	0,73	6,3
FA.PL.320.1070	6 (6,00 kN/m^2)	0,06	0,32	1,07	8,6
FA.PL.320.1570	6 (6,00 kN/m^2)	0,06	0,32	1,57	12,2
FA.PL.320.2070	6 (6,00 kN/m^2)	0,06	0,32	2,07	15,5
FA.PL.320.2570	6 (6,00 kN/m^2)	0,06	0,32	2,57	18,9
FA.PL.320.3070	5 (4,50 kN/m^2)	0,06	0,32	3,07	22,3
GALVANIZED					

2.8 ACCESS DECK WITH HATCH

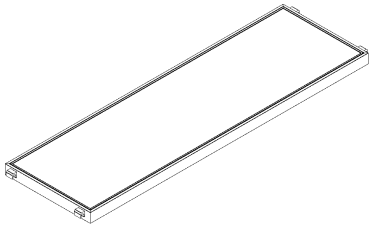


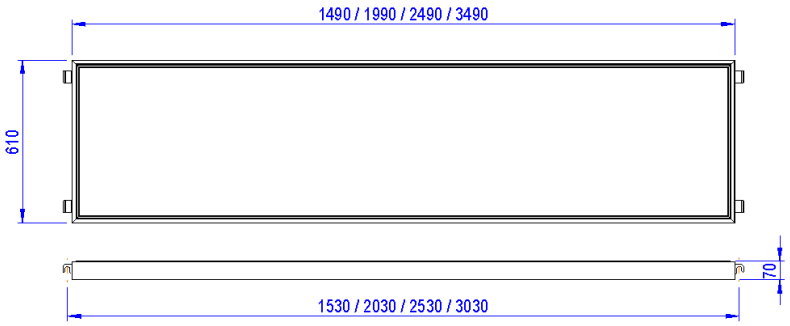


Access deck with hatch allows, with all safety, the passage from one scaffold to other. To be pointed out the high lightness of this FA-48® component.
The main structure and the hatch are made in aluminium and the deck anti slip phenol panel.

Code	Load Class	Height (m)	Width (m)	Length (m)	Weight (kg)
FA.PA.2070	3 (2,00 kN/m^2)	0,07	0,61	2,07	20,0
FA.PA.2570	3 (2,00 kN/m^2)	0,07	0,61	2,57	23,0
FA.PA.3070	3 (2,00 kN/m^2)	0,07	0,61	3,07	25,0

2.9 WOOD AND ALUMINIUM DECKS

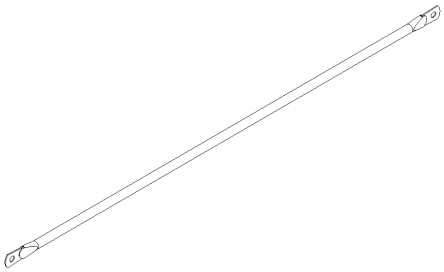


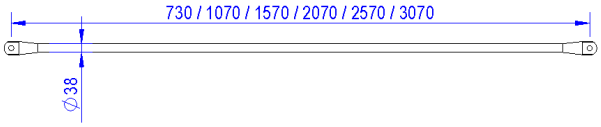


The double platform replaces the use of two conventional steel decks. It has de advantage of reducing the equipment's weight, making easier it's assembling/disassembling. This high Professional solution is the best option for rental market (as it reduces the assembling/disassembling time). The main structure is made of aluminium and the deck is anti-slip phenol panel.

Code	Load Class	Height (m)	Width (m)	Length (m)	Weight (kg)
FA.PAM.1570	3 (2,00 kN/m^2)	0,07	0,61	1,57	12,1
FA.PAM.2070	3 (2,00 kN/m^2)	0,07	0,61	2,07	14,6
FA.PAM.2570	3 (2,00 kN/m^2)	0,07	0,61	2,57	18,0
FA.PAM.3070	3 (2,00 kN/m^2)	0,07	0,61	3,07	21,0

2.10 TRANSOM

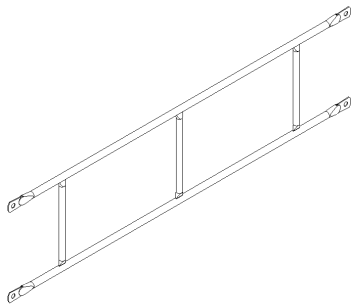


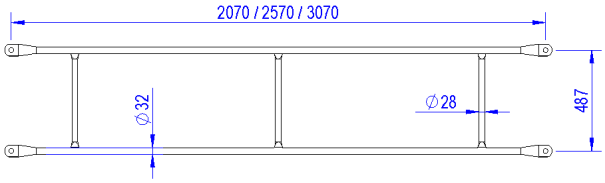


This is a protection anti fall element, providing at the same time stability to the
It is made of steel tube with 38mm diameter, DX51D, and is available in six different sizes, as shown in the following table.

Code	Length (m)	Weight (kg)
FA.TR.730	0,73	1,1
FA.TR.1070	1,07	1,6
FA.TR.1570	1,57	2,5
FA.TR.2070	2,07	3,3
FA.TR.2570	2,57	4,3
FA.TR.3070	3,07	5,2
GALVANIZED		

2.11 GUARD RAIL

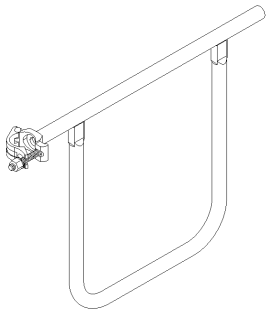


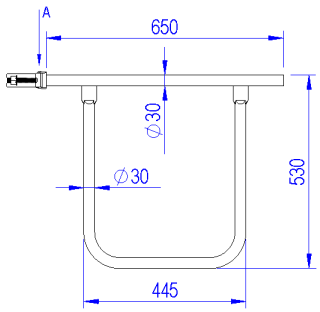


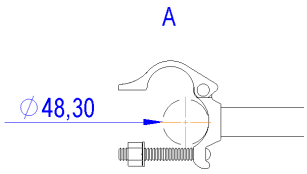
It is made of a 32mm diameter tube, S235, wants to create a safety handrail for the workers and, ate the same time, to give great stability.
The guard rail replaces the transom with the advantage of increasing the solidity of the structure. Nevertheless, it's recommended its use, at least, scaffold's last level.

Code	Length (m)	Weight (kg)
FA.GC.2070	2,07	8,7
FA.GC.2570	2,57	10,8
FA.GC.3070	3,07	11,9
GALVANIZED		

2.12 TOP GUARD RAIL



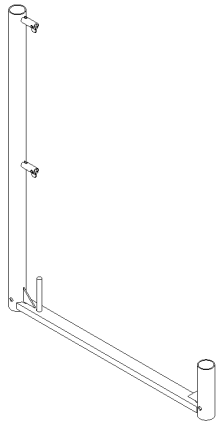


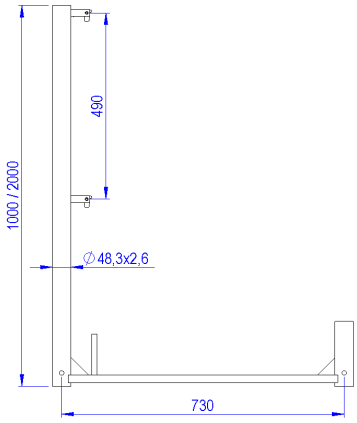


It is used for lateral protection of the working platform.
Made of steel tube with 30mm diameter, S235, it is used at the scaffold's ends, guaranteeing the worker's safety.

Code	Width (m)	Weight (kg)
FA.GT.730	0,73	4,2
GALVANIZED		

2.13 LEDGERS

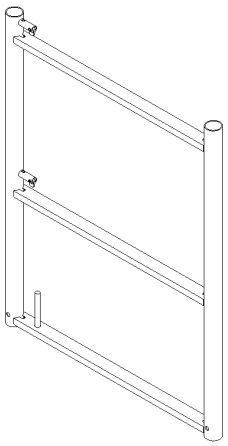


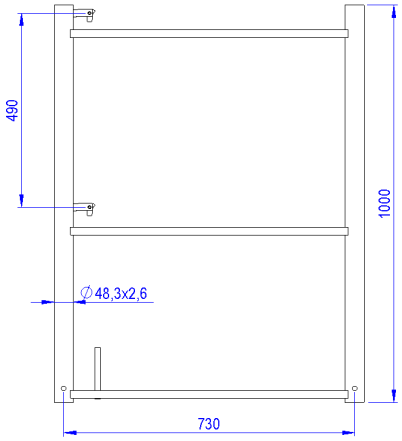


This element is applied on the upper level of the scaffolding and its functions as a buffer to the worker.
Made in steel tube of 48,3mm diameter, S235, and rectangular tube.

Code	Height (m)	Width (m)	Weight (kg)
FA.PP.730.1000	1,00	0,73	5,4
FA.PP.730.2000	2,00	0,73	9,0
GALVANIZED			

2.14 TOP LEDGER

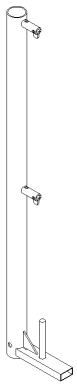


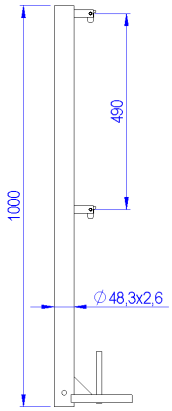


Made on steel tube with 48,3mm diameter, S235, and rectangular tube, it is used on the superior plans of the scaffolding (tops) for worker's protection.

Code	Height (m)	Width (m)	Weight (kg)
FA.PT.730	1,00	0,73	10,0
GALVANIZED			

2.15 SIMPLE LEDGER

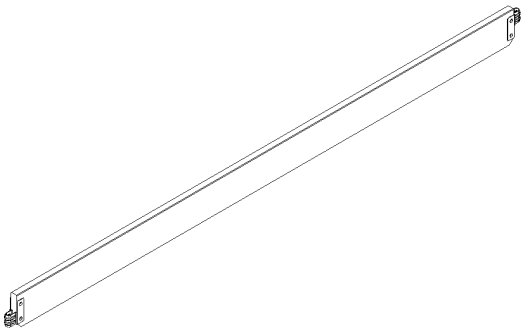


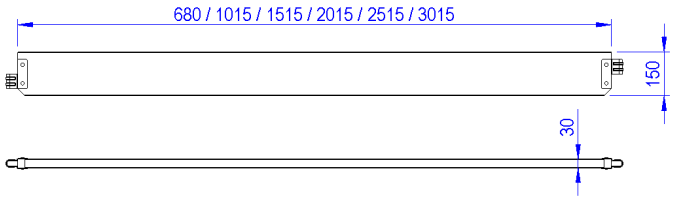


This element is used in special situations, replacing the ledger.
It is made of steel tube with 48,3mm diameter, S235.

Code	Height (m)	Weight (kg)
FA.PS	1,00	4,0
GALVANIZED		

2.16 TOE BOARDS

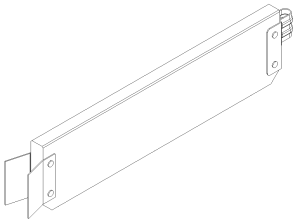


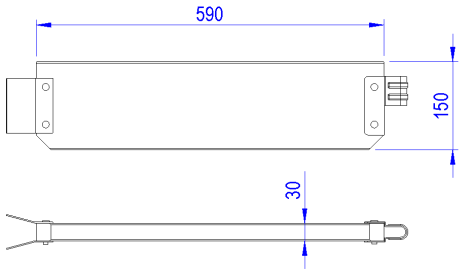


This is a protection element of the working deck (against objects falling).
It is made of wood (special treatment) with special ends for a perfect notch in the scaffolding.

Code	Height (m)	Length (m)	Weight (kg)
FA.RF.0730	0,15	0,73	1,6
FA.RF.1070	0,15	1,07	2,3
FA.RF.1570	0,15	1,57	3,3
FA.RF.2070	0,15	2,07	4,2
FA.RF.2570	0,15	2,57	5,2
FA.RF.3070	0,15	3,07	6,2
PAINTED			

2.17 TOP TOE BOARD

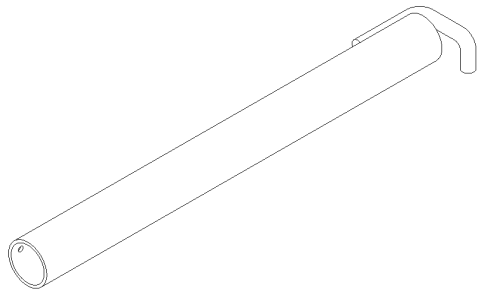




This type of toe board is applied at the end of scaffold in order to prevent materials falling.
It is made of wood (special treatment) with special ends for a perfect notch in the scaffolding.

Code	Height (m)	Width (m)	Weight (kg)
FA.RT.730	0,15	0,73	1,6
PAINTED			

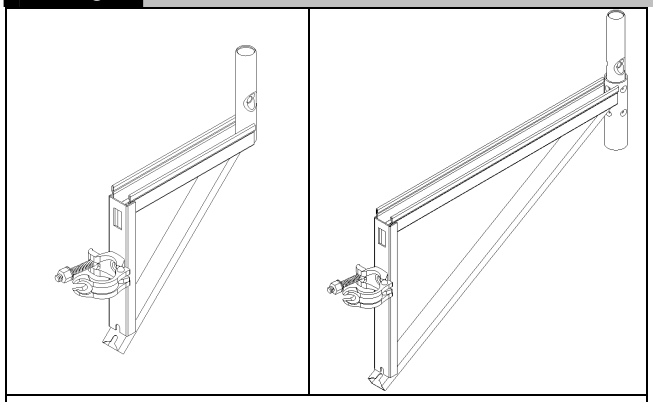
2.18 ANCHOR CLAMP

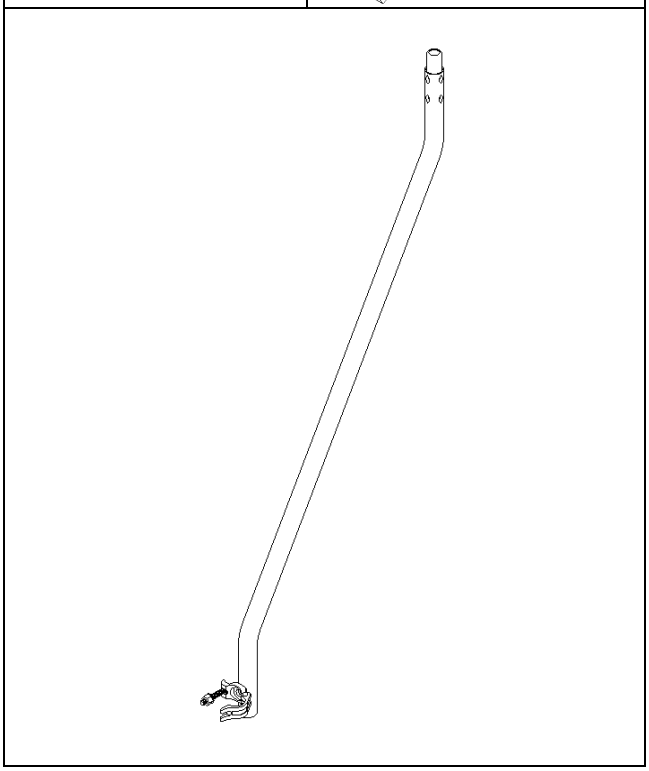


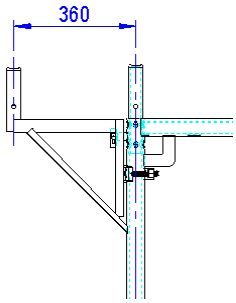
It used to attach the scaffolding to the front, ensuring their stability even with strong winds.
It is made of a 48,3x3,2mm diameter tube (S235).

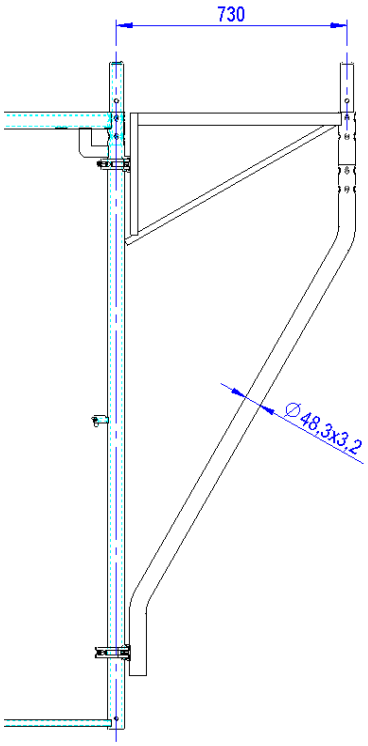
Code	Length (m)	Weight (kg)
AA.GA.250	0,25	1,0
AA.GA.500	0,50	1,9
AA.GA.1000	1,00	3,2
AA.GA.1500	1,50	4,8
AA.GA.2000	2,00	7,0
GALVANIZED		

2.19 CONSOLES AND CONSOLE'S SUPPORTING TUBE





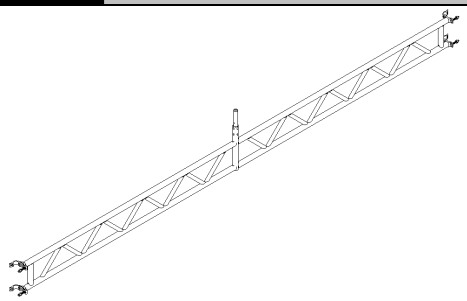


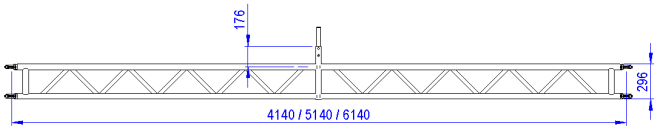


They allow the scaffoldings' adaptation to irregular fronts amplifying the work surface (with one or two supplementary decks).
Made in high quality steel with engage on U profile.
Supporting tube works together with the 0,73m console.
Its proper use requires attach the coupler to the inferior scaffolding module and, on the other hand, engage the upper end of the console's supporting tube on the inferior cylindrical engage of it. This way, we can potentiate a greater firmness to the work surface increased.
Made in steel tube of 48,3mm diameter, S235.

Code	Width (m)	Weight (kg)
FA.CL.320	0,32	3,0
FA.CL.730	0,73	5,3
AA.TC	2,00	7,5
GALVANIZED		

2.20 BRACKET TRANSOM

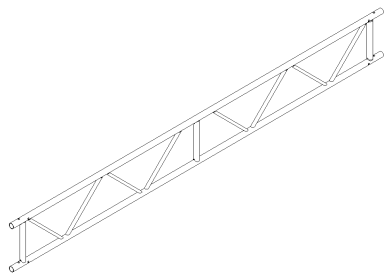


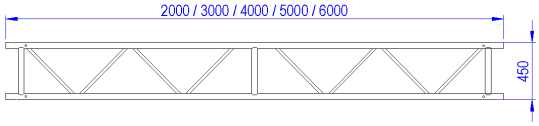


Whenever it is necessary to amplify the spans between modules, for example, above the garage gates, theses beams can be used in order to create spans with 6m.
It is made of two parallels with 48,3x3,2mm diameter (with couplers ate the extremities), connected by a zigzag tube to guarantee highest stability.

Code	Height (m)	Length (m)	Weight (kg)
FA.VS.4140	0,30	4,14	40,0
FA.VS.5140	0,30	5,14	49,0
FA.VS.6140	0,30	6,14	63,0
GALVANIZED			

2.21 PARALEL TRANSOM

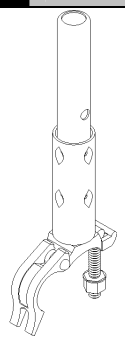




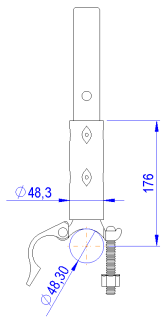
This should be used in hanging scaffoldings, under the platforms in order to guarantee stability to the structure. Example: it is used as reinforcement when the scaffolding is assembled on pedestrian sidewalks or when it is necessary to bear heavy loads, among other situations.
It is made of tube with 48,3x3, and it has zigzag reinforcements.

Code	Height (m)	Length (m)	Weight (kg)
AA.VP.2000	0,45	2,00	18,5
AA.VP.3000	0,45	3,00	27,0
AA.VP.4000	0,45	4,00	38,0
AA.VP.5000	0,45	5,00	45,0
AA.VP.6000	0,45	6,00	55,0
GALVANIZED			

2.22 COUPLER WITH SPIGOT

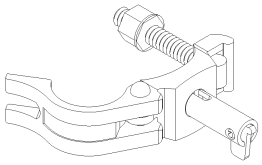


It is used when there is a need to create an additional vertical from a 48,3mm tube. It is made by a coupler with a welded spigot.



Code	Weight (kg)
AA.AE	0,9
GALVANIZED	

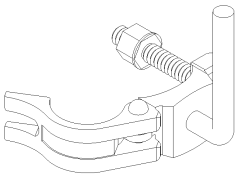
2.23 COUPLER WITH LOCK



It is used whenever is necessary to create an additional support for a transom, a diagonal or guard rails. It is totally made of zinc steel.

Code	Weight (kg)
AA.AF	0,65
ZINC	

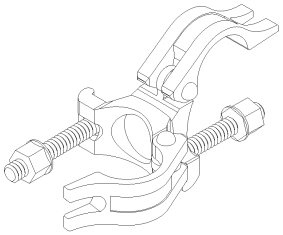
2.24 TOE BOARD COUPLER



Its use is recommended whenever it is necessary to create an additional support for a toe board. It is totally made of zinc steel.

Code	Weight (kg)
AA.AR	0,8
ZINC	

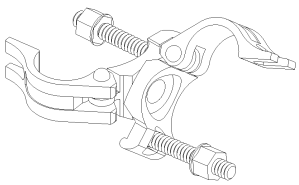
2.25 ORTHOGONAL COUPLER



It is used to connect two perpendicular tubes with 48,3mm.
It is totally made of zinc steel.

Code	Weight (kg)
AA.OT	1,2
ZINC	

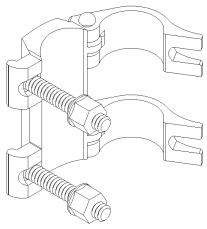
2.26 SWIVEL COUPLER



It is similar to the orthogonal coupler (fixed) but with the specificity of allowing perpendicular rotary motion positions of the tube attachment elements. This makes possible a multiplicity of adjusting levels.
It is totally made of zinc steel.

Code	Weight (kg)
AA.G	1,4
ZINC	

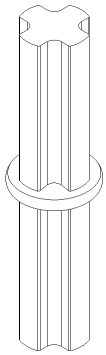
2.27 DOUBLE COUPLER



It is used to connect two parallel tubes with 48,3mm diameter.
It is totally made of zinc steel.

Code	Weight (kg)
AA.AD.48	1,5
ZINC	

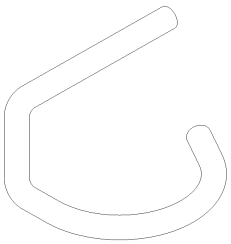
2.28 SPIGOT FOR JOINTING



Its function is to joint two tubes with 48,3mm diameter.
It is totally made of steel and it has two cross ends with a bushing with 48,3mm on the centre.

Code	Weight (kg)
AA.EE	1,3
ZINC	

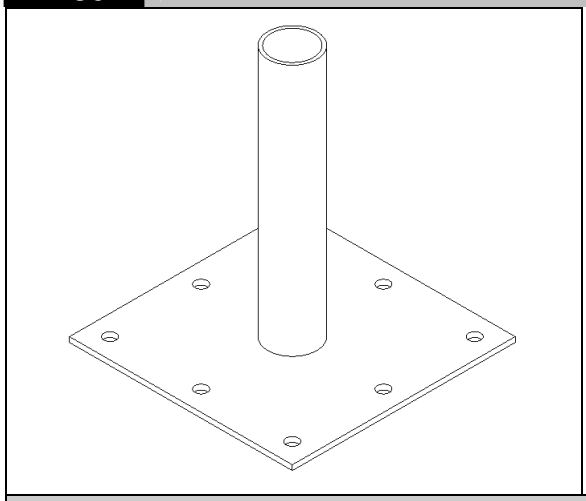
2.29 PIGTAIL



It shall always be used to guarantee a safe connection between the scaffolding's modules.
It is totally made in steel tie rod with 8mm diameter.

Code	Weight (kg)
AA.PS	0,13
GALVANIZED	

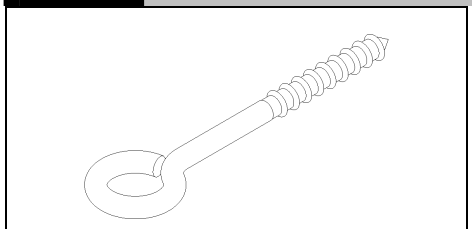
2.30 FIXATION PLATE



This is multifunctional element that is used, for example, to attach an advertising plate to a 48,3mm diameter tube or to create an additional anchorage, perpendicular to the façade line.
It consists of a 250mm tube welded on a 220x220mm base with 5mm thickness.

Code	Weight (kg)
AA.PF	3,5
GALVANIZED	

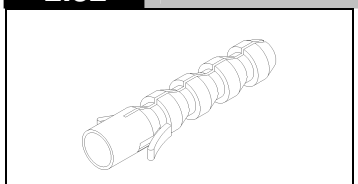
2.31 SCREW LOOP



This is an accessory used to attach the scaffolding to the façade.
It is made of steel and it is characterized by its special screw which guarantees a safe anchorage.

Code	Weight (kg)
AA.OL.120	0,16
AA.OL.190	0,18
GALVANIZED	

2.32 STOPPER



This is a stopper prepared for great efforts and to work together with the screw loop.
It is indicate for attachment in solid elements such as concrete, ceramic tiles, etc.

Code	Weight (kg)
AA.BC.80	0,01
AA.BC.100	0,01
GALVANIZED	

3

BRIEFLY OF
EN 12810 NORM

3.1 GENERAL

The European Norm 12810-1 has been adopted by the European Committee for Normalization (CEN) on 4 September 2003.

This document, which replaces the previous HD 1000 of 1998, with direct application in relation to the signing states, specifies the performance and general requirements for structural design and evaluation of prefabricated scaffolding systems.

3.2 APPLICATION

This document applies to all types of scaffolding systems entirely produced with steel or aluminium alloy as material base or with some elements made from these materials and incorporating wood components or derivatives, when connected to the facades for moorings and does not specify requirements for the use of awnings or provide instructions for assembly, use, disassembly or maintenance.

3.3 OBJECT

The provision of the Norm intends that the equipment which meets the expressed requirements ensures to the workers a higher level of safety (avoiding accidents at work), stability, load capacity, ease assembly and reliability.

This document is intended:

- Targeting the election of the principal dimensions of prefabricated scaffolding at the conception time;
- Sort prefabricated scaffoldings according to their load capacities;
- Specify the technical properties of the materials used;
- Provide a framework for security standards;
- Describe a basic model of the assembled structure.

3.4 CLOSING REMARKS

To the extent that this standard is focused on the rationalization of production, because it provides the basic elements to consider when the production process (design and production), the type of equipment to ensure objective and believe that the products in question meet the requirements of quality and safety requirements of legal document above.

SECURITUY ALERTS

In the use of scaffolding may happens several hazards that are identified below as its causes and preventive measures to be taken.

IDENTIFIED HAZARDS

Falling a different level

- Falling at the same level
- Structures falling
- Falling of materials on people or goods
- Electrical contacts direct or indirect
- Efforts on the assembly or disassembly work
- Cuts

CAUSES

- Use of defective scaffoldings (cracked or deformed elements);
- Incorrect assembly of the structure, and work platforms;
- Dimensions of insufficient working platforms;
- No guard rails and/or toe boards ;
- Up and down the scaffolding by the elements amounts (and no by the their accesses);
- Excessive deviation between the scaffolding and the structure;
- Fixation to constructive elements without strength or resistance;
- Use of scaffolding modified by non-specialists people;
- Failure of wearing personal protective equipment required;
- Lack of training of workers;
- Electrical contacts by insulation disabled the electrical circuits of lighting on the scaffolding, or of the tools alimentation, or of the existence of electric lines of high or low voltage in the vicinity.

PREVENTIVE MEASURES

Scaffolding elements:

- The vertical elements mounted on the first level should have extensible bases and / or articulated to facilitate the leveling of the whole;
- Scaffolding with superior height is 25m, are to be calculated by a responsible technician, whatever the material in them used;
- The wood applied must be of good quality, dry, without producing cracks that compromise their strength, being

forbidden the use of paint to cover the defects;

- If the scaffolding is covered with a safety net, the calculation should be included in the effort resulting from the wind.

Before starting the assembly:

- Training of employees on the proper techniques for use and assembly of the scaffold;
- Knowledge of all the constraints imposed by the progression of construction and for existing equipment;
- Inspections of all elements of the scaffold in order to verify that there are deformed, cracks, corrosion, warping, wear or changes in geometry;
- The soil where is based the scaffold must have the strength and cohesion necessary to support loads that will be applied, otherwise, should be properly packed and, if necessary, to place a layer of Encore properly compacted and over, concrete of cleaning with a minimum thickness of 5cm.

During assembly:

- Always that there exist nearby overhead power lines, distances should be kept to protection ranging between 4 and 5m, depending on their voltage is below or above 50,000 volts;
- Delimit the mounting area with at least 2m away around the assembly area in order to prevent the passage and retention of staff down the scaffold;
- Do not start the assembly of a new level without having completed the previous level, with all the elements of stability;
- Working platforms should be consolidated soon after its assembly, with couplers or clamps;
- All the grips of couplers, clamps and other fastening parts must be inspected at any level before moving to the next, in order to detect loose parts or lack of some;
- The elements of scaffold should be raised and lowered, properly connected, using mechanical means. The couplers and other small materials should be moved inside the appropriate buckets.
- The extensible bases and/or articulated should be nailed to wooden boards where they are placed;
- Scaffolding must be placed on wooden planks to make the distribution of burdens, which can also be done using elements of reinforced concrete with adequate strength and stability. To this effect should be strictly forbidden the use of bricks, concrete blocks or other elements that may fracture;
- Next to the slope top (minimum distance of 1m), the scaffold must be properly anchored to ensure that the weight of the structure does not put at risk the stability of slope;
- The wooden platforms must to protrude at least 20cm of their support;
- The wooden platforms should be intertwined in the longitudinal direction, their overlap should not be less than 35cm;
- The wooden platforms should be locked (firmly secured to the frame) with clamps or bolts of steel washer, placed so as not may cause the workers falling;
- The hatches of the interior accesses must open to up. They must have 50cm wide and 60cm long and be run so that, when closed, the horizontal platform has a uniform and sturdy floor; ladders should be securely fixed on the top.
- The stairs access of interior should not be used simultaneously by two or more employees (each haul), to have superior hauls to 3 feet in length, width of 50cm and must have a distance between steps from 25 to 33cm.
- In the scaffolding is provided for the simultaneous use of more than 15 workers must be installed two stairways (preferably at the tops).
- The fixations should be run to resistant elements and never the temporary structures. The arrangement and number

of fixations should be able to withstand horizontal loads, perpendicular and parallel (should be run at least one fixation for each 10m2 of scaffolding);

- In new construction, the minimum width of the platforms should be 80cm (minimum of four boards) and the maximum opening of the props should be 2m;
- In conservation work, the minimum width of the platform shall be 60cm (minimum 2 boards) and the maximum opening of the props should be 2.5 m.
- The platforms should not have spaces for the falling objects, materials or tools (between two boards, for example).
- Working platforms should enable the movement and intercommunication necessary for the proper performance of work.
- Working platforms, located at the same or superior height than 2m, must have superior guard rails and middle between 90 and 100cm height and between 45 and 50 cm and toe boards with 15cm height;
- Should be removed from the platforms, to quota "0", all the stripping materials over the assembly.

In use:

- Users should be properly informed about the limits of stability and rupture of the scaffolding, so as their correct use;
- Should be strictly forbidden to jump from working platforms for the building. The movement must be made through the appropriate passage (minimum width of 60 cm, equipped with guard rails and toe boards);
- Should be banned the use of scaffolds during storms. After the storm, the scaffolding must be inspected by a qualified person before being reused;
- The materials should be distributed uniformly by the work platforms, in order to avoid overloads;
- Must be strictly prohibited the withdrawal of any security elements or of the scaffolding support.

CONDITIONS OF USE

- The use of the products mentioned in this guide implies by the user the accomplishment of the requirements as legal as normative applicable to the work concerned and to the materials and used equipments, as so to the security and health of the users. In Portugal, the legislation that should be considered is:

Ordinance n.º 101/96 – regulates the minimum safety and health in workplaces and temporary or mobile warehouses.

Decree-law n.º 273/2003 – establish general rules for planning, organization and coordination to promote the safety, hygiene and health in the work in warehouses of construction.

Decree-law n.º 50/2005 – concerning the minimum safety and health requirements for the use of work equipment by workers.

Decree n.º 41821/58 – regulates the security in civil construction work.

Concerning to the normalization, the manufacture and use of this scaffolding follows the provisions of the EN 12810 and 12811 Norms.

- We recommend the use of protective equipment, helmet, gloves and boots, steel toe and anti-slip floor, to the workers handling these products.

- In the operations of assembly and/or disassembly, in addition to the equipment mentioned above, the workers must be protected from the danger of fall by the use of appropriate equipment, harness, for example.

- The couplers used must meet the requirements of EN 74 Norm.

- Additional tubes should have 48.3mm diameter and 3.2mm thickness, in accordance with EN 39 Norm.

- The service charges can not, by level, overcome the limited by the class of the charges of platforms and, in the overall of the structure, the limited by the class of scaffolding.

- In the design of the settings set to this scaffold (defined ahead) were taken into account the overload by the wind, according to the EN 12810Norm, were not taken into account operations due to snow and ice. If the work were performed under conditions where the force of the wind action are superior or with snow or ice limitations, the maximum allowed by class of scaffolding should be applied.

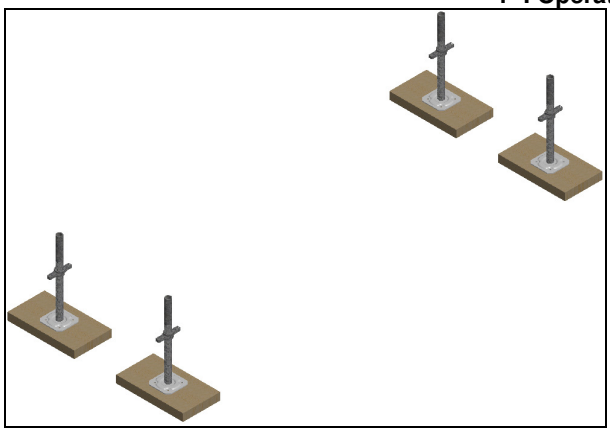
- The procedure for removal should follow that described for the assembly in reverse order. Pay particular attention to fixations and to care only withdraw after disassembling the entire structure.

- Components which verifies structural defects that endanger the safety of their use should not be used (this evaluation must be made by responsible aware of the implications of using the component in question).

- We recommend storing in proper containers. If can not be possible take into account the height conditioning, in order to prevent accidents from falls.

ASSEMBLY SCHEME

1st. Operation

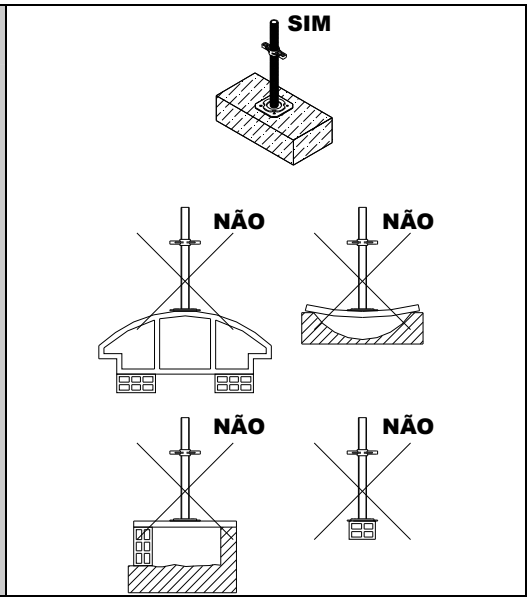


Settlement of the levelling bases

The settlement of the levelling bases must be made according to the ground's specificity. According to the technical characteristics of this element, namely the crewed set, it is possible to get infinite regulations. Whenever possible, it should start the installation from the highest point, adjusting the screw at minimum.

IMPORTANT

CORRECT SETTLEMENT OF THE BASES

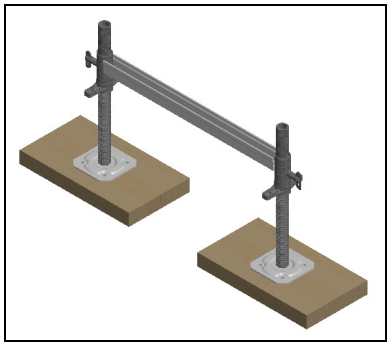


Settlement of the Bases

Fixate the bases on an uneven surface or unstable can lead to accidents. The initiation bases (or levelling bases, as needed) should be supported on a solid surface, providing guarantees to the assembly of scaffolding.

(See lateral image)

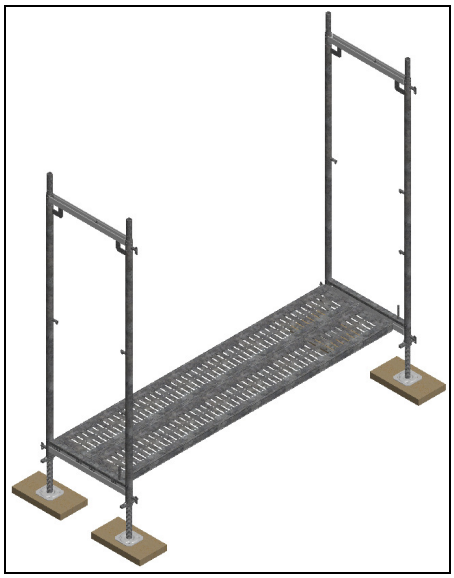
2nd. Operation



Initiation bracket's fitting

The initiation bracket allows the perpendicular connection (with respect to the facade) between the levelling bases, the module and locking, to allow the initial alignment and locking.

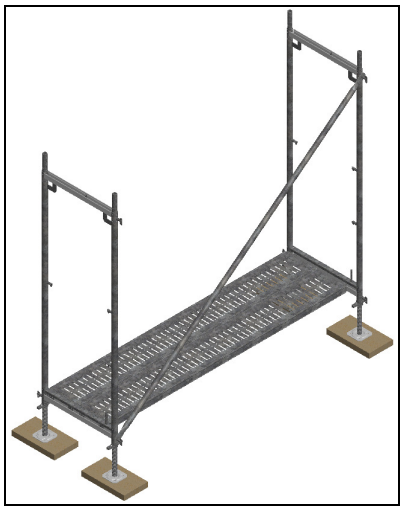
3rd. Operation

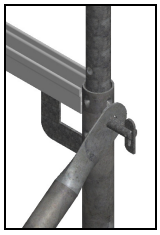


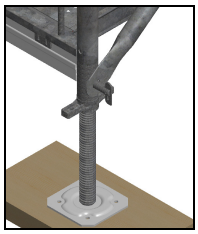
Scaffolding modules placement

The third operation corresponds to the fitting of the first scaffolding modules (Ref. FA.MD.700.2000) as well as the decks of the lower level (to support the stair of vertical access of the access decks with hatch).

4th. Operation



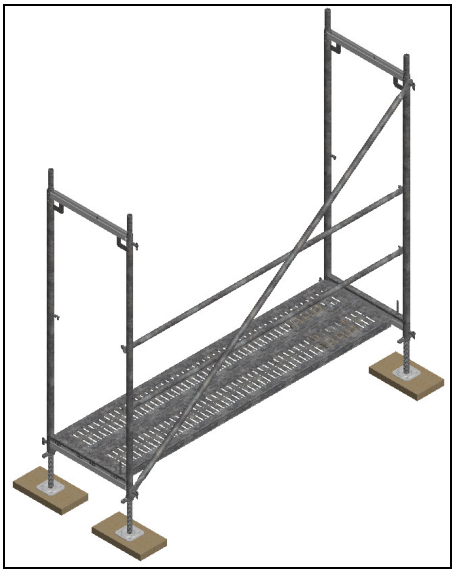




Diagonals Fitting

Fit a diagonal (FA.DG.2000, FA.DG.2500, or FA.DG.3000) in the pin of the scaffolding's module and, at the inferior level, in the initiation bracket, in order to guarantee verticality and stability to the system.

5th. Operation

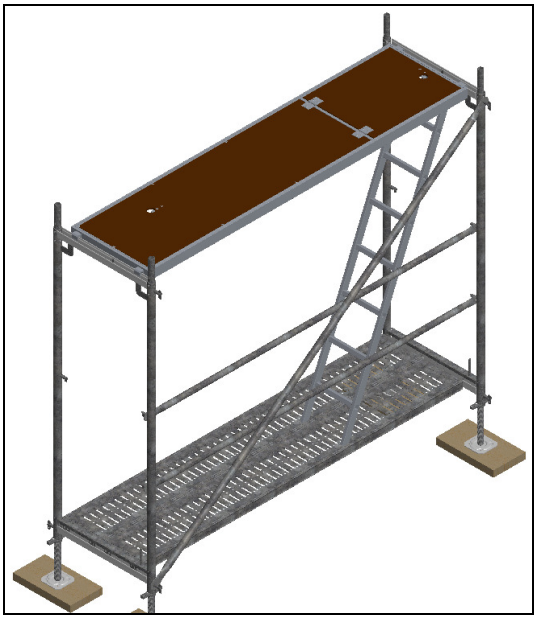


Guard Rails or pair of transoms

This step corresponds to the beginning of the first security elements. You can choose between the collocation of a guard rail or two parallel transoms.

These elements have the double function of guaranteeing safety to the worker and, ate the same time, to give stability and resistance to the scaffolding.

6th. Operation

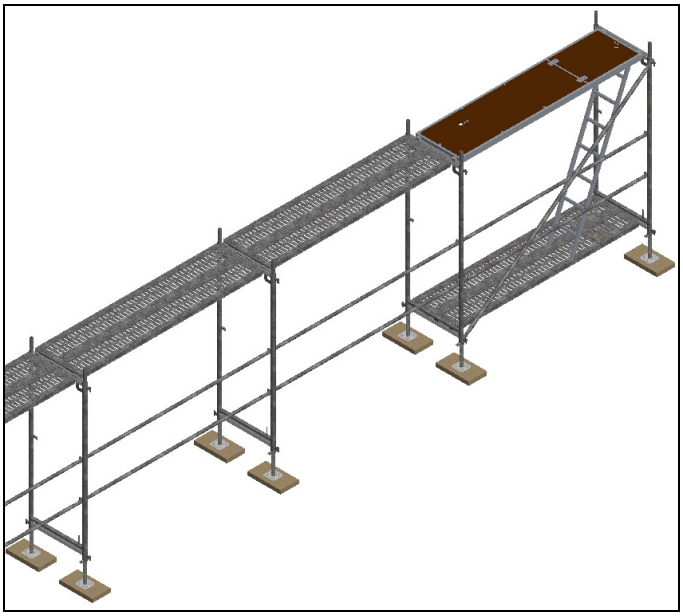


Decks fitting

Fitting the decks on the superior level.

NOTE: For added protection you should put the access ladder to the access deck with hatch on the side of the diagonal's fitting, as in the above figure.

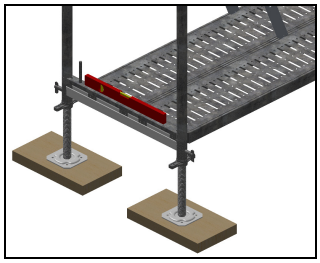
7th. Operation

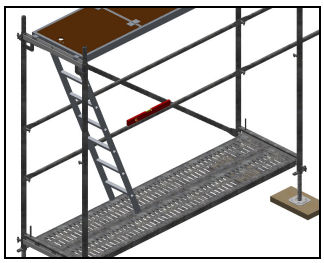


Assemble the scaffolding sequence

At this time we should to check the distance from the scaffolding in relation to the facade, according to the dimensions indicated in the project.

8th. Operation





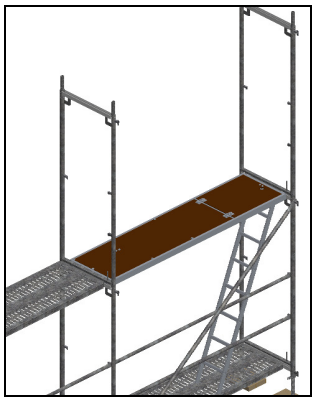
Vertical levelling

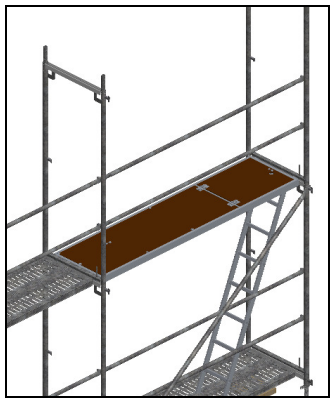
After assembly the first level of scaffolding (and before you install the second floor) is necessary to check the levelling of the first body of the installed scaffolding.

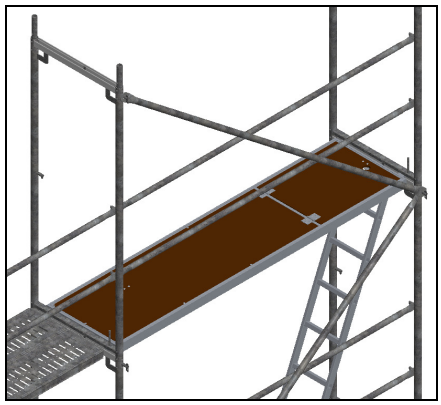
9th. Operation

Superior levels assembly

Repeat the assembly sequence for the upper levels.



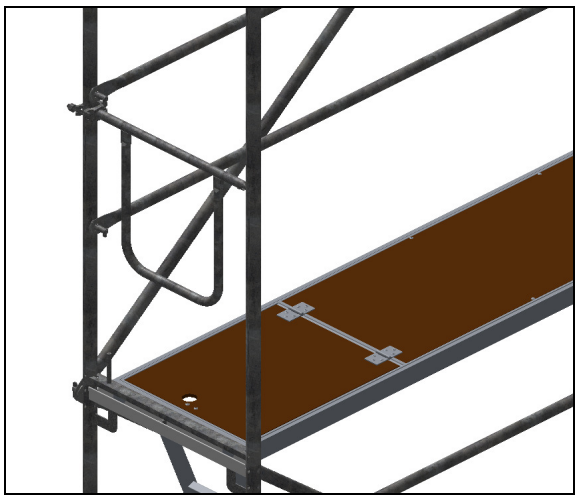




10th. Operation

Top Guard Rail

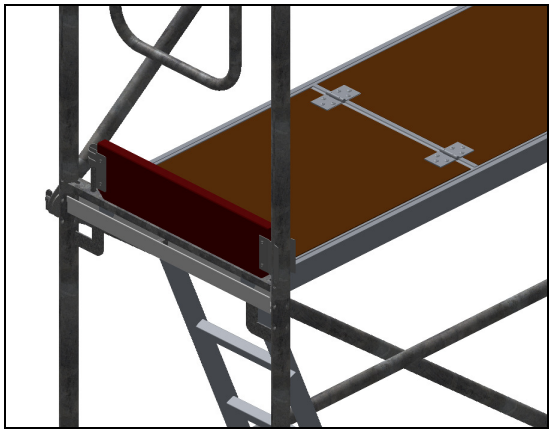
Place a top guard rail on each lateral side (top) of the scaffolding.

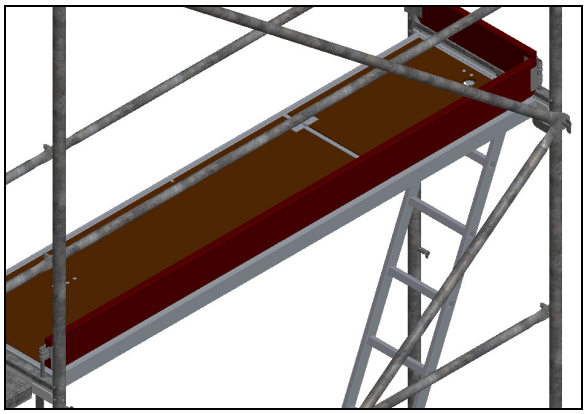


11th. Operation

Toe Boards

Fit the toe boards throughout the second level of the scaffolding.

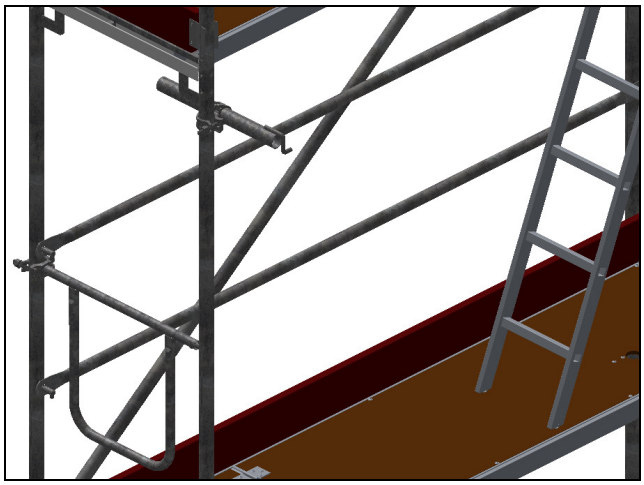


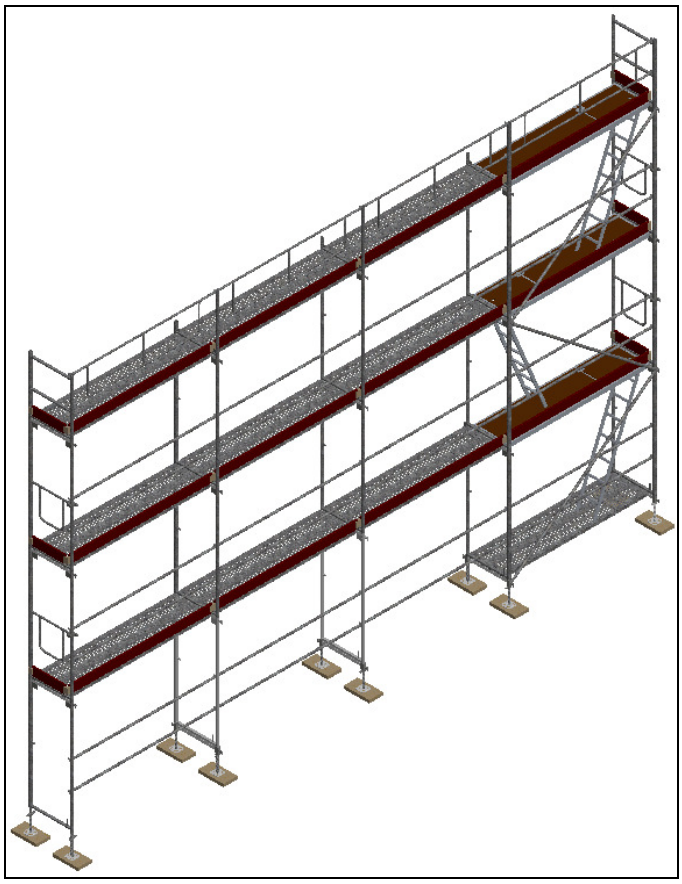


12th. Operation

Subsequent levels

Adjust the scaffolding to the height of the facade and put the decks on the next levels.





Assembly the façade

At the top level for added stability should be only used guard rails (Ref. FA.GC.2070, and FA.GC.2570 FA.GC.3070) rather than the alternative of two transoms.

IMPORTANT NOTE
FA-48®

One of the most important reasons what assists to the FA-48® option relates to the issue of security that this product gives to the user(s).

To a great extent, the safety of the scaffolding develops to the degree of stability that this safeguard, not enough only to be checked all the production requirements set out in EN 12810 Norm, is also essential to meet the correct installation of the equipment, as to confer all the necessary conditions to the maximization of their income and their guarantees.

To that extent, it is appropriate to address briefly the question of the importance of the diagonals and the anchorages of the scaffolding, by the importance that these components have as safety.

A DIAGONALS

The diagonals have three main functions:

A_1) Stability – the extent that they support much of the effort (in terms of weight);

A_2) Against wind – the fact that ensure the rigidity of the structure even with strong winds;

A_3) Geometry – by not allowing the deformation of the geometric configuration of the scaffolding.

Together with the diagonals, also highlighted the activities of the platforms in terms of stability in the horizontal plane.

In the vertical plane, the stiffness of the scaffolding is supplanted by the joint action of the diagonals and the transoms (or guard rails, as appropriate).

Another important aspect is the fact that should never let more than three steps without diagonals of scaffolding (as the schemes on the following pages).

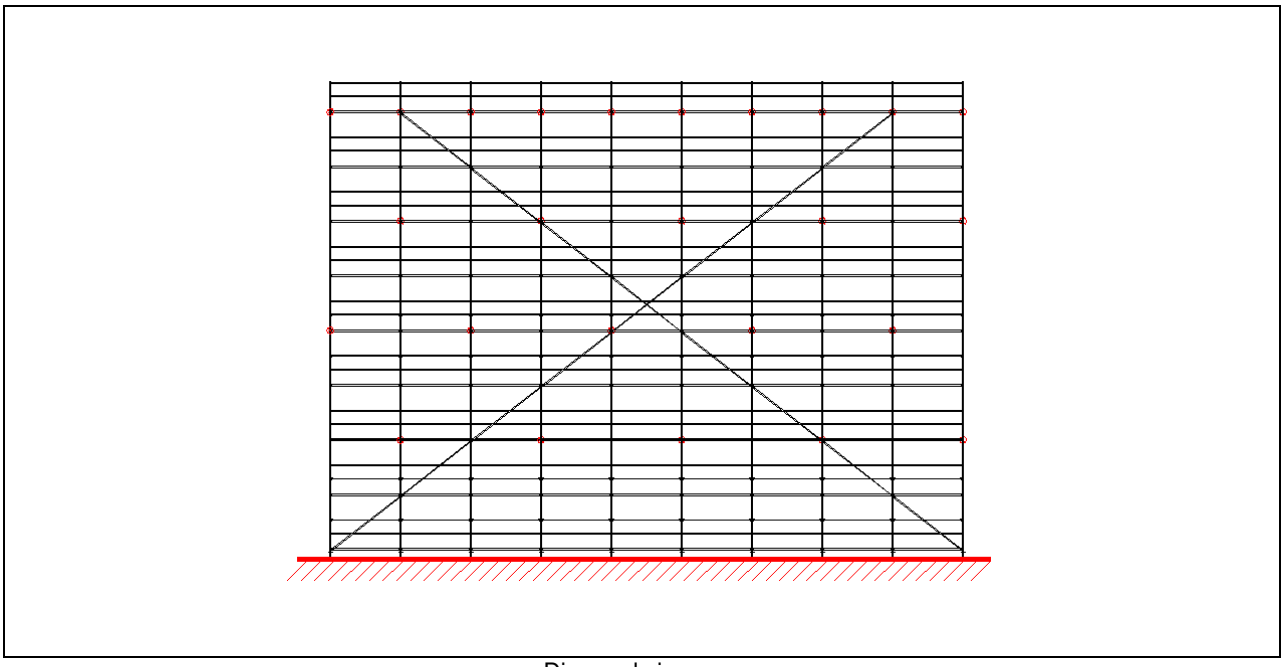
B ANCHORAGES

The anchorages are the connection points of the scaffold to the facade. Their function is to ensure the immobility of the scaffold, even under adverse conditions caused by high winds or large efforts of various natures. In general, are the anchorages that support horizontal loads parallel and perpendicular to the façade.

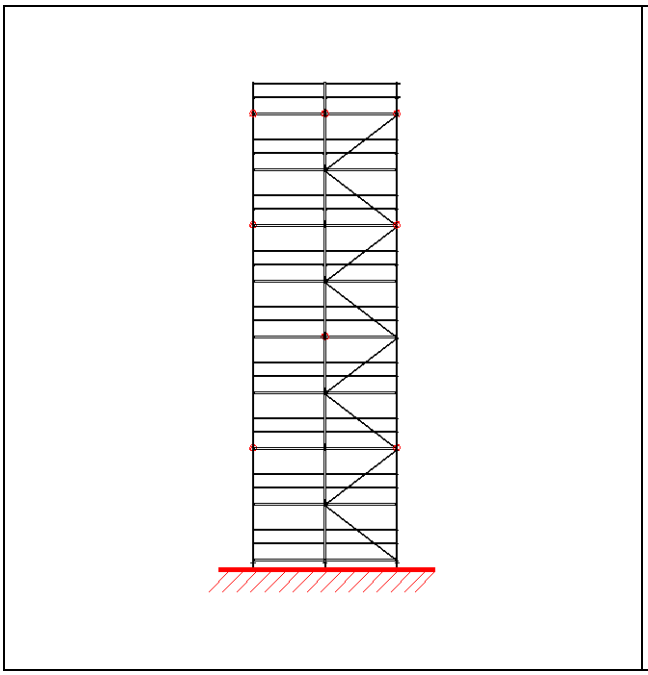
It is essential to check the fastness of each anchor point of the facade.

General rule, the anchorages should be placed at reason of one per 24m2 in scaffolding discovered, or one per 12m2 in scaffolding and with awning superimposed.

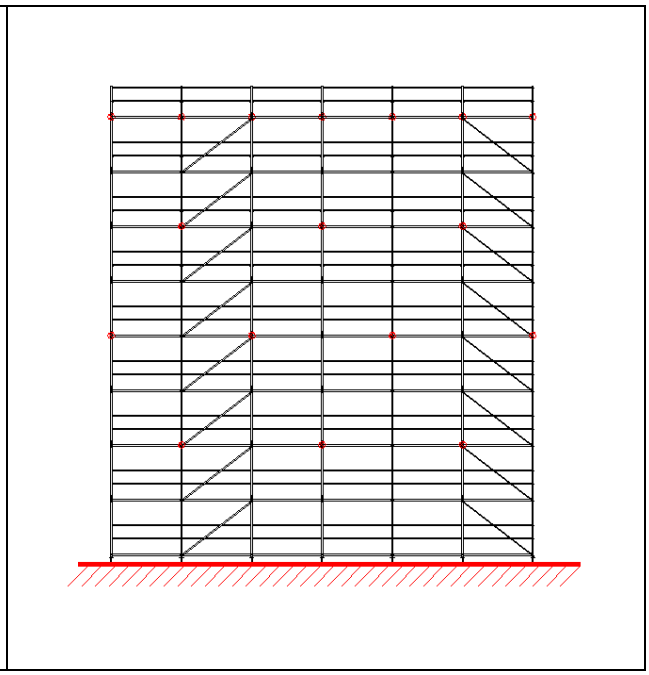
A. LAYING OF DIAGONALS



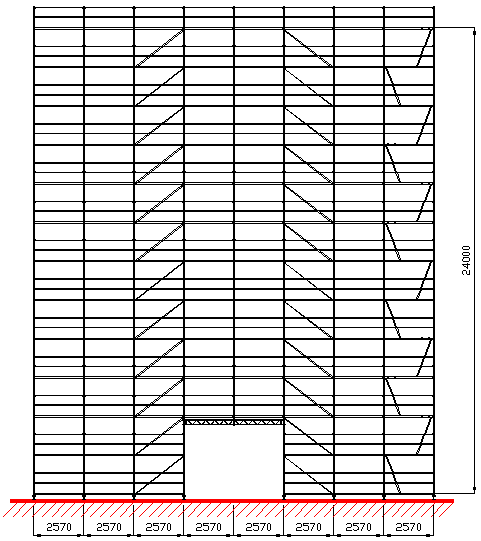
Diagonals in cross

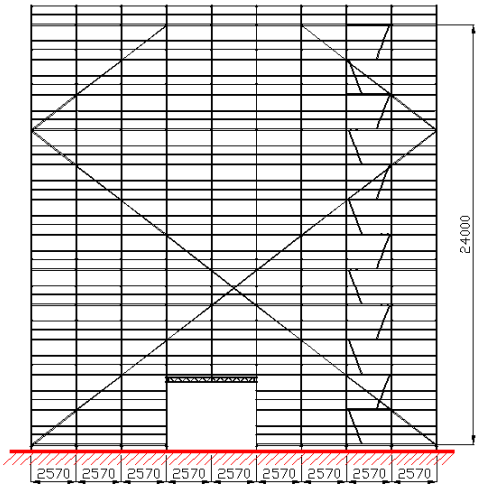


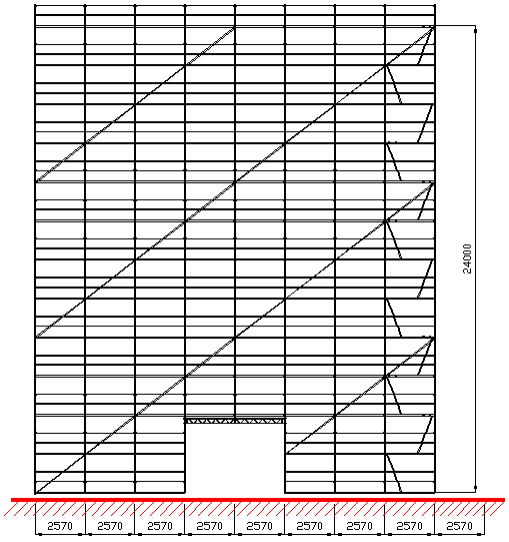
Zig-zag diagonals



Diagonals in parallel

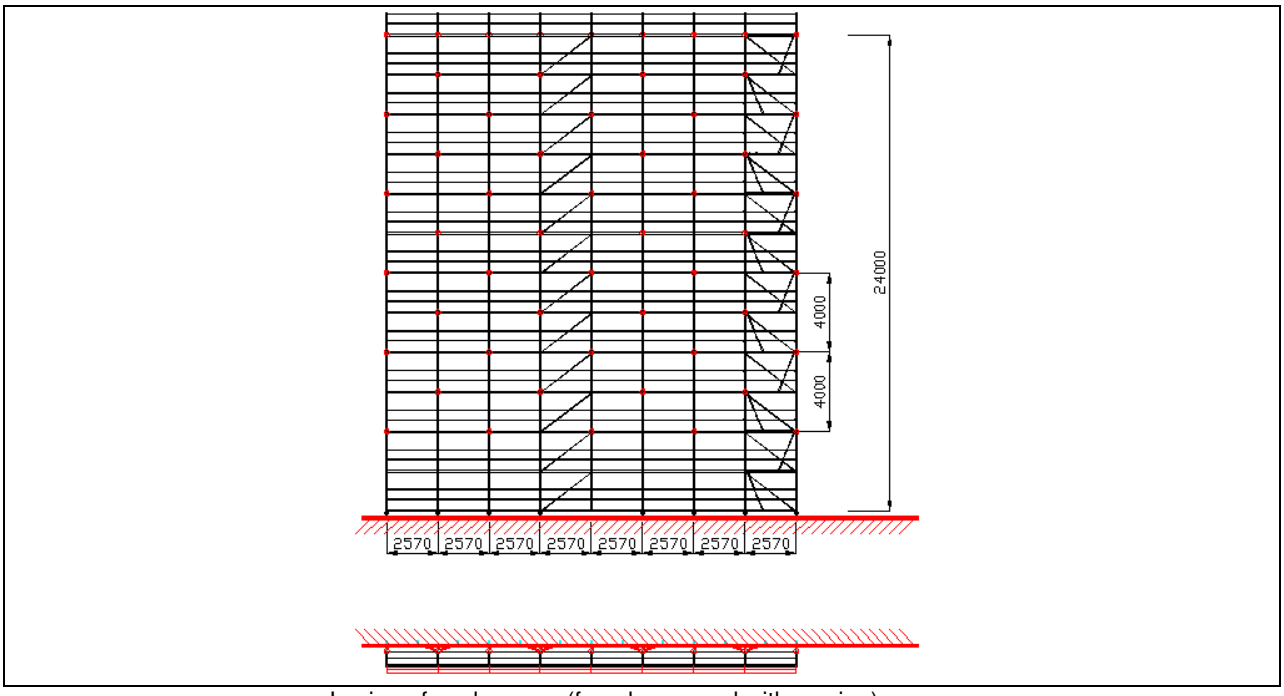




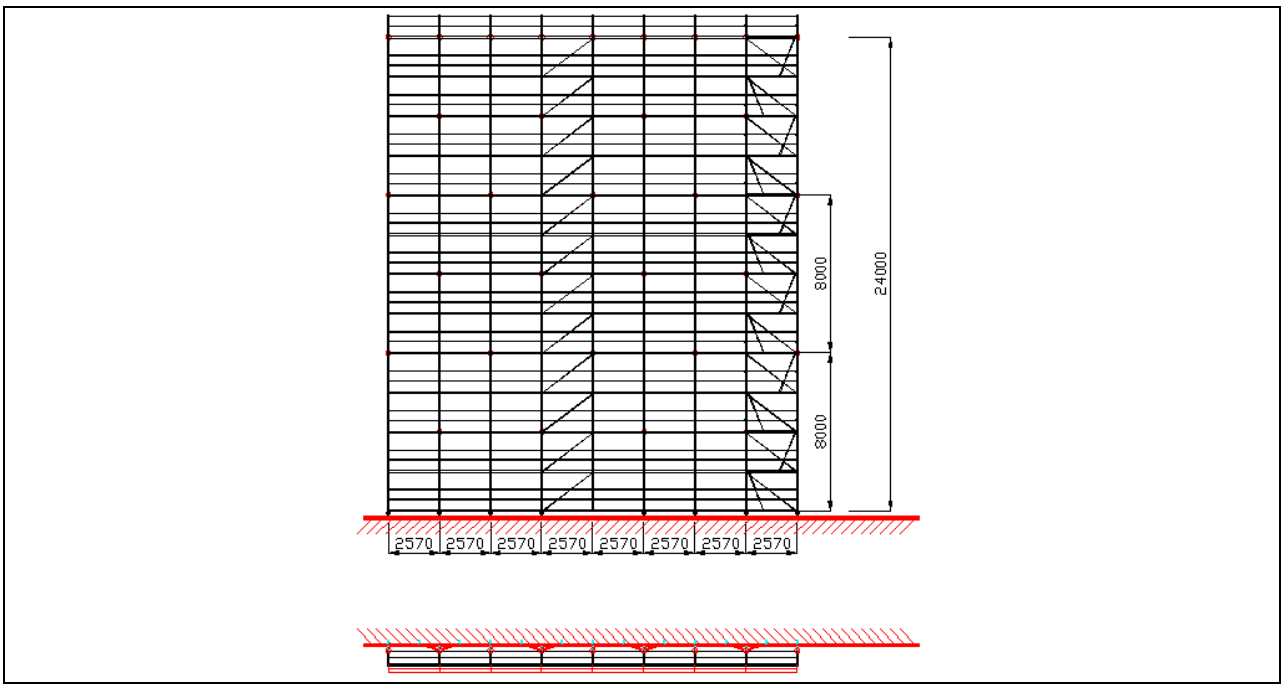


3 examples of assembly of the diagonals with support beams (never leave more than three steps of scaffolding without diagonals).

B. ANCHORAGES

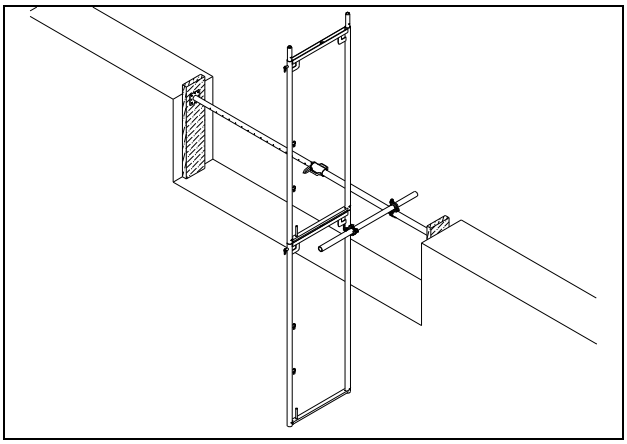


Laying of anchorages (facade covered with awning).
Note: never leave more than three steps of scaffolding without diagonals.

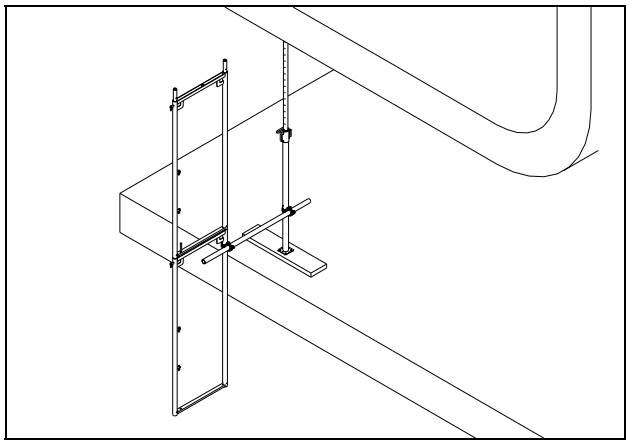


Laying of anchorages (façade covered without awning).
Note: never leave more than three steps of scaffolding without diagonals.

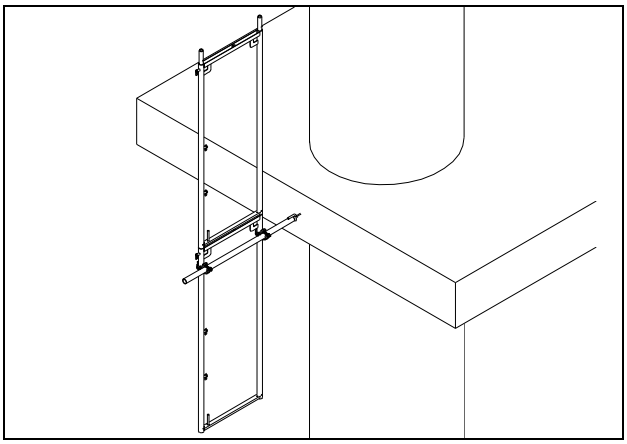
TYPES OF ANCHORAGES



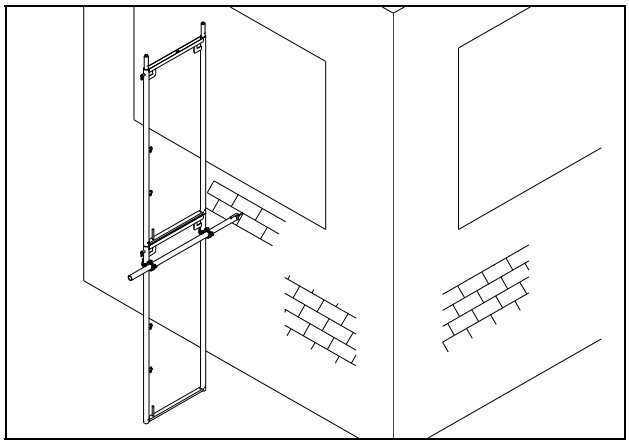
Anchorage at the window or balcony



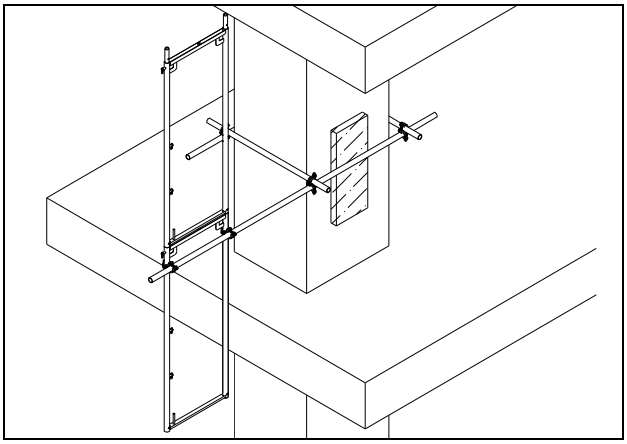
Anchorage with prop
(See catalogue **CATARI** props)



Anchorage at a slab



Anchorage at a façade



Anchorage at a column

5

FA-48®
SYSTEM

5.1 SYSTEM DEFINITION

O sistema de andaime pode ser apresentado nos seguintes variantes:

System	Class Load	Length	Height	Width
FA-48	5	3070	2000	730
FA-48	5	2570	2000	730
FA-48	5	2070	2000	730
FA-48	5	1570	2000	730
FA-48	5	1070	2000	730
FA-48	5	730	2000	730

NOTE: Any different configuration other than those mentioned here in may not provide the security and stability guaranteed by the manufacturer.
These settings can be realized by carrying out structural calculations by specialists. Any additional technical information may be requested from the manufacturer.
According to EN 12810 Norm, the designation of the **FA-48®**, in their models and variants is defined according to the following table:

Model	System	Type of Scaffolding	Norm		Class of service load	With or without drop test		Class of the width of the system		Length		Height class		With or without protection		Type of vertical access
Base	FA-48	Façade	EN 12810	-	5	N	-	SW06	/	307	-	H1	-	B	-	LA
Variant	FA-48	Façade	EN 12810	-	5	N	-	SW06	/	257	-	H1	-	B	-	LA
Variant	FA-48	Façade	EN 12810	-	5	N	-	SW06	/	207	-	H1	-	B	-	LA

These models are valid for any length and up to a height of 25 m, for scaffolding without cover and properly tied to the building. However, changes to the basic design are possible. About the requirements for the structural design defined by the standard, we present a summary below.

5.2 KEY ELEMENTS IN THE CONSTRUCTION OF THE SYSTEM

STRUCTURAL ELEMENTS: Scaffolding module, Passage module, Diagonals, Levelling and initiation Bases, Initiation bracket.
PROTECTION ELEMENTS: Transoms, Guard rails, Toe Boards.
PLATFORMS: Steel decks, aluminium and wood platforms, Access decks with hatch.
The classes of the service and loads uniformly distributed admissible for the various types of platforms are indicated together with the description of the components, in 2 - Components & Accessories **FA-48®**.

5.3 LOADS IMPOSED BY THE SCAFFOLDING TO THE GROUND AND TO THE FAÇADE

In the context of system definition, above, were determined, by calculation, the reactions of vertical forces, Fv, and horizontals, Fh, imposed by the scaffolding to the ground and to the façade of the building, respectively. In the most onerous cases we obtain a value Fv = 18.36 kN and Fh = 4.22 kN.

Requirements for structural design

1. Basic Requirements

Each scaffolding structure must be designed, made and maintained to ensure that it does not collapse or move involuntarily and can be used safely. This applies to all stages of use, including the erection, modification, and until that are completely dismantled.
The scaffolding components must be made to be transported, erected, used, maintained, dismantled and stored safely.

The structure in use should have a support or foundation capable of withstanding the loads required and limitations of movement.
The lateral stability of the scaffolding structure, as a whole and punctual, must be checked when is subject to different forces possible, such as wind.

To expand different working conditions, the Standard EN 12811-1 specifies six different classes of cargo and seven classes of width of work areas. The service classes are arranged in the following table:

Tabela 1 – classes de serviço em áreas de trabalho

Load classes	Load evenly distributed q_1 kN/m^2	Concentrated load in an area of 500 mm x 500 mm F_1 kN	Concentrated load in an area of 200 mm x 200 mm F_1 kN	Load in partial* area	
				q_2 kN/m^2	The partial area factor a_p
1	0,75**	1,50	1,00	---	---
2	1,50	1,50	1,00	---	---
3	2,00	1,50	1,00	---	---
4	3,00	3,00	1,00	5,00	0,4
5	4,50	3,00	1,00	7,50	0,4
6	6,00	3,00	1,00	10,00	0,5

* this area is obtained by multiplying the area of each platform by a factor of partial area
* to scaffolding of service of class of load 1, all single platforms should be able to support loads of service of class 2, although this does not apply to the structure as a whole

2. Actions

2.1. General Conditions

It is necessary to consider three main types of loads:
a) Permanent loads; these should include the weight of the scaffold structure, including all components such as decks, walls or other protective structures and auxiliary structures that are supported in the scaffolding.
b) Variable loads; these should include service loads (loads applied on the working area, loads in the side protections), loads due to wind and, if applicable, loads due to ice and snow.
c) Accidental loads; the only considered is the punctual load of 1.5 kN applied on the side protection.

2.2. Loads in service area

2.2.1. General Conditions

The service loads should be as specified in the table 1. Each work area should be able to support the different loads applied, q1, F1 and F2, separately but not cumulatively. Only uniformly distributed loads should be addressed to evaluate the stability of the structure, however, in structures involving more than two elements of support of platforms in both directions, horizontally (for example, with more than two verticals US®, placed in parallel to increase the width of the structure), must, in addition, be chosen the loads by partial area.

For purposes of structural design, service loads on the working areas should be applied over an area determined as follows:
- Where exist adjacent platforms lengthwise or crosswise to the scaffolding structure, the line who separate them should be considered as the centre of the elements that support them.

As extremes of the dimension, w, should be considered the exterior limits, or if there exist toe boards including toe boards with 30 mm (Figure 1).

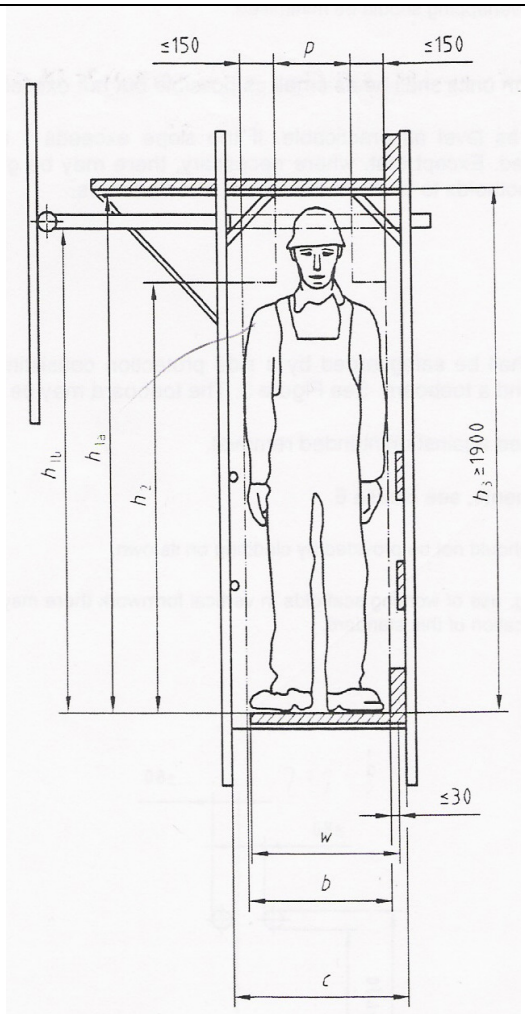


Figure 1 – Requirements for height and width free of the working areas

2.2.2. Service Load uniformly Distributed

Each working area should be able to support the load uniformly distributed q1, specified in table 1.

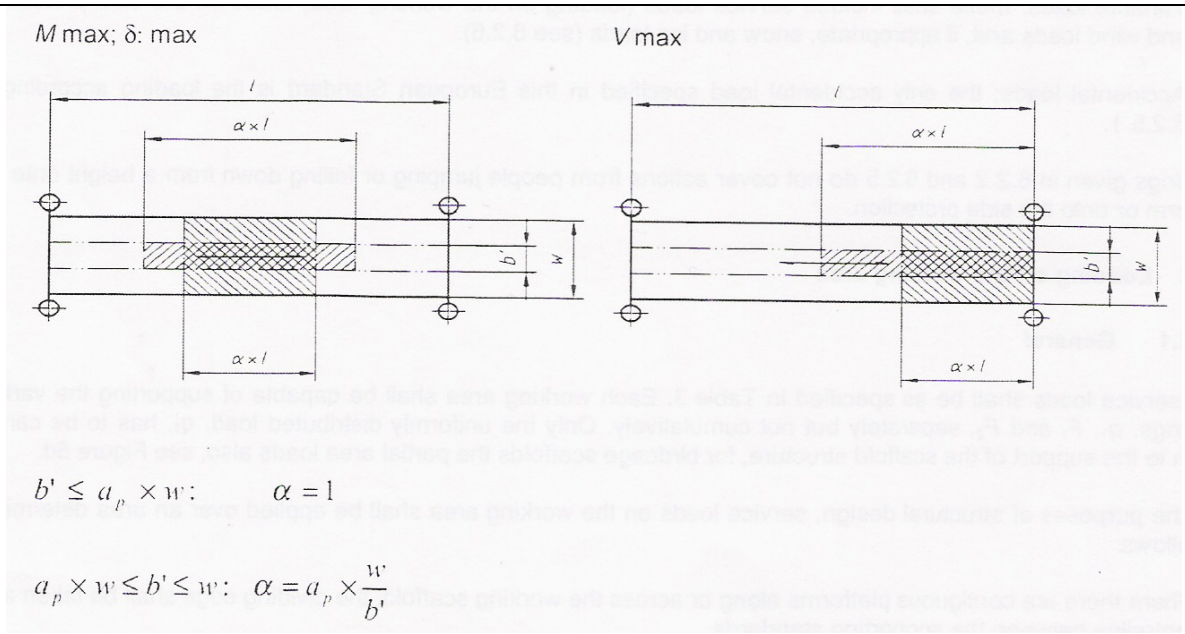
2.2.3. Concentrated Load

Each single platform should be able to support the load of the F1, specified in table 1, uniformly distributed over an area of 500 mm x 500 mm and, but not simultaneously, the load F2, specified in table 1, uniformly distributed over an area of 200 mm x 200 mm.
The orientation of the loads must be able to transfer the caused forces to the support elements. The position of each load should be chosen considering the point where the effect of force is more adverse. If the single platform has less than 500 mm in width, the load F1 can be reduced proportionately but never less than 1.5 kN.

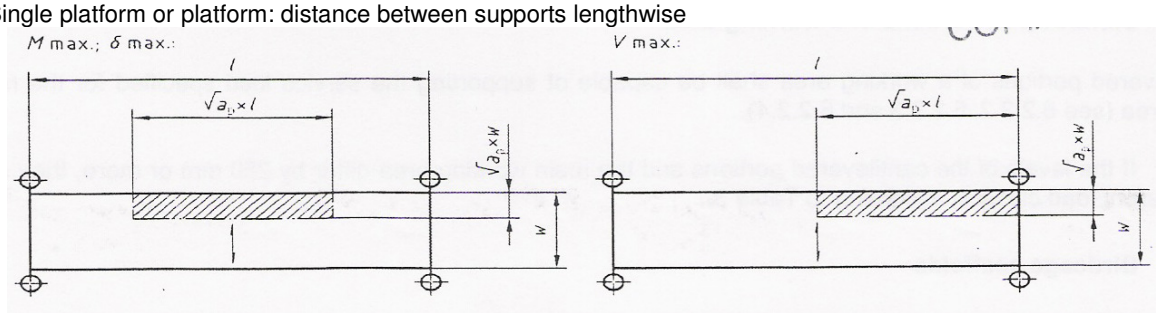
2.2.4. Load Partial Area

Each platform of class of load 4, 5 and 6 must be capable of support a load uniformly distributed over an partial area, according as specified in table 1.

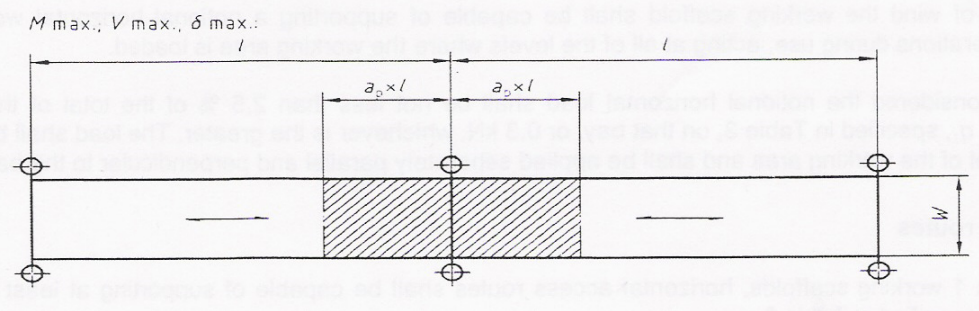
The orientation of the loads must be able to transfer the caused forces to the support elements. Where exist more than two elements to support of platforms, in both directions the loads by partial areas of 4 adjacent levels should be considered for verification of the respective support element. The position of each load should be chosen considering the point where the effect of force is more adverse. Some examples are shown in figure 2.



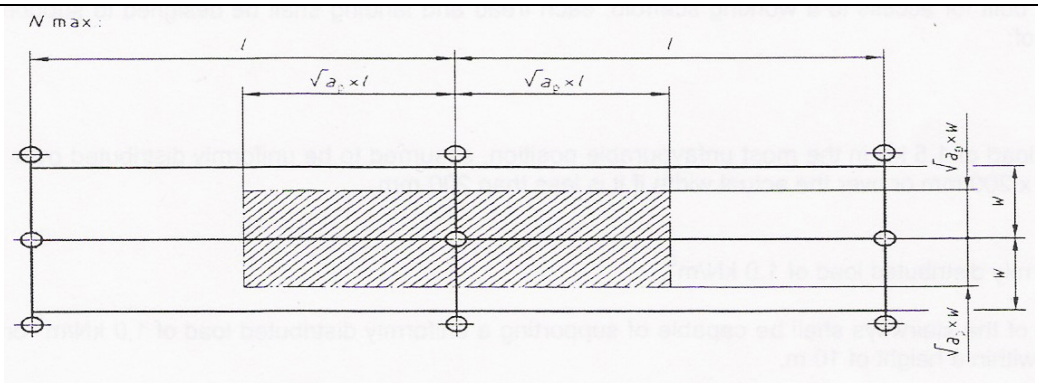
a) Single platform or platform: distance between supports lengthwise



b) Transversal distance between the supports of the platforms



c)) Longitudinal distance between the supports of the platforms



d) Centre of support elements of the platforms for structures with 2 or more elements in both directions

Legend:

ℓ	System Length	M max	Maximum bending moment
w	Width of the Platform	V max	Maximum rupture strength
a_p	Partial Area Factor	N max	Maximum Axial Force
b'	Width of Single Platform	δ max	Maximum Deflection

Figure 2 – Examples of positioning of the loads of the partial area for the calculation of some structural components

2.2.5. Service Area Extensions

Any extension to the working area (the use of consoles, for example) should be able to also support the loads set for the main area.
If the level of extensions is different from the main area in more than 250mm, these may be of inferior class.

2.2.6. Special Structures

The loads in the supporting components in structures with two or more support elements in both directions must be calculated that the load uniformly distributed q1, specified in table 1, acts on a maximum area of 60 m2 in combination with a load of 0.75 kN/m2 on the remaining area.

2.3. Load Service Horizontal Additional

In the absence of wind, the scaffolding must be capable to support an additional horizontal load, which represents the operations during the use, acting at all levels which working area is loading. For each level considered this load should not be less than 25% of the total load uniformly distributed, q1, of this same level, or 0.3 kN, according that is greater. We must assume that load acts at the level of working area and should be applied parallel and perpendicular to the level.

2.4. Means of Access

Except for the scaffolding of class 1, the components for horizontal access should be able to support at least the class 2 of service loads.
When part of the component is to be used for service, must be able to support the service load relevant described in table 3. Usually, the level of access that is at the same level of the service area, but outside, it doesn't needs to support the same load.
For stairs built for access to the scaffolding service, each step and upper and lower levels should be designed with capacity to support the worst of the following cases:
a) single load of 1.5 kN, in the worst position, uniformly distributed over an area of 200 mm x 200 mm, or on the width if less than 200 mm,
or
b) Na load uniformly distributed of 1,0 kN/m^2.
The stairs structure should be able to support a uniformly distributed load of 1.0 kN/m2 in all steps and levels within a height of 10m.

2.5. Loads Lateral Protections

2.5.1. Decreasing Loads

Any main or intermediate guard rails, regardless of their method of support, should support a punctual load of 1.25 kN. This also applies to any other component of lateral protection that is used in place of the guard rails. This load should be applied on the most adverse point, in descendent direction within a sector of ±10 º relative to the vertical.

2.5.2. Horizontal Loads

All components of the lateral protection, except toe boards, should be designed to support a load horizontal punctual of 0.3 kN. This load can be distributed over a maximum area of 300mm x 300mm. For toe boards the value of the load is 0.15 kN. In any cases, the load should be applied at the most adverse point.

2.5.3. Upward Loads

To check the anchorage of the components of the lateral protection, except toe boards, a punctual load of 0.3 kN should be applied, on the upward direction, in the most adverse position.

2.6. Loads Snow and Ice

Additional loads representing ice and snow actions may be required by the regulations of each country.

2.7. Wind Loads

2.7.1. General Regards

The loads imposed by the wind action should be calculated assuming that there exists a pressure speed in one referenced area of the scaffolding, which is, usually the projected area of the wind direction. The resulting force of the wind, F, in kN, is obtained by equation (2):

$$F = c_s \; x \sum_i (c_{f,i} \; x \; A_i \; x \; q_i) \qquad (2)$$

where
F is the resultant force of the wind;
$C_{f,i}$ is the coefficient of aerodynamic force for the i component;
A_i is the referenced area of the i component;
q_i is the speed pressure that acts in the i component;
c_s local coefficient

Protection effects should not be taken in consideration.

2.7.2. Coefficient Aerodynamic Force, c_f

Scaffolding without coverage

Values of cf given by ENV 1991-2-4 for cross sections of some components of scaffolding must be used to calculate the wind force.
For other sections the coefficient of aerodynamic force, can be withdrawal from certain national norms or in determined tests of a wind tunnel.
The value of the aerodynamic force coefficient is 1.3 for all projected areas, including platforms and toe boards and the nominal area as defined in 2.7.4.1 and 2.7.4.2, respectively.

Scaffolding with coverage

Coverage type network
Where the values of cf, for a particular type of network, are not available by the testing of the tunnel of wind, should be taken as follows:
$c_{f\perp} = 1,3$
$c_{fD} = 0,1$

Coverage type awning
$c_{f\perp} = 1,3$
$c_{fD} = 0,1$

For wind actions, as normal as parallel to the coverage, the total area of coverage is the reference area, A. For both cases, the network or awning, the areas of scaffolding components or objects behind the coverage, should not be considered in the wind actions normal to the plane of the coverage.

2.7.3. Local Coefficient, c_s

Scaffolding without coverage

This value takes into account the location of the scaffolding over the building, for example in front of the façade. To wind normal forces to the façade, the value of $c_{s\perp}$ should be withdrawal from figure 3. It depends of the ratio fastness, φ_B, which is given by the equation:

$$\varphi_B = \frac{A_{B,n}}{A_{B,g}}$$

where
$A_{B,n}$ is the effective area of the façade (with the deducted openings);
$A_{B,g}$ is the total area of the façade

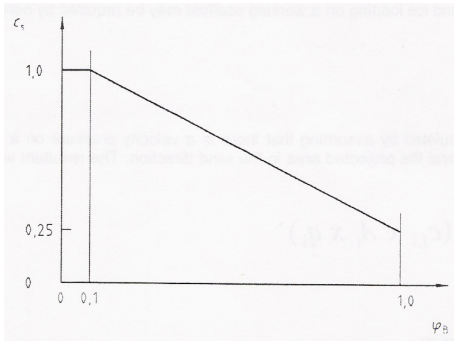


Figure 3 – Local coefficient $c_{s\perp}$ for scaffolding in front of the façade, for normal winds to the façade

For wind forces parallel to the façade, the value of $c_{s\parallel}$ should be takes as 1,0.

Scaffolding with coverage

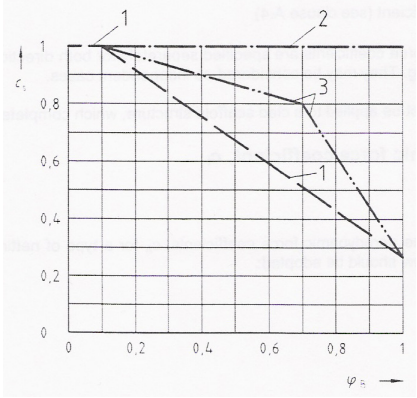
Coverage type network Cobertura tipo toldo

The value of c_s depends of the ratio fastness, φ_B, which is given by the equation:

$$\varphi_B = \frac{A_{B,n}}{A_{B,g}}$$

where
$A_{B,n}$ is the effective area of the façade (with the deducted openings);
$A_{B,g}$ is the total area of the façade

The value of C_s should be withdrawal from figure 4.



Legend:
1 with network in normal and parallel directions
2 with awning in normal and parallel directions
3 with awning, but only to calculate the tension forces of normal anchorage to the façade
Cs local coefficient
φ_B fastness ratio

Figure 4 – Local Coefficient, C_s, for covered scaffolding in front of the façade

2.7.4. Velocity Pressure

2.7.4.1. Maximum Wind Load

The maximum wind load for each region should take into account their type and location. If the European Standard for wind loads is available it should be applied. Depending on your availability, data should be removed from the national norms. A statistical factor considering the time since erecting to dismantling the scaffolding can be considered. This value should not be less than 0.7 and should be applied to the speed pressure of the wind for a return period of 50 years.
To embrace the equipment and materials that are on the working area, we should assume an increase in the nominal area, at the same level and its entire length. This area will have 200mm in height, measured from the level of the working area and including the toe board area. On must to assume that the loads resulting from wind pressure in this area acts at the level of the working area.

2.7.4.2. Service Wind Load

A speed pressure uniformly distributed of 0,2 kN/m^2 should be taken into account. To embrace the equipment and materials that are on the working area, it should be taken into account one nominal area of reference, as specified in 2.7.4.1, but with 400mm in height, used to calculate the loads of the service wind.

2.8. Carga dinâmica

As seguintes figuras podem ser consideradas como cargas estáticas equivalentes para representar o excesso de carga causado pelos efeitos dinâmicos em condições de utilização.
a) O efeito dinâmico da carga de um item individual, excepto pessoas, a mover-se verticalmente deve ser representado por um aumento de 20% ao peso do item.
b) O efeito dinâmico da carga de um item individual, excepto pessoas, a mover-se horizontalmente deve ser representado por uma força estática equivalente de 10% do peso do item, actuando em qualquer das possíveis direcções horizontais.

2.9. Dynamic Load

Each structure of scaffolding of service should be able to support the worst possible combinations of loads that may be subject.

2.9.1. Scaffolding Façade

The combinations a) and b) should be used structural calculation of scaffolding façade, except if the information about the use the scaffolding is available. For each individual case the conditions in service or out of service should be considered.
a) Service Condition

1) The own height of the scaffolding.
2) The service load uniformly distributed appropriately to the class of scaffolding, according to table 1, applied to the working area in the most unfavourable level.
3) 50% of the load specified in 2) in the service areas in the upper and lower levels, if the scaffolding has more than one level of height.
4) Load of the wind of service specified in 2.7.4.2 or load of additional horizontal service specified in 2.3.

b) Out of service condition

1) The own height of the scaffolding.
2) One percentage of load service uniformly distributed appropriately to the class of scaffolding, according to table 1, applied to the working area in the most unfavourable level. The value depends on the class:

Class 1	0%	(Without load of service in the working area)
Classes 2 and 3	25%	(representing materials stored in the working area)
Classes 4, 5 and 6	50%	(representing materials stored in the working area)

3) The maximum wind load specified in 2.5.2.

In the cases) 2) b) 2) the load must be taken as zero, if that consideration lead to more favourable results.

3. Deflections

3.1. Elastic Deflections Platforms Unitary

When subjected to concentrated loads defined in table 1, the elastic deflection of any platform unit may not exceed 1 / 100 of its length and the difference given by the deflection of the load platform and the adjacent platform without load can not exceed 25mm.

3.2. Elastic Deflections Lateral Protections

Each guard rail or toe board, regardless of their length, can not suffer an elastic deflection exceeding 25 mm, when subjected to loads defined in 2.5.2.

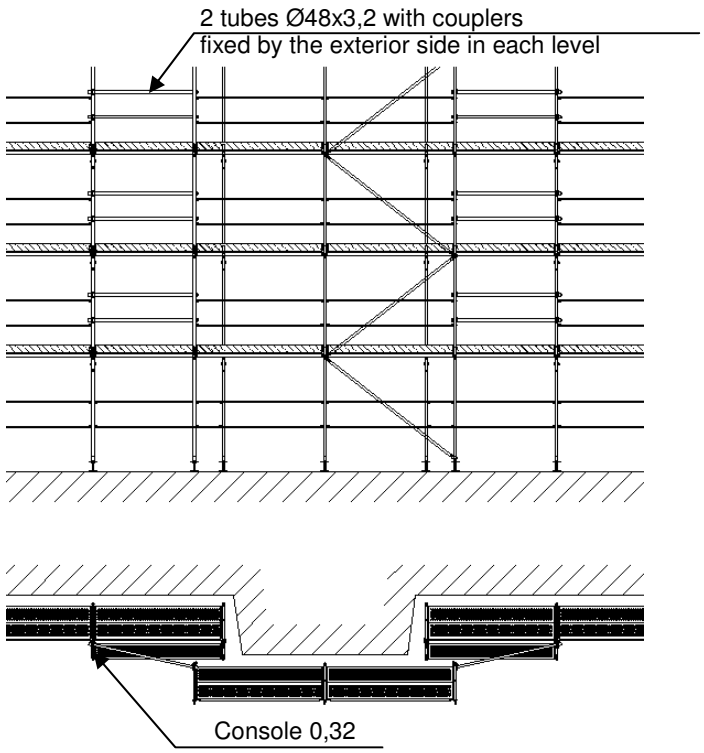
3.3. Deflections Sealing Structures

When subjected to loads defined in 2.5.2, the sealing structure can not deflect more than 100mm in relation to its supporters. When the sealing is formed with guard rails matching the requirements for the guard rails must be satisfied separately.

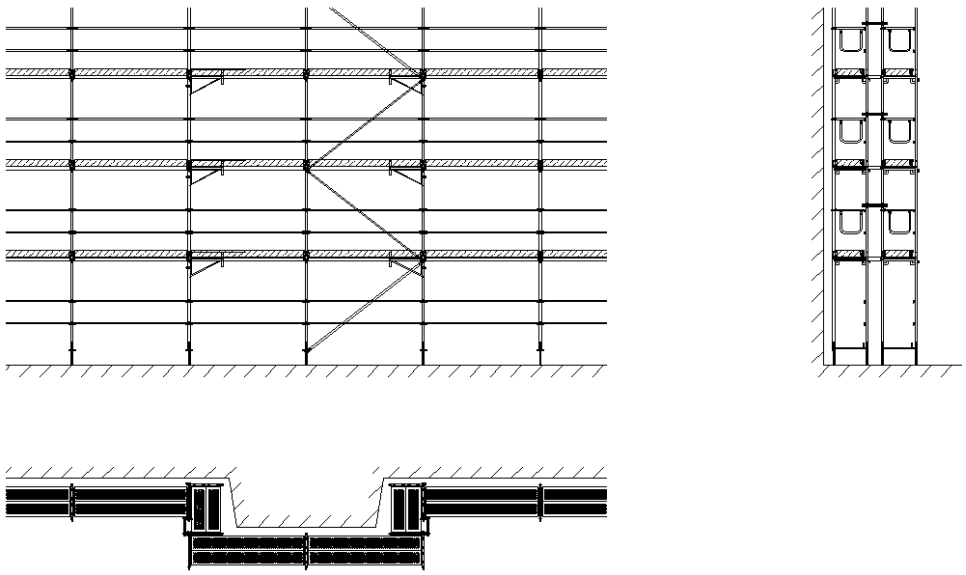
The information above is a free translation of defined in EN 12811-1 Norm to the structural design, for more complete information should be consulted the documents: EN 12810-1, EN 12810-2, EN 12811-1, EN 12811 -- 2 and EN 12811-3.

FA-48® SOLUTIONS

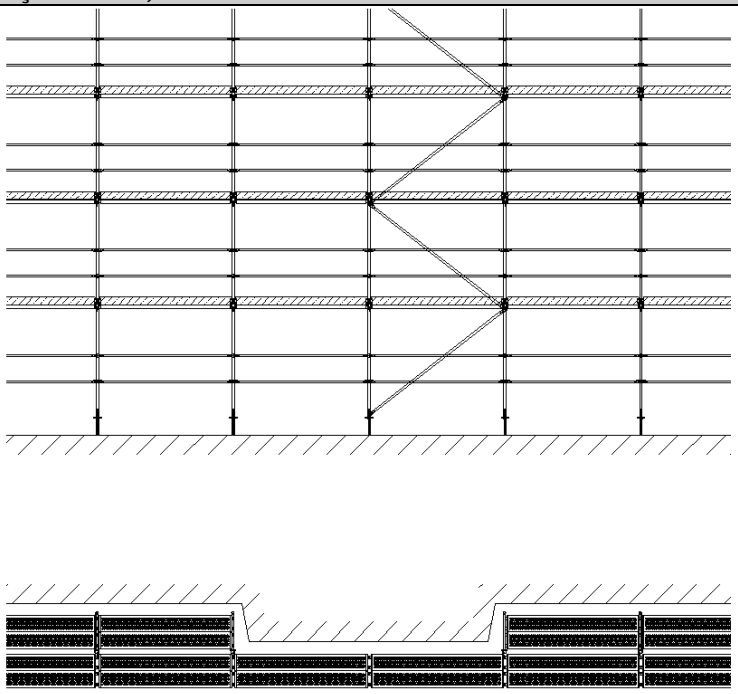
EXTENSION TO THE FAÇADE SUPERIOR TO 0,70 METERS (1)



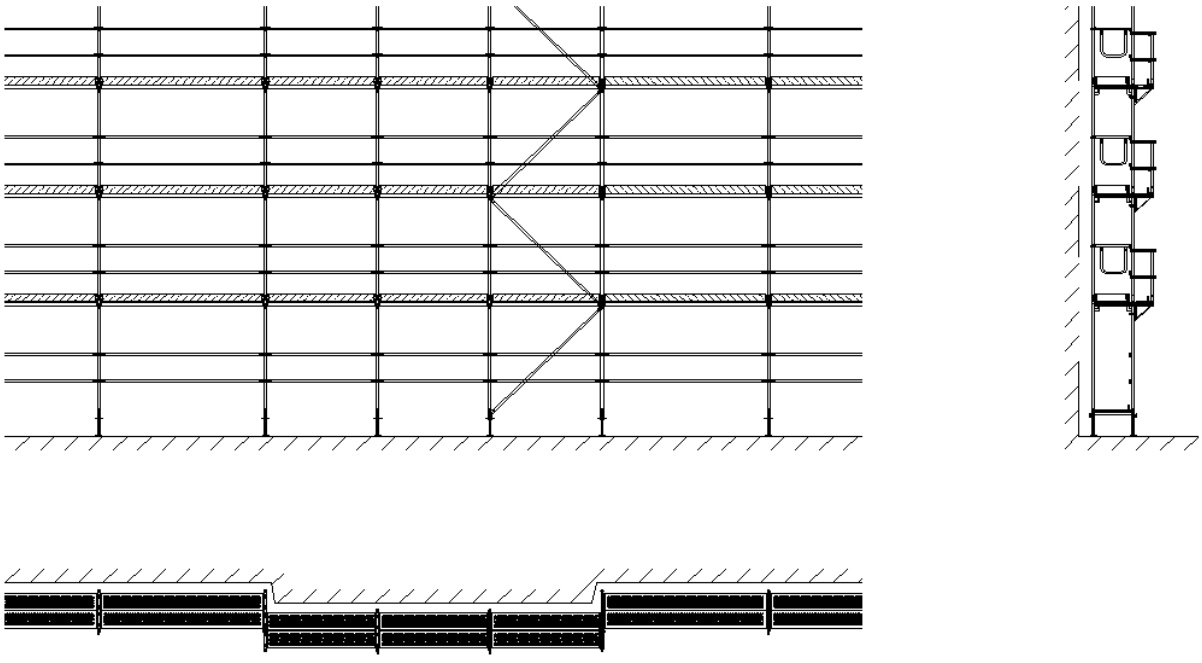
EXTENSION TO THE FAÇADE SUPERIOR TO 0,70 METERS (2)



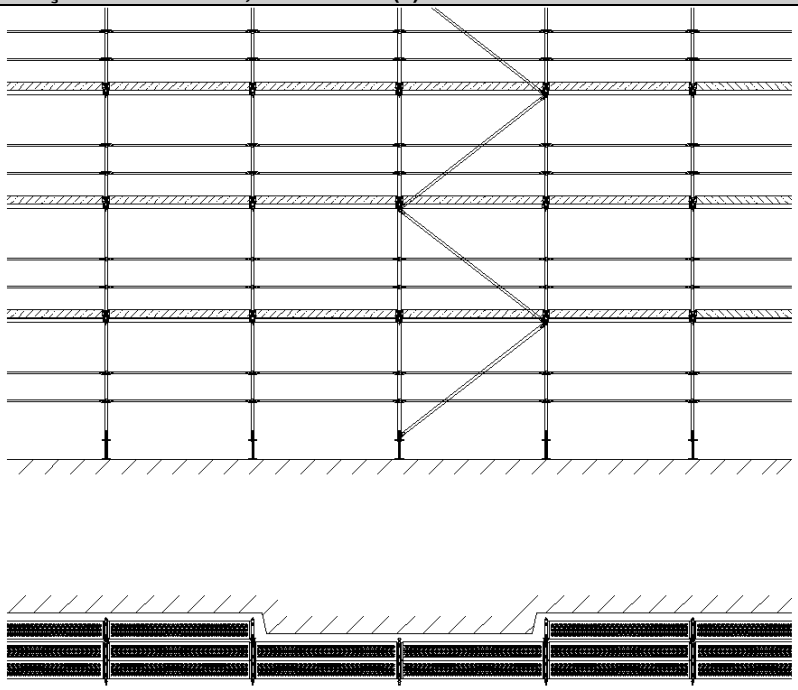
EXTENSION TO THE FAÇADE OF 0,70 METERS



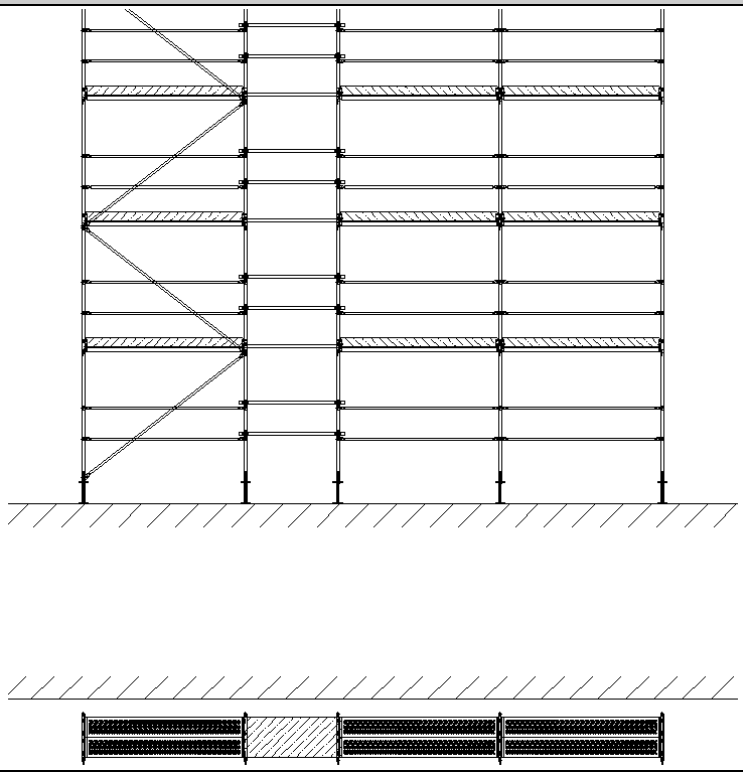
EXTENSION TO THE FAÇADE LESS TO 0,70 METERS (1)



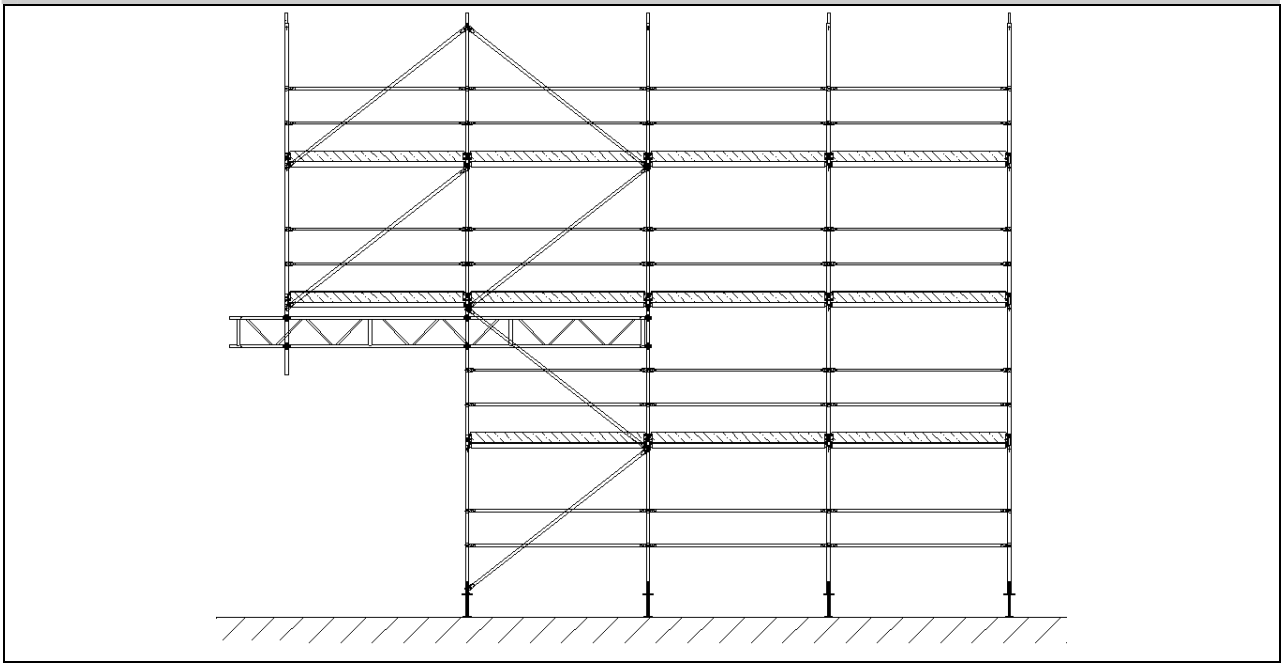
EXTENSION TO THE FAÇADE LESS TO 0,70 METERS (2)



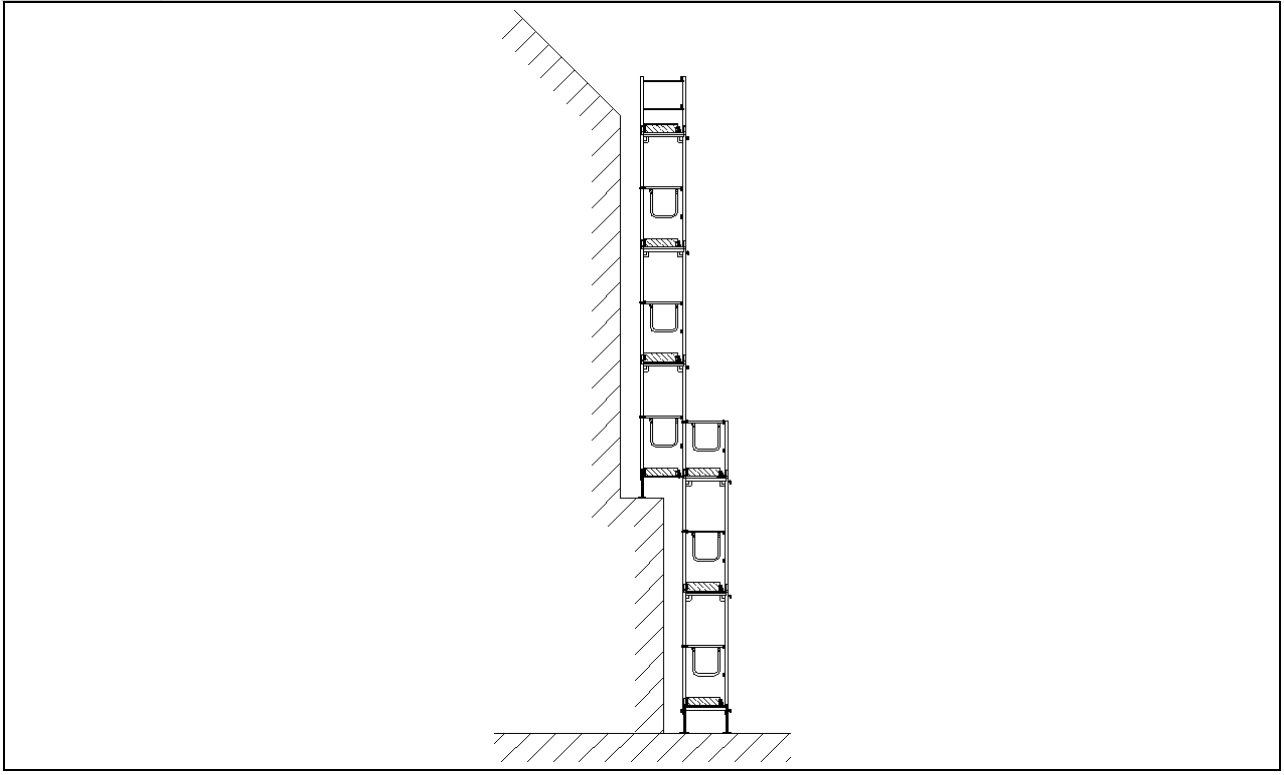
FAÇADE VIEW



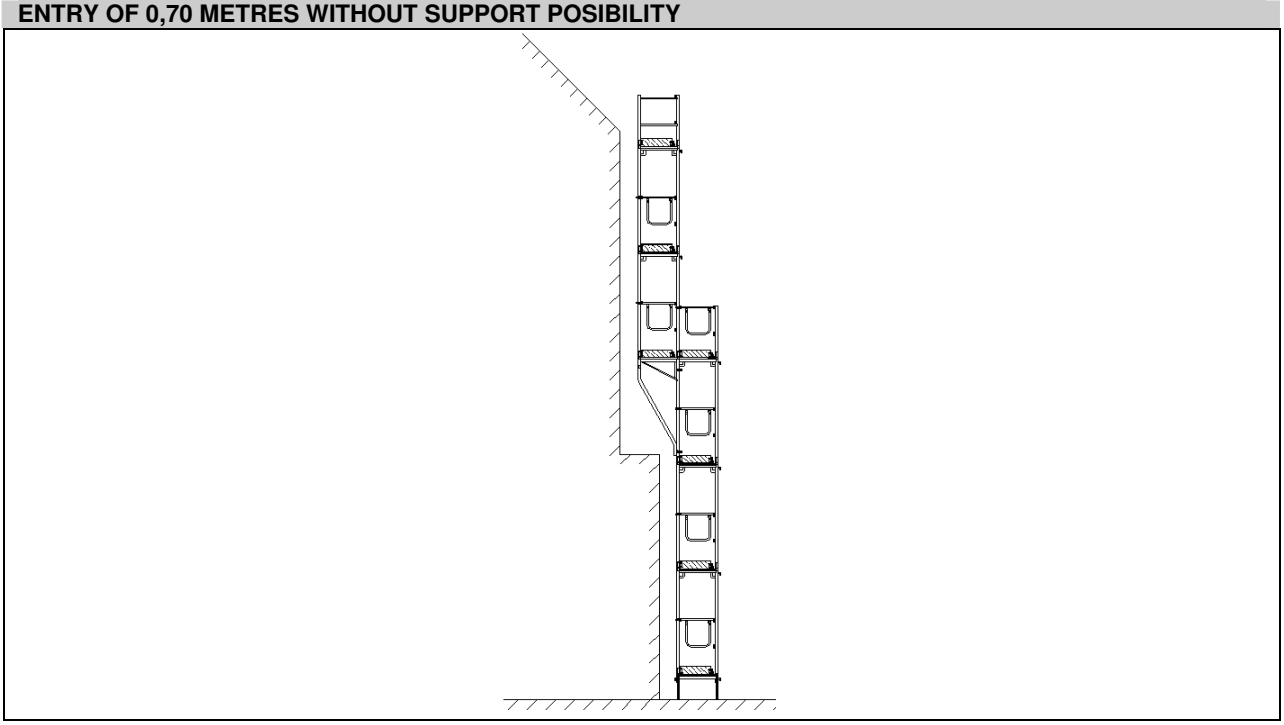
SOLUTION FOR EXTREME WITH PARALLEL TRANSOM



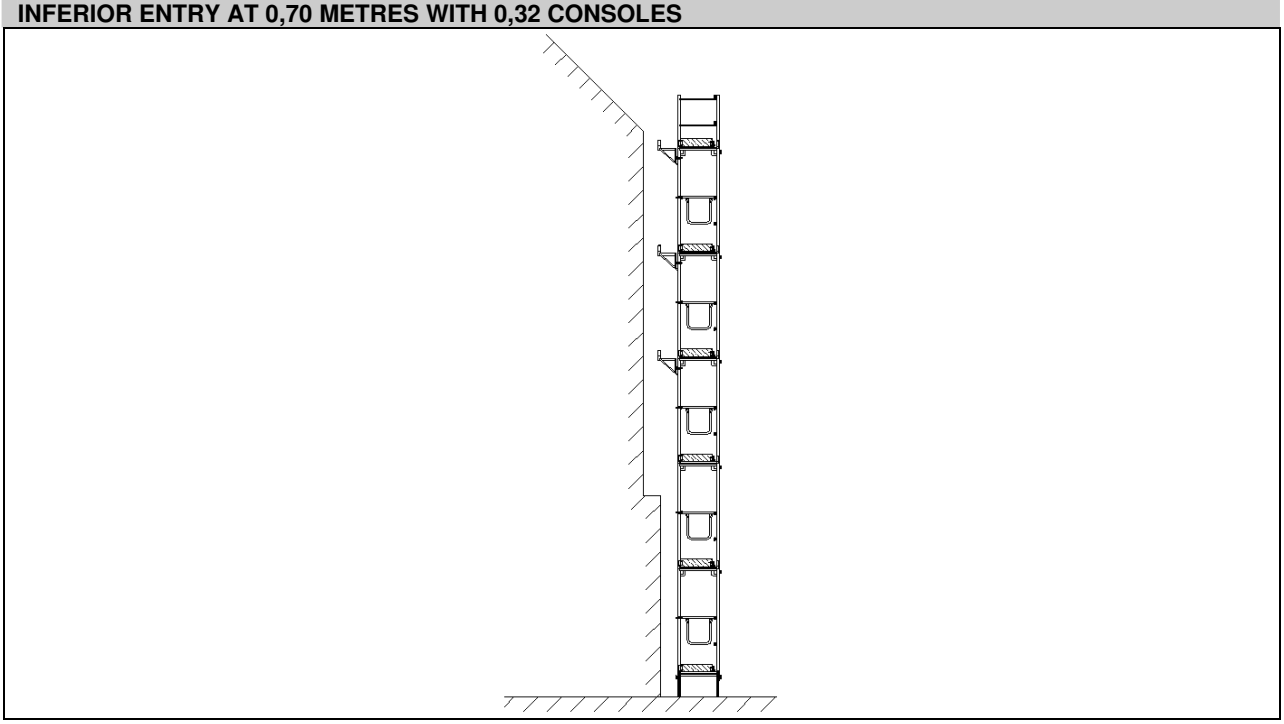
ENTRY OF 0,70 METRES WITH SUPPORT POSIBILITY



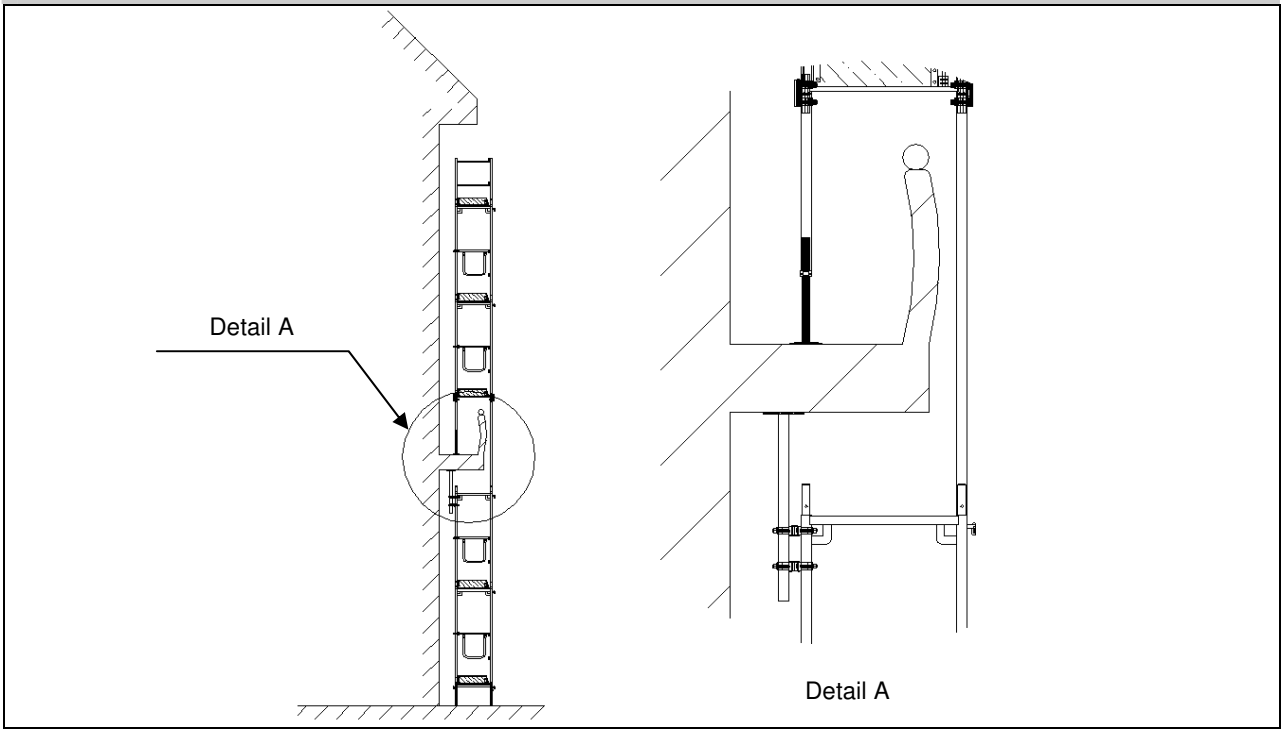
ENTRY OF 0,70 METRES WITHOUT SUPPORT POSIBILITY



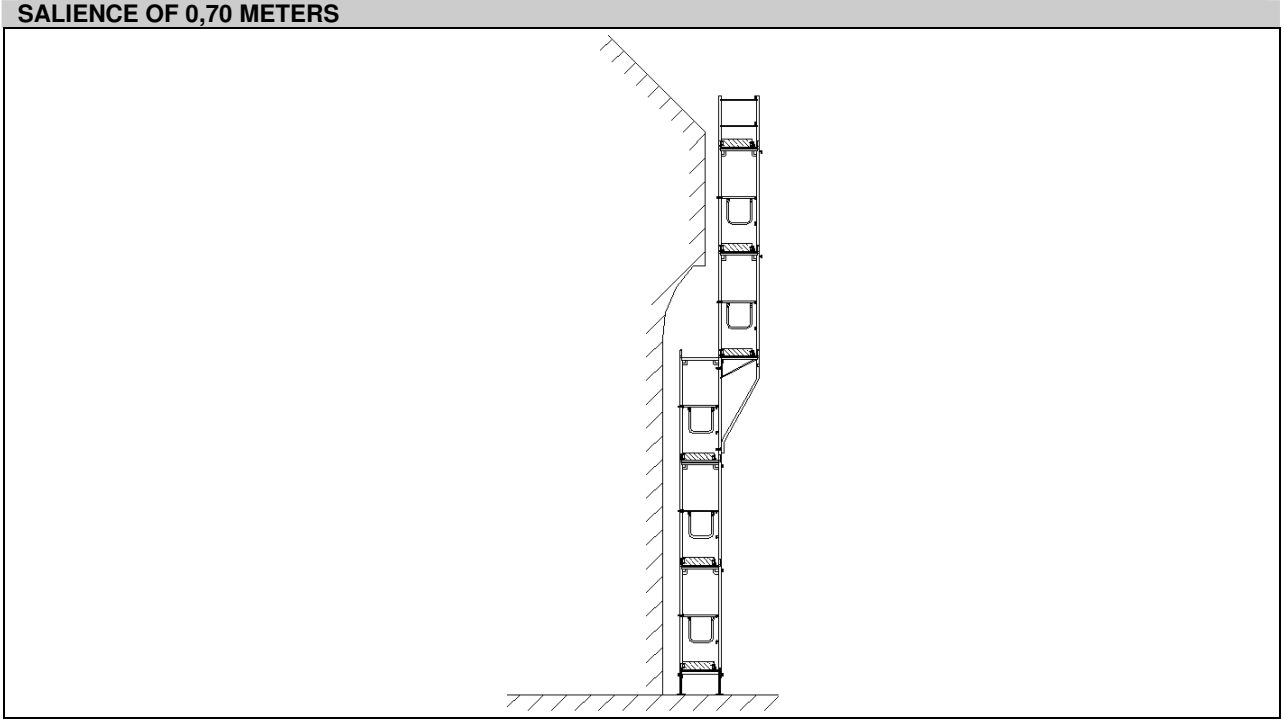
INFERIOR ENTRY AT 0,70 METRES WITH 0,32 CONSOLES



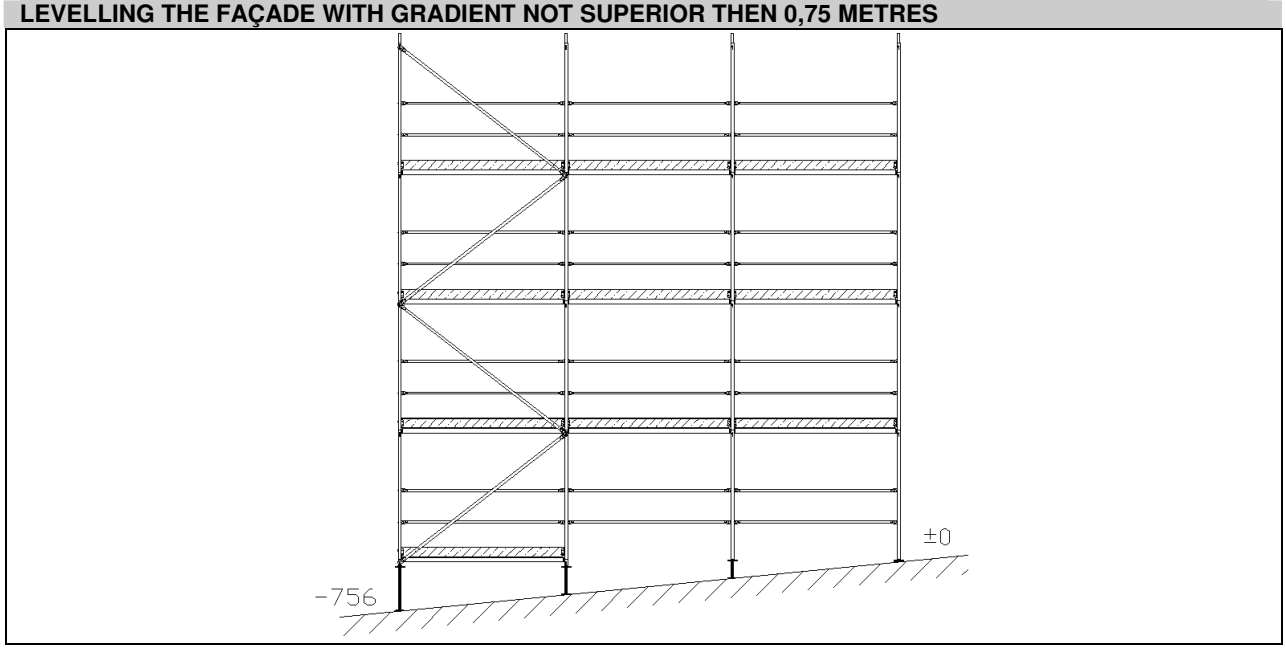
SECTION WITH BALCONY



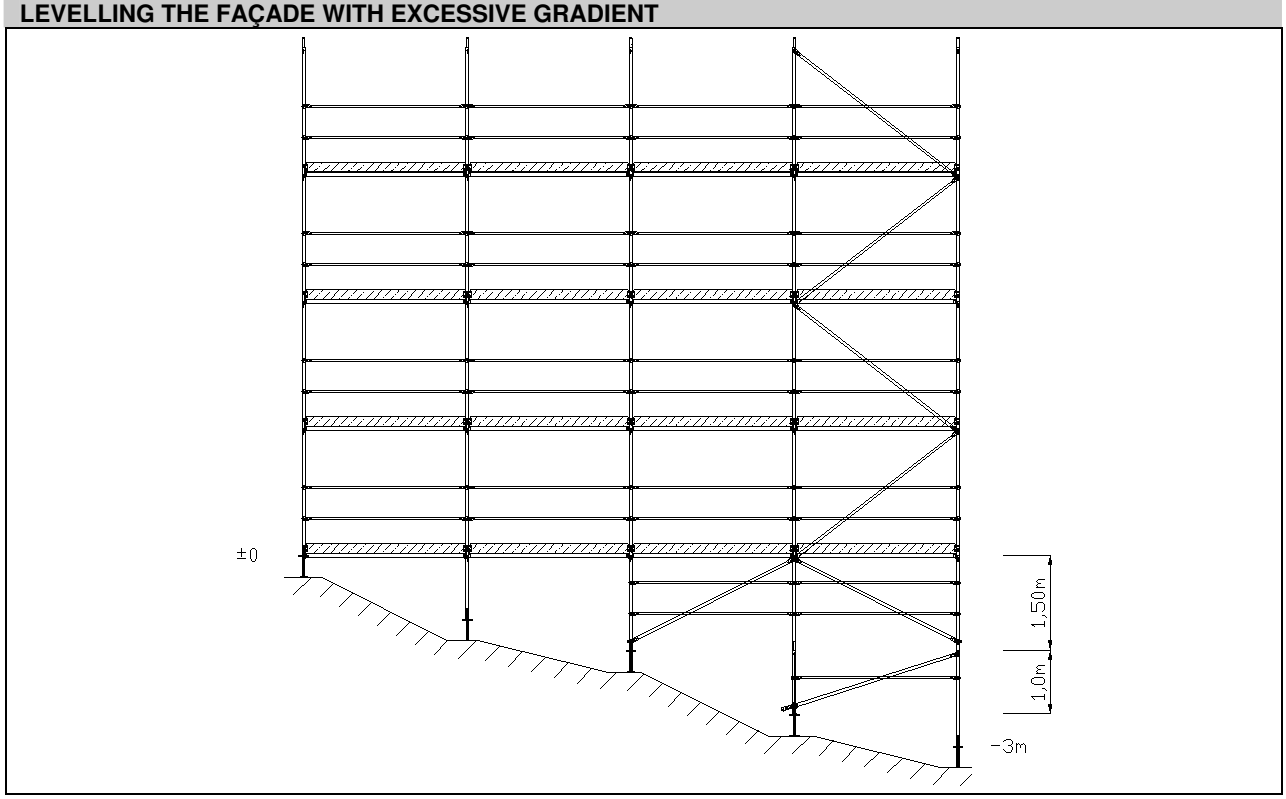
SALIENCE OF 0,70 METERS



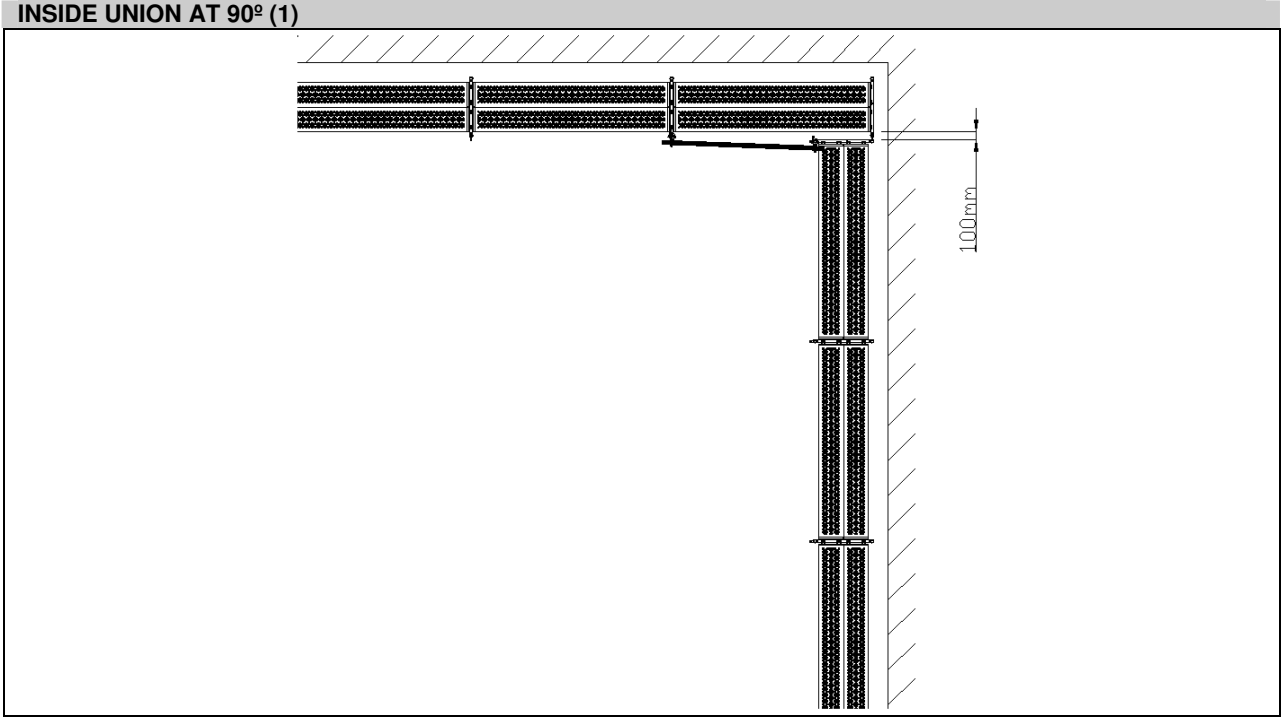
LEVELLING THE FAÇADE WITH GRADIENT NOT SUPERIOR THEN 0,75 METRES



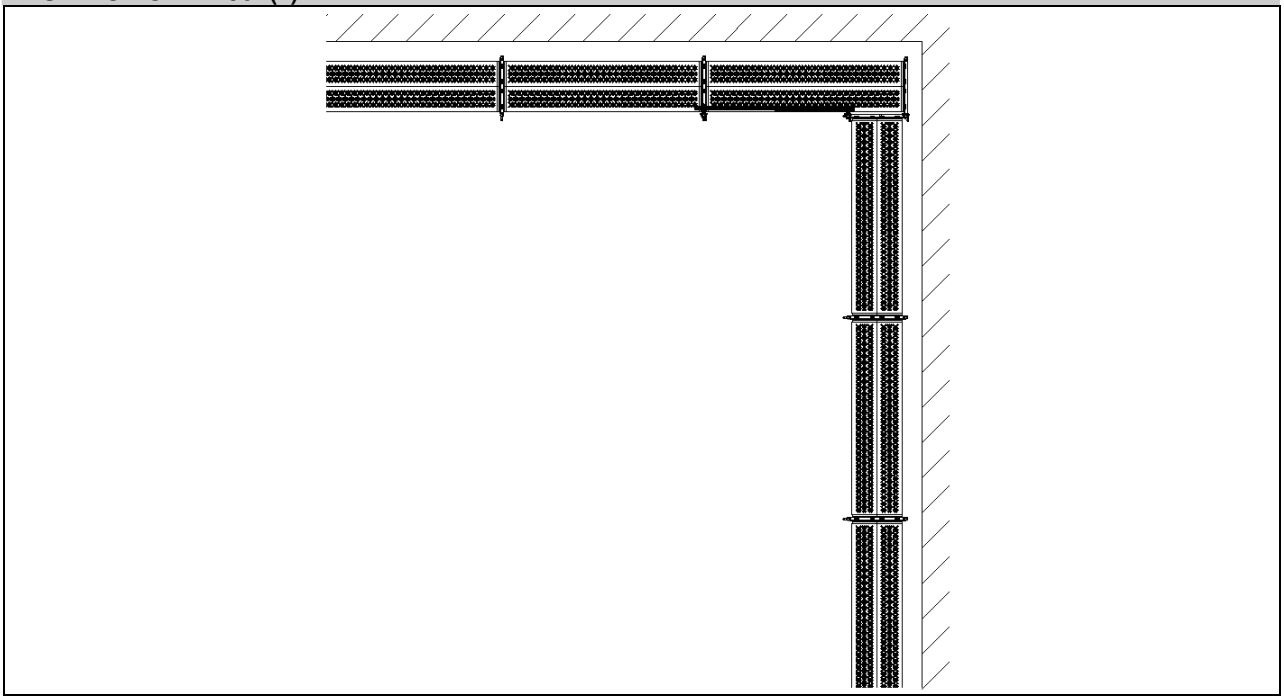
LEVELLING THE FAÇADE WITH EXCESSIVE GRADIENT



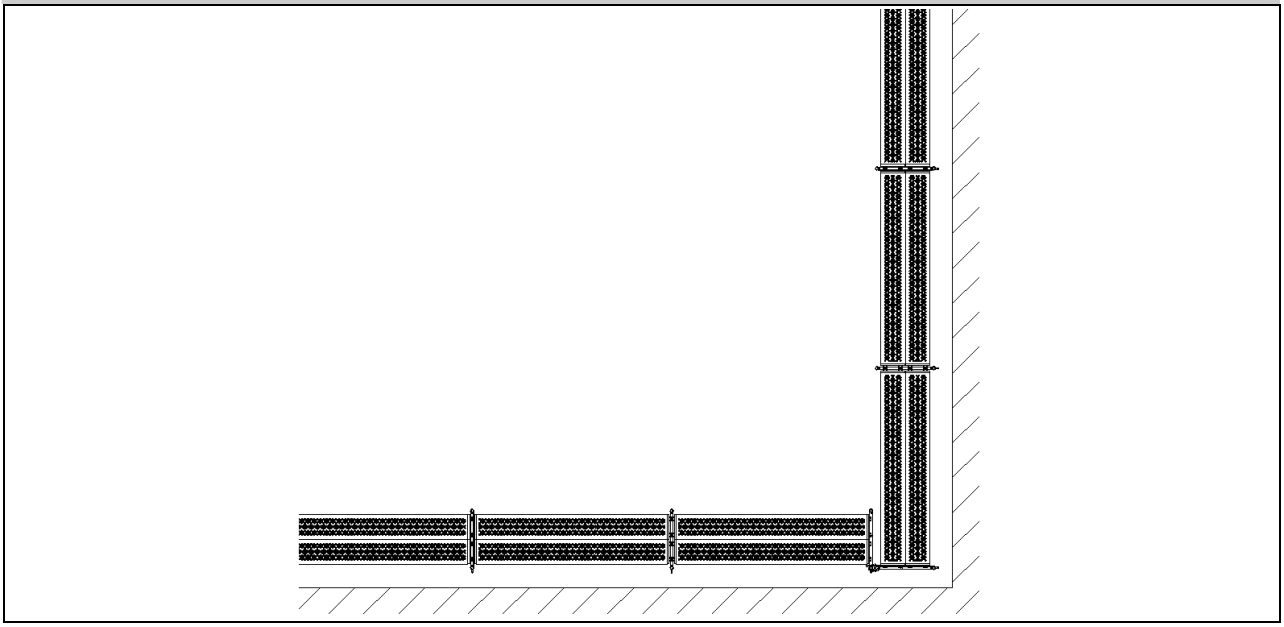
INSIDE UNION AT 90º (1)



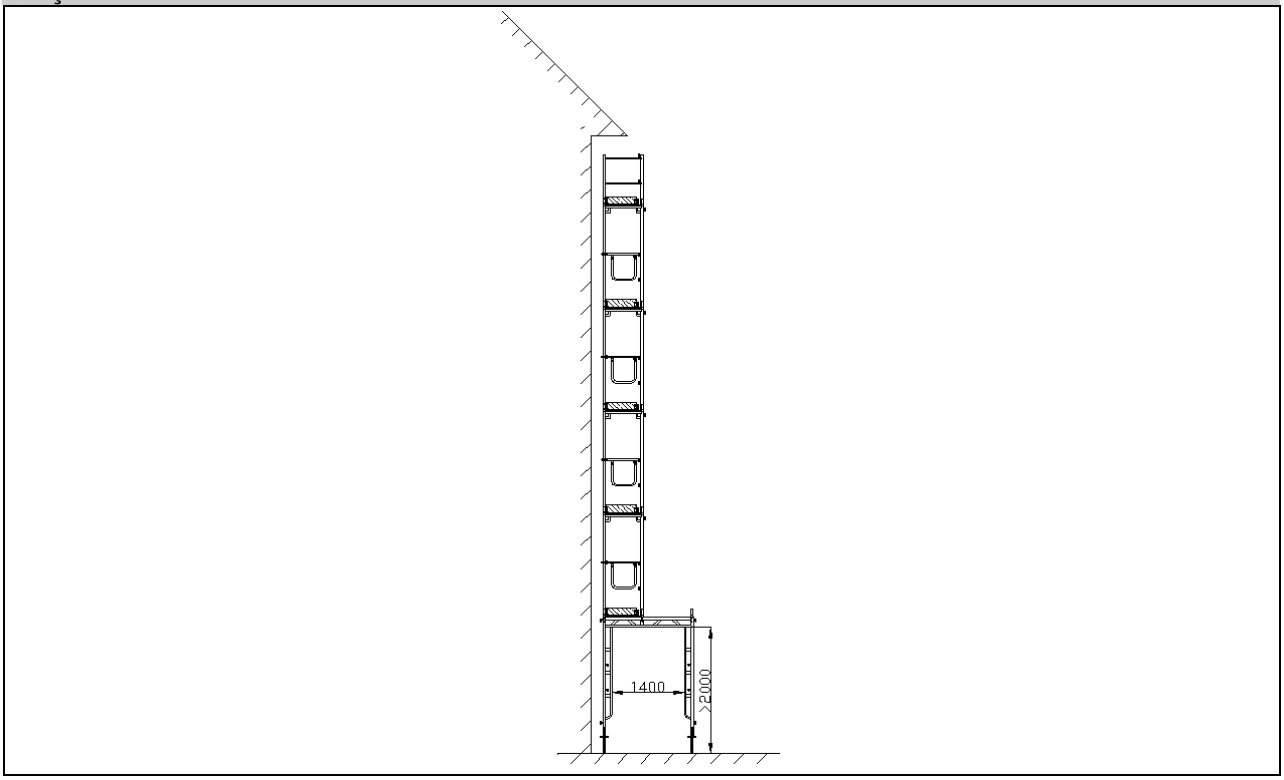
INSIDE UNION AT 90º (2)



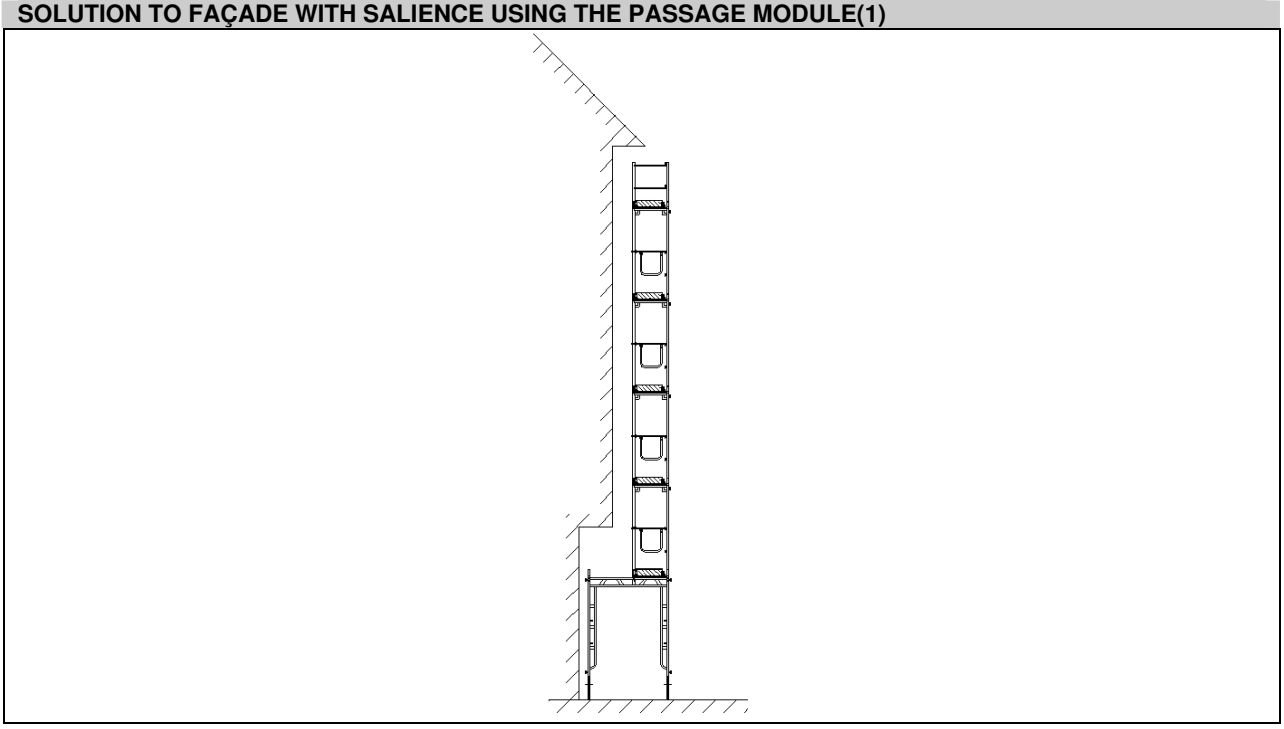
OUTSIDE UNION AT 90º



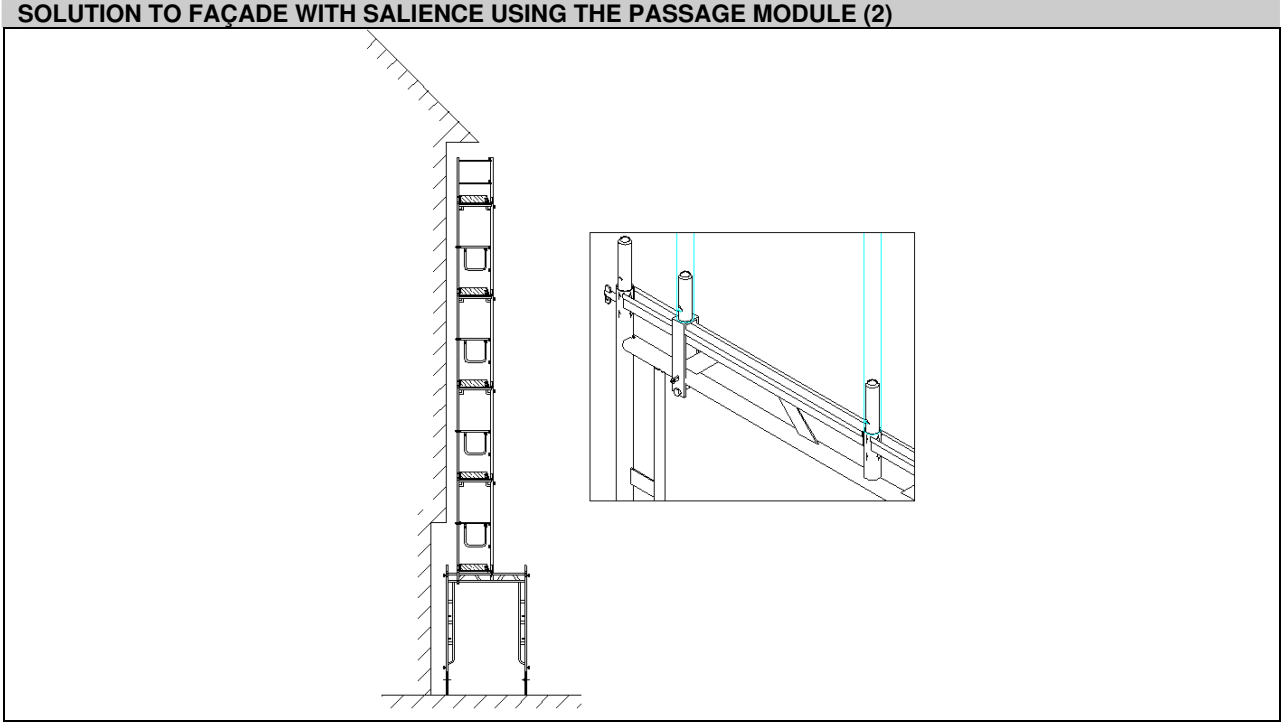
FAÇADE WITH PASSAGE MODULE



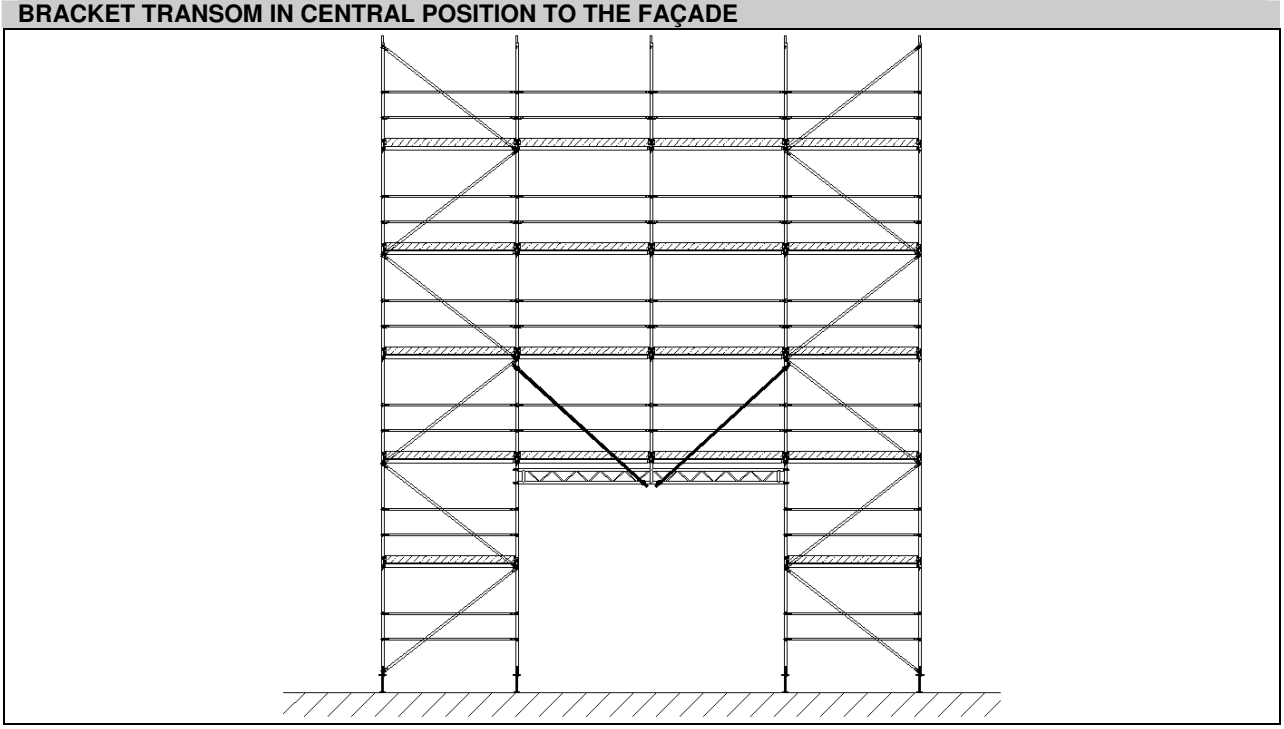
SOLUTION TO FAÇADE WITH SALIENCE USING THE PASSAGE MODULE(1)



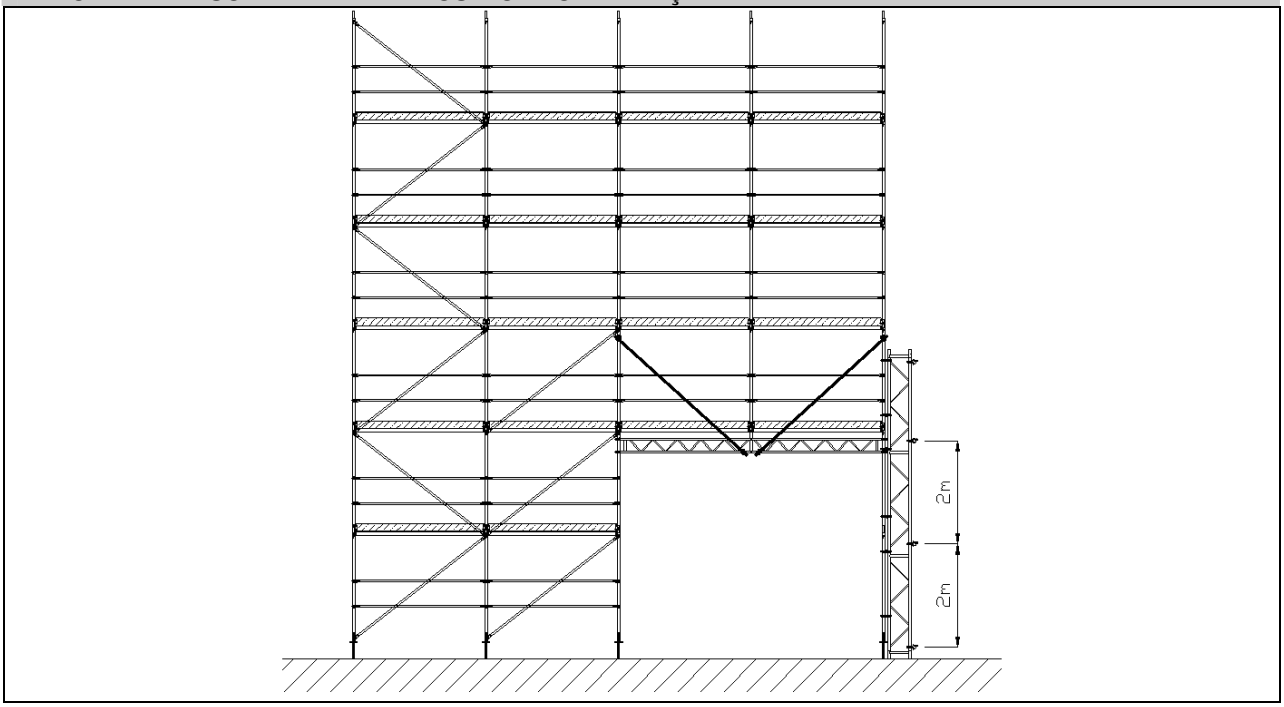
SOLUTION TO FAÇADE WITH SALIENCE USING THE PASSAGE MODULE (2)



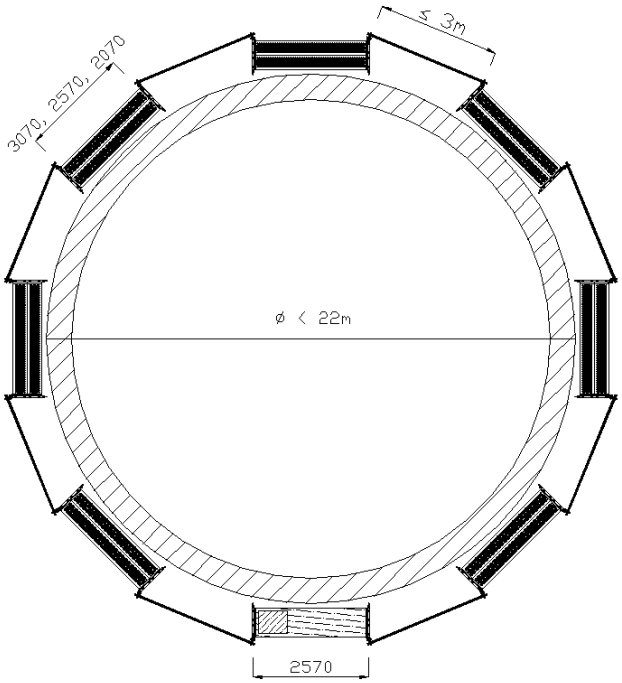
BRACKET TRANSOM IN CENTRAL POSITION TO THE FAÇADE



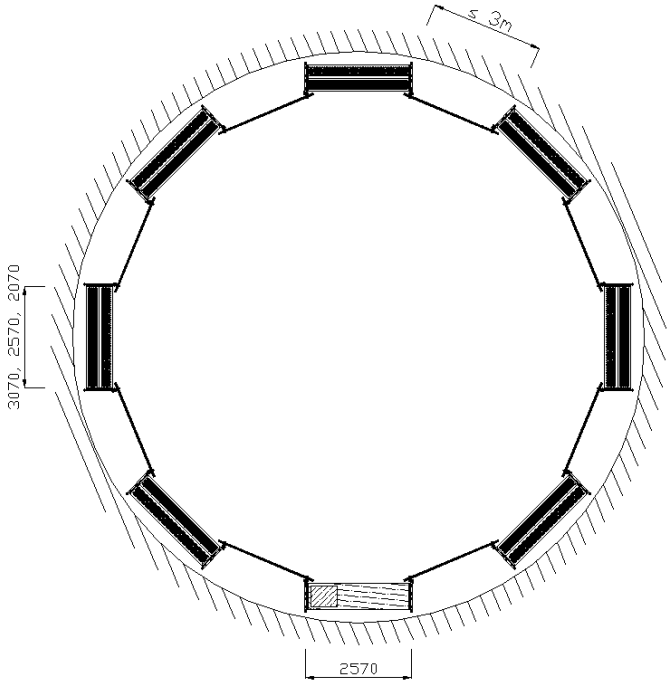
BRACKET TRANSOM IN LATERAL POSITION TO THE FAÇADE



EXTERIORS OF CIRCULAR DEPÓSITS



INTERIORS OF CIRCULAR DEPÓSITS



product
guide

TABLE OF CONTENTS