Resablok

Resablok
Manufacturer Manual

Multidirectional scaffolding system
Galvanized steel

Manufacturer Manual Ed.2020
10/12/2020

UNE EN 12810
UNE EN 12811
Bureau Veritas
Certification

MANUFACTURER MANUAL

RESABLOK SYSTEM

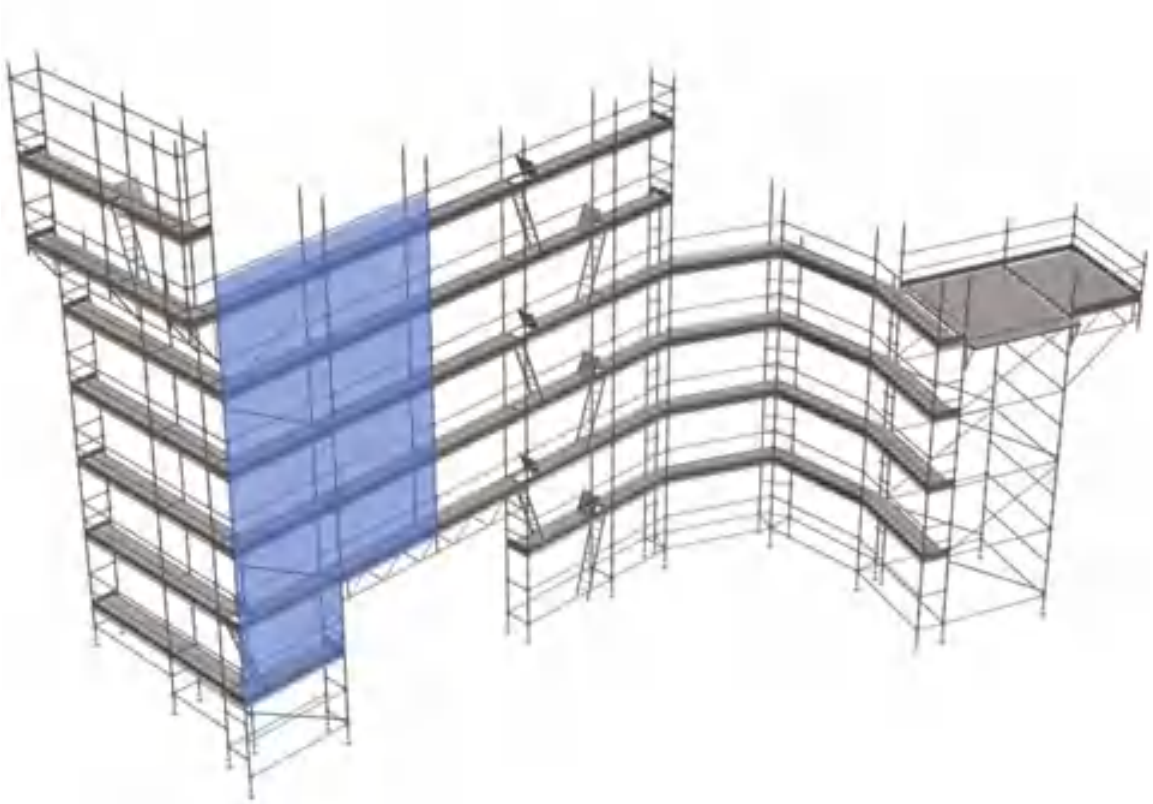
Multidirectional scaffolding system **RESABLOK**

Manufactured by:

Resa Quality Factory, S.L.
Área Empresarial Andalucía, Sector 1.
C/ Serranía de Ronda, 6-8
28320 Pinto - MADRID

Contents

1. INTRODUCTION TO RESABLOK SYSTEM



One system for all applications:

With a small number of components.
Easy, Light, Durable.

No matter how complex an application might be…
…the Resablok System has the best solution.

Resablok System

Resablok is a Multidirectional Scaffolding System which allows a wide range of configurations. This System is composed of standard tubular elements; the assembly of these elements is carried out by a head - wedge connection called **"Resablok Node".**

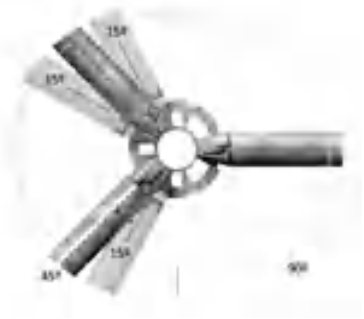
Total Versatility

RBN/RBP Series: Natural Evolution

RBN Series
4 positions

RBP Series
8 positions

Totally compatible series

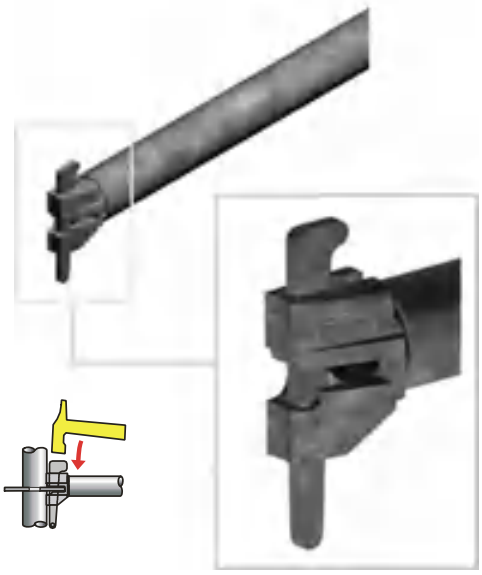


RBP Resablok Node allows assembling with angles from 30º up to 60º which give us a multitude of possibilities, including perimeter assemblies in tanks, vessels and spheres.

Ease to Assembly

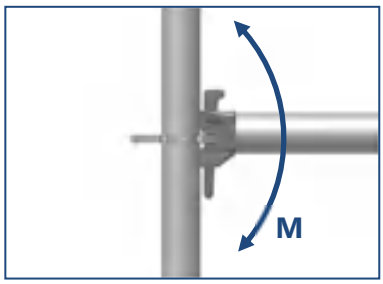
The tubular components are joined by Resablok Node System which allows the joining without needing screws to its fastening.

This system makes the assembly easier since an only man is able to place the components and, a rigid and strong connection is obtained with a hammer hit.



Safety

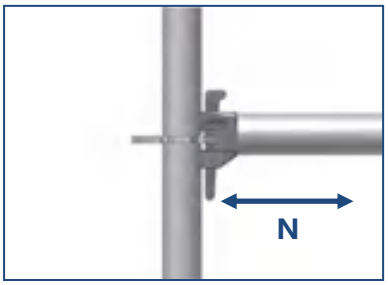
High Resistance of Resablok Node → Reliable and Safe System.



Bending Moment:

Bending force acts on the point of union of the scaffold.

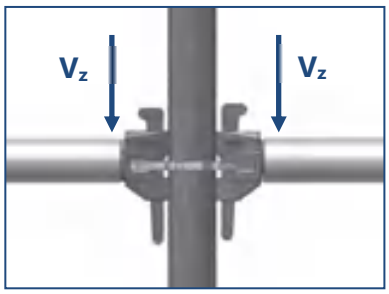
$\mathbf{M_{y\,R,d}} = \pm$ 92,8 kN·cm



Axial Force:

Tension and compression forces act along the length of the ledgers.

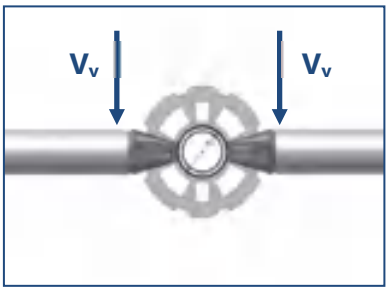
$\mathbf{N}_{R,d} = \pm$ 25,4 kN



Vertical Shear Stress:

Vertical force acts on the standards at the points of union between the ledger and the standard.

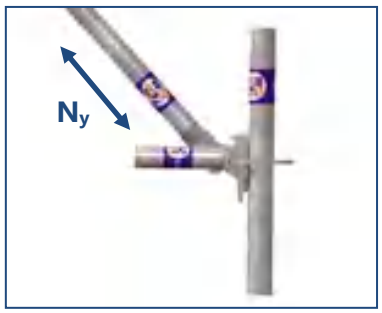
$\mathbf{V_z}_{R,d} = \pm$15,7 kN $\quad\quad$ $\Sigma\mathbf{V_z}_{R,d} = \pm$62,9 kN



Horizontal Shear Stress:

Horizontal stress acts on the ledgers at the points of union.

$\mathbf{V_y}_{R,d} = \pm$7,5 kN



Diagonal Force:

Tension and compression forces act along the length of the diagonal.

$\mathbf{N_y}_{R,d}$ (Tensile) = +10,4 kN
$\mathbf{N_y}_{R,d}$ (Compression) = - 6,0 kN

R,d =Resistance Nominal Value (included safety partial factor of resistance $\gamma_M = 1{,}1$)
The maximum safe working load is calculated dividing the nominal value by safety partial factor of applied forces $\gamma_F = 1{,}5$

2. INTEGRATED MANAGEMENT

Resa Group has a Management System of Quality, Health & Safety and Environment which is certified by ABS Quality Evaluations for design, assembly and commercialisation of tubular structures.

Quality – ISO 9001:2015

Environment – ISO 14001:2015

Safety & Health – ISO 45001:2018

Each phase of the manufacturing, from the material reception up to product finishing, is submitted to the most exhaustive quality controls. This control process is finalized in our test bench where the safety control tests, which are required legally, are carried out.

The Characteristics of a Leader

Our aim is to provide to our **clients** a **service** which surpasses always their expectations, not only with **professionalism** but also with the impeccable work **ethic** of our employees.

EFFICIENCY, INNOVATION, SAFETY, QUALITY AND SERVICE

3. PRODUCT CERTIFICATION

The Resablok Multidirectional Scaffolding is approved by the certification authority BUREAU VERITAS CERTIFICATION (Certificate Nº ES-040977-2), according to UNE-EN 12810 and UNE-EN 12811 Regulations.

UNE EN 12810-1:2005

Facade scaffolds made of prefabricated components.
Part 1: Product Specifications.

UNE EN 12810-2:2005

Facade scaffolds made of prefabricated components.
Part 1: Particular methods of structural design.

UNE EN 12811-1:2005

Temporary works equipment. Scaffolds.
Part 1: Performance requirements and general design.

UNE EN 12811-2:2005

Temporary works equipment. Scaffolds.
Part 2: Information on materials.

UNE EN 12811-3:2003

Temporary works equipment. Scaffolds.
Part 3: Load testing.

Certification Background:

HD 1000	UNE EN 12810	UNE EN 12810	UNE EN 12810	UNE EN 12810	UNE EN 12810	UNE EN 12810/11	UNE EN 12810/11
1997	2003 - 2006	2006 - 2009	2009-2012	2012-2015	2015-2018	2018-2021	2021-2024

Bureau Veritas Certification

BVC CERTIFICATE OF PRODUCT

Certificate nº: **ES040977-2**

In application of the BVC procedure for the products certification, BVC has established that the products:

GALVANIZED MULTIDIRECTIONAL SCAFFOLDING. RESABLOK

MODEL. RBN/RBP SERIES. BRAND: RESA

1, 2, 3, 4, 5 AND 6th CLASSES

Made by the manufacturer:

RESA QUALITY FACTORY, S.L.

In its factory located in:

C/Serrania de Ronda, 6-8 Área empresarial Andalucía
28320 PINTO (Madrid)

They are submitted by the manufacturer to the test and Factory Production Control, and submitted to the evaluation, the Tests and Factory Production Control by Bureau Veritas Certification and performs the continuous surveillance, assessment and approval of the Factory Production Control described in the harmonized standard:

UNE-EN 12810-1:2005
UNE-EN 12810-2:2005
UNE-EN 12811-1:2005
UNE-EN 12811-2:2005
UNE-EN 12811-3:2003

This certificate remains valid while the product, the production conditions of the factory or the same FPC have not changed significantly.

Initial date of issue: **2013, January 15th**
Date of update: **2021, April 19th**
Expiration date: **2024, May 16th**

Mónica Botas
Certification Manager

Bureau Veritas Iberia, S.L., Edificio Caoba. C/ Valportillo Primera 22-24,
28108 Alcobendas (MADRID)

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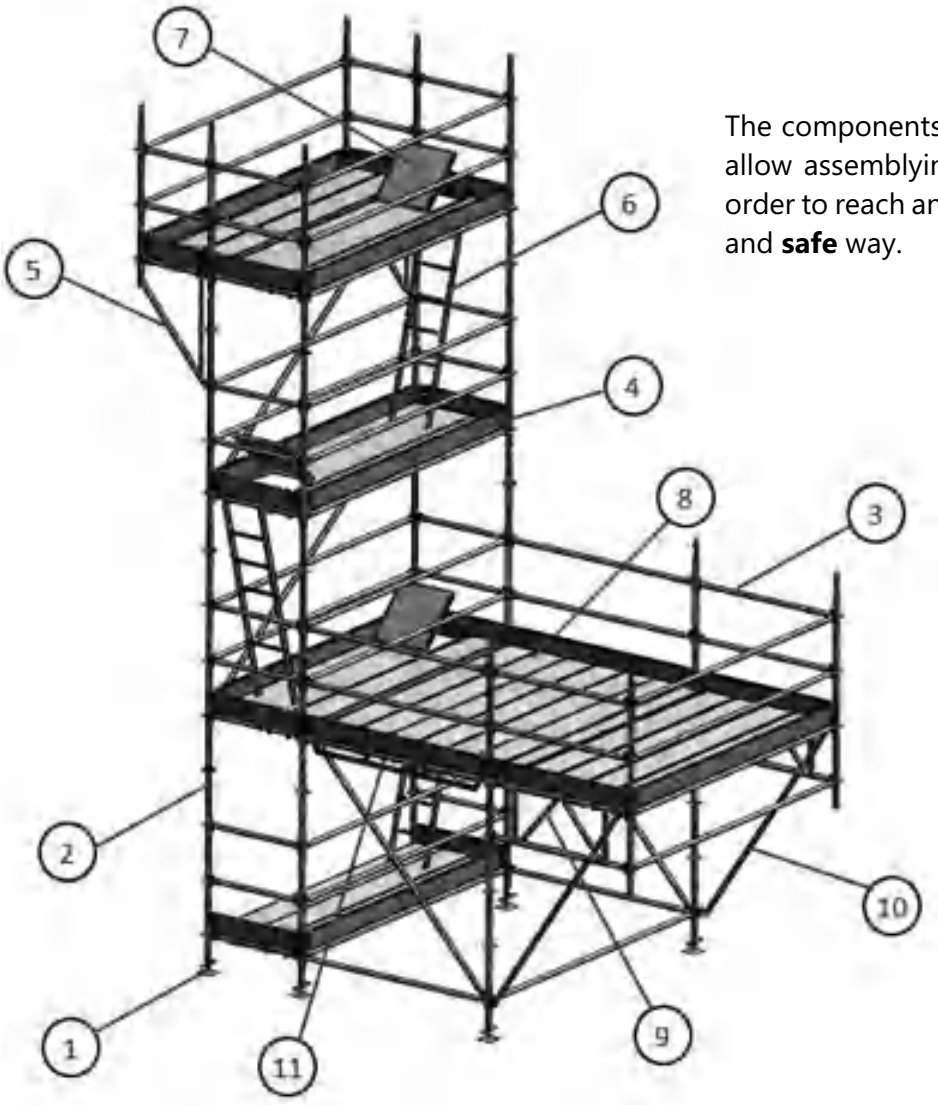
4. SYSTEM COMPONENTS



The components of the **Resablok System** allow assemblying complex scaffolding in order to reach any work area in **easy**, **quick** and **safe** way.

COMPONENTS:		6	LADDER
1	SCREW JACK	7	ACCESS DECK
2	STANDARD	8	DECK
3	LEDGER	9	LATTICE BEAM
4	TOE BOARD	10	DIAGONAL BRACE
5	SIDE BRACKET	11	REINFORCED LEDGER

4.1. Vertical Components

RBN Standards

Code	Dimensions	Weight (kg)
RBNVE1GA	2.00 m	9.01
RBNVE2GA	1.50 m	6.34
RBNVE3GA	1.00 m	4.52
RBNVE4GA	0.50 m	2.64
RBNVE5GA	0.30 m	1.78

Manufactured in high quality steel tubing, with **48 mm diameter and 3 mm thick** and galvanized by heat immersion.

Nodes are welded every 50 cm, **with 4 holes** that allow a large variety of angles, as well as a connection for standard use.

RBP Standards

Code	Dimensions	Weight (kg)
RBPVE1GA	2.00 m	10.05
RBPVE2GA	1.50 m	7.73
RBPVE3GA	1.00 m	5.39
RBPVE4GA	0.50 m	3.05
RBPVE5GA	0.30 m	1.55
RBPVE6GA	0.25 m	1.30

Manufactured in high quality steel tubing, with **48,3 mm diameter and 3,2 mm thick** and galvanized by heat immersion.

Nodes are welded every 50 cm, **with 8 holes** that allow a large variety of angles, as well as a connection for standard use.

RBP Starting Post

Code	Dimensions	Weight (kg)
RBPVE8GA	0.33 m	2.85

Manufactured in steel tubing, with **48 mm diameter and 3 mm thick**.
With one node and tubing of connects of 58 diameter and 4 mm thick.

Union Hook for Standards

Code	Dimensions	Weight (kg)	
RBNUV1GA	0.50 m	1.40	1. For the resistant union of standards
ALAU1RBP	Para Ø48	0.07	2. For fixation between standards
RBPDC1GA	-	0.89	3. For the union of standards from Node.

Coupling Pin

Code	Dimensions	Weight (kg)
COMEU2GA	40 x 2 mm	0.54

Tubing joint 48 x 3 mm

Supplements

Code	Dimensions	Weight (kg)	
RBNSV1ZI	0.25 m	2.01	1. Half coupler spigot
RBNSV3GA	0.25 m	4.37	2. Two coupler spigot for beam

4.2. Horizontal Components

RBN Ledgers

Code	Dimensions	Weight (kg)
RBNLA1GA	3.00 m	6.72
RBNLA10GA	2.50 m	5.78
RBNLA2GA	2.00 m	4.56
RBNLA3GA	1.50 m	3.77
RBNLA4GA	1.00 m	2.69
RBNLA8GA	0.75 m	2.10
RBNLA6GA	0.50 m	1.70
RBNLA13GA	0.42 m	1.42
RBNLA11GA	0.40 m	1.40
RBNLA7GA	0.30 m	1.15

Manufactured in high quality steel tubing, with **42 mm diameter and 2 mm thick** and galvanized by heat immersion.

With two wedge heads that connect perfectly to the nodes, making a rigid structure once assembled.

They are used as horizontal beams, handrails or decks supports.

RBP Ledgers

Code	Dimensions	Weight (kg)
RBPLA9GA	2.50 m	10.02
RBPLA2GA	2.00 m	7.94
RBPLA3GA	1.50 m	6.16
RBPLA4GA	1.00 m	4.21
RBPLA8GA	0.75 m	3.23
RBPLA11GA	0.42 m	1.93

Manufactured in high quality steel tubing, with **48.3 mm diameter and 3.2 mm thick** and galvanized by heat immersion.

With two wedge heads that connect perfectly to the nodes, making a rigid structure once assembled.

They are used as horizontal beams, handrails or decks supports.

RBN Reinforced Ledgers

Code	Dimensions	Weight (kg)
RBNLR1GA	3.00 m	10.51
RBNLR4GA	2.50 m	8.69
RBNLR2GA	2.00 m	6.86
RBNLR3GA	1.50 m	5.58

Horizontal transoms reinforced on their lower side in order to increase their resistance.

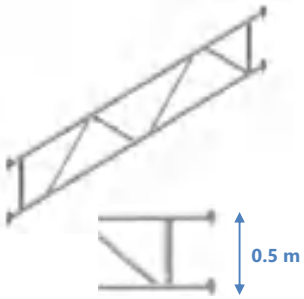
Manufactured in galvanized steel tubing with **42 mm diameter and 2 mm thick**. They are used as decks support.

RBP Reinforced Ledgers

Code	Dimensions	Weight (kg)
RBPLR4GA	2.50 m	13.30
RBPLR2GA	2.00 m	10.38
RBPLR3GA	1.50 m	7.85

Horizontal transoms reinforced on their lower side in order to increase their resistance.

Manufactured in galvanized steel tubing with **48.3 mm diameter and 3.2 mm thick**. They are used as decks support.



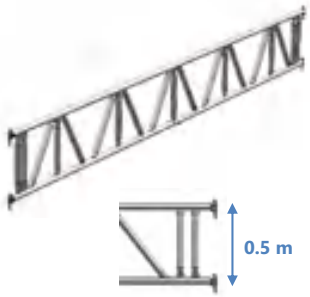
RBN Lattice Beams

Code	Dimensions	Weight (kg)
RBNVI1GA	6.00 m	57.21
RBNVI6GA	5.00 m	44.17
RBNVI2GA	4.00 m	41.05
RBNVI3GA	3.00 m	28.81
RBNVI7GA	2.50 m	25.58
RBNVI4GA	2.00 m	18.36
RBNVI5GA	1.50 m	16.12

Lattice beams manufactured in **48 mm diameter tubing and 3 mm thick**, hot-dip galvanized.

With wedge heads that connect perfectly to the nodes, making a rigid structure once assembled.

50 cm high, they permit a wide variety of assemblies.



RBP Lattice Beams

Code	Dimensions	Weight (kg)
RBPVI1GA	6.00 m	80.00
RBPVI2GA	5.00 m	59.00
RBPVI3GA	4.00 m	51.00
RBPVI4GA	3.00 m	35.50
RBPVI5GA	2.50 m	32.00
RBPVI6GA	2.00 m	24.50
RBPVI7GA	1.50 m	21.00

Lattice beams manufactured in **48,3 mm diameter tubing and 3,2 mm thick**, hot-dip galvanized.

With wedge heads that connect perfectly to the nodes, making a rigid structure once assembled.

50 cm high, they permit a wide variety of assemblies.

RBP Intermediate Ledgers (Ledger to Ledger)

Code	Dimensions	Weight (kg)
RBPLI3GA	1.00 m	4.55
RBPLI2GA	0.75 m	3.64
RBPLI1GA	0.42 m	2.25

Manufactured in galvanized steel tubing with **48.3 mm diameter and 3.2 mm thick**

Intermediate ledger to place small platform in zones with vertical interferences.

Resting on Ledger.

RBP Intermediate Reinforced Ledgers (Ledger to Ledger)

Code	Dimensions	Weight (kg)
RBPLI7GA	3.00 m	16.03
RBPLI6GA	2.50 m	12.86
RBPLI5GA	2.00 m	10.44
RBPLI4GA	1.50 m	8.21

Intermediate ledger reinforced on their lower side in order to increase their resistance. Manufactured in galvanized steel tubing with **48.3 mm diameter and 3.2 mm thick.**

Intermediate ledger to place small platform in zones with vertical interferences.

Resting on Ledger.

RBP Intermediate Ledgers (Ledger to Deck)

Code	Dimensions	Weight (kg)
RBPLP3GA	1.295	5.14
RBPLP2GA	0.965	4.12
RBPLP1GA	0.670	3.10
RBPLP4GA	0.370	2.06

Manufactured in galvanized steel tubing with **48.3 mm diameter and 3.2 mm thick.**

Intermediate ledger to place small platform in zones with vertical interferences.

Resting on ledger – deck.

RBP Intermediate Ledgers (Deck to Deck)

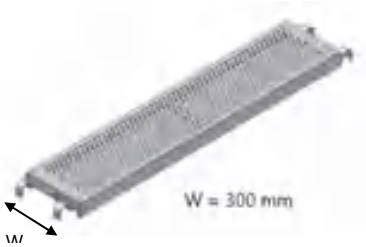
Code	Dimensions	Weight (kg)
RBPPP3GA	1.190	5.02
RBPPP2GA	0.890	4.31
RBPPP1GA	0.585	3.22
RBPPP4GA	0.300	2.22

Manufactured in galvanized steel tubing with **48.3 mm diameter and 3.2 mm thick.**

Intermediate ledger to place small platform in zones with vertical interferences.

Resting on deck.

4.3. Decks

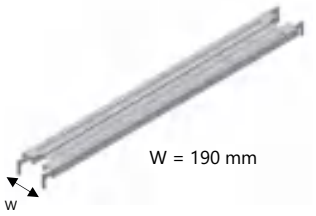


Decks 0.30

Code	Dimensions	Weight (kg)
COMPL1GA	0.30 x 3.00 m	18.57
COMPL7GA	0.30 x 2.50 m	15.20
COMPL2GA	0.30 x 2.00 m	12.73
COMPL3GA	0.30 x 1.50 m	10.33
COMPL4GA	0.30 x 1.00 m	7.48
COMPL8GA	0.30 x 0.75 m	5.85

High quality steel decks that are heat galvanized and designed and manufactured for the simplest assembly and maximum safety.

They are light and resistant with a non-slip finishing as well as a system to prevent overturning.



Decks 0.19

Code	Dimensions	Weight (kg)
RBNPT1GA	0.19 x 3.00 m	14.57
RBNPT4GA	0.19 x 2.50 m	12.04
RBNPT2GA	0.19 x 2.00 m	9.88
RBNPT3GA	0.19 x 1.50 m	7.73
RBNPT5GA	0.19 x 1.00 m	5.86

High quality steel decks, hot dip galvanized; they are for its assembly between modules in order to reduce distances and gaps in the work decks.

With non-slip finishing.

Cover-Gap Decks for Perpendicular Bays

Code	Dimensions	Weight (kg)
COMCBH1GA	0.28 x 2.50 m	19.00
COMCBH2GA	0.28 x 2.00 m	15.00
COMCBH3GA	0.28 x 1.50 m	12.00

High quality steel decks that are heat galvanized and designed and manufactured for the simplest assembly and maximum safety.

This decks avoid the gaps between two modules with perpendicular decks..

Access Decks

Code	Dimensions	Weight (kg)
COMPP1GA	0.60 x 3.00 m	38.10
COMPP3GA	0.60 x 2.50 m	31.85
COMPP2GA	0.60 x 2.00 m	29.31
COMPP4GA	0.60 x 0.75 m	12.21

High quality steel decks with trap-door and anti-slip finish.

It is used for use together with the ladders.

Access Decks – Wooden Surface

Code	Dimensions	Weight (kg)
COMPP6CO	0.60 x 3.00 m	32.50
COMPP9CO	0.60 x 2.50 m	28.50
COMPP8CO	0.60 x 2.00 m	24.61

High quality steel decks with trap-door and aluminium ladder.

Steel frame and wooden surface.

Model with side opening.

Special Decks H= 25 mm

Code	Dimensions	Weight (kg)
COMPLE1GA	0.255 x 1.90 m	12.42
COMPLE2GA	0.255 x 1.40 m	9.26
COMPLE3GA	0.255 x 0.95 m	6.53
COMPLE4GA	0.255 x 0.72 m	4.95

Special deck of small height to assembly between two modules.

With non-slip finishing.

Angular Decks

Code	Dimensions	Weight (kg)
COMPLA1GA	-	14.74

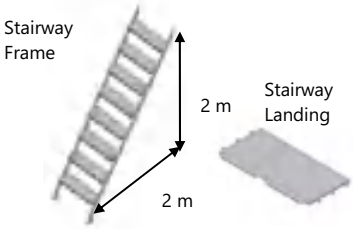
Deck used in vessels and tanks to make easier the perimeter assemblies.

Assembly on modules of 0.75 m width.

4.4. Ladders / Stairways

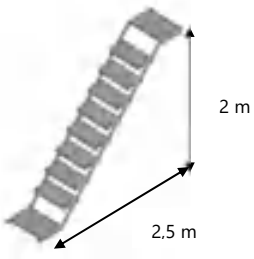
Ladders – Steel / Aluminium

Code	Dimensions	Weight (kg)	
COMES3GA	3.00 m	15.89	- Steel Ladder: Used with the metal access decks.
COMES2GA	2.50 m	13.74	
COMES1GA	2.00 m	10.89	
COMES4CO	2.00 m	2.86	- Aluminium Ladder: Used with the metal and wooden access decks.



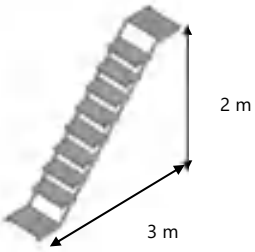
Heavy Duty Stairway: 2,00 m x 2,00 m

Code	Dimensions	Weight (kg)	
COMEZ2GA	2.00 x 2.00 m	116.00	Complete Stairway
COMZA2GA	2.00 x 2.00 m	70.00	Stairway Frame
COMMZ2GA	2.00 x 1.00 m	46.00	Stairway Landing Plank



Heavy Duty Stairway 2,50 m x 2,00 m

Code	Dimensions	Weight (kg)	
COMEZ3GA	2.50 x 2.00 m	77.77	Complete Stairway
COMEZ31GA	-	44.33	Stairway Frame
COMEZ32GA	-	5.97	Stairway Landing Plank 2.5 / 3 m
COMEZ33GA	-	10.75	Stairway Internal Railing
COMEZ34GA	-	4.57	Stairway Enclosing Railing 2.5 m



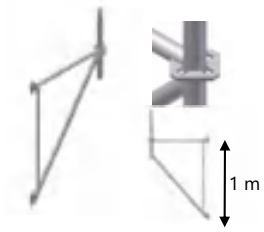
Heavy Duty Stairway 3,00 m x 2,00 m

Code	Dimensions	Weight (kg)	
COMEZ4GA	3.00 x 2.00 m	89.98	Complete Stairway
COMEZ41GA	-	53.16	Stairway Frame
COMEZ42GA	-	12.44	Stairway Internal Railing
COMEZ43GA	-	4.76	Stairway Enclosing Railing
RBNSV4ZI	-	2.14	Enclosing Spigot for Stairways

Stairway Frames

Code	Dimensions	Weight (kg)	
COMPES1GA	3.00 x 2.00 m	28.65	Used with Resablok decks. Width from 0,75 m to 3,00 m (*). (*) See limitations to each stairway
COMPES2GA	1.50 x 1.00 m	14.04	

4.5. Side Brackets

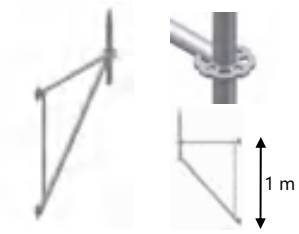


Side Brackets RBN

Code	Dimensions	Weight (kg)
RBNME1GA	1.00 m	8.84
RBNME4GA	0.75 m	8.10
RBNME3GA	0.30 m	3.52

Enable the scaffolding to be adapted to irregular distances thus increasing the work surface.

Manufactured in galvanized steel, with joining elements directly to standards.
Node with 4 holes



Side Brackets RBP

Code	Dimensions	Weight (kg)
RBPME1GA	1.00 m	9.43
RBPME4GA	0.75 m	8.67

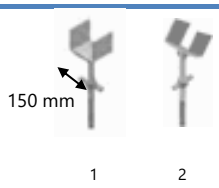
Enable the scaffolding to be adapted to irregular distances thus increasing the work surface.

Manufactured in galvanized steel, with joining elements directly to standards.
Node with 8 holes

4.6. Screw Jacks

Screw Jacks

Code	Dimensions	Weight (kg)	
COMHU4ZI	1.00 m	8.04	1 – Screw Jack
COMHU2ZI	0.70 m	5.25	1 – Screw Jack
COMHU1ZI	0.50 m	4.41	1 – Screw Jack
COMHG1ZI	0.50 m	4.60	2 – Swivel Screw Jack
COMRH1	0.50 m	9.04	3 – Caster Screw Jack * With Brake
COMRU1	0.24 m	6.54	4 – Pin Caster



U-Head Screw Jacks

Code	Dimensions	Weight (kg)	
COMHH1GA	0.50 m	7.05	1 – U-Head screw jack
COMHO4GA	0.50 m	8.30	2 – U-Head swivel screw jack

4.7. Toe Boards

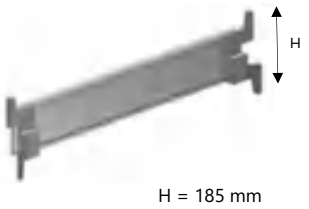
Toe Boards RBN

Code	Dimensions	Weight (kg)
RBNRO1GA	3.00 m	9.57
RBNRO6GA	2.50 m	8.75
RBNRO2GA	2.00 m	6.80
RBNRO3GA	1.50 m	5.21
RBNRO4GA	1.00 m	3.81
RBNRO7GA	0.75 m	2.99

Protective element against falling debris from the decks.

Manufactured in high quality steel and hot dip galvanized.

This element is jointed to the Resablok node.



Toe Boards RBP

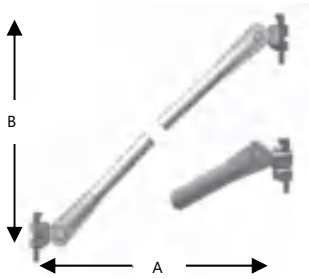
Code	Dimensions	Weight (kg)
RBPRO11GA	3.00 m	11.89
RBPRO16GA	2.50 m	9.87
RBPRO12GA	2.00 m	8.42
RBPRO13GA	1.50 m	6.59
RBPRO14GA	1.00 m	5.17
RBPRO15GA	0.75 m	4.43

Protective element against falling debris from the decks.

Manufactured in high quality steel and hot dip galvanized.

This element is jointed to the Resablok node (2 positions).

4.8. Diagonal Braces

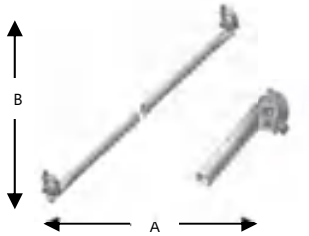


RBP Diagonal Braces

Code	Dimensions	Weight (kg)
RBPDI1GA	3.00 x 2.00 m	7.81
RBPDI8GA	2.50 x 2.00 m	7.03
RBPDI2GA	2.00 x 2.00 m	6.30
RBPDI3GA	1.50 x 2.00 m	5.43
RBPDI4GA	1.00 x 2.00 m	5.25
RBPDI5GA	0.75 x 2.00 m	5.12
RBPDI9GA	1.50 x 1.00 m	4.69
RBPDI7GA	1.00 x 1.00 m	4.18

Manufactured in 42 mm tubing and 2 mm thick heat galvanized.

With two wedge heads that connect perfectly to the nodes, making a rigid structure once assembled.



Diagonal Braces - Coupler

Code	Dimensions	Weight (kg)
COMDI1GA	3.00 x 2.00 m	8.11
COMDI2GA	2.00 x 2.00 m	6.69
COMDI3GA	1.50 x 2.00 m	6.31

Manufactured in 42 mm tubing and 2 mm thick, heat galvanized.

With two coupler heads that connect perfectly to the standards, making a rigid structure once assembled.

4.9. Complements

1 2 3

Couplers

Code	Dimensions	Weight (kg)	
GRAPAOR48	-	1.27	1 – Right Angle Coupler (90º)
GRAPAGI48	-	1.44	2 – Swivel Coupler
GRAPAUÑ48	-	1.10	3 – Girder Coupler

Base Plate

Code	Dimensions	Weight (kg)	
COMPV1GA	150 x 150 mm	1.29	Supplementary support or anchor plate.

Mobile Resablok Node

Code	Dimensions	Weight (kg)	
RBPRM1GA	-	1.07	Mobile Resablok Node can be placed in any part of the standard. With 6 holes for joining components.

Anchorage Elements

Code	Dimensions	Weight (kg)	
COMAP3GA	1.50 m	5.90	Elements that fix the scaffolding to the facade, guaranteeing the safe horizontal support of the structure including in windy conditions. Ask for information about the available variety of nails, bolts and metal fastenings.
COMAP2GA	1.00 m	4.06	
COMAP1GA	0.50 m	2.03	

Galvanized Steel Tube

Code	Dimensions	Weight (kg)	
-	48,3 x 3,2 mm	-	Galvanized steel tubing for multiple combinations of tubing and brackets, joints and anchors. Length according to needs.

1. Debris Protector 2. Debris Protector Plate

Debris Protector RBN

Code	Dimensions	Weight (kg)	
RBNPC1GA	1.50 m	6.53	1 – Debris protector
COMOT7GA	2.00 x 1.00 m	11.76	2 – Debris protector plate

Protective element against falling debris from upper levels.

1. Support Cover Roof

2. Ridge Cover Roof

Roof Cover Beams

Code	Dimensions	Weight (kg)
RBNHOM1GA	30º	36.83
RBNCUM1GA	30º	25.39

1. Support Cover Roof

2. Ridge Cover Roof

Specific elements for assembly of covers.
For utilization together with elements Resablok
With angle of inclination of 30º

Swing Gate

Code	Dimensions	Weight (kg)
COMPU1GA	0.75 x 0.50 m	8.20

Element of lateral protection that allows the opening in a sense.

Width of step: 0,75 m.

U-Handrails

Code	Dimensions	Weight (kg)
COMPS6GA	3.00 m	7.88
COMPS7GA	2.00 m	5.00
COMPS8GA	1.50 m	3.58

Element for placing protection shells.

For using together with debris protector.

Stage Wooden Boards

Code	Dimensions	Weight (kg)
COMTE1CO	2.00 x 1.00 m	41.02
COMTE2CO	2.00 x 1.00 m	42.10

* 250 Kg

* 750 Kg

Stage wooden boards of water-repellent non-slipping wood.

1. U-Head Spigot

2. End Y-Head Spigot

U-Head Spigot

Code	Dimensions	Weight (kg)
COMHO1GA	0.50 m	1.00
COMHO3GA	0.50 m	0.77

1. U-Head Spigot.

2. End U-Head Spigot

Elements of support of the stage wooden boards.
For connection with Standards.

Blue Debris Netting

Code	Dimensions	Weight (kg)
RED_AZ_PZ	6 x 12 m	4.82

Polyethylene (HDPE), UV stable.

5. SYSTEM APPLICATIONS

5.1. Facade Scaffold

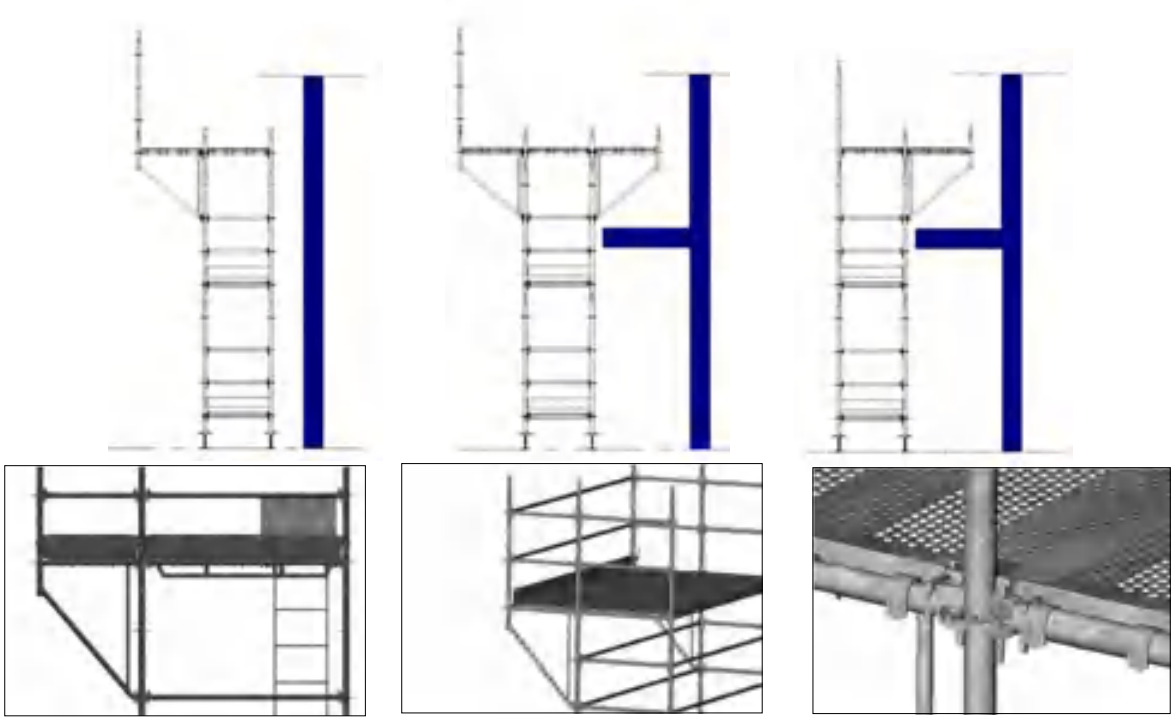
Facade scaffold is a temporary structure which is used to support people and materials during the construction or refurbishment of buildings and other large structures.

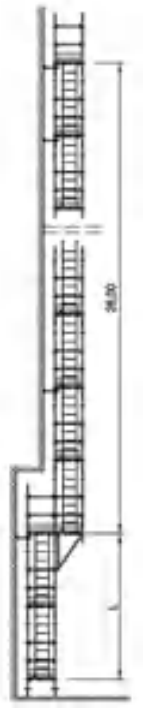
European tubular scaffolding manufactured under European Standards: UNE EN 12810 y UNE EN 12811.

Class	Uniformly Distributed Load	Load over Partial Surface		Local Load (*)	Application	Storage of material	Width Mín. (m)	Span Max. Length (m)	Deck Material
	[kN/m2]	[kN/m^2]	[m^2]	[kN]	(*) Area 500 mm x 500 mm				
1	0.75	-	-	1.50	Inspection works with light tools	Not	0,60	3,00	Steel
2	1.50	-	-	1.50	Inspection works with immediate use tools: cleaning, painting, coatings, etc.	Yes	0,60	3,00	Steel
3	2.00	-	-	1.50	Inspection works with immediate use tools: cleaning, painting, coatings, etc.	Yes	0,60	3,00	Steel
4	3.00	5.00	0.4A^2	3.00	Carrying out of factories with brick facades, prefabricated concrete, coatings, etc.	Yes	0,60	3,00	Steel
5	4.50	7.50	0.4A^2	3.00	Carrying out of factories with brick facades, prefabricated concrete, coatings, etc.	Yes	0,60	2,50	Steel
6	6.00	10.00	0.5A^2	3.00	Carrying out of factories with heavy element facades (stone, masonry, etc.)	Yes	0,60	2,00	Steel

Adaptation to all work conditions

Side Brackets allow adapting the scaffolding to facade obstacles. They can be used to modify the scaffold design, both for approaching to the wall and for increasing the work area towards the external side.





A Safe Assembly

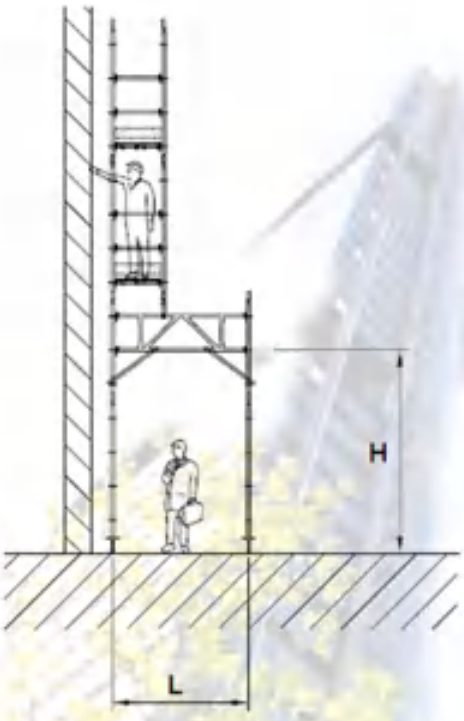
The Side Brackets don´t lift up because of their non-overturning system. The Narrow Deck (0,19 m) obtains flat and without gaps surfaces.

Load Capacity

Configuration Height: **up to 26 m** *.

* Consult Load Conditions.

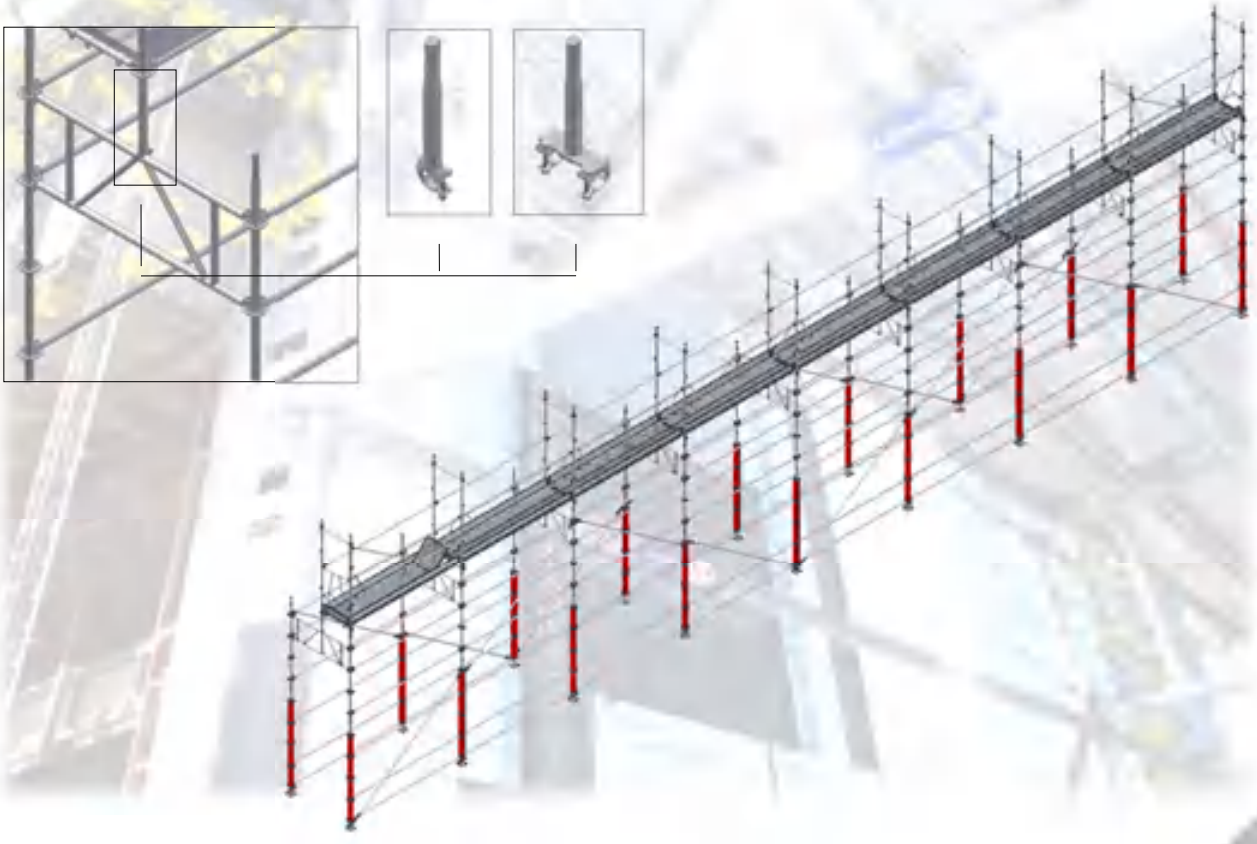
Walkways are well-protected zones to allow pedestrian crossing and traffic while the works are carried out above the scaffolding.



Safety

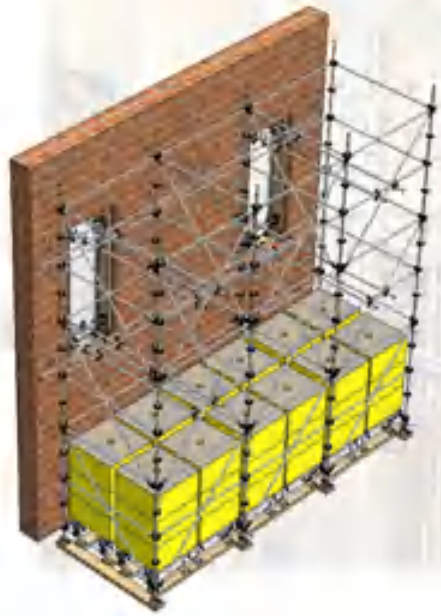
The Verification Cards show when the scaffolding can be used.

It is often necessary to assembly facade scaffolding walkways. Vertical supplements allow us to begin scaffold safety from the light beams that form the walkway.



5.2. Facade Stabilizer

The facade stabilizer allows us to maintain the facade of a building or structure while the building inside is pulled down completely, and following it´s possible to rebuilt it in the same conditions like a new building.



The facade stabilizer can be assembled with vertical, horizontal and diagonal elements which create a stable structure; this structure is designed to support the facade during the demolition work. It is also quite common to use concrete blocks as counterweights in order to make the structure even more stable.

Each individual application should be studied by qualified technicians.

RESA Group offers important resources and advanced computerized tools to complete the design, calculations and assembly of scaffolding.

5.3. Temporary Cover

The Temporary Covers are used like protection systems, both for projects where it´s necessary to work in the external surface of a building and for stage and canopy assemblies.

Support Cover Roof

Ridge Cover Roof

The structure is carried out with arches which incline steepness is **30°**; their main components are Roof Cover Supports, Roof Cover Ridges and Light Beams. The transversal union of arches is made by ledgers and light beams alternatively.

In this way, we obtain light and resistant structures which are able to support both the wind aerodynamic load and the snow load.

SHRINK FILM

Using of retractable canvas to make a work environment protected of adverse atmospherics conditions.

5.4. Tower / Mobile Tower

If possible, the scaffold structure will have to be tied horizontally. Sometimes, it´s not possible to carry out the tie and therefore, it´ll be necessary to assure the scaffold stability in other way.

It is possible to calculate the dimensions of a mobile tower, so that it is stable, taking into account the following guidelines:

Indoor Area: $\frac{H}{L} < 4$

Outdoor Area: $\frac{H}{L} < 3$

Where "L" is the smallest dimension of the base of the mobile tower (A or B).

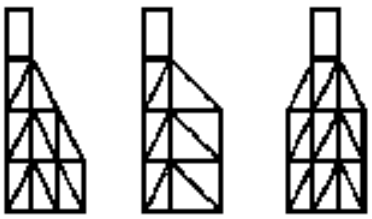
Warning:
The recommendations for the use of lateral stabilizers are only illustrative and, in practice, each specific case should be studied.

Some recommendations for towers:

Minimum Dimension (A or B)		0,75 m	1,00 m	1,50 m	2,00 m	3,00 m
Max. Height	Indoor Assembly	3 m	4 m	6 m	8 m	12 m
	Outdoor Assembly	2 m	3 m	4 m	6 m	8 m

Indoor Assembly – Maximum Height: 12 m.
Outdoor Assembly – Maximum Height: 8m.
Ask for Manufacturer for higher tower.

If the tower isn´t stable due to its dimensions, it´ll be necessary to increase the scaffold base with a stabilizer scaffold as the following pictures show



Different possibilities to stabilize a tower

Each case must be studied by qualified personnel

Pin / Connection Node-Node

Screw Jacks

Wheels/screw jacks have to be selected according to loads and heights.

Type	Buckling length (mm)		
	120	380	550
Hollowed screw Jack	29,70	19,00	-
Solid screw jack	32,70	32,70	26,75
Swivel screw jack	16,45		
Caster screw jack	7,85		

Values in kN. Safety coefficients are included.

Safety recommendations:

The transport or movement of people and material son the towers are forbidden during the manoeuvre of position change.
The caster brakes should be applied in work position to avoid displacements.

5.5. Access Stairway

Resablok Stairways allow reaching different work areas with a quick, comfortable and safe access. They can be used in independent way or together with a scaffold structure.

Heavy Duty Stairway 2,00 m x 2,00 m

Resablok Stairways: big advantages

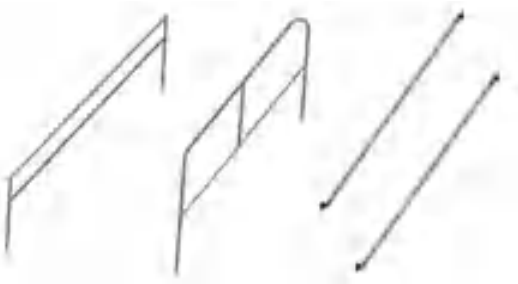
At high altitudes assemblies, an access stairway attached to the scaffolding work allows operators to move in a faster way, shortening execution of the work.

Heavy Duty Stairway 3,00 m x 2,00 m

A wide range of Stairways allows us to solve any difficult and to adapt to the work requirements and necessities.

- Heavy Duty Stairway 2,00 m / 2,50 m / 3,00 m
- Stairway Frames 1,50 m / 3,00 m

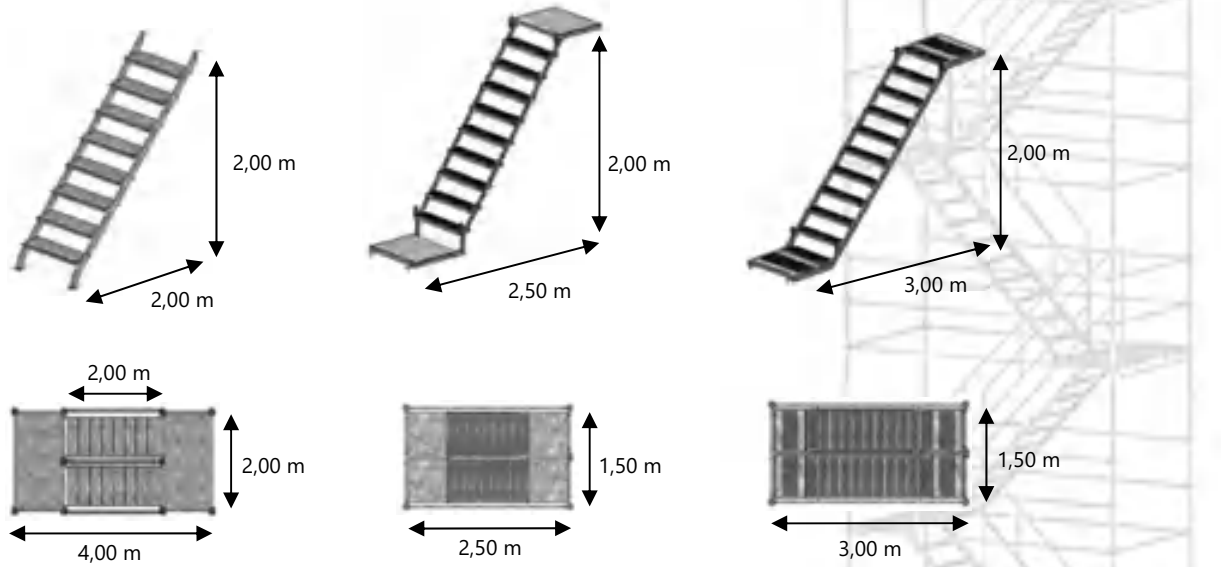
The Stairways meet the **highest safety requirements**; they are assembled with specific or standard components such as diagonal braces as a kind of handrails.



Stairway Frame 3,00 m long

Heavy Duty Stairways

Steps welded to frame.
It has the landing plank independent.
Height: 2,00 m



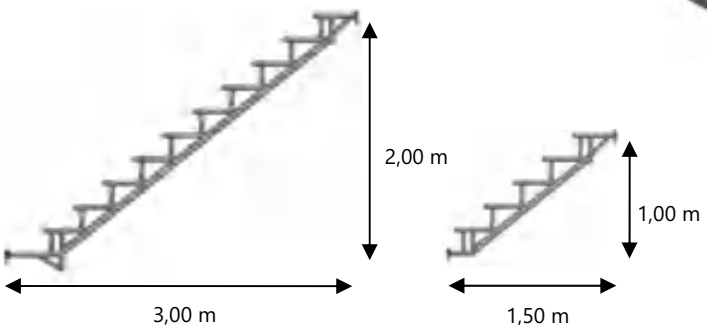
Heavy Duty Stairway 2,00 m | Heavy Duty Stairway 2,50 m | Heavy Duty Stairway 3,00 m

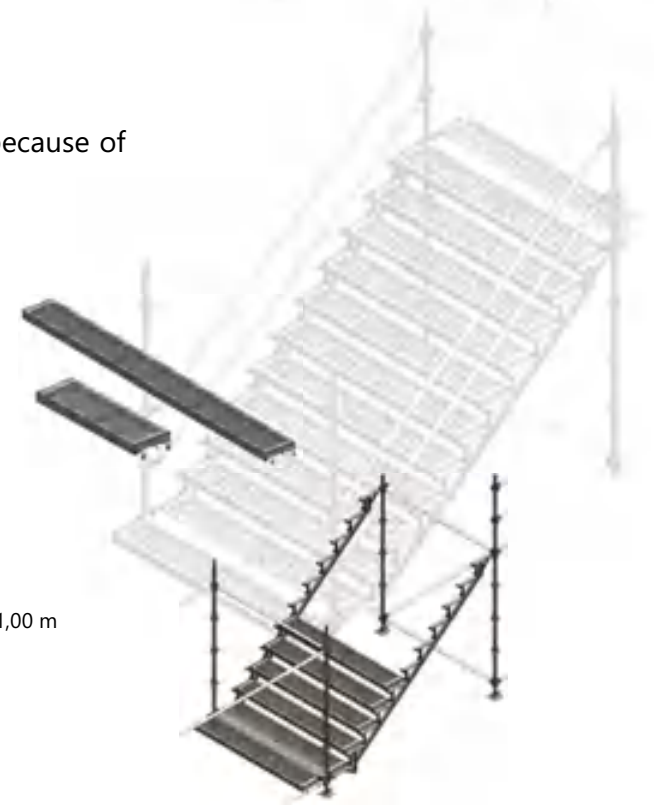
Stairway Frames

With multiple uses such as scape stairways.

Component very versatile and easy assembly because of Resablok decks use.
Stairway wide: 0,75 m – 3,00 m.

Stairway frame 3,00 m → Max. wide: 2,00 m
Stairway frame 1,50 m → Max. wide: 3,00 m

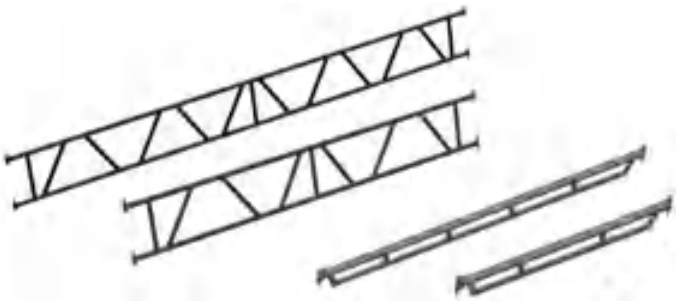




5.6. Birdcage Scaffold

Birdcage Scaffold is a solution for projects where it´s necessary to have a big work area at a height

The features of Resablok System components provide the necessary resistance and stability to carry out assemblies in which the scaffold structure is lightened, thereby achieving a significant saving of material.

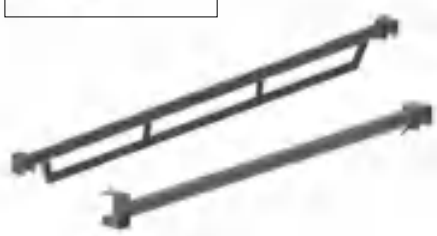


Lightened Scaffold

Components such as the light beams allow spanning big distances without putting standards.

This kind of scaffolding allows working in the inside of **tanks**, **vessels** or **boilers**, where it´s necessary to have access to all interior areas.

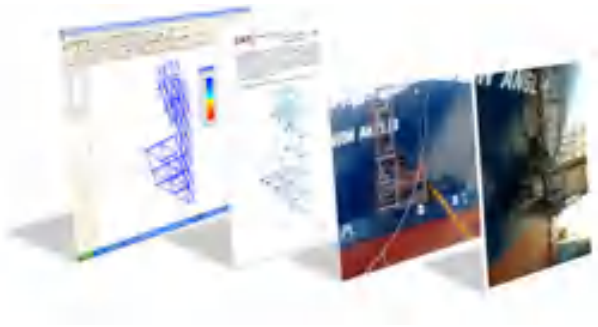
Swivel Screw Jacks are used in this kind of scaffolding since they are very useful when it´s necessary to carry out assemblies over surfaces with slope.



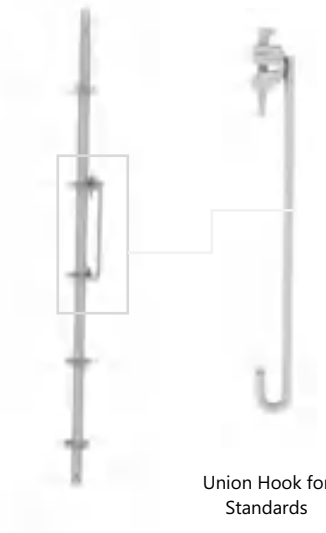
Our Intermediate Ledgers provide a solution for avoiding all kind of obstacles (**beams, piping,** ...); in this way, surfaces without gaps are obtained to work in **safety way**.

5.7. Hanging Scaffold

When the scaffold can´t be assembled from ground or supported in any other surface, the Hanging Scaffold is the solution.



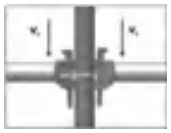
The Union Hooks for Standards provide more resistance and rigidity to this kind of scaffolding.



Union Hook for Standards

Node-node union	Dimensions. (mm)	Weight (Kg)
	0,56	1.40
	* For hanging scaffold	
	Distance node-node	0.50 m

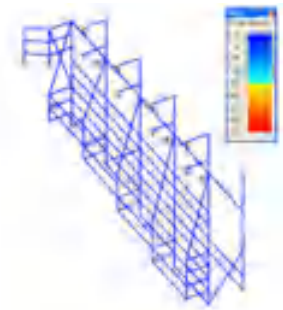
Vertical Shear Stress of Resablok node:



Simple / Per Node

$V_{z\,R,d} = \pm 15,7$ $\Sigma V_{z\,R,d} = \pm 62,9$ kN

*Element's strength is greater than node's strength.

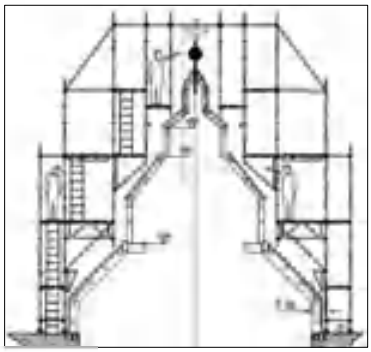


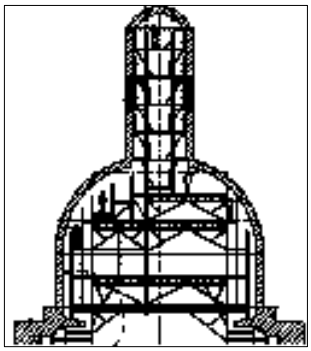
Each specific application should be studied by qualified technicians.

RESA Group offers important resources and advanced computerized tools to complete the design, calculations and assembly of the scaffolding

5.8. Perimeter Scaffold

Assembly with RBP System gives us the possibility of varying the angles which allow us to create perimeter applications for **tanks**, **vessels** and **domes**.





One inside Base

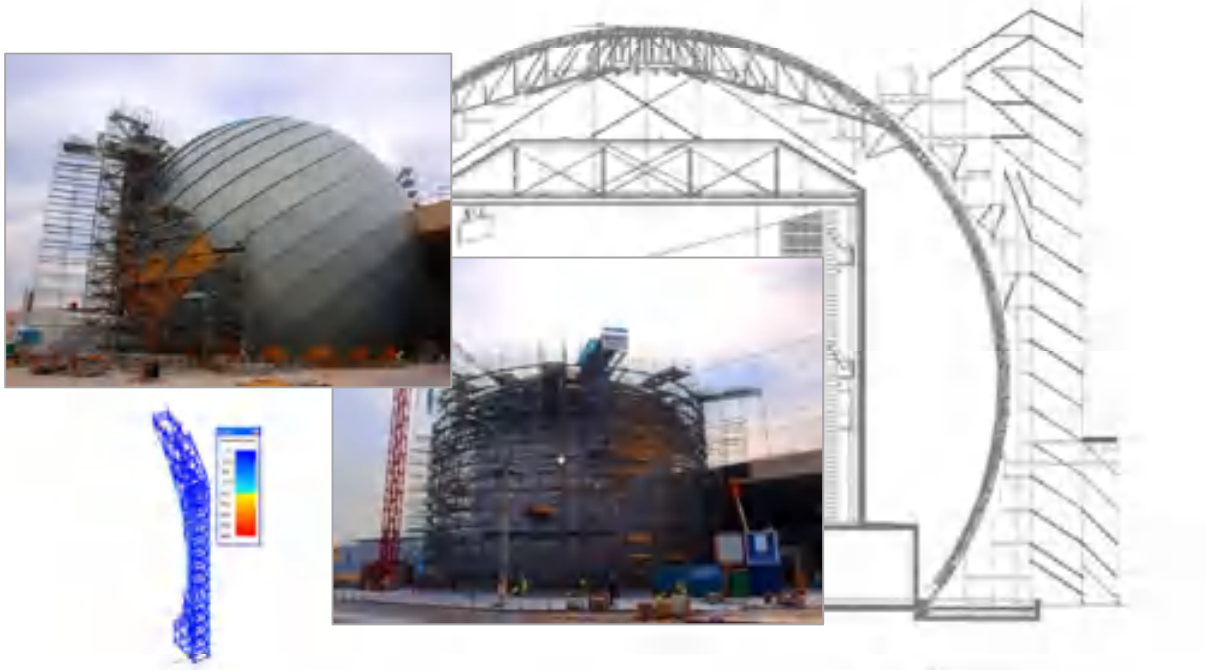
Two inside Bases

Weight Reduction / Ease to Assembly

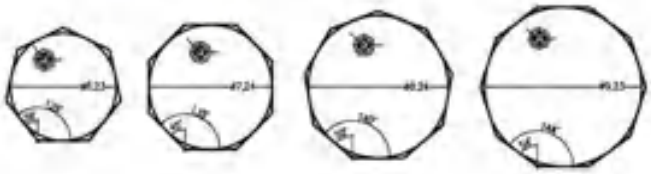
Our System makes possible the uniting of the inside bases for assemblies with angles between 30^0 and 60^0 (approx.); in this way, we get to reduce the scaffolding weight and make an easy and quick assembly.

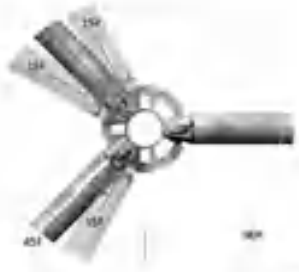
Angular Metal Plank

More information: 7. Configuration and Assembly



Different configurations depending on the radius / curve:

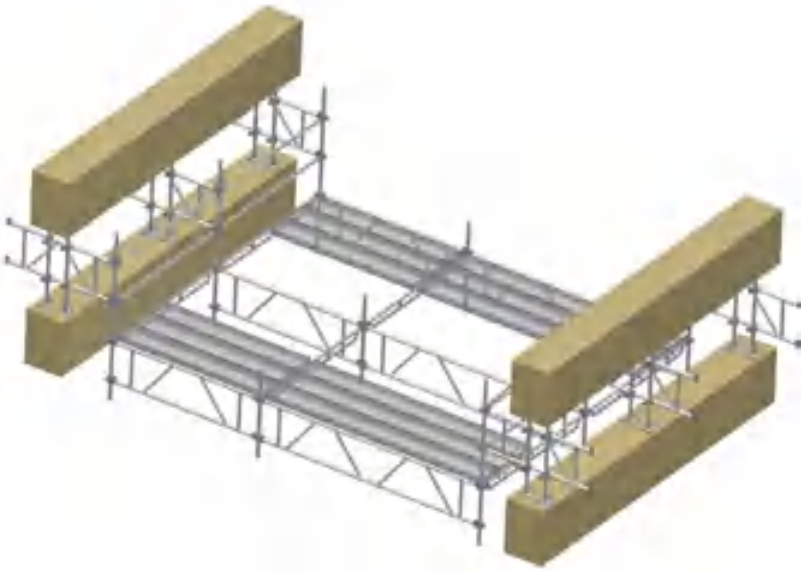




5.9. ''Pipe-Rack'' Assemblies

Pipe Rack Assembly refers to an assembly carried out for maintaining or construction of a piping whole placed in parallel.

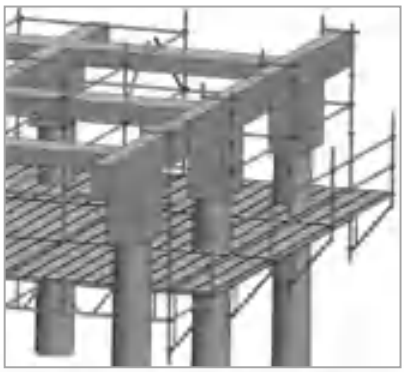
Scaffolding is hanged from metallic structures which form the rack in this kind of assemblies.



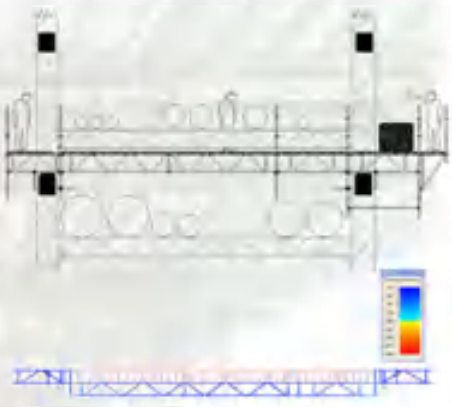
Fastening Components

The fastening components of Resablok System provide with resistant and stable supports for the scaffolding assembly.

Large Work Areas are obtained with the light beams and metal planks of Resablok System; the comfortable and safety work is possible with our System.



It´ll be necessary to alternate the direction of metal planks in adjacent sections in order to avoid the horizontal element overloading; in this way, the scaffold has more load capacity.



More information: 7. Configuration and Assembly.

5.10. Formwork

The **Formworks** are auxiliary structures which purpose is to support the weight of another structure during its construction or refurbishment.

Our Standards due to their load capacity can work like pillars; these are joined by horizontals and diagonal braces.

High Resistance

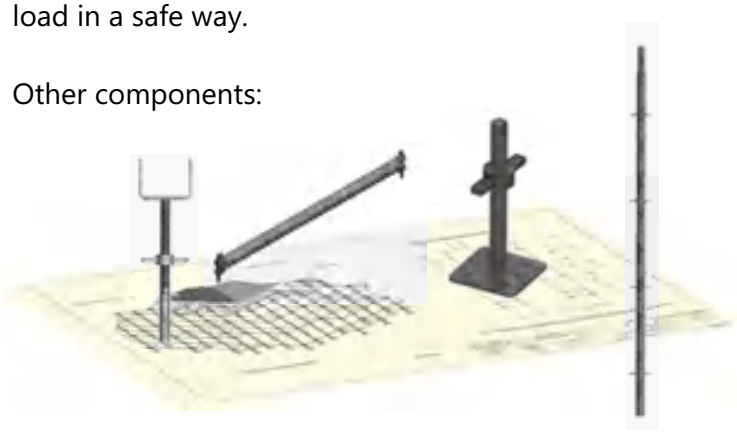
Double Node and Wedge Unit allows increasing the load capacity since we could join up to four standards

U-Head swivel screw jack

Support of metallic beam on U-Head screw jack

The U-Head characteristics (dimension and resistance) allow placing both wood and metal beams to transmit the load in a safe way.

Other components:

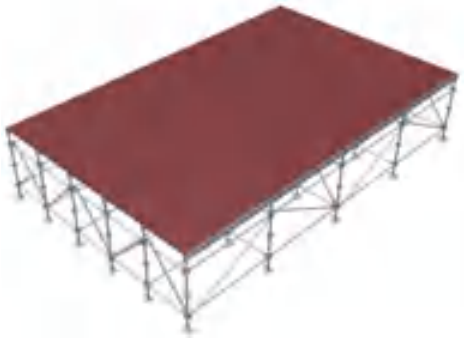


Each individual application should be studied by qualified technicians.

RESA Group offers important resources and advanced computerized tools to complete the design, calculations and assembly of the scaffolding.

5.11. Stages

Resablok System has specific components for stage assembly. Large and high load capacity areas are obtained assembling these components together with our standard elements.



Specific Components

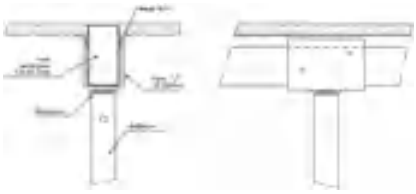
U-Head Spigot

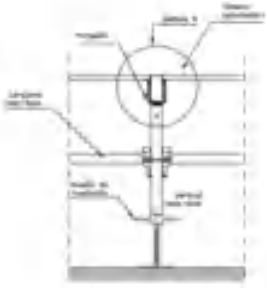
End U-Head Spigot

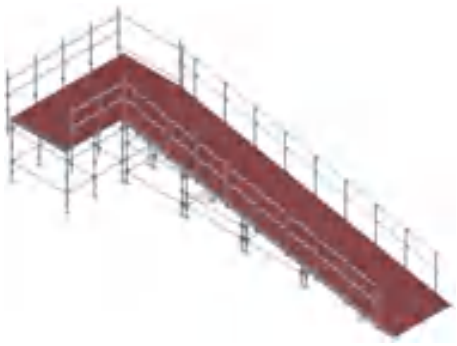
Wood Stage Plank 2x1 m

Assembly Possibilities

The compatibility between these components and our standard elements allows assembling steeped stages.







Access/Complements

Our System has a wide range of possibilities to choose the suitable access according to the project necessities. From tailor-made ramps to standard stairways can be assembled.

More information: 5.5 Access Stairways

Resablok System has all necessary components to assembly fully equipped stages:

- Cover Elements.
- Security Systems.
- Access.
- Tarpaulin.

5.12. Bridges and Walkways

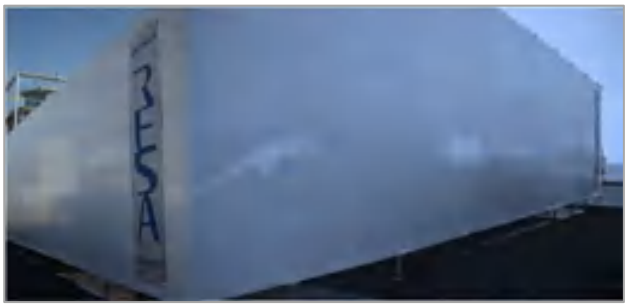
These tubular structures allow people to walk along them from one place to another on the upper levels, while opening up space on the lower areas.

The Resablok system provides quick and safe solutions with its standard elements for the execution of trusses on large span structures as well as high loads.

Our Resablok Beam is an essential component in order to assembly stable, resistant and long walkways.

5.13. Flame Retardant Shrink Film

The Shrink Film is composed of construction quality plastic film and can be used in different environments; from those that are aesthetically demanding to others under aggressive weather conditions where a simple mesh is not sufficient.



Characteristics	Properties
Resistant to abrasion:	Excellent
Resistant to punctures:	Excellent
Resistant to scratches:	Excellent
Opaque:	Good
Adjustment/Sealing	Excellent / Excellent
Weather resistant:	Good to Excellent
Elongation:	600 / 700 %
Resistant to traction:	245 / 245 Kg/m^2
Thickness:	300 (± 10%) mm
Fire Resistant:	EN 13501-1:2002

Easy and quick application and installation

Ask us about your specific needs

Due to the use of pressurized products and open flames, all risks should be carefully evaluated and all safety, security and protection rules and regulations should be respected. Each application should be studied, developed and carried out by qualified technicians.

6. COMPONENT TECHNICAL CHARACTERISTICS

6.1. Standard

RBN Standard

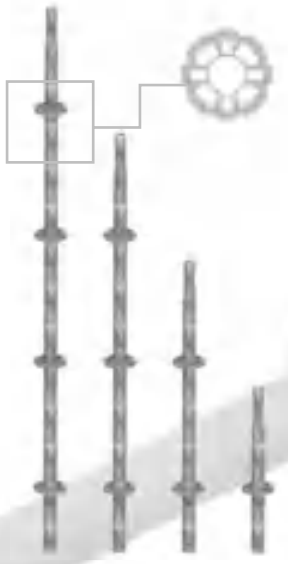
Description

Standards are manufactured in galvanized steel tubing S275 and 48 mm diameter and 3 mm thick. With RBN couplers that are welded in place at 50 cm intervals, permitting joints of different angles.

Buckling Length (m)	0,50	1,00	1,50	2,00
Resistance to compression (KN)	68,05	59,16	42,92	28,04

Technical Data Sheet
FT-01-0012

RBP Standard



Description

Standards are manufactured in galvanized steel tubing S355 and 48,3 mm diameter and 3,2 mm thick. With RBP couplers that are welded in place at 50 cm intervals, permitting joints of different angles.

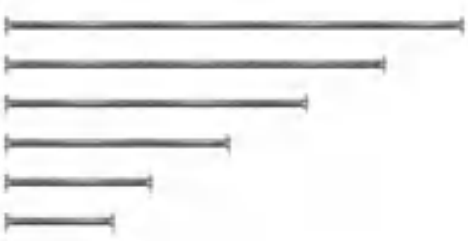
Buckling Length (m)	0,50	1,00	1,50	2,00
Resistance to compression (KN)	92,70	76,56	50,00	31,21

Technical Data Sheet
FT-01-002

Resistance to compession = Service load
Included safety partial factor of resistance $\gamma_M = 1{,}1$ and safety partial factor of applied forces $\gamma_F = 1{,}5$

6.2. Horizontal Components

RBN Ledger



Description

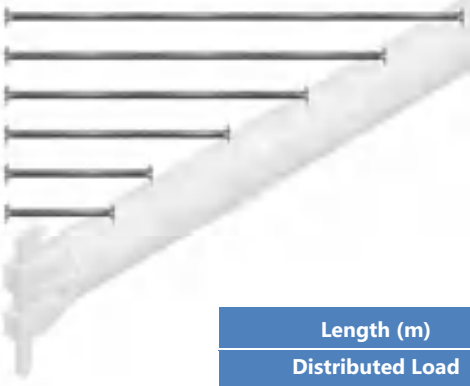
Manufactured in galvanized steel tubing S235: 42 mm diameter and 2 mm thick.

The ledgers and the vertical components are joined by means of the "Resablok Node", which guarantees a suitable functioning of scaffolding.

Length (m)	0,75	1,00	1,50	2,00	2,50	3,00
Distributed Load q_{Lmax} (KN/m)	9,38	5,27	2,32	1,29	0,81	0,55
Point Load P_{max} (KN)	4,69	3,27	2,22	1,67	1,32	1,10

Technical Data Sheet
FT-01-0003

RBP Ledger



Description

Manufactured in galvanized steel tubing S355: 48,3 mm diameter and 3,2 mm thick.

The ledgers and the vertical components are joined by means of the "Resablok Node", which guarantees a suitable functioning of scaffolding.

Length (m)	0,75	1,00	1,50	2,00	2,50
Distributed Load q_{Lmax} (KN/m)	28,65	16,01	7,01	3,87	2,42
Punctual Load P_{max} (KN)	13,64	9,32	6,38	4,81	3,81

Technical Data Sheet
FT-01-0008

Distributed load / Point load = Service load
Included safety partial factor of resistance $\gamma_M = 1{,}1$ and safety partial factor of applied forces $\gamma_F = 1{,}5$

RBN Reinforced Ledger

Description

Manufactured in galvanized steel tubing S235: 42 mm diameter and 2 mm thick.

Ledgers are provided with reinforced elements to increase the resistance.

The ledgers and the vertical components are joined by means of the "Resablok Node", which guarantees a suitable functioning of scaffolding.

Length (m)	1,50	2,00	2,50	3,00
Distributed Load q_{Lmax} (KN/m)	3,78	2,36	1,67	1,13
Point Load P_{max} (KN)	3,83	2,11	2,30	1,85

Technical Data Sheet
FT-01-0004

RBP Reinforced Ledger

Description

Manufactured in galvanized steel tubing S355: 48,3 mm diameter and 3,2 mm thick.

Ledgers are provided with reinforced elements to increase the resistance.

The ledgers and the vertical components are joined by means of the "Resablok Node", which guarantees a suitable functioning of scaffolding.

Length (m)	1,50	2,00	2,50
Distributed Load q_{Lmax} (KN/m)	10,30	4,06	2,54
Point Load P_{max} (KN)	7,31	5,05	4,00

Technical Data Sheet
FT-01-0009

Distributed load / Point load = Service load
Included safety partial factor of resistance $\gamma_M = 1{,}1$ and safety partial factor of applied forces $\gamma_F = 1{,}5$

RBP Intermediate Ledger

Description

Manufactured in galvanized steel tubing S355, 48,3 mm diameter and 3,2 mm thick.

Intermediate ledgers greater or equal than 1,50 m long are manufactured with reinforced elements to increase the ledger resistance.

- **Ledger to Ledger**

The joining between ledgers is made with a U-Head; this element assures a good working of scaffolding.

Length (m)	0,42	0,75	1,00	1,50	2,00	2,50	3,00
Distributed Load q_{Lmax} (KN/m)	63,69	19,99	11,18	4,97	2,78	1,76	1,22
Point Load P_{max} (KN)	13,49	7,53	5,57	3,70	2,74	2,40	1,91

Technical Data Sheet
FT-01-0039 / FT-01-0040

- **Ledger to Platform**

The joining between ledgers is made with a U-Head and the joining between ledgers and metal planks is made with a Special Head; both elements assure a good working of scaffolding.

Length (m)	0,370	0,670	0,965	1,295
Distributed Load q_{Lmax} (KN/m)	81,57	25,08	12,14	6,60
Point Load P_{max} (KN)	15,34	8,44	5,84	4,28

Technical Data Sheet
FT-01-0044

- **Platform to Platform**

The joining between metal planks is made with a Special Head; it assures a good working of scaffolding.

Length (m)	0,300	0,585	0,890	1,190
Distributed Load q_{Lmax} (KN/m)	124,59	33,18	14,20	7,92
Point Load P_{max} (KN)	18,69	9,68	6,33	4,72

Technical Data Sheet
FT-01-0046

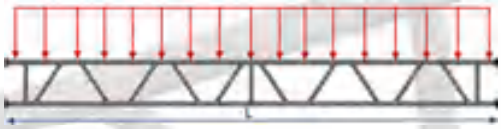
Distributed load / Point load = Service load
Included safety partial factor of resistance $\gamma_M = 1,1$ and safety partial factor of applied forces $\gamma_F = 1,5$

RBN Lattice Beam

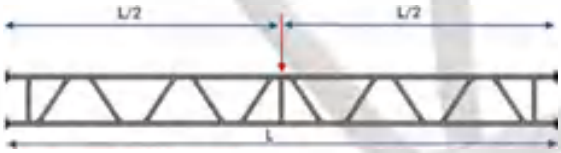
Description

Manufactured in galvanized steel tubing: S275: 48 mm diameter and 3 mm thick, and the reinforcements are in galvanized steel tubing: S235 with 42 and 35 mm diameter and 2 mm thick.

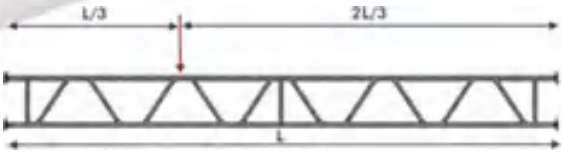
The ledgers and the vertical components are joined by means of the "Resablok Node", which guarantees a suitable functioning of scaffolding.



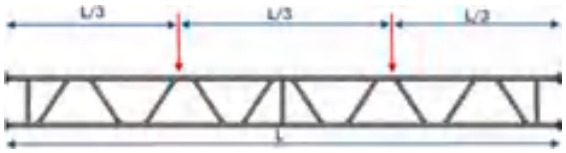
Length (m)	1,50	2,00	2,50	3,00	4,00	5,00	6,00
Distributed Load q_{Lmax} (KN/m)	14,91	8,24	7,43	4,92	3,66	2,55	2,45



Length (m)	1,50	2,00	2,50	3,00	4,00	5,00	6,00
Point Load P_{max} (KN)	15,99	9,87	6,03	5,34	9,27	10,15	9,89



Length (m)	1,50	2,00	2,50	3,00	4,00	5,00	6,00
Point Load P_{max} (KN)	11,73	7,34	9,27	7,34	5,65	6,03	6,72

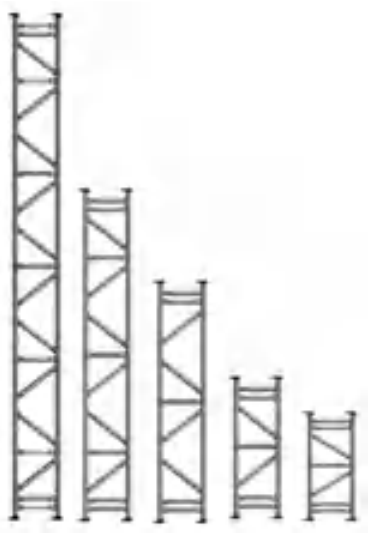


Length (m)	1,50	2,00	2,50	3,00	4,00	5,00	6,00
Point Load P_{max} (KN)	9,13	5,53	5,70	4,76	4,07	4,71	4,76

Technical Data Sheet
FT-01-0005

Distributed load / Point load = Service load
Included safety partial factor of resistance $\gamma_M = 1{,}1$ and safety partial factor of applied forces $\gamma_F = 1{,}5$

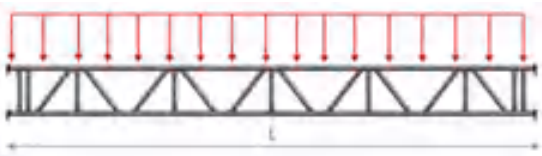
RBP Lattice Beam



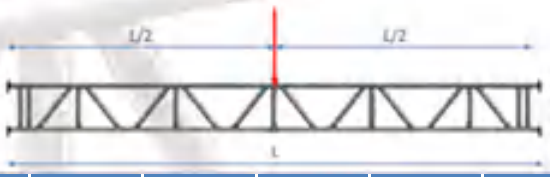
Description

Manufactured in galvanized steel tubing: S355: 48,3 mm diameter and 3,2 mm thick.

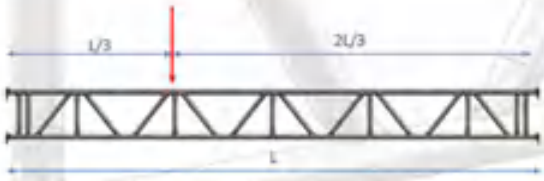
The ledgers and the vertical components are joined by means of the "Resablok Node", which guarantees a suitable functioning of scaffolding.



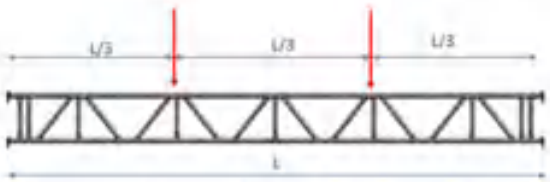
Length (m)	1,50	2,00	2,50	3,00	4,00	5,00	6,00
Distributed Load q_{Lmax} (KN/m)	37,50	24,00	20,80	11,70	9,00	8,00	5,40



Length (m)	1,50	2,00	2,50	3,00	4,00	5,00	6,00
Point Load P_{max} (KN)	35,00	17,00	28,00	17,00	17,00	15,80	15,80



Length (m)	1,50	2,00	2,50	3,00	4,00	5,00	6,00
Point Load P_{max} (KN)	18,70	16,50	20,00	13,30	8,30	12,10	14,50



Length (m)	1,50	2,00	2,50	3,00	4,00	5,00	6,00
Point Load P_{max} (KN)	18,70	16,20	14,00	8,50	7,00	10,50	9,50

Technical Data Sheet
FT-01-0068

Distributed load / Point load = Service load
Included safety partial factor of resistance $\gamma_M = 1{,}1$ and safety partial factor of applied forces $\gamma_F = 1{,}5$

6.3. Decks

Resablok Decks have been designed and manufactured according to UNE-EN 12811 Standard. They have a non-slip finishing and are completely compatible with Resablok System.

Class	Load [kN/m²]	Decks 0.30 / Decks 0.19						Steel Access Decks			
		Deck Length						Deck Length			
		0,75 m	1,00 m	1,50 m	2,00 m	2,50 m	3,00 m	0,75 m	2,00 m	2,50 m	3,00 m
1	0.75	•	•	•	•	•	•	•	•	•	•
2	1.50	•	•	•	•	•	•	•	•	•	•
3	2.00	•	•	•	•	•	•	•	•	•	•
4	3.00	•	•	•	•	•	•		•	•	•
5	4.50	•	•	•	•	•					
6	6.00	•	•	•	•						

Access Decks – Wooden Surface

L= 2.00 m	Class 6
L= 2.50 m	Class 6
L= 3.00 m	Class 4

Angular Decks

Class 3

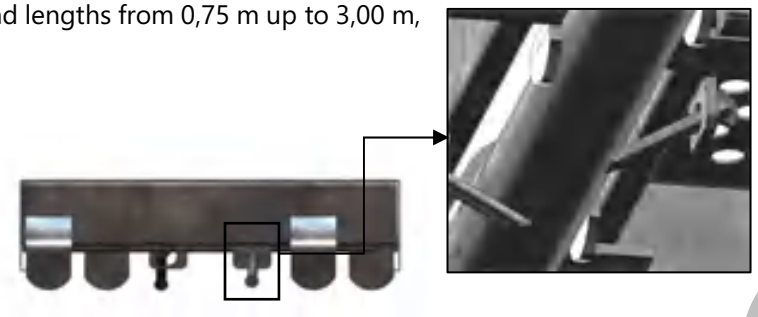
Special Decks

L= 0.72 m	Class 6
L= 0.95 m	Class 6
L= 1.40 m	Class 6
L= 1.90 m	Class 4

Cover Gap Decks for Perpendicular Bays

L= 1.50 m	Class 6
L= 2.00 m	Class 6
L= 2.50 m	Class 6

With widths from 0,19 m up to 0,60 m and lengths from 0,75 m up to 3,00 m, Resablok System get to any work area.



Maximum Safety

The non-slip finishing and the non-overturning system provide us a safe and reliable work area.

6.4. Couplers

Right Angle Coupler

For 48,3 mm diameter tubes.
To connect tubes in straight angle.
Skidding Resistance: 15 kN.
Bending Moment: 0,8 kNm.

Swivel Coupler

For 48,3 mm diameter tubes.
To connect tubes in variable angle.
Skidding Resistance:10 kN.

Girder Coupler

Fastenings for beams.
Two units are necessary.
Maximum load on the vertical: 9 kN.

Double Node and Wedge Unit

Connection for two standards with parallel node-node.

Mobile Resablok Node

It can be placed in any part of standard.

Fixed and Swivel couplers for D=48,3 mm (UNE EN-74)
Manufactured in steel, with screws in accordance with EN-74
Tightening torque: 50 Nm

Galvanized steel tubing
With the couplers, permit the possibility of non-conventional assemblies and applications, with the necessary structural analysis.

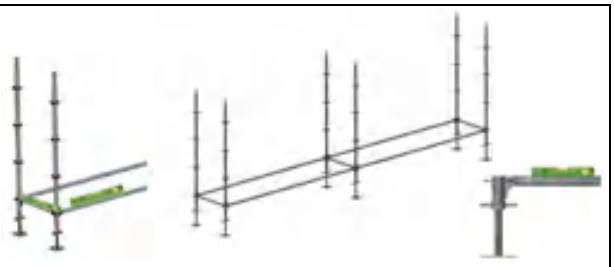
Steel tube 48,3 x 3,25 mm

7. CONFIGURATION AND ASSEMBLY

7.1. Assembly General Plan

SCAFFOLDING LAYOUT

1. Location of screw jacks and initial standards.
- ➔ To use distribution sleepers in case of not resistance or unstable surfaces.
- ➔ Assembling initial standards of 1,50 m or 2,00 m we will have a safety anchorage point in the top level (See article 8.2).



2. Joint of longitudinal and transversal ledgers.
- ➔ Vertical and horizontal levelling of the structure by a spirit level.
- ➔ Rectifying of slopes by the screw jacks regulation.

SCAFFOLDING ASSEMBLY

Non-overturn System

3. Colocación de las plataformas en el nivel inferior.
- ➔ To assure the stability of platforms by non-overturn system.
- ➔ Assembly of decks according to the article 7.3.1.

4. Getting height, assembling new standards, ledgers and decks.
- ➔ It should make use of PPE according to the article 8.2.
- ➔ It is important to put diagonal braces in the first bay for stabilizing the structure.

5. Protection against people falling at different level.
- ➔ Location of double handrails of perimeter protection.
- ➔ Each level shall be completely assembled before make the next level.

6. Protection against debris falling.
- ➔ Location of toe-boards on every perimeter of the scaffolding according the article 7.3.1.

7. Progressively structural stabilizing by diagonal braces.
- ➔ Assembling diagonal braces according to the article 7.3.4.

8. Horizontal Anchoring of the scaffold.
- ➔ Placing of horizontal anchors by the Assembly, Use and Dismantling Method Statement or the standard configuration.

SCAFFOLDING DISSASEMBLY

9. Inverse procedure to the assembly.
- ➔ Not withdraw elements that keep stable the structure: horizontal anchors, structural ledgers...
- ➔ It must be used the proper PPEs according the article 8.2.
- ➔ Do not store elements that will disassemble on cantilever surfaces or surfaces that we do not know the resistance.

- **Method Statement for assembly, usage and disassembly of scaffolding**

RD 2177:2004

Specific assembly procedures:

- Façade scaffold.
- Birdcage scaffold.
- Rectangular perimeter tower.
- Circular perimeter tower.
- Hanging scaffold.
- Shoring.
- Rack scaffold.
- Façade stabilizer
- Other assemblies.

More information:
Consult with technical department.

7.2. Standard Scaffolding

Resablok Standard Scaffolding are considered those settings tested or calculated by the Resa Group.

All configurations are composed of elements Resablok Multidirectional System and comply with regulations of UNE-EN 12810 and UNE-EN 12811. For correct use of scaffolding Resablok type, should consider the following aspects:

- Must be ensured that the vertical loads are transmitted correctly to the support surface using sleepers if necessary.

- Must be ensured that the horizontal loads are transmitted correctly through the ties, also the anchoring must be from the scaffold to the more resistant areas of the building or vertical surface.

- They must stop the work processes, assembly and disassembly of scaffolding to adverse weather conditions such as rain, snow or exceeding 72 km/h wind, proceeding to remove the materials or tools that could fall from the surface of the scaffold.

- The maximum allowed load each of the elements forming the scaffolding structure may not be exceeded in any circumstances (See article 6: Component Technical Characteristics).

Assembly types: facade scaffolding, walkways, vehicle access, towers, etc...

Generally, they will be continued instructions of the Method Statement for Assembly, Use and Disassembly of Scaffolding of RESA GROUP.

7.2.1. Configuration descriptions

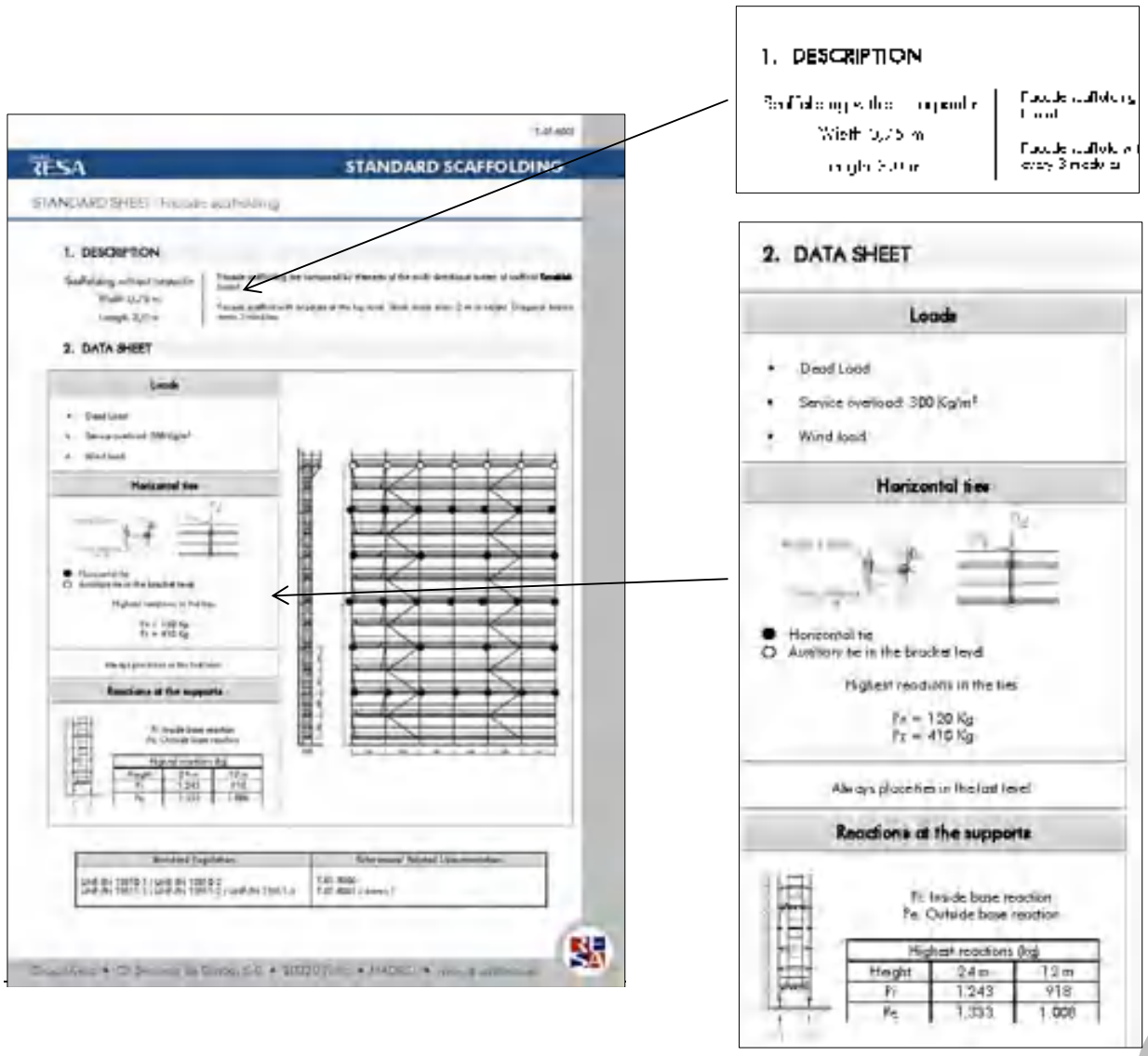
Each configuration standard and its variants are shown in different standard sheets, where information is collected and necessary details to understand the layout and characteristics of the scaffold.

Description

In each of the standard sheets is described the scaffold configuration by complying their basic dimensions, types of covers or placements of auxiliary elements such as outstanding parts, walkways or vehicle access.

Data Sheet

In this article it is defined the high load of use of each configuration in addition to the horizontal reactions from the ties and vertical reactions in the supports. A drawing on which reflect the basic dimensions of the scaffold and the arrangement of anchors and diagonal braces are also shown.



Loads

Each of the configurations or variants are designed to withstand the maximum loads indicated in each Data Sheet according to UNE EN 12811-1:

Load type	Uniformly distributed load	Concentrated load in an area of 500mm x 500mm	Concentrated load in an area of 200mm x 200mm	Load in a partial area	
	[kN/m^2]	[kN]	[kN]	[kN/m^2]	[a_n]
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

Table: Service loads in work areas.

To the design and calculate of each configuration it has kept in mind the following loads:

- Dead Load. Weight which corresponds to the elements of the structure, including all structural components and platforms of the scaffold.

- Service Overload. Service load in the work areas.

  It is considered an uniformly distributed overload acting on the worst level of work plus the 50 per cent of the specified load acting on the most unfavorable adjacent level.

- Wind load: according to the coating type and the structure height. Calculation criteria:

Horizontal ties/ Reactions on the supports

Each sheet shows the horizontal reactions produced in the ties to the worst configuration that it is contemplated, i.e., for a height of 24 m with the maximum wind load.

Types of anchoring: See “Resablok Manual. Part 7.6 Anchorages”

Also, the vertical reactions produced on the supports that depend of the height of scaffolding (24m/12m), differentiating between inside base (closer to the facade) and the outside base (furthest from the facade).

7.2.2. Configurations

The next table show all configurations approved by Resa Group according to type of assembly:

FACADE SCAFFOLDS

Reference	Width Bay	Length Bay	Covering
T-01-R001	0,75 m	3,00 m	Without net/tarpaulin
T-01-R002	0,75 m	3,00 m	With net
T-01-R003	0,75 m	3,00 m	With tarpaulin
T-01-R004	0,75 m	2,00 m	Without net/tarpaulin
T-01-R005	0,75 m	2,00 m	With net
T-01-R006	0,75 m	2,00 m	With tarpaulin
T-01-R007	1,00 m	3,00 m	Without net/tarpaulin
T-01-R008	1,00 m	3,00 m	With net
T-01-R009	1,00 m	3,00 m	With tarpaulin
T-01-R010	1,00 m	2,00 m	Without net/tarpaulin
T-01-R011	1,00 m	2,00 m	With net
T-01-R012	1,00 m	2,00 m	With tarpaulin

WALKWAYS

Reference	Width Bay	Length Bay	Width Walkway
T-01-R013	0,75 m	3,00 m	Up to 3,00 m
T-01-R014	0,75 m	2,00 m	Up to 3,00 m
T-01-R015	1,00 m	3,00 m	Up to 3,00 m
T-01-R016	1,00 m	2,00 m	Up to 3,00 m

VEHICLE ACCESS

Reference	Width Bay	Length Bay	Access Width
T-01-R017	0,75 m / 1,00 m	3,00 m	6,00 m
T-01-R018	0,75 m / 1,00 m	2,00 m	6,00 m
T-01-R019	0,75 m / 1,00 m	2,00 m	4,00 m

TOWERS

Reference	Width Bay	Length Bay	Version
T-01-R020	1,50 m	Up to 3,00 m	Reinforce ledger / Beam
T-01-R021	2,00 m	Up to 3,00 m	Reinforce ledger / Beam
T-01-R022	3,00 m	Up to 3,00 m	Reinforce ledger / Beam

TOWERS WITH CANTILEVER

Reference	Dimensions	Length Cantilever	Version
T-01-R023	3,00 m x 3,00 m	1,50 m	Reinforce ledger / Beam
T-01-R024	3,00 m x 3,00 m	2,00 m	Reinforce ledger / Beam
T-01-R025	3,00 m x 3,00 m	3,00 m	Reinforce ledger / Beam

ALLITERATIVE TOWERS

Reference	Width	Length	Version
T-01-R026	1,50 m	Until 3,00 m	Reinforce ledger / Beam
T-01-R027	2,00 m	Until 3,00 m	Reinforce ledger / Beam
T-01-R028	3,00 m	Until 3,00 m	Reinforce ledger / Beam

ACCESS STAIRWAY

Reference	Stairway	Dimensions (Plant View)
T-01-R029	Heavy Duty Stairway 2,00 m x 2,00 m	4,00 m x 2,00 m
T-01-R030	Heavy Duty Stairway 2,50 m x 2,00 m	2,50 m x 1,50 m
T-01-R031	Heavy Duty Stairway 3,00 m x 2,00 m	3,00 m x 1,50 m

HANGING SCAFFOLDING

Reference	Width	Length	Version
T-01-R032	0,75 m	Until 3,00 m	Beam 1,50 m
T-01-R033	1,00 m	Until 3,00 m	Beam 1,50 m
T-01-R034	0,75 m	Until 3,00 m	Beam 2,00 m
T-01-R035	1,00 m	Until 3,00 m	Beam 2,00 m
T-01-R036	0,75 m	Until 3,00 m	Beam 3,00 m
T-01-R037	1,00 m	Until 3,00 m	Beam 3,00 m

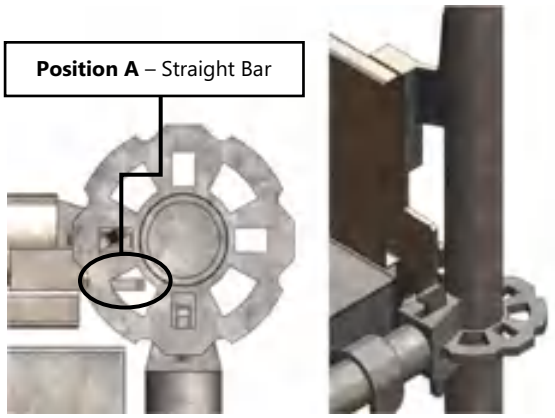
7.3. Specific assembly recommendations.

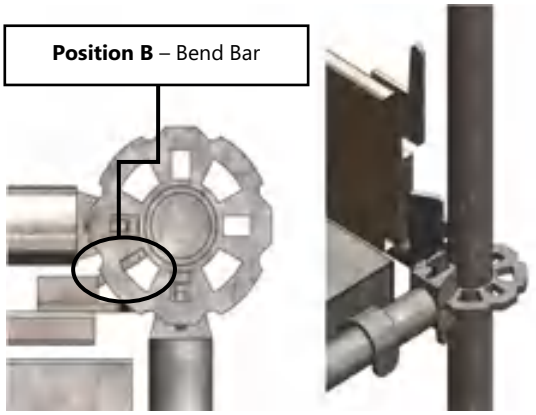
7.3.1. Toe Boards and Decks

Resablok System allows us to assembly any configuration and, in addition, it allows obtaining flat and without gaps surfaces. Assembly instructions:

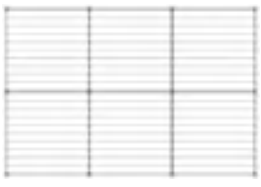
Width (m)	N° Decks 0,30	N° Decks 0,19	RBP Toe Board
0,75	2	0	B
1,00	3	0	A
1,50	4	1	A
2,00	5	2	A
2,50	8	0	A
3,00	9	1	A

RBP Toe Board can be situated in two different positions: Position A) straight bar placed downwards; Position B) bend bar placed downwards.

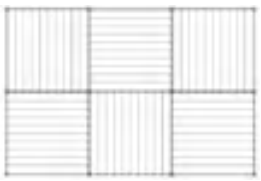




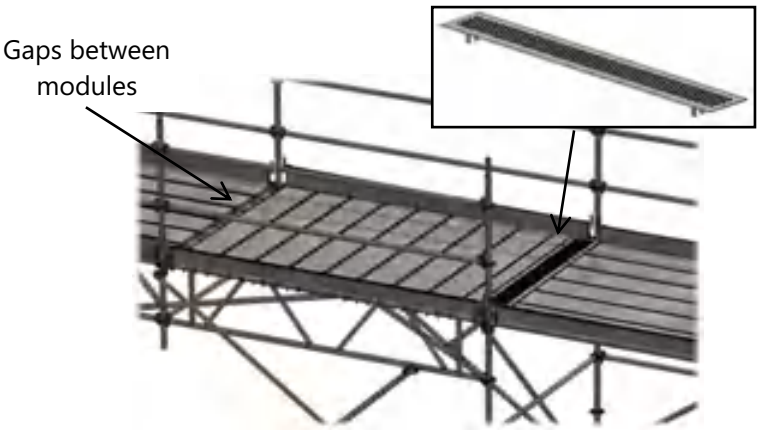
In case of birdcage scaffolding in which it is required a great load capacity, it is recommended to place decks by random manner. By this way we get distributing the load on more horizontal elements. (Reinforced ledgers or lattice beams). The cover-gap decks allow to cover the gaps between random manner modules.



Decks in the same direction



Decks by random manner



Alternating the direction of decks we get increasing the scaffolding load capacity.

7.3.2. Horizontal elements

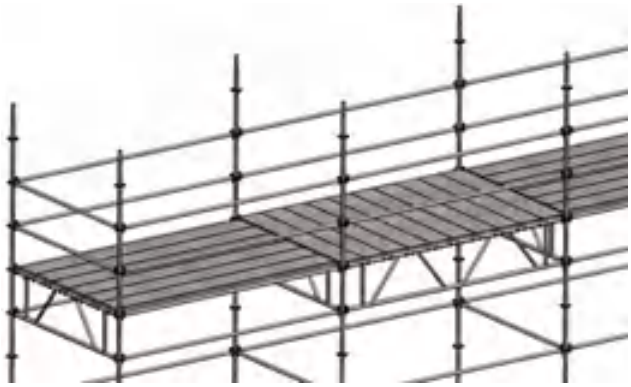
To choose the horizontal elements which acts as support of work platforms, it has to take into account its length and the loads that the must support.

Length	Ledger type
0,75 m	Ledger
1,00 m	Ledger
1,50 m	Reinforced Ledger / Lattice Beam
2,00 m	Reinforced Ledger / Lattice Beam
2,50 m	Reinforced Ledger / Lattice Beam
3,00 m	Reinforced Ledger / Lattice Beam

Horizontal elements- Platform support

Horizontal elements of length equal or greater than 1,50 long on which they support work platforms, they must be reinforced ledgers or lattice beams.

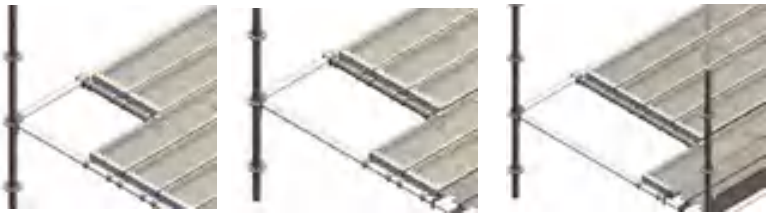
It has to assure that admissible maximum load of the element is not overtaken in any case. (See article 6: Technical Characteristics of elements).

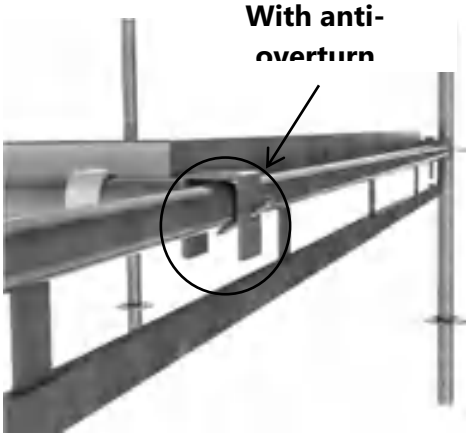


Assembly of intermediate ledgers

At assembly moment of intermediate ledgers, it should keep in mind the load on the support (ledger or deck).

It has to make all necessary steps to find appropriate solutions for safe working.





- RBP Intermediate ledger (ledger to ledger)
- RBP Intermediate ledger (ledger to deck)
- RBP Intermediate ledger (deck to deck)

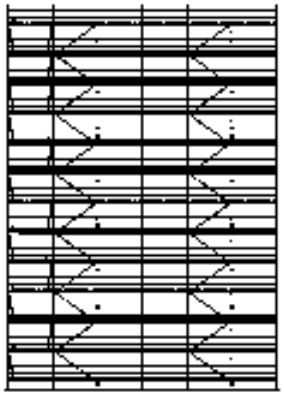
7.3.3. Diagonal Bracing

It is important to make a proper diagonal bracing of the scaffolding to avoid displacements and to assure the structural stability.

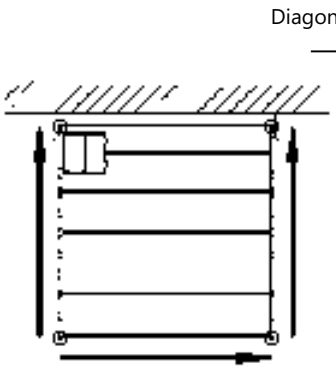
The diagonal bracing can change depending on the scaffolding type and its dimensions. By indicative way, it will follow the below indications:

Scaffolding type	Diagonal Bracing
Perimeter/facade scaffolding	One each three bays
Birdcage scaffolding	One each three bays
Tower – Height < 3,00 m *	It is not needed anchoring
Tower – Height ≥ 3,00 m *	Minimum three diagonal braces sides
Self-stable Tower (without horizontal anchoring)	Diagonal bracing for every sides (Except at the entrance side of the lower level)

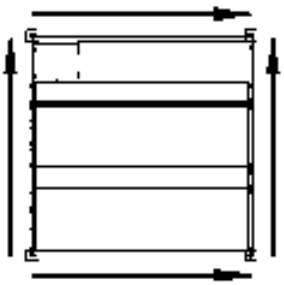
* Height of the top level



Façade Scaffolding

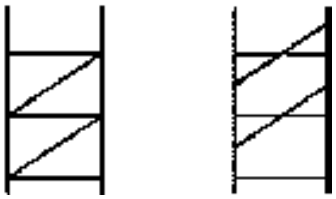


Anchored tower



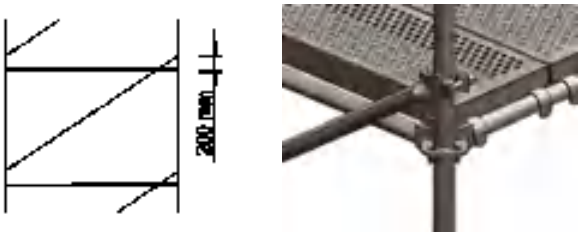
Self-stable Tower

To get a proper diagonal bracing, the assembly should make by longitudinally and transversally fixed nodes.



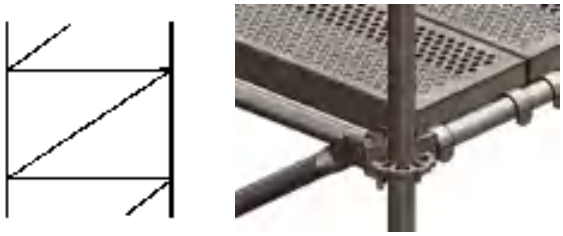
Right Incorrect

RBN Series



The assembly of diagonal braces for the RBN series will make with a maximum distance of 20 cm to the fixed node.

RBP Series



The assembly of diagonal braces in the RBP series will fix to the node.

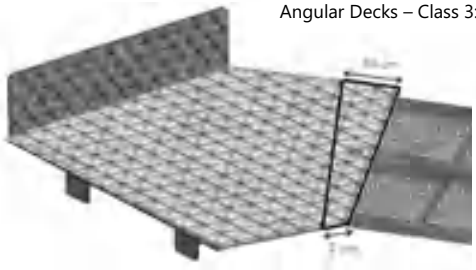
7.3.4. Special and Angular Decks Assembly

These decks must be attached with fasteners (bolts, wires, flanges, etc.) to avoid their movement due to involuntary hits.

The usage of angular deck in vessels and tanks makes easier the assembly and provides the necessary safety on site.

Warning: the support surface of the angular metal plank on the decks will have to comply with indicated in below figure (2 cm / 10 cm).

Angular Decks – Class 3: 2,00 kN/m^2



The special decks (H=25 mm) offer a useful solution in order to cover all possible gaps; furthermore, they allow working in areas with complicated access.

Special Metal Plank Length	Class	Maximum Load (kN/m^2)	Minimum Support Length (A)
720 mm	6	6,00	10 cm
950 mm	6	6,00	10 cm
1400 mm	6	6,00	20 cm
1900 mm	4	3,00	20 cm

Tanks

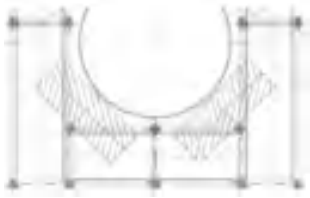
Indicative recommendations for tank layouts:

Ø ≤ 4 m
1. Rectangular perimeter scaffolding

4 m ≤ Ø < 10 m
2. Circular perimeter Scaffolding
One inside base.

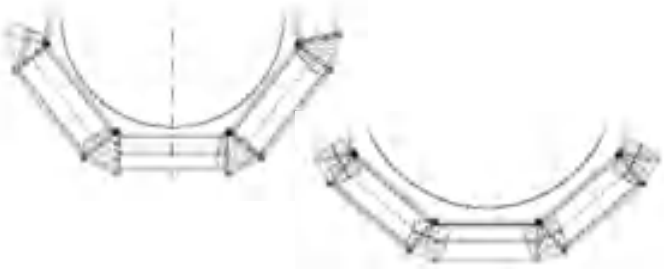
Ø ≥ 10 m
3. Circular perimeter Scaffolding
Two inside bases.

Indicative recommendations to the usage of the angular decks and special decks in the hollows that are originate in the assembly of perimeter scaffolding:



1. Rectangular perimeter Scaffolding

Diameter	Deck type
0 – 2 m	Special Decks L =1,40 m
2 – 4 m	Special Decks L =1,90 m



2. Circular perimeter Scaffolding

Diameter	Deck type
4 m	Angular Decks
5 m	Angular Decks L =0,72 m
6 – 7 m	Angular Decks
8 – 9 m	Special Decks L =0,72 m

3. Circular perimeter Scaffolding

Diameter	Deck type
10 m	Special Decks L =0,95 m
11 m – 15 m	Special Decks L =0,95 m / 0,72 m
> 15 m	Special Decks L =0,72 m

*** REMARKS:**

- These recommendations are indicative notes of mounting. The assembly of a deck type or the scaffolding layout could vary depending on bay lengths, widths and other criteria as the distance between wall and scaffold.
- It must be respected at all times the minimum length of supported indicated in the previous article.

7.4. Anchorages

Anchorage Arrangement

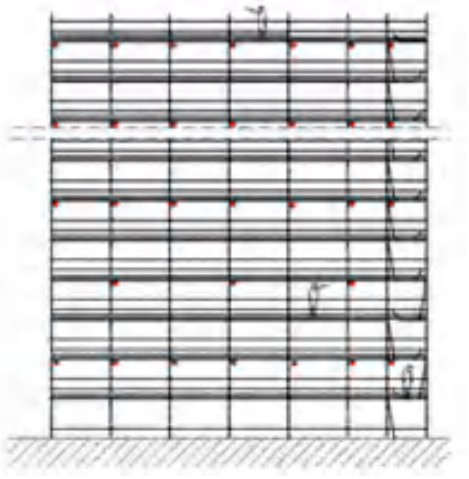
All scaffolding structures must be tied horizontally to guarantee their stability and resistance.

Each scaffold must study and design to define both the type and the quantity of necessary horizontal ties.

By indicative way, for facade scaffold of height less than 24 m, it will follow the criteria bellow:

Scaffolding Type	Horizontal anchores
Scaffolding without coating	Every 24 m^2
Scaffolding with net	Every 12 m^2
Scaffolding with tarpaulin	All levels and vertical posts

First level of anchoring will make to 4 m high as maximum.



Reference model of anchoring on façade scaffolding

It is important to fix the anchorages in all the frames or upper - most standard beams at the top of the scaffolding; in this way, the scaffold stability is guaranteed.

The scaffold must be anchored to the facade both in perpendicular way and parallel way; in this way, the scaffold is resistant to compression and tensile stress.

Scaffold with tarpaulin

A specific analysis of horizontal ties must be made for those scaffolds assembled with tarpaulins which avoid wind crossing.

A suitable anchorage of scaffold is basic to avoid its overturning since the wind causes big horizontal efforts in these cases.

Anchorage Types

The ties to vertical surface must be carried out with tube-coupler and, they always must be placed the closest to scaffold ledgers.

Short Anchorage

Long Anchorage

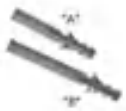
Cross-Shape Anchorage

It´s recommended putting long or cross-shape anchorages when horizontal big stresses (parallel to façade) were happened, since this kind of ties are more effective in supporting these forces.

Safe and Quick Solutions:

Anchor Tube

Coupler



Plugs

Eyebolts

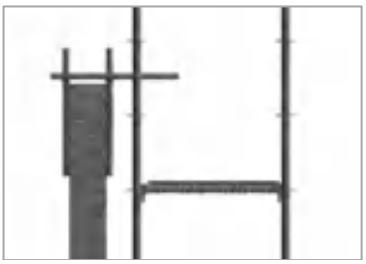
Expanding Plugs

Always check the assembly and resistant capacity of plug.
Read the manufacturer assembly instructions.

Other kind of anchorages:

When the scaffolding can´t have standard anchorages, there are many solutions to tie the structure in a safety and resistant way.

A qualified technician must check that the ties were carried out in proper way.



Fastenings to overhangs

Shoring up windows

Keys for cement or metal structures

Specific anchorage for metal beams

8. SAFETY

Security at work is one of the basic principles which determine the development of **RESA GROUP** activities. All Company knows and identifies with our Prevention Policy, Quality and Environment.

This company´s commitment with safety and health of employees, along with continuous improvement, was what led us to accredit according to international standard **ISO 45001 NATIONWIDE**. The management system of safety and health at work is accredited to all the RESA GROUP´s local offices. This allows us to a better control risk and improves our performance in Occupational Safety and Health.

Working in total safety…

8.1. Safety recommendations in the assembly, use and disassembly

Recommendations previous to the Assembly

- To make a proper approach of the scaffold taking into account the geometry of the facade or surface, service load, use of coatings or not,...

- It must to take care about the resistance as support scaffolding areas as the type and number of horizontal anchors needed to assure the stability of the scaffold.

Recommendations during the Assembly

- Previous checking of the assembly zone, regarding the soil conditions, anchoring areas and possible obstacles during the assembly.

- Delimited and signaling of assembly and storage zones.

- To follow the assembly instructions established by the manufacturer:

    - Layout and leveling of first level.
    - Horizontal bracing according to the initial design proposed.
    - Diagonal bracing of the scaffolding.
    - Assuring of every decks against the overturning by a safety device.
    - Perimeter protection: double safety handrail and toe board.

Recommendations during the usage of the scaffold

- To make periodic inspections according to the Real Decreto 2177/2004.

- Stopping Works on the scaffold in case of raining, snowing or wind stronger than 72 km/h.

- Don't overload the scaffolding above its resistance capacity.

- Don't store materials nor work equipment on cantilever places or places where it doesn't know the resistance capacity.

- To keep organized and cleaned the work area to avoid fallen at the same level and debris fallen to low levels.

- The scaffolding modifications shall be carried out by qualified staff and always under supervision of the company that mounts the scaffold.

Recommendations during the disassembly

- The disassembly will make it by assembly inverse process.

- It mustn't dismount elements needed for maintain the structure stability; therefore, it only can dismount these elements which role has been disappeared.

8.2. Personal Protective Equipment (PPE´s)

The equipment of personal protective can be devices, complements or accessories used by the workers with the aim of protect themselves against risks that could threaten their health and safety while they work.

The obligatory personal protective equipment for assembly and disassembly performances are:

Safety helmet
Protection of the head

Safety shoes
Protection of the feet

Safety gloves
Protection of the hands

When the protection against falls by means of collective protections (double handrails) is not assured, it will be needed to use an equipment of anti-falling composed by safety harness and anchoring devices.

To be always connected is needed to dispose with double karabiner.

Anti-falling protection equipment
Protection against falls to different levels.

Before using the scaffolding structure as anchoring point, it is needed to make the horizontal anchoring of the scaffolding to assure the stability and resistance.
(See article 7.5 Anchors).

The safety harness will anchors to the Resablok scaffolding structure in the following points:

1. Anchored to the braced node.

Braced nodes by mean of horizontal elements in both directions (longitudinally and transversally).

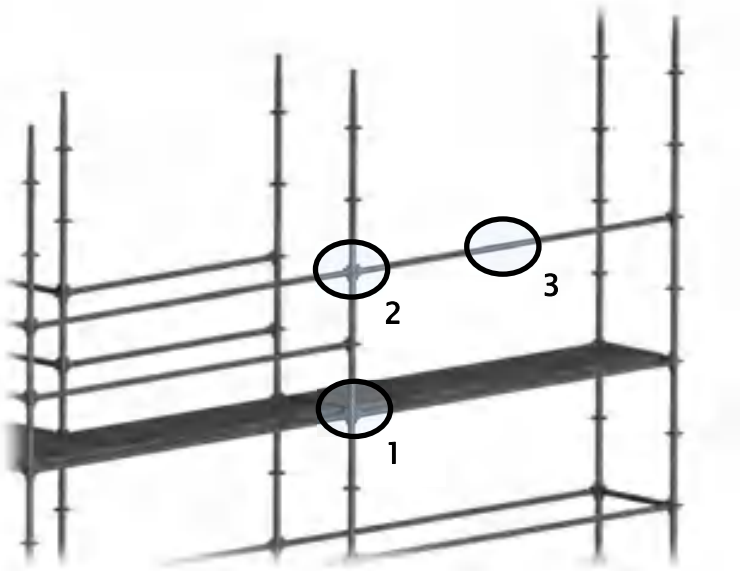
2. Anchored to the node.

This node belongs to the standard which has at least one braced node.

The anchorage to the node will place it 1 meter over the braced node.

3. Anchored to the ledger

To move through work levels.



8.3. Scaffolding Checking

According to the Real Decreto 2177/2004, the scaffolding shall be checked by the criteria below:

- Before putting into service.
- In use, periodically.
- After any modification, non-used period or any other circumstance that could affect to their resistance or stability.

In general, a maximum period between inspections of 15 days is recommended, but this may be different according to local regulations, use to which the scaffolding, etc.

By indicative means, it has to check:

- Proper location of the bases.
- Vertical and horizontal elements have to be levelled and align.
- Horizontal anchors according to the standard configuration or the Assembly Plans.
- Decks assured by a non-overturning device.
- Proper collective protections.

When some parts of the scaffolding won't be ready for its use, particularly during assembly, disassembly or modifications, these parts must have advertency signs (Safety cards).

INVALID SCAFFOLD

VALID SCAFFOLD

Once finished the assembly with all proper safety protections, they will be placed in the access zones at the same time than the safety card in which is indicated that scaffold is valid or not.

9. ENGINEERING & INNOVATION

RESA Group department of Engineering and Innovation is composed by a team of Engineers and Technicians who work at headquarters, in Pinto, in close contact with several technicians at the different local offices. This department provides services to the Group's factories, Delegations, National and International Subsidiary Companies, and Projects for Large Clients, as well as technical assistance when it's required.

This Department has efficient licensed tools for design and calculation, recognized in the industrial environment:

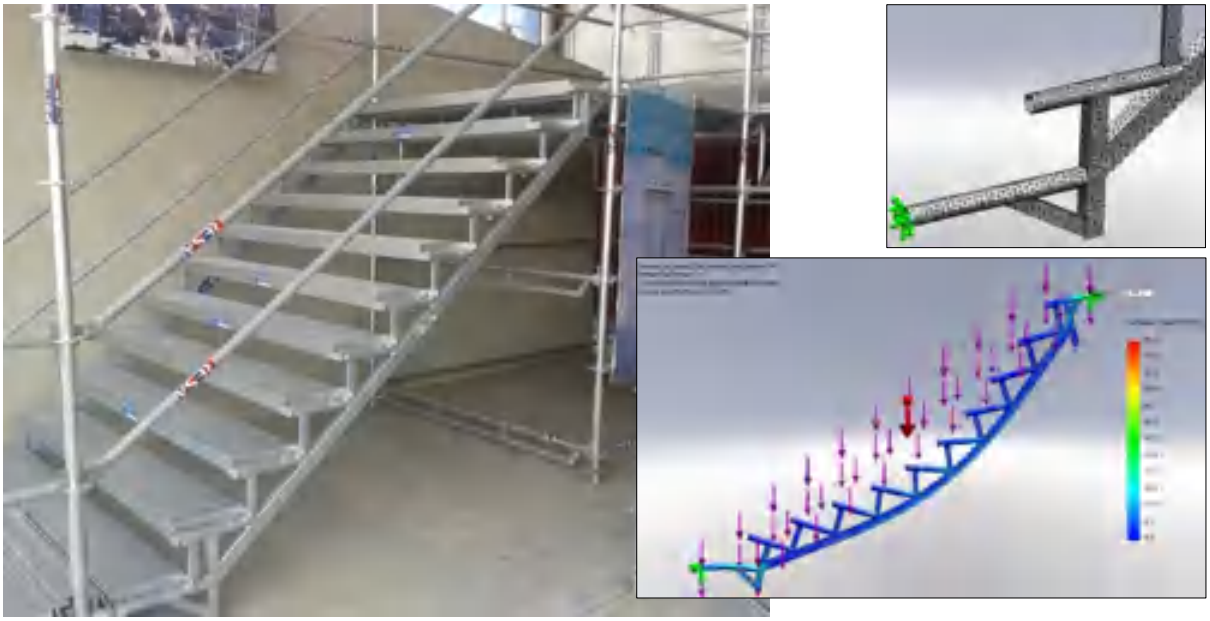
- Design: AutoCAD, Inventor y SolidWorks
- Structural Calculations: Tricalc (Arktec)
- Finite Element Method: SolidWorks Simulation
- RGM (Resa Global Management): Stock and Project Control

Testing Bench

Located at our headquarters, RESA Group has a testing bench where new elements and materials are checked; in addition, this area is prepared for providing personnel training, both for our own workforce and for our clients.

Calculation and tests of elements

All elements of Resablok System have been calculated and tested according to the UNE-EN 12811.

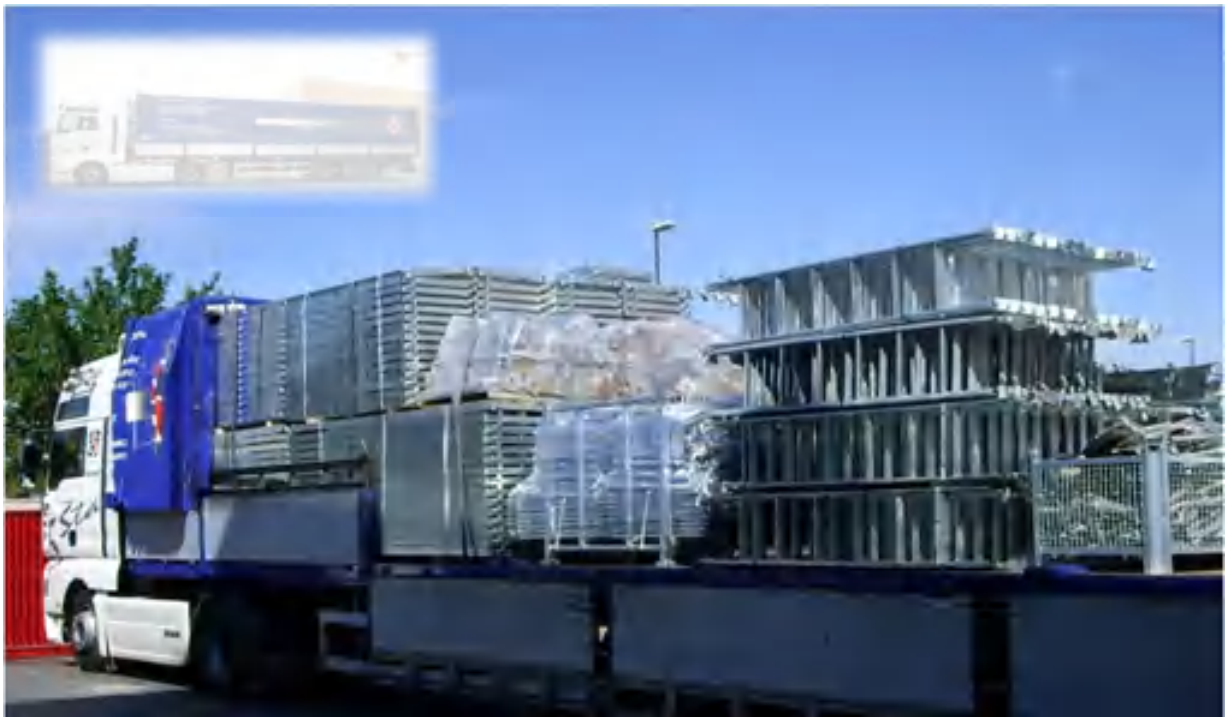


The area where is going to execute the tests, will be delimited and appropriate by the necessary means for the proper test performances.

In addition, they are made testing of materials and strength tests at **external laboratories** with high prestige.

10. TRANSPORT AND STORAGE

Resa Group has specific facilities in all its Local Offices and Subsidiaries for carrying out a suitable storage. In addition, these storages have a load/unload area for large tonnage vehicles.



Storage in Works/Temporary Places.

Sometimes, logistics and the need to work in situ force us to establish centers of storage and loading / unloading on-site from special works.

This requires us to rationalize the spaces and stockpiled items; therefore we will use Resablok cages.

Store and Transport

The component transport is carried out in pallets and specific mesh crates in accordance with their size and weight.

This kind of organization allows us to transport the material in safety and quick way and, furthermore, it guarantees organized movements on site.

H1000: Large dimension pallet for classification and transportation of tubular elements RBN/RBP, manufactured in galvanized steel.

RBN002: Pallet for classification and transport of tubular elements RBN/RBP, manufactured in galvanized steel.

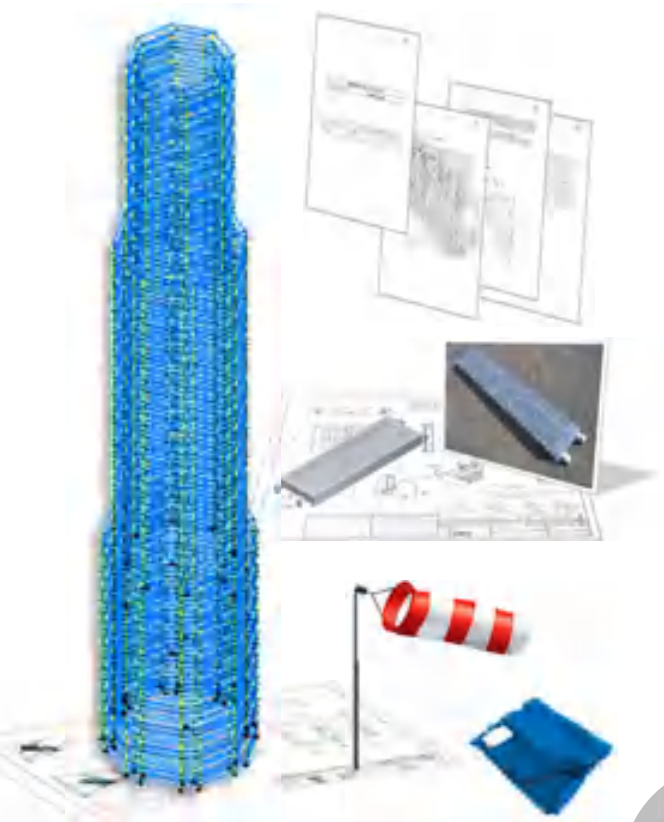
H500: Mesh Crate for small dimension elements, manufactured in galvanized steel.

Material preservation

The components are inspected and verified exhaustively for guaranteeing a perfect conservation of them.

Associated Documentation: IT-PG-06-04

11. REFERENCES

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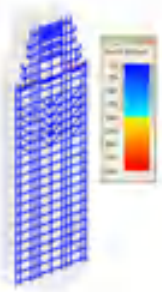

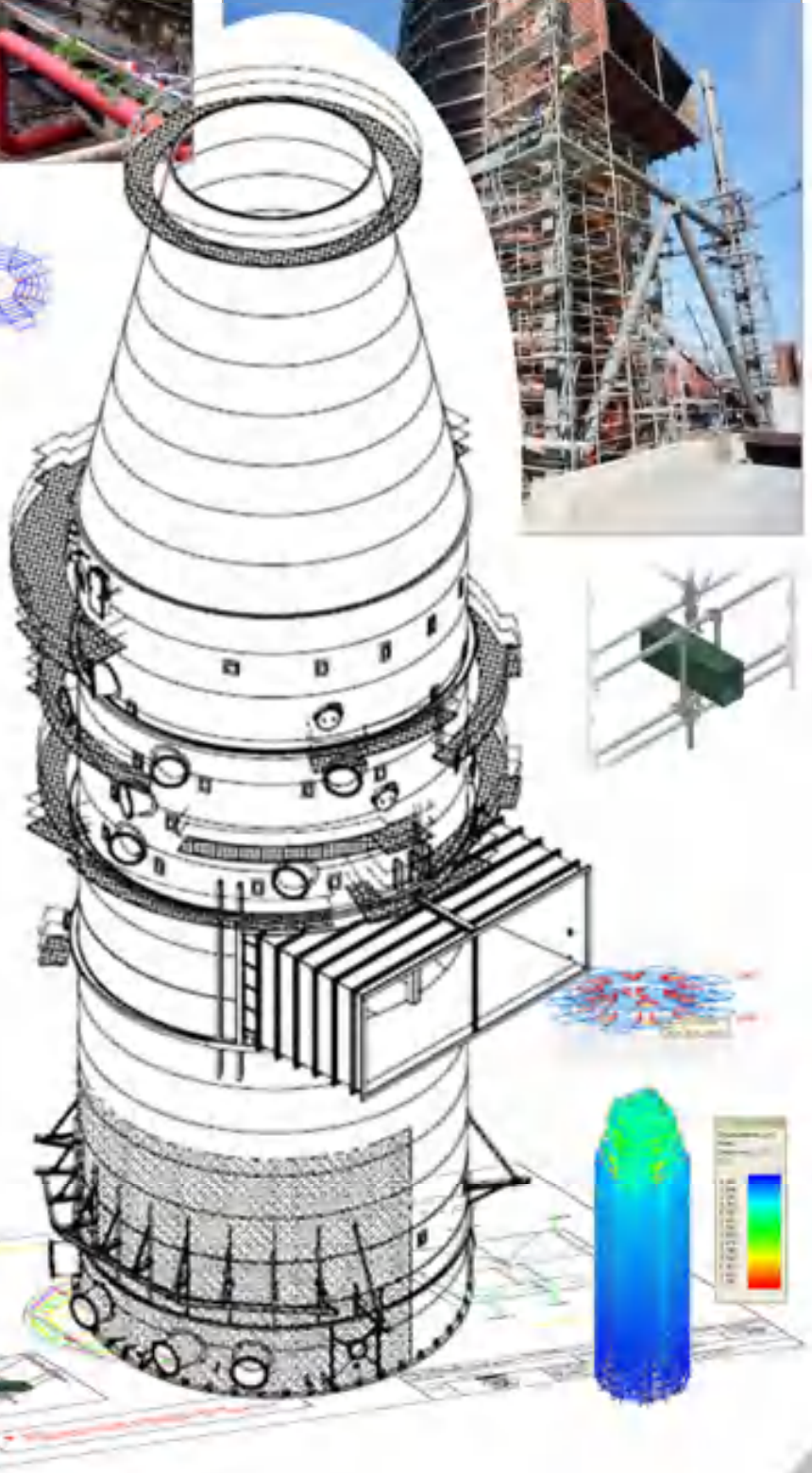

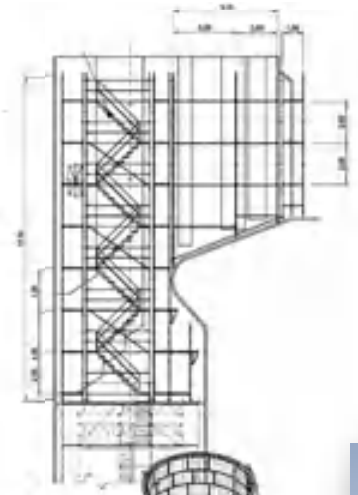

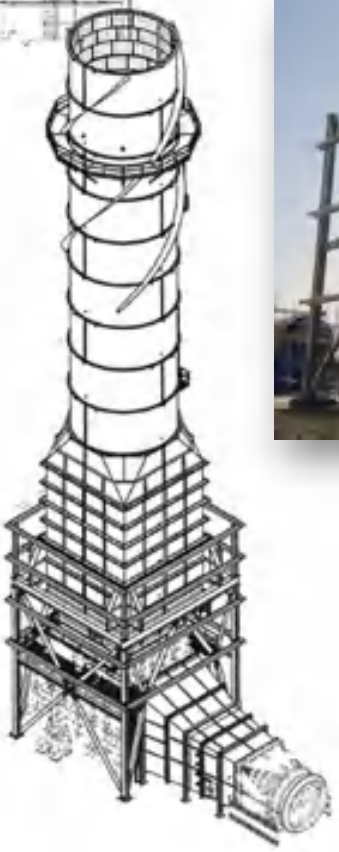


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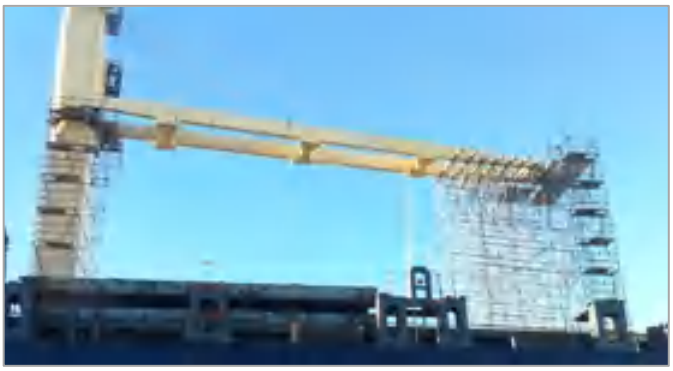


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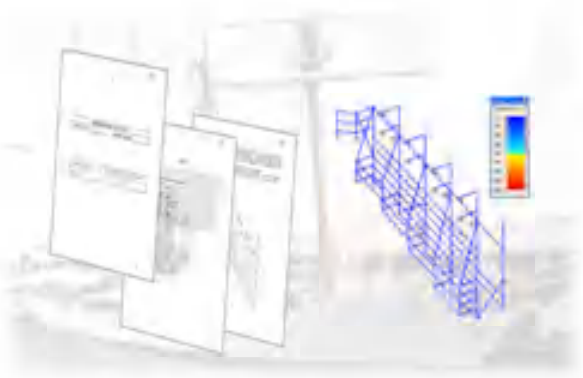


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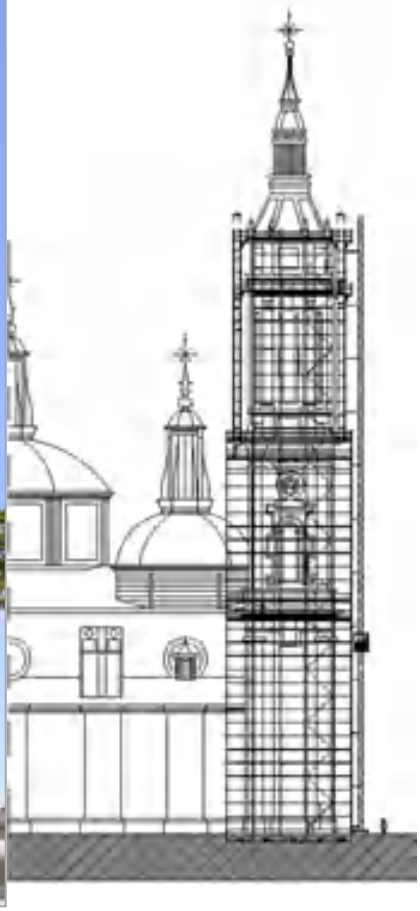

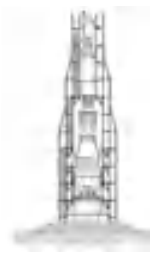

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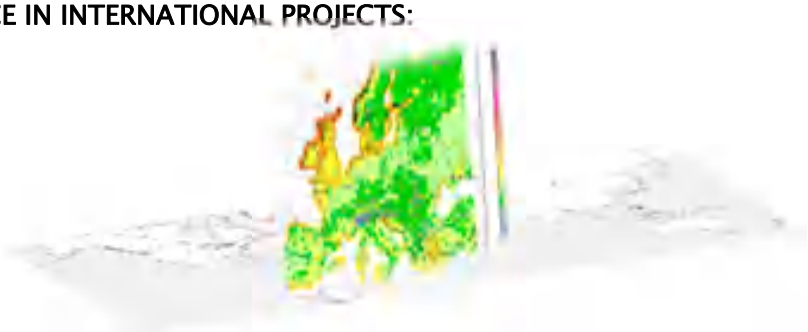

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