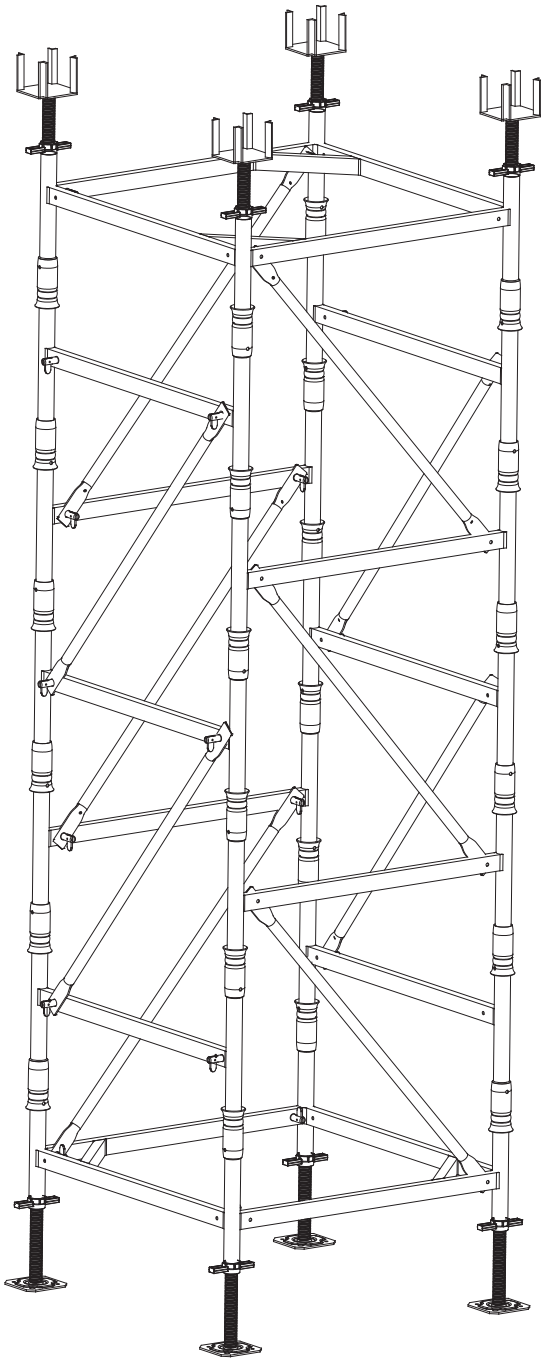
GBM
SHORING AND SCAFFOLDING

Instructions for use

SHORING TOWER SYSTEM STS100



Edition 02/2017 - September

GBM
SHORING AND SCAFFOLDING

Summary

Foreword

The aim of this manual is to provide clear instruction for using, assembling and handling of the shoring tower system ST 100.
This users' manual is meant to provide useful instruction and cannot replace national safety standards of each country in any case.
The employer will therefore prepare a document evaluating the risks to complete the safety standards.
The employer makes sure the instructions are known and understood by the users.
It is necessary to comply with the instructions herein contained in particular as regards the loads, the configurations, assembly, disassembly and use of the system.

Symbols
The following symbols are used:

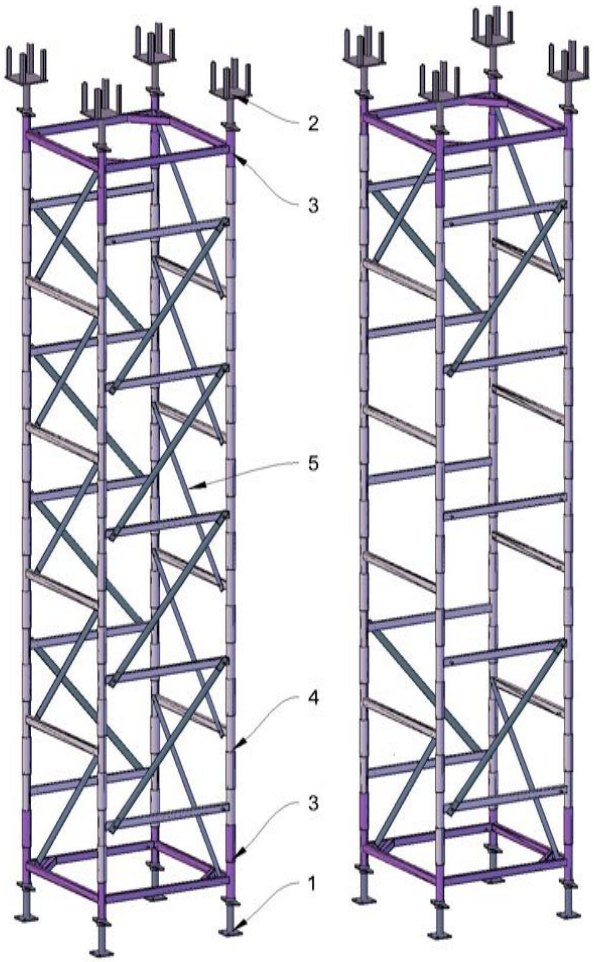

ATTENTION – DANGER (failure to comply with the instructions may cause damages or be dangerous for the health)


USEFUL ADVICE


VISUAL CHECK

System Description

The shoring tower system ST100 is commonly used as temporary shoring with or without forkheads and with primary and secondary wooden beams to strike slabs.



The shoring tower system ST100 comes in two configurations (with or without braces) and has the following features**:**

Standard grid - The standard grid of the shoring tower is 1,0 m x 1,0 m at the base with a maximum height of 12,00 m and intermediate heights at each 0,50 m.

Height adjustment is possible through base jacks and forkheads.

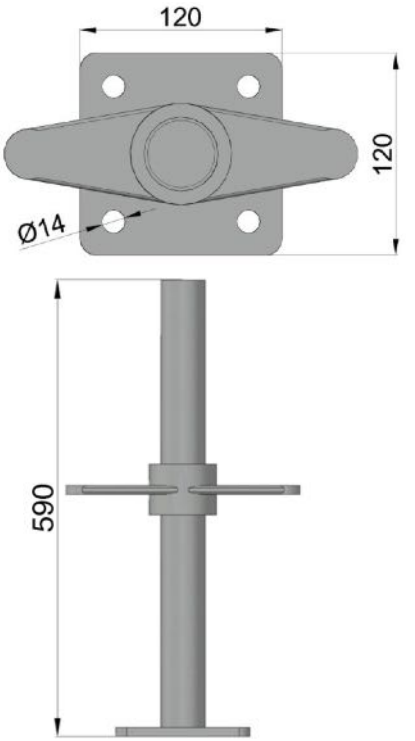
Loading capacity – The shoring towers ST100 can have great loading capacity even at the maximum height of di 12,0 m (see § "Loading capacity and displacement tables).

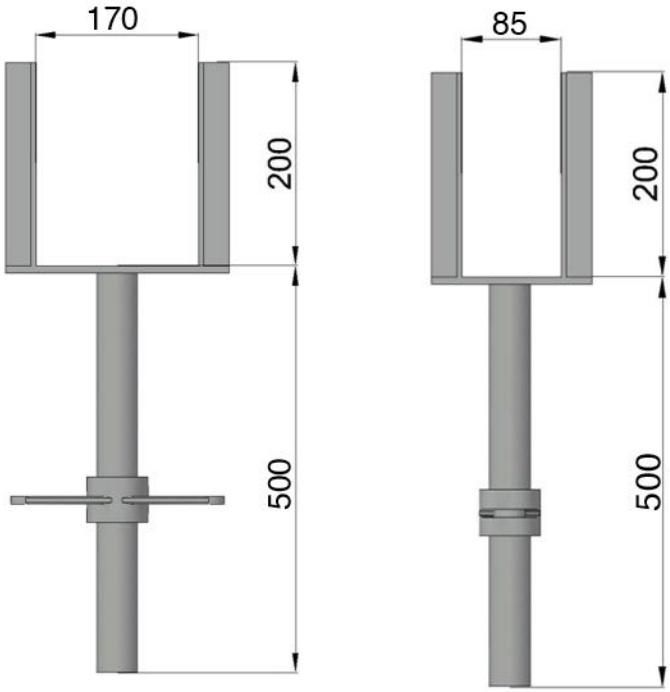
Easy to use – The shoring tower system ST100 is very easy to assemble and use, thanks to the limited number of components and few connecting accessories**.**

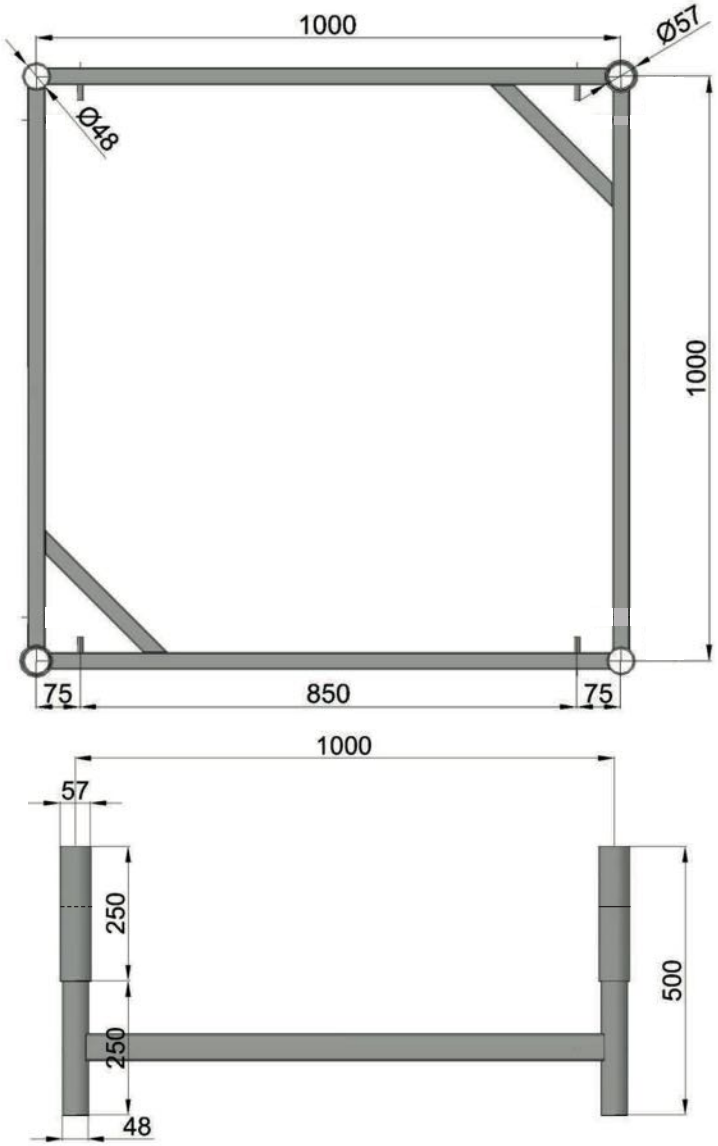
safety – Stability and safety of the system are guaranteed by the diagonal braces on the four sides.

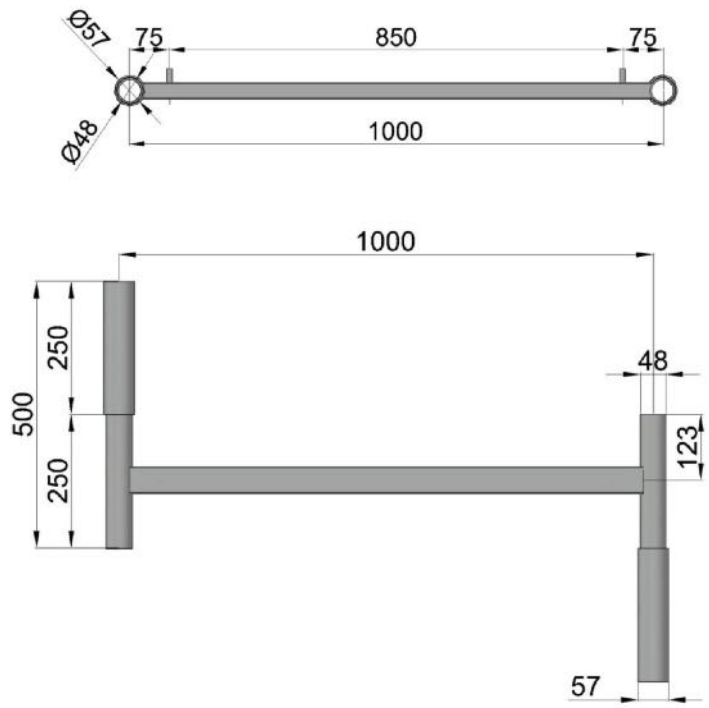
Shoring Tower ST100 components

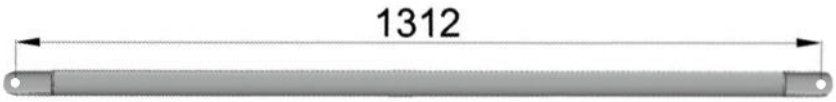
The components of the shoring tower system are:

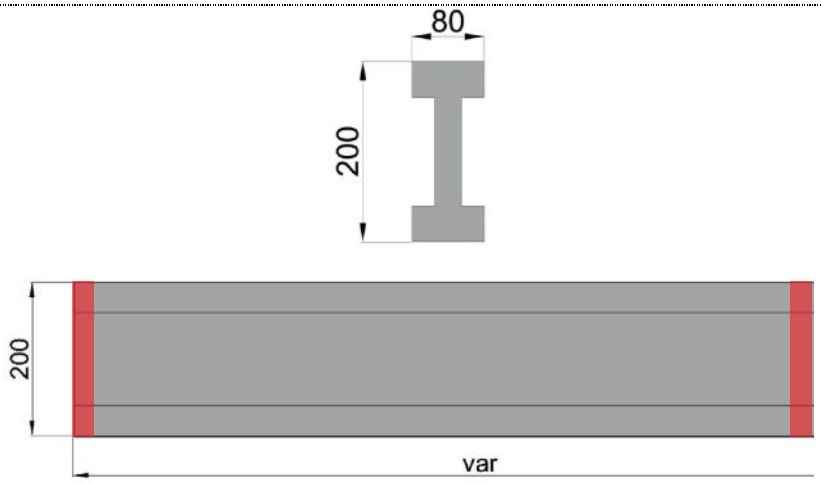
1 – Jack base		Weight: 2,60 kg
To adjust the height of the tower.		

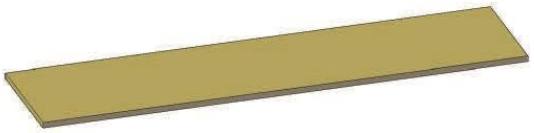
2 – Fork head		Weight: 5,50 kg
For positioning wooden beams (primary beams)		

3 – Base frame and top frame		Weight: 18,0 kg
The base frame is assembled as both base and top frame.		

4 - Frame		Weight: 7,70 kg
Frames are assembled at alternate sides from the base frame to the top frame.		

5 – Diagonal		Weight: 2,15 kg

6 – Wooden beam H20		Weight: 5 kg/m
For both primary and secondary beams for various kinds of formwork		

7 – Formwork panel		Weight: 12 kg/sqm (27mm)
For horizontal formwork		

Checking of the components

The user must inspect the components before use.

COMPONENTS THAT ARE DAMAGED, DEFORMED, WEAKENED DUE TO WEAR, CORROSION OE RUST MUST BE REPLACED BEFORE USE.

Here a list of the most common defects:

- Damaged or cracked tubes;
- Cracks in welding
- Deformed components;
- Deformed tubes
- Damaged connecting devices.

Instructions for assembly and use

General notice

INSPECT THE MATERIALS BEFORE USE AS SPECIFIED IN THE SECTION ABOVE. ANY COMPONENTS THAT ARE DAMAGED, DEFORMED, WEAKENED DUE TO WEAR, CORROSION OR DUST MUST BE REPLACED . G.B.M shall not be held responsible for any damage caused by combining ST100 shoring tower systems with those of other manufacturers.

TRAINED PERSONNEL IS REQUIRED FOR THE ASSEMBLY.

ASSEMBLY IS TO BE DONE WITH MOBILE SCAFFOLDING WHEN WORKING AT A HEIGHT OF 2,00M OR MORE

USE SAFETY DEVICES TO AVOID FALLING WHEN WORKING AT A HEIGHT OF 2,00 M OR MORE .

THE TOWER SHALL BE ANCHORED WHEN WORKING AT A HEIGHT OF MORE THAN 4 M.

REMOVE THE FORMWORK ONLY WHEN THE CONCRETE HAS ATTAINED ITS PROPERTIES.

The towers can be assembled in two ways:

- Vertical assembling
- Horizontal assembling

Vertical assembling of the towers

Provide safety devices when assembling the towers vertically at a height of 2,00 m or more.
The main phases of the assembly are:

1. **Positioning of the base jacks**

Position the base jacks according to a grid of 1,0 m x 1,0 and adjust the height so that the tower is perpendicular when assembled.

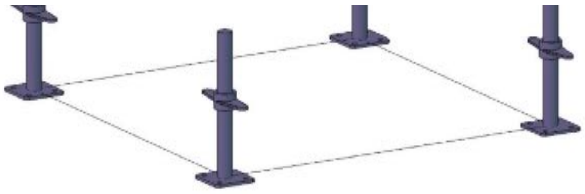


Fig. 1 – Base jacks

2. **Insert the frames in the base jacks**

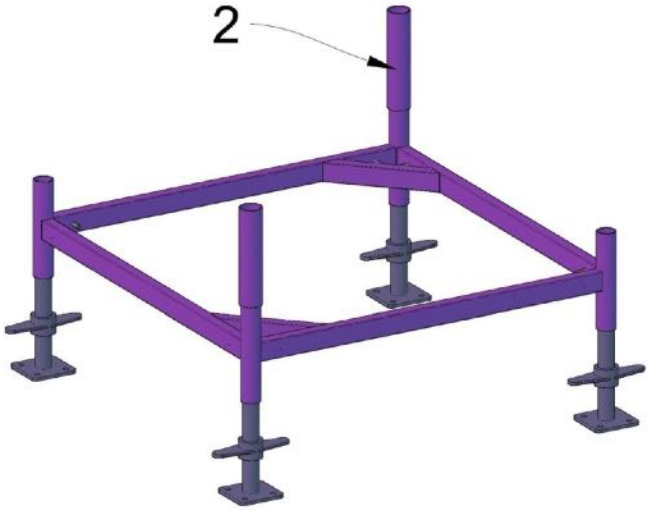
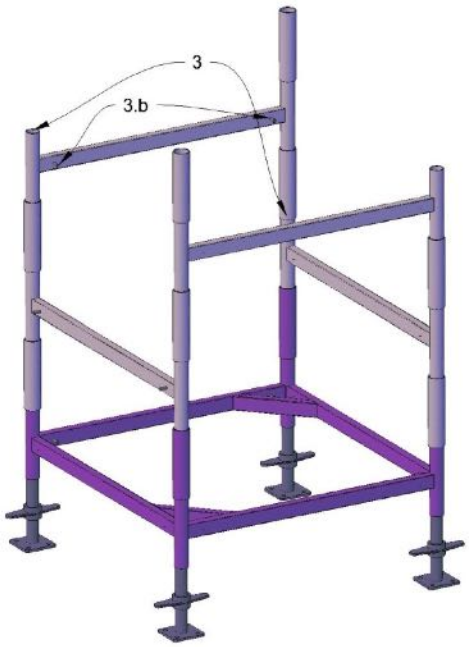


Fig. 2 – base frame

3. Insert the frames:

Fig. 3 – frames at alternate sides

THE FIRST TWO FRAMES ARE TO BE ASSEMBLED KEEPING THE PINS OF THE DIAGONAL BRACES EXTERNALLY (3.a)



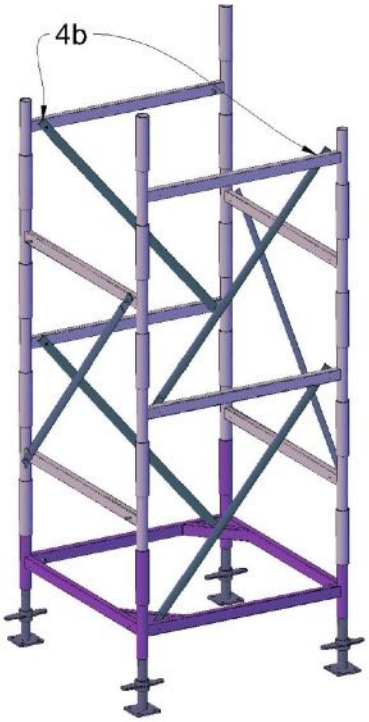
TTHE FOLLOWING TWO FRAMES ARE TO BE ASSEMBLED KEEPING THE PINS OF THE DIAGONAL BRACES INTERNALLY (3.b)

4. Assembly the diagonal braces at alternate sides

THE FIRST TWO DIAGONAL BRACES CONNECTING THE BASE FRAME WITH THE FOLLOWING FRAMES ARE TO BE ASSEMBLED INSIDE THE TOWER

Fig. 4 – side diagonals

DIAGONAL BRACES ARE TO BE ASSEMBLED AT ALTERNATE SIDES EXTERNALLY (4.a) AND INTERNALLY TO THE TOWER (4b)



5. Position the wooden platform

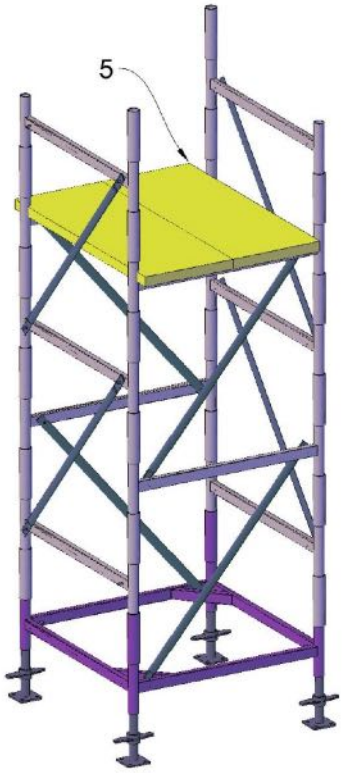


Fig. 5 –wooden platform for assembly at more than 2,00 m

BEFORE USE MAKE SURE THE WOODEN PLATFORM IS FIXED ON THE FRAMES

6. **Position the base frame on top**

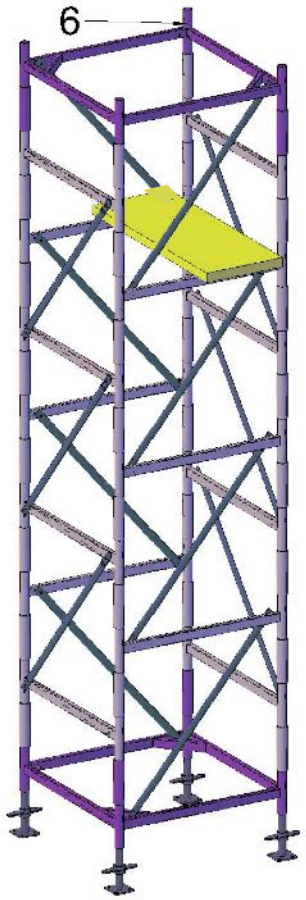


Fig. 6 – base frame on top

7. **Position the adjustable forkheads**

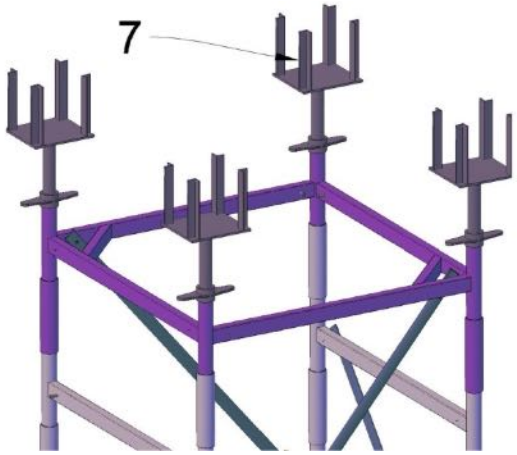


Fig. 7 – positioning of the forkheads

8. Position the primary beams

Place the primary beams in the forkheads:

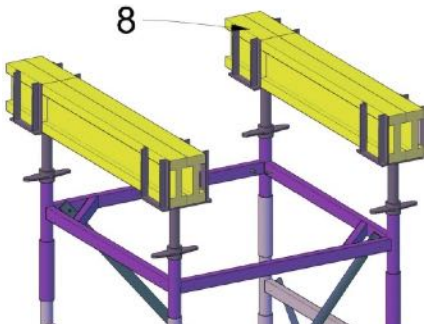


Fig. 8 – primary wooden beams

9. Position the secondary beams

Place the secondary beams on the primary beams:

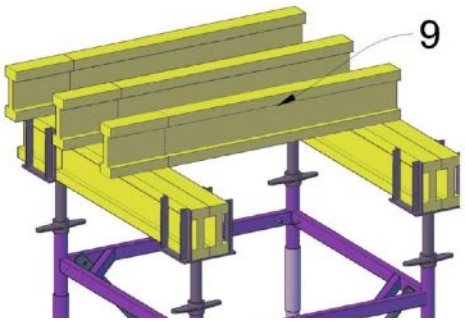
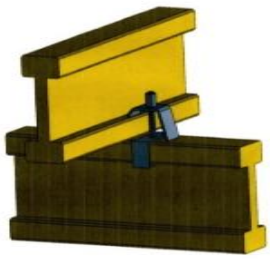


Fig. 9 – positioning of secondary beams

Lock the secondary beams on the primary beams to avoid overturning



10. Position the formwork

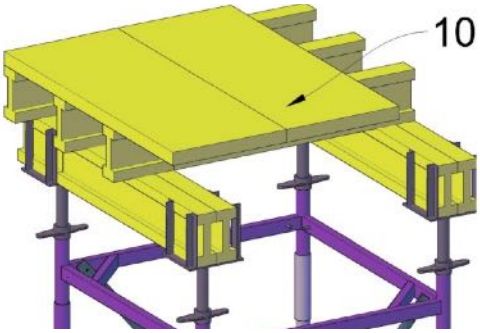


Fig. 10 –position the formworks

Horizontal assembling of the towers

Assembly can be done horizontally. Completed the assembly phase the tower can be lifted and afterwards shifted in the working position.

ASSEMBLING OF TOWERS WITHOUT DIAGONALS CAN BE DONE ONLY VERTICALLY.

1. **Assembly of the towers on the ground level**

Assembly on the ground follows the same steps as vertical assembly:

Fig. 11 – insertion of the base frame in the base jacks

THE FIRST TWO FRAMES ARE TO BE ASSEMBLED VERTICALLY

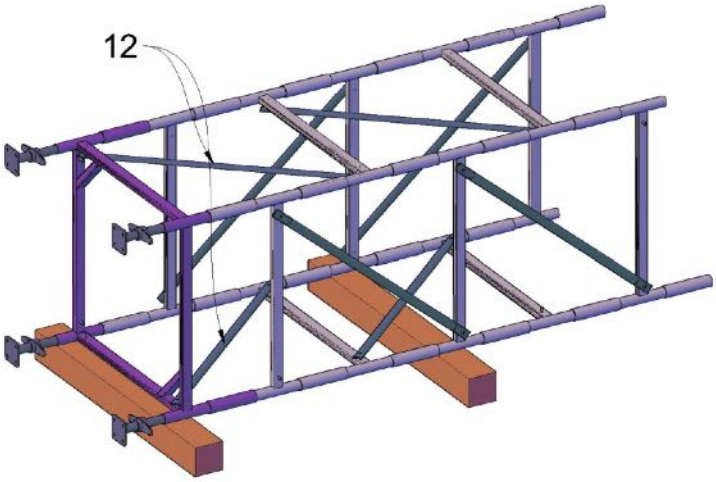


Fig. 12 – insertion of the frames

THE INTERNAL DIAGONAL BRACES ARE ON THE HORIZONTAL SIDES OF THE TOWER

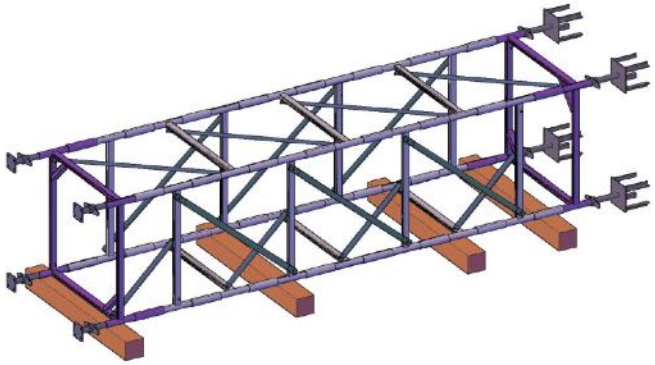
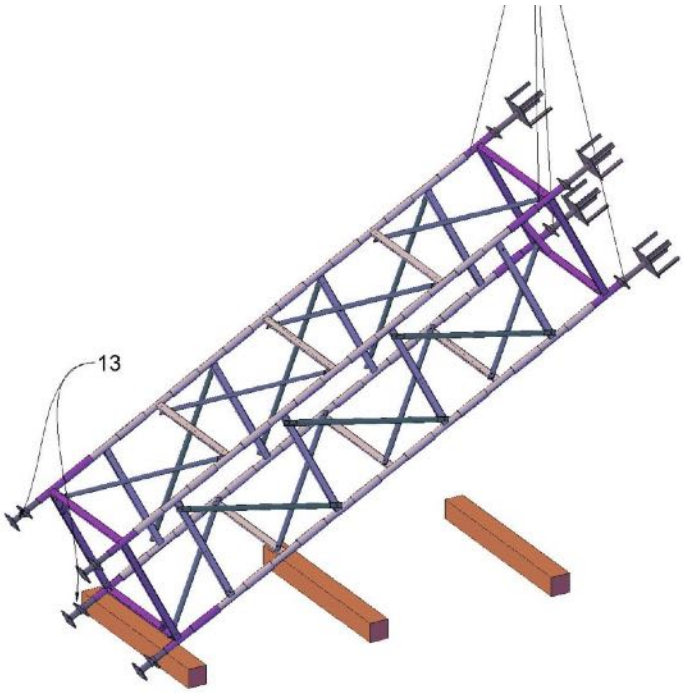


Fig. 13 – complete tower

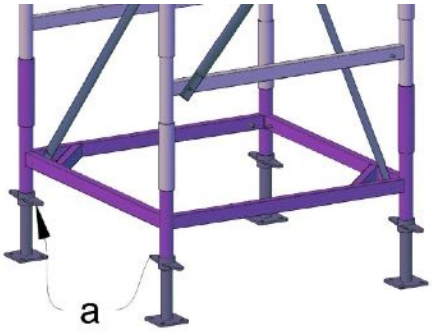
2. **Uplift and shift the tower**



BEFORE UPLIFTING MAKE SURE THE BASE JACKS ARE FIXED ON THE TOWER

Removing the element of the towers

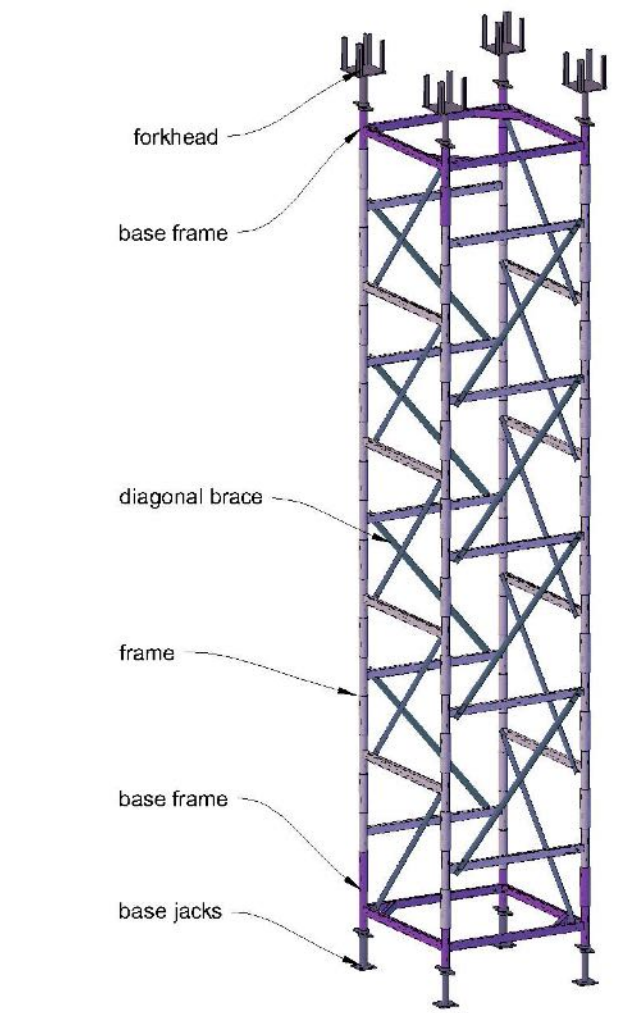
1. **After strike: remove the elements lowering the base jacks**



Materials

List of the materials according to different heights of the tower:

WEIGHT (kg)	2.60	18.00	7.70	2.15	5.50
COD					
TOWER HEIGHT – m	Jack base 50 cm	Base frame	Frame	Diagonal	Fork head
2.0	4	2	6	6	4
3.0	4	2	10	10	4
4.0	4	2	14	14	4
5.0	4	2	18	18	4
6.0	4	2	22	22	4
7.0	4	2	26	26	4
8.0	4	2	30	30	4
9.0	4	2	34	34	4
10.0	4	2	38	38	4
11.0	4	2	42	42	4
12.0	4	2	46	46	4



Cleaning and Maintenance

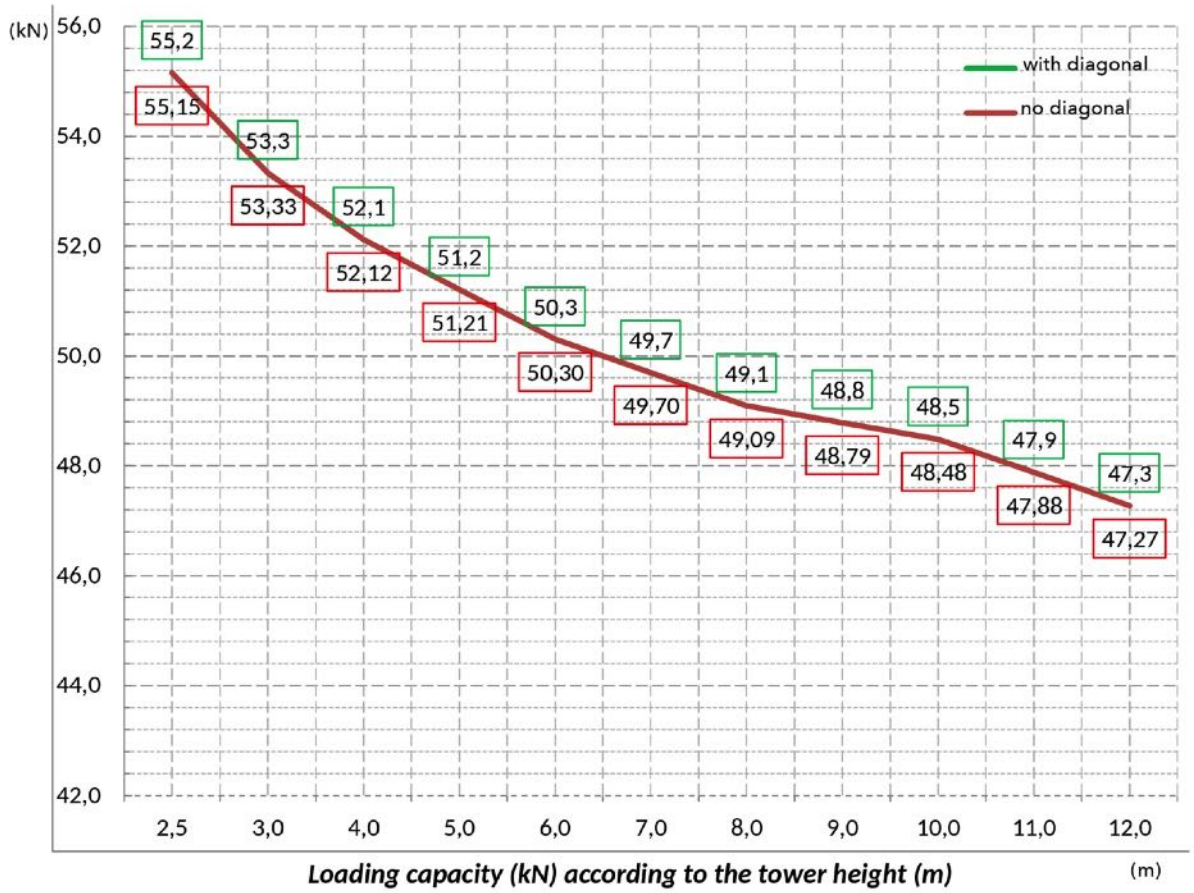
Clean the components of the tower before use.

Repairs or replacements of parts of the tower are exclusively to be made by G.B.M.

In the case of unauthorized modifications or repairs , G.B.M shall not be held responsible for any damage that may occur.

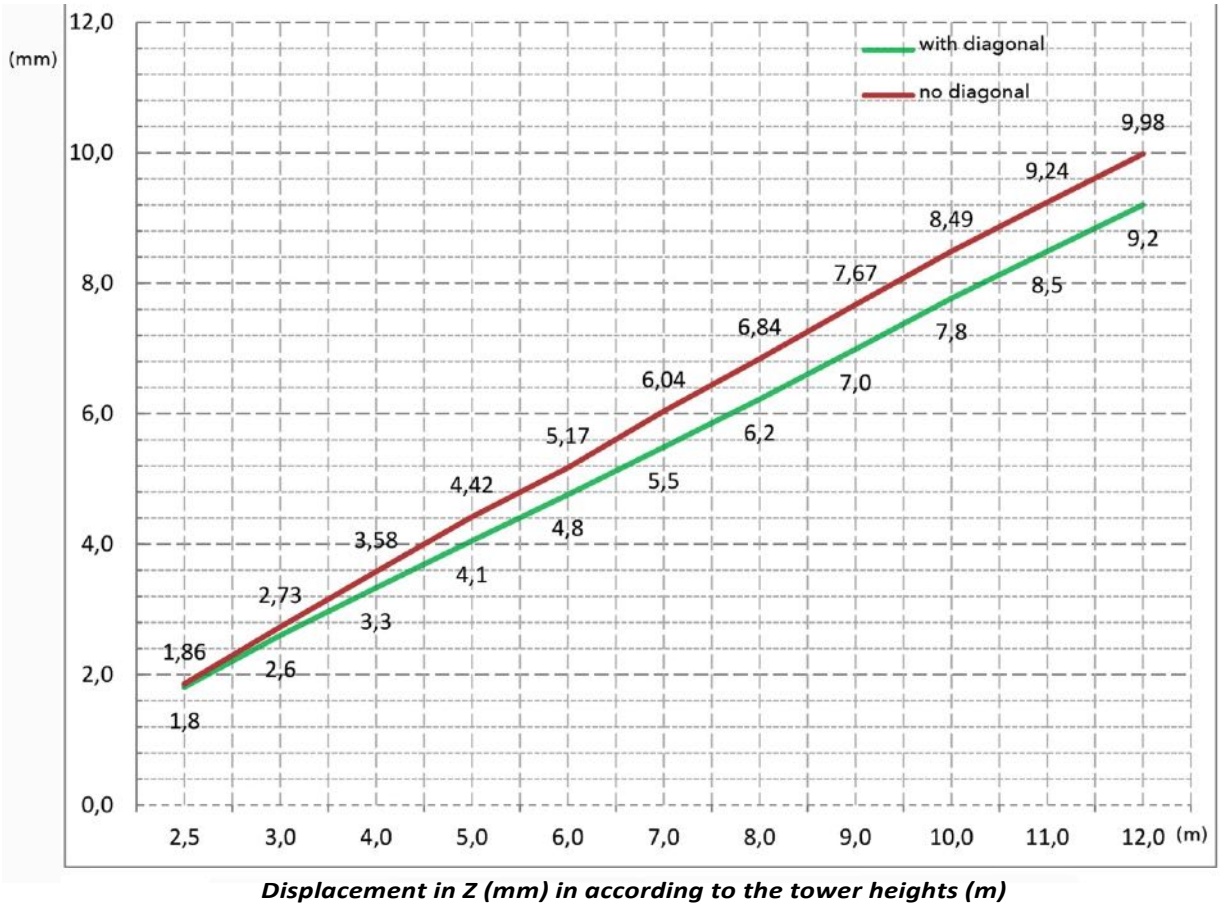
After exceptional climatic events it will be necessary to check connecting devices and joints to avoid instability and possible related accidents.

Loading capacity and displacement tables



Loading capacity (kN) according to the tower height (m)

Tower heights	Scheme with diagonals	Scheme without diagonals
m	kN	kN
2.50	**55.2**	**55.15**
3.00	**53.3**	**53.33**
4.00	**52.1**	**52.12**
5.00	**51.2**	**51.21**
6.00	**50.3**	**50.30**
7.00	**49.7**	**49.70**
8.00	**49.1**	**49.09**
9.00	**48.8**	**48.79**
10.00	**48.5**	**48.48**
11.00	**47.9**	**47.88**
12.00	**47.3**	**47.27**



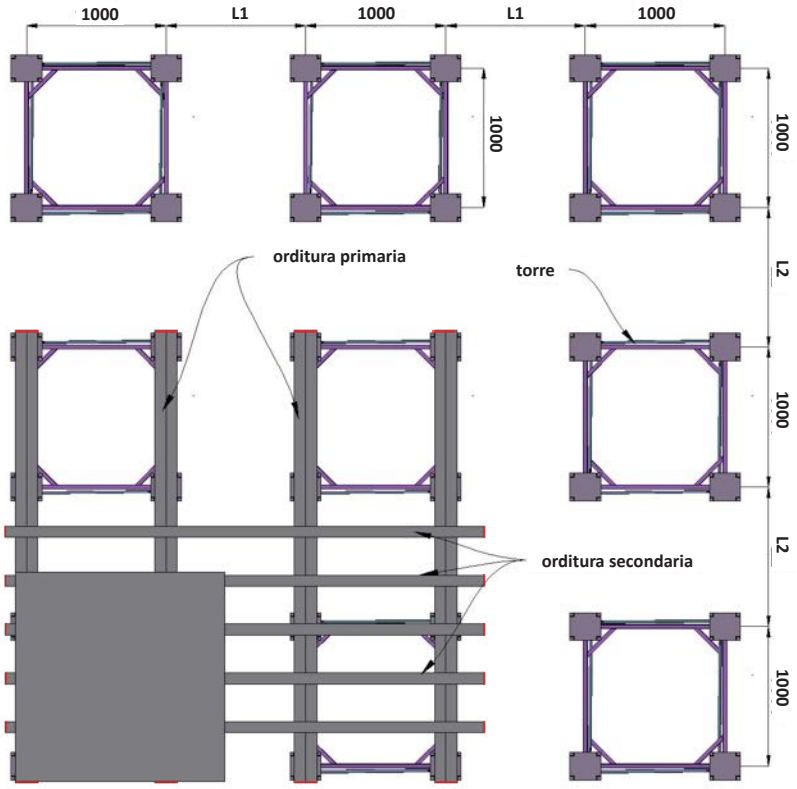
Displacement in Z (mm) in according to the tower heights (m)

Displacement Table in Z

Tower heights	Scheme with diagonals	Scheme without diagonals
m	mm	mm
2.50	**1.8**	**1.86**
3.00	**2.6**	**2.73**
4.00	**3.3**	**3.58**
5.00	**4.1**	**4.42**
6.00	**4.8**	**5.17**
7.00	**5.5**	**6.04**
8.00	**6.2**	**6.84**
9.00	**7.0**	**7.67**
10.00	**7.8**	**8.49**
11.00	**8.5**	**9.24**
12.00	**9.2**	**9.98**

Layout

It is the manufacturer's competence the use of primary load- bearing and secondary beams appropriate for support loadings.



The following formula should be applied in order to find the collocation of the towers.
Of which:

$L_1 = L_2 = L$

$P=g_{CLS}*h*[(L+1)/2]^2$ every upright

$$L = \sqrt{\frac{4P}{g_{CLS}*h*0,5}} = \text{ m}$$

Of which: P = capacity of each tower upright (as shown in the table page 20 based on the height of the tower)

h = solar height (in m)

g_{CLS} = 25.0 kN/m^3 specific weight of concrete

The safety factor is already considered as P value (safety factor = 1,65).

Ex. To support a solar with thickness 30 cm (0,30 m), at a height of 12.00mt, it is necessary to mount the lorry considering L space below:

$$L = \sqrt{\frac{4*47.3\ kN}{25.0\frac{kN}{m^3}*0.3m*0.5m^2}} = 10,00 \text{ m}$$

ATTENCTION: THE TOWERS ALLOCATION SHOULD CONSIDER RESISTANCE OF THE LOAD-BEARING AND OF THE SECONDARY BEAMS

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Notes

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