HID 15*new*

Frame support

User guide

HÜNNEBECK

BY BRANDSAFWAY

Contents

1 Product features

The HÜNNEBECK ID 15 frame support is a supporting structure for concrete formwork with type approval and base dimensions of 1.00 x 1.00 m that needs only six basic parts.

Depending on the height, the frame supports can be assembled in 33 cm steps with ID frames 100, ID frames 133 or combinations of both frames with supplementary components.

The ID head and base jacks allow a stepless height adaption to the building. The welded frames are made of hot dip galvanized steel tubes.

The weight including head and base jack, diagonal rungs and planks is approximately between 45 - 55 kg for each meter in height. The pin-ended bearing plates of the head and base jacks allow an adaption to inclinations of up to 6%. In total the full adjustment range of the jacks is 33.0 cm according to the official approval of ID 15.

The stacked frames are shifted at each level for 90°. This way the tower is stiffened the same way in each vertical level.

Due to the built-in quick-action connectors the connection of the standard frames are tension-proofed. The vertical legs are made of steel tubes with an outside diameter of 48.3 mm and allow the connection of standard scaffolding tubes and couplers.

The construction of the individual parts allows the vertical as well as the horizontal assembly of the frame support. That permits the time saving construction of high towers that can be set up and shifted to the point of use by crane.

1.1 Intended use

The typical assembly shown in this user guide is intended for transferring vertical loads to the ground. The ID 15 frame support can be used for the following purposes:

- To carry the loads of components, systems and equipment resulting from the construction, maintenance, modification or removal of structures.
- To carry the loads generated by the freshly poured concrete until the construction has even reached a self-supporting capacity.

The allowable loads must be observed. For more information, refer to the applicable type approval that is available from HÜNNEBECK.

The ID 15 frame support can be used as falsework when the towers are braced with tubes and couplers.

1.2 Safety instructions

Important information regarding the intended use and safe application of formwork and falsework

The contractor is responsible for drawing up a comprehensive risk assessment and a set of installation instructions. The latter is not usually identical to the user guide.

- Risk assessment
  The contractor is responsible for the assembly, the documentation, implementation and revision of a risk assessment for each construction site. Employees are obliged to implement the measures resulting from this in accordance with all legal requirements.
- Installation instructions
  The contractor is responsible for compiling a written set of installation instructions. The user guide is part of the basis for the compilation of a set of installation instructions.

Product features

- User guide
  Formwork and falsework are technical work equipment that is intended for commercial use only. The product must be used as intended exclusively by properly trained personnel and appropriately qualified supervising personnel. The user guide is an integral component of the formwork construction. It comprises minimum safety guidelines, details on the standard configuration and intended use, as well as the system description.
  The functional instructions (standard configuration) contained in the user guide are to be complied with as stated. Enhancements, deviations or changes represent a potential risk and therefore require separate verification (with the help of a risk assessment and a structural analysis) or a set of installation instructions that comply with the relevant laws, standards and safety regulations. The same applies in those cases where formwork and/or falsework components are provided by the contractor.
  This user guide is intended for commercial users with appropriate technical training. The contents and processes described are in accordance with the legal and occupational safety regulations of Germany and Austria. HÜNNEBECK assumes no liability for deviations from the contents and processes described or for use outside this area of application.
- Availability of the user guide
  The contractor has to ensure that the user guide provided by the manufacturer are available on site at all times. Before the assembly and use the site personal have to be familiar with the user guide and the user guide must be readable and complete. Replacements can be obtained from HÜNNEBECK.
- Illustrations
  The illustrations shown in the user guide are, in part, situations of assembly and not always complete in terms of safety considerations. Nevertheless, the safety installations that may not be shown in these illustrations must be available.
- Storage and transportation
  The special requirements of the respective formwork constructions regarding transportation procedures as well as storage must be complied with. For example, the appropriate lifting gear should be indicated.
- Material check
  Formwork and falsework material deliveries are to be checked on arrival at the construction site/place of destination as well as before each use to ensure that they are in perfect condition and function correctly. Changes to the formwork materials are not permitted.
- Spare parts and repairs
  Only original components may be used as spare parts. Repairs are to be carried out by the manufacturer or authorized repair facilities only.
- Use of other products
  Combining formwork components from different manufacturers carries certain risks. They are to be individually verified and can result in the compilation of a separate set of assembly instructions required for the installation of the equipment.

- Safety warnings, notes and visual check
  The individual safety messages or notes and the visual check are to be complied with.

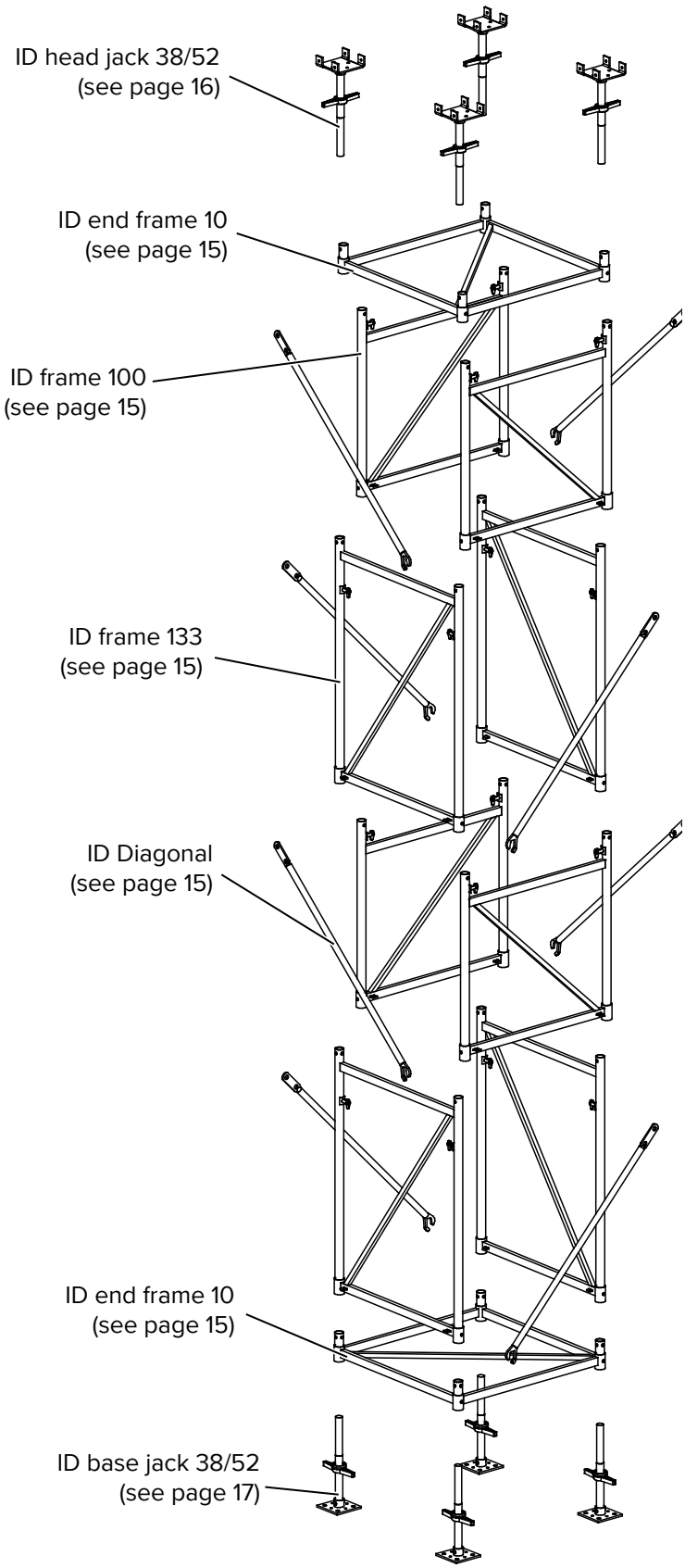
Examples:

DANGER	**DANGER!** DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	**WARNING!** WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	**CAUTION!** CAUTION used with the safety alert symbol indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTE	**NOTE** NOTE refers to practices not related to personal injury.
VISUAL CHECK	VISUAL CHECK refers to a visual check and is not related to personal injury.

- Miscellaneous
  Technical improvements and modifications are subject to change without note.
  For the safety-related application and use of the products all current country-specific laws, standards and other safety regulations are to be complied with without exception. They form a part of the obligations of employers and employees regarding industrial work safety. This results in, among other things, the responsibility of the contractor to ensure the stability of the formwork and falsework constructions as well as the structure during all stages of construction.
  This also includes the basic assembly, disassembly and the transport of the formwork and falsework constructions or their components. The complete construction is to be checked during and after assembly.

2 Overview

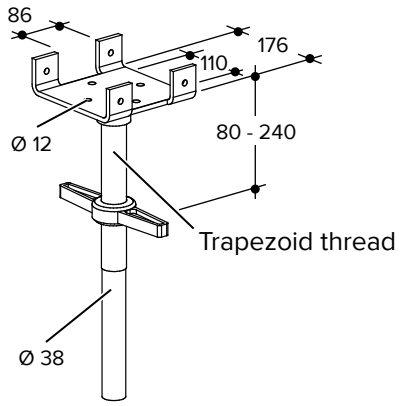
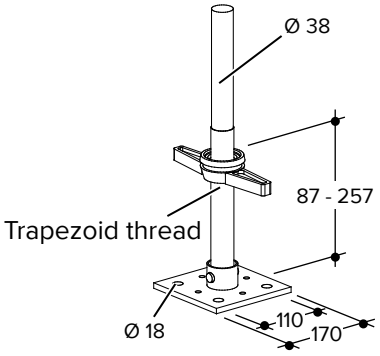
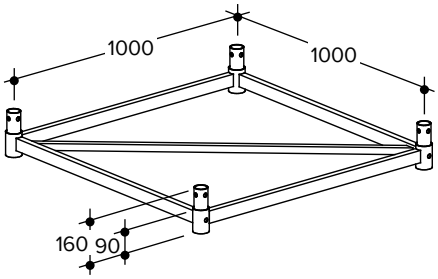
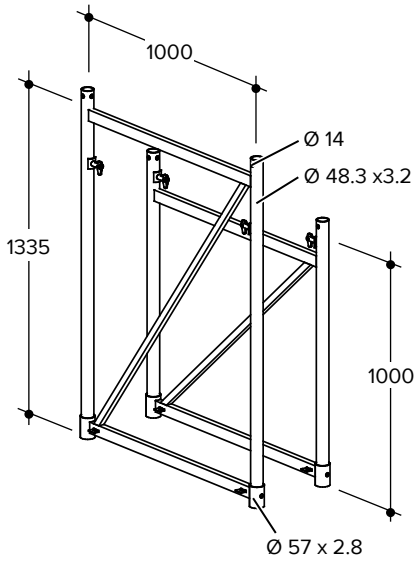
Shown is an ID 15 frame support with the dimensions 1.00 x 1.00 m in a construction height of min. 5.09 m up to max. 5.42 m

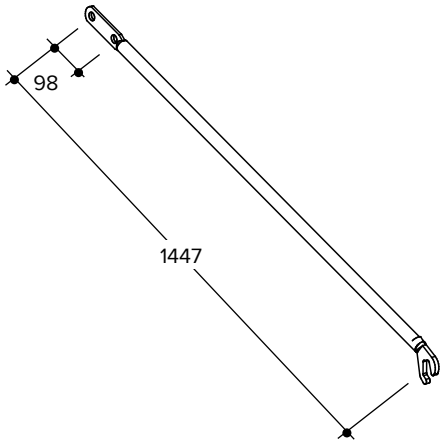


Unless stated otherwise all dimensions are in mm

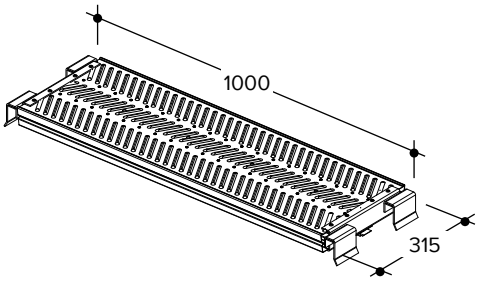
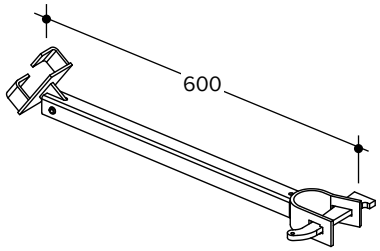
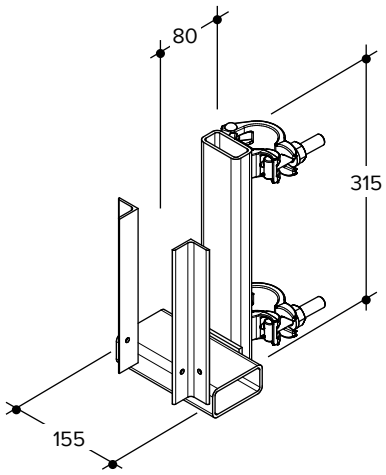
3 Components

3.1 Basic parts

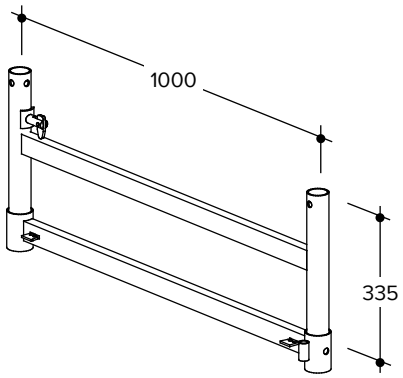
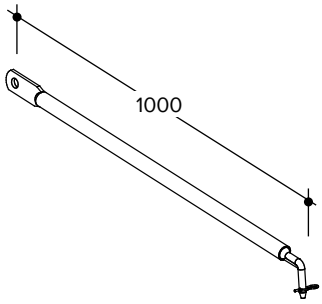
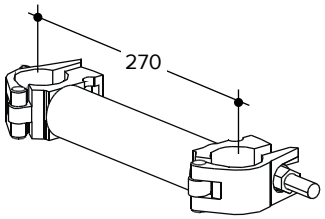
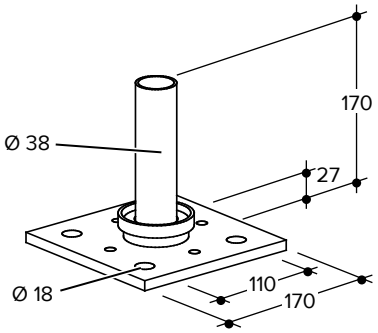
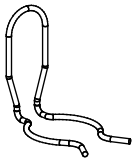
	Component	Product code	Weight [kg]
	**ID 15 head jack 38/52** For bearing of timber or steel beams. Inclinations of up to 6% can be compensated by the ID head jack 38/52. Height adjustment: from 8.0 to 24.0 cm according to type approval (see page 16).	**148530**	**8.20**
	**ID 15 base jack 38/52** For setting-up the frame support. Inclinations of up to 6% can be compensated by the ID base jack 38/52. Height adjustment: from 8.7 to 25.7 cm (see page 17).	**148552**	**8.34**
	**ID 15 end frame 10** Used for horizontal bracing of the frame support. Is always installed at the top and at the base (see page 15). Construction height at the top: 16 cm Construction height at the base: 9 cm	**118163**	**15.67**
	**ID 15 frame 100** **ID 15 frame 133** The frames are connected tension-resistant with the integrated wedges of the quickaction connectors. Pins with integrated gravity locks allow a secure attachment of the ID diagonals. Height of frames: 100 cm or 133.5 cm (see page 15 or page 17).	**57173** **57162**	**15.88** **18.85**

	Component	Product code	Weight [kg]
	**ID 15 diagonal** Used for bracing of the tower, perpendicular to the frames. The lower end with the claw is fixed to the horizontal bottom bar, the upper end is fixed to the hinged pin of the ID frame 100 or 133 (see page 15).	**148574**	**2.63**

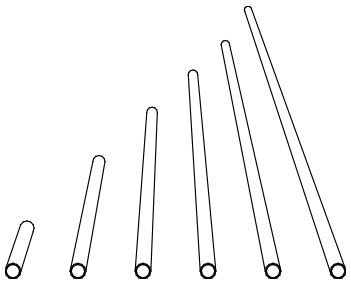
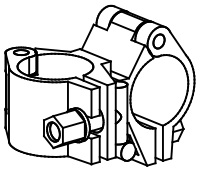
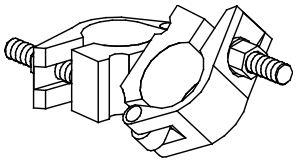
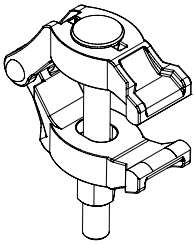
3.2 Accessories

	Component	Product code	Weight [kg]
	**ID 15 plank** The ID 15 plank is secured to the horizontals of two opposing ID 15 frames and is used for the setup of ID 15 towers as an installation aid. This plank is secured with integrated latches to the frames against uplift and can be installed into vertically and horizontally assembled ID 15 towers (see page 18).	**603506**	**7.88**
	**ID 15 diagonal rung** The ID 15 diagonal rung is a climbing rung to allow access from ID 15 plank to ID 15 plank. This rung is clamped to the vertical leg and the diagonal of an ID 15 frame and is secured with a wedge to the vertical leg (see page 17).	**603337**	**2.87**
	**H20 console** This bracket allows the installation of safe working decks close to the top of the ID 15 towers to operate the slab formwork. The H20 console is designed to carry a standard H20 or a R24 timber beam in combination with a 5 x 28 cm timber plank decking (see page 21). Clamping torque of the couplers: 50 Nm.	**603844**	**4.36**

Unless stated otherwise all dimensions are in mm

	Component	Product code	Weight [kg]
	**ID 15 adjustment frame 33** Is used for heights between 2.00 and 3.00 m as well as for height adjustment of assembled ID 15 frame supports during multiple re-uses. A complete reconstruction of a tower assembly is not necessary. Structural height of the frame: 33.5 cm	**77670**	**8.80**
	**ID 15 diagonal 33** Required as bracing for ID adjustment frame 33.	**77680**	**1.85**
	**ID 15 frame connection 27** For the connection of additional frames to ID 15 towers with a leg distance of 27 cm. The connection allows the arrangement of ID frames in tight adjustment areas or to support particularly high or concentrated loads (see page 24).	**121915**	**2.10**
	**ID 15 head/base piece, rigid** Used for applications that do not require adjustments in height with jacks at the base or at the top.	**62935**	**2.76**
	**ID 15 base jack retainer** Prevents the ID base jack or the ID head/ base piece from dropping-out when the tower is lifted and moved by crane (see page 17).	**78652**	**0.05**

Components

	Component	Product code	Weight [kg]
	**Scaffold tubes 48,3 × 3.2 mm**		
	Scaffold tube 48.3 × 50	**169001**	**1.90**
	Scaffold tube 48.3 × 100	**169012**	**3.81**
	Scaffold tube 48.3 × 150	**169023**	**5.72**
	Scaffold tube 48.3 × 200	**169034**	**7.62**
	Scaffold tube 48.3 × 250	**169045**	**9.53**
	Scaffold tube 48.3 × 300	**169056**	**11.43**
	Scaffold tube 48.3 × 350	**169067**	**13.34**
	Scaffold tube 48.3 × 400	**169078**	**15.24**
	Scaffold tube 48.3 × 450	**169089**	**17.15**
	Scaffold tube 48.3 × 500	**169090**	**19.05**
	Scaffold tube 48.3 × 600	**169115**	**22.86**
	**Rigid coupler 48/48 w.a.f. 22** Permitted load: 6 kN (Class A) Required torque: 50 Nm	**2514**	**1.18**
	**Swivel coupler 48/48 w.a.f. 22** Permitted load: 6 kN (Class A) Required torque: 50 Nm	**2525**	**1.37**
	**C-clamp 16/70** see page 25	**603750**	**1.73**

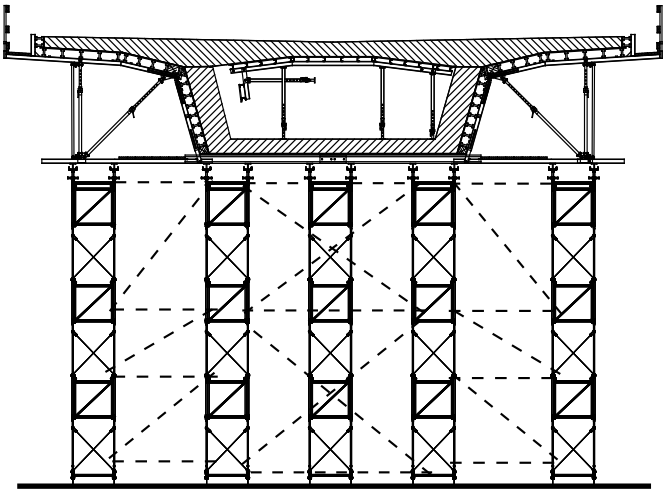
Unless stated otherwise all dimensions are in mm

4 Assembly

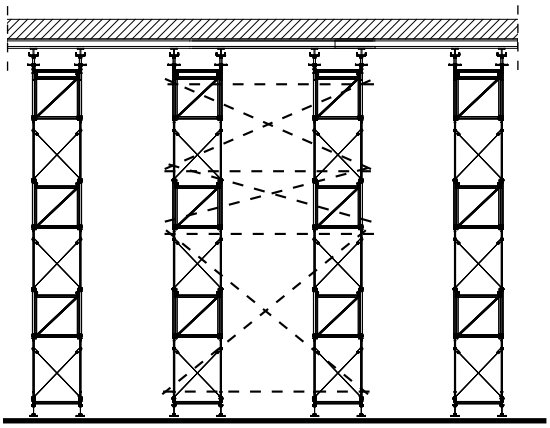
Preceding operational planning and preparations will improve the quick and safe assembly of the ID 15 frame support.

- Hand over drawings, material list, user guide as well as the valid approvals and test reports of the type tests to the job site.

Example: Bridge construction



Example: Slab construction



WARNING

WARNING!

Pressure from fresh concrete is not included within these calculations.

4.1 Preparations for erecting

- Make sure that the material is complete and not damaged and stored clearly organized.
- Sort out damaged parts and store them separately, order spare parts. Damaged parts may be items such as head jacks with bearing plates which slope too much.
- During reconstruction store and protect unused material.
- If necessary, mark the locations of the towers on the foundations.
- Instruct site staff if necessary.

Basis of structural calculation – Load assumptions

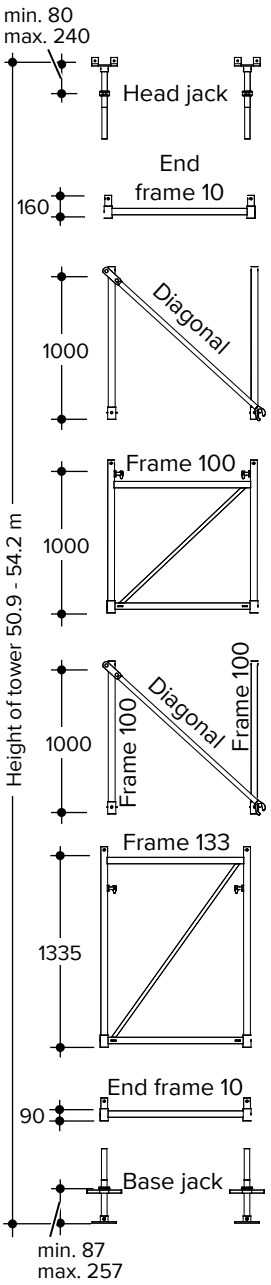
- Specific weight of fresh concrete: γ_c = 25.0 kN/m^3
- Dead weight from formwork, shoring structure, steel beams or timber beams.
- Live loads and concrete clusters according to DIN EN 12812.
- Horizontal loads from velocity pressure according to DIN EN 1991-1-4/NA as well as 1% of the vertical load at their point of influence according to DIN EN 12812 (only valid for free standing supporting structures).

4.2 Information for assembly

- Preassemble the ID 15 frame supports according to the required combinations as described. The orientation of frames and diagonals must be shifted by 90° with each frame level.
- Pre-adjust head and base jacks at rough extension lengths. Make sure that the adjusted length of the jacks must have enough reserve to release the load.
- Load-distributing planks under the base jack must be provided.
- Erect the preassembled frame supports with a crane. Attach the crane slings to the horizontal members of the highest fully assembled frame level. Do not use the ID end frame or the head jacks to attach the tower to crane.
- Base jacks may only stand on even ground with adequate load bearing capacity. Permitted inclination of the foundation up to a maximum of 6%.
- Ensure the exact vertical erection of ID 15 frame supports prior to loading.
- If required for structural reasons install bracings (scaffold tubes with couplers).
- For stability reasons during erection and stripping always install adequate auxiliary bracings against tilting of the towers.
  Use scaffold tubes (Ø 48.3 mm, 3,2 mm wall thickness) according to the structural calculation. Connect them to all neighboring ID 15 frame supports with rigid couplers 48/48. It is recommended to connect the tubes of the bracings to existing walls, columns, piers, etc. for direct load transfer.
- Final height adjustment (leveling) should be performed at the head jacks after placing the primary beams.
  The head jacks can adapt to a 6% inclination. Bigger inclinations have to be compensated by timber wedges (hard wood) at the jacks.
- All aspects of the approval have to be followed.
- Furthermore, the “Safety Rules and Requirements for Protection of Health in Falsework and Formwork Construction“ as well as other relevant national or local regulations in the valid version must be applied to.

4.3 Calculation of material

Combination chart



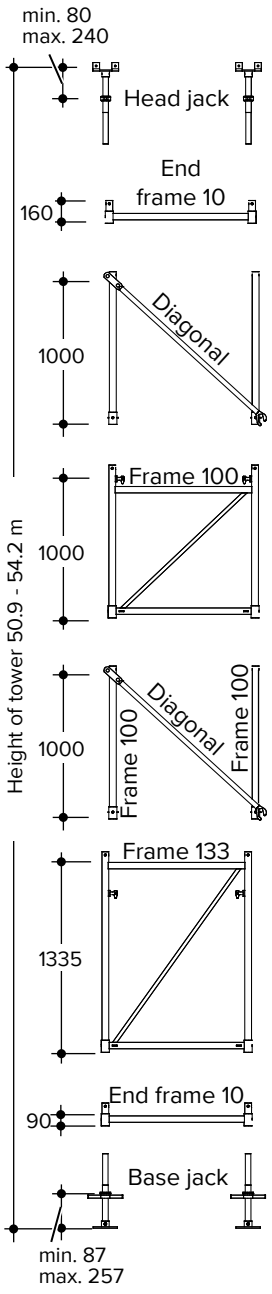
Product code	148530	148552	057162	057173	118163	148574	603506	603337	
Weight / item [kg]	8.56	8.34	18.85	15.88	15.67	2.63	9.89	2.87	
Height of tower [m]	Head jack	Base jack	Frame 133	Frame 100	End frame 10	Diagonal	Plank	Diagonal rung	Weight of tower [kg]
1.42 - 1.75	4	4	–	2	2	2	-	-	135.96
1.75 - 2.08	4	4	2	–	2	2	-	-	141.90
1.84 - 2.17	4	4	2	–	3	2	-	-	157.57
1.93 - 2.26	4	4	2	–	4	2	-	-	173.24
2.42 - 2.75	4	4	–	4	2	4	1	1	185.74
2.75 - 3.08	4	4	2	2	2	4	1	1	191.68
3.09 - 3.42	4	4	4	–	2	4	1	1	197.62
3.42 - 3.75	4	4	–	6	2	6	2	2	235.52
3.75 - 4.08	4	4	2	4	2	6	2	2	241.46
4.09 - 4.42	4	4	4	2	2	6	2	2	247.40
4.42 - 4.75	4	4	6	–	2	6	2	2	253.34
4.75 - 5.08	4	4	2	6	2	8	3	3	291.24
5.09 - 5.42	4	4	4	4	2	8	3	3	297.18
5.42 - 5.75	4	4	6	2	2	8	3	3	303.12
5.76 - 6.09	4	4	8	–	2	8	3	3	309.06
6.09 - 6.42	4	4	4	6	2	10	4	4	346.96
6.42 - 6.75	4	4	6	4	2	10	4	4	352.90
6.76 - 7.09	4	4	8	2	2	10	4	4	358.84
7.09 - 7.42	4	4	10	–	2	10	4	4	364.78
7.42 - 7.75	4	4	6	6	2	12	5	5	402.68
7.76 - 8.09	4	4	8	4	2	12	5	5	408.62
8.09 - 8.42	4	4	10	2	2	12	5	5	414.56
8.43 - 8.76	4	4	12	–	2	12	5	5	420.50
8.76 - 9.09	4	4	8	6	2	14	6	6	458.40
9.09 - 9.42	4	4	10	4	2	14	6	6	464.34
9.43 - 9.76	4	4	12	2	2	14	6	6	470.28
9.76 - 10.09	4	4	14	–	2	14	6	6	476.22
10.09 - 10.42	4	4	10	6	2	16	7	7	514.12
10.43 - 10.76	4	4	12	4	2	16	7	7	520.06
10.76 - 11.09	4	4	14	2	2	16	7	7	526.00
11.10 - 11.43	4	4	16	–	2	16	7	7	531.94
Max. jack extension accord. to approval:			Head jack 240 mm extended Base jack 257 mm extended						

NOTE

Note

Consider the stripping play of the jacks.

Assembly



Product code	148530	148552	057162	057173	118163	148574	603506	603337	Weight of tower [kg]
Weight / item [kg]	8.56	8.34	18.85	15.88	15.67	2.63	9.89	2.87	
Height of tower [m]	Head jack	Base jack	Frame 133	Frame 100	End frame 10	Diagonal	Plank	Diagonal rung	
11.43 - 11.76	4	4	12	6	2	18	8	8	569.84
11.76 - 12.09	4	4	14	4	2	18	8	8	575.78
12.10 - 12.43	4	4	16	2	2	18	8	8	581.72
12.43 - 12.76	4	4	18	–	2	18	8	8	587.66
12.76 - 13.09	4	4	14	6	2	20	9	9	625.56
13.10 - 13.43	4	4	16	4	2	20	9	9	631.50
13.43 - 13.76	4	4	18	2	2	20	9	9	637.44
13.77 - 14.10	4	4	20	–	2	20	9	9	643.38
14.10 - 14.43	4	4	16	6	2	22	10	10	681.28
14.43 - 14.76	4	4	18	4	2	22	10	10	687.22
14.77 - 15.10	4	4	20	2	2	22	10	10	693.16
15.10 - 15.43	4	4	22	–	2	22	10	10	699.10
15.43 - 15.76	4	4	18	6	2	24	11	11	737.00
15.77 - 16.10	4	4	20	4	2	24	11	11	742.94
16.10 - 16.43	4	4	22	2	2	24	11	11	748.88
16.44 - 16.77	4	4	24	–	2	24	11	11	754.82
16.77 - 17.10	4	4	20	6	2	26	12	12	792.72
17.10 - 17.43	4	4	22	4	2	26	12	12	798.66
17.44 - 17.77	4	4	24	2	2	26	12	12	804.60
17.77 - 18.10	4	4	26	–	2	26	12	12	810.54
18.10 - 18.43	4	4	22	6	2	28	13	13	848.44
18.44 - 18.76	4	4	24	4	2	28	13	13	854.38
18.77 - 19.10	4	4	26	2	2	28	13	13	860.32
19.11 - 19.44	4	4	28	–	2	28	13	13	866.26
19.44 - 19.77	4	4	24	6	2	30	14	14	904.16
19.77 - 20.10	4	4	26	4	2	30	14	14	910.10
Max. jack extension accord. to approval:			Head jack 240 mm extended Base jack 257 mm extended						

NOTE

Note

Attention: The given dimensions refer to the heigt of the tower!
The clear hight results in height of tower + primary beam + secondary beam + plywood.

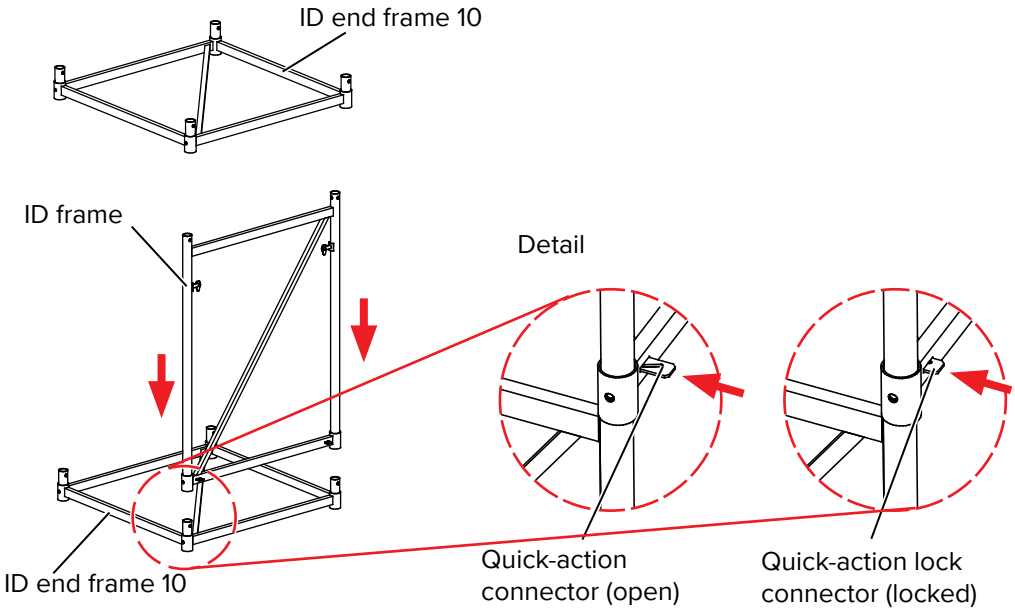
Unless stated otherwise all dimensions are in mm

4.4 Horizontal assembly

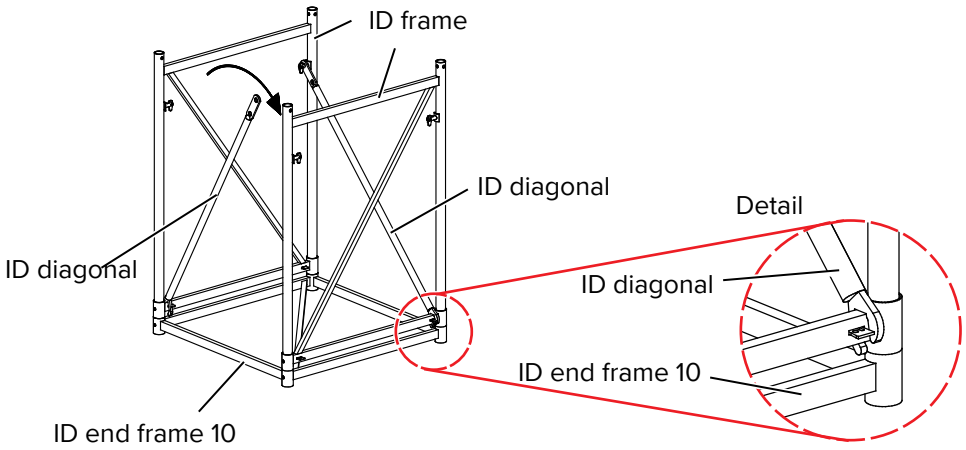
Step 1 Lay the ID end frame 10 on an even assembly ground near to a crane.

Step 2 Stick two ID frames into the ID end frame 10 and lock them with the quick-action connectors.

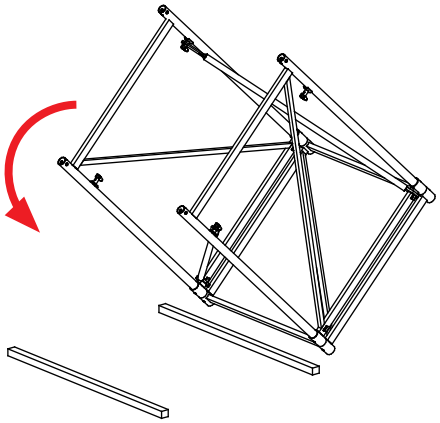
VISUAL CHECK	Make sure that the quick-action connector is locked (see detail).



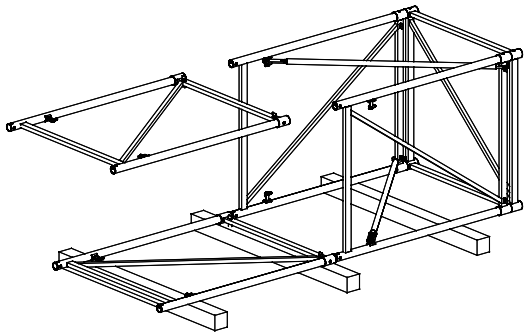
Step 3 Connect the ID diagonal with its lower end over the horizontal of the ID frame and fix the upper side to the pins with integrated gravity lock.



Step 4 Tip over the partly assembled unit onto square timbers for the next assembly steps.



Step 5 Insert ID frame and lock it with the quick-action connectors.

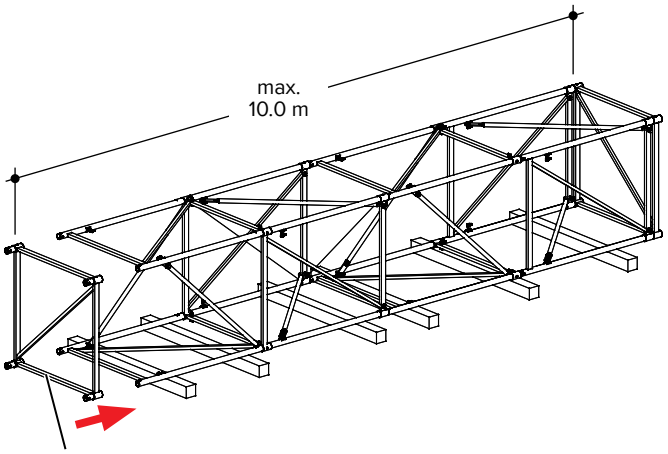


WARNING

Warning!

For stability reasons always mount the ID frames shifted by 90° in each level!

Step 6 Insert the next ID frames and continue the assembly sequence as described until reaching the desired height (max. 10 m) and place an ID end frame 10 onto the last two ID frames.



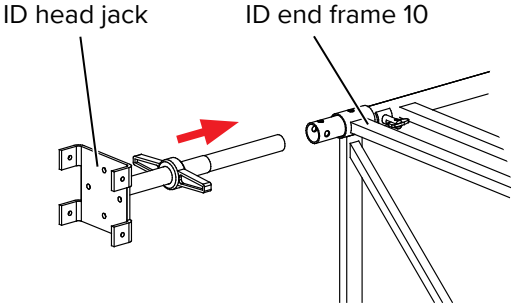
NOTE

Note

When stacking preassembled tower segments on top of each other, it is recommended to attach end frames at both ends of each segment to ensure square shape and easy fit.

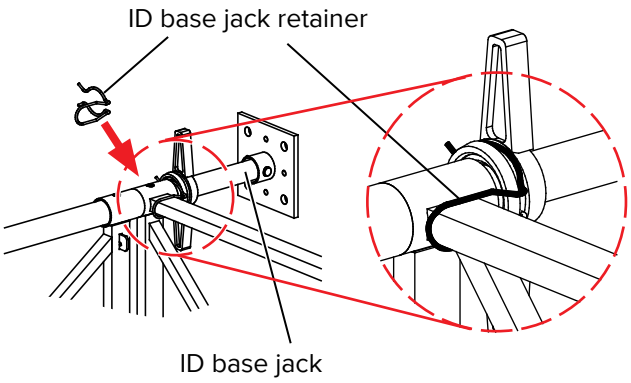
Step 7 Now the tower construction can be equipped with ID 15 diagonal rungs and ID 15 planks (see page 17).

Step 8 Insert ID head jacks into the ID end frame 10.



Unless stated otherwise all dimensions are in mm

Step 9 Insert ID base jacks into the ID end frame 10 and add the ID jack retainer.



NOTE	**Note** Consider the stripping play of the jacks.

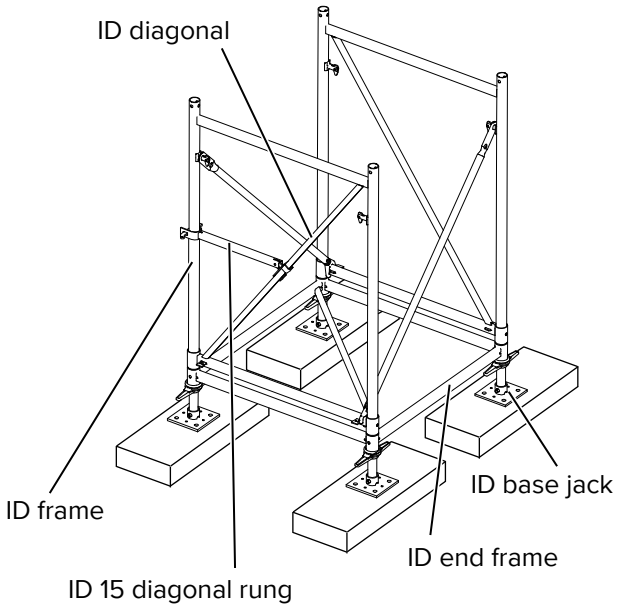
WARNING	**Warning!** The lifting of horizontally assembled towers into upright position can be performed in segments of up to 10 m!

WARNING	**Warning!** First secure the raised tower against tilting. Only then release the tower from the crane. The towers can be secured for example with eye bolts and scaffold retainers to a building or to each other with tubes and couplers. The construction requires a structural analysis!

4.5 Vertical assembly

NOTE	**Note** All base jacks have to stand on load distributing boards.

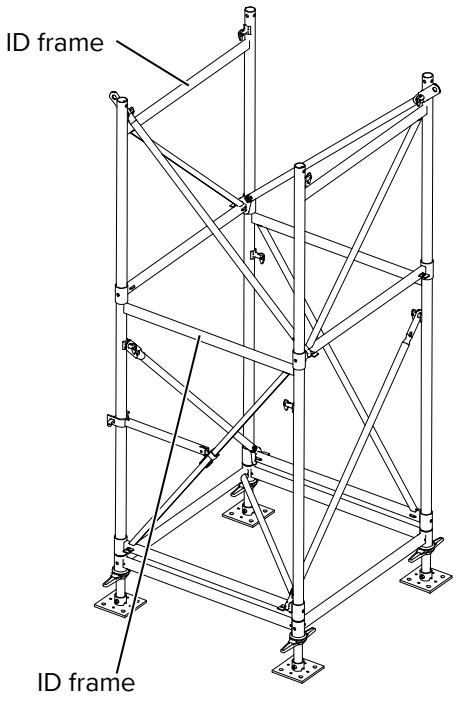
Step 1 Insert the ID base jacks into an ID end frame and lock them with the ID jack retainer (see page 17). Mount the ID frames and ID diagonal as well as the ID 15 diagonal rung.



NOTE	**Note** Always fix the ID 15 diagonal rung to the frame and not to a diagonal.

Assembly of next level

Make sure that the orientation of the ID frames is always shifted by 90° with each frame level. The connections must be properly secured with the quick-action connectors (see page 15).



WARNING

Warning!

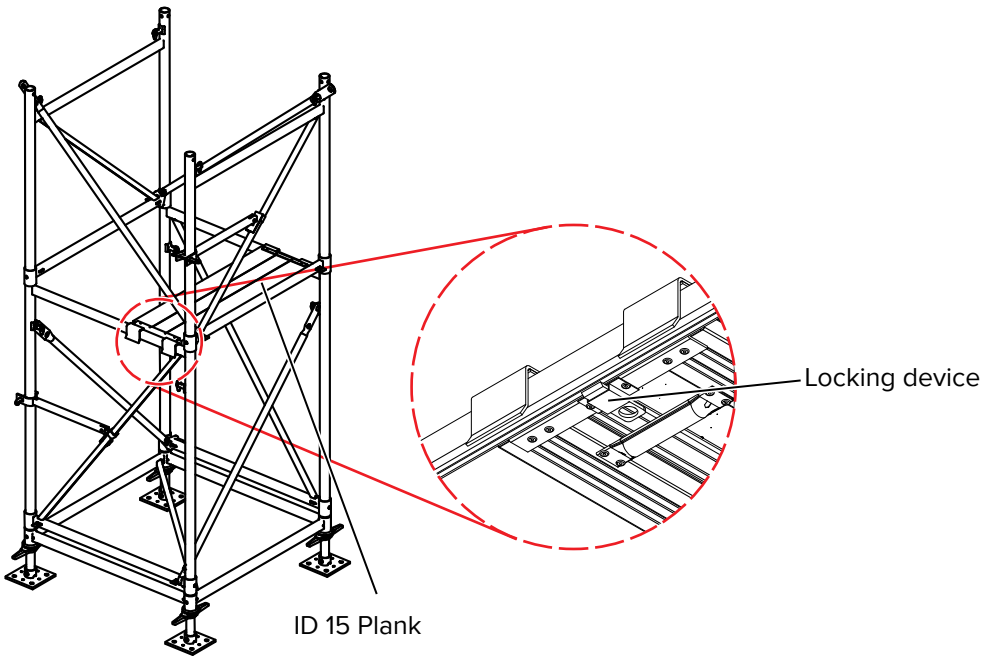
For stability reasons always mount the ID frames shifted by 90°!

NOTE

Note

For reasons of clarity, the load distributing boards are not shown in the following pictures.

Step 2 Place the ID 15 plank onto the ID frame.



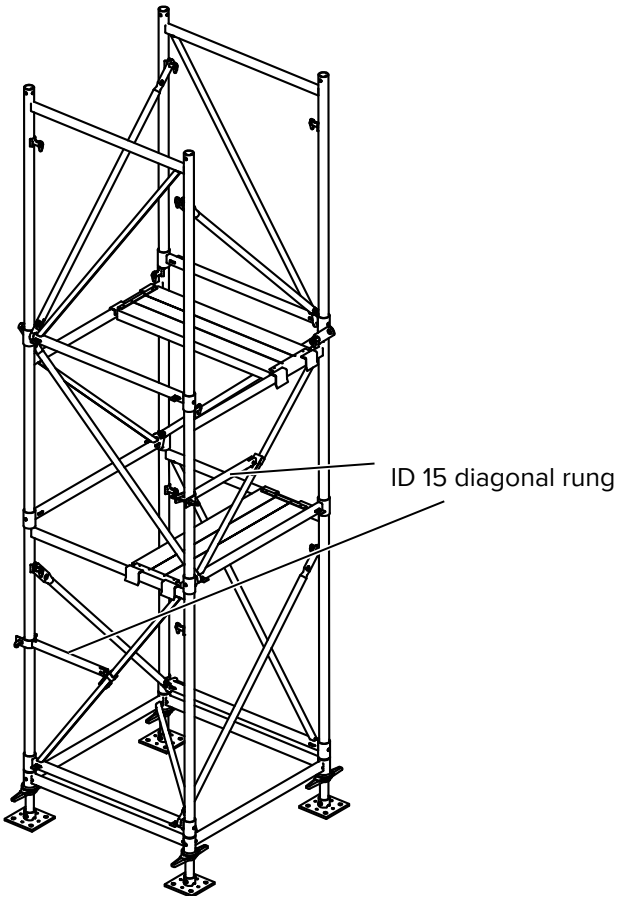
VISUAL CHECK Make sure that the lift-off retainer is locked.

NOTE

Note

During vertical assembly each level must be equipped with a diagonal rung and a plank. Climbing with only two planks is not possible.

The following assembly steps have to be performed from the ID 15 planks.



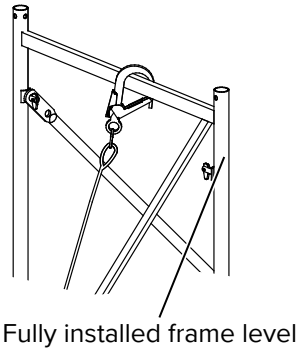
WARNING

Warning!

The tower must be secured against tilting.

Starting from a fall height of 2.00 m personal protective equipment against falls from a height has to be used.

Attachment point for personal protective equipment



Retractable fall arresters must be used to guard against falls from height, in accordance with DIN EN 360.

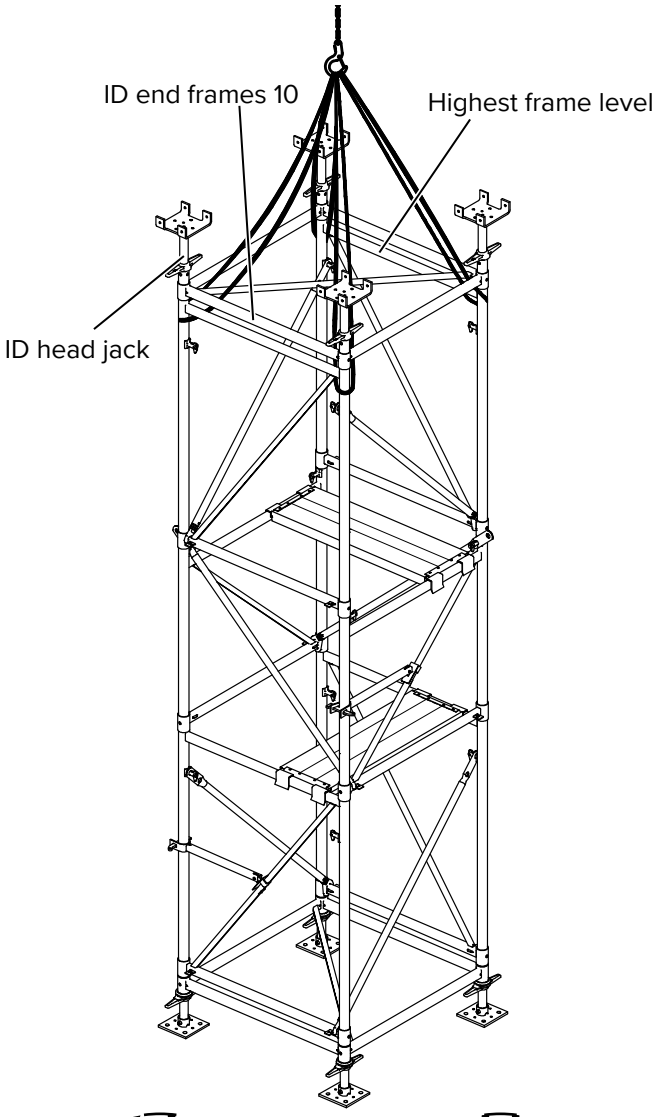
The personal protective equipment against falls from a height has to be attached to the vertical of the highest fully assembled frame level.

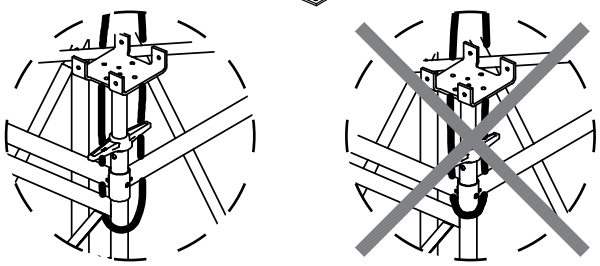
WARNING

Warning!

Do not attach the personal protective equipment against falls from a height to the unsecured top ID end frame 10. Risk of falling!

To complete the tower assembly install the ID end frame and the ID head jacks.





WARNING

Warning!

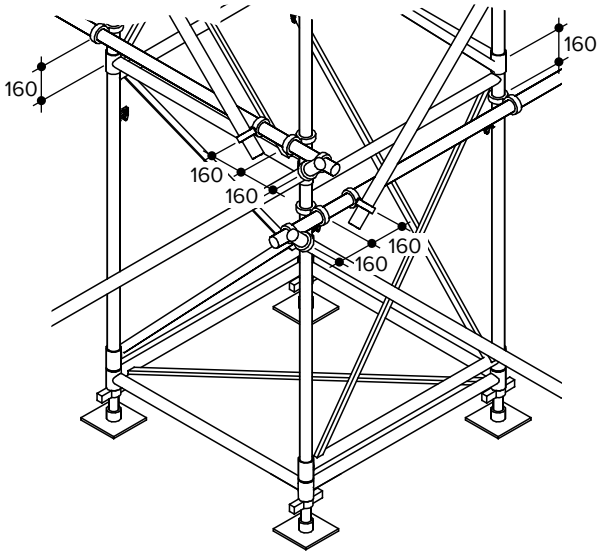
For the transport by crane, do not attach the crane hooks to the unsecured top ID end frame 10. Attach the crane hooks to the completely assembled frame level directly below the end frame! First secure the tower against tilting. Only then release the tower from the crane.

Unless stated otherwise all dimensions are in mm

5 Scaffold tubes with couplers

If a bracing with scaffold tubes and couplers is necessary, install it according to the structural analysis.

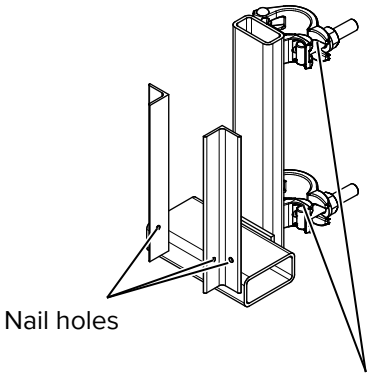
Scaffold tubes with couplers must be mounted as near as possible to the nodes. The maximum distance between the node and the coupler is 16 cm.



6 Working decks

Working decks at the top of the tower are often necessary to operate the slab formwork. The H20 console allows the installation of working decks according to DIN EN 12811-1 load class 2 (1.50 kN/m^2).

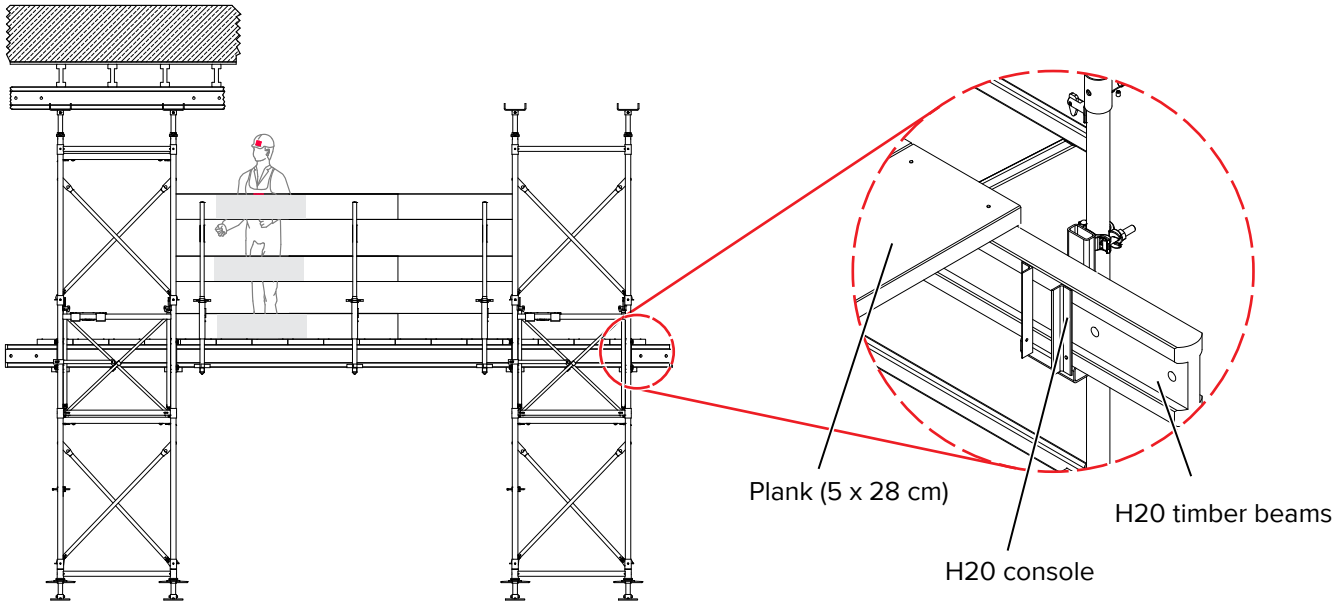
H 20 console



Torque of the couplers: 50 Nm

6.1 Assembly

With H20 consoles, H20 timber beams and timber planks (5 x 28 cm) a working deck at the top level to maintain the slab formwork can be installed between the ID 15 frame supports. The H20 consoles are fixed at two facing ID 15 frame supports. Always fix two H20 consoles at each ID 15 frame support. The consoles are clamped with the integrated couplers to the vertical legs of the upper frames. Place a H20 or R24 timber beam into two H20 consoles and secure the beams with nails.



Nail the timber planks onto the timber beams. The required side protection can be assembled with PROTECTO multiple clamps, PROTECTO railing posts and PROTECTO protective mesh panels. As an alternative to the mesh panels a plank railing according to EN 338 can be used. Therefore additionally the PROTECTO toe board retainers are required.

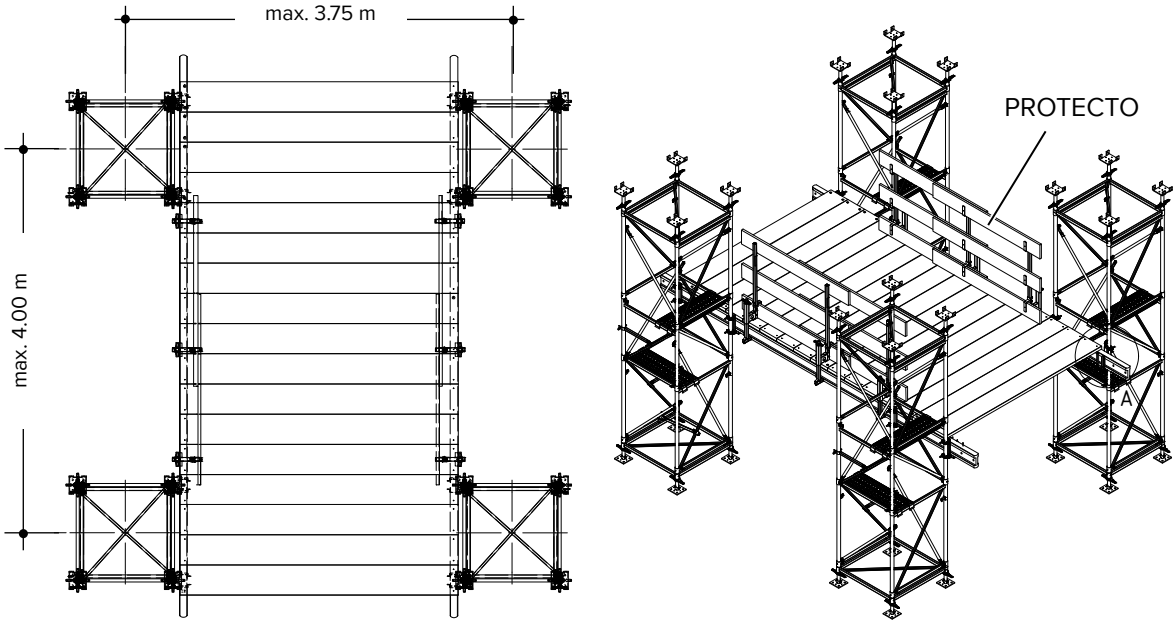
WARNING

Warning!

Follow the PROTECTO user guide!

6.2 Maximum distance between towers

The maximum distance between the towers with installed working deck is 3.75 x 4.00 m.



NOTE

Note

The maximum distance is related to the working deck. According to the load from the formwork shorter distances may result.

WARNING

Warning!

Only use this level as working deck! It is not permitted to apply and transfer any other loads from the slab formwork to the working decks!

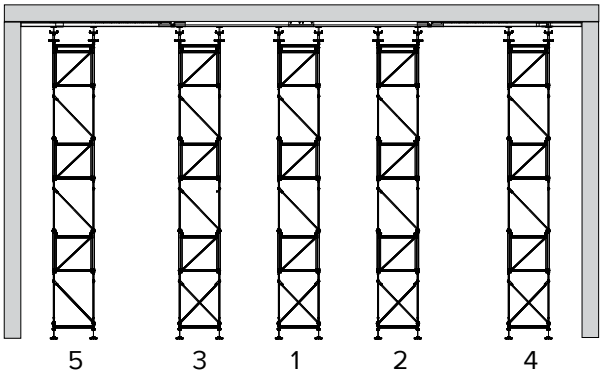
Unless stated otherwise all dimensions are in mm

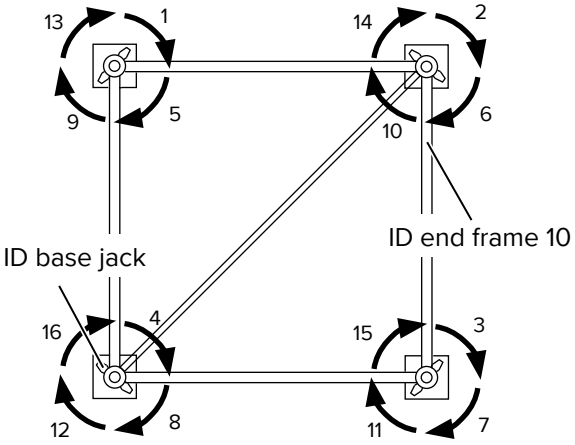
7 Disassembly

7.1 Release of shoring towers

In order to avoid overloading of individual towers during stripping, the towers are lowered through a particular process that should be adjusted accordingly to the expected deformation of the ceiling. Each individual tower has to be relieved at the base jacks from its load also by a particular process. Starting on a leg, the spindle nuts must, one by one, be released at all four corners by turning them clockwise by a quarter of a turn until all spindles are completely relieved of load. This method is intended to prevent the load to rest on one leg only and therefore overloading it.

Example: Sequence to lower the towers





NOTE	**Note**
	The disassembly procedure takes place in the reverse order of assembly. Personal safety equipment must be used! The structural stability must be assured during assembly, use and dissassembly. The vertical transport of scaffold components is done outside of the ID 15 tower by e.g. using a rope. Intermediate platforms can be installed to allow easy assembly and disassembly (see page 21).

7.2 Disassembly of towers

WARNING	**Warning!**
	Do not throw or drop scaffold components off the tower!

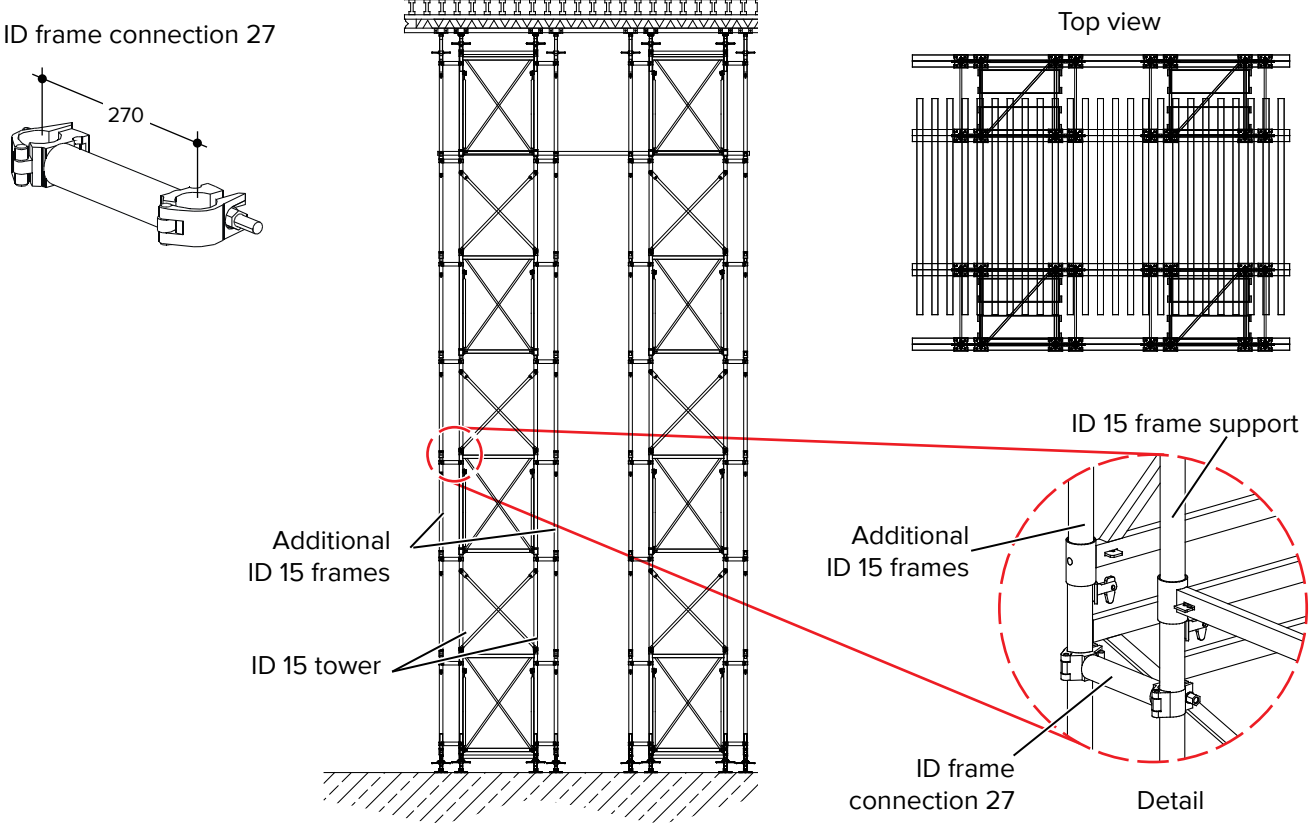
Removal of head jacks

The head jacks can only be removed when the tower is lowered at the head and base jacks, so that the distance between the upper edge of the top frame and the bottom of the slab is at least 54 cm.

If the distance between the top frame and the slab is not sufficient remove the jacks together with the frames of the uppermost frame level.

8 Additional ID 15 frames

The ID frame connection 27 is used to connect additional ID frames to ID 15 frame supports with a leg distance of 27 cm. The connection allows for the assembly of ID frames in tight adjustment areas or as reinforcement of ID 15 frame supports to support particularly high or concentrated loads. The ID frame connectors must always be connected directly underneath the horizontal members of the frames.



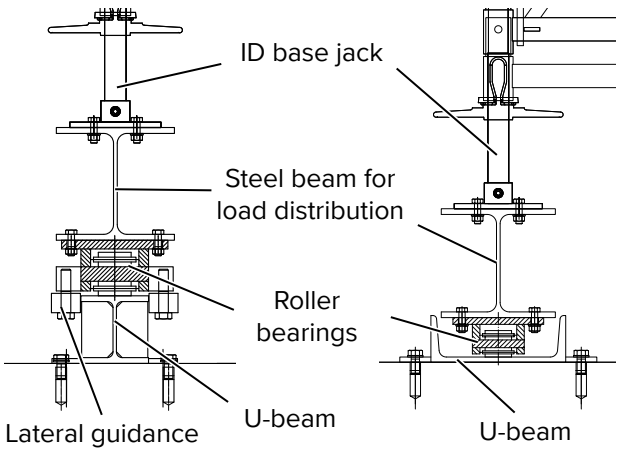
NOTE

Note

When additional frames are mounted, a separate project specific structural analysis is mandatory!

8.1 Solutions for moving

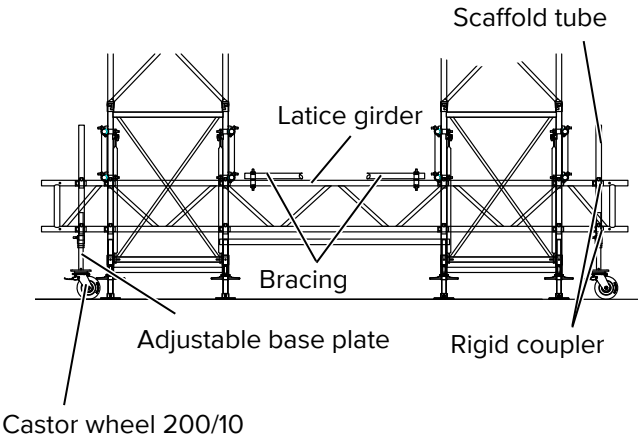
The adjacent illustration shows solutions for the shifting of the ID 15 frame supports.



Unless stated otherwise all dimensions are in mm

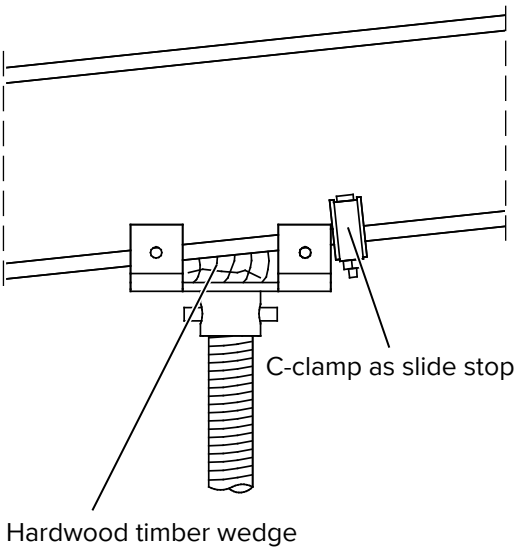
NOTE	**Note** All adjacent examples need a separate structural approval.

Solution for moving small tower assemblies



8.2 Inclinations

The adjacent illustration shows the solution of an inclinations of the primary beam of > 6 %



NOTE	**Note** The adjacent examples need a separate structural approval.

Inclinations <6 % can be realized with the ID head jack. To compensate inclinations >6 % additionally use hardwood timber wedges.

9 Load bearing capacity

9.1 Chart and table overview

The adjacent tables give an overview over the charts and tables on the next pages.

9.2 Typical influence that has to be considered

Examples of typical vertical influence (in compliance to DIN EN 12811 and DIN EN 12812

- Dead weight fresh concrete
- Dead weight of formwork and/or complete supporting structure
- Substitute loads out of working mode
- Storage areas
- Snow and ice
- Concrete clusters

Examples for typical horizontal influence (in compliance to DIN EN 12812)

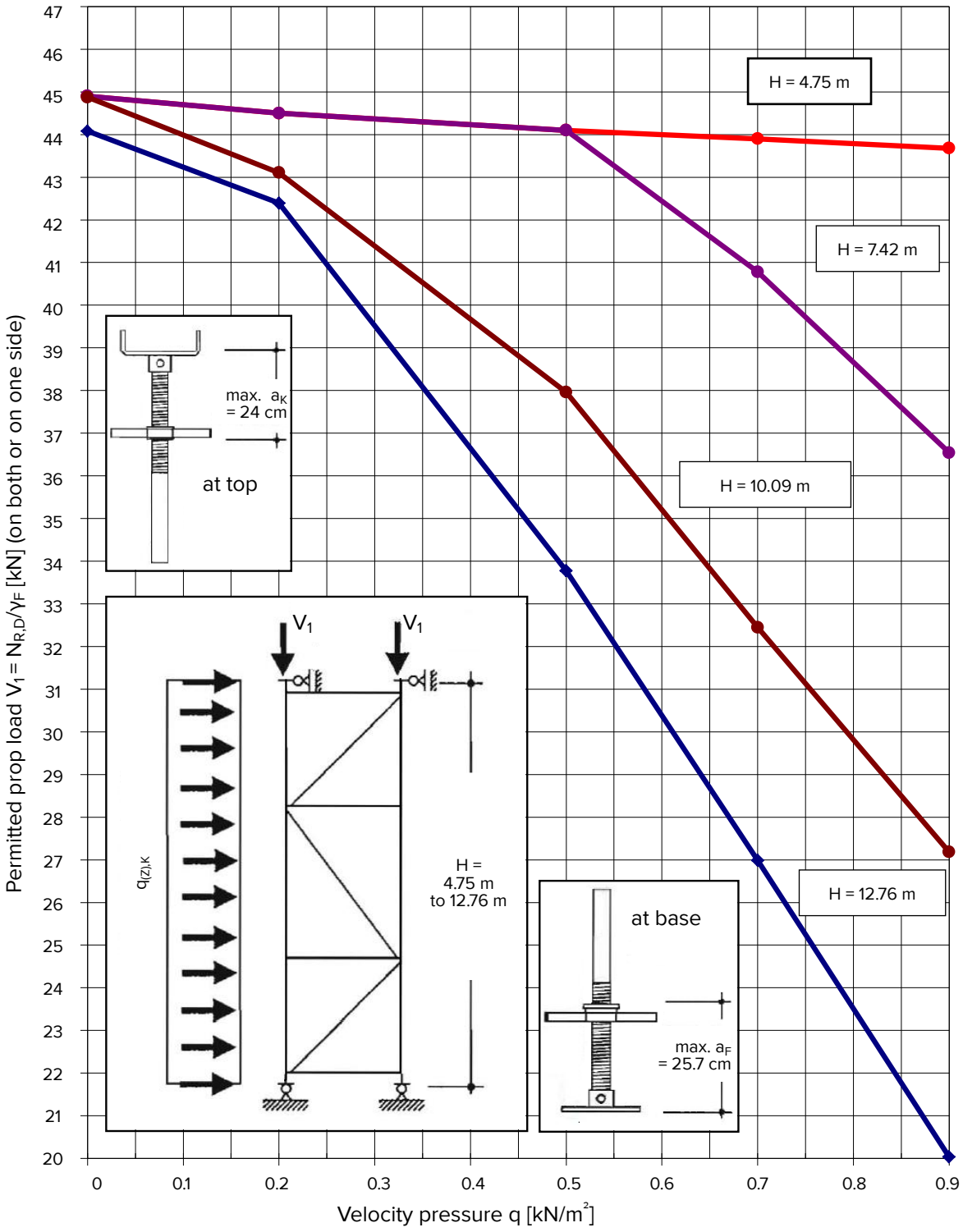
- Horizontal substitute load for working mode (1% of vertical load)
- Wind (follow the local attachment of the valid standard!)
- Laterally concrete pressure
- Downforce due to inclination of the frame support

9.3 Charts of load bearing capacity

ID 15 height of tower: 4.75 m - 12.76 m

Held at top

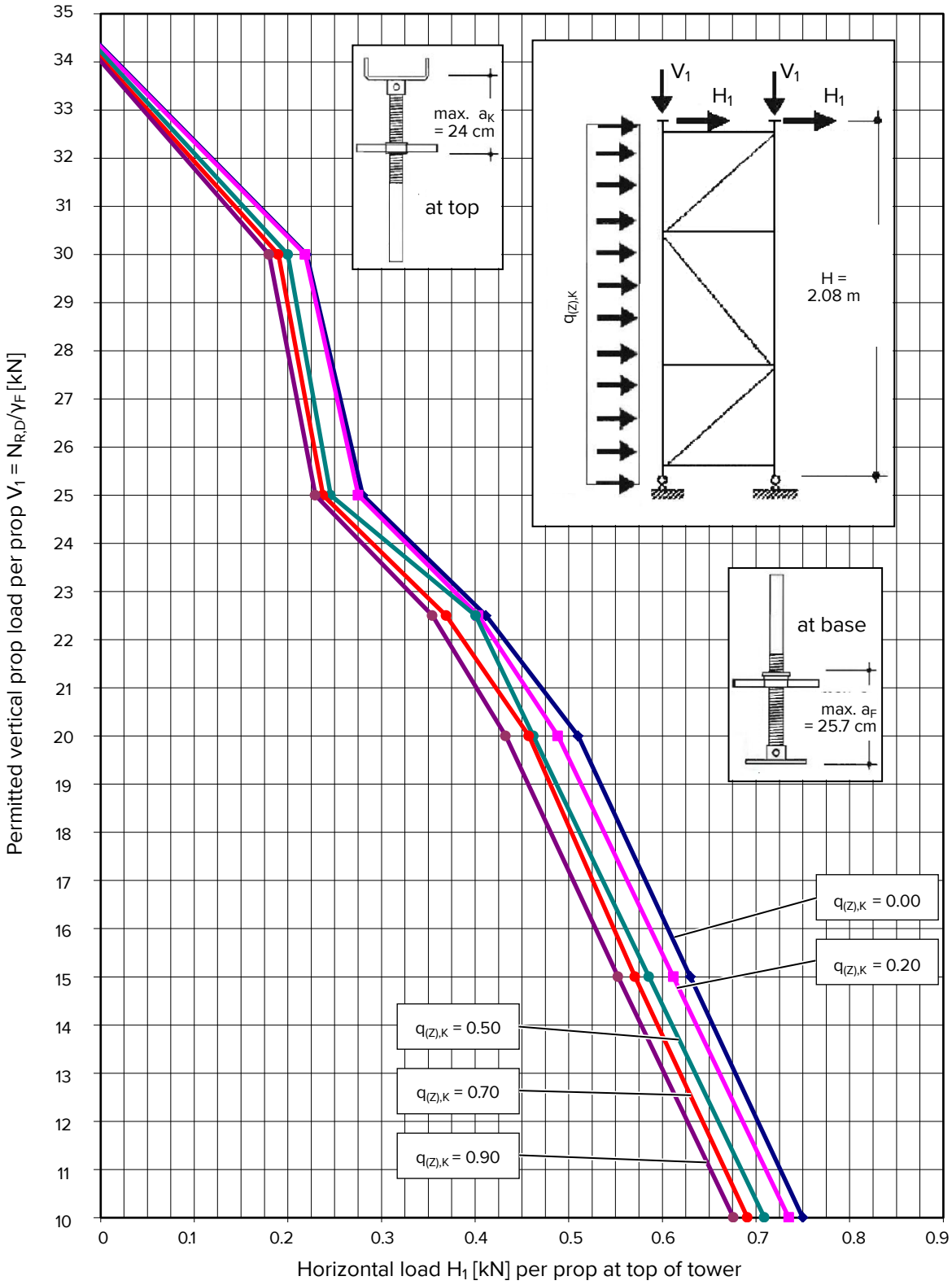
Interpolate intermediate values.



ID 15 height of tower: 2.08 m

Free standing

Interpolate intermediate values.

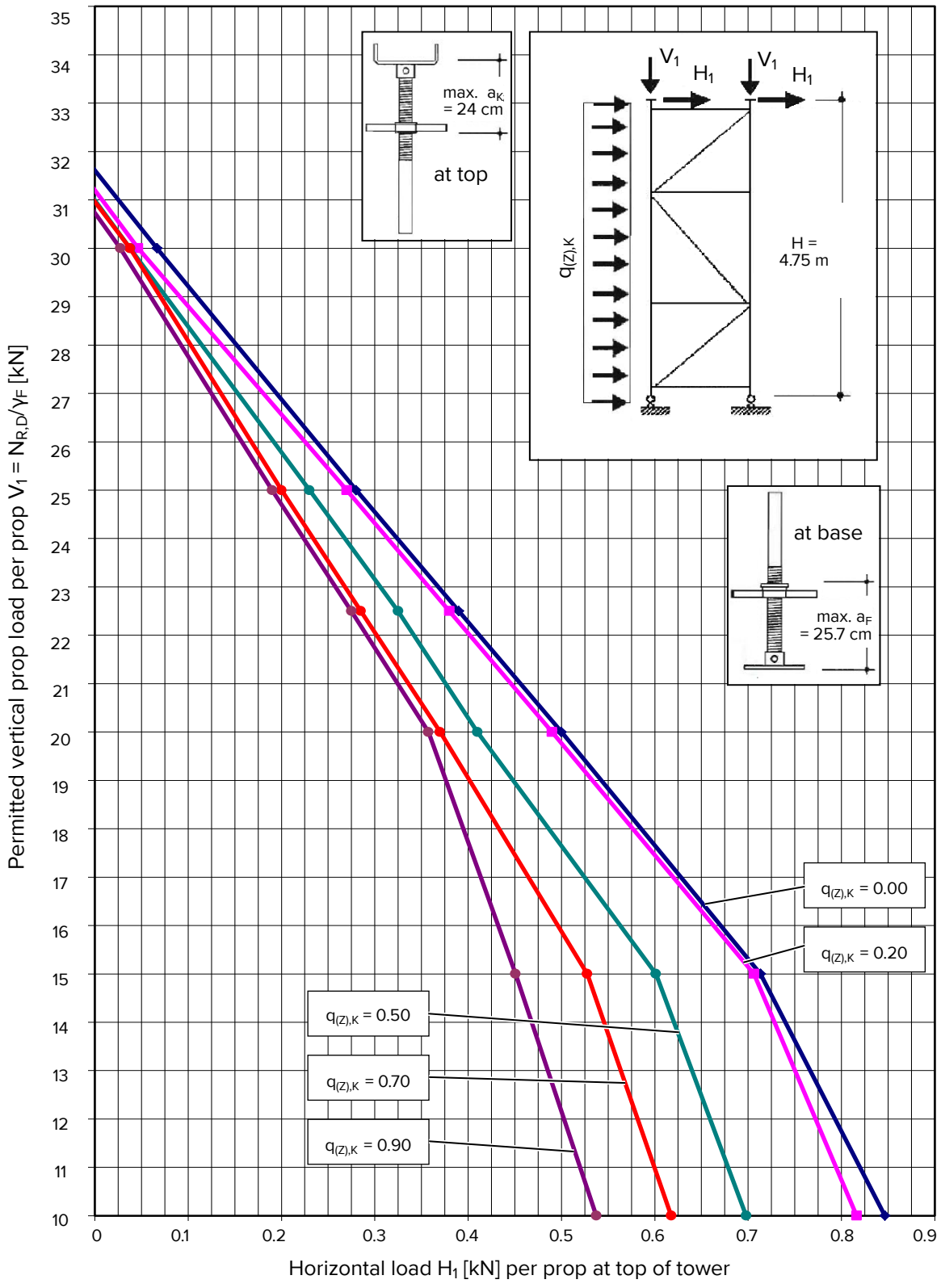


Unless stated otherwise all dimensions are in mm

ID 15 height of tower: 4.75 m

Free standing

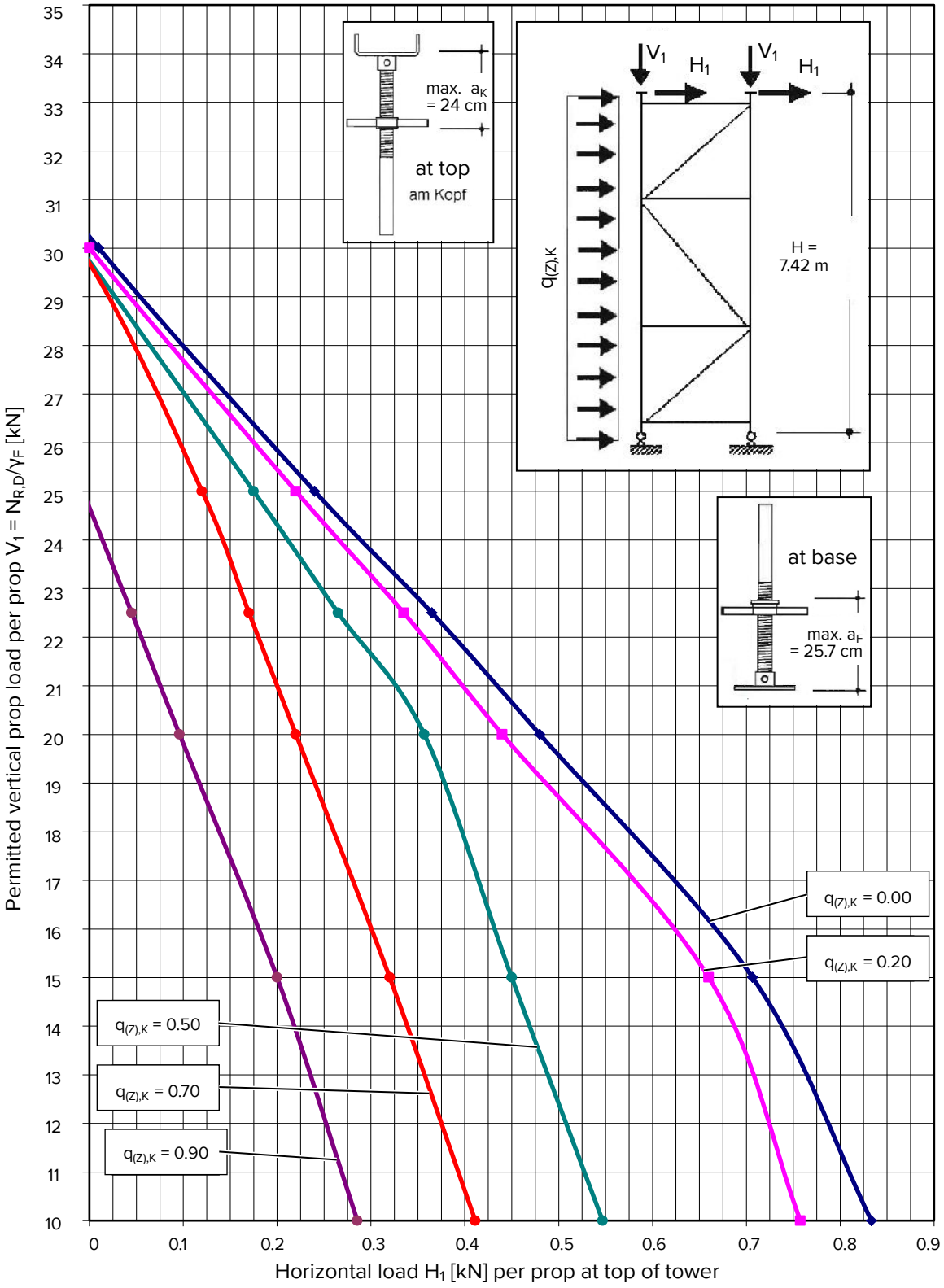
Interpolate intermediate values.



ID 15 height of tower: 7.42 m

Free standing

Interpolate intermediate values.



Unless stated otherwise all dimensions are in mm

9.4 Maximum operation heights

The following charts allow for a quick determination of the characteristic velocity pressure $q_{Z,K}$. It is calculated from the wind load zone/terrain category.
Choose the correct table according to the planned operation time.

Resulting velocity pressure with an operation time ≤1 year			
Wind load zone/Terrain category	**Height top edge of ID 15 tower over ground [m]**		
WLZ 1/ GK II + III	32	100	284
WLZ 2/ GK II + III	19	46	124
WLZ 3/ GK I + II	4	13	34
WLZ 4/ GK I	-	3	10
Velocity pressure [kN/m²]	$q_{(Z),K}$ = 0.50	$q_{(Z),K}$ = 0.70	$q_{(Z),K}$ = 0.90
Wind speed [km/h]	100 100	120 120	135 135

Resulting velocity pressure with an operation time ≤2 years			
Wind load zone/Terrain category	Height top edge of ID 15 tower over ground [m]		
WLZ 1/ GK II + III	21	52	149
WLZ 2/ GK II + III	12	30	65
WLZ 3/ GK I + II	-	-	19
WLZ 4/ GK I	-	-	4
Velocity pressure [kN/m²]	$q_{(Z),K}$ = 0.50	$q_{(Z),K}$ = 0.70	$q_{(Z),K}$ = 0.90
Wind speed [km/h]	100 100	120 120	135 135

Resulting velocity pressure with an operation time >2 years			
Wind load zone/Terrain category	Height top edge of ID 15 tower over ground [m]		
WLZ 1/ GK II + III	8	20	39
WLZ 2/ GK II + III	5	12	23
WLZ 3/ GK I + II	-	-	5
WLZ 4/ GK I	-	-	-
Velocity pressure [kN/m²]	$q_{(Z),K}$ = 0.50	$q_{(Z),K}$ = 0.70	$q_{(Z),K}$ = 0.90
Wind speed [km/h]	100 100	120 120	135 135

9.5 Explanation of the charts

The load charts on the next pages are valid for towers that are held at top or for free standing single towers.

Interpolate intermediate values.

Basis of calculation:

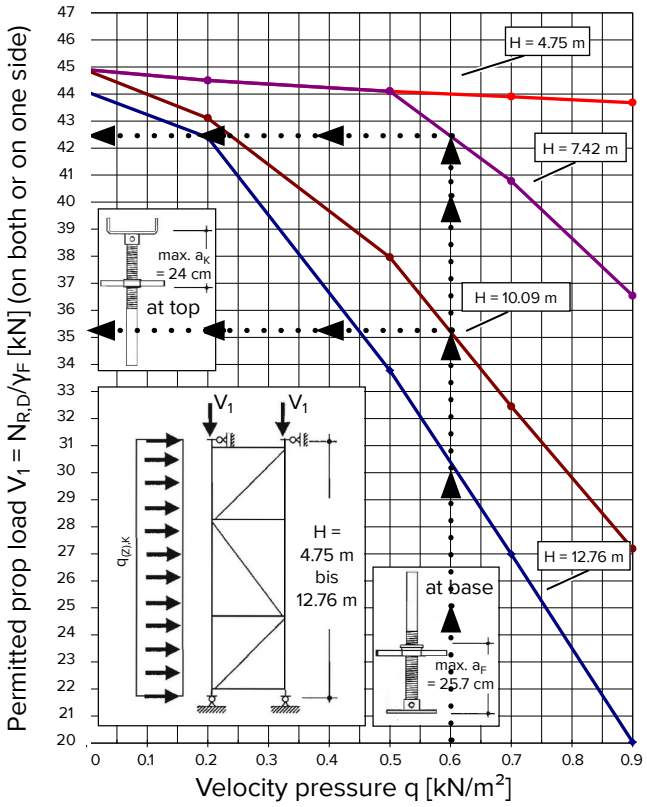
- Wind exposed area: 0.166 m^2/m per prop
- Imperfections acc. to DIN EN 12812 considered
- Horizontal equivalent load out of operation (V/100) considered
- All values are characteristically - partial safety coefficients acc. to EC3, DIN EN 12812 are considered

Example for towers that are held at top

The desired figures for this example are a tower with a height of 9.00 m and a velocity pressure of $q_{(Z),K}$ = 0.6 kN/m^2.

Follow the dotted line to find the permitted prop load for H = 7.42 m of 42.5 kN and for H = 10.09 m of 35,2 kN.

The linear interpolation gives a value of 38.2 kN for this example.



Unless stated otherwise all dimensions are in mm

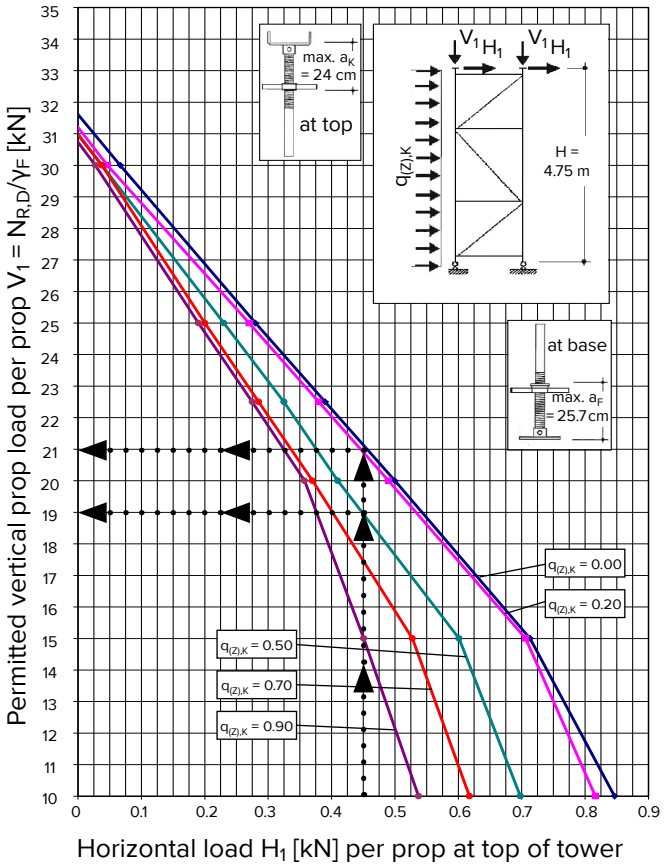
Example for free standing towers:

The desired figures for this example are a tower with a height of 6.00 m, a horizontal load H1 of 0.45 kN per leg and a velocity pressure of $q_{(Z),K}$ = 0.3 kN/m².

Therefore first determine the prop load for a 4.75 m high tower per interpolation.

Follow the dotted line to find the permitted prop load for $q_{(Z),K}$ = 0.20 kN/m² of 21.0 kN and for $q_{(Z),K}$ = 0.50 kN/m² of 19.0 kN.

Interpolated: 20.3 kN



Repeat the same for a 7.42 m high tower.

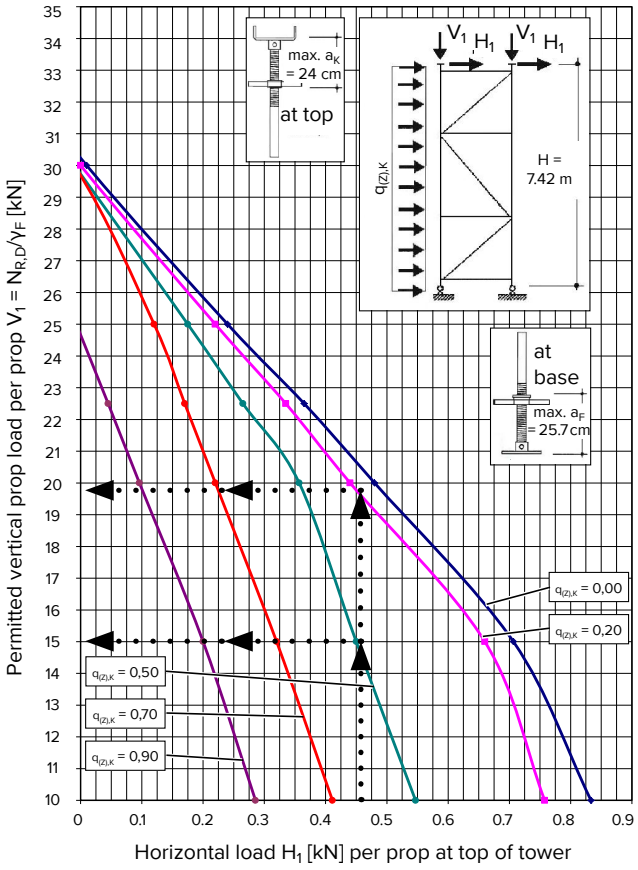
Follow the dotted line to find the permitted prop load for $q_{(Z),K}$ = 0.20 kN/m² of 19.8 kN and for $q_{(Z),K}$ = 0.50 kN/m² of 15.0 kN.

Interpolated: 18.2 kN

Now interpolate the values of the 4.75 m high tower (20.3 kN) and the 7.42 m high tower (18.2 kN) for a 6.00 m high tower.

$V_{1\,int.}$ = 19.3 kN

The calculation for this interpolation can be found underneath the diagram.



$V_{1\,int.}$ = 18.2kN + (20.3 - 18.2 kN) · (7.42 m - 6.00 m) / (7.42 m - 4.75 m)

$V_{1\,int.}$ = 19.3 kN

WARNING

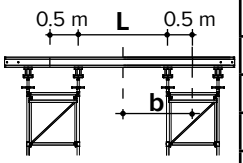
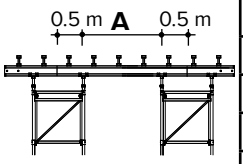
Warning!

The jack extension has to meet the requirements given in the diagrams!

9.6 Load table

according to DIN EN 12812 with H20 secondary beams and double H20 primary beams according to DIN EN 13377

H20	M_{perm}: 5 kNm	q_{EN}: $g_s + g_{FB} + g_{BA} + v$	q_{EN}: Surface load
	V_{perm}: 11 kN	g_s: 0.25 kN/m²	g_s: Dead weight formwork
	EI: 500 kNm²	g_{FB}: 25 kN/m³ × d/100	g_{FB}: Dead weight fresh concrete
	f_{perm}: L/500	g_{BA}: 0.10 * g_{FB} ... 0.75 ≤ g_{BA} ≤ 1.75 kN/m²	g_{BA}: Concrete clusters
	f_{perm}: A/500	v: 0.75 kN/m²	v: Live load

Slab thickness d	[cm]	14	16	18	20	22	24	26	28	30	35	40	45	50	55
Surface load q_{EN}	[kN/m²]	5.25	5.75	6.25	6.75	7.25	7.75	8.25	8.75	9.25	10.63	12.00	13.38	14.75	16.13
Distance secondary beams e [m]		L permitted span of secondary beams [m] (timber beams H20) ≥1.00m													
	0,20	4.00	4.00	3.95	3.85	3.76	3.67	3.60	3.53	3.46	3.31	3.17	3.06	2.96	2.88
	0,33	3.54	3.43	3.34	3.25	3.18	3.11	3.04	2.99	2.93	2.80	2.69	2.59	2.51	2.43
	0,40	3.32	3.22	3.13	3.05	2.98	2.92	2.86	2.80	2.75	2.62	2.52	2.43	2.35	2.28
	0,50	3.08	2.99	2.91	2.83	2.77	2.71	2.65	2.60	2.55	2.44	2.34	2.26	2.18	2.12
	0,63	2.85	2.77	2.69	2.62	2.56	2.51	2.45	2.41	2.36	2.26	2.17	2.09	2.02	1.96
	0,67	2.79	2.71	2.64	2.57	2.51	2.45	2.40	2.36	2.31	2.21	2.12	2.05	1.98	1.92
	0,75	2.69	2.61	2.54	2.48	2.42	2.36	2.32	2.27	2.23	2.13	2.04	1.97	1.90	1.82
Loading width [m] b = L/2 + 0.5m		A permitted span of primary beams [m] (double timber beams H20) ≥1.00m													
	1,00	3.08	2.99	2.91	2.83	2.77	2.71	2.65	2.60	2.55	2.44	2.34	2.26	2.18	2.12
	1,25	2.86	2.78	2.70	2.63	2.57	2.51	2.46	2.41	2.37	2.26	2.17	2.09	2.03	1.97
	1,50	2.69	2.61	2.54	2.48	2.42	2.36	2.32	2.27	2.23	2.13	2.04	1.97	1.90	1.82
	1,75	2.56	2.48	2.41	2.35	2.30	2.25	2.20	2.16	2.12	2.02	1.94	1.85	1.70	1.56
	2,00	2.45	2.37	2.31	2.25	2.20	2.15	2.10	2.06	2.02	1.93	1.83	1.64	1.49	1.36
	2,25	2.35	2.28	2.22	2.16	2.11	2.07	2.02	1.98	1.95	1.83	1.63	1.46	1.33	1.21
	2,50	2.27	2.20	2.14	2.09	2.04	1.99	1.95	1.91	1.86	1.66	1.47	1.32	1.19	1.09
Loading width [m] b = L/2 + 0.5m		N_K resulting load [kN]													
	1,00	10.7	11.5	12.2	12.9	13.7	14.4	15.1	15.7	16.4	18.3	20.0	21.8	23.5	25.2
	1,25	12.7	13.6	14.4	15.3	16.2	17.0	17.8	18.7	19.5	21.7	23.8	25.9	27.9	29.9
	1,50	14.5	15.6	16.6	17.6	18.6	19.6	20.5	21.5	22.4	24.9	27.4	29.8	32.1	34.1
	1,75	16.3	17.5	18.7	19.8	20.9	22.0	23.1	24.2	25.2	28.1	30.9	33.3	34.9	36.1
	2,00	18.1	19.4	20.7	21.9	23.2	24.4	25.6	26.8	28.0	31.2	33.9	35.4	36.8	38.1
	2,25	19.8	21.2	22.6	24.0	25.4	26.7	28.1	29.4	30.7	33.8	35.5	37.0	38.6	40.1
	2,50	21.5	23.0	24.5	26.1	27.5	29.0	30.5	31.9	33.1	35.3	37.0	38.7	40.4	42.2

WARNING

Warning!

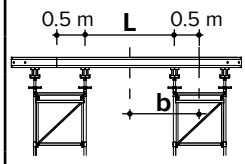
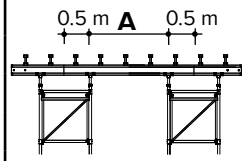
The resulting loads N_K may not exceed the vertical prop loads V_1, taken from the diagrams on page 27 et seq.!
Otherwise the distances between the towers have to be reduced!

Load bearing capacity

Load table

according to DIN EN 12812 with H20 secondary beams and double R24 primary beams according to DIN EN 13377

H20	M_{perm}: 5 kNm	q_{EN}: $g_s + g_{FB} + g_{BA} + v$	q_{EN}: Surface load
	V_{perm}: 11 kN	g_s: 0.25 kN/m²	g_s: Dead weight formwork
	EI: 500 kNm²	g_{FB}: 25 kN/m³ × d/100	g_{FB}: Dead weight fresh concrete
	f_{perm}: L/500	g_{BA}: 0.10 * g_{FB} ... 0.75 ≤ g_{BA} ≤ 1.75 kN/m²	g_{BA}: Concrete clusters
	f_{perm}: A/500	v: 0.75 kN/m²	v: Live load

Slab thickness d	[cm]	60	65	70	75	80	85	90	95	100	105	110	115	120	125
Surface load q_{EN}	[kN/m²]	17.50	18.88	20.25	21.50	22.75	24.00	25.25	26.50	27.75	29.00	30.25	31.50	32.75	34.00
Distance secondary beams e [m]		L permitted span of secondary beams [m] (timber beams H20) ≥1.00m													
	0.20	2.80	2.73	2.67	2.61	2.57	2.52	2.48	2.44	2.40	2.37	2.33	2.30	2.27	2.24
	0.33	2.37	2.31	2.26	2.21	2.17	2.13	2.10	2.06	2.03	2.00	1.97	1.95	1.92	1.89
	0.40	2.22	2.17	2.12	2.07	2.04	2.00	1.97	1.94	1.90	1.86	1.82	1.75	1.68	1.62
	0.50	2.06	2.01	1.96	1.93	1.88	1.83	1.74	1.66	1.59	1.52	1.45	1.40	1.34	1.29
	0.63	1.90	1.83	1.72	1.62	1.53	1.46	1.38	1.32	1.26	1.20	1.15	1.11	1.07	1.03
	0.67	1.85	1.74	1.62	1.53	1.44	1.37	1.30	1.24	1.18	1.13	1.09	1.04	1.00	-
	0.75	1.68	1.55	1.45	1.36	1.29	1.22	1.16	1.11	1.06	1.01	-	-	-	-
Loading width [m] b = L/2 + 0.5m		A permitted span of primary beams [m] (double timber beams H20) ≥1.00m													
	1.00	2.06	2.01	1.96	1.93	1.88	1.83	1.74	1.66	1.59	1.52	1.45	1.40	1.34	1.29
	1.25	1.91	1.84	1.74	1.64	1.55	1.47	1.39	1.33	1.27	1.21	1.16	1.12	1.07	1.04
	1.50	1.68	1.55	1.45	1.36	1.29	1.22	1.16	1.11	1.06	1.01	-	-	-	-
	1.75	1.44	1.33	1.24	1.17	1.11	1.05	1.00	-	-	-	-	-	-	-
	2.00	1.26	1.17	1.09	1.02	-	-	-	-	-	-	-	-	-	-
	2.25	1.12	1.04	-	-	-	-	-	-	-	-	-	-	-	-
	2.50	1.01	-	-	-	-	-	-	-	-	-	-	-	-	-
Loading width [m] b = L/2 + 0.5m		N_K resulting load [kN]													
	1.00	26.8	28.4	30.0	31.5	32.7	33.9	34.6	35.3	35.9	36.5	37.1	37.8	38.4	39.0
	1.25	31.9	33.5	34.7	35.4	36.2	37.0	37.8	38.6	39.3	40.1	40.9	41.7	42.5	43.3
	1.50	35.1	36.2	37.2	38.1	39.1	40.0	40.9	41.9	42.8	43.8	44.7	-	-	-
	1.75	37.3	38.5	39.7	40.8	41.9	43.0	44.1	-	-	-	-	-	-	-
	2.00	39.5	40.9	42.3	43.5	44.8	-	-	-	-	-	-	-	-	-
	2.25	41.7	43.2	44.8	-	-	-	-	-	-	-	-	-	-	-
	2.50	43.9	-	-	-	-	-	-	-	-	-	-	-	-	-

WARNING

Warning!

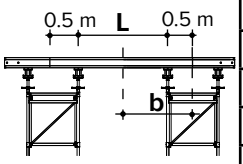
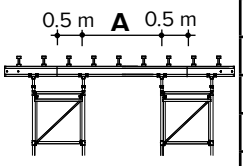
The resulting loads N_K may not exceed the vertical prop loads V_1, taken from the diagrams on page 27 et seq.!
Otherwise the distances between the towers have to be reduced!

Unless stated otherwise all dimensions are in mm

Load table

according to DIN EN 12812 with R24 secondary beams and double R24 primary beams according to DIN EN 13377

R24			
	M_{perm}: 7 kNm	**q_{EN}: g_s + g_{FB} + g_{BA} + v**	**q_{EN}: Surface load**
	V_{perm}: 13 kN	**g_s: 0.25 kN/m²**	**g_s: Dead weight formwork**
	EI: 900 kNm²	**g_{FB}: 25 kN/m³ • d/100**	**g_{FB}: Dead weight fresh concrete**
	f_{perm}: L/500	**g_{BA}: 0.10 * gFB ... 0.75 ≤ gBA ≤ 1.75 kN/m²**	**g_{BA}: Concrete clusters**
	f_{perm}: A/500	**v: 0.75 kN/m²**	**v: Live load**

Slab thickness d	[cm]	14	16	18	20	22	24	26	28	30	35	40	45	50	55
Surface load qEN	[kN/m²]	5.25	5.75	6.25	6.75	7.25	7.75	8.25	8.75	9.25	10.63	12.00	13.38	14.75	16.13
Distance secondary beams e [m]		L permitted span of secondary beams [m] (timber beams R24) ≥1.00m													
	0.20	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	3.86	3.72	3.61	3.50
	0.33	4.00	4.00	4.00	3.96	3.87	3.78	3.70	3.63	3.56	3.40	3.27	3.15	3.05	2.96
	0.40	4.00	3.92	3.81	3.71	3.63	3.55	3.47	3.41	3.34	3.19	3.07	2.96	2.86	2.78
	0.50	3.75	3.64	3.54	3.45	3.37	3.29	3.22	3.16	3.10	2.96	2.85	2.74	2.66	2.58
	0.63	3.47	3.37	3.27	3.19	3.12	3.05	2.99	2.93	2.87	2.74	2.63	2.54	2.45	2.35
	0.67	3.40	3.30	3.21	3.13	3.05	2.99	2.92	2.87	2.81	2.69	2.58	2.49	2.38	2.28
	0.75	3.27	3.18	3.09	3.01	2.94	2.88	2.82	2.76	2.71	2.59	2.49	2.36	2.25	2.15
Loading width [m] b = L/2 + 0.5m		A permitted span of primary beams [m] (double timber beams R24) ≥1.00m													
	1.00	3.75	3.64	3.54	3.45	3.37	3.29	3.22	3.16	3.10	2.96	2.85	2.74	2.66	2.58
	1.25	3.48	3.38	3.28	3.20	3.12	3.06	2.99	2.93	2.88	2.75	2.64	2.55	2.46	2.36
	1.50	3.27	3.18	3.09	3.01	2.94	2.88	2.82	2.76	2.71	2.59	2.49	2.36	2.25	2.15
	1.75	3.11	3.02	2.93	2.86	2.79	2.73	2.68	2.62	2.58	2.45	2.31	2.19	2.01	1.84
	2.00	2.98	2.89	2.81	2.74	2.67	2.61	2.56	2.51	2.46	2.30	2.16	1.94	1.76	1.61
	2.25	2.86	2.78	2.70	2.63	2.57	2.51	2.46	2.39	2.32	2.16	1.93	1.73	1.57	1.43
	2.50	2.76	2.68	2.61	2.54	2.48	2.40	2.33	2.26	2.20	1.96	1.73	1.56	1.41	1.29
		N_K resulting load [kN]													
Loading width [m] b = L/2 + 0.5m	1.00	12.5	13.3	14.2	15.0	15.8	16.6	17.4	18.2	19.0	21.1	23.1	25.0	27.0	28.9
	1.25	14.7	15.7	16.7	17.7	18.7	19.6	20.6	21.5	22.4	24.9	27.3	29.7	31.9	33.8
	1.50	16.8	18.0	19.2	20.3	21.4	22.5	23.6	24.7	25.7	28.6	31.4	33.7	36.0	38.1
	1.75	18.9	20.2	21.5	22.8	24.1	25.3	26.5	27.7	28.9	32.1	34.7	37.3	38.9	40.1
	2.00	20.9	22.3	23.8	25.2	26.6	28.0	29.4	30.7	32.0	35.0	37.9	39.4	40.8	42.1
	2.25	22.8	24.4	26.0	27.6	29.1	30.6	32.1	33.3	34.5	37.8	39.5	41.0	42.6	44.1
	2.50	24.7	26.4	28.2	29.9	31.5	33.0	34.3	35.7	37.0	39.3	41.0	42.7	44.4	-

WARNING

Warning!

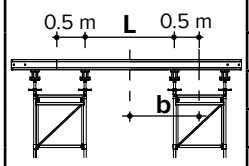
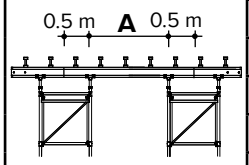
The resulting loads N_K may not exceed the vertical prop loads V_1, taken from the diagrams on page 27 et seq.!
Otherwise the distances between the towers have to be reduced!

Load bearing capacity

Load table

(with R24 secondary beams and double R24 primary beams)

R24	**M_{perm}: 7 kNm**	**q_{EN}: gs + gFB + gBA + v**	**q_{EN}: Surface load**
	V_{perm}: 13 kN	**g_s: 0.25 kN/m²**	**g_s: Dead weight formwork**
	EI: 900 kNm²	**g_{FB}: 25 kN/m³ • d/100**	**g_{FB}: Dead weight fresh concrete**
	f_{perm}: L/500	**g_{BA}: 0.10 * gFB ... 0.75 ≤ gBA ≤ 1.75 kN/m²**	**g_{BA}: Concrete clusters**
	f_{perm}: A/500	**v: 0.75 kN/m²**	**v: Live load**

Slab thickness d	[cm]	60	65	70	75	80	85	90	95	100	105	110	115	120	125
Surface load qEN	[kN/m²]	17.50	18.88	20.25	21.50	22.75	24.00	25.25	26.50	27.75	29.00	30.25	31.50	32.75	34.00
Distance secondary beams e [m]		L permitted span of secondary beams [m] (timber beams R24) ≥1.00m													
	0.20	3.41	3.32	3.24	3.18	3.12	3.07	3.01	2.97	2.92	2.88	2.84	2.80	2.76	2.73
	0.33	2.88	2.81	2.75	2.69	2.64	2.59	2.55	2.51	2.47	2.42	2.37	2.32	2.28	2.23
	0.40	2.70	2.64	2.57	2.52	2.48	2.42	2.35	2.30	2.25	2.20	2.15	2.06	1.98	1.91
	0.50	2.51	2.44	2.35	2.28	2.22	2.16	2.06	1.96	1.87	1.79	1.72	1.65	1.59	1.53
	0.63	2.25	2.17	2.04	1.92	1.81	1.72	1.63	1.56	1.49	1.42	1.36	1.31	1.26	1.21
	0.67	2.19	2.06	1.92	1.80	1.71	1.62	1.54	1.46	1.40	1.34	1.28	1.23	1.18	1.14
	0.75	1.98	1.84	1.71	1.61	1.52	1.44	1.37	1.31	1.25	1.20	1.15	1.10	1.06	1.02
Loading width [m] b = L/2 + 0.5m		A permitted span of primary beams [m] (double timber beams R24) ≥1.00m													
	1.00	2.51	2.44	2.35	2.28	2.22	2.16	2.06	1.96	1.87	1.79	1.72	1.65	1.59	1.53
	1.25	2.26	2.18	2.05	1.93	1.83	1.73	1.65	1.57	1.50	1.43	1.38	1.32	1.27	1.22
	1.50	1.98	1.84	1.71	1.61	1.52	1.44	1.37	1.31	1.25	1.20	1.15	1.10	1.06	1.02
	1.75	1.70	1.57	1.47	1.38	1.31	1.24	1.18	1.12	1.07	1.02	-	-	-	-
	2.00	1.49	1.38	1.28	1.21	1.14	1.08	1.03	-	-	-	-	-	-	-
	2.25	1.32	1.22	1.14	1.07	1.02	-	-	-	-	-	-	-	-	-
	2.50	1.19	1.10	1.03	-	-	-	-	-	-	-	-	-	-	-
Loading width [m] b = L/2 + 0.5m		N_K resulting load [kN]													
	1.00	30.7	32.4	33.9	35.3	36.6	37.9	38.6	39.3	39.9	40.5	41.1	41.8	42.4	43.0
	1.25	35.7	37.5	38.7	39.4	40.2	41.0	41.8	42.6	43.3	44.1	44.9	-	-	-
	1.50	39.1	40.2	41.2	42.1	43.1	44.0	44.9	-	-	-	-	-	-	-
	1.75	41.3	42.5	43.7	44.8	-	-	-	-	-	-	-	-	-	-
	2.00	43.5	44.9	-	-	-	-	-	-	-	-	-	-	-	-
	2.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-

WARNING

Warning!

The resulting loads N_K may not exceed the vertical prop loads V_1, taken from the diagrams on page 27 et seq.!
Otherwise the distances between the towers have to be reduced!

Unless stated otherwise all dimensions are in mm

10 Application examples

10.1 Example: bridge

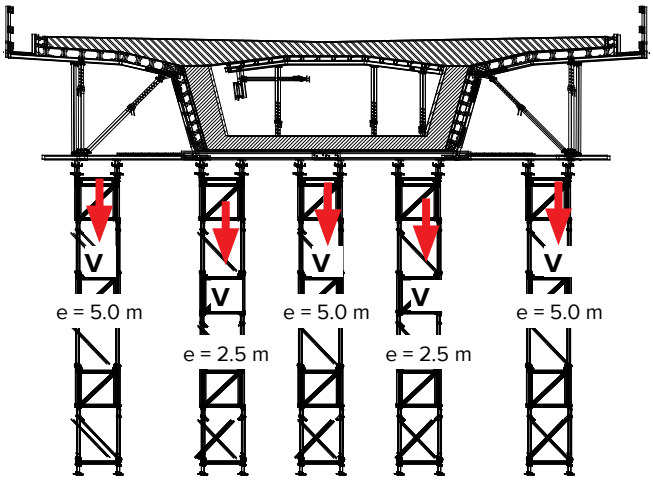
Example for an arrangement of ID 15 frame supports with uneven distributed vertical loads (V) and the resulting influence areas.

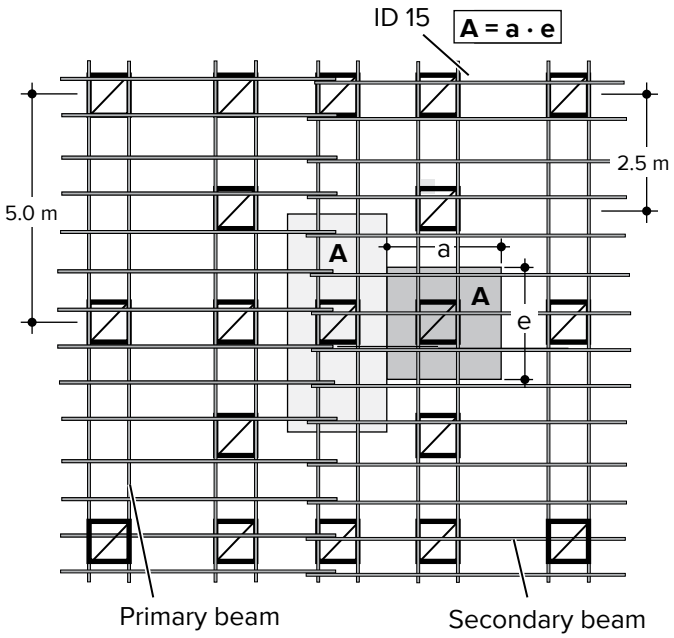
Assumptions for V-loads:

Dead weight of concrete, dead weight of formwork, live load, concrete clusters, etc.

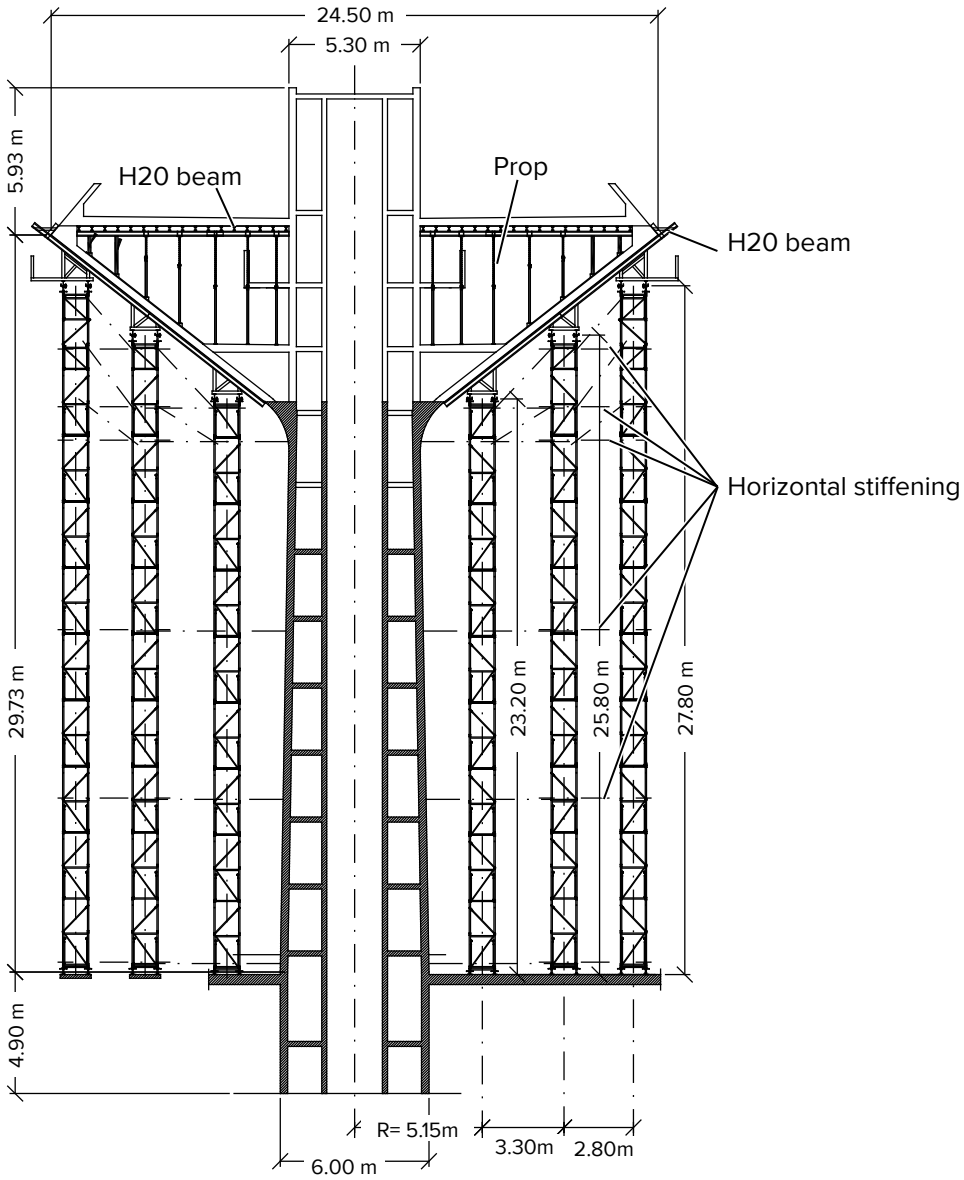
Horizontal loads from wind pressure and V/100.

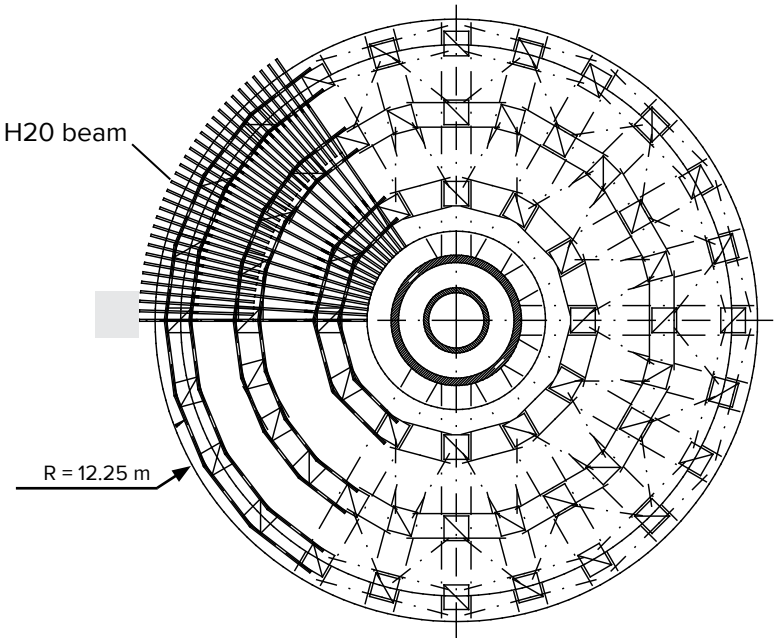
The following illustration is only schematic. The required bracing between the towers is not shown.





10.2 Example: Water tower





Unless stated otherwise all dimensions are in mm

11 Notes on structural analysis

Unless explicitly stated otherwise, all load specifications in this document are safe working loads. This means that characteristic loads can be used for calculations.
The following safety factors are included in the safe working load (where applicable):

Load:

$\gamma_f = 1.5$
According to DIN EN 1991-1-1 / DIN EN 1991-1-1

Resistances:

Steel:
$\gamma_m = 1.1$
Imperfections, load assumptions and additional rules:
According to DIN EN 1993 / DIN EN 12810 / DIN EN 12811/ DIN EN 12812 / DIN EN 1991

Aluminum:
$\gamma_m = 1.1$
Imperfections, load assumptions and additional rules:
According to DIN EN 1999 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

Timber:
$\gamma_m = 1.3$
$K_{mod} = 0.9$
Imperfections, load assumptions and additional rules:
According to DIN EN 1995 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

Concrete:
$\gamma_m = 1.5$
Imperfections, load assumptions and additional rules:
According to DIN EN 1992 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

Concrete steel:
$\gamma_m = 1.15$
Imperfections, load assumptions and additional rules:
According to DIN EN 1992 / DIN EN 12810 / DIN EN 12811 / DIN EN 12812 / DIN EN 1991

These values only include those loads that derive from the respective part itself (unless stated otherwise).

An increase of the loads due to effects in the full system (e.g. Theory II, substitute horizontal loads, scaffolding class...) have to be considered.

12 Chronology

Changes compared to issue 2016-03		
Changes	**Page**	**Date**
Layout updated	div	2018-09

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The illustrations in this brochure depict actual site conditions which may not always conform with applicable safety rules and regulations.

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Keep for later use!

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