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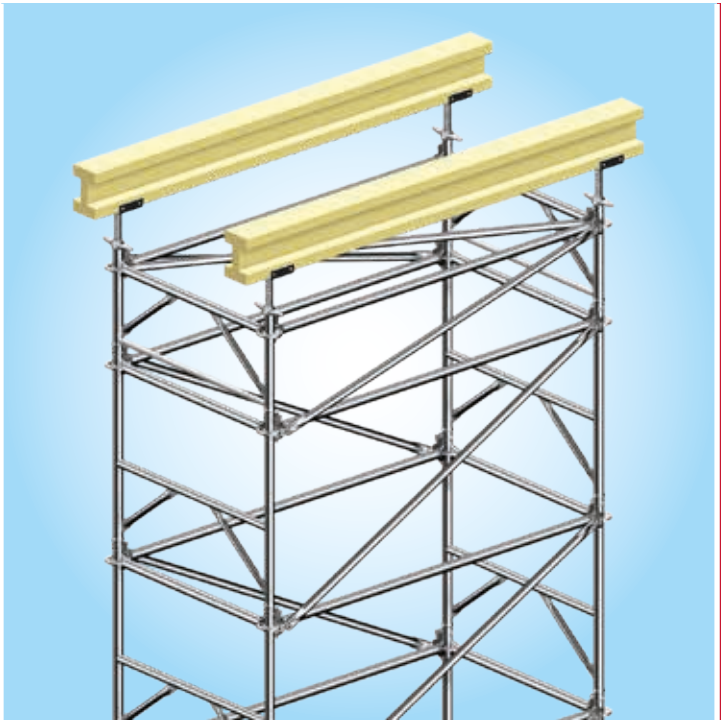
More Possibilities. The Scaffolding System.

LAYHER ALLROUND SHORING TOWER TG 60
INSTRUCTIONS FOR ASSEMBLY AND USE
TECHNICAL DOCUMENTS

TYPE TESTING TP-11-017



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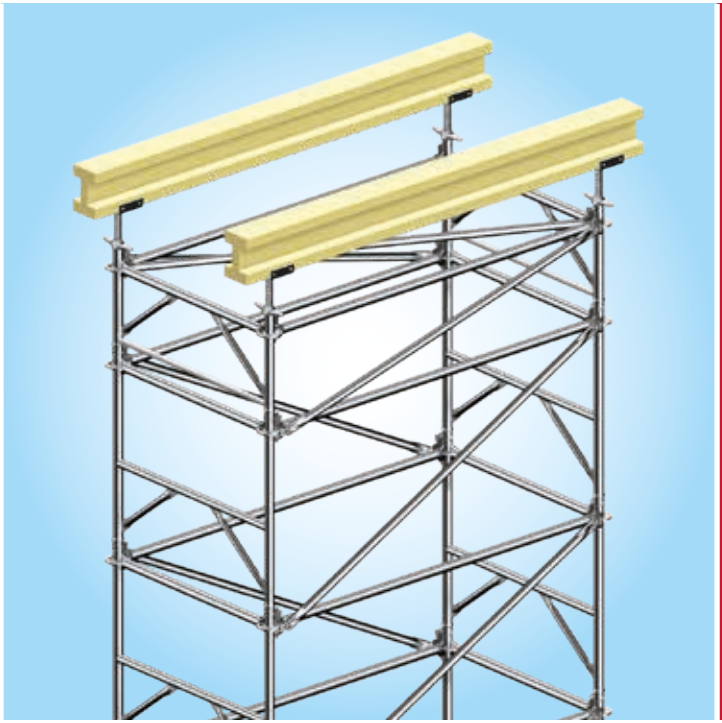


NOTE

The products and assembly variants shown in this document may be subject to country-specific regulations. The user of the products bears the responsibility for compliance with such regulations. Subject to local regulations, we reserve the right not to supply all the products illustrated here.

Your Layher partner on the spot will be happy to provide advice and answers to all questions relating to the products, to their use and approvals, or to specific assembly regulations.

The contents of this document relate exclusively to original Layher scaffolding components. Layher has prepared these contents, in particular the specifications, presentations, data, computations, directions and recommendations, with the utmost care. Nevertheless, Layher cannot accept any liability for the correctness, completeness and currentness of the contents. Where legally permissible, liability shall be excluded unless Layher is acting with intent. This applies in particular for obvious mistakes, typing errors, calculation errors and printing errors. Use of the contents shall be at the user's own risk. The structural strength calculations and load specifications have been prepared by Layher to the best of its knowledge and belief on the basis of the relevant technical regulations, and confirmed by DIBt's Inspection Office for Structural Engineering as part of the type-testing process. This type-testing too relates to the exclusive use of original Layher scaffolding components. The use of the type test must be checked by the users on their own responsibility, in compliance with the country-specific and relevant requirements, provisions and regulations applying at the respective place of use. Divergences from the assembly variants in this type test must be verified in each individual case.

1. INTRODUCTION

General

These instructions for assembly and use relate to assembly, modification and dismantling of the main assembly variants of the Shoring Tower TG 60 from Wilhelm Layher GmbH & Co KG, of Güglingen-Eibensbach, Germany. These instructions cannot cover all the possible applications. If you have any questions about specific applications, please contact your Layher partner.

Caution: The stability of the Shoring Towers TG 60 must be verified and assured at all times, including in the assembled state. The Layher Shoring Tower TG 60 may only be assembled, modified and dismantled under the supervision of a qualified expert and by technically trained employees.

During assembly, only original Layher Shoring Frames TG 60 and scaffolding components identified with the conformity mark <Ü> and the appropriate German approval numbers Z-8.22.64 Z-8.22-939 or Z-8.22-949 may be used.

Fig. 1: Shoring TG 60
Standard Frame

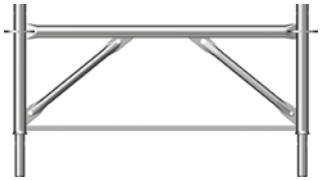


Fig. 2: Shoring TG 60
Equalising Frame

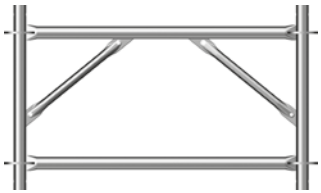


Fig. 3: Shoring TG 60
Initial Frame

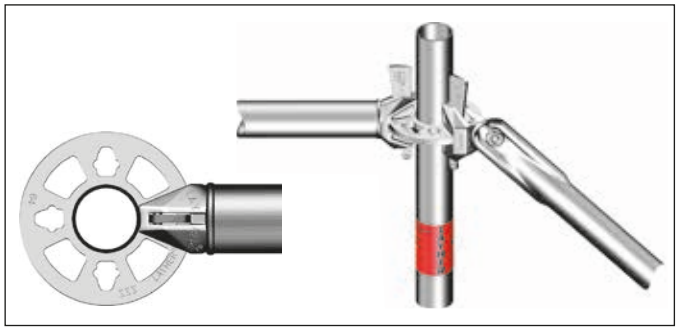


Fig. 4: Layher Allround Steel acc. to Z-8.22-64

Visually check all scaffolding components prior to installation and before they are used to ensure that they are in flawless condition. Do not use damaged components.

Caution: Assembly, alteration and dismantling of the Shoring Towers TG 60 involve risk from falls. Perform scaffolding assembly work in such a way that the risk of falls is avoided as far as possible and that the residual risk is minimised.

The scaffolding erector must stipulate, on the basis of how he assesses the risk, suitable measures to prevent or minimise risks for the actual case and/or the respective activities involved.

The measures must be selected with due consideration of the actual risk, their usefulness and their practical possibilities, and also depending on

- the qualification of the employees
- the type and duration of the activity in the high-risk area
- the possible fall height
- the state of the surface onto which the employee might fall
- the state of the workplace and its access

.

Technical, organisational and personnel-related measures can be applied during assembly, modification and dismantling. Possible measures can include, depending on the assembly situation, the use of qualified personnel specifically informed of the respective risk situation or the use of suitable personal safety apparatus against falls.

If personal safety apparatus against falls is required for assembly of the Layher Shoring Tower TG 60 or is specified by local regulations, the attachment points specified in section 3 must be used. The attachment points shown (on page 9) have been verified by drop tests with original Layher scaffolding. If no original Layher components are used, the suitability of the attachment points for the use of personal safety apparatus against falls must be verified separately by the scaffolding erector/contractor. Compliance with the minimum distance between the attachment point and the possible impact point must also be assured.

Before the start of scaffolding work, the contractor must ascertain whether the planned working area contains equipment that might endanger the employees. Assembly, modification and dismantling may only be performed with appropriate protective equipment. Scaffolding components must not be thrown; instead they must be handed over in such a way that they cannot slip or be dropped.

Every use of the scaffolding must be preceded by a check that it is in good condition.
With regard to the following instructions for assembly and use of the Shoring Tower TG 60, it must be pointed out that as a general principle scaffolding may only be assembled, modified or dismantled under the supervision of a qualified person and by technically trained employees adequately and specifically instructed in this work. To that extent, and with regard to use, we refer to the required conditions set forth in German Ordinance on Industrial Safety and Health (BetrSichV). In the following instructions for assembly and use, we provide the erector and the user, on the basis of our risk analysis, with advice on how to comply with the requirements of the above ordinance in the respective assembly situation.

The technical details set forth in the instructions for assembly and use are intended to help the erector and/or user to comply with the requirements of the ordinance and are not mandatory specifications for them. The erector/user must take the measures needed on the basis of the risk assessment, prepared according to the preconditions of the Ordinance, at his own discretion and exercising all due care and diligence. The specific features of the individual case must be taken into account here.

It is essential that the following instructions for assembly and use are complied with in every case. It is pointed out that all information, particularly that regarding the stability of the assembly variants, applies only when original Layher components identified with the previously stated approval numbers are used. The installation of non-Layher parts can lead to safety defects and insufficient stability.

The present instructions for assembly and use must be available to the supervisor and to the employees involved.

During assembly, modification and dismantling, as well as during use of the scaffolding, the legal regulations of the German Ordinance on Industrial Safety and Health (BetrSichV) and the explanatory German Technical Rules for Industrial Safety (TRBS 2121-1) must be complied with.

Testing and use

The scaffolding must, whenever it has been assembled and before it is put into service, be inspected by persons qualified to do so.

The user must check that the shoring is suitable and safe to use for its respective application. In particular, it must be checked whether the assembled shoring complies with dimensioning and structural analysis requirements. If defects are found during this check, the scaffolding must not be used in those areas where there are defects until these have been eliminated by the scaffolding contractor. Subsequent alterations to the scaffolding are deemed as assembly, modification or dismantling and may only be performed by technically trained employees. The alterations must be inspected and approved by the scaffolding erector.

The legal regulations of the German Ordinance on Industrial Safety and Health (BetrSichV) must be complied with.

The basis for Allround Scaffolding approval in Germany is German and European standards. Allround Scaffolding has been approved in many other countries.

Caution: Differing and supplementary local regulations are not taken into account in these instructions, but must be complied with.

A detailed list of articles can be found in our catalogue. Information on structural strength values of Allround Scaffolding can be found in the technical documents and in the approval Z-8.22-64, Z-8.22-939 or Z-8.22-949. A verified structural analysis exists for the Shoring Tower TG 60 as an individual tower. The load-bearing capacities of the towers can be found in the technical documents. Assembly variants not covered in the tables must be structurally verified.

2. GENERAL

The Shoring Towers TG 60 comprise special Allround Shoring Frames TG 60 combined with Allround Scaffolding parts. As a result, the towers can be designed flexibly to allow a wide range of possible uses. Integration into an Allround Scaffolding structure is also possible. The individual components of the Layher Shoring Tower TG 60 are connected to one another using the proven Allround wedge head connection. The following two variants of this connection must be distinguished:

a. Variant II
Made until 1999

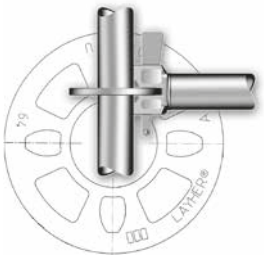


Fig. 5

b. K2000+
Made starting in 2000

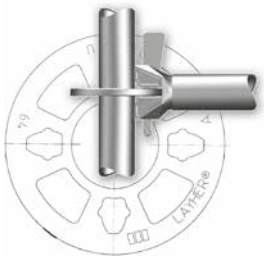


Fig. 6

c. Variant LW
Made starting in 2013

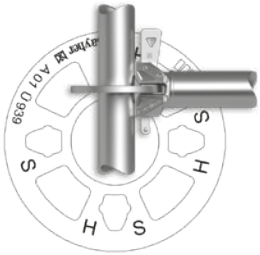


Fig. 7

All variants have different load-bearing capacities, but can be used interchangeably. In the case of these mixed structures, the lower load-bearing capacities of variant II must be assumed.

Function principle of Allround wedge head connection

1. Slide the wedge head over the rosette.

2. Insert the wedge into a hole. The component is secure against shifting and falling out.

3. Hammer down the wedge to provide a non-positive connection (use 500 g metal hammer until the blow bounces off).

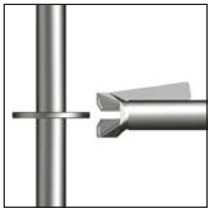


Fig. 8

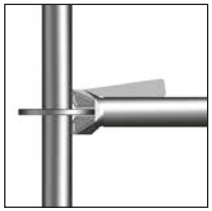


Fig. 9

Fig. 10

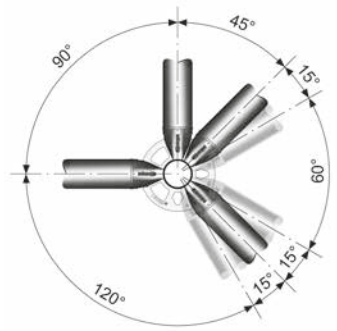


Fig. 11

The rosette allows up to 8 components to be connected. In the Shoring Frame TG 60 the rung is welded in, meaning that a further 7 components can be connected. When the small hole is used, the components are automatically connected at right angles to one another. In the large holes, the connection angles are variable.

⚠ WARNING

Wedges must be hammered home immediately after assembly of the components using a 500 g metal hammer until the blow bounces off. An exception to this is aligning the bottom frame plane.

Supplementing the Allround Shoring Tower TG 60 with scaffolding tubes and couplers

The Allround Shoring Tower TG 60 can be supplemented with

- Scaffolding tubes ∅ = 48.3 mm as per EN 39 with minimum wall thickness:
  - steel tubes 3.2 mm
  - aluminium tubes 4.0 mm
- scaffolding couplers acc. to EN 74-1

Scaffolding tubes can be connected using scaffolding couplers to standards, ledgers, rungs and other Allround components. Scaffolding tubes connected using scaffolding couplers can have both a structural function (e.g. bracing or coupling of towers) and be used for secondary purposes.

⚠ WARNING

Incorrectly fitted scaffolding couplers reduce the stability of the scaffolding structure and can lead to its collapse.

The wedge couplers must be hammered tight using a 500 g metal hammer until the blow bounces off. Screw couplers must be tightened with a 50 Nm torque.

3. MEASURES TO PREVENT FALLS

Preventing falls during assembly, modification or dismantling of the scaffolding

General

In line with local regulations or as the result of a risk analysis performed by the scaffolding erector, personal safety apparatus against falls may be necessary for assembly, modification or dismantling of the scaffolding.

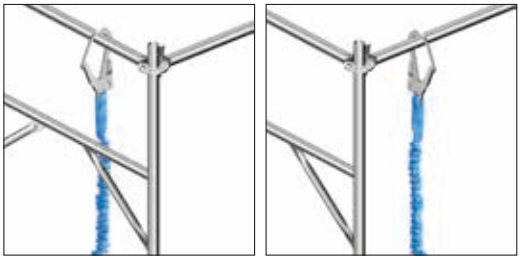
Attachment points for personal safety apparatus against falls

When personal safety apparatus against falls is used, only use the specified attachment points:

a) Attachment to rosette (in large and in small hole) – Fig. 12.

b) Attachment to a rung of the frame or to an O-ledger – Figs. 13.

Fig. 12



Figs. 13

4. IMPORTANT ASSEMBLY INSTRUCTIONS

Work on the scaffolding should wherever possible be performed from a safe standing area.

⚠ WARNING

Wedges must be hammered home immediately after assembly of the components using a 500 g metal hammer until the blow bounces off.

The wedge couplers must be hammered tight using a 500 g metal hammer until the blow bounces off. Screw couplers must be tightened with a 50 Nm torque.

Scaffolding may only be erected on sufficiently strong surfaces. Before assembling Layher Allround Scaffolding, the surface must be checked for sufficient load-bearing capacity. Suitable load-distributing supports must be selected.

The maximum spindle extension lengths must not be exceeded. One-sided positioning of the baseplate can cause excessive stresses in its cross-section and collapse of the scaffolding.

Stability must be assured at all times, even during assembly, modification or dismantling, by ballasting, bracing or other measures.

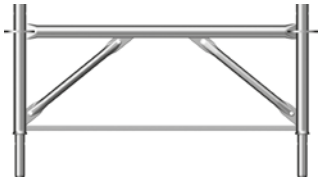
Decks must be prevented from being lifted out by lift-off preventers.

No personnel or loose objects may be on the Shoring Towers TG 60 while they are being moved.

The wheels are designed only as an assembly aid, for positioning the Shoring Towers TG 60. Before the Shoring Towers TG 60 are subjected to loads, the wheels must be removed or immobilised.

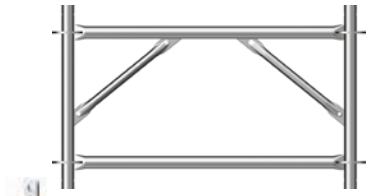
5. BASIC COMPONENTS OF SHORING TOWER TG 60

Head jack

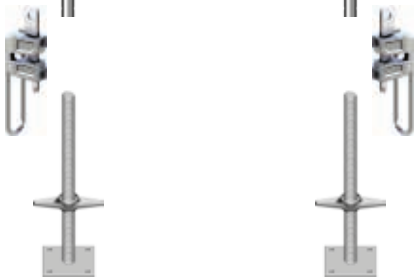


Shoring Frame TG 60
H = 0.50 m
as end frame or
equalising frame

Shoring Frame TG 60
H = 1.00 m
as frame in
central tower area



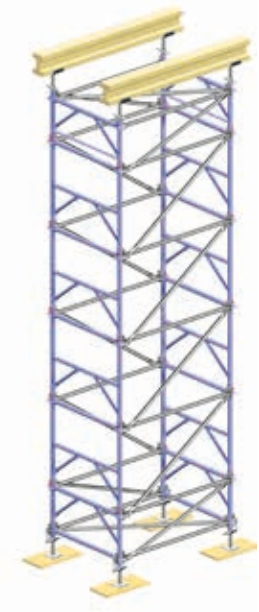
Shoring Frame TG 60
H = 0.71 m
as initial frame



Spindle holder

Baseplate

6. ASSEMBLY VARIANTS OF TOWERS



The Shoring Frames TG 60 are 1.09 m wide and are usually arranged on the end face of the Shoring Tower. In the perpendicular plane, the Shoring Frames TG 60 are connected to Allround ledgers and diagonal braces.

Fig. 14:
Arrangement of Shoring Frames TG 60

By varying the Allround bay length (1.09 m, 1.57 m, 2.07 m, 2.57 m and 3.07 m), towers with both square (1.09 x 1.09m) and rectangular, extended ground plans can be assembled.

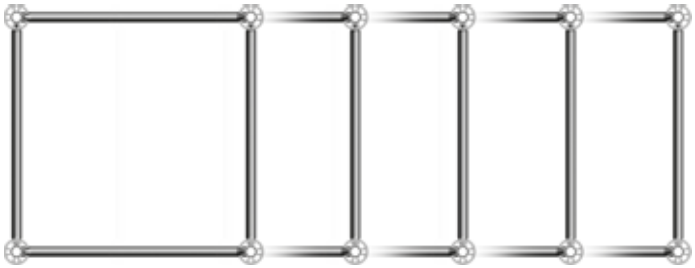


Fig. 15: Possible ground plans of individual towers

Vertical arrangement of Shoring Frames TG 60

In the vertical direction, the Layher Shoring Frames TG 60 are always arranged to the same principle. At the base of the tower, the initial frame H=71 cm is always used to begin with. This initial frame is the only frame having two rosettes one above the other, and is supplied without spigots. Above it, the 100 cm high standard frames are arranged as required. For height adjustment, a 50 cm frame can be arranged at the top of the tower, allowing any required tower height to be achieved in 50 cm increments.

Caution: The frame must be assembled in such a way that the spigots are always pointing downwards.

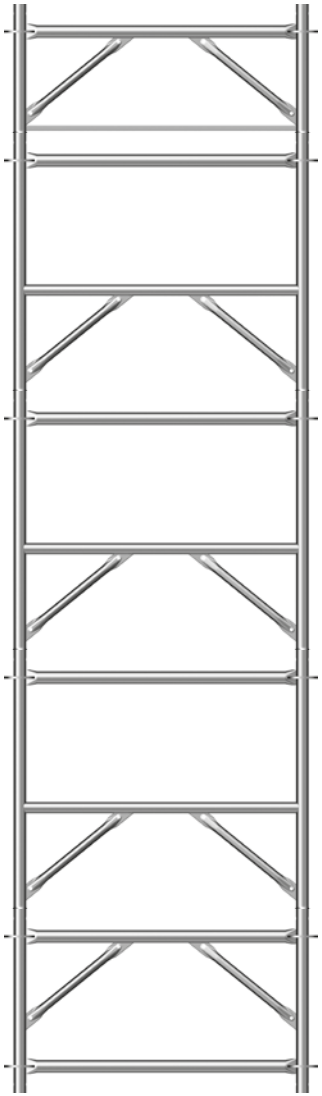


Fig. 16: Vertical arrangement principle of Shoring Frames TG 60

7. ASSEMBLY OF SHORING TOWERS TG 60

General

The Layher Shoring Towers TG 60 can be assembled both upright and lying on their sides.

The towers may have to be safeguarded against tilting and sliding during assembly. This can be achieved either by ballasting or by additional bracing, struts or anchoring. The technical documents contain information on the "ballasting" variant for the individual towers. Stiffening braces, supports or anchoring must be verified individually.

Caution: The towers may only be erected on sufficiently strong surfaces. The maximum spindle extension length must not be exceeded.

Information on arrangement of diagonal braces:
Opposite diagonal braces must always be arranged in opposite directions. In the vertical direction, the diagonal braces of an Allround plane must be arranged in the same direction.

Upright assembly
The following describes the assembly sequence of a Shoring Tower TG 60 without ballasting and other safeguarding measures.

1. Provide flat ground with sufficient load-bearing capacity under every spindle foot.
2. Lay out wooden boards (can perhaps be dispensed with when assembly is on load-bearing concrete).
3. Position baseplates and set approximate spindle extension.

4. Place the initial frame onto them.
5. Install the Allround ledgers and horizontal diagonal braces at the level of the bottom rosette. **Note: The horizontal diagonal brace can only be fitted when one of the two ledgers has not yet been installed.**

6. Extend the base plates to the required height and align the bottom level. The permissible spindle extension length must not be exceeded.

7. Fit spindle lock (only required for crane transport or movement on wheels).

8. Install ledgers and diagonal braces in the area of the initial frame.

9. Insert the assembly decks on the ledgers at the level of the second rosette. Close the lift-off preventers!

10. Fit the 100 cm frames of the next level and install the hinged pins.

11. Install Allround ledgers and diagonal braces in the area of the 100 cm frame.

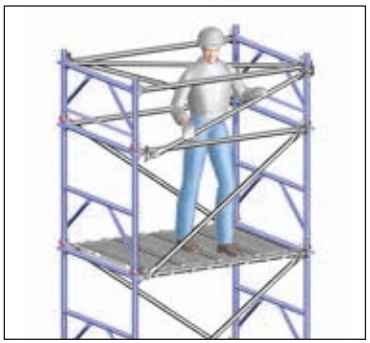
12. Fit the 100 cm frames of the next tower level and install the ledgers and diagonal braces.

13. Reposition the assembly decks by one level (100 cm) upwards. One deck remains in the level underneath. Climb up and close the hatch with additional decks.

Caution: Access is only permitted on the inside of the towers!

14. Repeat steps 12 and 13 until all 100 cm frames have been fitted.

15. If required, fit the 50 cm high end frame / equalising frame and fit the ledgers and diagonal braces in this area.



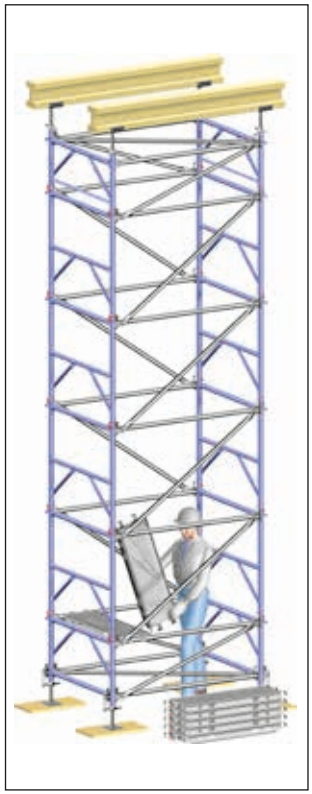
16. If a further 50 cm frame is required, repeat step 15.

17. Fit the head jacks and set the required height.
Caution: Ensure that there are sufficient reserves at the head jacks for taking the load off the tower later on.

18. Position the formwork supports or other components to be supported, and do the fine levelling.

19. Remove assembly decks.

Caution: Ascending towers without intermediate decks or other safety measures is not permissible. In this case, personal safety apparatus against falls must be used. The ascent must always be inside the tower, as otherwise the stability is jeopardised (risk of tipping over).



Assembly on the ground

The Layher Shoring Towers TG 60 are designed so that every tower variant can also be assembled lying down if required. This enables the towers to be preassembled conveniently at a suitable area, saving time and removing any risk of falls, and later moved by crane.

The assembly sequence can be similar to that for the upright variant. To do so, timber supports (if necessary stacked edge sections) of sufficient height must be laid down for simple assembly of components placed directly above the ground.

Before suspension and uprighting using a crane, ensure that all connections have been hammered tight and the hinged pins or connecting pins have been inserted. The baseplates must be set to the approximate height required and then secured with the spindle holder designed for the purpose.

Further work steps for assembly on the ground:

1. The surface of the erection location must be suitably prepared (see under upright assembly, items 1 and 2).
2. The assembly decks (if required) can either be preassembled on the ground or installed after uprighting.
3. Moving of preassembled tower by crane. **Caution:** Before movement, check that all hinged pins and connecting pins and also the spindle locks have been fitted.
4. Alignment/precise levelling of towers (to do so, the spindle holders may have to be temporarily removed).
5. Set required height at the head jacks.
   Caution: Ensure that there are sufficient reserves at the head jacks for taking the load off the tower later on.
6. Position the formwork supports or other components to be supported, and do the fine levelling.
7. Remove assembly decks.

Dismantling of towers

The towers can be dismantled either when upright or lying on the ground. In both cases, first take the load off the support tower, which is usually achieved by lowering the head jacks. Then dismantle the tower in the reverse sequence to that of assembly.
Caution: Lowering at the baseplates can cause unwelcome tilting or, when towers are linked together, stresses.

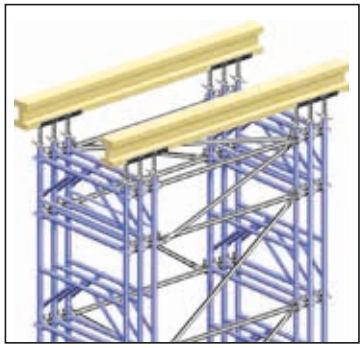
8. COMBINATION POSSIBILITIES

The following describes assembly variants and possible uses. For more details, please refer to the technical documents.

Linking of several individual towers

The Layher Shoring Towers TG 60 can be connected to one another in any way required using Allround ledgers and diagonal braces. This linking of the towers allows very stiff structures to be built to great heights (for example with bridges).

Combining Shoring Frames TG 60

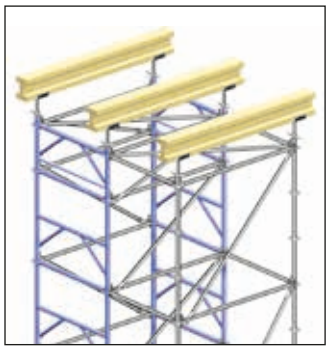


For very heavy loads, the Shoring Frames TG 60 can be combined to increase their load-bearing capacity. At the end faces of the Shoring Towers TG 60 structural strength requirements can be met by supplementing with any number of Shoring Frames TG 60. The connection can for example be achieved with the Allround double wedge head coupler, thus reducing the distances between frames. A concentration of several frames in a very narrow space is thus possible.

Towers with several frames

Section 6 details the assembly variants of the individual towers with frame planes at the end faces. The Shoring Tower TG 60 system offers the option of arranging several frame planes one behind the other and connecting them using Allround ledgers and diagonal braces. As a result, towers can if necessary be built with three or more frame planes with identical or differing bay lengths.

Expansion with the Allround construction kit



The Layher Shoring Towers TG 60 are designed so that they can be combined in any way required thanks to their rosette arrangement using the Allround construction kit. Lateral extensions or even integration into an existing scaffolding structure are possible.

Wheels

Wheels can be fitted to the Layher Shoring Towers TG 60. They allow the assembled Shoring Towers TG 60 to be moved across flat ground without the need to continually assemble and dismantle them. Linked towers can also be moved on the wheels, allowing complete formwork tables, for example, to be moved.

9. VERIFICATION OF STABILITY

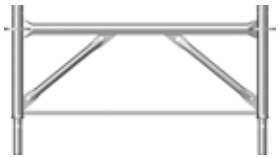
The Layher Shoring Tower TG 60 has been type-tested as an individual tower on the basis of DIN EN 12812:2008-12 and may be used in classes A, B1 and B2. The technical documents detail the maximum load-bearing capacities for the respective tower types.

In the event of divergence from the stated boundary conditions for the type test, or when the towers are extended/linked or the frames are combined, a separate and project-related verification is required.

10. COMPONENTS OF THE SYSTEM

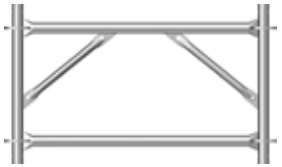
Shoring Frame TG 60

Shoring Frame TG 60
0.50 x 1.09 m with spigots
(end frame / equalising frame)
Ref. No. 2602.036
Weight 13.0 kg



Shoring Frame TG 60
1.00 x 1.09 m with spigots (standard frame)
Ref. No. 2602.035
Weight 17.7 kg

Shoring Frame TG 60
0.71 x 1.09 m without spigots (initial frame)
Ref. No. 2602.034
Weight 15.9 kg



Connectors for the Shoring Frames TG 60

Hinged pin ∅12 mm
Ref. No. 4905.666
Weight 0.10 kg

Shoring spigot
Ref. No. 2602.032
Weight 1.1 kg

Scaffolding spindles

Baseplate 60
solid, w/o lock
(max. spindle travel 39 cm)
Ref. No. 5602.060
Weight 6.7 kg

Spindle holder for baseplate
Ref. No. 2602.033
Weight 0.8 kg

Head jack 45, solid, 16 cm
(max. spindle travel 26 cm),
effective fork width 16 cm
Ref. No. 5314.045
Weight 6.6 kg

Cross head jack 45, solid
(max. spindle travel 26 cm),
opening dimensions 8.5 / 17 cm
Ref. No. 5315.045
Weight 6.9 kg

Swivelling head jack 45, solid
(max. spindle travel 26 cm),
effective fork width 16 cm
Ref. No. 5312.045
Weight 7.3 kg

Allround ledgers and diagonal braces

O-ledger LW, steel

L = 1.09 m, Ref. No. 2601.109, weight 4.0 kg

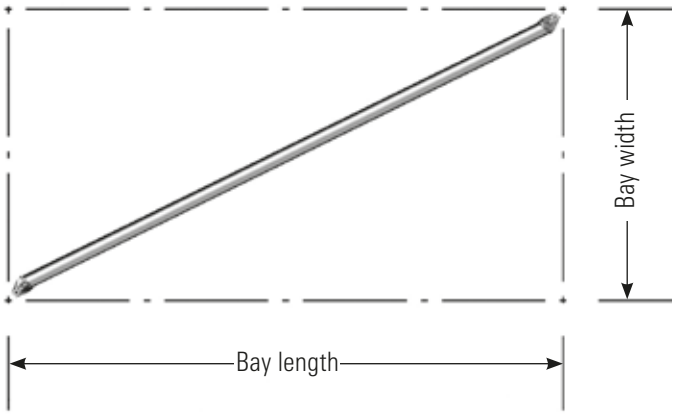
L = 1.57 m, Ref. No. 2601.157, weight 5.5 kg

L = 2.07 m, Ref. No. 2601.207, weight 7.0 kg

L = 2.57 m, Ref. No. 2601.257, weight 8.5 kg

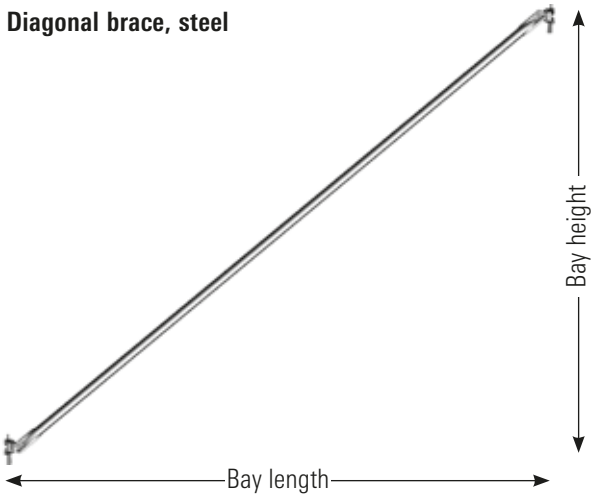
L = 3.07 m, Ref. No. 2601.307, weight 10.1 kg

O-ledger, horizontal-diagonal, steel



Bay length = 1.09 m, H = 1.09 m, Ref. No. 2608.108. weight 6.2 kg
Bay length = 1.57 m, H = 1.09 m, Ref. No. 2608.159, weight 6.9 kg
Bay length = 2.07 m, H = 1.09 m, Ref. No. 2608.209, weight 8.4 kg
Bay length = 2.57 m, H = 1.09 m, Ref. No. 2608.259, weight 9.7 kg
Bay length = 3.07 m, H = 1.09 m, Ref. No. 2608.309, weight 11.0 kg

Diagonal brace, steel

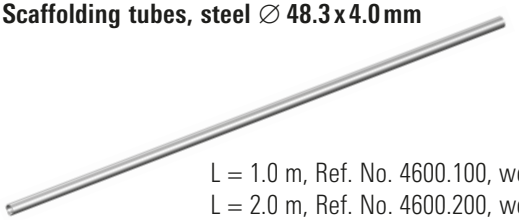


Bay length = 1.09 m, H = 1.00 m, Ref. No. 2681.109, weight 4.8 kg
Bay length = 1.57 m, H = 1.00 m, Ref. No. 2681.157, weight 6.3 kg
Bay length = 2.07 m, H = 1.00 m, Ref. No. 2681.207, weight 7.4 kg
Bay length = 2.57 m, H = 1.00 m, Ref. No. 2681.257, weight 8.8 kg
Bay length = 3.07 m, H = 1.00 m, Ref. No. 2681.307, weight 9.9 kg

Bay length = 1.09 m, H = 0.50 m, Ref. No. 2680.109, weight 4.0 kg
Bay length = 1.57 m, H = 0.50 m, Ref. No. 2680.157, weight 5.7 kg
Bay length = 2.07 m, H = 0.50 m, Ref. No. 2680.207, weight 7.2 kg
Bay length = 2.57 m, H = 0.50 m, Ref. No. 2680.257, weight 8.4 kg
Bay length = 3.07 m, H = 0.50 m, Ref. No. 2680.307, weight 9.6 kg

Scaffolding tubes and couplers

Scaffolding tubes, steel ∅ 48.3 x 4.0 mm



L = 1.0 m, Ref. No. 4600.100, weight 4.5 kg
L = 2.0 m, Ref. No. 4600.200, weight 9.0 kg
L = 3.0 m, Ref. No. 4600.300, weight 13.5 kg
L = 4.0 m, Ref. No. 4600.400, weight 18.0 kg
L = 5.0 m, Ref. No. 4600.500, weight 22.5 kg
L = 6.0 m, Ref. No. 4600.600, weight 27.0 kg

Couplers

Wedge head coupler LW, double
Ref. No. 2629.000
Weight 1.2 kg

Wedge head coupler, rigid
19 AF Ref. No. 2628.019
22 AF Ref. No. 2628.022
Weight 1.4 kg

Wedge head coupler, swivelling
19 AF Ref. No. 2629.019
22 AF Ref. No. 2629.022
Weight 1.5 kg

Double coupler
Class BB, EN 74-1
19 AF Ref. No. 4700.019
22 AF Ref. No. 4700.022
Weight 1.3 kg

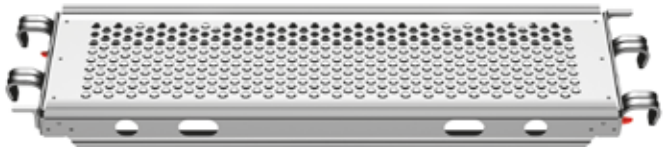
Wedge double coupler
Ref. No. 4727.000
Weight 1.5 kg

Swivel coupler
Class B, EN 74-1
19 AF Ref. No. 4702.019
22 AF Ref. No. 4702.022
Weight 1.5 kg

Wedge swivel coupler
Ref. No. 4728.000
Weight 1.8 kg

Assembly accessories

O-steel deck 1.09 x 0.32 m as assembly deck
Ref. No. 3862.109, weight 9.4 kg



Wheel adapter
Ref. No. 2602.040
Weight 6.4 kg

Wheel 1000
Ref. No.
5219.2001
Weight 6.3 kg

PSA safety harness AX 60 S with extension
Ref. No. 5969.150
Weight 1.5 kg

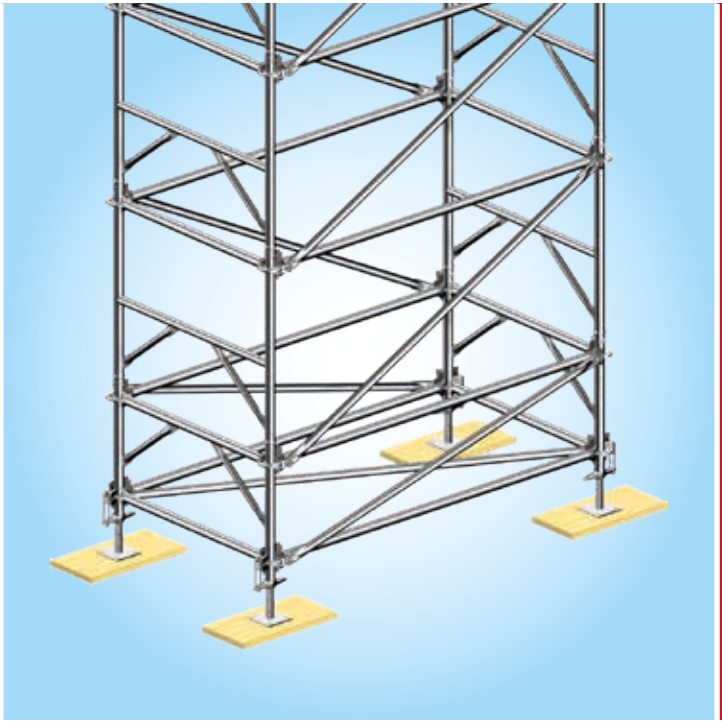
PSA connecting line BFD
with snap hook FS 90,
as per EN 354/EN 355
Rope 1.50 m
Ref. No. 5969.400
Weight 1.1 kg

PSA flexible connecting line BFD
with snap hook FS 90,
as per EN 354/EN 355
Flexible rope, 2.0 m
Ref. No. 5969.501
Weight 1.1 kg

Layher®

Mehr möglich. Das Gerüst System.

LAYHER ALLROUND SHORING TOWER TG 60
TECHNICAL DOCUMENTS



1. GENERAL

Possible uses

The Layher Shoring Tower TG 60 can be used for shoring in every field of civil and industrial engineering, and for bridge building. It was specifically developed to handle heavy loads even from great heights. Thanks to its unlimited flexibility and compatibility with Allround Scaffolding, shoring can be individually adapted to every application and optimally exploited from the economic viewpoint.

Type testing

The Layher Shoring Tower TG 60 has been verified as an individual tower on the basis of DIN EN 12812:2008-12 for class B1 and may also be used as shoring in all other classes. The load-bearing capacities for the usual assembly variants of the individual towers are detailed in the enclosed tables and diagrams.

For the ledgers and diagonal braces, the load-bearing values of Variant II were applied. As a result, Allround components of Variant LW, K2000+ and Variant II are permissible. Mixed structures using both variants are also permissible.

As an alternative to O-ledgers, U-ledgers or bridging ledgers of steel may be used. The increase in the wind loads must be taken into account here.

For all other assembly variants and in the event of divergence from the boundary conditions taken as the basis, a separate structural strength verification is required.

Tower design

All components of the Layher Shoring Tower TG 60 are made from hot-dip-galvanised steel, making them particularly resistant to corrosion and also durable.

The load-bearing elements of the tower are the particularly sturdy ShoringFrames with a width of 1.09 m. Combination with Layher Allround Scaffolding allows the towers to be built with wide variation.

The ground plans of the towers can be both square and rectangular. With a constant width B = 1.09 m, the length (1.09 / 1.57 / 2.07 / 2.57 / 3.07 m) is variable.
The Shoring Frames TG 60 are arranged at the end faces of the towers and connected perpendicular to them using Allround ledgers and diagonal braces.

The components are connected using the time-saving Layher wedge head connection. The rosettes used here are arranged on the Shoring Frames TG 60 such that they match the heights of the Allround Scaffolding. This makes the Shoring Frames TG 60 extendable in all directions and integratable without any problems into existing scaffolding structures.

The Shoring Frames TG 60 are available in the heights 71 cm, 100 cm and 50 cm. The 71 cm high frame has two rosettes one above the other and is supplied without spigots. This frame is used exclusively as the initial frame at the base of the tower. The 100 cm high frames (standard frames) with spigots are fitted onto it. The spigots are always pointing downwards. For height adjustment at the top of the tower, the 50 cm high frame is installed if required. The tower height can therefore be varied in 50 cm increments. To increase the loading capacity, two 50 cm frames can also be fitted at the top of the tower instead of one 100 cm frame. Fine adjustment for a precise height setting is achieved with the baseplates and head jacks. The maximum extension length at the bottom is $s_{F\,max}$ = 39 cm and at the top $s_{K\,max}$ = 26 cm, meaning a maximum total spindle travel of $s_{tot\,max}$ = 65 cm. For the type-tested individual towers, the entire spindle travel is split between 60 % to the baseplates and 40 % to the head jacks ($s_F = 0.6 \times s_{tot}$; $s_K = 0.4 \times s_{tot}$).

The first 100 cm frame above the 71 cm initial frame can also be replaced if necessary by a 50 cm high frame. The tested load capacities of the originally 50 cm higher tower are on the safe side and may thus be used.

Tower assembly

The towers can be assembled both upright and lying on their sides. For further details please refer to the Instructions for Assembly and Use.

2. MATERIAL REQUIREMENTS

The following tables detail the material required (parts list) for the type-tested individual towers up to about 14 m high. For greater heights, material lists are available on request.

Five ground plan variants are distinguished.

Type A: Ground plan 1.09 x 1.09 m
Type B: Ground plan 1.09 x 1.57 m
Type C: Ground plan 1.09 x 2.07 m
Type D: Ground plan 1.09 x 2.57 m
Type E: Ground plan 1.09 x 3.07 m

When individual towers are combined/linked, additional material is required. Any assembly material needed (e.g. decks) is not included.

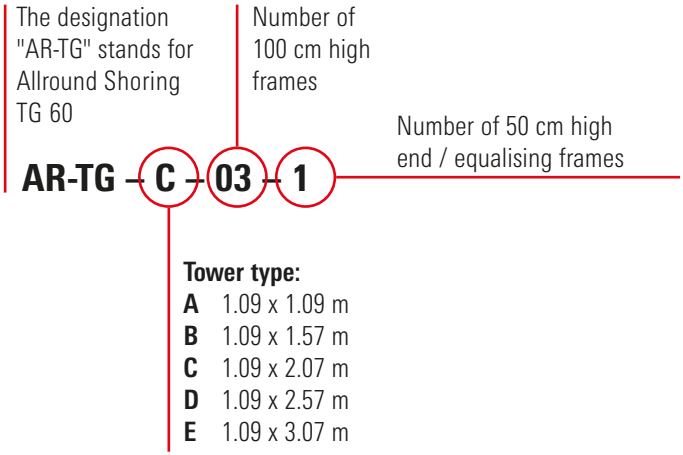
The spindle holders are only needed when the towers are to be moved by crane or on wheels.

The hinged pins must be installed whenever planning requires tensile forces to be transferred between the frames. This is the case when the towers are ballasted or are moved by crane, for example.

Instead of the solid head jack, a cross head jack or a swivelling head jack is available.

Tower designation

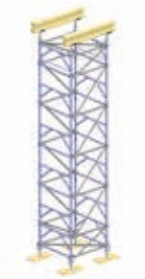
Key to designations of towers using the example AR-TG-C-03-1:



This is a Shoring Tower TG 60 with a rectangular ground plan, 1.09 x 2.07 m. Each frame plane consists of an initial frame H = 71 cm, three standard frames H = 100 cm and one equalising frame H = 50 cm.

Allround Shoring Towers TG 60
Type A
1.09 x 1.09 m

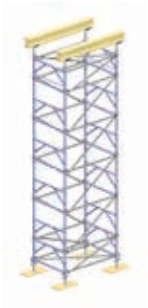
Design heights
and material required



Type	Number of 100-cm-frames	Number of 50-cm-frames	H_{AR} [m]	H_{min} S = 0/0 cm [m]	H_{50} S = 30/20 cm [m]	H_{max} S = 39/26 cm [m]	Components of Shoring Tower TG 60										Weight [kg]
							ZB Baseplate 60 solid, without lock	AR Shoring Spindle holder	AR Shoring Frame TG 60 0.71 x 1.09 m	AR Shoring Frame TG 60 1.00 x 1.09 m	AR Shoring Frame TG 60 0.50 x 1.09 m	Hinged pin	AR head jack 45, solid, 16 cm	AR O-ledger LW, steel, 1.09 m	AR diagonal brace LW, steel 1.09 x 1.00 m	AR diagonal brace LW, steel 1.09 x 0.50 m	AR O-ledger, 1.54 m HD, 1.09 x 1.09 m	
							5602.060	2602.033	2602.034	2602.035	2602.036	4905.666	5314.045	2601.109	2681.109	2680.109	2608.108	
AR-TG-A-00-1	0	1	1.21	1.31	1.81	1.96	4	4	2	0	2	4	4	6	0	4	2	169.80
AR-TG-A-00-2	0	2	1.71	1.81	2.31	2.46	4	4	2	0	4	8	4	8	0	6	2	213.00
AR-TG-A-01-0	1	0	1.71	1.81	2.31	2.46	4	4	2	2	0	4	4	6	2	2	2	180.80
AR-TG-A-01-1	1	1	2.21	2.31	2.81	2.96	4	4	2	2	2	8	4	8	2	4	2	224.00
AR-TG-A-01-2	1	2	2.71	2.81	3.31	3.46	4	4	2	2	4	12	4	10	2	6	2	267.20
AR-TG-A-02-0	2	0	2.71	2.81	3.31	3.46	4	4	2	4	0	8	4	8	4	2	2	235.00
AR-TG-A-02-1	2	1	3.21	3.31	3.81	3.96	4	4	2	4	2	12	4	10	4	4	2	278.20
AR-TG-A-02-2	2	2	3.71	3.81	4.31	4.46	4	4	2	4	4	16	4	12	4	6	2	321.40
AR-TG-A-03-0	3	0	3.71	3.81	4.31	4.46	4	4	2	6	0	12	4	10	6	2	2	289.20
AR-TG-A-03-1	3	1	4.21	4.31	4.81	4.96	4	4	2	6	2	16	4	12	6	4	2	332.40
AR-TG-A-03-2	3	2	4.71	4.81	5.31	5.46	4	4	2	6	4	20	4	14	6	6	2	375.60
AR-TG-A-04-0	4	0	4.71	4.81	5.31	5.46	4	4	2	8	0	16	4	12	8	2	2	343.40
AR-TG-A-04-1	4	1	5.21	5.31	5.81	5.96	4	4	2	8	2	20	4	14	8	4	2	386.60
AR-TG-A-04-2	4	2	5.71	5.81	6.31	6.46	4	4	2	8	4	24	4	16	8	6	2	429.80
AR-TG-A-05-0	5	0	5.71	5.81	6.31	6.46	4	4	2	10	0	20	4	14	10	2	2	397.60
AR-TG-A-05-1	5	1	6.21	6.31	6.81	6.96	4	4	2	10	2	24	4	16	10	4	2	440.80
AR-TG-A-05-2	5	2	6.71	6.81	7.31	7.46	4	4	2	10	4	28	4	18	10	6	2	484.00
AR-TG-A-06-0	6	0	6.71	6.81	7.31	7.46	4	4	2	12	0	24	4	16	12	2	2	451.80
AR-TG-A-06-1	6	1	7.21	7.31	7.81	7.96	4	4	2	12	2	28	4	18	12	4	2	495.00
AR-TG-A-06-2	6	2	7.71	7.81	8.31	8.46	4	4	2	12	4	32	4	20	12	6	2	538.20
AR-TG-A-07-0	7	0	7.71	7.81	8.31	8.46	4	4	2	14	0	28	4	18	14	2	2	506.00
AR-TG-A-07-1	7	1	8.21	8.31	8.81	8.96	4	4	2	14	2	32	4	20	14	4	2	549.20
AR-TG-A-07-2	7	2	8.71	8.81	9.31	9.46	4	4	2	14	4	36	4	22	14	6	2	592.40
AR-TG-A-08-0	8	0	8.71	8.81	9.31	9.46	4	4	2	16	0	32	4	20	16	2	2	560.20
AR-TG-A-08-1	8	1	9.21	9.31	9.81	9.96	4	4	2	16	2	36	4	22	16	4	2	603.40
AR-TG-A-08-2	8	2	9.71	9.81	10.31	10.46	4	4	2	16	4	40	4	24	16	6	2	646.60
AR-TG-A-09-0	9	0	9.71	9.81	10.31	10.46	4	4	2	18	0	36	4	22	18	2	2	614.40
AR-TG-A-09-1	9	1	10.21	10.31	10.81	10.96	4	4	2	18	2	40	4	24	18	4	2	657.60
AR-TG-A-09-2	9	2	10.71	10.81	11.31	11.46	4	4	2	18	4	44	4	26	18	6	2	700.80
AR-TG-A-10-0	10	0	10.71	10.81	11.31	11.46	4	4	2	20	0	40	4	24	20	2	2	668.60
AR-TG-A-10-1	10	1	11.21	11.31	11.81	11.96	4	4	2	20	2	44	4	26	20	4	2	711.80
AR-TG-A-10-2	10	2	11.71	11.81	12.31	12.46	4	4	2	20	4	48	4	28	20	6	2	755.00
AR-TG-A-11-0	11	0	11.71	11.81	12.31	12.46	4	4	2	22	0	44	4	26	22	2	2	722.80
AR-TG-A-11-1	11	1	12.21	12.31	12.81	12.96	4	4	2	22	2	48	4	28	22	4	2	766.00
AR-TG-A-11-2	11	2	12.71	12.81	13.31	13.46	4	4	2	22	4	52	4	30	22	6	2	809.20
AR-TG-A-12-0	12	0	12.71	12.81	13.31	13.46	4	4	2	24	0	48	4	28	24	2	2	777.00
AR-TG-A-12-1	12	1	13.21	13.31	13.81	13.96	4	4	2	24	2	52	4	30	24	4	2	820.20
AR-TG-A-12-2	12	2	13.71	13.81	14.31	14.46	4	4	2	24	4	56	4	32	24	6	2	863.40

Allround Shoring Towers TG 60
Type B
1.09 x 1.57 m

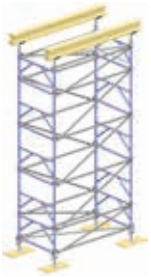
Design heights
and material required



Type	Number of 100-cm-frames	Number of 50-cm-frames	H_{AR} [m]	H_{min} S = 0/0 cm [m]	H_{50} S = 30/20 cm [m]	H_{max} S = 39/26 cm [m]	Components of Shoring Tower TG 60											Weight [kg]
							ZB Baseplate 60 solid, without lock	AR Shoring Spindle holder	AR Shoring Frame TG 60 0.71 x 1.09 m	AR Shoring Frame TG 60 1.00 x 1.09 m	AR Shoring Frame TG 60 0.50 x 1.09 m	Hinged pin	AR head jack 45, solid, 16 cm	AR O-ledger LW, steel, 1.57 m	AR diagonal brace LW, steel 1.57 x 1.00 m	AR diagonal brace LW, steel 1.57 x 0.50 m	AR O-ledger, 1.91 m HD, 1.57 x 1.09 m	
							5602.060	2602.033	2602.034	2602.035	2602.036	4905.666	5314.045	2601.157	2681.157	2680.157	2608.159	
AR-TG-B-00-1	0	1	1.21	1.31	1.81	1.96	4	4	2	0	2	4	4	6	0	4	2	187.60
AR-TG-B-00-2	0	2	1.71	1.81	2.31	2.46	4	4	2	0	4	8	4	8	0	6	2	237.40
AR-TG-B-01-0	1	0	1.71	1.81	2.31	2.46	4	4	2	2	0	4	4	6	2	2	2	198.20
AR-TG-B-01-1	1	1	2.21	2.31	2.81	2.96	4	4	2	2	2	8	4	8	2	4	2	248.00
AR-TG-B-01-2	1	2	2.71	2.81	3.31	3.46	4	4	2	2	4	12	4	10	2	6	2	297.80
AR-TG-B-02-0	2	0	2.71	2.81	3.31	3.46	4	4	2	4	0	8	4	8	4	2	2	258.60
AR-TG-B-02-1	2	1	3.21	3.31	3.81	3.96	4	4	2	4	2	12	4	10	4	4	2	308.40
AR-TG-B-02-2	2	2	3.71	3.81	4.31	4.46	4	4	2	4	4	16	4	12	4	6	2	358.20
AR-TG-B-03-0	3	0	3.71	3.81	4.31	4.46	4	4	2	6	0	12	4	10	6	2	2	319.00
AR-TG-B-03-1	3	1	4.21	4.31	4.81	4.96	4	4	2	6	2	16	4	12	6	4	2	368.80
AR-TG-B-03-2	3	2	4.71	4.81	5.31	5.46	4	4	2	6	4	20	4	14	6	6	2	418.60
AR-TG-B-04-0	4	0	4.71	4.81	5.31	5.46	4	4	2	8	0	16	4	12	8	2	2	379.40
AR-TG-B-04-1	4	1	5.21	5.31	5.81	5.96	4	4	2	8	2	20	4	14	8	4	2	429.20
AR-TG-B-04-2	4	2	5.71	5.81	6.31	6.46	4	4	2	8	4	24	4	16	8	6	2	479.00
AR-TG-B-05-0	5	0	5.71	5.81	6.31	6.46	4	4	2	10	0	20	4	14	10	2	2	439.80
AR-TG-B-05-1	5	1	6.21	6.31	6.81	6.96	4	4	2	10	2	24	4	16	10	4	2	489.60
AR-TG-B-05-2	5	2	6.71	6.81	7.31	7.46	4	4	2	10	4	28	4	18	10	6	2	539.40
AR-TG-B-06-0	6	0	6.71	6.81	7.31	7.46	4	4	2	12	0	24	4	16	12	2	2	500.20
AR-TG-B-06-1	6	1	7.21	7.31	7.81	7.96	4	4	2	12	2	28	4	18	12	4	2	550.00
AR-TG-B-06-2	6	2	7.71	7.81	8.31	8.46	4	4	2	12	4	32	4	20	12	6	2	599.80
AR-TG-B-07-0	7	0	7.71	7.81	8.31	8.46	4	4	2	14	0	28	4	18	14	2	2	560.60
AR-TG-B-07-1	7	1	8.21	8.31	8.81	8.96	4	4	2	14	2	32	4	20	14	4	2	610.40
AR-TG-B-07-2	7	2	8.71	8.81	9.31	9.46	4	4	2	14	4	36	4	22	14	6	2	660.20
AR-TG-B-08-0	8	0	8.71	8.81	9.31	9.46	4	4	2	16	0	32	4	20	16	2	2	621.00
AR-TG-B-08-1	8	1	9.21	9.31	9.81	9.96	4	4	2	16	2	36	4	22	16	4	2	670.80
AR-TG-B-08-2	8	2	9.71	9.81	10.31	10.46	4	4	2	16	4	40	4	24	16	6	2	720.60
AR-TG-B-09-0	9	0	9.71	9.81	10.31	10.46	4	4	2	18	0	36	4	22	18	2	2	681.40
AR-TG-B-09-1	9	1	10.21	10.31	10.81	10.96	4	4	2	18	2	40	4	24	18	4	2	731.20
AR-TG-B-09-2	9	2	10.71	10.81	11.31	11.46	4	4	2	18	4	44	4	26	18	6	2	781.00
AR-TG-B-10-0	10	0	10.71	10.81	11.31	11.46	4	4	2	20	0	40	4	24	20	2	2	741.80
AR-TG-B-10-1	10	1	11.21	11.31	11.81	11.96	4	4	2	20	2	44	4	26	20	4	2	791.60
AR-TG-B-10-2	10	2	11.71	11.81	12.31	12.46	4	4	2	20	4	48	4	28	20	6	2	841.40
AR-TG-B-11-0	11	0	11.71	11.81	12.31	12.46	4	4	2	22	0	44	4	26	22	2	2	802.20
AR-TG-B-11-1	11	1	12.21	12.31	12.81	12.96	4	4	2	22	2	48	4	28	22	4	2	852.00
AR-TG-B-11-2	11	2	12.71	12.81	13.31	13.46	4	4	2	22	4	52	4	30	22	6	2	901.80
AR-TG-B-12-0	12	0	12.71	12.81	13.31	13.46	4	4	2	24	0	48	4	28	24	2	2	862.60
AR-TG-B-12-1	12	1	13.21	13.31	13.81	13.96	4	4	2	24	2	52	4	30	24	4	2	912.40
AR-TG-B-12-2	12	2	13.71	13.81	14.31	14.46	4	4	2	24	4	56	4	32	24	6	2	962.20

Allround Shoring Towers TG 60
Type C
1.09 x 2.07 m

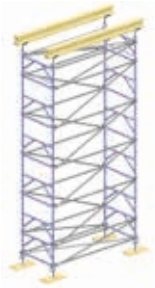
Design heights
and material required



Type	Number of 100-cm-frames	Number of 50-cm-frames	H_{AR} [m]	H_{min} S = 0/0 cm [m]	H_{50} S = 30/20 cm [m]	H_{max} S = 39/26 cm [m]	Components of Shoring Tower TG 60											Weight [kg]
							ZB Baseplate 60 solid, without lock	AR Shoring Spindle holder	AR Shoring Frame TG 60 0.71 x 1.09 m	AR Shoring Frame TG 60 1.00 x 1.09 m	AR Shoring Frame TG 60 0.50 x 1.09 m	Hinged pin	AR head jack 45, solid, 16 cm	AR O-ledger LW, steel, 2.07 m	AR diagonal brace LW, steel 2.07 x 1.00 m	AR diagonal brace LW, steel 2.07 x 0.50 m	AR O-ledger, 2.34 m HD, 2.07 x 1.09 m	
							5602.060	2602.033	2602.034	2602.035	2602.036	4905.666	5314.045	2601.207	2681.207	2680.207	2608.209	
AR-TG-C-00-1	0	1	1.21	1.31	1.81	1.96	4	4	2	0	2	4	4	6	0	4	2	208.00
AR-TG-C-00-2	0	2	1.71	1.81	2.31	2.46	4	4	2	0	4	8	4	8	0	6	2	264.60
AR-TG-C-01-0	1	0	1.71	1.81	2.31	2.46	4	4	2	2	0	4	4	6	2	2	2	217.80
AR-TG-C-01-1	1	1	2.21	2.31	2.81	2.96	4	4	2	2	2	8	4	8	2	4	2	274.40
AR-TG-C-01-2	1	2	2.71	2.81	3.31	3.46	4	4	2	2	4	12	4	10	2	6	2	331.00
AR-TG-C-02-0	2	0	2.71	2.81	3.31	3.46	4	4	2	4	0	8	4	8	4	2	2	284.20
AR-TG-C-02-1	2	1	3.21	3.31	3.81	3.96	4	4	2	4	2	12	4	10	4	4	2	340.80
AR-TG-C-02-2	2	2	3.71	3.81	4.31	4.46	4	4	2	4	4	16	4	12	4	6	2	397.40
AR-TG-C-03-0	3	0	3.71	3.81	4.31	4.46	4	4	2	6	0	12	4	10	6	2	2	350.60
AR-TG-C-03-1	3	1	4.21	4.31	4.81	4.96	4	4	2	6	2	16	4	12	6	4	2	407.20
AR-TG-C-03-2	3	2	4.71	4.81	5.31	5.46	4	4	2	6	4	20	4	14	6	6	2	463.80
AR-TG-C-04-0	4	0	4.71	4.81	5.31	5.46	4	4	2	8	0	16	4	12	8	2	2	417.00
AR-TG-C-04-1	4	1	5.21	5.31	5.81	5.96	4	4	2	8	2	20	4	14	8	4	2	473.60
AR-TG-C-04-2	4	2	5.71	5.81	6.31	6.46	4	4	2	8	4	24	4	16	8	6	2	530.20
AR-TG-C-05-0	5	0	5.71	5.81	6.31	6.46	4	4	2	10	0	20	4	14	10	2	2	483.40
AR-TG-C-05-1	5	1	6.21	6.31	6.81	6.96	4	4	2	10	2	24	4	16	10	4	2	540.00
AR-TG-C-05-2	5	2	6.71	6.81	7.31	7.46	4	4	2	10	4	28	4	18	10	6	2	596.60
AR-TG-C-06-0	6	0	6.71	6.81	7.31	7.46	4	4	2	12	0	24	4	16	12	2	2	549.80
AR-TG-C-06-1	6	1	7.21	7.31	7.81	7.96	4	4	2	12	2	28	4	18	12	4	2	606.40
AR-TG-C-06-2	6	2	7.71	7.81	8.31	8.46	4	4	2	12	4	32	4	20	12	6	2	663.00
AR-TG-C-07-0	7	0	7.71	7.81	8.31	8.46	4	4	2	14	0	28	4	18	14	2	2	616.20
AR-TG-C-07-1	7	1	8.21	8.31	8.81	8.96	4	4	2	14	2	32	4	20	14	4	2	672.80
AR-TG-C-07-2	7	2	8.71	8.81	9.31	9.46	4	4	2	14	4	36	4	22	14	6	2	729.40
AR-TG-C-08-0	8	0	8.71	8.81	9.31	9.46	4	4	2	16	0	32	4	20	16	2	2	682.60
AR-TG-C-08-1	8	1	9.21	9.31	9.81	9.96	4	4	2	16	2	36	4	22	16	4	2	739.20
AR-TG-C-08-2	8	2	9.71	9.81	10.31	10.46	4	4	2	16	4	40	4	24	16	6	2	795.80
AR-TG-C-09-0	9	0	9.71	9.81	10.31	10.46	4	4	2	18	0	36	4	22	18	2	2	749.00
AR-TG-C-09-1	9	1	10.21	10.31	10.81	10.96	4	4	2	18	2	40	4	24	18	4	2	805.60
AR-TG-C-09-2	9	2	10.71	10.81	11.31	11.46	4	4	2	18	4	44	4	26	18	6	2	862.20
AR-TG-C-10-0	10	0	10.71	10.81	11.31	11.46	4	4	2	20	0	40	4	24	20	2	2	815.40
AR-TG-C-10-1	10	1	11.21	11.31	11.81	11.96	4	4	2	20	2	44	4	26	20	4	2	872.00
AR-TG-C-10-2	10	2	11.71	11.81	12.31	12.46	4	4	2	20	4	48	4	28	20	6	2	928.60
AR-TG-C-11-0	11	0	11.71	11.81	12.31	12.46	4	4	2	22	0	44	4	26	22	2	2	881.80
AR-TG-C-11-1	11	1	12.21	12.31	12.81	12.96	4	4	2	22	2	48	4	28	22	4	2	938.40
AR-TG-C-11-2	11	2	12.71	12.81	13.31	13.46	4	4	2	22	4	52	4	30	22	6	2	995.00
AR-TG-C-12-0	12	0	12.71	12.81	13.31	13.46	4	4	2	24	0	48	4	28	24	2	2	948.20
AR-TG-C-12-1	12	1	13.21	13.31	13.81	13.96	4	4	2	24	2	52	4	30	24	4	2	1004.80
AR-TG-C-12-2	12	2	13.71	13.81	14.31	14.46	4	4	2	24	4	56	4	32	24	6	2	1061.40

Allround Shoring Towers TG 60
Type D
1.09 x 2.57 m

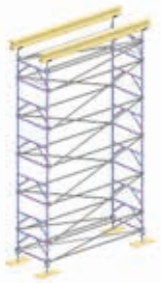
Design heights
and material required



Type	Number of 100-cm-frames	Number of 50-cm-frames	H_{AR} [m]	H_{min} S = 0/0 cm [m]	H_{50} S = 30/20 cm [m]	H_{max} S = 39/26 cm [m]	Components of Shoring Tower TG 60											Weight [kg]
							ZB Baseplate 60 solid, without lock	AR Shoring Spindle holder	AR Shoring Frame TG 60 0.71 x 1.09 m	AR Shoring Frame TG 60 1.00 x 1.09 m	AR Shoring Frame TG 60 0.50 x 1.09 m	Hinged pin	AR head jack 45, solid, 16 cm	AR O-ledger LW, steel, 2.57 m	AR diagonal brace LW, steel 2.57 x 1.00 m	AR diagonal brace LW, steel 2.57 x 0.50 m	AR O-ledger, 2.79 m HD, 2.57 x 1.09 m	
							5602.060	2602.033	2602.034	2602.035	2602.036	4905.666	5314.045	2601.257	2681.257	2680.257	2608.259	
AR-TG-D-00-1	0	1	1.21	1.31	1.81	1.96	4	4	2	0	2	4	4	6	0	4	2	224.88
AR-TG-D-00-2	0	2	1.71	1.81	2.31	2.46	4	4	2	0	4	8	4	8	0	6	2	287.04
AR-TG-D-01-0	1	0	1.71	1.81	2.31	2.46	4	4	2	2	0	4	4	6	2	2	2	235.08
AR-TG-D-01-1	1	1	2.21	2.31	2.81	2.96	4	4	2	2	2	8	4	8	2	4	2	297.24
AR-TG-D-01-2	1	2	2.71	2.81	3.31	3.46	4	4	2	2	4	12	4	10	2	6	2	359.40
AR-TG-D-02-0	2	0	2.71	2.81	3.31	3.46	4	4	2	4	0	8	4	8	4	2	2	307.44
AR-TG-D-02-1	2	1	3.21	3.31	3.81	3.96	4	4	2	4	2	12	4	10	4	4	2	369.60
AR-TG-D-02-2	2	2	3.71	3.81	4.31	4.46	4	4	2	4	4	16	4	12	4	6	2	431.76
AR-TG-D-03-0	3	0	3.71	3.81	4.31	4.46	4	4	2	6	0	12	4	10	6	2	2	379.80
AR-TG-D-03-1	3	1	4.21	4.31	4.81	4.96	4	4	2	6	2	16	4	12	6	4	2	441.96
AR-TG-D-03-2	3	2	4.71	4.81	5.31	5.46	4	4	2	6	4	20	4	14	6	6	2	504.12
AR-TG-D-04-0	4	0	4.71	4.81	5.31	5.46	4	4	2	8	0	16	4	12	8	2	2	452.16
AR-TG-D-04-1	4	1	5.21	5.31	5.81	5.96	4	4	2	8	2	20	4	14	8	4	2	514.32
AR-TG-D-04-2	4	2	5.71	5.81	6.31	6.46	4	4	2	8	4	24	4	16	8	6	2	576.48
AR-TG-D-05-0	5	0	5.71	5.81	6.31	6.46	4	4	2	10	0	20	4	14	10	2	2	524.52
AR-TG-D-05-1	5	1	6.21	6.31	6.81	6.96	4	4	2	10	2	24	4	16	10	4	2	586.68
AR-TG-D-05-2	5	2	6.71	6.81	7.31	7.46	4	4	2	10	4	28	4	18	10	6	2	648.84
AR-TG-D-06-0	6	0	6.71	6.81	7.31	7.46	4	4	2	12	0	24	4	16	12	2	2	596.88
AR-TG-D-06-1	6	1	7.21	7.31	7.81	7.96	4	4	2	12	2	28	4	18	12	4	2	659.04
AR-TG-D-06-2	6	2	7.71	7.81	8.31	8.46	4	4	2	12	4	32	4	20	12	6	2	721.20
AR-TG-D-07-0	7	0	7.71	7.81	8.31	8.46	4	4	2	14	0	28	4	18	14	2	2	669.24
AR-TG-D-07-1	7	1	8.21	8.31	8.81	8.96	4	4	2	14	2	32	4	20	14	4	2	731.40
AR-TG-D-07-2	7	2	8.71	8.81	9.31	9.46	4	4	2	14	4	36	4	22	14	6	2	793.56
AR-TG-D-08-0	8	0	8.71	8.81	9.31	9.46	4	4	2	16	0	32	4	20	16	2	2	741.60
AR-TG-D-08-1	8	1	9.21	9.31	9.81	9.96	4	4	2	16	2	36	4	22	16	4	2	803.76
AR-TG-D-08-2	8	2	9.71	9.81	10.31	10.46	4	4	2	16	4	40	4	24	16	6	2	865.92
AR-TG-D-09-0	9	0	9.71	9.81	10.31	10.46	4	4	2	18	0	36	4	22	18	2	2	813.96
AR-TG-D-09-1	9	1	10.21	10.31	10.81	10.96	4	4	2	18	2	40	4	24	18	4	2	876.12
AR-TG-D-09-2	9	2	10.71	10.81	11.31	11.46	4	4	2	18	4	44	4	26	18	6	2	938.28
AR-TG-D-10-0	10	0	10.71	10.81	11.31	11.46	4	4	2	20	0	40	4	24	20	2	2	886.32
AR-TG-D-10-1	10	1	11.21	11.31	11.81	11.96	4	4	2	20	2	44	4	26	20	4	2	948.48
AR-TG-D-10-2	10	2	11.71	11.81	12.31	12.46	4	4	2	20	4	48	4	28	20	6	2	1010.64
AR-TG-D-11-0	11	0	11.71	11.81	12.31	12.46	4	4	2	22	0	44	4	26	22	2	2	958.68
AR-TG-D-11-1	11	1	12.21	12.31	12.81	12.96	4	4	2	22	2	48	4	28	22	4	2	1020.84
AR-TG-D-11-2	11	2	12.71	12.81	13.31	13.46	4	4	2	22	4	52	4	30	22	6	2	1083.00
AR-TG-D-12-0	12	0	12.71	12.81	13.31	13.46	4	4	2	24	0	48	4	28	24	2	2	1031.04
AR-TG-D-12-1	12	1	13.21	13.31	13.81	13.96	4	4	2	24	2	52	4	30	24	4	2	1093.20
AR-TG-D-12-2	12	2	13.71	13.81	14.31	14.46	4	4	2	24	4	56	4	32	24	6	2	1155.36

Allround Shoring Towers TG 60
Type E
1.09 x 3.07 m

Design heights
and material required



Type	Number of 100-cm-frames	Number of 50-cm-frames	H_{AR} [m]	H_{min} S = 0/0 cm [m]	H_{50} S = 30/20 cm [m]	H_{max} S = 39/26 cm [m]	Components of Shoring Tower TG 60											Weight [kg]
							ZB Baseplate 60 solid, without lock	AR Shoring Spindle holder	AR Shoring Frame TG 60 0.71 x 1.09 m	AR Shoring Frame TG 60 1.00 x 1.09 m	AR Shoring Frame TG 60 0.50 x 1.09 m	Hinged pin	AR head jack 45, solid, 16 cm	AR O-ledger LW, steel, 3.07 m	AR diagonal brace LW, steel 3.07 x 1.00 m	AR diagonal brace LW, steel 3.07 x 0.50 m	AR O-ledger, 3.26 m HD, 3.07 x 1.09 m	
							5602.060	2602.033	2602.034	2602.035	2602.036	4905.666	5314.045	2601.307	2681.307	2680.307	2608.309	
AR-TG-E-00-1	0	1	1.21	1.31	1.81	1.96	4	4	2	0	2	4	4	6	0	4	2	248.60
AR-TG-E-00-2	0	2	1.71	1.81	2.31	2.46	4	4	2	0	4	8	4	8	0	6	2	317.20
AR-TG-E-01-0	1	0	1.71	1.81	2.31	2.46	4	4	2	2	0	4	4	6	2	2	2	258.60
AR-TG-E-01-1	1	1	2.21	2.31	2.81	2.96	4	4	2	2	2	8	4	8	2	4	2	327.20
AR-TG-E-01-2	1	2	2.71	2.81	3.31	3.46	4	4	2	2	4	12	4	10	2	6	2	395.80
AR-TG-E-02-0	2	0	2.71	2.81	3.31	3.46	4	4	2	4	0	8	4	8	4	2	2	337.20
AR-TG-E-02-1	2	1	3.21	3.31	3.81	3.96	4	4	2	4	2	12	4	10	4	4	2	405.80
AR-TG-E-02-2	2	2	3.71	3.81	4.31	4.46	4	4	2	4	4	16	4	12	4	6	2	474.40
AR-TG-E-03-0	3	0	3.71	3.81	4.31	4.46	4	4	2	6	0	12	4	10	6	2	2	415.80
AR-TG-E-03-1	3	1	4.21	4.31	4.81	4.96	4	4	2	6	2	16	4	12	6	4	2	484.40
AR-TG-E-03-2	3	2	4.71	4.81	5.31	5.46	4	4	2	6	4	20	4	14	6	6	2	553.00
AR-TG-E-04-0	4	0	4.71	4.81	5.31	5.46	4	4	2	8	0	16	4	12	8	2	2	494.40
AR-TG-E-04-1	4	1	5.21	5.31	5.81	5.96	4	4	2	8	2	20	4	14	8	4	2	563.00
AR-TG-E-04-2	4	2	5.71	5.81	6.31	6.46	4	4	2	8	4	24	4	16	8	6	2	631.60
AR-TG-E-05-0	5	0	5.71	5.81	6.31	6.46	4	4	2	10	0	20	4	14	10	2	2	573.00
AR-TG-E-05-1	5	1	6.21	6.31	6.81	6.96	4	4	2	10	2	24	4	16	10	4	2	641.60
AR-TG-E-05-2	5	2	6.71	6.81	7.31	7.46	4	4	2	10	4	28	4	18	10	6	2	710.20
AR-TG-E-06-0	6	0	6.71	6.81	7.31	7.46	4	4	2	12	0	24	4	16	12	2	2	651.60
AR-TG-E-06-1	6	1	7.21	7.31	7.81	7.96	4	4	2	12	2	28	4	18	12	4	2	720.20
AR-TG-E-06-2	6	2	7.71	7.81	8.31	8.46	4	4	2	12	4	32	4	20	12	6	2	788.80
AR-TG-E-07-0	7	0	7.71	7.81	8.31	8.46	4	4	2	14	0	28	4	18	14	2	2	730.20
AR-TG-E-07-1	7	1	8.21	8.31	8.81	8.96	4	4	2	14	2	32	4	20	14	4	2	798.80
AR-TG-E-07-2	7	2	8.71	8.81	9.31	9.46	4	4	2	14	4	36	4	22	14	6	2	867.40
AR-TG-E-08-0	8	0	8.71	8.81	9.31	9.46	4	4	2	16	0	32	4	20	16	2	2	808.80
AR-TG-E-08-1	8	1	9.21	9.31	9.81	9.96	4	4	2	16	2	36	4	22	16	4	2	877.40
AR-TG-E-08-2	8	2	9.71	9.81	10.31	10.46	4	4	2	16	4	40	4	24	16	6	2	946.00
AR-TG-E-09-0	9	0	9.71	9.81	10.31	10.46	4	4	2	18	0	36	4	22	18	2	2	887.40
AR-TG-E-09-1	9	1	10.21	10.31	10.81	10.96	4	4	2	18	2	40	4	24	18	4	2	956.00
AR-TG-E-09-2	9	2	10.71	10.81	11.31	11.46	4	4	2	18	4	44	4	26	18	6	2	1024.60
AR-TG-E-10-0	10	0	10.71	10.81	11.31	11.46	4	4	2	20	0	40	4	24	20	2	2	966.00
AR-TG-E-10-1	10	1	11.21	11.31	11.81	11.96	4	4	2	20	2	44	4	26	20	4	2	1034.60
AR-TG-E-10-2	10	2	11.71	11.81	12.31	12.46	4	4	2	20	4	48	4	28	20	6	2	1103.20
AR-TG-E-11-0	11	0	11.71	11.81	12.31	12.46	4	4	2	22	0	44	4	26	22	2	2	1044.60
AR-TG-E-11-1	11	1	12.21	12.31	12.81	12.96	4	4	2	22	2	48	4	28	22	4	2	1113.20
AR-TG-E-11-2	11	2	12.71	12.81	13.31	13.46	4	4	2	22	4	52	4	30	22	6	2	1181.80
AR-TG-E-12-0	12	0	12.71	12.81	13.31	13.46	4	4	2	24	0	48	4	28	24	2	2	1123.20
AR-TG-E-12-1	12	1	13.21	13.31	13.81	13.96	4	4	2	24	2	52	4	30	24	4	2	1191.80
AR-TG-E-12-2	12	2	13.71	13.81	14.31	14.46	4	4	2	24	4	56	4	32	24	6	2	1260.40

3. LOAD-BEARING CAPACITY

The Layher Shoring Tower TG 60 has been type-tested on the basis of DIN EN 12812:2008-12. The structural analysis calculations are based on the rating method B1. The towers can therefore be used for all classes.

Effects from running water, earthquake stresses, temperature-dependent deformations or deformations from pretensioning have not been taken into account in the calculations. In these specific cases, a project-related verification is required. The effect of temperature-dependent deformations may be ignored generally speaking if the structure to be supported is not more than 60 m in length.

Structural system

As a general principle, a distinction is made between towers fixed laterally at the top and freely movable towers. The positioned formwork supports are connected to the head jacks in a simple supported way. The point of attack of the H-load is thus at the level of the top edge of the head jack plate. The stabilisation/tilt prevention for the formwork supports must be achieved with the formwork placed over it. For introducing the vertical loads, a non-centricity of 5 mm is calculated in accordance with the standard. When the swivelling head jack with load centering is used, no non-centricity would need to be assumed

Differential settlements

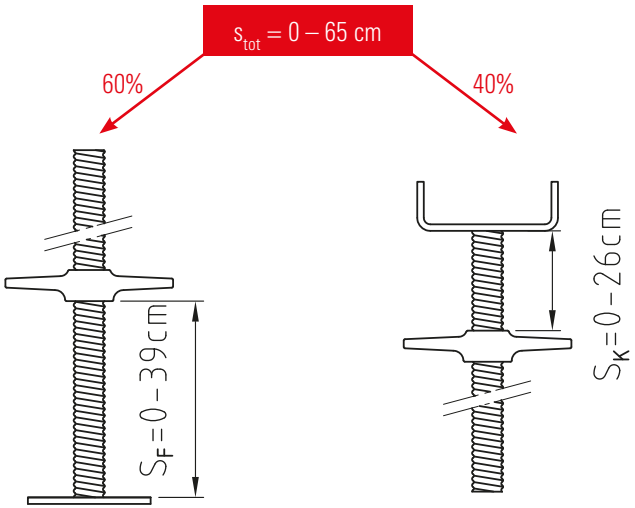
The load-bearing capacities of the towers were ascertained using the rating method B1 without differential settlement assumptions. If differential settlements cannot be ruled out, verification is required for each individual case.

Load determination

The loading effects on the towers must be precisely determined with the rating method B1. If the load distribution is however determined in simplified form using structurally determined partial systems (coverage areas), then the shoring is categorised in the rating class B2 and the stated load must be reduced by a factor of 1.15.

Spindle extension

The load-bearing capacity of the towers depends in particular on the spindle extension. The permissible spindle travel at the head jacks and baseplates must on no account be exceeded. The maximum possible spindle extension is 39 cm at the baseplate and 26 cm at the head jack. The reduction of the load due to spindle extension must be borne in mind. For the type-tested individual towers, the entire spindle travel is split between 60 % to the baseplates and 40 % to the head jacks ($s_F = 0.6 \times s_{tot}$; $s_K = 0.4 \times s_{tot}$).



Wind loads

The dynamic wind pressure on the Shoring Towers TG 60 must be determined depending on their place of use. In Germany this is based on the standard DIN EN 1991-1-4 in its current version.
The loads on the towers are specified for different dynamic wind pressures (q = 0.0 / 0.5 / 0.8 / 1.1 kN/m²). For intermediate values, linear interpolation can be used. For applications with dynamic wind pressures exceeding 1.10 kN/m², a separate verification is required.
Note: According to DIN EN 1991-1-4/NA (NA.B.5), the wind load in the final state can in most cases be reduced based on how long the tower has been standing.

Increase in wind loads when U-ledgers and U-bridging ledgers are used.

When U-ledgers and U-bridging ledgers made of steel are used instead of O-ledgers, the surface exposed to the wind of the Allround level increases and hence the wind load on the tower. To use the values from type testing, the dynamic wind pressures must be increased as follows.

Type A (1.09 x 1.09 m)	+23%
Type B (1.09 x 1.57 m)	+34 %
Type C (1.09 x 2.07 m)	+40 %
Type D (1.09 x 2.57 m)	+43 %
Type E (1.09 x 3.07 m)	+46 %

Horizontal loads

With unattached towers freely movable at the top, the H load must be dissipated into the ground via the Shoring Tower TG 60. The vertical loads on these towers are therefore always quoted as a function of the horizontal loads. According to DIN EN 12812, a horizontal dummy load (1 % of vertical load) must be assumed. This dummy load is already incorporated into the calculations and does not have to be taken into account separately.
For towers attached at the top, the horizontal loads have no effect on the load-bearing capacity, since the H loads are transmitted directly via the attachment at the top of the tower.

Tensile forces between the standards

When hinged pins or bolts are used between the frame standards, tensile forces can be transmitted. This is necessary when, for example, the towers are to be moved by crane or when working with ballast. The maximum permissible tensile force depends on the connectors. If locking pins, dia. 11 mm are used, the permissible tensile force is 2.9 kN (rated value $Z_{R,d}$ = 4.4 kN), if bolts or screws of dia. 12 mm, grade 8.8. are used, the permissible tensile force is 10.1 kN (rated value $Z_{R,d}$ = 15.1 kN).
For towers attached at the top with wind attack, under certain circumstances there may also be the occurrence of tensile forces at the standard joint (e.g. high tower with low vertical load). When bolts or screws of dia. 12 mm, grade 8.8. are used, precise verification is not required. Further details about this are available from your Layher partner.

Load-bearing capacity diagrams

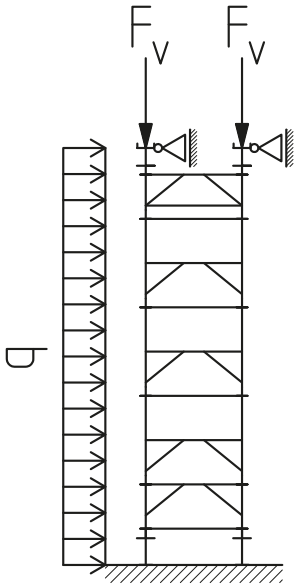
The load-bearing capacities of the individual towers were determined by calculations according to second order theory and shown in the following diagrams and tables. Due to the poor reading accuracy of the diagrams, the permissible loads should be taken from the tables. The following must be taken into account when using the diagrams and tables:

- The specified loads are maximum permitted working loads, which in the verification of stability must be listed together with the characteristic loads. In the case of verification at the rated level (e.g. with differing partial safety coefficients γ_F on the affected side), the rated value of the resistance R_d must be determined by multiplication of the specified value with 1.5.
- The loads were determined for scaffolding structures of class B1 . When the towers are used as scaffolding of class B2. the specified values must be divided by the factor 1.15.
- The boundary conditions (attached at top / free-standing tower, wind load, spindle travel, etc.) must be complied with at all times.

Off-centre load

An off-centre load on the Shoring Tower leads to an uneven distribution of the loads on the standards. This is harmless as long as the lowest vertical standard load F_{V1} is at least 20 % of the highest prevailing standard load F_{V2} ($F_{V1} > 0.2 * F_{V2}$). With larger off-centre loads separate verification is required. The maximum standard load must on no account exceed the permissible load per standard.

For free-standing towers, an additional verification of tilting prevention must always be provided when the load is off-centre.



Load and minimum superimposed load for laterally attached at the top Shoring Towers TG 60

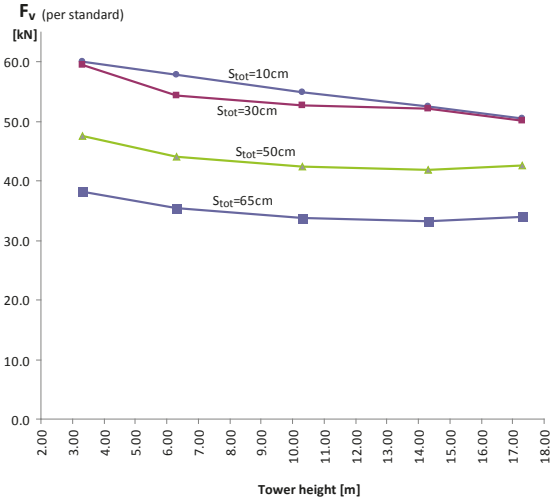
For Shoring Towers TG 60 attached at the top, the lateral attachment is assumed at the level of the head jack plate. The parameters of ground plan, tower height, spindle travel and dynamic wind pressure are varied.

The permissible loads per standard are specified in each case. Non-specified intermediate values can be calculated by linear interpolation. (e.g. for $q = 0.6$ kN / m² or $s_{tot} = 40$ cm)

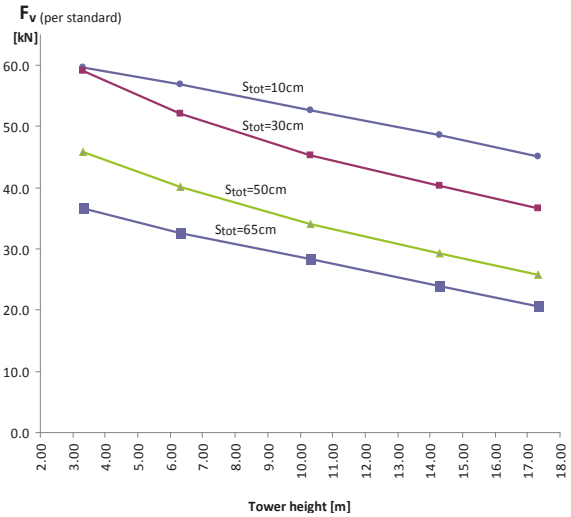
When wind acts on the towers, a minimum superimposed load is required to rule out sliding of the baseplates. These values are quoted independently of the spindle travel in the last columns of the table. Any ballasting present can be included in the calculation as a minimum superimposed load, however the permissible load capacity must then be reduced by the proportionate ballast weight per standard.

Tower type A – ground plan 1.09 x 1.09 m

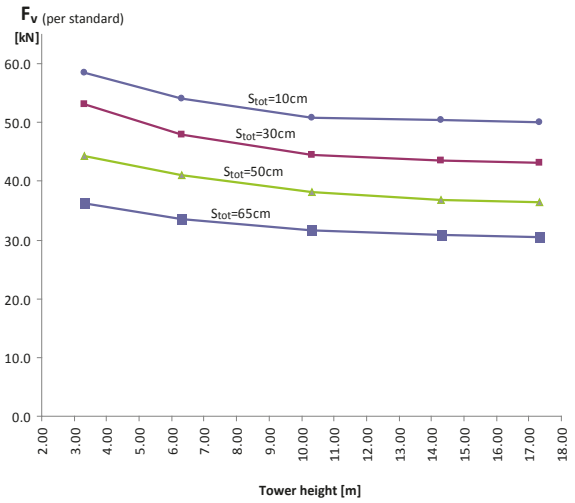
- Towers attached at top **without wind action** with one or two **50 cm frames at the top of the tower**



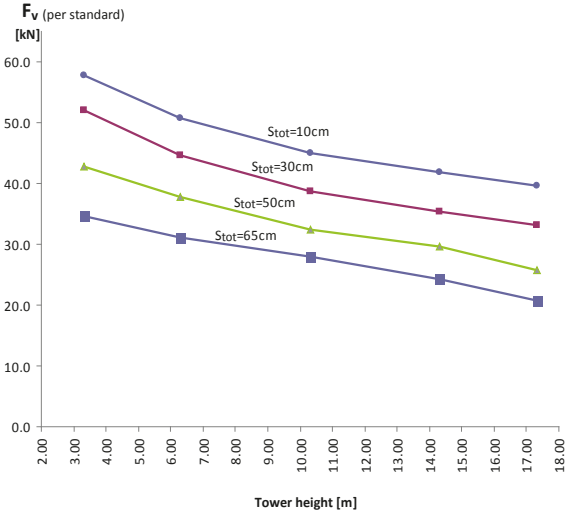
- Towers attached at top **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- Towers attached at top **without wind action** with **100 cm frame at the top of the tower**



- Towers attached at top **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**

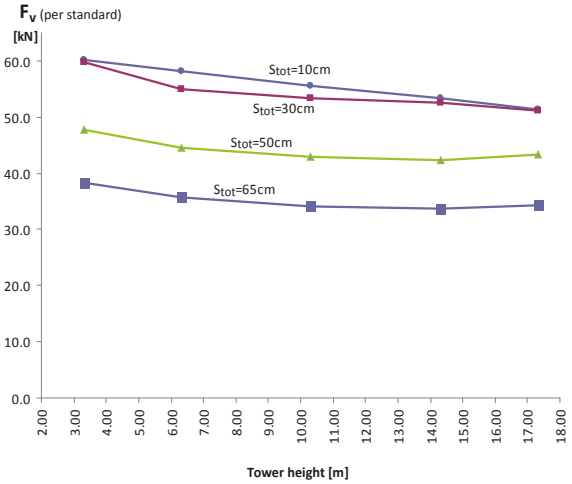


Maximum load per standard for the tower **laterally attached at the top**

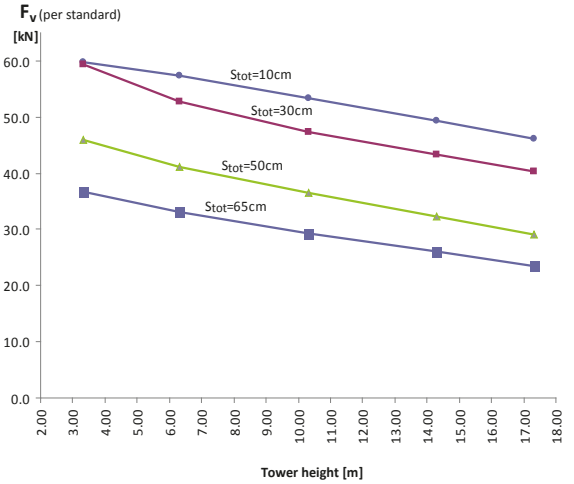
Tower type A – ground plan 1.09 x 1.09 m																					Minimum superimposed load per standard against sliding of the base plates min. F_V [kN]		
					perm. load capacity F_V per standard for class B1 [kN]																		
					s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm)				s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm)				s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm)				s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm)						
					Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure		
Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
AR-TG-A-00-1	0	1	1.31	1.96	60.0	59.7	59.5	59.3	59.5	59.1	57.9	56.1	47.6	45.8	44.6	43.0	38.2	36.6	34.3	33.0	0.1	0.4	0.7
AR-TG-A-00-2	0	2	1.81	2.46	60.0	59.7	59.5	59.3	59.5	59.1	57.9	56.1	47.6	45.8	44.6	43.0	38.2	36.6	34.3	33.0	0.2	0.6	1.0
AR-TG-A-01-0	1	0	1.81	2.46	58.5	57.8	57.3	56.9	53.0	52.0	51.4	50.7	44.3	42.8	42.0	41.1	36.2	34.7	32.7	31.4	0.2	0.6	1.0
AR-TG-A-01-1	1	1	2.31	2.96	60.0	59.7	59.5	59.3	59.0	58.0	57.0	56.1	47.6	45.8	44.6	43.0	38.2	36.6	34.3	33.0	0.3	0.8	1.2
AR-TG-A-01-2	1	2	2.81	3.46	60.0	59.7	59.5	59.3	59.0	58.0	57.0	56.1	47.6	45.8	44.6	43.0	38.2	36.6	34.3	33.0	0.3	0.9	1.5
AR-TG-A-02-0	2	0	2.81	3.46	58.5	57.8	57.3	56.9	53.0	52.0	51.4	50.7	44.3	42.8	42.0	41.1	36.2	34.7	32.7	31.4	0.4	0.9	1.5
AR-TG-A-02-1	2	1	3.31	3.96	59.3	58.7	58.4	58.1	57.5	55.8	54.8	52.4	46.4	43.9	42.0	39.9	37.3	35.3	32.6	30.8	0.4	1.1	1.7
AR-TG-A-02-2	2	2	3.81	4.46	59.3	58.7	58.4	58.1	57.5	55.8	54.8	52.4	46.4	43.9	42.0	39.9	37.3	35.3	32.6	30.8	0.5	1.2	1.9
AR-TG-A-03-0	3	0	3.81	4.46	57.0	55.4	54.4	53.3	51.3	49.5	48.2	47.2	43.2	41.1	39.8	38.6	35.3	33.5	31.5	30.1	0.5	1.2	2.0
AR-TG-A-03-1	3	1	4.31	4.96	58.5	57.8	57.3	56.9	56.1	54.3	51.7	48.7	45.2	42.0	39.5	36.8	36.3	34.0	30.8	28.5	0.6	1.4	2.2
AR-TG-A-03-2	3	2	4.81	5.46	58.5	57.8	57.3	56.9	56.1	54.3	51.7	48.7	45.2	42.0	39.5	36.8	36.3	34.0	30.8	28.5	0.6	1.5	2.4
AR-TG-A-04-0	4	0	4.81	5.46	55.5	53.1	51.5	49.7	49.6	47.1	45.1	43.6	42.1	39.5	37.7	36.1	34.5	32.4	30.2	28.8	0.7	1.6	2.4
AR-TG-A-04-1	4	1	5.31	5.96	57.8	56.9	56.3	55.7	54.4	52.2	48.6	45.1	44.1	40.1	36.9	33.8	35.4	32.7	29.1	26.3	0.7	1.7	2.7
AR-TG-A-04-2	4	2	5.81	6.46	57.8	56.9	56.3	55.7	54.4	52.2	48.6	45.1	44.1	40.1	36.9	33.8	35.4	32.7	29.1	26.3	0.8	1.8	2.9
AR-TG-A-05-0	5	0	5.81	6.46	54.0	50.7	48.5	46.1	48.0	44.6	42.0	40.0	41.1	37.8	35.6	33.6	33.6	31.2	29.0	27.6	0.8	1.9	2.9
AR-TG-A-05-1	5	1	6.31	6.96	57.1	55.8	55.0	53.1	53.9	50.5	46.3	42.1	43.6	38.6	34.8	31.1	35.0	31.6	27.2	23.9	0.9	2.0	3.1
AR-TG-A-05-2	5	2	6.81	7.46	57.1	55.8	55.0	53.1	53.9	50.5	46.3	42.1	43.6	38.6	34.8	31.1	35.0	31.6	27.2	23.9	0.9	2.1	3.4
AR-TG-A-06-0	6	0	6.81	7.46	53.2	49.3	46.6	43.6	47.1	43.1	40.2	37.6	40.3	36.5	34.0	31.2	33.1	30.4	27.3	25.0	1.0	2.2	3.4
AR-TG-A-06-1	6	1	7.31	7.96	56.4	54.8	53.8	50.5	53.5	48.8	43.9	39.1	43.2	37.0	32.8	28.5	34.6	30.5	25.4	21.4	1.0	2.3	3.6
AR-TG-A-06-2	6	2	7.81	8.46	56.4	54.8	53.8	50.5	53.5	48.8	43.9	39.1	43.2	37.0	32.8	28.5	34.6	30.5	25.4	21.4	1.1	2.5	3.8
AR-TG-A-07-0	7	0	7.81	8.46	52.4	47.8	44.7	41.2	46.3	41.7	38.5	35.2	39.6	35.2	32.4	28.7	32.6	29.5	25.7	22.4	1.1	2.5	3.9
AR-TG-A-07-1	7	1	8.31	8.96	55.7	53.7	52.5	47.9	53.1	47.1	41.6	36.1	42.8	35.5	30.7	25.8	34.1	29.4	23.6	19.0	1.2	2.6	4.1
AR-TG-A-07-2	7	2	8.81	9.46	55.7	53.7	52.5	47.9	53.1	47.1	41.6	36.1	42.8	35.5	30.7	25.8	34.1	29.4	23.6	19.0	1.2	2.8	4.3
AR-TG-A-08-0	8	0	8.81	9.46	51.7	46.4	42.8	38.7	45.4	40.2	36.7	32.8	38.8	33.8	30.8	26.3	32.1	28.7	24.0	19.8	1.3	2.8	4.4
AR-TG-A-08-1	8	1	9.31	9.96	55.0	52.7	51.3	45.3	52.7	45.4	39.2	33.1	42.4	34.0	28.6	23.2	33.7	28.3	21.7	16.5	1.3	2.9	4.6
AR-TG-A-08-2	8	2	9.81	10.46	55.0	52.7	51.3	45.3	52.7	45.4	39.2	33.1	42.4	34.0	28.6	23.2	33.7	28.3	21.7	16.5	1.3	3.1	4.8
AR-TG-A-09-0	9	0	9.81	10.46	50.9	45.0	41.0	36.2	44.6	38.7	34.9	30.4	38.1	32.5	29.2	23.8	31.6	27.9	22.3	17.3	1.4	3.1	4.9
AR-TG-A-09-1	9	1	10.31	10.96	54.4	51.6	49.3	42.4	52.6	44.1	37.2	30.4	42.3	32.8	26.7	20.4	33.6	27.2	19.8	14.8	1.4	3.3	5.1
AR-TG-A-09-2	9	2	10.81	11.46	54.4	51.6	49.3	42.4	52.6	44.1	37.2	30.4	42.3	32.8	26.7	20.4	33.6	27.2	19.8	13.5	1.5	3.4	5.3
AR-TG-A-10-0	10	0	10.81	11.46	50.8	44.2	39.6	34.3	44.3	37.9	33.5	28.5	37.8	31.8	27.3	21.0	31.4	27.0	20.3	14.0	1.6	3.4	5.3
AR-TG-A-10-1	10	1	11.31	11.96	53.7	50.6	47.4	39.5	52.4	42.9	35.2	27.7	42.2	31.6	24.9	17.7	33.4	26.1	17.9	11.3	1.6	3.6	5.5
AR-TG-A-10-2	10	2	11.81	12.46	53.7	50.6	47.4	39.5	52.4	42.9	35.2	27.7	42.2	31.6	24.9	17.7	33.4	26.1	17.9	10.4	1.6	3.7	5.8
AR-TG-A-11-0	11	0	11.81	12.46	50.7	43.4	38.2	32.5	44.0	37.1	32.2	26.5	37.5	31.1	25.4	18.2	31.2	26.1	18.4	10.8	1.7	3.8	5.8
AR-TG-A-11-1	11	1	12.31	12.96	53.1	49.6	45.5	36.6	52.3	41.6	33.2	24.9	42.1	30.4	23.0	14.9	33.3	25.0	16.0	7.8	1.7	3.9	6.0
AR-TG-A-11-2	11	2	12.81	13.46	53.1	49.6	45.5	36.6	52.3	41.6	33.2	24.9	42.1	30.4	23.0	14.9	33.3	25.0	16.0	7.4	1.8	4.0	6.2
AR-TG-A-12-0	12	0	12.81	13.46	50.5	42.6	36.8	30.6	43.8	36.3	30.8	24.6	37.2	30.3	23.5	15.4	31.0	25.2	16.4	7.6	1.8	4.1	6.3
AR-TG-A-12-1	12	1	13.31	13.96	52.5	48.6	43.5	33.7	52.1	40.4	31.3	22.2	42.0	29.2	21.2	12.2	33.2	24.0	14.1	4.4	1.9	4.2	6.5
AR-TG-A-12-2	12	2	13.81	14.46	52.5	48.6	43.5	33.7	52.1	40.4	31.3	22.2	42.0	29.2	21.2	12.2	33.2	24.0	14.1	4.4	1.9	4.3	6.7
AR-TG-A-13-0	13	0	13.81	14.46	50.4	41.9	35.4	28.7	43.5	35.5	29.5	22.7	36.9	29.6	21.6	12.7	30.8	24.4	14.5	4.4	2.0	4.4	6.8
AR-TG-A-13-1	13	1	14.31	14.96	51.8	47.4	41.3	30.7	51.5	39.1	29.2	19.0	42.2	28.1	19.0	-	33.4	22.9	-	-	2.0	4.5	7.0
AR-TG-A-13-2	13	2	14.81	15.46	51.8	47.4	41.3	30.7	51.5	39.1	29.2	19.0	42.2	28.1	19.0	-	33.4	22.9	-	-	2.1	4.6	7.2
AR-TG-A-14-0	14	0	14.81	15.46	50.3	41.1	34.2	27.0	43.4	34.7	28.0	19.4	36.7	28.3	19.4	-	30.7	23.1	-	-	2.1	4.7	7.3
AR-TG-A-14-1	14	1	15.31	15.96	51.1	46.3	39.2	27.7	50.8	37.9	27.1	15.9	42.4	26.9	16.8	-	33.7	21.8	-	-	2.2	4.8	7.5
AR-TG-A-14-2	14	2	15.81	16.46	51.1	46.3	39.2	27.7	50.8	37.9	27.1	15.9	42.4	26.9	16.8	-	33.7	21.8	-	-	2.2	4.9	7.7
AR-TG-A-15-0	15	0	15.81	16.46	50.1	40.4	32.9	25.3	43.3	33.9	26.6	16.2	36.6	27.0	17.1	-	30.6	21.9	-	-	2.3	5.0	7.7
AR-TG-A-15-1	15	1	16.31	16.96	50.5	45.1	37.0	24.7	50.1	36.6	25.1	12.7	42.6	25.7	14.7	-	34.0	20.7	-	-	2.3	5.1	8.0
AR-TG-A-15-2	15	2	16.81	17.46	50.5	45.1	37.0	24.7	50.1	36.6	25.1	12.7	42.6	25.7	14.7	-	34.0	20.7	-	-	2.4	5.3	8.2
AR-TG-A-16-0	16	0	16.81	17.46	50.0	39.6	31.7	23.6	43.2	33.2	25.2	13.0	36.5	25.7	14.9	-	30.5	20.7	-	-	2.4	5.3	8.2

Tower type B – ground plan 1.09 x 1.57 m

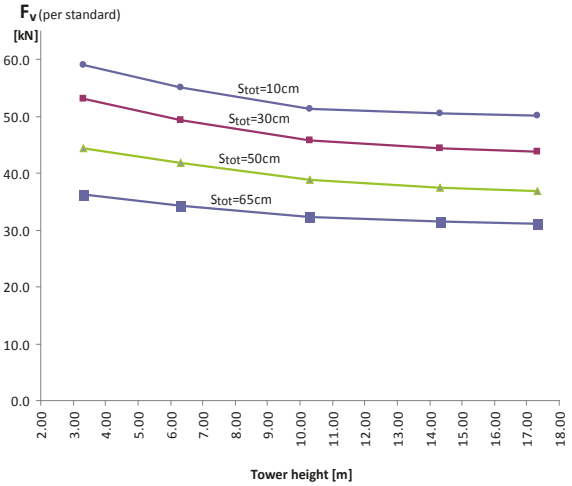
- Towers attached at top **without wind action** with one or two **50 cm frames at the top of the tower**



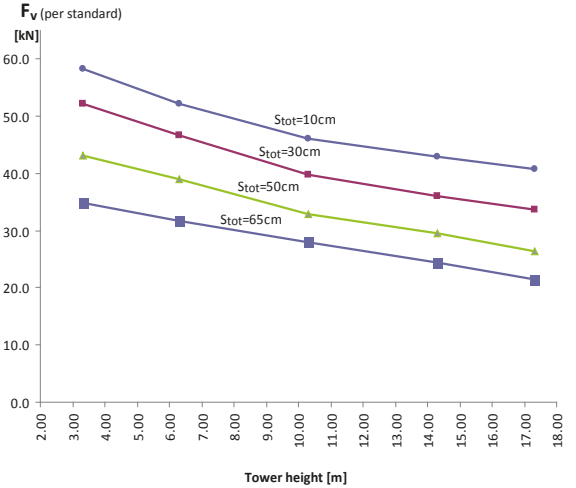
- Towers attached at top **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- Towers attached at top **without wind action** with **100 cm frame at the top of the tower**



- Towers attached at top **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**

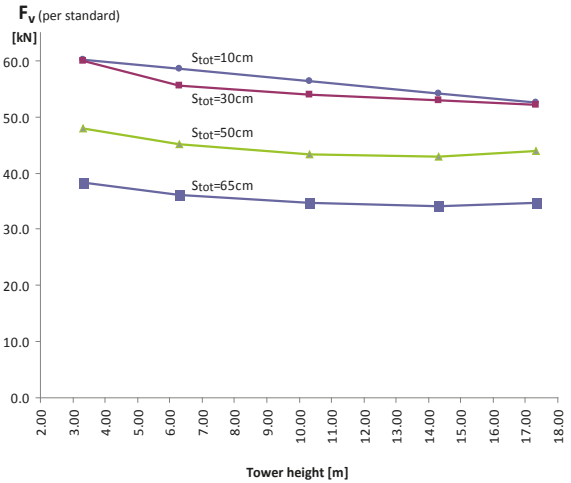


Maximum load per standard for the tower **laterally attached at the top**

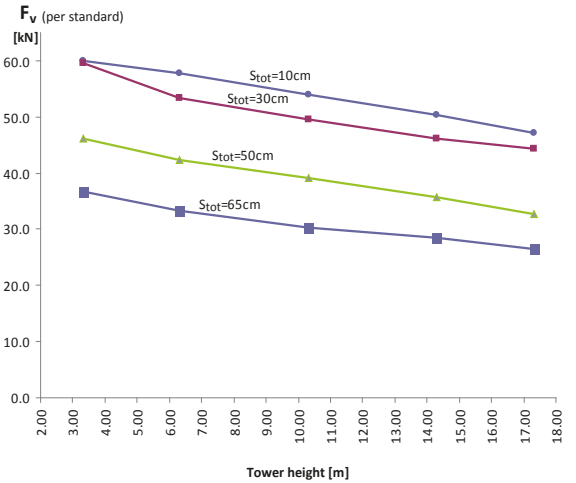
Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type B – ground plan 1.09 x 1.57 m; perm. load capacity F_V per standard for class B1 [kN]; s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	Minimum superimposed load per standard against sliding of the base plates min. F_V [kN]; Dynamic wind pressure q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
AR-TG-B-00-1	0	1	1.31	1.96	60.1	59.8	59.7	59.5	59.7	59.4	58.7	57.5	47.8	46.0	44.9	43.6	38.3	36.6	34.3	33.1	0.2	0.6	1.0
AR-TG-B-00-2	0	2	1.81	2.46	60.1	59.8	59.7	59.5	59.7	59.4	58.7	57.5	47.8	46.0	44.9	43.6	38.3	36.6	34.3	33.1	0.3	0.8	1.3
AR-TG-B-01-0	1	0	1.81	2.46	59.0	58.2	57.8	57.3	53.2	52.1	51.6	50.9	44.3	43.1	42.4	41.5	36.3	35.0	32.8	31.8	0.3	0.8	1.2
AR-TG-B-01-1	1	1	2.31	2.96	60.1	59.8	59.7	59.5	59.7	58.8	58.0	57.0	47.8	46.0	44.9	43.6	38.3	36.6	34.3	33.1	0.4	0.9	1.5
AR-TG-B-01-2	1	2	2.81	3.46	60.1	59.8	59.7	59.5	59.7	58.8	58.0	57.0	47.8	46.0	44.9	43.6	38.3	36.6	34.3	33.1	0.4	1.1	1.8
AR-TG-B-02-0	2	0	2.81	3.46	59.0	58.2	57.8	57.3	53.2	52.1	51.6	50.9	44.3	43.1	42.4	41.5	36.3	35.0	32.8	31.8	0.5	1.1	1.7
AR-TG-B-02-1	2	1	3.31	3.96	59.5	59.0	58.7	58.4	58.1	56.8	55.8	54.2	46.7	44.4	42.8	41.1	37.5	35.4	32.8	31.3	0.5	1.2	1.9
AR-TG-B-02-2	2	2	3.81	4.46	59.5	59.0	58.7	58.4	58.1	56.8	55.8	54.2	46.7	44.4	42.8	41.1	37.5	35.4	32.8	31.3	0.5	1.4	2.2
AR-TG-B-03-0	3	0	3.81	4.46	57.7	56.2	55.3	54.3	51.9	50.3	49.2	48.0	43.4	41.7	40.5	39.2	35.6	33.9	31.7	30.5	0.6	1.4	2.2
AR-TG-B-03-1	3	1	4.31	4.96	58.8	58.1	57.7	57.3	56.5	54.9	53.1	50.9	45.7	42.8	40.8	38.7	36.6	34.2	31.4	29.5	0.6	1.5	2.4
AR-TG-B-03-2	3	2	4.81	5.46	58.8	58.1	57.7	57.3	56.5	54.9	53.1	50.9	45.7	42.8	40.8	38.7	36.6	34.2	31.4	29.5	0.7	1.7	2.6
AR-TG-B-04-0	4	0	4.81	5.46	56.4	54.2	52.8	51.3	50.6	48.5	46.8	45.1	42.6	40.4	38.7	36.9	34.9	32.8	30.5	29.2	0.7	1.7	2.6
AR-TG-B-04-1	4	1	5.31	5.96	58.2	57.3	56.7	56.1	55.0	52.7	50.3	47.6	44.6	41.2	38.7	36.3	35.8	33.0	29.9	27.6	0.8	1.8	2.8
AR-TG-B-04-2	4	2	5.81	6.46	58.2	57.3	56.7	56.1	55.0	52.7	50.3	47.6	44.6	41.2	38.7	36.3	35.8	33.0	29.9	27.6	0.8	1.9	3.1
AR-TG-B-05-0	5	0	5.81	6.46	55.1	52.2	50.3	48.2	49.3	46.7	44.4	42.2	41.7	39.0	36.8	34.6	34.2	31.7	29.4	27.9	0.8	2.0	3.1
AR-TG-B-05-1	5	1	6.31	6.96	57.5	56.3	55.5	54.1	54.5	51.4	48.3	44.9	44.2	40.0	36.9	33.8	35.4	32.1	28.5	25.6	0.9	2.1	3.3
AR-TG-B-05-2	5	2	6.81	7.46	57.5	56.3	55.5	54.1	54.5	51.4	48.3	44.9	44.2	40.0	36.9	33.8	35.4	32.1	28.5	25.6	0.9	2.2	3.5
AR-TG-B-06-0	6	0	6.81	7.46	54.2	50.6	48.4	45.8	48.5	45.0	42.3	39.6	41.0	37.5	34.9	32.1	33.7	30.7	27.8	25.6	1.0	2.3	3.6
AR-TG-B-06-1	6	1	7.31	7.96	56.9	55.3	54.3	52.2	54.1	50.1	46.3	42.1	43.7	38.8	35.2	31.3	35.0	31.2	27.1	23.5	1.0	2.4	3.8
AR-TG-B-06-2	6	2	7.81	8.46	56.9	55.3	54.3	52.2	54.1	50.1	46.3	42.1	43.7	38.8	35.2	31.3	35.0	31.2	27.1	23.5	1.0	2.5	4.0
AR-TG-B-07-0	7	0	7.81	8.46	53.2	49.1	46.4	43.3	47.6	43.2	40.1	37.0	40.3	35.9	33.1	29.6	33.3	29.8	26.2	23.3	1.1	2.6	4.0
AR-TG-B-07-1	7	1	8.31	8.96	56.3	54.3	53.1	50.2	53.7	48.7	44.3	39.4	43.3	37.7	33.4	28.9	34.6	30.2	25.7	21.4	1.1	2.7	4.2
AR-TG-B-07-2	7	2	8.81	9.46	56.3	54.3	53.1	50.2	53.7	48.7	44.3	39.4	43.3	37.7	33.4	28.9	34.6	30.2	25.7	21.4	1.2	2.8	4.5
AR-TG-B-08-0	8	0	8.81	9.46	52.3	47.6	44.5	40.9	46.7	41.5	38.0	34.3	39.6	34.4	31.2	27.2	32.8	28.9	24.6	20.9	1.2	2.9	4.5
AR-TG-B-08-1	8	1	9.31	9.96	55.6	53.3	52.0	48.2	53.3	47.4	42.3	36.7	42.9	36.5	31.7	26.4	34.2	29.3	24.2	19.4	1.3	3.0	4.7
AR-TG-B-08-2	8	2	9.81	10.46	55.6	53.3	52.0	48.2	53.3	47.4	42.3	36.7	42.9	36.5	31.7	26.4	34.2	29.3	24.2	19.4	1.3	3.1	4.9
AR-TG-B-09-0	9	0	9.81	10.46	51.4	46.0	42.6	38.4	45.8	39.7	35.9	31.7	38.9	32.9	29.3	24.7	32.3	28.0	23.1	18.6	1.4	3.2	5.0
AR-TG-B-09-1	9	1	10.31	10.96	55.1	52.4	50.4	45.7	53.1	46.4	40.5	34.3	42.8	35.5	29.9	23.9	34.1	28.5	22.5	17.8	1.4	3.3	5.2
AR-TG-B-09-2	9	2	10.81	11.46	55.1	52.4	50.4	45.7	53.1	46.4	40.5	34.3	42.8	35.5	29.9	23.9	34.1	28.5	22.5	16.5	1.4	3.4	5.4
AR-TG-B-10-0	10	0	10.81	11.46	51.2	45.3	41.3	36.6	45.4	38.8	34.5	29.9	38.5	32.1	27.7	22.5	32.1	27.1	21.5	16.2	1.5	3.5	5.4
AR-TG-B-10-1	10	1	11.31	11.96	54.5	51.4	48.8	43.2	52.9	45.3	38.8	31.8	42.7	34.5	28.2	21.5	33.9	27.7	20.8	14.6	1.5	3.6	5.6
AR-TG-B-10-2	10	2	11.81	12.46	54.5	51.4	48.8	43.2	52.9	45.3	38.8	31.8	42.7	34.5	28.2	21.5	33.9	27.7	20.8	13.7	1.5	3.7	5.8
AR-TG-B-11-0	11	0	11.81	12.46	51.0	44.5	39.9	34.8	45.1	37.8	33.1	28.0	38.2	31.2	26.1	20.3	31.9	26.2	19.9	13.8	1.6	3.8	5.9
AR-TG-B-11-1	11	1	12.31	12.96	53.9	50.4	47.3	40.7	52.8	44.3	37.1	29.4	42.5	33.4	26.5	19.0	33.8	26.9	19.0	11.3	1.6	3.9	6.1
AR-TG-B-11-2	11	2	12.81	13.46	53.9	50.4	47.3	40.7	52.8	44.3	37.1	29.4	42.5	33.4	26.5	19.0	33.8	26.9	19.0	10.9	1.7	4.0	6.3
AR-TG-B-12-0	12	0	12.81	13.46	50.8	43.7	38.5	33.0	44.7	36.9	31.8	26.2	37.8	30.4	24.5	18.1	31.8	25.3	18.4	11.3	1.7	4.0	6.3
AR-TG-B-12-1	12	1	13.31	13.96	53.3	49.4	45.7	38.2	52.6	43.2	35.3	27.0	42.4	32.4	24.7	16.5	33.6	26.1	17.3	8.1	1.8	4.2	6.5
AR-TG-B-12-2	12	2	13.81	14.46	53.3	49.4	45.7	38.2	52.6	43.2	35.3	27.0	42.4	32.4	24.7	16.5	33.6	26.1	17.3	8.1	1.8	4.3	6.7
AR-TG-B-13-0	13	0	13.81	14.46	50.6	43.0	37.2	31.2	44.4	36.0	30.4	24.4	37.4	29.5	23.0	15.9	31.6	24.4	16.8	8.9	1.9	4.3	6.8
AR-TG-B-13-1	13	1	14.31	14.96	52.7	48.3	44.0	35.8	52.1	42.3	33.5	24.2	42.7	31.3	22.8	-	33.9	25.3	-	-	1.9	4.5	7.0
AR-TG-B-13-2	13	2	14.81	15.46	52.7	48.3	44.0	35.8	52.1	42.3	33.5	24.2	42.7	31.3	22.8	-	33.9	25.3	-	-	1.9	4.6	7.2
AR-TG-B-14-0	14	0	14.81	15.46	50.4	42.2	36.0	29.6	44.2	35.2	29.1	22.0	37.2	28.5	21.3	-	31.4	23.5	-	-	2.0	4.6	7.3
AR-TG-B-14-1	14	1	15.31	15.96	52.1	47.2	42.2	33.4	51.6	41.3	31.7	21.4	43.0	30.2	20.9	-	34.1	24.4	-	-	2.0	4.7	7.5
AR-TG-B-14-2	14	2	15.81	16.46	52.1	47.2	42.2	33.4	51.6	41.3	31.7	21.4	43.0	30.2	20.9	-	34.1	24.4	-	-	2.1	4.9	7.7
AR-TG-B-15-0	15	0	15.81	16.46	50.3	41.5	34.8	28.0	44.0	34.4	27.8	19.7	37.1	27.5	19.6	-	31.3	22.5	-	-	2.1	4.9	7.7
AR-TG-B-15-1	15	1	16.31	16.96	51.5	46.1	40.4	31.0	51.2	40.4	30.0	18.5	43.2	29.1	19.0	-	34.3	23.5	-	-	2.2	5.0	7.9
AR-TG-B-15-2	15	2	16.81	17.46	51.5	46.1	40.4	31.0	51.2	40.4	30.0	18.5	43.2	29.1	19.0	-	34.3	23.5	-	-	2.2	5.2	8.1
AR-TG-B-16-0	16	0	16.81	17.46	50.2	40.7	33.6	26.4	43.9	33.7	26.5	17.3	36.9	26.4	17.9	-	31.2	21.5	-	-	2.3	5.2	8.2

Tower type C – ground plan 1.09 x 2.07 m

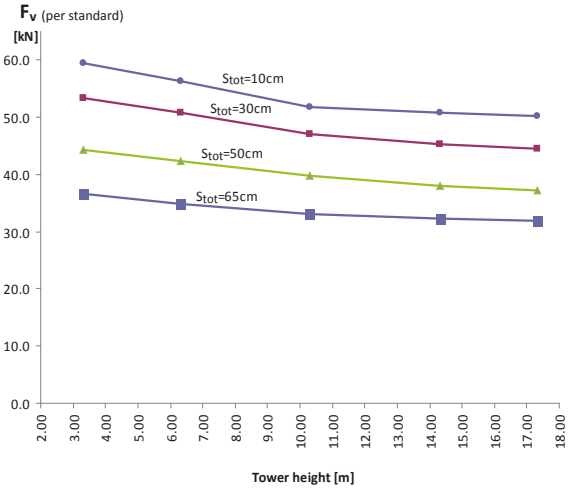
- Towers attached at top **without wind action** with one or two **50 cm frames at the top of the tower**



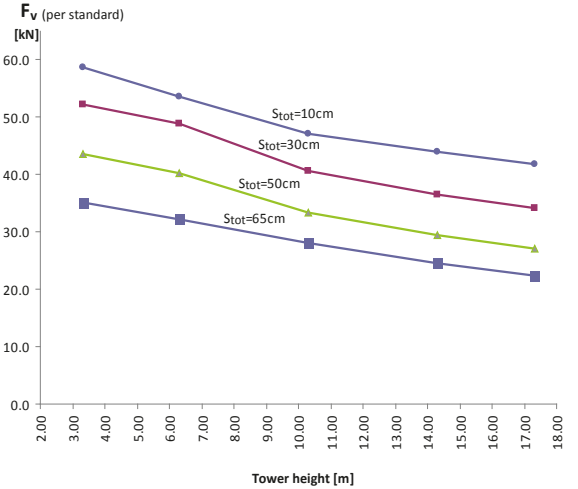
- Towers attached at top **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- Towers attached at top **without wind action** with **100 cm frame at the top of the tower**



- Towers attached at top **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**

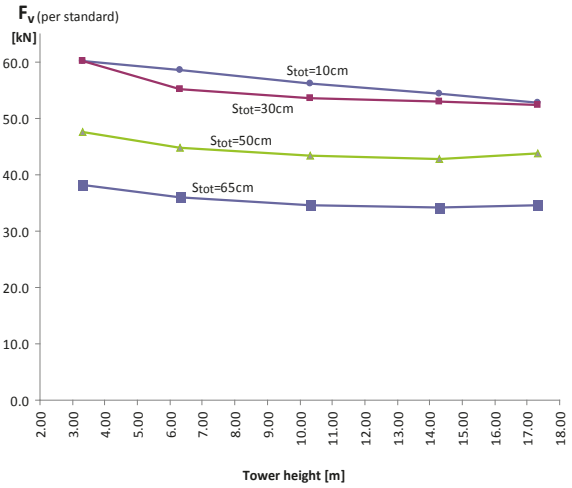


Maximum load per standard for the tower **laterally attached at the top**

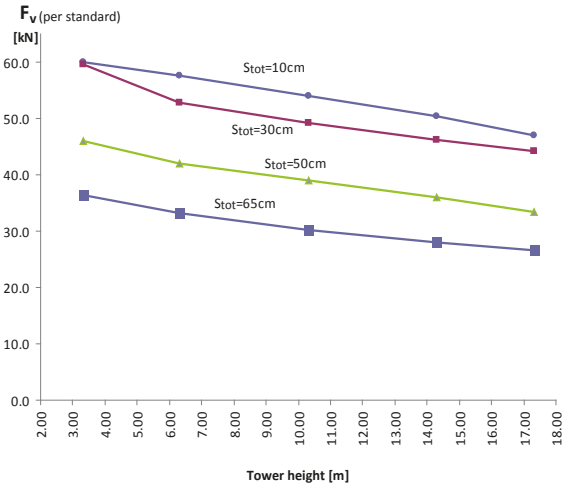
Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type C – ground plan 1.09 x 2.07 m; perm. load capacity F_V per standard for class B1 [kN]; s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	Minimum superimposed load per standard against sliding of the base plates min. F_V [kN]; Dynamic wind pressure q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
AR-TG-C-00-1	0	1	1.31	1.96	60.3	60.0	59.9	59.7	60.0	59.7	59.5	59.0	48.0	46.2	45.2	44.2	38.4	36.7	34.4	33.3	0.3	0.8	1.2
AR-TG-C-00-2	0	2	1.81	2.46	60.3	60.0	59.9	59.7	60.0	59.7	59.5	59.0	48.0	46.2	45.2	44.2	38.4	36.7	34.4	33.3	0.4	1.1	1.7
AR-TG-C-01-0	1	0	1.81	2.46	59.6	58.8	58.3	57.8	53.3	52.3	51.8	51.2	44.3	43.5	42.8	42.0	36.6	35.2	33.0	32.2	0.4	0.9	1.5
AR-TG-C-01-1	1	1	2.31	2.96	60.3	60.0	59.9	59.7	60.0	59.0	58.5	57.8	48.0	46.2	45.2	44.2	38.4	36.7	34.4	33.3	0.5	1.1	1.8
AR-TG-C-01-2	1	2	2.81	3.46	60.3	60.0	59.9	59.7	60.0	59.0	58.5	57.8	48.0	46.2	45.2	44.2	38.4	36.7	34.4	33.3	0.6	1.4	2.2
AR-TG-C-02-0	2	0	2.81	3.46	59.6	58.8	58.3	57.8	53.3	52.3	51.8	51.2	44.3	43.5	42.8	42.0	36.6	35.2	33.0	32.2	0.6	1.3	2.1
AR-TG-C-02-1	2	1	3.31	3.96	59.7	59.3	59.0	58.7	58.5	57.5	56.3	55.3	47.0	44.9	43.7	42.4	37.6	35.6	33.2	31.9	0.7	1.5	2.4
AR-TG-C-02-2	2	2	3.81	4.46	59.7	59.3	59.0	58.7	58.5	57.5	56.3	55.3	47.0	44.9	43.7	42.4	37.6	35.6	33.2	31.9	0.7	1.7	2.7
AR-TG-C-03-0	3	0	3.81	4.46	58.5	57.1	56.2	55.4	52.5	51.2	50.2	48.9	43.7	42.4	41.2	39.8	36.0	34.2	31.9	30.8	0.8	1.7	2.6
AR-TG-C-03-1	3	1	4.31	4.96	59.1	58.5	58.1	57.7	57.1	55.4	54.5	53.1	46.1	43.6	42.1	40.6	36.9	34.5	32.0	30.4	0.8	1.9	2.9
AR-TG-C-03-2	3	2	4.81	5.46	59.1	58.5	58.1	57.7	57.1	55.4	54.5	53.1	46.1	43.6	42.1	40.6	36.9	34.5	32.0	30.4	0.9	2.1	3.2
AR-TG-C-04-0	4	0	4.81	5.46	57.4	55.4	54.1	52.9	51.6	50.1	48.6	46.7	43.1	41.3	39.6	37.7	35.4	33.2	30.8	29.5	0.9	2.1	3.2
AR-TG-C-04-1	4	1	5.31	5.96	58.5	57.7	57.2	56.6	55.6	53.3	52.0	50.2	45.2	42.3	40.6	38.9	36.2	33.4	30.8	29.0	1.0	2.2	3.5
AR-TG-C-04-2	4	2	5.81	6.46	58.5	57.7	57.2	56.6	55.6	53.3	52.0	50.2	45.2	42.3	40.6	38.9	36.2	33.4	30.8	29.0	1.0	2.4	3.8
AR-TG-C-05-0	5	0	5.81	6.46	56.3	53.7	52.1	50.5	50.8	49.0	46.9	44.5	42.4	40.2	38.1	35.6	34.8	32.2	29.7	28.2	1.1	2.4	3.8
AR-TG-C-05-1	5	1	6.31	6.96	58.0	56.8	56.1	55.3	55.2	52.4	50.3	47.8	44.7	41.5	39.1	36.6	35.8	32.6	29.8	27.3	1.1	2.6	4.0
AR-TG-C-05-2	5	2	6.81	7.46	58.0	56.8	56.1	55.3	55.2	52.4	50.3	47.8	44.7	41.5	39.1	36.6	35.8	32.6	29.8	27.3	1.2	2.7	4.3
AR-TG-C-06-0	6	0	6.81	7.46	55.2	52.0	50.1	48.0	49.9	46.9	44.4	41.6	41.8	38.5	35.9	33.1	34.4	31.1	28.3	26.2	1.3	2.8	4.3
AR-TG-C-06-1	6	1	7.31	7.96	57.4	55.9	54.9	53.9	54.7	51.4	48.7	45.3	44.3	40.7	37.7	34.3	35.5	31.9	28.8	25.7	1.3	2.9	4.6
AR-TG-C-06-2	6	2	7.81	8.46	57.4	55.9	54.9	53.9	54.7	51.4	48.7	45.3	44.3	40.7	37.7	34.3	35.5	31.9	28.8	25.7	1.3	3.1	4.9
AR-TG-C-07-0	7	0	7.81	8.46	54.1	50.4	48.2	45.6	48.9	44.8	41.9	38.8	41.1	36.8	33.8	30.6	33.9	30.1	26.8	24.1	1.4	3.1	4.9
AR-TG-C-07-1	7	1	8.31	8.96	56.9	55.0	53.8	52.6	54.3	50.5	47.0	42.9	43.9	39.9	36.3	32.1	35.1	31.1	27.8	24.0	1.5	3.3	5.1
AR-TG-C-07-2	7	2	8.81	9.46	56.9	55.0	53.8	52.6	54.3	50.5	47.0	42.9	43.9	39.9	36.3	32.1	35.1	31.1	27.8	24.0	1.5	3.4	5.4
AR-TG-C-08-0	8	0	8.81	9.46	53.0	48.8	46.3	43.2	48.0	42.8	39.4	35.9	40.4	35.0	31.6	28.1	33.5	29.1	25.4	22.1	1.6	3.5	5.4
AR-TG-C-08-1	8	1	9.31	9.96	56.3	54.1	52.7	51.2	53.9	49.5	45.4	40.4	43.4	39.1	34.9	29.8	34.7	30.4	26.9	22.3	1.6	3.6	5.7
AR-TG-C-08-2	8	2	9.81	10.46	56.3	54.1	52.7	51.2	53.9	49.5	45.4	40.4	43.4	39.1	34.9	29.8	34.7	30.4	26.9	22.3	1.7	3.8	5.9
AR-TG-C-09-0	9	0	9.81	10.46	51.9	47.2	44.4	40.8	47.1	40.7	36.9	33.0	39.7	33.3	29.5	25.7	33.1	28.1	23.9	20.1	1.7	3.9	6.0
AR-TG-C-09-1	9	1	10.31	10.96	55.8	53.1	51.5	49.1	53.7	48.7	43.9	38.3	43.3	38.2	33.2	27.6	34.6	29.9	25.3	21.0	1.8	4.0	6.2
AR-TG-C-09-2	9	2	10.81	11.46	55.8	53.1	51.5	49.1	53.7	48.7	43.9	38.3	43.3	38.2	33.2	27.6	34.6	29.9	25.3	19.7	1.8	4.2	6.5
AR-TG-C-10-0	10	0	10.81	11.46	51.6	46.4	43.0	39.0	46.6	39.7	35.5	31.3	39.3	32.4	28.2	24.0	32.9	27.2	22.7	18.4	1.9	4.2	6.5
AR-TG-C-10-1	10	1	11.31	11.96	55.3	52.2	50.4	47.0	53.5	47.9	42.5	36.2	43.2	37.4	31.6	25.4	34.4	29.4	23.7	18.0	1.9	4.4	6.8
AR-TG-C-10-2	10	2	11.81	12.46	55.3	52.2	50.4	47.0	53.5	47.9	42.5	36.2	43.2	37.4	31.6	25.4	34.4	29.4	23.7	17.1	2.0	4.5	7.0
AR-TG-C-11-0	11	0	11.81	12.46	51.3	45.6	41.7	37.3	46.2	38.6	34.1	29.6	38.9	31.4	26.9	22.4	32.7	26.3	21.6	16.8	2.1	4.6	7.1
AR-TG-C-11-1	11	1	12.31	12.96	54.7	51.2	49.2	45.0	53.3	47.1	41.0	34.1	43.0	36.5	30.0	23.2	34.3	28.9	22.2	14.9	2.1	4.7	7.3
AR-TG-C-11-2	11	2	12.81	13.46	54.7	51.2	49.2	45.0	53.3	47.1	41.0	34.1	43.0	36.5	30.0	23.2	34.3	28.9	22.2	14.5	2.1	4.9	7.6
AR-TG-C-12-0	12	0	12.81	13.46	51.0	44.9	40.4	35.6	45.7	37.6	32.7	27.9	38.4	30.4	25.6	20.8	32.5	25.4	20.4	15.2	2.2	4.9	7.7
AR-TG-C-12-1	12	1	13.31	13.96	54.2	50.3	48.0	42.9	53.1	46.2	39.5	32.0	42.9	35.7	28.4	21.0	34.2	28.4	20.6	11.9	2.3	5.1	7.9
AR-TG-C-12-2	12	2	13.81	14.46	54.2	50.3	48.0	42.9	53.1	46.2	39.5	32.0	42.9	35.7	28.4	21.0	34.2	28.4	20.6	11.9	2.3	5.2	8.1
AR-TG-C-13-0	13	0	13.81	14.46	50.8	44.1	39.0	33.8	45.3	36.6	31.4	26.2	38.0	29.5	24.4	19.2	32.4	24.5	19.3	13.6	2.4	5.3	8.2
AR-TG-C-13-1	13	1	14.31	14.96	53.6	49.2	46.7	41.1	52.8	45.6	38.0	29.5	43.3	34.7	26.7	-	34.4	27.8	-	-	2.4	5.4	8.4
AR-TG-C-13-2	13	2	14.81	15.46	53.6	49.2	46.7	41.1	52.8	45.6	38.0	29.5	43.3	34.7	26.7	-	34.4	27.8	-	-	2.5	5.6	8.7
AR-TG-C-14-0	14	0	14.81	15.46	50.6	43.3	37.9	32.3	45.1	35.8	30.2	24.7	37.8	28.7	23.3	-	32.2	23.8	-	-	2.6	5.7	8.8
AR-TG-C-14-1	14	1	15.31	15.96	53.1	48.2	45.3	39.3	52.5	44.9	36.5	27.0	43.6	33.7	25.1	-	34.6	27.2	-	-	2.6	5.8	9.0
AR-TG-C-14-2	14	2	15.81	16.46	53.1	48.2	45.3	39.3	52.5	44.9	36.5	27.0	43.6	33.7	25.1	-	34.6	27.2	-	-	2.6	5.9	9.2
AR-TG-C-15-0	15	0	15.81	16.46	50.5	42.6	36.7	30.8	44.8	35.0	29.1	23.2	37.5	27.9	22.2	-	32.0	23.1	-	-	2.7	6.0	9.3
AR-TG-C-15-1	15	1	16.31	16.96	52.5	47.1	44.0	37.3	52.2	44.3	35.0	24.6	44.0	32.7	23.4	-	34.8	26.5	-	-	2.7	6.1	9.6
AR-TG-C-15-2	15	2	16.81	17.46	52.5	47.1	44.0	37.3	52.2	44.3	35.0	24.6	44.0	32.7	23.4	-	34.8	26.5	-	-	2.8	6.3	9.8
AR-TG-C-16-0	16	0	16.81	17.46	50.3	41.9	35.6	29.4	44.6	34.2	27.9	21.8	37.3	27.1	21.1	-	31.9	22.4	-	-	2.9	6.4	9.9

Tower type D – ground plan 1.09 x 2.57 m

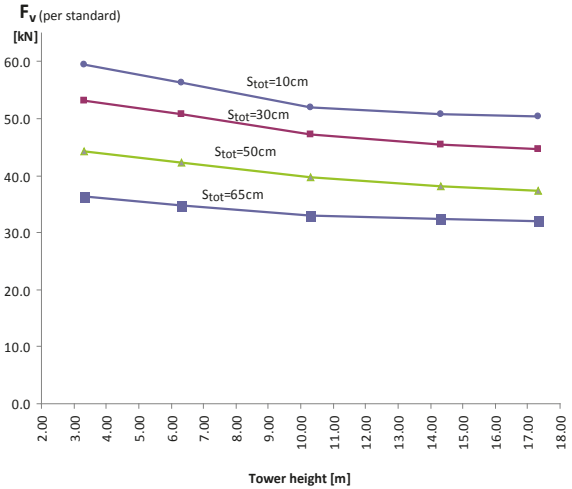
- Towers attached at top **without wind action** with one or two **50 cm frames at the top of the tower**



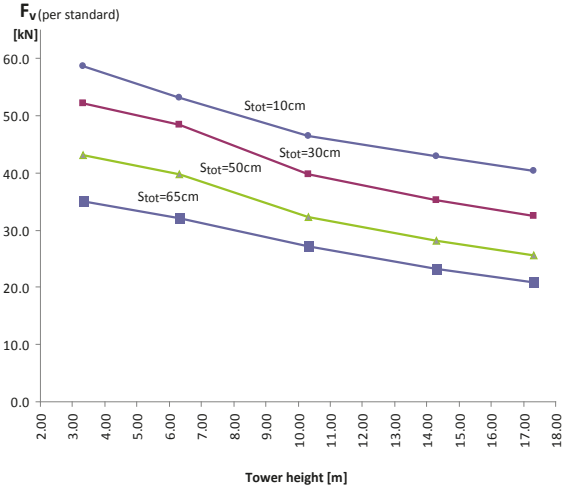
- Towers attached at top **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- Towers attached at top **without wind action** with **100 cm frame at the top of the tower**



- Towers attached at top **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**

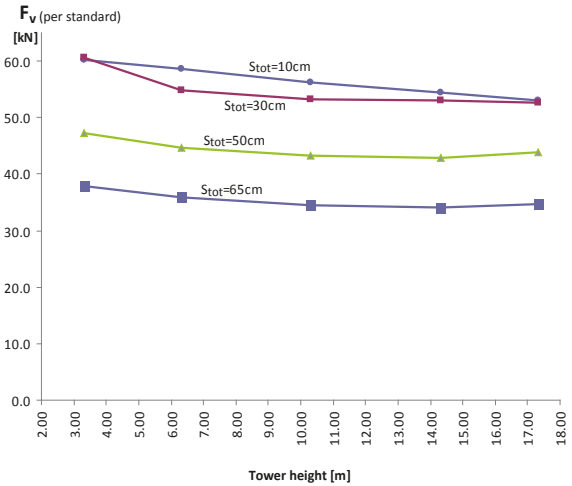


Maximum load per standard for the tower **laterally attached at the top**

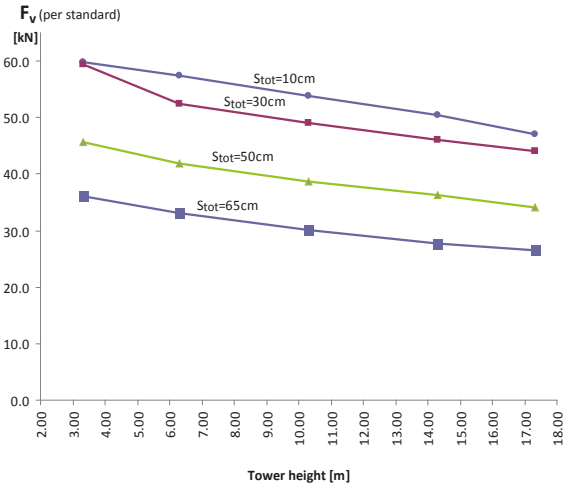
Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type D – ground plan 1.09 x 2.57 m; perm. load capacity F_V per standard for class B1 [kN]; s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	Minimum superimposed load per standard against sliding of the base plates min. F_V [kN]; Dynamic wind pressure q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
AR-TG-D-00-1	0	1	1.31	1.96	60.3	60.0	59.8	59.6	60.3	59.5	59.1	58.4	47.6	45.9	44.9	43.5	38.1	36.4	33.9	32.5	0.4	1.0	1.5
AR-TG-D-00-2	0	2	1.81	2.46	60.3	60.0	59.8	59.6	60.3	59.5	59.1	58.4	47.6	45.9	44.9	43.5	38.1	36.4	33.9	32.5	0.6	1.3	2.1
AR-TG-D-01-0	1	0	1.81	2.46	59.4	58.6	57.9	57.6	53.2	52.1	51.6	50.9	44.2	43.2	42.4	41.7	36.4	35.0	32.8	32.0	0.5	1.2	1.8
AR-TG-D-01-1	1	1	2.31	2.96	60.3	60.0	59.8	59.6	60.3	59.5	59.0	58.0	47.6	45.9	44.9	43.5	38.1	36.4	33.9	32.5	0.6	1.4	2.2
AR-TG-D-01-2	1	2	2.81	3.46	60.3	60.0	59.8	59.6	60.3	59.5	59.0	58.0	47.6	45.9	44.9	43.5	38.1	36.4	33.9	32.5	0.8	1.7	2.6
AR-TG-D-02-0	2	0	2.81	3.46	59.4	58.6	57.9	57.6	53.2	52.1	51.6	50.9	44.2	43.2	42.4	41.7	36.4	35.0	32.8	32.0	0.8	1.6	2.5
AR-TG-D-02-1	2	1	3.31	3.96	59.7	59.2	58.8	58.5	58.6	57.3	56.6	55.5	46.7	44.6	43.3	41.7	37.4	35.4	32.7	30.9	0.8	1.8	2.8
AR-TG-D-02-2	2	2	3.81	4.46	59.7	59.2	58.8	58.5	58.6	57.3	56.6	55.5	46.7	44.6	43.3	41.7	37.4	35.4	32.7	30.9	0.9	2.1	3.3
AR-TG-D-03-0	3	0	3.81	4.46	58.4	56.8	55.7	54.9	52.4	50.9	49.7	48.3	43.6	42.0	40.6	39.1	35.8	34.0	31.6	30.3	1.0	2.1	3.2
AR-TG-D-03-1	3	1	4.31	4.96	59.1	58.4	57.9	57.5	56.9	55.1	54.1	52.7	45.8	43.4	41.8	39.9	36.8	34.3	31.4	29.4	1.0	2.3	3.5
AR-TG-D-03-2	3	2	4.81	5.46	59.1	58.4	57.9	57.5	56.9	55.1	54.1	52.7	45.8	43.4	41.8	39.9	36.8	34.3	31.4	29.4	1.1	2.5	3.9
AR-TG-D-04-0	4	0	4.81	5.46	57.4	55.0	53.6	52.2	51.6	49.7	47.8	45.7	43.0	40.9	38.8	36.6	35.3	33.0	30.4	28.5	1.2	2.5	3.8
AR-TG-D-04-1	4	1	5.31	5.96	58.5	57.6	57.0	56.4	55.2	52.9	51.6	49.8	44.9	42.1	40.3	38.1	36.1	33.2	30.2	27.9	1.2	2.7	4.2
AR-TG-D-04-2	4	2	5.81	6.46	58.5	57.6	57.0	56.4	55.2	52.9	51.6	49.8	44.9	42.1	40.3	38.1	36.1	33.2	30.2	27.9	1.3	2.9	4.5
AR-TG-D-05-0	5	0	5.81	6.46	56.3	53.2	51.4	49.5	50.7	48.5	45.9	43.1	42.4	39.7	37.0	34.1	34.7	32.1	29.2	26.8	1.4	2.9	4.5
AR-TG-D-05-1	5	1	6.31	6.96	58.0	56.7	55.9	55.1	54.8	52.0	50.0	47.4	44.5	41.3	39.0	36.2	35.7	32.5	29.2	26.4	1.4	3.1	4.8
AR-TG-D-05-2	5	2	6.81	7.46	58.0	56.7	55.9	55.1	54.8	52.0	50.0	47.4	44.5	41.3	39.0	36.2	35.7	32.5	29.2	26.4	1.5	3.3	5.2
AR-TG-D-06-0	6	0	6.81	7.46	55.2	51.6	49.3	46.8	49.8	46.3	43.3	40.0	41.7	37.9	34.7	31.4	34.3	30.8	27.5	24.6	1.6	3.4	5.2
AR-TG-D-06-1	6	1	7.31	7.96	57.4	55.8	54.8	53.8	54.4	51.1	48.5	45.1	44.1	40.5	37.7	34.2	35.4	31.7	28.2	24.9	1.6	3.5	5.5
AR-TG-D-06-2	6	2	7.81	8.46	57.4	55.8	54.8	53.8	54.4	51.1	48.5	45.1	44.1	40.5	37.7	34.2	35.4	31.7	28.2	24.9	1.7	3.7	5.8
AR-TG-D-07-0	7	0	7.81	8.46	54.1	49.9	47.2	44.1	49.0	44.1	40.6	37.0	41.1	36.0	32.4	28.7	33.9	29.6	25.7	22.3	1.8	3.8	5.8
AR-TG-D-07-1	7	1	8.31	8.96	56.9	54.9	53.7	52.4	54.0	50.2	46.9	42.7	43.7	39.7	36.4	32.2	35.0	31.0	27.2	23.4	1.8	4.0	6.1
AR-TG-D-07-2	7	2	8.81	9.46	56.9	54.9	53.7	52.4	54.0	50.2	46.9	42.7	43.7	39.7	36.4	32.2	35.0	31.0	27.2	23.4	1.9	4.2	6.4
AR-TG-D-08-0	8	0	8.81	9.46	53.0	48.2	45.0	41.3	48.1	41.9	37.9	33.9	40.4	34.2	30.2	26.1	33.5	28.4	24.0	20.1	2.0	4.2	6.5
AR-TG-D-08-1	8	1	9.31	9.96	56.3	54.0	52.6	51.1	53.6	49.3	45.4	40.3	43.4	38.9	35.1	30.2	34.6	30.2	26.2	21.9	2.0	4.4	6.8
AR-TG-D-08-2	8	2	9.81	10.46	56.3	54.0	52.6	51.1	53.6	49.3	45.4	40.3	43.4	38.9	35.1	30.2	34.6	30.2	26.2	21.9	2.1	4.6	7.1
AR-TG-D-09-0	9	0	9.81	10.46	51.9	46.5	42.9	38.6	47.2	39.7	35.3	30.8	39.8	32.3	27.9	23.4	33.1	27.2	22.3	17.8	2.2	4.6	7.1
AR-TG-D-09-1	9	1	10.31	10.96	55.8	53.1	51.4	48.8	53.5	48.5	43.9	38.2	43.2	38.2	33.6	28.2	34.5	29.7	24.8	18.8	2.2	4.8	7.4
AR-TG-D-09-2	9	2	10.81	11.46	55.8	53.1	51.4	48.8	53.5	48.5	43.9	38.2	43.2	38.2	33.6	28.2	34.5	29.7	24.8	18.8	2.3	5.0	7.7
AR-TG-D-10-0	10	0	10.81	11.46	51.7	45.6	41.4	36.7	46.7	38.6	33.8	28.9	39.4	31.3	25.5	21.6	32.9	26.2	21.0	15.6	2.4	5.1	7.8
AR-TG-D-10-1	10	1	11.31	11.96	55.3	52.2	50.3	46.8	53.3	47.7	42.3	36.1	43.1	37.4	32.1	26.2	34.4	29.1	23.4	15.8	2.4	5.2	8.1
AR-TG-D-10-2	10	2	11.81	12.46	55.3	52.2	50.3	46.8	53.3	47.7	42.3	36.1	43.1	37.4	32.1	26.2	34.4	29.1	23.4	15.8	2.5	5.4	8.4
AR-TG-D-11-0	11	0	11.81	12.46	51.4	44.7	39.9	34.7	46.3	37.5	32.2	27.0	38.9	30.2	23.2	19.8	32.8	25.2	19.7	13.5	2.6	5.5	8.4
AR-TG-D-11-1	11	1	12.31	12.96	54.8	51.2	49.1	44.3	53.2	47.0	40.8	34.0	43.0	36.7	30.6	24.2	34.2	28.6	22.1	12.7	2.6	5.7	8.7
AR-TG-D-11-2	11	2	12.81	13.46	54.8	51.2	49.1	44.3	53.2	47.0	40.8	34.0	43.0	36.7	30.6	24.2	34.2	28.6	22.1	12.7	2.7	5.8	9.0
AR-TG-D-12-0	12	0	12.81	13.46	51.1	43.8	38.4	32.8	45.8	36.4	30.7	25.1	38.5	29.2	20.8	18.0	32.6	24.3	18.4	11.3	2.8	5.9	9.1
AR-TG-D-12-1	12	1	13.31	13.96	54.3	50.3	47.9	42.3	53.0	46.2	39.3	31.9	42.9	35.9	29.1	22.2	34.1	28.1	20.7	9.6	2.8	6.1	9.4
AR-TG-D-12-2	12	2	13.81	14.46	54.3	50.3	47.9	42.3	53.0	46.2	39.3	31.9	42.9	35.9	29.1	22.2	34.1	28.1	20.7	9.6	2.9	6.3	9.7
AR-TG-D-13-0	13	0	13.81	14.46	50.8	42.9	36.9	30.9	45.4	35.3	29.2	23.2	38.1	28.2	18.5	16.1	32.4	23.3	17.1	-	3.0	6.3	9.7
AR-TG-D-13-1	13	1	14.31	14.96	53.8	49.2	46.5	38.6	52.9	45.5	37.9	29.7	43.2	35.1	27.5	-	34.3	27.6	-	-	3.0	6.5	10.0
AR-TG-D-13-2	13	2	14.81	15.46	53.8	49.2	46.5	38.6	52.9	45.5	37.9	29.7	43.2	35.1	27.5	-	34.3	27.6	-	-	3.1	6.7	10.3
AR-TG-D-14-0	14	0	14.81	15.46	50.7	42.0	35.6	29.2	45.2	34.4	27.9	21.5	37.8	27.3	18.5	-	32.2	22.5	-	-	3.2	6.8	10.4
AR-TG-D-14-1	14	1	15.31	15.96	53.3	48.2	45.2	34.8	52.7	44.8	36.5	27.5	43.5	34.2	25.9	-	34.5	27.1	-	-	3.2	6.9	10.7
AR-TG-D-14-2	14	2	15.81	16.46	53.3	48.2	45.2	34.8	52.7	44.8	36.5	27.5	43.5	34.2	25.9	-	34.5	27.1	-	-	3.3	7.1	11.0
AR-TG-D-15-0	15	0	15.81	16.46	50.6	41.2	34.3	27.5	44.9	33.5	26.7	19.9	37.6	26.4	18.5	-	32.1	21.7	-	-	3.4	7.2	11.0
AR-TG-D-15-1	15	1	16.31	16.96	52.7	47.1	43.8	31.0	52.5	44.1	35.1	25.3	43.9	33.4	24.3	-	34.7	26.5	-	-	3.4	7.4	11.3
AR-TG-D-15-2	15	2	16.81	17.46	52.7	47.1	43.8	31.0	52.5	44.1	35.1	25.3	43.9	33.4	24.3	-	34.7	26.5	-	-	3.5	7.5	11.6
AR-TG-D-16-0	16	0	16.81	17.46	50.4	40.3	33.0	25.8	44.7	32.6	25.4	18.2	37.3	25.6	18.5	-	31.9	20.8	-	-	3.6	7.6	11.7

Tower type E – ground plan 1.09 x 3.07 m

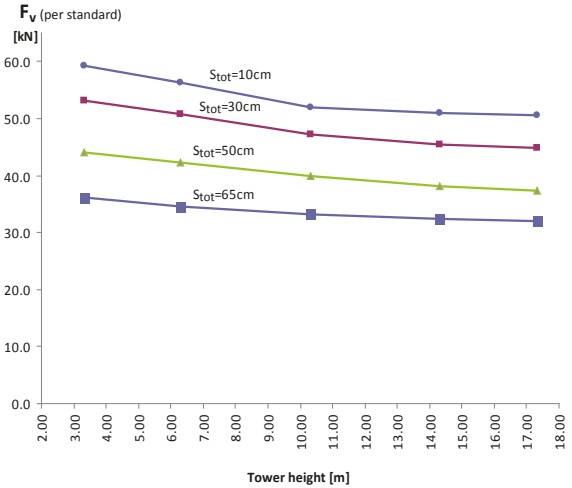
- Towers attached at top **without wind action** with one or two **50 cm frames at the top of the tower**



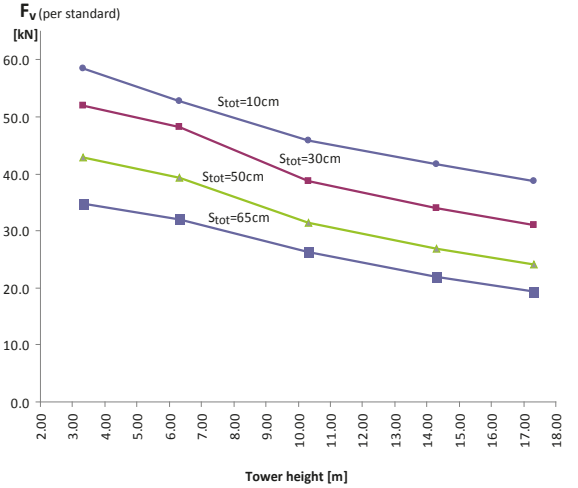
- Towers attached at top **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- Towers attached at top **without wind action** with **100 cm frame at the top of the tower**



- Towers attached at top **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**

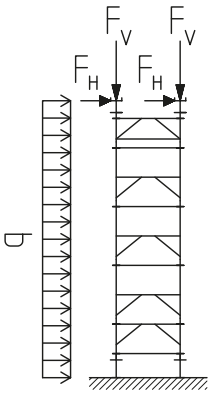


Maximum load per standard for the tower **laterally attached at the top**

Tower type E – ground plan 1.09 x 3.07 m																					Minimum superimposed load per standard against sliding of the base plates min. F_V [kN]		
perm. load capacity F_V per standard for class B1 [kN]																							
					s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm)				s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm)				s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm)				s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm)						
					Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure		
Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
AR-TG-E-00-1	0	1	1.31	1.96	60.3	59.9	59.7	59.5	60.6	59.4	58.6	57.9	47.3	45.6	44.5	42.9	37.9	36.2	33.4	31.6	0.5	1.2	1.8
AR-TG-E-00-2	0	2	1.81	2.46	60.3	59.9	59.7	59.5	60.6	59.4	58.6	57.9	47.3	45.6	44.5	42.9	37.9	36.2	33.4	31.6	0.7	1.6	2.4
AR-TG-E-01-0	1	0	1.81	2.46	59.2	58.5	57.5	57.3	53.1	52.0	51.4	50.7	44.0	42.8	42.1	41.4	36.2	34.9	32.7	31.9	0.6	1.4	2.1
AR-TG-E-01-1	1	1	2.31	2.96	60.3	59.9	59.7	59.5	60.5	59.4	58.6	57.8	47.3	45.6	44.5	42.9	37.9	36.2	33.4	31.6	0.8	1.7	2.6
AR-TG-E-01-2	1	2	2.81	3.46	60.3	59.9	59.7	59.5	60.5	59.4	58.6	57.8	47.3	45.6	44.5	42.9	37.9	36.2	33.4	31.6	0.9	2.0	3.1
AR-TG-E-02-0	2	0	2.81	3.46	59.2	58.5	57.5	57.3	53.1	52.0	51.4	50.7	44.0	42.8	42.1	41.4	36.2	34.9	32.7	31.9	0.9	1.9	2.9
AR-TG-E-02-1	2	1	3.31	3.96	59.7	59.1	58.7	58.4	58.7	57.1	56.1	55.1	46.4	44.3	43.0	41.1	37.3	35.1	32.1	30.0	1.0	2.2	3.3
AR-TG-E-02-2	2	2	3.81	4.46	59.7	59.1	58.7	58.4	58.7	57.1	56.1	55.1	46.4	44.3	43.0	41.1	37.3	35.1	32.1	30.0	1.1	2.4	3.8
AR-TG-E-03-0	3	0	3.81	4.46	58.2	56.6	55.2	54.4	52.3	50.7	49.2	47.7	43.4	41.6	40.0	38.4	35.7	33.9	31.3	29.7	1.1	2.4	3.7
AR-TG-E-03-1	3	1	4.31	4.96	59.1	58.3	57.8	57.3	56.8	54.8	53.6	52.3	45.5	43.1	41.6	39.2	36.6	34.1	30.9	28.4	1.2	2.6	4.1
AR-TG-E-03-2	3	2	4.81	5.46	59.1	58.3	57.8	57.3	56.8	54.8	53.6	52.3	45.5	43.1	41.6	39.2	36.6	34.1	30.9	28.4	1.3	2.9	4.5
AR-TG-E-04-0	4	0	4.81	5.46	57.3	54.7	53.0	51.5	51.5	49.4	47.1	44.7	42.9	40.4	38.0	35.5	35.2	32.9	30.0	27.6	1.4	2.9	4.4
AR-TG-E-04-1	4	1	5.31	5.96	58.5	57.5	56.8	56.2	54.9	52.5	51.1	49.5	44.7	41.9	40.1	37.4	36.0	33.0	29.6	26.9	1.5	3.1	4.8
AR-TG-E-04-2	4	2	5.81	6.46	58.5	57.5	56.8	56.2	54.9	52.5	51.1	49.5	44.7	41.9	40.1	37.4	36.0	33.0	29.6	26.9	1.6	3.4	5.2
AR-TG-E-05-0	5	0	5.81	6.46	56.4	52.8	50.7	48.6	50.7	48.1	44.9	41.7	42.3	39.3	35.9	32.6	34.6	32.0	28.7	25.5	1.6	3.4	5.2
AR-TG-E-05-1	5	1	6.31	6.96	58.0	56.6	55.7	54.9	54.5	51.6	49.7	47.1	44.3	41.1	38.9	35.7	35.6	32.3	28.6	25.5	1.7	3.6	5.6
AR-TG-E-05-2	5	2	6.81	7.46	58.0	56.6	55.7	54.9	54.5	51.6	49.7	47.1	44.3	41.1	38.9	35.7	35.6	32.3	28.6	25.5	1.8	3.9	6.0
AR-TG-E-06-0	6	0	6.81	7.46	55.3	51.1	48.4	45.6	49.8	45.8	42.1	38.4	41.7	37.3	33.5	29.7	34.2	30.5	26.7	23.0	1.9	3.9	5.9
AR-TG-E-06-1	6	1	7.31	7.96	57.4	55.7	54.6	53.6	54.1	50.7	48.2	44.8	44.0	40.3	37.7	34.0	35.3	31.5	27.5	24.2	1.9	4.1	6.3
AR-TG-E-06-2	6	2	7.81	8.46	57.4	55.7	54.6	53.6	54.1	50.7	48.2	44.8	44.0	40.3	37.7	34.0	35.3	31.5	27.5	24.2	2.0	4.3	6.7
AR-TG-E-07-0	7	0	7.81	8.46	54.2	49.3	46.1	42.5	49.0	43.5	39.3	35.2	41.1	35.3	31.1	26.9	33.9	29.1	24.7	20.5	2.1	4.4	6.7
AR-TG-E-07-1	7	1	8.31	8.96	56.9	54.8	53.5	52.3	53.7	49.9	46.8	42.5	43.6	39.5	36.5	32.3	34.9	30.8	26.5	22.9	2.2	4.6	7.0
AR-TG-E-07-2	7	2	8.81	9.46	56.9	54.8	53.5	52.3	53.7	49.9	46.8	42.5	43.6	39.5	36.5	32.3	34.9	30.8	26.5	22.9	2.2	4.8	7.4
AR-TG-E-08-0	8	0	8.81	9.46	53.1	47.6	43.8	39.5	48.1	41.1	36.5	31.9	40.4	33.3	28.7	24.0	33.5	27.7	22.7	18.0	2.3	4.9	7.4
AR-TG-E-08-1	8	1	9.31	9.96	56.3	53.9	52.5	50.8	53.3	49.0	45.4	40.2	43.3	38.7	35.3	30.6	34.6	30.1	25.5	21.6	2.4	5.1	7.8
AR-TG-E-08-2	8	2	9.81	10.46	56.3	53.9	52.5	50.8	53.3	49.0	45.4	40.2	43.3	38.7	35.3	30.6	34.6	30.1	25.5	21.6	2.5	5.3	8.2
AR-TG-E-09-0	9	0	9.81	10.46	52.0	45.8	41.5	36.5	47.3	38.8	33.7	28.7	39.8	31.3	26.3	21.2	33.1	26.2	20.7	15.5	2.6	5.4	8.2
AR-TG-E-09-1	9	1	10.31	10.96	55.8	53.0	51.3	48.3	53.2	48.3	43.8	38.1	43.2	38.1	33.9	28.8	34.4	29.5	24.3	18.0	2.6	5.6	8.5
AR-TG-E-09-2	9	2	10.81	11.46	55.8	53.0	51.3	48.3	53.2	48.3	43.8	38.1	43.2	38.1	33.9	28.8	34.4	29.5	24.3	18.0	2.7	5.8	8.9
AR-TG-E-10-0	10	0	10.81	11.46	51.7	44.8	39.8	34.3	46.8	37.6	32.0	26.6	39.4	30.2	22.8	19.2	32.9	25.2	19.3	12.8	2.8	5.9	8.9
AR-TG-E-10-1	10	1	11.31	11.96	55.4	52.1	50.2	46.0	53.2	47.6	42.2	36.1	43.1	37.5	32.6	27.0	34.3	28.9	23.1	14.5	2.9	6.1	9.3
AR-TG-E-10-2	10	2	11.81	12.46	55.4	52.1	50.2	46.0	53.2	47.6	42.2	36.1	43.1	37.5	32.6	27.0	34.3	28.9	23.1	14.5	2.9	6.3	9.6
AR-TG-E-11-0	11	0	11.81	12.46	51.4	43.7	38.1	32.2	46.4	36.4	30.4	24.5	39.0	29.1	19.4	17.2	32.8	24.1	17.8	-	3.0	6.4	9.7
AR-TG-E-11-1	11	1	12.31	12.96	54.9	51.2	49.0	43.8	53.1	46.9	40.7	34.0	43.0	36.8	31.2	25.1	34.2	28.3	22.0	10.9	3.1	6.6	10.0
AR-TG-E-11-2	11	2	12.81	13.46	54.9	51.2	49.0	43.8	53.1	46.9	40.7	34.0	43.0	36.8	31.2	25.1	34.2	28.3	22.0	10.9	3.2	6.8	10.4
AR-TG-E-12-0	12	0	12.81	13.46	51.2	42.7	36.5	30.1	45.9	35.2	28.7	22.4	38.6	28.0	16.0	15.1	32.6	23.1	16.4	-	3.3	6.9	10.4
AR-TG-E-12-1	12	1	13.31	13.96	54.5	50.4	47.9	41.3	53.0	46.2	39.1	31.9	42.9	36.2	29.9	23.3	34.1	27.8	20.8	-	3.3	7.0	10.8
AR-TG-E-12-2	12	2	13.81	14.46	54.5	50.4	47.9	41.3	53.0	46.2	39.1	31.9	42.9	36.2	29.9	23.3	34.1	27.8	20.8	-	3.4	7.3	11.1
AR-TG-E-13-0	13	0	13.81	14.46	50.9	41.7	34.8	27.9	45.5	34.0	27.1	20.3	38.2	26.9	12.6	-	32.5	22.0	15.0	-	3.5	7.3	11.2
AR-TG-E-13-1	13	1	14.31	14.96	54.0	49.3	46.4	36.2	52.9	45.4	37.8	29.8	43.2	35.5	28.3	-	34.3	27.4	-	-	3.6	7.5	11.5
AR-TG-E-13-2	13	2	14.81	15.46	54.0	49.3	46.4	36.2	52.9	45.4	37.8	29.8	43.2	35.5	28.3	-	34.3	27.4	-	-	3.6	7.7	11.9
AR-TG-E-14-0	14	0	14.81	15.46	50.8	40.7	33.3	26.1	45.3	33.0	25.7	18.3	37.9	25.9	13.7	-	32.3	21.1	-	-	3.7	7.8	11.9
AR-TG-E-14-1	14	1	15.31	15.96	53.5	48.2	45.0	30.3	52.8	44.3	36.5	27.8	43.5	34.8	26.8	-	34.4	27.0	-	-	3.8	8.0	12.3
AR-TG-E-14-2	14	2	15.81	16.46	53.5	48.2	45.0	30.3	52.8	44.3	36.5	27.8	43.5	34.8	26.8	-	34.4	27.0	-	-	3.8	8.2	12.6
AR-TG-E-15-0	15	0	15.81	16.46	50.6	39.7	31.9	24.2	45.0	32.0	24.2	16.4	37.7	25.0	14.8	-	32.1	20.2	-	-	4.0	8.3	12.7
AR-TG-E-15-1	15	1	16.31	16.96	53.0	47.1	43.6	24.4	52.7	43.5	35.0	26.1	43.8	34.1	25.2	-	34.6	26.6	-	-	4.0	8.5	13.0
AR-TG-E-15-2	15	2	16.81	17.46	53.0	47.1	43.6	24.4	52.7	43.5	35.0	26.1	43.8	34.1	25.2	-	34.6	26.6	-	-	4.1	8.7	13.4
AR-TG-E-16-0	16	0	16.81	17.46	50.5	38.7	30.5	22.0	44.8	31.0	22.8	13.8	37.4	24.0	16.0	-	32.0	19.3	-	-	4.2	8.8	13.4

Free-standing towers

For free-standing Shoring Towers TG 60, the parameters of ground plan, tower height, spindle travel, dynamic wind pressure and horizontal load are varied. The H-loads (per standard) are applied at the level of the head jack plate and act additionally to the horizontal dummy load $F_V/100$. The H-loads specified in the tables are thus "dummy load-free" additional H-loads.



The permissible loads per standard are specified in each case. Non-specified intermediate values can be calculated by linear interpolation (e.g. for q=0.6 kN/m² or s_{tot} = 40 cm).

To make the towers safe from tilting or sliding, a minimum superimposed load is necessary in most cases. The minimum superimposed load (per standard) to prevent tilting is specified, independently of the spindle travel, in the last columns of the table. The sliding prevention verification must be performed additionally "by hand".

Ballasting at the foot of the tower can be counted towards the minimum superimposed load. The following must be noted here:

- The load capacity is reduced by the applied ballast, i.e. per standard by a quarter of the ballast ($F_{v,\,red} = F_v - G_{Ballast} / 4$)
- The wind loads on the ballast must be taken into account
- Hinged pins (or screws/bolts) must be installed

For **tilting prevention verification**, the wind loads on the ballast, where applicable, must be converted to an equivalent, tilt-relevant load at the head jack level. This is done with the following formula:

$$H_k = W_B * (h_B/h_K)$$

H_k – tilt-relevant H-load at level of head jack
W_B – wind load on the ballast at the base of the tower
h_B – level of wind result
h_B – level of head jack plate

The load H_k must be taken into account additionally to the loads acting on the head jacks and distributed over all 4 jacks.

For **sliding prevention verification**, the following condition must be met:

$$F_d < R_d$$
$$(W + H) * 1.5 < 0.9 * N * \mu / 1.3 \quad (1)$$

W – wind load acting on the tower (incl. any ballast)
H – other H-loads acting on the tower
(incl. dummy load V/100)
N – load acting vertically to the sliding level
μ – friction coefficient 0.3 for steel on concrete
0.4 for wood on wood
0.5 for wood on steel
0.8 for wood on concrete

The load acting vertically to the sliding level is made up of the dead weight G of the towers and the sum of the vertical loads F_v (incl. any ballast). From the inequation (1) the result is with μ = 0.3 for the necessary minimum superimposed load the following equation:

$$F_{v,\,min} = 7.22 * (W+H) - G \text{ (per tower)}$$

The dead weight of the towers is given in the material requirements tables (Section 2).

The wind loads are made up of the wind load on the tower and of any ballast present. The effective surface of the tower exposed to the wind can be assumed as follows:

	Type A	Type B	Type C	Type D	Type E
Base incl. spindles	0.64 m²	0.82 m²	0.99 m²	1.17 m²	1.35 m²
Tower section H = 100 cm	0.48 m²	0.49 m²	0.56 m²	0.64 m²	0.73 m²
Tower section H = 50 cm	0.32 m²	0.36 m²	0.45 m²	0.54 m²	0.62 m²

The base includes the 71 cm initial frame, the head jacks and base plates, and the horizontal diagonal braces of the tower.
The wind load resulting is then:

$$W = q * 1.3 * A_{tot} \text{ (q – dynamic wind pressure)}$$

Example 1: Conversion of wind load on the ballast for tilting prevention verification

Tower AR-LG-B-04-1, ballast = 1 ton, dynamic pressure q = 0.80 kN/m², spindle extension: s_{tot} = 30 cm (s_F = 18 cm, s_K = 12 cm)

The ballast is provided in the form of concrete slabs, i.e. the resultant ballast is about 100/100/40 cm in length/width/height. The surface subject to wind flow is thus about 0.40 m². The ballast rests on steel decks suspended from the top AR ledgers of the initial frame.

Wind load onto the ballast: $W_B = 0.80 * 1.3 * 0.40 = 0.42$ kN

Level of wind result: $h_B \sim 0.18 + 0.71 + 0.40/2 = 1.10$ m

Level of head jack: $h_K = 5.61$ m (material requirements table)

Equivalent wind load at level of head jack plate:

$H_{K, tot} = 0.42 * 1.10/5.61 = 0.08$ kN (total)

or $H_K = 0.082/4 =$ <u>0.02 kN/standard</u>

This equivalent H-load must be additionally taken into account at the head jacks.

Example 2: Sliding prevention verification

Tower AR-TG-B-04-1 without additional ballast with dynamic wind pressure q = 0.5 kN/m², H-load of 0.15 kN/standard and baseplates on concrete.

Area of tower exposed to wind:

$A = 0.82\ m^2 + 4 * 0.49\ m^2 + 1 * 0.36\ m^2 = 3.14\ m^2$

→ $W = 0.5\ kN/m^2 * 1.3 * 3.14\ m^2 = 2.04$ kN

Other H-load:

$H = 4 * 0.15$ kN = 0.60 kN (total per tower)

Dead weight of tower:

G = 4.3 kN (corresponds to 429 kg, see material requirements table)

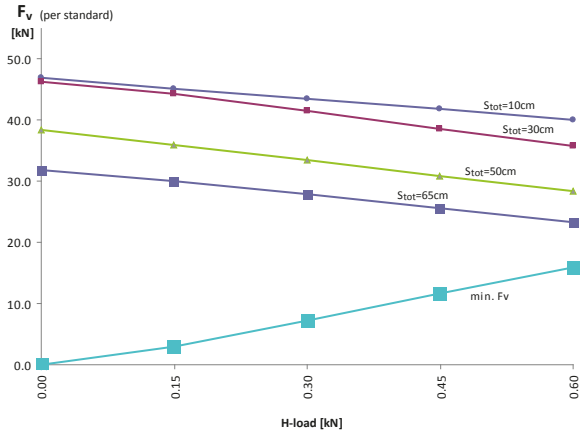
Calculation of required minimum superimposed load against sliding:

$F_{v, min} = 7.22 * (2.04 + 0.60) - 4.3 = 14.8$ kN (per tower)

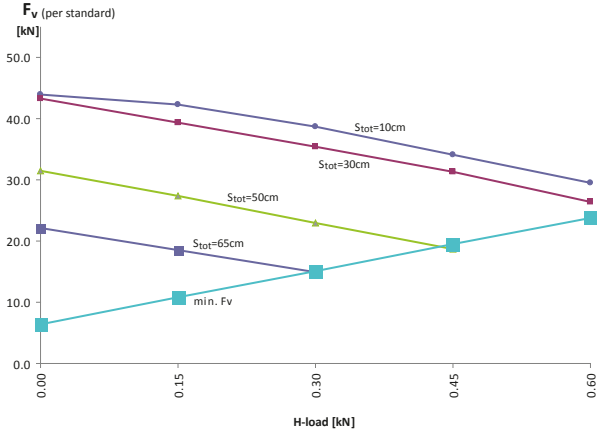
or $F_{v, min} = 14.8$ kN/4 = <u>3.7 kN/standard</u>

Tower type A – ground plan 1.09 x 1.09 m

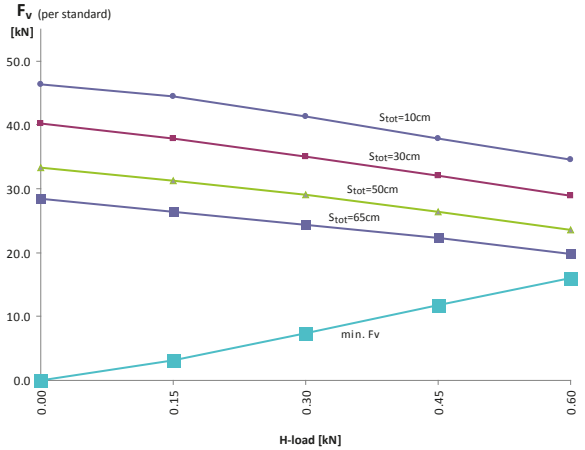
- free-standing towers **without wind action** with one or two **50 cm frames at the top of the tower**



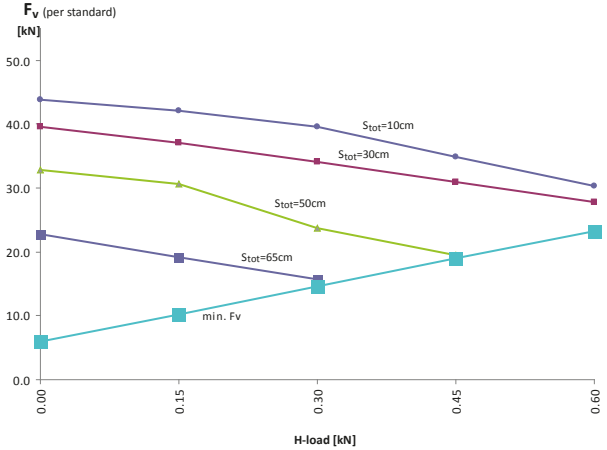
- free-standing towers **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- free-standing towers **without wind action** with one **100 cm frame at the top of the tower**



- free-standing towers **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**



Maximum load per standard for the **free-standing** tower

H-load per standard [kN]	Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type A – ground plan 1.09 x 1.09 m: perm. load capacity F_V per standard for class B1 [kN]														Minimum superimposed load per standard against tilting of the tower min. F_V [kN]			
						s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm)				s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm)				s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm)				s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm)							
						Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure			
						q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.00 kN	AR-TG-A-00-1	0	1	1.31	1.96	54.6	53.9	52.0	48.4	48.1	47.3	46.9	45.5	39.0	38.4	38.0	31.1	32.1	31.9	26.2	22.4	0.0	0.2	0.5	0.9
	AR-TG-A-00-2	0	2	1.81	2.46	54.6	53.9	52.0	48.4	48.1	47.3	46.9	45.5	39.0	38.4	38.0	31.1	32.1	31.9	26.2	22.4	0.0	0.4	1.0	1.6
	AR-TG-A-01-0	1	0	1.81	2.46	46.8	46.2	45.9	45.5	40.7	40.2	39.9	39.6	33.7	33.3	32.9	32.3	28.7	28.3	27.1	23.7	0.0	0.4	0.9	1.4
	AR-TG-A-01-1	1	1	2.31	2.96	54.6	53.9	52.0	48.4	48.1	47.3	46.9	45.5	39.0	38.4	38.0	31.1	32.1	31.9	26.2	22.4	0.0	0.8	1.5	2.3
	AR-TG-A-01-2	1	2	2.81	3.46	54.6	53.9	52.0	48.4	48.1	47.3	46.9	45.5	39.0	38.4	38.0	31.1	32.1	31.9	26.2	22.4	0.0	1.2	2.4	3.6
	AR-TG-A-02-0	2	0	2.81	3.46	46.8	46.2	45.9	45.5	40.7	40.2	39.9	39.6	33.7	33.3	32.9	32.3	28.7	28.3	27.1	23.7	0.0	1.1	2.1	3.1
	AR-TG-A-02-1	2	1	3.31	3.96	52.1	50.6	48.0	42.9	47.5	46.0	42.8	38.9*	38.8	36.1	32.9*	25.2*	32.0	28.6	22.3*	-	0.0	1.7	3.2	4.6
	AR-TG-A-02-2	2	2	3.81	4.46	52.1	50.6	48.0	42.9	47.5	46.0	42.8	38.9*	38.8	36.1	32.9*	25.2*	32.0	28.6	22.3*	-	0.0	2.5	4.5	6.5
	AR-TG-A-03-0	3	0	3.81	4.46	46.6	45.4	44.3	41.5	40.5	40.0	39.4	35.6*	33.6	33.1	29.9*	26.6*	28.6	26.5	23.3*	-	0.0	2.2	4.0	5.8
	AR-TG-A-03-1	3	1	4.31	4.96	49.5	47.3	43.9	37.3	46.9	44.7	38.8	32.3*	38.6	33.8	27.7*	19.4*	31.9	25.4	18.5*	-	0.0	3.1	5.5	8.0
	AR-TG-A-03-2	3	2	4.81	5.46	49.5	47.3	43.9	37.3	46.9	44.7	38.8	32.3*	38.6	33.8	27.7*	19.4*	31.9	25.4	18.5*	-	0.0	4.2	7.3	10.5
	AR-TG-A-04-0	4	0	4.81	5.46	46.5	44.7	42.7	37.5	40.4	39.8	38.9	31.6*	33.5	33.0	26.9*	20.9*	28.5	24.6	19.5*	-	0.0	3.8	6.7	9.5
	AR-TG-A-04-1	4	1	5.31	5.96	47.0	44.1	39.8	31.8	46.4	43.4	34.8	25.7*	38.4	31.5	22.6*	13.5*	31.8	22.1	14.6*	-	0.0	5.0	8.7	12.5
	AR-TG-A-04-2	4	2	5.81	6.46	47.0	44.1	39.8	31.8	46.4	43.4	34.8	25.7*	38.4	31.5	22.6*	-	31.8	22.1	14.6*	-	0.0	6.5	11.2	15.9
	AR-TG-A-05-0	5	0	5.81	6.46	46.3	43.9	41.1	33.6	40.2	39.6	38.4	27.7*	33.4	32.9	23.9*	15.3*	28.4	22.8	15.7*	-	0.0	5.9	10.3	14.6
F_H = 0.15 kN	AR-TG-A-00-1	0	1	1.31	1.96	53.7	51.1	47.5	43.9	45.3	44.5	44.0	39.4	36.5	35.9	31.5	27.7	30.4	30.0	22.8	19.0	0.6	1.2	1.5	1.9
	AR-TG-A-00-2	0	2	1.81	2.46	53.7	51.1	47.5	43.9	45.3	44.5	44.0	39.4	36.5	35.9	31.5	27.7	30.4	30.0	22.8	19.0	0.8	1.7	2.3	2.9
	AR-TG-A-01-0	1	0	1.81	2.46	44.9	44.3	43.8	43.2	38.4	37.8	37.3	36.8	31.5	31.1	30.8	28.9	26.6	26.3	23.7	20.2	0.9	1.7	2.2	2.7
	AR-TG-A-01-1	1	1	2.31	2.96	53.7	51.1	47.5	43.9	45.3	44.5	44.0	39.4	36.5	35.9	31.5	27.7	30.4	30.0	22.8	19.0	1.0	2.3	3.1	3.9
	AR-TG-A-01-2	1	2	2.81	3.46	53.7	51.1	47.5	43.9	45.3	44.5	44.0	39.4	36.5	35.9	31.5	27.7	30.4	30.0	22.8	19.0	1.2	3.2	4.3	5.5
	AR-TG-A-02-0	2	0	2.81	3.46	44.9	44.3	43.8	43.2	38.4	37.8	37.3	36.8	31.5	31.1	30.8	28.9	26.6	26.3*	23.7*	20.2	1.3	3.0	4.0	5.0
	AR-TG-A-02-1	2	1	3.31	3.96	50.9	48.2	43.4	38.3*	44.9	42.8	39.6*	33.1*	36.3	33.0*	27.1*	-	30.3	26.2*	18.8*	-	1.5	4.0	5.4	6.9
	AR-TG-A-02-2	2	2	3.81	4.46	50.9	48.2	43.4	38.3*	44.9	42.8	39.6*	33.1*	36.3	33.0*	27.1*	-	30.3	26.2*	18.8*	-	1.7	5.1	7.1	9.1
	AR-TG-A-03-0	3	0	3.81	4.46	44.7	43.6	41.4	38.4*	38.2	37.6	35.5*	32.1*	31.4	31.0*	27.1*	23.0*	26.5	23.9*	19.8*	-	1.8	4.8	6.6	8.4
	AR-TG-A-03-1	3	1	4.31	4.96	48.0	45.3	39.3	32.8*	44.6	41.1	35.2*	26.9*	36.1	30.2*	22.7*	-	30.2	22.4*	14.9*	-	2.1	6.1	8.5	11.0
	AR-TG-A-03-2	3	2	4.81	5.46	48.0	45.3	39.3	32.8*	44.6	41.1	35.2*	26.9*	36.1	30.2*	22.7*	-	30.2	22.4*	14.9*	-	2.3	7.6	10.7	13.9
	AR-TG-A-04-0	4	0	4.81	5.46	44.6	42.9	38.9	33.7*	38.1	37.3	33.8*	27.4*	31.3	30.8*	23.3*	17.0*	26.5	21.6*	15.9*	-	2.4	7.2	10.1	13.0
	AR-TG-A-04-1	4	1	5.31	5.96	45.2	42.4	35.3	27.3*	44.3	39.4	30.8*	20.7*	35.9	27.4*	18.3*	-	30.1	18.6*	-	-	2.7	8.9	12.6	16.3
	AR-TG-A-04-2	4	2	5.81	6.46	45.2	42.4	35.3	27.3*	44.3	39.4	30.8*	20.7*	35.9	27.4*	18.3*	-	30.1	18.6*	-	-	3.0	10.8	15.5	20.2
	AR-TG-A-05-0	5	0	5.81	6.46	44.4	42.1	36.5	29.0*	37.9	37.1	32.0*	22.7*	31.2	30.7*	19.5*	-	26.4	19.2*	-	-	3.1	10.3	14.6	18.9
F_H = 0.30 kN	AR-TG-A-00-1	0	1	1.31	1.96	51.9	46.6	43.0	39.4	42.4	41.6	40.3	35.5	34.0	33.4	28.1	24.1	28.2	23.1	19.3	15.5	1.6	2.2	2.5	2.8
	AR-TG-A-00-2	0	2	1.81	2.46	51.9	46.6	43.0	39.4	42.4	41.6	40.3	35.5	34.0	33.4	28.1	24.1	28.2	23.1	19.3	15.5	2.1	3.0	3.6	4.2
	AR-TG-A-01-0	1	0	1.81	2.46	42.2	41.1	40.4	39.7	35.7	34.8	34.2	33.7	29.4	28.8	28.4	25.5	24.6	24.2	20.2	17.9	2.1	3.0	3.4	3.9
	AR-TG-A-01-1	1	1	2.31	2.96	51.9	46.6	43.0	39.4	42.4	41.6	40.3	35.5	34.0	33.4	28.1	24.1	28.2	23.1	19.3	15.5	2.6	3.9	4.7	5.5
	AR-TG-A-01-2	1	2	2.81	3.46	51.9	46.6	43.0	39.4	42.4	41.6	40.3	35.5	34.0	33.4	28.1	24.1	28.2	23.1	19.3	15.5	3.1	5.1	6.2	7.4
	AR-TG-A-02-0	2	0	2.81	3.46	42.2	41.1	40.4	39.7	35.7	34.8	34.2	33.7	29.4	28.8	28.4	25.5	24.6	24.2	20.2	17.9	3.2	4.9	5.9	7.0
	AR-TG-A-02-1	2	1	3.31	3.96	49.1	44.0	38.9*	33.8*	42.1	39.6	35.5*	28.9*	33.8	29.9*	23.4*	-	28.1	20.4*	-	-	3.8	6.2	7.7	9.2
	AR-TG-A-02-2	2	2	3.81	4.46	49.1	44.0	38.9*	33.8*	42.1	39.6	35.5*	28.9*	33.8	29.9*	23.4*	-	28.1	20.4*	-	-	4.3	7.7	9.7	11.7
	AR-TG-A-03-0	3	0	3.81	4.46	41.9	40.5	37.6*	34.6*	35.5	34.5*	32.0*	28.4*	29.2	27.2*	24.0*	-	24.5	21.4*	-	-	4.4	7.4	9.2	11.0
	AR-TG-A-03-1	3	1	4.31	4.96	46.3	41.3	34.8*	28.2*	41.8	37.5	30.8*	22.3*	33.6	26.4*	18.7*	-	28.0	17.7*	-	-	5.1	9.1	11.5	14.0
	AR-TG-A-03-2	3	2	4.81	5.46	46.3	41.3	34.8*	28.2*	41.8	37.5	30.8*	22.3*	33.6	26.4*	18.7*	-	28.0	17.7*	-	-	5.7	11.0	14.2	17.3
	AR-TG-A-04-0	4	0	4.81	5.46	41.6	40.0	34.8*	29.5*	35.3	34.3*	29.8*	23.0*	29.1	25.5*	19.6*	-	24.4	18.5*	-	-	5.8	10.6	13.5	16.4
	AR-TG-A-04-1	4	1	5.31	5.96	43.5	38.7	30.7*	22.6*	41.5	35.4	26.1*	-	33.4	23.0*	-	-	27.9	15.0*	-	-	6.5	12.7	16.5	20.2
	AR-TG-A-04-2	4	2	5.81	6.46	43.5	38.7	30.7*	-	41.5	35.4	26.1*	-	33.4	23.0*	-	-	27.9	-	-	-	7.3	15.1	19.8	24.5
	AR-TG-A-05-0	5	0	5.81	6.46	41.3	39.5	32.0*	24.5*	35.1	34.1*	27.6*	-	29.0	23.8*	-	-	24.3	15.7*	-	-	7.4	14.6	18.9	23.3

*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

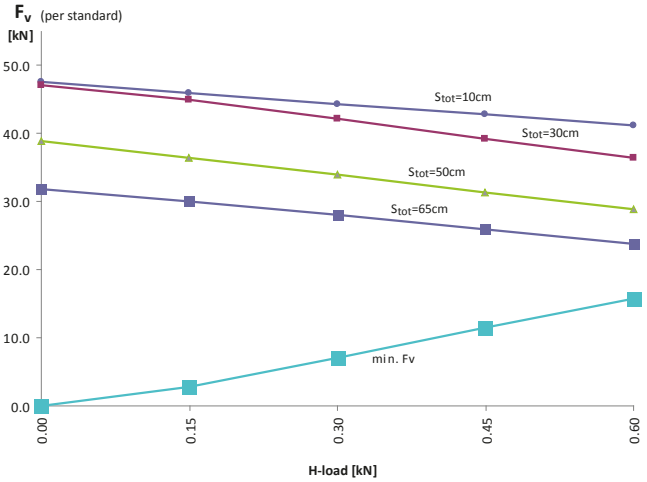
Maximum load per standard for the **free-standing** tower

H-load per standard [kN]	Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type A – ground plan 1.09 x 1.09 m; perm. load capacity F_V per standard for class B1 [kN]; s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	Minimum superimposed load per standard against tilting of the tower min. F_V [kN]; Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.45 kN	AR-TG-A-00-1	0	1	1.31	1.96	48.1	42.1	38.4	34.8	39.5	38.7	35.9	31.5	31.5	30.8	24.4	19.8	26.0	19.6	15.8*	11.9*	2.6	3.2	3.5	3.8
	AR-TG-A-00-2	0	2	1.81	2.46	48.1	42.1	38.4	34.8	39.5	38.7	35.9	31.5	31.5	30.8	24.4	19.8	26.0	19.6	15.8*	11.9*	3.3	4.3	4.9	5.4
	AR-TG-A-01-0	1	0	1.81	2.46	38.7	37.6	36.9	36.3	32.6	31.7	31.1	30.5	26.8	26.1	25.6	21.3	22.5	22.0	16.7*	13.2*	3.4	4.2	4.7	5.2
	AR-TG-A-01-1	1	1	2.31	2.96	48.1	42.1	38.4	34.8	39.5	38.7	35.9	31.5	31.5	30.8	24.4	19.8	26.0	19.6	15.8*	11.9*	4.2	5.5	6.3	7.1
	AR-TG-A-01-2	1	2	2.81	3.46	48.1	42.1	38.4	34.8	39.5	38.7	35.9	31.5	31.5	30.8	24.4	19.8	26.0	19.6	15.8*	11.9*	5.0	7.0	8.1	9.3
	AR-TG-A-02-0	2	0	2.81	3.46	38.7	37.6	36.9	36.3	32.6	31.7	31.1	30.5	26.8	26.1	25.6	21.3	22.5	22.0	16.7*	13.2*	5.1	6.8	7.9	8.9
	AR-TG-A-02-1	2	1	3.31	3.96	46.0	39.4*	34.3*	29.1*	39.2	36.3*	31.0*	-	31.3	26.8*	-	-	25.9*	-	-	-	6.0	8.5	9.9	11.4
	AR-TG-A-02-2	2	2	3.81	4.46	46.0	39.4*	34.3*	29.1*	39.2	36.3*	31.0*	-	31.3	26.8*	-	-	25.9*	-	-	-	7.0	10.3	12.3	14.3
	AR-TG-A-03-0	3	0	3.81	4.46	38.5	36.7*	33.8*	30.7*	32.4	31.4*	28.2*	-	26.7	23.9*	-	-	22.5*	18.7*	-	-	7.1	10.1	11.9	13.7
	AR-TG-A-03-1	3	1	4.31	4.96	43.9	36.8*	30.3*	23.3*	38.9	33.8*	26.0*	-	31.1	22.7*	-	-	25.7*	-	-	-	8.1	12.1	14.5	17.0
	AR-TG-A-03-2	3	2	4.81	5.46	43.9	36.8*	30.3*	23.3*	38.9	33.8*	26.0*	-	31.1	22.7*	-	-	25.7*	-	-	-	9.1	14.4	17.6	20.8
	AR-TG-A-04-0	4	0	4.81	5.46	38.2	35.8*	30.6*	25.1*	32.2	31.2*	25.4*	-	26.6	21.7*	-	-	22.4*	15.4*	-	-	9.2	14.0	16.9	19.8
	AR-TG-A-04-1	4	1	5.31	5.96	41.8	34.2*	26.2*	-	38.6	31.4*	21.1*	-	30.9	18.7*	-	-	25.6*	-	-	-	10.4	16.6	20.3	24.1
	AR-TG-A-04-2	4	2	5.81	6.46	41.8	34.2*	26.2*	-	38.6	31.4*	-	-	30.9	-	-	-	25.6*	-	-	-	11.6	19.5	24.2	28.9
	AR-TG-A-05-0	5	0	5.81	6.46	38.0	35.0*	27.4*	-	32.0	31.0*	-	-	26.4*	19.5*	-	-	22.3*	-	-	-	11.7	19.0	23.3	27.6
F_H = 0.60 kN	AR-TG-A-00-1	0	1	1.31	1.96	43.5	37.5	33.9	30.3	36.6	35.1	31.6	27.6	28.9	28.2	20.2	15.6*	23.7	16.1*	12.3*	-	3.6	4.2	4.5	4.8
	AR-TG-A-00-2	0	2	1.81	2.46	43.5	37.5	33.9	30.3	36.6	35.1	31.6	27.6	28.9	28.2	20.2	15.6*	23.7	16.1*	12.3*	-	4.6	5.6	6.1	6.7
	AR-TG-A-01-0	1	0	1.81	2.46	35.3	34.1	33.4	32.7	29.4	28.5	27.9	27.3	24.0	23.2	22.8	17.1*	20.1	19.5	13.2*	8.8*	4.7	5.5	6.0	6.5
	AR-TG-A-01-1	1	1	2.31	2.96	43.5	37.5	33.9	30.3	36.6	35.1	31.6	27.6	28.9	28.2	20.2	15.6*	23.7	16.1*	12.3*	-	5.8	7.1	7.9	8.7
	AR-TG-A-01-2	1	2	2.81	3.46	43.5	37.5	33.9	30.3	36.6	35.1	31.6	27.6	28.9	28.2	20.2	15.6*	23.7	16.1*	12.3*	-	7.0	8.9	10.1	11.2
	AR-TG-A-02-0	2	0	2.81	3.46	35.3	34.1	33.4	32.7	29.4	28.5	27.9	27.3	24.0	23.2	22.8	17.1*	20.1	19.5	13.2*	-	7.0	8.7	9.8	10.8
	AR-TG-A-02-1	2	1	3.31	3.96	42.4	34.9*	29.7*	-	36.3	32.2*	26.5*	-	28.7*	23.7*	-	-	23.6*	-	-	-	8.3	10.7	12.2	13.7
	AR-TG-A-02-2	2	2	3.81	4.46	42.4	34.9*	29.7*	-	36.3	32.2*	26.5*	-	28.7*	23.7*	-	-	23.6*	-	-	-	9.6	12.9	14.9	17.0
	AR-TG-A-03-0	3	0	3.81	4.46	35.0	32.9*	29.8*	-	29.2	28.2*	24.4*	-	23.9*	20.6*	-	-	20.0*	-	-	-	9.7	12.7	14.5	16.3
	AR-TG-A-03-1	3	1	4.31	4.96	41.2	32.2*	25.5*	-	36.0	29.3*	21.4*	-	28.5*	19.1*	-	-	23.4*	-	-	-	11.1	15.1	17.6	20.0
	AR-TG-A-03-2	3	2	4.81	5.46	41.2	32.2*	25.5*	-	36.0	29.3*	21.4*	-	28.5*	19.1*	-	-	23.4*	-	-	-	12.6	17.8	21.0	24.2
	AR-TG-A-04-0	4	0	4.81	5.46	34.8	31.6*	26.3*	-	29.1	28.0*	21.0*	-	23.8*	17.9*	-	-	19.9*	-	-	-	12.7	17.5	20.3	23.2
	AR-TG-A-04-1	4	1	5.31	5.96	40.1	29.6*	-	-	35.8	26.4*	-	-	28.3*	-	-	-	23.3*	-	-	-	14.3	20.5	24.2	27.9
	AR-TG-A-04-2	4	2	5.81	6.46	40.1	29.6*	-	-	35.8	26.4*	-	-	28.3*	-	-	-	23.3*	-	-	-	16.0	23.8	28.5	33.2
	AR-TG-A-05-0	5	0	5.81	6.46	34.5	30.4*	-	-	28.9*	27.8*	-	-	23.6*	-	-	-	19.9*	-	-	-	16.1	23.3	27.6	31.9

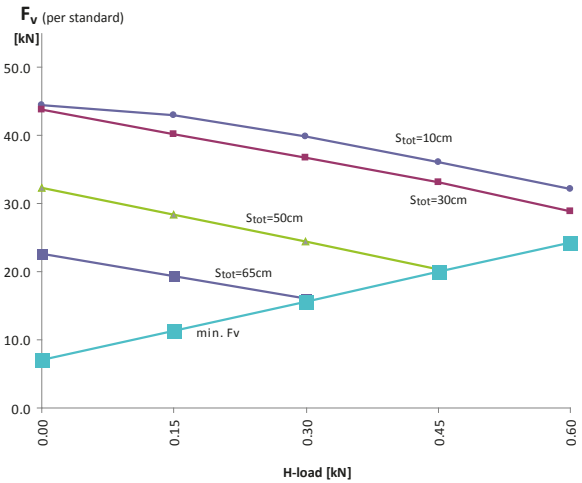
*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

Tower type B – ground plan 1.09 x 1.57 m

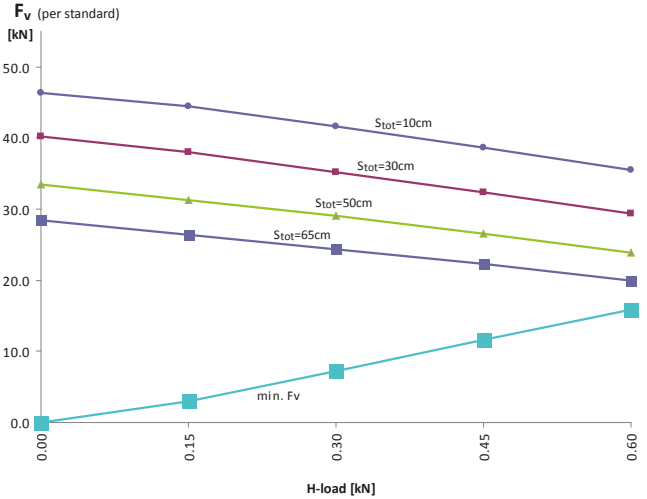
- free-standing towers **without wind action** with one or two **50 cm frames at the top of the tower**



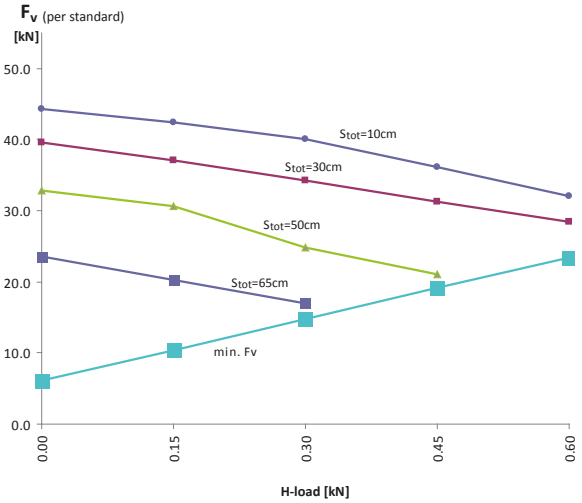
- free-standing towers **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- free-standing towers **without wind action** with one **100 cm frame at the top of the tower**



- free-standing towers **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**



Maximum load per standard for the **free-standing** tower

H-load per standard [kN]	Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type B – ground plan 1.09 x 1.57 m; perm. load capacity F_V per standard for class B1 [kN]; s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	Minimum superimposed load per standard against tilting of the tower min. F_V [kN]; Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.00 kN	AR-TG-B-00-1	0	1	1.31	1.96	55.1	54.3	52.8	49.8	48.5	47.8	47.3	46.0	39.3	38.8	38.4	32.2	32.0	31.8	26.7	22.9	0.0	0.3	0.7	1.1
	AR-TG-B-00-2	0	2	1.81	2.46	55.1	54.3	52.8	49.8	48.5	47.8	47.3	46.0	39.3	38.8	38.4	32.2	32.0	31.8	26.7	22.9	0.0	0.6	1.3	2.0
	AR-TG-B-01-0	1	0	1.81	2.46	46.9	46.2	45.8	45.3	40.8	40.2	39.8	39.4	33.8	33.2	32.9	32.3	28.7	28.2	27.3	24.3	0.0	0.5	1.0	1.6
	AR-TG-B-01-1	1	1	2.31	2.96	55.1	54.3	52.8	49.8	48.5	47.8	47.3	46.0	39.3	38.8	38.4	32.2	32.0	31.8	26.7	22.9	0.0	0.9	1.8	2.7
	AR-TG-B-01-2	1	2	2.81	3.46	55.1	54.3	52.8	49.8	48.5	47.8	47.3	46.0	39.3	38.8	38.4	32.2	32.0	31.8	26.7	22.9	0.0	1.5	2.8	4.2
	AR-TG-B-02-0	2	0	2.81	3.46	46.9	46.2	45.8	45.3	40.8	40.2	39.8	39.4	33.8	33.2	32.9	32.3	28.7	28.2	27.3	24.3	0.0	1.2	2.3	3.4
	AR-TG-B-02-1	2	1	3.31	3.96	52.6	51.1	48.8	44.4	48.1	46.4	43.5	39.7*	39.1	36.6	33.4*	26.2*	31.9	28.8	22.7*	-	0.0	1.9	3.5	5.2
	AR-TG-B-02-2	2	2	3.81	4.46	52.6	51.1	48.8	44.4	48.1	46.4	43.5	39.7*	39.1	36.6	33.4*	26.2*	31.9	28.8	22.7*	-	0.0	2.8	5.0	7.3
	AR-TG-B-03-0	3	0	3.81	4.46	46.7	45.5	44.5	42.0	40.6	40.0	39.4	36.1*	33.7	33.1	30.2*	27.0*	28.6	26.7	23.6*	-	0.0	2.3	4.2	6.1
	AR-TG-B-03-1	3	1	4.31	4.96	50.1	47.8	44.8	39.0	47.6	45.1	39.6	33.5*	39.0	34.4	28.3*	20.3*	31.8	25.7	18.8*	-	0.0	3.3	6.0	8.6
	AR-TG-B-03-2	3	2	4.81	5.46	50.1	47.8	44.8	39.0	47.6	45.1	39.6	33.5*	39.0	34.4	28.3*	20.3*	31.8	25.7	18.8*	-	0.0	4.6	8.1	11.6
	AR-TG-B-04-0	4	0	4.81	5.46	46.6	44.9	43.2	38.7	40.5	39.8	38.9	32.7*	33.5	33.0	27.5*	21.7*	28.5	25.1	19.9*	-	0.0	3.9	6.9	10.0
	AR-TG-B-04-1	4	1	5.31	5.96	47.6	44.6	40.8	33.5	47.1	43.8	35.8	27.2*	38.8	32.3	23.3*	14.3*	31.8	22.7	14.8*	-	0.0	5.3	9.3	13.3
	AR-TG-B-04-2	4	2	5.81	6.46	47.6	44.6	40.8	33.5	47.1	43.8	35.8	27.2*	38.8	32.3	23.3*	-	31.8	22.7	14.8*	-	0.0	7.0	12.1	17.2
	AR-TG-B-05-0	5	0	5.81	6.46	46.4	44.2	41.9	35.4	40.3	39.6	38.5	29.4*	33.4	32.8	24.9*	16.5*	28.4	23.6	16.3*	-	0.0	6.1	10.6	15.1
F_H = 0.15 kN	AR-TG-B-00-1	0	1	1.31	1.96	54.3	52.1	49.2	45.9	45.7	45.0	44.5	40.9	36.9	36.3	32.9	29.2	30.4	30.0	23.6	19.7	0.6	1.3	1.7	2.1
	AR-TG-B-00-2	0	2	1.81	2.46	54.3	52.1	49.2	45.9	45.7	45.0	44.5	40.9	36.9	36.3	32.9	29.2	30.4	30.0	23.6	19.7	0.7	1.9	2.6	3.2
	AR-TG-B-01-0	1	0	1.81	2.46	45.0	44.3	43.7	43.1	38.5	37.8	37.3	36.7	31.6	31.1	30.7	29.2	26.7	26.2	24.1	21.2	0.8	1.7	2.3	2.9
	AR-TG-B-01-1	1	1	2.31	2.96	54.3	52.1	49.2	45.9	45.7	45.0	44.5	40.9	36.9	36.3	32.9	29.2	30.4	30.0	23.6	19.7	1.0	2.5	3.4	4.3
	AR-TG-B-01-2	1	2	2.81	3.46	54.3	52.1	49.2	45.9	45.7	45.0	44.5	40.9	36.9	36.3	32.9	29.2	30.4	30.0	23.6	19.7	1.1	3.4	4.7	6.1
	AR-TG-B-02-0	2	0	2.81	3.46	45.0	44.3	43.7	43.1	38.5	37.8	37.3	36.7	31.6	31.1	30.7	29.2	26.7	26.2	24.1	21.2	1.2	3.1	4.2	5.3
	AR-TG-B-02-1	2	1	3.31	3.96	51.5	49.0	45.1	40.5*	45.5	43.4	40.4*	34.8*	36.7	33.7*	28.4*	-	30.3	26.4*	-	-	1.4	4.1	5.8	7.4
	AR-TG-B-02-2	2	2	3.81	4.46	51.5	49.0	45.1	40.5*	45.5	43.4	40.4*	34.8*	36.7	33.7*	28.4*	-	30.3	26.4*	-	-	1.6	5.4	7.6	9.9
	AR-TG-B-03-0	3	0	3.81	4.46	44.8	43.7	41.8	39.2*	38.3	37.6	35.9*	32.8*	31.5	30.9*	27.5*	23.6*	26.6	24.2*	20.4*	-	1.7	4.9	6.8	8.8
	AR-TG-B-03-1	3	1	4.31	4.96	48.7	46.0	40.9	35.1*	45.2	41.8	36.3*	28.8*	36.6	31.0*	23.8*	-	30.2	22.9*	-	-	1.9	6.3	9.0	11.6
	AR-TG-B-03-2	3	2	4.81	5.46	48.7	46.0	40.9	35.1*	45.2	41.8	36.3*	28.8*	36.6	31.0*	23.8*	-	30.2	22.9*	-	-	2.2	8.0	11.5	15.0
	AR-TG-B-04-0	4	0	4.81	5.46	44.7	43.1	39.9	35.3*	38.1	37.3	34.5*	28.8*	31.4	30.8*	24.2*	18.1*	26.5	22.2*	16.6*	-	2.3	7.3	10.4	13.4
	AR-TG-B-04-1	4	1	5.31	5.96	46.0	43.0	36.8	29.6*	45.0	40.3	32.3*	22.7*	36.4	28.4*	19.3*	-	30.1	19.4*	-	-	2.5	9.2	13.2	17.2
	AR-TG-B-04-2	4	2	5.81	6.46	46.0	43.0	36.8	29.6*	45.0	40.3	32.3*	22.7*	36.4	28.4*	19.3*	-	30.1	19.4*	-	-	2.8	11.3	16.4	21.6
	AR-TG-B-05-0	5	0	5.81	6.46	44.5	42.5	38.0	31.4*	38.0	37.1	33.0*	24.9*	31.2	30.6*	20.9*	-	26.4	20.2*	-	-	2.9	10.4	14.9	19.4
F_H = 0.30 kN	AR-TG-B-00-1	0	1	1.31	1.96	52.4	48.1	45.2	42.0	42.9	42.1	41.0	37.2	34.4	33.8	29.7	25.8	28.3	24.3	20.5	16.4	1.6	2.3	2.7	3.1
	AR-TG-B-00-2	0	2	1.81	2.46	52.4	48.1	45.2	42.0	42.9	42.1	41.0	37.2	34.4	33.8	29.7	25.8	28.3	24.3	20.5	16.4	2.0	3.1	3.8	4.5
	AR-TG-B-01-0	1	0	1.81	2.46	42.5	41.4	40.7	40.0	35.8	34.9	34.4	33.8	29.4	28.8	28.4	26.0	24.6	24.2	21.0	18.9	2.1	3.0	3.6	4.1
	AR-TG-B-01-1	1	1	2.31	2.96	52.4	48.1	45.2	42.0	42.9	42.1	41.0	37.2	34.4	33.8	29.7	25.8	28.3	24.3	20.5	16.4	2.6	4.1	5.0	5.9
	AR-TG-B-01-2	1	2	2.81	3.46	52.4	48.1	45.2	42.0	42.9	42.1	41.0	37.2	34.4	33.8	29.7	25.8	28.3	24.3	20.5	16.4	3.0	5.3	6.6	8.0
	AR-TG-B-02-0	2	0	2.81	3.46	42.5	41.4	40.7	40.0	35.8	34.9	34.4	33.8	29.4	28.8	28.4	26.0	24.6	24.2	21.0	18.9	3.2	5.0	6.1	7.2
	AR-TG-B-02-1	2	1	3.31	3.96	49.7	45.4	41.1*	36.5*	42.6	40.3	36.7*	30.9*	34.2	30.7*	24.9*	-	28.2	21.6*	-	-	3.7	6.4	8.0	9.7
	AR-TG-B-02-2	2	2	3.81	4.46	49.7	45.4	41.1*	36.5*	42.6	40.3	36.7*	30.9*	34.2	30.7*	24.9*	-	28.2	21.6*	-	-	4.2	8.0	10.3	12.5
	AR-TG-B-03-0	3	0	3.81	4.46	42.2	40.9	38.5*	35.8*	35.6	34.7*	32.6*	29.3*	29.3	27.5*	24.6*	-	24.5	21.7*	-	-	4.4	7.5	9.5	11.4
	AR-TG-B-03-1	3	1	4.31	4.96	47.0	42.6	37.0*	30.9*	42.4	38.5	32.4*	24.6*	34.1	27.5*	20.2*	-	28.1	18.8*	-	-	4.9	9.4	12.0	14.6
	AR-TG-B-03-2	3	2	4.81	5.46	47.0	42.6	37.0*	30.9*	42.4	38.5	32.4*	24.6*	34.1	27.5*	20.2*	-	28.1	18.8*	-	-	5.6	11.4	14.9	18.4
	AR-TG-B-04-0	4	0	4.81	5.46	41.9	40.5	36.3*	31.7*	35.5	34.5*	30.9*	24.8*	29.2	26.2*	20.8*	-	24.4	19.3*	-	-	5.7	10.7	13.8	16.8
	AR-TG-B-04-1	4	1	5.31	5.96	44.4	39.9	32.9*	25.4*	42.1	36.7	28.1*	-	33.9	24.4*	-	-	28.0	16.0*	-	-	6.4	13.1	17.0	21.0
	AR-TG-B-04-2	4	2	5.81	6.46	44.4	39.9	32.9*	-	42.1	36.7	28.1*	-	33.9	24.4*	-	-	28.0	16.0*	-	-	7.1	15.7	20.8	25.9
	AR-TG-B-05-0	5	0	5.81	6.46	41.7	40.0	34.1*	27.5*	35.3	34.2*	29.2*	-	29.0	24.9*	-	-	24.3	16.9*	-	-	7.3	14.8	19.3	23.8

*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

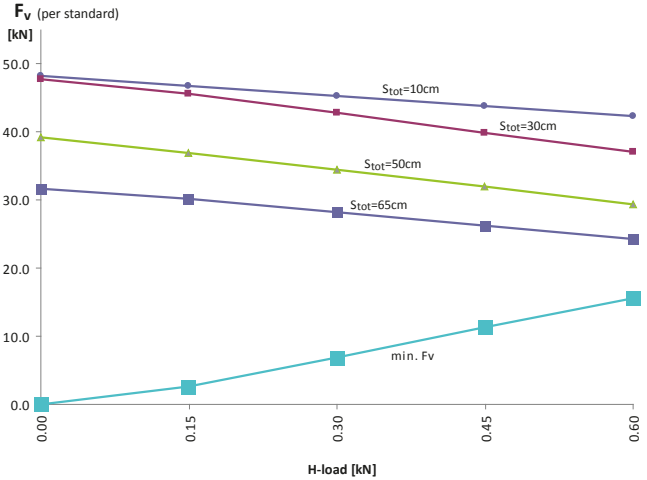
Maximum load per standard for the **free-standing** tower

H-load per standard [kN]	Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type B – ground plan 1.09 x 1.57 m; perm. load capacity F_V per standard for class B1 [kN]; s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	Minimum superimposed load per standard against tilting of the tower min. F_V [kN]; Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.45 kN	AR-TG-B-00-1	0	1	1.31	1.96	48.7	43.9	41.0	38.0	40.0	39.2	37.0	33.6	31.9	31.3	26.3	21.9	26.2	21.2	17.3	13.1	2.6	3.2	3.7	4.1
	AR-TG-B-00-2	0	2	1.81	2.46	48.7	43.9	41.0	38.0	40.0	39.2	37.0	33.6	31.9	31.3	26.3	21.9	26.2	21.2	17.3	13.1	3.3	4.4	5.1	5.8
	AR-TG-B-01-0	1	0	1.81	2.46	39.4	38.3	37.6	36.9	33.0	32.0	31.4	30.9	27.0	26.2	25.7	22.3	22.6	22.0	17.9	14.6	3.4	4.3	4.9	5.4
	AR-TG-B-01-1	1	1	2.31	2.96	48.7	43.9	41.0	38.0	40.0	39.2	37.0	33.6	31.9	31.3	26.3	21.9	26.2	21.2	17.3	13.1	4.1	5.7	6.6	7.5
	AR-TG-B-01-2	1	2	2.81	3.46	48.7	43.9	41.0	38.0	40.0	39.2	37.0	33.6	31.9	31.3	26.3	21.9	26.2	21.2	17.3	13.1	5.0	7.2	8.5	9.9
	AR-TG-B-02-0	2	0	2.81	3.46	39.4	38.3	37.6	36.9	33.0	32.0	31.4	30.9	27.0	26.2	25.7	22.3	22.6	22.0	17.9	14.6	5.1	6.9	8.0	9.1
	AR-TG-B-02-1	2	1	3.31	3.96	46.7	41.3*	37.0*	32.2*	39.8	37.2*	32.5*	-	31.7	27.6*	-	-	26.1*	-	-	-	5.9	8.7	10.3	11.9
	AR-TG-B-02-2	2	2	3.81	4.46	46.7	41.3*	37.0*	32.2*	39.8	37.2*	32.5*	-	31.7	27.6*	-	-	26.1*	-	-	-	6.9	10.6	12.9	15.2
	AR-TG-B-03-0	3	0	3.81	4.46	39.2	37.6*	35.1*	32.2*	32.8	31.8*	29.2*	-	26.8*	24.5*	-	-	22.5*	19.2*	-	-	7.0	10.2	12.1	14.0
	AR-TG-B-03-1	3	1	4.31	4.96	44.8	38.7*	33.0*	26.4*	39.5	35.2*	28.0*	-	31.6	24.0*	-	-	26.0*	-	-	-	8.0	12.4	15.0	17.7
	AR-TG-B-03-2	3	2	4.81	5.46	44.8	38.7*	33.0*	26.4*	39.5	35.2*	28.0*	-	31.6	24.0*	-	-	26.0*	-	-	-	9.0	14.8	18.3	21.8
	AR-TG-B-04-0	4	0	4.81	5.46	38.9	36.8*	32.7*	27.5*	32.6	31.6*	27.0*	-	26.7*	22.8*	-	-	22.4*	16.4*	-	-	9.1	14.2	17.2	20.2
	AR-TG-B-04-1	4	1	5.31	5.96	42.8	36.1*	28.9*	-	39.3	33.2*	23.6*	-	31.4	20.4*	-	-	25.9*	-	-	-	10.3	16.9	20.9	24.9
	AR-TG-B-04-2	4	2	5.81	6.46	42.8	36.1*	28.9*	-	39.3	33.2*	-	-	31.4	20.4*	-	-	25.9*	-	-	-	11.5	20.0	25.1	30.2
	AR-TG-B-05-0	5	0	5.81	6.46	38.7	36.1*	30.2*	-	32.4	31.3*	24.8*	-	26.6*	21.1*	-	-	22.3*	-	-	-	11.6	19.1	23.6	28.1
F_H = 0.60 kN	AR-TG-B-00-1	0	1	1.31	1.96	44.5	39.7	36.8	33.6	37.2	35.8	33.0	29.9	29.3	28.7	22.5	17.9*	24.1	17.9*	13.8*	-	3.5	4.2	4.7	5.1
	AR-TG-B-00-2	0	2	1.81	2.46	44.5	39.7	36.8	33.6	37.2	35.8	33.0	29.9	29.3	28.7	22.5	17.9*	24.1	17.9*	13.8*	-	4.6	5.7	6.4	7.1
	AR-TG-B-01-0	1	0	1.81	2.46	36.3	35.1	34.4	33.7	30.0	29.0	28.4	27.9	24.3	23.5	23.0	18.6*	20.2	19.6	14.7*	10.4*	4.7	5.6	6.1	6.7
	AR-TG-B-01-1	1	1	2.31	2.96	44.5	39.7	36.8	33.6	37.2	35.8	33.0	29.9	29.3	28.7	22.5	17.9*	24.1	17.9*	13.8*	-	5.7	7.2	8.2	9.1
	AR-TG-B-01-2	1	2	2.81	3.46	44.5	39.7	36.8	33.6	37.2	35.8	33.0	29.9	29.3	28.7	22.5	17.9*	24.1	17.9*	13.8*	-	6.9	9.1	10.5	11.8
	AR-TG-B-02-0	2	0	2.81	3.46	36.3	35.1	34.4	33.7	30.0	29.0	28.4	27.9	24.3	23.5	23.0	18.6*	20.2	19.6	14.7*	-	7.0	8.8	9.9	11.1
	AR-TG-B-02-1	2	1	3.31	3.96	43.4	37.2*	32.8*	-	36.9	33.5*	28.4*	-	29.2*	24.7*	-	-	24.0*	-	-	-	8.2	10.9	12.5	14.2
	AR-TG-B-02-2	2	2	3.81	4.46	43.4	37.2*	32.8*	-	36.9	33.5*	28.4*	-	29.2*	24.7*	-	-	24.0*	-	-	-	9.5	13.2	15.5	17.8
	AR-TG-B-03-0	3	0	3.81	4.46	36.0	34.1*	31.6*	-	29.8*	28.8*	25.8*	-	24.2*	21.4*	-	-	20.1*	-	-	-	9.6	12.8	14.7	16.6
	AR-TG-B-03-1	3	1	4.31	4.96	42.3	34.7*	28.7*	-	36.7	31.2*	23.8*	-	29.0*	20.6*	-	-	23.9*	-	-	-	11.0	15.4	18.0	20.7
	AR-TG-B-03-2	3	2	4.81	5.46	42.3	34.7*	28.7*	-	36.7	31.2*	23.8*	-	29.0*	20.6*	-	-	23.9*	-	-	-	12.4	18.3	21.8	25.3
	AR-TG-B-04-0	4	0	4.81	5.46	35.8	33.1*	28.8*	-	29.6*	28.6*	23.1*	-	24.0*	19.4*	-	-	20.1*	-	-	-	12.6	17.6	20.6	23.6
	AR-TG-B-04-1	4	1	5.31	5.96	41.2	32.2*	-	-	36.4	28.9*	-	-	28.9*	-	-	-	23.8*	-	-	-	14.1	20.8	24.8	28.8
	AR-TG-B-04-2	4	2	5.81	6.46	41.2	32.2*	-	-	36.4	28.9*	-	-	28.9*	-	-	-	23.8*	-	-	-	15.8	24.3	29.5	34.6
	AR-TG-B-05-0	5	0	5.81	6.46	35.5	32.1*	-	-	29.4*	28.4*	-	-	23.9*	-	-	-	20.0*	-	-	-	15.9	23.4	27.9	32.4

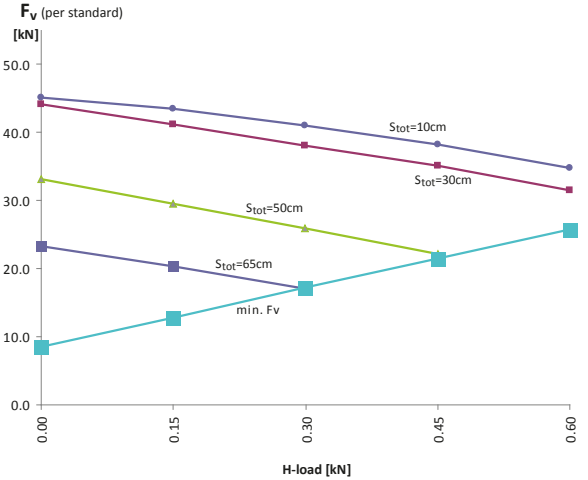
*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

Tower type C – ground plan 1.09 x 2.07 m

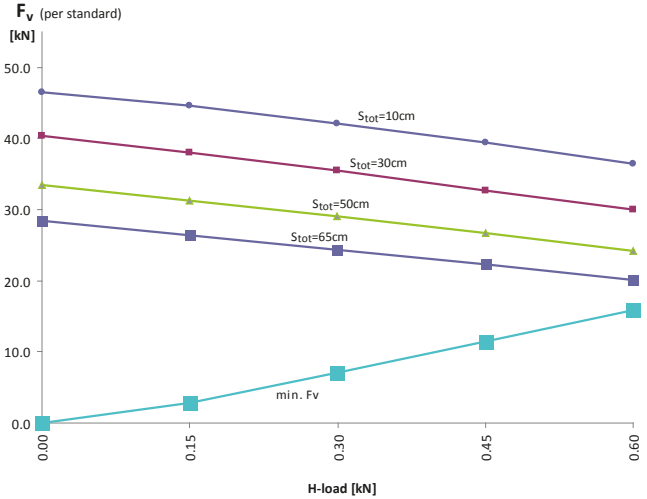
- free-standing towers **without wind action** with one or two **50 cm frames at the top of the tower**



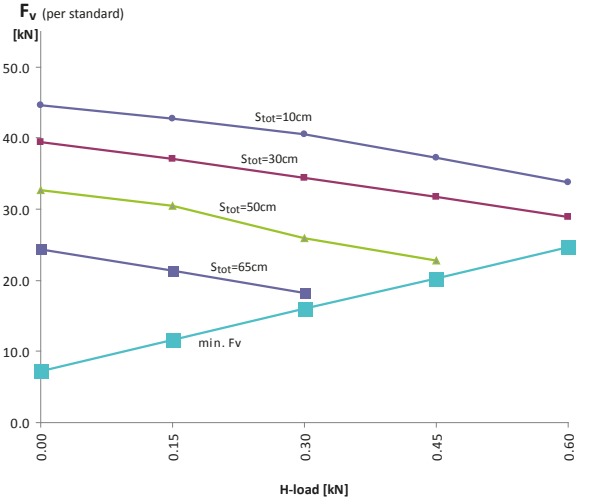
- free-standing towers **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- free-standing towers **without wind action** with one **100 cm frame at the top of the tower**



- free-standing towers **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**



Maximum load per standard for the **free-standing** tower

						Tower type C – ground plan 1.09 x 2.07 m																Minimum superimposed load per standard against tilting of the tower min. F_V [kN]			
						perm. load capacity F_V per standard for class B1 [kN]																			
						s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm)				s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm)				s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm)				s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm)							
						Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure			
H-load per standard [kN]	Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.00 kN	AR-TG-C-00-1	0	1	1.31	1.96	55.6	54.8	53.6	51.3	49.0	48.3	47.8	46.5	39.6	39.1	38.8	33.5	31.9	31.7	27.2	23.3	0.0	0.4	0.9	1.4
	AR-TG-C-00-2	0	2	1.81	2.46	55.6	54.8	53.6	51.3	49.0	48.3	47.8	46.5	39.6	39.1	38.8	33.5	31.9	31.7	27.2	23.3	0.0	0.8	1.6	2.4
	AR-TG-C-01-0	1	0	1.81	2.46	47.0	46.2	45.7	45.1	40.9	40.1	39.7	39.2	33.8	33.2	32.8	32.3	28.7	28.2	27.4	25.0	0.0	0.6	1.2	1.9
	AR-TG-C-01-1	1	1	2.31	2.96	55.6	54.8	53.6	51.3	49.0	48.3	47.8	46.5	39.6	39.1	38.8	33.5	31.9	31.7	27.2	23.3	0.0	1.1	2.2	3.3
	AR-TG-C-01-2	1	2	2.81	3.46	55.6	54.8	53.6	51.3	49.0	48.3	47.8	46.5	39.6	39.1	38.8	33.5	31.9	31.7	27.2	23.3	0.0	1.8	3.5	5.1
	AR-TG-C-02-0	2	0	2.81	3.46	47.0	46.2	45.7	45.1	40.9	40.1	39.7	39.2	33.8	33.2	32.8	32.3	28.7	28.2	27.4	25.0	0.0	1.5	2.8	4.1
	AR-TG-C-02-1	2	1	3.31	3.96	53.2	51.6	49.7	46.0	48.6	46.9	44.1	40.6*	39.5	37.1	33.9*	27.3*	31.8	28.9	23.2*	-	0.0	2.3	4.3	6.3
	AR-TG-C-02-2	2	2	3.81	4.46	53.2	51.6	49.7	46.0	48.6	46.9	44.1	40.6*	39.5	37.1	33.9*	27.3*	31.8	28.9	23.2*	-	0.0	3.4	6.1	8.9
	AR-TG-C-03-0	3	0	3.81	4.46	46.8	45.7	44.7	42.5	40.7	39.9	39.3	36.6*	33.7	33.1	30.5*	27.4*	28.6	26.9	23.9*	-	0.0	2.8	5.1	7.3
	AR-TG-C-03-1	3	1	4.31	4.96	50.8	48.3	45.7	40.7	48.2	45.5	40.5	34.7*	39.4	35.1	29.0*	21.2*	31.8	26.1	19.1*	-	0.0	4.1	7.2	10.4
	AR-TG-C-03-2	3	2	4.81	5.46	50.8	48.3	45.7	40.7	48.2	45.5	40.5	34.7*	39.4	35.1	29.0*	21.2*	31.8	26.1	19.1*	-	0.0	5.6	9.8	14.0
	AR-TG-C-04-0	4	0	4.81	5.46	46.7	45.1	43.7	39.9	40.5	39.7	38.9	33.9*	33.6	32.9	28.2*	22.6*	28.6	25.6	20.4*	-	0.0	4.7	8.3	11.8
	AR-TG-C-04-1	4	1	5.31	5.96	48.3	45.1	41.8	35.3	47.8	44.2	36.8	28.8*	39.3	33.1	24.1*	-	31.7	23.4	15.1*	-	0.0	6.4	11.2	16.0
	AR-TG-C-04-2	4	2	5.81	6.46	48.3	45.1	41.8	35.3	47.8	44.2	36.8	28.8*	39.3	33.1	24.1*	-	31.7	23.4	15.1*	-	0.0	8.5	14.6	20.7
	AR-TG-C-05-0	5	0	5.81	6.46	46.5	44.6	42.6	37.3	40.4	39.5	38.6	31.2*	33.5	32.8	25.9*	-	28.5	24.3	16.9*	-	0.0	7.3	12.6	17.9
F_H = 0.15 kN	AR-TG-C-00-1	0	1	1.31	1.96	54.9	53.1	51.0	48.1	46.2	45.5	45.0	42.4	37.3	36.7	34.3	30.9	30.3	30.0	24.5	20.4	0.5	1.4	1.9	2.4
	AR-TG-C-00-2	0	2	1.81	2.46	54.9	53.1	51.0	48.1	46.2	45.5	45.0	42.4	37.3	36.7	34.3	30.9	30.3	30.0	24.5	20.4	0.6	2.0	2.9	3.7
	AR-TG-C-01-0	1	0	1.81	2.46	45.1	44.3	43.7	43.0	38.6	37.8	37.2	36.7	31.6	31.0	30.6	29.4	26.7	26.2	24.7	22.3	0.8	1.9	2.5	3.2
	AR-TG-C-01-1	1	1	2.31	2.96	54.9	53.1	51.0	48.1	46.2	45.5	45.0	42.4	37.3	36.7	34.3	30.9	30.3	30.0	24.5	20.4	0.9	2.7	3.8	4.9
	AR-TG-C-01-2	1	2	2.81	3.46	54.9	53.1	51.0	48.1	46.2	45.5	45.0	42.4	37.3	36.7	34.3	30.9	30.3	30.0	24.5	20.4	1.0	3.8	5.4	7.0
	AR-TG-C-02-0	2	0	2.81	3.46	45.1	44.3	43.7	43.0	38.6	37.8	37.2	36.7	31.6	31.0	30.6	29.4	26.7	26.2	24.7	22.3	1.2	3.4	4.7	6.0
	AR-TG-C-02-1	2	1	3.31	3.96	52.2	49.9	46.8	42.7*	46.0	44.0	41.3*	36.5*	37.2	34.3*	29.7*	-	30.3	26.7*	-	-	1.3	4.6	6.6	8.5
	AR-TG-C-02-2	2	2	3.81	4.46	52.2	49.9	46.8	42.7*	46.0	44.0	41.3*	36.5*	37.2	34.3*	29.7*	-	30.3	26.7*	-	-	1.5	6.0	8.8	11.5
	AR-TG-C-03-0	3	0	3.81	4.46	44.9	43.8	42.3	40.0*	38.4	37.6	36.2*	33.5*	31.5	30.9*	27.9*	24.4*	26.6	24.5*	21.0*	-	1.6	5.4	7.7	9.9
	AR-TG-C-03-1	3	1	4.31	4.96	49.5	46.8	42.6	37.4*	45.8	42.6	37.5*	30.7*	37.0	31.9*	25.1*	-	30.2	23.5*	-	-	1.8	7.1	10.2	13.4
	AR-TG-C-03-2	3	2	4.81	5.46	49.5	46.8	42.6	37.4*	45.8	42.6	37.5*	30.7*	37.0	31.9*	25.1*	-	30.2	23.5*	-	-	2.0	9.0	13.2	17.4
	AR-TG-C-04-0	4	0	4.81	5.46	44.7	43.3	41.0	37.0*	38.2	37.3	35.2*	30.4*	31.4	30.7*	25.1*	19.3*	26.5	22.9*	17.3*	-	2.2	8.1	11.7	15.3
	AR-TG-C-04-1	4	1	5.31	5.96	46.8	43.6	38.4	32.0*	45.6	41.1	33.8*	24.8*	36.9	29.5*	20.5*	-	30.1	20.3*	-	-	2.4	10.3	15.1	19.8
	AR-TG-C-04-2	4	2	5.81	6.46	46.8	43.6	38.4	32.0*	45.6	41.1	33.8*	-	36.9	29.5*	20.5*	-	30.1	20.3*	-	-	2.6	12.8	19.0	25.1
	AR-TG-C-05-0	5	0	5.81	6.46	44.6	42.8	39.6	33.9*	38.0	37.1	34.2*	27.2*	31.3	30.6*	22.3*	-	26.4	21.3*	-	-	2.8	11.6	16.9	22.2
F_H = 0.30 kN	AR-TG-C-00-1	0	1	1.31	1.96	53.0	49.7	47.6	44.8	43.4	42.6	41.7	39.1	34.8	34.2	31.4	27.7	28.4	25.7	21.7	17.5	1.5	2.3	2.9	3.4
	AR-TG-C-00-2	0	2	1.81	2.46	53.0	49.7	47.6	44.8	43.4	42.6	41.7	39.1	34.8	34.2	31.4	27.7	28.4	25.7	21.7	17.5	1.9	3.3	4.2	5.0
	AR-TG-C-01-0	1	0	1.81	2.46	42.8	41.7	41.0	40.3	36.0	35.1	34.5	34.0	29.5	28.8	28.3	26.6	24.7	24.1	21.9	19.9	2.0	3.1	3.8	4.5
	AR-TG-C-01-1	1	1	2.31	2.96	53.0	49.7	47.6	44.8	43.4	42.6	41.7	39.1	34.8	34.2	31.4	27.7	28.4	25.7	21.7	17.5	2.5	4.3	5.4	6.5
	AR-TG-C-01-2	1	2	2.81	3.46	53.0	49.7	47.6	44.8	43.4	42.6	41.7	39.1	34.8	34.2	31.4	27.7	28.4	25.7	21.7	17.5	2.9	5.7	7.3	8.9
	AR-TG-C-02-0	2	0	2.81	3.46	42.8	41.7	41.0	40.3	36.0	35.1	34.5	34.0	29.5	28.8	28.3	26.6	24.7	24.1	21.9	19.9	3.1	5.3	6.6	7.9
	AR-TG-C-02-1	2	1	3.31	3.96	50.4	46.9	43.4*	39.3*	43.2	41.1	37.8*	33.0*	34.7	31.4*	26.5*	-	28.4	22.8*	-	-	3.6	6.8	8.8	10.8
	AR-TG-C-02-2	2	2	3.81	4.46	50.4	46.9	43.4*	39.3*	43.2	41.1	37.8*	33.0*	34.7	31.4*	26.5*	-	28.4	22.8*	-	-	4.1	8.7	11.4	14.1
	AR-TG-C-03-0	3	0	3.81	4.46	42.5	41.3	39.5*	37.1*	35.8	34.9*	33.3*	30.3*	29.3	27.9*	25.1*	-	24.6	22.2*	-	-	4.3	8.0	10.3	12.6
	AR-TG-C-03-1	3	1	4.31	4.96	47.8	44.0	39.3*	33.8*	43.0	39.6	34.0*	26.9*	34.6	28.7*	21.7*	-	28.3	20.0*	-	-	4.8	10.1	13.2	16.4
	AR-TG-C-03-2	3	2	4.81	5.46	47.8	44.0	39.3*	33.8*	43.0	39.6	34.0*	26.9*	34.6	28.7*	21.7*	-	28.3	20.0*	-	-	5.4	12.4	16.6	20.8
	AR-TG-C-04-0	4	0	4.81	5.46	42.3	40.9	37.9*	33.8*	35.6	34.6*	32.0*	26.6*	29.2	26.9*	21.9*	-	24.5	20.2*	-	-	5.6	11.5	15.1	18.7
	AR-TG-C-04-1	4	1	5.31	5.96	45.3	41.1	35.1*	28.3*	42.8	38.1	30.1*	-	34.5	25.9*	-	-	28.2	17.1*	-	-	6.2	14.2	18.9	23.7
	AR-TG-C-04-2	4	2	5.81	6.46	45.3	41.1	35.1*	-	42.8	38.1	30.1*	-	34.5	25.9*	-	-	28.2	-	-	-	7.0	17.2	23.3	29.4
	AR-TG-C-05-0	5	0	5.81	6.46	42.1	40.5	36.4*	30.6*	35.4	34.4*	30.8*	-	29.1	26.0*	-	-	24.4	18.2*	-	-	7.1	16.0	21.3	26.6

*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

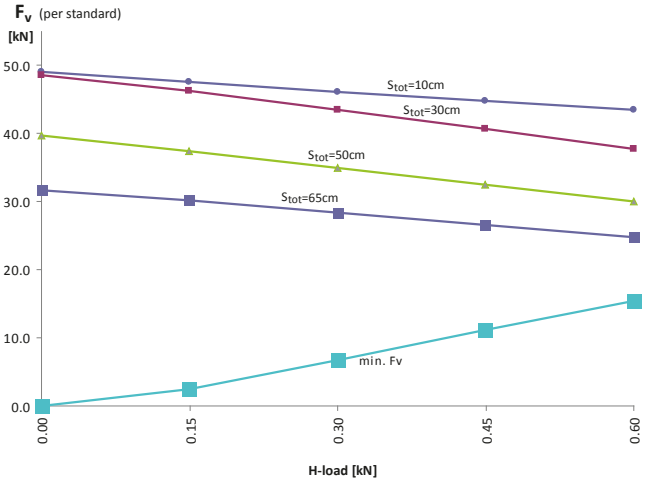
Maximum load per standard for the **free-standing** tower

						Tower type C – ground plan 1.09 x 2.07 m perm. load capacity F_V per standard for class B1 [kN]														Minimum superimposed load per standard against tilting of the tower min. F_V [kN]			
						s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm)				s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm)				s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm)				s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm)							
						Dynamic wind pressure				**Dynamic wind pressure**				**Dynamic wind pressure**				**Dynamic wind pressure**				**Dynamic wind pressure**			
H-load per standard [kN]	**Type**	**Number of 100 cm frames**	**Number of 50 cm frames**	**H_{min} [m]**	**H_{max} [m]**	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.45 kN	AR-TG-C-00-1	0	1	1.31	1.96	49.4	45.8	43.7	41.3	40.6	39.8	38.1	35.7	32.4	31.7	28.3	24.1	26.5	23.0	18.8	14.3	2.5	3.3	3.8	4.4
	AR-TG-C-00-2	0	2	1.81	2.46	49.4	45.8	43.7	41.3	40.6	39.8	38.1	35.7	32.4	31.7	28.3	24.1	26.5	23.0	18.8	14.3	3.2	4.6	5.4	6.3
	AR-TG-C-01-0	1	0	1.81	2.46	40.1	39.0	38.3	37.6	33.3	32.4	31.8	31.2	27.1	26.3	25.8	23.4	22.6	22.0	19.1	16.0	3.3	4.4	5.1	5.8
	AR-TG-C-01-1	1	1	2.31	2.96	49.4	45.8	43.7	41.3	40.6	39.8	38.1	35.7	32.4	31.7	28.3	24.1	26.5	23.0	18.8	14.3	4.1	5.9	7.0	8.1
	AR-TG-C-01-2	1	2	2.81	3.46	49.4	45.8	43.7	41.3	40.6	39.8	38.1	35.7	32.4	31.7	28.3	24.1	26.5	23.0	18.8	14.3	4.9	7.6	9.2	10.8
	AR-TG-C-02-0	2	0	2.81	3.46	40.1	39.0	38.3	37.6	33.3	32.4	31.8	31.2	27.1	26.3	25.8	23.4	22.6	22.0	19.1	16.0	5.0	7.2	8.5	9.8
	AR-TG-C-02-1	2	1	3.31	3.96	47.6	43.3*	39.7*	35.4*	40.4	38.2*	34.1*	-	32.2	28.6*	-	-	26.4*	-	-	-	5.8	9.1	11.1	13.0
	AR-TG-C-02-2	2	2	3.81	4.46	47.6	43.3*	39.7*	35.4*	40.4	38.2*	34.1*	-	32.2	28.6*	-	-	26.4*	-	-	-	6.7	11.3	14.0	16.7
	AR-TG-C-03-0	3	0	3.81	4.46	39.9	38.4*	36.6*	33.8*	33.1	32.1*	30.2*	-	27.0*	25.1*	-	-	22.5*	19.7*	-	-	6.9	10.7	12.9	15.2
	AR-TG-C-03-1	3	1	4.31	4.96	45.7	40.7*	35.7*	29.5*	40.2	36.6*	30.2*	-	32.1	25.4*	-	-	26.3*	-	-	-	7.8	13.1	16.3	19.4
	AR-TG-C-03-2	3	2	4.81	5.46	45.7	40.7*	35.7*	29.5*	40.2	36.6*	30.2*	-	32.1	25.4*	-	-	26.3*	-	-	-	8.9	15.9	20.1	24.3
	AR-TG-C-04-0	4	0	4.81	5.46	39.6	37.8*	34.8*	30.0*	32.9	31.9*	28.7*	-	26.8*	23.9*	-	-	22.4*	17.3*	-	-	9.0	15.0	18.5	22.1
	AR-TG-C-04-1	4	1	5.31	5.96	43.8	38.2*	31.8*	-	40.0	35.1*	26.2*	-	32.0	22.2*	-	-	26.3*	-	-	-	10.1	18.0	22.8	27.6
	AR-TG-C-04-2	4	2	5.81	6.46	43.8	38.2*	31.8*	-	40.0	35.1*	-	-	32.0	22.2*	-	-	26.3*	-	-	-	11.3	21.5	27.6	33.8
	AR-TG-C-05-0	5	0	5.81	6.46	39.4	37.3*	33.1*	-	32.7	31.7*	27.1*	-	26.7*	22.7*	-	-	22.3*	-	-	-	11.5	20.3	25.6	30.9
F_H = 0.60 kN	AR-TG-C-00-1	0	1	1.31	1.96	45.5	41.9	39.8	37.0	37.7	36.5	34.5	32.3	29.8	29.2	24.9	20.4*	24.5	19.7*	15.4*	-	3.5	4.3	4.8	5.3
	AR-TG-C-00-2	0	2	1.81	2.46	45.5	41.9	39.8	37.0	37.7	36.5	34.5	32.3	29.8	29.2	24.9	20.4*	24.5	19.7*	15.4*	-	4.5	5.9	6.7	7.6
	AR-TG-C-01-0	1	0	1.81	2.46	37.3	36.1	35.4	34.7	30.6	29.6	29.0	28.4	24.6	23.8	23.3	20.2*	20.4	19.7	16.3*	12.0*	4.6	5.7	6.4	7.0
	AR-TG-C-01-1	1	1	2.31	2.96	45.5	41.9	39.8	37.0	37.7	36.5	34.5	32.3	29.8	29.2	24.9	20.4*	24.5	19.7*	15.4*	-	5.7	7.5	8.6	9.7
	AR-TG-C-01-2	1	2	2.81	3.46	45.5	41.9	39.8	37.0	37.7	36.5	34.5	32.3	29.8	29.2	24.9	20.4*	24.5	19.7*	15.4*	-	6.8	9.5	11.1	12.7
	AR-TG-C-02-0	2	0	2.81	3.46	37.3	36.1	35.4	34.7	30.6	29.6	29.0	28.4	24.6	23.8	23.3	20.2*	20.4	19.7	16.3*	12.0*	6.9	9.1	10.4	11.7
	AR-TG-C-02-1	2	1	3.31	3.96	44.5	39.6*	35.9*	-	37.5	34.9*	30.4*	-	29.7*	25.7*	-	-	24.4*	-	-	-	8.1	11.4	13.3	15.3
	AR-TG-C-02-2	2	2	3.81	4.46	44.5	39.6*	35.9*	-	37.5	34.9*	30.4*	-	29.7*	25.7*	-	-	24.4*	-	-	-	9.4	13.9	16.6	19.4
	AR-TG-C-03-0	3	0	3.81	4.46	37.0	35.4*	33.5*	-	30.4*	29.4*	27.2*	-	24.4*	22.3*	-	-	20.3*	-	-	-	9.5	13.3	15.5	17.8
	AR-TG-C-03-1	3	1	4.31	4.96	43.4	37.2*	32.1*	-	37.3	33.2	26.2*	-	29.6*	22.2*	-	-	24.3*	-	-	-	10.8	16.1	19.3	22.4
	AR-TG-C-03-2	3	2	4.81	5.46	43.4	37.2*	32.1*	-	37.3	33.2*	26.2*	-	29.6*	22.2*	-	-	24.3*	-	-	-	12.3	19.3	23.5	27.7
	AR-TG-C-04-0	4	0	4.81	5.46	36.8	34.6*	31.5*	-	30.2*	29.2*	25.3*	-	24.3*	20.9*	-	-	20.2*	-	-	-	12.4	18.4	21.9	25.5
	AR-TG-C-04-1	4	1	5.31	5.96	42.3	34.8*	28.2*	-	37.1	31.5*	-	-	29.4*	-	-	-	24.3*	-	-	-	14.0	21.9	26.7	31.4
	AR-TG-C-04-2	4	2	5.81	6.46	42.3	34.8*	-	-	37.1	31.5*	-	-	29.4*	-	-	-	24.3*	-	-	-	15.6	25.8	32.0	38.1
	AR-TG-C-05-0	5	0	5.81	6.46	36.5	33.8*	-	-	30.0*	28.9*	-	-	24.2*	-	-	-	20.1*	-	-	-	15.8	24.6	29.9	35.2

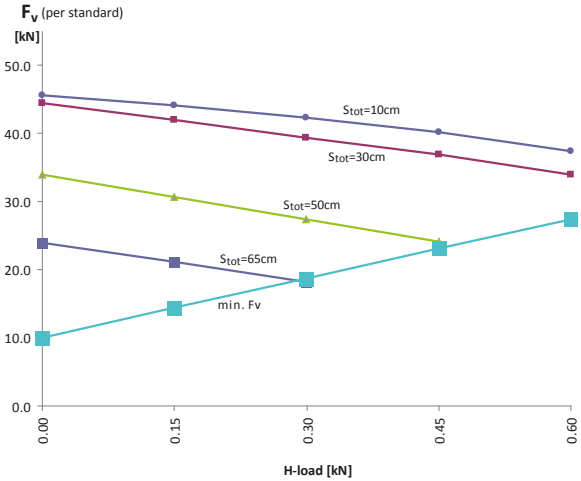
*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

Tower type D – ground plan 1.09 x 2.57 m

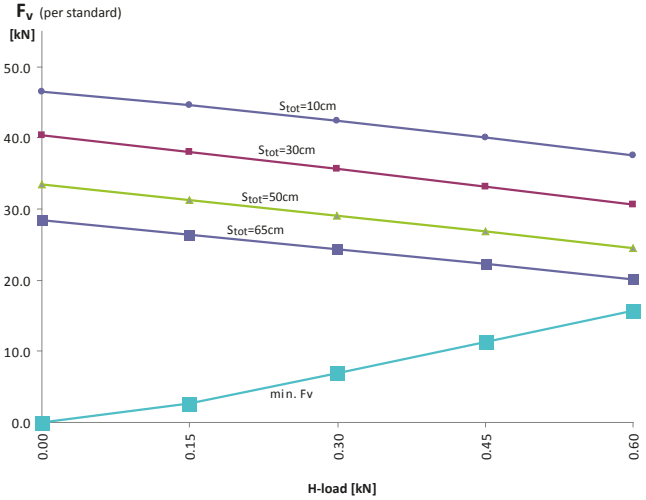
- free-standing towers **without wind action** with one or two **50 cm frames at the top of the tower**



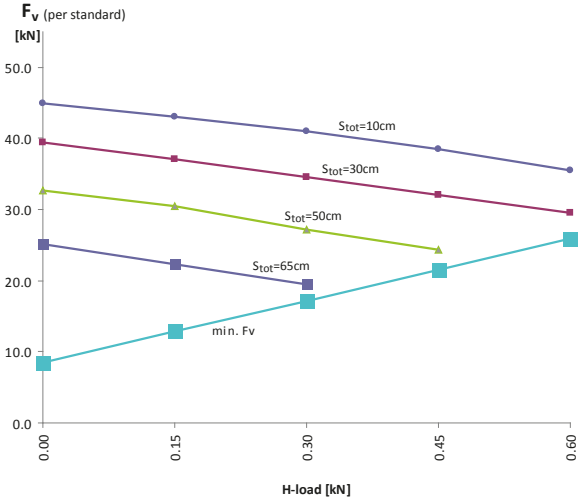
- free-standing towers **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- **free-standing towers without wind action** with one **100 cm frame at the top of the tower**



- free-standing towers **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**



Maximum load per standard for the **free-standing** tower

H-load per standard [kN]	Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type D – ground plan 1.09 x 2.57 m; perm. load capacity F_V per standard for class B1 [kN]; s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm); Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	Minimum superimposed load per standard against tilting of the tower min. F_V [kN]; Dynamic wind pressure q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.00 kN	AR-TG-D-00-1	0	1	1.31	1.96	56.1	55.3	54.4	52.7	49.5	48.7	48.3	47.0	39.9	39.5	39.2	34.7	31.7	31.6	27.7	23.8	0.0	0.5	1.1	1.7
	AR-TG-D-00-2	0	2	1.81	2.46	56.1	55.3	54.4	52.7	49.5	48.7	48.3	47.0	39.9	39.5	39.2	34.7	31.7	31.6	27.7	23.8	0.0	1.0	2.0	3.0
	AR-TG-D-01-0	1	0	1.81	2.46	47.1	46.1	45.6	44.9	41.0	40.1	39.6	39.1	33.9	33.2	32.7	32.2	28.8	28.2	27.6	25.7	0.0	0.7	1.5	2.3
	AR-TG-D-01-1	1	1	2.31	2.96	56.1	55.3	54.4	52.7	49.5	48.7	48.3	47.0	39.9	39.5	39.2	34.7	31.7	31.6	27.7	23.8	0.0	1.4	2.7	4.0
	AR-TG-D-01-2	1	2	2.81	3.46	56.1	55.3	54.4	52.7	49.5	48.7	48.3	47.0	39.9	39.5	39.2	34.7	31.7	31.6	27.7	23.8	0.0	2.2	4.2	6.1
	AR-TG-D-02-0	2	0	2.81	3.46	47.1	46.1	45.6	44.9	41.0	40.1	39.6	39.1	33.9	33.2	32.7	32.2	28.8	28.2	27.6	25.7	0.0	1.7	3.3	4.8
	AR-TG-D-02-1	2	1	3.31	3.96	53.8	52.1	50.5	47.5	49.2	47.3	44.8	41.4*	39.9	37.7	34.4*	28.4*	31.7	29.1	23.6*	-	0.0	2.8	5.1	7.4
	AR-TG-D-02-2	2	2	3.81	4.46	53.8	52.1	50.5	47.5	49.2	47.3	44.8	41.4*	39.9	37.7	34.4*	28.4*	31.7	29.1	23.6*	-	0.0	4.1	7.3	10.5
	AR-TG-D-03-0	3	0	3.81	4.46	46.9	45.8	44.8	43.0	40.8	39.9	39.3	37.0*	33.8	33.0	30.8*	27.8*	28.7	27.1	24.2*	-	0.0	3.3	5.9	8.5
	AR-TG-D-03-1	3	1	4.31	4.96	51.4	48.8	46.7	42.3	48.9	46.0	41.3	35.9*	39.8	35.8	29.6*	22.1*	31.7	26.5	19.4*	-	0.0	4.8	8.5	12.2
	AR-TG-D-03-2	3	2	4.81	5.46	51.4	48.8	46.7	42.3	48.9	46.0	41.3	35.9*	39.8	35.8	29.6*	22.1*	31.7	26.5	19.4*	-	0.0	6.7	11.6	16.5
	AR-TG-D-04-0	4	0	4.81	5.46	46.8	45.4	44.1	41.1	40.6	39.7	39.0	35.0*	33.6	32.9	28.9*	23.4*	28.6	26.1	20.9*	-	0.0	5.5	9.6	13.8
	AR-TG-D-04-1	4	1	5.31	5.96	49.0	45.6	42.8	37.1	48.6	44.6	37.9	30.3*	39.7	33.9	24.8*	-	31.7	24.0	15.3*	-	0.0	7.6	13.2	18.7
	AR-TG-D-04-2	4	2	5.81	6.46	49.0	45.6	42.8	37.1	48.6	44.6	37.9	30.3*	39.7	33.9	24.8*	-	31.7	24.0	-	-	0.0	10.1	17.3	24.4
	AR-TG-D-05-0	5	0	5.81	6.46	46.6	45.0	43.4	39.2	40.4	39.4	38.6	33.0*	33.5	32.7	27.0*	-	28.5	25.1	17.5*	-	0.0	8.5	14.7	20.8
F_H = 0.15 kN	AR-TG-D-00-1	0	1	1.31	1.96	55.5	54.1	52.7	50.2	46.7	46.0	45.5	44.0	37.7	37.1	35.7	32.5	30.3	30.0	25.4	21.2	0.5	1.5	2.1	2.7
	AR-TG-D-00-2	0	2	1.81	2.46	55.5	54.1	52.7	50.2	46.7	46.0	45.5	44.0	37.7	37.1	35.7	32.5	30.3	30.0	25.4	21.2	0.6	2.2	3.2	4.2
	AR-TG-D-01-0	1	0	1.81	2.46	45.2	44.3	43.6	42.9	38.7	37.8	37.2	36.6	31.7	31.0	30.5	29.7	26.7	26.1	25.2	23.3	0.7	2.0	2.8	3.5
	AR-TG-D-01-1	1	1	2.31	2.96	55.5	54.1	52.7	50.2	46.7	46.0	45.5	44.0	37.7	37.1	35.7	32.5	30.3	30.0	25.4	21.2	0.8	3.0	4.3	5.5
	AR-TG-D-01-2	1	2	2.81	3.46	55.5	54.1	52.7	50.2	46.7	46.0	45.5	44.0	37.7	37.1	35.7	32.5	30.3	30.0	25.4	21.2	1.0	4.2	6.1	8.0
	AR-TG-D-02-0	2	0	2.81	3.46	45.2	44.3	43.6	42.9	38.7	37.8	37.2	36.6	31.7	31.0	30.5	29.7	26.7	26.1	25.2	23.3	1.1	3.6	5.2	6.7
	AR-TG-D-02-1	2	1	3.31	3.96	52.8	50.8	48.5	44.9*	46.6	44.6	42.1*	38.3*	37.6	35.0*	31.0*	-	30.3	27.0*	-	-	1.2	5.1	7.4	9.6
	AR-TG-D-02-2	2	2	3.81	4.46	52.8	50.8	48.5	44.9*	46.6	44.6	42.1*	38.3*	37.6	35.0*	31.0*	-	30.3	27.0*	-	-	1.4	6.7	9.9	13.2
	AR-TG-D-03-0	3	0	3.81	4.46	45.0	43.9	42.8	40.8*	38.5	37.5	36.6*	34.2*	31.6	30.8*	28.3*	25.1*	26.6	24.9*	21.6*	-	1.5	5.9	8.5	11.2
	AR-TG-D-03-1	3	1	4.31	4.96	50.2	47.5	44.3	39.7*	46.4	43.3	38.7*	32.6*	37.5	32.8*	26.3*	-	30.2	24.1*	-	-	1.7	7.9	11.5	15.2
	AR-TG-D-03-2	3	2	4.81	5.46	50.2	47.5	44.3	39.7*	46.4	43.3	38.7*	32.6*	37.5	32.8*	26.3*	-	30.2	24.1*	-	-	1.9	10.1	15.0	20.0
	AR-TG-D-04-0	4	0	4.81	5.46	44.8	43.5	42.0	38.6*	38.3	37.3	35.9*	31.9*	31.4	30.7*	26.0*	20.4*	26.6	23.6*	18.0*	-	2.0	8.9	13.1	17.2
	AR-TG-D-04-1	4	1	5.31	5.96	47.6	44.2	40.1	34.4*	46.3	42.0	35.4*	26.9*	37.4	30.6*	21.6*	-	30.2	21.2*	-	-	2.2	11.5	17.0	22.6
	AR-TG-D-04-2	4	2	5.81	6.46	47.6	44.2	40.1	34.4*	46.3	42.0	35.4*	-	37.4	30.6*	21.6*	-	30.2	21.2*	-	-	2.5	14.4	21.6	28.8
	AR-TG-D-05-0	5	0	5.81	6.46	44.6	43.1	41.2	36.4*	38.1	37.1	35.3*	29.5*	31.3	30.5*	23.7*	-	26.5	22.3*	-	-	2.6	12.9	19.0	25.1
F_H = 0.30 kN	AR-TG-D-00-1	0	1	1.31	1.96	53.5	51.3	49.9	47.6	44.0	43.2	42.4	40.9	35.3	34.7	33.0	29.5	28.6	27.0	23.0	18.5	1.5	2.5	3.1	3.7
	AR-TG-D-00-2	0	2	1.81	2.46	53.5	51.3	49.9	47.6	44.0	43.2	42.4	40.9	35.3	34.7	33.0	29.5	28.6	27.0	23.0	18.5	1.9	3.5	4.5	5.5
	AR-TG-D-01-0	1	0	1.81	2.46	43.1	42.0	41.3	40.6	36.2	35.3	34.7	34.1	29.5	28.8	28.3	27.2	24.7	24.1	22.7	21.0	2.0	3.3	4.1	4.8
	AR-TG-D-01-1	1	1	2.31	2.96	53.5	51.3	49.9	47.6	44.0	43.2	42.4	40.9	35.3	34.7	33.0	29.5	28.6	27.0	23.0	18.5	2.4	4.6	5.8	7.1
	AR-TG-D-01-2	1	2	2.81	3.46	53.5	51.3	49.9	47.6	44.0	43.2	42.4	40.9	35.3	34.7	33.0	29.5	28.6	27.0	23.0	18.5	2.9	6.1	8.0	9.9
	AR-TG-D-02-0	2	0	2.81	3.46	43.1	42.0	41.3	40.6	36.2	35.3	34.7	34.1	29.5	28.8	28.3	27.2	24.7	24.1	22.7	21.0	3.0	5.6	7.1	8.6
	AR-TG-D-02-1	2	1	3.31	3.96	51.1	48.3	45.7*	42.1*	43.8	41.9	39.0*	35.1*	35.2	32.2*	28.1*	-	28.5	24.1*	-	-	3.5	7.3	9.6	11.9
	AR-TG-D-02-2	2	2	3.81	4.46	51.1	48.3	45.7*	42.1*	43.8	41.9	39.0*	35.1*	35.2	32.2*	28.1*	-	28.5	24.1*	-	-	4.0	9.4	12.6	15.8
	AR-TG-D-03-0	3	0	3.81	4.46	42.9	41.7	40.4*	38.3*	36.0	35.0*	33.9*	31.3*	29.4	28.2*	25.7*	-	24.6	22.6*	-	-	4.2	8.5	11.2	13.8
	AR-TG-D-03-1	3	1	4.31	4.96	48.6	45.3	41.5*	36.6*	43.6	40.7	35.6*	29.3*	35.1	29.8*	23.3*	-	28.5	21.2*	-	-	4.7	10.9	14.5	18.2
	AR-TG-D-03-2	3	2	4.81	5.46	48.6	45.3	41.5*	36.6*	43.6	40.7	35.6*	29.3*	35.1	29.8*	23.3*	-	28.5	21.2*	-	-	5.3	13.5	18.5	23.4
	AR-TG-D-04-0	4	0	4.81	5.46	42.7	41.4	39.5*	36.0*	35.8	34.8*	33.2*	28.4*	29.2	27.7*	23.1*	-	24.5	21.1*	-	-	5.5	12.4	16.5	20.6
	AR-TG-D-04-1	4	1	5.31	5.96	46.2	42.3	37.3*	31.2*	43.5	39.5	32.2*	-	35.0	27.4*	-	-	28.4	18.2*	-	-	6.1	15.4	20.9	26.4
	AR-TG-D-04-2	4	2	5.81	6.46	46.2	42.3	37.3*	-	43.5	39.5	32.2*	-	35.0	27.4*	-	-	28.4	-	-	-	6.8	18.8	25.9	33.1
	AR-TG-D-05-0	5	0	5.81	6.46	42.4	41.0	38.6*	33.7*	35.6	34.6*	32.4*	-	29.1	27.1*	-	-	24.4	19.5*	-	-	7.0	17.2	23.3	29.5

*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

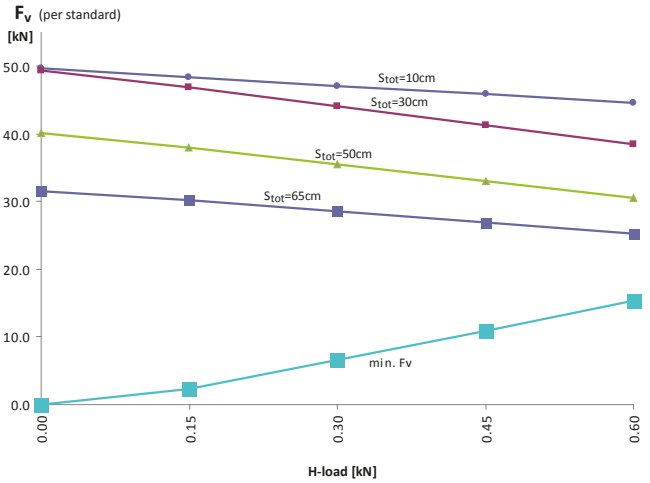
Maximum load per standard for the **free-standing** tower

						Tower type D – ground plan 1.09 x 2.57 m																Minimum superimposed load per standard against tilting of the tower min. F_V [kN]			
						perm. load capacity F_V per standard for class B1 [kN]																			
						s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm)				s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm)				s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm)				s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm)							
						Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure			
H-load per standard [kN]	Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.45 kN	AR-TG-D-00-1	0	1	1.31	1.96	50.1	47.8	46.3	44.6	41.1	40.3	39.2	37.8	32.8	32.2	30.3	26.2	26.8	24.7	20.4	15.5	2.5	3.5	4.0	4.6
	AR-TG-D-00-2	0	2	1.81	2.46	50.1	47.8	46.3	44.6	41.1	40.3	39.2	37.8	32.8	32.2	30.3	26.2	26.8	24.7	20.4	15.5	3.1	4.8	5.8	6.8
	AR-TG-D-01-0	1	0	1.81	2.46	40.8	39.7	39.0	38.3	33.7	32.8	32.1	31.6	27.2	26.4	25.9	24.5	22.6	22.0	20.3	17.4	3.3	4.6	5.3	6.1
	AR-TG-D-01-1	1	1	2.31	2.96	50.1	47.8	46.3	44.6	41.1	40.3	39.2	37.8	32.8	32.2	30.3	26.2	26.8	24.7	20.4	15.5	4.0	6.1	7.4	8.7
	AR-TG-D-01-2	1	2	2.81	3.46	50.1	47.8	46.3	44.6	41.1	40.3	39.2	37.8	32.8	32.2	30.3	26.2	26.8	24.7	20.4	15.5	4.8	8.0	9.9	11.8
	AR-TG-D-02-0	2	0	2.81	3.46	40.8	39.7	39.0	38.3	33.7	32.8	32.1	31.6	27.2	26.4	25.9	24.5	22.6	22.0	20.3	17.4	4.9	7.5	9.0	10.5
	AR-TG-D-02-1	2	1	3.31	3.96	48.4	45.3*	42.4*	38.7*	41.0	39.2*	35.8*	-	32.7	29.5*	-	-	26.7*	-	-	-	5.7	9.6	11.9	14.2
	AR-TG-D-02-2	2	2	3.81	4.46	48.4	45.3*	42.4*	38.7*	41.0	39.2*	35.8*	-	32.7	29.5*	-	-	26.7*	-	-	-	6.6	12.0	15.2	18.4
	AR-TG-D-03-0	3	0	3.81	4.46	40.6	39.3*	38.0*	35.5*	33.5	32.5*	31.2*	-	27.1*	25.7*	-	-	22.5*	20.2*	-	-	6.8	11.2	13.8	16.4
	AR-TG-D-03-1	3	1	4.31	4.96	46.6	42.7*	38.5*	32.7*	40.8	38.1*	32.3*	-	32.6	26.8*	-	-	26.7*	-	-	-	7.7	13.9	17.6	21.2
	AR-TG-D-03-2	3	2	4.81	5.46	46.6	42.7*	38.5*	32.7*	40.8	38.1*	32.3*	-	32.6	26.8*	-	-	26.7*	-	-	-	8.7	16.9	21.9	26.8
	AR-TG-D-04-0	4	0	4.81	5.46	40.4	38.9*	37.0*	32.6*	33.3	32.3*	30.3*	-	27.0*	25.1*	-	-	22.4*	18.3*	-	-	8.9	15.8	19.9	24.0
	AR-TG-D-04-1	4	1	5.31	5.96	44.8	40.2*	34.6*	-	40.7	36.9*	28.8*	-	32.5	24.1*	-	-	26.6*	-	-	-	10.0	19.2	24.8	30.3
	AR-TG-D-04-2	4	2	5.81	6.46	44.8	40.2*	34.6*	-	40.7	36.9*	-	-	32.5	24.1*	-	-	26.6*	-	-	-	11.1	23.1	30.3	37.5
	AR-TG-D-05-0	5	0	5.81	6.46	40.1	38.4*	36.0*	-	33.1	32.0*	29.4*	-	26.8*	24.4*	-	-	22.4*	-	-	-	11.3	21.5	27.7	33.8
F_H = 0.60 kN	AR-TG-D-00-1	0	1	1.31	1.96	46.5	44.2	42.7	40.4	38.3	37.3	36.0	34.6	30.3	29.6	27.3	22.8*	24.9	21.5*	16.9*	-	3.4	4.4	5.0	5.6
	AR-TG-D-00-2	0	2	1.81	2.46	46.5	44.2	42.7	40.4	38.3	37.3	36.0	34.6	30.3	29.6	27.3	22.8*	24.9	21.5*	16.9*	-	4.4	6.1	7.1	8.1
	AR-TG-D-01-0	1	0	1.81	2.46	38.3	37.2	36.5	35.7	31.2	30.2	29.6	29.0	24.9	24.0	23.6	21.7*	20.5	19.8	17.9*	13.6*	4.6	5.8	6.6	7.4
	AR-TG-D-01-1	1	1	2.31	2.96	46.5	44.2	42.7	40.4	38.3	37.3	36.0	34.6	30.3	29.6	27.3	22.8*	24.9	21.5*	16.9*	-	5.6	7.7	9.0	10.3
	AR-TG-D-01-2	1	2	2.81	3.46	46.5	44.2	42.7	40.4	38.3	37.3	36.0	34.6	30.3	29.6	27.3	22.8*	24.9	21.5*	16.9*	-	6.7	9.9	11.8	13.7
	AR-TG-D-02-0	2	0	2.81	3.46	38.3	37.2	36.5	35.7	31.2	30.2	29.6	29.0	24.9	24.0	23.6	21.7*	20.5	19.8	17.9*	13.6*	6.8	9.4	10.9	12.4
	AR-TG-D-02-1	2	1	3.31	3.96	45.5	41.9*	39.1*	-	38.1	36.2*	32.3*	-	30.2*	26.7*	-	-	24.9*	-	-	-	8.0	11.8	14.1	16.4
	AR-TG-D-02-2	2	2	3.81	4.46	45.5	41.9*	39.1*	-	38.1	36.2*	32.3*	-	30.2*	26.7*	-	-	24.9*	-	-	-	9.2	14.6	17.8	21.0
	AR-TG-D-03-0	3	0	3.81	4.46	38.1	36.6*	35.3*	-	31.0*	30.0*	28.5*	-	24.7*	23.2*	-	-	20.4*	-	-	-	9.4	13.8	16.4	19.0
	AR-TG-D-03-1	3	1	4.31	4.96	44.5	39.7*	35.4*	-	38.0	35.1*	28.7*	-	30.1*	23.8*	-	-	24.8*	-	-	-	10.7	16.9	20.6	24.2
	AR-TG-D-03-2	3	2	4.81	5.46	44.5	39.7*	35.4*	-	38.0	35.1*	28.7*	-	30.1*	23.8*	-	-	24.8*	-	-	-	12.2	20.4	25.3	30.2
	AR-TG-D-04-0	4	0	4.81	5.46	37.8	36.1*	34.1*	-	30.8*	29.7*	27.5*	-	24.6*	22.5*	-	-	20.3*	-	-	-	12.3	19.2	23.3	27.5
	AR-TG-D-04-1	4	1	5.31	5.96	43.4	37.5*	31.8*	-	37.8	34.1*	-	-	30.0*	-	-	-	24.7*	-	-	-	13.8	23.1	28.6	34.2
	AR-TG-D-04-2	4	2	5.81	6.46	43.4	37.5*	-	-	37.8	34.1*	-	-	30.0*	-	-	-	24.7*	-	-	-	15.5	27.4	34.6	41.8
	AR-TG-D-05-0	5	0	5.81	6.46	37.5	35.5*	33.0*	-	30.6*	29.5*	-	-	24.4*	-	-	-	20.2*	-	-	-	15.7	25.9	32.0	38.1

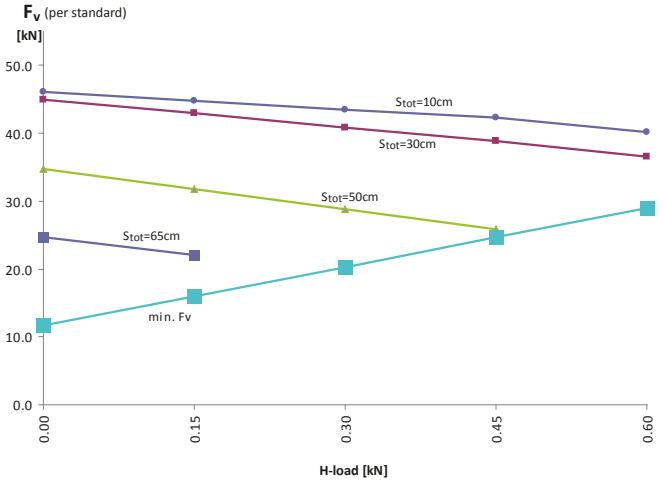
*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

Tower type E – ground plan 1.09 x 3.07 m

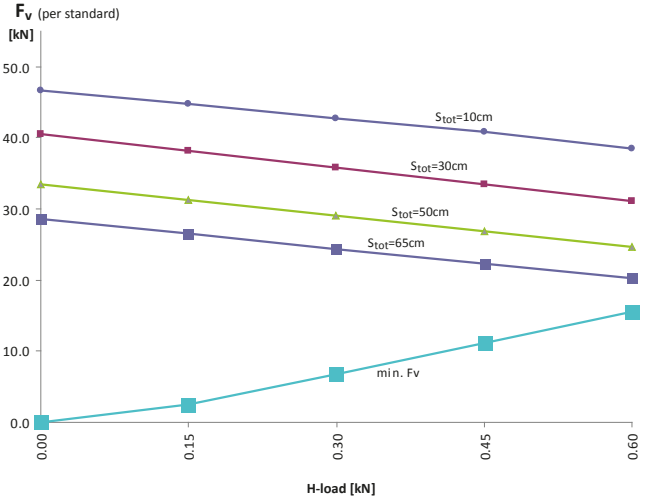
- free-standing towers **without wind action** with one or two **50 cm frames at the top of the tower**



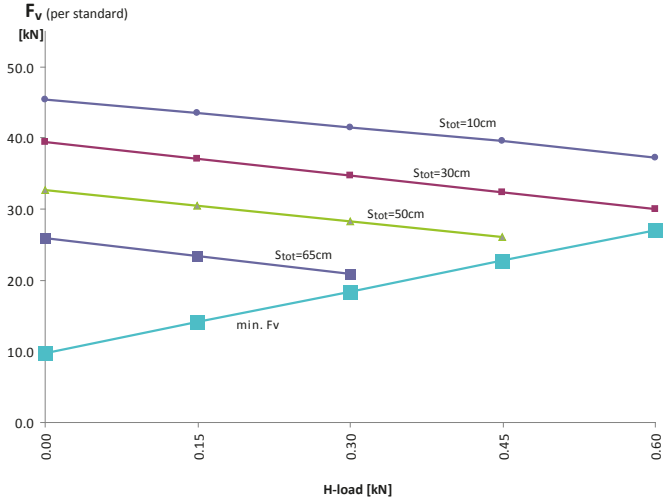
- free-standing towers **with wind action q = 0.50 kN/m²** with one or two **50 cm frames at the top of the tower**



- free-standing towers **without wind action** with one **100 cm frame at the top of the tower**



- free-standing towers **with wind action q = 0.50 kN/m²** with **100 cm frame at the top of the tower**



Maximum load per standard for the **free-standing** tower

H-load per standard [kN]	Type	Number of 100 cm frames	Number of 50 cm frames	H_{min} [m]	H_{max} [m]	Tower type E – ground plan 1.09 x 3.07 m, perm. load capacity F_V per standard for class B1 [kN]																Minimum superimposed load per standard against tilting of the tower min. F_V [kN]			
						s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm)				s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm)				s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm)				s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm)							
						Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure			
						q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.00 kN	AR-TG-E-00-1	0	1	1.31	1.96	56.7	55.8	55.2	54.2	50.0	49.2	48.7	47.6	40.3	39.9	39.6	35.9	31.6	31.5	28.2	24.3	0.0	0.6	1.3	1.9
	AR-TG-E-00-2	0	2	1.81	2.46	56.7	55.8	55.2	54.2	50.0	49.2	48.7	47.6	40.3	39.9	39.6	35.9	31.6	31.5	28.2	24.3	0.0	1.1	2.3	3.4
	AR-TG-E-01-0	1	0	1.81	2.46	47.3	46.1	45.5	44.8	41.1	40.1	39.5	38.9	34.0	33.2	32.7	32.2	28.8	28.1	27.7	26.4	0.0	0.8	1.7	2.6
	AR-TG-E-01-1	1	1	2.31	2.96	56.7	55.8	55.2	54.2	50.0	49.2	48.7	47.6	40.3	39.9	39.6	35.9	31.6	31.5	28.2	24.3	0.0	1.6	3.1	4.6
	AR-TG-E-01-2	1	2	2.81	3.46	56.7	55.8	55.2	54.2	50.0	49.2	48.7	47.6	40.3	39.9	39.6	35.9	31.6	31.5	28.2	24.3	0.0	2.6	4.8	7.1
	AR-TG-E-02-0	2	0	2.81	3.46	47.3	46.1	45.5	44.8	41.1	40.1	39.5	38.9	34.0	33.2	32.7	32.2	28.8	28.1	27.7	26.4	0.0	2.0	3.8	5.5
	AR-TG-E-02-1	2	1	3.31	3.96	54.3	52.5	51.4	49.1	49.8	47.8	45.5	42.3*	40.3	38.2	34.9*	29.5*	31.6	29.2	24.0*	-	0.0	3.3	5.9	8.5
	AR-TG-E-02-2	2	2	3.81	4.46	54.3	52.5	51.4	49.1	49.8	47.8	45.5	42.3*	40.3	38.2	34.9*	29.5*	31.6	29.2	24.0*	-	0.0	4.8	8.5	12.1
	AR-TG-E-03-0	3	0	3.81	4.46	47.1	45.9	45.0	43.5	40.9	39.9	39.2	37.5*	33.8	33.0	31.1	28.2*	28.7	27.4	24.5*	-	0.0	3.8	6.8	9.8
	AR-TG-E-03-1	3	1	4.31	4.96	52.0	49.3	47.6	44.0	49.5	46.4	42.2	37.1*	40.2	36.5	30.3*	23.0*	31.6	26.9	19.8*	-	0.0	5.6	9.8	14.0
	AR-TG-E-03-2	3	2	4.81	5.46	52.0	49.3	47.6	44.0	49.5	46.4	42.2	37.1*	40.2	36.5	30.3*	23.0*	31.6	26.9	19.8*	-	0.0	7.7	13.4	19.0
	AR-TG-E-04-0	4	0	4.81	5.46	46.9	45.6	44.6	42.3	40.7	39.6	39.0	36.2*	33.7	32.8	29.6	24.2*	28.6	26.6	21.3*	-	0.0	6.3	11.0	15.7
	AR-TG-E-04-1	4	1	5.31	5.96	49.7	46.1	43.8	39.0	49.3	45.0	39.0	31.8*	40.2	34.8	25.6*	-	31.6	24.6	-	-	0.0	8.8	15.1	21.4
	AR-TG-E-04-2	4	2	5.81	6.46	49.7	46.1	43.8	39.0	49.3	45.0	39.0	31.8*	40.2	34.8	25.6*	-	31.6	24.6	-	-	0.0	11.6	19.8	28.0
	AR-TG-E-05-0	5	0	5.81	6.46	46.7	45.4	44.2	41.1	40.5	39.4	38.7	34.8*	33.6	32.6	28.0	-	28.5	25.9	18.1*	-	0.0	9.7	16.7	23.7
F_H = 0.15 kN	AR-TG-E-00-1	0	1	1.31	1.96	56.1	55.2	54.5	52.3	47.3	46.5	46.0	45.5	38.1	37.5	37.2	34.1	30.3	30.0	26.3	21.9	0.4	1.6	2.2	2.9
	AR-TG-E-00-2	0	2	1.81	2.46	56.1	55.2	54.5	52.3	47.3	46.5	46.0	45.5	38.1	37.5	37.2	34.1	30.3	30.0	26.3	21.9	0.5	2.4	3.6	4.7
	AR-TG-E-01-0	1	0	1.81	2.46	45.4	44.2	43.6	42.9	38.8	37.8	37.2	36.6	31.8	31.0	30.5	30.0	26.8	26.1	25.7	24.4	0.7	2.1	3.0	3.9
	AR-TG-E-01-1	1	1	2.31	2.96	56.1	55.2	54.5	52.3	47.3	46.5	46.0	45.5	38.1	37.5	37.2	34.1	30.3	30.0	26.3	21.9	0.8	3.2	4.7	6.2
	AR-TG-E-01-2	1	2	2.81	3.46	56.1	55.2	54.5	52.3	47.3	46.5	46.0	45.5	38.1	37.5	37.2	34.1	30.3	30.0	26.3	21.9	0.9	4.5	6.8	9.0
	AR-TG-E-02-0	2	0	2.81	3.46	45.4	44.2	43.6	42.9	38.8	37.8	37.2	36.6	31.8	31.0	30.5	30.0	26.8	26.1	25.7	24.4	1.0	3.9	5.7	7.4
	AR-TG-E-02-1	2	1	3.31	3.96	53.5	51.7	50.2	47.2	47.1	45.3	43.0	40.0*	38.1	35.6	32.4*	-	30.2	27.3*	-	-	1.1	5.5	8.1	10.8
	AR-TG-E-02-2	2	2	3.81	4.46	53.5	51.7	50.2	47.2	47.1	45.3	43.0	40.0*	38.1	35.6	32.4*	-	30.2	27.3*	-	-	1.3	7.4	11.1	14.8
	AR-TG-E-03-0	3	0	3.81	4.46	45.1	44.0	43.3	41.6	38.6	37.5	36.9	35.0*	31.6	30.8	28.7*	25.8*	26.7	25.2	22.2*	-	1.4	6.4	9.4	12.4
	AR-TG-E-03-1	3	1	4.31	4.96	51.0	48.3	46.0	42.0	47.0	44.1	39.9	34.5*	38.0	33.7	27.5*	-	30.2	24.7*	-	-	1.6	8.6	12.8	17.0
	AR-TG-E-03-2	3	2	4.81	5.46	51.0	48.3	46.0	42.0	47.0	44.1	39.9	34.5*	38.0	33.7	27.5*	-	30.2	24.7*	-	-	1.7	11.1	16.8	22.4
	AR-TG-E-04-0	4	0	4.81	5.46	44.9	43.7	43.0	40.3	38.4	37.3	36.6	33.4*	31.5	30.6	26.9*	21.6*	26.6	24.3	18.7*	-	1.9	9.7	14.4	19.1
	AR-TG-E-04-1	4	1	5.31	5.96	48.4	44.8	41.7	36.9	46.9	42.9	36.9	29.0*	37.9	31.8	22.7*	-	30.2	22.1*	-	-	2.1	12.6	19.0	25.3
	AR-TG-E-04-2	4	2	5.81	6.46	48.4	44.8	41.7	36.9	46.9	42.9	36.9	-	37.9	31.8	-	-	30.2	22.1*	-	-	2.3	16.0	24.2	32.4
	AR-TG-E-05-0	5	0	5.81	6.46	44.7	43.5	42.7	39.0	38.2	37.1	36.4	31.8*	31.4	30.4	25.2*	-	26.5	23.4	-	-	2.5	14.1	21.0	28.0
F_H = 0.30 kN	AR-TG-E-00-1	0	1	1.31	1.96	54.1	53.0	52.3	50.4	44.5	43.7	43.2	42.7	35.7	35.1	34.7	31.3	28.7	28.4	24.2	19.5	1.4	2.6	3.2	3.9
	AR-TG-E-00-2	0	2	1.81	2.46	54.1	53.0	52.3	50.4	44.5	43.7	43.2	42.7	35.7	35.1	34.7	31.3	28.7	28.4	24.2	19.5	1.8	3.7	4.9	6.0
	AR-TG-E-01-0	1	0	1.81	2.46	43.5	42.3	41.6	40.9	36.5	35.5	34.9	34.3	29.6	28.8	28.3	27.8	24.8	24.1	23.6	22.1	1.9	3.4	4.3	5.2
	AR-TG-E-01-1	1	1	2.31	2.96	54.1	53.0	52.3	50.4	44.5	43.7	43.2	42.7	35.7	35.1	34.7	31.3	28.7	28.4	24.2	19.5	2.3	4.8	6.3	7.7
	AR-TG-E-01-2	1	2	2.81	3.46	54.1	53.0	52.3	50.4	44.5	43.7	43.2	42.7	35.7	35.1	34.7	31.3	28.7	28.4	24.2	19.5	2.8	6.5	8.7	10.9
	AR-TG-E-02-0	2	0	2.81	3.46	43.5	42.3	41.6	40.9	36.5	35.5	34.9	34.3	29.6	28.8	28.3	27.8	24.8	24.1	23.6	22.1	2.9	5.8	7.6	9.3
	AR-TG-E-02-1	2	1	3.31	3.96	51.8	49.8	48.0	45.0*	44.4	42.7	40.2*	37.2*	35.7	33.0	29.8*	-	28.7	25.3*	-	-	3.4	7.8	10.4	13.0
	AR-TG-E-02-2	2	2	3.81	4.46	51.8	49.8	48.0	45.0*	44.4	42.7	40.2*	37.2*	35.7	33.0	29.8*	-	28.7	25.3*	-	-	3.9	10.0	13.7	17.4
	AR-TG-E-03-0	3	0	3.81	4.46	43.2	42.1	41.4	39.6*	36.2	35.2	34.6*	32.3*	29.4	28.6	26.3*	-	24.6	23.0*	-	-	4.1	9.0	12.0	15.0
	AR-TG-E-03-1	3	1	4.31	4.96	49.4	46.7	43.8	39.5*	44.3	41.8	37.2*	31.7*	35.6	30.9	24.8*	-	28.6	22.3*	-	-	4.6	11.6	15.8	20.0
	AR-TG-E-03-2	3	2	4.81	5.46	49.4	46.7	43.8	39.5*	44.3	41.8	37.2*	31.7*	35.6	30.9	24.8*	-	28.6	22.3*	-	-	5.2	14.6	20.2	25.9
	AR-TG-E-04-0	4	0	4.81	5.46	43.0	41.8	41.1	38.2*	36.0	35.0	34.3*	30.3*	29.3	28.4	24.3*	-	24.5	21.9*	-	-	5.3	13.2	17.9	22.5
	AR-TG-E-04-1	4	1	5.31	5.96	47.1	43.6	39.6	34.1*	44.2	40.9	34.3*	-	35.5	28.8	-	-	28.6	-	-	-	6.0	16.5	22.8	29.1
	AR-TG-E-04-2	4	2	5.81	6.46	47.1	43.6	39.6	-	44.2	40.9	34.3*	-	35.5	28.8	-	-	28.6	-	-	-	6.6	20.3	28.5	36.7
	AR-TG-E-05-0	5	0	5.81	6.46	42.8	41.6	40.8	36.9*	35.8	34.7	34.1*	-	29.2	28.3	-	-	24.4	20.9*	-	-	6.8	18.4	25.4	32.3

*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

Maximum load per standard for the **free-standing** tower

						Tower type E – ground plan 1.09 x 3.07 m perm. load capacity F_V per standard for class B1 [kN]																Minimum superimposed load per standard against tilting of the tower min. F_V [kN]			
						s_{tot} = 10 cm (s_F = 6 cm; s_K = 4 cm)				s_{tot} = 30 cm (s_F = 18 cm; s_K = 12 cm)				s_{tot} = 50 cm (s_F = 30 cm; s_K = 20 cm)				s_{tot} = 65 cm (s_F = 39 cm; s_K = 26 cm)							
						Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure				Dynamic wind pressure			
H-load per standard [kN]	**Type**	**Number of 100 cm frames**	**Number of 50 cm frames**	**H_{min} [m]**	**H_{max} [m]**	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²	q = 0.0 kN/m²	q = 0.5 kN/m²	q = 0.8 kN/m²	q = 1.1 kN/m²
F_H = 0.45 kN	AR-TG-E-00-1	0	1	1.31	1.96	50.8	49.7	49.0	48.0	41.7	40.9	40.4	39.9	33.3	32.6	32.3	28.4	27.1	26.4	21.9	16.7*	2.4	3.5	4.2	4.9
	AR-TG-E-00-2	0	2	1.81	2.46	50.8	49.7	49.0	48.0	41.7	40.9	40.4	39.9	33.3	32.6	32.3	28.4	27.1	26.4	21.9	16.7*	3.1	5.0	6.1	7.3
	AR-TG-E-01-0	1	0	1.81	2.46	41.6	40.4	39.7	39.0	34.1	33.1	32.5	31.9	27.4	26.5	26.0	25.5	22.7	22.0	21.6	18.9	3.2	4.7	5.6	6.5
	AR-TG-E-01-1	1	1	2.31	2.96	50.8	49.7	49.0	48.0	41.7	40.9	40.4	39.9	33.3	32.6	32.3	28.4	27.1	26.4	21.9	16.7*	3.9	6.4	7.9	9.3
	AR-TG-E-01-2	1	2	2.81	3.46	50.8	49.7	49.0	48.0	41.7	40.9	40.4	39.9	33.3	32.6	32.3	28.4	27.1	26.4	21.9	16.7*	4.7	8.4	10.6	12.8
	AR-TG-E-02-0	2	0	2.81	3.46	41.6	40.4	39.7	39.0	34.1	33.1	32.5	31.9	27.4	26.5	26.0	25.5	22.7	22.0	21.6	18.9	4.9	7.7	9.5	11.2
	AR-TG-E-02-1	2	1	3.31	3.96	49.2	47.2	45.2*	41.9*	41.6	40.2	37.4*	-	33.2	30.4*	-	-	27.0	23.1*	-	-	5.7	10.0	12.6	15.3
	AR-TG-E-02-2	2	2	3.81	4.46	49.2	47.2	45.2*	41.9*	41.6	40.2	37.4*	-	33.2	30.4*	-	-	27.0	23.1*	-	-	6.5	12.6	16.3	20.0
	AR-TG-E-03-0	3	0	3.81	4.46	41.3	40.1	39.4	37.1*	33.9	32.9	32.3*	29.5*	27.2	26.4*	23.9*	-	22.6	20.6*	-	-	6.7	11.7	14.6	17.6
	AR-TG-E-03-1	3	1	4.31	4.96	47.5	44.8	41.3*	35.9*	41.5	39.5	34.4*	-	33.1	28.1*	-	-	27.0	19.7*	-	-	7.6	14.6	18.8	23.0
	AR-TG-E-03-2	3	2	4.81	5.46	47.5	44.8	41.3*	35.9*	41.5	39.5	34.4*	-	33.1	28.1*	-	-	27.0	19.7*	-	-	8.6	18.0	23.6	29.3
	AR-TG-E-04-0	4	0	4.81	5.46	41.1	39.9	39.1	35.1*	33.7	32.6	32.0*	27.1*	27.1	26.2*	21.7*	-	22.5	19.3*	-	-	8.8	16.6	21.3	26.0
	AR-TG-E-04-1	4	1	5.31	5.96	45.9	42.3	37.5*	-	41.4	38.8	31.4*	-	33.1	25.9*	-	-	26.9	-	-	-	9.8	20.4	26.7	33.0
	AR-TG-E-04-2	4	2	5.81	6.46	45.9	42.3	37.5*	-	41.4	38.8	-	-	33.1	25.9*	-	-	26.9	-	-	-	11.0	24.6	32.8	41.1
	AR-TG-E-05-0	5	0	5.81	6.46	40.9	39.6	38.8	-	33.5	32.4	31.8*	-	27.0	26.1*	-	-	22.4	-	-	-	11.2	22.8	29.7	36.7
F_H = 0.60 kN	AR-TG-E-00-1	0	1	1.31	1.96	47.6	46.4	45.7	43.8	38.9	38.0	37.5	37.0	30.8	30.1	29.8	25.3	25.4	23.3	18.5	13.7*	3.4	4.5	5.2	5.9
	AR-TG-E-00-2	0	2	1.81	2.46	47.6	46.4	45.7	43.8	38.9	38.0	37.5	37.0	30.8	30.1	29.8	25.3	25.4	23.3	18.5	13.7*	4.3	6.3	7.4	8.6
	AR-TG-E-01-0	1	0	1.81	2.46	39.4	38.2	37.5	36.8	31.8	30.8	30.2	29.6	25.2	24.3	23.8	23.3	20.6	19.9	19.5	15.2*	4.5	6.0	6.9	7.7
	AR-TG-E-01-1	1	1	2.31	2.96	47.6	46.4	45.7	43.8	38.9	38.0	37.5	37.0	30.8	30.1	29.8	25.3	25.4	23.3	18.5	-	5.5	8.0	9.4	10.9
	AR-TG-E-01-2	1	2	2.81	3.46	47.6	46.4	45.7	43.8	38.9	38.0	37.5	37.0	30.8	30.1	29.8	25.3	25.4	23.3	18.5	-	6.6	10.3	12.5	14.7
	AR-TG-E-02-0	2	0	2.81	3.46	39.4	38.2	37.5	36.8	31.8	30.8	30.2	29.6	25.2	24.3	23.8	23.3	20.6	19.9	19.5	15.2*	6.8	9.7	11.4	13.1
	AR-TG-E-02-1	2	1	3.31	3.96	46.6	44.3	42.3*	37.7*	38.7	37.6	34.3*	-	30.7	27.8*	-	-	25.3	-	-	-	7.9	12.3	14.9	17.5
	AR-TG-E-02-2	2	2	3.81	4.46	46.6	44.3	42.3*	37.7*	38.7	37.6	34.3*	-	30.7	27.8*	-	-	25.3	-	-	-	9.1	15.3	18.9	22.6
	AR-TG-E-03-0	3	0	3.81	4.46	39.1	37.9	37.1*	34.2*	31.6	30.5*	29.9*	-	25.0	24.2*	-	-	20.5	-	-	-	9.3	14.3	17.3	20.2
	AR-TG-E-03-1	3	1	4.31	4.96	45.6	42.3	38.8*	31.7*	38.6	37.1	31.1*	-	30.6	25.4*	-	-	25.3	-	-	-	10.6	17.6	21.8	26.0
	AR-TG-E-03-2	3	2	4.81	5.46	45.6	42.3	38.8*	-	38.6	37.1	31.1*	-	30.6	25.4*	-	-	25.3	-	-	-	12.0	21.4	27.1	32.7
	AR-TG-E-04-0	4	0	4.81	5.46	38.8	37.5	36.8*	31.6*	31.4	30.3*	29.7*	-	24.9	24.0*	-	-	20.4	-	-	-	12.2	20.0	24.7	29.4
	AR-TG-E-04-1	4	1	5.31	5.96	44.6	40.2	35.3*	-	38.5	36.6	-	-	30.6	-	-	-	25.2	-	-	-	13.7	24.2	30.6	36.9
	AR-TG-E-04-2	4	2	5.81	6.46	44.6	40.2	-	-	38.5	36.6	-	-	30.6	-	-	-	25.2	-	-	-	15.3	29.0	37.2	45.4
	AR-TG-E-05-0	5	0	5.81	6.46	38.5	37.2	36.4*	-	31.2	30.1*	-	-	24.7	-	-	-	20.3	-	-	-	15.5	27.1	34.1	41.0

*To prevent local slipping, the baseplates must be non-positively connected directly above the foot plate (e.g. with tube and coupler).

4. BUILDING STATES

The stability of the Shoring Towers TG 60 must be verified for all building states. To comply with tilting and sliding prevention verification requirements when assembling the towers, additional measures might be necessary. For the type-tested Layher Shoring Towers TG 60, ballasting figures that ensure the stability of the individual tower are stated as a function of the prevailing wind conditions. Bracing of the towers or similar supporting measures such as linking the towers or anchoring are possible, but must be verified separately.

The tilting and sliding prevention verifications were performed for each tower type on the assumption of the least-favourable wind effect. For assembly, working levels at distances of $\Delta H = 2.00$ m each with one person in an unfavourable position were assumed.

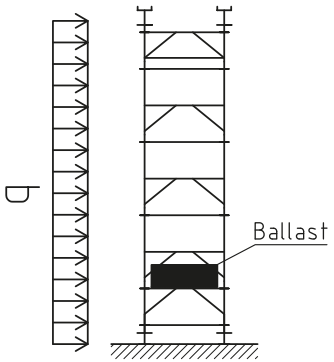
Sliding prevention is verified with the sliding friction coefficient $\mu = 0.3$ (steel/concrete) between the baseplate and the ground. If supporting timbers are used, the verifications are also met.

The following are values for ballasting of the towers. According to DIN EN 12812. a dynamic pressure of 0.20 kN/m² is applicable for the wind during working. Supplementing these, the values for ballasting against a dynamic pressure of 0.10 kN/m² are quoted. It must however be ensured here that the wind effects do not cause any higher dynamic pressures. The dynamic pressure q = 0.20 kN/m² corresponds to a wind speed of 17.9 m/s (64.4 kph). On the Beaufort scale this matches about wind force 7. The reduced dynamic pressure of 0.10 kN/m² corresponds to a wind speed of 12.6 m/s (45.4 kph), approximately wind force 6.

Caution: The ballast was determined for the building state and is as a rule removed after assembly. If the ballast is to remain in place in the end state too, the load capacity of the tower must be reduced by the applied ballast.

Dynamic wind pressure
q = 0.10 kN/m²

Type	Number of 100-cm-frames	Number of 50-cm-frames	max. total height from lower edge of foot plate to top edge of head jack	Required ballast for stability in the building state				
				Type A Ground plan 1.09 x 1.09 m	Type B Ground plan 1.09 x 1.57 m	Type C Ground plan 1.09 x 2.07 m	Type D Ground plan 1.09 x 2.57 m	Type E Ground plan 1.09 x 3.07 m
AR-TG-...-00-1		1	1.96 m	-	-	-	-	-
AR-TG-...-00-2		2	2.46 m	-	-	-	-	-
AR-TG-...-01-0	1	0	2.46 m	-	-	-	-	-
AR-TG-...-01-1		1	2.96 m	-	-	-	-	-
AR-TG-...-01-2		2	3.46 m	-	-	-	-	-
AR-TG-...-02-0	2	0	3.46 m	-	-	-	-	-
AR-TG-...-02-1		1	3.96 m	-	-	-	-	-
AR-TG-...-02-2		2	4.46 m	-	-	-	-	-
AR-TG-...-03-0	3	0	4.46 m	-	-	-	-	-
AR-TG-...-03-1		1	4.96 m	-	-	-	-	-
AR-TG-...-03-2		2	5.46 m	0.9 kN	0.6 kN	0.7 kN	0.9 kN	1.1 kN
AR-TG-...-04-0	4	0	5.46 m	0.9 kN	0.4 kN	0.5 kN	0.6 kN	0.7 kN
AR-TG-...-04-1		1	5.96 m	1.3 kN	0.8 kN	1.0 kN	1.2 kN	1.5 kN
AR-TG-...-04-2		2	6.46 m	2.1 kN	1.7 kN	2.1 kN	2.5 kN	2.9 kN
AR-TG-...-05-0	5	0	6.46 m	2.1 kN	1.5 kN	1.7 kN	2.0 kN	2.3 kN
AR-TG-...-05-1		1	6.96 m	2.5 kN	2.1 kN	2.4 kN	2.9 kN	3.3 kN
AR-TG-...-05-2		2	7.46 m	4.0 kN	3.4 kN	4.0 kN	4.7 kN	5.3 kN
AR-TG-...-06-0	6	0	7.46 m	3.8 kN	3.1 kN	3.5 kN	4.0 kN	4.5 kN
AR-TG-...-06-1		1	7.96 m	4.4 kN	3.8 kN	4.4 kN	5.1 kN	5.8 kN
AR-TG-...-06-2		2	8.46 m	5.9 kN	5.3 kN	6.1 kN	7.1 kN	8.1 kN
AR-TG-...-07-0	7	0	8.46 m	5.7 kN	4.8 kN	5.5 kN	6.2 kN	7.0 kN
AR-TG-...-07-1		1	8.96 m	6.4 kN	5.7 kN	6.6 kN	7.6 kN	8.6 kN
AR-TG-...-07-2		2	9.46 m	8.4 kN	7.6 kN	8.8 kN	10.2 kN	11.5 kN
AR-TG-D-08-0	8	0	9.46 m	8.1 kN	7.1 kN	8.0 kN	9.1 kN	10.1 kN

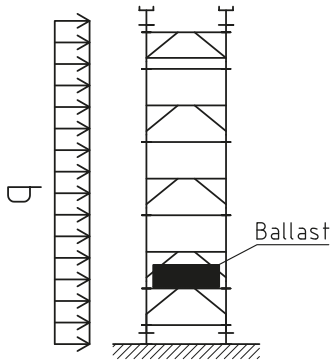


Required ballasting [kN] for assembly on concrete without horizontal loading of the head jacks and baseplates with maximum spindle extension (39 cm at bottom, 26 cm at top). The ballast must be spread evenly over the four standards of the support tower. In the calculations, the ballast was applied at the level of the upper ledger of the initial frame. To do so, assembly decks are used, for example. For ballasting of more than 5 kN, in Type A U-ledgers must be used instead of O-ledgers (only in the area of the removed ballast). For ballasting of tower types B – E, bridging ledgers must be used in all cases.

With higher towers, uneconomical ballasting figures result. In these cases, other safeguarding measures such as additional bracing, anchoring or linking of the towers must be selected.

Dynamic wind pressure
q = 0.20 kN/m²

Type	Number of 100-cm-frames	Number of 50-cm-frames	max. total height from lower edge of foot plate to top edge of head jack	Required ballast for stability in the building state				
				Type A Ground plan 1.09 x 1.09 m	Type B Ground plan 1.09 x 1.57 m	Type C Ground plan 1.09 x 2.07 m	Type D Ground plan 1.09 x 2.57 m	Type E Ground plan 1.09 x 3.07 m
AR-TG-...-00-1		1	1.96 m	0.5 kN	0.9 kN	1.2 kN	1.6 kN	2.0 kN
AR-TG-...-00-2		2	2.46 m	0.7 kN	1.1 kN	1.5 kN	2.1 kN	2.6 kN
AR-TG-...-01-0	1	0	2.46 m	0.8 kN	1.0 kN	1.3 kN	1.7 kN	2.1 kN
AR-TG-...-01-1		1	2.96 m	1.0 kN	1.2 kN	1.7 kN	2.2 kN	2.7 kN
AR-TG-...-01-2		2	3.46 m	1.3 kN	1.4 kN	2.0 kN	2.7 kN	3.3 kN
AR-TG-...-02-0	2	0	3.46 m	1.2 kN	1.3 kN	1.8 kN	2.3 kN	2.8 kN
AR-TG-...-02-1		1	3.96 m	1.8 kN	1.7 kN	2.1 kN	2.8 kN	3.4 kN
AR-TG-...-02-2		2	4.46 m	3.0 kN	3.0 kN	3.5 kN	4.1 kN	4.7 kN
AR-TG-...-03-0	3	0	4.46 m	2.8 kN	2.6 kN	2.9 kN	3.3 kN	3.7 kN
AR-TG-...-03-1		1	4.96 m	3.7 kN	3.6 kN	4.2 kN	4.8 kN	5.5 kN
AR-TG-...-03-2		2	5.46 m	6.3 kN	6.2 kN	7.1 kN	8.2 kN	9.3 kN
AR-TG-...-04-0	4	0	5.46 m	6.0 kN	5.5 kN	6.2 kN	6.9 kN	7.7 kN
AR-TG-...-04-1		1	5.96 m	7.1 kN	6.9 kN	7.9 kN	9.1 kN	10.2 kN



Required ballasting [kN] for assembly on concrete without horizontal loading of the head jacks and baseplates with maximum spindle extension (39 cm at bottom, 26 cm at top). The ballast must be spread evenly over the four standards of the support tower. In the calculations, the ballast was applied at the level of the upper ledger of the initial frame. To do so, assembly decks are used, for example. For ballasting of more than 5 kN, in Type A U-ledgers must be used instead of O-ledgers (only in the area of the removed ballast). For ballasting of tower types B – E, bridging ledgers must be used in all cases.

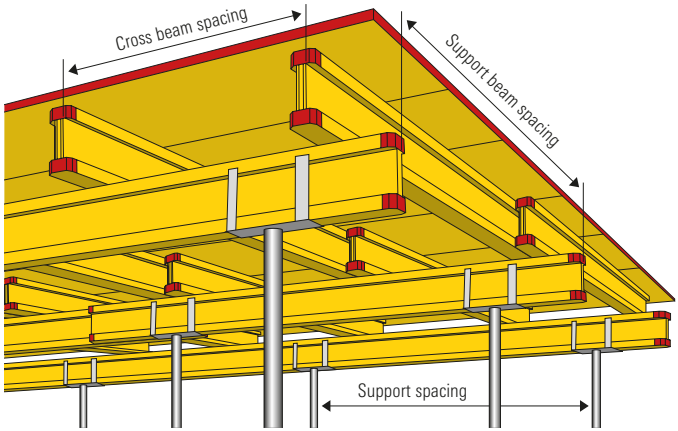
With higher towers, uneconomical ballasting figures result. In these cases, other safeguarding measures such as additional bracing, anchoring or linking of the towers must be selected.

5. RATING AIDS

For supporting the formwork skin, prefabricated wooden formwork supports are used. The following tables are provided for predimensioning and assignment of the Shoring Towers TG 60. The permissible spans in the tables were determined for standard wooden formwork supports with H = 20 cm and H = 24 cm. The sag of these supports is limited to L/500. The tables are intended as preliminary information and are no substitute for a verification of stability. The values for the permissible stress capacity can vary depending on manufacturer. Ask your supplier for more details about this.

Caution: The specified standard loads are characteristic values, i.e. actually existing loads.

The calculation of the spans is performed on the basic of structurally determined part-systems with an even load distribution, meaning that the covered width corresponds to the beam spacing. When the beam spacings differ, the covered width of the beams must be determined and assumed as the spacing.



Assumptions:

- Formwork weight approx. 0.40 kN/m²
- • Concrete weight 25 kN/m³
- Dummy loads from work operations and additional load for concrete accumulation according to DIN EN 12812

Table 5.1: for a solid wooden beam H = 20 cm

H-20 M_{perm} = 5.0 kNm Q_{perm} = 11.0 kN f_{max} = L/500	Floor thickness																							
	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60	65	70	75	80	85	90
	Total surface load q = formwork + fresh concrete + working operation + concrete accumulation [kN/m²] acc. to DIN EN 12812																						
	4.40	4.90	5.40	5.90	6.40	6.90	7.40	7.90	8.40	8.90	9.40	10.78	12.15	13.53	14.90	16.28	17.65	19.03	20.40	21.65	22.90	24.15	25.40
	Permissible spans for the formwork supports as cross beams																						
Cross beam spacing 0.20 m	4.21	4.07	3.94	3.82	3.72	3.63	3.54	3.47	3.40	3.33	3.27	3.12	3.00	2.90	2.80	2.72	2.65	2.58	2.53	2.48	2.43	2.39	2.35
Cross beam spacing 0.25 m	3.91	3.77	3.65	3.55	3.45	3.37	3.29	3.22	3.15	3.09	3.03	2.90	2.79	2.69	2.60	2.53	2.46	2.40	2.35	2.30	2.26	2.22	2.18
Cross beam spacing 0.30 m	3.68	3.55	3.44	3.34	3.25	3.17	3.10	3.03	2.97	2.91	2.86	2.73	2.62	2.53	2.45	2.38	2.31	2.26	2.21	2.16	2.12	2.09	2.05
Cross beam spacing 0.35 m	3.50	3.37	3.27	3.17	3.09	3.01	2.94	2.88	2.82	2.77	2.71	2.59	2.49	2.40	2.33	2.26	2.20	2.14	2.10	2.06	2.02	1.98	1.95
Cross beam spacing 0.40 m	3.35	3.23	3.12	3.03	2.95	2.88	2.81	2.75	2.70	2.65	2.59	2.48	2.38	2.30	2.23	2.16	2.10	2.05	2.01	1.97	1.93	1.90	1.86
Cross beam spacing 0.45 m	3.22	3.10	3.00	2.92	2.84	2.77	2.70	2.65	2.59	2.54	2.49	2.38	2.29	2.21	2.14	2.08	2.02	1.97	1.93	1.89	1.86	1.82	1.79
Cross beam spacing 0.50 m	3.11	3.00	2.90	2.82	2.74	2.67	2.61	2.56	2.50	2.46	2.41	2.30	2.21	2.13	2.07	2.01	1.95	1.90	1.86	1.83	1.79	1.76	1.73
Cross beam spacing 0.55 m	3.01	2.90	2.81	2.73	2.66	2.59	2.53	2.48	2.43	2.38	2.33	2.23	2.14	2.07	2.00	1.94	1.89	1.84	1.80	1.77	1.74	1.66	1.57
Cross beam spacing 0.60 m	2.92	2.82	2.73	2.65	2.58	2.52	2.46	2.40	2.36	2.31	2.27	2.17	2.08	2.01	1.94	1.89	1.84	1.79	1.75	1.69	1.60	1.52	1.44
Cross beam spacing 0.65 m	2.85	2.75	2.66	2.58	2.51	2.45	2.39	2.34	2.29	2.25	2.21	2.11	2.03	1.95	1.89	1.84	1.79	1.74	1.66	1.56	1.48	1.40	1.33
Cross beam spacing 0.70 m	2.78	2.68	2.59	2.52	2.45	2.39	2.33	2.28	2.24	2.20	2.15	2.06	1.98	1.91	1.85	1.79	1.75	1.65	1.54	1.45	1.37	1.30	1.24
Cross beam spacing 0.75 m	2.71	2.62	2.53	2.46	2.39	2.34	2.28	2.23	2.19	2.15	2.10	2.01	1.93	1.86	1.80	1.75	1.66	1.54	1.44	1.35	1.28	1.21	1.15
Cross beam spacing 0.80 m	2.66	2.56	2.48	2.41	2.34	2.29	2.23	2.18	2.14	2.10	2.06	1.97	1.89	1.82	1.77	1.68	1.55	1.44	1.35	1.27	1.20	1.14	1.08

Continuation of Table 5.1

H-20
M_{perm} = 5.0 kNm
Q_{perm} = 11.0 kN
f_{max} = L/500

Spacing / covered width of support beams	Floor thickness [cm]																							
	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60	65	70	75	80	85	90
	Total surface load q = formwork + fresh concrete + working operation + concrete accumulation [kN/m²] acc. to DIN EN 12812																						
	4.40	4.90	5.40	5.90	6.40	6.90	7.40	7.90	8.40	8.90	9.40	10.78	12.15	13.53	14.90	16.28	17.65	19.03	20.40	21.65	22.90	24.15	25.40
	Permissible spans for the formwork supports as support beams [m] and associated characteristic standard load [kN]																						
1.09 m	2.40	2.31	2.24	2.17	2.11	2.06	2.01	1.97	1.93	1.89	1.86	1.78	1.66	1.49	1.35	1.24	1.14	-	-	-	-	-	-
	11.49	12.34	13.17	13.97	14.75	15.50	16.25	16.97	17.68	18.37	19.09	20.91	22.00	22.00	22.00	22.00	22.00	-	-	-	-	-	-
1.33 m	2.24	2.16	2.09	2.03	1.98	1.93	1.88	1.84	1.81	1.77	1.74	1.53	1.36	1.22	1.11	-	-	-	-	-	-	-	-
	13.12	14.09	15.04	15.95	16.84	17.70	18.55	19.38	20.19	20.98	21.80	22.00	22.00	22.00	22.00	-	-	-	-	-	-	-	-
1.57 m	2.12	2.05	1.98	1.92	1.87	1.83	1.78	1.74	1.67	1.57	1.49	1.30	1.15	-	-	-	-	-	-	-	-	-	-
	14.65	15.74	16.79	17.81	18.81	19.77	20.72	21.64	22.00	22.00	22.00	22.00	22.00	-	-	-	-	-	-	-	-	-	-
1.82 m	2.02	1.95	1.89	1.83	1.78	1.74	1.63	1.53	1.44	1.36	1.28	1.12	-	-	-	-	-	-	-	-	-	-	-
	16.17	17.37	18.53	19.66	20.75	21.82	22.00	22.00	22.00	22.00	22.00	22.00	-	-	-	-	-	-	-	-	-	-	-
2.07 m	1.93	1.87	1.81	1.75	1.66	1.54	1.44	1.35	1.27	1.19	1.13	-	-	-	-	-	-	-	-	-	-	-	-
	17.62	18.93	20.19	21.42	22.00	22.00	22.00	22.00	22.00	22.00	22.00	-	-	-	-	-	-	-	-	-	-	-	-
2.32 m	1.86	1.80	1.74	1.61	1.48	1.37	1.28	1.20	1.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	19.01	20.42	21.79	22.00	22.00	22.00	22.00	22.00	22.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.57 m	1.80	1.74	1.59	1.45	1.34	1.24	1.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20.35	21.86	22.00	22.00	22.00	22.00	22.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.82 m	1.74	1.59	1.44	1.32	1.22	1.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21.65	22.00	22.00	22.00	22.00	22.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.07 m	1.63	1.46	1.33	1.21	1.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22.00	22.00	22.00	22.00	22.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.50 m	1.43	1.28	1.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22.00	22.00	22.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.00 m	1.25	1.12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	22.00	22.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Permissible spans for the formwork supports as double support beams [m] and associated characteristic standard load [kN]																						
1.09 m	3.02	2.91	2.82	2.74	2.66	2.60	2.54	2.48	2.43	2.39	2.34	2.24	2.15	2.07	2.01	1.95	1.90	1.85	1.81	1.77	1.74	1.67	1.59
	14.47	15.55	16.59	17.60	18.58	19.53	20.47	21.38	22.27	23.15	24.06	26.35	28.55	30.66	32.71	34.69	36.62	38.50	40.24	41.87	43.46	44.00	44.00
1.33 m	2.82	2.72	2.64	2.56	2.49	2.43	2.37	2.32	2.28	2.23	2.19	2.09	2.01	1.94	1.88	1.82	1.78	1.73	1.62	1.53	1.44	1.37	1.30
	16.53	17.76	18.94	20.10	21.22	22.31	23.37	24.41	25.43	26.43	27.47	30.09	32.60	35.01	37.35	39.61	41.82	43.96	44.00	44.00	44.00	44.00	44.00
1.57 m	2.67	2.58	2.50	2.42	2.36	2.30	2.25	2.20	2.15	2.11	2.07	1.98	1.90	1.84	1.78	1.72	1.58	1.47	1.37	1.29	1.22	1.16	1.10
	18.46	19.83	21.16	22.45	23.70	24.91	26.10	27.27	28.41	29.52	30.68	33.61	36.41	39.11	41.72	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00
1.82 m	2.54	2.45	2.38	2.31	2.24	2.19	2.14	2.09	2.05	2.01	1.97	1.89	1.81	1.75	1.62	1.48	1.37	1.27	1.19	1.12	-	-	-
	20.37	21.88	23.35	24.77	26.15	27.49	28.81	30.09	31.35	32.58	33.86	37.09	40.18	43.16	44.00	44.00	44.00	44.00	44.00	44.00	-	-	-
2.07 m	2.44	2.35	2.28	2.21	2.15	2.10	2.05	2.00	1.96	1.93	1.89	1.81	1.74	1.57	1.42	1.30	1.20	1.11	-	-	-	-	-
	22.19	23.85	25.44	26.99	28.49	29.96	31.39	32.79	34.16	35.50	36.89	40.41	43.78	44.00	44.00	44.00	44.00	44.00	-	-	-	-	-
2.32 m	2.35	2.26	2.19	2.13	2.07	2.02	1.97	1.93	1.89	1.85	1.82	1.74	1.56	1.40	1.27	1.16	-	-	-	-	-	-	-
	23.95	25.73	27.45	29.12	30.74	32.32	33.87	35.38	36.85	38.30	39.81	43.60	44.00	44.00	44.00	44.00	-	-	-	-	-	-	-
2.57 m	2.27	2.19	2.12	2.06	2.00	1.95	1.91	1.87	1.83	1.79	1.76	1.58	1.40	1.26	1.15	-	-	-	-	-	-	-	-
	25.64	27.55	29.39	31.18	32.91	34.61	36.26	37.87	39.45	41.01	42.62	44.00	44.00	44.00	44.00	-	-	-	-	-	-	-	-
2.82 m	2.20	2.12	2.05	1.99	1.94	1.89	1.85	1.81	1.77	1.74	1.65	1.44	1.28	1.15	-	-	-	-	-	-	-	-	-
	27.27	29.30	31.26	33.17	35.01	36.82	38.57	40.29	41.97	43.62	44.00	44.00	44.00	44.00	-	-	-	-	-	-	-	-	-
3.07 m	2.14	2.06	2.00	1.94	1.89	1.84	1.80	1.76	1.71	1.61	1.52	1.33	1.18	-	-	-	-	-	-	-	-	-	-
	28.86	31.01	33.09	35.10	37.05	38.96	40.82	42.64	44.00	44.00	44.00	44.00	44.00	-	-	-	-	-	-	-	-	-	-
3.50 m	2.05	1.97	1.91	1.85	1.81	1.76	1.70	1.59	1.50	1.41	1.33	1.16	-	-	-	-	-	-	-	-	-	-	-
	31.50	33.84	36.11	38.30	40.44	42.52	44.00	44.00	44.00	44.00	44.00	44.00	-	-	-	-	-	-	-	-	-	-	-
4.00 m	1.96	1.89	1.83	1.77	1.72	1.59	1.49	1.39	1.31	1.24	1.17	-	-	-	-	-	-	-	-	-	-	-	-
	34.43	36.99	39.47	41.87	44.00	44.00	44.00	44.00	44.00	44.00	44.00	-	-	-	-	-	-	-	-	-	-	-	-

Table 5.2: for a wooden lattice beam H = 24 cm as single-bay beam or continuous beam with mounting inside connector

GT-24
M_{perm} = 7.0 kNm
Q_{perm} = 13.0 kN
f_{max} = L/500

		Floor thickness [cm]																						
		10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60	65	70	75	80	85	90
		Total surface load q = formwork + fresh concrete + working operation + concrete accumulation [kN/m²] acc. to DIN EN 12812																						
		4.40	4.90	5.40	5.90	6.40	6.90	7.40	7.90	8.40	8.90	9.40	10.78	12.15	13.53	14.90	16.28	17.65	19.03	20.40	21.65	22.90	24.15	25.40
		Permissible spans for the formwork supports as cross beams [m]																						
Cross beam spacing	0.20 m	5.19	5.01	4.85	4.70	4.58	4.47	4.36	4.27	4.18	4.10	4.02	3.84	3.69	3.56	3.45	3.35	3.26	3.18	3.11	3.05	2.99	2.94	2.89
	0.25 m	4.82	4.65	4.50	4.37	4.25	4.15	4.05	3.96	3.88	3.81	3.74	3.57	3.43	3.31	3.20	3.11	3.03	2.95	2.89	2.83	2.78	2.73	2.68
	0.30 m	4.53	4.37	4.23	4.11	4.00	3.90	3.81	3.73	3.65	3.58	3.52	3.36	3.23	3.11	3.01	2.93	2.85	2.78	2.72	2.66	2.62	2.57	2.53
	0.35 m	4.31	4.15	4.02	3.90	3.80	3.71	3.62	3.54	3.47	3.40	3.34	3.19	3.07	2.96	2.86	2.78	2.71	2.64	2.58	2.53	2.48	2.44	2.40
	0.40 m	4.12	3.97	3.85	3.73	3.63	3.54	3.46	3.39	3.32	3.26	3.19	3.05	2.93	2.83	2.74	2.66	2.59	2.52	2.47	2.42	2.38	2.33	2.30
	0.45 m	3.96	3.82	3.70	3.59	3.49	3.41	3.33	3.26	3.19	3.13	3.07	2.93	2.82	2.72	2.63	2.56	2.49	2.43	2.37	2.33	2.28	2.24	2.21
	0.50 m	3.82	3.69	3.57	3.47	3.37	3.29	3.21	3.15	3.08	3.02	2.96	2.83	2.72	2.63	2.54	2.47	2.40	2.34	2.29	2.25	2.21	2.15	2.05
	0.55 m	3.70	3.57	3.46	3.36	3.27	3.19	3.11	3.05	2.99	2.93	2.87	2.74	2.64	2.54	2.46	2.39	2.33	2.27	2.22	2.17	2.06	1.96	1.86
	0.60 m	3.60	3.47	3.36	3.26	3.17	3.10	3.02	2.96	2.90	2.84	2.79	2.67	2.56	2.47	2.39	2.32	2.26	2.21	2.12	2.00	1.89	1.79	1.71
	0.65 m	3.50	3.38	3.27	3.18	3.09	3.01	2.95	2.88	2.82	2.77	2.72	2.60	2.49	2.41	2.33	2.26	2.20	2.10	1.96	1.85	1.75	1.66	1.57
	0.70 m	3.42	3.30	3.19	3.10	3.02	2.94	2.87	2.81	2.75	2.70	2.65	2.53	2.43	2.35	2.27	2.21	2.10	1.95	1.82	1.72	1.62	1.54	1.46
	0.75 m	3.34	3.22	3.12	3.03	2.95	2.87	2.81	2.75	2.69	2.64	2.59	2.47	2.38	2.29	2.22	2.12	1.96	1.82	1.70	1.60	1.51	1.44	1.36
	0.80 m	3.27	3.15	3.05	2.96	2.88	2.81	2.75	2.69	2.63	2.58	2.53	2.42	2.33	2.25	2.16	1.99	1.84	1.70	1.59	1.50	1.42	1.35	1.28
		Permissible spans for the formwork supports as support beams [m] and associated characteristic standard load [kN]																						
Spacing / covered width of support beams	1.09 m	2.95	2.84	2.75	2.67	2.60	2.54	2.48	2.43	2.38	2.33	2.29	2.18	1.96	1.76	1.60	1.46	1.35	1.25	1.17	1.10	-	-	-
		14.14	15.19	16.21	17.19	18.15	19.08	20.00	20.89	21.76	22.61	23.50	25.69	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-
	1.33 m	2.76	2.66	2.58	2.50	2.43	2.37	2.32	2.27	2.22	2.18	2.07	1.81	1.60	1.44	1.31	1.20	1.10	-	-	-	-	-	-
		16.14	17.35	18.51	19.63	20.73	21.79	22.83	23.85	24.85	25.75	26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-
	1.57 m	2.61	2.52	2.44	2.37	2.30	2.25	2.20	2.10	1.97	1.86	1.76	1.53	1.36	1.22	1.11	-	-	-	-	-	-	-	-
		18.03	19.37	20.67	21.93	23.15	24.34	25.50	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-
	1.82 m	2.48	2.40	2.32	2.25	2.19	2.07	1.93	1.81	1.70	1.61	1.51	1.32	1.17	-	-	-	-	-	-	-	-	-	-
		19.90	21.38	22.81	24.20	25.54	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-	-	-
	2.07 m	2.38	2.30	2.22	2.13	1.96	1.82	1.70	1.59	1.50	1.41	1.33	1.16	-	-	-	-	-	-	-	-	-	-	-
		21.68	23.30	24.85	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-	-	-	-
	2.32 m	2.29	2.21	2.08	1.90	1.75	1.62	1.51	1.42	1.33	1.26	1.19	-	-	-	-	-	-	-	-	-	-	-	-
		23.39	25.14	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-	-	-	-	-
	2.57 m	2.21	2.06	1.87	1.71	1.58	1.47	1.37	1.28	1.20	1.14	-	-	-	-	-	-	-	-	-	-	-	-	-
		25.05	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.82 m	2.10	1.88	1.71	1.56	1.44	1.34	1.25	1.17	1.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3.07 m	1.92	1.73	1.57	1.44	1.32	1.23	1.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		26.00	26.00	26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3.50 m	1.69	1.52	1.38	1.26	1.16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		26.00	26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.00 m	1.48	1.33	1.20	1.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		26.00	26.00	26.00	26.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Continuation of Table 5.2

GT-24
M_{perm} = 7.0 kNm
Q_{perm} = 13.0 kN
f_{max} = L/500

Spacing / covered width of double support beams	Floor thickness [cm]																							
	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60	65	70	75	80	85	90
	Total surface load q = formwork + fresh concrete + working operation + concrete accumulation [kN/m²] acc. to DIN EN 12812																						
	4.40	4.90	5.40	5.90	6.40	6.90	7.40	7.90	8.40	8.90	9.40	10.78	12.15	13.53	14.90	16.28	17.65	19.03	20.40	21.65	22.90	24.15	25.40
	Permissible spans for the formwork supports as double support beams [m] and associated characteristic standard load [kN]																						
1.09 m	3.71	3.58	3.47	3.37	3.28	3.20	3.12	3.06	2.99	2.94	2.88	2.75	2.64	2.55	2.47	2.40	2.34	2.28	2.23	2.18	2.08	1.98	1.88
	17.81	19.14	20.42	21.66	22.87	24.04	25.19	26.32	27.41	28.49	29.61	32.43	35.14	37.74	40.26	42.70	45.07	47.39	49.53	51.41	52.00	52.00	52.00
1.33 m	3.48	3.35	3.25	3.15	3.07	2.99	2.92	2.86	2.80	2.75	2.70	2.58	2.47	2.39	2.31	2.25	2.18	2.05	1.92	1.81	1.71	1.62	1.54
	20.34	21.85	23.32	24.73	26.11	27.46	28.77	30.05	31.30	32.53	33.81	37.04	40.12	43.10	45.97	48.76	51.36	52.00	52.00	52.00	52.00	52.00	52.00
1.57 m	3.29	3.17	3.07	2.98	2.90	2.83	2.77	2.71	2.65	2.60	2.55	2.44	2.34	2.26	2.18	2.03	1.87	1.73	1.62	1.53	1.45	1.37	1.30
	22.72	24.41	26.04	27.63	29.17	30.67	32.13	33.56	34.96	36.34	37.77	41.37	44.82	48.14	51.27	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
1.82 m	3.13	3.02	2.92	2.84	2.76	2.69	2.63	2.58	2.52	2.48	2.43	2.32	2.23	2.11	1.91	1.75	1.61	1.50	1.40	1.32	1.25	1.18	1.12
	25.07	26.94	28.74	30.49	32.19	33.84	35.46	37.04	38.58	40.10	41.68	45.65	49.46	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00
2.07 m	3.00	2.89	2.80	2.72	2.65	2.58	2.52	2.47	2.42	2.37	2.33	2.22	2.06	1.85	1.68	1.54	1.42	1.32	1.23	1.16	1.10	-	-
	27.32	29.35	31.31	33.22	35.07	36.87	38.63	40.36	42.04	43.69	45.41	49.74	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	-	-
2.32 m	2.89	2.79	2.70	2.62	2.55	2.49	2.43	2.38	2.33	2.28	2.24	2.07	1.84	1.65	1.50	1.37	1.27	1.17	1.10	-	-	-	-
	29.48	31.67	33.79	35.84	37.84	39.79	41.69	43.54	45.36	47.14	49.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	-	-	-	-
2.57 m	2.79	2.69	2.61	2.53	2.46	2.40	2.35	2.30	2.25	2.21	2.15	1.87	1.66	1.49	1.35	1.24	1.14	-	-	-	-	-	-
	31.56	33.90	36.17	38.37	40.51	42.59	44.63	46.62	48.56	50.47	52.00	52.00	52.00	52.00	52.00	52.00	52.00	-	-	-	-	-	-
2.82 m	2.71	2.61	2.53	2.45	2.39	2.33	2.28	2.23	2.17	2.07	1.96	1.71	1.51	1.36	1.23	1.13	-	-	-	-	-	-	-
	33.57	36.07	38.48	40.82	43.10	45.31	47.48	49.59	51.51	52.00	52.00	52.00	52.00	52.00	52.00	52.00	-	-	-	-	-	-	-
3.07 m	2.63	2.54	2.46	2.39	2.32	2.26	2.21	2.14	2.02	1.90	1.80	1.57	1.39	1.25	1.13	-	-	-	-	-	-	-	-
	35.53	38.17	40.72	43.20	45.61	47.95	50.24	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	-	-	-	-	-	-	-	-
3.50 m	2.52	2.43	2.35	2.28	2.22	2.15	2.01	1.88	1.77	1.67	1.58	1.37	1.22	1.09	-	-	-	-	-	-	-	-	-
	38.77	41.66	44.44	47.15	49.77	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	-	-	-	-	-	-	-	-	-
4.00 m	2.41	2.32	2.25	2.18	2.03	1.88	1.76	1.65	1.55	1.46	1.38	1.20	-	-	-	-	-	-	-	-	-	-	-
	42.38	45.53	48.58	51.41	52.00	52.00	52.00	52.00	52.00	52.00	52.00	52.00	-	-	-	-	-	-	-	-	-	-	-

Table 5.3: for a wooden lattice beam H = 24 cm as continuous beam with mounting between connectors

GT-24 chord support M_{perm} = 4.0 kNm Q_{perm} = 10.0 kN f_{max} = L/500		Floor thickness [cm]																							
		10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60	65	70	75	80	85	90
		Total surface load q = formwork + fresh concrete + working operation + concrete accumulation [kN/m²] acc. to DIN EN 12812																						
		4.40	4.90	5.40	5.90	6.40	6.90	7.40	7.90	8.40	8.90	9.40	10.78	12.15	13.53	14.90	16.28	17.65	19.03	20.40	21.65	22.90	24.15	25.40
		Permissible spans for the formwork supports as cross beams [m]																						
Cross beam spacing	0.20 m	5.19	5.01	4.85	4.70	4.58	4.47	4.36	4.27	4.18	4.10	4.02	3.84	3.62	3.43	3.27	3.13	3.01	2.90	2.80	2.72	2.64	2.57	2.51
	0.25 m	4.82	4.65	4.50	4.37	4.25	4.15	4.05	3.96	3.88	3.79	3.68	3.44	3.24	3.07	2.93	2.80	2.69	2.59	2.50	2.43	2.36	2.30	2.24
	0.30 m	4.53	4.37	4.23	4.11	4.00	3.90	3.80	3.67	3.56	3.46	3.36	3.14	2.96	2.80	2.67	2.56	2.45	2.36	2.29	2.22	2.16	2.10	2.05
	0.35 m	4.31	4.15	4.02	3.90	3.78	3.64	3.51	3.40	3.30	3.21	3.11	2.91	2.74	2.60	2.47	2.37	2.27	2.19	2.12	2.06	2.00	1.95	1.90
	0.40 m	4.12	3.97	3.85	3.68	3.54	3.41	3.29	3.18	3.09	3.00	2.91	2.72	2.56	2.43	2.31	2.21	2.13	2.05	1.98	1.92	1.87	1.82	1.77
	0.45 m	3.96	3.81	3.63	3.47	3.33	3.21	3.10	3.00	2.91	2.83	2.75	2.56	2.42	2.29	2.18	2.09	2.00	1.93	1.87	1.81	1.76	1.72	1.67
	0.50 m	3.81	3.61	3.44	3.29	3.16	3.05	2.94	2.85	2.76	2.68	2.61	2.43	2.29	2.17	2.07	1.98	1.90	1.83	1.77	1.72	1.67	1.63	1.57
	0.55 m	3.64	3.45	3.28	3.14	3.02	2.90	2.80	2.71	2.63	2.56	2.48	2.32	2.18	2.07	1.97	1.89	1.81	1.75	1.69	1.64	1.59	1.51	1.43
	0.60 m	3.48	3.30	3.14	3.01	2.89	2.78	2.68	2.60	2.52	2.45	2.38	2.22	2.09	1.98	1.89	1.81	1.74	1.67	1.62	1.54	1.46	1.38	1.31
	0.65 m	3.34	3.17	3.02	2.89	2.77	2.67	2.58	2.50	2.42	2.35	2.28	2.13	2.01	1.90	1.81	1.74	1.67	1.61	1.51	1.42	1.34	1.27	1.21
	0.70 m	3.22	3.05	2.91	2.78	2.67	2.57	2.49	2.41	2.33	2.27	2.20	2.06	1.94	1.84	1.75	1.67	1.61	1.50	1.40	1.32	1.25	1.18	1.12
	0.75 m	3.11	2.95	2.81	2.69	2.58	2.49	2.40	2.32	2.25	2.19	2.13	1.99	1.87	1.77	1.69	1.62	1.51	1.40	1.31	1.23	1.16	1.10	1.05
	0.80 m	3.02	2.86	2.72	2.60	2.50	2.41	2.32	2.25	2.18	2.12	2.06	1.92	1.81	1.72	1.64	1.53	1.41	1.31	1.23	1.15	1.09	1.04	0.98
		Permissible spans for the formwork supports as support beams [m] and associated characteristic standard load [kN]																						
Spacing / covered width of support beams	1.09 m	2.58	2.45	2.33	2.23	2.14	2.06	1.99	1.93	1.87	1.82	1.76	1.65	1.51	1.35	1.23	1.12	-	-	-	-	-	-	-
		12.39	13.07	13.72	14.35	14.94	15.51	16.07	16.60	17.12	17.62	18.14	19.42	20.00	20.00	20.00	20.00	-	-	-	-	-	-	-
	1.33 m	2.34	2.22	2.11	2.02	1.94	1.87	1.80	1.75	1.69	1.64	1.59	1.39	1.23	1.11	-	-	-	-	-	-	-	-	-
		13.68	14.44	15.16	15.85	16.50	17.14	17.75	18.34	18.91	19.46	20.00	20.00	20.00	20.00	-	-	-	-	-	-	-	-	-
	1.57 m	2.15	2.04	1.94	1.86	1.78	1.72	1.66	1.61	1.52	1.43	1.35	1.18	-	-	-	-	-	-	-	-	-	-	-
		14.87	15.69	16.47	17.22	17.93	18.62	19.28	19.92	20.00	20.00	20.00	20.00	-	-	-	-	-	-	-	-	-	-	-
	1.82 m	2.00	1.89	1.80	1.73	1.66	1.59	1.49	1.39	1.31	1.23	1.17	-	-	-	-	-	-	-	-	-	-	-	-
		16.01	16.89	17.73	18.54	19.31	20.00	20.00	20.00	20.00	20.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-
	2.07 m	1.87	1.78	1.69	1.62	1.51	1.40	1.31	1.22	1.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		17.07	18.02	18.91	19.77	20.00	20.00	20.00	20.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.32 m	1.77	1.68	1.60	1.46	1.35	1.25	1.16	1.09	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		18.07	19.07	20.00	20.00	20.00	20.00	20.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.57 m	1.68	1.59	1.44	1.32	1.22	1.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		19.02	20.00	20.00	20.00	20.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2.82 m	1.61	1.45	1.31	1.20	1.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		19.93	20.00	20.00	20.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3.07 m	1.48	1.33	1.21	1.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20.00	20.00	20.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3.50 m	1.30	1.17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20.00	20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4.00 m	1.14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		20.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Continuation of Table 5.3

GT-24 chord support M_{perm} = 4.0 kNm Q_{perm} = 10.0 kN f_{max} = L/500		Floor thickness [cm]																							
		10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60	65	70	75	80	85	90
		Total surface load q = formwork + fresh concrete + working operation + concrete accumulation [kN/m²] acc. to DIN EN 12812																						
		4.40	4.90	5.40	5.90	6.40	6.90	7.40	7.90	8.40	8.90	9.40	10.78	12.15	13.53	14.90	16.28	17.65	19.03	20.40	21.65	22.90	24.15	25.40
		Permissible spans for the formwork supports as double support beams [m] and associated characteristic standard load [kN]																						
Spacing / covered width of double support beams	1.09 m	3.65	3.46	3.30	3.15	3.03	2.92	2.82	2.73	2.64	2.57	2.50	2.33	2.19	2.08	1.98	1.90	1.82	1.75	1.70	1.65	1.60	1.52	1.44
		17.52	18.49	19.41	20.29	21.13	21.94	22.72	23.48	24.21	24.92	25.65	27.46	29.16	30.77	32.29	33.75	35.15	36.49	37.72	38.86	39.97	40.00	40.00
	1.33 m	3.31	3.13	2.99	2.86	2.74	2.64	2.55	2.47	2.39	2.33	2.26	2.11	1.99	1.88	1.79	1.72	1.65	1.58	1.47	1.39	1.31	1.25	1.18
		19.35	20.42	21.44	22.41	23.34	24.23	25.10	25.93	26.74	27.52	28.33	30.33	32.21	33.99	35.67	37.28	38.83	40.00	40.00	40.00	40.00	40.00	40.00
	1.57 m	3.04	2.88	2.75	2.63	2.52	2.43	2.35	2.27	2.20	2.14	2.08	1.94	1.83	1.73	1.65	1.56	1.44	1.33	1.25	1.18	1.11	-	-
		21.03	22.19	23.29	24.35	25.36	26.33	27.27	28.17	29.05	29.90	30.78	32.96	35.00	36.93	38.76	40.00	40.00	40.00	40.00	40.00	40.00	-	-
	1.82 m	2.83	2.68	2.55	2.44	2.34	2.26	2.18	2.11	2.05	1.99	1.93	1.80	1.70	1.61	1.47	1.35	1.24	1.15	-	-	-	-	-
		22.64	23.89	25.08	26.22	27.30	28.35	29.36	30.33	31.28	32.20	33.14	35.48	37.68	39.76	40.00	40.00	40.00	40.00	-	-	-	-	-
	2.07 m	2.65	2.51	2.39	2.29	2.20	2.12	2.04	1.98	1.92	1.86	1.81	1.69	1.59	1.42	1.29	1.18	1.09	-	-	-	-	-	-
		24.14	25.48	26.75	27.96	29.12	30.23	31.31	32.35	33.36	34.34	35.35	37.84	40.00	40.00	40.00	40.00	40.00	-	-	-	-	-	-
	2.32 m	2.50	2.37	2.26	2.16	2.08	2.00	1.93	1.87	1.81	1.76	1.71	1.59	1.41	1.27	1.15	-	-	-	-	-	-	-	-
		25.56	26.97	28.32	29.60	30.83	32.01	33.15	34.25	35.32	36.35	37.42	40.00	40.00	40.00	40.00	-	-	-	-	-	-	-	-
	2.57 m	2.38	2.25	2.15	2.05	1.97	1.90	1.83	1.78	1.72	1.67	1.63	1.44	1.28	1.15	-	-	-	-	-	-	-	-	-
		26.90	28.39	29.80	31.15	32.44	33.69	34.89	36.05	37.17	38.26	39.38	40.00	40.00	40.00	-	-	-	-	-	-	-	-	-
	2.82 m	2.27	2.15	2.05	1.96	1.88	1.81	1.75	1.69	1.64	1.59	1.50	1.31	1.16	-	-	-	-	-	-	-	-	-	-
		28.18	29.74	31.22	32.63	33.99	35.29	36.55	37.76	38.94	40.00	40.00	40.00	40.00	-	-	-	-	-	-	-	-	-	-
	3.07 m	2.18	2.06	1.96	1.88	1.80	1.74	1.68	1.62	1.55	1.46	1.38	1.21	-	-	-	-	-	-	-	-	-	-	-
		29.40	31.03	32.57	34.05	35.46	36.82	38.13	39.40	40.00	40.00	40.00	40.00	-	-	-	-	-	-	-	-	-	-	-
	3.50 m	2.04	1.93	1.84	1.76	1.69	1.63	1.54	1.45	1.36	1.28	1.21	-	-	-	-	-	-	-	-	-	-	-	-
		31.39	33.13	34.78	36.35	37.86	39.31	40.00	40.00	40.00	40.00	40.00	-	-	-	-	-	-	-	-	-	-	-	-
	4.00 m	1.91	1.81	1.72	1.65	1.56	1.45	1.35	1.27	1.19	1.12	-	-	-	-	-	-	-	-	-	-	-	-	-
		33.56	35.42	37.18	38.86	40.00	40.00	40.00	40.00	40.00	40.00	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 5.4: for the formwork skin

The dead weight of the formwork skin was assumed as 25 kg/m²

Pre-dimensioning of formwork skin f_{max} = L/500		Floor thickness [cm]																						
		10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60	65	70	75	80	85	90
		Total surface load q = formwork skin + fresh concrete + working operation + concrete accumulation [kN/m²] acc. to DIN EN 12812																						
		4.25	4.75	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	17.50	18.88	20.25	21.50	22.75	24.00	25.25
		Permissible spans of formwork skin [cm]																						
D=21 mm, single		0.61	0.58	0.56	0.55	0.53	0.52	0.51	0.50	0.49	0.48	0.47	0.45	0.43	0.41	0.40	0.39	0.38	0.37	0.36	0.35	0.35	0.34	0.33
D=2 x 21 mm, double		0.76	0.74	0.71	0.69	0.67	0.65	0.64	0.63	0.61	0.60	0.59	0.56	0.54	0.52	0.50	0.49	0.48	0.46	0.45	0.44	0.44	0.43	0.42
D=27 mm, single		0.75	0.72	0.70	0.68	0.66	0.64	0.63	0.62	0.60	0.59	0.58	0.55	0.53	0.51	0.50	0.48	0.47	0.46	0.45	0.44	0.43	0.42	0.42
D=2 x 27 mm, double		0.95	0.91	0.88	0.86	0.83	0.81	0.79	0.78	0.76	0.75	0.73	0.70	0.67	0.65	0.63	0.61	0.59	0.58	0.56	0.55	0.54	0.53	0.52

6. EXAMPLES

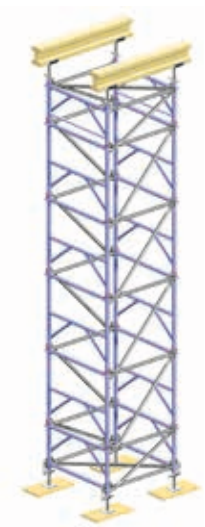
Assembly variants and possible combinations

The wide flexibility of Layher Shoring Towers TG 60 offers the user an unlimited number of assembly variants and possible uses, in particular thanks to full compatibility with Layher Allround Scaffolding. The following pages show examples of some assembly variants and possible uses of Layher Shoring Towers TG 60.

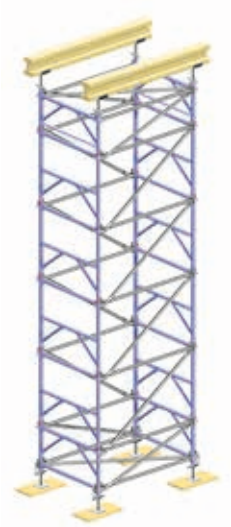
a) Individual towers:

The individual towers can be extended in their length and thus adapted to the specific application for optimum use. With a constant width B = 1.09 m the tower length is available in the Layher dimensions L = 1.09 m / 1.57 m / 2.07 m / 2.57 m and 3.07 m. For the type-tested individual towers, material requirement tables are available to allow time-saving job preparation without any additional structural strength calculations.

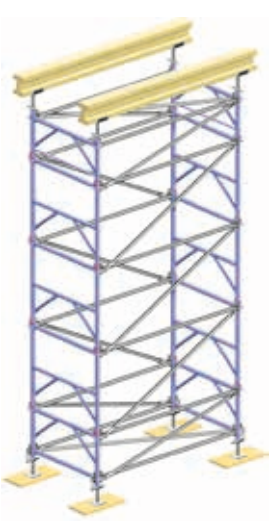
The towers can be assembled both upright and lying on their sides. Using the assembly decks, all work safety requirements are met during upright assembly thanks to the all-round advancing guardrail.



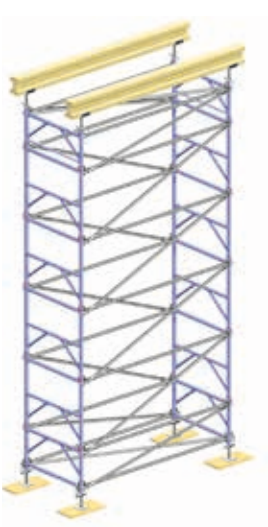
Tower type A
(1.09 x 1.09 m)



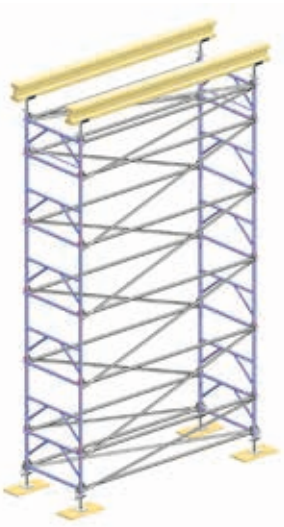
Tower type B
(1.09 x 1.57 m)



Tower type C
(1.09 x 2.07 m)

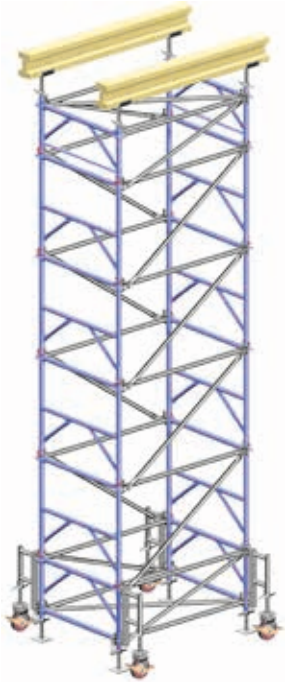


Tower type D
(1.09 x 2.57 m)

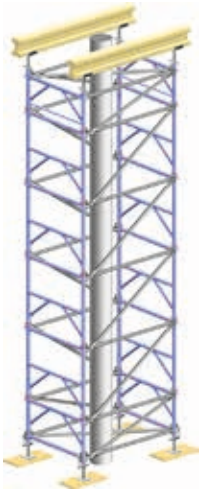


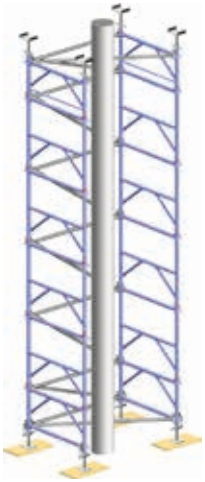
Tower type E
(1.09 x 3.07 m)

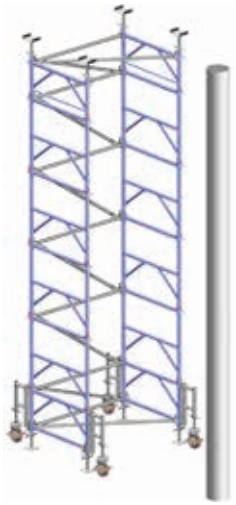
b) Attachment of wheels:
Wheels from the Layher Allround series can be fitted with the aid of adapters specially designed for Shoring Towers TG 60. This allows the Shoring Towers TG 60 to be moved by hand to the next work location without any further equipment. Continual assembly and dismantling of the towers can be dispensed with.
When several towers are connected, it is even possible to move complete formwork tables and to lift them from level to level using a crane.

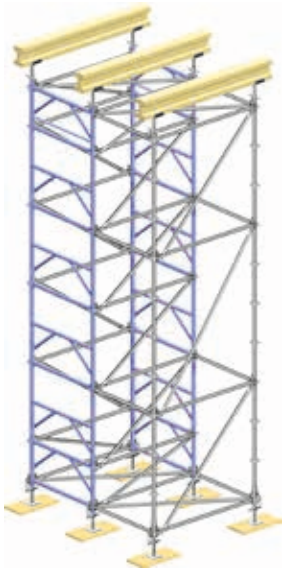


c) Integration of a support:
When putting formwork around a floor, the shoring towers can be arranged independently of the support configuration for the floor. In Shoring Towers TG 60 with frames at the end faces, a floor support can be integrated without problems into the tower. For moving the towers, the ledgers and diagonal braces on one side are removed, allowing the tower to be moved, for example with wheels that can be fitted to it.

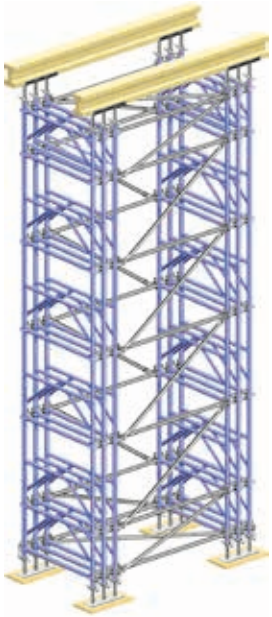




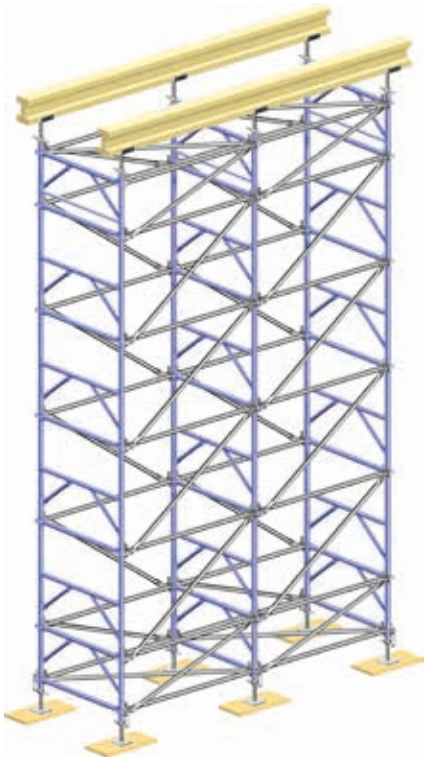




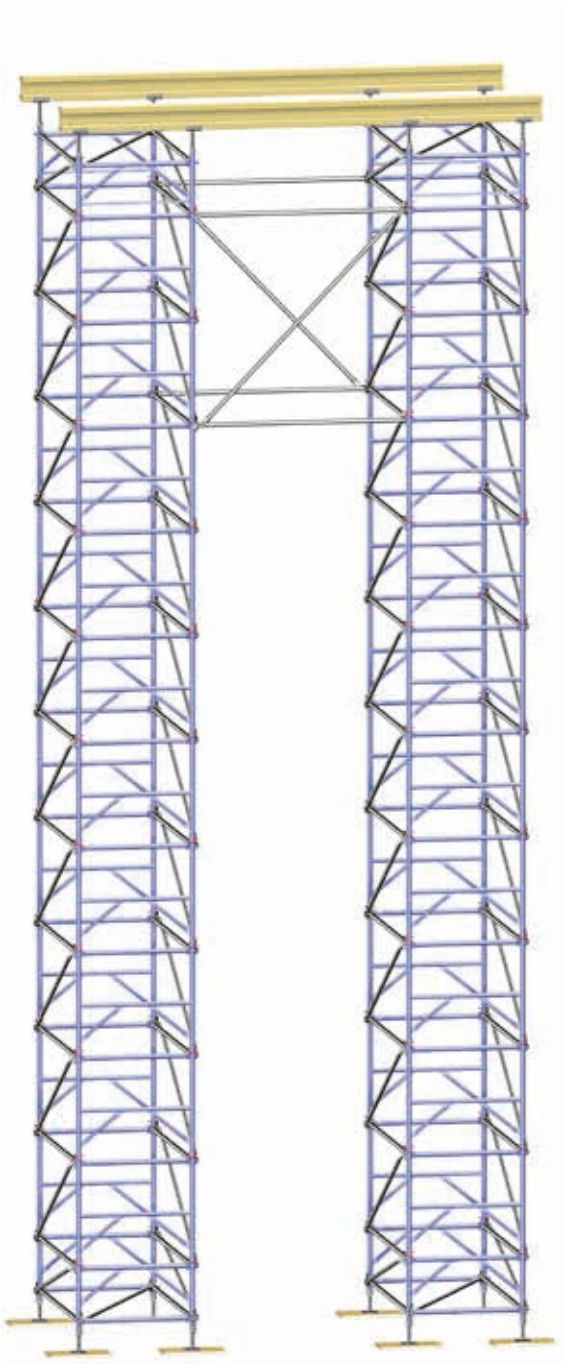
d) Tower with lateral Allround extension:
The Shoring Towers TG 60 are fully compatible with Layher Allround Scaffolding. This permits extensions and specific geometry adaptations as well as integration into an existing scaffolding structure. The connection is made with the proven wedge head connectors, eliminating the need for time-consuming connections with tubes and couplers.



e) Towers with three or more frame planes:
The Shoring Tower TG 60 system offers the option of arranging several frame planes one behind the other and connecting them using Allround ledgers and diagonal braces. As a result, towers can if necessary be arranged with three or more frame planes with identical or differing bay widths.



f) Reinforced towers with combined frames:
For load concentrations, the frames can be combined to increase the load-bearing capacities of the towers. With the Layher double wedge head coupler, as many frame planes as required can be connected in a narrow space at the end faces. For square towers, reinforcement on all sides is possible.

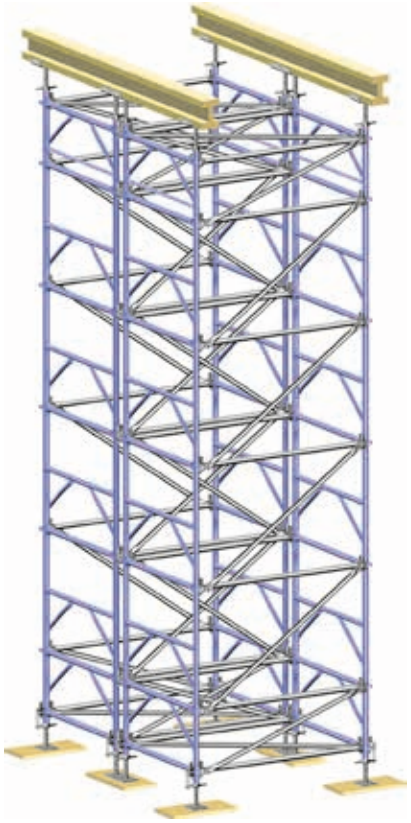


g) Connection of towers:

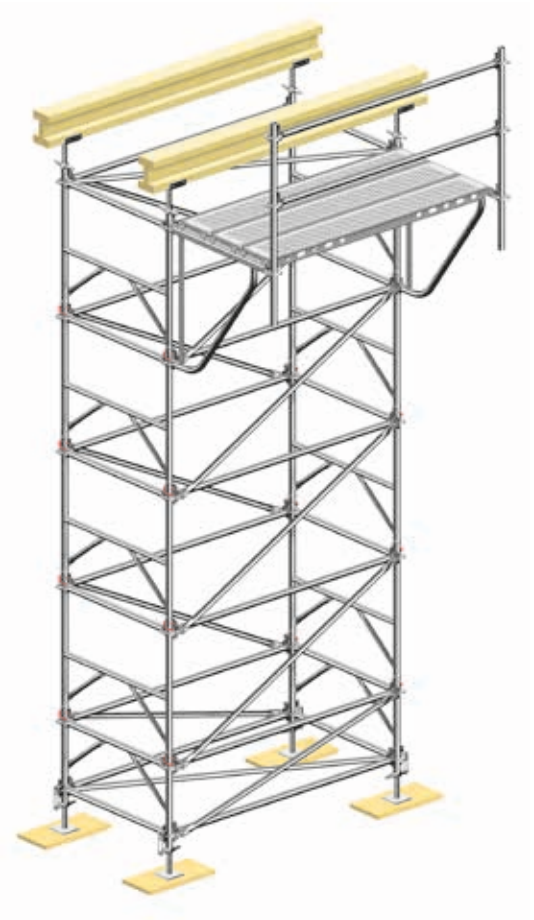
The towers can be connected as required using the welded-on rosettes plus wedge head connections. The connecting components can be standard parts from the Allround construction kit, so complicated connections using tubes and couplers can be dispensed with.

For high towers and for towers freely movable at the top, connection may be needed to provide a sufficiently stiff and strong overall structure.

For smaller towers too, it may be useful to connect the towers, for example to move them as a single unit with a crane, to move them on the wheels or to optimally adjust the loads.



h) Attachment of brackets:
The Shoring Towers TG 60 can be expanded without problems at floor edges or at edge binding beams using Allround standard brackets.



7. EXAMPLE OF CALCULATION

Details of project:

- Floor thickness h = 60 cm
- Storey height 6.60 m (clear height 6.00 m)
- Formwork attached laterally
- Formwork support by solid timber beam H-20
- Support beam H-20 as double support beam
- Load ascertained using coverage surfaces
- Wind action with dynamic pressure q = 0.8 kN/m²

Job preparation steps:

1. Use tables 5.1 to 5.4 to determine the optimum ground plan of the towers.

In this case, it is apt to position the support beams in the transverse direction and the formwork cross-beams in the longitudinal direction of the towers. The span of the support beams in the transverse direction of the towers must therefore be at least 1.09 m.

- Table 5.1: selected support beam spacing 2.07 (= span of formwork supports), perm. span 1.20 m > 1.09 m.
- Tower type C with ground plan 1.09 x 2.07 m is the suitable tower.
- The maximum vertical standard load is 44 kN (from table for 1.20 m support beam span). The actual standard load for the slightly reduced span and hence the coverage area is $F_{v, exist.}$ = 1.09 / 1.20 x 44 kN = 40 kN.

2. The formwork cross-beams spaced 40 cm apart have a perm. span of 2.10 m > 2.07 m

- The result from table 5.4 is a single formwork skin D = 27 mm with a permissible span of 47 cm > 40 cm. Alternatively, a double formwork skin with 2 x 21 mm can be used or a single formwork skin with 21 mm in conjunction with a reduced cross beam spacing of 38 cm.

3. Determining the required tower height:

– Clear height h_{clear} = 6.00 m
– Height of formwork (support + skin)
$h_{Formwork}$ = 2 * 20 cm + 2.7 cm = 43 cm

- req. H_{tower} = 6.00 m – 0.43 m = 5.57 m
  ➔ selected tower **AR-TG-C-04-1** with H_{min} = 5.31 m (from material requirements table for tower type C).
- The total spindle extension is:
  5.57 m – 5.31 m = 0.26 m.

When timber supports are used, the total spindle travel must be reduced accordingly. The total spindle extension is split, in accordance with the requirements, between the baseplates (60 %) and head jacks (40 %).
It is s_F = 0.6 x 26 = 16 cm and s_K = 0.4 x 26 = 10 cm.

4. Testing the load-bearing capacity of the selected tower using the load-bearing capacity diagrams

Based on the standard load determination by coverage areas, the shoring is assigned to class B2 and the load-bearing capacity of the towers is reduced by the factor 1.15.

Load capacity acc. to type test for B1
(s_{tot} = 30 cm, q = 0.80 kN/m²): max. perm. F_v = 52.0 kN

Reduction for classification as B2
max. perm. $F_{v, B2}$ = 52.0 / 1.15 = 45.2 kN > 40 kN = $F_{v, vorh}$
➔ Verification provided.

8. TEST REPORT

Deutsches Institut für Bautechnik

DIBt

Zulassungsstelle für Bauprodukte und Bauarten

Bautechnisches Prüfamt

Eine vom Bund und den Ländern gemeinsam getragene Anstalt des öffentlichen Rechts

Mitglied der EOTA, der UEAtc und der WFTAO

Prüfbericht

Datum: 19.07.2016

Geschäftszeichen: I37 6210#2011-17/3

Prüfbericht Nr.:
TP-11-017

Geltungsdauer
vom: **21.07.2016**
bis: **20.07.2021**

Antragsteller:
Wilhelm Layher GmbH & Co. KG
Ochsenbacher Straße 56
74363 Güglingen-Eibensbach
DEUTSCHLAND

Gegenstand der Typenprüfung:
Allround Traggerüstturm TG 60

Dieser Prüfbericht umfasst zehn Seiten und gilt für die unter II.1 aufgeführten Bauvorlagen.

DIBt

DIBt | Kolonnenstraße 30 B | D-10829 Berlin | Tel.: +49 30 78730-0 | Fax: +49 30 78730-320 | E-Mail: dibt@dibt.de | www.dibt.de

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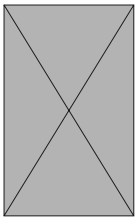
Ochsenbacher Strasse 56
74363 Güglingen-Eibensbach
Germany

Postfach 40
74361 Güglingen-Eibensbach
Germany
Telephone +49(0) 71 35 70-0
Fax +49(0) 71 35 70-265
E-mail info@layher.com
www.layher.com



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