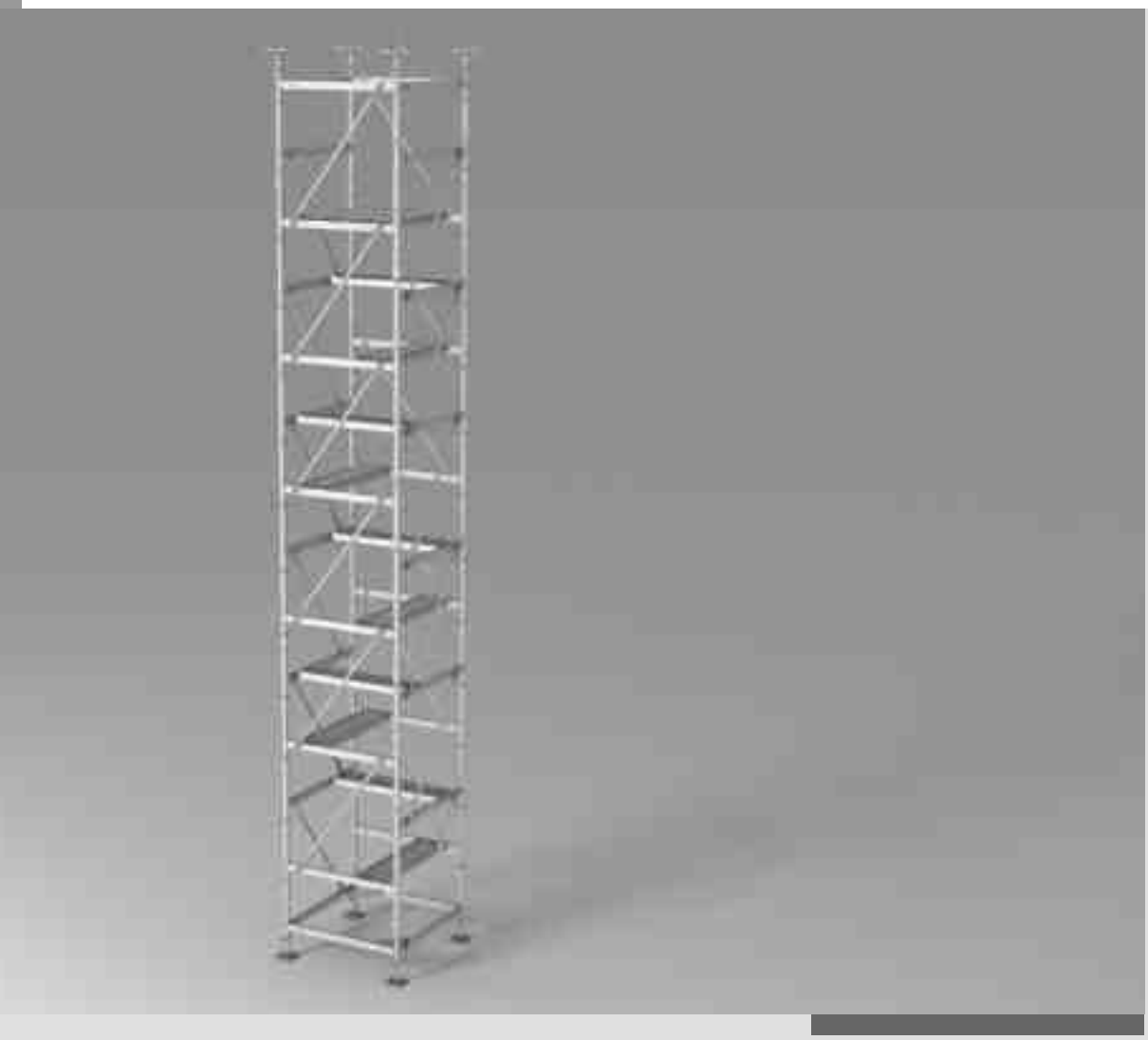
# ST 100 Stacking Tower
## Shoring

Instructions for Assembly and Use – Standard Configuration



Edition 04 | 2014

# Content



**Key**


Safety instructions


Visual check


Load-bearing point


Safety helmet


Eye protection


Important

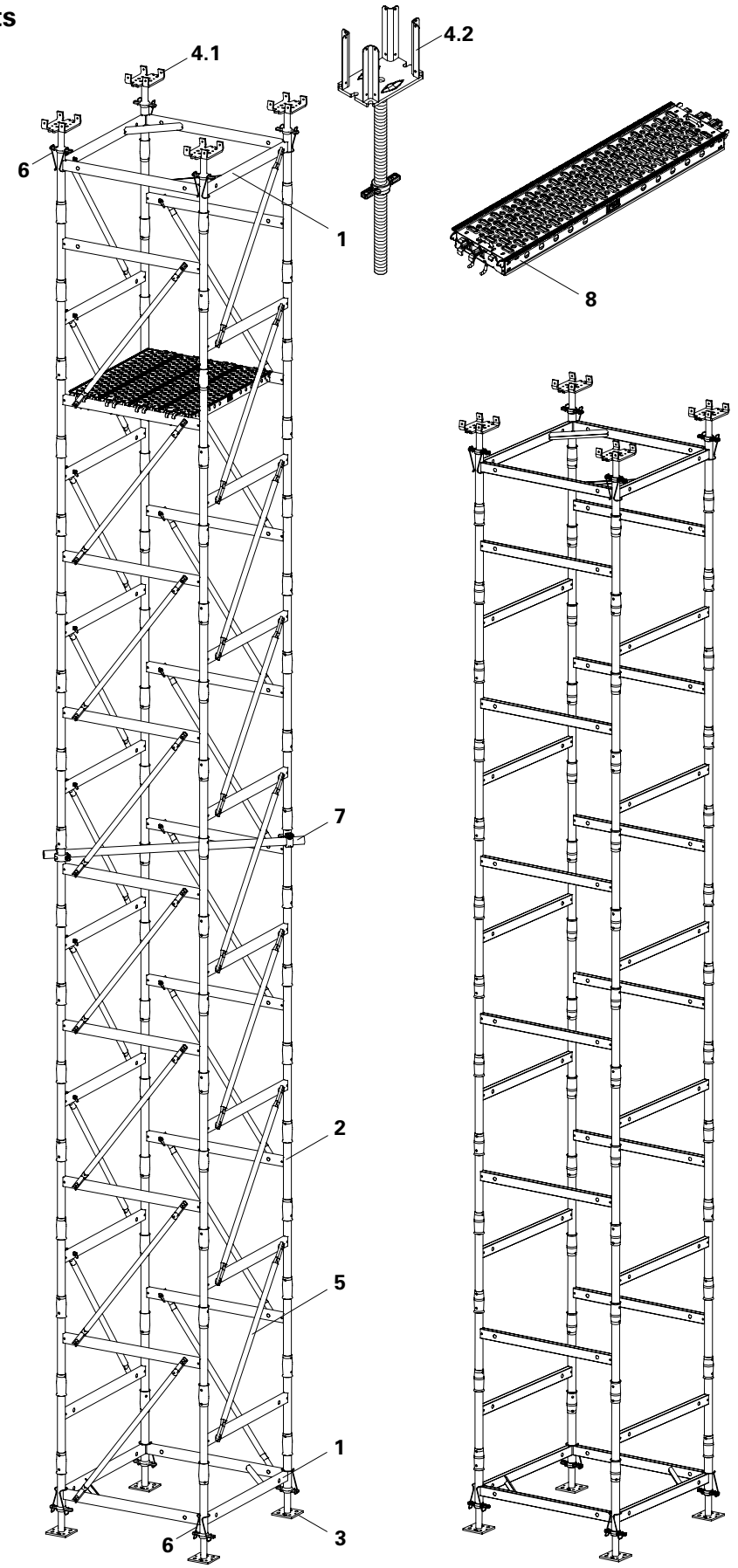

Tip


Hand protection


Foot protection

# Introduction

## Overview, Main Components




1 Base-Head Frame ST 100
2 Stacking Frame ST 100
3 Base Spindle TR 38-70/50
4.1 Head-Spindle-2 TR 38-70/50
4.2 Cross-Forkhead TR 38-70/50
5 Diagonal Strut ST 100
6 Spindle Safety Strap
7 Horizontal Brace
8 Steel Deck UDG 25 x 100

# Introduction

## Intended Use

**Product Description**
The PERI ST 100 Stacking Tower is used for shoring purposes. The tower can be used either free-standing or restrained at the top.
All permissible heights can be assembled using only one type of stacking frame. Connecting the stacking frame is carried out without any small parts – it is simply slotted together. The diagonal bracing guarantees very tight connections in order to allow transportation with the crane as well as erection of the tower.
Assembly and dismantling is possible both vertically and horizontally without the use of a crane.
The ST 100 is completely galvanized and maintenance-free.

**Technical Data**
For permissible load-bearing capacities see type tests and PERI design tables.

Type-tested assembly heights as an individual shoring tower:
– free-standing up to h = 7.29 m
– restrained at the top up to h = 12.29 m

**System dimensions:**
Square-shaped layout with
1.00 m x 1.00 m axial dimensions.

## Misapplications

**General**
The use in a way not intended, deviating from the standard configuration or the intended use according to the Instructions for Assembly and Use, represents a misapplication with a potential safety risk, e.g. risk of falling.

Only PERI original components may be used. The use of other products and spare parts represents a misapplication with associated safety risks.

Changes to PERI components are not permitted.

The illustration on the front cover of these instructions is understood to be a system representation only. The structures shown in these instructions for assembly and use are examples and feature only one component size. They are valid for all component sizes contained in the standard configuration accordingly.

For the sake of comprehensibility, some safety details have been omitted. The safety installations which have possibly not been featured in these detailed drawings must nevertheless be available.

## Safety instructions

**General**

PERI products have been designed for exclusive use in the industrial and commercial sectors only by suitably trained personnel.

These instructions for assembly and use serve as basis for the project-related risk assessment and the instructions for the provision and use of the system by the contractor (user). However, they do not replace them.

Materials and working areas are to be inspected on a regular basis especially before each use and assembly, and checked for signs of damage as well as stability and functionality. Damaged components must be exchanged immediately on site and may no longer be used.

Safety instructions and permissible loads must be observed at all times.

Remove safety components only when they are no longer required or if the official representative of the contractor gives instructions for this to take place.

For the application, inspection and repair of our products, the current safety regulations and guidelines must be observed in the respective countries where they are being used.

Components provided by the contractor must conform with the characteristics required in these Instructions for Assembly and Use as well as with all valid construction guidelines and standards. In particular, the following applies if nothing else is specified:

- timber components: Strength Class C24 for Solid Wood according to EN 338.
- scaffold tubes: galvanised steel tubes with minimum dimensions of Ø 48.3 x 3.2 mm according to EN 12811-1:2003 4.2.1.2.
- scaffold tube couplings according to EN 74.

Deviations from the standard configuration may only be carried out after a separate risk assessment has been completed by the contractor (user). On this basis, appropriate measures for the working safety and stability are to be implemented.

The contractor must ensure that the Instructions for Assembly and Use provided by PERI are available at all times for the users and must ensure they are also fully understood.

In the case of unfavourable weather conditions, suitable precautions and measures are to be implemented in order to guarantee working safety and stability.

After exceptional events or long periods of downtime on the jobsite whereby the scaffold or sub-structure were not used, the unit and its components must be checked for signs of damage as well as stability and functionality by an authorized person.

The contractor (user) must ensure the stability throughout all phases of construction. He must ensure and verify that all occuring loads are safely transferred.

The contractor (user) has to provide safe working areas for site personnel which are to be reached through the provision of safe access ways. Areas of risk must be cordoned off and clearly marked. Hatches and openings on accessible working areas must be kept closed during working operations.

The contractor must ensure that the user fulfils the minimum requirements for personal protective equipment, e.g.:

- hand protection,
- safety helmet,
- foot protection,
- eye protection.

## Storage and Transportation

Do not drop the components.

Store and transport components ensuring that no unintentional change in their position is possible. Detach lifting gear from the lowered units only if they are in a stable position and no unintentional change is possible.

During the moving procedure, ensure that components are picked up and set down so that unintentional falling over, falling apart, sliding or rolling is avoided.

Use only suitable load-carrying equipment to move the components as well as the designated load-bearing points.

During the moving procedure always use a guide rope.

Move components on clean, flat and sufficiently load-bearing surfaces only.

Use original PERI storage and transport systems, e.g. crate pallets, pallets or stacking devices.

## Safety Instructions

**System-specific**
Retract components only when the concrete has sufficiently hardened and the person in charge has given the go-ahead for striking to take place.

Anchoring is to take place only if the anchorage has sufficient concrete strength.

The horizontal non-displaceability of the component which is to be supported must be ensured (exception: free-standing towers).

The load-distributing support used, such as planking, must match the respective covering. If several layers are required, planks are to be arranged crosswise.

In the case of application as horizontal bracing, project-specific proof of stability is required.

The stacking tower is not a climbing aid!

## Additional Product Information

- ST 100 Stacking Tower brochure
- ST 100 Stacking Tower type test
- PERI design tables
- Instructions for Use: Pallets and Stacking Devices
- Data Sheet for Anchor Bolt PERI 14/20 x 130

## Care and Maintenance Instructions

PERI products have been designed for long-term use on construction sites.

In order to maintain the value and operational readiness of the working and safety scaffold over a long period of time, it is important that all components are carefully handled at all times.

Repairs on PERI products are to be carried out only by qualified PERI personnel.

Scaffolding couplers are mounted while always ensuring that the surface of the tubes is not damaged.

## Inspection and Hand-Over

The erected shoring must be inspected by the contractor in order to determine that assembly has been carried out correctly. If the contractor is convinced that the scaffold has been correctly erected, it can then be handed over to the user. It is advisable to carry out the hand-over together with the user and document this in a written report, for example.

# A1 Horizontal Assembly

## Assembly of the Base

| | | |
|---|---|---|
| **1** | Base Frame | 1x |
| **2** | Stacking Frame | 6x |
| **3** | Base Spindle TR 38-70/50 | 4x |
| **5** | Diagonal Strut ST 100 | 4x |
| **6** | Spindle Safety Strap | 4x |

**Always use the stacking frame crosswise!**

**Assembly**

1. Insert four Base Spindles TR 38-70/50 (3) into the Base-Head Frame ST 100 (1). (Fig. A1.01)
2. Adjust Quick Jack Nut (3.1) accordingly. Take into consideration the maximum spindle extension (see design tables)!
3. Check the evenness by means of a spirit level and adjust height if necessary. (Fig. A1.02)
4. Secure Base Spindles using Safety Straps (6). (Fig. A1.03 + A1.03a)
5. Mount Stacking Frame (2) crosswise. (Fig. A1.04 + A1.04a)
6. Mount Diagonal Strut (5), see below. (Fig. A1.04)
7. Place tower base together with Base Spindles on timbers. (Fig. A1.05)

– Safety Straps must be attached to the longitudinal holes of the Quick Jack Nuts.
– Legs of the Stacking Frame must lie flat. (Fig. A1.04a)

## Assembly of the Diagonal Struts

Diagonal Struts can be internally or externally-mounted.

Install the Diagonal Struts on the underside from the inside!

**Assembly**

1. Attach pin (5.1) to the Base-Head Frame or Stacking Frame.(Fig. A1.05a)
2. Fix to the next highest Stacking Frame by means of a gravity pin (5.2). (Fig. A1.05b)

The Struts are now installed with tension and compression-proof connections.

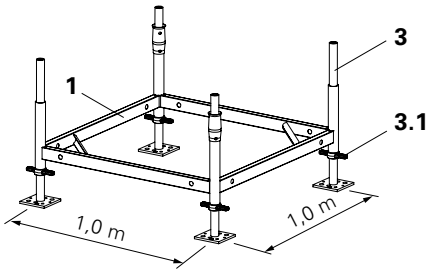


Fig. A1.01

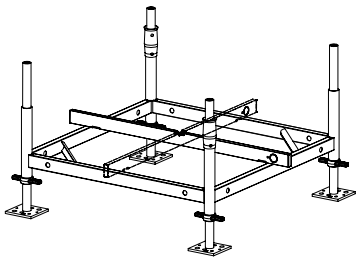


Fig. A1.02

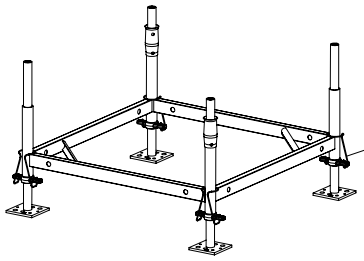


Fig. A1.03

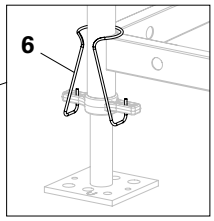


Fig. A1.03a

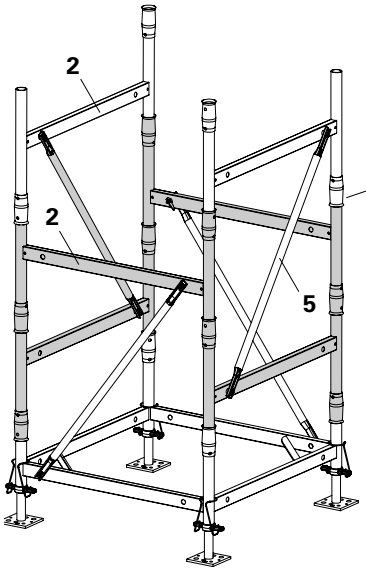


Fig. A1.04

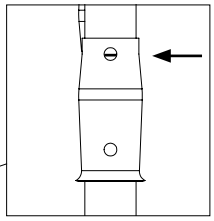


Fig. A1.04a

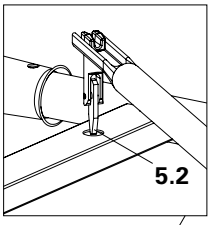


Fig. A1.05b

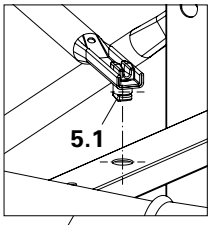


Fig. A1.05a

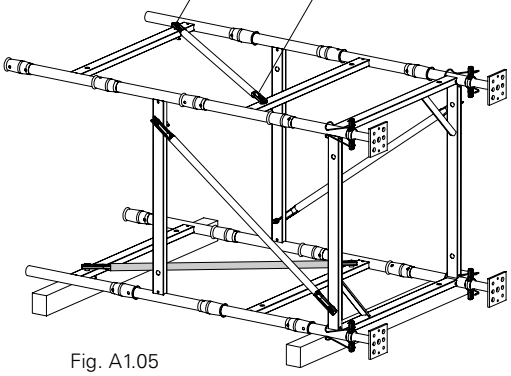


Fig. A1.05

## Assembly of the Stacking Tower

| | | |
|---|---|---|
| **1** | Base Frame | 1x |
| **2** | Stacking Frame* | 4x |
| **4.1** | Head-Spindle-2 TR 38-70/50 | 4x |
| **4.2** | Cross-Forkhead TR 38-70/50 | 4x |
| **5** | Diagonal Strut ST 100* | 4x |
| **6** | Spindle Safety Strap | 4x |

* per metre of height

**During horizontal assembly, ensure that all diagonal struts and safety straps are installed!**

- For tower heights h > 8.30 m, a Horizontal Brace (7) is to be mounted in order to ensure the cross-sectional form, approx. at h/2, see A2.
  This consists of: 1 x scaffold tube Ø 48.3 and 2 x standard couplings.
- When dismantling, a clearance of 90 cm is required for removing the Head Spindle.

**Assembly**

1. Mount Stacking Frames (2) until required height has been reached (4 pieces per metre of height). (Fig. A1.06)
2. Install Diagonal Struts (5) keeping pace with assembly progress.
3. Insert Base-Head Frame (1). (Fig. A1.07)
4. Adjust Head Spindle (4) accordingly. Take into consideration the maximum spindle extension (see design tables)!
5. Insert Head Spindle into the Base-Head Frame and secure with Safety Straps (6). (Fig. A1.08)

The Stacking Tower is tension-proof connected.

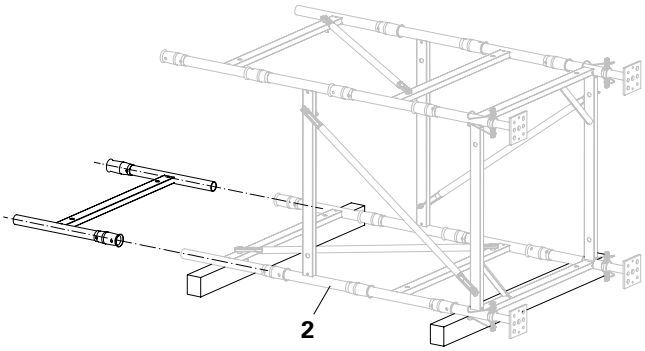



Fig. A1.06

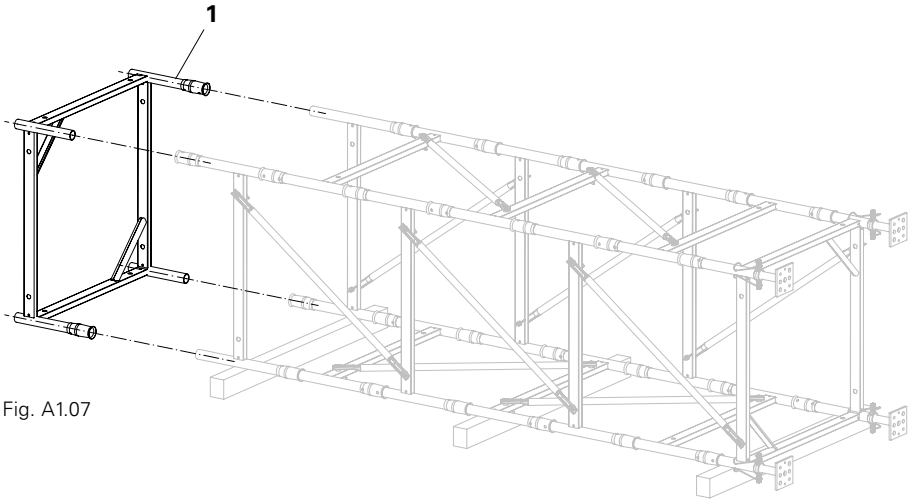



Fig. A1.07

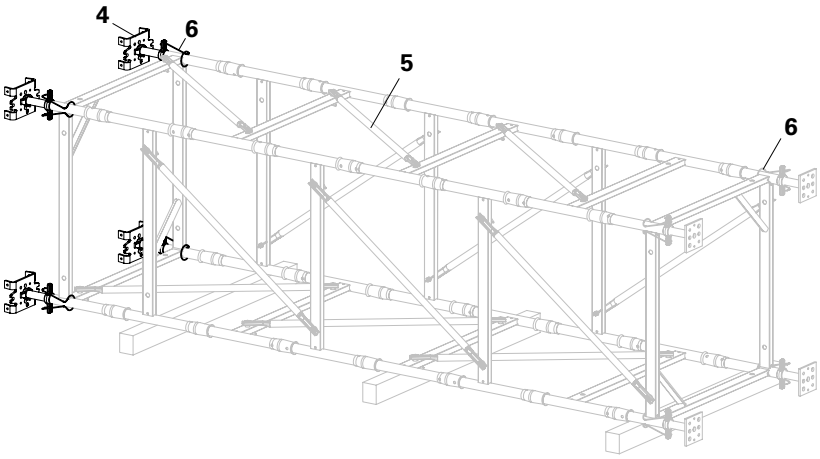



Fig. A1.08

## Head Spindles

| | | |
|---|---|---|
| **4.1** | Head Spindle TR 38-70/50 | 4x |
| **4.2** | Cross Forkhead TR 38-70/50 | 4x |

**Head Spindle TR 38-70/50 (4.1)**
With articulated-mounted Head Plate.
This carries loads centrically.
The maximum tilt of the forkhead is 4.4° on all sides.
Different types of main beams can be used, e.g. Steel Walers SRZ/SRU or wooden girders.
(Fig. A1.09a)

**Cross Forkhead TR 38-70/50 (4.2)**
With rigid Head Plate for tilt-resistant support of one or two GT 24 or VT 20 girders.
(Fig. A1.09b)

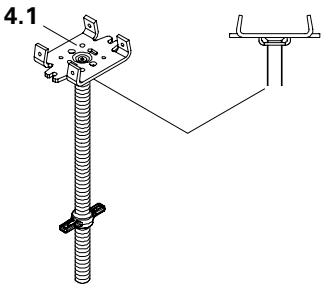



Fig. A1.09a

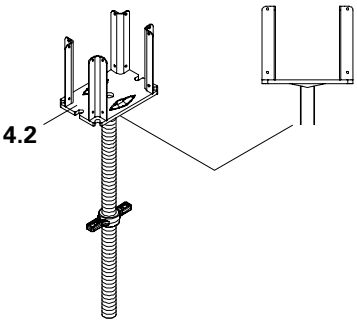



Fig. A1.09b

## Raising the Stacking Tower

**Check the stability at all times! Secure stacking tower against tipping!**

**Erection**

1. Raise the stacking tower and position on a flat and sufficiently load-bearing surface.
2. Vertically align the Stacking Tower. Check the vertical position of the legs and adjust if necessary.
3. Brace the Stacking Tower, see Section A5.
4. Install assembly level in order to mount bracing or release the crane slings; e.g. with Steel Decks UDG.

**Tower height h ≤ 12.30 m**
Attach crane slings, L > 3.0 m (4-sling) to the end frame of the Stacking Tower.
(Fig. A1.10)

Stacking towers h > 12.30 m must be pre-assembled using individual units which are vertically placed above each other.

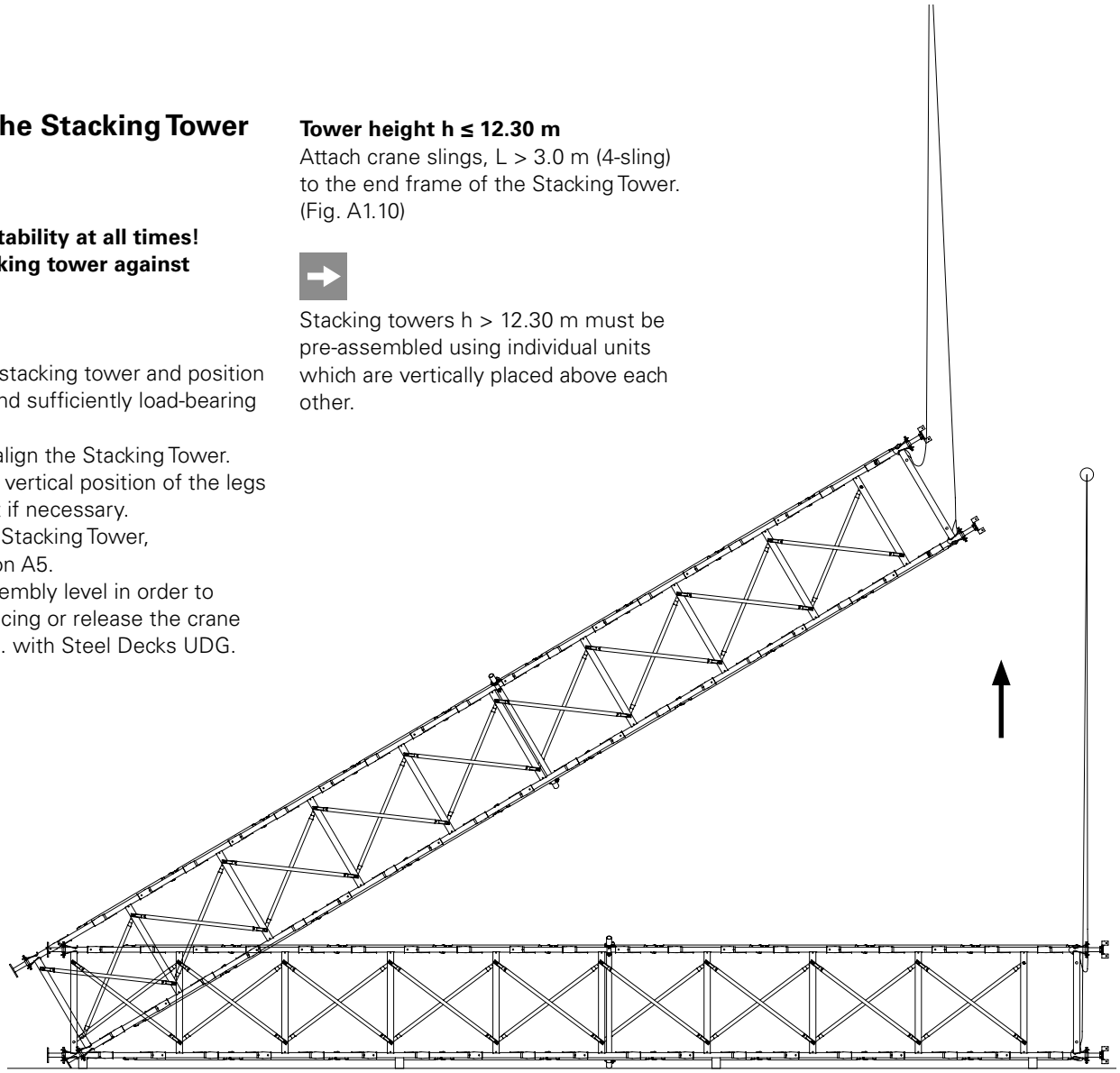


Fig. A1.10

## Assembly of the Base

See A1: Horizontal Assembly

## Assembly of the Stacking Tower

| | | |
|---|---|---|
| **1** | Base-Head Frame | 1x |
| **2** | Stacking Frame* | 4x |
| **4.1** | Head Spindle TR 38-70/50 | 4x |
| **4.2** | Cross Forkhead TR 38-70/50 | 4x |
| **5** | Diagonal Strut ST 100* | 4x |
| **6** | Spindle Safety Strap | 4x |

* per metre of height

**Assembly aids**

| | |
|---|---|
| **8** | Steel Deck UDG 25 x 100 |

**Fall hazard!**
**Check the stability at all times!**
**Secure Stacking Tower against tipping!**
**Take all required components up to the required assembly position using the protection of the erected Stacking Tower and install (cf. Fig. A2.01)!**

**Assembly**

1. Mount Stacking Frames (2) until required height has been reached (4 pieces per metre of height). Check the vertical position of the legs and adjust if necessary. (Fig. A2.01)
2. Spindle-shaped installation of Steel Deck UDG 25 x 100 (8) for use as access means and platform (assembly aid). (Fig. A2.02)
3. Install Diagonal Struts (5) and Safety Straps according to the individual application and static requirements. Assembly: see A1.
4. Insert Base-Head Frame (1).
5. Adjust Head Spindles (4) accordingly and insert into the Base-Head Frame. (Fig. A2.02)

Take into consideration the maximum spindle extension (see design tables)!

The formwork configuration can now be mounted.

For tower heights h > 8.30 m, a horizontal brace is to be fitted at the halfway point of the tower in order to ensure the cross-sectional form. (Fig. A2.03)
Consists of:
1 x scaffold tube Ø 48.3 (7.1),
2 x standard couplings (7.2).

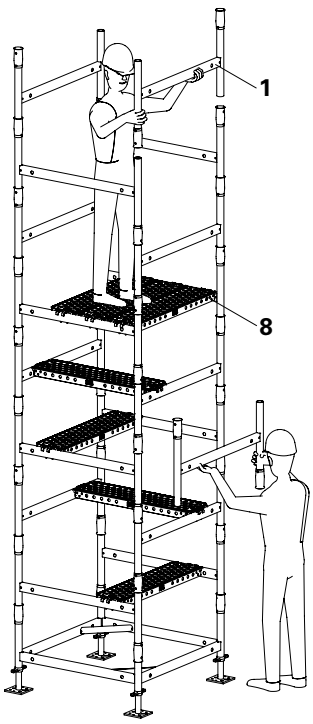



Fig. A2.01

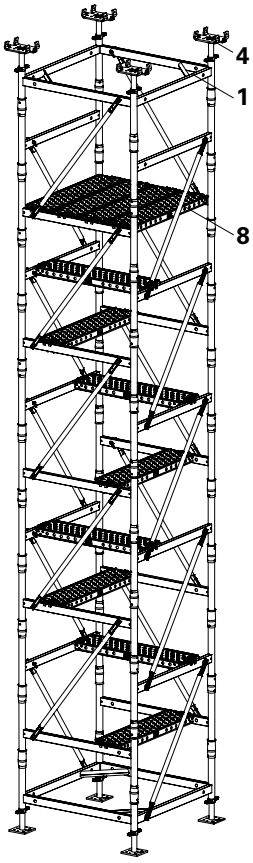



Fig. A2.02

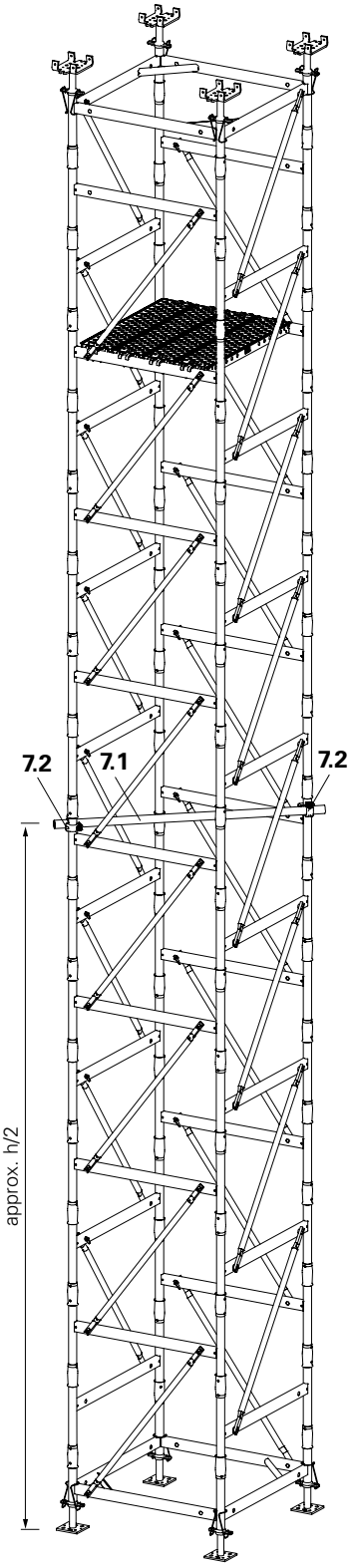



Fig. A2.03

## Moving by Crane

**Moving**

1. Tightly connect all frames with Diagonal Strut (5) and mount Safety Straps (6).
2. Attach lifting gear and move Stacking Tower.
3. Secure Stacking Tower against moving and tilting, see Section A5. (Fig. A3.01)
4. Release crane lifting gear.

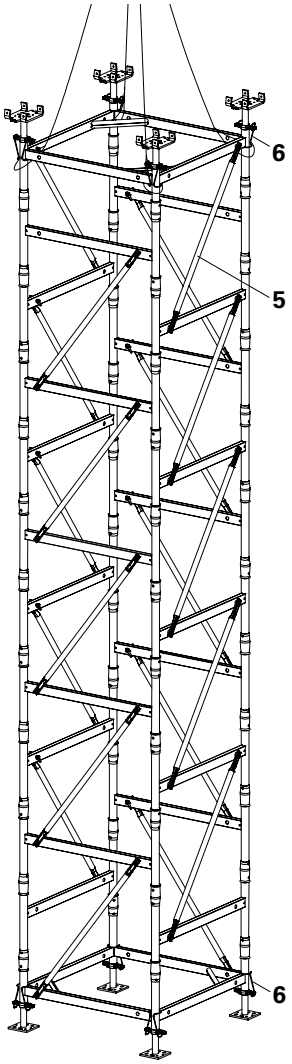


Fig. A3.01

## Moving with the Transportation Wheel

| | | |
|---|---|---|
| **9a** | Transportation Wheel UEW* | 4x |
| **9b** | Connection Transp. Wheel ST 100* | 4x |

* per tower

**The Transportation Wheel is used exclusively for moving the Stacking Tower!**
**Load-bearing capacity per wheel:**
- **3.5 kN with spindle extensions up to 30 cm!**
- **2.5 kN when fully extended (not part of the type test)!**

Coupling only closes if the Base-Head Frame is resting on the supports, and the Base-Head Frame and Stacking Frame are completely flat.

**Preparation**

1. Tightly connect Stacking Tower h > 4.50 m with Diagonal Struts.
2. Remove Safety Straps from the Base Spindles.

**Mounting the Transportation Wheel**

1. Insert Transportation Wheel UEW (9a) as far as possible into the designated connection (9b) and pin. Open coupling.
2. Retract Transportation Wheel with supports (9.1) under the Base-Head Frame.
3. Lift Tranportation Wheel and position vertically. The locating board (9.2) clips on the Stacking Frame.
4. Close coupling by means of the star grip (9.3). (Fig. A3.02)
5. Mount Transportation Wheels to all legs of the Stacking Tower.

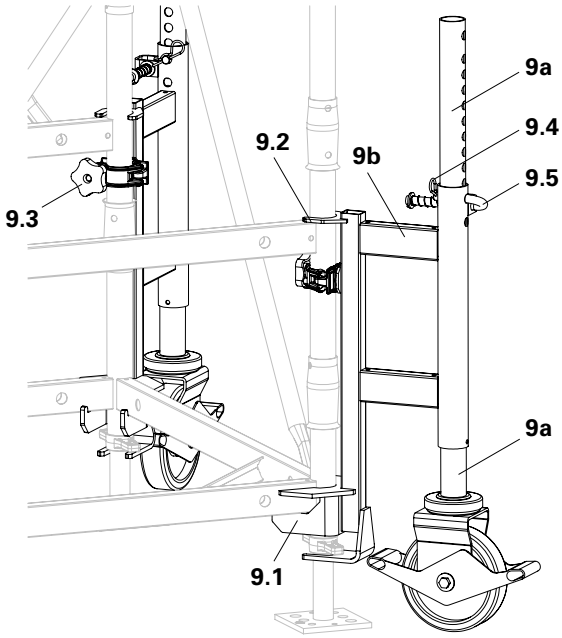


Fig. A3.02

## Moving with the Transportation Wheel

**Shift Stacking Tower (weight) onto the Transportation Wheel**
Working on all four Transportation Wheels.
1. Release cotter pins (9.4) and remove bolts (9.5).
2. Lower Transportation Wheels UEW (9a) to the ground and pin with bolts (9.5) in the corresponding hole combination.
3. Secure with cotter pins.
4. Release Base Plates by alternately turning all four Quick Jack Nuts until the weight of the Stacking Tower is moved onto the Transportation Wheels. (Fig. A3.03)

**Moving**

A minimum of 2 persons are required to move the Stacking Tower.
Secure Stacking Tower h > 4.50 m against tipping when moving.

**Moving**
1. Remove formwork, decking and loose components.
2. Move the Stacking Towers on a clean and flat surface.

**Position Stacking Tower**
1. Lower Base Plates and place Stacking Tower on the Base Plates.
2. Vertically align Stacking Tower and secure against tipping, see Section A5.
3. Release bolts (9.5), retract Transportation Wheels (9a) and secure with cotter pins.
4. Open couplings by means of the star grip (9.3).
5. Remove Transportation Wheels.

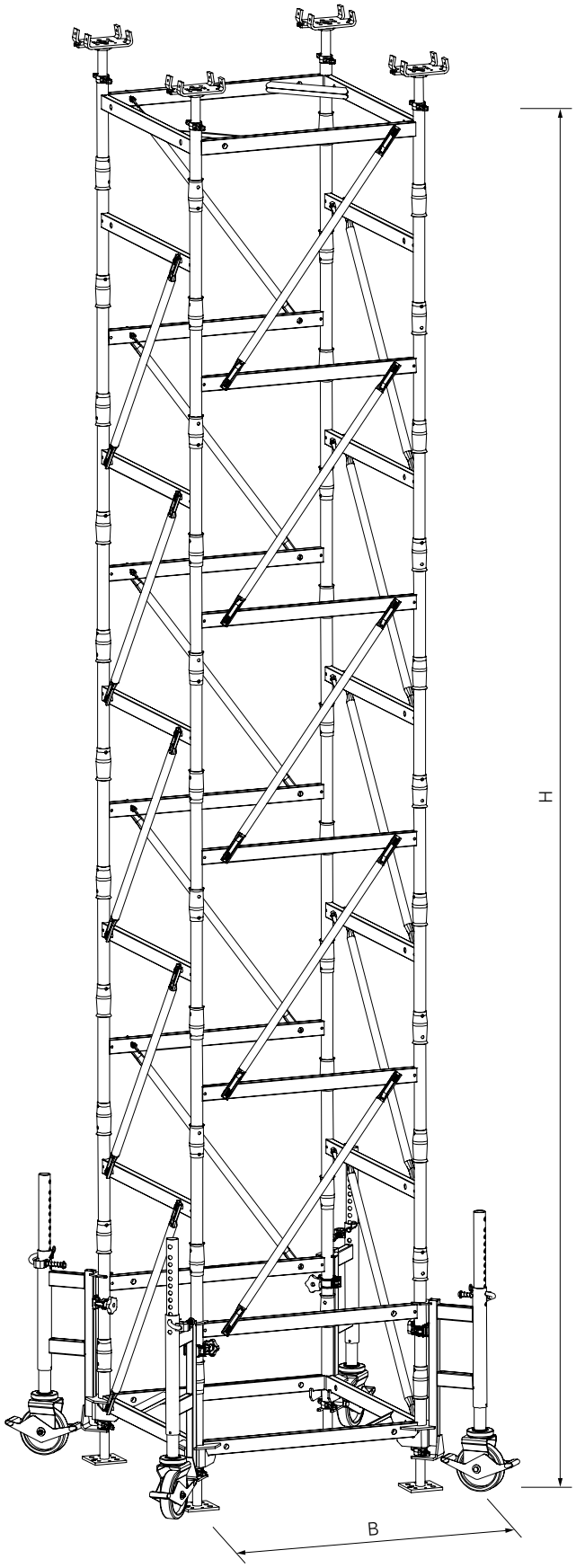



Fig. A3.03

# A4 Dismantling

Dismantling can take place on a vertically or horizontally-positioned Stacking Tower.

– When dismantling, a clearance of 90 cm is required for removing the Head Spindle.

**Vertical Dismantling**
Remove all parts using the protection of the Stacking Tower itself.

**Fall hazard!**
**Ensure stability during dismantling at all times!**
**Secure Stacking Tower against tipping!**

1. Spindle-shaped installation of steel decking, also for use as platform (assembly aid).
2. Set the Stacking Tower load-free.
3. Remove formwork configuration.
4. Dismantle tower from top to bottom. Remove horizontal mounting security only when the stability has been ensured. (Fig. A4.01)

**Horizontal Dismantling**
1. Set the Stacking Tower load-free.
2. Move out Stacking Tower from under the concreted slab.
3. Attach lifting chains and lower Stacking Tower onto a flat surface.
4. Dismantle Stacking Tower.

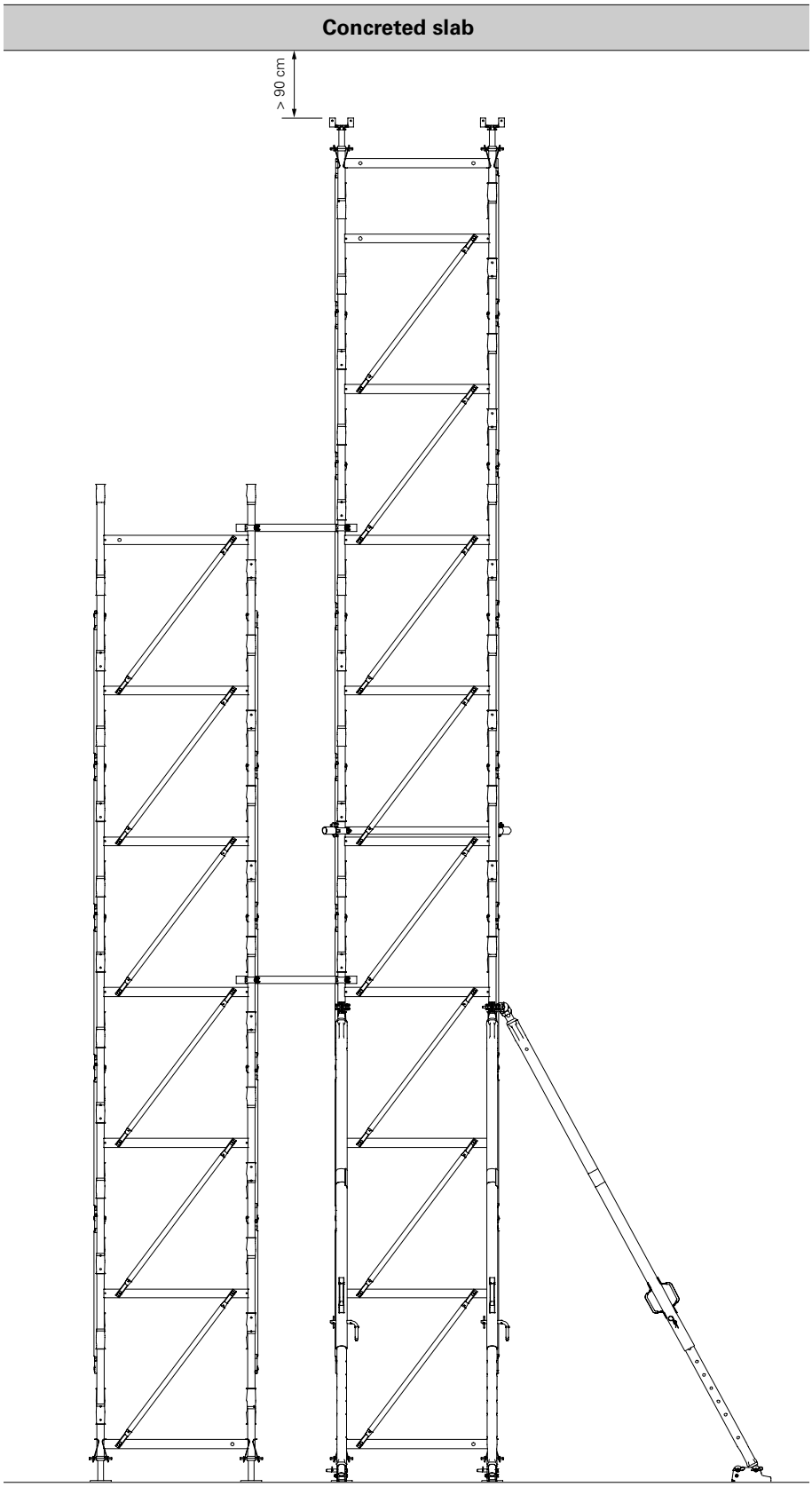



Fig. A4.01

# A5 Temporary Support

During assembly and dismantling, Stacking Towers or stacking tower units are to be secured against tipping by means of temporary assembly aids.

**Risk of tipping!**
**Units have to support one another. For providing stability, mount 3 push-pull props as assembly aids.**

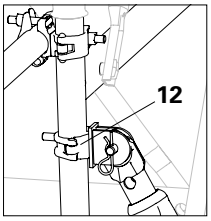



Fig. A5.01a

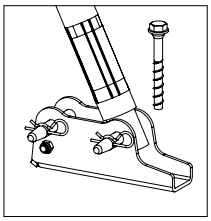


Fig. A5.01b

## Support with Push-Pull Props

**Assembly**

1. Attach tube coupling of the Brace Connector HDR (12) to the legs of the Stacking Frame.
2. Fix push-pull prop with bolts and cotter pins. (Fig. A5.01a)
3. Fix Base Plate RSS to the foundations by means of Anchor Bolt.
4. Fix push-pull prop to the Base Plate with bolts and cotter pins. (Fig. A5.01b)
5. Release Stacking Tower from crane.

**Connecting with tubes and couplers**

**Assembly**

1. Fix couplers to the legs of the Stacking Frame.
2. Connect Stacking Towers with scaffold tubes (11). (Fig. A5.02 + A5.02a)

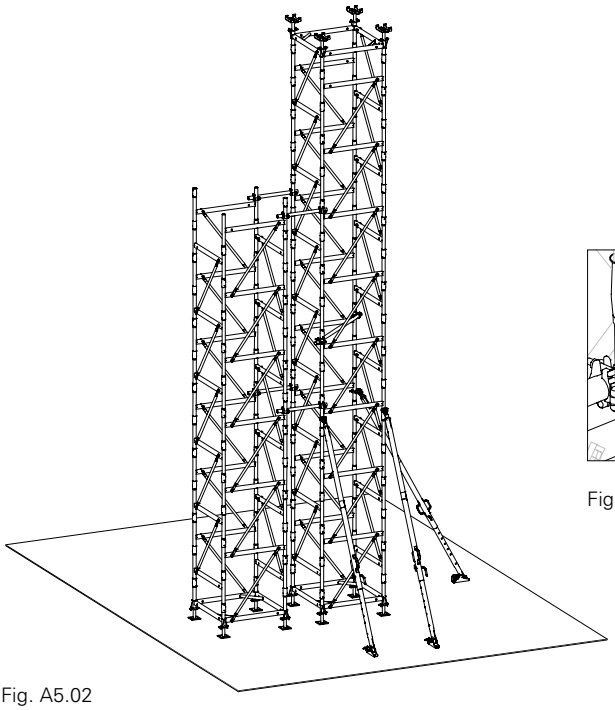


Fig. A5.02

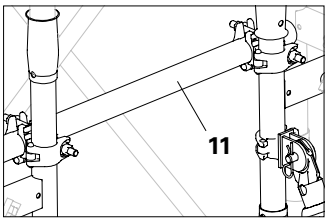



Fig. A5.02a

## Support in units

**Connecting with Clamping Rosetts and Ledgers**
(Out of PERI UP modular scaffolding system.)

**Assembly**

1. Arrange Stacking Towers in a metric grid
2. Fix Rosett Coupler (10) to the legs of the stacking frame. (Fig. A5.03a)
3. Mount Ledgers with the appropriate length in the Rosett Couplers.
4. Secure wedge using a hammer. (Fig. A5.03)

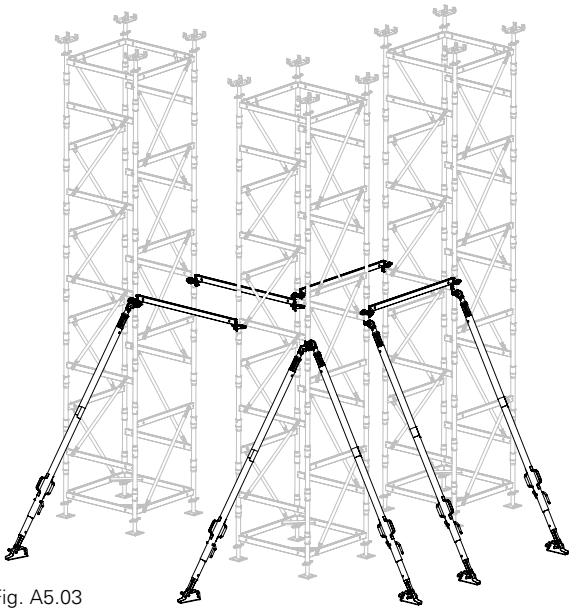


Fig. A5.03

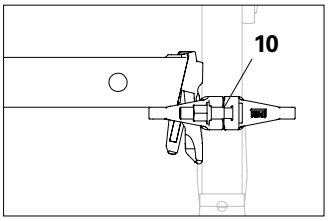



Fig. A5.03a

# A6 Storage and Transportation

**Follow Instructions for Use for PERI pallets and stacking devices!**

**Manually-created transport units must be correctly stacked and secured!**

**Storage**
ST 100 components are stored and transported in the PERI Pallet ST 100-2 (13a).
Capacity:
– 84 Stacking Frames +
– Head and Base Spindles +
– Diagonal Struts ST 100
(Fig. A6.01a)

The Base-Head Frame ST 100 (1) is to be stored in stacks and transported according to current regulations.
(Fig. A6.01b)

ST 100 components can also be stored and transported in PERI Crate Pallets (13b).
(Fig. A6.01c)

**Transportation**
PERI pallets and stacking devices are suitable for lifting by crane or forklift. They can also be moved with the PERI Pallet Lifting Trolley.
All pallets and stacking devices can be lifted using both the longitudinal and front sides.

The following are just some examples.

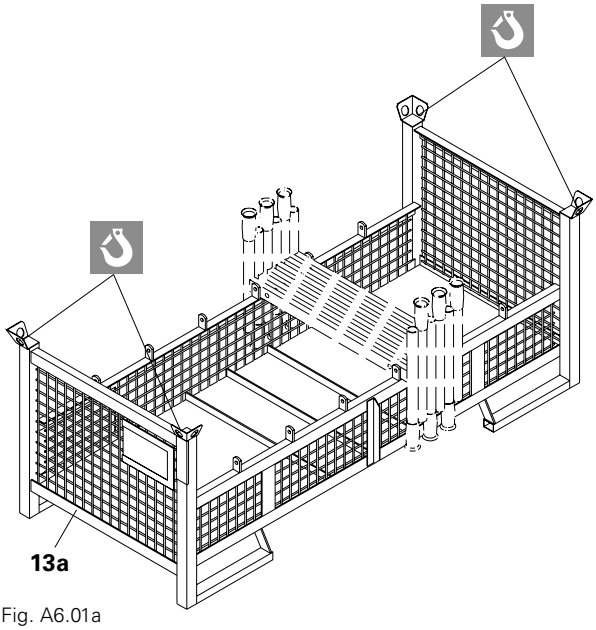
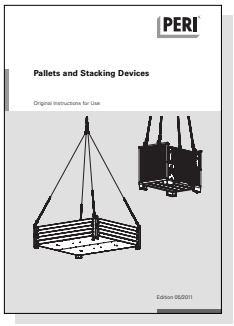



Fig. A6.01a



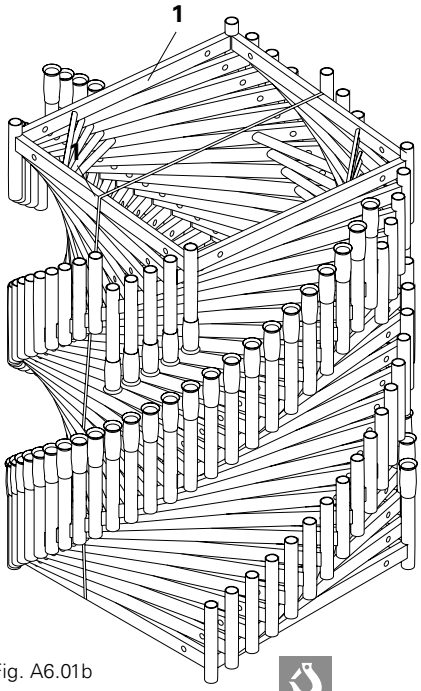




Fig. A6.01b

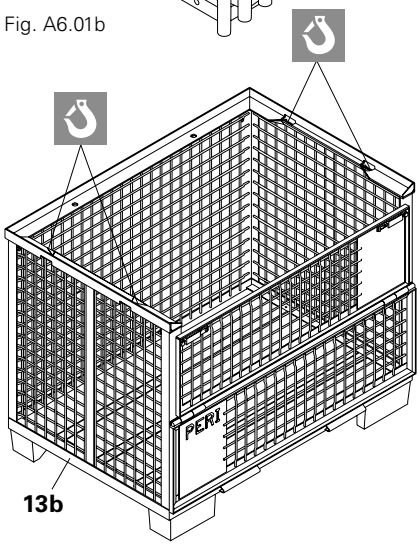



Fig. A6.01c

# A7 Calculating Material Quantities

**Required individual components for ST 100**
**Tower heights from 1.80 up to 22.29 m**

| Tower height [m] min. – max. | Stacking Frame | Diagonal Bracing (if required) | Weight [kg]* with Diagonal Struts | Weight [kg]* without Diagonal Struts |
|---|---|---|---|---|
| 1.80 – 2.29 | 4 | 4 | 121.76 | 112.60 |
| 2.30 – 2.79 | 6 | 6 | 139.98 | 126.24 |
| 2.80 – 3.29 | 8 | 8 | 158.20 | 139.88 |
| 3.30 – 3.79 | 10 | 10 | 176.42 | 153.52 |
| 3.80 – 4.29 | 12 | 12 | 194.64 | 167.16 |
| 4.30 – 4.79 | 14 | 14 | 212.86 | 180.80 |
| 4.80 – 5.29 | 16 | 16 | 231.08 | 194.44 |
| 5.30 – 5.79 | 18 | 18 | 249.30 | 208.08 |
| 5.80 – 6.29 | 20 | 20 | 267.52 | 221.72 |
| 6.30 – 6.79 | 22 | 22 | 285.74 | 235.36 |
| 6.80 – 7.29 | 24 | 24 | 303.96 | 249.00 |
| 7.30 – 7.79 | 26 | 26 | 322.18 | 262.64 |
| 7.80 – 8.29 | 28 | 28 | 340.40 | 276.28 |
| 8.30 – 8.79 | 30 | 30 | 368.52 | |
| 8.80 – 9.29 | 32 | 32 | 386.74 | |
| 9.30 – 9.79 | 34 | 34 | 404.96 | |
| 9.80 – 10.29 | 36 | 36 | 423.18 | |
| 10.30 – 10.79 | 38 | 38 | 441.40 | |
| 10.80 – 11.29 | 40 | 40 | 459.62 | |
| 11.30 – 11.79 | 42 | 42 | 477.84 | |
| 11.80 – 12.29 | 44 | 44 | 496.06 | |
| 12.30 – 12.79 | 46 | 46 | 514.28 | |
| 12.80 – 13.29 | 48 | 48 | 532.50 | |
| 13.30 – 13.79 | 50 | 50 | 550.72 | |
| 13.80 – 14.29 | 52 | 52 | 568.94 | |
| 14.30 – 14.79 | 54 | 54 | 587.16 | |
| 14.80 – 15.29 | 56 | 56 | 605.38 | |
| 15.30 – 15.79 | 58 | 58 | 623.60 | |
| 15.80 – 16.29 | 60 | 60 | 641.82 | |
| 16.30 – 16.79 | 62 | 62 | 669.94 | |
| 16.80 – 17.29 | 64 | 64 | 688.16 | |
| 17.30 – 17.79 | 66 | 66 | 706.38 | |
| 17.80 – 18.29 | 68 | 68 | 724.60 | |
| 18.30 – 18.79 | 70 | 70 | 742.82 | |
| 18.80 – 19.29 | 72 | 72 | 761.04 | |
| 19.30 – 19.79 | 74 | 74 | 779.26 | |
| 19.80 – 20.29 | 76 | 76 | 797.48 | |
| 20.30 – 20.79 | 78 | 78 | 815.70 | |
| 20.80 – 21.29 | 80 | 80 | 833.92 | |
| 21.30 – 21.79 | 82 | 82 | 852.14 | |
| 21.80 – 22.29 | 84 | 84 | 870.36 | |

**Basic components for all tower heights:**

2 x Base-Head Frames ST 100
4 x Base Spindles TR 38-70/50
4 x Head-Spindles-2
TR 38-70/50
or
4 x Cross Forkhead TR 38-70/50

8 x Safety Straps (if required)

Complete tower heights including Base and Head Spindles.
For tower heights:
> 8.30 m, 1 Horizontal Brace
> 16.30 m, install 2 Horizontal Braces (see A3 Vertical Assembly).

* The weight specifications are with the Cross Forkhead TR 38-70/50.

# Design Concept with Partial Safety Factors

## Static calculations according to state-of-the-art technology

In Germany and Europe, the design concept with partial safety factors has been considered as standard practice for some time now. Here, the actions (loads) are compared to the resistances (load-bearing capacities) of the static system. This is done on the design level (Index d for "design") and achieved through the increase of the characteristic actions and reduction of the characteristic resistances (Index k) with corresponding partial safety factors. The safety level remains the same.

Method of proof: $E_d \leq R_d$ with $E_d = E(\sum F_d)$, $F_d = \gamma_F \cdot F_k$ and $R_d = \frac{R_k}{\gamma_M}$

**Resistance side**

$R_k$ Characteristic value of the resistance (maximum load-bearing capacity to be applied; for steel, e.g. the yield strength)

$R_d$ Design value of the resistance

$\gamma_M$ Partial safety factor for resistances depending on the type of material
Steel: $\gamma_M = 1.10$
Timber: $\gamma_M = 1.30$

In addition, the following applies for timber:

$$R_d = k_{mod} \cdot \frac{R_k}{\gamma_M}$$

$k_{mod}$ Modification factor to consider the moisture content of the timber and load duration.

**Load side**

$F_k$ Characteristic value of an action (e.g. actual dead weight, assumed live load, assumed wind load)

$E_d$ Design value of an effect (e.g. internal forces or stresses) due to the sum of all actions $\sum F_d$ from a load combination.

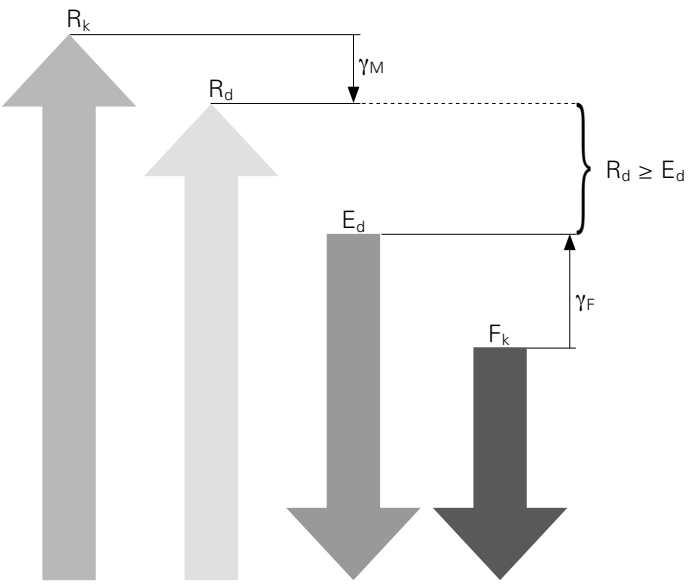
$\gamma_F$ Partial safety factor for actions depending on the type of action and according to the load combination (e.g. $\gamma_F = 1.35$ for dead weight or $\gamma_F = 1.50$ for live loads and wind loads)

**Background:**

Characteristic resistance values are generally determined by means of calculations of known limit stresses or through tests. In this respect, the 95%-fractile principle generally applies. This means that in statistical terms, 95% of all failure values are more than the characteristic resistance.

**Warning:**
The characteristic (actual) values of the actions are always to be increased with the partial safety factor $\gamma_F$ in order to be able to compare them with the design values of the resistance.

**Principle of the design method with partial safety factors**




**Note:**
Separate tables with design values $R_d$, which are to be used for the new concept with partial safety factors, are expressly indicated by PERI.
The design values can, after division by $\gamma_F = 1.5$, also be used as a permissible load for the procedure with an absolute safety factor.

# The Old Design Concept with Absolute Safety Factor

## Achieving the result faster

For carrying out quick and rough calculations on the construction site, calculations done according to the old design concept with an absolute safety factor are common and generally produce faster results.

Therefore, PERI continues to provide the user with only permissible loads and the resulting reaction forces in the design tables.

Effective safety against failure is given for both design methods. The only important thing is that it is clear to the user which value is to be used.

Method of proof: $F_{act.} \leq F_{perm.}$ with $F_{perm.} = \frac{F_{limit}}{\gamma_{tot}} \left(= \frac{R_k}{\gamma_M \ \gamma_F}\right)$

**Resistance side**

$F_{limit}$ Load-bearing capacity limit (maximum load-bearing capacity to be applied; for steel, e.g. the yield strength) corresponds to the characteristic value of the resistance $R_k$

$F_{perm.}$ Permissible load-bearing capacity

$\gamma_{tot}$ Absolute safety factor depending on the type of material
Steel: $\gamma_{tot} = 1.65$
Timber: $\gamma_{tot} = 2.17$

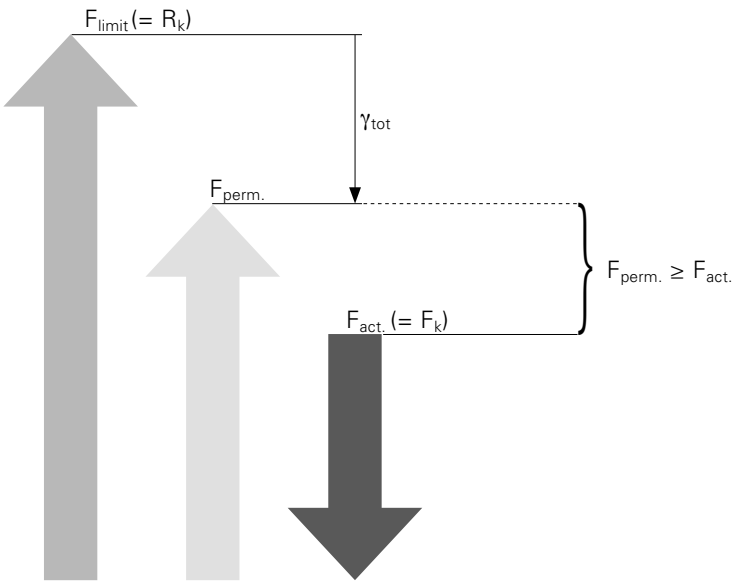
**Load side**

$F_{act.}$ Actual action (e.g. actual dead load, assumed live load, assumed wind load) corresponds to the characteristic value of the action $F_k$

**Note:**

This design method corresponds to DIN 4421. Through the assumption of a determined safety factor for actions of $\gamma_F = 1.5$, this proof is on the safe side.

**Principle of the design method with absolute safety factor**



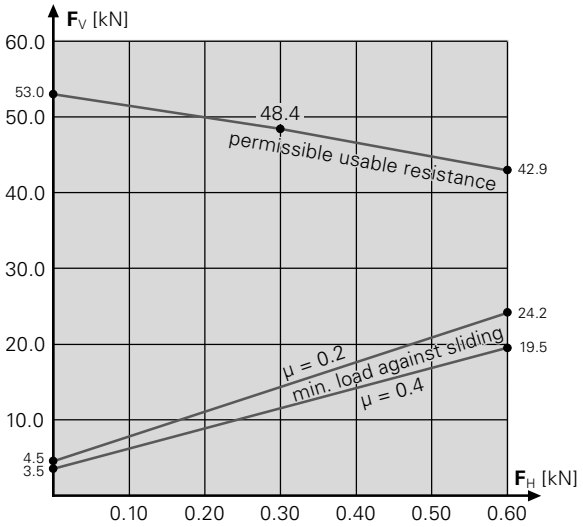

**Note:**
All tables in the PERI design tables or in the PERI bochures which are not separately marked feature permissible load-bearing capacities in accordance with this design method. After multiplication using $\gamma_F = 1.5$, the maximum load-bearing capacity can also be converted into a design value of the resistance $R_d$ for the method with partial safety factors.

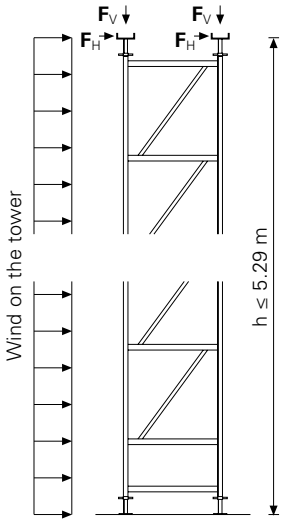
# ST 100 Stacking Tower
## Free Standing, with Pivoting Head Spindle

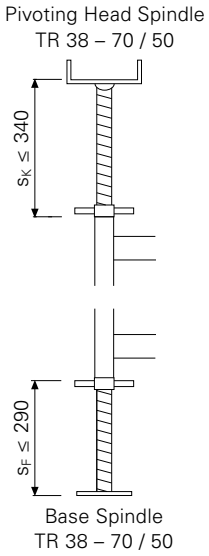
### Application Conditions (D1)

– free standing
– with wind
– with diagonal strut
– h ≤ 5.29 m

### Permissible leg load in accordance with the type test



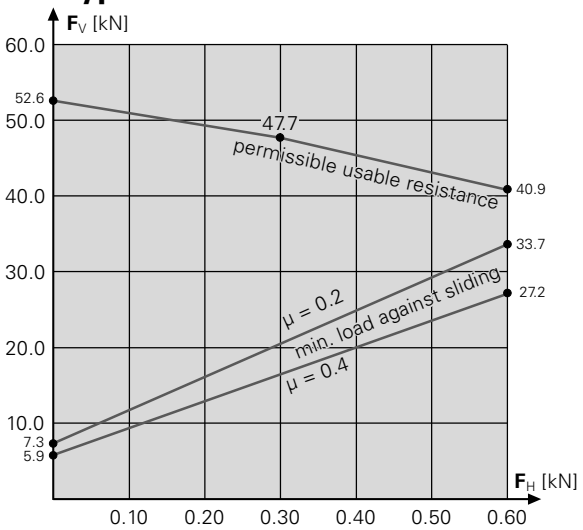



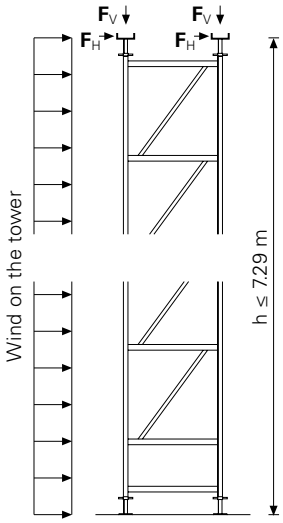



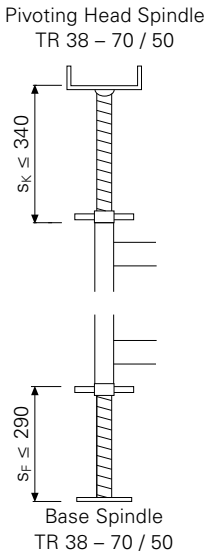

### Application Conditions (D2)

– free standing
– with wind
– with diagonal strut
– h ≤ 7.29 m

### Permissible leg load in accordance with the type test



# ST 100 Stacking Tower
## Restrained at the Top, with Pivoting Head Spindle

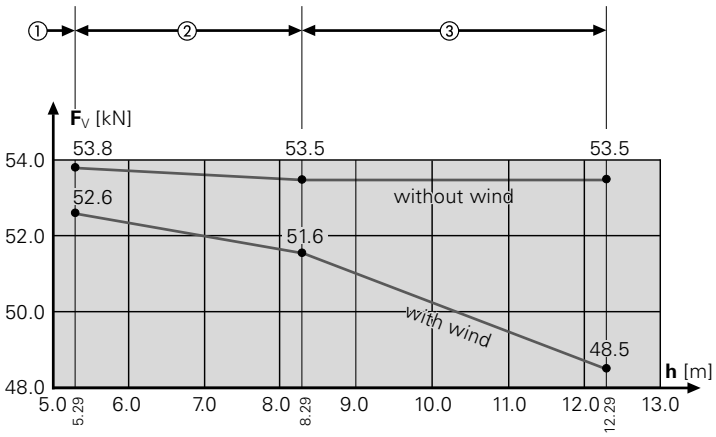
### Application Conditions (D3)

– restrained at the top
– with/without wind
– ① h ≤ 5.29 m:
  1 diagonal strut at the top and bottom

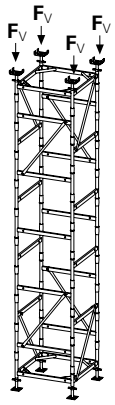
  ② 5.29 m < h ≤ 8.29 m:
  2 diagonal struts at the top and bottom

  ③ 8.29 m < h ≤ 12.29 m:
  3 diagonal struts at the top and bottom
  plus horizontal cross strut at approx. h/2

### Permissible leg load in accordance with the type test

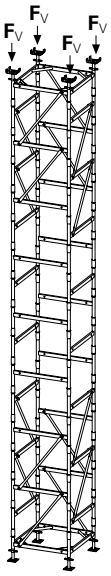



① **53.8 kN / Leg**
without wind
**52.6 kN / Leg**
with wind




**h ≤ 5.29 m:**
1 diagonal strut at the top and bottom.

② **53.5 kN / Leg**
without wind
**51.6 kN / Leg**
with wind




**h 5.29 m – 8.29 m:**
2 diagonal struts at the top and bottom.

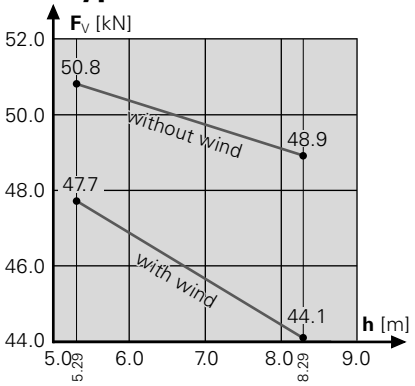
③ **53.5 kN / Leg**
without wind
**48.5 kN / Leg**
with wind

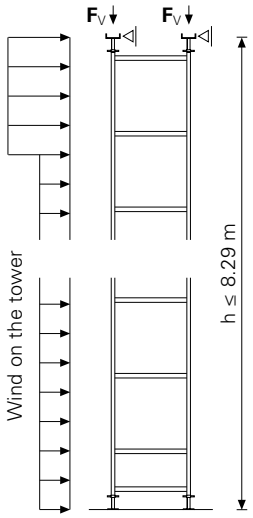

**h 8.29 m – 12.29 m:**
3 diagonal struts at the top and bottom, plus horizontal cross strut at h/2.

### Application Conditions (D4)

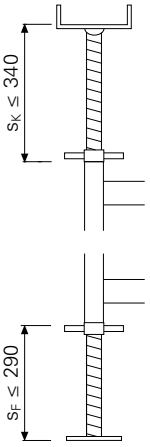
– restrained at the top
– without diagonal strut
– with/without wind
– h ≤ 8.29 m

### Permissible leg load in accordance with the type test




Pivoting Head Spindle
TR 38 – 70 / 50



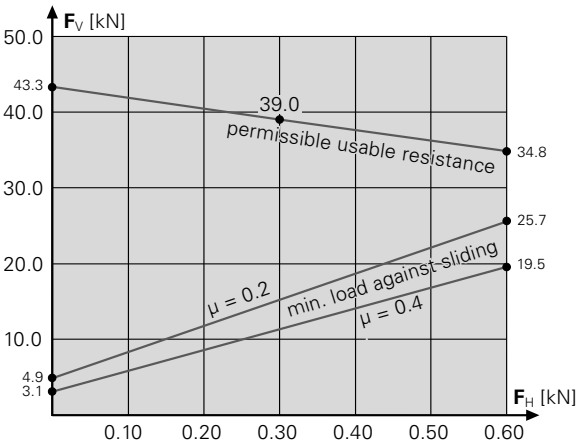

Base Spindle
TR 38 – 70 / 50

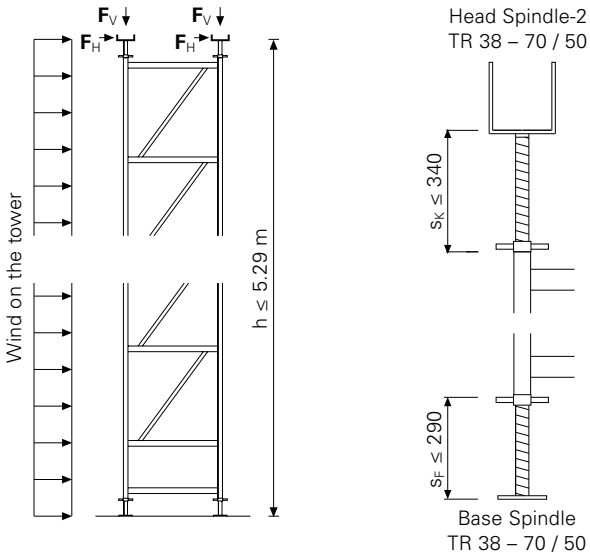
# ST 100 Stacking Tower
## Free Standing, with Head Spindle-2

### Application Conditions (D5)

– free standing
– with wind
– with diagonal strut
– h ≤ 5.29 m

### Permissible leg load in accordance with the type test

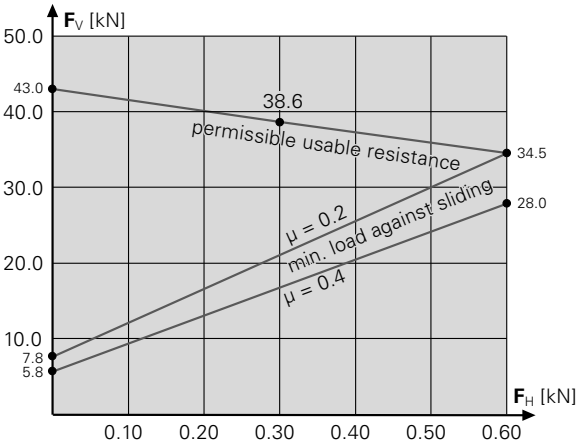


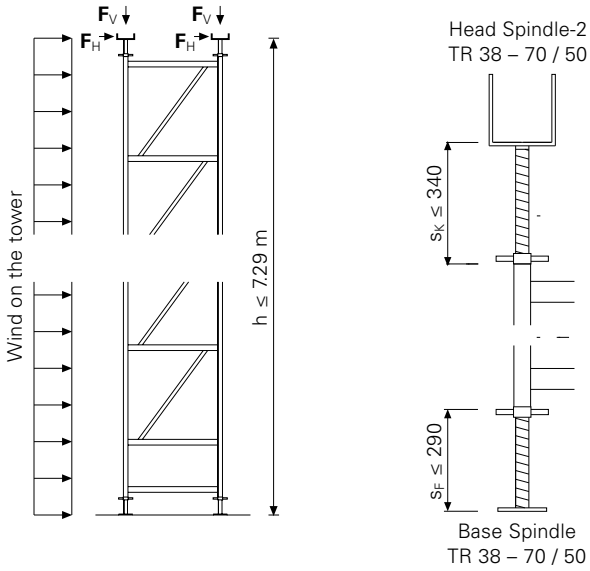




### Application Conditions (D6)

– free standing
– with wind
– with diagonal strut
– h ≤ 7.29 m

### Permissible leg load in accordance with the type test



# ST 100 Stacking Tower
## Restrained at the Top, with Head Spindle-2

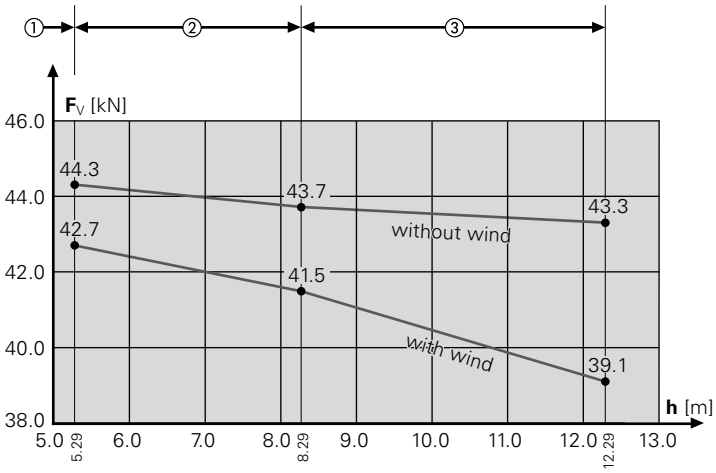
### Application Conditions (D7)

– restrained at the top
– with/without wind
– ① h ≤ 5.29 m:
  1 diagonal strut at the top and bottom

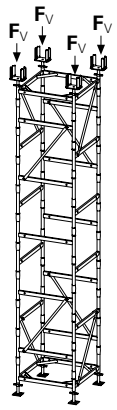
  ② 5.29 m < h ≤ 8.29 m:
  2 diagonal struts at the top and bottom

  ③ 8.29 m < h ≤ 12.29 m:
  3 diagonal struts at the top and bottom
  plus horizontal cross strut at approx. h/2

### Permissible leg load in accordance with the type test

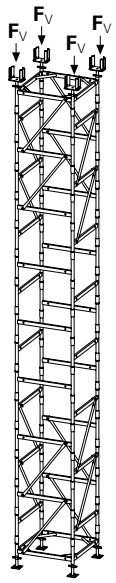



① **44.3 kN / Leg**
without wind
**42.7 kN / Leg**
with wind




**h ≤ 5.29 m:**
1 diagonal strut at the top and bottom.

② **43.7 kN / Leg**
without wind
**41.5 kN / Leg**
with wind




**h 5.29 m – 8.29 m:**
2 diagonal struts at the top and bottom.

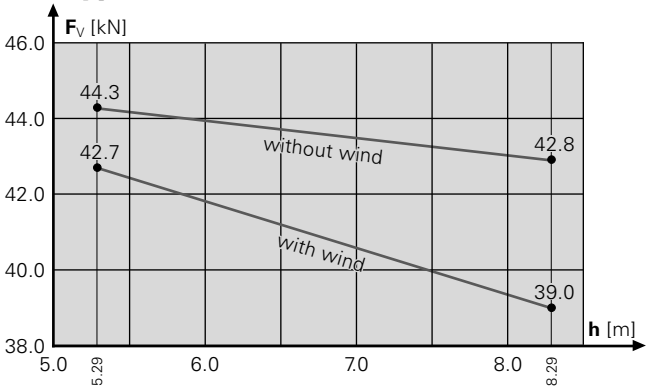
③ **43.3 kN / Leg**
without wind
**39.1 kN / Leg**
with wind

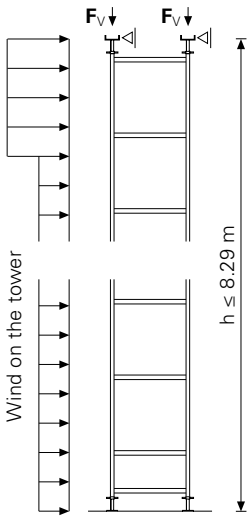

**h 8.29 m – 12.29 m:**
3 diagonal struts at the top and bottom, plus horizontal cross strut at h/2.

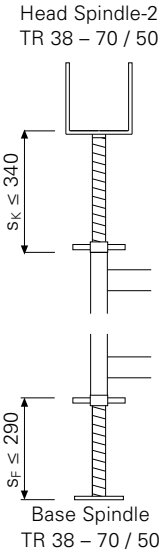
### Application Conditions (D8)

– restrained at the top
– without diagonal strut
– with/without wind
– h ≤ 8.29 m

### Permissible leg load in accordance with the type test



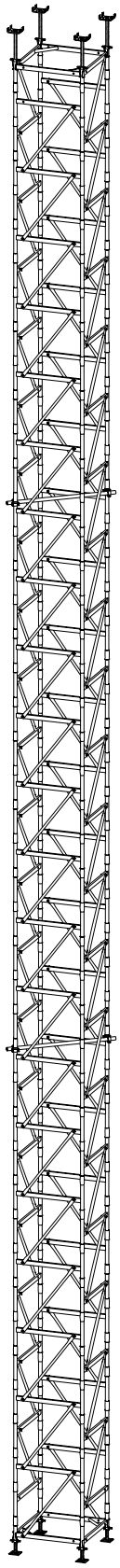



# ST 100 Stacking Tower

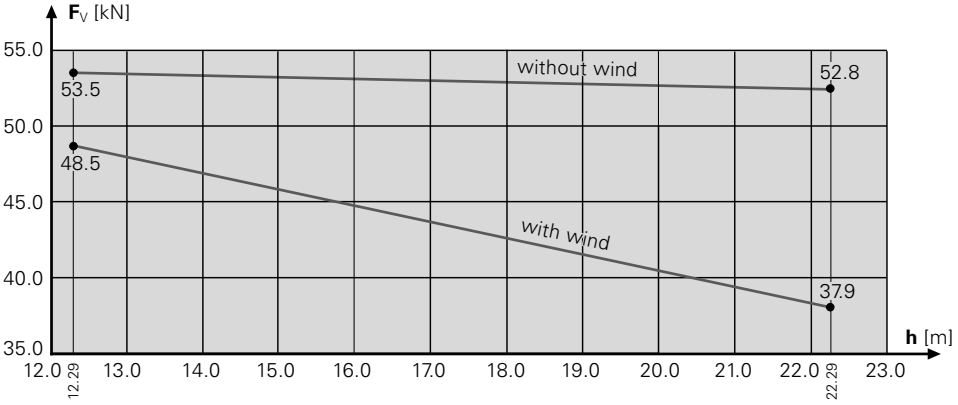
## Restrained at the Top, 12.29 m ≥ h ≤ 22.29 m, with Pivoting Head Spindle

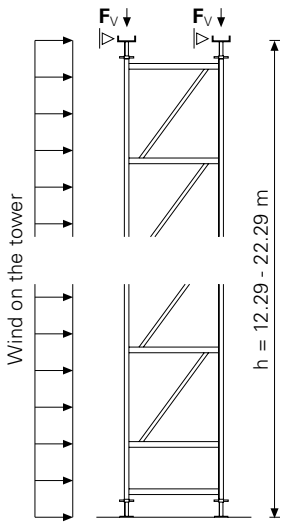
### Supplement for (D3)

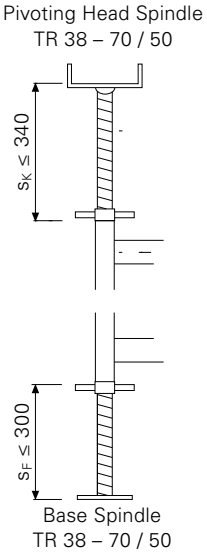
- restrained at the top
- with/without wind
- with diagonal struts all around
- 2 horizontal cross struts at every h/3



### Perm. Leg Load



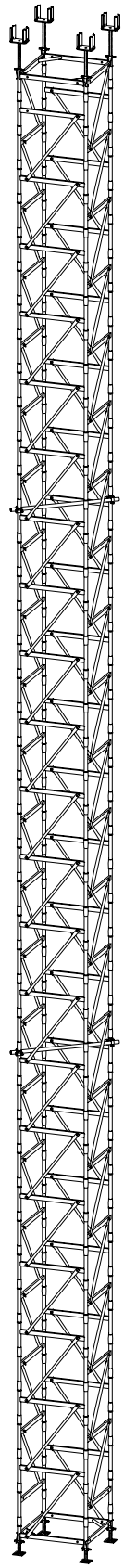



# ST 100 Stacking Tower

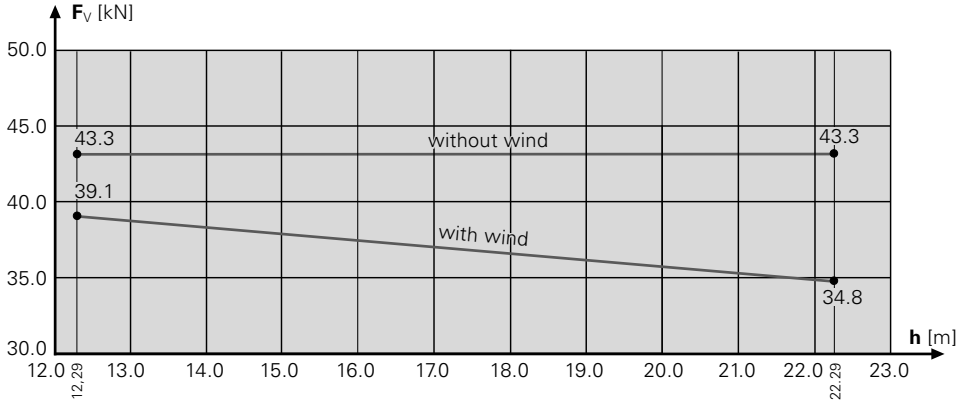
## Restrained at the Top, 12.29 m ≥ h ≤ 22.29 m, with Head Spindle-2

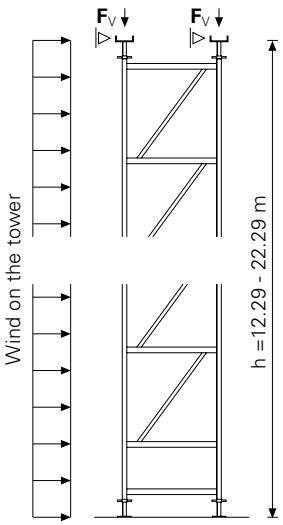
### Supplement for (D7)

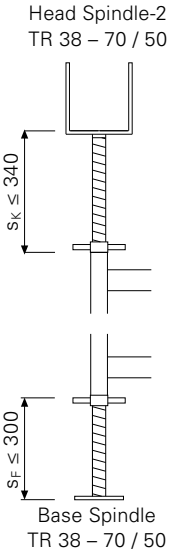
- restrained at the top
- with/without wind
- with diagonal struts all around
- 2 horizontal cross struts at every h/3



### Perm. Leg Load

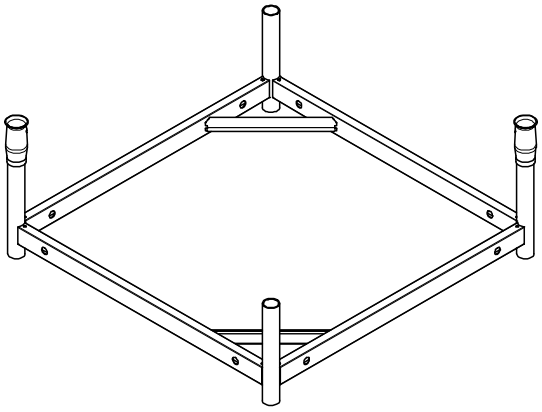


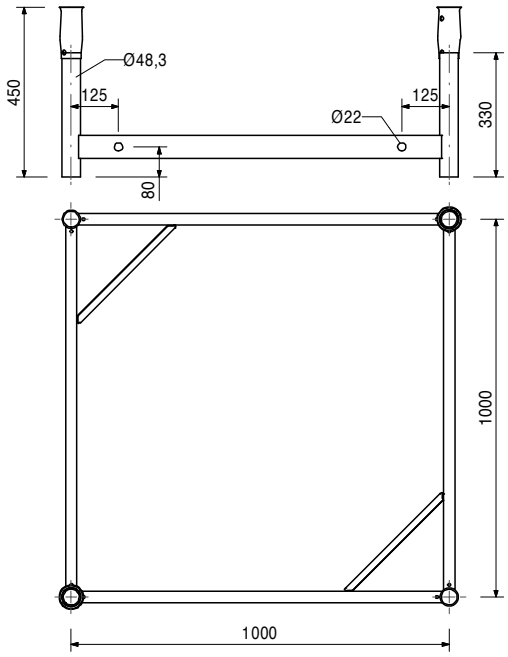



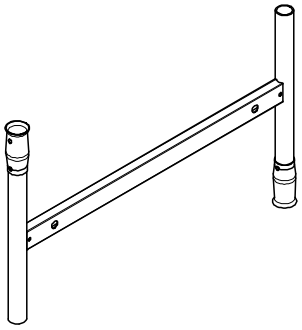
# ST 100 Stacking Tower

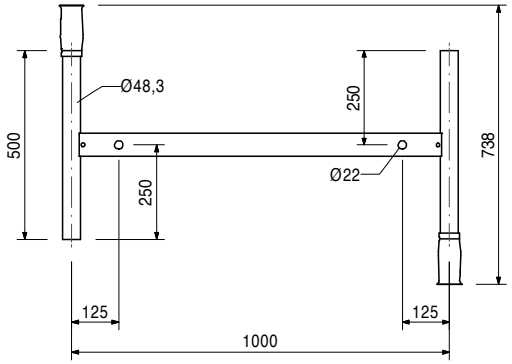
| Item no. | Weight kg | |
|---|---|---|
| 019900 | 16,600 | **Base-Head Frame ST 100, galv.**<br>Base and head frame for the ST 100 Stacking Tower. |



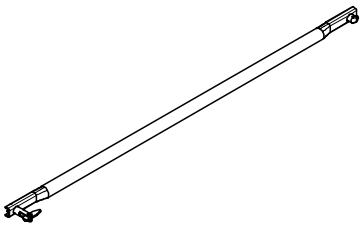


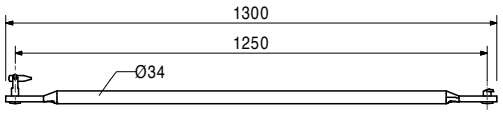

| | | |
|---|---|---|
| 019910 | 6,820 | **Stacking Frame ST 100, galv.**<br>Frame for Stacking Tower ST 100. 4 pieces per ascending metre. |



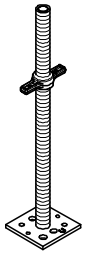


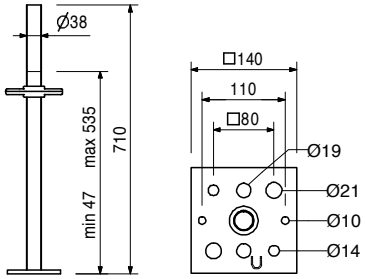

| | | |
|---|---|---|
| 019940 | 2,280 | **Diagonal Strut ST 100, galv.**<br>Diagonals for Stacking Tower ST 100. Number required depends on the static system. |



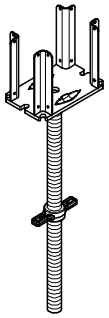


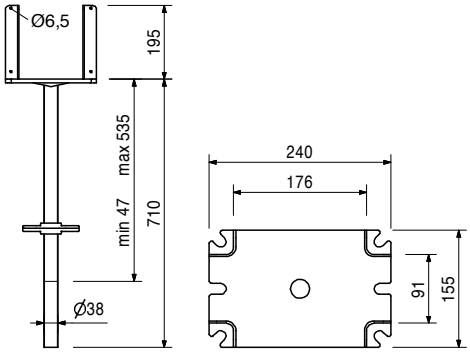
| Item no. | Weight kg | | |
|---|---|---|---|
| 019780 | 5,250 | **Base Spindle TR 38-70/50**<br>For heavily loaded shoring. | **Note**<br>With captive silver Quick Jack Nut. |






| | | | |
|---|---|---|---|
| 019950 | 7,780 | **Cross Forkhead TR 38-70/50**<br>Tilt-resistant head spindle for holding one or two GT 24 or VT 20 Girders. | **Note**<br>With captive Quick Jack Nut. |

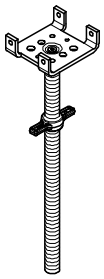


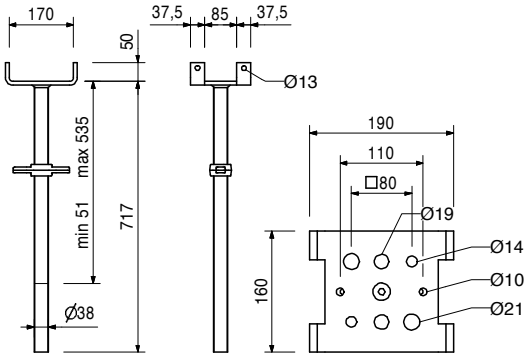



Accessories

| | | |
|---|---|---|
| 028590 | 0,568 | **Tension Strap 16-25, galv.** |

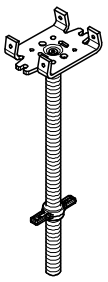
| | | | |
|---|---|---|---|
| 319790 | 6,460 | **Head Spindle TR 38-70/50, galv.**<br>Maximum inclination of the head plate on all sides 4.4°. | **Note**<br>With captive Quick Jack Nut.<br>Only available as rental item! |

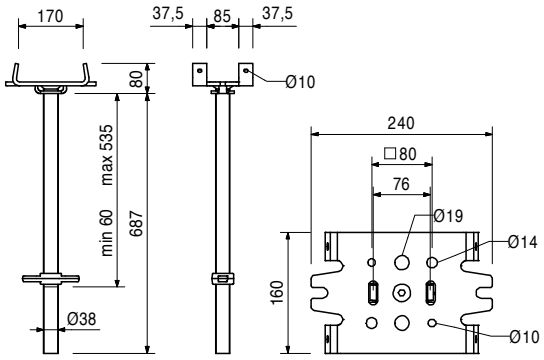




| Item no. | Weight kg | |
|---|---|---|
| 116081 | 7,040 | **Head Spindle-2 TR 38-70/50**<br>Maximum inclination of the head plate on all sides 4.4°. |

**Note**
With locking device and captive Quick Jack Nut.

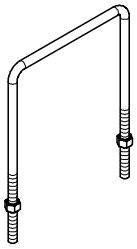


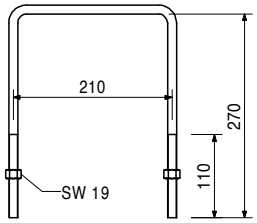



Accessories

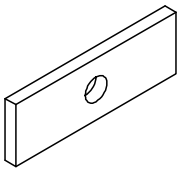
| | | |
|---|---|---|
| 028590 | 0,568 | **Tension Strap 16-25, galv.** |
| 018300 | 0,564 | **Cross Strap, galv.** |

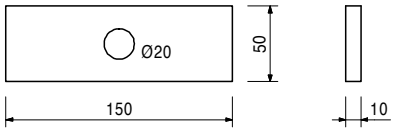
| | | |
|---|---|---|
| 028590 | 0,568 | **Tension Strap 16-25, galv.**<br>For mounting 2 GT 24 or VT 20 Girders on the Cross Forkhead and Head Spindle TR 38 and on the Crosshead 20/24 or 20/24S. |






| | | |
|---|---|---|
| 018300 | 0,564 | **Cross Strap, galv.**<br>For fixing Steel Walers SRZ and SRU on the Head Spindle TR 38. |

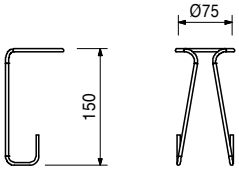





Accessories

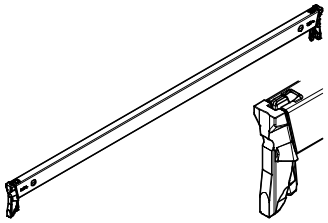
| | | |
|---|---|---|
| 018350 | 0,310 | **Bolt ISO 4016 M16 x 160-4.6 MU, galv.** |

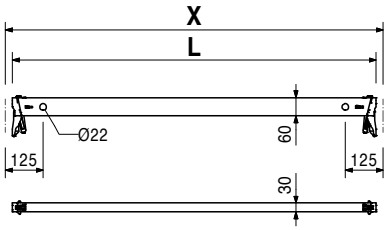
| Item no. | Weight kg | |
|---|---|---|
| 019800 | 0,063 | **Spindle Safety Strap ST 100**<br>To prevent spindles from falling out during moving with the crane. |




| | | **Ledgers UH Plus** | **L** | **X** | **Sticker** |
|---|---|---|---|---|---|
| 114613 | 1,420 | **Ledger UH 25 Plus** | 204 | 250 | |
| 125840 | 1,770 | **Ledger UH 37.5 Plus** | 329 | 375 | |
| 114595 | 2,070 | **Ledger UH 50 Plus** | 454 | 500 | |
| 114629 | 2,730 | **Ledger UH 75 Plus** | 704 | 750 | White |
| 114632 | 4,460 | **Ledger UH 100 Plus** | 954 | 1000 | White |
| 114638 | 5,430 | **Ledger UH 125 Plus** | 1204 | 1250 | |
| 114641 | 4,710 | **Ledger UH 150 Plus** | 1454 | 1500 | |
| 117032 | 5,380 | **Ledger UH 175 Plus** | 1704 | 1750 | |
| 114645 | 6,040 | **Ledger UH 200 Plus** | 1954 | 2000 | |
| 116356 | 6,700 | **Ledger UH 225 Plus** | 2204 | 2250 | |
| 114648 | 7,360 | **Ledger UH 250 Plus** | 2454 | 2500 | |
| 114651 | 8,680 | **Ledger UH 300 Plus** | 2954 | 3000 | |

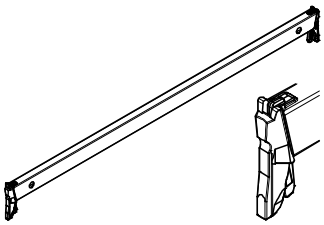
**Note**
Longitudinelly-stamped and with coloured label for easier identification.

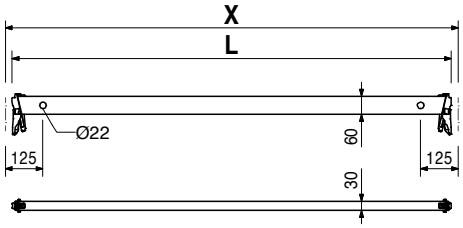




| Item no. | Weight kg | Ledgers UH | L | X | Sticker |
|---|---|---|---|---|---|
| 404780 | 1,390 | **Ledger UH 25** | 204 | 250 | |
| 404779 | 2,040 | **Ledger UH 50** | 454 | 500 | |
| 400017 | 2,710 | **Ledger UH 75** | 704 | 750 | White |
| 401159 | 3,370 | **Ledger UH 100** | 954 | 1000 | White |
| 410347 | 4,020 | **Ledger UH 125** | 1204 | 1250 | |
| 400021 | 4,690 | **Ledger UH 150** | 1454 | 1500 | |
| 400023 | 6,020 | **Ledger UH 200** | 1954 | 2000 | White |
| 400025 | 7,340 | **Ledger UH 250** | 2454 | 2500 | Red |
| 400027 | 8,670 | **Ledger UH 300** | 2954 | 3000 | Black |

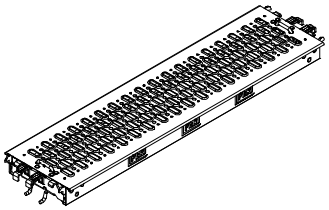
**Note**
Longitudinally-stamped and with coloured label for easier identification.
Ledgers UH can be replaced by Ledgers UH Plus.

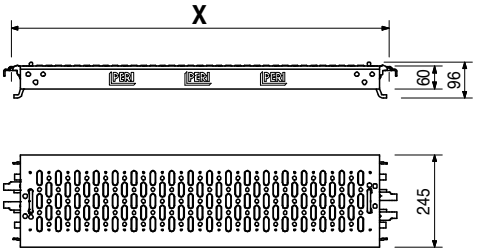





| | | | X | perm. p [kN/m²] | max. p [kN/m²] |
|---|---|---|---|---|---|
| 406092 | 6,950 | **Industrial Deck UDI 25 x 100**<br>Mounted on Ledger UH. | 1000 | 6,0 | 40.0 |

**Note**
perm. p according to DIN EN 12811-1.
max. p = < maximum possible load without deflection limitation.

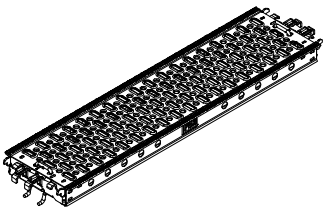


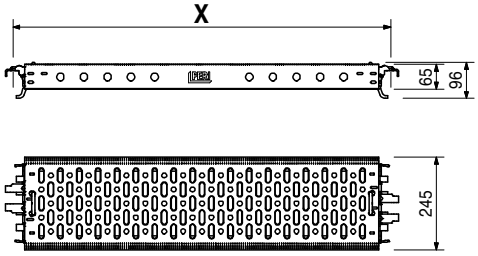


| Item no. | Weight kg | |
|---|---|---|
| 124118 | 6,550 | **Steel Deck UDG 25 x 100**<br>Mounted on Ledger UH. |

| X | perm. p [kN/m²] | max. p [kN/m²] |
|---|---|---|
| 1000 | 6.0 | 40.0 |

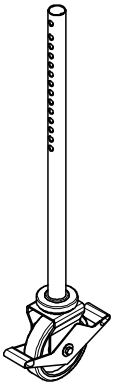
**Note**
perm. p according to DIN EN 12811-1.
max. p = maximum possible load without deflection limitation.

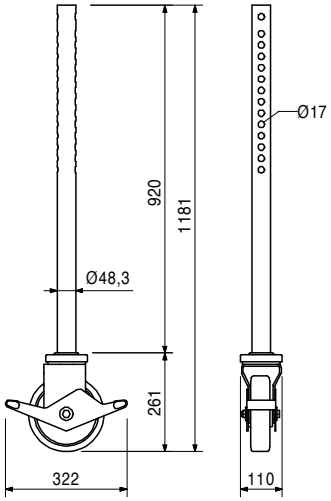





| | | |
|---|---|---|
| 116176 | 15,000 | **Transportation Wheel UEW**<br>For inserting in Connection Transportation Wheel UER (for Rosett) and Transportation Wheel ST 100. |

**Technical Data**
Permissible load-bearing capacity 3.5 kN per wheel with spindle extension of Shoring Tower up to 30 cm.

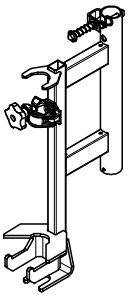


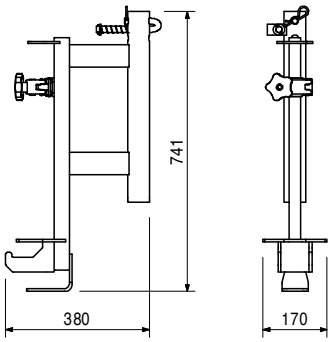



Accessories

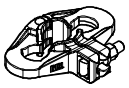
| | | |
|---|---|---|
| 116193 | 5,150 | **Connection Transportation Wheel UER** |
| 116800 | 8,110 | **Connection Transportation Wheel ST 100** |

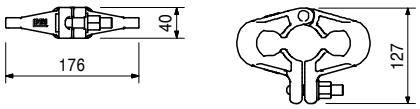
| | | |
|---|---|---|
| 116800 | 8,110 | **Connection Transportation Wheel ST 100** |





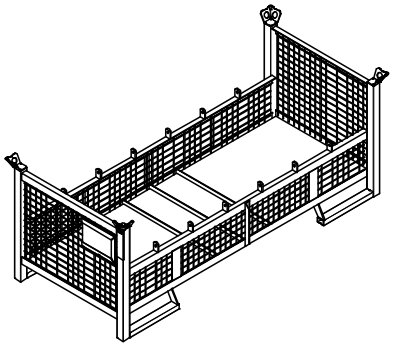
| Item no. | Weight kg | |
|---|---|---|
| 116306 | 1,700 | **Rosett Coupler UEV 180°** |

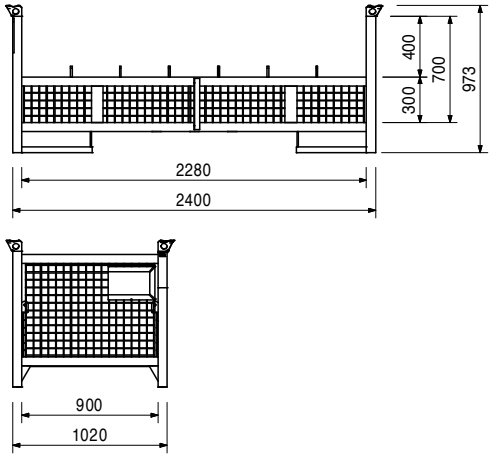





| | | |
|---|---|---|
| 065050 | 129,000 | **Pallet ST 100/2, galv.**<br>For stacking and transportation of ST 100.<br>Capacity: 84 stacking frames + base and head spindles + diagonals. |

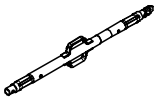
**Note**
Follow Instructions for Use!
**Technical Data**
Permissible load-bearing capacity 1.5 t.

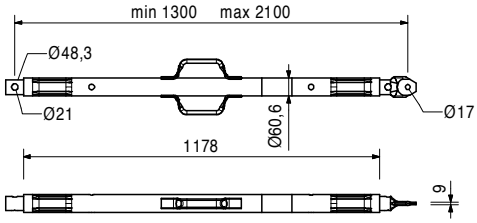





| | | |
|---|---|---|
| 117466 | 10,600 | **Push-Pull Prop RS 210, galv.**<br>Extension length l = 1.30 – 2.10 m.<br>For aligning PERI formwork systems and precast concrete elements. |

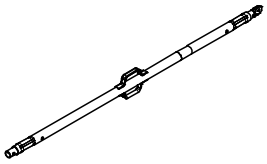
**Note**
Permissible load see PERI Design Tables.

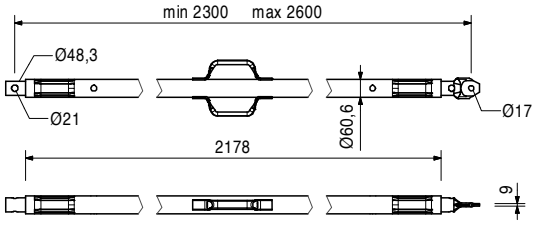




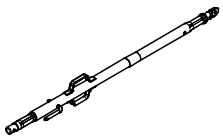

| | | |
|---|---|---|
| 118238 | 12,200 | **Push-Push Prop RS 260, galv.**<br>Extension length l = 2.30 – 2.60 m.<br>For aligning PERI formwork systems and precast concrete elements. |

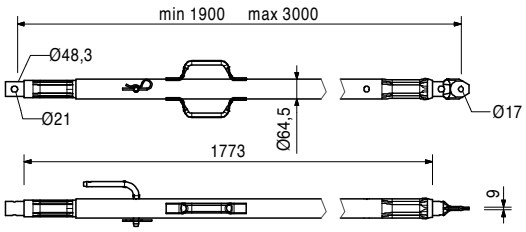
**Note**
Permissible load see PERI Design Tables.



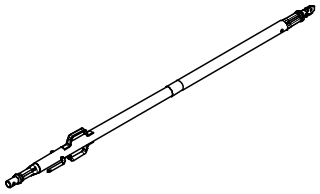


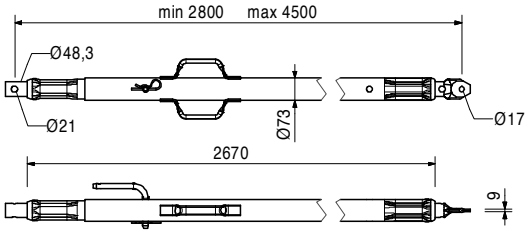
| Item no. | Weight kg | | |
|---|---|---|---|
| 117467 | 15,500 | **Push-Pull Prop RS 300, galv.**<br>Extension length l = 1.90 – 3.00 m.<br>For aligning PERI formwork systems and precast concrete elements. | **Note**<br>Permissible load see PERI Design Tables. |



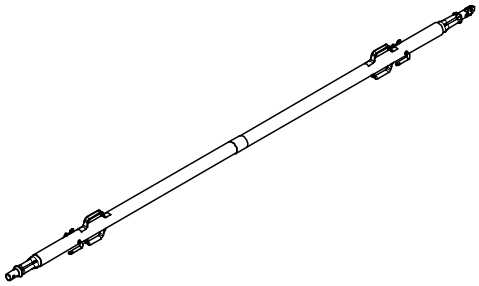


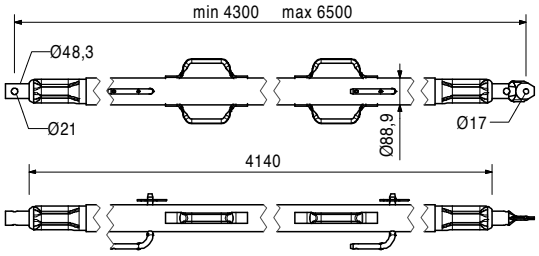

| | | | |
|---|---|---|---|
| 117468 | 23,000 | **Push-Pull Prop RS 450, galv.**<br>Extension length l = 2.80 – 4.50 m.<br>For aligning PERI formwork systems and precast concrete elements. | **Note**<br>Permissible load see PERI Design Tables. |



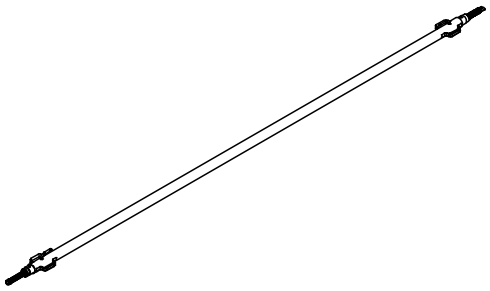


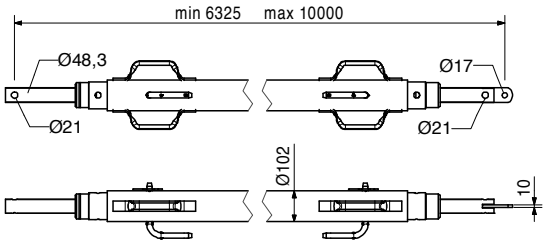

| | | | |
|---|---|---|---|
| 117469 | 40,000 | **Push-Pull Prop RS 650, galv.**<br>Extension length l = 4.30 – 6.50 m.<br>For aligning PERI formwork systems and precast concrete elements. | **Note**<br>Permissible load see PERI Design Tables. |



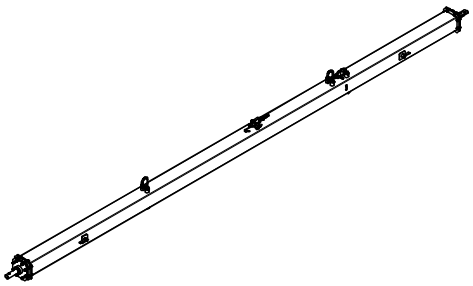


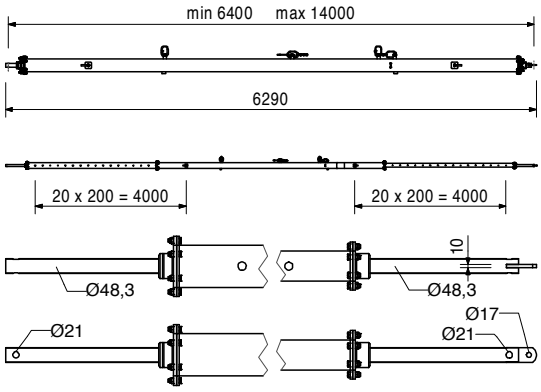

| | | | |
|---|---|---|---|
| 028990 | 115,000 | **Push-Pull Prop RS 1000, galv.**<br>Extension length l = 6.40 – 10.00 m.<br>For aligning PERI formwork systems. | **Note**<br>Permissible load see PERI Design Tables. |



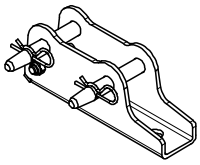


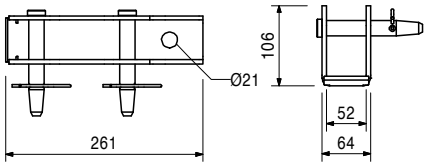
| Item no. | Weight kg | | |
|---|---|---|---|
| 103800 | 271,000 | **Push-Pull Prop RS 1400, galv.**<br>Extension length l = 6.40 – 14.00 m.<br>For aligning PERI formwork systems. | **Note**<br>Permissible load see PERI Design Tables.<br>Chain can be operated from bottom. |






| | | | |
|---|---|---|---|
| 117343 | 3,250 | **Base Plate-2 for RS 210 – 1400, galv.**<br>For assembly of Push-Pull Props RS 210, 260, 300, 450, 650, 1000 and 1400. | **Complete with**<br>2 pc. 105400 Pin Ø 20 x 140, galv.<br>2 pc. 018060 Cotter Pin 4/1, galv. |

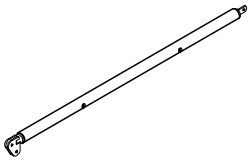


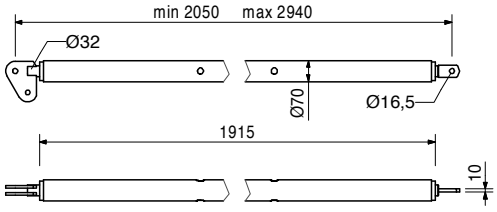



Accessories

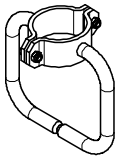
| | | |
|---|---|---|
| 124777 | 0,210 | **Anchor Bolt PERI 14/20 x 130** |

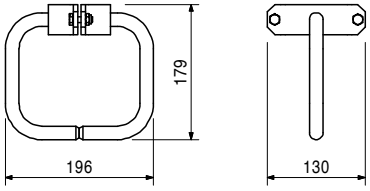
| | | | |
|---|---|---|---|
| 028010 | 17,900 | **Push-Pull Prop RSS I**<br>Extension length l = 2.05 – 2.94 m.<br>For aligning PERI formwork systems. | **Note**<br>Permissible load see PERI Design Tables. |



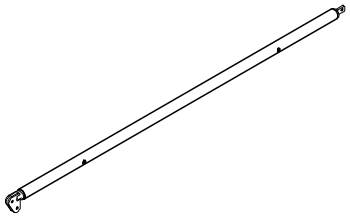


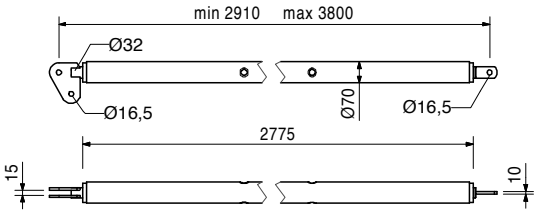
| Item no. | Weight kg | |
|---|---|---|
| 113397 | 1,600 | **Spindle Handle RSS / AV**<br>Spindle Handle for screwing on Push-Pull-Props RSS I, RSS II, RSS III and Kickers AV 210 and AV 190 complete with 2 bolts and nuts M8. |



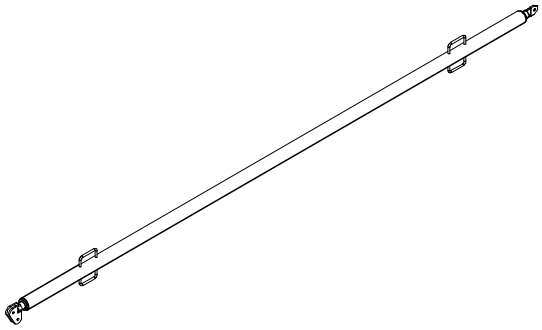


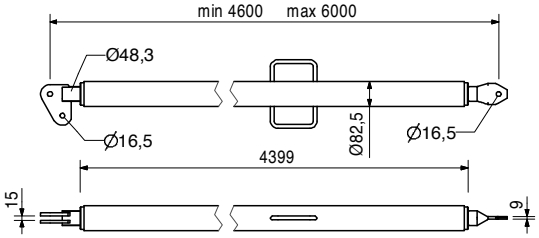

| | | | |
|---|---|---|---|
| 028020 | 22,000 | **Push-Pull Prop RSS II**<br>Extension length l = 2.91 – 3.80 m.<br>For aligning PERI formwork systems. | **Note**<br>Permissible load see PERI Design Tables. |



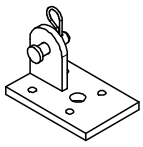


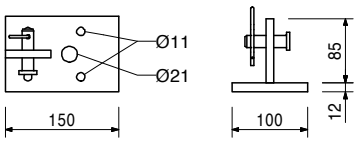

| | | | |
|---|---|---|---|
| 028030 | 38,400 | **Push-Pull Prop RSS III**<br>Extension length l = 4.60 – 6.00 m.<br>For aligning PERI formwork systems. | **Note**<br>Permissible load see PERI Design Tables. |






| | | | |
|---|---|---|---|
| 106000 | 1,820 | **Base Plate-2 for RSS, galv.**<br>For assembly of RSS Push-Pull Props. | **Complete with**<br>1 pc. 027170 Pin Ø 16 x 42, galv.<br>1 pc. 018060 Cotter Pin 4/1, galv. |





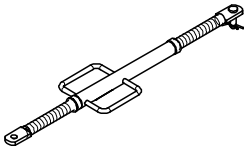

Accessories

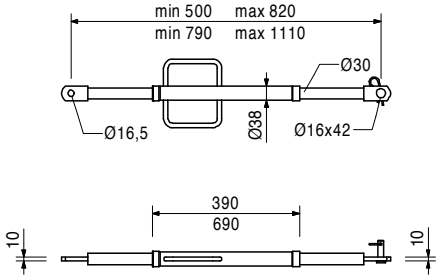
| | | |
|---|---|---|
| 124777 | 0,210 | **Anchor Bolt PERI 14/20 x 130** |

| Item no. | Weight kg | | min. L | max. L |
|---|---|---|---|---|
| | | **Kickers AV** | | |
| 057087 | 3,720 | **Kicker AV 82** | 500 | 820 |
| 057088 | 4,410 | **Kicker AV 111** | 790 | 1110 |

Extension lenght l = 0.50 – 0.82 m.
For aligning PERI formwork systems.

**Complete with**
1 pc. 027170 Pin Ø 16 x 42, galv.
1 pc. 018060 Cotter Pin 4/1, galv.
**Note**
Permissible load see PERI Design Tables.

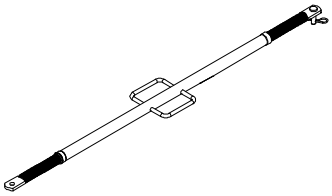


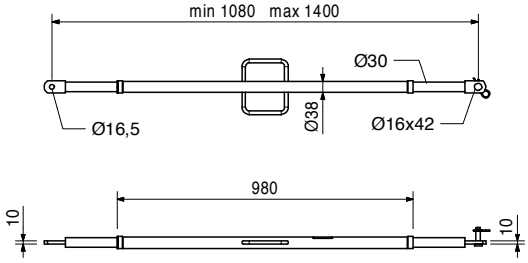



| | | |
|---|---|---|
| 028110 | 5,180 | **Kicker AV 140** |

Extension length l = 1.08 – 1.40 m.
For aligning PERI formwork systems.

**Complete with**
1 pc. 027170 Pin Ø 16 x 42, galv.
1 pc. 018060 Cotter Pin 4/1, galv.
**Note**
Permissible load see PERI Design Tables.

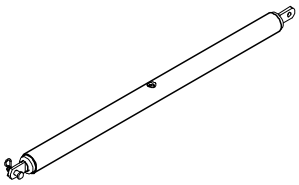


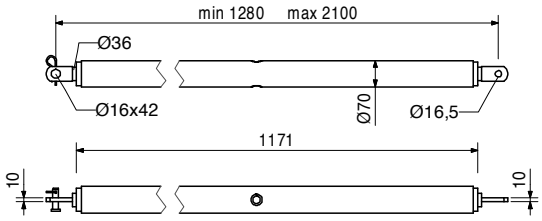



| | | |
|---|---|---|
| 108135 | 12,900 | **Kicker AV 210** |

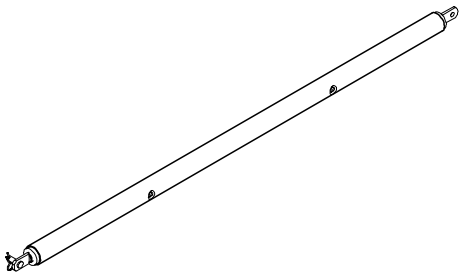
Extension length l = 1.28 – 2.10 m.
For aligning PERI formwork systems.

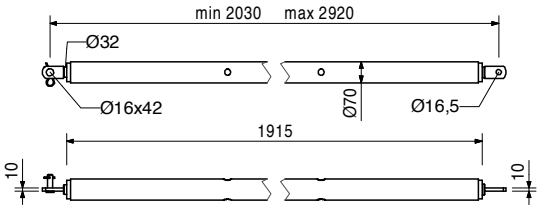
**Complete with**
1 pc. 027170 Pin Ø 16 x 42, galv.
1 pc. 018060 Cotter Pin 4/1, galv.
**Note**
Permissible load see PERI Design Tables.



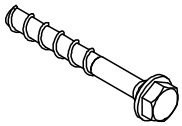


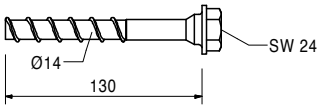
| Item no. | Weight kg | | |
|---|---|---|---|
| 028120 | 17,000 | **Kicker AV RSS III**<br>Extension length l = 2.03 – 2.92 m.<br>For aligning PERI formwork systems. | **Complete with**<br>1 pc. 027170 Pin Ø 16 x 42, galv.<br>1 pc. 018060 Cotter Pin 4/1, galv.<br>**Note**<br>Permissible load see PERI Design Tables. |






| | | | |
|---|---|---|---|
| 124777 | 0,210 | **Anchor Bolt PERI 14/20 x 130**<br>For temporary fixation to reinforced concrete structures. | **Note**<br>See PERI data sheet!<br>Drilling Ø 14 mm. |





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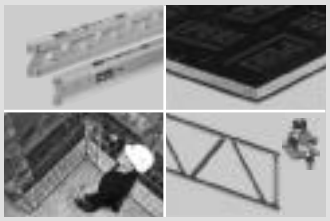
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