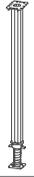


6

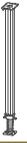
6.2. HEAVY-DUTY ALUMINIUM PROPS and accessories



MOUNTING TECHNOLOGY



ROBUSTA
GAUKEL



Your benefits at a glance:

- For carrying heavy loads at great room heights
- For use as single props and as shoring towers with horizontal aluminium frames
- 3 different prop sizes and intermediate pieces
- For heights from 0.80 m up to more than 20 m
- 2 sizes of strong stringer beams to carry greater prop intervals and loads
- With a type-tested structural analysis and general building authority approval
- Sensible accessories that can be combined with standard scaffolding materials
- Excellent handling thanks to low dead weight
- Safe, trouble-free working
- Long service life; no danger of rusting

Advantages for the planner:

With the **heavy-duty props** made of aluminium and its accessories a supporting system is available when planning to reach extreme flexibility with a limited number of parts.

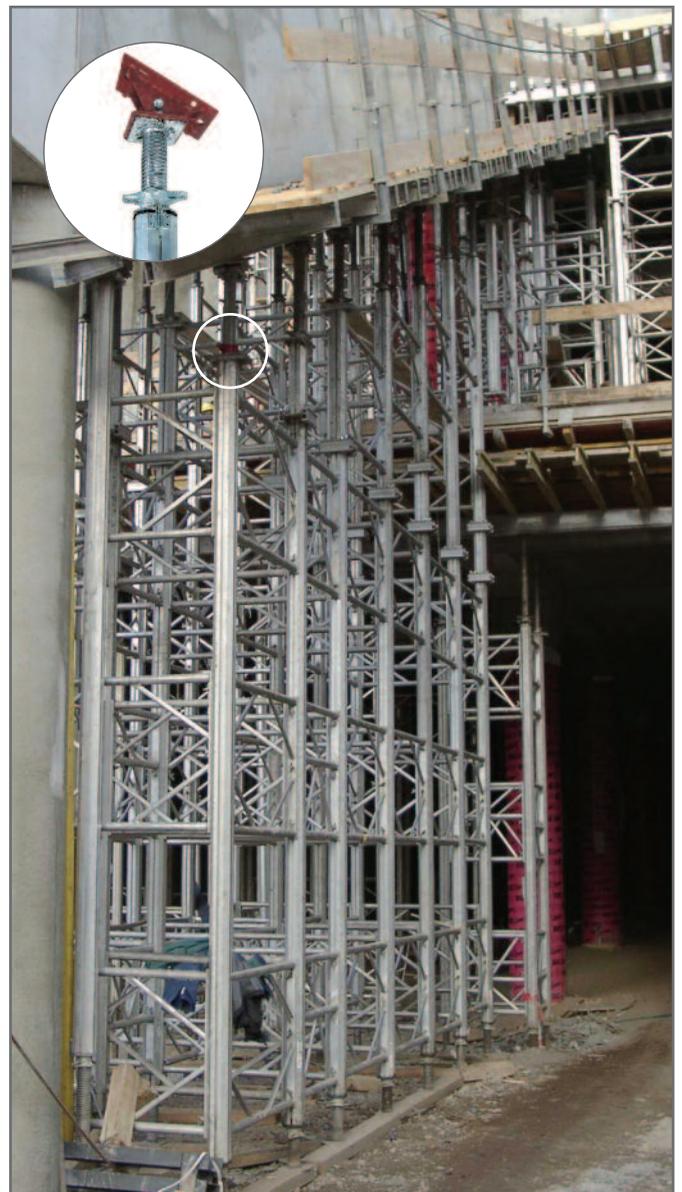
With less system parts optimum supportings can be realized. As single parts or as shoring tower, changing and high room heights, complicated floor plans, big slab thickness, all can be solved with this system. Also the installation on inclined floors can be realized in a simple way.

Because of the proven static and the **official permission**, combined with the according load-bearing tables, the calculating effort for the alu construction parts is **reduced to a minimum**.

Also the constructor is assured that the static proof will be accepted by the testing engineer.

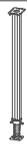


Shoring towers for insitu concrete main girders with supported secondary girders made of prefab elements.



Optimum adjustment of height for inclined beams in use in stadium construction.





Tables of bearing load see pages 16 ff.

Advantages for the user:

The best surprise for first users is the light weight of all single parts which enable almost playful working. Even the biggest single prop up to 5.50 m has a weight of **only 29 kgs**. Although these props do have a **bearing load** which is **three times higher**, especially at floor heights of more than 4 m, compared to steel props with the same extension length.

So it is possible to reduce the number of **necessary props to approx. a third**. This saves time and money when installing and removing, when changing on the site, when transporting with the truck.

A special aspect is the safe mounting of shore towers:

All parts can be mounted comfortably on the ground, the upward movement of single parts and dangerous balancing movements at height are not necessary anymore.

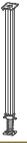


110 heavy duty aluminium props – they replaced the planned 310 steel props



H-frames for stabilizing special formwork of mushroom head





Your benefits at a glance:

- 3 different sizes of props and 4 extension elements for heights of 0.81 to 11.00 m
- Bearing loads up to 101.8 kN
- Usable as single part or assembled
- Approx. 3 times more bearing loads compared to steel props
- Use also possible turned at 180°
- Stable discharge protection from security hook
- Quick adjustment of the swivelling nut by releasing the security hook
- Spindle with double trapezoidal thread, that means reducing of exertion by 50%
- 2 lengths of spindles, adjustment range 1.20 m and 0.40 m

External tube:

The octagonal special hollow section of the props is **extreme load and bend resistant** and in despite that very light (4.4 kgs/m) because of its geometry. 3 lengths for external tube available for the standard prop sizes, on top with head plate, below with security hook to fix the spindle with swivelling nut.



The **spring-loaded safety hook** at the external tube secures the spindle against discharging. For a quick adjustment in unloaded condition this hook can be released. The spindle with the swivelling nut can be removed from the external tube and the swivelling nut can be easily turned.

The rectangle head plate with stiffening rib has a centered boring to insert a second spindle.



In that way **the adjustment range** of 1.20 m **will double** to 2.40 m.

At the continuous longitudinal grooves, with the help of standard hammer head bolts, more stiffening elements can be fixed at various heights, for example to connect half couplers and diagonal scaffold tubes.



Spindles:

The spindles, also made of aluminium, with a **double trapezoidal rolled durable thread**, guarantee an **easily adjusting under load**.

The removing protection prevents against turning out too far.

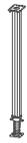
For all 3 standard props sizes the long spindle is used with an adjustment range of 1.20 m. Additionally a short spindle with an adjustment range of 0.40 m is available.

For short supporting heights smaller than 1.50 m, for example at low sub-basements, the short spindle will be inserted into the shortest adjustment element. In that way a heavy loadable prop with a minimum length of 0.81 m is available.



Single props with wide distances used in home building



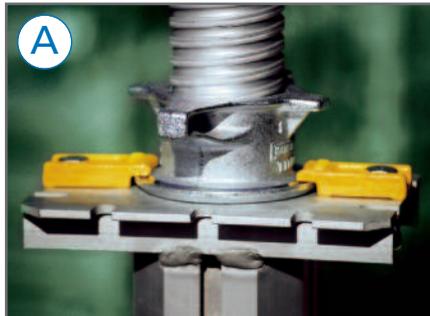


HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES

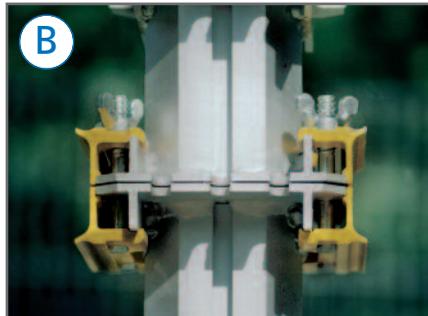
6

COMBINATION OF SINGLE PROPS

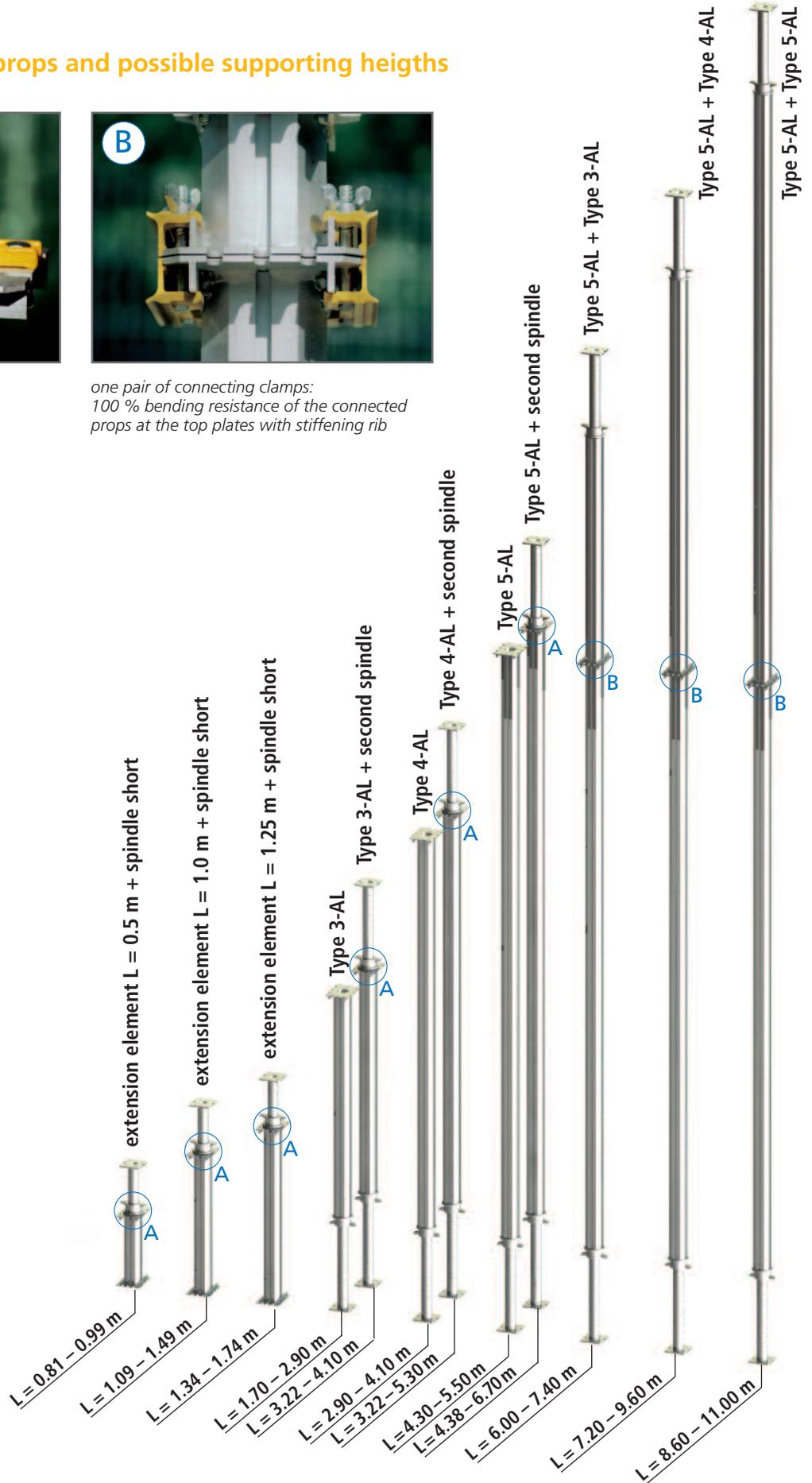
Survey: Combination of single props and possible supporting heights

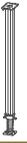


Protection against dropping out of the additional spindle with 2 holders



one pair of connecting clamps:
100 % bending resistance of the connected props at the top plates with stiffening rib





Your benefits at a glance:

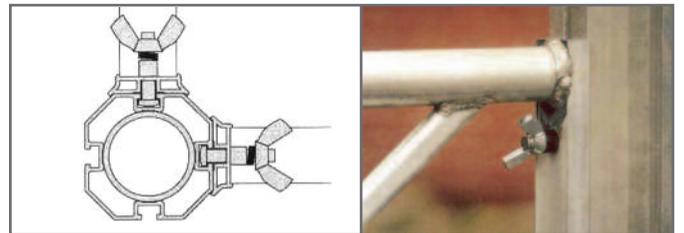
- 3 different sizes of props and 4 extension elements for heights of 1.70 m to more than 20 m
- Bearing loads from 113.0 kN to 9.5 kN
- 7 different H-frames for square and rectangular tower plan
- Towers to install with a various number of props
- Shore tower stiffened movable in one piece
- Quick and easy mounting laying on the ground without the help of a crane
- No loose parts to fix the H-frames

Horizontal frame

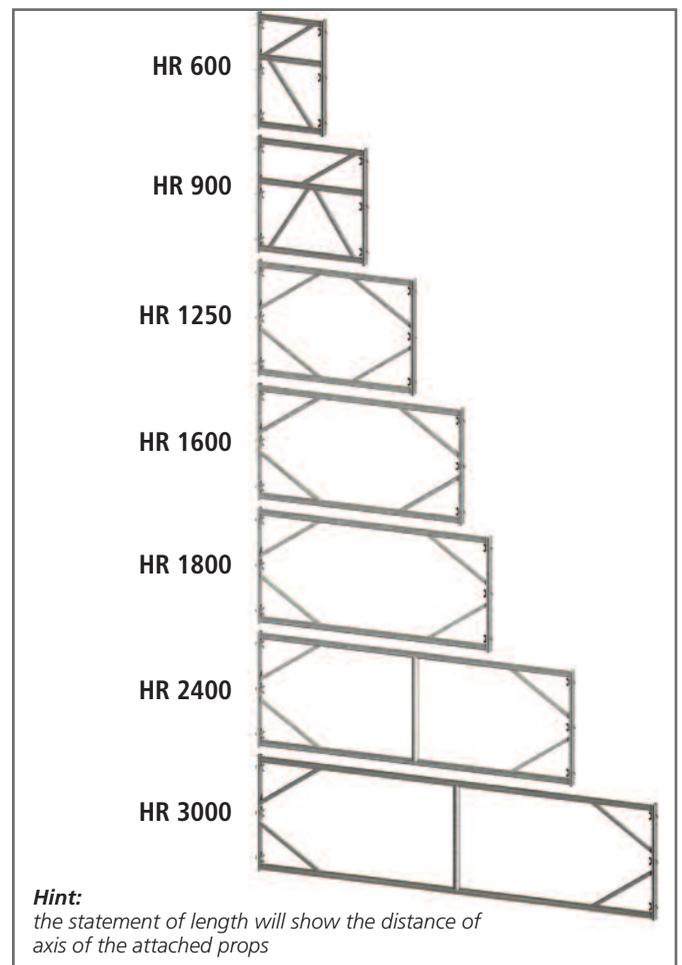
With the horizontal frames the aluminium props will be connected to stable shore towers. In this case the **bearing load is increased** because of the stiffening effect compared to the single prop and higher supporting heights are possible.

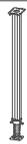
With the 7 different measurements of the H-frames from 0.60 m to 3.00 m a very sensitive adjusting of the prop distances and an optimum efficiency of the props according to the bearing load is possible. The planning form of the towers is free to choose as square or rectangle.

Shore towers with 4 legs or multiple legs are possible to be installed into two directions, because 4 H-frames can be screwed onto each external tube.



The frictional and form-closed connection of the frame to the props is realized by undetachable spring-loaded hammerbolts.



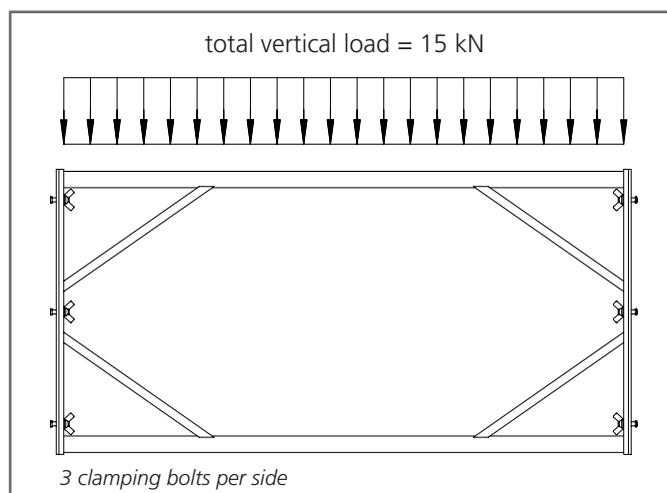


The horizontal tubes of the H-frames have a diameter of 48 mm, thus the connecting of standard scaffolding tube couplers for the connection of diagonal bracings is possible. For further works at the lower side of the slab formwork planing can be placed onto the frames to produce a walking area. Also plastic planking is available in the system adjusted to the length of the usual H-frames. This planking is lighter than wood, corrosion proof and will be fixed stable with the locking claws.

Transferable frictional force per clamping bolt = 2.5 kN
This will result in a permissible load of 15 kN per H-frame.

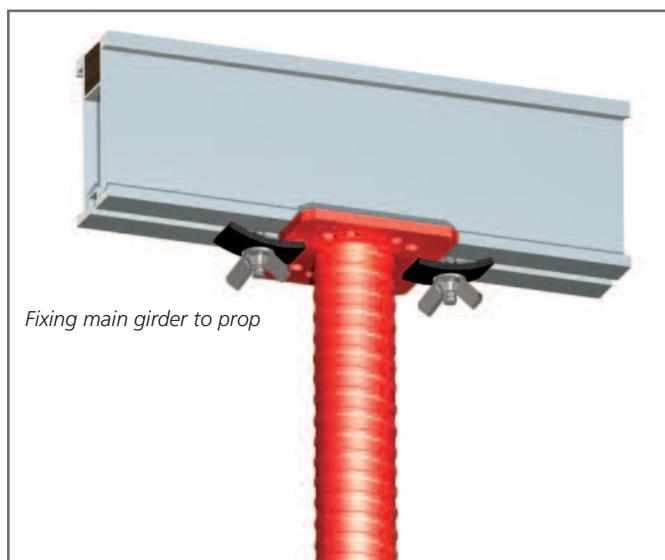
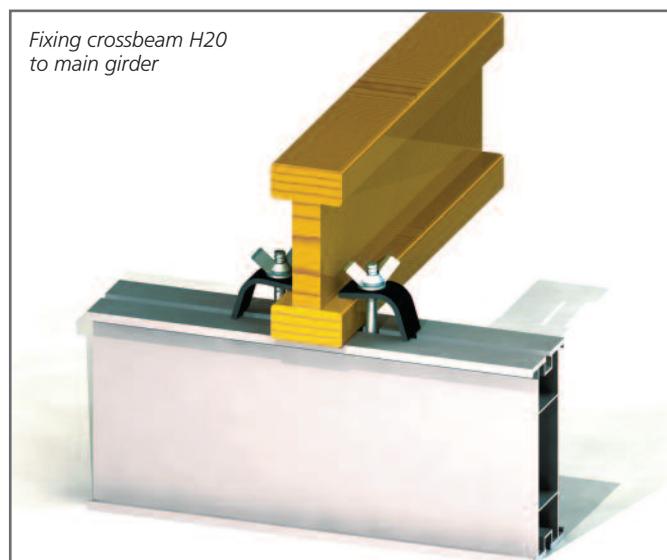
Very important for a safe working underneath the slab formwork:

Walking boards can be placed onto the tubes of the frames in order to get a bearing surface. New available in our system are also boards made of aluminium, which are adjusted to the length of the usual H-frames. These boards are lighter than wood, they do not rot, can be fixed safe and stable with locking claws.



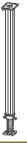
Aluminium main girder

Because of the higher bearing capacity compared to the steel props you can realize wider prop distances. That means for the main girders bigger span widths have to be bridged and higher shoring loads have to be taken up. For that the usual wooden girders are not suitable any more. The two stable girders are optimized for these higher loads and so finish the heavy duty shore aluminium program perfectly. A narrow-stepped raster of lengths will allow an optimum adjustment to the room measurements and help to prevent expensive lap joints. These girders have a continuous joint at the lower side, just like the external tube of the prop, which is adjusted to the clamping bolts. This guarantees a secure connection of the clamping bolts between prop and girder. The alu main girders can be mounted when mounting the shore on ground. A dangerous placing, when the shore is already standing upright is not necessary any more!



6

HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES



SHORE TOWERS

Easy and quick mounting of shore towers:

1



All parts can be carried easily at ground level and can be mounted in laying position on the ground, a crane is not necessary during the whole mounting process.

2



Because it is not necessary to carry parts upwards, mounting times of approx. 0.22 hours per mounting meter can be reached for 4 leg tower.

3



The fixing of the H-frames to the joint of external tube is made quick and uncomplicated with the help of 3 captive bolts per frame side.

4



Only after complete mounting of the tower elements, the screwed construction can be erected with the crane and moved to the place of operation. This will save the need of crane capacity enormously.



Tower unit consisting of 6 props, erected upright in one piece





Mechanical lifting carriage

The secure connections between the props and the frames guarantee an enormous natural stability for the whole mounted construction.

Big mounted tower elements can be transported by crane without problem and moved easily inside the building. For the moving with muscle power without crane the mechanical lifting carriage will be pushed underneath the lower tube of the H-frame, afterwards the spindles will be turned free of load and the unit can be moved to the next concreting step.



2 slab formwork systems L = approx. 11.5 m

Width of tunnel: 8.10 m

width: 2 x 3.20 m

height: approx. 4.90 m

slab thickness: max. 0.80 m



tunnel slab supporting towers with drive-through opening:

length: approx. 15.0 m

width: approx. 11.0 m

height: approx. 8.0 m

slab thickness: max. 1.35 m

clearance:

width: approx. 4.0 m

height: approx. 4.0 m

time:

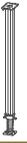
lowering, moving, adjusting,
approx. 2 hours with 6 persons



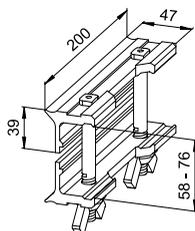
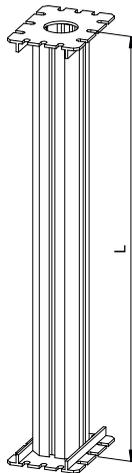
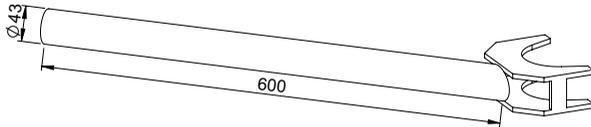
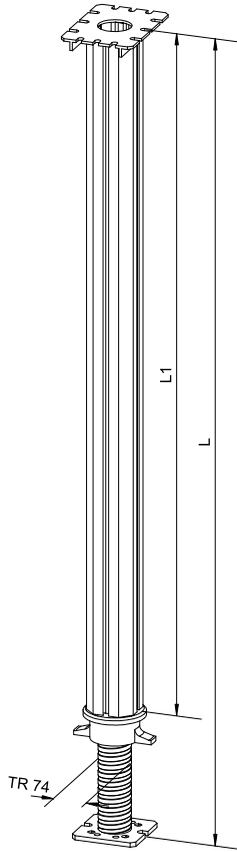
6

HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES

SINGLE PROPS AND ACCESSORIES

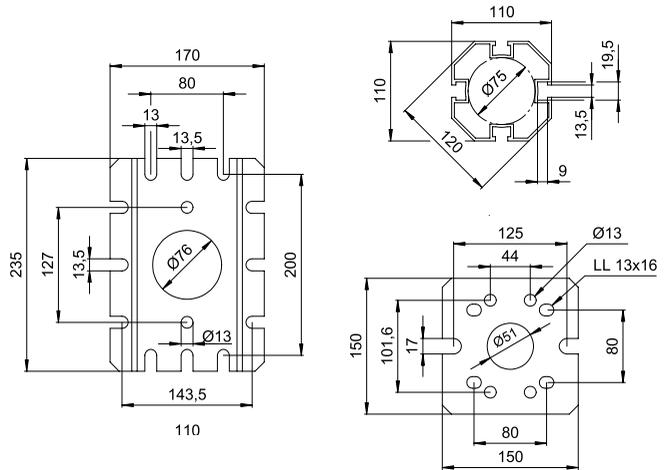


TECHNICAL DATA:



Single props with one spindle

| Type | Extension-length L [m] | Length L 1 [m] | Weight [kg/unit] | Item No. |
|------|------------------------|----------------|------------------|----------|
| 3-AL | 1.70 – 2.90 | 1.62 | 17.0 | 621329 |
| 4-AL | 2.90 – 4.10 | 2.82 | 21.0 | 621441 |
| 5-AL | 4.30 – 5.50 | 4.22 | 28.0 | 621555 |



Wrench for spindle

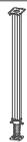
| Length L [mm] | Weight [kg/unit] | Item No. |
|---------------|------------------|----------|
| 930 | 3.50 | 621099 |

Extension elements

| Length L [m] | Weight [kg/unit] | Item No. |
|--------------|------------------|----------|
| 0.50 | 4.30 | 621005 |
| 1.00 | 5.70 | 621010 |
| 1.25 | 8.50 | 621013 |
| 5.00 | 24.00 | 621050 |

Adjustment clamp (2 pieces necessary per joint)

| Weight [kg/unit] | Item No. |
|------------------|----------|
| 3.70 | 629911 |

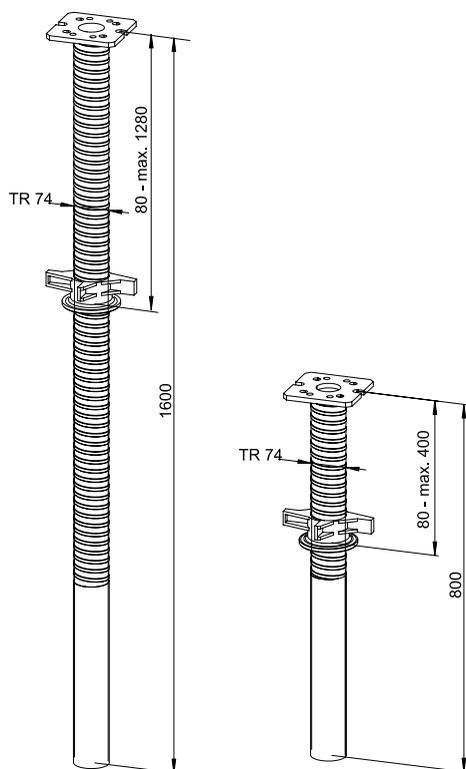


HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES

6

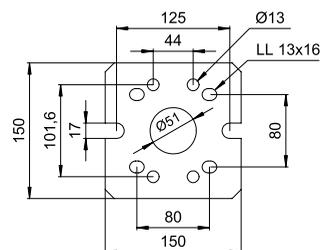
ACCESSORIES AND HORIZONTAL FRAME

TECHNICAL DATA:



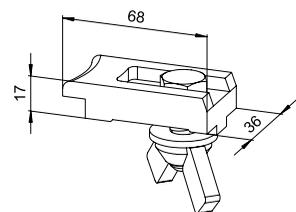
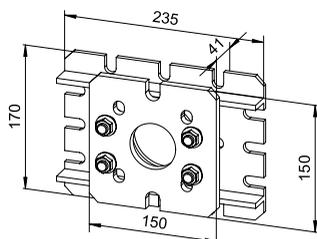
Additional spindle with protection against unscrewing

| Type | Length [m] | Adjusting range [m] | Weight [kg/unit] | Item No. |
|-------|------------|---------------------|------------------|----------|
| long | 1.60 | 1.20 | 10.40 | 621012 |
| short | 0.80 | 0.40 | 6.10 | 621004 |



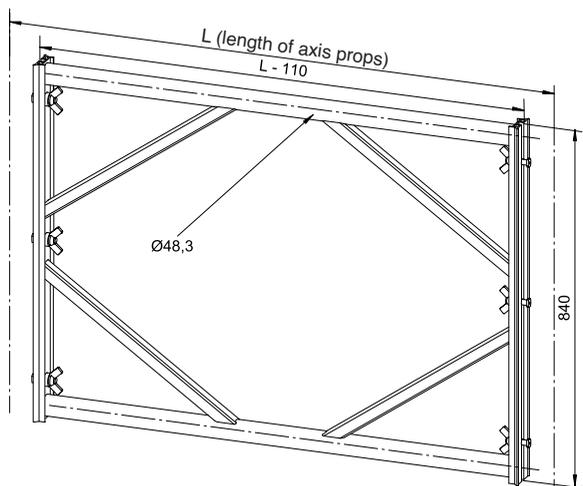
4-cross head to expand the base plate of the spindle when using the spindle on top

| Weight [kg/unit] | Item No. |
|------------------|----------|
| 1.43 | 621097 |



Holding of spindle (2 pieces necessary per add. spindle)

| Weight [kg/unit] | Item No. |
|------------------|----------|
| 0.24 | 629913 |



Horizontal frame

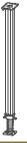
| Axial dimension [m] | Weight [kg/unit] | Item No. |
|---------------------|------------------|----------|
| 600 | 5.60 | 622006 |
| 900 | 7.50 | 622009 |
| 1250 | 7.80 | 622012 |
| 1600 | 8.80 | 622016 |
| 1800 | 9.70 | 622018 |
| 2400 | 13.50 | 622024 |
| 3000 | 15.90 | 622030 |



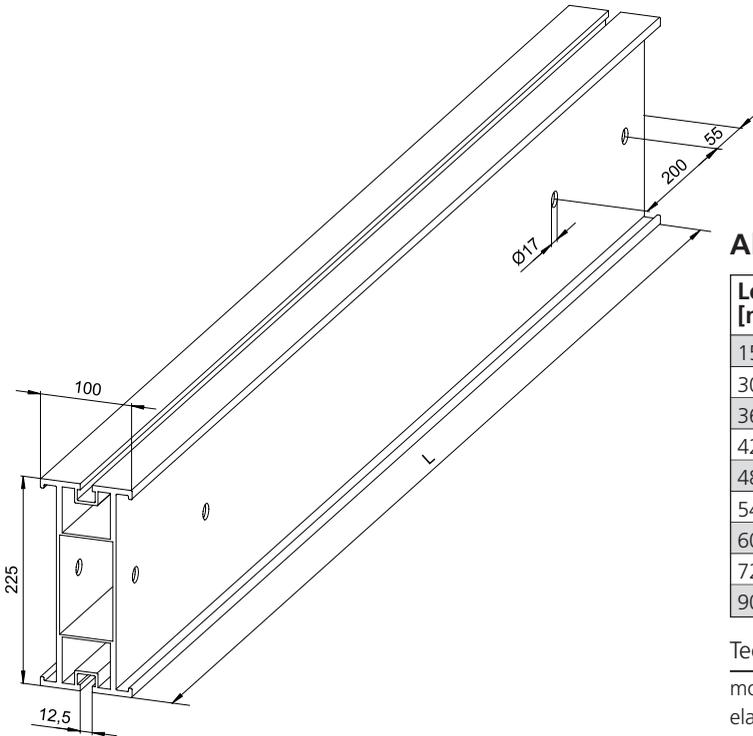
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HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES

MAIN GIRDERS AND ACCESSORIES



TECHNICAL DATA:

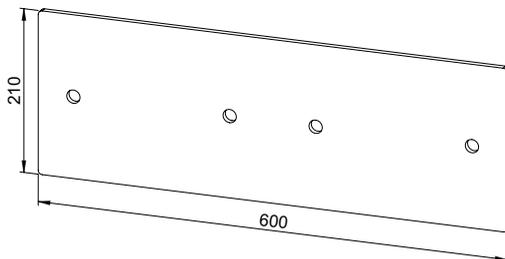


Aluminium main girder "AL 225"

| Length [mm] | Weight [kg/unit] | Item No. |
|-------------|------------------|----------|
| 1500 | 12.75 | 622215 |
| 3000 | 25.50 | 622230 |
| 3600 | 30.60 | 622236 |
| 4200 | 35.70 | 622242 |
| 4800 | 40.80 | 622248 |
| 5400 | 45.90 | 622254 |
| 6000 | 51.00 | 622260 |
| 7200 | 61.20 | 622272 |
| 9000 | 75.60 | 622290 |

Technical data:

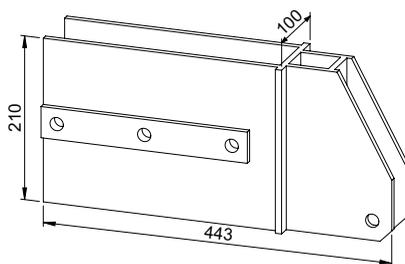
| | |
|----------------------------|----------------------|
| moment of inertia: | 2273 cm ⁴ |
| elastic modulus: | 202 cm ³ |
| admissible bending moment: | 23.0 kNm |
| admissible shear force: | 89.0 kN |



Connecting plate for girder "AL 225"

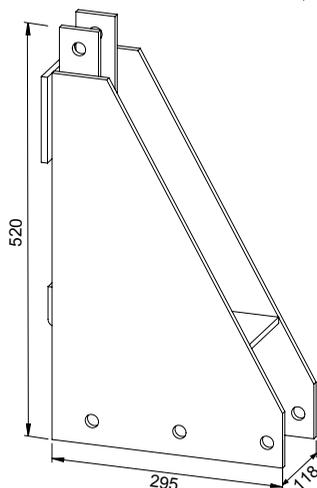
(2 units necessary per joint)

| Weight [kg/set] | Item No. |
|-----------------|----------|
| 16.0 | 622691 |



Girder support for "AL 225"

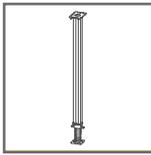
| Weight [kg/unit] | Item No. |
|------------------|----------|
| 18.0 | 622692 |



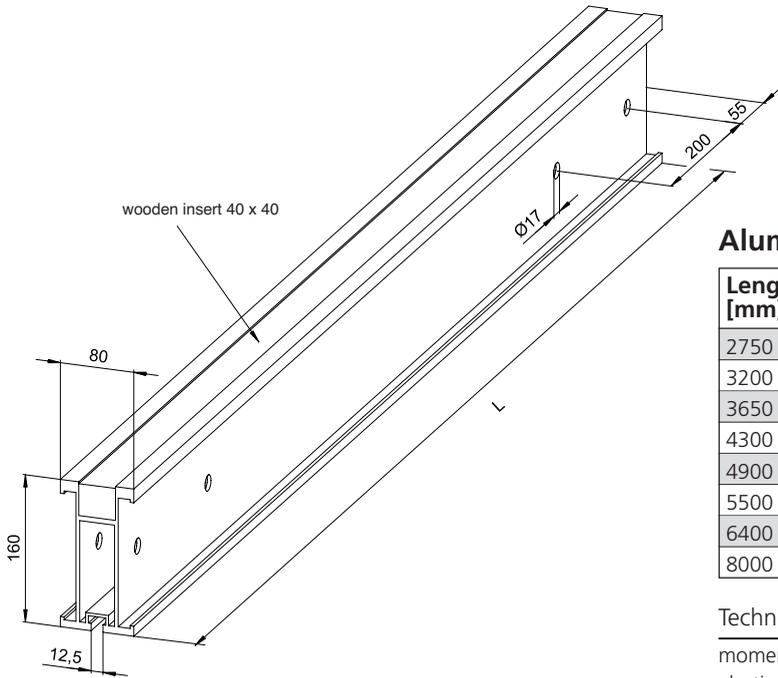
Counter support for "AL 225"

| Weight [kg/unit] | Item No. |
|------------------|----------|
| 16.0 | 622693 |





TECHNICAL DATA:

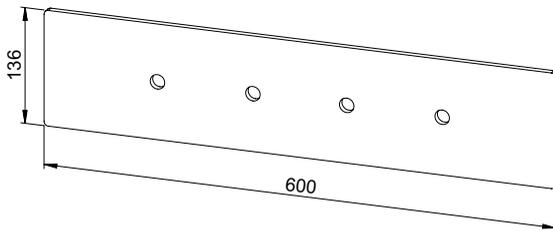


Aluminium main girder "AL 160H"

| Length [mm] | Weight [kg/unit] | Item No. |
|-------------|------------------|----------|
| 2750 | 18.0 | 621627 |
| 3200 | 20.0 | 621632 |
| 3650 | 24.0 | 621636 |
| 4300 | 28.0 | 621643 |
| 4900 | 32.0 | 621649 |
| 5500 | 36.0 | 621655 |
| 6400 | 42.0 | 621664 |
| 8000 | 52.0 | 621680 |

Technical data:

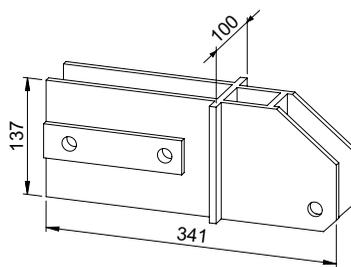
| | |
|----------------------------|---------------------|
| moment of inertia: | 787 cm ⁴ |
| elastic modulus: | 98 cm ³ |
| admissible bending moment: | 10.7 kNm |
| admissible shear force: | 52.0 kN |



Connecting plate for "AL 160H"

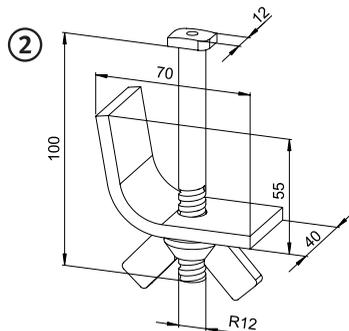
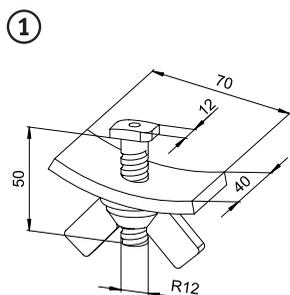
(2 units necessary per joint)

| Weight [kg/unit] | Item No. |
|------------------|----------|
| 12,00 | 621691 |



Girder support for "AL 160H"

| Weight [kg/unit] | Item No. |
|------------------|----------|
| 5.00 | 621692 |



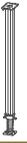
Clamping bolts

| Type | Weight [kg/unit] | Item No. |
|---------------------------|------------------|----------|
| ① main girder at prop | 0.20 | 629910 |
| ② H20-beam at main girder | 0.36 | 629912 |



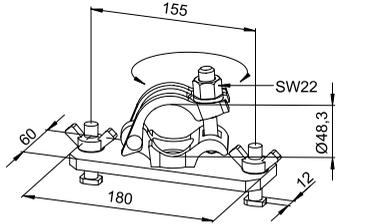
6

HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES



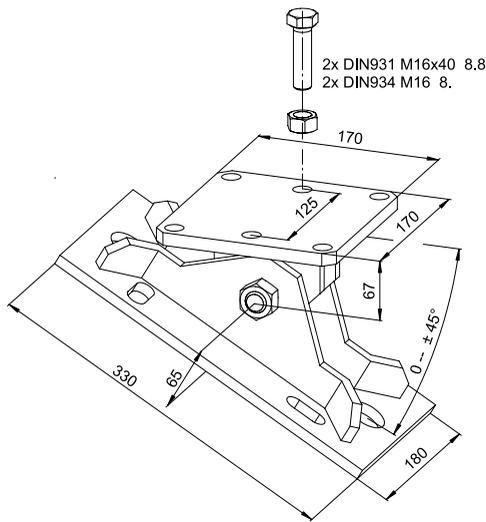
ACCESSORIES

TECHNICAL DATA:



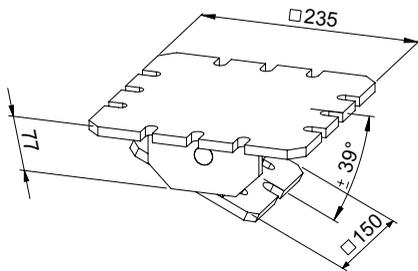
Half coupler

| Weight [kg/unit] | Item No. |
|------------------|----------|
| 1.56 | 629915 |



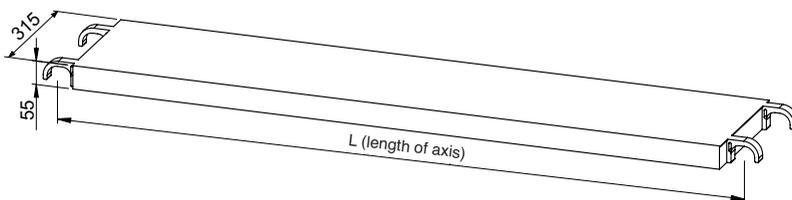
Hinged support

| Weight [kg/unit] | Item No. |
|------------------|----------|
| 6.0 | 629914 |



Adjustable head plate

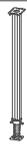
| Weight [kg/unit] | Item No. |
|------------------|----------|
| 3.0 | 629916 |



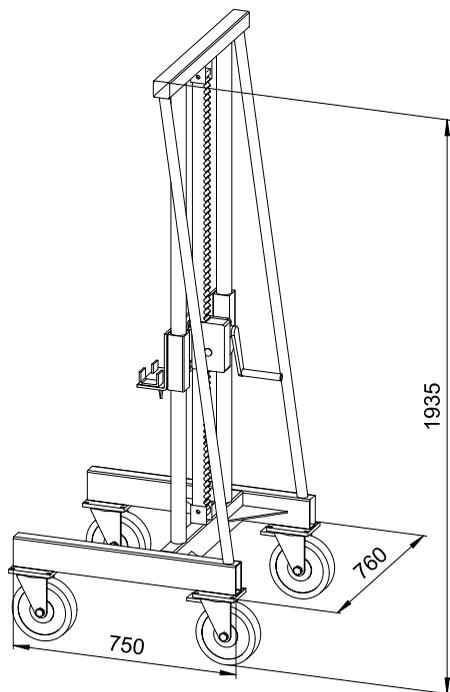
Aluminium scaffolding planking

| Length L [m] | Weight [kg/unit] | Item No. |
|--------------|------------------|----------|
| 1.25 | 6.00 | 625112 |
| 1.60 | 7.50 | 625116 |
| 1.80 | 8.40 | 625118 |
| 2.40 | 11.30 | 625124 |
| 3.00 | 13.60 | 625130 |



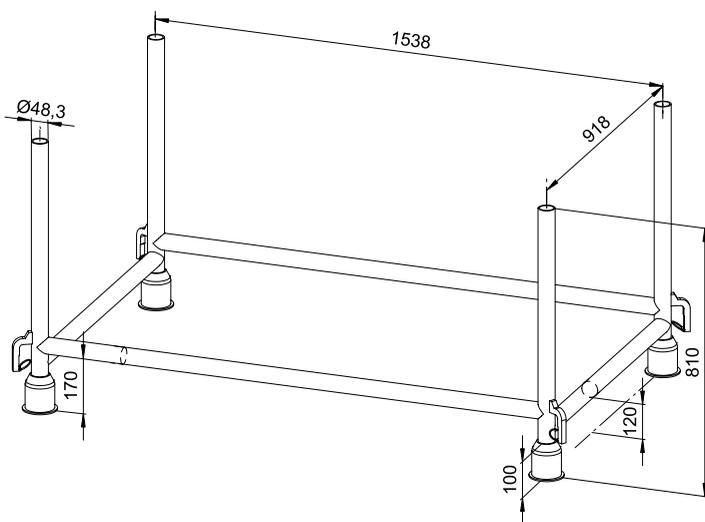
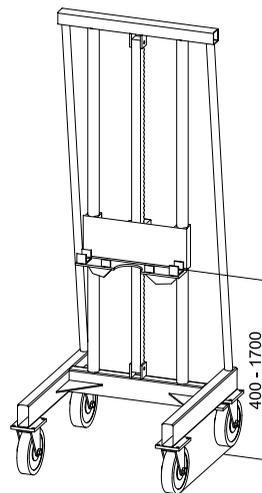


TECHNICAL DATA:



Mechanical lifting carriage

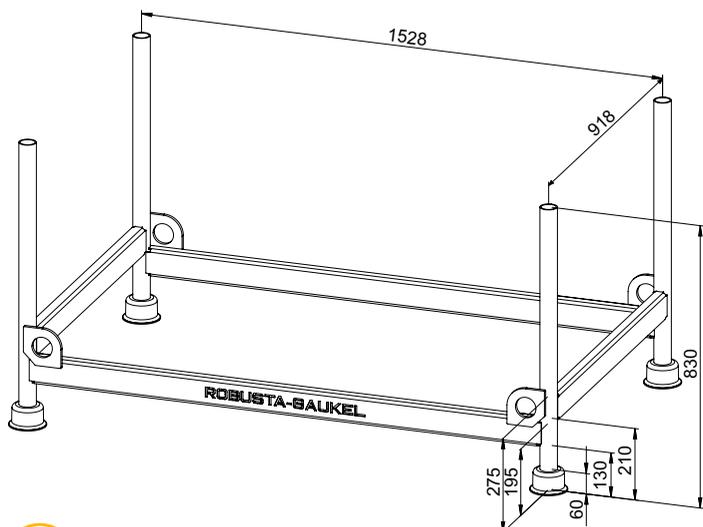
| Weight [kg/unit] | Permissible load [kN] | Item No. |
|------------------|-----------------------|----------|
| 124.0 | 10.0 | 629920 |



Rack, standard version, stackable for crane transportation, galvanized

| Size L x W x H [mm] | Adm. load [kN] | Weight [kg/unit] | Item No. |
|---------------------|----------------|------------------|----------|
| 1490 x 870 x 775 | 38.0 | 15.0 | 639901 |

units per rack: 30

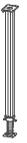


Rack, reinforced version, stackable, galvanized for crane and fork-lift transportation

| Size L x W x H [mm] | Adm. load [kN] | Weight [kg/unit] | Item No. |
|---------------------|----------------|------------------|----------|
| 1490 x 870 x 775 | 52.0 | 15.0 | 639902 |

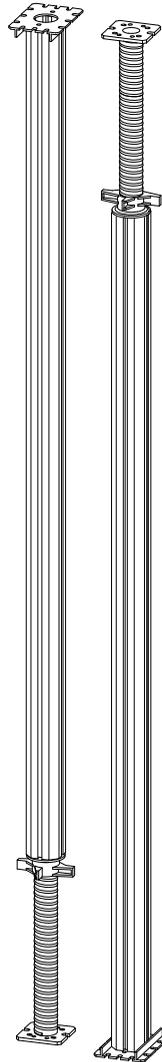
units per rack: 30





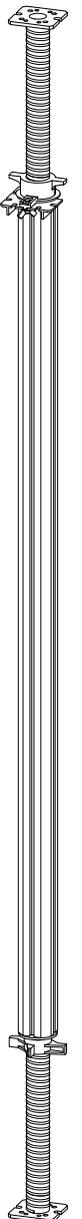
Single props

| | Length of prop [m] | Distance of lowering [m] | Permissible load [kN] ²⁾ | |
|-----------|--------------------|--------------------------|-------------------------------------|-------------|
| | | | Use within the system | |
| | | | Base spindle | Top spindle |
| Type 3-AL | 1.70 | 0.00 | 128.0 | 128.0 |
| | 1.80 | 0.10 | 128.0 | 123.7 |
| | 1.90 | 0.20 | 128.0 | 119.3 |
| | 2.00 | 0.30 | 128.0 | 115.0 |
| | 2.10 | 0.40 | 128.0 | 110.6 |
| | 2.20 | 0.50 | 121.3 | 102.2 |
| | 2.30 | 0.60 | 114.6 | 93.9 |
| | 2.40 | 0.70 | 107.8 | 85.5 |
| | 2.50 | 0.80 | 101.1 | 77.1 |
| | 2.60 | 0.90 | 92.5 | 71.3 |
| Type 4-AL | 2.70 | 1.00 | 83.9 | 65.6 |
| | 2.80 | 1.10 | 75.3 | 59.8 |
| | 2.90 | 1.20 | 66.7 | 54.0 |
| | 2.90 | 0.00 | 114.1 | 128.0 |
| | 3.00 | 0.10 | 106.9 | 116.0 |
| | 3.10 | 0.20 | 99.7 | 103.9 |
| | 3.20 | 0.30 | 92.4 | 91.8 |
| | 3.30 | 0.40 | 85.2 | 79.8 |
| | 3.40 | 0.50 | 80.5 | 72.7 |
| | 3.50 | 0.60 | 75.8 | 65.7 |
| Type 5-AL | 3.60 | 0.70 | 71.0 | 58.6 |
| | 3.70 | 0.80 | 66.3 | 51.5 |
| | 3.80 | 0.90 | 61.2 | 47.8 |
| | 3.90 | 1.00 | 56.1 | 44.1 |
| | 4.00 | 1.10 | 51.0 | 40.4 |
| | 4.10 | 1.20 | 45.9 | 36.7 |
| | 4.30 | 0.00 | 54.1 | 58.7 |
| | 4.40 | 0.10 | 52.0 | 55.7 |
| | 4.50 | 0.20 | 49.9 | 52.7 |
| | 4.60 | 0.30 | 47.7 | 49.6 |
| 4.70 | 0.40 | 45.6 | 46.6 | |
| 4.80 | 0.50 | 43.7 | 43.6 | |
| 4.90 | 0.60 | 41.8 | 40.6 | |
| 5.00 | 0.70 | 39.8 | 37.6 | |
| 5.10 | 0.80 | 37.9 | 34.6 | |
| 5.20 | 0.90 | 35.9 | 32.4 | |
| 5.30 | 1.00 | 33.9 | 30.1 | |
| 5.40 | 1.10 | 31.9 | 27.9 | |
| 5.50 | 1.20 | 29.9 | 25.6 | |



Single props with add. spindle

| | Length of prop [m] | Distance of lowering [m] | Adm. load [kN/prop] ^{1) 2)} |
|-----------|--------------------|--------------------------|--------------------------------------|
| Type 3-AL | 3.20 | 0.00 | 61.2 |
| | 3.30 | 0.10 | 57.6 |
| | 3.40 | 0.20 | 54.0 |
| | 3.50 | 0.30 | 50.3 |
| | 3.60 | 0.40 | 46.7 |
| | 3.70 | 0.50 | 43.1 |
| | 3.80 | 0.60 | 40.8 |
| | 3.90 | 0.70 | 38.5 |
| | 4.00 | 0.80 | 36.1 |
| | 4.10 | 0.90 | 33.8 |
| Type 4-AL | 4.20 | 1.00 | 31.5 |
| | 3.20 | 0.00 | 99.8 |
| | 3.30 | 0.10 | 94.0 |
| | 3.40 | 0.20 | 88.2 |
| | 3.50 | 0.30 | 82.4 |
| | 3.60 | 0.40 | 76.6 |
| | 3.70 | 0.50 | 70.8 |
| | 3.80 | 0.60 | 65.0 |
| | 3.90 | 0.70 | 61.6 |
| | 4.00 | 0.80 | 58.1 |
| Type 5-AL | 4.10 | 0.90 | 54.7 |
| | 4.20 | 1.00 | 51.3 |
| | 4.30 | 1.10 | 47.8 |
| | 4.40 | 1.20 | 44.4 |
| | 4.50 | 1.30 | 40.9 |
| | 4.60 | 1.40 | 37.5 |
| | 4.70 | 1.50 | 35.8 |
| | 4.80 | 1.60 | 34.2 |
| | 4.90 | 1.70 | 32.5 |
| | 5.00 | 1.80 | 30.8 |
| Type 5-AL | 5.10 | 1.90 | 29.1 |
| | 5.20 | 2.00 | 27.5 |
| | 5.30 | 2.10 | 25.8 |
| | 5.40 | 2.20 | 24.1 |
| | 4.40 | 0.02 | 52.6 |
| | 4.50 | 0.12 | 50.7 |
| | 4.60 | 0.22 | 48.8 |
| | 4.70 | 0.32 | 46.8 |
| | 4.80 | 0.42 | 44.9 |
| | 4.90 | 0.52 | 43.0 |
| 5.00 | 0.62 | 41.1 | |
| 5.10 | 0.72 | 39.1 | |
| 5.20 | 0.82 | 37.2 | |
| 5.30 | 0.92 | 35.7 | |
| 5.40 | 1.02 | 34.3 | |
| 5.50 | 1.12 | 32.8 | |
| 5.60 | 1.22 | 31.4 | |
| 5.70 | 1.32 | 29.9 | |
| 5.80 | 1.42 | 28.4 | |
| 5.90 | 1.52 | 27.0 | |
| 6.00 | 1.62 | 25.5 | |
| 6.10 | 1.72 | 24.4 | |
| 6.20 | 1.82 | 23.4 | |
| 6.30 | 1.92 | 22.3 | |
| 6.40 | 2.02 | 21.2 | |
| 6.50 | 2.12 | 20.1 | |
| 6.60 | 2.22 | 19.1 | |
| 6.70 | 2.32 | 18.0 | |
| 6.80 | 2.42 | 16.9 | |



Hints for using the tables

(S. 16 – 19):

The permissible loads (utilizable resistance according to DIN EN 12812 (shoring group B1)) are only valid on condition that the props are held at the top through a horizontal area. Therefore only vertical loads with the max. eccentricity ≤ 5 mm are transferred.

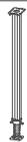
Approved type static means:

No engineers work necessary to prove the permissible loads and seamless approval of a trustworthy scaffolding.

¹⁾ both spindles with equal extension length

²⁾ according type test No. II B4-540-177/91





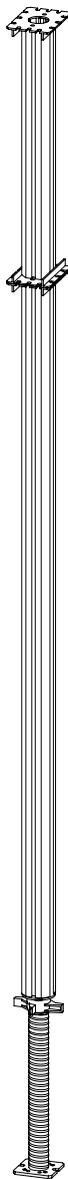
HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES

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LOAD TABLES FOR SINGLE PROPS

Single props with extension element 1 m

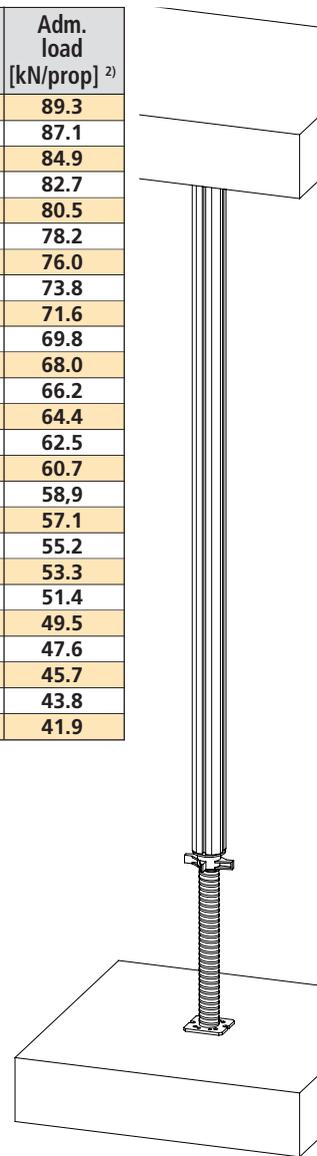
| | Length of propp [m] | Dist. of lowering [m] | Adm. load [kN/prop] ^{2) 3)} |
|-----------|---------------------|-----------------------|--------------------------------------|
| Type 3-AL | 2.70 | 0.00 | 50.5 |
| | 2.80 | 0.10 | 49.4 |
| | 2.90 | 0.20 | 48.4 |
| | 3.00 | 0.30 | 47.3 |
| | 3.10 | 0.40 | 50.5 |
| | 3.20 | 0.50 | 49.4 |
| | 3.30 | 0.60 | 48.4 |
| | 3.40 | 0.70 | 47.3 |
| | 3.50 | 0.80 | 46.2 |
| | 3.60 | 0.90 | 44.1 |
| | 3.70 | 1.00 | 42.1 |
| | 3.80 | 1.10 | 40.0 |
| 3.90 | 1.20 | 37.9 | |
| Type 4-AL | 3.90 | 0.00 | 41.0 |
| | 4.00 | 0.10 | 40.2 |
| | 4.10 | 0.20 | 39.4 |
| | 4.20 | 0.30 | 38.6 |
| | 4.30 | 0.40 | 37.8 |
| | 4.40 | 0.50 | 36.7 |
| | 4.50 | 0.60 | 35.6 |
| | 4.60 | 0.70 | 34.4 |
| | 4.70 | 0.80 | 33.3 |
| | 4.80 | 0.90 | 32.1 |
| | 4.90 | 1.00 | 30.9 |
| | 5.00 | 1.10 | 29.6 |
| 5.10 | 1.20 | 28.4 | |
| Type 5-AL | 5.30 | 0.00 | 28.0 |
| | 5.40 | 0.10 | 27.5 |
| | 5.50 | 0.20 | 27.0 |
| | 5.60 | 0.30 | 26.4 |
| | 5.70 | 0.40 | 25.9 |
| | 5.80 | 0.50 | 25.3 |
| | 5.90 | 0.60 | 24.6 |
| | 6.00 | 0.70 | 24.0 |
| | 6.10 | 0.80 | 23.3 |
| | 6.20 | 0.90 | 22.3 |
| | 6.30 | 1.00 | 21.3 |
| | 6.40 | 1.10 | 20.3 |
| 6.50 | 1.20 | 19.3 | |



Single props (fixed ends on base and top)

| | Length of prop [m] | Dist. of lowering [m] | Adm. load [kN/prop] ²⁾ |
|-----------|--------------------|-----------------------|-----------------------------------|
| Type 3-AL | 1.70 | 0.00 | 128.0 |
| | 1.75 | 0.05 | 128.0 |
| | 1.80 | 0.10 | 128.0 |
| | 1.85 | 0.15 | 128.0 |
| | 1.90 | 0.20 | 128.0 |
| | 1.95 | 0.25 | 128.0 |
| | 2.00 | 0.30 | 128.0 |
| | 2.05 | 0.35 | 128.0 |
| | 2.10 | 0.40 | 128.0 |
| | 2.15 | 0.45 | 128.0 |
| | 2.20 | 0.50 | 128.0 |
| | 2.25 | 0.55 | 128.0 |
| | 2.30 | 0.60 | 128.0 |
| | 2.35 | 0.65 | 128.0 |
| | 2.37 | 0.67 | 123.9 |
| | 2.40 | 0.70 | 123.8 |
| | 2.45 | 0.75 | 119.8 |
| | 2.50 | 0.80 | 115.7 |
| | 2.55 | 0.85 | 113.3 |
| | 2.60 | 0.90 | 110.9 |
| Type 4-AL | 2.65 | 0.95 | 108.4 |
| | 2.70 | 1.00 | 106.0 |
| | 2.75 | 1.05 | 103.6 |
| | 2.80 | 1.10 | 98.8 |
| | 2.85 | 1.15 | 93.3 |
| | 2.90 | 1.20 | 89.1 |
| | 2.90 | 0.00 | 128.0 |
| | 2.95 | 0.05 | 128.0 |
| | 3.00 | 0.10 | 128.0 |
| | 3.05 | 0.15 | 128.0 |
| | 3.10 | 0.20 | 128.0 |
| | 3.15 | 0.25 | 128.0 |
| | 3.20 | 0.30 | 128.0 |
| | 3.25 | 0.35 | 128.0 |
| | 3.29 | 0.39 | 128.0 |
| | 3.30 | 0.40 | 126.8 |
| | 3.35 | 0.45 | 123.7 |
| | 3.38 | 0.48 | 122.0 |
| | 3.40 | 0.50 | 119.7 |
| | 3.45 | 0.55 | 113.9 |
| 3.50 | 0.60 | 108.1 | |
| 3.55 | 0.65 | 102.3 | |
| 3.60 | 0.70 | 96.5 | |
| 3.65 | 0.75 | 90.7 | |
| 3.70 | 0.80 | 84.9 | |
| 3.75 | 0.85 | 81.9 | |
| 3.80 | 0.90 | 78.8 | |
| 3.85 | 0.95 | 75.8 | |
| 3.90 | 1.00 | 72.7 | |
| 3.95 | 1.05 | 69.7 | |
| 4.00 | 1.10 | 66.6 | |
| 4.05 | 1.15 | 63.6 | |
| 4.10 | 1.20 | 60.5 | |

| | Length of prop [m] | Dist. of lowering [m] | Adm. load [kN/prop] ²⁾ |
|-----------|--------------------|-----------------------|-----------------------------------|
| Type 5-AL | 4.30 | 0.00 | 89.3 |
| | 4.35 | 0.05 | 87.1 |
| | 4.40 | 0.10 | 84.9 |
| | 4.45 | 0.15 | 82.7 |
| | 4.50 | 0.20 | 80.5 |
| | 4.55 | 0.25 | 78.2 |
| | 4.60 | 0.30 | 76.0 |
| | 4.65 | 0.35 | 73.8 |
| | 4.70 | 0.40 | 71.6 |
| | 4.75 | 0.45 | 69.8 |
| | 4.80 | 0.50 | 68.0 |
| | 4.85 | 0.55 | 66.2 |
| | 4.90 | 0.60 | 64.4 |
| | 4.95 | 0.65 | 62.5 |
| | 5.00 | 0.67 | 60.7 |
| | 5.05 | 0.70 | 58.9 |
| | 5.10 | 0.75 | 57.1 |
| | 5.15 | 0.80 | 55.2 |
| | 5.20 | 0.85 | 53.3 |
| | 5.25 | 0.90 | 51.4 |
| 5.30 | 0.95 | 49.5 | |
| 5.35 | 1.00 | 47.6 | |
| 5.40 | 1.05 | 45.7 | |
| 5.45 | 1.10 | 43.8 | |
| 5.50 | 1.15 | 41.9 | |



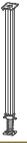
1) both spindles with equal extension length
 2) according type test No. II B4-540-177/91
 3) considering for spindle at base and on top



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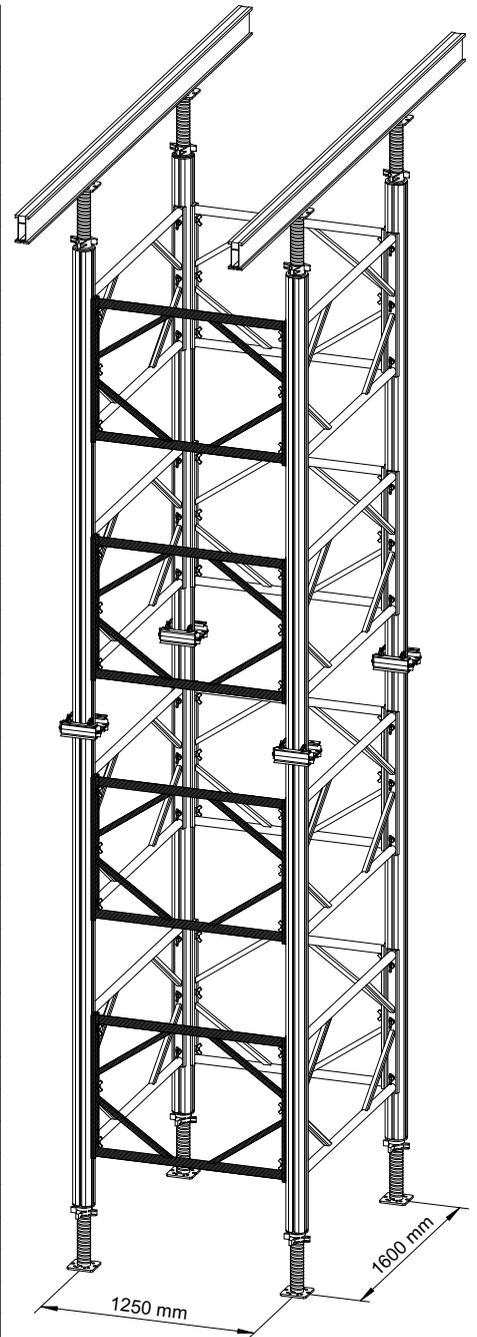
HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES

LOAD TABLES FOR SHORE TOWERS



| No. | Height [m] | min. F [kN] | max. F [kN] |
|-----|------------|-------------|-------------|
| 1 | 1.70 | 128.00 | 128.00 |
| 2 | 1.80 | 128.00 | 128.00 |
| 3 | 1.90 | 128.00 | 128.00 |
| 4 | 2.00 | 128.00 | 128.00 |
| 5 | 2.10 | 128.00 | 128.00 |
| 6 | 2.20 | 128.00 | 128.00 |
| 7 | 2.30 | 128.00 | 128.00 |
| 8 | 2.40 | 126.00 | 128.00 |
| 9 | 2.50 | 121.00 | 128.00 |
| 10 | 2.60 | 116.00 | 121.90 |
| 11 | 2.70 | 111.00 | 114.20 |
| 12 | 2.80 | 106.00 | 106.50 |
| 13 | 2.90 | 98.80 | 124.00 |
| 14 | 3.00 | 115.50 | 120.20 |
| 15 | 3.10 | 114.00 | 116.30 |
| 16 | 3.20 | 112.50 | 112.50 |
| 17 | 3.30 | 58.10 | 128.00 |
| 18 | 3.40 | 55.50 | 128.00 |
| 19 | 3.50 | 52.90 | 128.00 |
| 20 | 3.60 | 50.30 | 128.00 |
| 21 | 3.70 | 47.70 | 128.00 |
| 22 | 3.80 | 45.10 | 120.90 |
| 23 | 3.90 | 42.50 | 115.80 |
| 24 | 4.00 | 39.80 | 128.00 |
| 25 | 4.10 | 35.40 | 128.00 |
| 26 | 4.20 | 60.70 | 128.00 |
| 27 | 4.30 | 58.10 | 128.00 |
| 28 | 4.40 | 55.50 | 128.00 |
| 29 | 4.50 | 52.90 | 127.20 |
| 30 | 4.60 | 50.30 | 128.00 |
| 31 | 4.70 | 47.70 | 128.00 |
| 32 | 4.80 | 45.10 | 128.00 |
| 33 | 4.90 | 42.50 | 127.60 |
| 34 | 5.00 | 39.80 | 122.90 |
| 35 | 5.10 | 37.20 | 118.10 |
| 36 | 5.20 | 40.60 | 113.40 |
| 37 | 5.30 | 37.80 | 108.60 |
| 38 | 5.40 | 45.20 | 114.80 |
| 39 | 5.50 | 42.30 | 111.00 |
| 40 | 5.60 | 40.10 | 118.60 |
| 41 | 5.70 | 36.70 | 115.40 |
| 42 | 5.80 | 33.20 | 114.00 |
| 43 | 5.90 | 48.70 | 111.00 |
| 44 | 6.00 | 46.00 | 113.40 |
| 45 | 6.10 | 43.30 | 109.60 |
| 46 | 6.20 | 40.30 | 105.80 |
| 47 | 6.30 | 37.00 | 102.00 |
| 48 | 6.40 | 42.10 | 98.20 |
| 49 | 6.50 | 39.50 | 94.40 |
| 50 | 6.60 | 37.00 | 90.90 |
| 51 | 6.70 | 34.50 | 88.40 |
| 52 | 6.80 | 31.80 | 109.40 |
| 53 | 6.90 | 34.10 | 106.70 |

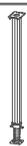
| No. | Height [m] | min. F [kN] | max. F [kN] |
|-----|------------|-------------|-------------|
| 54 | 7.00 | 31.50 | 110.60 |
| 55 | 7.10 | 46.80 | 106.80 |
| 56 | 7.20 | 44.60 | 110.00 |
| 57 | 7.30 | 42.30 | 106.20 |
| 58 | 7.40 | 40.00 | 102.50 |
| 59 | 7.50 | 37.80 | 99.50 |
| 60 | 7.60 | 35.50 | 96.80 |
| 61 | 7.70 | 33.20 | 94.20 |
| 62 | 7.80 | 35.60 | 97.70 |
| 63 | 7.90 | 33.20 | 95.50 |
| 64 | 8.00 | 30.80 | 103.70 |
| 65 | 8.10 | 33.60 | 101,10 |
| 66 | 8.20 | 31.30 | 102.40 |
| 67 | 8.30 | 32.70 | 99.30 |
| 68 | 8.40 | 30.60 | 96.10 |
| 69 | 8.50 | 45.00 | 93.00 |
| 70 | 8.60 | 42.90 | 99.40 |
| 71 | 8.70 | 40.70 | 96.50 |
| 72 | 8.80 | 38.50 | 93.50 |
| 73 | 8.90 | 36.40 | 90.60 |
| 74 | 9.00 | 34.20 | 99.10 |
| 75 | 9,10 | 32.00 | 96.70 |
| 76 | 9.20 | 30.70 | 94.30 |
| 77 | 9.30 | 31.50 | 91.90 |
| 78 | 9.40 | 29.70 | 93.20 |
| 79 | 9.50 | 31.20 | 96.50 |
| 80 | 9.60 | 29.50 | 96.50 |
| 81 | 9.70 | 39.00 | 84.90 |
| 82 | 9.80 | 37.10 | 91.90 |
| 83 | 9.90 | 35.10 | 89.50 |
| 84 | 10.00 | 33.10 | 87.20 |
| 85 | 10.10 | 31.20 | 84.90 |
| 86 | 10.20 | 33.90 | 82.60 |
| 87 | 10.30 | 31.90 | 80.20 |
| 88 | 10.40 | 32.40 | 85.60 |
| 89 | 10.50 | 30.70 | 83.80 |
| 90 | 10.60 | 29.00 | 91.00 |
| 91 | 10.70 | 30.80 | 89.70 |
| 92 | 10.80 | 29.00 | 91.00 |
| 93 | 10.90 | 30.50 | 88.90 |
| 94 | 11.00 | 28.90 | 86.70 |
| 95 | 11.10 | 34.90 | 84.60 |
| 97 | 11.30 | 31.20 | 80.30 |
| 98 | 11.40 | 34.80 | 77.30 |
| 99 | 11.50 | 33.20 | 76.00 |
| 100 | 11.60 | 31.60 | 74.00 |
| 101 | 11.70 | 29.90 | 72.40 |
| 102 | 11.80 | 28.30 | 86.50 |
| 103 | 11.90 | 29.80 | 84.70 |
| 104 | 12.00 | 28.20 | 82.90 |



This table gives an overview for the (characteristic) admissible loads. The realistic admissible load has to be calculated in every single case, regarding the place of use (wind zone and height over sea level) and how the tower is been assembled. On request we are pleased to send the fully detailed design tables for dimensioning.

continuation page 19





HEAVY-DUTY ALUMINIUM PROPS AND ACCESSORIES

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LOAD TABLES FOR SHORE TOWERS

| No. | Height [m] | min. F [kN] | max. F [kN] |
|-----|------------|-------------|-------------|
| 105 | 12.10 | 38.70 | 81.10 |
| 106 | 12.20 | 37.20 | 84.70 |
| 107 | 12.30 | 35.60 | 83.00 |
| 108 | 12.40 | 34.10 | 81.40 |
| 109 | 12.50 | 32.50 | 79.70 |
| 110 | 12.60 | 31.00 | 78.00 |
| 111 | 12.70 | 29.40 | 76.30 |
| 112 | 12.80 | 30.90 | 76.00 |
| 113 | 12.90 | 29.40 | 75.00 |
| 114 | 13.00 | 27.80 | 81.00 |
| 115 | 13.10 | 30.00 | 79.60 |
| 116 | 13.20 | 28.40 | 78.20 |
| 117 | 13.30 | 29.20 | 76.80 |
| 118 | 13.40 | 27.70 | 75.40 |
| 119 | 13.50 | 37.60 | 74.10 |
| 120 | 13.60 | 36.10 | 72.70 |
| 121 | 13.70 | 34.70 | 71.30 |
| 122 | 13.80 | 33.20 | 70.10 |
| 123 | 13.90 | 31.70 | 69.20 |
| 124 | 14.00 | 30.20 | 76.50 |
| 125 | 14.10 | 28.70 | 75.50 |
| 126 | 14.20 | 28.00 | 74.40 |
| 127 | 14.30 | 28.70 | 75.50 |
| 128 | 14.40 | 27.30 | 72.30 |
| 129 | 14.50 | 28.60 | 71.30 |
| 130 | 14.60 | 27.20 | 73.90 |
| 131 | 14.70 | 34.00 | 73.00 |
| 132 | 14.80 | 32.60 | 72.20 |
| 133 | 14.90 | 31.20 | 71.30 |
| 134 | 15.00 | 29.80 | 70.50 |
| 135 | 15.10 | 28.30 | 69.60 |
| 136 | 15.20 | 30.50 | 68.80 |
| 137 | 15.30 | 28.90 | 67.90 |
| 138 | 15.40 | 29.70 | 68.00 |
| 139 | 15.50 | 28.30 | 67.60 |
| 140 | 15.60 | 26.90 | 69.40 |
| 141 | 15.70 | 28.20 | 68.10 |
| 142 | 15.80 | 26.80 | 68.50 |
| 143 | 15.90 | 28.20 | 68.10 |
| 144 | 16.00 | 26.80 | 67.60 |
| 145 | 16.10 | 31.40 | 66.90 |
| 146 | 16.20 | 30.00 | 66.70 |
| 147 | 16.30 | 28.50 | 66.30 |
| 148 | 16.40 | 31.80 | 65.90 |
| 149 | 16.50 | 30.50 | 65.40 |
| 150 | 16.60 | 29.10 | 65.00 |
| 151 | 16.70 | 27.80 | 64.50 |
| 152 | 16.80 | 26.50 | 67.70 |
| 153 | 16.90 | 27.70 | 67.30 |
| 154 | 17.00 | 26.40 | 66.90 |
| 155 | 17.10 | 35.40 | 66.50 |
| 156 | 17.20 | 34.10 | 67.40 |
| 157 | 17.30 | 32.80 | 67.00 |

| No. | Height [m] | min. F [kN] | max. F [kN] |
|-----|------------|-------------|-------------|
| 158 | 17.40 | 31.50 | 66.60 |
| 159 | 17.50 | 30.10 | 66.20 |
| 160 | 17.60 | 28.80 | 65.50 |
| 161 | 17.70 | 27.50 | 65.60 |
| 162 | 17.80 | 28.80 | 65.50 |
| 163 | 17.90 | 27.50 | 65.20 |
| 164 | 18.00 | 26.20 | 66.70 |
| 165 | 18.10 | 27.90 | 66.30 |
| 166 | 18.20 | 26.50 | 66.00 |
| 167 | 18.30 | 27.40 | 65.70 |
| 168 | 18.40 | 26.10 | 65.30 |
| 169 | 18.50 | 34.60 | 65.00 |
| 170 | 18.60 | 33.40 | 65.00 |
| 171 | 18.70 | 32.10 | 64.70 |
| 172 | 18.80 | 30.90 | 64.50 |
| 173 | 18.90 | 29.60 | 64.20 |
| 174 | 19.00 | 28.40 | 65.90 |
| 175 | 19.10 | 27.10 | 65.60 |
| 176 | 19.20 | 26.30 | 65.30 |
| 177 | 19.30 | 27.10 | 65.00 |
| 178 | 19.40 | 25.90 | 64.70 |
| 179 | 19.50 | 27.10 | 65.60 |
| 180 | 19.60 | 25.80 | 65.40 |
| 181 | 19.70 | 31.80 | 65.10 |
| 182 | 19.80 | 30.50 | 64.90 |
| 183 | 19.90 | 29.30 | 64.60 |
| 184 | 20.00 | 28.10 | 64.30 |
| 185 | 20.10 | 26.90 | 64.10 |
| 186 | 20.20 | 28.50 | 63.80 |
| 187 | 20.30 | 27.30 | 63.50 |
| 188 | 20.40 | 28.10 | 63.90 |
| 189 | 20.50 | 26.90 | 63.70 |
| 190 | 20.60 | 25.70 | 64.60 |
| 191 | 20.70 | 26.90 | 64.30 |
| 192 | 20.80 | 25.70 | 64.40 |
| 193 | 20.90 | 26.80 | 64.20 |
| 194 | 21.00 | 25.60 | 64.00 |
| 195 | 21.10 | 29.50 | 63.80 |
| 196 | 21.20 | 28.30 | 63.60 |
| 197 | 21.30 | 27.00 | 63.40 |
| 198 | 21.40 | 30.10 | 63.20 |
| 199 | 21.50 | 29.00 | 62.90 |
| 200 | 21.60 | 27.80 | 62.70 |
| 201 | 21.70 | 26.60 | 62.50 |
| 202 | 21.80 | 25.50 | 62.30 |
| 203 | 21.90 | 26.60 | 62.10 |
| 204 | 22.00 | 25.50 | 63.00 |
| 205 | 22.10 | 33.40 | 62.90 |
| 206 | 22.20 | 32.20 | 62.90 |
| 207 | 22.30 | 31.10 | 62.80 |
| 208 | 22.40 | 29.90 | 62.60 |
| 209 | 22.50 | 28.80 | 62.10 |
| 210 | 22.60 | 27.60 | 62.30 |

| No. | Height [m] | min. F [kN] | max. F [kN] |
|-----|------------|-------------|-------------|
| 211 | 22.70 | 26.50 | 62.20 |
| 212 | 22.80 | 28.00 | 62.10 |
| 213 | 22.90 | 26.80 | 61.90 |
| 214 | 23.00 | 25.60 | 61.80 |
| 215 | 23.10 | 26.80 | 61.60 |
| 216 | 23.20 | 25.60 | 61.50 |
| 217 | 23.30 | 26.50 | 61.30 |
| 218 | 23.40 | 25.30 | 61.20 |
| 219 | 23.50 | 35.00 | 58.70 |
| 220 | 23.60 | 33.90 | 56.20 |
| 221 | 23.70 | 32.90 | 53.70 |
| 222 | 23.80 | 31.80 | 51.20 |
| 223 | 23.90 | 30.70 | 48.70 |
| 224 | 24.00 | 29.60 | 46.30 |
| 225 | 24.10 | 28.50 | 43.80 |
| 226 | 24.20 | 27.40 | 41.30 |
| 227 | 24.30 | 26.30 | 38.80 |
| 228 | 24.40 | 25.20 | 36.30 |
| 229 | 24.50 | 26.30 | 33.80 |
| 230 | 24.60 | 25.20 | 31.30 |

This table gives an overview for the (characteristic) admissible loads. The realistic admissible load has to be calculated in every single case, regarding the place of use (wind zone and height over sea level) and how the tower is been assembled. On request we are pleased to send the fully detailed design tables for dimensioning.



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