

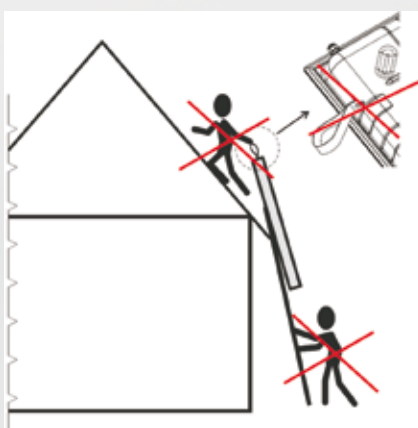
Installation, service and maintenance instructions

**Rooftop installation with
AluPlus installation system**

**Freestanding installation with
AluPlus installation system**

2.3 m² high performance solar collector:

- **Solerio F3Q**
- **Solar Plan 230V**



P 5

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Technical data

Technical data

| | | |
|--|---|---|
| Collector | Solerio F3Q | Solar Plan 230V |
| Casing | Deep-drawn sheet aluminium basin, natural finish, seawater-resistant. | |
| Dimensions (L x W x H) / (outside edges) | 1099x2099x110 mm | 2099x1099x110 mm |
| Gross area / area exposed to wind as per DIN 1055-4 | 2.3 m ² | 2.3 m ² |
| Effective absorber area | 2.0 m ² | 2.0 m ² |
| Weight (empty) | 41 kg | 40 kg |
| Contents | 1.9 litres | 1.7 litres |
| Absorber: | Copper/copper | Aluminium/copper |
| | Design: Meander, highly selective coating | |
| Cover | 3.2 mm solar safety glass, hail resistant* | |
| Insulation | Mineral wool | |
| Connections | flat-sealing with union nut G 3/4 | |
| Angle of installation | 15 ° to 90 ° | 15 ° to 90 ° |
| Optical efficiency * | 79.4% | 80.4 |
| Heat loss coefficient a_1 * | 3.494 W/(m K ²) | 3.310 W/(m K ²) |
| Heat loss coefficient a_2 * | 0.011 W/(m ² K ²) | 0.015W/(m ² K ²) |
| Stagnation temperature * (permissible operating temp.) | 160°C | 194°C |
| Irradiation angle correction factor K_{50° * | 95.4% | 94% |
| Heat capacity C * | 8.073 kJ/(m ² K) | 5.85 kJ/(m ² K) |
| Max. operation overpressure | 10 bar | 10 bar |
| Heating fluid | Tyfocor L ready-to-use mixture (45 % by vol.) | |
| Solar-Keymark registration no. | - | 011-7S260F |

* Values according to EN 12975

Standards and Regulations / safety instructions

Standards and Regulations



The following specifications, rules and guidelines are to be observed when installing and operating!

Installation on roofs. Please follow the accident prevention regulations (UVV)

- DTU P06-002: French standards NV65 'Regulations regarding the effects of snow and wind on constructions, as well as Appendix';
- DTU P06-006: Standard N84 'Construction work - snow loads'.
- NF EN 1991-1-3/NA: 'Eurocode 1 - Actions on structures - Parts 1-3: General actions - Snow loads'.
- NF EN 1991-1-4/NA: 'Eurocode 1 - Actions on structures - Parts 1-4: General actions - Wind actions'.
- Perf. specif. CSTB 1611: 'Determination of the forces applied to solar collectors and their glazing due to climatic loads'.
- Perf. specif. CSTB 1612: 'General recommendations for the employment of semi-installed, built-in or integrated collectors on or at a building'.
- Perf. specif. CSTB 1827: 'General technical specification sheet for level collectors with liquid circulation'.
- NF P50-601-1: DTU 65.12 'Building works - Plain solar collector installations using heat transfer liquid, used for heating and the production of domestic hot water - Part 1: technical specifications.'
- NF P84-204: DTU43.1 'Water resistance of flat roofs with a masonry structural member - complete technical specification + supplements'.
- Articles R4323-58 to R4323-68 of the German Labour Code: 'Safety precautions for temporary working at heights'.

Connection of thermal solar heating systems

- EN 12976 Thermal solar systems and components. Factory made systems. General requirements (containing generally applicable information on planning and execution)
- EN 12977 Thermal solar systems and components. Custom built systems. General requirements (containing generally applicable information on planning and execution)

Electrical connection

- NF C15-100: Low-voltage installations
- EN 62305 part 1-4: Lightning protection systems'
- IEC 60364-5-54 Selection and erection of electrical equipment, earthing arrangements, protective conductors

The collectors are tested in accordance with the following standards:

- EN 12975-1 Thermal solar systems and components. Solar collectors. General requirements
- EN 12975-2 Thermal solar systems and components. Solar collectors. Test methods

Safety instructions

The following symbols and signs are used in this description. These important instructions concern personal safety and technical reliability.



"Safety instructions" identify instructions with which you must exactly comply to prevent injury and damage to the equipment.

Example: because of the possibly very high temperatures in the collector there is a danger of being scalded by the hot heating fluid.



"Warning" identifies technical instructions which you must observe to prevent damage and avoid malfunctions.

Notices / pipework examples

Notices

The collectors should be directed toward a point between the south-east and the south-west (optimally: to the south). In the case of a different direction, please contact our technical advisors. Trees, adjacent buildings, chimneys etc. should throw as little shade as possible on the collectors. Consider the different positions of the sun (summer - winter).

The distance between the upper face of the solar collector and the lower edge of the roof ridge should be at least 3 roofing tiles, so that the feed pipe can be installed rising in the roof space.

In areas subject to abundant snowfall, it should be ensured that the snow can slide off the collector. Therefore, there should be no roof superstructures below the collector area. For safety reasons, the cross-battens and the roofing tiles under the roof hooks must not be pre-damaged (cracked, drilled or aged), since they can otherwise break under extreme snow loads. In cases of doubt the battens and/or roofing tiles must be replaced in these areas.

In addition, the battens underneath the roof hooks should be replaced by sheet metal battens in the case of rooftop installation.

Observe snow loads according to NF EN 1991-1-3/NA!

Pipework examples

Recommendation:

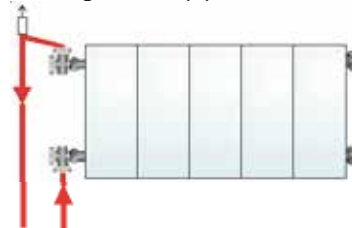


Vent
(install at the highest point)

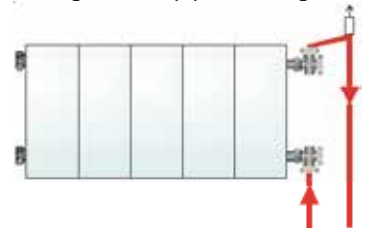


Flow regulation valve
for multiple
collector arrays

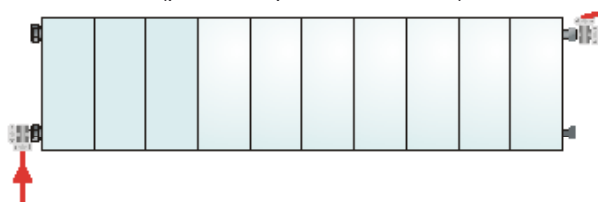
Single-sided pipework, left



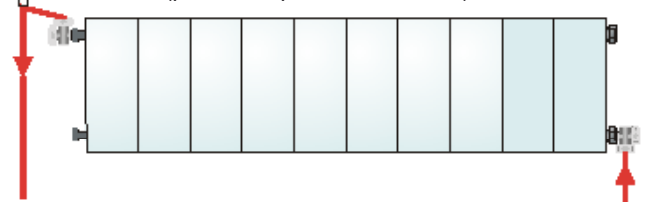
Single-sided pipework, right



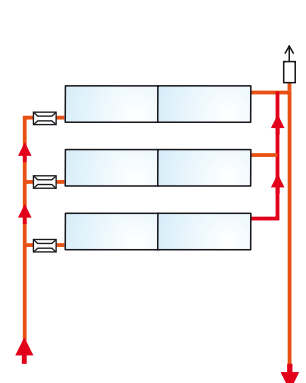
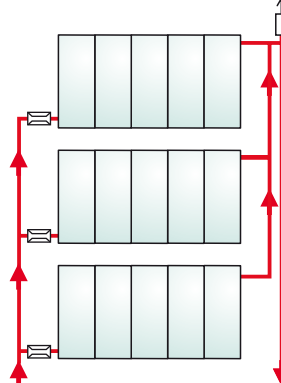
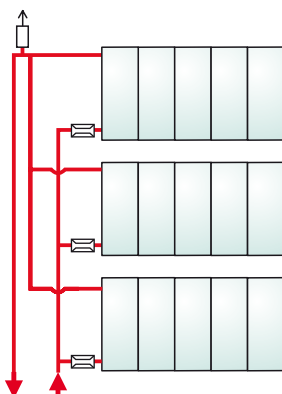
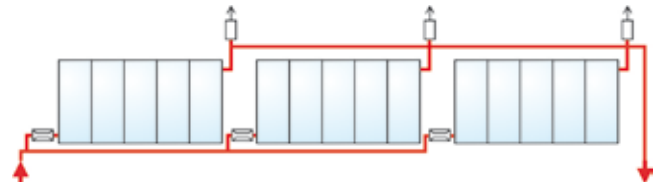
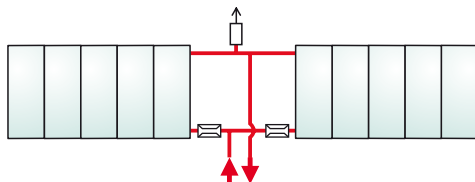
Double-sided pipework
(possible up to 10 collectors)



Double-sided pipework
(possible up to 10 collectors)



Pipework of several collector fields according to Tichelmann



Instructions regarding system hydraulics

Copper tubes with copper soldered joints are recommended for the installation of the collectors.

The insulation of outside pipes must be resistant to temperature, UV and birds.

Use only components that are resistant to high temperatures and suitable for solar technology.

Do not install any shut-off valves in the collector or collector field connections.

Regulate the flow rates of the solar medium.

A flow regulator on each collector field enables the regulation of the flow rates of the solar medium. This enables high productivity of the solar heating system and avoids overheating. The flow regulator must never be completely closed.

The flow regulator of the main collector should be installed under the roof or on the terrace, in order to facilitate the flow regulation of the system.

Attention: danger of burning: as soon as the collectors are mounted on a sloping or terraced roof, they must be protected by a sun blind so that they do not heat up. The sun blind can be removed after flushing and filling with heating fluid.

Fill the solar heating system only with heating fluid from Ygins. This ready-to-use medium consists of 45 % Tyfocor L.'

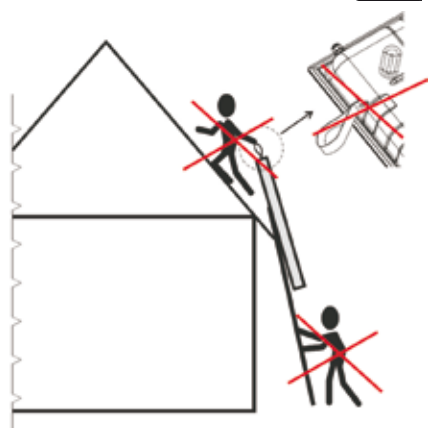
| | | Pressure losses in fields of 2.3 m ² collectors (mbar / mH ₂ O) * | | | | | | | | |
|------------------------|------------------------------------|---|------|------|-------------------------|-------------|-------------|-------------------------------|-------------|-------------|
| | | up to 5 collectors possible | | | 6-8 collectors possible | | | Max. 9 to 10 solar collectors | | |
| | Flow rate (l/h/m ²) | 20 | 25 | 30 | 20 | 25 | 30 | 20 | 25 | 30 |
| Solar Plan 230V | Not Tichelmann | 73 | 92 | 111 | X | X | X | X | X | X |
| | Tichelmann | 0.74 | 0.94 | 1.13 | 84 0.86 | 108 1.10 | 133 1.36 | 96 0.98 | 126 1.28 | 158 1.61 |
| Solerio F3Q | Not Tichelmann | 78 | 98 | 118 | X | X | X | X | X | X |
| | Tichelmann | 0.80 | 1.00 | 1.20 | 100 1.02 | 131 1.34 | 164 1.67 | 126 1.28 | 168 1.71 | 215 2.19 |

* In accordance with EN12975-2 Appendix L at a medium temperature of 20 °C.



The collector must **not** be pulled onto the roof exclusively by the rivet nuts!
Do not step underneath the collector during transport. (see picture)

In case of jerky movements the rivet nuts can tear off and the collector can fall.



General preparatory work

Transport and storage

Warning

- Transport and store the collector stacks only with the packing strips and pallets.
- Do not transport any more than 16 collectors on top of one another and do not store more than 24 collectors on top of one another.
- Do not transport collectors with the glass facing downwards.
- To avoid damage, do not carry the collectors by the collector supports or set the collectors down on the supports when transporting.
- Do not place the rear side of the collector down on an uneven surface.
- Collectors must be temporarily stored in dry, dust-free places.
- We recommend the use of carrying handles (available as accessories).

Installation

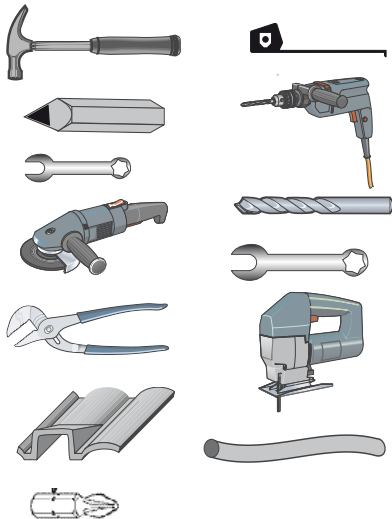


The installation and initial commissioning may be carried out only by approved specialist companies. These specialists are responsible for the proper installation and initial commissioning.



The collector connections, even of emptied collectors, can already become very hot when assembling. Wear protective gloves; there is a danger of being burned.

Tools required

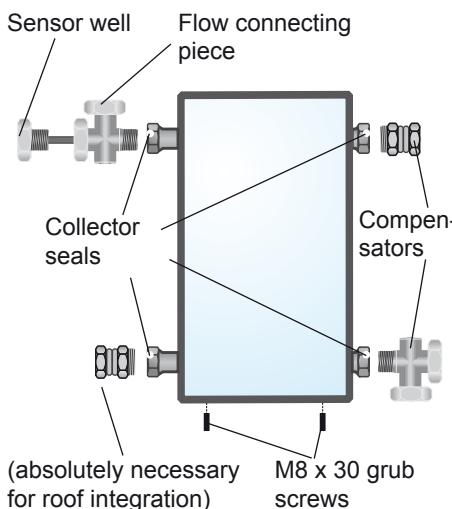


The following tools and auxiliary materials are required for the simple and safe installation of the collectors:

- 1 hammer
- 1 tape measure
- 1 pencil / stick of chalk
- 2 screwdrivers / wrenches 13 AF
- 1 wood drill approx. 5 mm (roof integration only)
- 1 angle grinder with stone disk
- 2 open-ended spanners 30 AF
- 1 tongue-and-groove pliers
- 1 jig saw (in the case of existing roof boarding)
- Roof feed-throughs for the solar pipes (e.g. grind exhaust roofing tiles to fit using an angle grinder)
- Protective pipes (sensor cable, pipework)
- Fall protection
- Crosshead bit

Preparatory work for the installation

This work should be carried out **before transporting the collectors up to the roof** (exception: freestanding installation).



Warning: mount the compensators only on the short connecting pieces!

In the case of single-sided pipework on the left (example illustration) the connecting pieces are on the right-hand side.

For single-sided pipework on the right, the collector must be rotated by 180°.

Before screwing on the connectors, check that the collector seals are inside the joints. When installing the connecting pieces, compensators and plugs, the union nuts must be held in place on the collectors. The tightening torque may not exceed 20 Nm!

Remove the sensor well from the carton with regulating parts and screw it into the flow connecting piece.

Fully screw in 2 grub screws M8x30 on the lower edge of each basin.

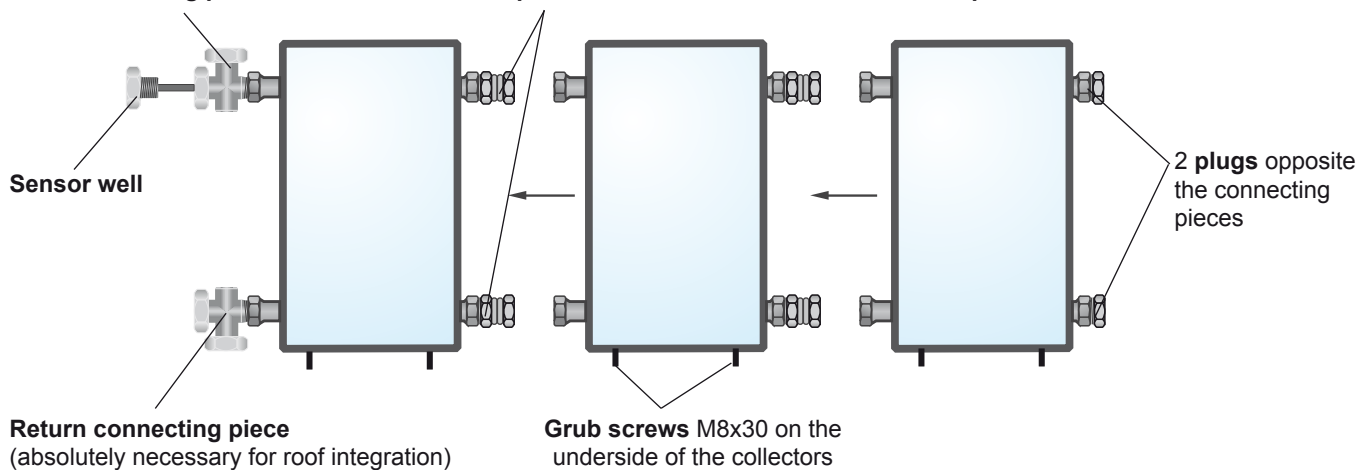
General preparatory work

Layout example: 3 collectors, Solar Plan 230V, portrait orientation, single-sided connection on the left side

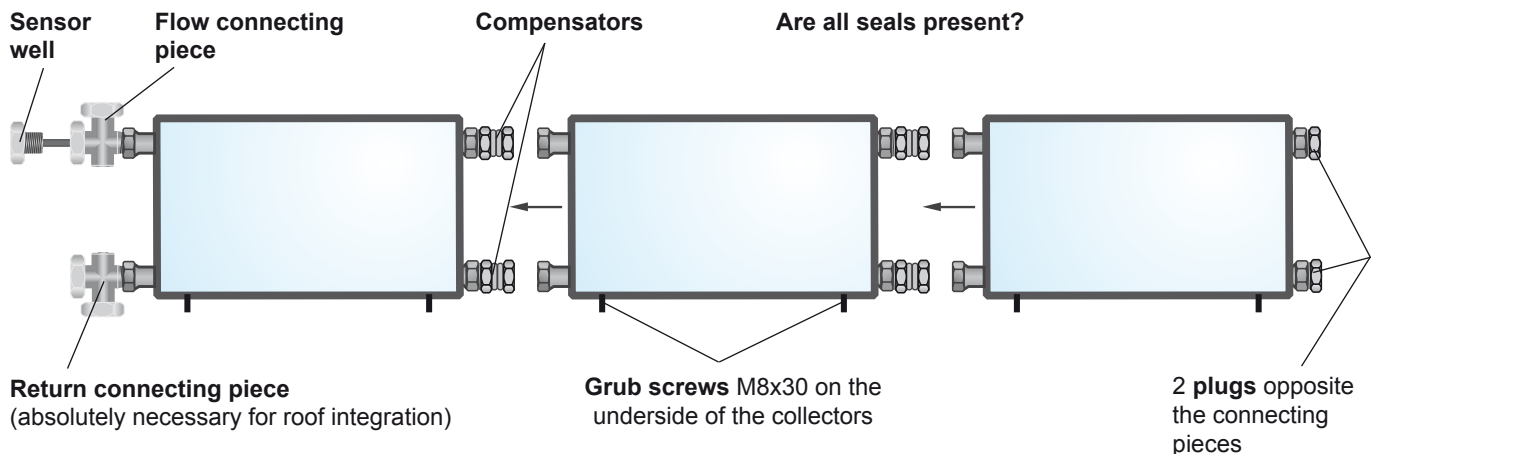
Flow connecting piece

Compensators

Are all seals present?

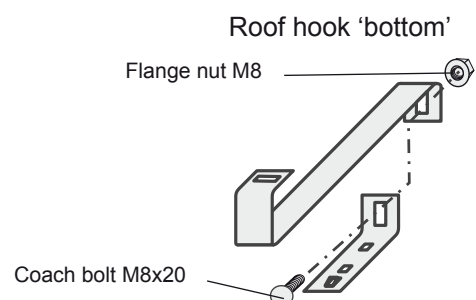
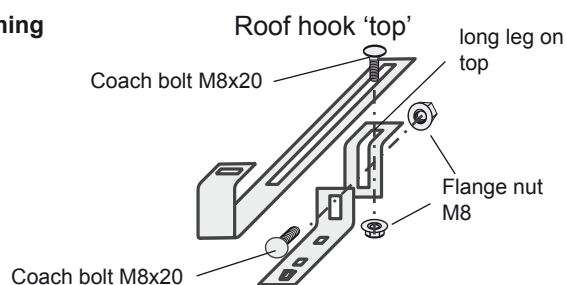


Layout example: 3 collectors, Solerio F3Q, landscape orientation, single-sided connection on the left side



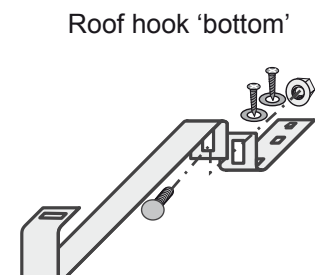
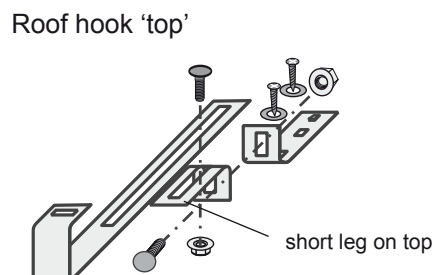
Pre-installation of the roof hooks for rooftop installation

Installation on roof lathing
(pre-mounted)



Installation on rafters
(reinstallation)

Screw the roof hooks only hand-tight at first according to the illustration.



Installing on rafters is absolutely necessary in the case of elevated mounting on a pitched roof!

Rooftop installation (interlocking tiles, beaver-tail tiles) Scope of supply / snow loads

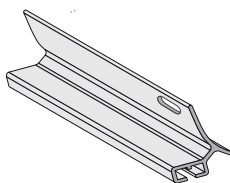
Scope of supply of fastening material - appropriate number of:



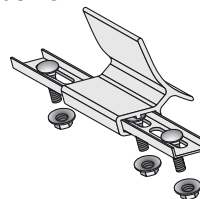
Roof hook 'top' with fixing bracket



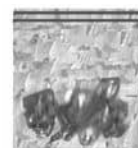
Roof hook 'bottom' with fixing bracket



Assembly rail



Assembly rails connector kit (if necessary)



Bolts, nuts, grub screws, wood screws in bag

Accessories



Adjusting rails kit with wood screws for rafter installation

Positioning of the collector field in the case of rooftop installation

Warning

All roof hooks supplied must be distributed evenly over the width of the collector field in order to distribute the prevailing loads. Position the roof hooks as close as possible to the rafters.

Reference dimensions for determining the collector field width

Warning: the space required for the installation of the pipe connections is not accounted for.

| Collector quantity | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--|-----|------|------|------|-------|-------|-------|-------|-------|-------|
| Width [m] - portrait orientation of Solar Plan 230 V | X | 2.23 | 3.36 | 4.49 | 5.62 | 6.75 | 7.88 | 9.01 | 10.14 | 11.27 |
| Width [m] - landscape orientation of Solerio F3Q | 2.1 | 4.23 | 6.36 | 8.49 | 10.62 | 12.75 | 14.88 | 17.01 | 19.14 | 21.27 |

Max. snow load for an installation with a collector inclination of 30° to 45° for flat-plate collectors, portrait format

| Alpine region * | Zone 1 | Zone 2 | Zone 3 | Zone 4,5 |
|--------------------------------------|--------|--------|--------|----------|
| max. snow load 2.4 kN/m ² | 1297 m | 764 m | 463 m | - |

| Mediterranean region * | Zone 1 | Zone 2 | Zone 3 | Zone 4,5 |
|--------------------------------------|--------|--------|--------|----------|
| max. snow load 2.4 kN/m ² | 762 m | 506 m | 349 m | 149 m |

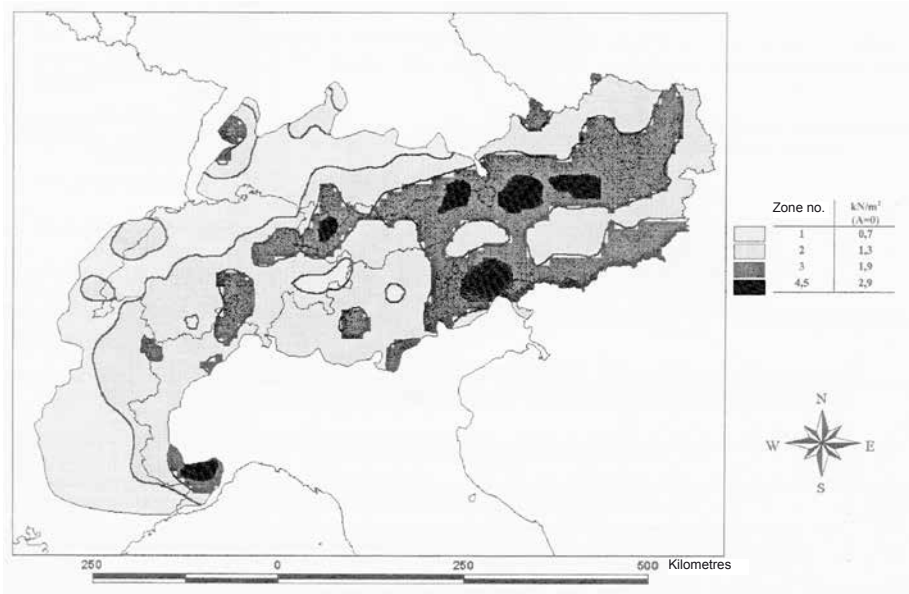
| Central region and the west * | Zone 1 | Zone 2 | Zone 3 | Zone 4,5 |
|--------------------------------------|--------|--------|--------|----------|
| max. snow load 2.4 kN/m ² | 2547 m | 2388 m | 2230 m | 1992 m |

* above sea level

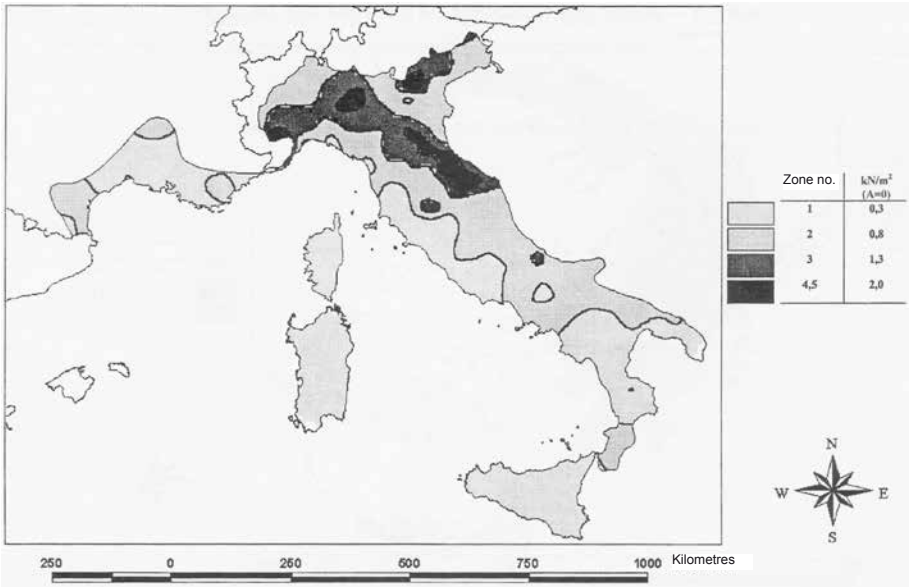
Data for a ridge roof with an inclination $\alpha = 0^\circ - 30^\circ$. The BS EN 1991-1-3/NA standard must be consulted for the exact determination of the snow load. The snow load is smaller for roof inclinations of greater than 30° - data in accordance with the BS EN 1991-1-3/NA standard.

Snow loads

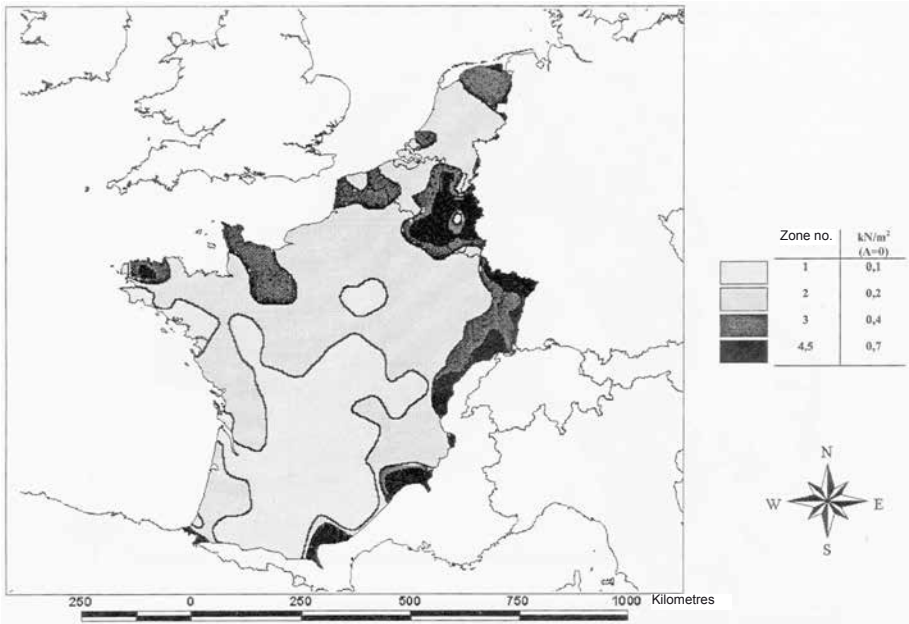
Alpine region



Mediterranean region



Central region and the west



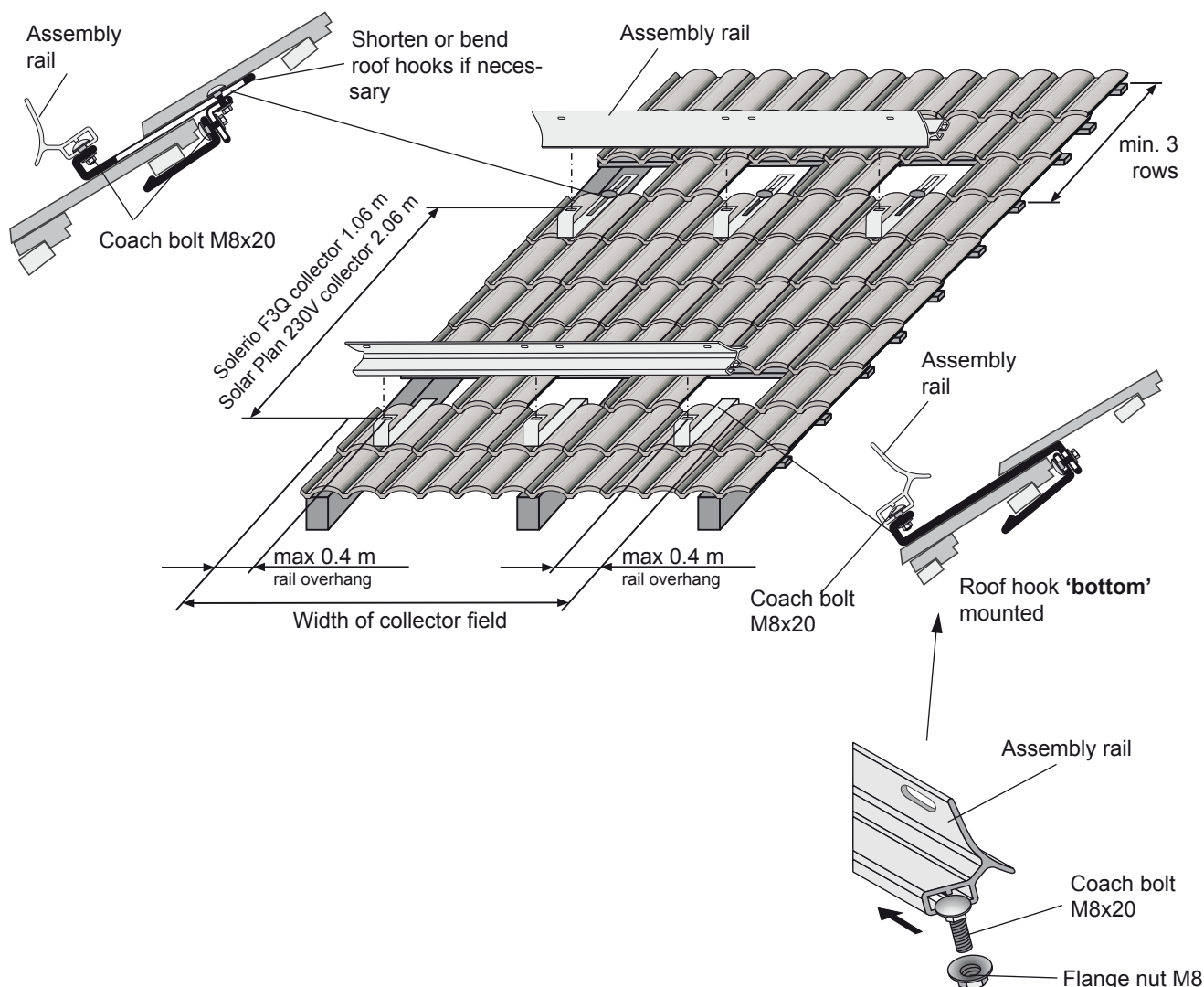
Roftop installation (interlocking tiles, bea- vertail tiles) Roof hooks on roof lathing



This installation does not meet the requirements of the AvisTechnique.

Installing the roof hooks on roof lathing (Example for 2 collectors)

Roof hook 'top' mounted



1. Mount roof hook 'bottom' in accordance with the illustration and hook onto the roof lathing.
2. Assemble roof hook 'top' in accordance with the illustration and hook onto the roof lathing.
Set the distance between the two rails to 2.06 m in the case of installation with portrait orientation or to 1.06 m in the case of installation with landscape orientation by adjusting the upper roof hook in the slot as shown in the illustration and fixing with two M8 x 20 coach bolts.
3. Adjust the height of the fixing brackets and fix with two M8 x 20 coach bolts so that the pressure is distributed evenly over the roofing tiles.
4. Thread-up a sufficient number of M8 x 20 coach bolts into the assembly rails.
5. Fasten the assembly rails to the roof hooks using flange nuts.
6. Cover with roofing tiles in the vicinity of the roof hooks.



Roof lathing must have a thickness of at least 30 mm.



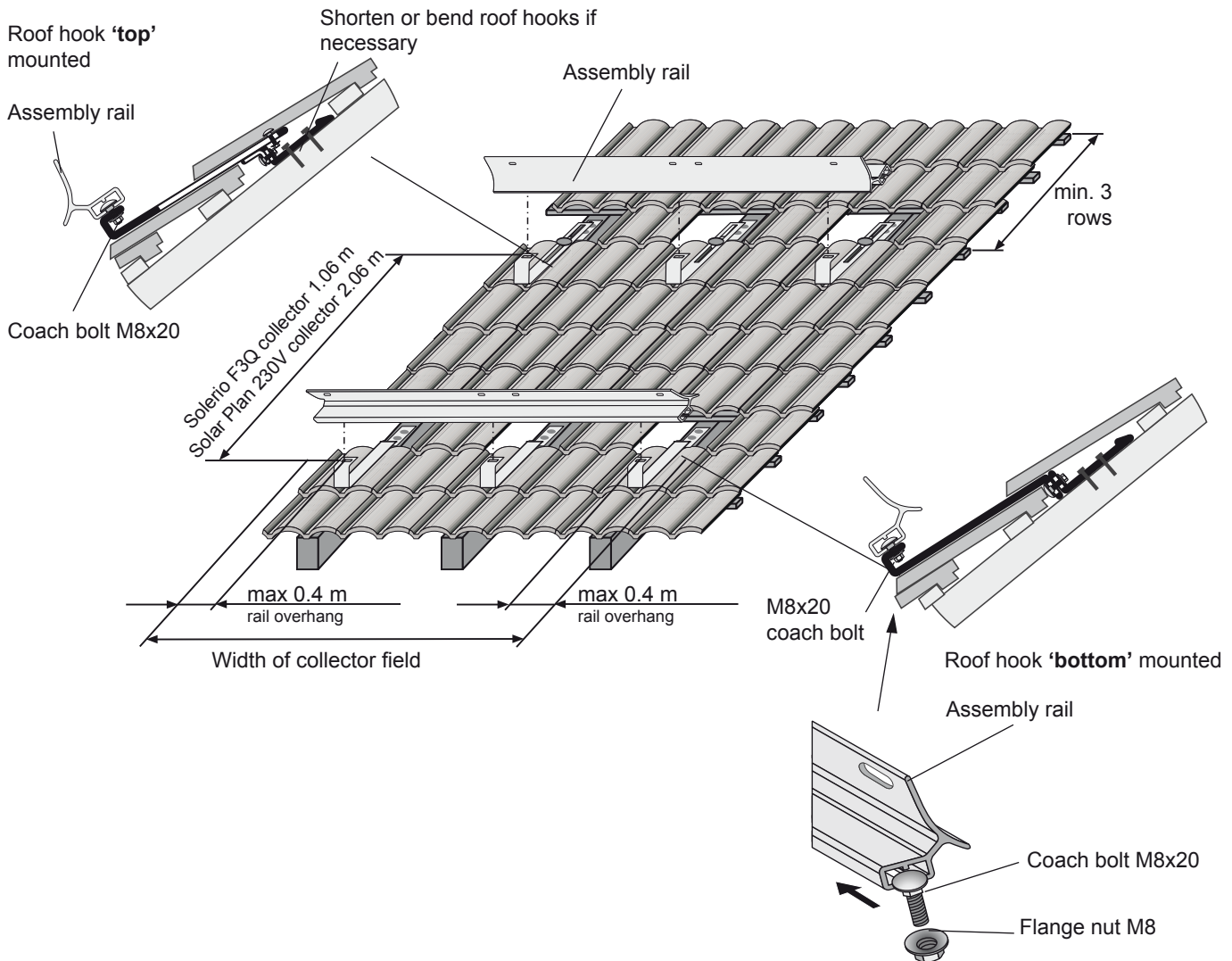
Roof lathing on which hooks are mounted must be screwed.

Rooftop installation (interlocking tiles, beavertail tiles) Roof hooks on rafters



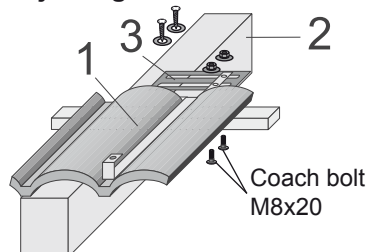
Installing the roof hooks on rafters

(Example for 2 collectors)



1. Mount the roof hook 'bottom' in accordance with the illustration and fasten it to the rafter using 6 x 60 wood screws.
2. Mount the roof hook 'top' as shown in the illustration; set the distance between the two rails to 2.06 m when installing the collector with a portrait orientation or to 1.06 m when installing the collector with a landscape orientation by adjusting the hook in the slot as shown in the illustration, fix with two M8 x 20 coach bolts and fasten to the rafter with 6 x 60 wood screws.
3. Adjust the height of the fixing brackets and fix with two M8 x 20 coach bolts so that the pressure is distributed evenly over the roofing tiles.
4. Thread-up a sufficient number of M8 x 20 coach bolts into the assembly rails.
5. Mount the assembly rails on the roof hooks.
6. Cover with roofing tiles in the vicinity of the roof hooks.

Rafter attachment with adjusting rails



- If the trough of a tile is not above a rafter, the adjusting rails '3' provided are fastened to the rafter '2' and the roof hook '1' is screwed onto the adjusting rail in the trough.
- Fasten the adjusting rails '3' to the rafters '2' with 6 x 60 wood screws and washers.
- Push the M8 x 20 coach bolt through the adjusting rail from underneath.
- Place the roof hook on top and fasten it firmly with the hexagonal nuts.

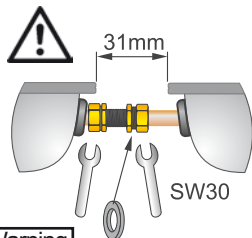
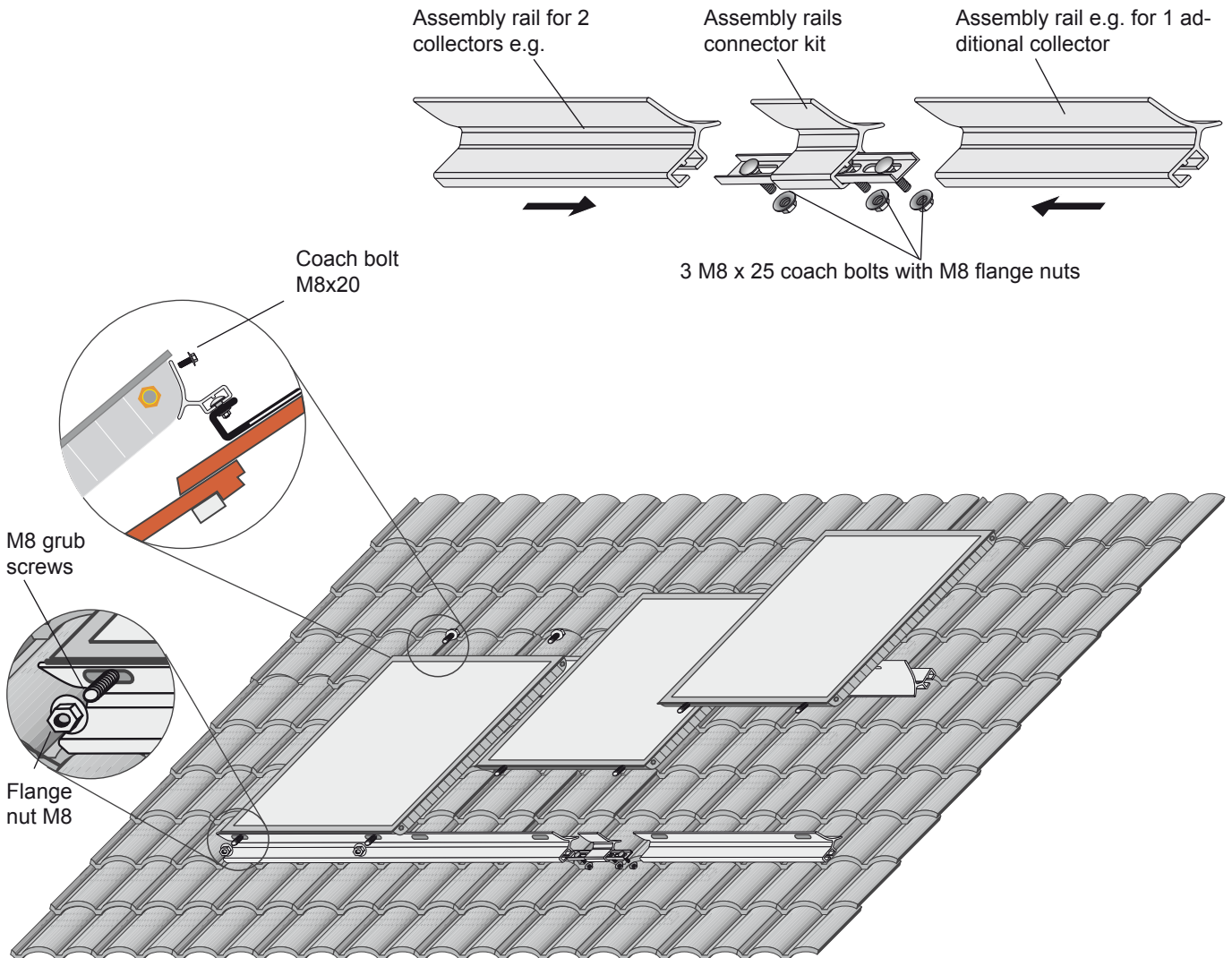
Rooftop installation (interlocking tiles, bea- vertail tiles) Installation of the collectors



Connection of assembly rails

The assembly rails can be extended with the aid of the assembly rail connector kits.

One of the 3 screws can also be used for fixing to a roof hook. The U rail remains centrally aligned; the screw can be brought into the appropriate position above the hook in the slot.



Warning

- Are the seals available?
 - Maintain proper distance
 - Align the screw connection parts
 - Hold with another open-end spanner
- Maximum tightening torque 20 Nm

1. First insert the collector with the grub screws into the lower assembly rail as shown in the illustration, then secure with M8 flange nuts, tightening only hand-tight for the time being.
2. Slide the M8 x 20 combination screws through the upper assembly rail and screw into the collector, tightening only hand-tight for the time being.
3. Installing other collectors in the same manner.
4. Screwing the connections for supply and return lines. Checking the seals.
5. Tightening all screws and nuts for fixing the collectors.

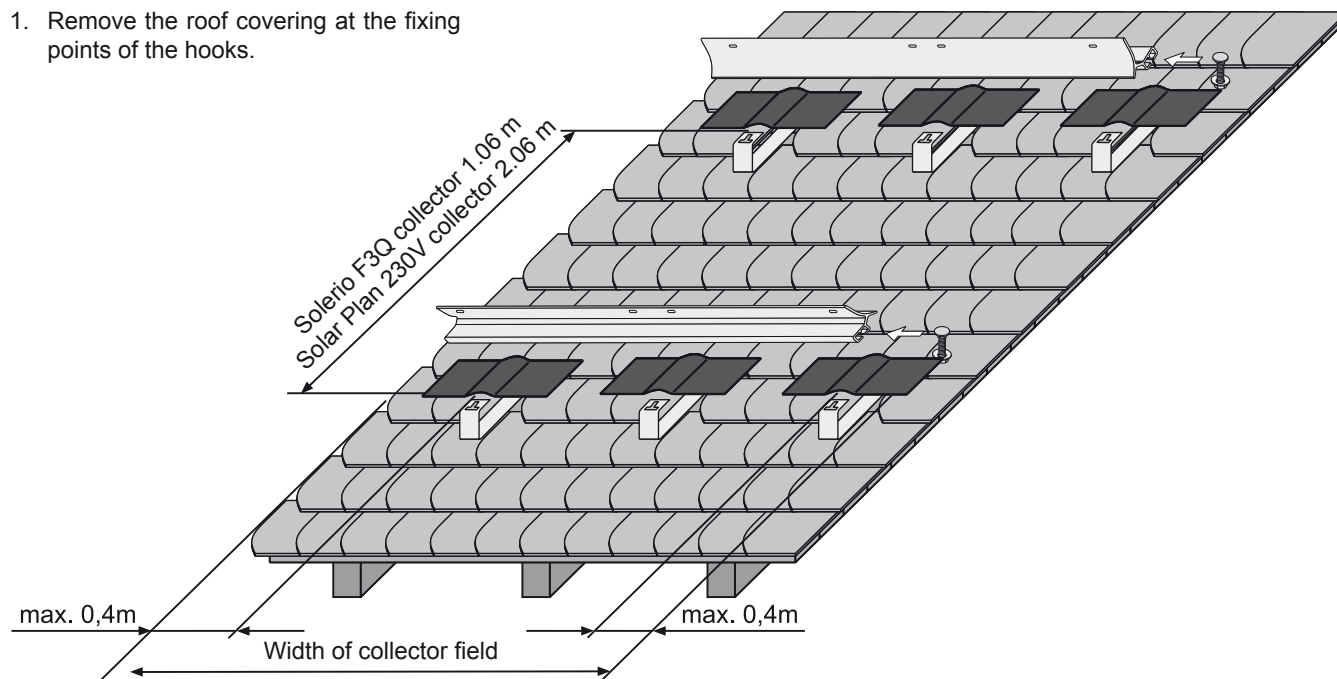
Note: some tile forms (e.g. interlocking tiles, which are interlocked above and below) must be ground out in the vicinity of the roof hooks so that the mounted roof hook rests correctly and the tile on top of it does not stand off from it.

Special features of a rooftop installation on a slate roof with slate hooks

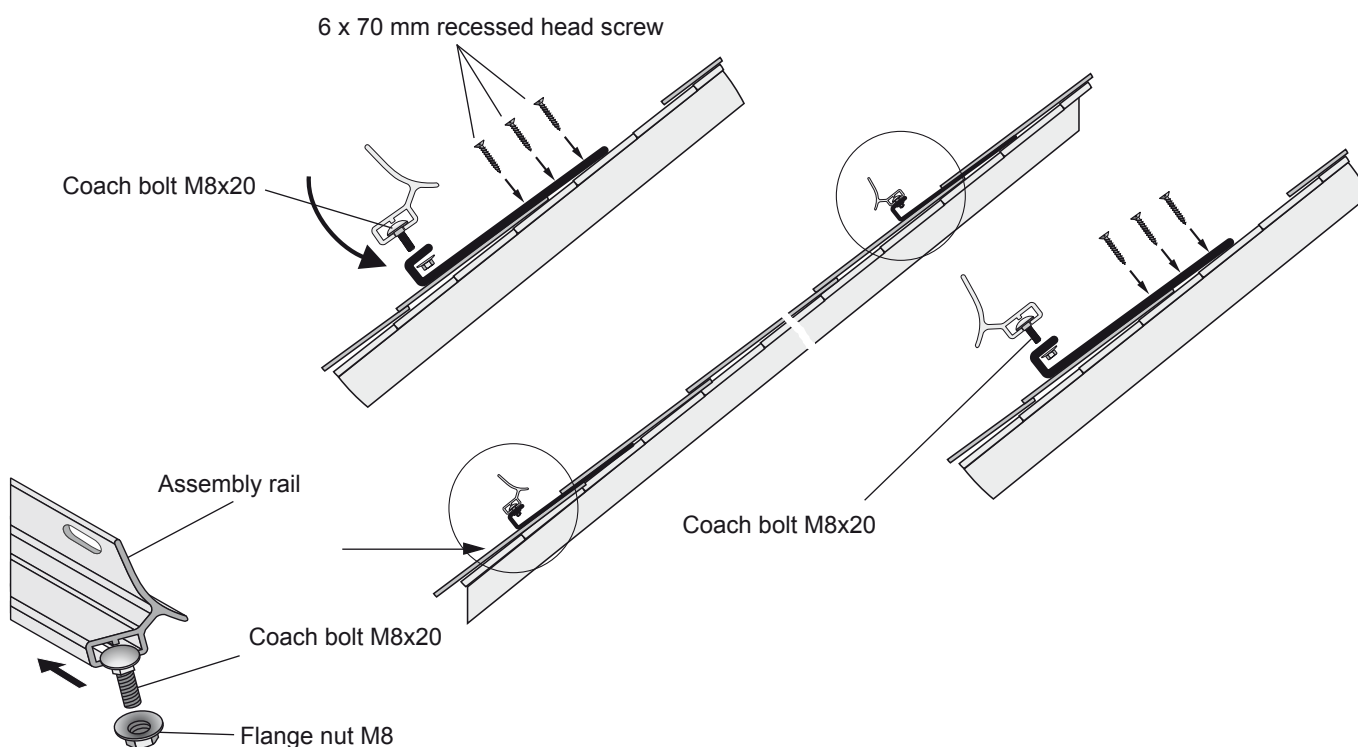


Warning All roof hooks supplied must be distributed evenly over the width of the collector field in order to distribute the prevailing loads.

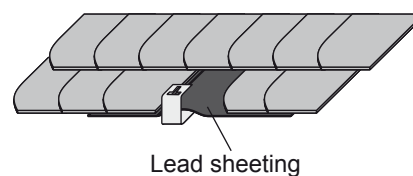
1. Remove the roof covering at the fixing points of the hooks.



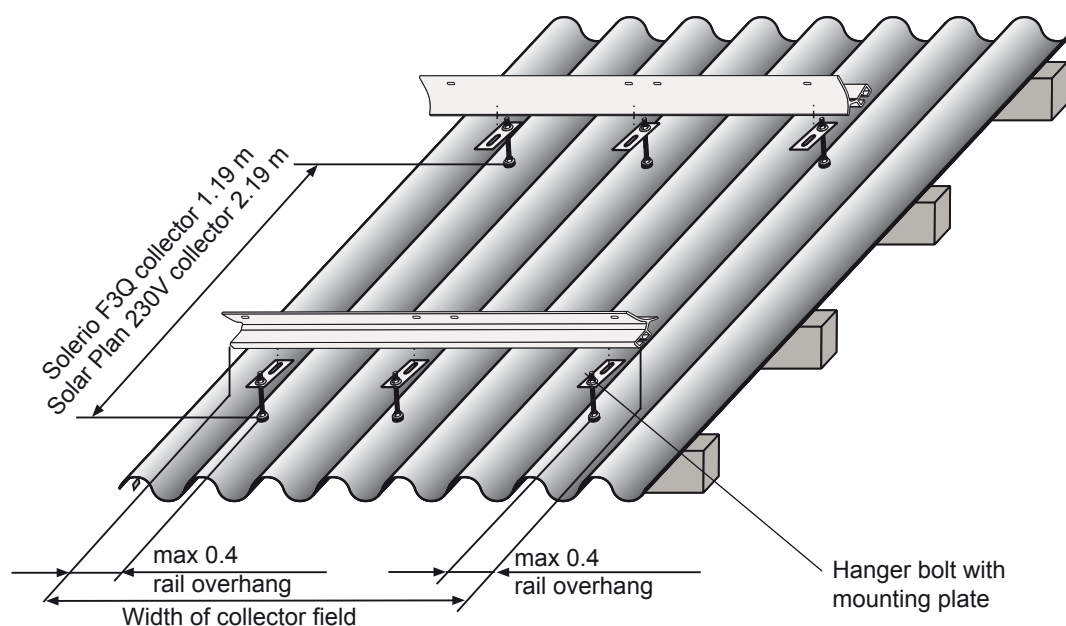
2. Fasten the hook with 6 x 70 mm recessed head screws.



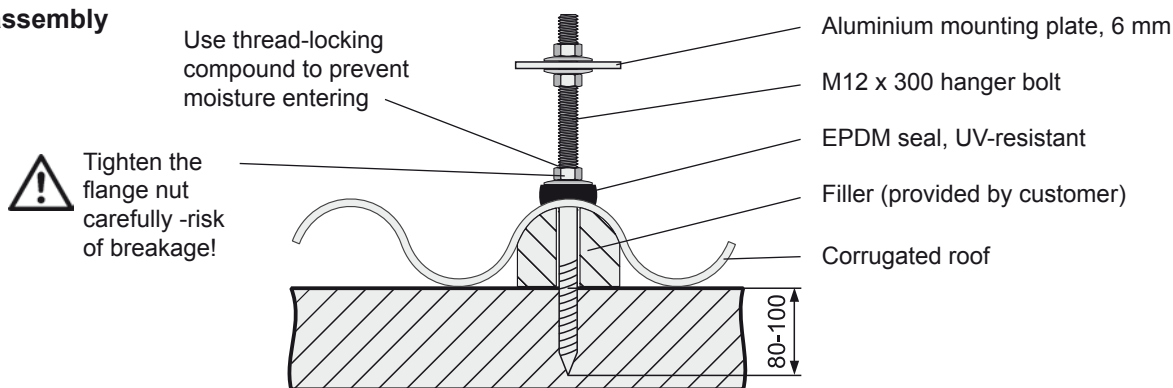
3. Clad the slate hooks with commercially available lead sheeting.
4. Replace the roof covering.



Special features of a rooftop installation on a corrugated roof / sheet metal roof with hanger bolts



Hanger bolt assembly



Warning All hanger bolts supplied must be distributed evenly over the width of the collector field in order to distribute the prevailing loads.

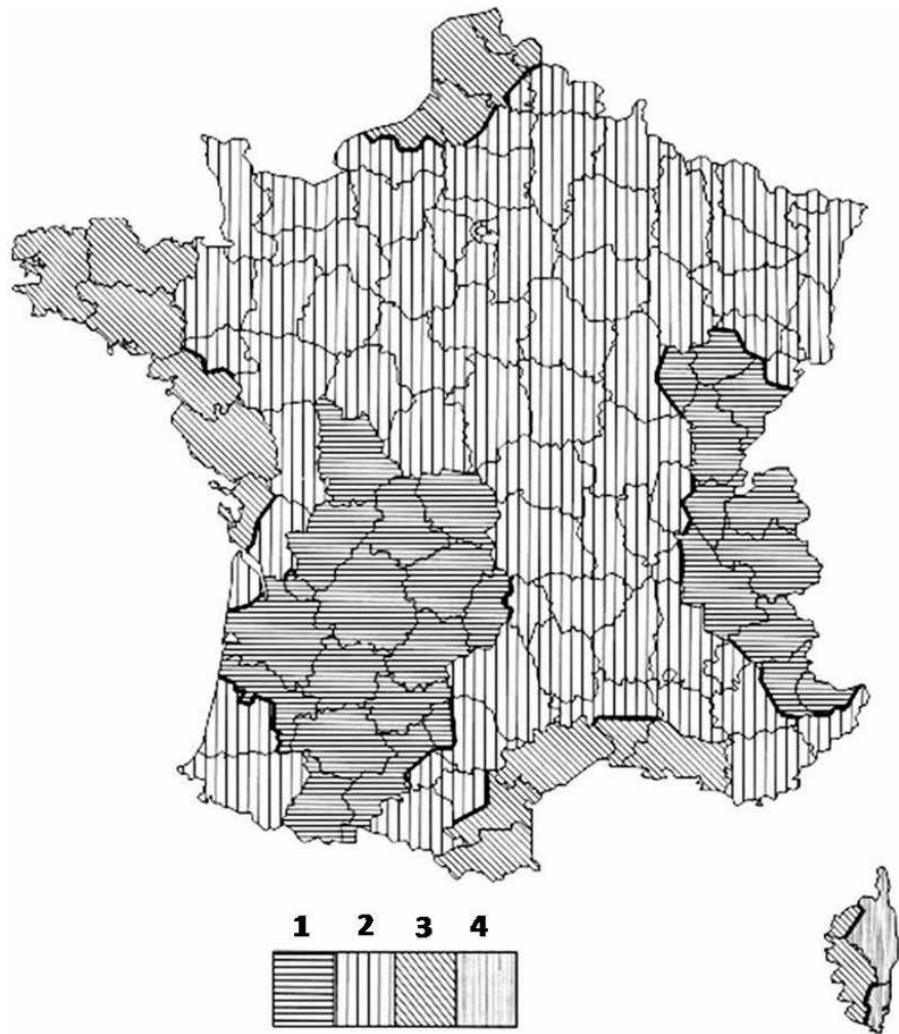
- In the case of corrugated roofs, the holes ($\varnothing 14$) in the roof membrane for the hanger bolts are each to be drilled at the highest point of the panel profile.
- The vertical spacing of the holes for the hanger bolts must be maintained so that the spacing of the rails is ensured.
- Secure fastening to the substructure/rafters must be ensured. If necessary, an auxiliary sub-structure must be erected by the customer.
- The fixing holes for the hanger bolts are pre-drilled in the rafters ($\varnothing 8.5$). A suitable dowel is to be used in the case of brickwork or masonry.
- The hanger bolts must be screwed in to a depth of 80 - 100 mm. Greasing facilitates screwing in. The smooth area of the shaft serves as a seal seat for the pressing seal. It must lie in the vicinity of the roof membrane.
- The upper mounting plates point downwards; the lower mounting plates point upwards. If the snow load extension set is used the double ended screws should be cut off flush with the nut, above the mounting plate. This ensures that the collector housing does not come to rest on the screws.
- The roof skin is sealed by lightly and carefully tightening the flanged nut. Corrugated Eternit roofing sheets may otherwise fracture. Use filler elements (on site) where necessary.
- We recommend the use of a thread-locking compound (e.g. Marston-Domsel 585.243) to prevent moisture entering along the thread and to secure the position of the flange nut.



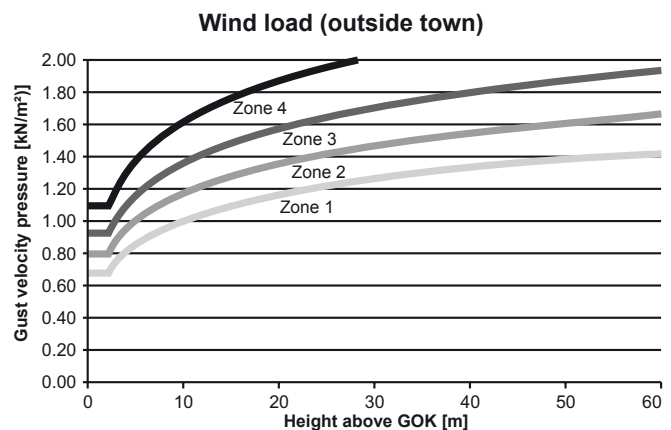
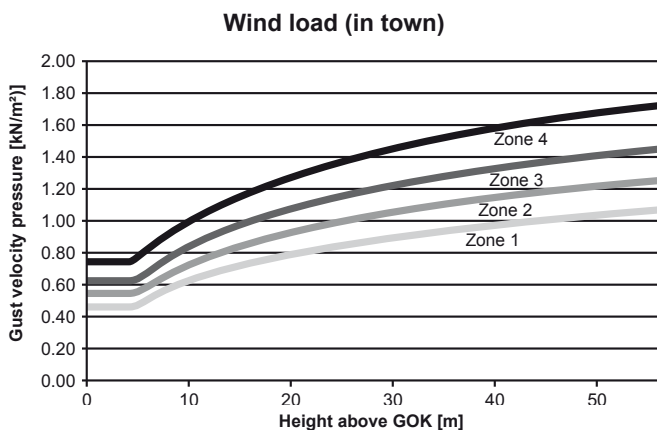
Freestanding / wall installation Determination of wind loads

Wind load approaches

The wind load of the triangle stand depends on the respective installation location. In order to distinguish the different wind intensities with the associated probabilities of occurrence, the region is divided into the following wind zones:



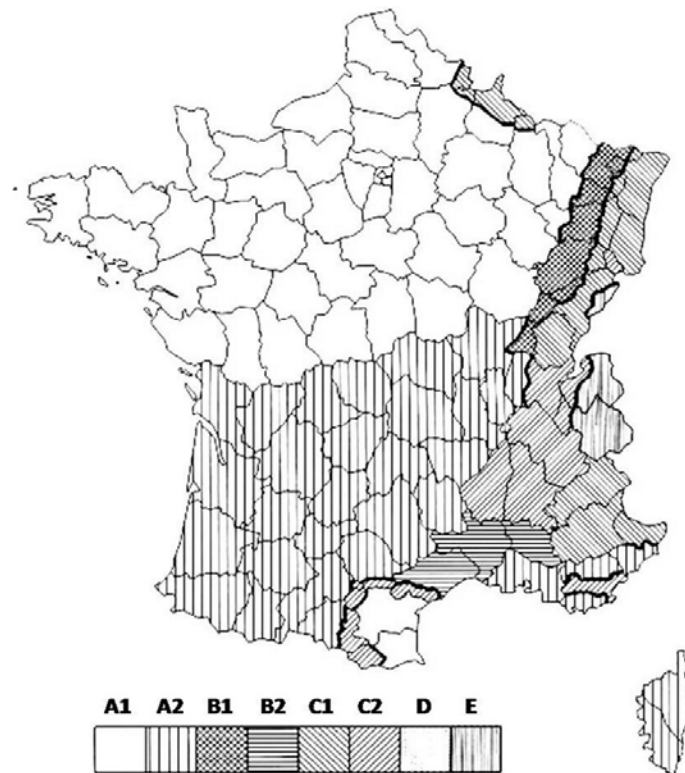
The gust velocity pressure for the corresponding location is determined using the following diagrams. The wind zone and the building height above the top of ground surface (GOK) must be known as input values. In case of locations on hilltops and in sag curve locations, it is absolutely essential to consult a person authorised to sign building plans since these locations may develop gust velocity pressures that are much more unfavourable.



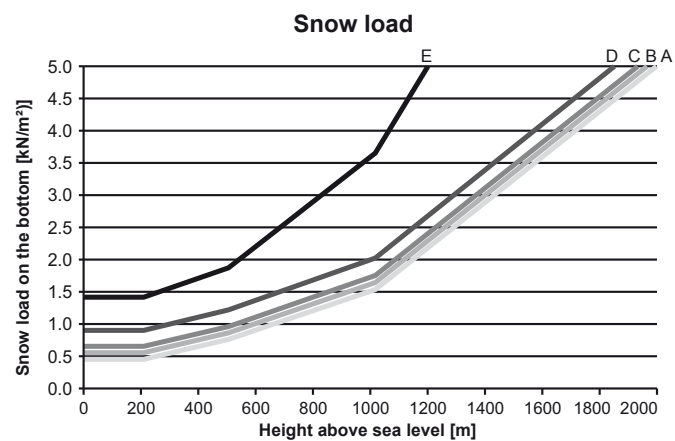
Freestanding / wall installation Determining the snow and wind loads

Snow load approaches

Similar to the wind load, the snow height to be expected, to a great extent depends on the corresponding installation location too.



The snow load for the corresponding location is determined with the help of the following diagram.



Freestanding / wall installation

AluFlex-U triangle stand

General instructions

The AluFlex-U triangle stand available in portrait and landscape orientation has been statically proven taking into account the following rules and boundary conditions:

- DIN 1055-4:2005 /
DIN EN 1991-1-4:2005 Wind loads
- DIN 1055-5:2005 /
DIN EN 1991-1-3:2007/NA Snow loads
- DIN 18800-2008 Steel constructions
- DIN 4113-1:1980 Aluminium constructions
- DIN 4113-1-A1:2002 Aluminium constructions

Before assembling the AluFlex-U triangle stand, its usability for the corresponding location is to be checked in accordance with the following planning document. The load of the triangle stand is a combination of wind and snow loads.

In accordance with DIN 1055-4, flat roofs are roofs that have an inclination of less than $\pm 5^\circ$.

Evaluating the usability of the AluFlex-U triangle stand for the corresponding location

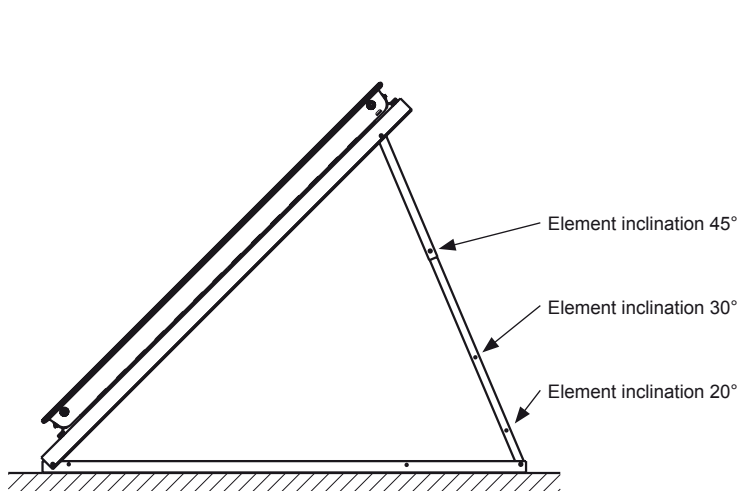


Static application limits given in the following tables are applicable for the inner zone of flat roofs and wall surfaces depending on the element inclination. The usability of the AluFlex-U triangle stand is given when the corresponding cell of the respective table contains values for anchoring forces and/or the required ballasting. If the corresponding cell is filled with "Not usable", the AluFlex-U triangle stand cannot be used.

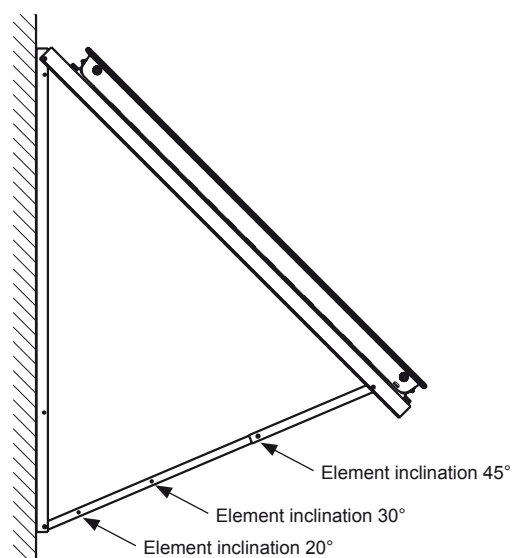
These tables cannot be used for edge and corner areas of flat roofs since these areas are exposed to higher wind and snow loads. Furthermore, the system would be difficult to access for inspection. Widths of edge areas of flat roofs can be estimated in a simplified manner as 1/10 the longer side of the building in the plan or 1/10 of double the building height. In case of wall installation, the edge area width value for a flat roof must be doubled.

Applications of the AluFlex-U triangle stand

Freestanding installation:



Wall installation:



Freestanding / wall installation Anchoring forces and ballasting

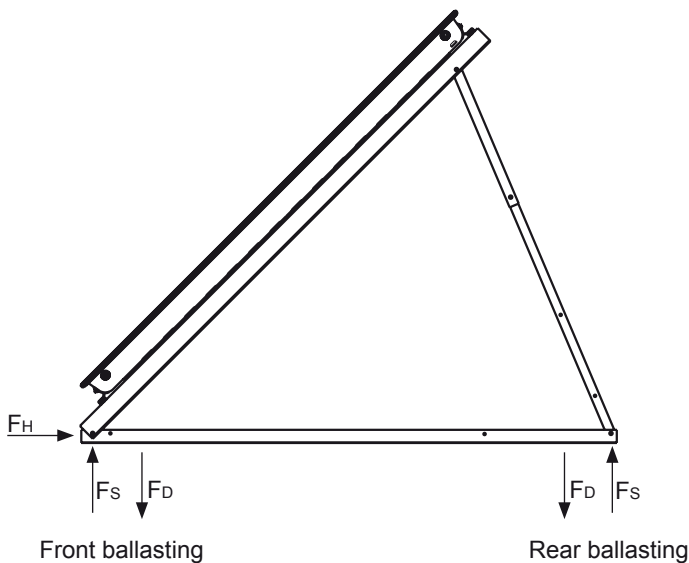
Selecting the anchoring system



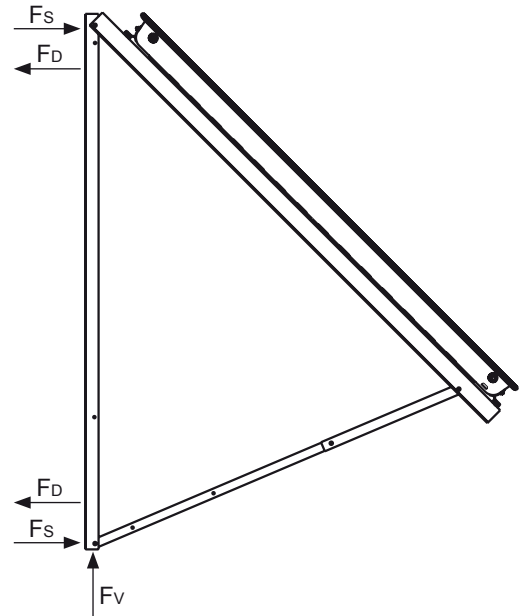
The triangle stands are to be securely connected to the structure. Anchoring elements whose dimensioning complies with a standard or have a valid building inspection approval of the Deutsches Institut für Bautechnik (DIBt) (German Institute for Building Technology) or a valid European technical approval (ETA) are to be used. The selection of the anchoring system mainly depends on the building method of the carrying structure.

Contact point of anchoring forces

Freestanding installation:



Wall installation:



| | |
|-------|--|
| F_D | maximum compressive force [kN] |
| F_S | maximum tensile force (suction force) [kN] |
| F_H | maximum horizontal force [kN] |
| F_V | maximum vertical force [kN] |

Anchoring forces and ballasting

The following tables summarise the anchoring forces of every triangle stand depending on the element inclination as well as wind and snow loads. The first number represents the maximum rated value of compression force [kN], the second number represents the maximum rated value of tensile force (suction force) [kN], and the third number represents the maximum rated value of horizontal force [kN] for every anchor. For the freestanding installation, the front and rear ballast of each triangle stand is specified in kilogram in other tables. The coefficient of friction of the roof surface was selected as $\mu = 0.4$. If the coefficient of friction of the roof surface deviates from the coefficient of friction taken as a reference for calculating the values in table, the ballast must be determined on site.



In case of an anchored installation, ensure that the structure has a reserved load-bearing capacity of 0.2 kN/m² and is reinforced and stabilised adequately for the additionally acting wind load. If ballasting is preferred over anchoring, a statical verification must be carried out on an individual basis since the ballast weights may reach the range of planned snow load.

Freestanding installation - statistic application limits, anchoring forces, ballasting

Freestanding installation - portrait orientation

Element inclination 20°

| 20° | Freestanding installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|---------------------------------|---|----------------|----------------|----------------|----------------|----------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | Specified values [kN]: maximum vertical compressive force / maximum vertical tensile force / maximum horizontal force | | | | | | | | | | | | | | |
| Snow load on the bottom [kN/m²] | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | |
| | 0.20 | 0.82/0.28/0.08 | 1.05/0.81/0.17 | 1.32/1.33/0.25 | 1.6/1.85/0.33 | 1.88/2.37/0.41 | 2.15/2.29/0.5 | 2.43/3.42/0.58 | 2.71/3.94/0.66 | 2.98/4.46/0.75 | 3.26/4.99/0.83 | 3.54/5.51/0.91 | 3.81/6.03/0.99 | 4.09/6.55/1.08 | 4.37/7.08/1.16 |
| | 0.40 | 1.14/0.28/0.08 | 1.31/0.81/0.17 | 1.48/1.33/0.25 | 1.76/1.85/0.33 | 2.04/2.37/0.41 | 2.31/2.29/0.5 | 2.59/3.42/0.58 | 2.87/3.94/0.66 | 3.14/4.46/0.75 | 3.42/4.99/0.83 | 3.7/5.51/0.91 | 3.97/6.03/0.99 | 4.25/6.55/1.08 | 4.53/7.08/1.16 |
| | 0.60 | 1.47/0.28/0.08 | 1.63/0.81/0.17 | 1.8/1.33/0.25 | 1.96/1.85/0.33 | 2.2/2.37/0.41 | 2.48/2.29/0.5 | 2.75/3.42/0.58 | 3.03/3.94/0.66 | 3.31/4.46/0.75 | 3.58/4.99/0.83 | 3.86/5.51/0.91 | 4.14/6.03/0.99 | 4.41/6.55/1.08 | 4.69/7.08/1.16 |
| | 0.80 | 1.79/0.28/0.08 | 1.95/0.81/0.17 | 2.12/1.33/0.25 | 2.29/1.85/0.33 | 2.45/2.37/0.41 | 2.64/2.29/0.5 | 2.91/3.42/0.58 | 3.19/3.94/0.66 | 3.47/4.46/0.75 | 3.74/4.99/0.83 | 4.02/5.51/0.91 | 4.3/6.03/0.99 | 4.57/6.55/1.08 | 4.85/7.08/1.16 |
| | 1.00 | 2.11/0.28/0.08 | 2.28/0.81/0.17 | 2.44/1.33/0.25 | 2.61/1.85/0.33 | 2.78/2.37/0.41 | 2.94/2.29/0.5 | 3.11/3.42/0.58 | 3.35/3.94/0.66 | 3.63/4.46/0.75 | 3.9/4.99/0.83 | 4.18/5.51/0.91 | 4.46/6.03/0.99 | 4.73/6.55/1.08 | 5.01/7.08/1.16 |
| | 1.20 | 2.44/0.28/0.08 | 2.6/0.81/0.17 | 2.77/1.33/0.25 | 2.93/1.85/0.33 | 3.1/2.37/0.41 | 3.27/2.29/0.5 | 3.43/3.42/0.58 | 3.6/3.94/0.66 | 3.79/4.46/0.75 | 4.07/4.99/0.83 | 4.34/5.51/0.91 | 4.62/6.03/0.99 | 4.9/6.55/1.08 | 5.17/7.08/1.16 |
| | 1.40 | 2.76/0.28/0.08 | 2.92/0.81/0.17 | 3.09/1.33/0.25 | 3.26/1.85/0.33 | 3.42/2.37/0.41 | 3.59/2.29/0.5 | 3.75/3.42/0.58 | 3.92/3.94/0.66 | 4.09/4.46/0.75 | 4.25/4.99/0.83 | 4.5/5.51/0.91 | 4.78/6.03/0.99 | 5.06/6.55/1.08 | 5.33/7.08/1.16 |
| | 1.60 | 3.08/0.28/0.08 | 3.25/0.81/0.17 | 3.41/1.33/0.25 | 3.58/1.85/0.33 | 3.75/2.37/0.41 | 3.91/2.29/0.5 | 4.08/3.42/0.58 | 4.24/3.94/0.66 | 4.41/4.46/0.75 | 4.58/4.99/0.83 | 4.74/5.51/0.91 | 4.94/6.03/0.99 | 5.22/6.55/1.08 | 5.5/7.08/1.16 |
| | 1.80 | 3.4/0.28/0.08 | 3.57/0.81/0.17 | 3.74/1.33/0.25 | 3.9/1.85/0.33 | 4.07/2.37/0.41 | 4.23/2.29/0.5 | 4.4/3.42/0.58 | 4.57/3.94/0.66 | 4.73/4.46/0.75 | 4.9/4.99/0.83 | 5.06/5.51/0.91 | 5.23/6.03/0.99 | 5.4/6.55/1.08 | 5.66/7.08/1.16 |
| | 2.00 | 3.73/0.28/0.08 | 3.89/0.81/0.17 | 4.06/1.33/0.25 | 4.23/1.85/0.33 | 4.39/2.37/0.41 | 4.56/2.29/0.5 | 4.72/3.42/0.58 | 4.89/3.94/0.66 | 5.06/4.46/0.75 | 5.22/4.99/0.83 | 5.39/5.51/0.91 | 5.55/6.03/0.99 | 5.72/6.55/1.08 | 5.89/7.08/1.16 |
| | 2.20 | 4.05/0.28/0.08 | 4.22/0.81/0.17 | 4.38/1.33/0.25 | 4.55/1.85/0.33 | 4.72/2.37/0.41 | 4.88/2.29/0.5 | 5.05/3.42/0.58 | 5.21/3.94/0.66 | 5.38/4.46/0.75 | 5.55/4.99/0.83 | 5.71/5.51/0.91 | 5.88/6.03/0.99 | 6.04/6.55/1.08 | 6.21/7.08/1.16 |
| | 2.40 | 4.37/0.28/0.08 | 4.54/0.81/0.17 | 4.71/1.33/0.25 | 4.87/1.85/0.33 | 5.04/2.37/0.41 | 5.2/2.29/0.5 | 5.37/3.42/0.58 | 5.54/3.94/0.66 | 5.71/4.46/0.75 | 5.87/4.99/0.83 | 6.03/5.51/0.91 | 6.2/6.03/0.99 | 6.37/6.55/1.08 | 6.53/7.08/1.16 |
| | 2.60 | 4.7/0.28/0.08 | 4.86/0.81/0.17 | 5.03/1.33/0.25 | 5.2/1.85/0.33 | 5.36/2.37/0.41 | 5.53/2.29/0.5 | 5.69/3.42/0.58 | 5.86/3.94/0.66 | 6.03/4.46/0.75 | 6.19/4.99/0.83 | 6.36/5.51/0.91 | 6.52/6.03/0.99 | 6.69/6.55/1.08 | 6.86/7.08/1.16 |
| | 2.80 | 5.02/0.28/0.08 | 5.19/0.81/0.17 | 5.35/1.33/0.25 | 5.52/1.85/0.33 | 5.68/2.37/0.41 | 5.85/2.29/0.5 | 6.02/3.42/0.58 | 6.18/3.94/0.66 | 6.35/4.46/0.75 | 6.51/4.99/0.83 | 6.68/5.51/0.91 | 6.85/6.03/0.99 | 7.01/6.55/1.08 | 7.18/7.08/1.16 |
| | 3.00 | 5.34/0.28/0.08 | 5.51/0.81/0.17 | 5.68/1.33/0.25 | 5.84/1.85/0.33 | 6.01/2.37/0.41 | 6.17/2.29/0.5 | 6.34/3.42/0.58 | 6.51/3.94/0.66 | 6.67/4.46/0.75 | 6.84/4.99/0.83 | 7/5.51/0.91 | 7.17/6.03/0.99 | 7.34/6.55/1.08 | 7.5/7.08/1.16 |
| | 3.20 | 5.67/0.28/0.08 | 5.83/0.81/0.17 | 6/1.33/0.25 | 6.17/1.85/0.33 | 6.33/2.37/0.41 | 6.5/2.29/0.5 | 6.66/3.42/0.58 | 6.83/3.94/0.66 | 7/4.46/0.75 | 7.16/4.99/0.83 | 7.33/5.51/0.91 | 7.49/6.03/0.99 | Not usable | Not usable |
| | 3.40 | 5.99/0.28/0.08 | 6.16/0.81/0.17 | 6.32/1.33/0.25 | 6.49/1.85/0.33 | 6.65/2.37/0.41 | 6.82/2.29/0.5 | 6.99/3.42/0.58 | 7.15/3.94/0.66 | 7.32/4.46/0.75 | 7.48/4.99/0.83 | 7.65/5.51/0.91 | Not usable | Not usable | Not usable |
| | 3.60 | 6.31/0.28/0.08 | 6.48/0.81/0.17 | 6.65/1.33/0.25 | 6.81/1.85/0.33 | 6.98/2.37/0.41 | 7.14/2.29/0.5 | 7.31/3.42/0.58 | 7.48/3.94/0.66 | 7.64/4.46/0.75 | Not usable | Not usable | Not usable | Not usable | Not usable |
| 3.80 | 6.64/0.28/0.08 | 6.8/0.81/0.17 | 6.97/1.33/0.25 | 7.13/1.85/0.33 | 7.3/2.37/0.41 | 7.47/2.29/0.5 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| 4.00 | 6.96/0.28/0.08 | 7.13/0.81/0.17 | 7.29/1.33/0.25 | 7.46/1.85/0.33 | 7.62/2.37/0.41 | 7.79/2.29/0.5 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |

| Freestanding installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | | |
|--|--------------------------------|---------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|
| Specified values [kg]: front ballast weight / rear ballast weight | | | | | | | | | | | | | | | |
| Safety coefficients are taken into account in these tables. Ballast materials must be applied with their characteristic value (e.g. normal concrete: 2400 kg/m³) | | | | | | | | | | | | | | | |
| 20° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | |
| Snow load on the bottom [kN/m²] | 0.20 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 0.40 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 0.60 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 0.80 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 1.00 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 1.20 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 1.40 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 1.60 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 1.80 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 2.00 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 2.20 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 2.40 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 2.60 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 2.80 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| | 3.00 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | 573 / 728 | 618 / 786 |
| 3.20 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | 527 / 670 | Not usable | Not usable | |
| 3.40 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | 435 / 554 | 481 / 612 | Not usable | Not usable | Not usable | |
| 3.60 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | 344 / 438 | 390 / 496 | Not usable | Not usable | Not usable | Not usable | Not usable | |
| 3.80 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | 298 / 380 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| 4.00 | 25 / 32 | 70 / 90 | 115 / 148 | 161 / 206 | 207 / 264 | 253 / 322 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |

Freestanding installation - statistic application limits, anchoring forces, ballasting

Freestanding installation - portrait orientation

Element inclination 30°

| 30° | Freestanding installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|---------------------------------|---|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------|------------|------------|
| | Specified values [kN]: Maximum vertical compressive force / maximum vertical tensile force / maximum horizontal force | | | | | | | | | | | | | | |
| Snow load on the bottom [kN/m²] | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | |
| | 0.20 | 0.84 / 0.44 / 0.16 | 1.25 / 1.11 / 0.31 | 1.66 / 1.77 / 0.47 | 2.07 / 2.43 / 0.62 | 2.48 / 3.09 / 0.78 | 2.89 / 3.76 / 0.94 | 3.3 / 4.42 / 1.09 | 3.71 / 5.08 / 1.25 | 4.12 / 5.75 / 1.4 | 4.53 / 6.41 / 1.56 | 4.94 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 0.40 | 1.06 / 0.44 / 0.16 | 1.38 / 1.11 / 0.31 | 1.79 / 1.77 / 0.47 | 2.2 / 2.43 / 0.62 | 2.6 / 3.09 / 0.78 | 3.01 / 3.76 / 0.94 | 3.42 / 4.42 / 1.09 | 3.83 / 5.08 / 1.25 | 4.24 / 5.75 / 1.4 | 4.65 / 6.41 / 1.56 | 5.06 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 0.60 | 1.31 / 0.44 / 0.16 | 1.55 / 1.11 / 0.31 | 1.91 / 1.77 / 0.47 | 2.32 / 2.43 / 0.62 | 2.73 / 3.09 / 0.78 | 3.14 / 3.76 / 0.94 | 3.55 / 4.42 / 1.09 | 3.96 / 5.08 / 1.25 | 4.37 / 5.75 / 1.4 | 4.78 / 6.41 / 1.56 | 5.19 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 0.80 | 1.56 / 0.44 / 0.16 | 1.81 / 1.11 / 0.31 | 2.05 / 1.77 / 0.47 | 2.45 / 2.43 / 0.62 | 2.86 / 3.09 / 0.78 | 3.27 / 3.76 / 0.94 | 3.68 / 4.42 / 1.09 | 4.09 / 5.08 / 1.25 | 4.5 / 5.75 / 1.4 | 4.91 / 6.41 / 1.56 | 5.32 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 1.00 | 1.82 / 0.44 / 0.16 | 2.06 / 1.11 / 0.31 | 2.31 / 1.77 / 0.47 | 2.57 / 2.43 / 0.62 | 2.98 / 3.09 / 0.78 | 3.39 / 3.76 / 0.94 | 3.8 / 4.42 / 1.09 | 4.21 / 5.08 / 1.25 | 4.62 / 5.75 / 1.4 | 5.03 / 6.41 / 1.56 | 5.44 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 1.20 | 2.07 / 0.44 / 0.16 | 2.31 / 1.11 / 0.31 | 2.56 / 1.77 / 0.47 | 2.81 / 2.43 / 0.62 | 3.11 / 3.09 / 0.78 | 3.52 / 3.76 / 0.94 | 3.93 / 4.42 / 1.09 | 4.34 / 5.08 / 1.25 | 4.75 / 5.75 / 1.4 | 5.16 / 6.41 / 1.56 | 5.57 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 1.40 | 2.32 / 0.44 / 0.16 | 2.57 / 1.11 / 0.31 | 2.81 / 1.77 / 0.47 | 3.06 / 2.43 / 0.62 | 3.3 / 3.09 / 0.78 | 3.65 / 3.76 / 0.94 | 4.06 / 4.42 / 1.09 | 4.47 / 5.08 / 1.25 | 4.88 / 5.75 / 1.4 | 5.29 / 6.41 / 1.56 | 5.69 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 1.60 | 2.57 / 0.44 / 0.16 | 2.82 / 1.11 / 0.31 | 3.07 / 1.77 / 0.47 | 3.31 / 2.43 / 0.62 | 3.56 / 3.09 / 0.78 | 3.8 / 3.76 / 0.94 | 4.18 / 4.42 / 1.09 | 4.59 / 5.08 / 1.25 | 5 / 5.75 / 1.4 | 5.41 / 6.41 / 1.56 | 5.82 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 1.80 | 2.83 / 0.44 / 0.16 | 3.07 / 1.11 / 0.31 | 3.32 / 1.77 / 0.47 | 3.56 / 2.43 / 0.62 | 3.81 / 3.09 / 0.78 | 4.06 / 3.76 / 0.94 | 4.31 / 4.42 / 1.09 | 4.72 / 5.08 / 1.25 | 5.13 / 5.75 / 1.4 | 5.54 / 6.41 / 1.56 | 5.95 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 2.00 | 3.08 / 0.44 / 0.16 | 3.33 / 1.11 / 0.31 | 3.57 / 1.77 / 0.47 | 3.82 / 2.43 / 0.62 | 4.06 / 3.09 / 0.78 | 4.31 / 3.76 / 0.94 | 4.55 / 4.42 / 1.09 | 4.85 / 5.08 / 1.25 | 5.26 / 5.75 / 1.4 | 5.66 / 6.41 / 1.56 | 6.07 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 2.20 | 3.33 / 0.44 / 0.16 | 3.58 / 1.11 / 0.31 | 3.82 / 1.77 / 0.47 | 4.07 / 2.43 / 0.62 | 4.32 / 3.09 / 0.78 | 4.56 / 3.76 / 0.94 | 4.81 / 4.42 / 1.09 | 5.05 / 5.08 / 1.25 | 5.38 / 5.75 / 1.4 | 5.79 / 6.41 / 1.56 | 6.2 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 2.40 | 3.59 / 0.44 / 0.16 | 3.83 / 1.11 / 0.31 | 4.08 / 1.77 / 0.47 | 4.32 / 2.43 / 0.62 | 4.57 / 3.09 / 0.78 | 4.81 / 3.76 / 0.94 | 5.06 / 4.42 / 1.09 | 5.31 / 5.08 / 1.25 | 5.55 / 5.75 / 1.4 | 5.92 / 6.41 / 1.56 | 6.33 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 2.60 | 3.84 / 0.44 / 0.16 | 4.09 / 1.11 / 0.31 | 4.33 / 1.77 / 0.47 | 4.58 / 2.43 / 0.62 | 4.82 / 3.09 / 0.78 | 5.07 / 3.76 / 0.94 | 5.31 / 4.42 / 1.09 | 5.56 / 5.08 / 1.25 | 5.8 / 5.75 / 1.4 | 6.05 / 6.41 / 1.56 | 6.45 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| | 2.80 | 4.09 / 0.44 / 0.16 | 4.34 / 1.11 / 0.31 | 4.58 / 1.77 / 0.47 | 4.83 / 2.43 / 0.62 | 5.08 / 3.09 / 0.78 | 5.32 / 3.76 / 0.94 | 5.57 / 4.42 / 1.09 | 5.81 / 5.08 / 1.25 | 6.06 / 5.75 / 1.4 | 6.3 / 6.41 / 1.56 | 6.58 / 7.07 / 1.71 | Not usable | Not usable | Not usable |
| 3.00 | 4.35 / 0.44 / 0.16 | 4.59 / 1.11 / 0.31 | 4.84 / 1.77 / 0.47 | 5.08 / 2.43 / 0.62 | 5.33 / 3.09 / 0.78 | 5.57 / 3.76 / 0.94 | 5.82 / 4.42 / 1.09 | 6.07 / 5.08 / 1.25 | 6.31 / 5.75 / 1.4 | 6.56 / 6.41 / 1.56 | 6.8 / 7.07 / 1.71 | Not usable | Not usable | Not usable | |
| 3.20 | 4.6 / 0.44 / 0.16 | 4.84 / 1.11 / 0.31 | 5.09 / 1.77 / 0.47 | 5.34 / 2.43 / 0.62 | 5.58 / 3.09 / 0.78 | 5.83 / 3.76 / 0.94 | 6.07 / 4.42 / 1.09 | 6.32 / 5.08 / 1.25 | 6.56 / 5.75 / 1.4 | 6.81 / 6.41 / 1.56 | 7.06 / 7.07 / 1.71 | Not usable | Not usable | Not usable | |
| 3.40 | 4.85 / 0.44 / 0.16 | 5.1 / 1.11 / 0.31 | 5.34 / 1.77 / 0.47 | 5.59 / 2.43 / 0.62 | 5.83 / 3.09 / 0.78 | 6.08 / 3.76 / 0.94 | 6.33 / 4.42 / 1.09 | 6.57 / 5.08 / 1.25 | 6.82 / 5.75 / 1.4 | 7.06 / 6.41 / 1.56 | 7.31 / 7.07 / 1.71 | Not usable | Not usable | Not usable | |
| 3.60 | 5.1 / 0.44 / 0.16 | 5.35 / 1.11 / 0.31 | 5.6 / 1.77 / 0.47 | 5.84 / 2.43 / 0.62 | 6.09 / 3.09 / 0.78 | 6.33 / 3.76 / 0.94 | 6.58 / 4.42 / 1.09 | 6.82 / 5.08 / 1.25 | 7.07 / 5.75 / 1.4 | 7.32 / 6.41 / 1.56 | Not usable | Not usable | Not usable | Not usable | |
| 3.80 | 5.36 / 0.44 / 0.16 | 5.6 / 1.11 / 0.31 | 5.85 / 1.77 / 0.47 | 6.09 / 2.43 / 0.62 | 6.34 / 3.09 / 0.78 | 6.59 / 3.76 / 0.94 | 6.83 / 4.42 / 1.09 | 7.08 / 5.08 / 1.25 | 7.32 / 5.75 / 1.4 | Not usable | Not usable | Not usable | Not usable | Not usable | |
| 4.00 | 5.61 / 0.44 / 0.16 | 5.86 / 1.11 / 0.31 | 6.1 / 1.77 / 0.47 | 6.35 / 2.43 / 0.62 | 6.59 / 3.09 / 0.78 | 6.84 / 3.76 / 0.94 | 7.08 / 4.42 / 1.09 | 7.33 / 5.08 / 1.25 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |

| Freestanding installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|--|--------------------------------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| Specified values [kg]: front ballast weight / rear ballast weight | | | | | | | | | | | | | | |
| Safety coefficients are taken into account in these tables. Ballast materials must be applied with their characteristic value (e.g. normal concrete: 2400 kg/m³) | | | | | | | | | | | | | | |
| 30° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| Snow load on the bottom [kN/m²] | 0.20 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 0.40 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 0.60 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 0.80 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 1.00 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 1.20 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 1.40 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 1.60 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 1.80 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 2.00 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| Snow load on the bottom [kN/m²] | 2.20 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 2.40 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 2.60 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 2.80 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 3.00 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 3.20 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 3.40 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | 786 / 786 | Not usable | Not usable |
| | 3.60 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | 713 / 713 | Not usable | Not usable | Not usable |
| | 3.80 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | 640 / 640 | Not usable | Not usable | Not usable | Not usable |
| | 4.00 | 53 / 53 | 126 / 126 | 200 / 200 | 273 / 273 | 346 / 346 | 420 / 420 | 493 / 493 | 566 / 566 | Not usable | Not usable | Not usable | Not usable | Not usable |

Freestanding installation - statistic application limits, anchoring forces, ballasting

Freestanding installation - portrait orientation

Element inclination 45°

| Freestanding installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|---|--------------------------------|----------------|----------------|----------------|---------------|---------------|----------------|----------------|----------------|---------------|----------------|------------|------------|------------|
| Specified values [kN]: Maximum vertical compressive force / maximum vertical tensile force / maximum horizontal force | | | | | | | | | | | | | | |
| 45° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| Snow load on the bottom [kN/m²] | | | | | | | | | | | | | | |
| 0.20 | 0.72/0.47/0.22 | 1.16/1.11/0.44 | 1.61/1.76/0.66 | 2.05/2.41/0.88 | 2.49/3.05/1.1 | 2.93/3.7/1.32 | 3.37/4.34/1.54 | 3.81/4.99/1.76 | 4.25/5.64/1.98 | 4.69/6.28/2.2 | 5.13/6.93/2.42 | Not usable | Not usable | Not usable |
| 0.40 | 0.76/0.47/0.22 | 1.2/1.11/0.44 | 1.64/1.76/0.66 | 2.08/2.41/0.88 | 2.52/3.05/1.1 | 2.96/3.7/1.32 | 3.4/4.34/1.54 | 3.84/4.99/1.76 | 4.28/5.64/1.98 | 4.72/6.28/2.2 | 5.17/6.93/2.42 | Not usable | Not usable | Not usable |
| 0.60 | 0.82/0.47/0.22 | 1.23/1.11/0.44 | 1.67/1.76/0.66 | 2.11/2.41/0.88 | 2.56/3.05/1.1 | 3/3.7/1.32 | 3.44/4.34/1.54 | 3.88/4.99/1.76 | 4.32/5.64/1.98 | 4.76/6.28/2.2 | 5.2/6.93/2.42 | Not usable | Not usable | Not usable |
| 0.80 | 0.92/0.47/0.22 | 1.27/1.11/0.44 | 1.71/1.76/0.66 | 2.15/2.41/0.88 | 2.59/3.05/1.1 | 3.03/3.7/1.32 | 3.47/4.34/1.54 | 3.91/4.99/1.76 | 4.35/5.64/1.98 | 4.79/6.28/2.2 | 5.23/6.93/2.42 | Not usable | Not usable | Not usable |
| 1.00 | 1.02/0.47/0.22 | 1.3/1.11/0.44 | 1.74/1.76/0.66 | 2.18/2.41/0.88 | 2.62/3.05/1.1 | 3.07/3.7/1.32 | 3.51/4.34/1.54 | 3.95/4.99/1.76 | 4.39/5.64/1.98 | 4.83/6.28/2.2 | 5.27/6.93/2.42 | Not usable | Not usable | Not usable |
| 1.20 | 1.12/0.47/0.22 | 1.34/1.11/0.44 | 1.78/1.76/0.66 | 2.22/2.41/0.88 | 2.66/3.05/1.1 | 3.1/3.7/1.32 | 3.54/4.34/1.54 | 3.98/4.99/1.76 | 4.42/5.64/1.98 | 4.86/6.28/2.2 | 5.3/6.93/2.42 | Not usable | Not usable | Not usable |
| 1.40 | 1.21/0.47/0.22 | 1.39/1.11/0.44 | 1.81/1.76/0.66 | 2.25/2.41/0.88 | 2.69/3.05/1.1 | 3.13/3.7/1.32 | 3.57/4.34/1.54 | 4.02/4.99/1.76 | 4.46/5.64/1.98 | 4.9/6.28/2.2 | 5.34/6.93/2.42 | Not usable | Not usable | Not usable |
| 1.60 | 1.31/0.47/0.22 | 1.49/1.11/0.44 | 1.85/1.76/0.66 | 2.29/2.41/0.88 | 2.73/3.05/1.1 | 3.17/3.7/1.32 | 3.61/4.34/1.54 | 4.05/4.99/1.76 | 4.49/5.64/1.98 | 4.93/6.28/2.2 | 5.37/6.93/2.42 | Not usable | Not usable | Not usable |
| 1.80 | 1.41/0.47/0.22 | 1.59/1.11/0.44 | 1.88/1.76/0.66 | 2.32/2.41/0.88 | 2.76/3.05/1.1 | 3.2/3.7/1.32 | 3.64/4.34/1.54 | 4.08/4.99/1.76 | 4.53/5.64/1.98 | 4.97/6.28/2.2 | 5.41/6.93/2.42 | Not usable | Not usable | Not usable |
| 2.00 | 1.51/0.47/0.22 | 1.69/1.11/0.44 | 1.92/1.76/0.66 | 2.36/2.41/0.88 | 2.8/3.05/1.1 | 3.24/3.7/1.32 | 3.68/4.34/1.54 | 4.12/4.99/1.76 | 4.56/5.64/1.98 | 5.44/6.28/2.2 | 5.44/6.93/2.42 | Not usable | Not usable | Not usable |
| 2.20 | 1.6/0.47/0.22 | 1.78/1.11/0.44 | 1.96/1.76/0.66 | 2.39/2.41/0.88 | 2.83/3.05/1.1 | 3.27/3.7/1.32 | 3.71/4.34/1.54 | 4.15/4.99/1.76 | 4.59/5.64/1.98 | 5.03/6.28/2.2 | 5.48/6.93/2.42 | Not usable | Not usable | Not usable |
| 2.40 | 1.7/0.47/0.22 | 1.88/1.11/0.44 | 2.06/1.76/0.66 | 2.42/2.41/0.88 | 2.87/3.05/1.1 | 3.31/3.7/1.32 | 3.75/4.34/1.54 | 4.19/4.99/1.76 | 4.63/5.64/1.98 | 5.07/6.28/2.2 | 5.51/6.93/2.42 | Not usable | Not usable | Not usable |
| 2.60 | 1.8/0.47/0.22 | 1.98/1.11/0.44 | 2.16/1.76/0.66 | 2.46/2.41/0.88 | 2.9/3.05/1.1 | 3.34/3.7/1.32 | 3.78/4.34/1.54 | 4.22/4.99/1.76 | 4.66/5.64/1.98 | 5.1/6.28/2.2 | 5.54/6.93/2.42 | Not usable | Not usable | Not usable |
| 2.80 | 1.9/0.47/0.22 | 2.08/1.11/0.44 | 2.26/1.76/0.66 | 2.49/2.41/0.88 | 2.93/3.05/1.1 | 3.38/3.7/1.32 | 3.82/4.34/1.54 | 4.26/4.99/1.76 | 4.7/5.64/1.98 | 5.14/6.28/2.2 | 5.58/6.93/2.42 | Not usable | Not usable | Not usable |
| 3.00 | 1.99/0.47/0.22 | 2.17/1.11/0.44 | 2.35/1.76/0.66 | 2.53/2.41/0.88 | 2.97/3.05/1.1 | 3.41/3.7/1.32 | 3.85/4.34/1.54 | 4.29/4.99/1.76 | 4.73/5.64/1.98 | 5.17/6.28/2.2 | 5.61/6.93/2.42 | Not usable | Not usable | Not usable |
| 3.20 | 2.09/0.47/0.22 | 2.27/1.11/0.44 | 2.45/1.76/0.66 | 2.63/2.41/0.88 | 3/3.05/1.1 | 3.44/3.7/1.32 | 3.88/4.34/1.54 | 4.33/4.99/1.76 | 4.77/5.64/1.98 | 5.21/6.28/2.2 | 5.65/6.93/2.42 | Not usable | Not usable | Not usable |
| 3.40 | 2.19/0.47/0.22 | 2.37/1.11/0.44 | 2.55/1.76/0.66 | 2.73/2.41/0.88 | 3.04/3.05/1.1 | 3.48/3.7/1.32 | 3.92/4.34/1.54 | 4.36/4.99/1.76 | 4.8/5.64/1.98 | 5.24/6.28/2.2 | 5.68/6.93/2.42 | Not usable | Not usable | Not usable |
| 3.60 | 2.29/0.47/0.22 | 2.47/1.11/0.44 | 2.65/1.76/0.66 | 2.83/2.41/0.88 | 3.07/3.05/1.1 | 3.51/3.7/1.32 | 3.95/4.34/1.54 | 4.39/4.99/1.76 | 4.84/5.64/1.98 | 5.28/6.28/2.2 | 5.72/6.93/2.42 | Not usable | Not usable | Not usable |
| 3.80 | 2.38/0.47/0.22 | 2.56/1.11/0.44 | 2.74/1.76/0.66 | 2.92/2.41/0.88 | 3.11/3.05/1.1 | 3.55/3.7/1.32 | 3.99/4.34/1.54 | 4.43/4.99/1.76 | 4.87/5.64/1.98 | 5.31/6.28/2.2 | 5.75/6.93/2.42 | Not usable | Not usable | Not usable |
| 4.00 | 2.48/0.47/0.22 | 2.66/1.11/0.44 | 2.84/1.76/0.66 | 3.02/2.41/0.88 | 3.2/3.05/1.1 | 3.58/3.7/1.32 | 4.02/4.34/1.54 | 4.46/4.99/1.76 | 4.9/5.64/1.98 | 5.35/6.28/2.2 | 5.79/6.93/2.42 | Not usable | Not usable | Not usable |

| Freestanding installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|--|--------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------|------------|------------|
| Specified values [kg]: Front ballast weight / rear ballast weight | | | | | | | | | | | | | | |
| Safety coefficients are taken into account in these tables. Ballast materials must be applied with their characteristic value (e.g. normal concrete: 2400 kg/m³) | | | | | | | | | | | | | | |
| 45° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| Snow load on the bottom [kN/m²] | | | | | | | | | | | | | | |
| 0.20 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 0.40 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 0.60 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 0.80 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 1.00 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 1.20 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 1.40 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 1.60 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 1.80 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 2.00 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 2.20 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 2.40 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 2.60 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 2.80 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 3.00 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 3.20 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 3.40 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 3.60 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 3.80 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |
| 4.00 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable | Not usable |

Freestanding installation - statistic application limits, anchoring forces, ballasting

Freestanding installation - landscape orientation

Element inclination 20°

| Freestanding installation of elements in landscape orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|---|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|--------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Specified values [kN]: Maximum vertical compressive force / maximum vertical tensile force / maximum horizontal force | | | | | | | | | | | | | | |
| 20° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| Snow load on the bottom [kN/m²] | 0.20 | 0.88 / 0.31 / 0.08 | 1.11 / 0.89 / 0.17 | 1.4 / 1.148 / 0.25 | 1.69 / 2.06 / 0.33 | 1.98 / 2.65 / 0.41 | 2.27 / 3.23 / 0.5 | 2.56 / 3.82 / 0.58 | 2.85 / 4.4 / 0.66 | 3.13 / 4.99 / 0.75 | 3.42 / 5.58 / 0.83 | 3.71 / 6.16 / 0.91 | 4 / 6.75 / 0.99 | 4.29 / 7.33 / 1.08 |
| | 0.40 | 1.23 / 0.31 / 0.08 | 1.41 / 0.89 / 0.17 | 1.58 / 1.48 / 0.25 | 1.87 / 2.06 / 0.33 | 2.15 / 2.65 / 0.41 | 2.44 / 3.23 / 0.5 | 2.73 / 3.82 / 0.58 | 3.02 / 4.4 / 0.66 | 3.31 / 4.99 / 0.75 | 3.6 / 5.58 / 0.83 | 3.89 / 6.16 / 0.91 | 4.18 / 6.75 / 0.99 | 4.47 / 7.33 / 1.08 |
| | 0.60 | 1.59 / 0.31 / 0.08 | 1.76 / 0.89 / 0.17 | 1.93 / 1.48 / 0.25 | 2.11 / 2.06 / 0.33 | 2.33 / 2.65 / 0.41 | 2.62 / 3.23 / 0.5 | 2.91 / 3.82 / 0.58 | 3.2 / 4.4 / 0.66 | 3.49 / 4.99 / 0.75 | 3.77 / 5.58 / 0.83 | 4.06 / 6.16 / 0.91 | 4.36 / 6.75 / 0.99 | 4.64 / 7.33 / 1.08 |
| | 0.80 | 1.94 / 0.31 / 0.08 | 2.11 / 0.89 / 0.17 | 2.28 / 1.48 / 0.25 | 2.46 / 2.06 / 0.33 | 2.63 / 2.65 / 0.41 | 2.8 / 3.23 / 0.5 | 3.08 / 3.82 / 0.58 | 3.37 / 4.4 / 0.66 | 3.66 / 4.99 / 0.75 | 3.95 / 5.58 / 0.83 | 4.24 / 6.16 / 0.91 | 4.53 / 6.75 / 0.99 | 4.82 / 7.33 / 1.08 |
| | 1.00 | 2.29 / 0.31 / 0.08 | 2.46 / 0.89 / 0.17 | 2.64 / 1.48 / 0.25 | 2.81 / 2.06 / 0.33 | 2.98 / 2.65 / 0.41 | 3.16 / 3.23 / 0.5 | 3.33 / 3.82 / 0.58 | 3.55 / 4.4 / 0.66 | 3.84 / 4.99 / 0.75 | 4.13 / 5.58 / 0.83 | 4.41 / 6.16 / 0.91 | 4.7 / 6.75 / 0.99 | 4.99 / 7.33 / 1.08 |
| | 1.20 | 2.64 / 0.31 / 0.08 | 2.81 / 0.89 / 0.17 | 2.99 / 1.48 / 0.25 | 3.16 / 2.06 / 0.33 | 3.33 / 2.65 / 0.41 | 3.51 / 3.23 / 0.5 | 3.68 / 3.82 / 0.58 | 3.85 / 4.4 / 0.66 | 4.03 / 4.99 / 0.75 | 4.3 / 5.58 / 0.83 | 4.59 / 6.16 / 0.91 | 4.88 / 6.75 / 0.99 | 5.17 / 7.33 / 1.08 |
| | 1.40 | 2.99 / 0.31 / 0.08 | 3.16 / 0.89 / 0.17 | 3.34 / 1.48 / 0.25 | 3.51 / 2.06 / 0.33 | 3.68 / 2.65 / 0.41 | 3.86 / 3.23 / 0.5 | 4.03 / 3.82 / 0.58 | 4.2 / 4.4 / 0.66 | 4.38 / 4.99 / 0.75 | 4.55 / 5.58 / 0.83 | 4.77 / 6.16 / 0.91 | 5.05 / 6.75 / 0.99 | 5.34 / 7.33 / 1.08 |
| | 1.60 | 3.34 / 0.31 / 0.08 | 3.52 / 0.89 / 0.17 | 3.69 / 1.48 / 0.25 | 3.86 / 2.06 / 0.33 | 4.04 / 2.65 / 0.41 | 4.21 / 3.23 / 0.5 | 4.38 / 3.82 / 0.58 | 4.56 / 4.4 / 0.66 | 4.73 / 4.99 / 0.75 | 4.9 / 5.58 / 0.83 | 5.08 / 6.16 / 0.91 | 5.25 / 6.75 / 0.99 | 5.52 / 7.33 / 1.08 |
| | 1.80 | 3.69 / 0.31 / 0.08 | 3.87 / 0.89 / 0.17 | 4.04 / 1.48 / 0.25 | 4.21 / 2.06 / 0.33 | 4.39 / 2.65 / 0.41 | 4.56 / 3.23 / 0.5 | 4.73 / 3.82 / 0.58 | 4.91 / 4.4 / 0.66 | 5.08 / 4.99 / 0.75 | 5.25 / 5.58 / 0.83 | 5.43 / 6.16 / 0.91 | 5.6 / 6.75 / 0.99 | 5.77 / 7.33 / 1.08 |
| | 2.00 | 4.05 / 0.31 / 0.08 | 4.22 / 0.89 / 0.17 | 4.39 / 1.48 / 0.25 | 4.57 / 2.06 / 0.33 | 4.74 / 2.65 / 0.41 | 4.91 / 3.23 / 0.5 | 5.09 / 3.82 / 0.58 | 5.26 / 4.4 / 0.66 | 5.43 / 4.99 / 0.75 | 5.61 / 5.58 / 0.83 | 5.78 / 6.16 / 0.91 | 5.95 / 6.75 / 0.99 | 6.13 / 7.33 / 1.08 |
| | 2.20 | 4.4 / 0.31 / 0.08 | 4.57 / 0.89 / 0.17 | 4.74 / 1.48 / 0.25 | 4.92 / 2.06 / 0.33 | 5.09 / 2.65 / 0.41 | 5.26 / 3.23 / 0.5 | 5.44 / 3.82 / 0.58 | 5.61 / 4.4 / 0.66 | 5.78 / 4.99 / 0.75 | 5.96 / 5.58 / 0.83 | 6.13 / 6.16 / 0.91 | 6.3 / 6.75 / 0.99 | Not usable |
| | 2.40 | 4.75 / 0.31 / 0.08 | 4.92 / 0.89 / 0.17 | 5.09 / 1.48 / 0.25 | 5.27 / 2.06 / 0.33 | 5.44 / 2.65 / 0.41 | 5.61 / 3.23 / 0.5 | 5.79 / 3.82 / 0.58 | 5.96 / 4.4 / 0.66 | 6.13 / 4.99 / 0.75 | Not usable | Not usable | Not usable | Not usable |
| | 2.60 | 5.1 / 0.31 / 0.08 | 5.27 / 0.89 / 0.17 | 5.45 / 1.48 / 0.25 | 5.62 / 2.06 / 0.33 | 5.79 / 2.65 / 0.41 | 5.97 / 3.23 / 0.5 | 6.14 / 3.82 / 0.58 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| Snow load on the bottom [kN/m²] | 2.80 | 5.45 / 0.31 / 0.08 | 5.62 / 0.89 / 0.17 | 5.8 / 1.48 / 0.25 | 5.97 / 2.06 / 0.33 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.00 | 5.8 / 0.31 / 0.08 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.20 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.40 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.60 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.80 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.00 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.20 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.40 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.60 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.80 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 5.00 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |

| Freestanding installation of elements in landscape orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|--|--------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Specified values [kg]: Front ballast weight / rear ballast weight | | | | | | | | | | | | | | |
| Safety coefficients are taken into account in these tables. Ballast materials must be applied with their characteristic value (e.g. normal concrete: 2400 kg/m³) | | | | | | | | | | | | | | |
| 20° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| Snow load on the bottom [kN/m²] | 0.20 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 0.40 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 0.60 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 0.80 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 1.00 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 1.20 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 1.40 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 1.60 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 1.80 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 2.00 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 2.20 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 2.40 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 2.60 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| | 2.80 | 25 / 34 | 70 / 99 | 116 / 164 | 162 / 229 | 207 / 294 | 253 / 359 | 299 / 424 | 344 / 489 | 390 / 554 | 436 / 619 | 482 / 685 | 527 / 750 | 573 / 815 |
| Snow load on the bottom [kN/m²] | 3.00 | 25 / 34 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.20 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.40 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.60 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.80 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.00 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.20 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.40 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.60 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.80 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 5.00 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 5.20 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |

Freestanding installation - statistic application limits, anchoring forces, ballasting

Freestanding installation - landscape orientation

Element inclination 30°

| Freestanding installation of elements in landscape orientation - static application limits and anchoring forces | | | | | | | | | | | | | | | |
|---|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------------------|--------------------|------------|------------|------------|------------|
| Specified values [kN]: Maximum vertical compressive force / maximum vertical tensile force / maximum horizontal force | | | | | | | | | | | | | | | |
| 30° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 | |
| Snow load on the bottom [kN/m²] | 0.20 | 0.89 / 0.48 / 0.16 | 1.31 / 1.21 / 0.31 | 1.74 / 1.95 / 0.47 | 2.16 / 2.68 / 0.62 | 2.58 / 3.42 / 0.78 | 3.01 / 4.15 / 0.94 | 3.43 / 4.89 / 1.09 | 3.85 / 5.62 / 1.25 | 4.28 / 6.36 / 1.4 | 4.7 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 0.40 | 1.13 / 0.48 / 0.16 | 1.45 / 1.21 / 0.31 | 1.87 / 1.95 / 0.47 | 2.3 / 2.68 / 0.62 | 2.72 / 3.42 / 0.78 | 3.14 / 4.15 / 0.94 | 3.57 / 4.89 / 1.09 | 3.99 / 5.62 / 1.25 | 4.41 / 6.36 / 1.4 | 4.84 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 0.60 | 1.41 / 0.48 / 0.16 | 1.66 / 1.21 / 0.31 | 2.01 / 1.95 / 0.47 | 2.44 / 2.68 / 0.62 | 2.86 / 3.42 / 0.78 | 3.28 / 4.15 / 0.94 | 3.7 / 4.89 / 1.09 | 4.13 / 5.62 / 1.25 | 4.55 / 6.36 / 1.4 | 4.97 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 0.80 | 1.68 / 0.48 / 0.16 | 1.94 / 1.21 / 0.31 | 2.19 / 1.95 / 0.47 | 2.57 / 2.68 / 0.62 | 3 / 3.42 / 0.78 | 3.42 / 4.15 / 0.94 | 3.84 / 4.89 / 1.09 | 4.26 / 5.62 / 1.25 | 4.69 / 6.36 / 1.4 | 5.11 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 1.00 | 1.96 / 0.48 / 0.16 | 2.21 / 1.21 / 0.31 | 2.47 / 1.95 / 0.47 | 2.72 / 2.68 / 0.62 | 3.13 / 3.42 / 0.78 | 3.56 / 4.15 / 0.94 | 3.98 / 4.89 / 1.09 | 4.4 / 5.62 / 1.25 | 4.83 / 6.36 / 1.4 | 5.25 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 1.20 | 2.24 / 0.48 / 0.16 | 2.49 / 1.21 / 0.31 | 2.74 / 1.95 / 0.47 | 3 / 2.68 / 0.62 | 3.27 / 3.42 / 0.78 | 3.69 / 4.15 / 0.94 | 4.12 / 4.89 / 1.09 | 4.54 / 5.62 / 1.25 | 4.96 / 6.36 / 1.4 | 5.39 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 1.40 | 2.51 / 0.48 / 0.16 | 2.76 / 1.21 / 0.31 | 3.02 / 1.95 / 0.47 | 3.27 / 2.68 / 0.62 | 3.53 / 3.42 / 0.78 | 3.83 / 4.15 / 0.94 | 4.25 / 4.89 / 1.09 | 4.68 / 5.62 / 1.25 | 5.1 / 6.36 / 1.4 | 5.52 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 1.60 | 2.79 / 0.48 / 0.16 | 3.04 / 1.21 / 0.31 | 3.29 / 1.95 / 0.47 | 3.55 / 2.68 / 0.62 | 3.8 / 3.42 / 0.78 | 4.05 / 4.15 / 0.94 | 4.39 / 4.89 / 1.09 | 4.82 / 5.62 / 1.25 | 5.24 / 6.36 / 1.4 | 5.66 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 1.80 | 3.06 / 0.48 / 0.16 | 3.31 / 1.21 / 0.31 | 3.57 / 1.95 / 0.47 | 3.82 / 2.68 / 0.62 | 4.08 / 3.42 / 0.78 | 4.33 / 4.15 / 0.94 | 4.58 / 4.89 / 1.09 | 4.95 / 5.62 / 1.25 | 5.38 / 6.36 / 1.4 | 5.8 / 7.09 / 1.56 | Not usable | Not usable | Not usable | |
| | 2.00 | 3.34 / 0.48 / 0.16 | 3.59 / 1.21 / 0.31 | 3.84 / 1.95 / 0.47 | 4.1 / 2.68 / 0.62 | 4.35 / 3.42 / 0.78 | 4.6 / 4.15 / 0.94 | 4.86 / 4.89 / 1.09 | 5.11 / 5.62 / 1.25 | Not usable | Not usable | Not usable | Not usable | Not usable | |
| | 2.20 | 3.61 / 0.48 / 0.16 | 3.86 / 1.21 / 0.31 | 4.12 / 1.95 / 0.47 | 4.37 / 2.68 / 0.62 | 4.63 / 3.42 / 0.78 | 4.88 / 4.15 / 0.94 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 2.40 | 3.89 / 0.48 / 0.16 | 4.14 / 1.21 / 0.31 | 4.39 / 1.95 / 0.47 | 4.65 / 2.68 / 0.62 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| Snow load on the bottom [kN/m²] | 2.60 | 4.16 / 0.48 / 0.16 | 4.41 / 1.21 / 0.31 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| | 2.80 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| | 3.00 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| | 3.20 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| | 3.40 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| | 3.60 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| | 3.80 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |
| | 4.00 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | |

| Freestanding installation of elements in landscape orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|--|--------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Specified values [kg]: Front ballast weight / rear ballast weight | | | | | | | | | | | | | | |
| Safety coefficients are taken into account in these tables. Ballast materials must be applied with their characteristic value (e.g. normal concrete: 2400 kg/m³) | | | | | | | | | | | | | | |
| 30° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| Snow load on the bottom [kN/m²] | 0.20 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 0.40 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 0.60 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 0.80 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 1.00 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 1.20 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 1.40 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 1.60 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 1.80 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | 573 / 706 | 638 / 788 | Not usable | Not usable | Not usable |
| | 2.00 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | 443 / 543 | 508 / 625 | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 2.20 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | 313 / 380 | 378 / 461 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 2.40 | 53 / 53 | 118 / 135 | 183 / 217 | 248 / 298 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| Snow load on the bottom [kN/m²] | 2.60 | 53 / 53 | 118 / 135 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 2.80 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.00 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.20 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.40 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.60 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 3.80 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |
| | 4.00 | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable | Not usable |

Freestanding installation - statistic application limits, anchoring forces, ballasting

Freestanding installation - landscape orientation

Element inclination 45°

| Freestanding installation of elements in landscape orientation - static application limits and anchoring forces | | | | | | | | | | | | | |
|---|--------------------------------|----------------|----------------|---------------|--------------|-------------|---------------|---------------|---------------|--------------|---------------|------------|------------|
| Specified values [kN]: Maximum vertical compressive force / maximum vertical tensile force / maximum horizontal force | | | | | | | | | | | | | |
| 45° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.40 |
| 0.20 | 0.75/0.49/0.22 | 1.2/1.19/0.44 | 1.64/1.19/0.66 | 2.09/2.6/0.88 | 2.54/3.3/1.1 | 2.98/4/1.32 | 3.43/4.7/1.54 | 3.87/5.4/1.76 | 4.32/6.1/1.98 | 4.77/6.8/2.2 | 5.21/7.5/2.42 | Not usable | Not usable |
| 0.40 | 0.79/0.49/0.22 | 1.24/1.19/0.44 | 1.68/1.19/0.66 | 2.13/2.6/0.88 | 2.57/3.3/1.1 | 3.02/4/1.32 | 3.47/4.7/1.54 | 3.91/5.4/1.76 | 4.36/6.1/1.98 | 4.81/6.8/2.2 | 5.25/7.5/2.42 | Not usable | Not usable |
| 0.60 | 0.83/0.49/0.22 | 1.27/1.19/0.44 | 1.72/1.19/0.66 | 2.17/2.6/0.88 | 2.61/3.3/1.1 | 3.06/4/1.32 | 3.5/4.7/1.54 | 3.95/5.4/1.76 | 4.39/6.1/1.98 | 4.84/6.8/2.2 | 5.29/7.5/2.42 | Not usable | Not usable |
| 0.80 | 0.87/0.49/0.22 | 1.31/1.19/0.44 | 1.76/1.19/0.66 | 2.2/2.6/0.88 | 2.65/3.3/1.1 | 3.09/4/1.32 | 3.54/4.7/1.54 | 3.99/5.4/1.76 | 4.43/6.1/1.98 | 4.88/6.8/2.2 | 5.32/7.5/2.42 | Not usable | Not usable |
| 1.00 | 0.96/0.49/0.22 | 1.35/1.19/0.44 | 1.79/1.19/0.66 | 2.24/2.6/0.88 | 2.69/3.3/1.1 | 3.13/4/1.32 | 3.58/4.7/1.54 | 4.02/5.4/1.76 | 4.47/6.1/1.98 | 4.92/6.8/2.2 | 5.36/7.5/2.42 | Not usable | Not usable |
| 1.20 | 1.05/0.49/0.22 | 1.39/1.19/0.44 | 1.83/1.19/0.66 | 2.28/2.6/0.88 | 2.72/3.3/1.1 | 3.17/4/1.32 | 3.62/4.7/1.54 | 4.06/5.4/1.76 | 4.51/6.1/1.98 | 4.95/6.8/2.2 | 5.4/7.5/2.42 | Not usable | Not usable |
| 1.40 | 1.14/0.49/0.22 | 1.42/1.19/0.44 | 1.87/1.19/0.66 | 2.32/2.6/0.88 | 2.76/3.3/1.1 | 3.21/4/1.32 | 3.65/4.7/1.54 | 4.1/5.4/1.76 | 4.54/6.1/1.98 | 4.99/6.8/2.2 | 5.44/7.5/2.42 | Not usable | Not usable |
| 1.60 | 1.23/0.49/0.22 | 1.46/1.19/0.44 | 1.91/1.19/0.66 | 2.35/2.6/0.88 | 2.8/3.3/1.1 | 3.24/4/1.32 | 3.69/4.7/1.54 | 4.14/5.4/1.76 | 4.58/6.1/1.98 | 5.03/6.8/2.2 | 5.47/7.5/2.42 | Not usable | Not usable |
| 1.80 | 1.32/0.49/0.22 | 1.5/1.19/0.44 | 1.94/1.19/0.66 | 2.39/2.6/0.88 | 2.84/3.3/1.1 | 3.28/4/1.32 | 3.73/4.7/1.54 | 4.17/5.4/1.76 | 4.62/6.1/1.98 | 5.06/6.8/2.2 | 5.51/7.5/2.42 | Not usable | Not usable |
| 2.00 | 1.42/0.49/0.22 | 1.59/1.19/0.44 | 1.98/1.19/0.66 | 2.43/2.6/0.88 | 2.87/3.3/1.1 | 3.32/4/1.32 | 3.77/4.7/1.54 | 4.21/5.4/1.76 | 4.66/6.1/1.98 | 5.1/6.8/2.2 | 5.55/7.5/2.42 | Not usable | Not usable |
| 2.20 | 1.51/0.49/0.22 | 1.68/1.19/0.44 | 2.02/1.19/0.66 | 2.47/2.6/0.88 | 2.91/3.3/1.1 | 3.36/4/1.32 | 3.8/4.7/1.54 | 4.25/5.4/1.76 | 4.69/6.1/1.98 | 5.14/6.8/2.2 | 5.59/7.5/2.42 | Not usable | Not usable |
| 2.40 | 1.6/0.49/0.22 | 1.77/1.19/0.44 | 2.06/1.19/0.66 | 2.5/2.6/0.88 | 2.95/3.3/1.1 | 3.39/4/1.32 | 3.84/4.7/1.54 | 4.29/5.4/1.76 | 4.73/6.1/1.98 | 5.18/6.8/2.2 | 5.62/7.5/2.42 | Not usable | Not usable |
| 2.60 | 1.69/0.49/0.22 | 1.86/1.19/0.44 | 2.09/1.19/0.66 | 2.54/2.6/0.88 | 2.99/3.3/1.1 | 3.43/4/1.32 | 3.88/4.7/1.54 | 4.32/5.4/1.76 | 4.77/6.1/1.98 | 5.21/6.8/2.2 | 5.66/7.5/2.42 | Not usable | Not usable |
| 2.80 | 1.78/0.49/0.22 | 1.95/1.19/0.44 | 2.13/1.19/0.66 | 2.58/2.6/0.88 | 3.02/3.3/1.1 | 3.47/4/1.32 | 3.91/4.7/1.54 | 4.36/5.4/1.76 | 4.81/6.1/1.98 | 5.25/6.8/2.2 | 5.7/7.5/2.42 | Not usable | Not usable |
| 3.00 | 1.87/0.49/0.22 | 2.04/1.19/0.44 | 2.21/1.19/0.66 | 2.61/2.6/0.88 | 3.06/3.3/1.1 | 3.51/4/1.32 | 3.95/4.7/1.54 | 4.4/5.4/1.76 | 4.84/6.1/1.98 | 5.29/6.8/2.2 | 5.74/7.5/2.42 | Not usable | Not usable |
| 3.20 | 1.96/0.49/0.22 | 2.13/1.19/0.44 | 2.3/1.19/0.66 | 2.65/2.6/0.88 | 3.1/3.3/1.1 | 3.54/4/1.32 | 3.99/4.7/1.54 | 4.44/5.4/1.76 | 4.88/6.1/1.98 | 5.33/6.8/2.2 | 5.77/7.5/2.42 | Not usable | Not usable |
| 3.40 | 2.06/0.49/0.22 | 2.23/1.19/0.44 | 2.4/1.19/0.66 | 2.69/2.6/0.88 | 3.14/3.3/1.1 | 3.58/4/1.32 | 4.03/4.7/1.54 | 4.47/5.4/1.76 | 4.92/6.1/1.98 | 5.36/6.8/2.2 | Not usable | Not usable | Not usable |
| 3.60 | 2.15/0.49/0.22 | 2.32/1.19/0.44 | 2.49/1.19/0.66 | 2.73/2.6/0.88 | 3.17/3.3/1.1 | 3.62/4/1.32 | 4.06/4.7/1.54 | 4.51/5.4/1.76 | 4.96/6.1/1.98 | 5.4/6.8/2.2 | Not usable | Not usable | Not usable |
| 3.80 | 2.24/0.49/0.22 | 2.41/1.19/0.44 | 2.58/1.19/0.66 | 2.76/2.6/0.88 | 3.21/3.3/1.1 | 3.66/4/1.32 | 4.1/4.7/1.54 | 4.55/5.4/1.76 | 4.99/6.1/1.98 | Not usable | Not usable | Not usable | Not usable |
| 4.00 | 2.33/0.49/0.22 | 2.5/1.19/0.44 | 2.67/1.19/0.66 | 2.84/2.6/0.88 | 3.25/3.3/1.1 | 3.69/4/1.32 | 4.14/4.7/1.54 | 4.59/5.4/1.76 | Not usable | Not usable | Not usable | Not usable | Not usable |

| Freestanding installation of elements in landscape orientation - static application limits and anchoring forces | | | | | | | | | | | | | |
|--|--------------------------------|---------|---------|---------|---------|---------|---------|---------|------------|------------|------------|------------|------------|
| Specified values [kg]: Front ballast weight / rear ballast weight | | | | | | | | | | | | | |
| Safety coefficients are taken into account in these tables. Ballast materials must be applied with their characteristic value (e.g. normal concrete: 2400 kg/m³) | | | | | | | | | | | | | |
| 45° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.40 |
| 0.20 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 0.40 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 0.60 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 0.80 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 1.00 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 1.20 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 1.40 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 1.60 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 1.80 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 2.00 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 2.20 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 2.40 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 2.60 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 2.80 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 3.00 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 3.20 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | 923/923 | Not usable | Not usable |
| 3.40 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | Not usable | Not usable | Not usable |
| 3.60 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | 837/837 | Not usable | Not usable | Not usable |
| 3.80 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | 751/751 | Not usable | Not usable | Not usable | Not usable |
| 4.00 | 66/66 | 151/151 | 237/237 | 323/323 | 408/408 | 494/494 | 580/580 | 666/666 | Not usable | Not usable | Not usable | Not usable | Not usable |

26

Wall installation - portrait orientation

Element inclination 30°

| Wall installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|---|--------------------------------|---------------|----------------|----------------|----------------|---------------|----------------|----------------|----------------|---------------|---------------|----------------|----------------|----------------|
| Specified values [kN]: maximum horizontal compressive force / maximum horizontal tensile force / maximum vertical force | | | | | | | | | | | | | | |
| 30° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| 0.20 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 0.40 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 0.60 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 0.80 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 1.00 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 1.20 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 1.40 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 1.60 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 1.80 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 2.00 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 2.20 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 2.40 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 2.60 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 2.80 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 3.00 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 3.20 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 3.40 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 3.60 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 3.80 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |
| 4.00 | 0.33/0.35/0.67 | 0.5/0.54/0.75 | 0.68/0.73/0.82 | 0.85/0.97/0.89 | 1.03/1.24/0.96 | 1.2/1.51/1.04 | 1.38/1.78/1.11 | 1.55/2.06/1.18 | 1.73/2.33/1.26 | 1.91/2.6/1.33 | 2.08/2.87/1.4 | 2.26/3.14/1.47 | 2.43/3.41/1.55 | 2.61/3.68/1.62 |

Wall installation - statistic application limits, anchoring forces, ballasting

Wall installation - portrait orientation

Element inclination 45°

| Wall installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|---|--------------------------------|----------------|----------------|-------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Specified values [kN]: maximum horizontal compressive force / maximum horizontal tensile force / maximum vertical force | | | | | | | | | | | | | | |
| 45° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| Snow load on the bottom [kN/m²] | 0.20 | 0.39/0.38/0.74 | 0.54/0.5/0.82 | 0.69/0.82/0.91/0.84/1.14/0.99 | 0.99/1.47/1.08 | 1.15/1.79/1.17 | 1.3/2.12/1.26 | 1.45/2.44/1.35 | 1.6/2.77/1.44 | 1.75/3.09/1.52 | 1.9/3.42/1.61 | 2.05/3.74/1.7 | 2.2/4.07/1.79 | 2.35/4.39/1.88 |
| | 0.40 | 0.42/0.43/0.82 | 0.57/0.52/0.87 | 0.72/0.82/0.95/0.87/1.14/1.04 | 1.02/1.47/1.12 | 1.17/1.79/1.21 | 1.33/2.12/1.3 | 1.48/2.44/1.39 | 1.63/2.77/1.48 | 1.78/3.09/1.57 | 1.93/3.42/1.65 | 2.08/3.74/1.74 | 2.23/4.07/1.83 | 2.38/4.39/1.92 |
| | 0.60 | 0.48/0.49/0.9 | 0.6/0.56/0.96 | 0.75/0.82/1.01 | 0.9/1.14/1.08 | 1.05/1.47/1.17 | 1.2/1.79/1.25 | 1.35/2.12/1.34 | 1.51/2.44/1.43 | 1.66/2.77/1.52 | 1.81/3.09/1.61 | 1.96/3.42/1.7 | 2.11/3.74/1.78 | 2.26/4.07/1.87 |
| | 0.80 | 0.54/0.56/0.99 | 0.63/0.62/1.04 | 0.78/0.82/1.09/0.93/1.14/1.14 | 1.08/1.47/1.21 | 1.23/1.79/1.3 | 1.38/2.12/1.38 | 1.53/2.44/1.47 | 1.69/2.77/1.56 | 1.84/3.09/1.65 | 1.99/3.42/1.74 | 2.14/3.74/1.83 | 2.29/4.07/1.91 | 2.44/4.39/2 |
| | 1.00 | 0.6/0.62/1.07 | 0.69/0.69/1.12 | 0.81/0.82/1.18/0.96/1.14/1.23 | 1.11/1.47/1.28 | 1.26/1.79/1.34 | 1.41/2.12/1.43 | 1.56/2.44/1.51 | 1.71/2.77/1.6 | 1.87/3.09/1.69 | 2.02/3.42/1.78 | 2.17/3.74/1.87 | 2.32/4.07/1.96 | 2.47/4.39/2.04 |
| | 1.20 | 0.66/0.69/1.15 | 0.75/0.75/1.21 | 0.84/0.82/1.26/0.99/1.14/1.31 | 1.14/1.47/1.36 | 1.29/1.79/1.42 | 1.44/2.12/1.47 | 1.59/2.44/1.56 | 1.74/2.77/1.64 | 1.89/3.09/1.73 | 2.05/3.42/1.82 | 2.2/3.74/1.91 | 2.35/4.07/2 | 2.5/4.39/2.09 |
| | 1.40 | 0.72/0.75/1.24 | 0.81/0.82/1.29 | 0.9/0.88/1.34 | 1.02/1.14/1.39 | 1.17/1.47/1.45 | 1.32/1.79/1.5 | 1.47/2.12/1.55 | 1.62/2.44/1.61 | 1.77/2.77/1.69 | 1.92/3.09/1.77 | 2.07/3.42/1.86 | 2.23/3.74/1.95 | 2.38/4.07/2.04 |
| | 1.60 | 0.78/0.81/1.32 | 0.87/0.88/1.37 | 0.96/0.95/1.42 | 1.05/1.14/1.48 | 1.2/1.47/1.53 | 1.35/1.79/1.58 | 1.5/2.12/1.64 | 1.65/2.44/1.69 | 1.8/2.77/1.74 | 1.95/3.09/1.82 | 2.1/3.42/1.9 | 2.25/3.74/1.98 | 2.41/4.07/2.08 |
| | 1.80 | 0.84/0.88/1.4 | 0.93/0.95/1.46 | 1.02/1.01/1.51 | 1.11/1.14/1.56 | 1.23/1.47/1.61 | 1.38/1.79/1.67 | 1.53/2.12/1.72 | 1.68/2.44/1.77 | 1.83/2.77/1.83 | 1.98/3.09/1.88 | 2.13/3.42/1.95 | 2.28/3.74/2.03 | 2.43/4.07/2.12 |
| | 2.00 | 0.89/0.94/1.49 | 0.99/1.01/1.54 | 1.08/1.08/1.59 | 1.17/1.14/1.64 | 1.26/1.47/1.7 | 1.41/1.79/1.75 | 1.56/2.12/1.8 | 1.71/2.44/1.86 | 1.86/2.77/1.91 | 2.01/3.09/1.96 | 2.16/3.42/2.01 | 2.31/3.74/2.08 | 2.46/4.07/2.16 |
| | 2.20 | 0.95/1.01/1.57 | 1.04/1.07/1.62 | 1.13/1.14/1.67 | 1.22/1.21/1.73 | 1.32/1.47/1.78 | 1.44/1.79/1.83 | 1.59/2.12/1.89 | 1.74/2.44/1.94 | 1.89/2.77/1.98 | 2.04/3.09/2.05 | 2.19/3.42/2.1 | 2.34/3.74/2.15 | 2.49/4.07/2.21 |
| | 2.40 | 1.01/1.07/1.65 | 1.1/1.14/1.7 | 1.19/1.21/1.76 | 1.28/1.27/1.81 | 1.37/1.47/1.86 | 1.47/1.79/1.92 | 1.62/2.12/1.97 | 1.77/2.44/2.02 | 1.92/2.77/2.08 | 2.07/3.09/2.13 | 2.22/3.42/2.18 | 2.37/3.74/2.23 | 2.52/4.07/2.29 |
| | 2.60 | 1.07/1.14/1.74 | 1.16/1.2/1.79 | 1.25/1.27/1.84 | 1.34/1.34/1.89 | 1.43/1.47/1.95 | 1.52/1.79/2 | 1.65/2.12/2.05 | 1.8/2.44/2.11 | 1.95/2.77/2.16 | 2.1/3.09/2.21 | 2.25/3.42/2.26 | 2.4/3.74/2.32 | 2.55/4.07/2.37 |
| | 2.80 | 1.13/1.2/1.82 | 1.22/1.27/1.87 | 1.31/1.33/1.92 | 1.4/1.4/1.98 | 1.49/1.47/2.03 | 1.58/1.79/2.08 | 1.68/2.12/2.14 | 1.83/2.44/2.19 | 1.98/2.77/2.24 | 2.13/3.09/2.29 | 2.28/3.42/2.35 | 2.43/3.74/2.4 | 2.58/4.07/2.45 |
| | 3.00 | 1.19/1.27/1.9 | 1.28/1.33/1.95 | 1.37/1.4/2.01 | 1.46/1.47/2.06 | 1.55/1.53/2.11 | 1.64/1.79/2.17 | 1.73/2.12/2.22 | 1.86/2.44/2.27 | 2.01/2.77/2.33 | 2.16/3.09/2.38 | 2.31/3.42/2.43 | 2.46/3.74/2.48 | 2.61/4.07/2.54 |
| | 3.20 | 1.25/1.33/1.98 | 1.34/1.4/2.04 | 1.43/1.46/2.09 | 1.52/1.53/2.14 | 1.61/1.6/2.2 | 1.7/1.79/2.25 | 1.79/2.12/2.3 | 1.89/2.44/2.36 | 2.04/2.77/2.41 | 2.19/3.09/2.46 | 2.34/3.42/2.51 | 2.49/3.74/2.57 | 2.64/4.07/2.62 |
| | 3.40 | 1.31/1.39/2.07 | 1.4/1.46/2.12 | 1.49/1.53/2.17 | 1.58/1.59/2.23 | 1.67/1.66/2.28 | 1.76/1.79/2.33 | 1.85/2.12/2.39 | 1.94/2.44/2.44 | 2.07/2.77/2.49 | 2.22/3.09/2.54 | 2.37/3.42/2.6 | 2.52/3.74/2.65 | 2.67/4.07/2.7 |
| | 3.60 | 1.37/1.46/2.15 | 1.46/1.53/2.2 | 1.55/1.59/2.26 | 1.64/1.66/2.31 | 1.73/1.72/2.36 | 1.82/1.79/2.42 | 1.91/2.12/2.47 | 2/2.44/2.52 | 2.1/2.77/2.57 | 2.25/3.09/2.63 | 2.4/3.42/2.68 | 2.55/3.74/2.73 | 2.7/4.07/2.79 |
| | 3.80 | 1.43/1.52/2.23 | 1.52/1.59/2.29 | 1.61/1.66/2.34 | 1.7/1.72/2.39 | 1.79/1.79/2.45 | 1.88/1.86/2.5 | 1.97/2.12/2.55 | 2.06/2.44/2.61 | 2.15/2.77/2.66 | 2.28/3.09/2.71 | 2.43/3.42/2.76 | 2.58/3.74/2.82 | 2.73/4.07/2.88 |
| | 4.00 | 1.49/1.59/2.32 | 1.58/1.65/2.37 | 1.67/1.72/2.42 | 1.76/1.79/2.48 | 1.85/1.85/2.53 | 1.94/1.92/2.58 | 2.03/2.12/2.64 | 2.12/2.44/2.69 | 2.21/2.77/2.74 | 2.31/3.09/2.79 | 2.46/3.42/2.85 | 2.61/3.74/2.9 | 2.76/4.07/2.95 |

Wall installation - statistic application limits, anchoring forces, ballasting

Wall installation - landscape orientation

Element inclination 45°

| Wall installation of elements in portrait orientation - static application limits and anchoring forces | | | | | | | | | | | | | | |
|---|--------------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Specified values [kN]: maximum horizontal compressive force / maximum horizontal tensile force / maximum vertical force | | | | | | | | | | | | | | |
| 45° | Gust velocity pressure [kN/m²] | | | | | | | | | | | | | |
| | 0.10 | 0.20 | 0.30 | 0.40 | 0.50 | 0.60 | 0.70 | 0.80 | 0.90 | 1.00 | 1.10 | 1.20 | 1.30 | 1.40 |
| Snow load on the bottom [kN/m²] | 0.20 | 0.38 / 0.41 / 0.74 | 0.52 / 0.54 / 0.82 | 0.67 / 0.84 / 0.91 | 0.81 / 1.18 / 0.99 | 0.95 / 1.51 / 1.08 | 1.1 / 1.85 / 1.17 | 1.24 / 2.18 / 1.26 | 1.39 / 2.51 / 1.35 | 1.53 / 2.85 / 1.44 | 1.68 / 3.18 / 1.52 | 1.82 / 3.52 / 1.61 | 1.96 / 3.85 / 1.7 | 2.11 / 4.18 / 1.79 |
| | 0.40 | 0.41 / 0.45 / 0.82 | 0.55 / 0.57 / 0.87 | 0.69 / 0.84 / 0.95 | 0.84 / 1.18 / 1.04 | 0.98 / 1.51 / 1.12 | 1.13 / 1.85 / 1.21 | 1.27 / 2.18 / 1.3 | 1.42 / 2.51 / 1.39 | 1.56 / 2.85 / 1.48 | 1.7 / 3.18 / 1.57 | 1.85 / 3.52 / 1.65 | 1.99 / 3.85 / 1.74 | 2.14 / 4.18 / 1.83 |
| | 0.60 | 0.46 / 0.52 / 0.9 | 0.58 / 0.61 / 0.96 | 0.72 / 0.84 / 1.01 | 0.87 / 1.18 / 1.08 | 1.01 / 1.51 / 1.17 | 1.16 / 1.85 / 1.25 | 1.3 / 2.18 / 1.34 | 1.44 / 2.51 / 1.43 | 1.59 / 2.85 / 1.52 | 1.73 / 3.18 / 1.61 | 1.88 / 3.52 / 1.7 | 2.02 / 3.85 / 1.78 | 2.16 / 4.18 / 1.87 |
| | 0.80 | 0.52 / 0.59 / 0.99 | 0.61 / 0.67 / 1.04 | 0.75 / 0.84 / 1.09 | 0.89 / 1.18 / 1.14 | 1.04 / 1.51 / 1.21 | 1.18 / 1.85 / 1.3 | 1.33 / 2.18 / 1.38 | 1.47 / 2.51 / 1.47 | 1.62 / 2.85 / 1.56 | 1.76 / 3.18 / 1.65 | 1.9 / 3.52 / 1.74 | 2.05 / 3.85 / 1.83 | 2.19 / 4.18 / 1.91 |
| | 1.00 | 0.57 / 0.66 / 1.07 | 0.66 / 0.74 / 1.12 | 0.78 / 0.84 / 1.18 | 0.92 / 1.18 / 1.23 | 1.07 / 1.51 / 1.28 | 1.21 / 1.85 / 1.34 | 1.36 / 2.18 / 1.43 | 1.5 / 2.51 / 1.51 | 1.64 / 2.85 / 1.6 | 1.79 / 3.18 / 1.69 | 1.93 / 3.52 / 1.78 | 2.08 / 3.85 / 1.87 | 2.22 / 4.18 / 1.96 |
| | 1.20 | 0.63 / 0.72 / 1.15 | 0.72 / 0.8 / 1.21 | 0.81 / 0.88 / 1.26 | 0.95 / 1.18 / 1.31 | 1.1 / 1.51 / 1.36 | 1.24 / 1.85 / 1.42 | 1.38 / 2.18 / 1.47 | 1.53 / 2.51 / 1.56 | 1.67 / 2.85 / 1.64 | 1.82 / 3.18 / 1.73 | 1.96 / 3.52 / 1.82 | 2.11 / 3.85 / 1.91 | 2.25 / 4.18 / 2 |
| | 1.40 | 0.69 / 0.79 / 1.24 | 0.77 / 0.87 / 1.29 | 0.86 / 0.95 / 1.34 | 0.98 / 1.18 / 1.39 | 1.12 / 1.51 / 1.45 | 1.27 / 1.85 / 1.5 | 1.41 / 2.18 / 1.55 | 1.56 / 2.51 / 1.61 | 1.7 / 2.85 / 1.69 | 1.85 / 3.18 / 1.77 | 1.99 / 3.52 / 1.86 | 2.13 / 3.85 / 1.95 | 2.28 / 4.18 / 2.04 |
| | 1.60 | 0.74 / 0.86 / 1.32 | 0.83 / 0.94 / 1.37 | 0.92 / 1.02 / 1.42 | 1.01 / 1.18 / 1.48 | 1.15 / 1.51 / 1.53 | 1.3 / 1.85 / 1.58 | 1.44 / 2.18 / 1.64 | 1.59 / 2.51 / 1.69 | 1.73 / 2.85 / 1.74 | 1.87 / 3.18 / 1.82 | 2.02 / 3.52 / 1.9 | 2.16 / 3.85 / 1.98 | 2.31 / 4.18 / 2.08 |
| | 1.80 | 0.8 / 0.92 / 1.4 | 0.89 / 1.1 / 1.46 | 0.97 / 1.08 / 1.51 | 1.06 / 1.18 / 1.56 | 1.18 / 1.51 / 1.61 | 1.33 / 1.85 / 1.67 | 1.47 / 2.18 / 1.72 | 1.61 / 2.51 / 1.77 | 1.76 / 2.85 / 1.83 | 1.9 / 3.18 / 1.88 | 2.05 / 3.52 / 1.95 | 2.19 / 3.85 / 2.03 | 2.33 / 4.18 / 2.12 |
| | 2.00 | 0.86 / 0.99 / 1.49 | 0.94 / 1.07 / 1.54 | 1.03 / 1.15 / 1.59 | 1.12 / 1.23 / 1.64 | 1.21 / 1.51 / 1.7 | 1.35 / 1.85 / 1.75 | 1.5 / 2.18 / 1.8 | 1.64 / 2.51 / 1.86 | 1.79 / 2.85 / 1.91 | 1.93 / 3.18 / 1.96 | 2.07 / 3.52 / 2.01 | 2.22 / 3.85 / 2.08 | 2.36 / 4.18 / 2.16 |
| | 2.20 | 0.91 / 1.06 / 1.57 | 1.1 / 1.14 / 1.62 | 1.09 / 1.22 / 1.67 | 1.17 / 1.3 / 1.73 | 1.26 / 1.51 / 1.78 | 1.38 / 1.85 / 1.83 | 1.53 / 2.18 / 1.89 | 1.67 / 2.51 / 1.94 | 1.81 / 2.85 / 1.98 | 1.96 / 3.18 / 2.05 | 2.1 / 3.52 / 2.1 | 2.25 / 3.85 / 2.15 | 2.39 / 4.18 / 2.21 |
| | 2.40 | 0.97 / 1.12 / 1.65 | 1.06 / 1.2 / 1.7 | 1.14 / 1.28 / 1.76 | 1.23 / 1.36 / 1.81 | 1.32 / 1.51 / 1.86 | 1.41 / 1.85 / 1.92 | 1.55 / 2.18 / 1.97 | 1.7 / 2.51 / 2.02 | 1.84 / 2.85 / 2.08 | 1.99 / 3.18 / 2.13 | 2.13 / 3.52 / 2.18 | 2.28 / 3.85 / 2.23 | 2.42 / 4.18 / 2.29 |
| | 2.60 | 1.03 / 1.19 / 1.74 | 1.11 / 1.27 / 1.79 | 1.2 / 1.35 / 1.84 | 1.29 / 1.43 / 1.89 | 1.37 / 1.51 / 1.95 | 1.46 / 1.85 / 2 | 1.58 / 2.18 / 2.05 | 1.73 / 2.51 / 2.11 | 1.87 / 2.85 / 2.16 | 2.02 / 3.18 / 2.21 | 2.16 / 3.52 / 2.26 | 2.3 / 3.85 / 2.32 | 2.45 / 4.18 / 2.37 |
| | 2.80 | 1.09 / 1.26 / 1.82 | 1.17 / 1.34 / 1.87 | 1.26 / 1.42 / 1.92 | 1.34 / 1.5 / 1.98 | 1.43 / 1.58 / 2.03 | 1.52 / 1.85 / 2.08 | 1.61 / 2.18 / 2.14 | 1.76 / 2.51 / 2.19 | 1.9 / 2.85 / 2.24 | 2.04 / 3.18 / 2.29 | 2.19 / 3.52 / 2.35 | 2.33 / 3.85 / 2.4 | 2.48 / 4.18 / 2.45 |
| | 3.00 | 1.14 / 1.32 / 1.9 | 1.23 / 1.4 / 1.95 | 1.31 / 1.48 / 2.01 | 1.4 / 1.56 / 2.06 | 1.49 / 1.64 / 2.11 | 1.57 / 1.85 / 2.17 | 1.66 / 2.18 / 2.22 | 1.78 / 2.51 / 2.27 | 1.93 / 2.85 / 2.33 | 2.07 / 3.18 / 2.38 | 2.22 / 3.52 / 2.43 | 2.36 / 3.85 / 2.48 | 2.51 / 4.18 / 2.54 |
| | 3.20 | 1.2 / 1.39 / 1.98 | 1.28 / 1.47 / 2.04 | 1.37 / 1.55 / 2.09 | 1.46 / 1.63 / 2.14 | 1.54 / 1.71 / 2.2 | 1.63 / 1.85 / 2.25 | 1.72 / 2.18 / 2.3 | 1.81 / 2.51 / 2.36 | 1.96 / 2.85 / 2.41 | 2.1 / 3.18 / 2.46 | 2.24 / 3.52 / 2.51 | 2.39 / 3.85 / 2.57 | 2.53 / 4.18 / 2.62 |
| | 3.40 | 1.26 / 1.46 / 2.07 | 1.34 / 1.54 / 2.12 | 1.43 / 1.62 / 2.17 | 1.51 / 1.7 / 2.23 | 1.6 / 1.78 / 2.28 | 1.69 / 1.86 / 2.33 | 1.77 / 2.18 / 2.39 | 1.86 / 2.51 / 2.44 | 1.98 / 2.85 / 2.49 | 2.13 / 3.18 / 2.54 | 2.27 / 3.52 / 2.6 | 2.42 / 3.85 / 2.65 | 2.56 / 4.18 / 2.7 |
| | 3.60 | 1.31 / 1.53 / 2.15 | 1.4 / 1.61 / 2.2 | 1.48 / 1.68 / 2.26 | 1.57 / 1.76 / 2.31 | 1.66 / 1.84 / 2.36 | 1.74 / 1.92 / 2.42 | 1.83 / 2.18 / 2.47 | 1.92 / 2.51 / 2.52 | 2.01 / 2.85 / 2.57 | 2.16 / 3.18 / 2.63 | 2.3 / 3.52 / 2.68 | 2.45 / 3.85 / 2.73 | 2.59 / 4.18 / 2.79 |
| | 3.80 | 1.37 / 1.59 / 2.23 | 1.46 / 1.67 / 2.29 | 1.54 / 1.75 / 2.34 | 1.63 / 1.83 / 2.39 | 1.71 / 1.91 / 2.45 | 1.8 / 1.99 / 2.5 | 1.89 / 2.18 / 2.55 | 1.97 / 2.51 / 2.61 | 2.06 / 2.85 / 2.66 | 2.19 / 3.18 / 2.71 | 2.33 / 3.52 / 2.76 | 2.47 / 3.85 / 2.82 | 2.62 / 4.18 / 2.87 |
| | 4.00 | 1.43 / 1.66 / 2.32 | 1.51 / 1.74 / 2.37 | 1.6 / 1.82 / 2.42 | 1.68 / 1.9 / 2.48 | 1.77 / 1.98 / 2.53 | 1.86 / 2.06 / 2.58 | 1.94 / 2.18 / 2.64 | 2.03 / 2.51 / 2.69 | 2.12 / 2.85 / 2.74 | 2.21 / 3.18 / 2.79 | 2.36 / 3.52 / 2.85 | 2.5 / 3.85 / 2.9 | 2.65 / 4.18 / 2.95 |

Freestanding installation

General instructions



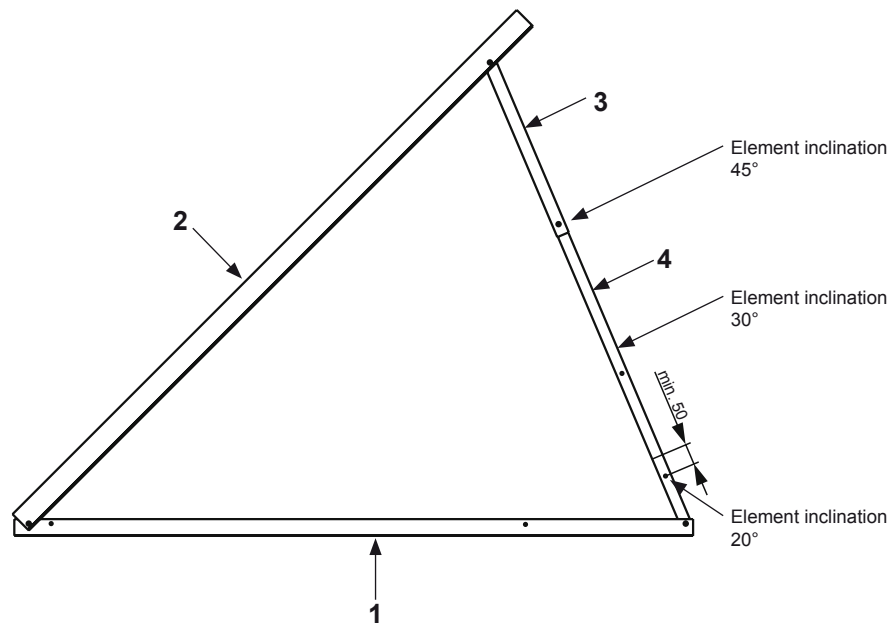
Before assembling the static capability of the roof and/or the wall surface is to be checked and, if required, a structural engineer to be consulted.

Warning

Only authorised experts are permitted to carry out the installation. These experts are responsible for the proper installation.

All screws of the triangle stand in the delivery state are hand-tight. The screws are to be tightened on site such that the screw locking reliability is ensured.

Setting options of the triangle stand

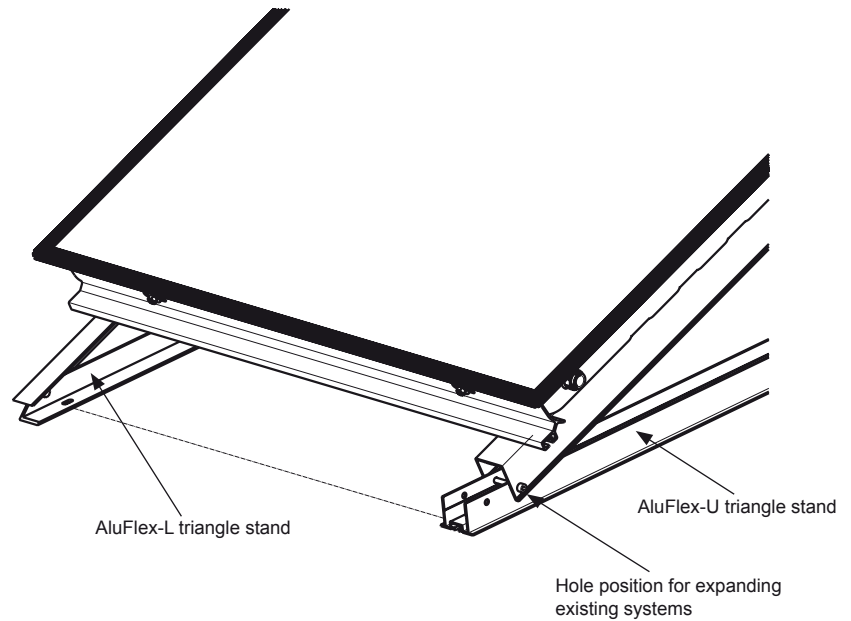


In the delivery state, the triangle stand is pre-mounted. It comprises the *base rail (1)*, *bearing rail (2)*, *upper support rail (3)* and *lower support rail (4)*. The lower support rail has preset holes for setting the inclination angles of 20°, 30° and 45°. The desired inclination angle of the triangle stand is set by inserting the setting screw into the corresponding hole. At the angle setting of 20°, the support rail must be cut to length at least 50 mm above the corresponding setting hole.

Freestanding installation

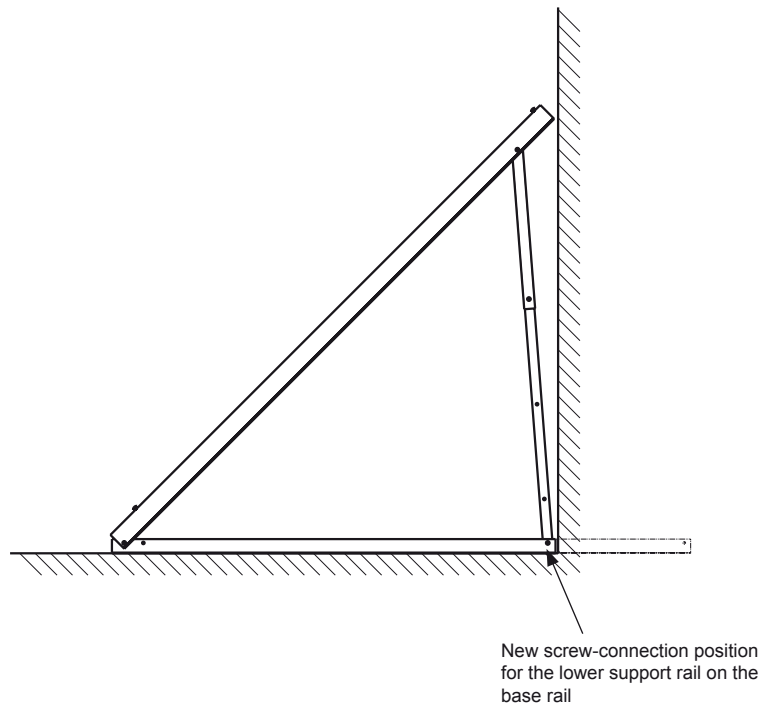
Compatibility with the old design of the triangle stand (AluFlex-L triangle stand)

The screw-connection position of the *bearing rail* on the *base rail* can be adapted using a pre-bored hole to expand existing systems with the old design of installation frames (AluFlex-L).



Installation against a wall

It is also possible to change the screw-connection position of the *lower support rail* on the *base rail* so that the AluFlex-U triangle stand can be mounted directly against a wall during the freestanding installation. The *base rail* must be shortened. Holes for the desired element inclination must be drilled in the *lower support rail* on site.



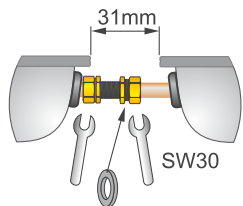
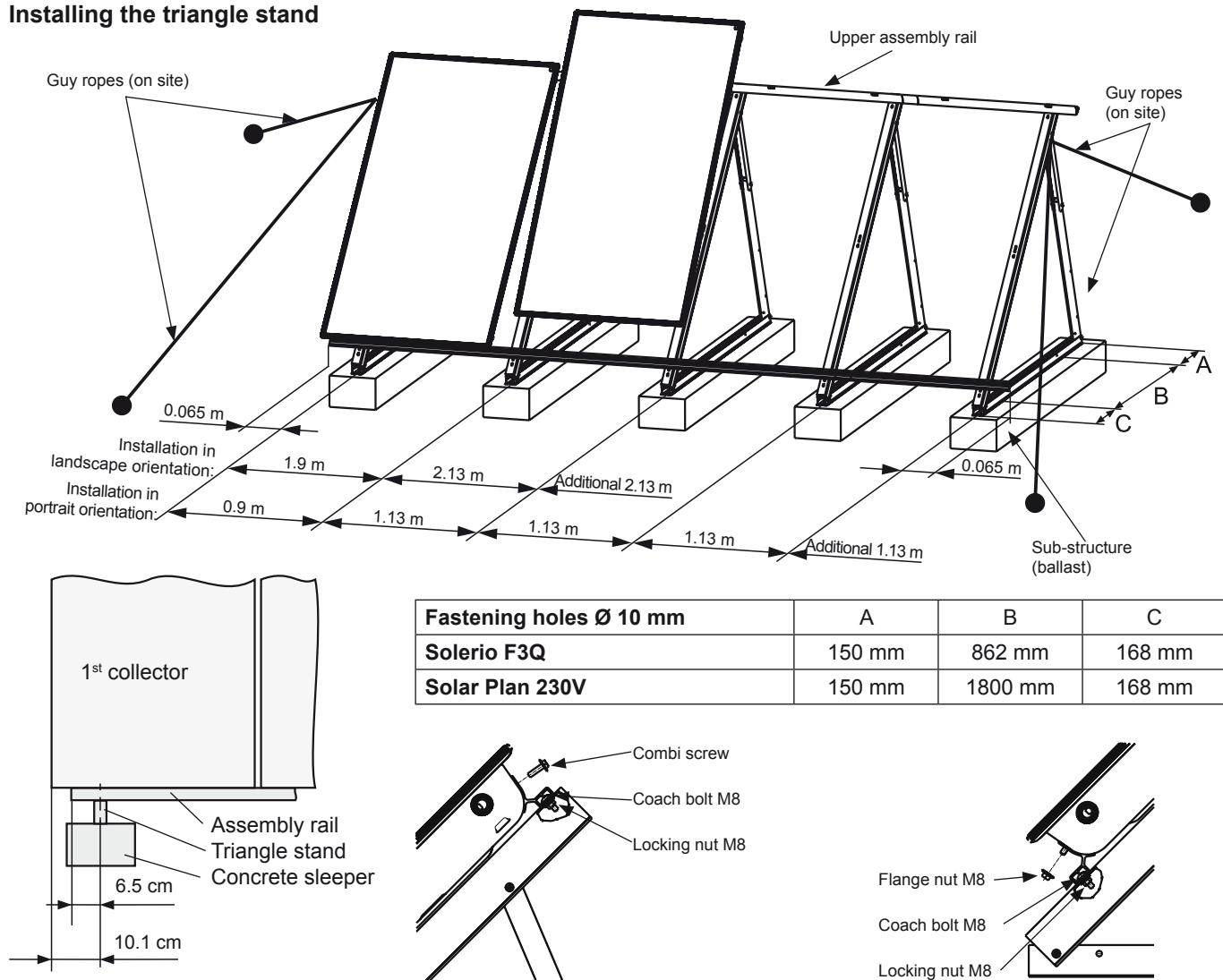
Reference dimensions for determining the collector field width

Warning: without the space required for mounting the pipe connections.

| Collector quantity | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---------------------------------|-----|------|------|------|-------|-------|-------|-------|-------|-------|
| Width [m] portrait orientation | - | 2.23 | 3.36 | 4.49 | 5.62 | 6.75 | 7.88 | 9.01 | 10.14 | 11.27 |
| Width [m] landscape orientation | 2.1 | 4.23 | 6.36 | 8.49 | 10.62 | 12.75 | 14.88 | 17.01 | 19.14 | 21.27 |

Freestanding installation

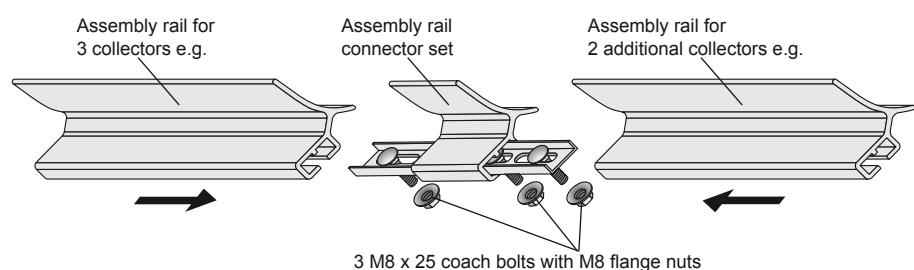
Installing the triangle stand



Warning

- Are the seals available?
 - Maintain proper distance
 - Align the screw connection parts
 - **Hold up** with another open-end spanner.
- Maximum tightening torque 20 Nm

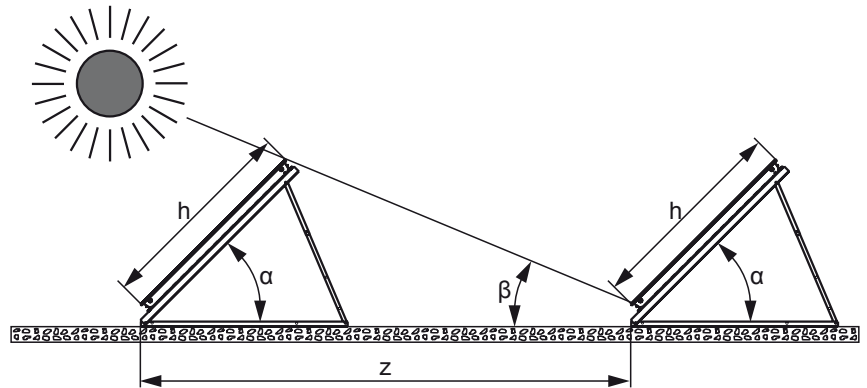
1. Preparation of adequate sub-structure as described in the planning document (e.g. using concrete sleepers) (on site).
2. Screwing the triangle stand to the sub-structure.
Securing the triangle stand using guy ropes if required (on site).
3. Fixing the lower/upper assembly rails on the triangle stand using M8 coach bolts.
4. Inserting the collector and threaded pins into the lower assembly rail as shown in the figure, then securing using M8 locking nuts such that they are hand-tight.
5. Sliding the M8 x 20 combi screws through the upper assembly rail and turning into the collector such that they are hand-tight.
6. Installing other collectors in the same manner.
7. Screwing the connections for supply and return lines. Checking the seals.
8. Tightening all screws and nuts for fixing the collectors.



Freestanding installation

Determining the collector row spacing "z" for freestanding installation

To avoid undesired shading of the collector surface, a specific spacing (dimension z) must be maintained when installing multiple collector rows. The shading angle β in Germany is between 12° (Flensburg) and 20° (Freiburg) depending on the latitude.



$$\frac{z}{h} = \frac{\sin (180^\circ - (\alpha + \beta))}{\sin \beta}$$

z = collector row spacing
h = collector height
 α = collector inclination angle
 β = angle of the sun position

Collector height for the landscape orientation = 1100 mm
Collector height for the portrait orientation = 2105 mm

Example of an installation site in Würzburg:

The latitude of Würzburg is approximately 50.
Angle $\beta = 90^\circ - 23.5^\circ - \text{latitude}$
(23.5° must be assumed as constant)
 $90^\circ - 23.5^\circ - 50^\circ = 16.5^\circ$

Installation in portrait orientation:

TopSon F3 solar collector
h = 2100 mm
Collector inclination $\alpha = 45^\circ$
 $\beta = 16,5^\circ$

$$z = \frac{h \cdot \sin (180^\circ - (\alpha + \beta))}{\sin \beta}$$

$$z = \frac{2100 \text{ mm} \cdot \sin (180^\circ - 61.5^\circ)}{\sin 16.5^\circ}$$

$$z = 6500 \text{ mm}$$

Installation in landscape orientation:

TopSon F3-Q solar collector
h = 1100mm
Collector inclination $\alpha = 45^\circ$
 $\beta = 16,5^\circ$

$$z = \frac{h \cdot \sin (180^\circ - (\alpha + \beta))}{\sin \beta}$$

$$z = \frac{1100 \text{ mm} \cdot \sin (180^\circ - 61.5^\circ)}{\sin 16.5^\circ}$$

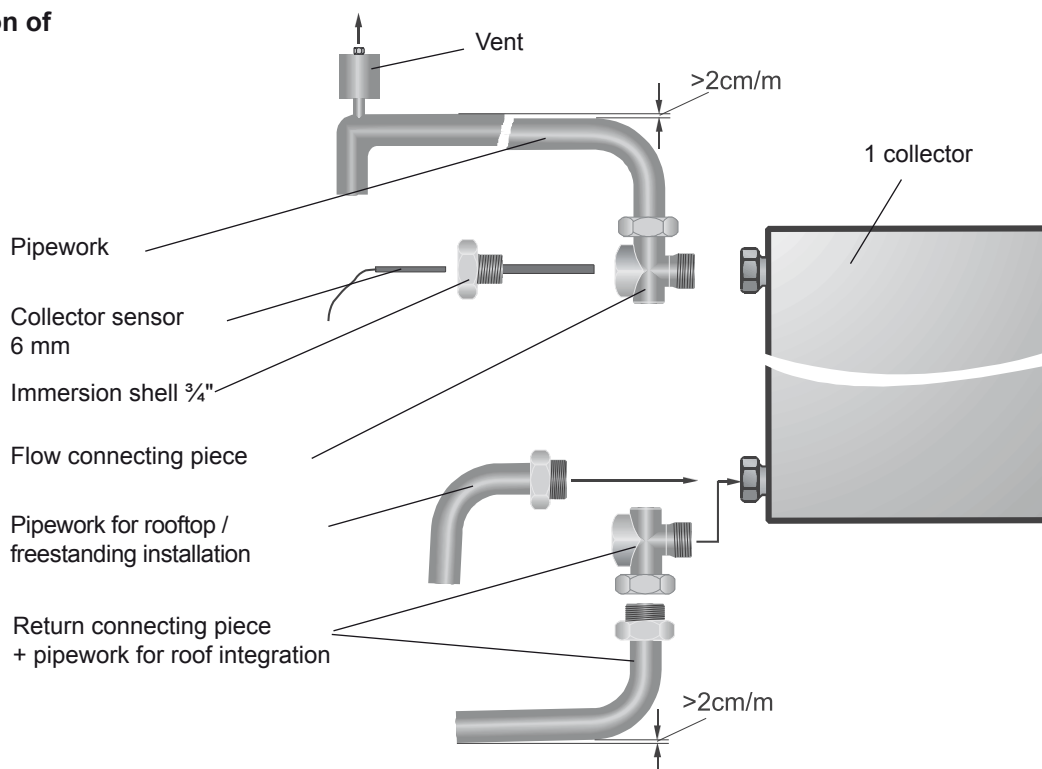
$$z = 3400 \text{ mm}$$

Pipework / filling the system / safety data sheet

Instructions regarding system hydraulics

- The collectors can be connected single-sided (up to 5 collectors next to each other) or alternating diagonally (up to 10 collectors next to each other).
- The pipes reach very high temperatures close to the collectors.
- Only the seals provided may be used.
- Insulating materials must be temperature-resistant ($>175^{\circ}\text{C}$) and must also be UV-resistant and weatherproof in the outdoor area.
- Do not use galvanised pipes, fittings etc.
- Installation of the vents
- Install an automatic vent suitable for solar heating systems at the highest point of each collector field. The shut-off valves of the vents must be manually closed after completely venting the system.

Pipework and installation of the sensor



Filling the system

For flushing and filling the solar heating system we recommend the use of a filling and flushing pump for at least 30 to 60 minutes! Manual venting can then be dispensed with.

Recommendation

In accordance with the technical data, only Tyfocor L ready-to-use mixture is permissible.

Excerpt from the safety data sheet:

| | |
|--|--|
| Trade name: | Tyfocor L heating fluid (ready-to-use mixture, frost protection to -30°C) |
| Company: | TYFOCOR Chemie GmbH, AntonRée-Weg 7, D-20537 Hamburg; Phone: 49 040 20 94 97 0; |
| Emergency information | Fax: 49 040 20 949 7 20; E-mail: info@tyfo.de Tel.: 49 040 20 94 97 0 |
| Chemical characterisation: | 1,2-propylene glycol with corrosion inhibitors, 45 % by vol. mixed with 55 % by vol. drinking water, coloured blue |
| Special hazard information for humans and environment: | not necessary |
| After eye contact: | Rinse out for 15 minutes under running water with eyelids spread |
| After skin contact: | Wash off with soap and water. |
| After swallowing: | Rinse out mouth and drink plenty of water. |
| Transport: | Not a hazardous material within the meaning of the transport regulations |
| Water hazard class: | WHC1; weakly hazardous to water. |

Leak test / commissioning

Leak test



In the case of strong sunlight, the test is to be performed only with the collectors covered over. There is otherwise a danger of being scalded.

For the leak test with Tyfocor L, a 6 bar relief valve and a manometer must be incorporated into the solar pipes.

Test at 5-6 bar over a period of at least 45 minutes.



When testing with water, very small leaks can remain undiscovered because of the higher surface tension.

Testing with air is not permissible. The failure of components under high air pressure can give rise to potentially fatal situations.

Following the leak test or commissioning, the system pressure is lowered to 3.0 bar.

Protection against lightning

The connection of the collector array to an existing or new lightning protection system and the installation of equipotential bonding may only be carried out by an authorised contractor, under consideration of local conditions and in compliance with the following technical rules:

EN 62305 Parts 1-4
VDE 0100 Part 540

Protection against lightning
Selection and erection of electrical equipment - earthing arrangements, protective conductors, equipotential bonding conductors

Start-up

Commissioning is to be carried out in accordance with the checklist.

Requirements:

- Leak test has been carried out.
- System is filled with Tyfocor L. The system pressure in a cold condition is approx. 3 bar. This applies up to a height of 17 m from the collector to the lowest point of the system.
- The entire solar heating circuit has been vented; all shut-off devices and non-return valves are to be opened for complete venting.
- Activate the circulation pump(s) in manual mode; repeat this procedure several times if necessary. Close the non-return valves after venting.
- Controller is ready for operation.

Warning: the respective instructions for the heat exchanger, pump and controller are to be observed separately.

Return of collectors

Used collectors can be returned to the Wolf company. They must be clearly marked and delivered free of charge to the company's office during office hours.

All collector materials are either properly recycled or disposed of by Wolf GmbH.

Packaging

For environmental reasons, please take the polystyrene packaging to suitable recycling collection points.

Dispose of heating liquid, for example, at the recycling centre.

Start-up

See document 'Commissioning protocol for solar collector hot water systems'

Operation / servicing

Operation

- Due to the temperature difference between the outside air and the collector, a thin mist may be generated particularly in the early morning hours. This disappears again as the collector heats up.
- If possible, do not switch the system off electrically during exposure to the sun. After possible steam formation in the case of very high solar yield, the system starts up again automatically after cooling down.
- It is not necessary to switch on the overheating protection function in the controller with flat plate collectors.
- No particular precautions need to be taken if no hot water is needed, for example when on holiday.
- If the system pressure varies strongly, or if Tyfocor L heating fluid escapes from the safety valve, the system must be checked by a specialist.

Servicing

Warning

- Service work may be carried out only by a specialist.
- The high-performance flat plate collectors require little maintenance. An annual inspection and need-based servicing are recommended for the complete system. Therefore, we recommend that you take out a service contract.
- If the system pressure fluctuates or there are loud pump noises, the system must be vented at the highest point.
- The system pressure must be checked.
- Depending upon operating conditions, the heating fluid consisting of 45 % Tyfocor L is to be checked annually in order to prevent decomposition and, hence, damage to the pipework.
- Remove a small quantity of heating fluid at the safety valve or the filling and drain valve
- Check the colour.
- No action is required if coloured blue.
- If coloured brown, perform a pH test. If the pH value is less than pH 7, the entire heating fluid must be exchanged by a specialist.
- Check frost protection
- Frost protection must be ensured in accordance with the climate zone. We recommend the exchange of the heating fluid from frost protection of less than 25 °C.
- Water must not be used to top up in the event of a shortfall. There is otherwise a danger of the loss of frost protection, leading to frost damage to the system in the case of snow and very low temperatures.

Warning

- Heat exchangers and thermostatic mixing valves are to be checked for limescale and function.
- After restarting, the flow rate is to be checked on the flow meter.
- It is recommended to check the control parameters for inadvertent misadjustment.

Servicing:

The following checks and maintenance measures should be performed regularly (once per year):

- Clean the glass surface of the solar collectors.
- Check and, if necessary, replace the seals and connections.
- Check pipe insulation for damage and replace if necessary.
- Check the pressure in the primary circuit.
- Check the freezing point of the heating fluid (preferably at the beginning of winter).
- Check the pH value of the heating fluid (pH reference value 7.5) to prevent corrosion in the primary circuit.

See document 'Servicing instructions for solar collector hot water systems'

Notes

Notes

Product fiche according to Regulation (EU) no. 811-812/2013

Product group: Solar

Product fiche according to Regulation (EU) no. 811/2013

| Supplier's name or trade mark | | | Atlantic International | Atlantic International |
|---|--------------|----------------|--|--|
| Supplier's model identifier | | | Solar Plan 230V | Solerio F3Q |
| Collector aperture area | A_{sol} | m ² | 1,99 | 1,99 |
| Collector efficiency | η_{col} | % | 66 | 63 |
| Energy efficiency class of the solar hot water storage tank | | W | dependent on the DHW storage tank | dependent on the DHW storage tank |
| Standing loss of the solar hot water storage tank | S | | dependent on the DHW storage tank | dependent on the DHW storage tank |
| Storage volume of the solar hot water storage tank | V | L | dependent on the DHW storage tank | dependent on the DHW storage tank |
| Annual non-solar heat contribution | Q_{nonsol} | kWh | dependent on the DHW storage tank and load profile | dependent on the DHW storage tank and load profile |
| Pump power consumption | solpump | W | 25 | 25 |
| Standby power consumption | solstandby | W | 5 | 5 |
| Annual auxiliary electricity consumption | Q_{aux} | kWh | 93,8 | 93,8 |

Product fiche according to Regulation (EU) no. 812/2013

| Supplier's name or trade mark | | | Atlantic International | Atlantic International |
|--|--------------|----------------|--|--|
| Supplier's model identifier | | | Solar Plan 230V | Solerio F3Q |
| Collector aperture area | A_{sol} | m ² | 1,99 | 1,99 |
| Zero-loss efficiency | η_0 | % | 0,804 | 0,794 |
| First-order coefficient | a_1 | W | 3,24 | 3,49 |
| Second-order coefficient | a_2 | | 0,012 | 0,015 |
| Incidence angle modifier | IAM | L | 0,94 | 0,95 |
| Storage volume | V | kWh | dependent on the DHW storage tank | dependent on the DHW storage tank |
| Load profile | | W | dependent on the DHW storage tank | dependent on the DHW storage tank |
| Annual non-solar heat contribution | Q_{nonsol} | W | dependent on the DHW storage tank and load profile | dependent on the DHW storage tank and load profile |
| Pump power consumption | solpump | kWh | 25 | 25 |
| Standby power consumption | solstandby | | 5 | 5 |
| Annual auxiliary electricity consumption | Q_{aux} | | 93,8 | 93,8 |

