

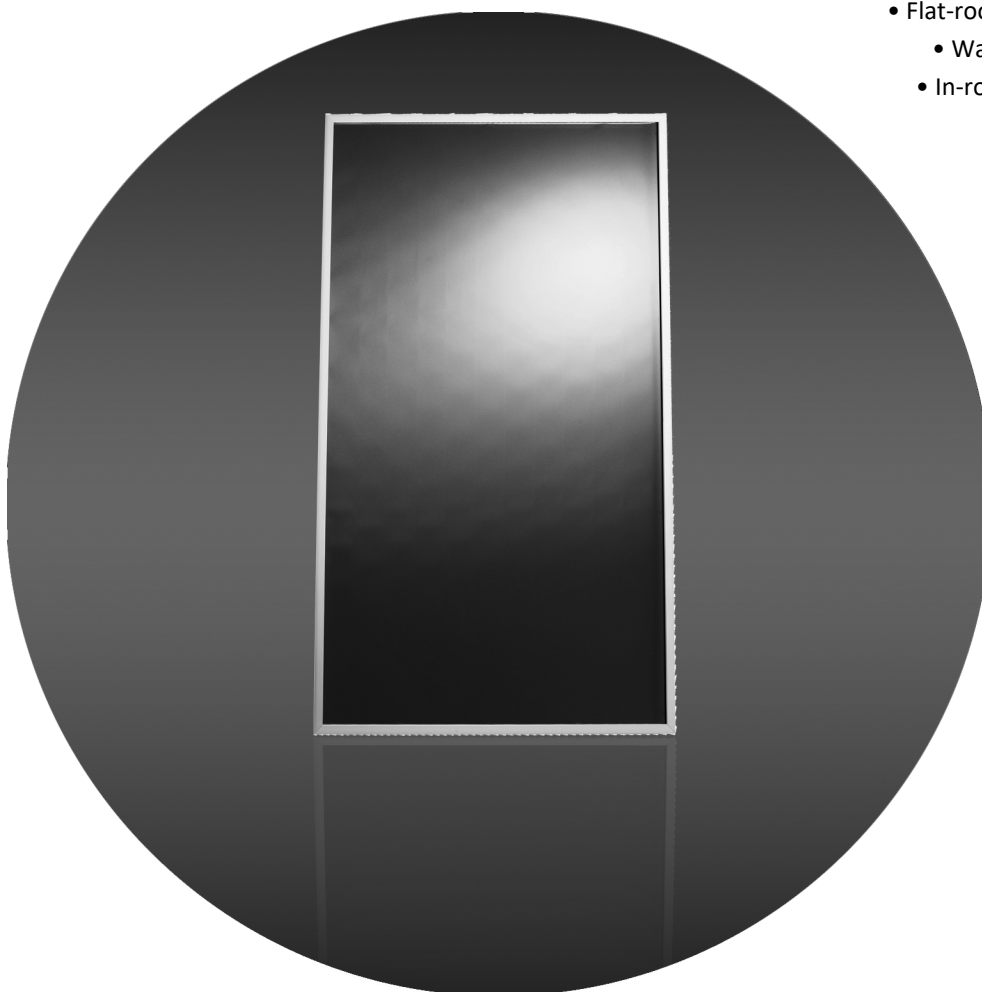
Installation

SolvisCala 254

The compact collectors C-254-C and C-254-E

For the mounting types:

- Roof-mount. (slope: 20° – 60°)
- Flat-roof (slope: 30° – 60°)
 - Wall (slope: 45° – 90°)
- In-roof (from 22° slope)



1 Information About These Instructions

These instructions are intended for you as a technician from an installation company. You will find the specifications for installation, start-up and maintenance of the system here.

Please keep these instructions with the system so they can be referred to when necessary.

We recommend that you participate in a Solvis training course to ensure safe and proper installation.

As we are interested in improving our technical documentation, we appreciate feedback of any kind.

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A list of our international representatives is provided at www.solvis.com.

Please understand that the telephone numbers are reserved for use by our installers.

Interested system operators should contact their installer.

Symbols used



DANGER

Immediate danger, with serious health consequences and even death.



WARNING

Danger, with potentially serious health consequences.



CAUTION

Possible risk of moderate or light injury.



CAUTION

Risk of damage to unit or system.



Useful information, notes and work tips.



Change of document, referring to another document.



Energy-saving tip with suggestions on how to save energy. This reduces costs and helps protect the environment.

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2 Notes

2.1 Safety Notes



DANGER

Observe the safety notes

This is primarily for your own safety.

- Make sure that you are familiar with the safety notes before beginning work.
- Observe and adhere to the applicable safety regulations and accident prevention regulations.



CAUTION

Country-specific regulations

Regulations can differ depending on the country and the region.

- These are to be observed and adhered to in order to ensure safe and faultless operation.
- If certain laws and regulations do not apply in a particular country, they are to be replaced by the country's own specific laws and regulations.

2.1.1 General Information



DANGER

Note the following in the vicinity of live overhead electric cables:

Touching the overhead cables or a flashover may cause burns or cardiac arrest.

- When working in the vicinity of overhead electric cables, observe the safety clearances.
- Refer to the Employers' Liability Insurance Association (German: "Berufsgenossenschaft") guidelines for safety and health at work to find out the applicable safety clearances and further measures.



WARNUNG

Burn hazard when there is direct sunlight

Fluid that remains in the collector or steam released from the collector can cause scalding. Touching hot connections may cause burns.

- Perform work on the collectors only when the sun is not shining or when the collectors are covered.
- Remove the sun protection only after the (re-) commissioning of the solar plant.



CAUTION

Do not make any unauthorised modifications

Otherwise, there is no guarantee that the system will function correctly.

- You must not make any changes to the components of the unit.
- Only use original spare parts.



CAUTION

Lower side of the collector is hot

This may damage the components below the collector.

- Materials that come into contact with the rear side of the collector must be able to withstand temperatures up to 120 °C.
- Otherwise, they must be spatially and thermally separated from the rear side of the collector.



CAUTION

Observe instructions

Solvis is not liable for any damage resulting from non-observance of these instructions.

- Read the instructions carefully before operating or installing the system.
- Contact our Technical Sales department if you have any questions.



WARNING

Read before working on roof

Injury hazard

- Check the local conditions and construction requirements carefully before beginning the installation. Employ a structural engineer for advice if necessary.
- For roof-mounted installations, you must construct a collective non-personal fall prevention or fall arrest system in accordance with DIN 18338 (roofing and roof sealing work) and DIN 18451 (scaffolding work with safety nets).
- If, for technical reasons, a collective non-personal fall prevention system is not available, safety harnesses must be used.
- Use only tested and recommended safety harnesses: safety belts, lanyards or straps, shock absorbers, fall arresters. Attach safety harnesses only to load-bearing structures and/or fixing points.
- In addition to protecting those participating in the construction project, uninvolved third parties must also be protected from falling objects.
- The use of normal non-secured ladders can cause accidents if the ladder sinks in, slides or falls over. Do not use damaged ladders. Ensure that the ladder is at the correct angle; between 68 and 75°. Secure all ladders.
- Wear safety gloves, a helmet and safety boots during installation. Also wear protective goggles when drilling or grinding.
- Protect against moisture and dampness during electrical installation.



Work to be performed by qualified technicians

- Only trained specialist companies may install or maintain the system.
- Only qualified electricians may work on electrical equipment.

Intended use

The solar collectors are intended only for indirect heating of drinking water and for heating support and must be operated with appropriately sized heat exchangers between the closed solar circuit and heat consumer.

Operating these collectors for any other purpose is prohibited. Exceptions require express written approval or a statement from the manufacturer in advance.

The warranty is voided if:

- The components supplied are subject to improper use or modified without permission,
- The installation instructions are not properly observed during installation,
- The structural requirements regarding the snow and wind loads are not observed.

Disclaimer

The manufacturer accepts no liability for any damage that occurs as a result improper, incomplete or false information.

2.1.2 Regulations

Specifications, standards and guidelines must be applied as implemented in the country in question.

The following specifications and guidelines are to be observed:

Regulatory provisions

- Statutory specifications for preventing accidents
- Statutory specifications for environment protection
- Specifications of professional associations
- GEG Building Energy Act

Standards and guidelines

- Safety regulations of the DIN, EN and VDE

Installation on roofs

- DGUV Rule 201-054: Roofing, carpentry and woodwork
- DIN 18338 Roofing work

- DIN 18339 Sheet metal roofing and wall covering work
- DIN 18451 Scaffolding works
- DIN EN 1995 Design of timber structures
- DIN EN 1991 Actions on structures

Connection of solar thermal systems

- EN 12975 Thermal solar systems and components – Solar collectors
- EN 12976 Thermal solar systems and components – Factory made systems
- EN 12977 Thermal solar systems and components – Custom built systems
- EN ISO 9488 Thermal solar systems and components – Terminology
- VDI 6002 Solar drinking water heating
- DIN EN 1044 Brazing

General Conditions for Water Supply, DVGW worksheet

- W551, W552 Technical Measures for Preventing Growth of Legionella

Installation and Equipment of Water Heaters

- DIN 18380 Heating of water for domestic and heating purposes – Leak testing
- DIN 18381 Gas, water and waste water installation work
- DIN 18421 Insulation of service installations
- DIN 1988 Codes of practice for drinking water installations
- EN 1717 Protection against pollution of potable water installations
- DIN 4753/EN 12897 Water heaters, water heating installations for drinking and service water; requirements, labelling, equipment and inspection

Electrical connection

- VDE 0100 Selection and erection of electrical equipment – Earthing arrangements and protective conductors
- VDE 0185 General notes on erection of lightning protection systems
- DIN EN 62305 Lightning protection of physical structures – Part 1: General principles
- VDE 0100-540 Main potential equalisation of electrical systems

2.2 Preventing Damage

2.2.1 Roof Construction



CAUTION

Failure to observe will void all warranty claims.

- You must ensure that the roof sub-structure is in perfect condition (structural analysis).
- Specifications for load-bearing structures assume that snow can slide off of the roof unhindered (no snow guards, dormer windows or similar fixtures underneath the collectors).
- If the distance above the solar system to the roof ridge is longer than 3 m and the roof slope is greater than 30°, we recommend placing snow guards above the solar system.
- The roof surface cannot have any height differential greater than 0.3 m, and it must not be shaped in any way that would allow snow to pile up.
- Possible solutions are to be implemented on-site.

Selection and dimensioning of the appropriate mounting material must be based on a static calculation. The local conditions (wind and snow load, building height, height above sea level, installation angle, etc.) must be included.

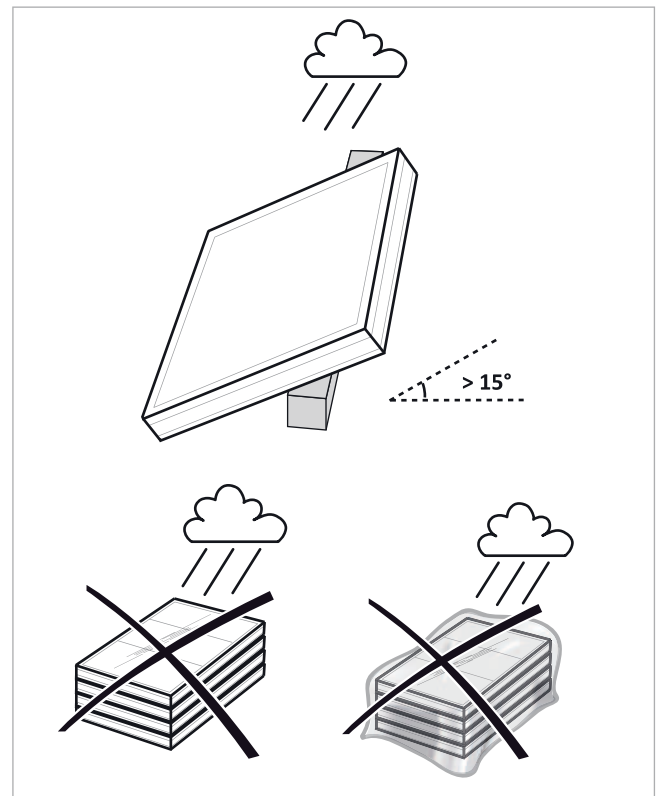


Fig. 1: Storing the SolvisCala outdoors

2.2.2 Collector in general

Transporting the collectors

The collector connections must not be subjected to load. Always use the Solvis collector installation grip to transport the collectors properly. Observe the instruction sheet for the installation grip.

Collector storage

If stored temporarily after delivery, the collector must be protected from moisture and frost. Either store it in a sheltered space or outside at a minimum slope of 15°.



CAUTION

The SolvisCala must not be stored horizontally outdoors

Moisture can otherwise penetrate the collector and cause damage

- Storage angle: > 15°.



CAUTION

Risk of corrosion

- Do not install the solar system on copper roofs or underneath copper components.



CAUTION

Risk of deposits

- Once the collector has been previously filled with solar liquid, it may not be exposed to sunlight when empty.



CAUTION

When filling the solar circuit:

- Fill only with original Tyfocor LS-rot ready-mixed heat transfer fluid and flush.
- Using other types of heat transfer fluid in this system is prohibited because it may damage the solar circuit components.
- Use only the Füll-Jet unit to flush and fill the system (please order separately).

2.2.3 Solar glass pane (anti-reflective glass)



CAUTION

Observe with regard to anti-reflective glass

Otherwise damage may result

- Handle with care Anti-reflective glass is treated with a special, delicate surface coating that increases its transparency.
- Leave minor soiling untreated. You have no influence on the effectiveness of the collector. Otherwise the pollutant may be ground into the surface or damage the surface coating.

Notes on handling

- Avoid leaving fingerprints. Handle the sheets only with clean, soft (cotton) gloves (no leather gloves)
- Handle anti-reflective glass sheets only around the edges
- Do not set glass panes down on the sharp edge
- Do not expose the glass panes to uneven pressure
- Preferably use glass lifters
- Prevent soiling: keep clean all objects and surfaces that come in contact with the sheets (such as storage areas, glass lifters, tools)
- Avoid contact with substances such as silicone, oil and other lubricants as well as other mineral substances such as cement and mortar
- Avoid letting rain from façades (especially with mineral coatings) run off onto the collector
- Store sheets in a dry place protected from rain and from freezing

Notes on cleaning

- Clean anti-reflective glass sheets carefully and without pressing using only a microfibre cloth
- Use only glass cleaner or isopropyl alcohol for cleaning
- Do not use aggressive, scouring or chemical cleaning substances
- No mechanical cleaning: do not use abrasive sponges, steel wool, or scrapers

2.3 Overvoltage Protection

Lightning protection

Clarify if a lightning arrester is required according to building legislation. In addition, the planner or insurance company may require that lightning protection be installed. Take this into account accordingly.



CAUTION

Observe the following for lightning protection devices

- The layout and installation of lightning protection devices should be carried out by suitably qualified technicians only, in accordance with the recognised technical regulations.
- Observe the general principles of the DIN EN 62305 lightning protection standard.

External lightning protection

External lightning protection comprises interception devices, conductors and ground electrodes.

If a lightning protection system is in place, the planner checks if and how (separation distance) the planned solar system can be positioned within the interception devices.

This applies in particular:

- If an external lightning protection system is required
- If additional lightning protection is required for solar systems which are elevated in an exposed location on public buildings (e.g. if the building becomes significantly taller as a result).

Internal lightning protection

The internal lightning protection comprises equipotential bonding and overvoltage protection for electrical devices. There must always be a connection between the equipotential bonding of the house and the solar circuit piping (solar flow and solar return); the cross section of the connection must be a minimum of 6 mm².



Even if no lightning protection is needed, you should at least install a lightning protection box (as close to the sensor as possible) to protect the collector sensor against overvoltage.



CAUTION

Please note the following with regard to lightning protection

Note that even a lightning protection system that fulfils all standards cannot guarantee complete protection against damage caused by lightning.

2.4 Dimensions

The collector spacing must be observed when connecting the collector connectors. Measurements are performed on the base (foot) of the collector.

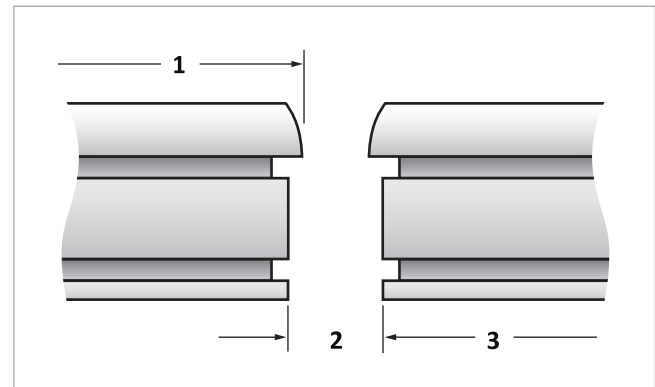


Fig. 2: The horizontal and vertical mounting clearance for collectors is measured at the base (foot) of the collector.

- 1 Head measurement (length and width at the top)
- 2 Clearance (horizontal and vertical at the bottom)
- 3 Foot measurement (length and width at the bottom)

Collector dimensions and clearances

Designation	C-254-C	C-254-E
Length (Head measurement)	2176	2168
Length (Foot measurement)	2168	
Width (Head measurement)	1176	1168
Width (Foot measurement)	1168	
Horizontal clearance	30*	30
Vertical clearance (transversal mounting)	30*	30
Vertical clearance (vertical mounting)	180*	180

All dimensions in [mm]

* (Foot measurement)

2.5 Orientation



CAUTION

Avoid excessively high temperature loads.

Otherwise, there may be damage to the solar system.

- The lower edge of the collector field **must not** be below the upper edge of the SolvisMax!

A solar system generates a maximum yield when it is facing due south. The recommended slope angle α of the collector in relation to horizontal depends on the type of installation, and is between:

- **Roof-mounted** 20° to 60°
- **Flat-roof** 30° to 60°
- **Wall** 45° to 90° . With additional cover on-site when 60° or more. Only 3 m above ground level when 75° or more.
- **in-roof** from 22°



In-roof installation possible only for C-254-C



CAUTION

avoid slope angles smaller than 20° vermeiden

Otherwise losses in the solar yield or damage caused by condensation in the collector are possible.

- Slope angles should always be greater than 20° .
- For small slope angles (20° to 30°) , an increased amount of condensate in the collector must be expected

Mounting orientation

Depending on your needs, the mounting orientation of the SolvisCala collectors can be upright (vertical) or crosswise (horizontal) for roof-mounted installation or installation on flat roof holders. In the case of vertical wall-mounted installation (90°) and in-roof installation (only possible for the C-254-C), the collectors can only be mounted upright; otherwise, penetrating rain water may cause irreparable damage.

2.6 Tile Heights for In-Roof Installation

In order to guarantee a sufficient slope for the lower connection to the roofing, the → table "Permitted tile heights" lists the maximum tile height depending on the roof slope .

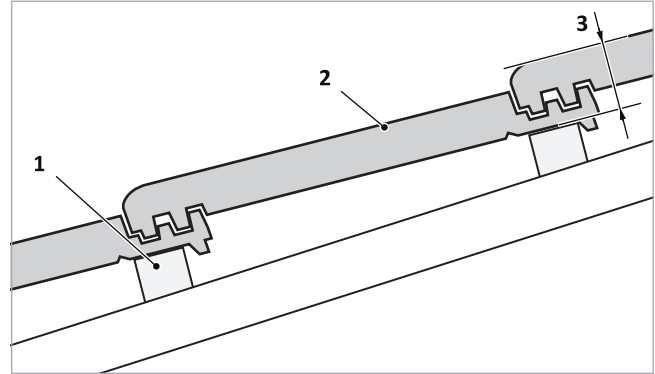


Fig. 3: Measuring the tile height

- 1 Batten
- 2 Tile
- 3 Tile height



Measure the height of the roofing tile at the upper bearing point of the tile from the upper edge of the batten to the upper edge of the tile.



Contact our Technical Sales department if you have any questions.

Permitted tile heights

Roof slope		Tile height
[°]	[%]	[mm]
22	40	Up to 20
24	45	Up to 25
26	49	Up to 30
28	53	Up to 35
32	62	Up to 40
36	73	Up to 45
38	78	Up to 50
42	90	Up to 55
44	97	Up to 60
48	111	Up to 65
52	128	Up to 70
54	138	Up to 75
58	160	Up to 80

2.7 Roof-Mounted, Flat-Roof and Wall-Mounted Installation

2.7.1 Installing the Holding Rails

Collectors are mounted on holding rails for roof-mounted, flat-roof, or wall-mounted installation. There are different combinations of pairs of holding rails available depending on the number of collectors connected in succession (see figure). They are screwed together on-site and mounted to the roof-mount frames or flat roof holders.

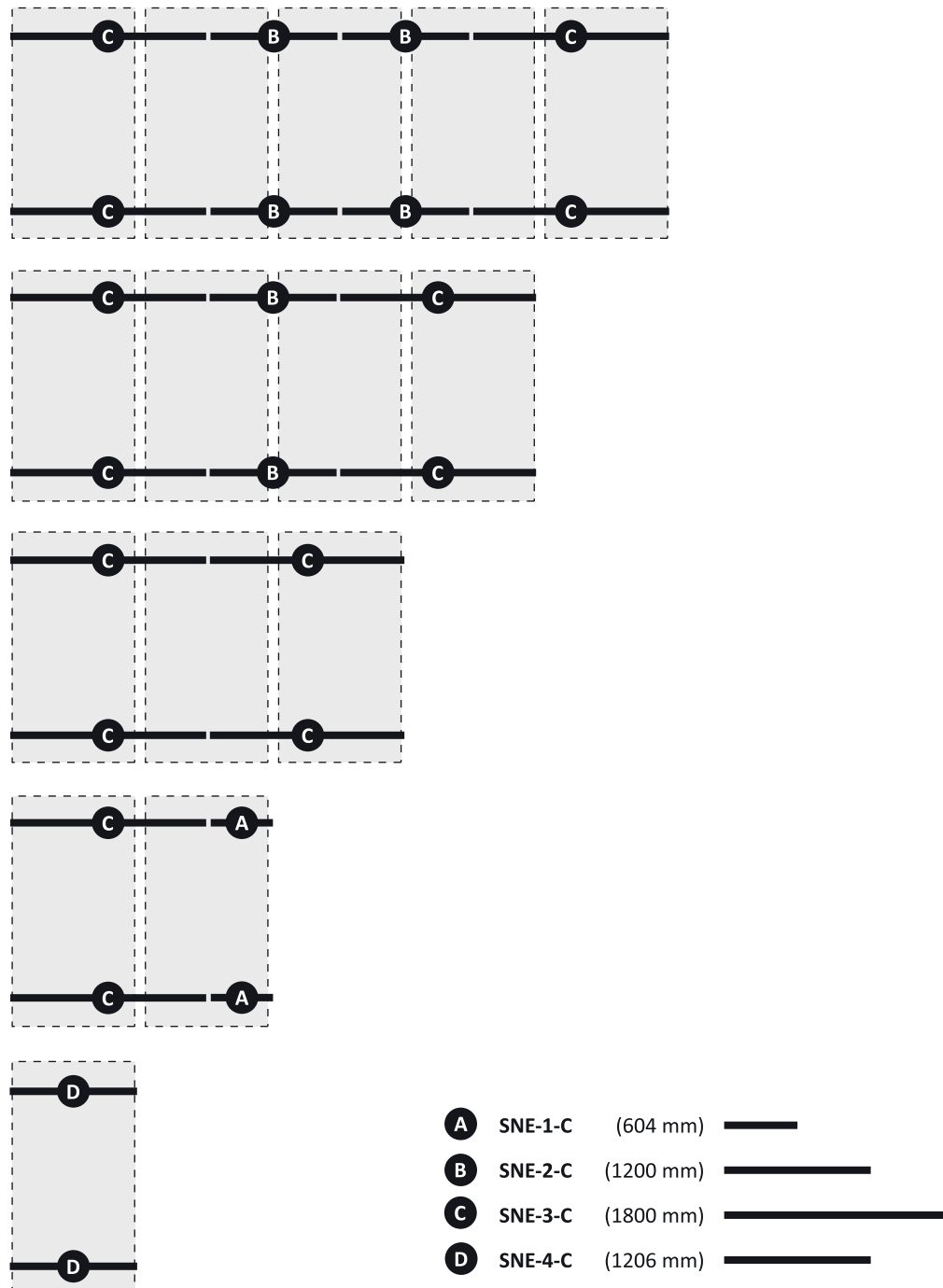


Fig. 4: Combination of pairs of holding rails

2 Notes

Holding rail assembly

Assemble the holding rails at ground level before mounting the collectors on the roof.

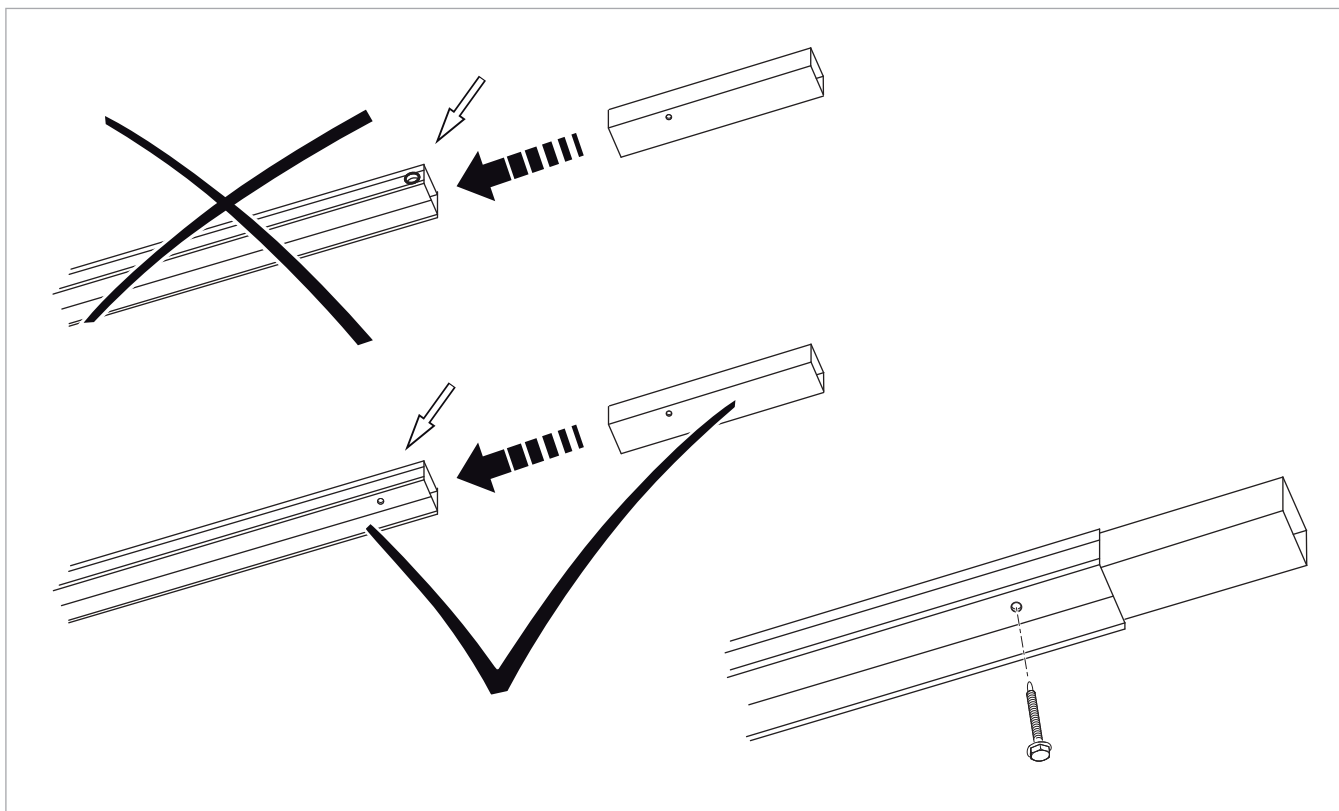


Fig. 5: Installing a connector

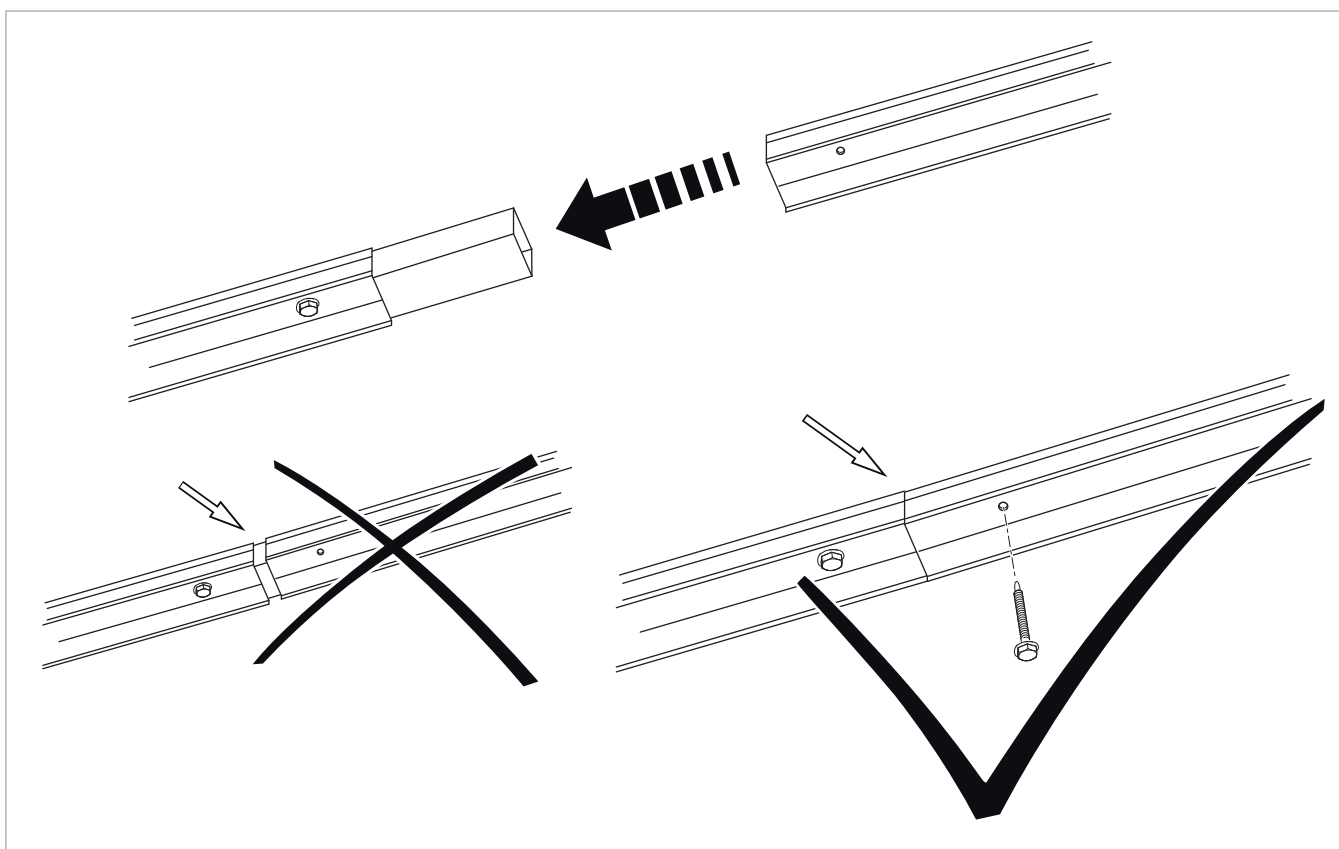


Fig. 6: Installing additional holding rails

2.7.2 Effects of Shadowing on Flat-Roof or Wall-Mounted Installations

Shadowing

Any shadow on the collector surface area reduces the solar yield and should be avoided whenever possible.

Shadows may also be cast by tall buildings, chimneys, dormer windows, tall trees, etc.

With flat-roof installation, it is also important to maintain sufficient spacing to prevent the adjacent collectors from casting shadows on one another.

Using the figures and the tables, you can calculate the spacing between the flat roof holders when taking shadowing into account:

- You can find the latitude of your location using → Fig. 7.
- The table shows the correct spacing given the latitude and the slope angle.

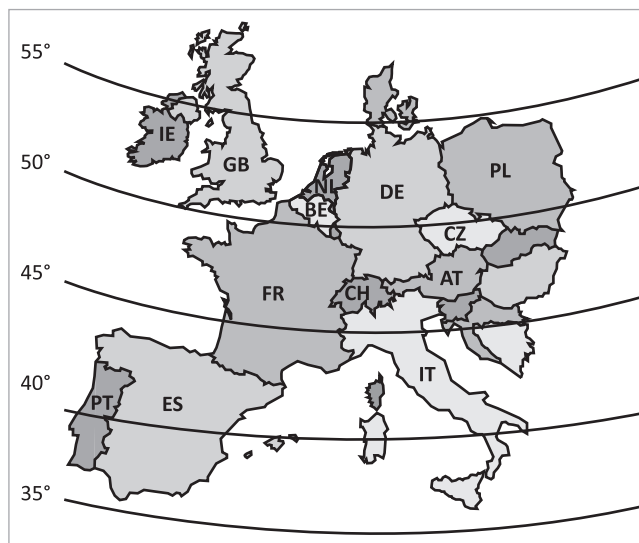


Fig. 7: Latitudes in Europe

Spacing depending on latitude (vertical installation)

Latitude	Flat roof mounted Installation						Wall-mounted Installation			
	Spacing In [m] for the slope angle						Spacing In [m] for the slope angle			
	30°		45°		60°		45°		60°	
	Measurement a	Measurement b	Measurement a	Measurement b	Measurement a	Measurement b	Measurement c	Measurement d	Measurement c	Measurement d
55	5.34	9.12	7.56	10.64	9.25	11.43	2.51	5.59	1.77	5.53
54	4.90	8.68	6.93	10.01	8.49	10.67	2.61	5.69	1.85	5.61
52	4.20	7.98	5.94	9.02	7.28	9.46	2.83	5.91	2.00	5.76
50	3.67	7.45	5.19	8.27	6.36	8.54	3.08	6.16	2.18	5.94
48	3.25	7.03	4.58	7.64	5.63	7.81	3.37	6.45	2.39	6.15
46	2.91	6.69	4.11	7.19	5.04	7.22	3.71	6.79	2.62	6.38
44	2.62	6.40	3.71	6.79	4.54	6.72	4.11	7.19	2.91	6.67
42	2.38	6.16	3.37	6.45	4.12	6.30	4.59	7.67	3.25	7.01
40	2.18	5.96	3.08	6.16	3.78	5.96	5.19	8.27	3.67	7.43
38	2.00	5.78	2.83	5.91	3.47	5.65	5.94	9.02	4.20	7.96
36	1.84	5.62	2.61	5.69	3.20	5.38	6.93	10.01	4.90	8.66

Spacing depending on latitude (horizontal installation)

Latitude	Flat roof mounted Installation						Wall-mounted Installation			
	Spacing In [m] for the slope angle						Spacing In [m] for the slope angle			
	30°		45°		60°		45°		60°	
	Measurement a	Measurement b	Measurement a	Measurement b	Measurement a	Measurement b	Measurement c	Measurement d	Measurement c	Measurement d
55	2.89	4.92	4.08	5.74	5.00	6.17	1.35	2.52	0.96	2.13
54	2.65	4.68	3.74	5.40	4.59	5.76	1.41	2.58	1.00	2.17
52	2.27	4.30	3.21	4.87	3.93	5.10	1.53	2.70	1.08	2.25
50	1.98	4.01	2.80	4.46	3.43	4.60	1.67	2.84	1.18	2.35
48	1.75	3.78	2.48	4.14	3.04	4.21	1.82	2.99	1.29	2.46
46	1.57	3.60	2.22	3.88	2.72	3.89	2.00	3.17	1.42	2.59
44	1.42	3.45	2.00	3.66	2.45	3.62	2.22	3.39	1.57	2.74
42	1.29	3.32	1.82	3.48	2.23	3.40	2.48	3.65	1.75	2.92
40	2.03	4.06	1.67	3.33	2.04	3.21	2.80	3.97	1.98	3.15
38	1.18	3.21	1.53	3.19	1.87	3.04	3.21	4.38	2.27	3.44
36	1.08	3.11	1.41	3.07	1.73	2.90	3.74	4.91	2.65	3.82

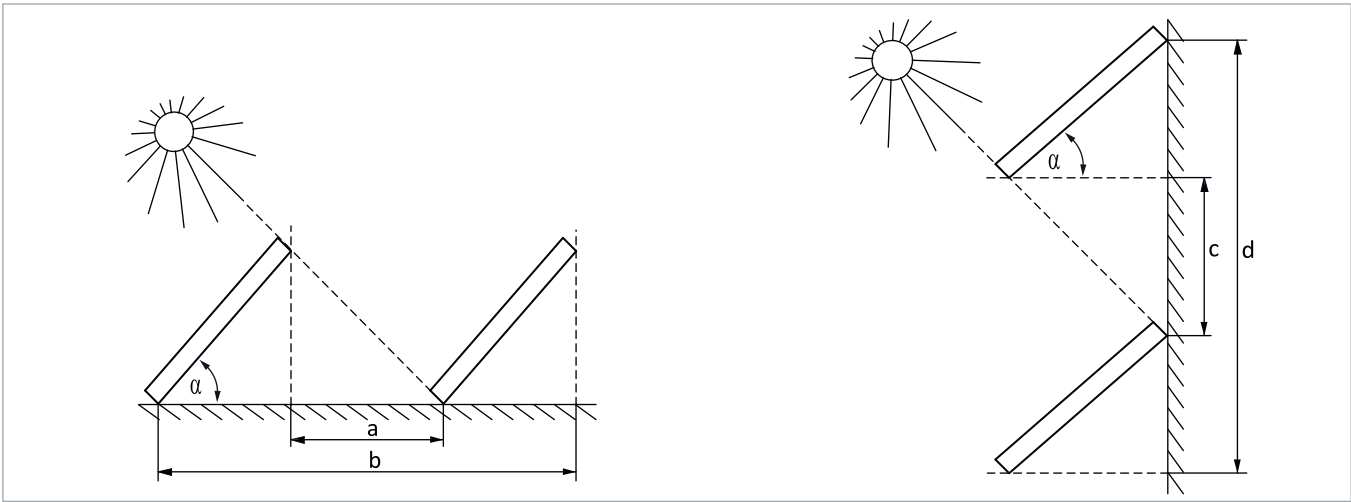


Fig. 8: Spacing and angles determined by shadowing

3 Hydraulics

Collectors of the type SolvisCala have the following properties:

- No bleeder necessary
- Minimal work required for piping
- Can be installed horizontally or vertically
- Can be turned through 180°.

The collector sensor must be ordered separately and is mounted directly on the collector output at the flow.



CAUTION

Longitudinal thermal expansion

Leaks may arise due to material expansion/contraction.

- Install only flexible connection lines in the collector field.
- Recommendation: Use the connection sets and connectors offered.



In terms of stagnation, the collectors drain more quickly and there is less of a thermal load on the solar liquid if the following points are followed:

- Solar lines are permitted to run only below the collector connections.
- Always run the solar lines down from the collector connections.
- The flowthrough of horizontally arranged SolvisCala-type collectors should be from bottom to top.

3.1 SolvisCala 254 Control

The optimised absorber hydraulics with double meander allows up to six collectors to be connected in series. The SolvisCala 254 Control can be combined with three pipe diameters (12, 15 and 18 mm). This allows optimum degrees of efficiency to be achieved for each system.

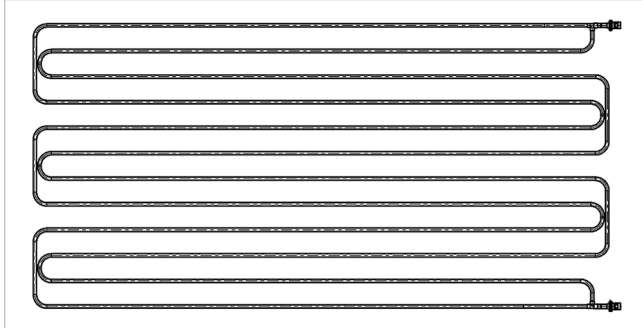


Fig. 9: Hydraulic diagram for SolvisCala 254 Control

Required pipe diameters

Depending on the size of the solar circuit, quick-fit duct SMR-12 or SMR-15 or, in certain cases, 18-mm copper tubing may be suitable. Please direct any questions to our technical sales team. In third-party systems, we recommend using bleeders at suitable points.

Required components for series connection

For wiring of 5 collectors:

- 5 x collectors (C-254-C) and an installation kit, depending on the installation type
- 4 x collector connector VB-C-N-12
- 1 x flexible connection pipe set, e.g. ROS-12-FLX
- 1 x connection set ASS-SEN-12-C-F
- 1 x BLS-SEN lightning protection box

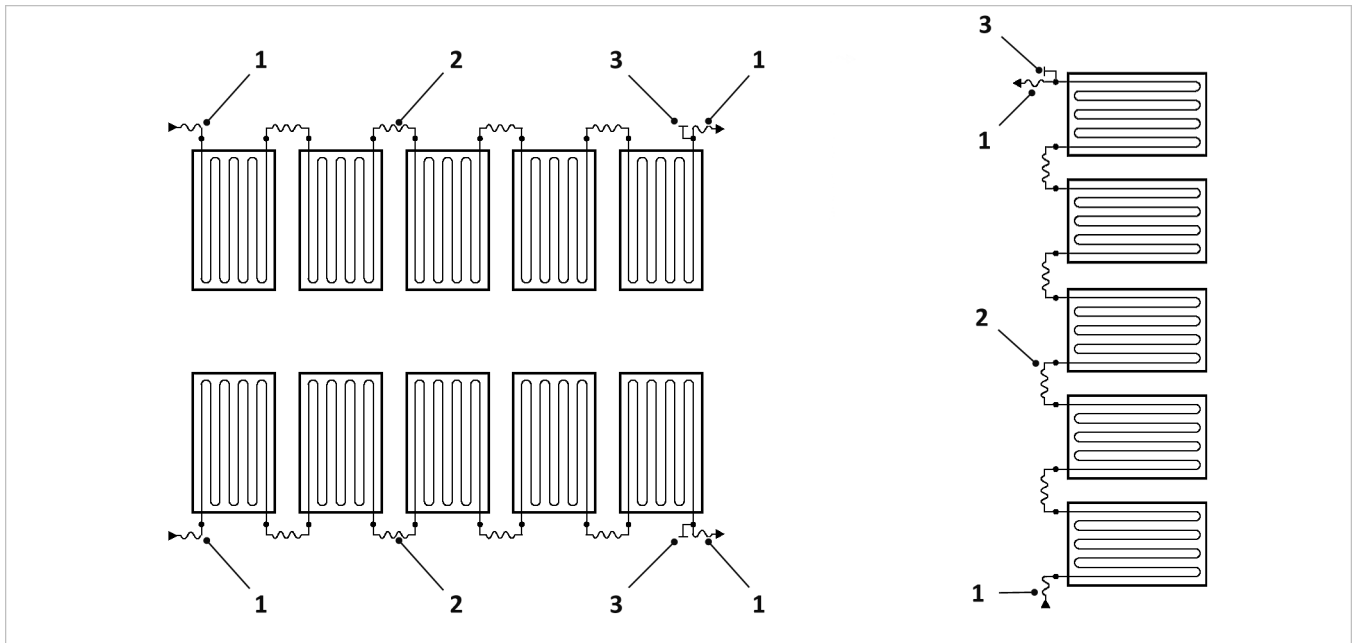


Fig. 10: SolvisCala 254 Control, horizontal and vertical series connection

1 ROS-12-FLX

2 VB-C-N-12

3 ASS-SEN-12-C/F with BLS-SEN

3.2 SolvisCala 254 Eco

The single meander of the SolvisCala 254 Eco allows series connection of up to four collectors, depending on the solar pump and size of the solar circuit. Up to 3 SolvisCala Eco units may be connected in series with the SÜS 5.5. If more collector surface area is desired (systems with SÜS-Max), parallel connection of 2x3 collectors is possible.

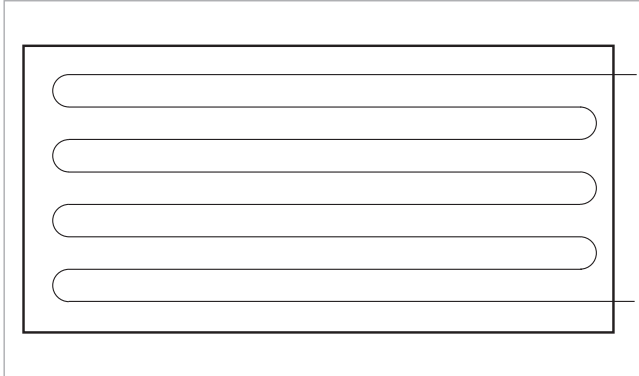


Fig. 11: Hydraulic diagram for SolvisCala 254 Eco

Required components for series connection

For wiring of 3 collectors:

- 3 x collectors (C-254-E) and an installation kit, depending on the installation type
- 2 x VB-CE collector connectors
- 1 x flexible connection pipe set, e.g. ROS-12-FLX
- 1 x connection set ASS-SEN-12-CE
- 1 x BLS-SEN lightning protection box

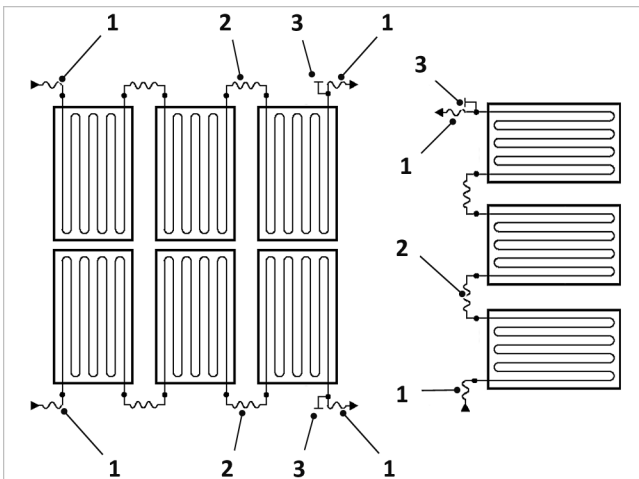


Fig. 12: SolvisCala 254 Eco, horizontal and vertical series connection

- 1 ROS-12-FLX
- 2 VB-CE
- 3 ASS-SEN-12-CE with BLS-SEN

Required components for series connection

For wiring of 4 collectors:

- 4 x collectors (C-254-E) and an installation kit, depending on the installation type
- 3 x VB-CE collector connectors
- 1 x flexible connection pipe set, e.g. ROS-12-FLX
- 1 x connection set ASS-SEN-12-CE
- 1 x BLS-SEN lightning protection box

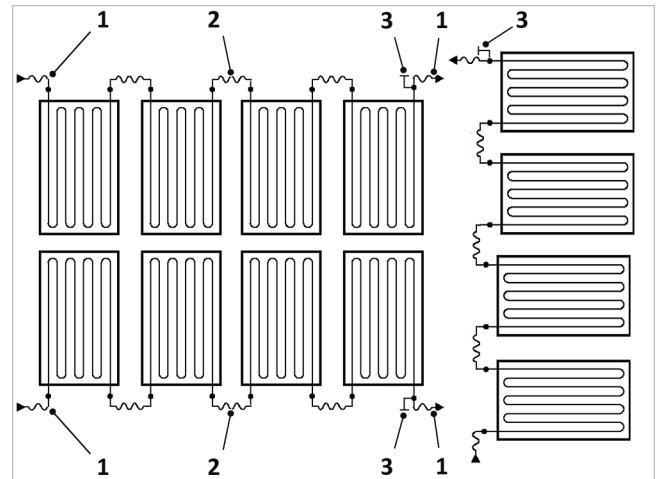


Fig. 13: SolvisCala 254 Eco, horizontal and vertical series connection

- 1 ROS-12-FLX
- 2 VB-CE
- 3 ASS-SEN-12-CE with BLS-SEN

Required components for parallel connection

For wiring of 6 collectors:

- 6 x collectors (C-254-E) and an installation kit, depending on the installation type
- and as follows for horizontal and vertical installation:

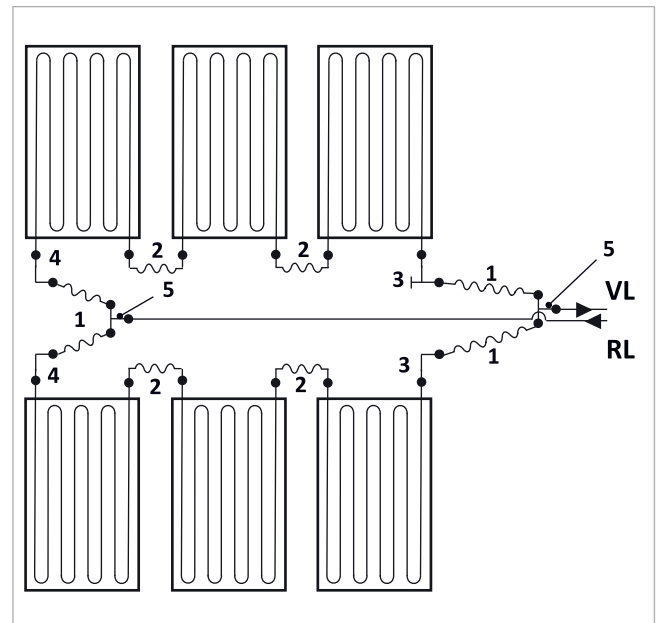


Fig. 14: SolvisCala 254 Eco, parallel connection for vertical installation

- 1 flexible connection pipe set ROS-12-FLX (2 pieces)
- 2 Collector connector VB-CE (4 pieces)
- 3 Connection set ASS-SEN-12-CE with lightning protection box BLS-SEN
- 4 Connection angle set ASS-CE
- 5 Parallel connection kit VB-SMR-12-P

Required pipe diameters

Depending on the size of the solar circuit, quick-fit duct SMR-12 or SMR-15 or, in certain cases, 18-mm copper tubing may be suitable. Please direct any questions to our technical sales team. In third-party systems, we recommend using bleeders at suitable points.

4 Roof-Mounted Installation

4.1 Scope of Delivery

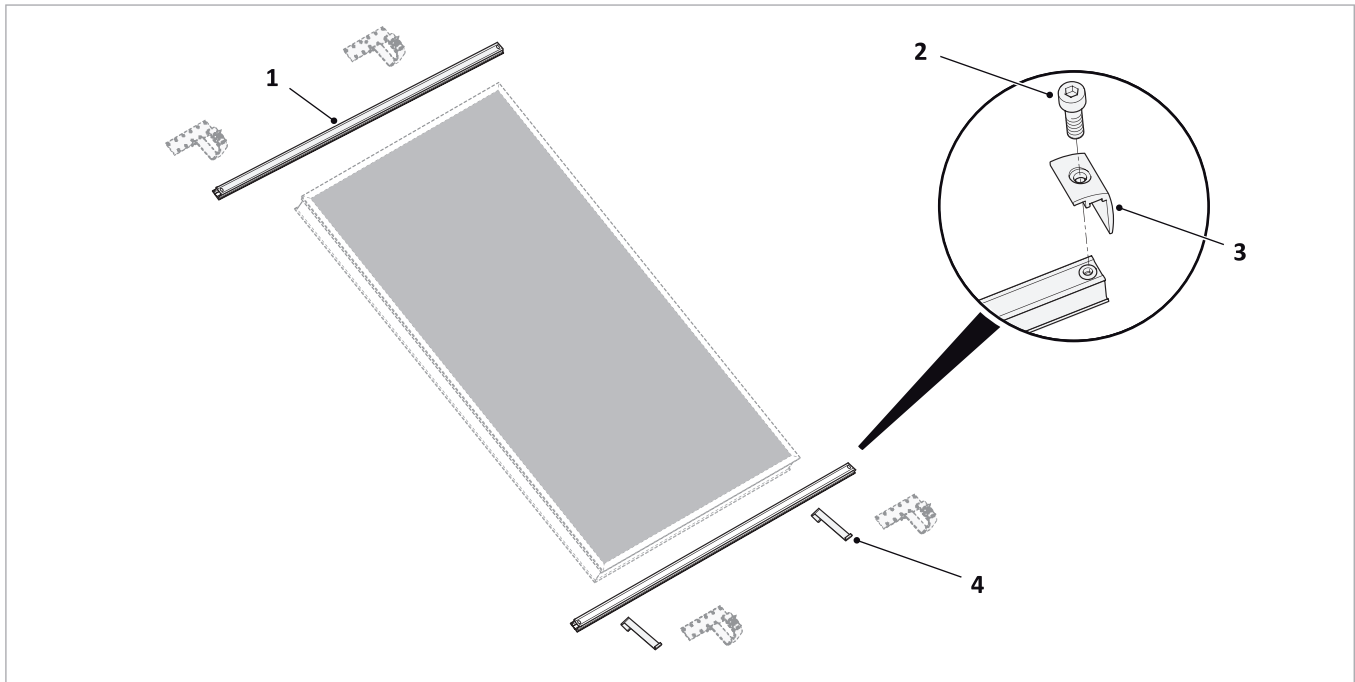


Fig. 15: Roof-mounted rail set (collector and roof-mount frame are not included in the scope of delivery)

- | | | | |
|---|-------------------------|---|------------|
| 1 | Holding rail | 3 | Edge clamp |
| 2 | Allen screw, M8 x 15 A2 | 4 | Stop hook |

List of tools

- Allen key size 6, extended by at least 10 cm
- Ratchet with extension, 17 mm socket
- Wrenches: size 12, 13, 14, 15, 17 (2 x), 19, 21, 27
- Adjustable wrench, pipe wrench
- Pencil, felt tip pen or chalk
- Folding metre ruler, 10 m measuring tape
- Measuring cord, spirit level
- Rubber mallet, hammer
- Cable drum, protective goggles
- Cordless screwdriver and/or drill

4.2 Structural Requirements

4.2.1 Edge and Corner Areas

Increased static loads occur at the edge area of the roof.



CAUTION

Risk of overloading the brackets

- Due to increased static load, the solar system must not protrude out to the edge areas of the roof unless special measures are taken (DIN EN 1991).
- If the solar system extends into the edge area, suitable measures for stabilising the system should be taken on-site.

The side edge area (**e**) applies for installation without elevation with a slope greater than 20°.

For roofs with a slope less than 30°, maintain a lower and upper edge area as well (**e'**).

Side edge area (**e**):

$$e = b * 0,1$$

$$e = h * 0,2$$

Lower/upper edge area (**e'**), if necessary:

$$e' = l * 0,1$$

$$e' = h * 0,2$$

When calculating the edge areas, the **smaller value** is to be used as the minimum size of the edge area (**e** and possibly **e'**).

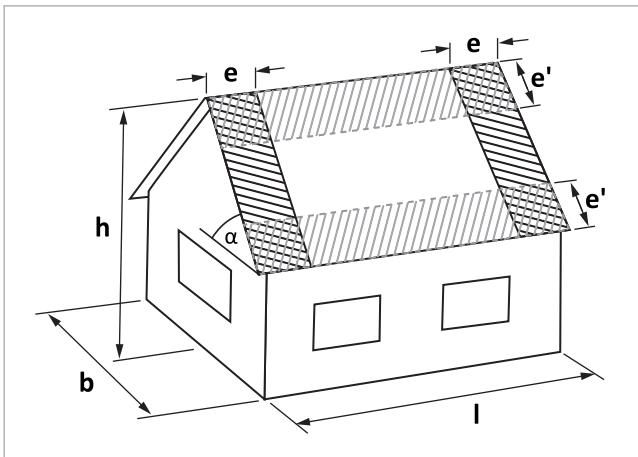


Fig. 16: Edge areas of the roof

- α Roof slope
 b Building width
 h Building height
 l Building length
 e Side edge area
 e' Lower/upper edge area

4.2.2 Structural Design

The following static designs only apply if all static requirements are met.



Contact our Technical Sales department if you have any questions.

Load class

Load classes were defined to simplify the design.

The snow and wind load zones must be identified before determining the load class, see → section "Snow and Wind Load Zones", p. 70.

Load classes are the result of different combinations of snow load zones and heights above sea level.



If the required ballast taken from the relevant table cannot be applied to the roof for structural reasons, an assessment of the individual circumstances is worthwhile. For this purpose, please send the completed statics project sheet for the installation of the collector (PRB-KOL, see → chapter "Statics project sheet for the installation of the collector" on page 72) to Solvis application consultancy; for phone numbers, see → chapter "Information About These Instructions" on page 2.

4 Roof-Mounted Installation

SolvisCala roof-mounted installation / static design

The information in the table below applies to the following load cases:

- **up to and including wind load zone IV** (only applies to Germany)
- Installation height **up to 15 m** above ground level.
- The loads are calculated for a **30°** roof, which corresponds to the maximum load caused by snow.

The Universal on-roof brackets are suitable for almost all roof tiles and concrete roof tiles. The structural design also corresponds to the corrugated roof, standing seam, plain tile and slate roof supports. A separate design is required for the large tile roof support set.

Snow load zone	Height above sea level	Load class	Requirement	Horizontally mounted SolvisCala collectors				
				1x C-254	2x C-254	3x C-254	4x C-254	5x C-254
1	Up to 400 m	A	Required number of pairs of roof-mount frames	2	3	4	5	6
1a	Up to 300 m							
2	Up to 200 m							
2a	Not permissible							
3	Not permissible							
1	Up to 500 m	B	Required number of pairs of roof-mount frames	2	3	5	6	7
1a	Up to 400 m							
2	Up to 300 m							
2a	Up to 300 m							
3	Up to 200 m							
1	Up to 800 m	C	Required number of pairs of roof-mount frames	2	4	6	8	10
1a	Up to 700 m							
2	Up to 500 m							
2a	Up to 400 m							
3	Up to 300 m							
1	Up to 950 m	D	Required number of pairs of roof-mount frames	3	5	7	9	11
1a	Up to 800 m							
2	Up to 600 m							
2a	Up to 500 m							
3	Up to 450 m							
1	Up to 1050 m	E	Required number of pairs of roof-mount frames	3	6	9	11	14
1a	Up to 950 m							
2	Up to 700 m							
2a	Up to 600 m							
3	Up to 550 m							

Maximum roof bracket spacings

Collector type	Designation	Maximum spacings e_{max} in [mm] for load class				
		A	B	C	D	E
1 x C-254	Number of roof brackets (pair)	2	2	2	3	3
	Roof bracket spacing	1168	1168	1168	584	584
2 x C254	Number of roof brackets (pair)	3	3	4	5	6
	Roof bracket spacing	1183	1183	789	592	473
3 x C-254	Number of roof brackets (pair)	4	5	6	7	9
	Roof bracket spacing	1188	891	713	594	446
4 x C-254	Number of roof brackets (pair)	5	6	8	9	11
	Roof bracket spacing	1190	952	680	595	476
5 x C254	Number of roof brackets (pair)	6	7	10	11	14
	Roof bracket spacing	1192	993	662	596	458

Additional holding rail



CAUTION

Do not exceed roof bracket spacing.

- An additional holding rail is necessary if the maximum roof bracket spacing is exceeded.
- If the required number of roof brackets cannot be divided onto rafters, you must use an additional holding rail.
- Mount the additional holding rail to the bottom third of the collectors.

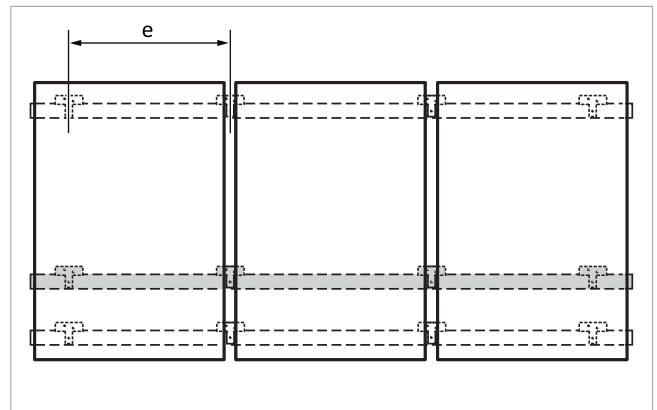


Fig. 17: Additional holding rail (horizontal installation)

4.3 Installing Roof Brackets and Rails

4.3.1 Horizontal Roof-Mounted Installation

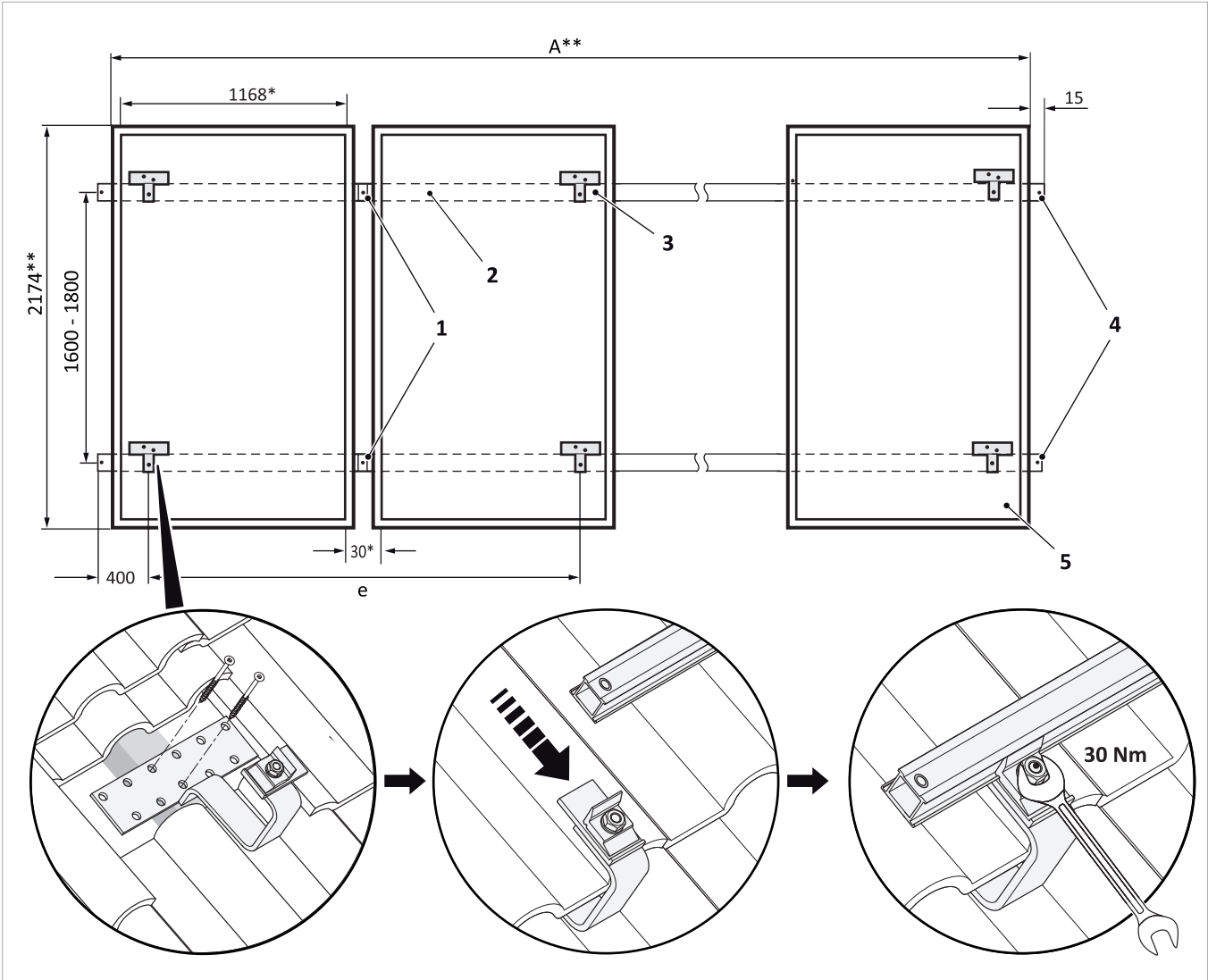


Fig. 18: Horizontal installation of the roof brackets and mounting rails.
The type of roof bracket varies depending on the roofing. Observe the installation instructions provided with the roof bracket.

- * Dimension measured at the base (foot) of the collector

** Dimension measured at the top (head) of the collector

1 Central clamp

2 Holding rail

3 Roof bracket

4 Edge clamp

5 collector

Abbrevia- tion	Designation	Number of collectors				
		1	2	3	4	5
–	Total weight incl. holding rails	55 kg	95 kg	140 kg	185 kg	230 kg
A	Field width (head measurement)	1174	2378	3582	4786	5990
e	Roof bracket spacing					

All dimension specifications in mm

4.3.2 Vertical Roof-Mounted Installation

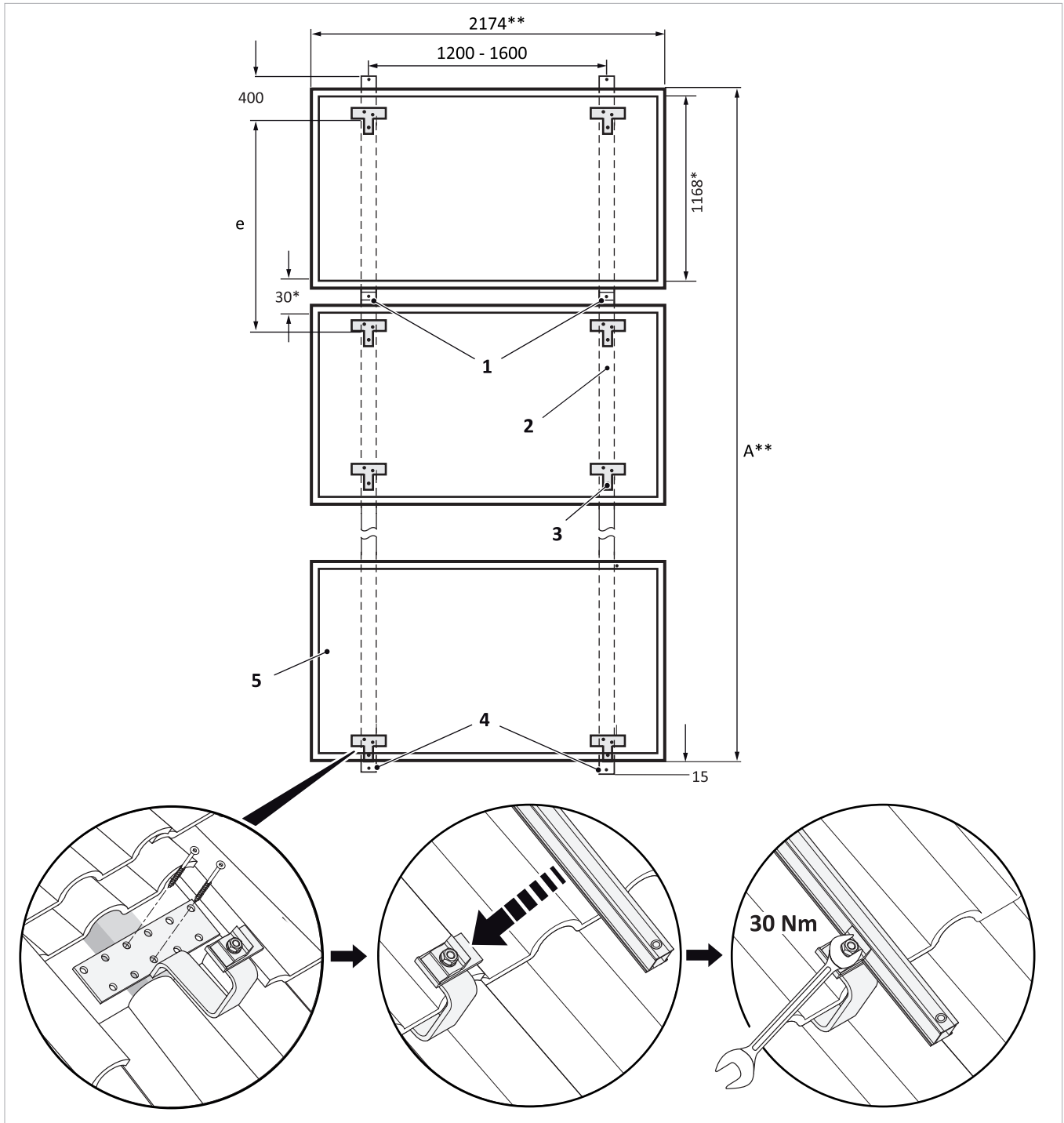


Fig. 19: Vertical installation of the roof brackets and mounting rails.

The type of roof bracket varies depending on the roofing. Observe the installation instructions provided with the roof bracket.

- | | | | |
|----|--|---|----------------------|
| * | Dimension measured at the base (foot) of the collector | 3 | Roof bracket |
| ** | Dimension measured at the top (head) of the collector | 4 | Edge clamp |
| 1 | Central clamp | 5 | SolvisCala collector |
| 2 | Holding rail | | |

Abbrevia- tion	Name	Number of collectors				
		1	2	3	4	5
–	Total weight incl. holding rails	55 kg	95 kg	140 kg	185 kg	230 kg
A	Field height (head measurement)	1174	2378	3582	4786	5990
e	Roof bracket spacing	see → Tab. "Maximum spacing between roof brackets", p. 21				

All dimension specifications in mm

4.4 Collector Installation



WARNUNG

Burn hazard when there is direct sunlight

Fluid that remains in the collector or steam released from the collector can cause scalding. Touching hot connections may cause burns.

- Perform work on the collectors only when the sun is not shining or when the collectors are covered.
- Remove the sun protection only after the (re-) commissioning of the solar plant.



DANGER

Collectors sliding during installation

Collectors could fall from the roof.

- Observe and adhere to the relevant safety requirements when performing roofing work.
- Secure off a large enough area below the roof so as to prevent persons from entering it.
- Secure the collectors from sliding off the roof during roof installation.



For upright installation on the roof, two anchor hooks must be used for each collector. They are included in the scope of delivery.

- One stop hook is attached to each outer edge of the lower retaining rail and moved inwards by approx. 200 mm.
- The stop hooks cannot be removed once the collectors have been attached and remain on the collector.



Fig. 20: Mounting the stop hook (2 per Collector)

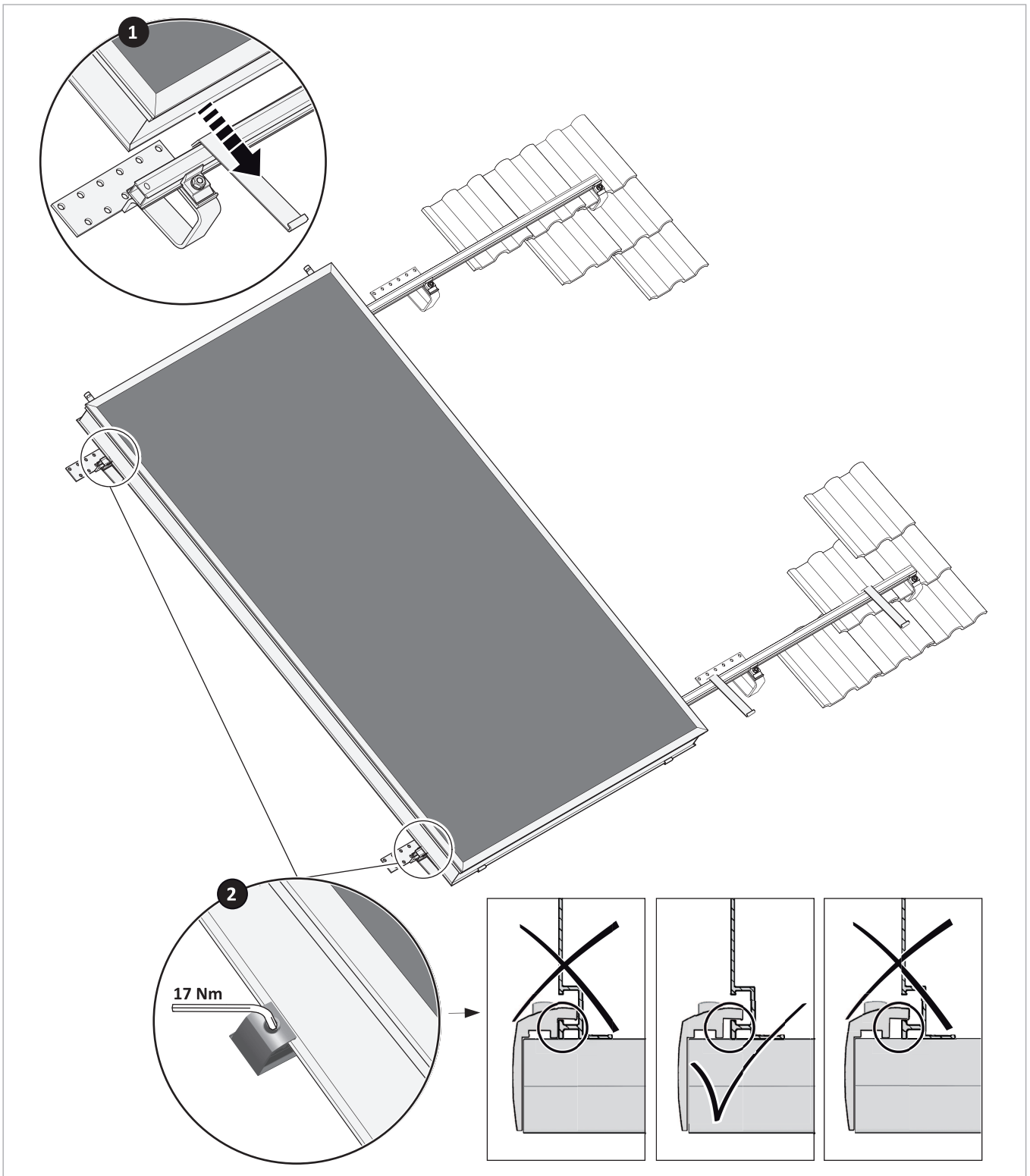


Fig. 21: Fastening a collector to the mounting rails

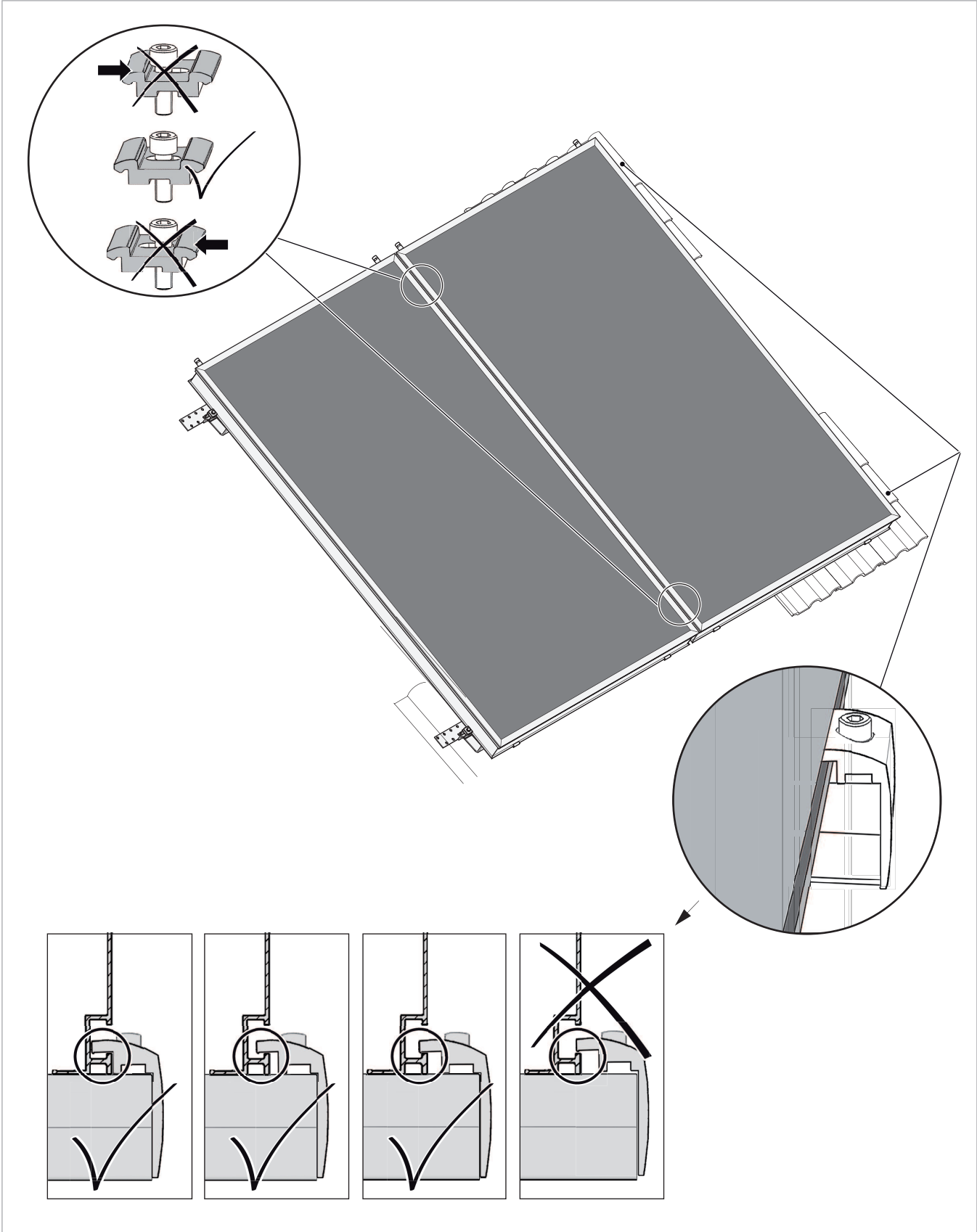


Fig. 22: Fastening the central and edge clamps

5 Flat-Roof or Wall-Mounted Installation

5.1 Scope of Delivery

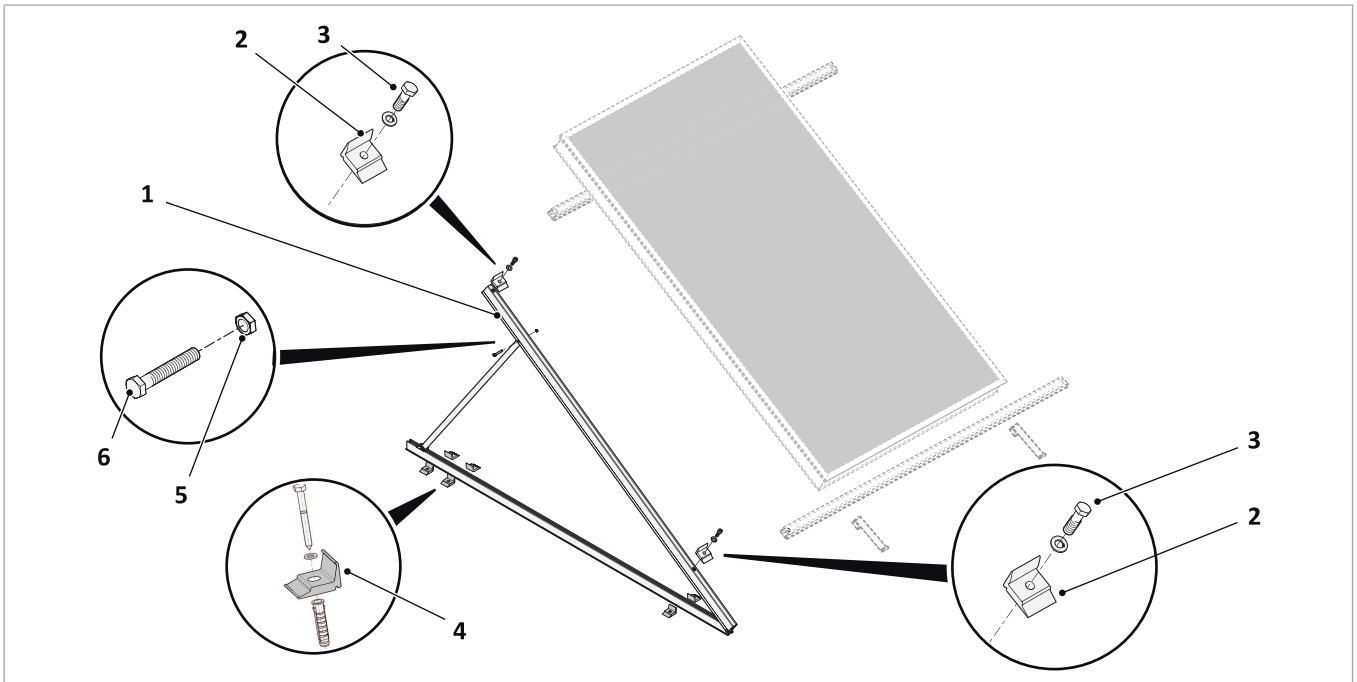


Fig. 23: Flat roof installation kit for SolvisCala, upright installation (collector and transverse rails are not included in the scope of delivery)

- | | | | |
|---|-----------------------------------|---|---|
| 1 | Flat roof holder | 4 | Clamping bracket (incl. concrete screws and wall plugs) |
| 2 | Clamping bracket for holding rail | 5 | M8 nut with locking serration |
| 3 | Hexagon screw M8 x 30 A2 | 6 | Screw M8 x 40 A2 |

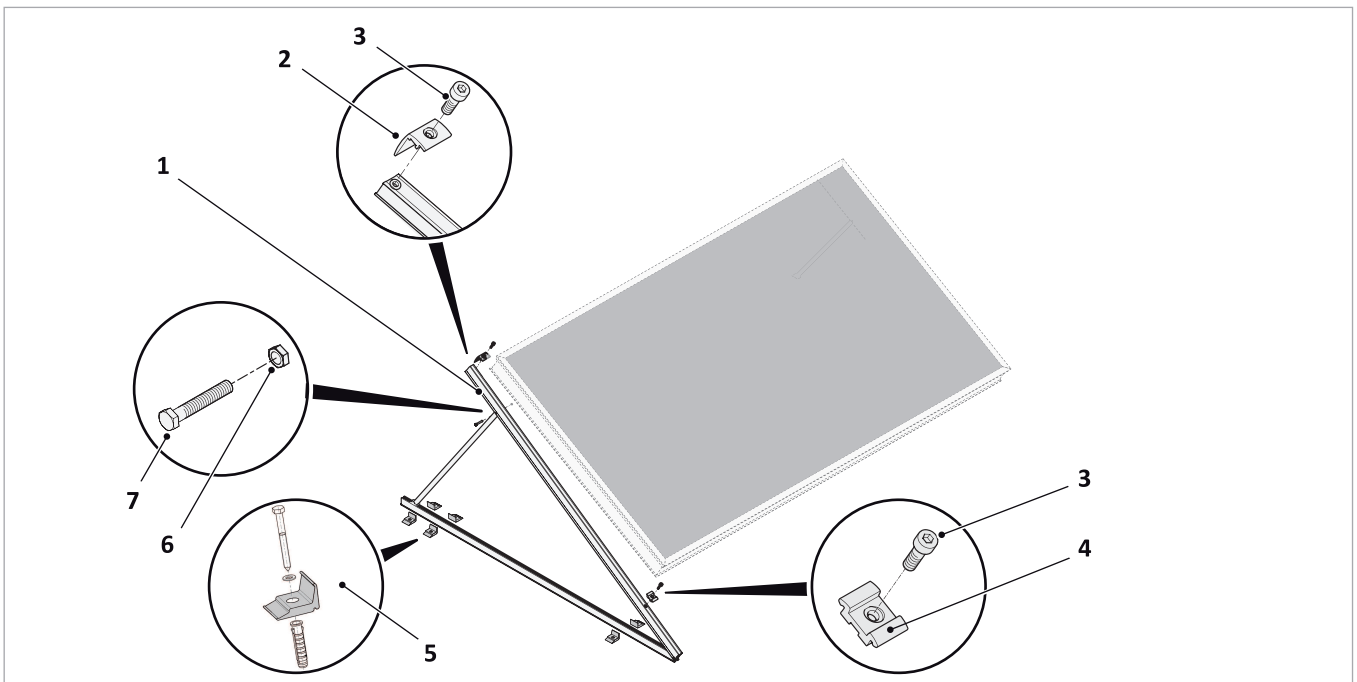


Abb. 24: Flat roof holder set for SolvisCala horizontal mounting (collector not included in the scope of delivery)

- | | | | |
|---|---|---|---|
| 1 | Flat roof holder | 5 | Clamping bracket (incl. concrete screws and wall plugs) |
| 2 | Collector edge collector edge clamp (for top) | 6 | M8 nut with locking serration |
| 3 | Allen screw M8 x 15 A2 | 7 | Screw M8 x 40 A2 |
| 4 | Collector central clamp (for below) | | |

List of tools

- Allen key size 6, extended by at least 10 cm
- Ratchet with extension, 17 mm socket
- Wrenches: size 12, 13, 14, 15, 17 (2 x), 19, 21, 27
- Adjustable wrench, pipe wrench, nipper pliers
- Pencil, felt tip pen or chalk
- Folding metre ruler, 10 m measuring tape
- Measuring cord, spirit level
- Rubber mallet, hammer
- Cable drum, protective goggles
- Cordless screwdriver and/or drill

5.2 Structural Requirements

5.2.1 Edge and Corner Areas

Increased static loads occur at the edge area of the roof.



CAUTION

Observe the minimum edge spacing

- On flat roofs, all superstructures should maintain a minimum spacing of 1 m to the edge of the roof.

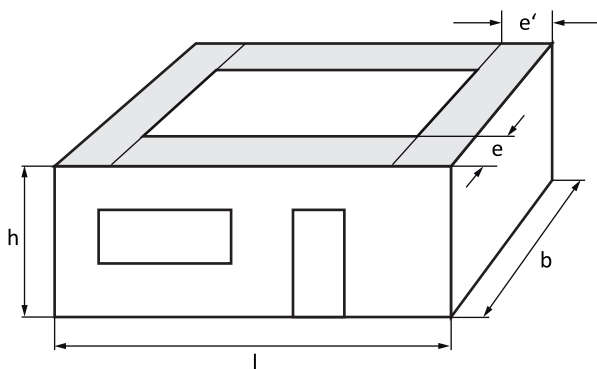
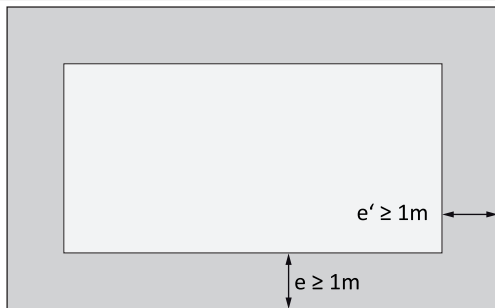


Fig. 25: Minimum spacing to edge of building

5.2.2 Structural Design

The following static designs only apply if all static requirements are met.



The information applies to concrete block. Please ask for the values for other ballastings!



Contact our Technical Sales department if you have any questions.

Load class

Load classes were defined to simplify the design.

The snow and wind load zones must be identified before determining the load class, see → section “Snow and Wind Load Zones”, p. 70.

Load classes are the result of different combinations of snow load zones and heights above sea level.



If the required ballast taken from the relevant table cannot be applied to the roof for structural reasons, an assessment of the individual circumstances is worthwhile. For this purpose, please send the completed statics project sheet for the installation of the collector (PRB-KOL, see → chapter “Statics project sheet for the installation of the collector” on page 72) to Solvis application consultancy; for phone numbers, see → chapter “Information About These Instructions” on page 2.

Flat roof mounted installation of SolvisCala 30° - vertical / static design

- Valid up to and including wind load zone IV (only applicable in Germany).
- for load class A
- Installation height **up to 15 m** above ground level.
- Terrain category: **inland mixed profile**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 650 m	A	3	4	5	6
1a	up to 550 m					
2	up to 380 m					
2a	up to 300 m					
3	up to 270 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		369	554	738	923
	8 - 15 m		492	738	984	1230
II	0 - 8 m		472	708	944	1180
	8 - 15 m		622	933	1244	1555
III	0 - 8 m		590	885	1180	1475
	8 - 15 m		771	1157	1542	1928
IV	0 - 8 m		722	1083	1444	1805
	8 - 15 m		938	1407	1876	2345

Flat roof mounted installation of SolvisCala 30° - vertical / static design

- Valid up to and including wind load zone IV (only applicable in Germany).
- for load class B
- Installation height **up to 15 m** above ground level.
- Terrain category: **inland mixed profile**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 800 m	B	3	5	6	8
1a	up to 700 m					
2	up to 500 m					
2a	up to 430 m					
3	up to 370 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		369	554	738	923
	8 - 15 m		492	738	984	1230
II	0 - 8 m		472	708	944	1180
	8 - 15 m		622	933	1244	1555
III	0 - 8 m		590	885	1180	1475
	8 - 15 m		771	1157	1542	1928
IV	0 - 8 m		722	1083	1444	1805
	8 - 15 m		938	1407	1876	2345



The information applies to concrete block. Please ask for the values for other ballastings!

5 Flat-Roof or Wall-Mounted Installation

Flat roof mounted installation of SolvisCala 30° - vertical / static design

- Valid up to and including wind load zone IV (only applicable in Germany).
- for load class C
- Installation height up to 15 m above ground level.
- Terrain category: inland mixed profile.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala slide by slide (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 900 m	C	4	6	8	10
1a	up to 800 m					
2	up to 550 m					
2a	up to 500 m					
3	up to 430 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala slide by slide (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		416	624	832	1040
	8 - 15 m		552	828	1104	1380
II	0 - 8 m		529	794	1058	1323
	8 - 15 m		695	1043	1390	1738
III	0 - 8 m		659	989	1318	1648
	8 - 15 m		858	1287	1716	2145
IV	0 - 8 m		804	1206	1608	2010
	8 - 15 m		1041	1562	2082	2603

Flat roof mounted installation of SolvisCala 30° - vertical / static design

- Valid for wind load zone IV (only applicable in Germany).
- Installation height up to 15 m above ground level.
- Terrain category: near the coast.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 200 m	n.V.	3	4	5	6
1a	up to 200 m					
2	up to 200 m					
2a	up to 200 m					
3	up to 200 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
II	0 - 8 m		692	1038	1384	1730
	8 - 15 m		839	1259	1678	2098
III	0 - 8 m		855	1283	1710	2138
	8 - 15 m		1031	1547	2062	2578
IV	0 - 8 m		1038	1557	2076	2595
	8 - 15 m		1248	1872	2496	3120



The information applies to concrete block. Please ask for the values for other ballastings!

Flat roof mounted installation of SolvisCala 45° - vertical / static design

- Valid for wind load zones I, II and III (only applicable in Germany).
- for load class A
- Installation height **up to 15 m** above ground level.
- Terrain category: **inland mixed profile**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 950 m	A	3	4	5	6
1a	up to 880 m					
2	up to 700 m					
2a	up to 600 m					
3	up to 530 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		514	771	1028	1285
	8 - 15 m		658	987	1316	1645
II	0 - 8 m		634	951	1268	1585
	8 - 15 m		810	1215	1620	2025
III	0 - 8 m		772	1158	1544	1930
	8 - 15 m		983	1475	1966	2458

Flat roof mounted installation of SolvisCala 45° - vertical / static design

- Valid for wind load zones I, II and III (only applicable in Germany).
- for load class B
- Installation height **up to 15 m** above ground level.
- Terrain category: **inland mixed profile**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 1100 m	B	3	5	6	8
1a	up to 1000 m					
2	up to 850 m					
2a	up to 800 m					
3	up to 700 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		586	879	1172	1465
	8 - 15 m		748	1122	1496	1870
II	0 - 8 m		722	1083	1444	1805
	8 - 15 m		920	1380	1840	2300
III	0 - 8 m		877	1316	1754	2193
	8 - 15 m		1116	1674	2232	2790



The information applies to concrete block. Please ask for the values for other ballastings!

5 Flat-Roof or Wall-Mounted Installation

Flat roof mounted installation of SolvisCala 45° - vertical / static design

- Valid for wind load zones I, II and III (only applicable in Germany).
- for load class C
- Installation height **up to 15 m** above ground level.
- Terrain category: **inland mixed profile**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 1200 m	C	4	6	8	10
1a	up to 1150 m					
2	up to 950 m					
2a	up to 880 m					
3	up to 800 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		633	950	1266	1583
	8 - 15 m		809	1214	1618	2023
II	0 - 8 m		780	1170	1560	1950
	8 - 15 m		994	1491	1988	2485
III	0 - 8 m		947	1421	1894	2368
	8 - 15 m		1205	1808	2410	3013

Flat roof mounted installation of SolvisCala 45° - vertical / static design

- Valid for wind load zone IV (only applicable in Germany).
- Installation height **up to 8 m** above ground level.
- Terrain category: **near the coast**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 200 m	n. V.	3	5	6	8
2	up to 200 m					
3	up to 200 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
IV	0 - 8 m		1112	1668	2224	2780



The information applies to concrete block. Please ask for the values for other ballastings!

Flat roof mounted installation of SolvisCala 60° - vertical / static design

- Valid for wind load zones I and II (only applicable in Germany).
- for load class A
- Installation height **up to 15 m** above ground level.
- Terrain category: **inland mixed profile**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 950 m	A	3	4	5	6
1a	up to 950 m					
2	up to 950 m					
2a	up to 950 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8m		837	1256	1674	2093
	8 - 15m		1069	1604	2138	2673
II	0 - 8m		1030	1545	2060	2575
	8 - 15m		1313	1970	2626	3283

Flat roof mounted installation of SolvisCala 60° - vertical / static design

- Valid for wind load zone III (only applicable in Germany).
- for load class B
- Installation height **up to 15 m** above ground level.
- Terrain category: **inland mixed profile**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 200 m	B	3	5	6	8
1a	up to 200 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
III	0 - 8 m		1082	1623	2164	2705
	8 - 15 m		1379	2069	2758	3448

Flat roof mounted installation of SolvisCala 60° - vertical / static design

- Valid for wind load zone IV (only applicable in Germany).
- for load class C
- Installation height **up to 8 m** above ground level.
- Terrain category: **near the coast**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 150 m	n. V.	4	6	8	10
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
IV	0 - 8 m		1816	2724	3632	4540



The information applies to concrete block. Please ask for the values for other ballastings!

5 Flat-Roof or Wall-Mounted Installation

Flat roof installation SolvisCala 30°/ - transverse / Structural design

- Valid up to and including wind load zone IV (only applicable in Germany).
- Installation height up to 15 m above ground level.
- Terrain category: inland mixed profile.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 1200 m	A	4	6	8	10
1a	up to 1000 m					
2	up to 750 m					
2a	up to 650 m					
3	up to 550 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		560	840	1120	1400
	8 - 15 m		732	1098	1464	1830
II	0 - 8 m		704	1056	1408	1760
	8 - 15 m		914	1371	1828	2285
III	0 - 8 m		868	1302	1736	2170
	8 - 15 m		1122	1683	2244	2805
IV	0 - 8 m		1054	1581	2108	2635
	8 - 15 m		1356	2034	2712	3390

Flat roof installation SolvisCala 45°/ - transverse / Static design

- Valid up to and including wind load zone IV (only applicable in Germany).
- Installation height up to 15 m above ground level.
- Terrain category: inland mixed profile.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 1200 m	A	4	6	8	10
1a	up to 1000 m					
2	up to 750 m					
2a	up to 650 m					
3	up to 550 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		550	825	1100	1375
	8 - 15 m		702	1053	1404	1755
II	0 - 8 m		676	1014	1352	1690
	8 - 15 m		862	1293	1724	2155
III	0 - 8 m		822	1233	1644	2055
	8 - 15 m		1044	1566	2088	2610
IV	0 - 8 m		984	1476	1968	2460
	8 - 15 m		1248	1872	2496	3120

 The information applies to concrete block. Please ask for the values for other ballastings!

Flat roof installation SolvisCala 60°/ - transverse / Static design

- Valid up to and including wind load zone IV (only applicable in Germany).
- Installation height **up to 15 m** above ground level.
- Terrain category: **inland mixed profile**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 1200 m	A	4	6	8	10
1a	up to 1000 m					
2	up to 750 m					
2a	up to 650 m					
3	up to 550 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
I	0 - 8 m		720	1080	1440	1800
	8 - 15 m		916	1374	1832	2290
II	0 - 8 m		884	1326	1768	2210
	8 - 15 m		1122	1683	2244	2805
III	0 - 8 m		1072	1608	2144	2680
	8 - 15 m		1358	2037	2716	3395
IV	0 - 8 m		1282	1923	2564	3205
	8 - 15 m		1624	2436	3248	4060

Flat roof installation SolvisCala 60°/ - transverse / Static design

- Valid for wind load zone IV (only applicable in Germany).
- Installation height **up to 8 m** above ground level.
- Terrain category: **near the coast**.

Snow load zone	Height above sea level	Load class	required flat roof stands in [pcs.] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
1	up to 200 m	A	4	6	8	10
1a	up to 200 m					
2	up to 200 m					
2a	up to 200 m					
3	up to 200 m					
Wind load zone	Installation height above ground level		required total load in [kg] for SolvisCala side by side (pcs.) ...			
			2 x C254	3 x C-254	4 x C-254	5 x C254
IV	0 - 8 m		1016	1524	2032	2540

i The information applies to concrete block. Please ask for the values for other ballastings!

5.2.3 Installation with Weights

Load distribution

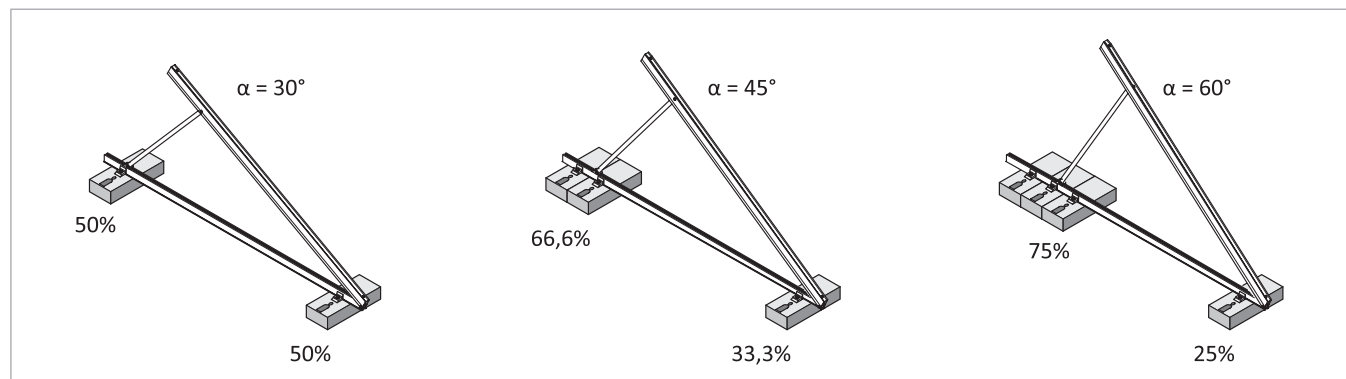


Fig. 26: Load distribution at slope angle $\alpha = 30^\circ / 45^\circ / 60^\circ$



CAUTION

Hazard due to overloading the building

- As the system (solar module + holder + weights) has a significant weight load, always check the structural calculations for the building bearing the load before beginning installation.



If the required ballast taken from the relevant table cannot be applied to the roof for structural reasons, an assessment of the individual circumstances is worthwhile. For this purpose, please send the completed statics project sheet for the installation of the collector (PRB-KOL, see → chapter “Statics project sheet for the installation of the collector” on page 72) to Solvis application consultancy; for phone numbers, see → chapter “Information About These Instructions” on page 2.

Superimposed loads

The superimposed loads can be made from any material. It is important that they ensure long-lasting protection against wind loads for the service life of the collectors. Higher superimposed loads are required for gravel fills. For more information, please contact the application consultancy team (for the phone number, see → chapter “Information About These Instructions”, page 2).

Example for load distribution

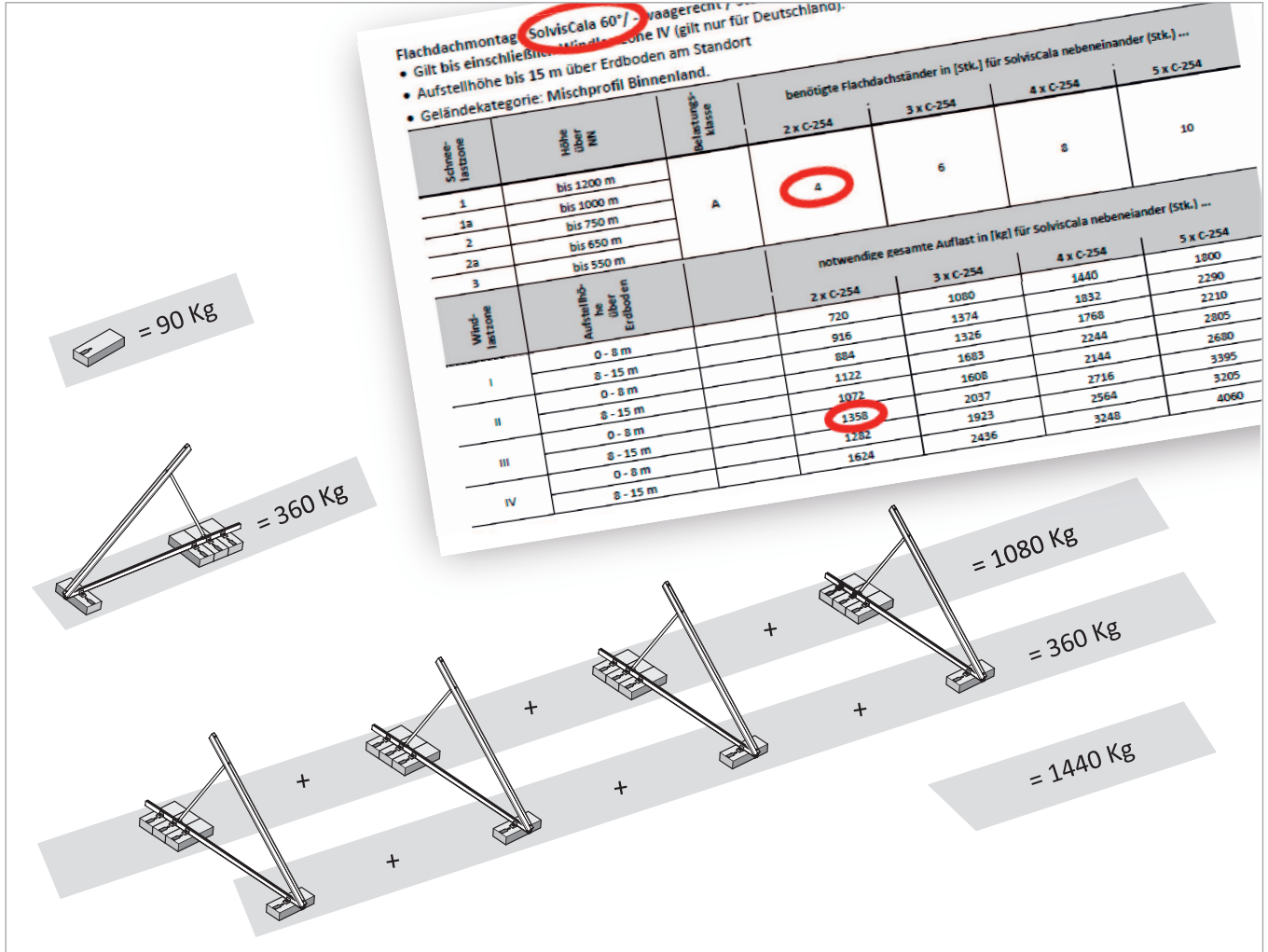


Fig. 27: Example for load distribution

5.2.4 Placement

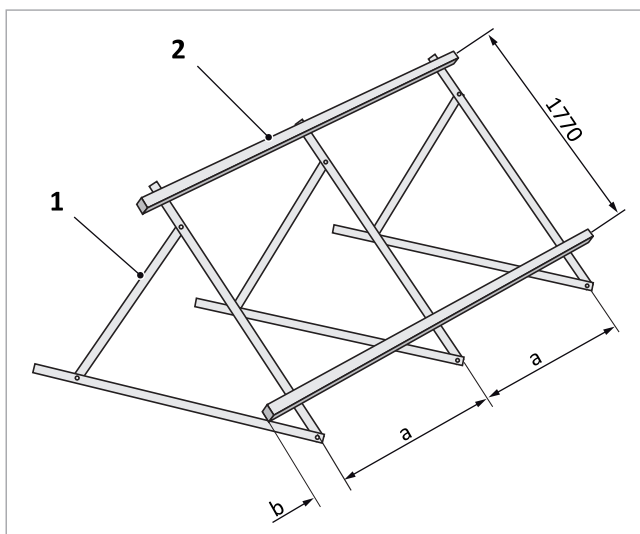


Fig. 28: Flat roof holder clearances

Number of required flat roof holders and spacing

Designation	Number of collectors			
	2 x	3 x	4 x	5 x
Number of flat roof holders (load class A)	3	4	5	6
Holder spacing (a) ± 50 [mm]	799	899	958	998
Collector overhang (b) ± 50 [mm]	399	449	479	499
Number of flat roof holders (load class B)	3	5	6	8
Holder spacing (a) ± 50 [mm]	799	719	799	749
Collector overhang (b) ± 50 [mm]	399	359	399	374
Number of flat roof holders (load class C)	4	6	8	10
Holder spacing (a) ± 50 [mm]	599	599	599	599
Collector overhang (b) ± 50 [mm]	300	300	300	300

5 Flat-Roof or Wall-Mounted Installation

Determining the installation angle

Installation angle (= slope angle) α°	Installation angle setting [mm]	
	c	Shortening size for S^1
25	311	690
30	89	420
35	400	420
40	603	420
45	112	-
50	383	-
55	707	-
60	1075	-

¹⁾ At an installation angle smaller or equal than 40° , it is necessary to shorten the support rail S by the measurement specified.

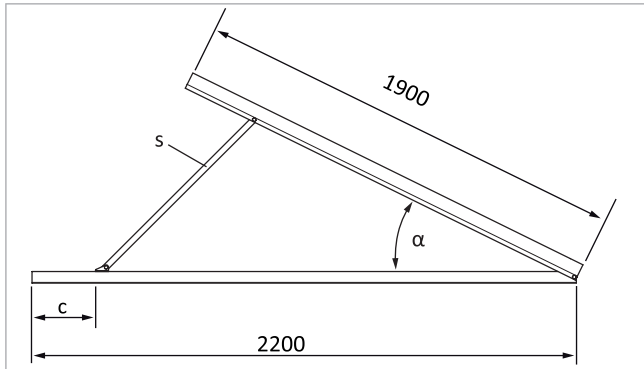


Fig. 29: Flat roof holder, dimensions and installation angle

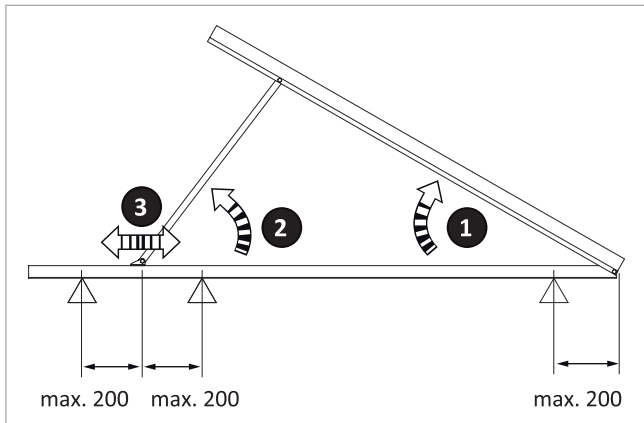


Fig. 30: Setting up the flat roof holder

Low Slope Surfaces

Low slope surfaces ($10^\circ - 40^\circ$) present special cases in terms of setting up flat roof holders.



A statics calculation for the specific circumstances is needed to determine the number of roof brackets required. For this purpose, please send the completed statics project sheet for the installation of the collector (PRB-KOL – for more information, see → chapter “Statics project sheet for the installation of the collector” on page 72) to Solvis application consultancy. For telephone numbers, see → chapter “Information About These Instructions” on page 2.



Contact our Technical Sales department if you have any questions.

If the collectors are to be installed on low slope surfaces (roof slope angle in relation to horizontal = γ) using flat roof holders, a flat roof holder installation angle (= β) of a

maximum of 20° is permitted. The overall slope of the collector α in relation to horizontal may not exceed 60° .

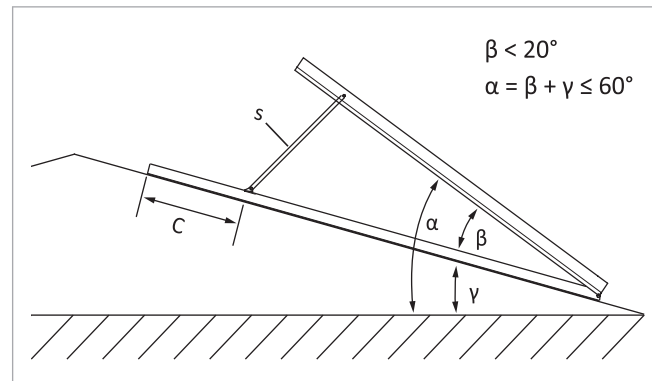


Fig. 31: Angle on low slope surfaces

Determining the installation angle - special case

Installation angle β°	Installation angle setting (mm)	
	c	Shortening size for S^1
10	9	900
15	158	900
20	46	690

¹⁾ At an installation angle smaller or equal than 20° , it is necessary to shorten the support rail S by the measurement specified. After shortening the support rail, drill an 8 mm hole in the support rail (in the same position as the original hole).

5.2.5 Wall-Mounted Installation



CAUTION

Horizontal installation on top of each other on the wall

The collectors may fail due to penetrating rain water.

- If multiple collectors are arranged crosswise on top of each other, wall mounting (90°) is not recommended because rain water run-off may penetrate through the ventilation holes in this case.

Installation variants

Solvis collectors, wall-mounted	
Orientation: upright only	Orientation: crosswise and upright
for heights up to 3 m $\alpha = 90^\circ$	All heights $75^\circ > \alpha > 45^\circ$

For wall-mounted installation up to a slope angle of 74° , flat roof holders are screwed on to customer-provided sub-structures or are fastened directly to the wall with wall plugs (provided the wall has sufficient load-bearing capacity). For this, holes are drilled in the centre of the bottom rail.

For thermally insulated façades, make sure that the foundation has sufficient compressive strength. Appropriate fixing materials can be purchased from producers of thermal insulation systems.

The fixing material you choose (wall plugs, etc.) must meet static requirements and be suitable for the on-site brick-work.

Minimum pull-out loads of the wall plugs

Applies for directly fastening the flat roof holders to the wall:

- 2 kN for buildings up to 8 m tall
- 3 kN for buildings between 8 and 20 m tall

If these values cannot be reached, then more attachment points must be sought. For example, a customer-provided substructure of horizontal rails to which the flat roof holders are screw-fastened.

i The construction party is responsible for providing on-site support structures.

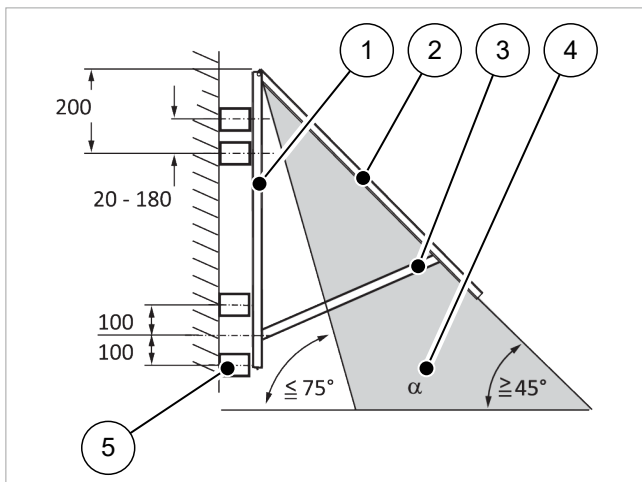


Fig. 32: Assembly of the holders on the wall

- 1 Bottom rail
- 2 Bearing rail
- 3 Support rail
- 4 Slope angle α ($75^\circ - 45^\circ$)
- 5 On-site connection according to construction and static specifications (installation example)

Where possible, install the collector at an angle to the wall. Use the holders described in the installation instructions for this.

For angles larger than 60° (e.g. vertical installation on the wall), fit the top of the collectors with a cover plate on site. During heavy rainfall, water could otherwise get into the collector via the ventilation holes. Metal flashing should also be secured against effects of the wind.

An additional cover plate is not necessary if the roof offers sufficient protection.

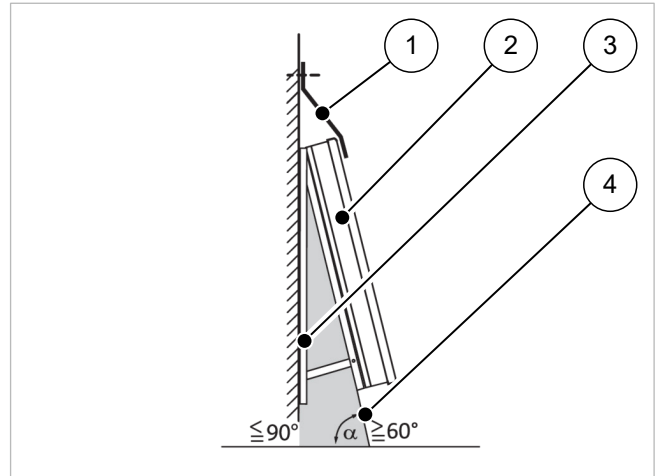


Fig. 33: Collector with cover plate

- 1 Cover plate (on-site)
- 2 Collector
- 3 Flat roof holder
- 4 Slope angle α ($90^\circ - 60^\circ$)

5.3 Flat Roof Holder Installation

5.3.1 Steel Girders

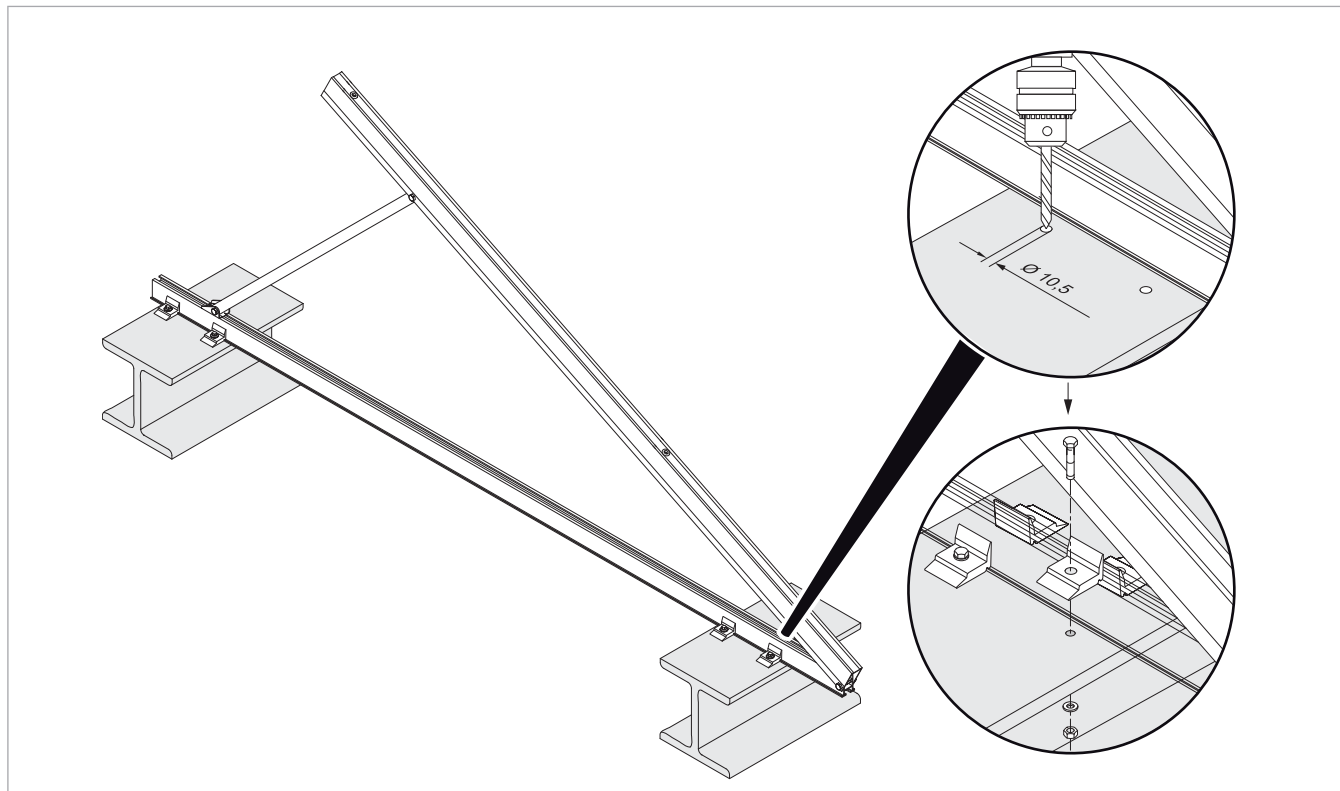


Fig. 34: Flat roof holder installation on steel girders

5.3.2 Steel girder (self-tapping)

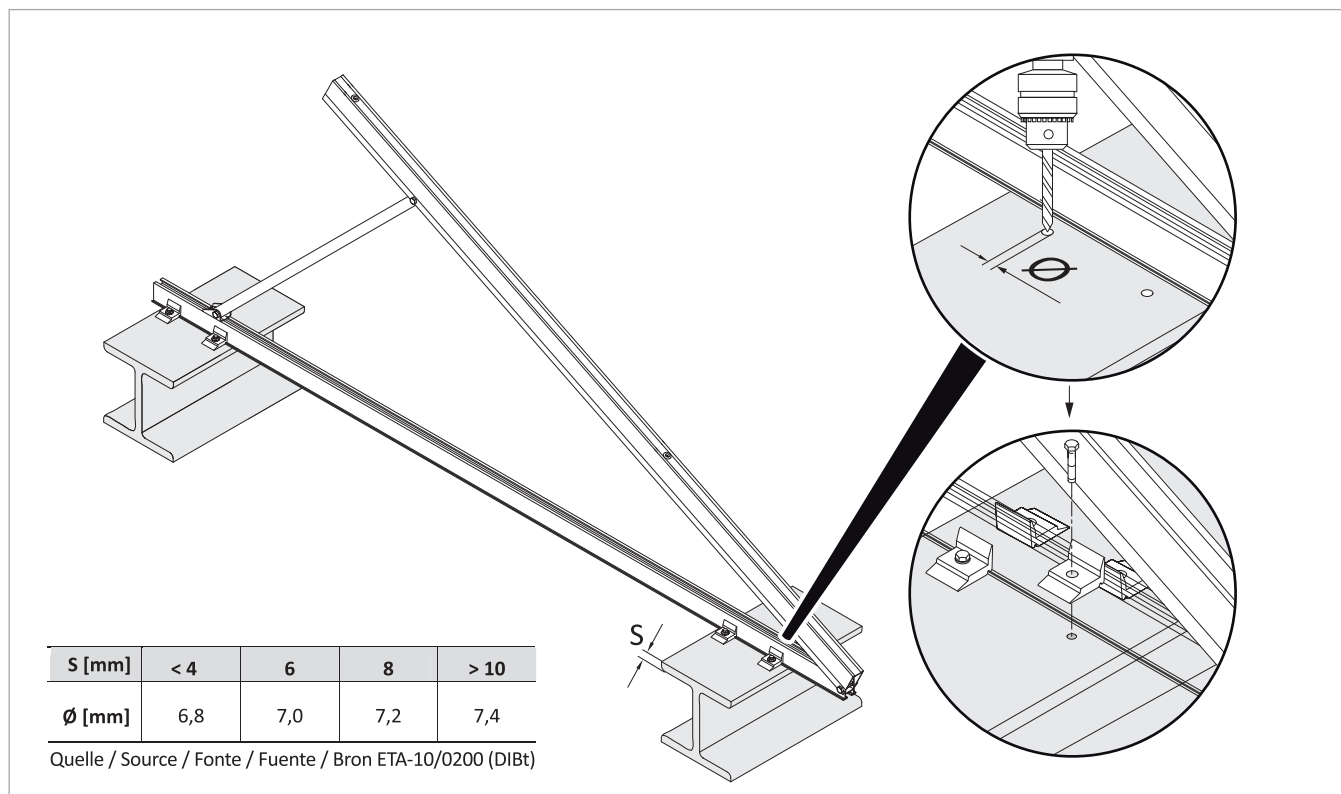


Fig. 35: Installation of the flat roof holder on a steel girder with self-tapping screws (flat roof holder set MUK)

5.3.3 Concrete Blocks

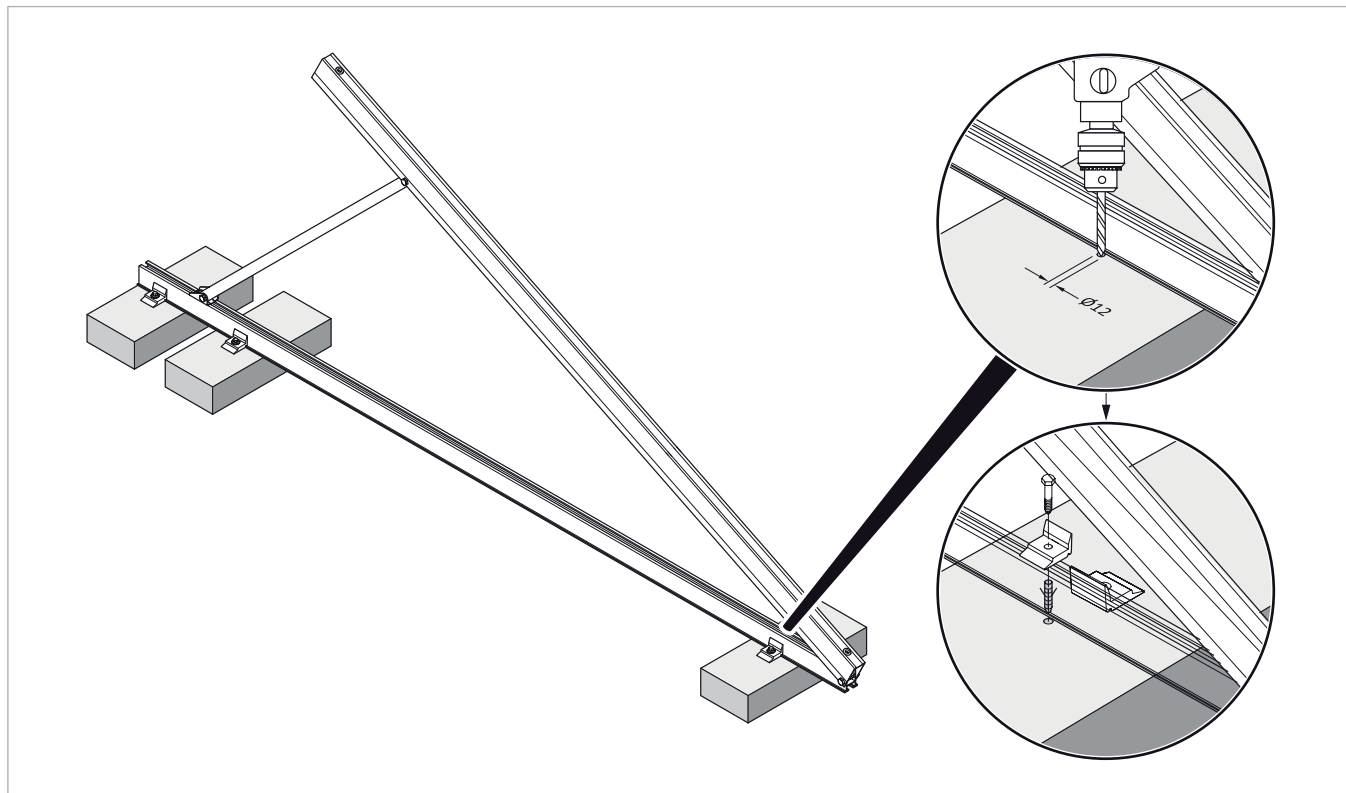


Fig. 36: Flat roof holder installation on concrete blocks

5.3.4 Roof-mount frame ADH-U

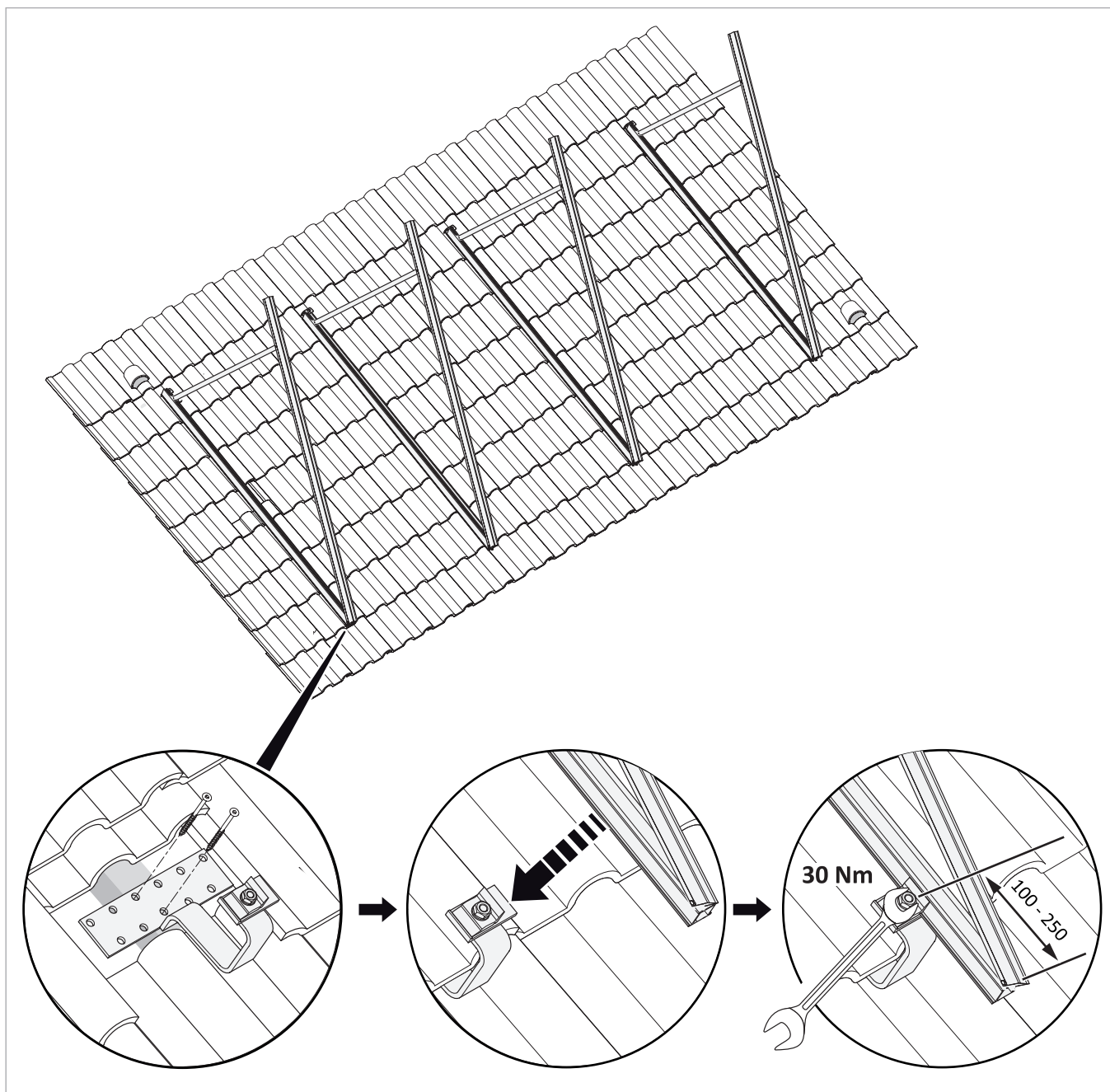


Fig. 37: Installation of the flat roof holder on a roof-mount frame ADH-U

5.3.5 Trapezoidal Sheet Metal

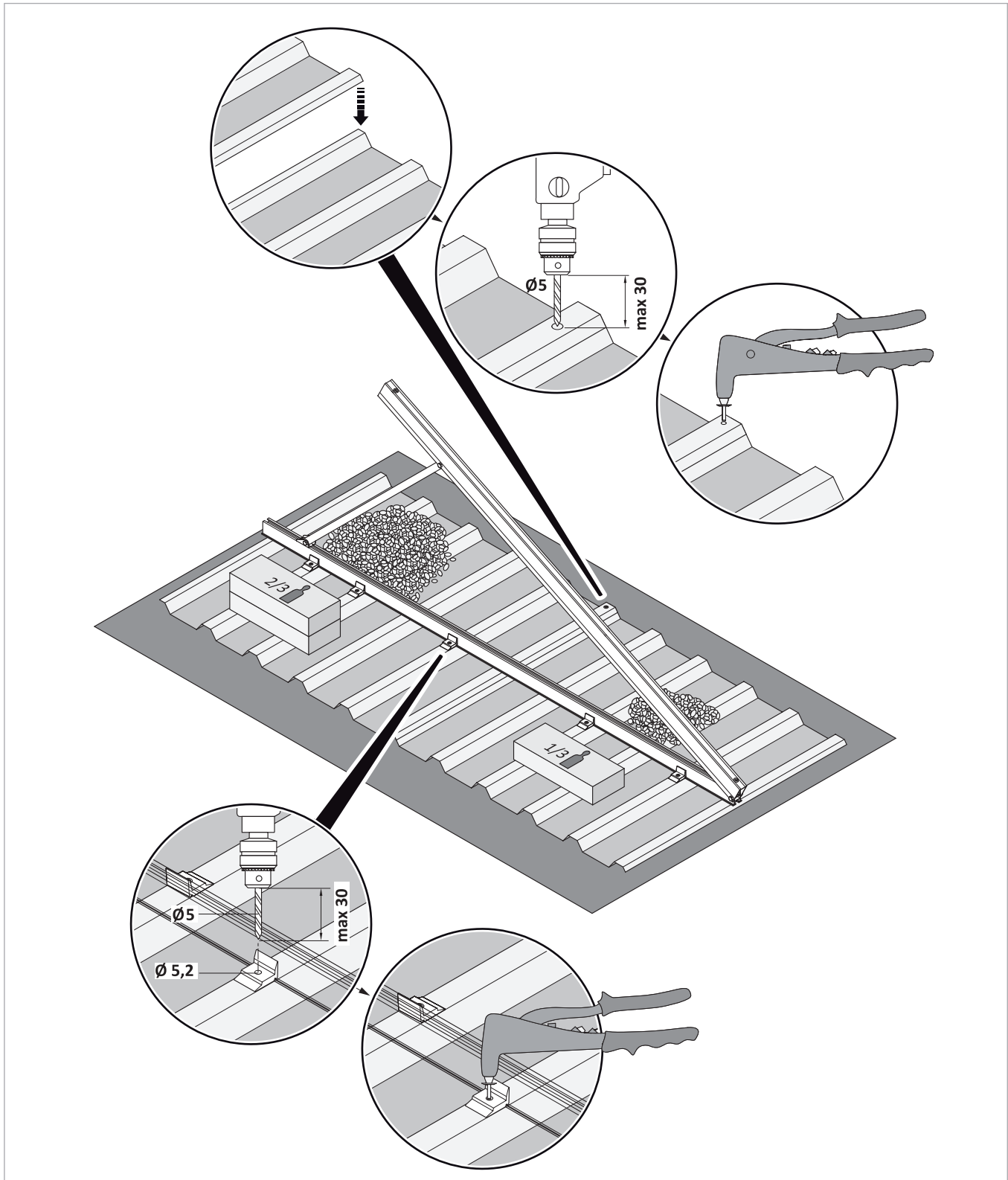


Fig. 38: Flat roof holder installation on trapezoidal sheet metal



CAUTION

Be careful when drilling the roofing

Possible building damage due to moisture

- Drill carefully
- Place a protective layer underneath

5.4 Collector Installation

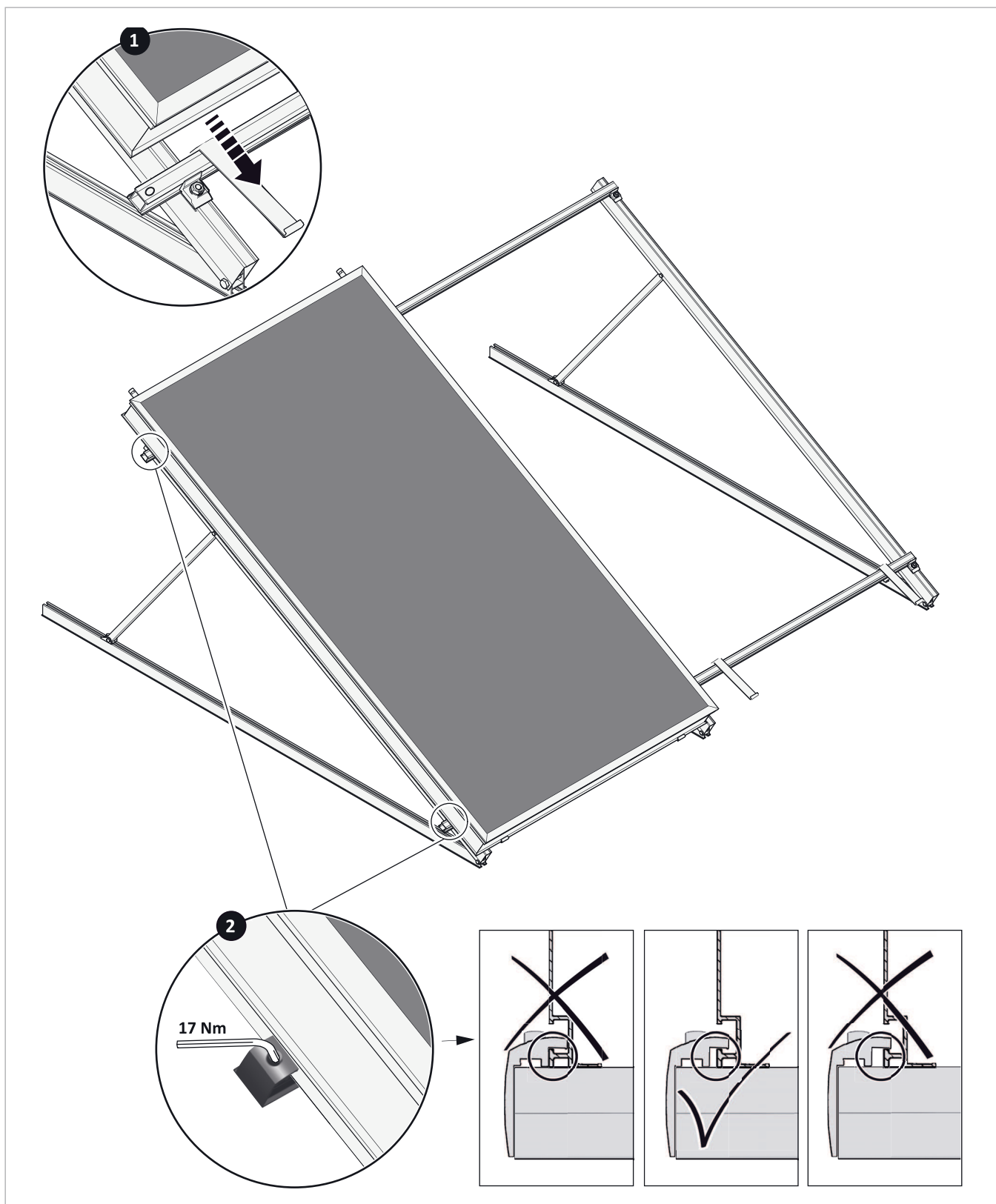


Fig. 39: Fastening a collector to flat roof holders

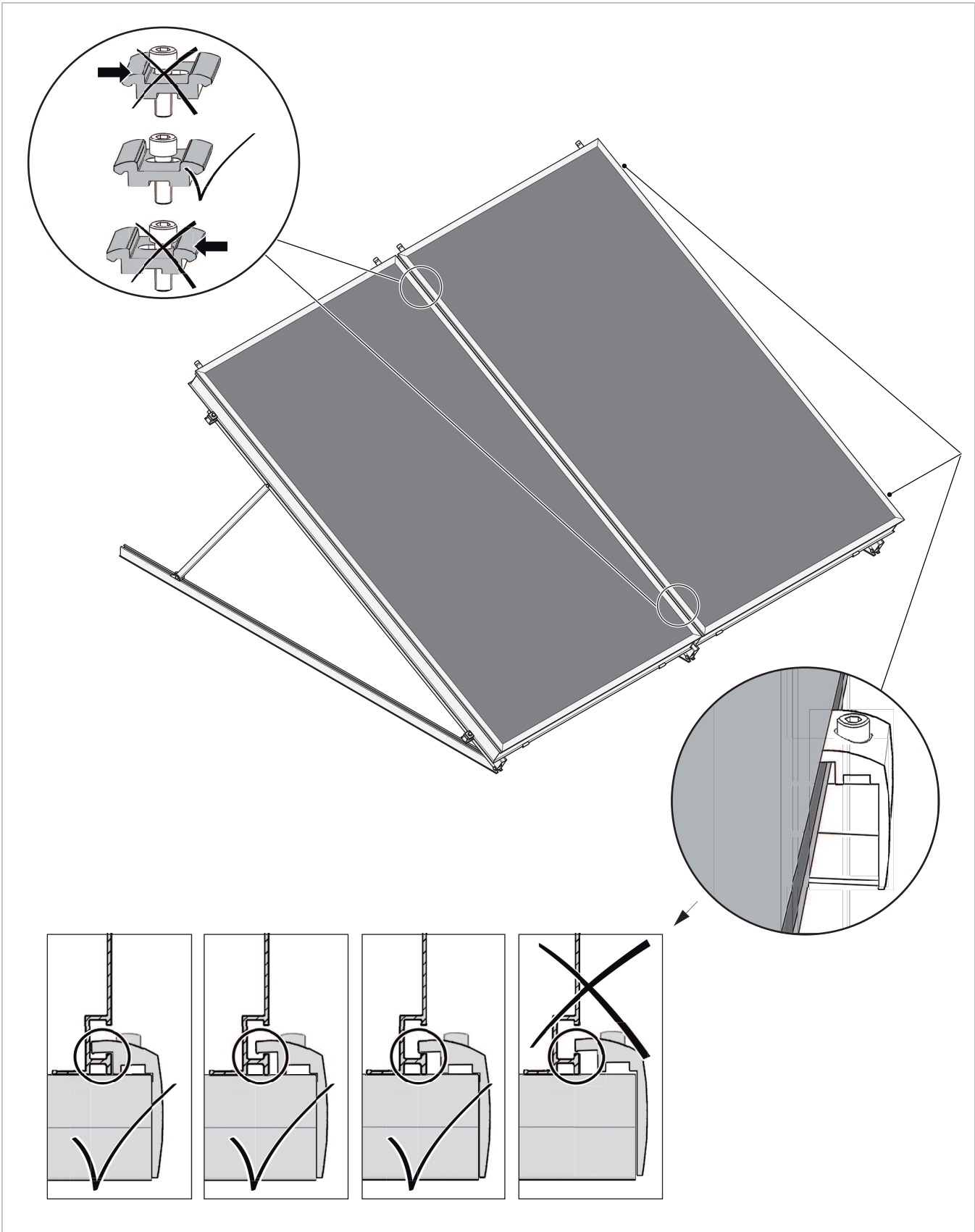


Fig. 40: Fastening the central and edge clamps

6 In-Roof Mounted Installation

6.1 Scope of Delivery

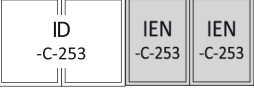
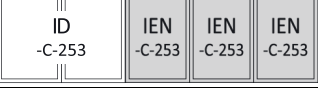
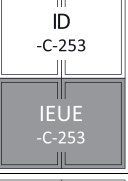
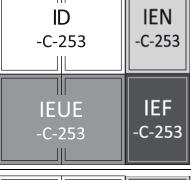
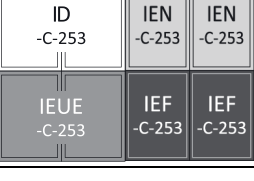
For in-roof installation (possible only with C-254-C), collectors are installed vertically (upright) in the roof using installation frames. A minimum of two collectors have to be installed horizontally. Installation is possible from roof slopes of 22°. The collector connections are to be

positioned at the top for a single row or in the middle for two rows.

Various installation kits are required depending on the number and the position of the collectors:

- In-roof installation kit for two collectors (MS-ID-C-253)
- expansion kits depending on the collector field (MS-IEN-C-253, MS-IEUE-C-253, MS-IEF-C-253)

In-roof installation kits required for standard contour tiles

Description	Number and position	ID	IEN	IEUE	IEF
2 collectors, horizontal installation		1	–	–	–
3 collectors, horizontal installation		1	1	–	–
4 collectors, horizontal installation		1	2	–	–
5 collectors, horizontal installation		1	3	–	–
2 collectors, horizontal installation and 2 collectors, vertical installation		1	–	1	–
3 collectors, horizontal installation and 2 collectors, vertical installation		1	1	1	1
4 collectors, horizontal installation and 2 collectors, vertical installation		1	2	1	2

List of tools

- Wrenches: size 12, 14, 15, 17, 19, 20, 21, 24, 27
- Adjustable wrench, pipe wrench
- Pencil, felt tip pen or chalk
- Folding metre ruler, 10 m measuring tape
- Measuring cord, spirit level
- Rubber mallet, hammer
- Cable drum, protective goggles
- Cordless screwdriver and/or drill
- Angle grinder with stone disk (dry cut diamond), if you need to cut tiles
- Bit Torx 25 and 3 mm diam. metal drill
- Tenon saw for wood

- Cutter
- Tool box (bin/bucket) with roof hook

6.2 Structural Requirements

6.2.1 Roof Construction

The in-roof mounting kit designed for roof tiles is suitable for roof pitches from 22°.

No additional thermal insulation may be fitted to the rear of the collector.

Pipes must be installed and insulated in such a way that they do not come into contact with wood or other flammable materials.

The duration of stagnation states must be minimized, e.g. through demand-oriented design of the system, regeneration of geothermal probes/collectors or pool heating. A maximum of 4 weeks may elapse between installation and commissioning of the system.

Requirements for the roof

- Materials underneath the collector (sarking membrane and/or insulation) must be able to withstand temperatures up to 120°C.
- The roof must have a roof underlay. This must be spatially (at least 10 mm) and thermally separated from the back of the collector. National regulations and building codes must be observed.
- If the area of the roof on which the collectors are to be installed is uneven, this area (batten height) must be evened out using wedges (or additional battens with Jamo screws), so that the plates can be installed flat without any abrupt vertical or horizontal offset.

6.2.2 Edge and Corner Areas

Increased static loads occur at the edge area of the roof.



CAUTION

Risk of overloading the brackets

- Due to increased static load, the solar system must not protrude out to the edge areas of the roof unless special measures are taken (DIN EN 1991).
- If the solar system extends into the edge area, suitable measures for stabilising the system should be taken on-site.

The side edge area (e) applies for installation without elevation with a slope greater than 20°.

For roofs with a slope less than 30°, maintain a lower and upper edge area as well (e').

Side edge area (e):

$$e = b * 0,1$$

$$e = h * 0,2$$

Lower/upper edge area (e'), if necessary:

$$e' = l * 0,1$$

$$e' = h * 0,2$$

When calculating the edge areas, the **smaller value** is to be used as the minimum size of the edge area (e and possibly e').

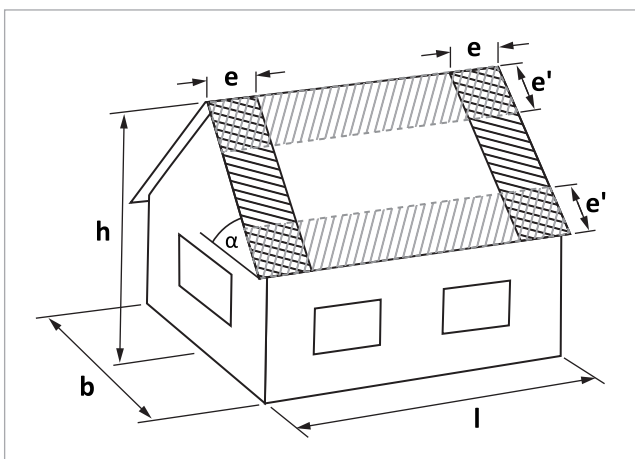


Fig. 41: Edge areas of the roof

- α Roof slope
- b Building width
- h Building height
- l Building length
- e Side edge area
- e' Lower/upper edge area

6.2.3 Snow and Wind Loads

Prerequisites

The following specifications apply to an overall load of snow and wind. Maintain the following conditions:

- Collectors may be installed on buildings no taller than 20 m.
- At the installation site the wind speeds must be lower than 130 km/h.
- The roof slope must conform to the values listed in the table → "Minimum roof slope".
- The roof substructure (statics) must be in perfect condition.
- Snow can slide off the roof unhindered (no snow guards, dormer windows or similar fixtures underneath the collectors).
- The roof surface does not have any height differences greater than 0.3 m.
- The roof surface must not be shaped in a way that allows piling up of snow.

Solvis cannot guarantee the product if any of the specified requirements are not fulfilled. Contact our Technical Sales department to determine if special measures can enable installation.

The snow load zone must first be identified to determine the design specifications, see → section "Snow and Wind Load Zones", p. 70.

Minimum roof slope depending on snow load zone and terrain height

The table shows the minimum roof slope according to the applicable standard DIN EN 1991.

Ground elevation above sea level	Minimum roof slope in [°] for snow load zone				
[m]	1	1a	2	2a	3
< 300	> 22	> 22	> 22	> 22	> 22
< 400	> 22	> 22	> 22	> 22	> 35
< 500	> 22	> 22	> 22	> 38	> 42
< 600	> 22	> 22	> 40	> 44	> 47
< 700	> 22	> 22	> 44	> 48	> 51
< 800	> 22	> 39	> 48	> 51	> 53
< 900	> 38	> 43	> 51	> 53	> 55
< 1000	> 42	> 46	> 52	> 55	> 56
< 1100	> 45	> 49	> 54	> 56	> 57
< 1200	> 47	> 51	> 56	> 57	> 58
< 1300	> 50	> 52	> 57	> 58	> 59
> 1300	On request				

In-roof installation is permissible in the shaded zones only if the installation frame is additionally reinforced (technical sales, telephone number see → section "Information About These Instructions", p. 2).

6.2.4 Dimensions and weight

Preparing installation

1. Measure the space needed for the entire system on the roof and mark the corners with chalk. Make sure to take the edge areas of the roof into account.

Dimensions and weight

Designation	Head measurement	Foot measurement
Collector length	2176	2168
Collector width	1176	1168
Collector weight	38 kg	
Field width	$n \times 1168 + (n-1) \times 30 + 240$	
Field height	$n \times 2168 + (n-1) \times 180 + 660$	

n = Number of collectors over width and height

• Vertical alignment

The position of the collector field is determined by the lower lead apron plates. These plates must be carefully aligned and positioned. The position of the individual collectors is determined by the components.

• Horizontal alignment

If possible, the collector system should be positioned so that it can be connected to the tiles on the sides without having to adjust the tiles themselves.



For systems with multiple rows of collectors, vertically mounted collectors must be aligned in a single vertical line. For this reason, the first collector in each new row must be aligned carefully.



CAUTION

Always pay attention to the gradient

Otherwise, there is a risk of moisture damage to the building.

- Top flashings and lead apron plates must always have an incline (in relation to a horizontal starting point) so that rain water cannot penetrate under the roofing and into the collectors.

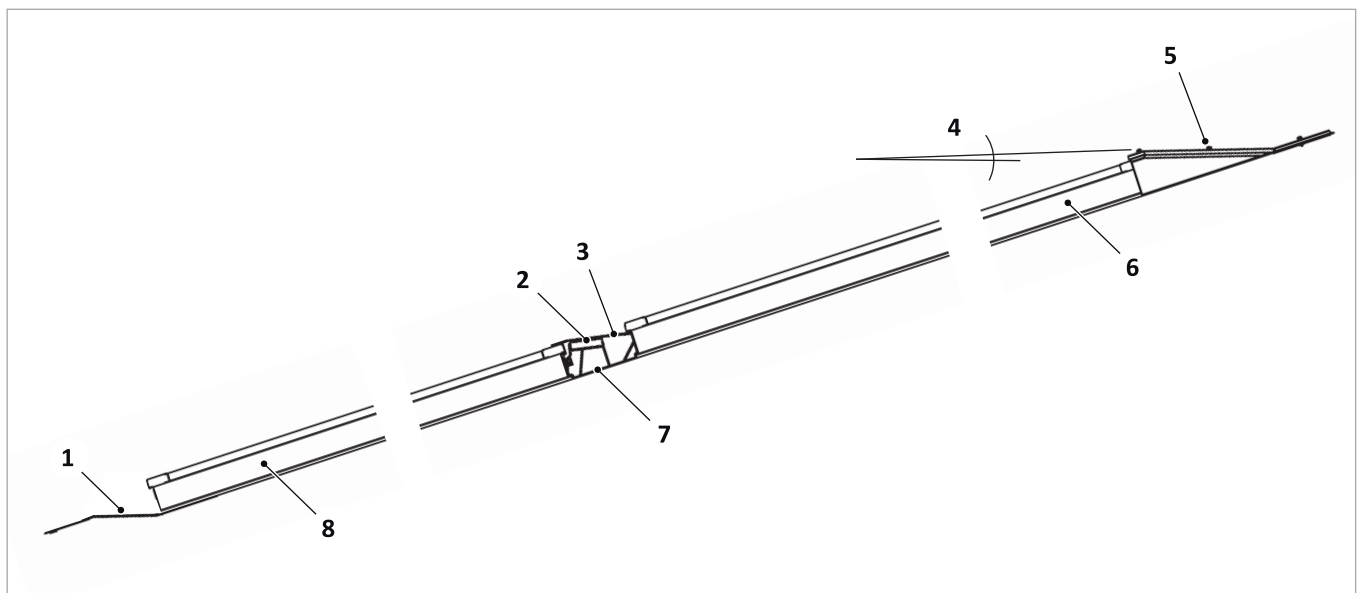


Fig. 42: Cross section of collector field with two rows

- 1 Lead apron
- 2 Intermediate flashing support
- 3 Intermediate flashing
- 4 Incline to collector

- 5 Top flashing
- 6 Upper collector
- 7 Collector spacer
- 8 Lower collector

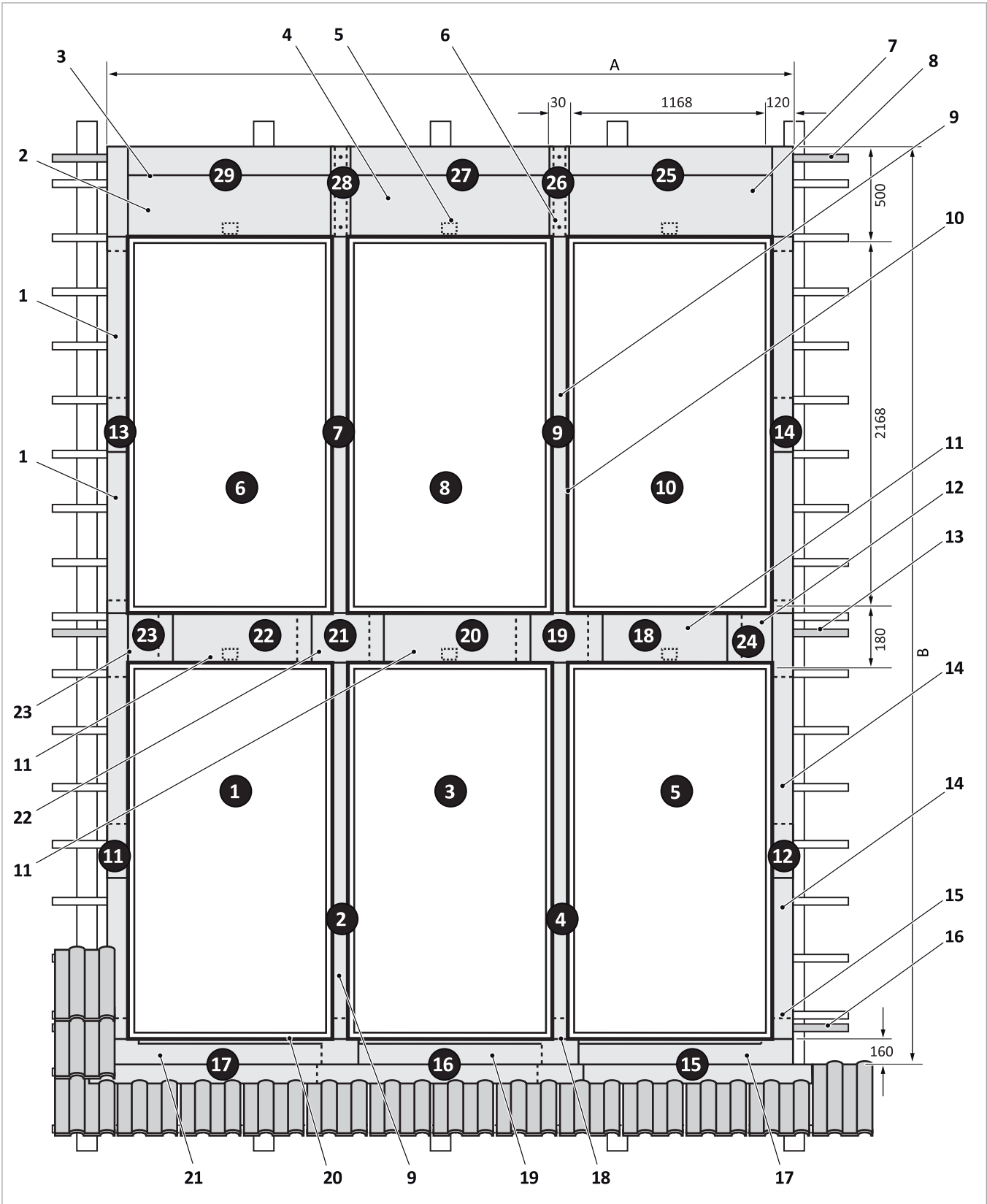


Fig. 43: Dimensions of an in-roof collector field with six SolvisCala collectors (dimensions in mm, collector dimensions are measured at the base (foot))

1 – 29 Installation sequence

- 1 Left side part
- 2 Left top flashing with corner
- 3 Bend in top flashing
- 4 Central top flashing
- 5 Mounting bracket
- 6 Top flashing connector
- 7 Right top flashing with corner
- 8 If necessary, additional battens ³⁾
- 9 Vertical central part
- 10 Collector frame
- 11 Intermediate flashing
- 12 Right intermediate flashing corner
- 13 If necessary, additional battens ²⁾
- 14 Right side part
- 15 Alignment line*
- 16 If necessary, additional battens ¹⁾
- 17 Right lead apron
- 18 Cover plate connector
- 19 Central lead apron
- 20 Cover plate
- 21 Left lead apron
- 22 Intermediate flashing junction
- 23 Left intermediate flashing corner

- * The alignment line for the upper edge of the lead apron plates is at a distance of 340 mm (measured from the upper edge of the lower row of tiles).

To support the cover plate, there must be battens in the following positions (install additional battens if necessary):

- ¹⁾ In the area between 180 and 320 mm, measured from the upper edge of the lower row of tiles
- ²⁾ At a distance of 145 mm (central line of batten), measured from the collector foot of the lower collectors
- ³⁾ In the area between 480 and 550 mm, measured from the collector foot of the upper collectors.

6.3 Collector Installation



CAUTION

Risk of corrosion

- Do not install the solar system on copper roofs or underneath copper components.



WARNING

Burn hazard when there is direct sunlight

Fluid that remains in the collector or steam released from the collector can cause scalding. Touching hot connections may cause burns.

- Perform work on the collectors only when the sun is not shining or when the collectors are covered.
- Remove the sun protection only after the (re-) commissioning of the solar plant.

6.3.1 Preparations

Preparing the roof surface

- Measure out the collector surface on the roof.
- Cover the roofing amply, but also in such a way that you can access the collectors from every side.

Bending the lead aprons

Bend the lead aprons onto the lower end plates as follows:

- First, bend the lead apron by 90°.
- Readjust at the right angle bracket using the rubber mallet.
- Then bend the lead aprons completely around and hammer them flat using the rubber mallet.

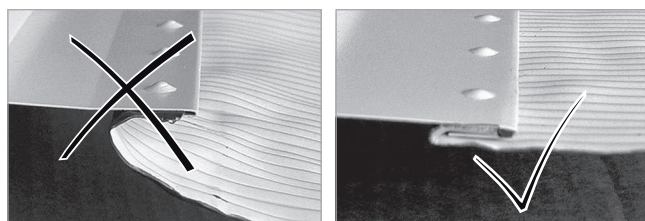
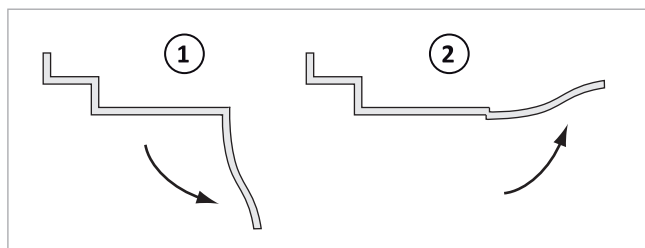


Fig. 44: Incorrect (left), correct (right)

Preparing for installation

- Check the position of the bottom batten: it must be located in the area between 180 and 320 mm (measured from the upper edge of the lower row of tiles).
- If there are **no** battens located in this area, an additional batten must be installed in the corresponding position.

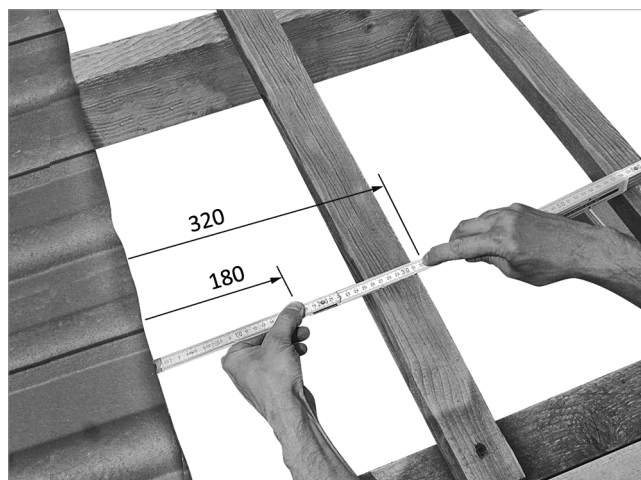


Fig. 45: Checking the position of the bottom batten

- Establish the position of the collector system in terms of width (including cover plates): if possible, the collector system should be positioned so that it can be connected to the tiles on the sides without having to adjust the tiles themselves.
- Mark the starting and ending points.



See also → "Dimensions" section, p. 9.

Positioning the lead aprons

The number of lead apron plates depends on the number of collectors in the row (1 plate per collector). An additional retaining plate supports the collectors using an angle profile.

The plates must be aligned as precisely as possible along a horizontal line.

- Measure 340 mm from the upper edge of the lower row of tiles. Measure the alignment line (e.g. using measuring cord).

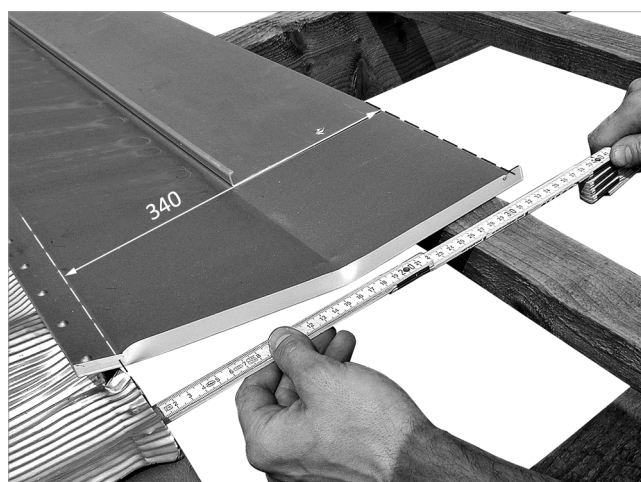


Fig. 46: Establishing the position of the lead apron plates

- Position the right-hand lead apron on the right side. The upper edge must lie on the alignment line.
- Screw on the plate in the area of the retaining plate.
 - Screw (5 x 80) at the height of a rafter
 - 4 additional screws (5 x 30), distributed over the entire width



Fig. 47: Positioning the first plate on the right and screwing it on

4. Remove the protective strips from the joint sealing strip on the top of the plate.

Depending on the number of collectors, you may need to install additional plates:

5. Position the next plate (central or left-hand lead apron) from the left. It must make contact with the retaining plate of the previous plate.

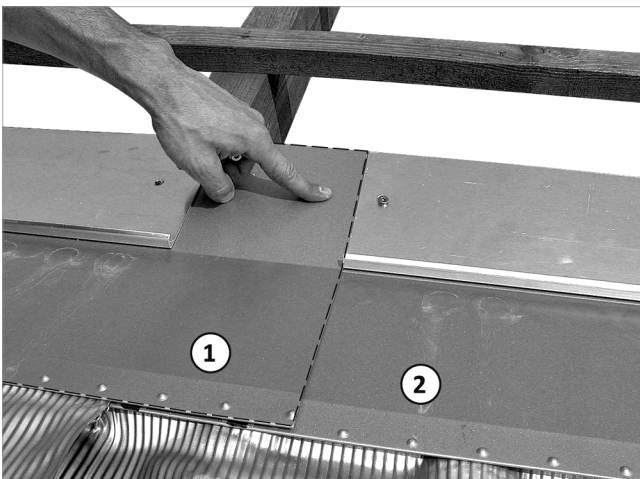


Fig. 48: Positioning the next plate from the left, adjusting it and screwing it on

6. Adjust the plate and screw it on. Then remove the protective strips from the joint sealing strip.



The outermost left lead apron plate has no joint sealing strip.

7. Finally, remove the protective strips from the joint sealing strip on the underside of the lead aprons and press the lead aprons onto the roofing tile.



Fig. 49: Removing the protective strips and pressing on the lead aprons

6.3.2 Lower Row of Collectors

Installing the first collector

The collectors are installed from left to right. The foot of the collector is pushed onto the retaining plate located on the lead apron plates.

1. Place the first collector on the left-hand side and push it onto the retaining plate.
2. Position the collector: the horizontal distance between the outer edge of the lead apron plate and the collector foot must be 120 mm.

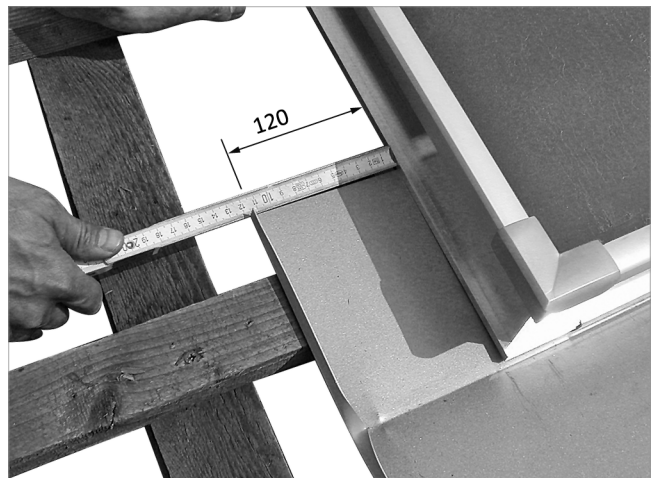


Fig. 50: Positioning the first collector on the left and establishing the horizontal spacing

3. Fasten the collector on the front at the top: attach the mounting bracket to a rafter using 3 Spax screws (5.0 x 80). Screw the collector onto the collector frame using 1 sheet metal screw (4.8 x 19, stainless steel).



Fig. 51: Fastening the collector to the rafter on the front at the top

Installing the vertical central plate

The vertical central plate is a connecting plate installed lengthwise between two collectors. The collars on both sides of the plate must lock into the slot under the clip profile.

1. Insert the connecting plate diagonally and place the metal collar onto the slot.
2. Rotate the metal collar to turn it into the slot and attach the connecting plate to the collector.

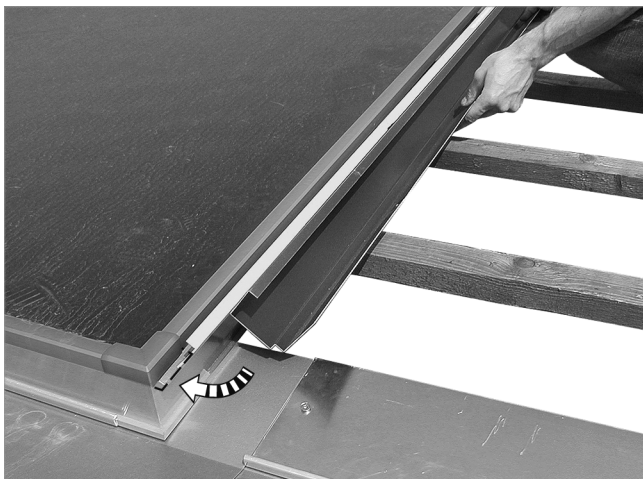


Fig. 52: Turning the connecting plate in

3. Push the connecting plate down until it locks into place and screw it onto the battens using Spax screws (5.0 x 30).



Fig. 53: Pushing the connecting plate down until it locks into the place and screwing it onto the battens

Installing additional collector(s)

1. Insert the next collector from the right.
2. Hold the collector approx. 20 mm above the adjacent collector. The slot in the clip profile of the collector must be held above the metal collar of the connecting plate.



Fig. 54: Setting down the next collector and pushing it down against the retaining plate

3. Set down the collector and push it down against the retaining plate.
4. Fasten the collector at the top using mounting brackets.

i If you plan to install another collector in the row, repeat the previous step outlined in “Installing the vertical central part”. Otherwise proceed to the next step, “Installing the side flashings on the left”.

Installing the side flashings on the left

The side flashings on each side consist of two identical individual parts.

1. Slide the upper part of the side flashing over the lower part of the side flashing.

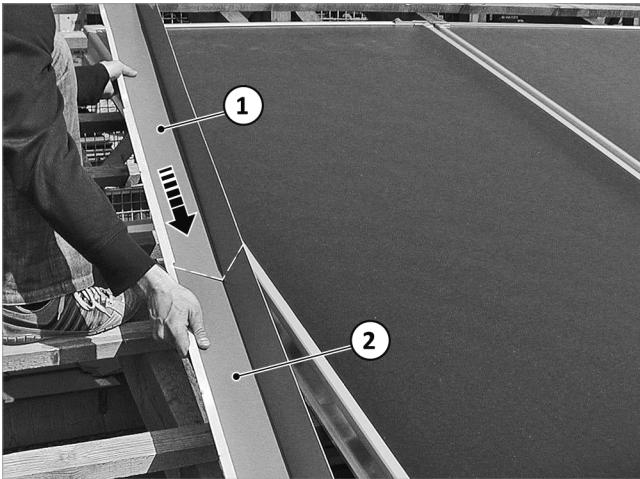


Fig. 55: Slide the upper part of the side flashing over the lower part of the side flashing.

- 1 Upper part of side flashing
- 2 Lower part of side flashing

2. Insert the entire flashing diagonally and position it next to the slot under the clip profile.
3. Use a turning motion to turn the flashing into the slot and attach the flashing to the collector.



Fig. 56: Positioning the flashing next to the slot under the clip profile, then attaching it to the collector

4. Slide the upper part of the side flashing up until it reaches the stop



Fig. 57: Sliding the upper part of the side flashing up until it reaches the stop

5. Slide the lower part of the side flashing down until it reaches the bend in the lead apron plate.

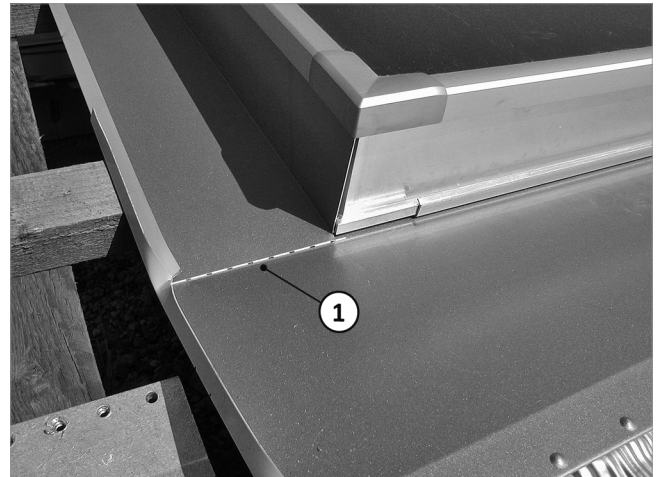


Fig. 58: Sliding the lower side flashing down until it reaches the bend

- 1 Bend

6. Fasten the flashing to the battens using metal retainers.



Fig. 59: Fastening the flashings to the battens using metal retainers

Installing the side flashings on the right

Proceed as described in the step "Installing the side flashings on the left." Reverse the procedure left to right.



The following steps describe the installation of the next (upper) row of collectors.

If the collector system consists of a single row only, continue with → section "Top Flashings", p. 60.

6.3.3 Upper Row of Collectors

Installing the collector spacers

In order to install the next row of collectors, collector spacers must be installed between the rows. The screw position is located at the top of installed collectors at a distance of 145 mm from the collector foot.

1. If the collector spacers cannot be installed in this area because there are no battens available, additional sheeting must be installed.
2. If necessary, support the sheeting so that it is flush with the battens.



Fig. 60: For additional rows of collectors, install additional sheeting above the collector if necessary.

Install a spacer on the left and right of each collector (distance from the centre of the spacer to the outer edge of the collector is 240 mm).

3. Position the collector spacers and screw them down onto the battens beneath.

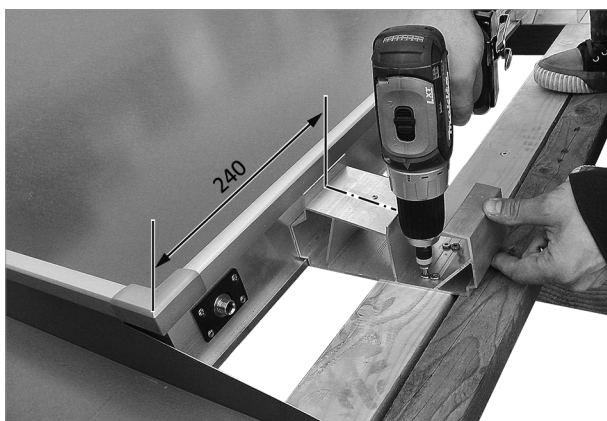


Fig. 61: Screwing on collector spacers at a distance to the left and right of the outer edge of the collector

Installing collectors

Installation of the upper row of collectors is similar to the installation of the lower row:

1. Place the first collector on the left-hand side and allow it to make contact with the collector spacers.



CAUTION

Ensure a positive fit

The bracket may otherwise fail.

- The spacers must form a positive fit on both sides of the collector foot.
- Wedge plastic beneath the spacers if necessary.

2. Position the outer edge of the collector so that it is aligned with the lower collector.



Fig. 62: Position of the collector spacers in relation to the collectors

3. Fasten the collector on the front at the top using a mounting bracket.
4. Install the vertical central part (connecting plate).
5. Install additional collectors and connecting plates until the outermost collector is on the right side.



See also → section "Lower Row of Collectors", p. 53:

- Installing the first collector
- Installing the vertical central part
- Installing additional collector(s).

Installing the side flashings on the left

The side flashings are identical for each row of collectors. They have two identical individual parts on each side. Installation of the upper row of collectors is similar to the installation of the lower row:

1. Slide the upper part of the side flashing over the lower part of the side flashing.



Fig. 63: Sliding the upper side flashing over the lower part

- 1 Upper part of side flashing
- 2 Lower part of side flashing

2. Insert the entire flashing diagonally and position it next to the slot under the clip profile.
3. Use a turning motion to turn the flashing into the slot and attach the flashing to the collector.



Fig. 64: Positioning the flashing next to the slot under the clip profile, then attaching it to the collector

4. Slide the upper part of the side flashing up until it reaches the stop



Fig. 65: Sliding the upper part of the side flashing up until it reaches the stop

5. Slide the lower part of the side flashing down until it reaches the lower edge of the collector frame. **Do not slide it past the lower edge.**

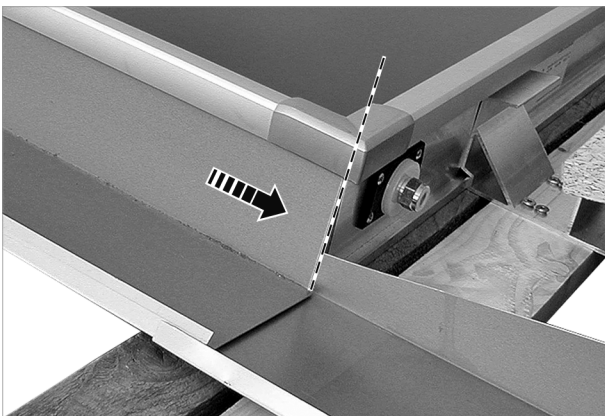


Fig. 66: Sliding the lower side flashing until it reaches the lower edge of the collector frame

6. Fasten the flashing to the battens using metal retainers.



Fig. 67: Fastening the flashings to the battens using metal retainers

Installing the side flashings on the right

Proceed as described in the step "Installing the side flashings on the left." Reverse the procedure left to right.

6.4 Installing the Flashings

6.4.1 Preparations

i You must perform the following work before proceeding with the installation (for further information see → section "Installing the Sensor", p. 63:

- Mounting the collector sensor
- Connecting collectors to the solar circuit
- Filling and pressure test.

Installing the intermediate flashing supports

To increase the stability of the plates between the collector rows, screw intermediate flashing supports onto the collector spacers.

1. Place the intermediate flashing supports onto the spacers.
2. Align them and then fasten them using Spax screws (5.0 x 30).



Fig. 68: Screwing intermediate flashing supports onto collector spacers

6.4.2 Intermediate Flashing Pieces

The space between the collector rows is covered using:

- One long piece of intermediate flashing per collector over the area of the intermediate flashing supports
- One or more junction plates
- One piece of intermediate flashing with corner on the outer left and right.

See also → Fig. 43, p. 50.

Installing the first piece of intermediate flashing

1. Stick the joint sealing strip on the upper edge of the lower row of collectors: begin on the side flashing and proceed along the entire width of the profile.



Fig. 69: Sticking joint sealing strip on the upper edge along the entire width

2. Position the first piece of intermediate flashing to the far right. Attach the metal collar to the slot under the clip profile.
3. Rotate the metal collar to turn it into the slot and attach the plate.
4. Press on the plate until it locks into position with the lower collector.

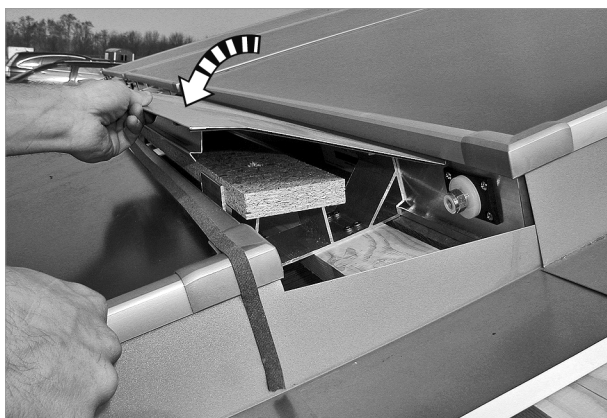


Fig. 70: Turning the first piece of intermediate flashing into the slot, positioning it and pressing it in

5. Position the plate: the distance from the right edge of the plate to the outer edge of the collector (head measurement) is 120 mm.



Fig. 71: Positioning the plate at the correct distance from the outer edge

6. Fasten the plate on the left side: screw it onto the intermediate flashing support, maintaining a minimum distance (10 mm) to the outer edge.



Fig. 72: Screwing on the intermediate flashing at least 10 mm from the outer left edge

Installing the first junction plate

The first junction plate is installed at the cross joint of the collectors (on the left next to the first intermediate flashing piece):

1. Position the junction plate: push the nose of the plate forward under the vertical connecting plate.
2. Attach the metal collar to the slot under the clip profile.
3. Remove the protective strips from the joint sealing strip on the underside of the junction plate.



Fig. 73: Removing the protective strips on the underside of the junction plate

4. Rotate the metal collar to turn it into the slot and attach the plate.
5. Press on the plate until it locks into position with the lower collector.

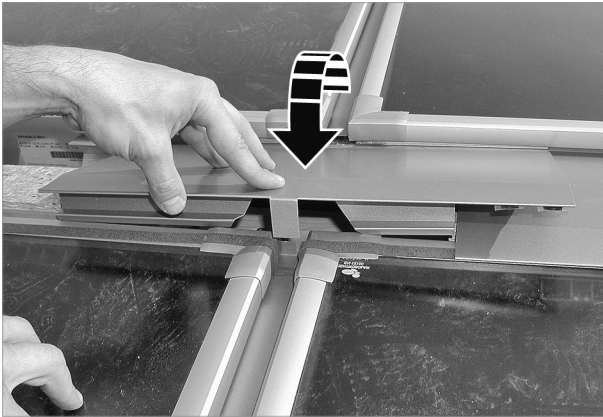


Fig. 74: Inserting the junction plate into the slot, positioning it and pressing it in



The junction plates do **not** need to be screwed into place.

Installing additional plates

1. Depending on the number of collectors, you may need to alternate between intermediate flashing pieces and junction plates. Before positioning the plates, remove the protective strips on the underside of the plate.



Fig. 75: Installing additional plates: removing the protective strips before positioning

Installing the intermediate flashing corners

1. Position the intermediate flashing corner on the right side. Attach the metal collar to the slot under the clip profile.

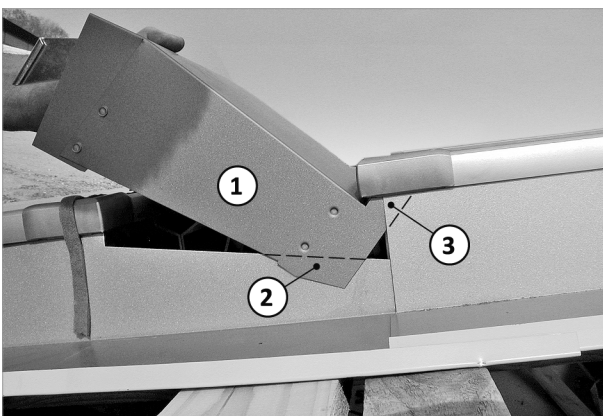


Fig. 76: Inserting the first intermediate flashing corner into the slot, positioning it and pressing it in



CAUTION

Check that the intermediate flashing corners are positioned correctly.

There is otherwise a risk of damage to the intermediate flashing.

The right side of the intermediate flashing corner (1) must:

- Cover the lower part of the side flashing (2)
- Be covered by the upper part of the side flashing (3).

2. Remove the protective strips from the joint sealing strip on the underside of the plate.
3. Rotate the metal collar to insert it into the slot and attach the plate.
4. Press on the plate until it locks into position with the lower collector.

6.4.3 Disassembling the Intermediate Flashing

Disassemble the intermediate flashing corners as needed

If you need to access the outer collector connections at a later time, proceed as follows to open the intermediate flashing corner:

1. Loosen the connection of the joint sealing strip: slide a cutter underneath the intermediate flashing corner and carefully cut along the lower plate.



Fig. 77: For access at a later time: loosening the connection between the plates ...

2. Press against the side and use leverage to flip up the plate.

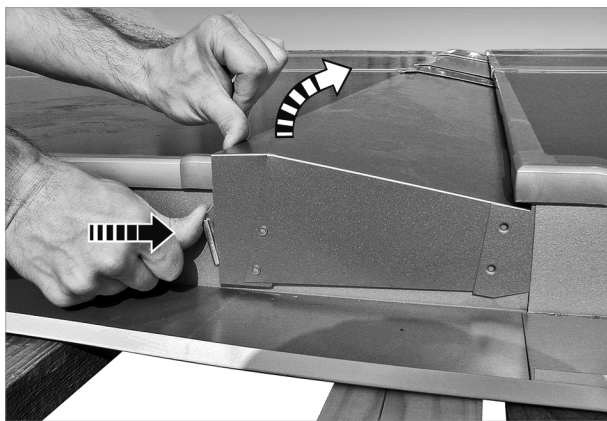


Fig. 78: ... pressing against the side and using leverage to flip up the intermediate flashing

i On the underside of each intermediate flashing, there is a plate bracket that attaches to the clip profile when the plate is locked into place. When a plate is removed at a later time, the plate bracket loses its tension. For this reason, make sure to bend it back before locking the plate back into place.

6.4.4 Top Flashings

The space above the collector is covered using:

- One top flashing (with corner) above the two outermost collectors
- Top flashings for the central collectors (for more than two collectors in a row)
- Connector(s) with upper and lower plate.

See also → Fig. 43, p. 50.

Installing the top flashing

1. Stick the joint sealing strip around the upper edge of the row of collectors: begin on the side flashing and proceed along the entire width of the profile.



Fig. 79: Sticking the joint sealing strip on the upper edge along the entire width of the profile

2. Check the position of the top batten: it must be located in the area between 480 and 550 mm (measured from the collector foot).



CAUTION

Install a batten if necessary.

It may otherwise not be possible to stably fasten the top flashings.

- An additional batten must be installed if a batten is not located in the area between 480 and 550 mm (measured from the collector foot).

3. Install the corresponding top flashing (with corner) over the two outermost collectors.
4. Place the top flashing on the side flashing and press it against the collector.

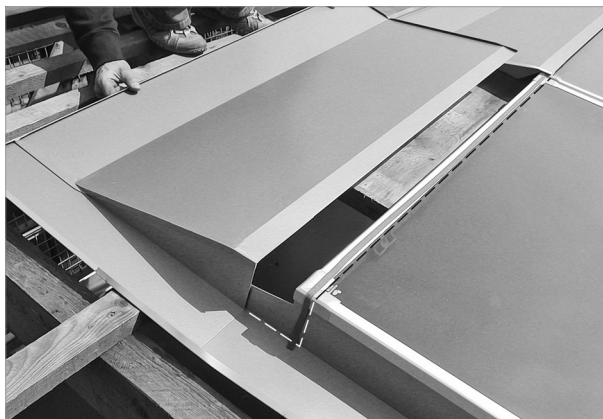


Fig. 80: Placing the top flashing on the side flashing and pressing it against the collector



The top flashings are positioned correctly when they are attached to the clip profile of the collector and completely cover the clip.

5. For more than two collectors in a row: press the top flashings (without corner) onto the central collectors.
6. At the butt joint of the top flashing: first push the **lower** plate of the connector until it is aligned under the top flashing.



Fig. 81: Pushing the lower plate of the connector under the top flashing

7. Position the **top** flashing of the connector to the butt joint.
8. Position holes in the **top** flashing so that they cover the thread adapters in the **lower** plate.

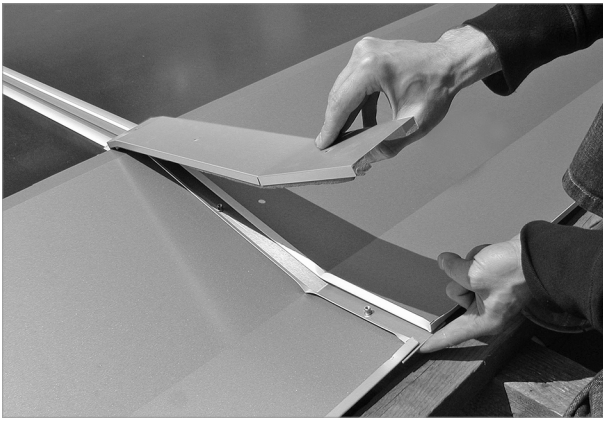


Fig. 82: Positioning the upper plate of the connector to cover the lower plate

9. Screw on the **upper** and **lower** plate using the screws and washers (included).

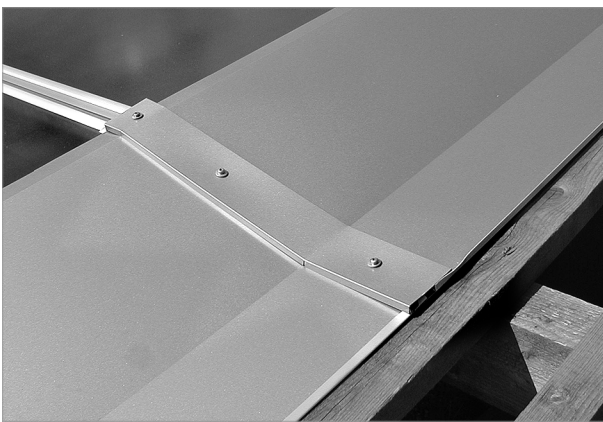


Fig. 83: Screwing the upper plate to the lower plate

10. Fasten the plates to the battens using metal retainers.

Installing the tile elevator (optional)

If the tiles hinge down too far when positioned, you can install tile elevators across the whole width of the top flashing.

1. Carefully position the roofing tiles.
2. If the tiles hinge down too far, install the tile elevators as shown in the figure, and bend the metal strips around the next batten.

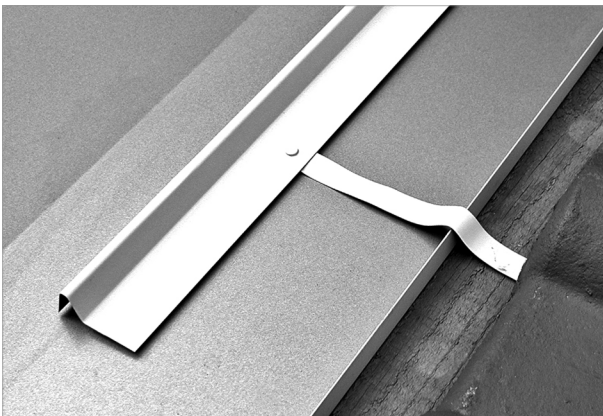


Fig. 84: Installing the tile elevator and bending the metal strips

i The row of tiles directly above the collector may extend only into the area between the bend of the top flashing and 50 mm above the bend.

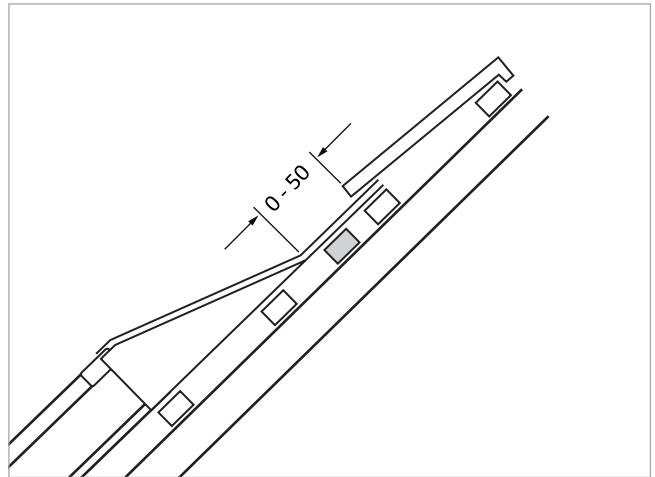


Fig. 85: Covering at the top (side view)

Installing the driving snow wedges

The driving snow wedges must be attached along the top and side flashings. The surfaces must be clean and dry for the adhesive to hold.

1. Remove the protective strips and attach the wedges with the diagonal side facing outwards (see arrow). Distance to the outer edge is approx. 30 mm.

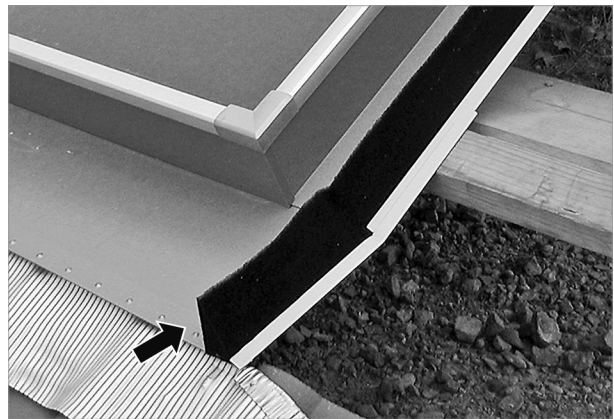


Fig. 86: Driving snow wedge attached

6.4.5 Final Tasks

Tiling the roof

1. Position tiles around the collectors.

In order to avoid storm damage, you must observe the following measures:

2. **For the side flashings:** For tiles that do **not** fit exactly against the side flashing, remove the stoppers with a hammer and fasten the tiles.



Fig. 87: Removing stoppers as necessary

3. **Near the top flashings:** Secure every third tile. Drill through the tiles using a 6 mm bit and fasten using Spax screws (alternatively, you can use storm safety devices).



Fig. 88: Fastening the tile next to the side flashing

Installing the cover plate

You will now install cover plates on the bottom front of the first (lower) row of collectors:

1. **Insert a small plate:** Push the nose of the plate forward under the vertical connecting plate. Then position the plate so that it is tight.

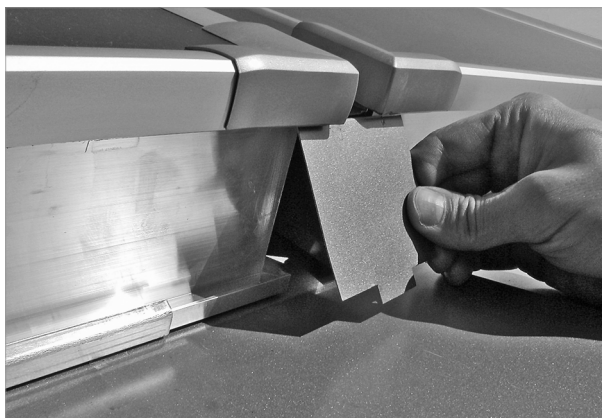


Fig. 89: Positioning the small plates in front of the gaps between the collectors

2. **Insert a long casing plate:** Place the wire springs of the plate on the slot of the clip profile and the plate against the collector frame with a rotating motion.
3. Next, press the plate upwards and against the collector at the same time. When you set the plate down, it locks into position.

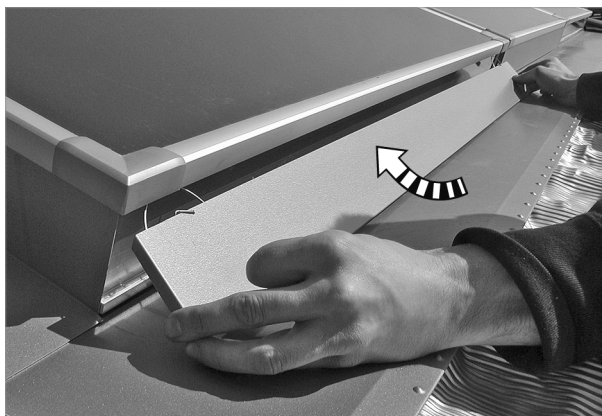


Fig. 90: Positioning the long casing plates on the front of the collectors

6.4.6 Disassembling the Casing Plate



In order to remove the plate, slide a flat plastic object (e.g. ice scraper) underneath the plate and press it upwards. Then turn it to remove the plate.

7 Installing the Sensor

i In order for the system to function properly, it is important that the sensor is positioned correctly.

- Always attach the sensor on the side of the collector where the solar flow is located.

Preparing installation

1. Push the PG screw fitting parts onto the collector sensor.

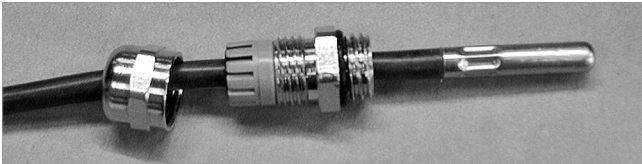


Fig. 91: Pushing the PG screw fitting onto the collector sensor

i The collector sensor is always installed at the output of the solar flow.

Installing the Sensor

1. Set clamp ring screw connection with T-piece on the collector connection (flow) and tighten by hand.
2. Tighten the clamp ring screw connection that has been tightened by hand with the open-end wrench (maximum of one rotation, hold in place).
3. Push the sensor into the sensor sleeve as far as it can go.
4. Screw in the front part of the PG screw fitting to the connection.
5. Tighten the union nut.



Fig. 92: Install sensor (solar flow)

i The sensor must be activated by the control using the **collector start** function.

Installing the lightning protection box

1. To protect the control from overvoltage, place a lightning protection box as close as possible to the collector (beneath the roof, for example).
2. Then extend the sensor cable over the lightning protection box connection to the control.



CAUTION

Pay attention to the sensor line when extending.

- The line you use must at least meet the requirements for temperature and UV radiation in the installation location.
- Use only shielded lines.
- Use a protective conduit to prevent damage by animals or mechanical strain.
- For extension up to 50 m: (2-wire, 0.75 mm²)
- For extension over 50 m: (2-wire, 1.5 mm²)

Final Tasks



CAUTION

Note the following for wall-mounted installation with slope angles greater than 60°

Possible reduction in solar yields or collector damage due to moisture.

- Fit the top of the collectors on-site with a suitable cover plate.
- See → section "Wall-Mounted Installation", p. 38.

8 Hydraulic Connection



CAUTION

Longitudinal thermal expansion

Leaks may arise due to material expansion/contraction.

- Install only flexible connection lines in the collector field.
- Recommendation: Use the connection sets and connectors offered.

Outlet turret

Vent tiles that are made for most roofing are particularly well suited for the outlet turret of the solar lines. The flexible connection set ROS-12-FLX facilitates outlet turrets.

Connecting collectors to the solar circuit

1. Push the flexible pipe (e.g. ROS-12-FLX) onto the return connection. For SolvisCala Eco, use connection angle from TST-SEN-CE or ASS-CE and do not forget the support sleeve on the collector.
2. Tighten the clamp ring screw connection that has been tightened by hand with the open-end wrench (maximum of one rotation, hold in place).
3. Push the other end of the flexible pipe onto the solar circuit connection and tighten as described in step 2. Do not forget the support sleeves.



Fig. 93: Connect return

4. Repeat the process on the solar flow T-piece on the last collector. For SolvisCala Eco, do not forget the support sleeve on the collector.



Fig. 94: Connect flow

5. Insulate pipes and T-piece with sensor in accordance with the Building Energy Act (GEG) or the applicable national regulations.

Connecting the collectors

Proceed as follows for collectors connected in series:

1. Put the collector connectors, e.g. VB-C-12-N, on the horizontally mounted collector connections and tighten the clamp ring screw connection by hand. For SolvisCala Eco, do not forget the support sleeve on the collector.
2. Tighten the clamp ring screw connection that has been tightened by hand with the open-end wrench (maximum of one rotation, hold in place).

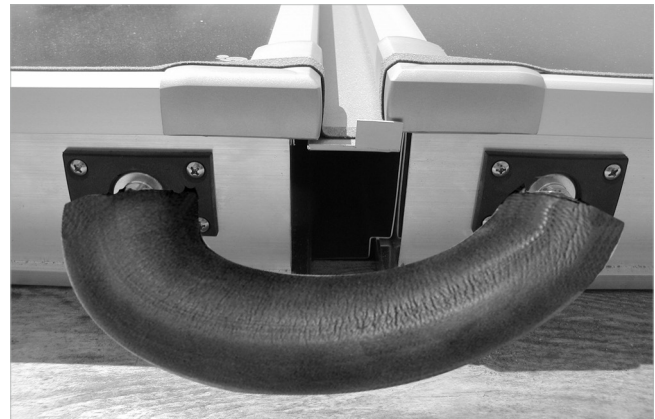


Fig. 95: Connecting the horizontally mounted SolvisCala collectors

9 Start-Up

Before commissioning, check the solar circuit for leaks using compressed air. Observe the blow-off pressure of the safety valve!



WARNING

Risk of hot steam escaping when working on the solar system

Scalding of hands and face possible.

- Carry out work on solar syst. only when there is no direct sunl. or when collect. are covered.



CAUTION

When filling the solar circuit:

- Fill only with original Tyfocor LS-rot ready-mixed heat transfer fluid and flush.
- Using other types of heat transfer fluid in this system is prohibited because it may damage the solar circuit components.
- Use only the Füll-Jet unit to flush and fill the system (please order separately).

Heat transfer fluid

Solvis can only guarantee correct performance when Tyfocor LS-rot heat transfer fluid, which has been designed especially for use in Solvis systems and collectors, is used. The corresponding safety data sheet in accordance with 91/155/EEC is included with the canister.

Fill, flush and vent the solar circuit in accordance with the installation instructions for the solar heat transfer station or solar storage tank. Then set the solar operating pressure and check the connections again for leaks.

Setting the solar operating pressure

1. Set the solar operating pressure approx. 0.3 bar higher than the admission pressure of the solar expansion vessel (e.g. admission pressure 3.1 bar, solar operation pressure 3.4 bar).
2. When the solar operating pressure has been reached, close the flushing valve.

The collector can be operated with an operating pressure of up to 6 bar. However, the higher the pressure, the higher the temperature load on the solar fluid. Therefore, do not set the pressure higher than calculated.



A calculation table sheet for the expansion vessel design (and a primary solar tank where applicable) and for determining the admission pressure and system filling pressure can be downloaded using the following link:



https://extranet.solvis.de/public/user_upload/MAG_Nachdruckhaltung_ab.xls



Fill and commission the system in accordance with → chapter "Commissioning" in the installation instructions for the relevant system.

10 Maintenance

You must perform an annual check of the pH value of the heat transfer fluid using suitable testing equipment.



Maintain the system according to → *section “Maintenance and Care” in the installation instructions and the maintenance reports for the respective system.*

11 Decommissioning

If the system is taken out of operation for a longer period or permanently it must be drained. Collect the solar fluid and dispose of it properly.

Ensure that as little solar fluid residue as possible remains in the collectors. For this reason, the solar circuit should preferably be drained using compressed air.

**CAUTION****Risk of deposits**

- Once the collector has been previously filled with solar liquid, it may not be exposed to sunlight when empty.

Observe the safety notes when disassembling the system, see → *section "Safety Notes", p. 5.*

**WARNING****Burn hazard when there is direct sunlight**

Fluid that remains in the collector or steam released from the collector can cause scalding. Touching hot connections may cause burns.

- Perform work on the collectors only when the sun is not shining or when the collectors are covered.
- Remove the sun protection only after the (re-) commissioning of the solar plant.

Environmentally-sound reuse

Old Solvis collectors may be returned to the factory free of charge and then recycled in an environmentally friendly manner.

12 Technical Data

12.1 General Specifications

Collector parameters for SolvisCala

Name	Unit	C-254-C	C-254-E
Dimension (gross surface area)	mm (m ²)	2176 x 1176 x 98 (2.56)	2168 x 1168 x 93 (2.53)
Opening surface area*	m ²	2.40	2.4
Absorber surface area	m ²	2.38	2.38
Total weight	kg	38	39
CE label	–	✓	✓
Anti-reflective glass	–	✓	–
Glass transmission	%	> 96	> 91
Absorber type	–	Aluminium with mirotherm® Control coating (96% absorption, emission dependent on temperature)	Aluminium with mirotherm® coating (95% absorption, 5% emission)
Climate class	–	very sunny	
Impact resistance	–	Hail impact test 150 g steel ball from 2 m height: no damage	
Solar Keymark register no.	–	011-7S3099 F	011-7S2768 F
Solar Keymark certificate	–	see → http://www.dincertco.com	

* Effective surface area according to EN 12975

12.2 Connection Dimensions

Centre-to-centre distances for the connectors

For more information on the position of the connectors, see → section "Hydraulics", page 15.

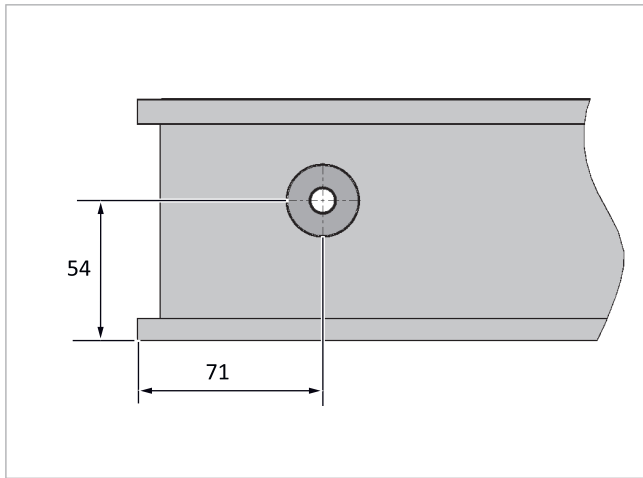


Fig. 96: Position of connection on SolvisCala C-254-E

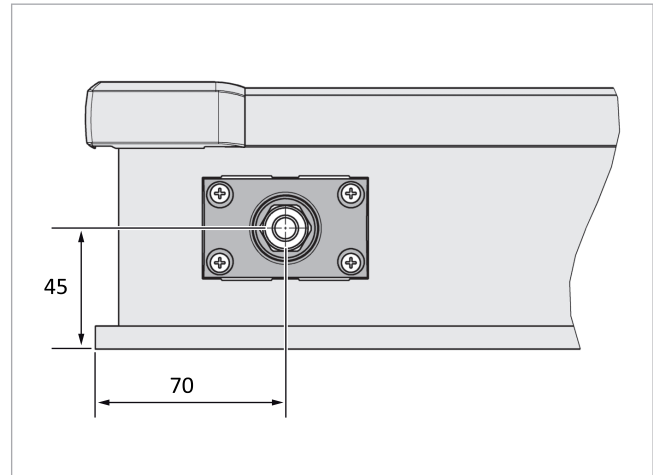


Abb. 97: Position of connection on SolvisCala C-254-C

12.3 Hydraulic Specifications

SolvisCala hydraulics

Name	Unit	C-254-C	C-254-E
Heat transfer fluid content	l	2.5	2.1
Hydraulics	–	2 x 6 pipes, serial flow	1 x 10 pipes, serial flow
Rated flow	l/(h m ²)	15 to 40	15 to 40
Connection	mm	18 (clamp ring)*	12 (clamp ring)
Pipe diameter in the meander	mm	12 x 0.5	12 x 0.4
Operating pressure	bar	4	4

* Reductions to 12 and 15 mm enclosed

12.4 Pressure Loss

SolvisCala C-254-C

Under the following conditions

- 2 x 6 pipes with serial flowthrough
- Solar liquid 40% Tyfocor/60% water
- Average collector temperature 40 °C

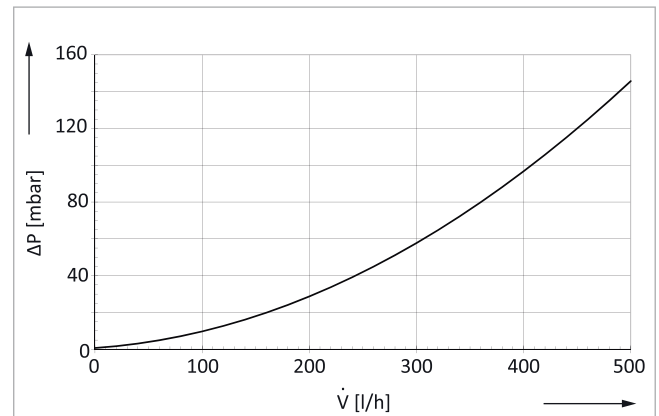


Fig. 98: SolvisCala C-254-C pressure loss curve

$\dot{V}$ Volume flow [l/h]

Δp Pressure loss in [mbar]

SolvisCala C-254-E

Under the following conditions

- 1 x 10 pipes, serial flow
- Solar liquid 40% Tyfocor/60% water
- Average collector temperature 40 °C

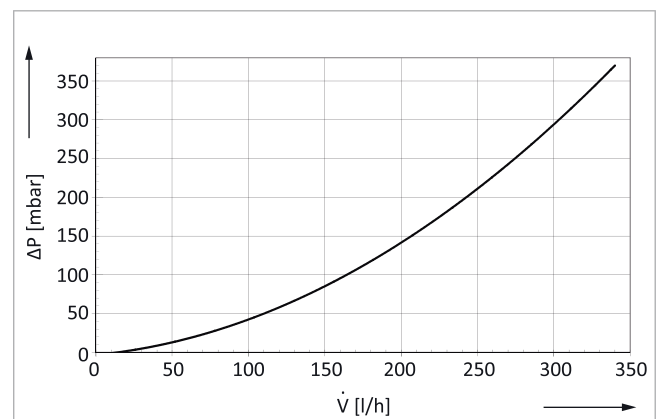


Fig. 99: Pressure loss curve SolvisCala C-254-E

$\dot{V}$ Volume flow [l/h]

Δp Pressure loss in [mbar]

13 Appendix

13.1 Snow and Wind Load Zones

For the structural design of the support structure, it is necessary to know and observe the additional snow and wind load in your region. These loads can be determined using the information from snow and wind load zones. This is the only way to ensure safe installation of the solar system.

The illustrated map provides an overview of the distribution of snow and wind load zones.

Contact the local authorities for the classifications of the standard snow load for the region.

i Contact Solvis if the standard snow load at the installation location is greater than the specifications in EN 1991 according to the local authorities responsible.

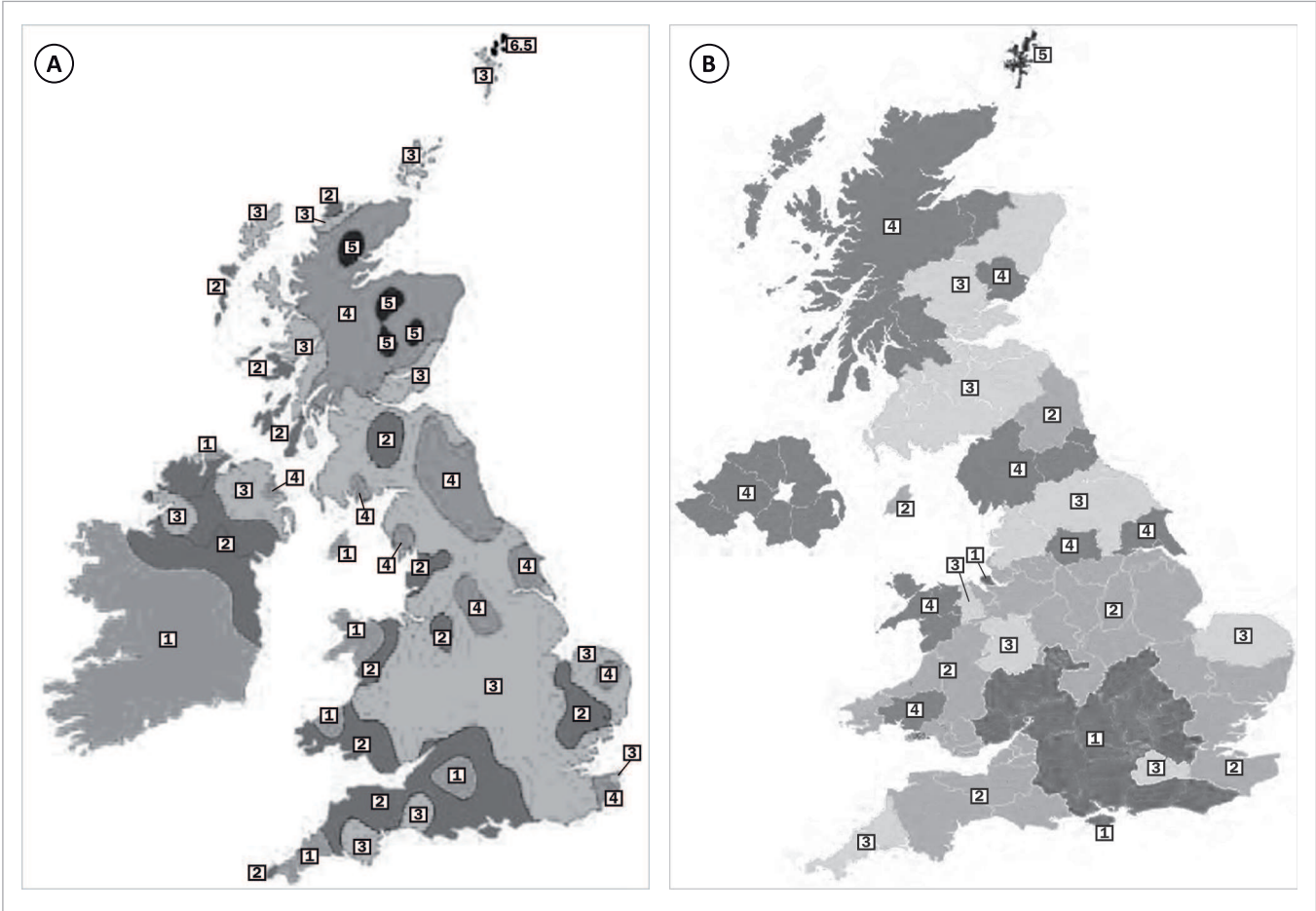


Fig. 100: Distribution of snow and wind load zones in Great Britain

A Snow load zones

B Wind load zones

13.2 Product Fiche



Product fiche collector

Scheda di prodotto di / Ficha del producto de / Ficha de produto de / Fiche de produit de / Productkaart voor de collector

Solvis GmbH
Grotrian-Steinweg-Str. 12
38112 Braunschweig - Germany

Information according to regulation / Informazioni secondo la normativa / Información según reglamento / Informação de acordo com regulamento / Information conforme à la règlement / Informatie volgens verordening:

→ installation instructions / istruzioni per il montaggio / instrucciones de montaje / instruções de montagem / instructions de montage / montage-instructies

Information in accordance with Annex IV

Informazioni in conformità all'Allegato IV / Información de acuerdo con el Anexo IV / Informações em conformidade com o anexo IV / Informations conformément à l'annexe IV / Informatie overeenkomstig bijlage IV

1	2	3									
		SolvisCala			SolvisLuna	SolvisFera					
		C-254-C	C-254-EC	C-254-E	LU-304	F-554-D	F-654-D	F-804-D	F-553-I-AR	F-653-I-AR	F-803-I-AR
4	$A_{sol(g)}$ [m²]	2,56	2,53	2,53	2,87	5,61	7,01	8,40	5,61	7,01	8,40
5	η_{col} [%]	60	57	58	54	62	62	62	63	63	63
6	η_o [%]	79,0	74	74,8	57,7	77	77	77	77,6	77,6	77,6
7	a_1 [W/(m²K)]	3,87	3,76	3,28	0,67	3,13	3,13	3,13	3,05	3,05	3,05
8	a_2 [W/(m²K²)]	0,018	0,009	0,021	0,004	0,014	0,014	0,014	0,016	0,016	0,016
9	IAM [-]	0.92	0.92	0.94	1.00	0.93	0.93	0.93	0.94	0.94	0.94

For collector gross area / Per l'area lorda del collettore / Para área bruta del colector / Para área Bruta do Coletor / Pour la surface brute du collecteur / Voor collector bruto oppervlakte

- Collector values / Valori da collezione / Valores de colector / Valores do coletor / Valeurs du collecteur / Collectorwaarden
- Abbreviation / Abbreviazione / Abreviatura / Abreviatura / Abréviation / Afkorting
- Solar collector / Collettore solare / Colector solar / Coletor solar / Capteur solaire / Zonnecollector
- Reference surface / Superficie di riferimento / Superficie de referencia / Superfície de referência / Surface de référence / Referentieoppervlakte
 $A_{sol(ap)}, A_{sol(g)}$ [m²]
- Collector efficiency / Efficienza del collettore / Eficiência do coletor / Rendement du capteur / Collectorefficiëntie η_{col} [%]
- Optical efficiency / Efficienza ottica / Eficiência óptica / Efficacité optique / Optische efficiëntie η_o [%]
- Linear heat transfer coefficient / Coefficiente di trasmissione termica lineare / Coeficiente de transferencia de calor lineal / Coeficiente de transferência de calor linear / Coefficient de transfert de chaleur linéaire / Lineaire warmteoverdrachtscoëfficiënt a_1 [W/(m²K)]
- Square heat transfer coefficient / Coefficiente di trasmissione termica quadrato / Coeficiente de transferencia de calor cuadrado / Coeficiente de transferência de calor quadrado / Coefficient de transfert de chaleur carré / vierkante warmteoverdrachtscoëfficiënt a_2 [W/(m²K²)]
- Incident angle modifier / Modificatore dell'angolo di incidenza / Modificador ángulo de incidencia / Modificador de ângulo de incidência / Agent de modification de l'angle d'incidence / Invalshoek modifier IAM [-]

Fig. 101: Product data sheet

13.3 Statics project sheet for the installation of the collector

Address	Request from:		Construction project:			
	Name				Preparation required by:	
	Street					
	Post code / town					
	Phone					
	Fax/e-mail					
Valid only for Germany! Height above sea level [m]:						
Geographical data	Snow load zone or snow load in [kN/m ²]:	☐ 1	☐ 1a	☐ 2	☐ 2a	
		☐ 3	☐ or snow load in [kN/m ²]:			
	Wind load zone or reference speed [m/s]:	☐ I	☐ II	☐ III	☐ IV	
		☐ or reference speed in [m/s]:				
Terrain category:	☐ Open sea, flat land	☐ Agricultural area	☐ Suburban area, industrial area	☐ Urban area		
	☐ Mixed profile by the coast	☐ Mixed profile inland				
Building data, geographical data	Installation height* c [m]:			☐ Wall-mounted installation $\alpha = 90^\circ$ $75^\circ > \alpha > 45^\circ$ 		☐ Flat roof mounted installation
	Ridge length a [m]:					
	Verge length d [m]:					
	Roof slope α in [°]:					
	Installation type	☐ Lean-to roof	☐ Gable roof/butterfly roof	☐ Hipped roof		
	☐ In-roof ☐ Roof-mounted, tile ☐ Roof-mounted, plain tiles ☐ Roof-mounted, standing seam ☐ Roof-mounted, corrugated ☐ Roof-mounted,					
	* The highest point of the surface to be built on is decisive. For free-standing installations on the ground , please enter 0 metres as the decisive height.					
Notes						

For the accuracy of the information:

(Location, date)

(Name in block letters)

(Signature)

13.4 Solar Keymark certificate

The Solar Keymark certificate and the corresponding data sheet can be viewed at <http://www.dincertco.com>.

13.5 Accessories



All accessories are listed in the → *Solvis price list*.

13.6 Nameplate

Each unit has a product-specific nameplate that indicates the most important parameters. The contents are explained using this example.

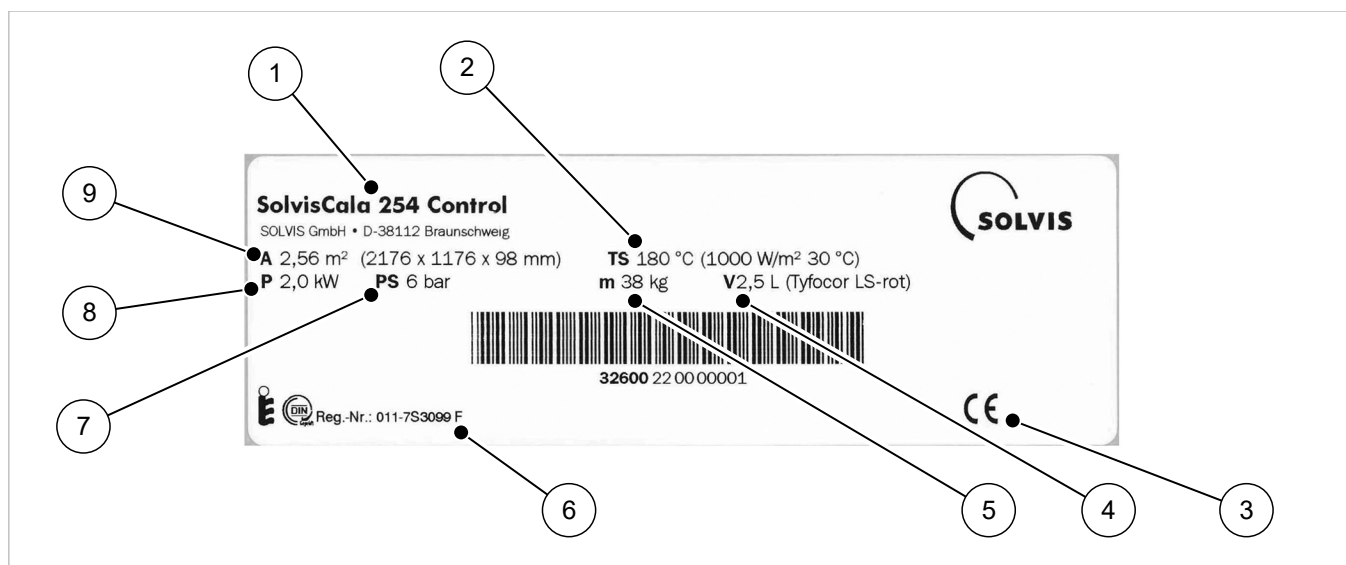


Fig. 102: SolvisCala sample nameplate

- 1 Type designation and manufacturer
- 2 Idle temperature
- 3 Conformity marking
- 4 Heat transfer fluid volume
- 5 Weight
- 6 Keymark registration
- 7 Permitted operating pressure
- 8 Max. performance
- 9 Gross surface area and collector dimensions

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