Installation and maintenance instructions

auroTHERM exclusive

VTK 570/2

VTK 1140/2

BE (fr), CH (fr), FR

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Contents

1 Safety

1.1 Action-related warnings

Classification of action-related warnings

The action-related warnings are classified in accordance with the severity of the possible danger using the following warning signs and signal words:

Warning symbols and signal words

Danger!
Imminent danger to life or risk of severe personal injury

Danger!
Risk of death from electric shock

Warning.
Risk of minor personal injury

Caution.
Risk of material or environmental damage

1.2 Intended use

There is a risk of injury or death to the user or others, or of damage to the product and other property in the event of improper use or use for which it is not intended.

The Vaillant **auroTHERM VTK**
auroTHERM VTK tube collectors are used for solar heating support and for solar-supported domestic hot water generation.

The collectors must only…

– Be installed vertically. Horizontal installation is not permitted.
– Be operated with Vaillant ready-mixed solar fluid (Tyfocor LS).
– Be combined with components (fastening, connections, etc.) and installation components that are supplied by Vaillant.

Installation of the collector in or on a vehicle is not permissible and is considered improper. Units that are not classed as vehicles are those that are installed in a fixed and permanent location (known as "fixed installation").

Intended use includes the following:

– observance of accompanying operating, installation and maintenance instructions for the product and any other system components
– installing and setting up the product in accordance with the product and system approval
– compliance with all inspection and maintenance conditions listed in the instructions.

Intended use also covers installation in accordance with the IP code.

Any other use that is not specified in these instructions, or use beyond that specified in this document, shall be considered improper use. Any direct commercial or industrial use is also deemed to be improper.

Caution.

Improper use of any kind is prohibited.

1.3 General safety information

1.3.1 Risk caused by inadequate qualifications

The following work must only be carried out by competent persons who are sufficiently qualified to do so:

– Set-up
– Dismantling
– Installation
– Start-up
– Inspection and maintenance
– Repair
– Decommissioning

► Proceed in accordance with current technology.

1.3.2 Risk of death due to falling collectors

► Sufficiently secure all collectors from falling.

1.3.3 Risk of death caused by inadequate fastening

The products may fall if they are not sufficiently secured to the roof. Observe the following information in order to install the products securely:

► Only install the products on a roof that has adequate load-bearing capacity. Ensure that a structural engineer has confirmed the load-bearing capacity of the roof.

- ▸ Clear out and sufficiently block off the areas below the roof before the installation. Use signs, for example, to mark the hazard area.
- ▸ Only install the products using the fastening systems that are described in these instructions.
- ▸ Carry out all of the work steps as described in these instructions.

1.3.4 Risk of death and material damage due to contact corrosion

For roofs or façade sections made of metals more precious than aluminium (e.g. copper roofs), contact corrosion may occur on the anchors. As a result, the anchors may buckle and the products may fall.

- ▸ Use suitable underlays to separate the metals.

1.3.5 Risk of burns, scalds and frostbite due to hot and cold components

There is a risk of burns and frostbite from some components, particularly uninsulated pipelines.

- ▸ Only carry out work on the components once they have reached environmental temperature.

1.3.6 Risk of injury due to the heavy weight of the product

- ▸ Make sure that the product is transported by at least two people.

1.3.7 Risk of burns caused by hot product surfaces

The products become very hot when the sun is shining. If you touch the products without protection, you could burn yourself.

- ▸ Ensure that the collectors are covered before starting the installation.
- ▸ Remove the sun protection film installed at the factory only after the solar system has been started up.
- ▸ Avoid performing installation and maintenance work under direct sunlight.
- ▸ You should preferably perform the work in the morning.
- ▸ Wear suitable protective gloves.

1.3.8 Risk of injury due to breaking glass

The glass of the collectors may break due to mechanical impact or torsion.

- ▸ Wear suitable protective gloves.
- ▸ Wear suitable protective goggles.

1.3.9 Material damage due to overvoltage

Overvoltage may damage the solar system.

- ▸ Earth the solar circuit to provide equipotential bonding and overvoltage protection.
- ▸ Secure the pipe clamps for earthing to the pipelines.
- ▸ Connect the pipe clamps for earthing to a busbar using a 16 mm² copper cable.

1.3.10 Material damage due to lightning

Lightning may damage the solar system.

- ▸ Connect the solar system to a lightning protection device in accordance with the applicable regulations.

1.3.11 Material damage due to snow falling from roofs

If the solar system is installed below a sloping roof, then snow falling from the roof may damage the collectors.

- ▸ Install snow guards above the solar system as protection against falling snow.

1.3.12 Material damage caused by a high-pressure cleaner

High-pressure cleaners may damage the collectors due to the extremely high pressure.

- ▸ Never clean the collectors with a high-pressure cleaner.

1.3.13 Risk of material damage caused by frost

Water residue in the collector may freeze in frosty conditions and damage the collector.

- ▸ Only fill and flush the solar circuit with our ready-mixed solar fluid.
- ▸ Check the solar fluid regularly with an anti-freeze tester.

1.3.14 Risk of material damage caused by using an unsuitable tool

- ▸ Use the correct tool.

1.4 Regulations (directives, laws, standards)

- Observe the national regulations, standards, directives, ordinances and laws.

1.5 Accident prevention regulations

- Observe all regulations that ensure safe work when mounting collectors at the appropriate heights.

2 Notes on the documentation

2.1 Observing other applicable documents

► Always observe all the operating and installation instructions included with the system components.

2.2 Storing documents

► Pass these instructions and all other applicable documents on to the end user.

2.3 Validity of the instructions

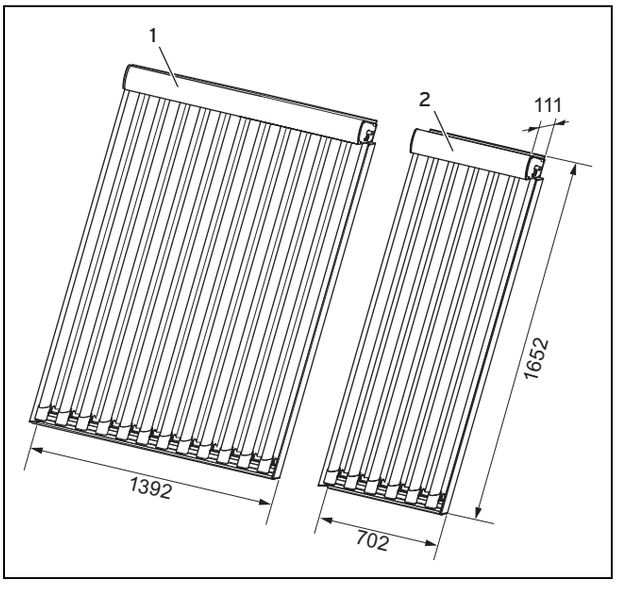
These instructions apply only to:

Product article number

VTK 570/2	0010002225
VTK 1140/2	0010002226

3 Product description

3.1 Product overview



1 VTK 1140/2 2 VTK 570/2

3.2 Information on the data plate

Information on the data plate	Meaning
	Solar Keymark: The collectors have been successfully tested according to the rules and requirements for the Solar Keymark.
	Read the set-up instructions.
VTK 570/2 VTK 1140/2	Type designation
VTK	Vaillant tube collector
570, 1140	Collector output
/2	Unit generation
 21054500100028300006000001N4	Barcode with serial number The 7th to 16th digits of the serial number form the article number

3.3 CE marking

The CE marking shows that the products comply with the basic requirements of the applicable directives as stated on the data plate.

The declaration of conformity can be viewed at the manufacturer's site.

4 Set-up

4.1 Preparing on-roof mounting and flat-roof installation

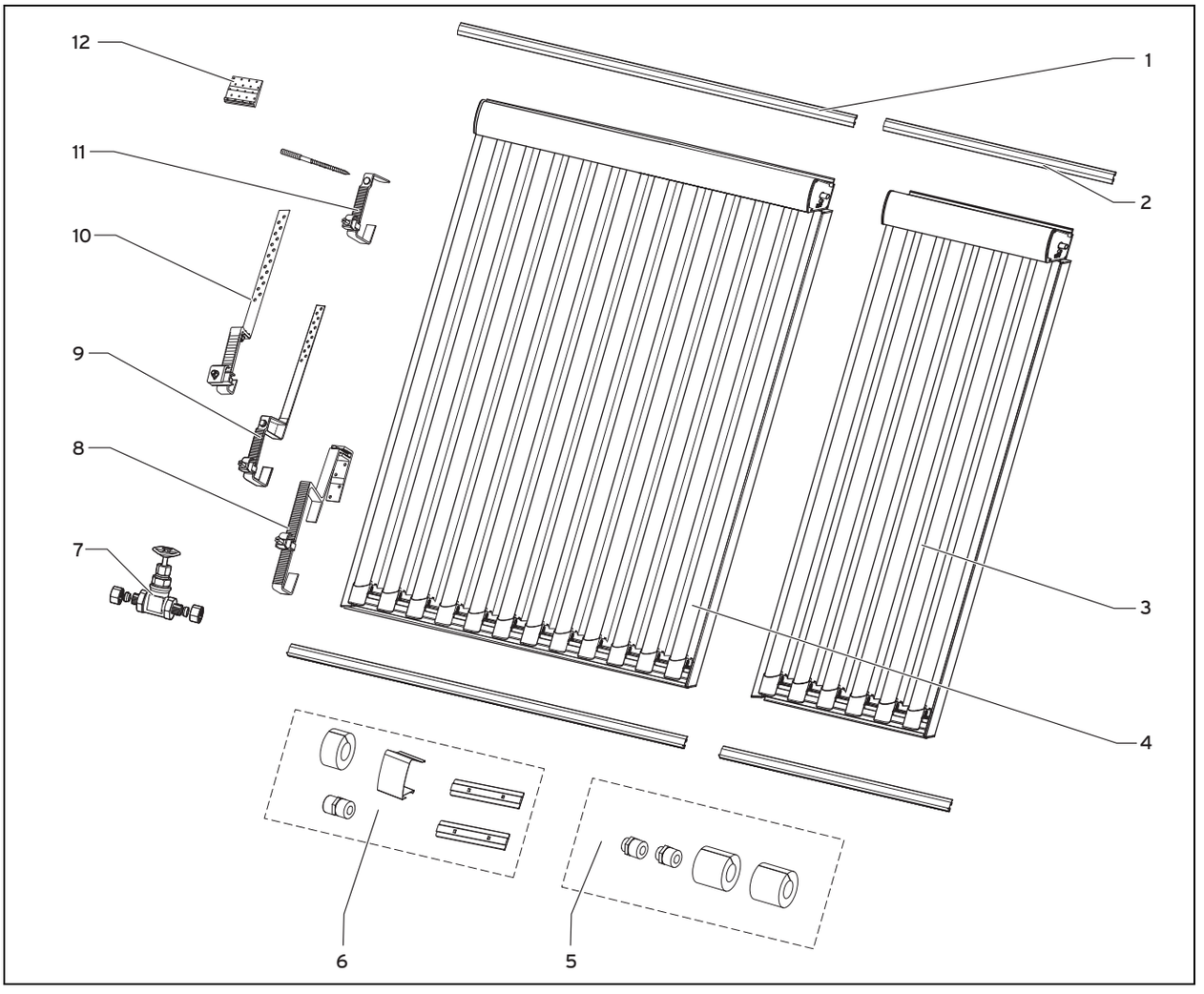
4.1.1 Storing the product

► To prevent moisture from penetrating into the collector, always store the collectors dry and in a weatherproof area.

4.1.2 Transporting the product

1. To protect the collectors against damage, always transport them when they are in a horizontal position.
2. To transport packaged collectors, use the carrying loops that are punched into the cardboard packaging.
3. To transport unpackaged collectors, use the retaining straps that are attached to the sides.
4. To transport the collectors to the roof, use a crane, inclined lift or similar equipment.

4.1.3 Checking the scope of delivery (on-roof installation)



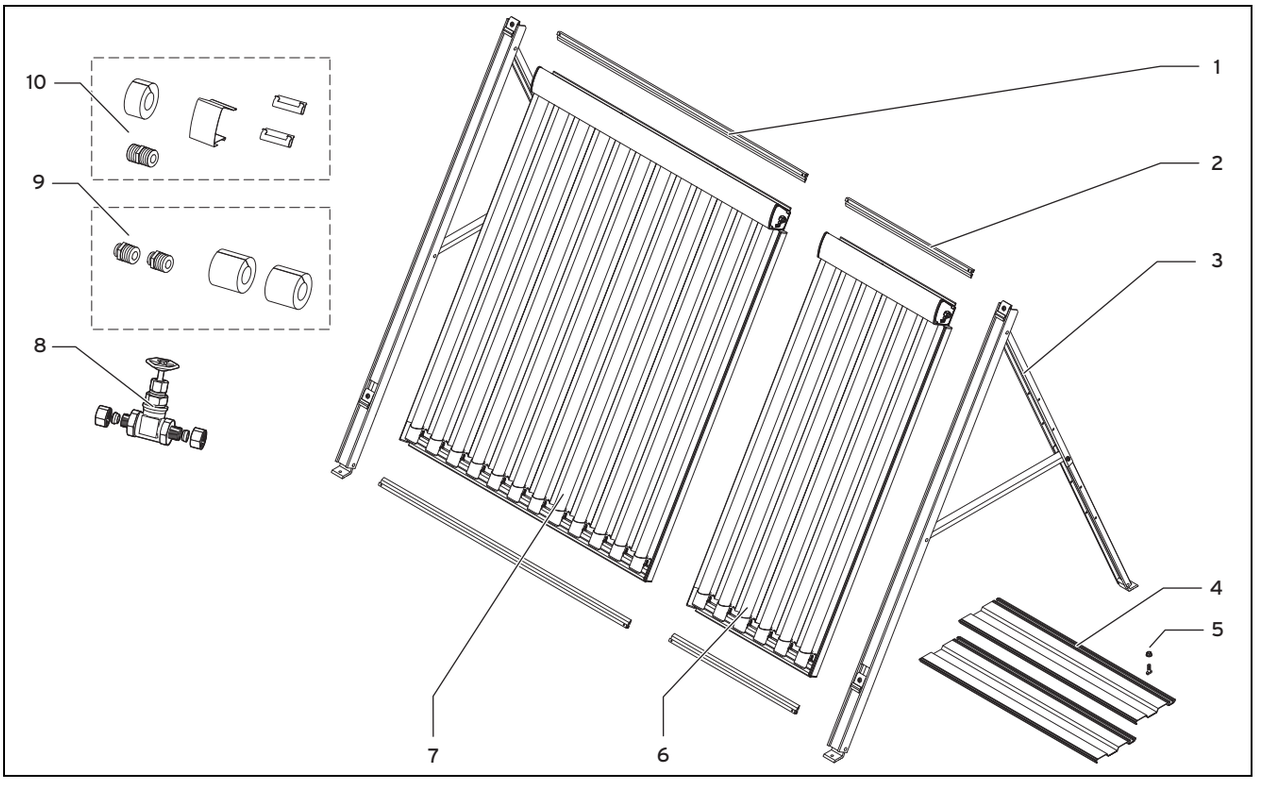
List of materials for on-roof installation

1	VTK 1140/2 rail set, 2 units
2	VTK 570/2 rail set, 2 units
3	VTK 570/2 tube collector, 1 unit
4	VTK 1140/2 tube collector, 1 unit
5	VTK installation set (basic set), 1 unit
6	VTK installation set (extension set), 1 unit
7	Stop valve, 2-way VTK for parallel connection, 1 unit
8	Roof bracket type P (for pantile) from the basic set, 4 units
	Roof bracket type P (for tile) from extension set, on top of each other, 2 units
9	Roof bracket type S (for beaver tail, etc.) (basic set), 4 units
	Roof bracket type S (for beaver tail, etc.) (extension set, on top of each other), 2 units
10	Roof bracket type S, flat, (for beaver tail, etc.) from the basic set, 4 units
	Roof bracket type S, flat (for beaver tail, etc.) from extension set, on top of each other, 2 units
11	Hanger bolt fastening set from the basic set, 4 units
	Hanger bolt fastening set from extension set, on top of each other, 2 units
12	Long base, hook type P, 4 units

► Use the illustration to check that the installation sets are complete.

Note
Not all roof anchor types are available in all countries.

4.1.4 Checking the scope of delivery (flat-roof installation)



List of materials for flat-roof installation

1	VTK 1140/2 rail set, 2 units	6	VTK 570/2 tube collector, 1 unit
2	VTK 570/2 rail set, 2 units	7	VTK 1140/2 tube collector, 1 unit
3	Frame set, 1 unit	8	Stop valve, 2-way VTK for parallel connection, 1 unit
4	Load plates from load plate set, 4 units	9	VTK installation set (basic set), 1 unit
5	Hammer-head bolt and nut from load plate set, 2 units	10	VTK installation set (extension set), 1 unit

► Use the illustration to check that the installation sets are complete.

Note
Not all roof anchor types are available in all countries.

4.1.5 Complying with clearances and installation clearances

Condition: On-roof installation

► In order to install the collectors correctly, you must maintain (→ Page 14)the clearances and installation clearances that are necessary for pitched roofs.

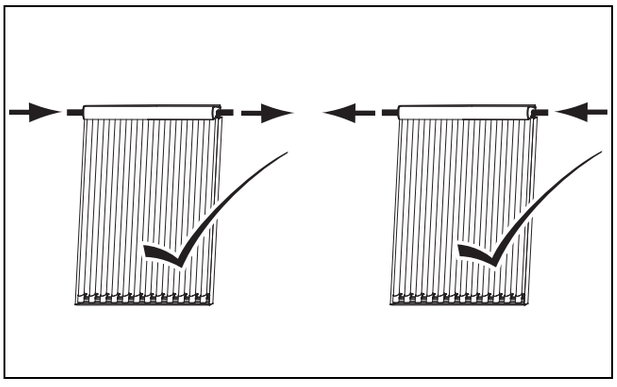
Condition: Flat-roof installation

► When installing the products on flat roofs, maintain a clearance of at least 1 m from the edge of the roof in order to avoid particularly strong wind forces along the edge of the roof.

4.1.6 Selecting suitable connection

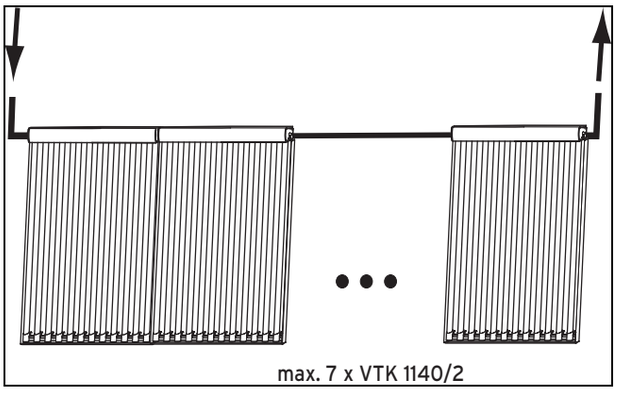
► Observe the planning information when designing the flow rate for the array (if available).

► Select the appropriate connection for the collectors.



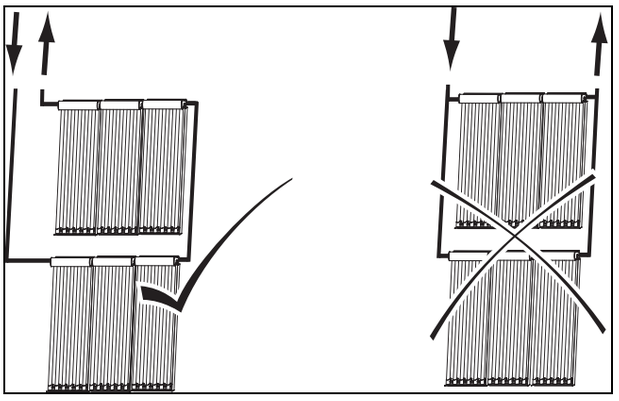
► Ensure that the solar fluid flows through the collectors either from left to right or from right to left.

Condition: Number of **VTK 1140/2** collectors: 1 … 7



► Switch up to 7 **VTK 1140/2** units in series (according to the 14 m² aperture surface area).

Condition: Parallel connection, aperture surface area: ≤ 7 m²

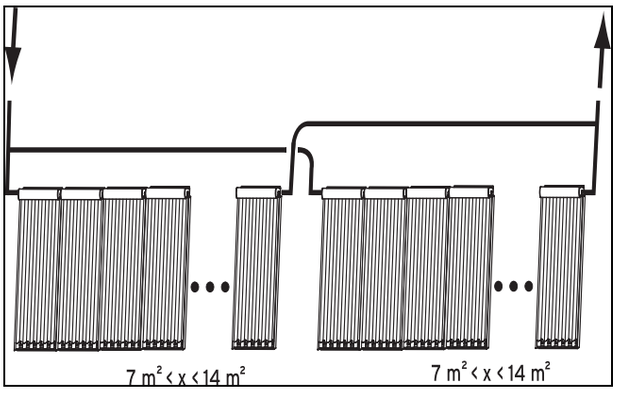


► Always connect as many collectors as possible in series, even when several collector rows are arranged on top of each other.

Note

Up to an aperture surface area of 7 m² (accordingly for 3 pcs **VTK 1140/2** + 1 pc **VTK 570/2**), you must switch the collectors in series.

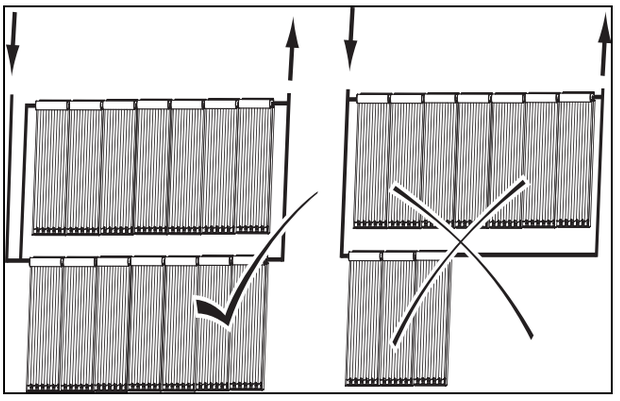
Condition: Parallel connection, aperture surface area: ≥ 14 m²



► Set up several parallel collector rows and connect these hydraulically in parallel.

► Always connect as many collectors (at least 7 m²) as possible in series.

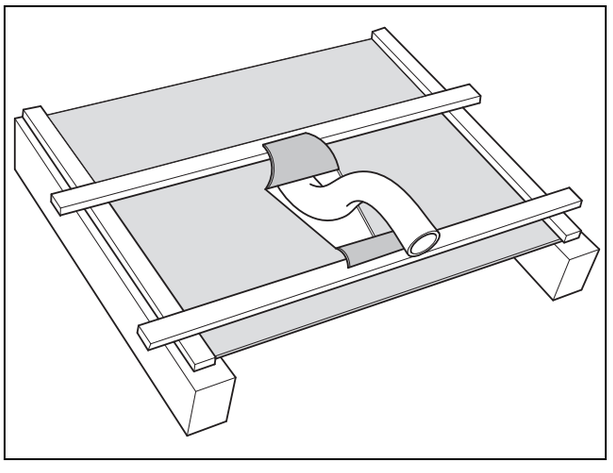
Condition: Parallel connection



- ► To avoid pressure losses in the sub-collector fields, only use parallel connection for collector rows with the same number of collectors.
- ► Ensure that each sub-collector field has the same total pipe length in the flow and return (Tichelmann system), in order to avoid pressure losses in the connection pipes.

4.1.7 Preparing the roof duct

Condition: On-roof installation



Caution.

Building damage due to penetrating water.

If the roof duct is not prepared properly, water may penetrate the building interior.

- ► Ensure that the roof duct is prepared properly.

- ► Make a v-shaped cut in the roofing felt membrane.
- ► Fold the upper, wider flap onto the roof batten above, and fold the lower, narrower flap onto the roof batten below.
- ► Fix the roofing felt membrane tight to the roof batten, so that any moisture runs off to the side.

Condition: Flat-roof installation

Caution.

Lack of tightness due to destruction of the roof skin.

In the event of destruction of the roof skin, water may penetrate the building.

- ► Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
- ► Place large-area building protection mats underneath the installation system.
- ► After installation, check the tightness of the building shell where there are directly connected racks.

- ► Commission a roofer to prepare the roof duct.

4.2 Preparing on-roof installation

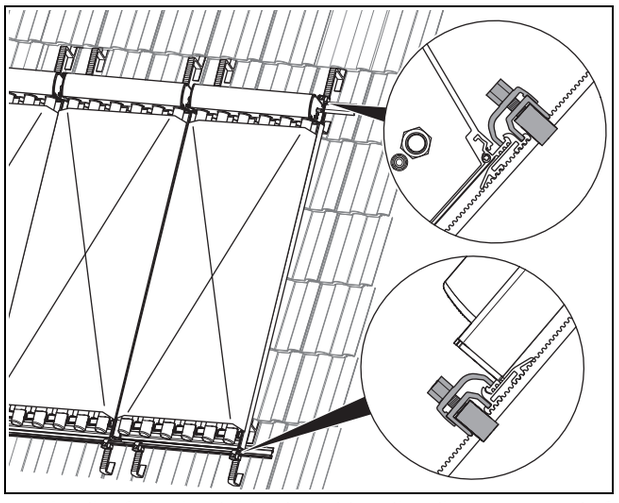
4.2.1 Putting together components

Note

In the case of roof batten clearances of ≥ 460 mm, the 2-row and 3-row installations are not possible. In this case, you can install the 2 or 3 rows individually (without using the same central roof anchor).

Not all roof anchor types are available in all countries.

Condition: Collector rows: 1

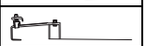
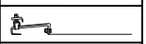


► Use the following tables to put together the components for installation.

Number of VTK 1140/2 collectors		1	2	3	4	5	6	7
Components		**Required sets**						
VTK installation set (basic set)		1 [1]						
VTK installation set (extension set)		–	1	2	3	4	5	6
Roof anchor set type P (tile)		1 [2]	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof anchor set type S (shingle)								
Roof bracket set type S, flat (slate)								
Roof anchor set, hanger bolt								
Rail set (2 pcs), VTK 1140/2		1	2	3	4	5	6	7

[1] 1 set for connecting to the pipelines; the collectors are connected together using the extension set

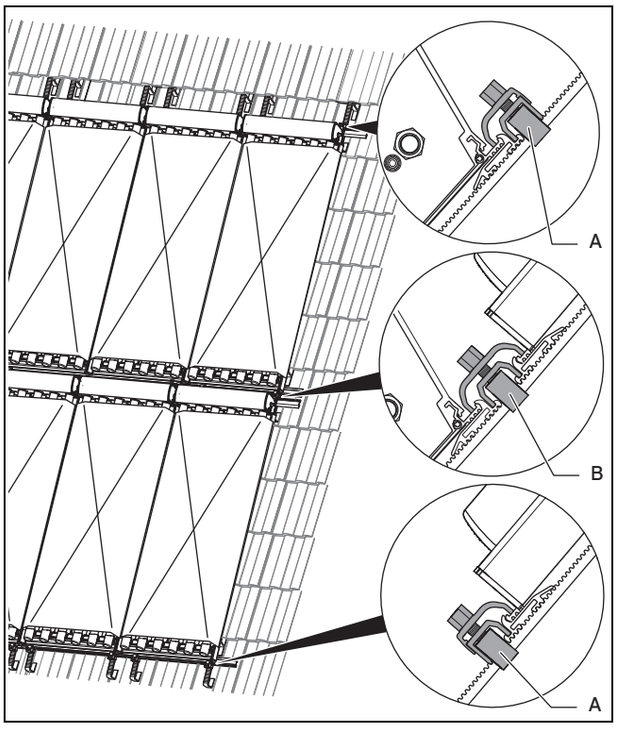
[2] valid up to 700 m above sea level

Number of VTK 1140/2 collectors		1	2	3	4	5	6
Number of VTK 570/2 collectors		1	1	1	1	1	1
Components		**Required sets**					
VTK installation set (basic set)		1 [1]					
VTK installation set (extension set)		1	2	3	4	5	6
Roof anchor set type P (tile)		2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof anchor set type S (shingle)							
Roof bracket set type S, flat (slate)							
Roof anchor set, hanger bolt							
VTK 1140/2 rail set		1	2	3	4	5	6
VTK 570/2 rail set		1					

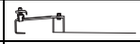
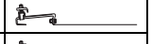
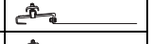
[1] 1 set per row for connecting to the pipelines; the collectors are connected together using the extension set

[2] valid up to 700 m above sea level

Condition: Collector rows: 2



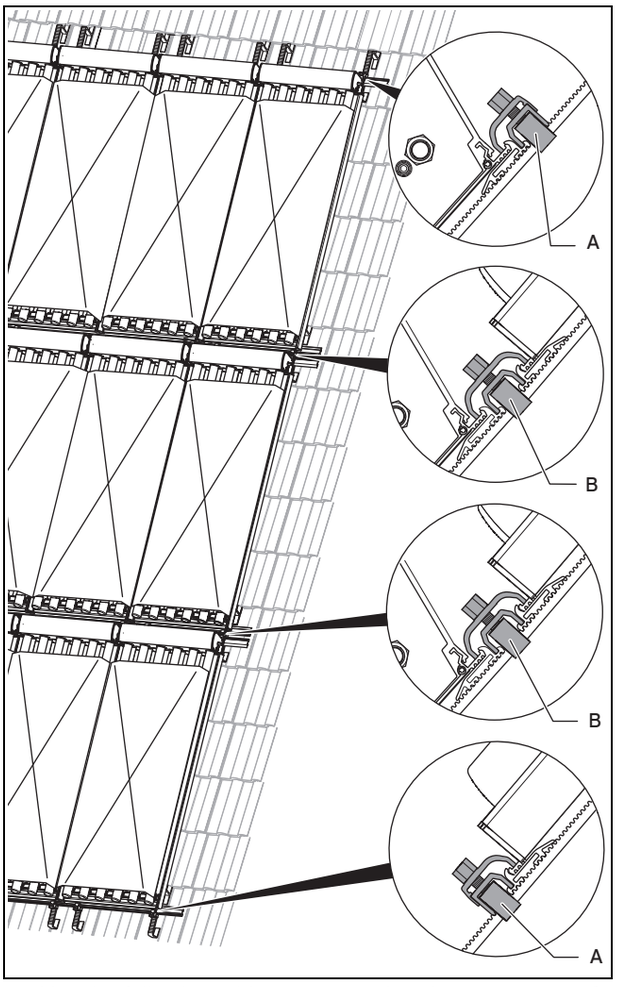
► Use the following table to put together the components for installation.

Number of VTK 1140/2 collectors per row			1	2	3	4	5	6	7
Components			**Required sets**						
VTK installation set (basic set)			2 [1]						
VTK installation set (extension set)			–	2	4	6	8	10	12
Roof bracket set type P (pantile)		**A**	1 [2]	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof bracket set type S (slate)									
Roof bracket set type S, flat (slate)									
Roof anchor set, hanger bolt									
Roof bracket set type P (pantile)		**B**	1 [2]	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof bracket set type S (slate)									
Roof bracket set type S, flat (slate)									
Roof anchor set, hanger bolt									
Rail set (2 pcs), VTK 1140/2			2	4	5	6	10	12	14

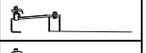
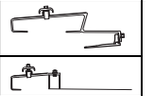
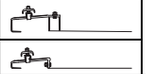
[1] 1 set per row for connecting to the pipelines; the collectors are connected together using the extension set – if the rows are also connected together so that they are flat-sealed.

[2] Valid up to 700 m above sea level

Condition: Collector rows: 3



► Use the following table to put together the components for installation.

Number of VTK 1140/2 collectors per row			1	2	3	4	5	6	7
Components			**Required sets**						
VTK installation set (basic set)			3 [1]						
VTK installation set (extension set)			–	3	6	9	12	15	18
Roof bracket set type P (pantile)		**A**	1 [2]	2 [2]	3 [2]	4 [2]	5 [2]	6 [2]	7 [2]
Roof bracket set type S (slate)									
Roof bracket set type S, flat (slate)									
Roof bracket set type P (pantile)		**B**	2 [2]	4 [2]	6 [2]	8 [2]	10 [2]	12 [2]	14 [2]
Roof bracket set type S (slate)									
Roof bracket set type S, flat (slate)									
Rail set (2), VTK 1140/2			3	6	9	12	15	18	21

[1] 1 set per row; the collectors are connected together using the extension set – if the rows are also connected together so that they are flat-sealed.

[2] Valid up to 700 m above sea level

4.2.2 Determining the number of required roof anchors

1. Ask the local building authority for the regional maximum snow load s_k.

Condition: Maximum snow load: ≤ 3 kN/m²

► Install 4 roof anchors per collector.

Condition: Maximum snow load: 3 … 4.5 kN/m²

► Install 6 roof anchors per collector.

Condition: Maximum snow load: > 4.5 kN/m²

► Compile statistics for the individual case.
► Ensure that the maximum permissible snow load per collector is 5.4 kN/m².

Note
The maximum permissible load per roof anchor type S/type P is: $F_{max.}$ = 1.875 kN.

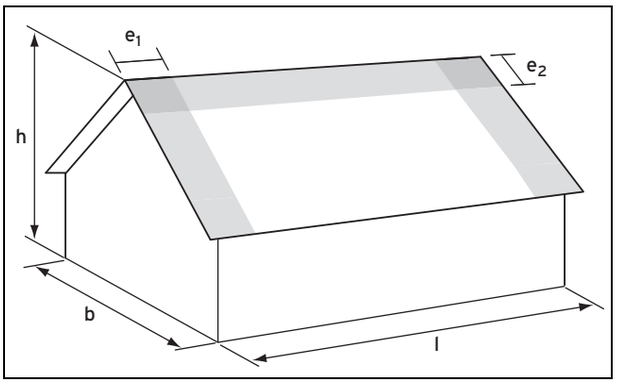
2. If you are using extension sets, ensure that the roof anchor is positioned centrally with equal clearances.

4.2.3 Defining the edge clearances of the roof anchors

Maximum lift points caused by wind loads can occur at the cut-away edges of wall and roof areas (e.g. verge and eaves). These maximum lift points result in high loads on the collectors and installation systems.

Areas in which lift points occur are called edge areas. Corner areas are zones in which edge areas overlap and especially high pull forces occur.

Edge and corner areas must not be used as installation areas.



b	Building width	e1	Edge clearance e_{short}
h	Building height	e2	Edge clearance e_{long}
l	Building length		

► Calculate the building width w, building height h and building length l.
► The values for the side edge clearances that are to be observed can be found in the following table:

b [m]	h [m]				
	5	6	7	8	9–15
8–10	1.0				
11	1.0	1.1			
12	1.0	1.2			
13	1.0	1.2	1.3		
14	1.0	1.2	1.4		
15	1.0	1.2	1.4	1.5	
16	1.0	1.2	1.4	1.6	
17	1.0	1.2	1.4	1.6	1.7
18	1.0	1.2	1.4	1.6	1.8

► The values for the edge clearances that are to be observed to the roof ridge can be found in the following table:

l [m]	h [m]					
	5	6	7	8	9	10–15
10	1.0					
11	1.0	1.1				
12	1.0	1.2				
13	1.0	1.2	1.3			
14	1.0	1.2	1.4			
15	1.0	1.2	1.4	1.5		
16	1.0	1.2	1.4	1.6		
17	1.0	1.2	1.4	1.6	1.7	
18	1.0	1.2	1.4	1.6	1.8	
19	1.0	1.2	1.4	1.6	1.8	1.9
20	1.0	1.2	1.4	1.6	1.8	2.0

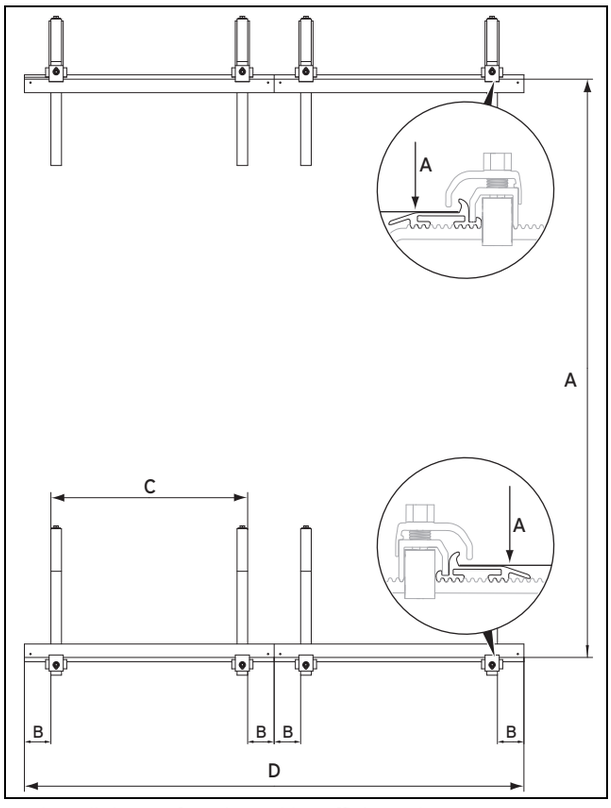
► When installing the roof anchors, observe the calculated edge clearances.

4.2.4 Defining the roof anchor clearances

1. Define the clearances of the roof anchors using the following table:

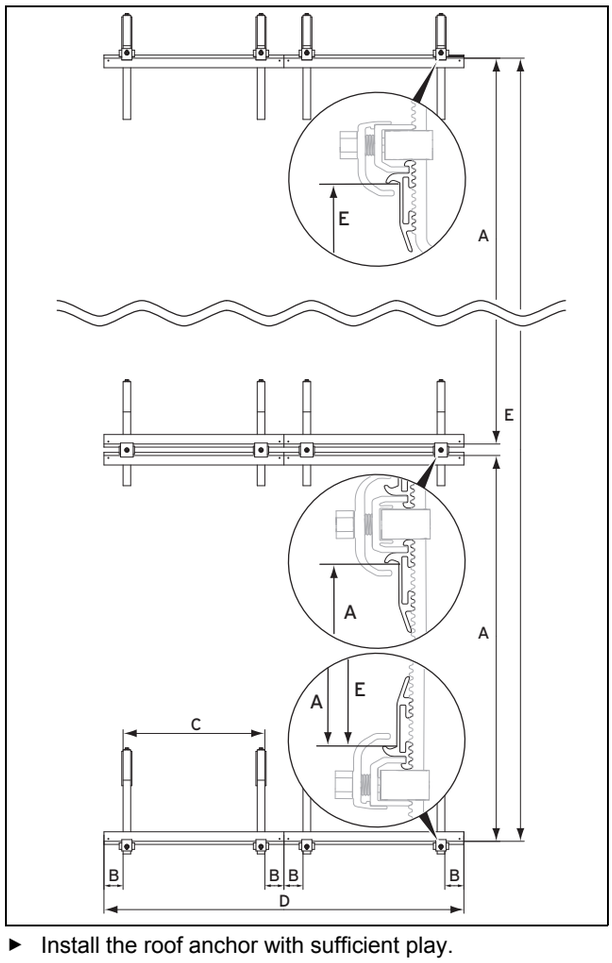
Quantity		A	B	C	D	E
VTK 570	VTK 1140					
-	1	1663 * / 1638 **	100–200	VTK 1140: 997–1197 — VTK 570: 507–607	1397	Two rows: 3322 — Three rows: 5006
-	2				2794	
-	3				4191	
-	4				5588	
-	5				6985	
-	6				8382	
-	7				9779	
1	1				2104	
1	2				3501	
1	3				4898	
1	4				6295	
1	5				7692	
1	6				8382	

Condition: One collector row



► Install the roof anchor with sufficient play.
  – Pre-installation dimension (*): = Finished installation dimension (**) + 20-25 mm

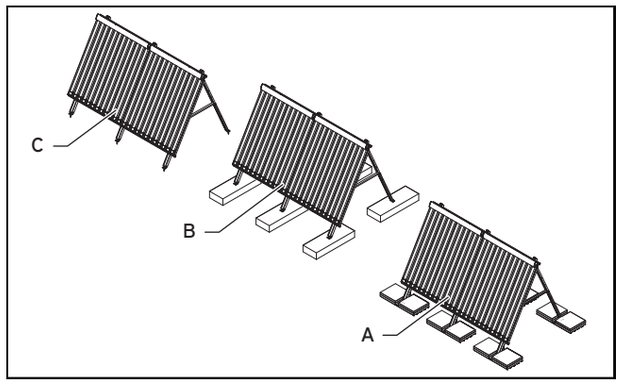
Condition: More than one collector row



► Install the roof anchor with sufficient play.
  – Pre-installation dimension (*): = Finished installation dimension (**) + 20-25 mm

4.3 Preparing flat-roof installation

4.3.1 Selecting the installation variant



A Floating installation with load plates and loading weights.

B Floating installation without load plates. The rack must be screwed onto suitable loading weights.

C Rack screwed directly onto the roof.

► Make a selection from the three available installation variants.

4.3.2 Putting together components

► Use the following tables to put together the components for installation.

Number of VTK 1140/2 collectors	1	2	3	4	5	6	7
Components	**Number of required sets**						
VTK installation set (basic set)	1 [1)]						
VTK installation set (extension set)	–	1	2	3	4	5	6
Installation set for open-air/flat-roof installation	2	3	4	5	6	7	8
Required rack	2	3	4	5	6	7	8
Rail set (2 pcs), VTK 1140/2	1	2	3	4	5	6	7

[1)] 1 set each per collector field for connecting to the pipelines; the collectors are connected together using the extension set

Number of VTK 1140/2 collectors	1	2	3	4	5	6
Number of VTK 570/2 collectors	**1**	**1**	**1**	**1**	**1**	**1**
Components	**Number of required sets**					
VTK installation set (basic set)	1 [1)]					
VTK installation set (extension set)	1	2	3	4	5	6
Installation set for open-air/flat-roof installation	3	4	5	6	7	8
Required rack	3	4	5	6	7	8
Rail set (2 pcs), VTK 1140/2	1	2	3	4	5	6
Rail set (2 pcs), VTK 570/2	1					

[1)] 1 set each per collector field for connecting to the pipelines; the collectors are connected together using the extension set

4.3.3 Determining the ballast load (floating installation)

Danger!
Risk of death and material damage due to excessive basic wind speeds!

The racks are designed for basic wind speeds of up to 108 km/h. If the basic wind speed at the site is greater than 108 km/h, then there can be no guarantee claim for the system.

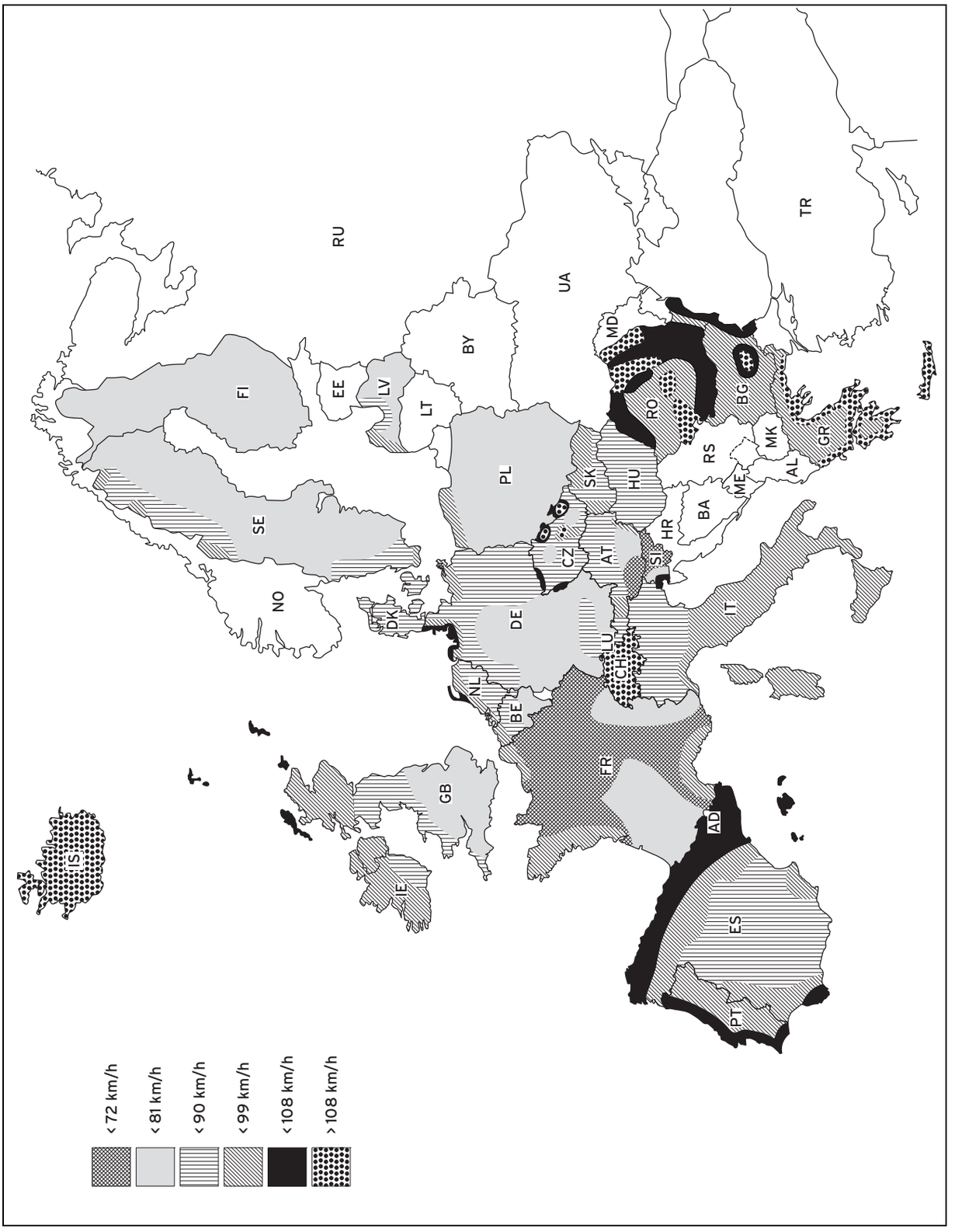
► Only install the rack in locations where the basic wind speed is a maximum of 108 km/h.

1. Please note the following for floating installation:

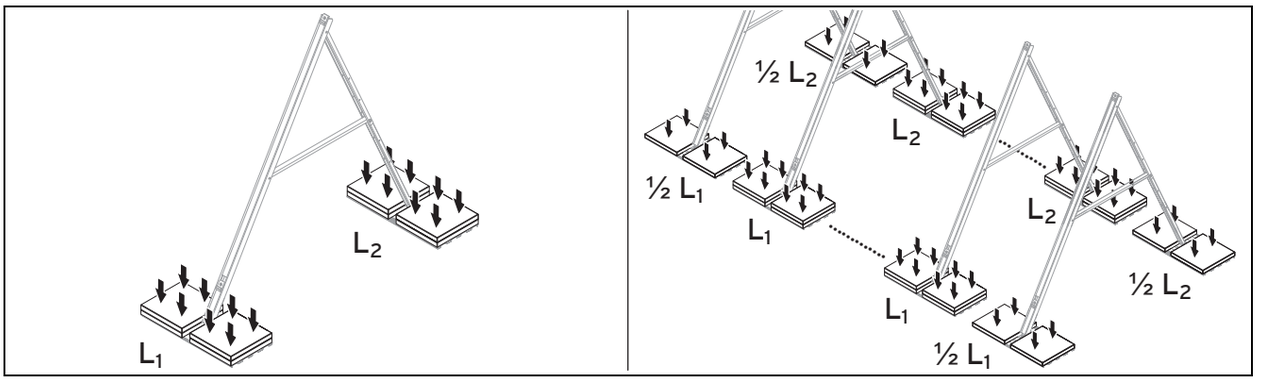
Installation variants	Please note
B	Weights that are firmly screwed onto the rack must consist of material capable of screw connections.
A and B	All weights must be weatherproof.

2. For quick determination of the basic wind speed at the site, use the following map.
3. For quick dimensioning of the required weights, use the following tables.

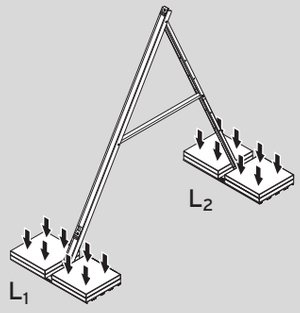
Note
Detailed dimensioning of the ballast loads is only possible using the Vaillant tool for dimensioning the wind and snow loads. If you have any questions on this subject, contact your responsible Vaillant sales partner.

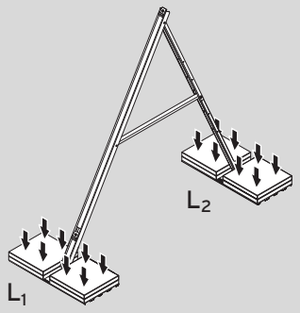


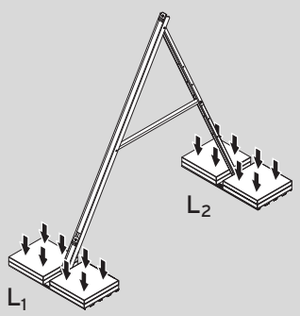
4. Use the map to determine the basic wind speed at the site.

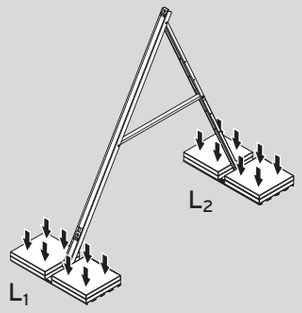


5. Use the tables to determine the required weights.

Vertical collector position Installation angle 30°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
			Note If the collectors are also anchored using steel ropes from the installation set for the storm protection, the reduced weights can only be used to protect against lifting. When there are at least two collectors in a row, the ballast loads can be reduced by half for the outer rack.					
Basic wind speed [km/h]		**Store**	**Building height**			**Building height**		
			up to 10 m	**10-18 m**	**18-25 m**	**up to 10 m**	**10-18 m**	**18-25 m**
up to 72	Inland	L_1	301	378	429	44	40	70
		L_2	167	213	244	167	213	244
up to 72	Coast and islands	L_1	413	487	534	67	81	90
		L_2	234	279	307	234	279	307
up to 81	Inland	L_1	357	469	544	56	78	92
		L_2	201	268	313	201	268	313
up to 81	Coast and islands	L_1	527	621	680	89	108	119
		L_2	303	359	395	303	359	395
up to 90	Inland	L_1	469	581	656	78	100	115
		L_2	268	335	380	268	335	380
up to 90	Coast and islands	L_1	619	731	806	107	129	144
		L_2	358	425	470	358	425	470
up to 99	Inland	L_1	581	694	806	100	122	144
		L_2	335	403	470	335	403	470
up to 99	Coast and islands	L_1	768	881	955	137	159	174
		L_2	448	515	560	448	515	560
up to 108	Inland	L_1	694	843	955	122	152	174
		L_2	403	492	560	403	492	560
up to 108	Coast and islands	L_1	918	1030	1143	166	188	211
		L_2	537	605	672	537	605	672

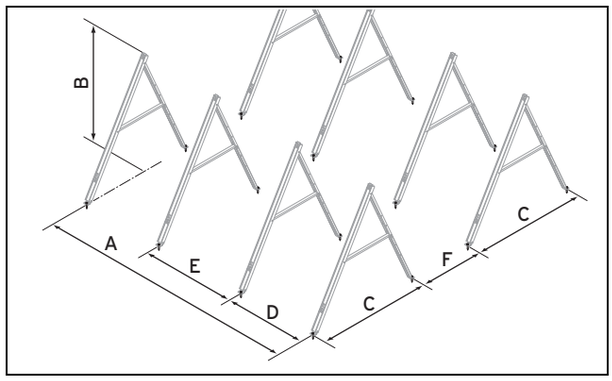
Vertical collector position Installation angle 45°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
			Note If the collectors are also anchored using steel ropes from the installation set for the storm protection, the reduced weights can only be used to protect against lifting. When there are at least two collectors in a row, the ballast loads can be reduced by half for the outer rack.					
Basic wind speed [km/h]		Store	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L_1	321	401	454	30	30	30
		L_2	191	245	281	173	220	251
up to 72	Coast and islands	L_1	437	513	562	30	30	30
		L_2	270	321	354	241	286	314
up to 81	Inland	L_1	379	495	572	30	30	30
		L_2	230	309	361	207	275	320
up to 81	Coast and islands	L_1	555	652	713	30	30	30
		L_2	350	415	4547	310	366	402
up to 90	Inland	L_1	495	611	688	30	30	30
		L_2	309	388	440	275	342	388
up to 90	Coast and islands	L_1	650	766	843	30	30	30
		L_2	414	493	545	365	433	478
up to 99	Inland	L_1	611	727	843	30	30	30
		L_2	388	466	545	342	410	478
up to 99	Coast and islands	L_1	804	920	998	30	30	30
		L_2	519	598	650	455	523	568
up to 108	Inland	L_1	727	882	998	30	30	30
		L_2	466	571	650	410	500	568
up to 108	Coast and islands	L_1	959	1075	1191	30	30	34
		L_2	624	703	781	546	613	681

Vertical collector position Installation angle 60°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
			Note If the collectors are also anchored using steel ropes from the installation set for the storm protection, the reduced weights can only be used to protect against lifting. When there are at least two collectors in a row, the ballast loads can be reduced by half for the outer rack.					
Basic wind speed [km/h]		Store	Building height			Building height		
			up to 10 m	10-18 m	18-25 m	up to 10 m	10-18 m	18-25 m
up to 72	Inland	L_1	297	372	421	30	30	37
		L_2	267	339	387	179	225	256

Vertical collector position Installation angle 60°			Weights/rack [kg]					
			To secure against sliding and lifting			To secure only against lifting (if secured/anchored against sliding)		
			Note If the collectors are also anchored using steel ropes from the installation set for the storm protection, the reduced weights can only be used to protect against lifting. When there are at least two collectors in a row, the ballast loads can be reduced by half for the outer rack.					
Basic wind speed [km/h]		**Store**	**Building height**			**Building height**		
			up to 10 m	**10-18 m**	**18-25 m**	**up to 10 m**	**10-18 m**	**18-25 m**
up to 72	Coast and islands	L_1 L_2	406 372	477 441	522 485	30 246	30 291	35 325
up to 81	Inland	L_1 L_2	352 319	460 424	532 494	30 212	30 280	37 325
up to 81	Coast and islands	L_1 L_2	516 479	607 566	664 621	35 315	45 372	52 407
up to 90	Inland	L_1 L_2	460 424	568 529	641 599	30 280	41 348	49 393
up to 90	Coast and islands	L_1 L_2	604 564	713 669	785 739	45 370	58 438	67 483
up to 99	Inland	L_1 L_2	568 529	677 634	785 739	41 348	54 415	67 483
up to 99	Coast and islands	L_1 L_2	749 704	857 809	930 879	62 461	75 528	84 573
up to 108	Inland	L_1 L_2	677 634	821 774	930 879	54 415	71 506	84 573
up to 108	Coast and islands	L_1 L_2	893 844	1002 949	1110 1054	80 551	92 619	105 686

4.3.4 Defining the rack clearances

Condition: Installed collectors: VTK 1140/2

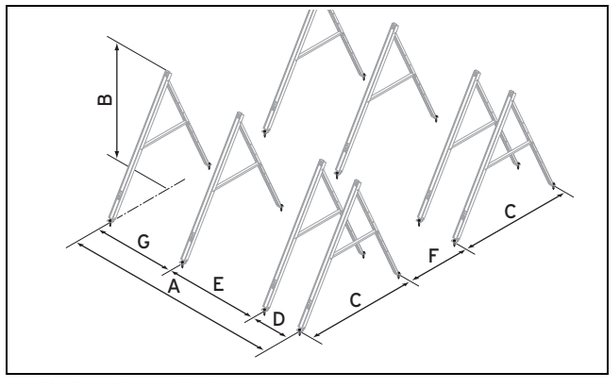


► Define the rack clearances.

Quantity	A	B	F [1]	C	D	E
1	1088	1106 (30°) 1476 (45°) 1749 (60°)	2420 (30°) 3001 (45°) 3267 (60°)	1684	–	–
2	2466				1233	1397
3	3863					
4	5260					
5	6657					
6	8054					
7	9451					

[1] Sun elevation of 20° (winter sun)

Condition: Installed collectors: VTK 570/2 and VTK 1140/2 in combination



► Define the rack clearances.

Number [1]	A	B	F [2]	C	D	E	G
1	1776	1106 (30°), 1476 (45°), 1749 (60°)	2420 (30°), 3001 (45°), 3267 (60°)	1684	543	1397	1233
2	3173						
3	4570						
4	5967						
5	7364						
6	8761						

[1] Once VTK 570 + number of VTK 1140 units

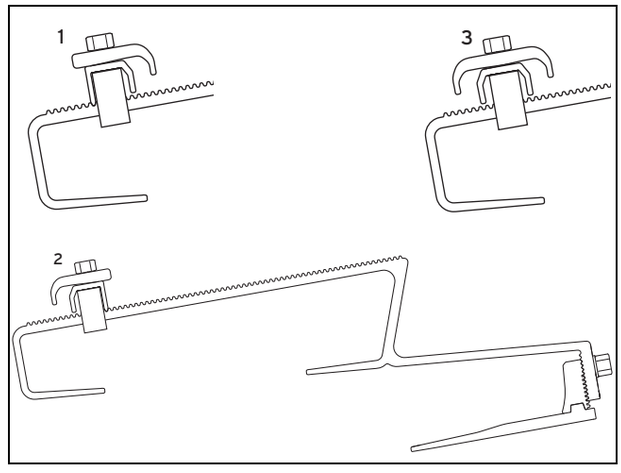
[2] Sun elevation of 20° (winter sun)

4.4 Installing collectors (on-roof)

The installation steps and notes in these instructions apply for both array configurations. Any different installation steps are clearly indicated in individual cases.

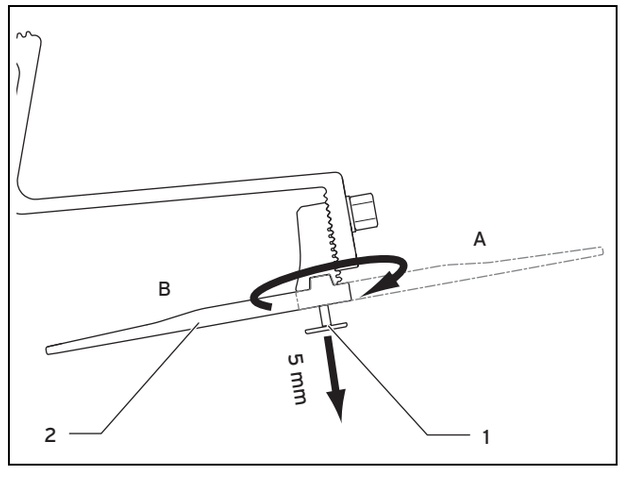
4.4.1 Installing roof anchors

4.4.1.1 Installing type P (for pantile)



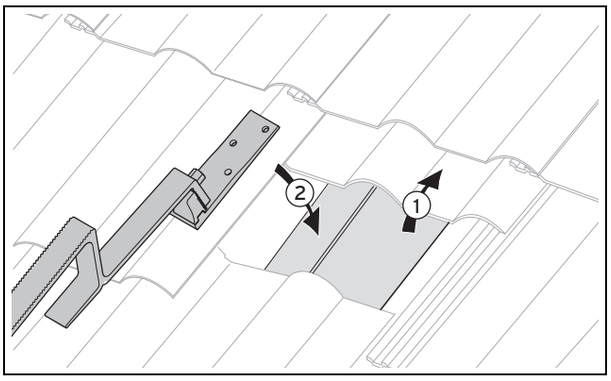
1 Lower roof bracket
2 Top roof bracket
3 Middle roof bracket

1. Use the top, middle and lower type P roof anchors shown.

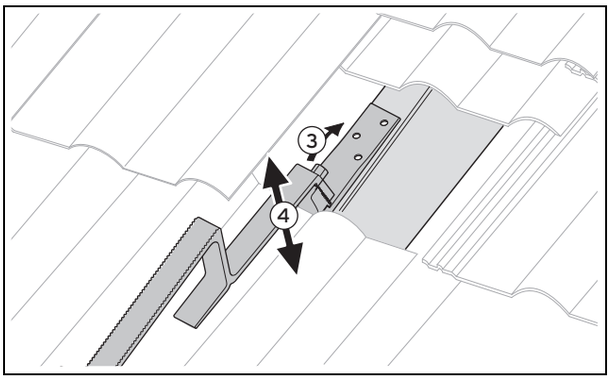


2. Secure the type P roof anchor either to the rafters **(A)** or to the roof batten **(B)**.
3. To do this, loosen the bolt **(1)** on the base of the roof anchor with the enclosed bit and unscrew the bolt by approx. 5 mm.
4. If you wish to secure the roof anchor onto the rafters, turn the base **(2)** outwards **(A)**.
5. If you wish to secure the roof anchor onto the roof batten, turn the base **(2)** inwards **(B)**.

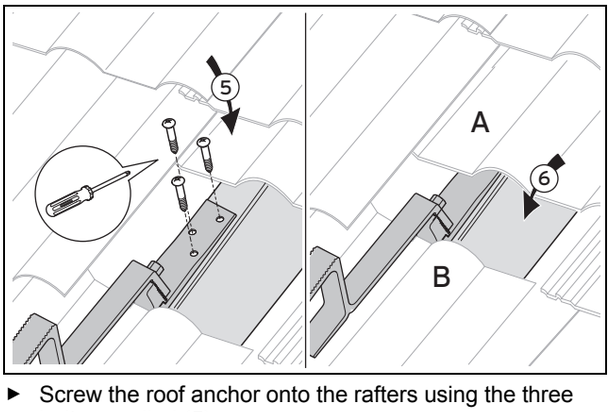
Condition: Fastening type: To rafters



- ► Define the clearances of the roof anchors. (→ Page 14)
- ► Expose the rafters at the corresponding position **(1)**.
- ► Position the roof anchor **(2)**. Ensure the correct position of the top, middle and lower roof anchors.



- ► Undo the top bolt until the height of the roof anchor can be adjusted **(3)**.
  - – Working materials: SW 13 spanner
- ► Adjust the roof anchor to the height of the pantiles, so that the top part of the roof anchor lies on the roofing **(4)**.
- ► Tighten the top bolt.
  - – Working materials: SW 13 spanner



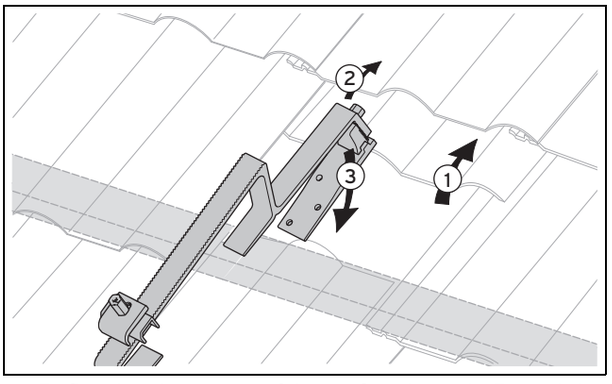
- ► Screw the roof anchor onto the rafters using the three bolts supplied **(5)**.
- ► Slide the pantiles into their original position again **(6)**.
- ► To ensure that the tiles lie tightly together, notch guttering onto the underside **(A)** or the upper side **(B)** of the pantile using a hammer, if necessary.

Note

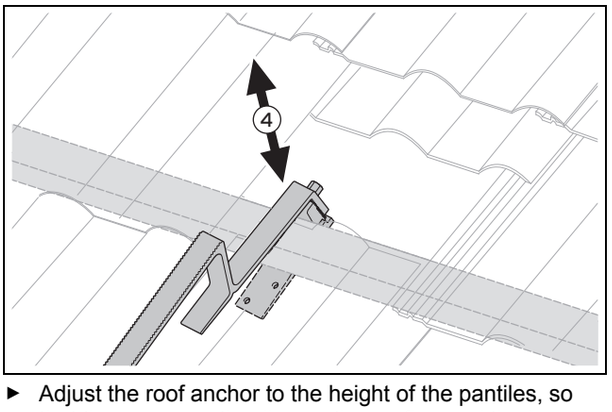
For some roof types, it may be necessary to offset the roof anchor laterally opposite the rafters.

To do this, use the "long base" accessory (not available in all countries).

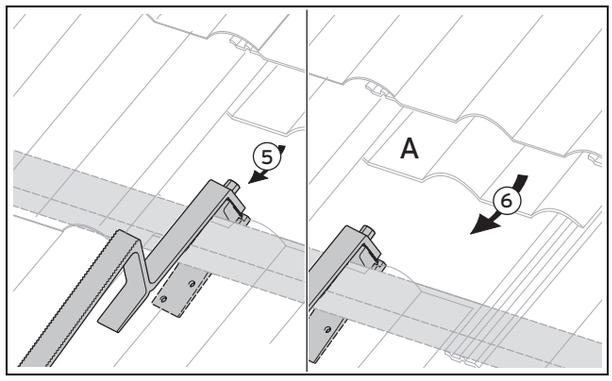
Condition: Fastening type: To roof batten



- ► Define the clearances of the roof anchors. (→ Page 14)
- ► Slide one to two pantiles upwards at the corresponding position above the roof batten **(1)**.
- ► Undo the top bolt until the height of the roof anchor can be adjusted **(2)**.
  - – Working materials: SW 13 spanner
- ► Hang the roof anchor on the roof batten **(3)**. Ensure that the top, middle and lower roof anchors are positioned correctly.

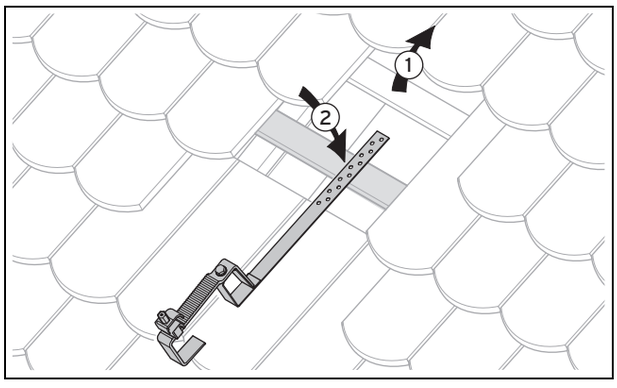


- ► Adjust the roof anchor to the height of the pantiles, so that the upper section lies on the roofing and the base is pushed tight against the roof batten from the bottom **(4)**.
- ► Ensure that the roof anchor fits securely around the roof batten and pantile when it engages.

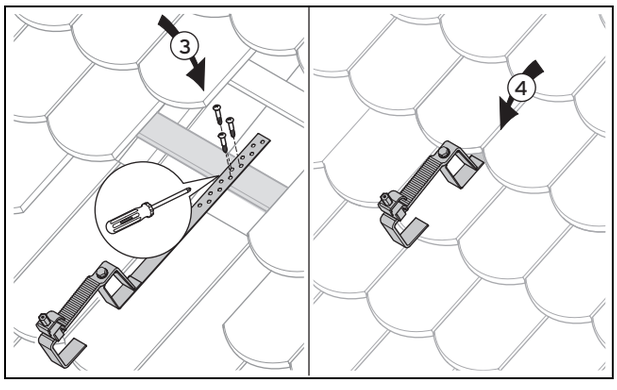


- ► Tighten the top bolt **(5)**.
  - – Working materials: SW 13 spanner
- ► Slide the pantiles into their original position again **(6)**.
- ► To ensure that the tiles lie tightly together, notch guttering onto the underside of the pantiles **(A)** using a hammer, if necessary.

4.4.1.2 Installing type S (for slate)

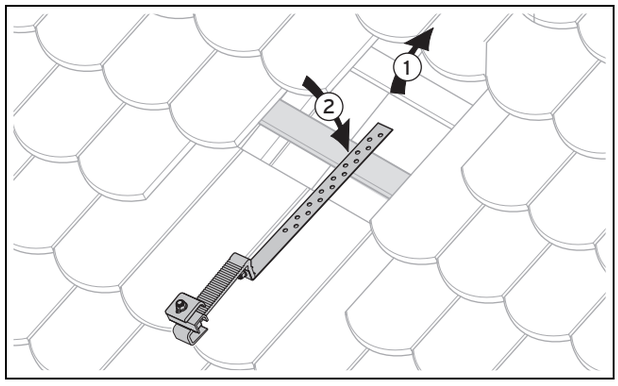


1. Define the clearances of the roof anchors. (→ Page 14)
2. At the appropriate position, expose the rafters or roof batten **(1)**.
3. Position the roof anchor. Ensure that the top, middle and lower roof anchors **(2)** are positioned correctly.

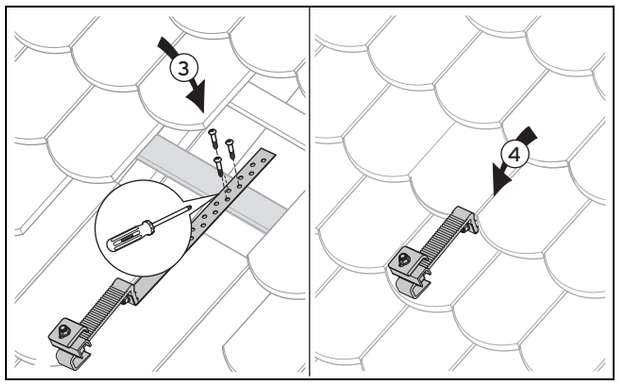


4. Screw the roof anchor onto the roof batten or rafters using the three screws supplied **(3)**.
5. Slide the pantiles into their original position again **(4)**.

4.4.1.3 Installing type S flat (for slate)

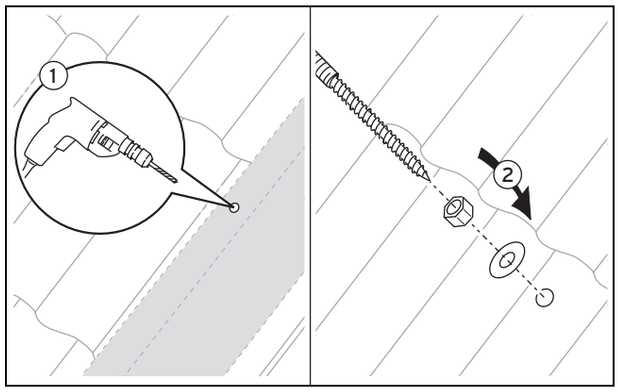


1. Define the clearances of the roof anchors. (→ Page 14)
2. At the appropriate position, expose the rafters or roof batten **(1)**.
3. Position the roof anchor. Ensure that the top, middle and lower roof anchors **(2)** are positioned correctly.

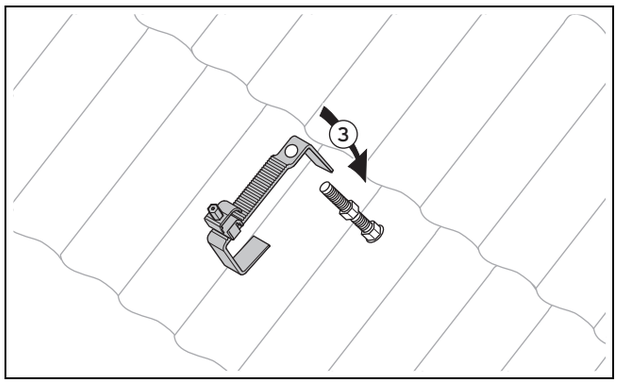


4. Screw the roof anchor onto the roof batten or rafters using the three screws supplied **(3)**.
5. Slide the pantiles into their original position again **(4)**.

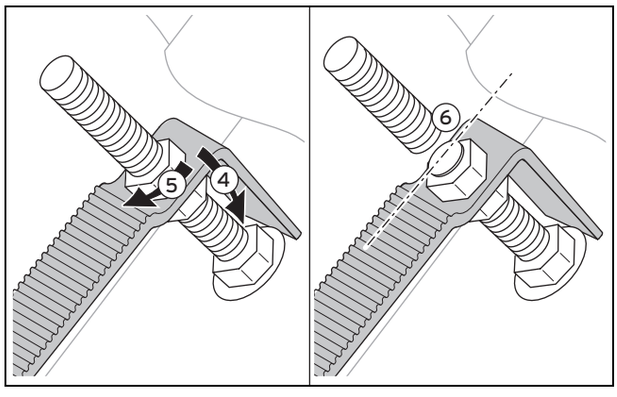
4.4.1.4 Installing the stair bolt type



1. Define the clearances of the roof anchors. (→ Page 14)
2. At the corresponding position, drill a hole in the pantile **(1)**.
3. Tighten the stair bolt onto the rafters through the pantile**(2)**.



4. Position the central nut so that, after inserting the upper part of the roof anchor, the front contact area lies on the roofing **(3)**. Ensure the correct positioning of the top, middle and lower roof anchors.



5. Position the roof anchor on the central nut **(4)**.
6. Screw the second nut on and tighten **(5)**.
   – Working materials: SW 17 spanner
7. Disconnect the threaded rod directly above the nut **(6)**.
8. Deburr the interface.

4.4.2 Installing collectors

Danger!

Personal injury and material damage due to a falling collector.

Improper fastening may cause a collector to fall.

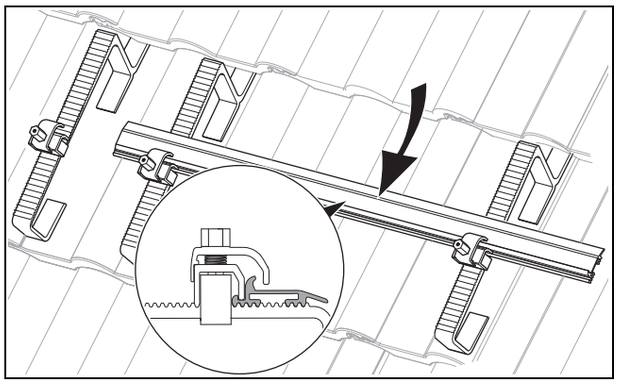
- ► Tighten the clamping elements.
- ► Check for proper tensioning by shaking the clamping blocks.
- ► If a clamping block moves, tighten the nut again.

1. Install the collectors on the roof as specified in the following sections.

Note

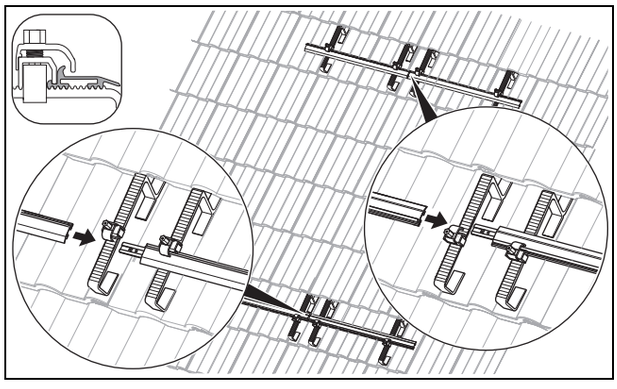
Mounting rails and clamping elements cannot be moved at the same time.

Installing mounting rails



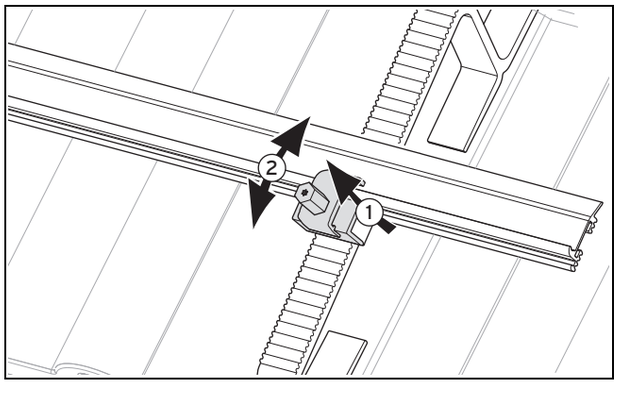
2. Secure the mounting rails with the clamping elements to the roof anchors.
3. Position the lower rail as far as possible downwards on the roof anchor.

Connecting mounting rails



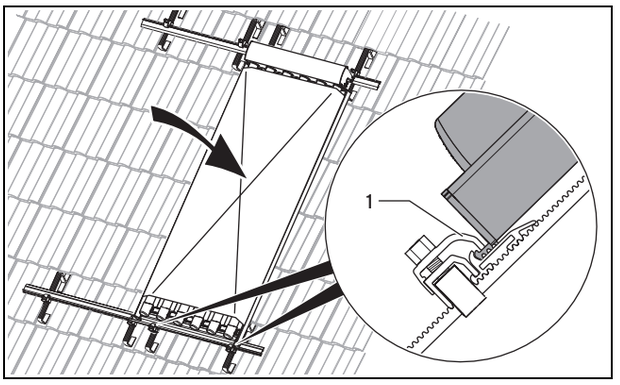
4. Insert the connecting elements laterally into the mounting rails until you feel them engage .
5. Connect the mounting rails underneath each other.
6. Secure the mounting rails with the clamping elements to the roof anchors.

Taring mounting rails



7. Secure the mounting rails horizontally.
8. Compensate for any height differences by moving the clamping elements.
9. To do this, pull the clamping element upwards **(1)**, move it **(2)** and release it so that it engages.

Laying and hooking collectors



Danger!

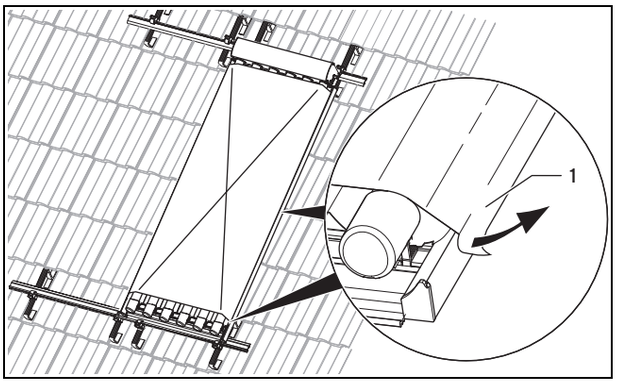
Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 300 °C.

- ► Avoid working in direct sunlight.
- ► Cover the collectors before starting work.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.

10. Position the collector on the lower mounting rail (top collector).
11. Hook the collector in on the clamping elements.
12. Ensure that the upper clamping block **(1)** of the clamping element is above the rail of the collector.
13. Tighten the clamping elements of the lower mounting rail.
    – Working materials: SW 13 spanner

Loosening the sun protection film



14. To ensure that the sun protection film can be easily removed after starting up the unit, loosen the sun protection film from the edges of the collector.

Rendering the retaining straps unusable

Danger!

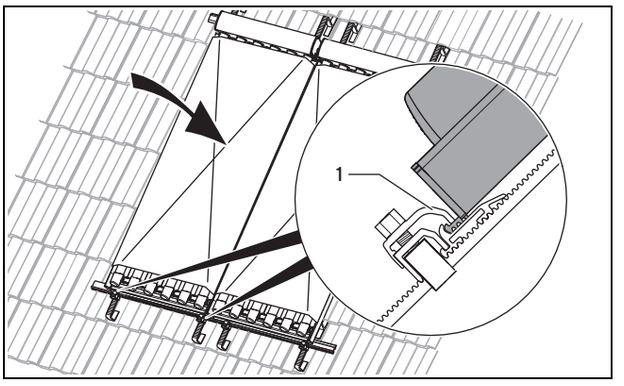
Risk of injury caused by transporting collectors on weathered retaining straps

The retaining straps that are attached to the collectors may become brittle due to environmental influences, and may tear under load.

- ► After the initial installation of the collectors, render the attached retaining straps unusable in order to rule out subsequent danger caused by weathered retaining straps.

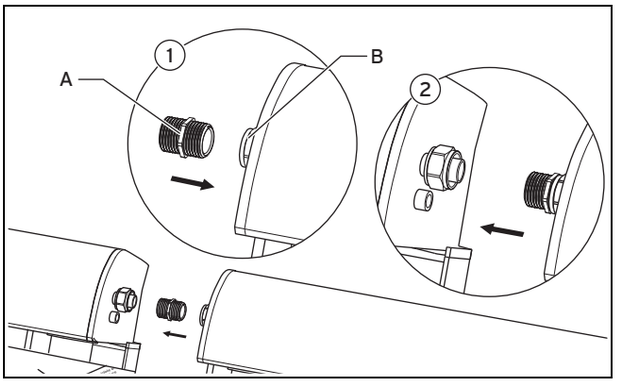
15. Render all retaining straps that are attached to the collector unusable.

Installing additional collectors



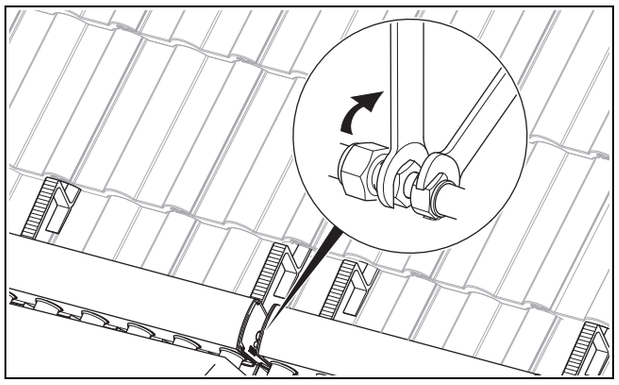
16. Position the next collector on the lower mounting rail.
17. Ensure that the upper clamping block **(1)** of the clamping element is above the rail of the collector.

Fitting connectors



18. Screw the double nipple **(A)** (from the **VTK** installation set (extension set)) in the thread of the second collector **(B)** with the union nut **(2)** of the first collector.
19. Push the collectors together.

Tightening the clamping ring connection



Caution.

Risk of damage to the collectors as a result of improper installation.

If the hydraulic connections are not installed properly, the stainless steel tubes inside the collector may become damaged.

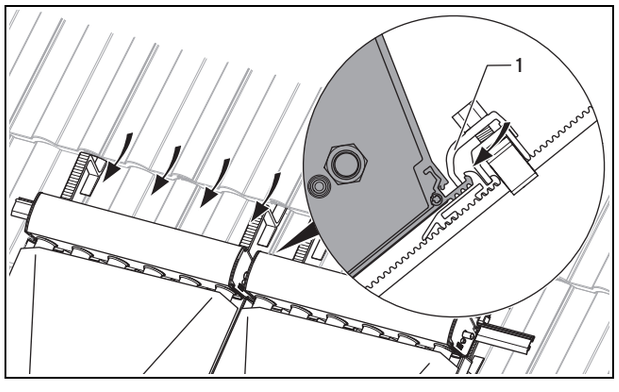
► When tightening the clamping ring connection, hold a second spanner against it.

20. Screw the two union nuts securely onto the double nipple.
21. Tighten the clamping elements of the lower mounting rail.
    – Working materials: SW 13 spanner

Completing collector rows

22. Install an additional collector. (→ Page 26)
23. Fit the connectors. (→ Page 26)
24. Tighten the clamping ring on the connection for both collectors. (→ Page 27)

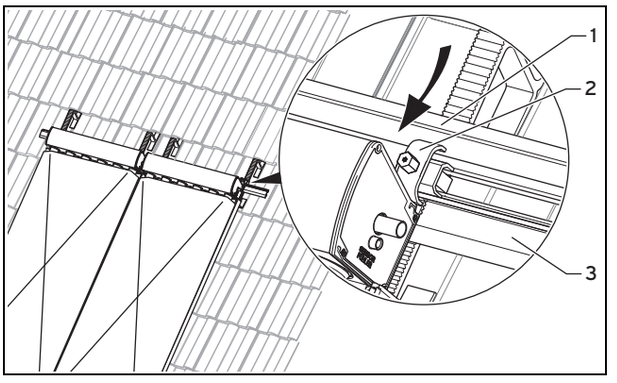
Positioning the top mounting rails



25. Slide the upper mounting rails until they are flush with the collectors.
26. Ensure that the clamping block **(1)** of the clamping elements lies over the collector rails.
27. Tighten the clamping elements of the top mounting rails.
    – Working materials: SW 13 spanner

Positioning the central mounting rail

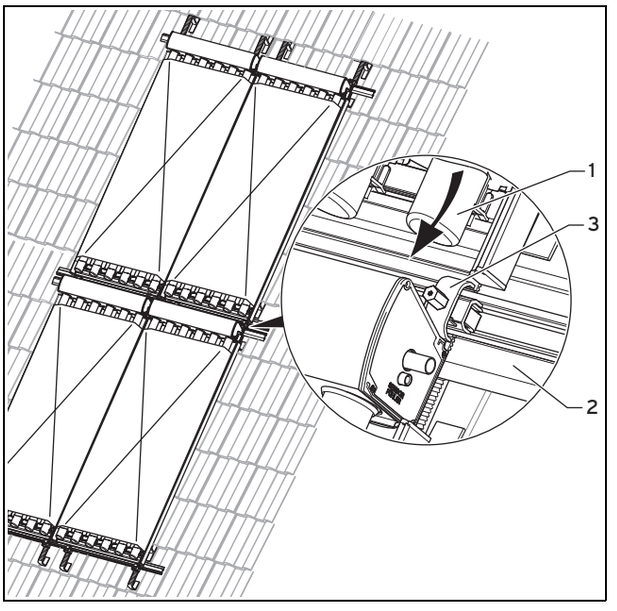
Condition: Collector rows: 2 … 3



► Slide the central mounting rail until it is flush with the lower collector **(3)**.
► Ensure that the top clamping block of the clamping element **(2)** is above the edge of the collector.
► Secure the mounting rail **(1)** for the next collector row to the clamping element.

Installing the upper collectors

Condition: Collector rows: 2 … 3



► Place the upper collector **(1)** into the central mounting rail **(2)**.
► Screw the clamping elements **(3)** of the central rail in tightly.
    – Working materials: SW 13 spanner
► Install the collector row in the same way as for the first collector row.
► Complete the collector row. (→ Page 27)
► Position the top mounting rails. (→ Page 27)

4.5 Installing collectors (flat-roof)

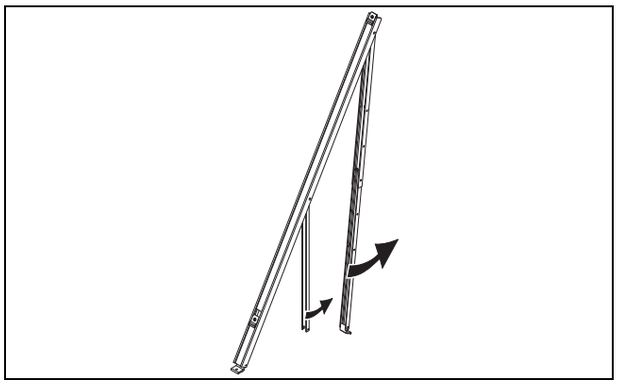
4.5.1 Installing racks

Danger!
Risk of death due to falling collectors!

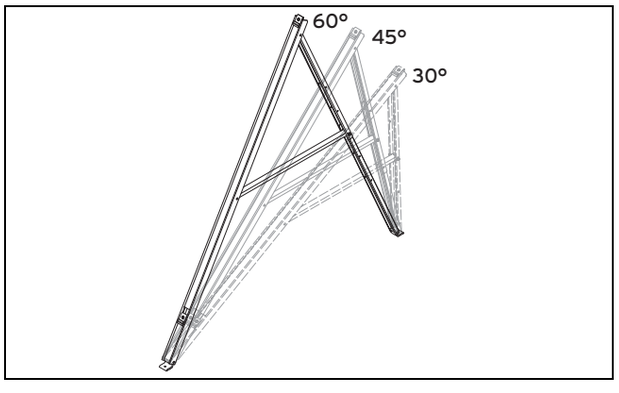
Unsecured collectors may fall from the flat roof due to the wind and present a danger to people.

- ► Perform the following safety precautions according to the installation type.
- ► For direct connection, screw the rack properly onto the base.
- ► Only use suitable load weights.
- ► Observe the required ballast load of the load weights.

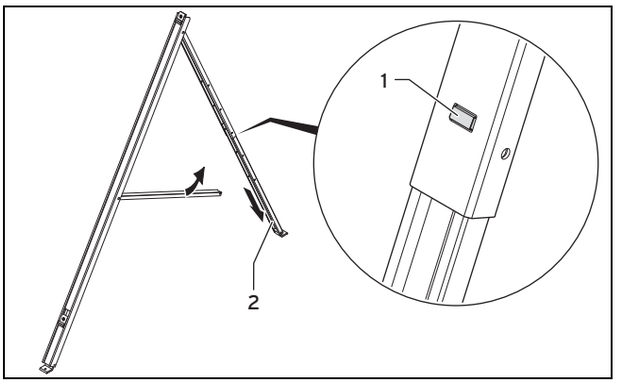
1. Determine the required number of racks.
   - For the first collector: 2 x racks
   - For each additional collector: One additional rack



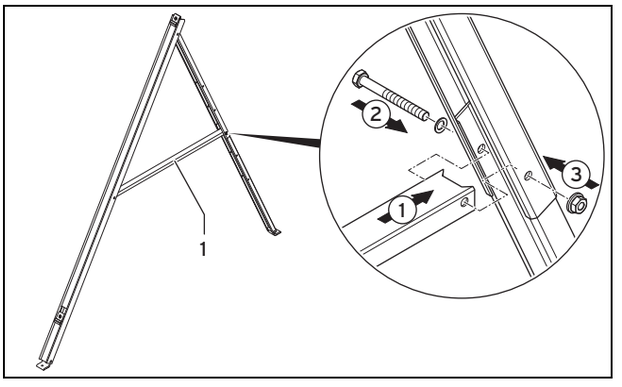
2. Fold out the first rack.



3. Select the required installation angle.
   - Installation angle:
     - 30°
     - 45°
     - 60°

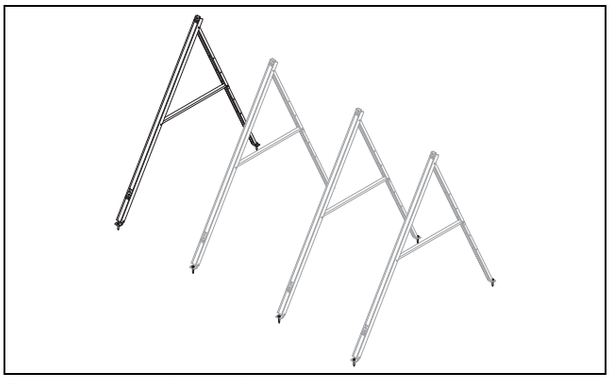


4. Push the locking button **(1)** on the telescopic rail.
5. Pull the telescopic rail **(2)** into the desired installation angle and allow the locking button to engage again.



6. Position the cross-member **(1)** such that its fastening holes lie between the corresponding threaded holes in the telescopic rail.
7. To secure the rack, insert the fixing screw **(2)** through all rails.
8. Secure the fixing screw **(2)** with the self-locking nuts **(3)**.
9. Tighten the nuts.

Condition: Type of installation: Direct mounting



Screwing on the rack

Caution.
Leak caused by destruction of the roof skin.

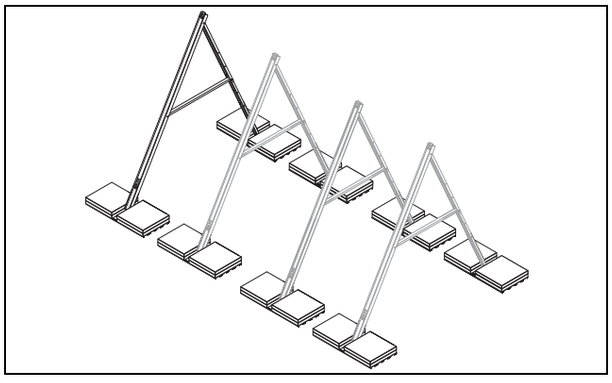
In the event of destruction of the roof skin, water can penetrate the building.

- ► Check the leak tightness of the roof skin after tightening screw connections.

► Restore the leak tightness of the roof skin if necessary.

► Define the required rack clearances as described in the section "Defining rack clearances".
► Drill the required holes at the defined positions.
► Secure the racks using fastenings that are suitable for underground use.
  – Fixing material: Rust-proof
  – Diameter of the fastenings: ≥ 10 mm
► Carry out an extraction test.
  – Extraction force of the anchor bolt: ≥ 9 kN
► Fit as many racks as you need to hold the collectors.

Condition: Type of installation: Floating installation (with load plates)



Preparing load plates

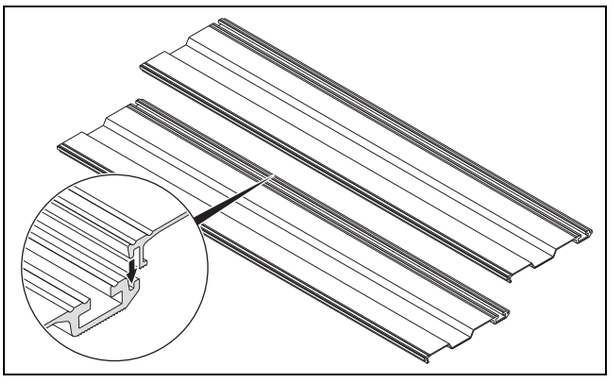
Caution.

Leak caused by destruction of the roof skin.

In the event of destruction of the roof skin, water may penetrate the building.

► Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
► Place large-area, non-slip building protection mats underneath the installation system.

► If the roof is covered with gravel, remove the gravel at the places where you wish to position the load plates, and use non-slip structural protection mats to protect the roof skin.

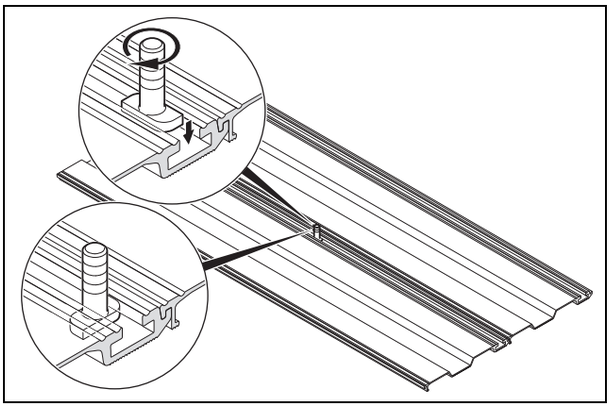


► Connect two load plates as shown in the image.
► Connect two additional load plates as shown in the image.

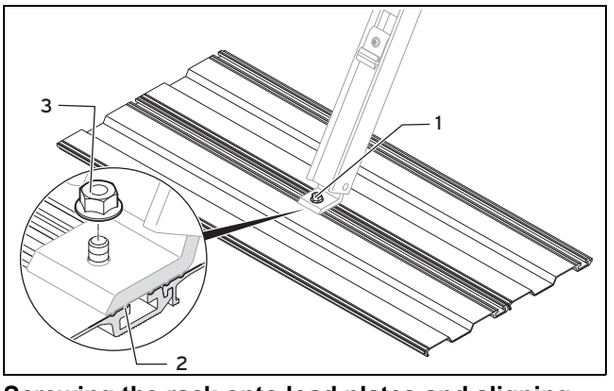
Note

For each rack, you require four load plates: One pair each for the front and rear rack feet.

► Align the load plates approximately in their final position on the flat roof.



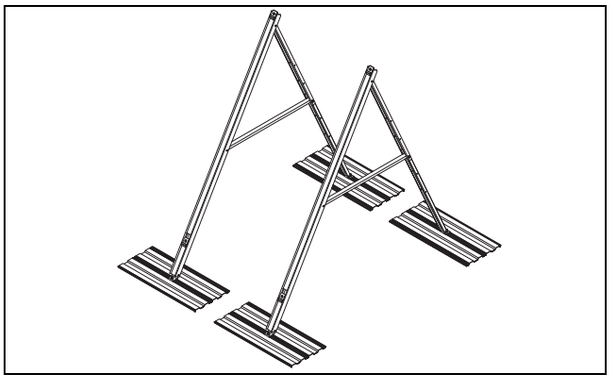
► Insert the first hammer-head bolt centrally in the groove between the first two load plates.
► To secure the hammer-head bolt, turn it by 90° in a clockwise direction.
► Secure the second hammer-head bolt in the same way between the other two load plates.



Screwing the rack onto load plates and aligning

► If you install the **VTK 570/2** collectors, turn the load plates by 90° so that the load plates do not overlap.
► Take hold of the first rack already secured in the installation angle.

- ► Position the front rack feet above the hammer-head bolt **(1)**.
- ► When positioning the rack feet, ensure that the anti-rotation lock **(2)** engages.
- ► Secure the rack feet with the self-locking nut **(3)**.
- ► Secure the rear rack feet in the same way on the other two load plates.
  - ◁ The first rack is installed so that it is stable.

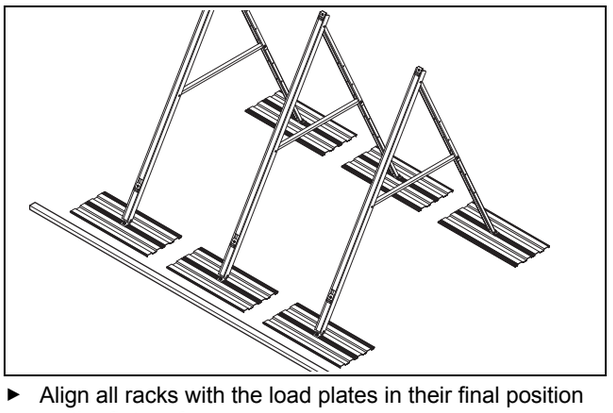


- ► Install the second rack on the load plates as described above.
- ► Mount as many racks and load plates as you need to hold the collectors.

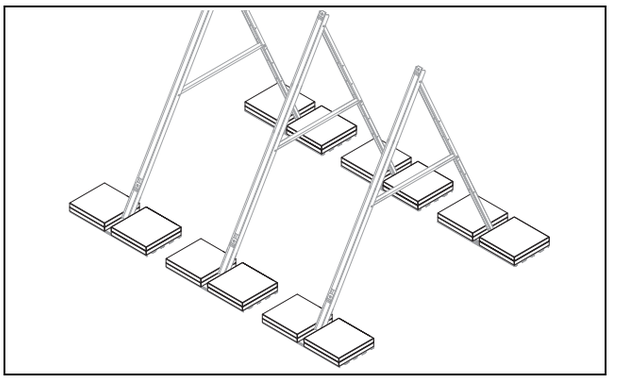
Note

For one collector, you require two racks.

For each additional adjacent collector, you will need an additional rack.



- ► Align all racks with the load plates in their final position on the flat roof.
- ► In doing so, maintain the required clearances for the racks (→ Page 22).



Placing loading weights on load plates

- ► Transport the required number of loading weights to the flat roof.
- ► Place the loading weights on the load plates as shown above.
- ► Ensure that the distance between the loading weights and the racks is as small as possible.

Danger!

Risk of death due to inadequate fastening of the load weights onto the load plates!

If the load weights are inadequately secured on the load plates, collectors could fall from the roof and cause life-threatening accidents.

- ► Secure all load weights on the load plates adequately against slipping and tilting.

- ► Distribute the loading weights evenly over the load plates.

Condition: Type of installation: Floating installation (without load plates)

Preparing weights

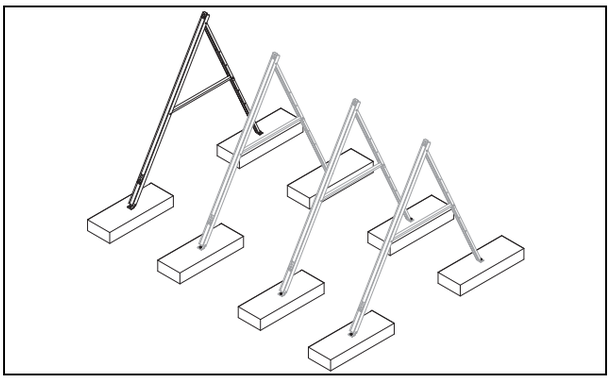
Caution.

Leak caused by destruction of the roof skin.

In the event of destruction of the roof skin, water may penetrate the building.

- ► Ensure adequate protection of the roof skin during installation on roof sealing surfaces.
- ► Place large-area, non-slip building protection mats underneath the installation system.

- ► If the roof is covered with gravel, remove the gravel at the places where you wish to position the weights, and use non-slip structural protection mats to protect the roof skin.

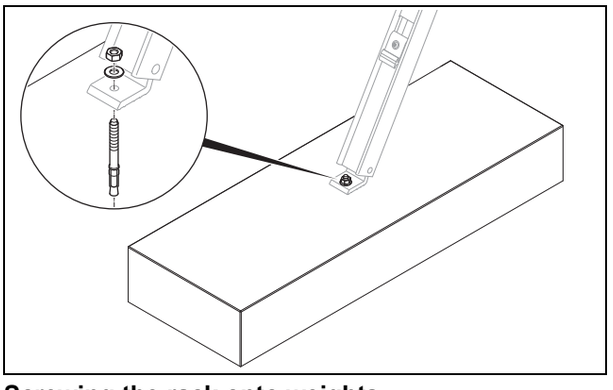


- ► Define the rack clearances. (→ Page 22)
- ► Transport the required number of weights to the flat roof.
- ► Lay the weights in the final positions of the installation site.

Note

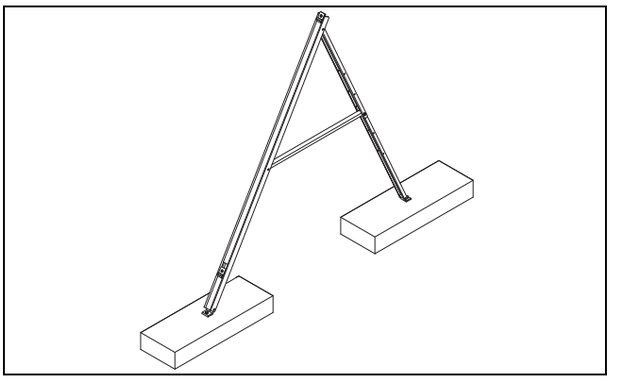
The four weights for holding two racks for a collector are extremely heavy. Therefore, it is advisable to determine the final position and orientation of the weights before screwing on the rack and laying the weights there.

- ► Select a suitable fixing material for the weights used (diameter: at least 10 mm).
- ► Drill a hole into the centre of each weight.



Screwing the rack onto weights

- ► Take hold of the first rack already secured in the installation angle.
- ► Screw the front rack feet onto the first weight.
- ► Screw the rear rack feet onto the second weight.
  - ◁ The first rack is installed so that it is stable.



- ► Install the second rack on the next two weights as described above.
- ► Fit as many racks as you need to hold the collectors.

4.5.2 Installing collectors

Danger!

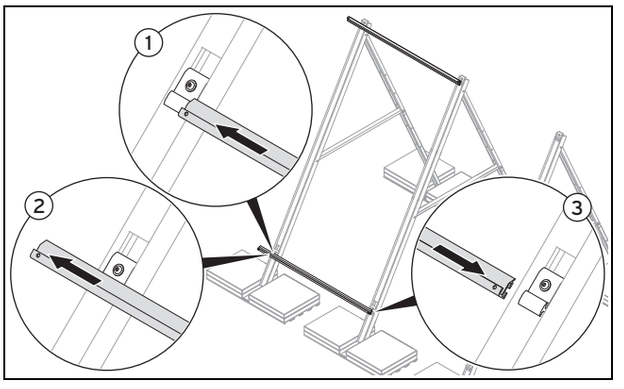
Personal injury and material damage due to a falling collector.

Improper fastening may cause a collector to fall.

- ► Tighten the clamping elements.
- ► Check for proper tensioning by shaking the clamping blocks.
- ► If a clamping block moves, tighten the nut again.

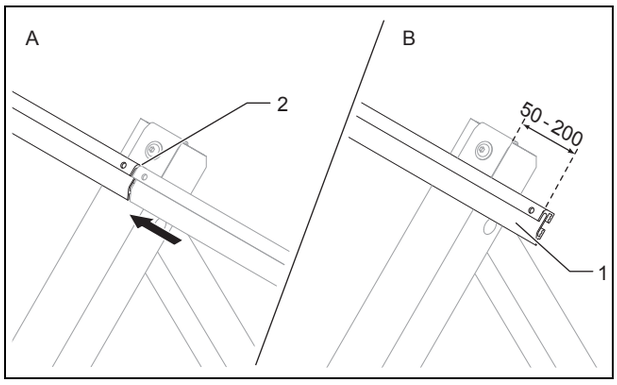
1. Install the collectors on the roof as specified in the following sections.

Sliding on mounting rails



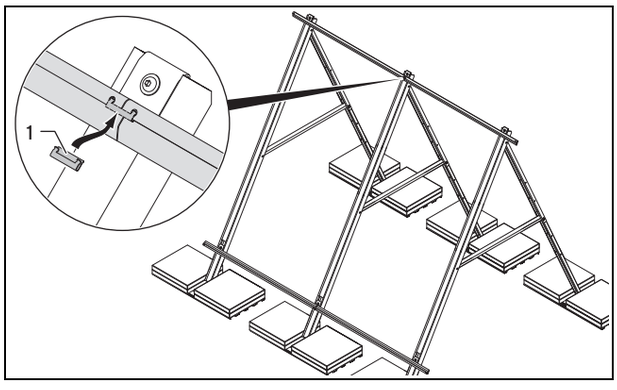
2. Slide the two mounting rail onto the top and bottom retainers, as shown in the figure.
3. Ensure that the open side of the bottom mounting rail is facing upwards and that the open side of the top mounting rail is facing downwards.
4. Slide the mounting rail onto one retainer **(1)** first.
5. Slide the mounting rail a little outwards **(2)**.
6. Then slide the mounting rail back onto the other retainer **(3)**.
7. Perform these steps one after the other for all racks.

Fitting mounting rails to several racks



8. When installing several collectors next to each other, allow the mounting rails to end in the centre of the brackets **(A)**.
9. Allow the mounting rails on the first and last rack to protrude 50–200 mm over the edge **(B)**.

Connecting mounting rails

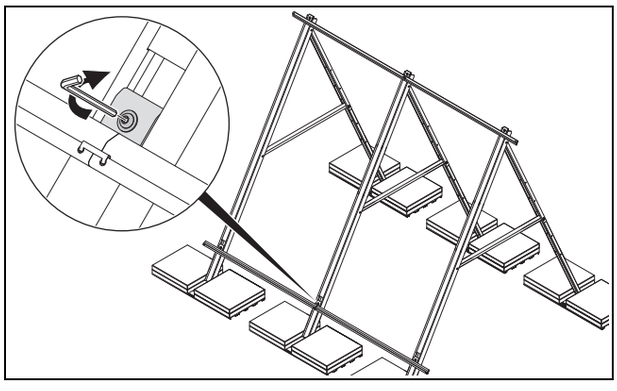


10. Clamp the rail connector **(1)** into the mounting rails.
11. Ensure that the rail connector **(1)** engages in the holes of the mounting rails.

Note

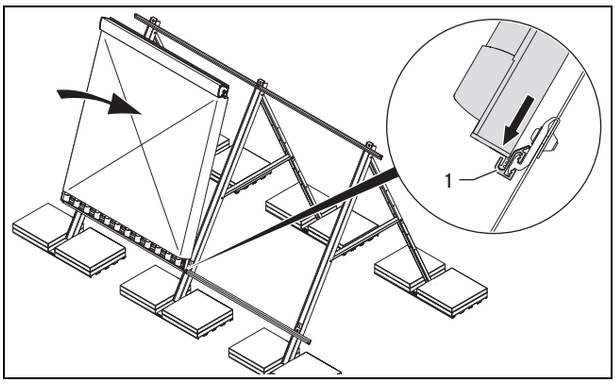
After installation, the rail connectors are no longer accessible.

Securing the lower mounting rails



12. Screw the retainers tightly onto the lower mounting rails.
    – Working materials: 5 mm Allen key

Hooking the collector in at the bottom



Danger!

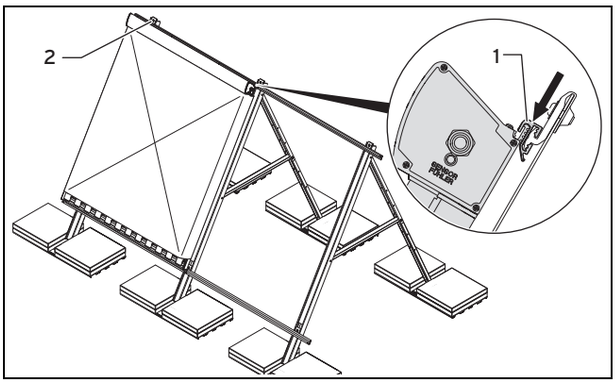
Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 300 °C.

- Avoid working in direct sunlight.
- Cover the collectors before starting work.
- You should preferably perform the work in the morning.
- Wear suitable safety gloves.

13. Place the collector so that its lower edge is in the profile of the mounting rail **(1)** (upper collector).
14. Ensure that the mounting rail surrounds the lower edge of the collector.

Securing the collector at the top



15. Slide the left side of the top mounting rail **(1)** until it is flush with the collector.
16. Ensure that the mounting rail surrounds the top edge of the collector.
17. Screw the retainer securely on the top left **(2)**.
    – Working materials: 5 mm Allen key
18. Ensure that the mounting rail does not slip while you are tightening the screw.

Rendering the retaining straps unusable

Danger!

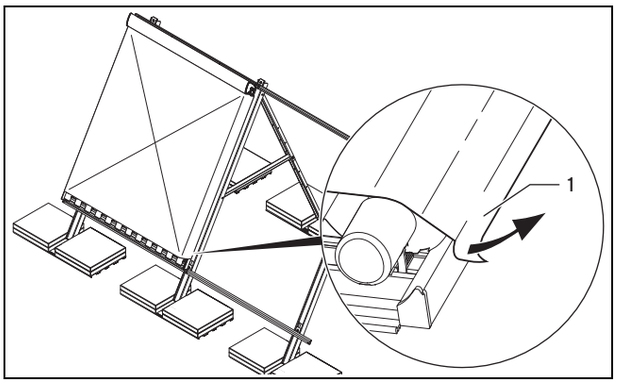
Risk of injury caused by transporting collectors on weathered retaining straps

The retaining straps that are attached to the collectors may become brittle due to environmental influences, and may tear under load.

► After the initial installation of the collectors, render the attached retaining straps unusable in order to rule out subsequent danger caused by weathered retaining straps.

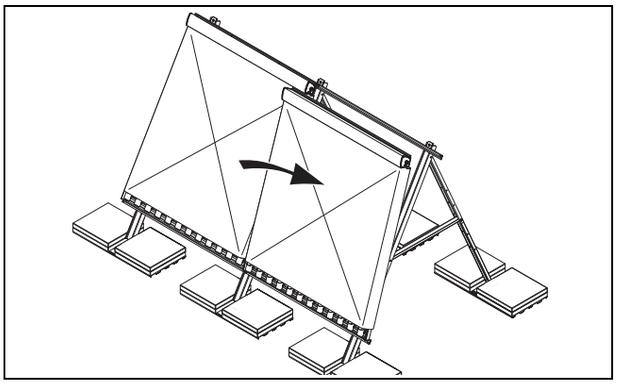
19. Render all retaining straps that are attached to the collector unusable.

Loosening the sun protection film



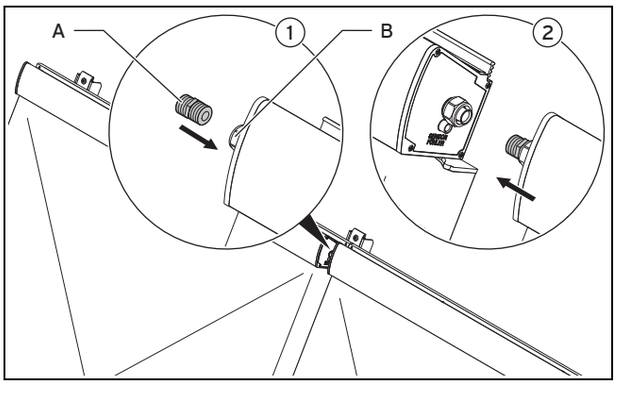
20. To ensure that the sun protection film can be easily removed after starting up the unit, loosen the sun protection film from the edges of the collector **(1)**.

Installing additional collectors



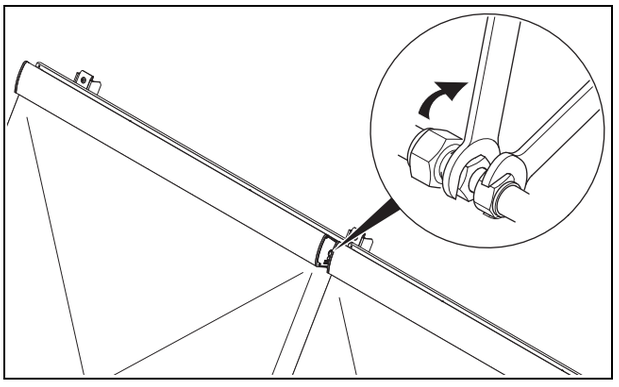
21. Position the next collector on the lower mounting rail so that there is a clearance of approx. 10 cm from the first collector.

Fitting connectors



22. Screw the double nipple **(A)** (from the **VTK** installation set (extension set)) in the thread of the second collector **(B)** with the union nut of the first collector (**(1)** and **(2)**).
23. Push the collectors together.

Tightening the clamping ring connection



Caution.

Risk of damage to the collectors as a result of improper installation.

If the hydraulic connections are not installed properly, the stainless steel tubes inside the collector may become damaged.

► When tightening the clamping ring connection, hold a second spanner against it.

24. Screw the two union nuts securely onto the double nipple.

Completing the installation of the collector

25. Slide the top mounting rail until it is flush with the collector.
26. Screw the upper mounting rail on the corresponding retainer tightly together with the mounting rail for the adjacent collector.
    – Working materials: 5 mm Allen key
27. Render the retaining straps unusable. (→ Page 32)
28. Loosen the sun protection film from the edges of the collector. (→ Page 33)

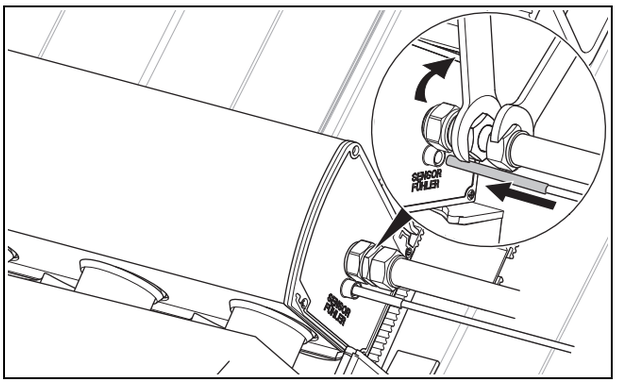
Completing collector rows

Condition: Not all collectors of a row have been installed yet.

► Install an additional collector. (→ Page 33)
► Fit the connectors. (→ Page 33)
► Tighten the clamping ring connection. (→ Page 33)

5 Installation

5.1 Establishing the hydraulic connections (on-roof installation)



Caution.
Leak caused by incorrect accessories.

Incorrect accessories may result in a leak in the solar circuit and cause material damage.

- ► Only work in the solar circuit with hard soldered connections, flat seals, compression fittings or press fittings which have been approved by the manufacturer for use in solar circuits and at correspondingly high temperatures.

Caution.
Risk of damage to the collectors as a result of improper installation.

If the hydraulic connections are not installed properly, the stainless steel tubes inside the collector may become damaged.

- ► When tightening the clamping ring connection, hold a second spanner against it.

1. Connect the collector flow and return to the system using the connection pipework.

Condition: System with collector temperature sensor

- ► Insert the collector temperature sensor into the opening provided on the collector flow side ("hot side").

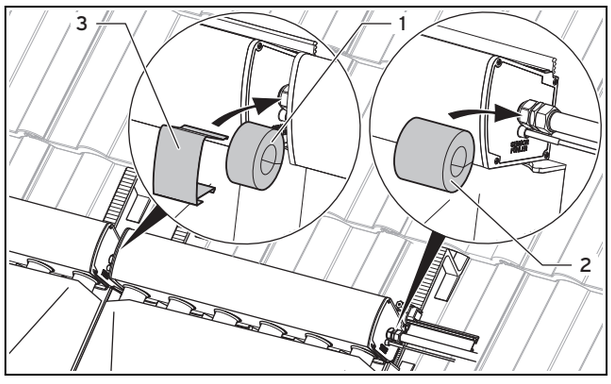
Note
In general, the collector temperature sensor can be attached to the right or left side of the collector field because the collectors on both sides have a corresponding opening.

Condition: Collector rows: 2 … 3

- ► Connect the collectors in accordance with the connection regulations (→ Page 9).
- ► Connect the collector flow and return to the system using the connection pipework.
- ► To do this, connect the clamping ring connection (from the **VTK** installation set (basic set)) to the collector.
- ► Connect the clamping ring connection with the connection pipework.
- ► Check the connections for tightness.

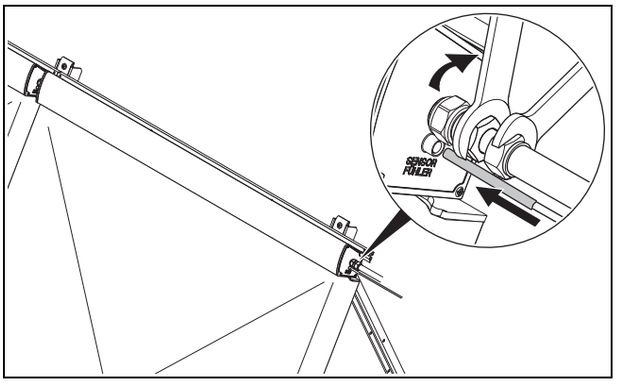
Insulating hydraulic connections

Condition: Start-up carried out



- ► Insulate the hydraulic connections using the heat insulation **(1)** (from the **VTK** installation set (extension set)).
- ► Cover the heat insulation with the cover plate **(3)** (from the **VTK** installation set (extension set)).
- ► Insulate the hydraulic system connections using the heat insulation **(2)** (from the **VTK** installation set (extension set)).

5.2 Establishing the hydraulic connections (flat-roof installation)



Caution.
Leak caused by incorrect accessories.

Incorrect accessories may result in a leak in the solar circuit and cause material damage.

- ► Only work in the solar circuit with hard soldered connections, flat seals, compression fittings or press fittings which have been approved by the manufacturer for use in solar circuits and at correspondingly high temperatures.

Caution.

Risk of damage to the collectors as a result of improper installation.

If the hydraulic connections are not installed properly, the stainless steel tubes inside the collector may become damaged.

► When tightening the clamping ring connection, hold a second spanner against it.

1. Connect the collector flow and return to the system using the connection pipework.
2. To do this, connect the clamping ring connection (from the **VTK** installation set (basic set)) to the collector.
3. Connect the clamping ring connection with the connection pipework.
4. Check the connections for tightness.

Condition: System with collector temperature sensor

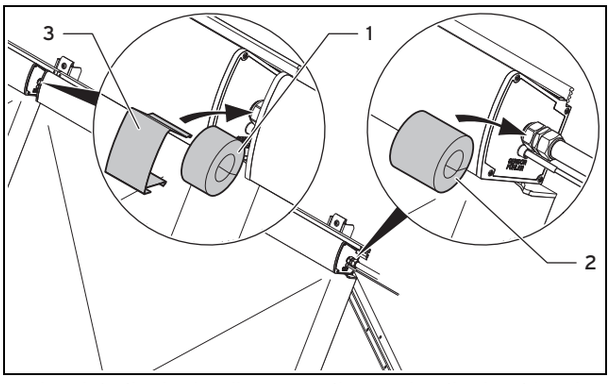
► Insert the collector temperature sensor into the opening provided on the collector flow side ("hot side").

Note

In general, the collector temperature sensor can be attached to the right or left side of the collector field because the collectors on both sides have a corresponding opening.

Insulating hydraulic connections

Condition: Start-up carried out



► Insulate the hydraulic connections using the heat insulation **(1)** (from the **VTK** installation set (extension set)).
► Cover the heat insulation with the cover plate **(3)** (from the **VTK** installation set (extension set)).
► Insulate the hydraulic system connections using the heat insulation **(2)** (from the **VTK** installation set (extension set)).

5.3 Completing installation

1. Insulate all of the pipes using heat insulation in order to prevent heat losses.
2. Connect the solar system to a lightning protection device in accordance with the applicable regulations.

6 Start-up

Condition: All of the components of the solar system are installed.

► Fill the solar system and check its tightness as described in the instructions for the solar pump station.
► Start up the system as described in the instructions for the solar pump station.

7 Handing over to the end user

► Inform the end user that they….
  – Must have the solar system purged again by the competent person four weeks after start-up.
  – Must have the product serviced in accordance with the specified intervals
  – Must check, on a monthly basis, whether the solar system is working correctly (e.g. by checking the solar yield).

8 Troubleshooting

8.1 Replacing defective components

8.1.1 Procuring spare parts

The original components of the product were also certified by the manufacturer as part of the declaration of conformity. If you use other, non-certified or unauthorised parts during maintenance or repair work, this may void the conformity of the product and it will therefore no longer comply with the applicable standards.

We strongly recommend that you use original spare parts from the manufacturer as this guarantees fault-free and safe operation of the product. To receive information about the available original spare parts, contact the contact address provided on the back page of these instructions.

► If you require spare parts for maintenance or repair work, use only the spare parts that are permitted for the product.

8.1.2 Replace leaking collectors

Danger!

Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 300 °C.

► Avoid working in direct sunlight.
► Cover the collectors before starting work.
► You should preferably perform the work in the morning.
► Wear suitable safety gloves.

1. Temporarily decommission (→ Page 37) the solar system.
2. Replace the leaking collectors.
3. Start up the solar system again as described in the operating instructions for the system.

8.1.3 Sealing leaking connections

Danger!
Risk of burns and scalding!
In the event of solar radiation inside the units, collectors can reach 300 °C.

- ► Avoid working in direct sunlight.
- ► Cover the collectors before starting work.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.

1. Temporarily decommission (→ Page 37) the solar system.

Caution.
Leak caused by incorrect accessories.
Incorrect accessories may result in a leak in the solar circuit and cause material damage.

- ► Only work in the solar circuit with hard soldered connections, flat seals, compression fittings or press fittings which have been approved by the manufacturer for use in solar circuits and at correspondingly high temperatures.

2. Seal any leaking connections.
3. Start up the solar system again as described in the operating instructions for the system.

8.1.4 Replacing defective pipe insulation

1. Temporarily decommission (→ Page 37) the solar system.
2. In order to prevent heat losses, replace any defective pipe insulation.
3. Start up the solar system again as described in the operating instructions for the system.

8.1.5 Replacing defective tubes

Danger!
Risk of injury caused by damaged vacuum tubes and sharp-edged components.
Shards and sharp-edged components may lead to cuts.

- ► Wear suitable safety gloves.

Danger!
Risk of burns from hot components!
The U tube, heat conducting plate and the interior of the vacuum tubes become warm as a result of solar radiation and may cause scalding.

- ► Wear suitable safety gloves.
- ► Wear suitable protective goggles.

1. Only use the Vaillant Original replacement tubes.

Note
If a tube has been damaged by a hailstorm, for example, the individual pipe can be replaced.
The solar system can remain in operation when replacing the tube.

2. Replace the defective tube as described in the set-up instructions for the replacement tube.

9 Inspection and maintenance

You can find an overview of the required inspection and maintenance work in the appendix.

9.1 Checking the product for damage, dirt and leaks

1. Check the collectors for dirt.
2. Check the collectors for damage.
3. Check the connections for leaks.

9.2 Check solar fluid

1. Check the pH value of the solar fluid.

Condition: pH value < 8

- ► Replace the solar fluid.

9.3 Cleaning collectors

Danger!
Risk of burns and scalding!
In the event of solar radiation inside the units, collectors can reach 200 °C.

- ► Avoid working in direct sunlight.
- ► You should preferably perform the work in the morning.
- ► Wear suitable safety gloves.
- ► Wear suitable protective goggles.

Caution.
Material damage due to high-pressure cleaner.
High-pressure cleaners may damage the collectors due to the extremely high pressure.

► Never clean the collectors with a high-pressure cleaner.

Caution.
Material damage due to cleaning agent.

Cleaning agents may damage the surface structure of the collector and decrease its efficiency.

► Never clean the collector with cleaning agents.

► Clean the collectors with a sponge and water.

9.4 Checking brackets and collector components for firm seating

1. Check the firm seating of all threaded connections.
2. Tighten any loose threaded connections.

9.5 Checking the pipe insulation for damage

1. Check the pipe insulation for damage.

Condition: The pipe insulation is damaged.

► Temporarily decommission (→ Page 37) the solar system.
► Replace the damaged pipe insulation.
► Start up the solar system again.

10 Decommissioning

10.1 Temporarily decommissioning

Caution.
Damage to the collectors.

Collectors that are not in operation may age more rapidly due to long periods of high idle temperatures.

► Only put the solar plant out of operation if you are a competent person.
► Do not decommission the collectors for more than four weeks.
► Cover any collectors that are not in use. Make sure that the cover is securely fastened.
► In the event of long periods of decommissioning of the solar plant, dismantle the collectors.

Caution.
Oxidation of the solar fluid.

If the solar circuit is opened when out of service for a prolonged period of time, the solar fluid may age more rapidly due to the penetrating oxygen in the air.

► Only decommission the solar plant if you are a competent person.
► Do not decommission the collectors for more than four weeks.
► Before decommissioning the system for a prolonged period of time, drain the entire solar plant and dispose of the solar fluid properly.
► In the event of long periods of decommissioning of the solar plant, dismantle the collectors.

For repair or maintenance work, you can temporarily decommission the solar system. To do this, you must switch off the solar pump.

► Temporarily decommission the solar system as described in the operating instructions for the system.

10.2 Permanently decommissioning

Danger!
Risk of burns and scalding!

In the event of solar radiation inside the units, collectors can reach 300 °C.

► Avoid working in direct sunlight.
► Cover the collectors before starting work.
► You should preferably perform the work in the morning.
► Wear suitable safety gloves.

Danger!
Risk of burns from hot components!

The U tube, heat conducting plate and the interior of the vacuum tubes become warm as a result of solar radiation and may cause scalding.

► Wear suitable safety gloves.
► Wear suitable protective goggles.

Caution.
Damage to the collector and the solar plant.

Improper removal may cause damage to the collector and to the solar plant.

► Before removing the collectors, ensure that a competent person or a Vaillant customer service engineer decommissions the solar plant.

Caution.
Environmental hazard due to solar fluid.

After the solar plant is decommissioned, the collector is still filled with solar fluid which can leak out during removal.

► During transport from the roof, seal the pipe connections of the collector with the red plugs.

1. Undo the hydraulic connections.
2. Undo the clamping elements.

Danger!

Risk of injury caused by transporting collectors on weathered retaining straps

The retaining straps that are attached to the collectors may become brittle due to environmental influences, and may tear under load.

► Where collectors have already been operated for a long time, do not use the attached retaining straps for transporting.
► Use suitable transport belts instead.
► After the initial installation of the collectors, render the attached retaining straps unusable.

3. Transport all of the collectors from the roof.
4. Remove the sealing plugs.
5. Drain the collector fully into a canister through two connections.
6. Fit the sealing plugs again.
7. Use adequate packing around the collectors.

11 Recycling and disposal

Disposing of the packaging

► Dispose of the packaging correctly.
► Observe all relevant regulations.

12 Customer service

Applicability: Belgium

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Golden Hopestraat 15
B-1620 Drogenbos
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Fax 2 3349319
Kundendienst / Service après-vente / Klantendienst 2 3349352
info@vaillant.be
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Applicability: Switzerland

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www.vaillant.ch

Service après-vente tél.: 026 40972 17

Service après-vente fax: 026 40972 19

Applicability: France

Les coordonnées de notre service après-vente sont indiquées au verso ou sur le site www.vaillant.fr.

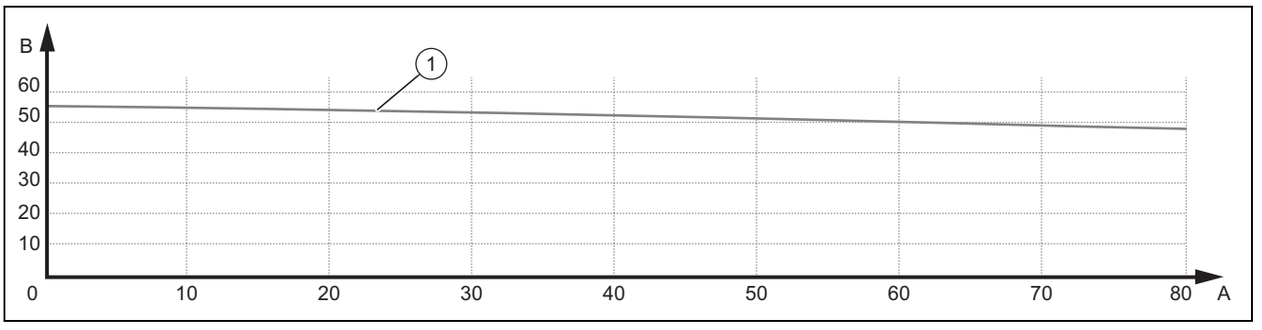
Appendix

A Inspection and maintenance work

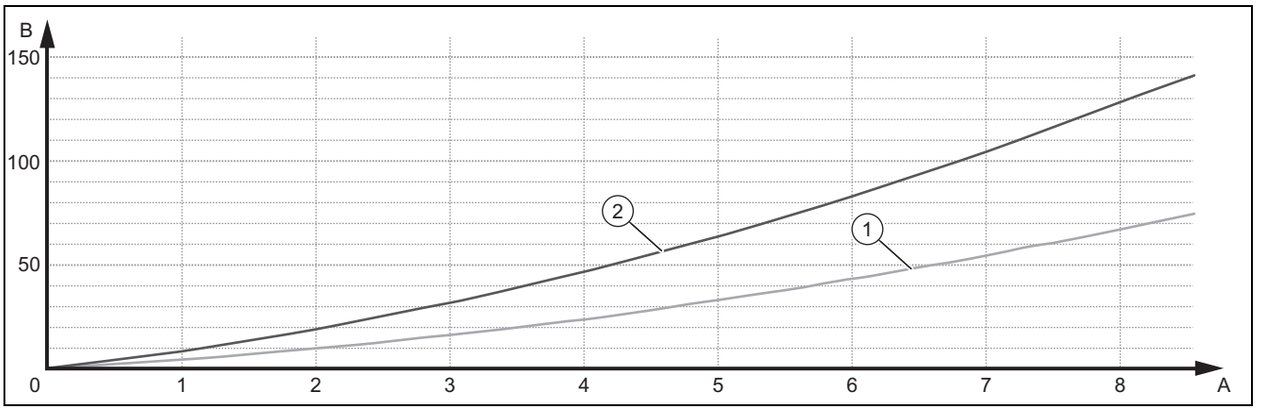
The table below lists the manufacturer requirements with respect to minimum inspection and maintenance intervals. If national regulations and directives require shorter inspection and maintenance intervals, you should observe these instead of the intervals listed.

#	Maintenance work	Interval	
1	Purging the solar system	Four weeks after initial start-up	
2	Check solar fluid	Annually	36
3	Checking the product for damage, dirt and leaks	Annually	36
4	Cleaning collectors	Annually	36
5	Checking brackets and collector components for firm seating	Annually	37
6	Checking the pipe insulation for damage	Annually	37

B Efficiency and pressure loss



A Efficiency [%]
B Temperature difference ΔT ($T_{collector}$ − $T_{ambient\ air}$) [K]
1 VTK 570/2 / VTK 1140/2



A Mass flow Q [l/min]
B Pressure loss Δp [mbar]
1 VTK 570/2
2 VTK 1140/2

C Technical data

Technical data

	VTK 570/2	VTK 1140/2
Number of tubes	6	12
η_0 (aperture), DIN4757-4 or EN12975	55.5 %	56 %
c_1 with wind, with reference to gross area	0.646 W/(m²k)	0.651 W/(m²k)
c_2 with wind, with reference to gross area	0.004 W/(m²k²)	0.004 W/(m²k²)
$K_{\theta,trans}$ (50°), with reference to gross area	0.98	0.98
$K_{\theta,long}$ (50°), with reference to gross area	0.95	0.95
Annual collector yield (example: Würzburg, 50°)	664 kWh/collector	1330 kWh/collector
Peak output per collector module W_{peak}	644 W	1,288 W
Area-related heat capacity c	7.91 kJ/(m²k)	7.98 kJ/(m²k)
Volume flow (per m² of collector surface)	24 l/(m²h)	24 l/(m²h)
Minimum volume flow in the solar circuit	180 l/h	180 l/h
Absolute pressure in the high vacuum	10^{-5} mbar (= 10^{-8} bar)	10^{-5} mbar (= 10^{-8} bar)
Alpha absorber absorption	≤ 94%	≤ 94%
Epsilon absorber absorption	≤ 6%	≤ 6%
Grid dimensions (length x height x depth) in m	0.7 x 1.65 x 0.11	1.39 x 1.65 x 0.11
Gross area	1.16 m²	2.30 m²
Aperture surface area	1.0 m²	2.0 m²
Absorber surface area	1.0 m²	2.0 m²
Collector capacity	0.9 l	1.6 l
Weight	19 kg	34 kg
Operating excess pressure, max. permissible	10 bar	10 bar
Shutdown temperature, max.	301 °C	301 °C
Connection width, flow/return	15 mm	15 mm
Material for the tube collector	Al/1.4301/glass/silicone/PBT/EPDM	Al/1.4301/glass/silicone/PBT/EPDM/TE
Material for glass tubes	Borosilicate 3.3	Borosilicate 3.3
Absorber layer	Highly selective	Highly selective
Glass tubes (outer diameter/inner diameter/wall thickness/tube length)	47 / 33 / 1.6 / 1503	47 / 33 / 1.6 / 1503
Colour (plastic parts)	Black	Black
Certification in accordance with the Pressure Equipment Directive	TÜV SÜD certificate no.: Z-IS-AN1-STG-S-18-08-2645213-29080643	TÜV SÜD certificate no.: Z-IS-AN1-STG-S-18-08-2645213-29080643
Max. wind load	2400	2400
Max. standard snow load	3350	3350
On-roof installation angle	15 … 75°	15 … 75°
Flat roof installation angle	30°, 45°, 60°	30°, 45°, 60°

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