Deutsches Institut für Bautechnik

DIBt

Public-law institution jointly founded by the federal states and the Federation

Technical authority granting approvals and permits for construction products and construction techniques

National technical approval / General construction technique permit

Date: 16 Jun 2023

Reference number: I 85-1.14.4-100/22

Number:

Z-14.4-790

Validity

from: **16 June 2023**

to: **7 April 2027**

Applicant:

Premium Mounting Technologies GmbH & Co. KG
Industriestrasse 25
95346 Stadtsteinach
Germany

Subject of decision:

Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

The subject named above is herewith granted a national technical approval (*allgemeine bauaufsichtliche Zulassung*) / general construction technique permit (*allgemeine Bauartgenehmigung*).

This decision contains nine pages and five annexes with 44 pages.

This national technical approval / general construction technique permit replaces national technical approval / general construction technique permit no. Z-14.4-790 of 18 May 2022. The subject concerned was granted the first national technical approval on 6 September 2017.

Translation authorised by DIBt

I GENERAL PROVISIONS

1 This decision confirms the fitness for use and application of the subject concerned within the meaning of the Building Codes of the federal states (*Landesbauordnungen*).

2 This decision does not replace the permits, approvals and certificates required by law for carrying out construction projects.

3 This decision is granted without prejudice to the rights of third parties, in particular private property rights.

4 Notwithstanding further provisions in the 'Special Provisions', copies of this decision shall be made available to the user and installer of the subject concerned. The user and installer of the subject concerned shall also be made aware that this decision must be made available at the place of use or place of application. Upon request, copies of the decision shall be provided to the authorities involved.

5 This decision shall be reproduced in full only. Partial publication requires the consent of DIBt. Texts and drawings in promotional material shall not contradict this decision. In the event of a discrepancy between the German original and this authorised translation, the German version shall prevail.

6 This decision may be revoked. The provisions contained herein may subsequently be supplemented and amended, in particular, if this is required by new technical findings.

7 This decision is based on the information and documents provided by the applicant. Alterations to this basis are not covered by this decision and shall be notified to DIBt without delay.

II SPECIAL PROVISIONS

1 Subject concerned and field of use and application

1.1 Subject of approval and field of use

The subject of approval comprises the following construction products for fixing and mounting framed or frameless photovoltaic modules as well as securing them in position via their deadweight and additional ballast, see Table 1 and Annexes 1.1 to 1.11 as well as Annexes 2.1 to 2.21.

Table 1: Subject of approval

Construction products	Annexes		
	'PMT EVOLUTION'	'PMT EVO 2.0'	'PMT EVO 2.1'
Base rails as well as start / end and connecting profiles	Annex 1.3	Annexes 2.8 to 2.10	Annexes 2.8 to 2.10
Support profiles 'Base' and 'Cube' with attachment (15° tilt) or without attachment (10° tilt), in variants 1 and 2, as well as support profiles 'Base' and 'Tower' (10° and 15° tilt)	Annexes 1.4 to 1.9	Annexes 2.11 and 2.12	Annexes 2.11 and 2.12
Cross members / ballast braces	Annex 1.10	Annexes 2.13 and 2.14	Annexes 2.13 and 2.14
Cross member connectors	-	Annex 2.15	Annex 2.15
Rear panels and rear panel tower (only for systems 'PMT EVOLUTION SOUTH', 'PMT EVO 2.0 SOUTH' and 'PMT EVO 2.1' SOUTH)	Annex 1.11	Annexes 2.16 and 2.17	Annexes 2.16 and 2.17
Support profile 'EVO Plate 2.1' – 10° and 15° and 'ProPlate' – 10° and 15°	-	-	Annexes 2.18 to 2.21

1.2 Subject of the permit and field of application

The subject of the permit is the planning, design and execution on flat roofs of the aerodynamic mounting systems 'PMT EVOLUTION', 'PMT EVO 2.0' and 'PMT EVO 2.1' consisting of the construction products named in Table 2.

Table 2: Subject of the permit

Construction products	Annexes
Aerodynamic mounting systems 'PMT EVOLUTION', 'PMT EVO 2.0' and 'PMT EVO 2.1', consisting of the construction products named in Table 1	
Module clamps (middle clamps / end clamps)	Annexes 3.1 and 3.2 as well as in accordance with decision no. Z-14.4-721[1], Annexes 1.2 and 1.3 and decision no. Z-14.4-687[2], Annexes 4.1 to 5.3
Connection elements button head screws and square nuts T-bolts and threaded sleeves or socket head cap screws and T-slot nuts	

The mounting systems are intended for installation and alignment of photovoltaic modules in the south-facing direction (systems 'PMT EVOLUTION SOUTH', 'PMT EVO 2.0 SOUTH' and 'PMT EVO 2.1 SOUTH') or in the east-west direction (systems 'PMT EVOLUTION EAST/WEST', 'PMT EVO 2.0 EAST/WEST' and 'PMT EVO 2.1 EAST/WEST'). Depending on the mounting system, the photovoltaic modules are tilted either by 10° or by 15°; see Annexes 1.1 and 1.2 as well as Annexes 2.1 to 2.6.

The mounting systems are designed in a way that they do not perforate the flat roof. The 'Base' support profiles, which are pre-installed on the base rails, are mounted together with the start / end and connecting profiles as supports at the base points of the photovoltaic modules. The 'Cube' or 'Tower' support profiles are then installed on the base rails as end or middle supports for the photovoltaic modules; 'Cube' support profiles (with or without attachments) shall be used for the 'PMT EVOLUTION' system, and 'Tower' support profiles for the 'PMT EVO 2.0' and 'PMT EVO 2.1' systems. The photovoltaic modules are fixed and fastened to the support profiles by means of module clamps.

1.2.1 'PMT EVOLUTION' system

In the 'PMT EVOLUTION' system, the 'Base' and 'Cube' support profiles are manufactured in two geometric variants which differ, in particular, in terms of the manner in which the module clamps (middle clamps and end clamps) are fastened to the support profiles:

- Variant 'Base 1' and 'Cube 1', see Annexes 1.4 to 1.6:

  This variant provides a 'clip channel' on the upper side of each of the support profiles 'Base 1' and 'Cube 1' (with or without attachment) for mounting framed photovoltaic modules by means of module clamps in accordance with decision no. Z-14.4-721[1], Annexes 1.2 and 1.3.

  The module clamps (Annexes 3.1 and 3.2) each consist of a top profile and a clip profile. The load is transferred through the clip connection of the module clamps with the support profiles 'Base 1' or 'Cube 1' and through tightening a button head screw and a square nut to fix the photovoltaic modules.

  The module middle clamp MH AK II Klick 30-50, the associated module end clamp and the connection elements (button head screw and square nut) in accordance with decision no. Z-14.4-721[1], Annexes 1.2 and 1.3 shall be used.

[1] Z-14.4-721: 21 October 2019 Decision, Deutsches Institut für Bautechnik (DIBt): Module clamps, laminate clamps, cross connectors and their components for fastening of photovoltaic modules on profile rails

[2] Z-14.4-687: 16 March 2017 Decision, Deutsches Institut für Bautechnik: Clamp brackets for fastening solar elements on support profiles

- Variant 'Base 2' and 'Cube 2', see Annexes 1.7 to 1.9:

  In this variant, framed or frameless photovoltaic modules are connected via module clamps (clamp brackets) in accordance with decision no. Z-14.4-687[2], Annexes 4.1 to 5.3, through T-bolts and threaded sleeves or through T-slot nuts and socket head cap screws to the support profiles 'Base 2' and 'Cube 2' (with or without attachments). The support profiles 'Base 2' and 'Cube 2' are manufactured with clamp channels, analogously to the geometry of the base rails in accordance with decision no. Z-14.4-687[2], Annexes 3.1 to 3.3.

  The photovoltaic modules are fixed via module clamps (clamp brackets) through tightening of the threaded sleeves with T-bolts inserted into the clamp channels of the support profiles or through tightening of socket head cap screws with T-slot nuts inserted into the clamp channels of the support profiles and the resultant contact pressure exerted on the photovoltaic modules.

  The module middle clamps, the module end clamps (clamp brackets) and the connection elements (T-bolt and threaded sleeve or socket head cap screw and T-slot nut) in accordance with decision no. Z-14.4-687[2], Annexes 4.1 to 5.3 shall be used.

1.2.2 'PMT EVO 2.0' and 'PMT EVO 2.1' systems

In the 'PMT EVO 2.0' system, both a clip channel and a clamp channel are provided on the upper side of each of the support profiles 'Base' and 'Tower'. The profiles are thus suitable both for mounting framed photovoltaic modules by means of module clamps in accordance with decision no. Z-14.4-721[1], Annexes 1.2 and 1.3 or for mounting framed or frameless photovoltaic modules by means of module clamps (clamp brackets) in accordance with decision No. Z-14.4-687[2], Annexes 4.1 to 5.3, as described in Section 1.1.

In the 'PMT EVO 2.1' mounting system, support profiles in accordance with Annexes 2.18 to 2.21 are used for connecting the base rails, as well as the start / end and connecting profiles to the substructure.

2 Provisions for the construction products

2.1 Properties and composition

2.1.1 General

Verification of the required material properties shall be provided through an inspection certificate 'type 3.1' in accordance with DIN EN 10204[3].

2.1.2 Base rails, start / end and connecting profiles, support profiles 'Base' and 'Cube' as well as 'Tower', cross members / ballast braces, cross member connectors, support plates

The base rails as well as the start / end and connecting profiles, the support profiles 'Base' and 'Cube' as well as 'Tower', the cross members / ballast braces and the cross member connectors shall be made from the aluminium alloy EN AW-6060 T66 in accordance with DIN EN 755-2[4] or an aluminium alloy having at least the same material properties in accordance with DIN EN 755-2[4]. DIN EN 755-9[5] shall apply to the dimensional tolerances.

The main dimensions shall be taken from Annexes 1.3 to 1.10, 2.7 to 2.15 as well as Annexes 2.18 to 2.21.

Further specifications are deposited with DIBt.

[3]	DIN EN 10204:2005-01	Metallic products – Types of inspection documents; German version EN 10204:2004
[4]	DIN EN 755-2:2016-10	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 2: Mechanical properties
[5]	DIN EN 755-9:2016-10	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 9: Profiles, tolerances on dimensions and form; German version EN 755-9:2016

2.1.3 Rear panels

The rear panels shall be made of the aluminium alloy EN AW-5754 O, H111 in accordance with DIN EN 485-2[6] or an aluminium alloy having at least the same material properties in accordance with DIN EN 485-2[6]. DIN EN 485-4[7] shall apply to the dimensional tolerances.

The main dimensions shall be taken from Annex 1.11 as well as from Annexes 2.16 and 2.17.

Further specifications are deposited with DIBt.

2.2 Manufacture, packaging, transport, storage and marking

2.2.1 Manufacture

Unless otherwise specified below, the Technical Building Rules (*Technische Baubestimmungen*) shall apply.

2.2.2 Packaging, transport and storage

The construction products named in Section 2.1 shall be packed, transported and stored in a way that protects them from corrosion and is suitable for the material.

2.2.3 Marking

The packaging or the documents accompanying the delivery note for the construction products named in Section 2.1 shall be marked by the manufacturer with the national conformity mark (*Ü-Zeichen*) in accordance with the Conformity Marking Ordinances (*Übereinstimmungszeichen-Verordnungen*) of the federal states. The mark shall only be applied if the requirements given in Section 2.3 are met.

2.3 Confirmation of conformity

2.3.1 General

The manufacturer shall confirm for each manufacturing plant that the construction products named in Section 2.1 comply with the provisions of the national technical approval included in this decision by way of a declaration of conformity based on factory production control and a certificate of conformity issued by a certification body recognised for these purposes as well as on regular external surveillance carried out by a recognised inspection body in accordance with the following provisions.

To issue the certificate of conformity and for external surveillance, including the associated product testing, the manufacturer of the construction products named in Section 2.1 shall use a certification body and an inspection body recognised for these purposes.

The declaration of conformity shall be submitted by the manufacturer through marking of the construction products named in Section 2.1 with the national conformity mark, including statement of the intended use.

The certification body shall send a copy of the certificate of conformity issued by it to DIBt.

2.3.2 Factory production control

A factory production control system shall be set up and implemented in each manufacturing plant. Factory production control shall be understood to be continuous surveillance of production by the manufacturer to ensure that the manufactured construction products satisfy the provisions of the national technical approval included in this decision.

6	DIN EN 485-2:2018-12	Aluminium and aluminium alloys – Sheet, strip and plate – Part 2: Mechanical properties
7	DIN EN 485-4:2019-05	Aluminium and aluminium alloys – Sheet, strip and plate – Part 4: Tolerances on shape and dimensions for cold-rolled products; German version EN 485-4:1993

The factory production control shall at least include the following measures:

- The required dimensions and tolerances as specified in Section 2.1, including those of the M8 thread of all screw channels, shall be checked for each batch.
- The conformity of the information in the inspection certificate with the specifications in Section 2.1 shall be checked.

The results of factory production control shall be recorded and evaluated. The records shall include at least the following information:

- designation of the construction product or the starting material or the components,
- type of check or test,
- date of manufacture and testing of the construction product or the starting material or the components,
- results of the checks and tests as well as, if applicable, comparison with requirements,
- signature of the person responsible for factory production control.

The records shall be kept for at least five years and submitted to the inspection body used for external surveillance. They shall be submitted to DIBt and the competent supreme building authority upon request.

If the test result is unsatisfactory, the manufacturer shall immediately take the necessary measures to resolve the defect. Construction products which do not meet the requirements shall be handled in such a way that they cannot be mixed up with compliant products. After the defect has been remedied, the relevant test shall be repeated immediately, if technically feasible and necessary to show that the defect has been eliminated.

2.3.3 External surveillance

The plant and the factory production control system shall be inspected regularly, i.e. at least once a year, by means of external surveillance at each manufacturing plant.

Initial type-testing of the construction products named in Section 2.1 shall be carried out within the scope of external surveillance. Samples for random testing may also be taken. Sampling and testing shall be the responsibility of the recognised inspection body.

The results of certification and external surveillance shall be kept for at least five years. They shall be presented by the certification or inspection body to DIBt and the competent supreme building authority upon request.

3 Provisions for planning, design and execution

3.1 Planning

Unless otherwise specified below, the Technical Building Rules as well as the provisions of the national technical approvals / general construction technique permits cited below shall apply.

The construction technique comprises the construction products named in Table 1 of this decision as well as the following construction products:

- Module clamps

  Specifications pertaining to the module clamps as middle clamps or as end clamps shall be taken from decision no. Z-14.4-721[1] and decision no. Z-14.4-687[2].

- Connection elements

  Specifications pertaining to the button head screws and square nuts shall be taken from decision no. Z-14.4-721[1].

  Information pertaining to the T-bolts and threaded sleeves or the socket head cap screws and T-slot nuts shall be taken from decision no. Z-14.4-687[2].

With respect to corrosion protection, the Technical Building Rules as well as the provisions of decisions no. Z-14.4-721[1] and no. Z-14.4-687[2] shall apply.

Fire safety verifications and other building physics verifications shall be provided separately, where necessary.

3.2 Design

The verification concept set out in DIN EN 1990[8] shall apply.

The serviceability and the structural safety of the connections, the mounting system as a whole and the supports shall be verified in each case by structural analysis in accordance with the Technical Building Rules.

This decision only regulates the application of the base rails as well as the start / end and connecting profiles, the support profiles 'Base', 'Cube' and 'Tower', the cross members / ballast braces, the cross member connectors and the rear panels as well as the ultimate limit state verification of the connections and mounting produced with the base rails as well as the start / end and connecting profiles, the support profiles 'Base', 'Cube' and 'Tower', the cross members / ballast braces, the cross member connectors and the rear walls for tensile loading (e.g. as a result of wind suction) as well as for shear loading acting longitudinally or transversely in the plane of the photovoltaic module (e.g. as a result of deadweight of the construction).

The characteristic resistance values and partial safety factors γ_M given in Annexes 4.1 to 4.4 ('PMT EVOLUTION' system) as well as Annexes 5.1 to 5.4 (systems 'PMT EVO 2.0' and 'PMT EVO 2.1') shall be used for the ultimate limit state verifications for the mounting systems and their connections.

It shall be verified that the design value of an action E_d does not exceed the design value of the corresponding resistance R_d. For combined loading from the following actions, a linear interaction verification shall additionally be provided:

$$\frac{Fk7_{Ed} \cdot \gamma_M}{Fk7_{Rk}} + \frac{Fk8_{Ed} \cdot \gamma_M}{Fk8_{Rk}} \leq 1{,}0$$

where

Fk_{Ed} [kN]	Design value of an action
Fk_{Rk} [kN]	Characteristic value of the resistance to an action, see Annexes 4.1 to 4.4 ('PMT EVOLUTION' system) as well as Annexes 5.1 to 5.4 (systems 'PMT EVO 2.0' and 'PMT EVO 2.1')
γ_M	Partial safety factor, see Annexes 4.1 to 4.4 ('PMT EVOLUTION' system) as well as Annexes 5.1 to 5.4 (systems 'PMT EVO 2.0' and 'PMT EVO 2.1')

8 DIN EN 1990:2010-12 Eurocode: Basis of structural design in conjunction with DIN EN 1990/NA:2010-12

For the planning and design of the module clamps, decision no. Z-14.4-721[1], Sections 3.1 and 3.2 as well as decision no. Z-14.4-687[2], Section 3 shall be observed. Due to the 10° or 15° tilt of the mounting systems, the resistance values given there shall be split up into their horizontal and vertical components for design purposes.

The following verifications shall be provided separately:

- serviceability,
- structural safety of the base rails as well as start / end and connecting profiles
- structural safety of the connections of the base rails as well as the start / end and connecting profiles to the substructure
- structural safety of the mounting systems 'PMT EVOLUTION', 'PMT EVO 2.0' and 'PMT EVO 2.1' as a whole,
- structural safety of the substructure,
- positional stability through appropriate ballast etc.,
- introduction and transfer of the verified forces into the main structural system.

3.3 Execution

The detailing of the mounting systems and their connections shall be taken from in accordance with the Annexes.

During installation, the frames of the photovoltaic modules shall rest against the module clamps.

For the installation of the module clamps, decisions no. Z-14.4-721[1], Section 3.3 as well as no. Z-14.4-687[2], Section 4 shall be observed. The construction products used in the mounting system, including the module clamps and the photovoltaic modules to be fixed, shall be stored and installed in clean, dry and grease-free condition. Before installation, an inspection of all construction products shall be carried out to ensure that they are in good condition. Damaged construction products shall be replaced.

The manufacturer shall draw up instructions for the installation of the mounting systems and provide them to the executing company. The installation instructions shall contain information on the screwing tool, adjustment of the screwing tool, minimum clamping depth, tightening torque and more. Impact drivers shall not be used.

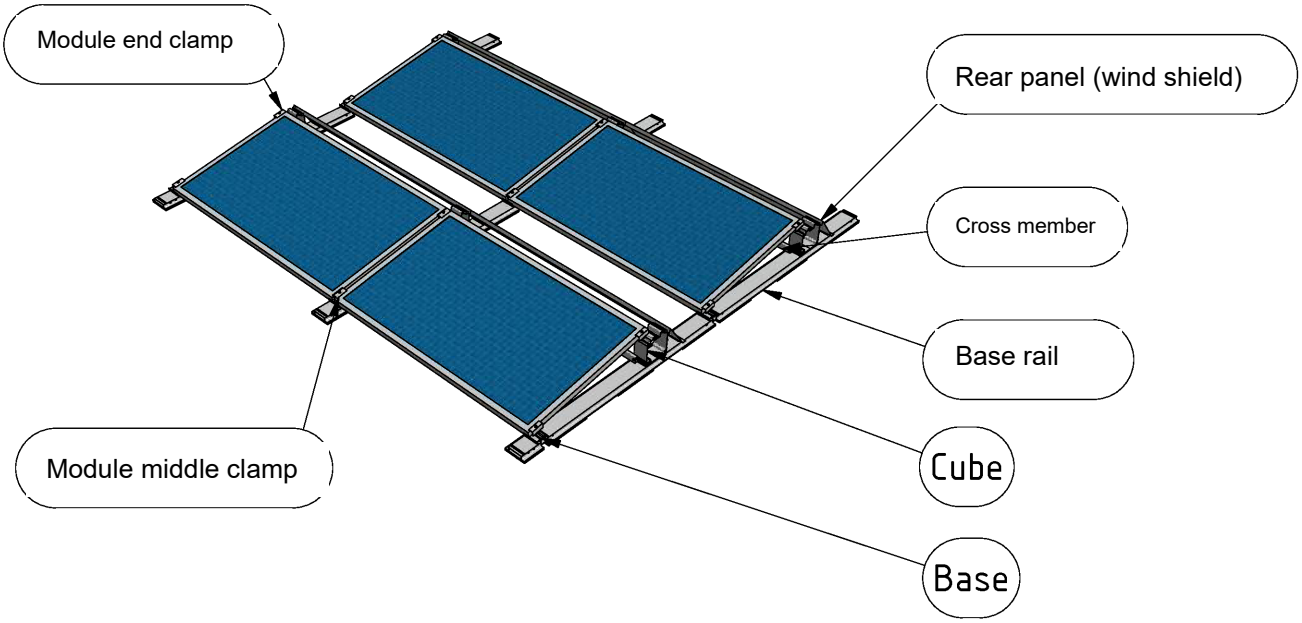
The mounting systems shall be installed only by companies that have the necessary experience.

The executing company shall provide a declaration of conformity in accordance with Section 16a(5) in conjunction with Section 21(2) of the Model Building Code as a confirmation of conformity of the mounting systems with the general construction technique permit included in this decision.

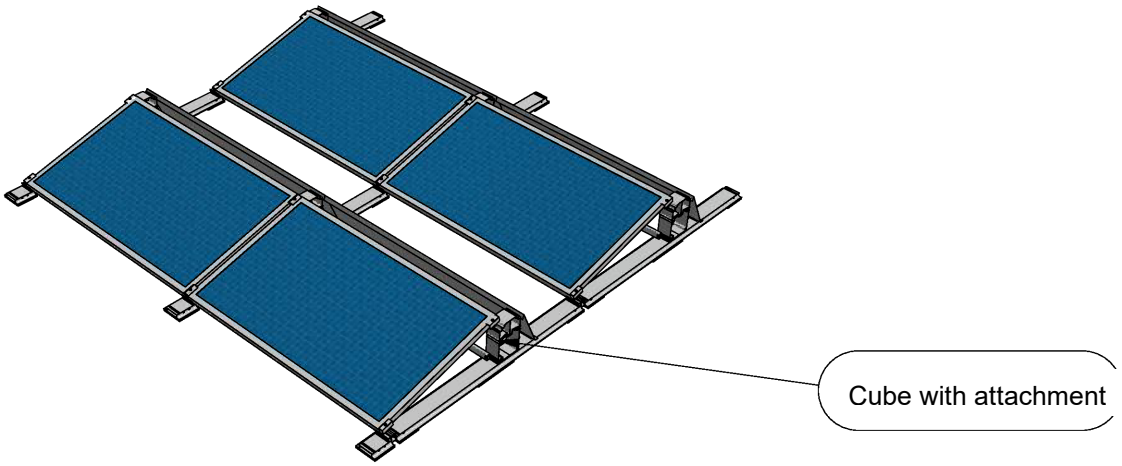
Dr.-Ing. Ronald Schwuchow
Head of Section

Drawn up by
Hetfleisch

PMT EVOLUTION SOUTH 10°



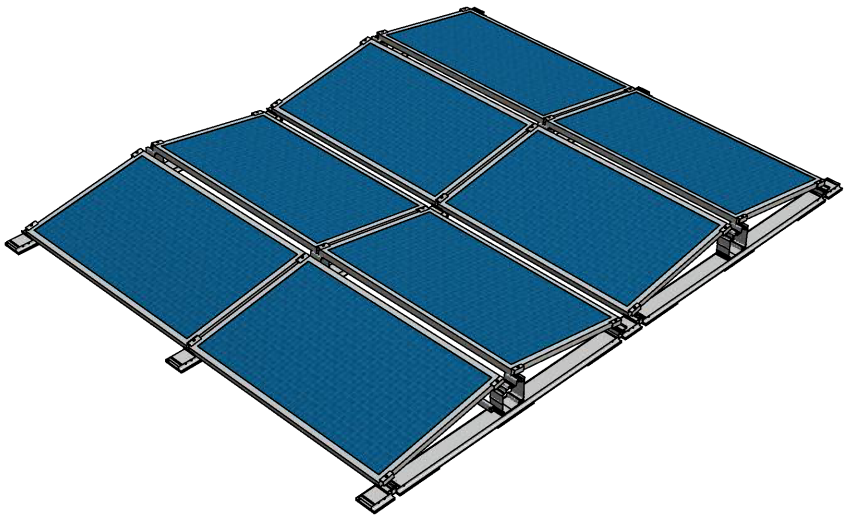
PMT EVOLUTION SOUTH 15°



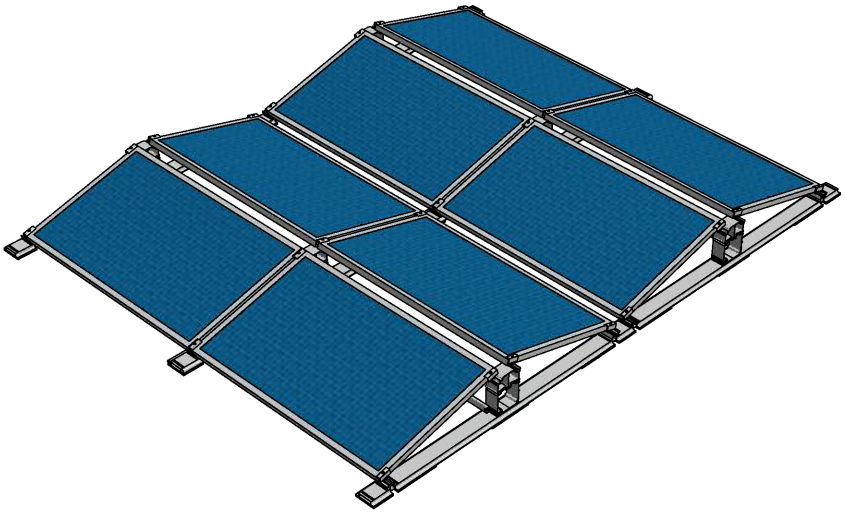
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.1
PMT EVOLUTION SOUTH system Overview	

Deutsches Institut für Bautechnik DIBt

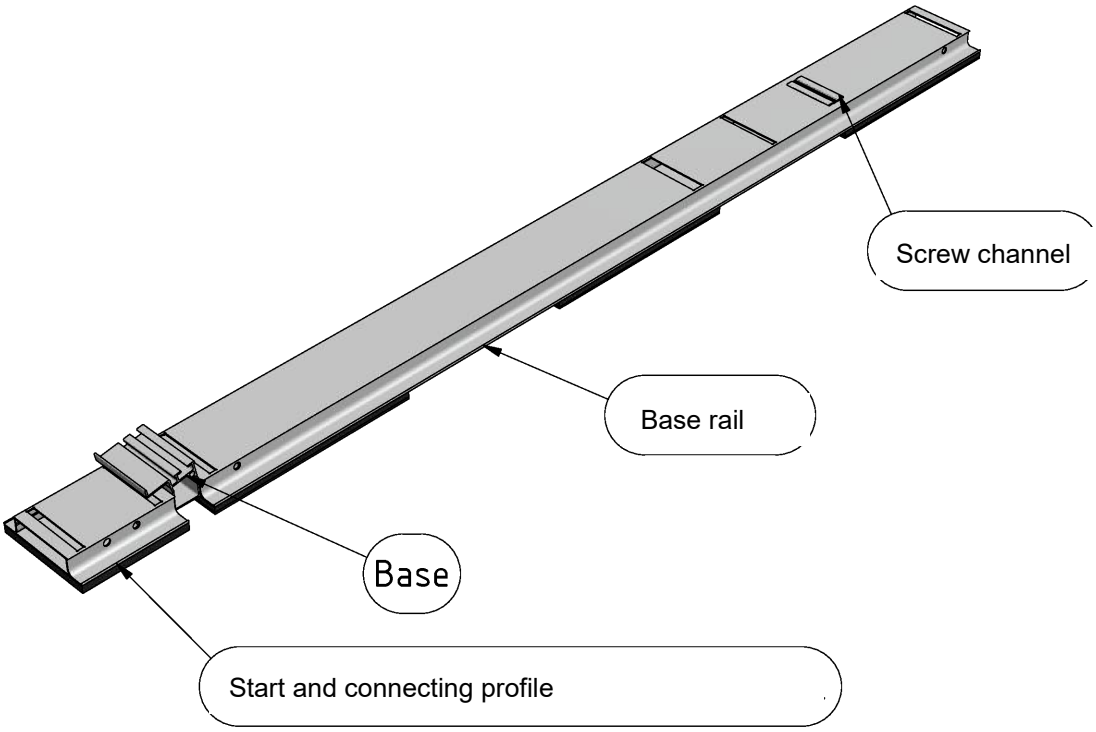
PMT EVOLUTION EAST/WEST 10°

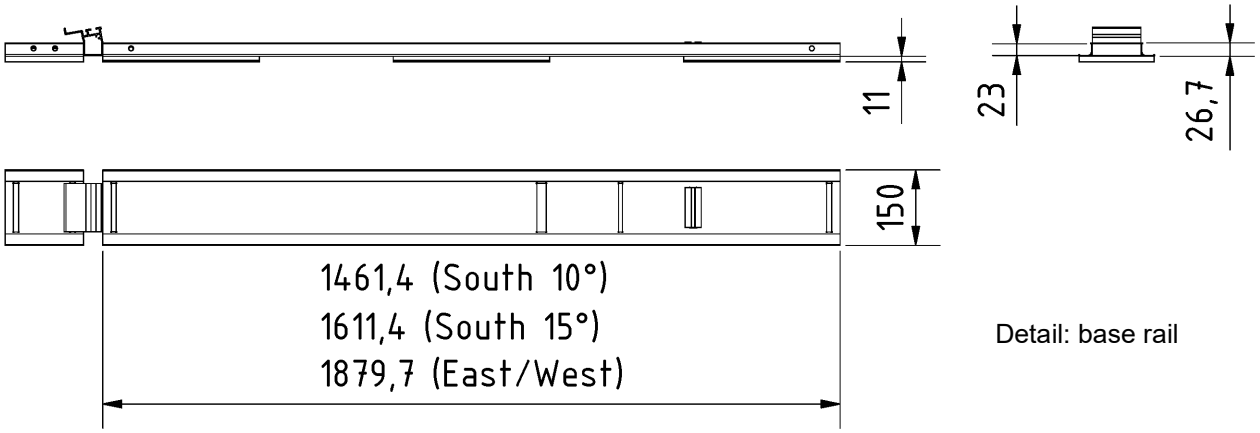


PMT EVOLUTION EAST/WEST 15°

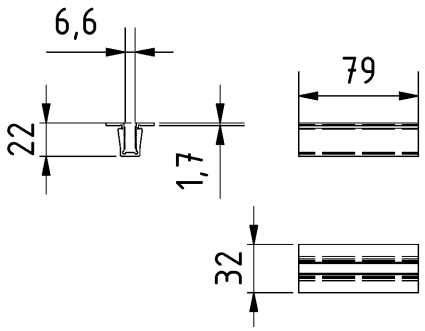


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.2
PMT EVOLUTION EAST/WEST system Overview	



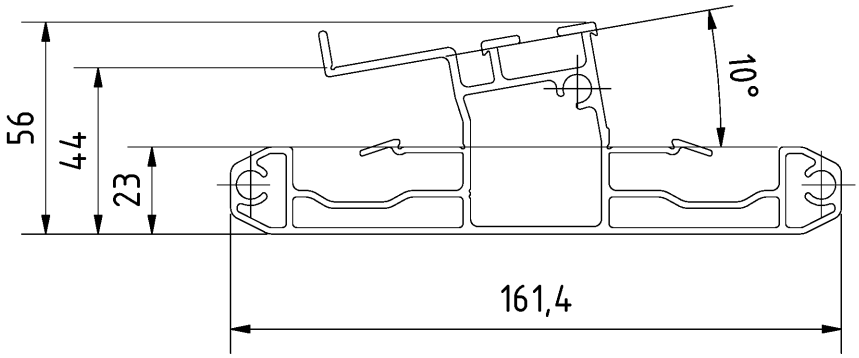


Detail: base rail

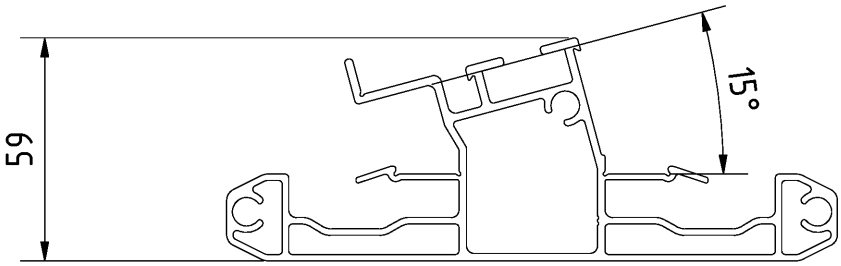


Detail: screw channel

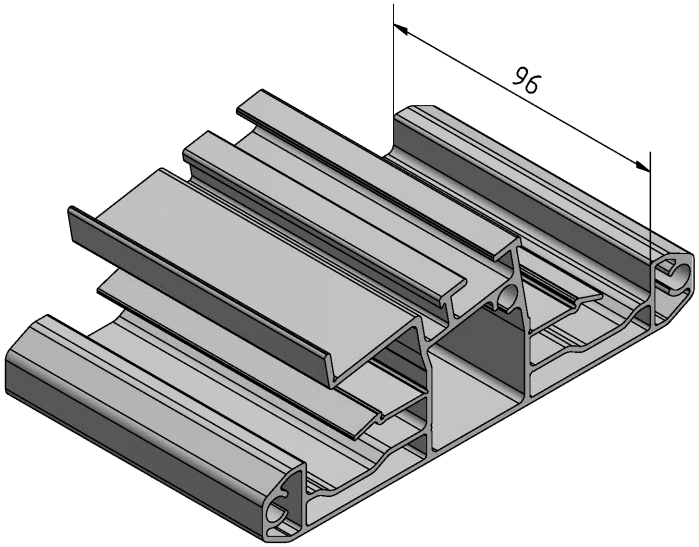
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.3
PMT EVOLUTION SOUTH system / PMT EVOLUTION EAST/WEST system Base rail with pre-installed support profile 'Base'	



'Base' for 10° systems



'Base' for 15° systems

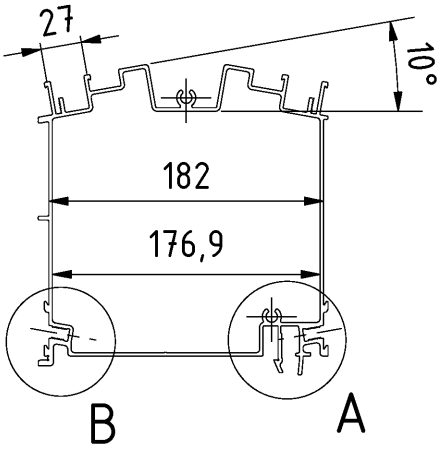


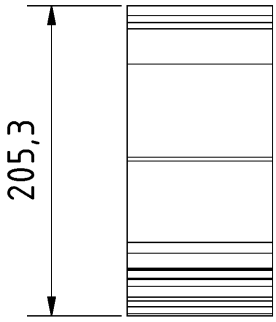
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

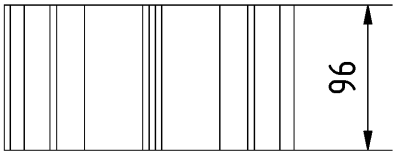
PMT EVOLUTION SOUTH system / PMT EVOLUTION EAST/WEST system
Support profile 'Base 1' – 10° and 15°

Annex 1.4

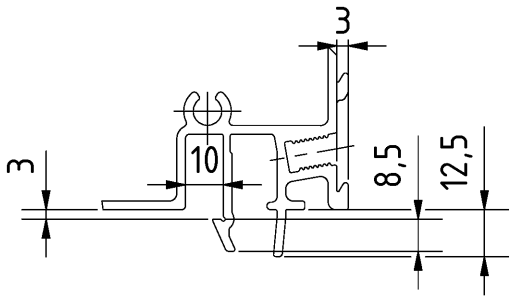
Deutsches Institut für Bautechnik DIBt



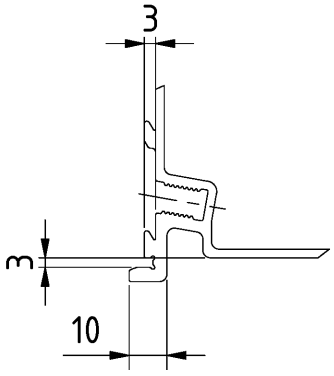


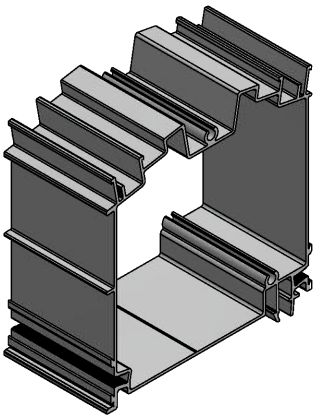


A (1 : 2)

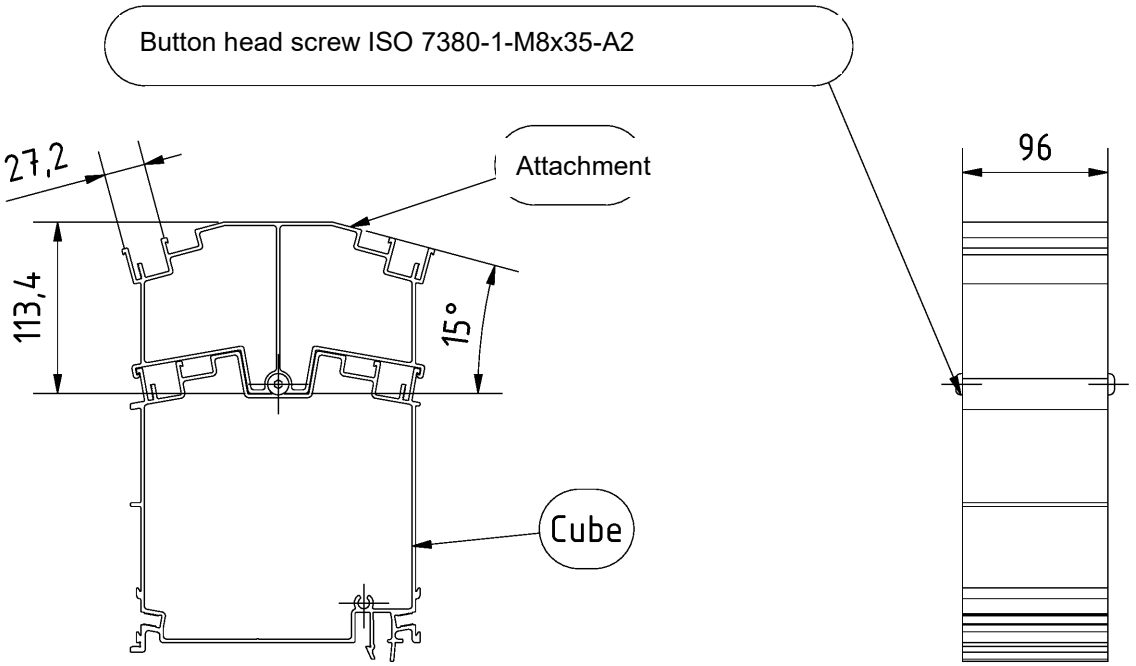


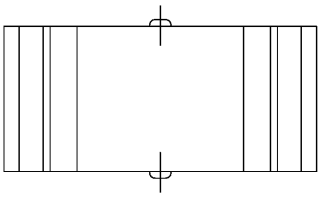
B (1 : 2)



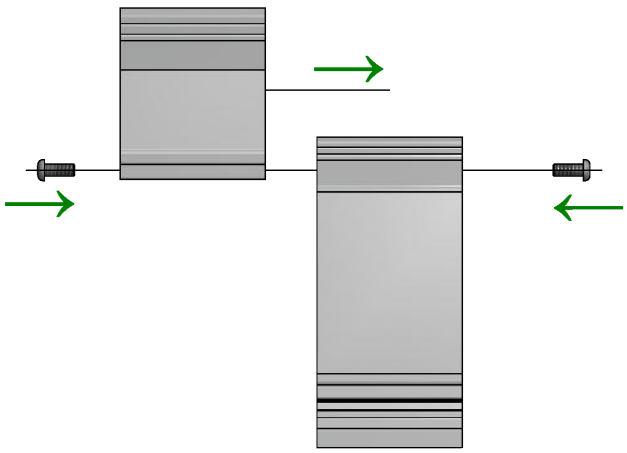


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.5
PMT EVOLUTION SOUTH system / PMT EVOLUTION EAST/WEST system Support profile "Cube 1" – 10° (without attachment)	

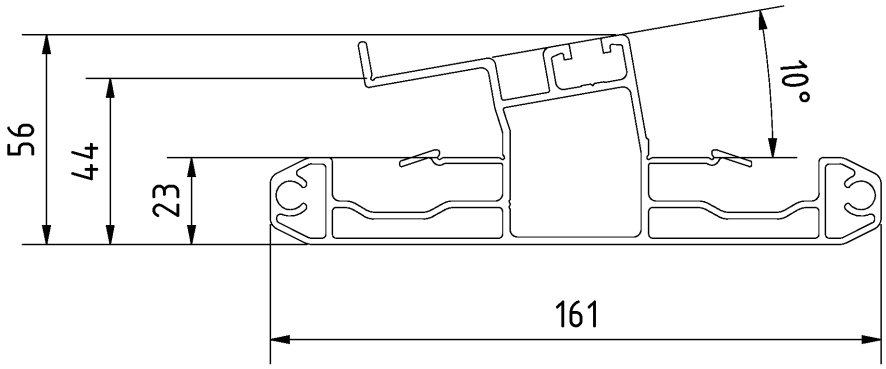




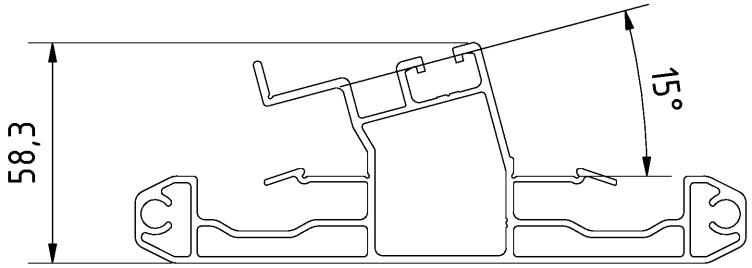
Assembly



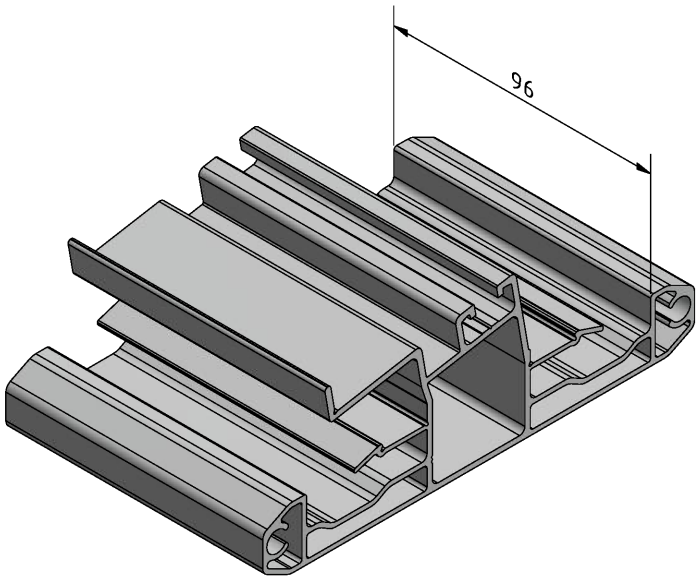
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.6
PMT EVOLUTION SOUTH system / PMT EVOLUTION EAST/WEST system Support profile 'Cube 1' – 15° (with attachment)	



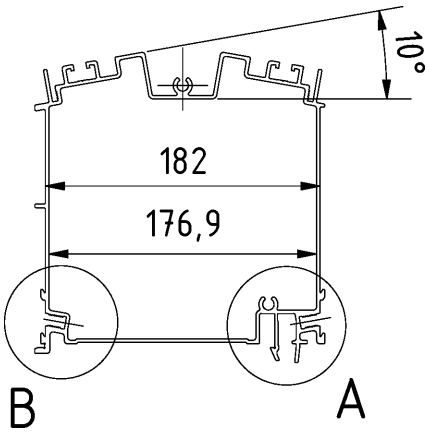
'Base' for 10° systems

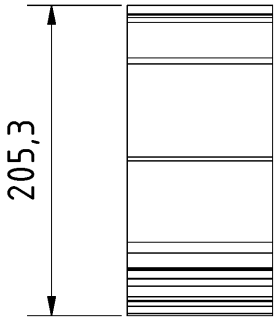


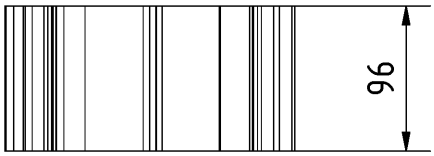
'Base' for 15° systems

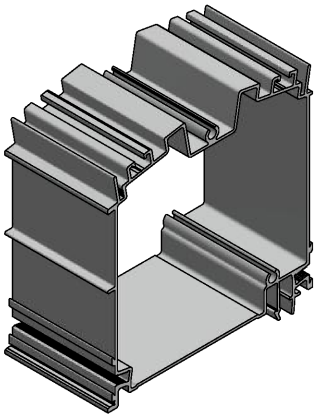


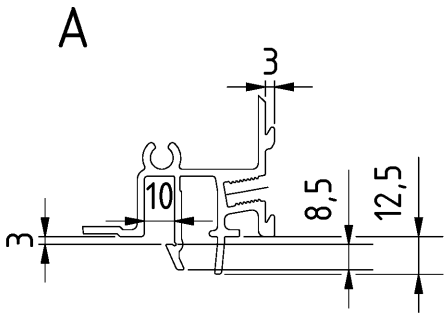
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.7
PMT EVOLUTION SOUTH system/ PMT EVOLUTION EAST/WEST system Support profile 'Base 2' – 10° and 15°	

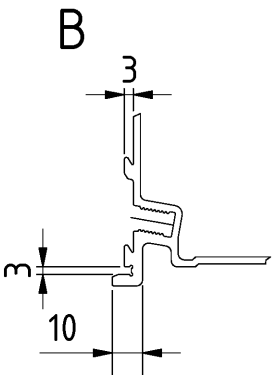




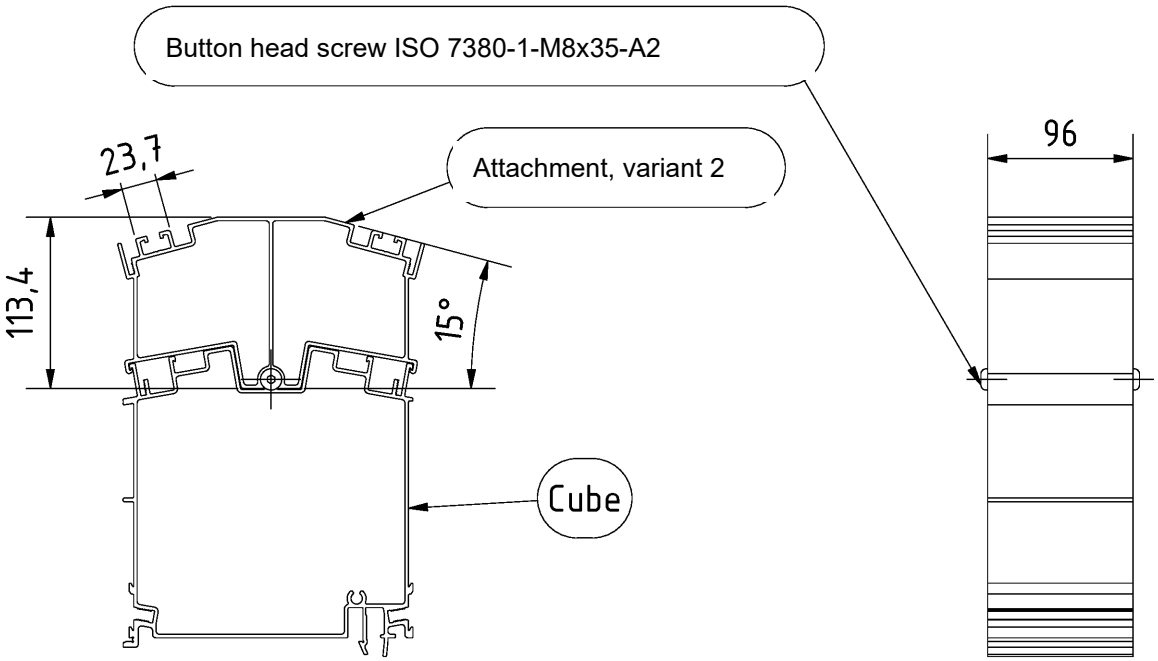


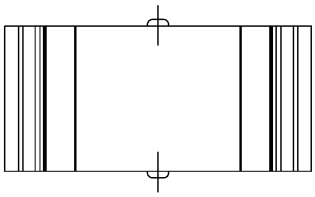




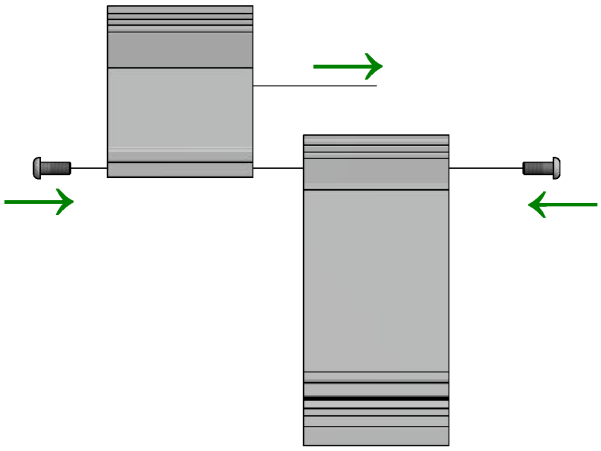


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.8
PMT EVOLUTION SOUTH system / PMT EVOLUTION EAST/WEST system Support profile 'Cube 2' – 10° (without attachment)	

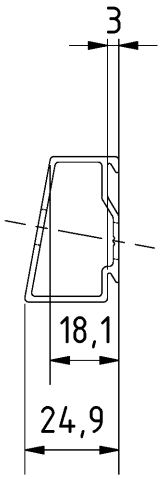


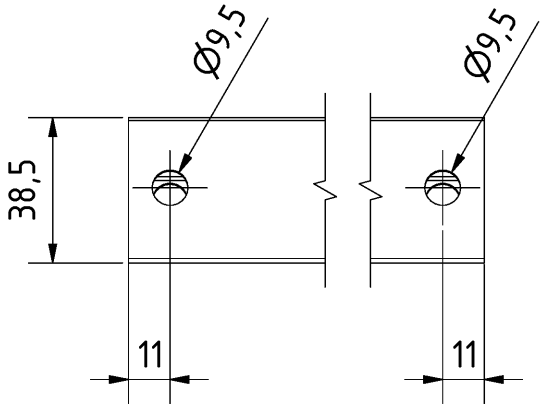


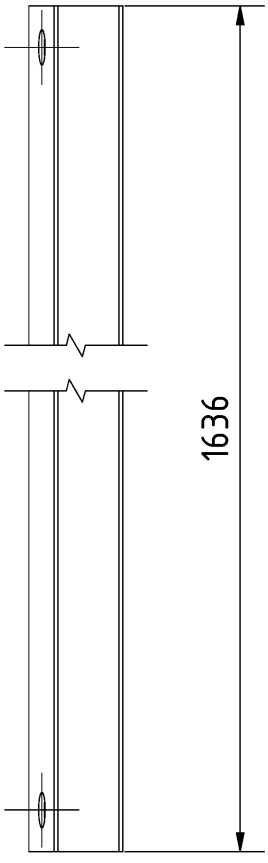
Assembly

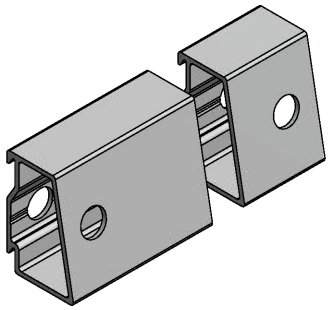


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.9
PMT EVOLUTION SOUTH system / PMT EVOLUTION EAST/WEST system Support profile 'Cube 2' – 15° (with attachment)	





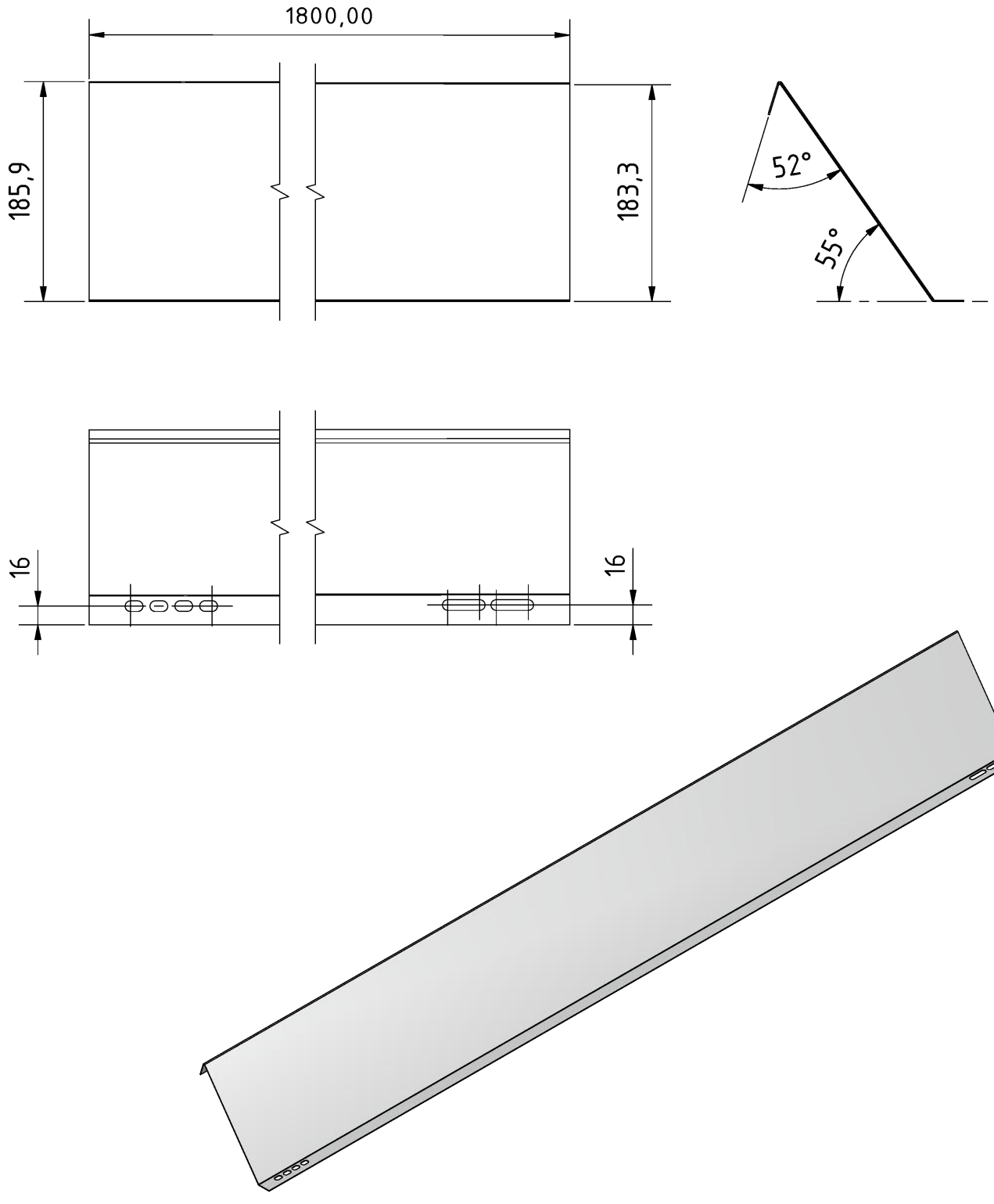




Button head screw 7380-1
ISO 7380-1-M8x35-A2

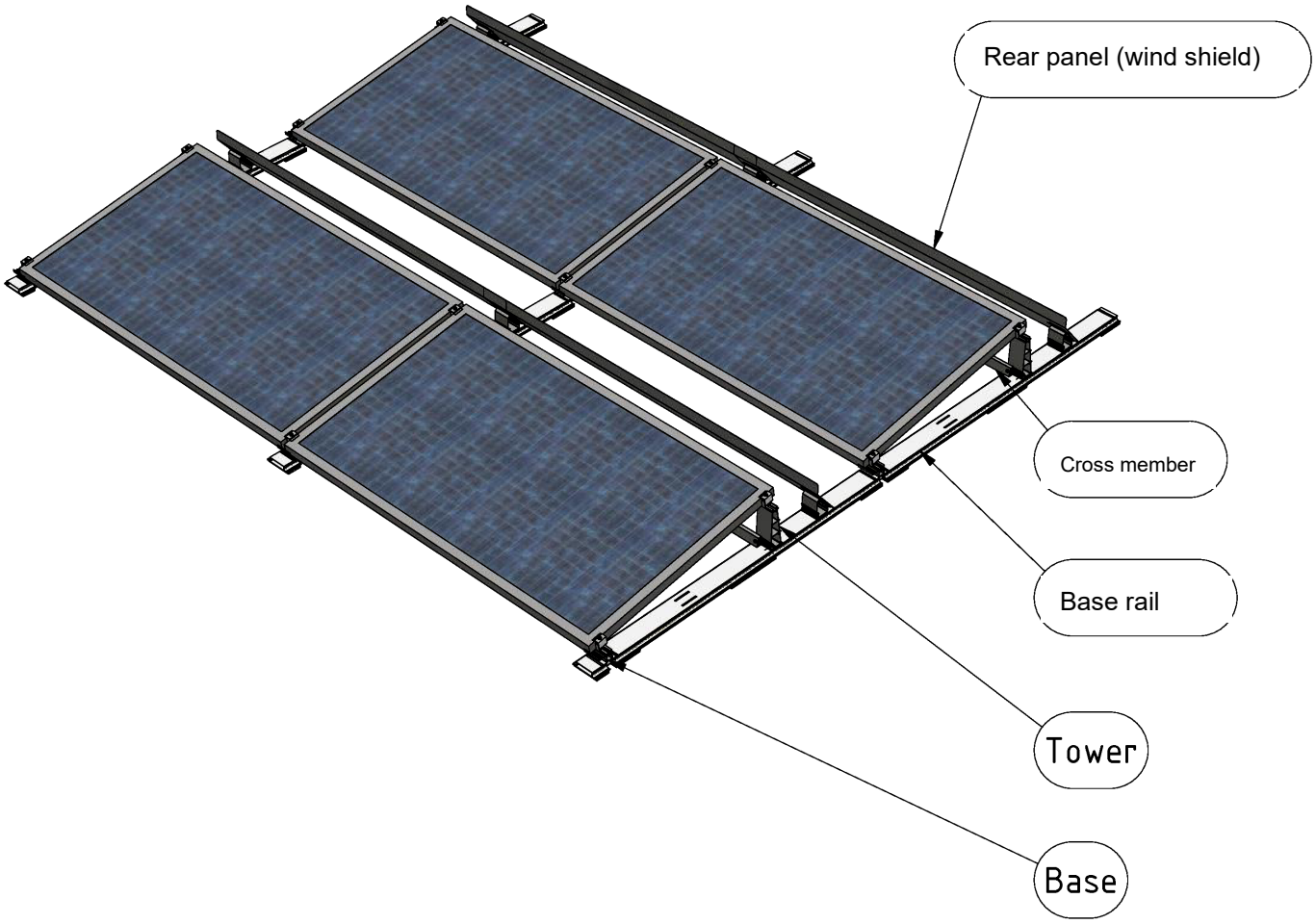
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.10
PMT EVOLUTION SOUTH system / PMT EVOLUTION EAST/WEST system Cross members / ballast braces	

Deutsches Institut für Bautechnik DIBt



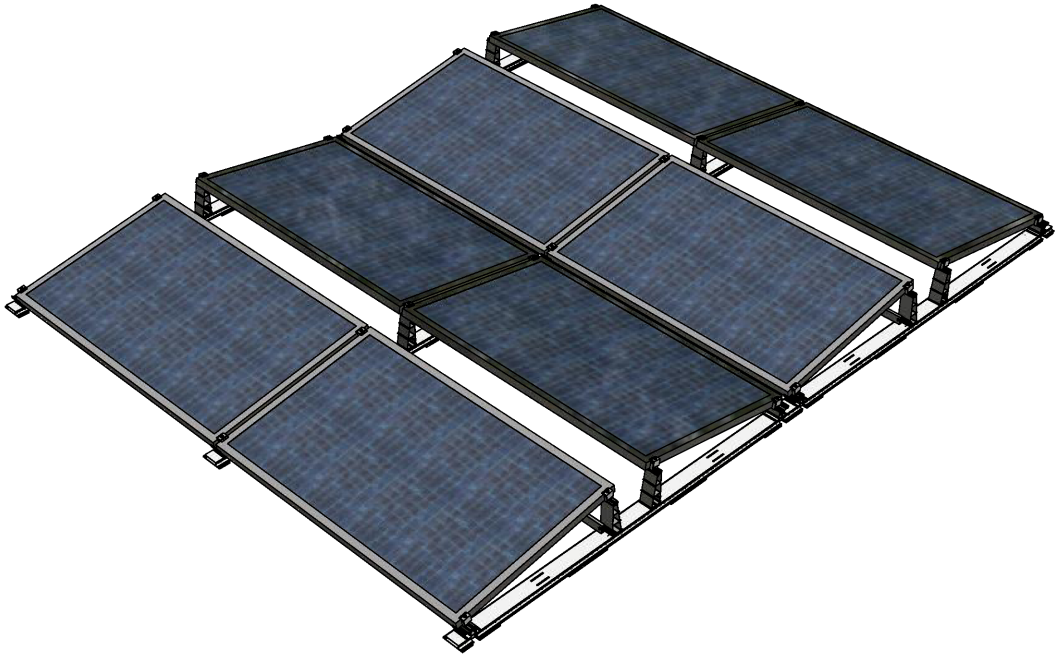
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 1.11
PMT EVOLUTION SOUTH system Rear panel	

Deutsches Institut für Bautechnik DIBt



Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.1
PMT EVO 2.0 SOUTH system Overview	

Deutsches Institut für Bautechnik DIBt

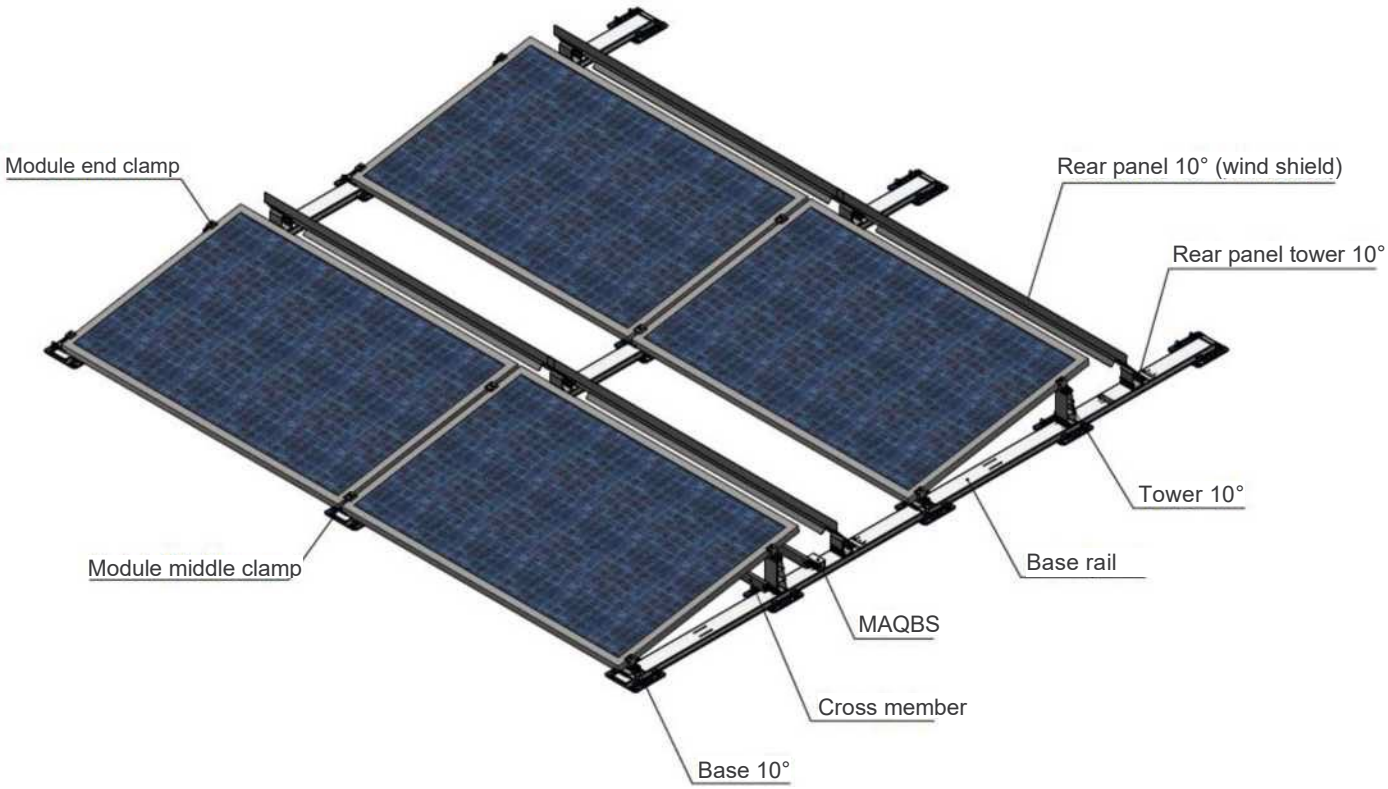


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

PMT EVO 2.0 EAST/WEST system
Overview

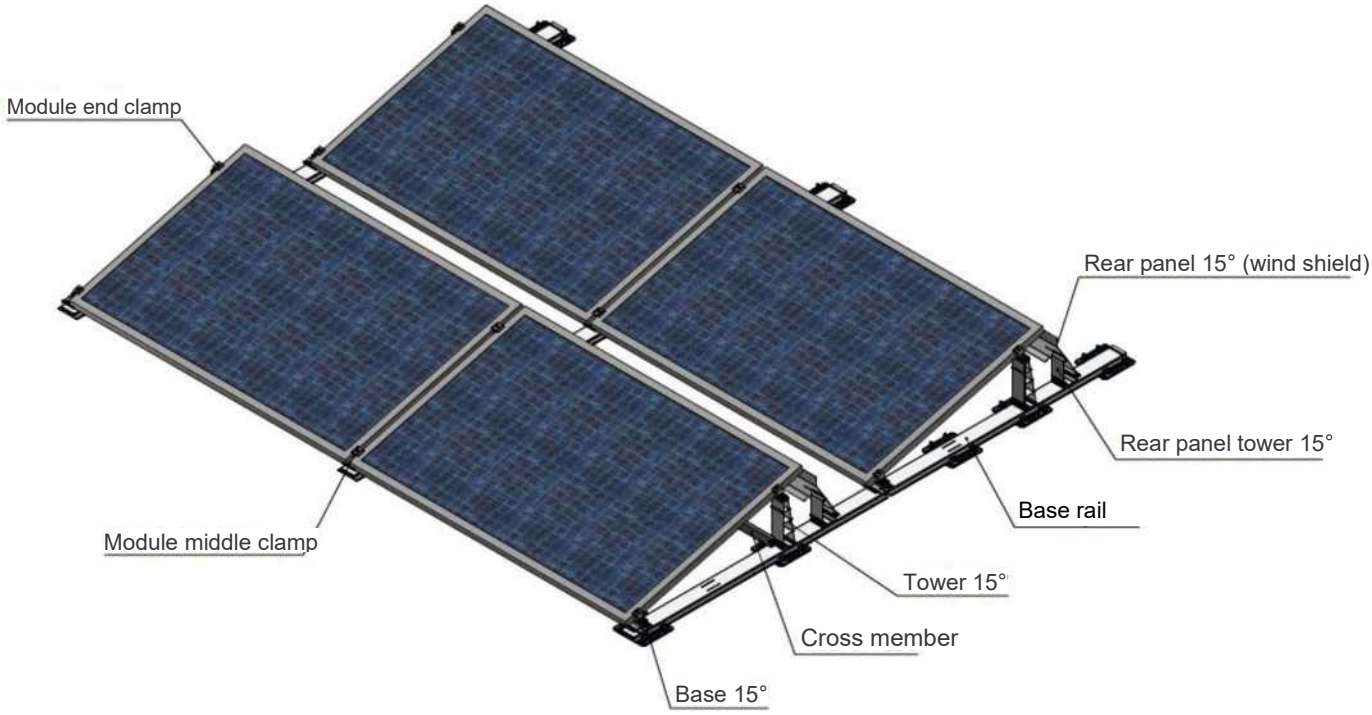
Annex 2.2

EVO 2.1 S 10°



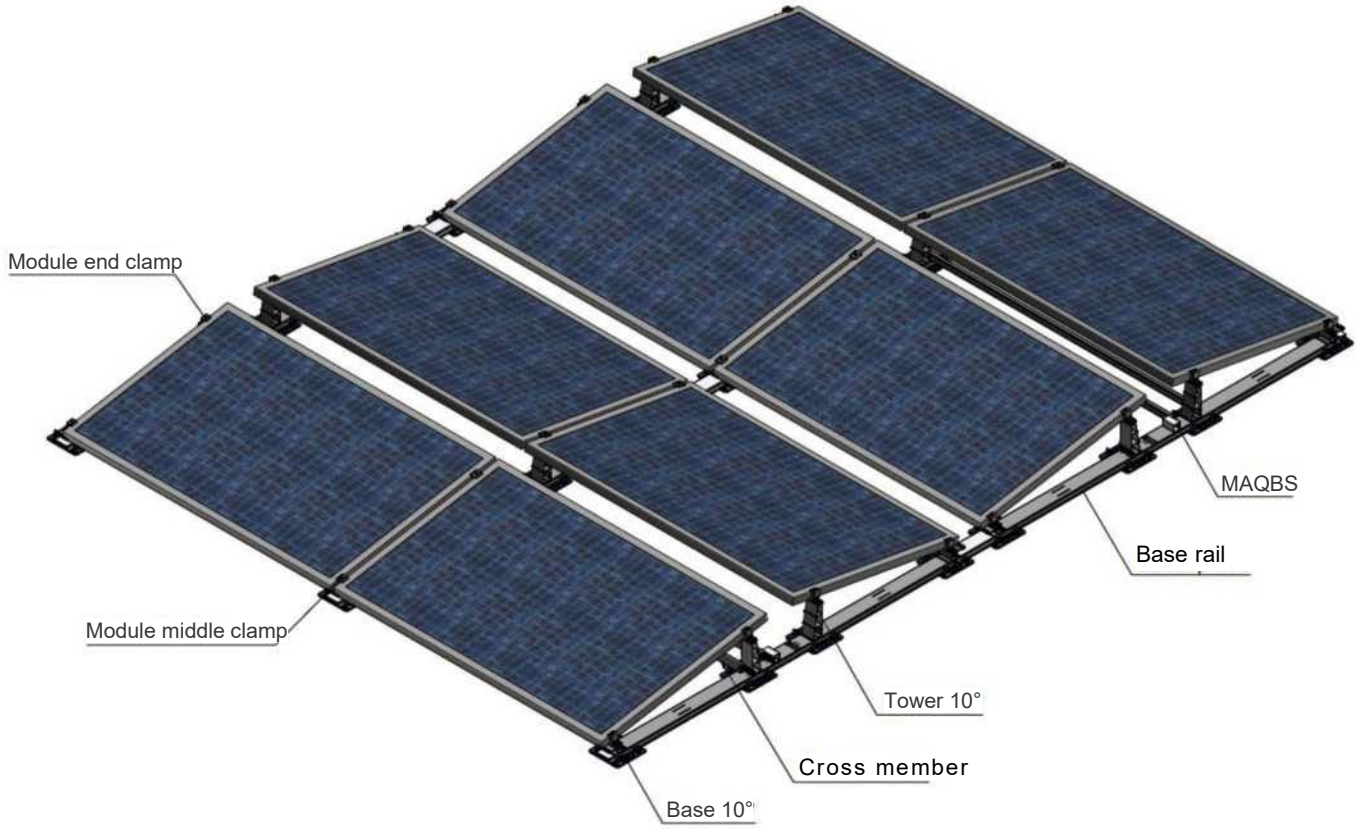
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.3
PMT EVO 2.1 SOUTH 10° system Overview	

EVO 2.1 S 15°



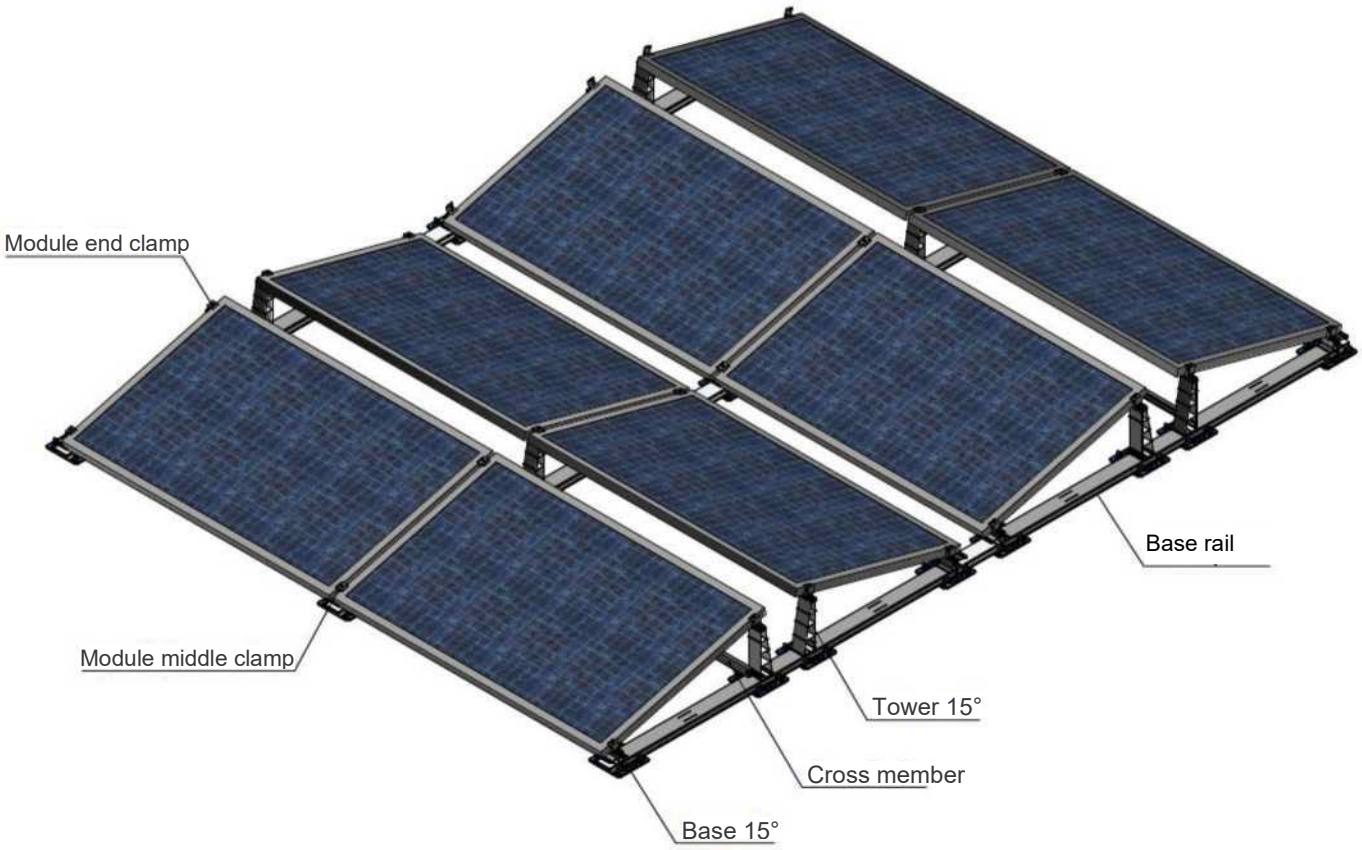
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.4
PMT EVO 2.1 SOUTH 15° system Overview	

EVO 2.1 EW 10°



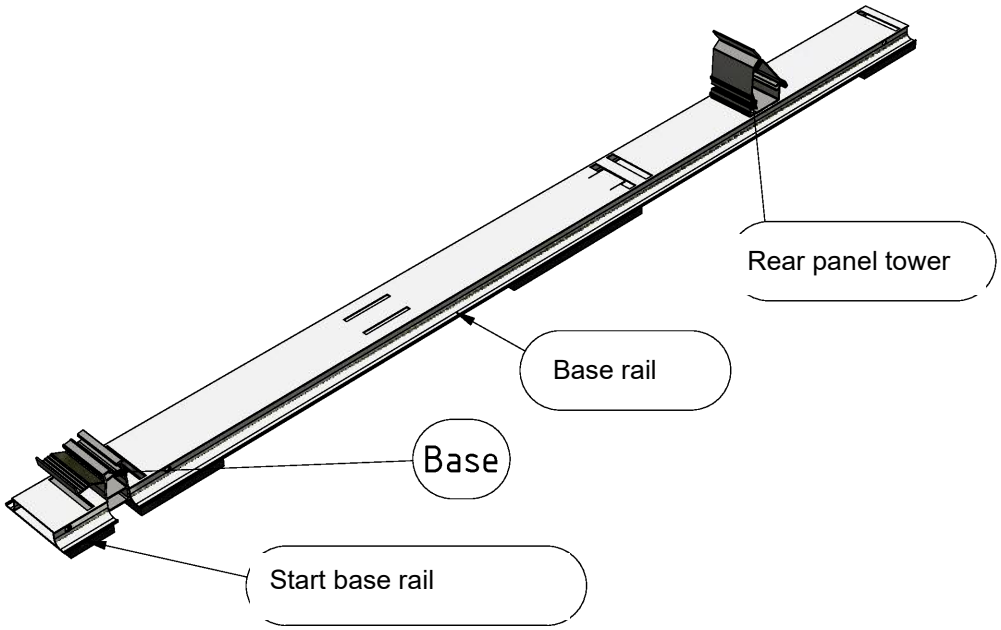
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.5
PMT EVO 2.1 EAST/WEST 10° system Overview	

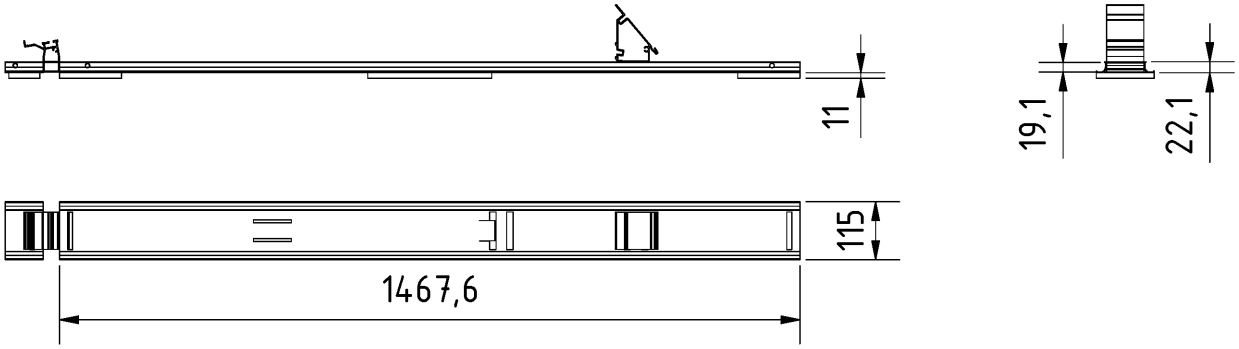
EVO 2.1 EW 15°



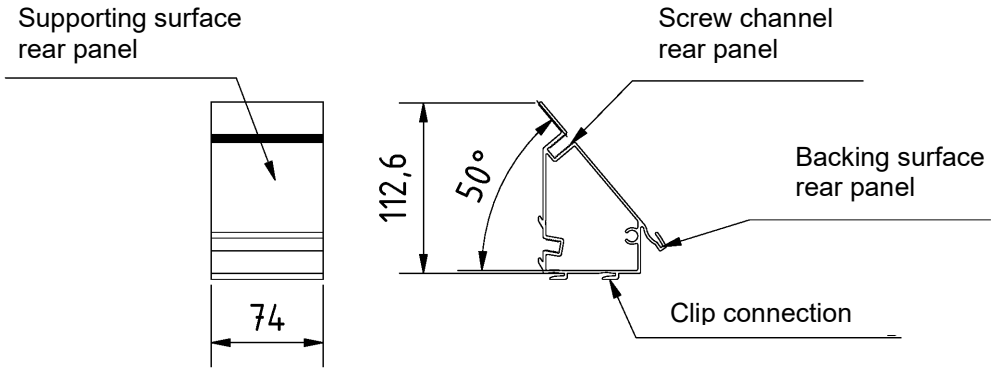
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.6
PMT EVO 2.1 EAST/WEST 15° system Overview	

Deutsches Institut für Bautechnik DIBt





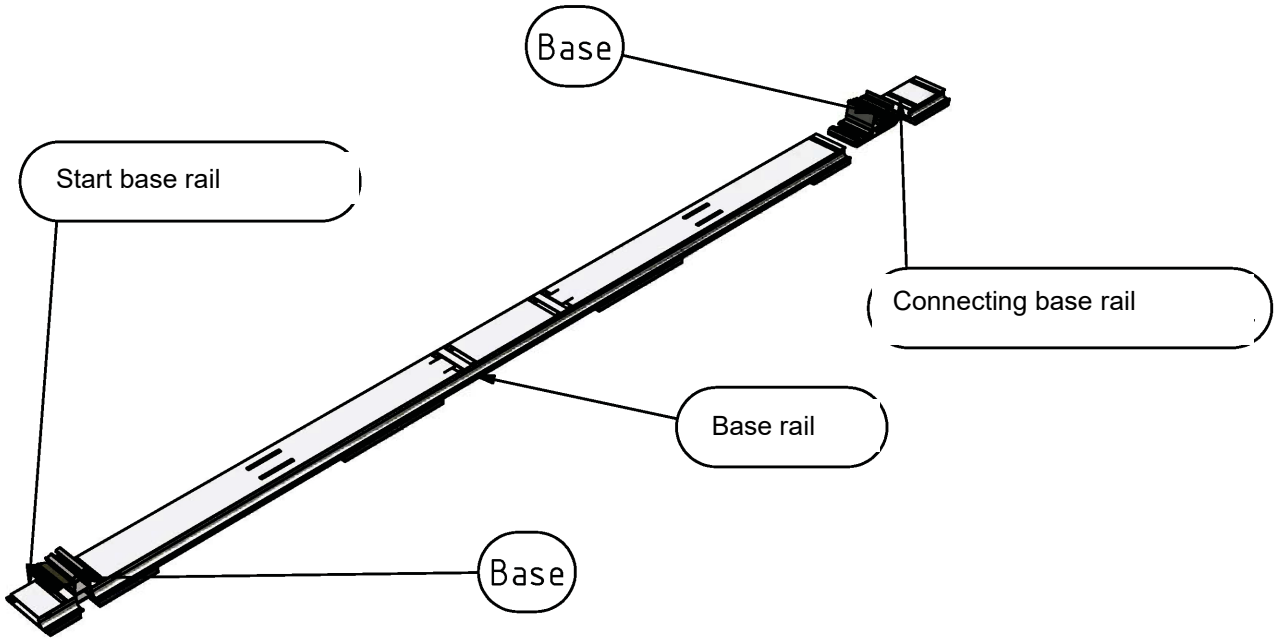
Detail: Base rail

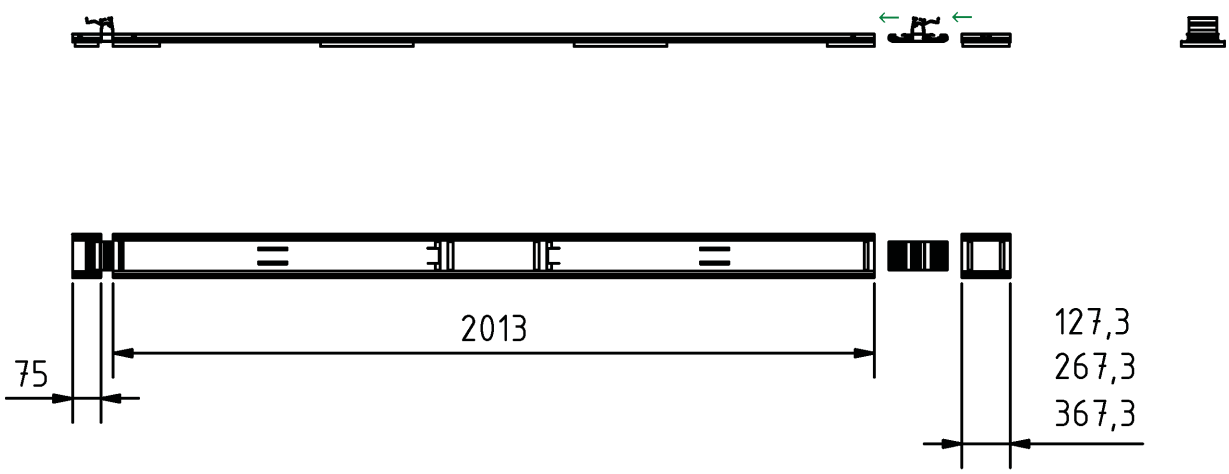


Detail: Rear panel tower

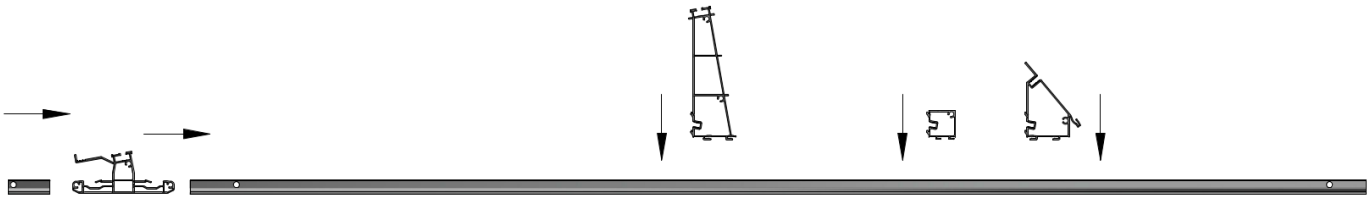
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.7
PMT EVO 2.0 SOUTH and PMT EVO 2.1 SOUTH systems Base rail with support profile 'Base' and rear panel tower	

Deutsches Institut für Bautechnik DIBt

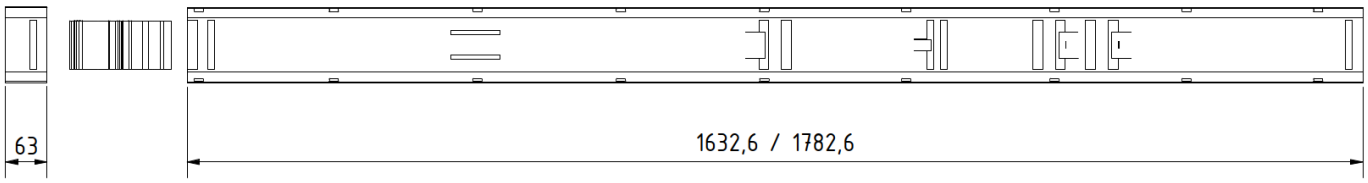




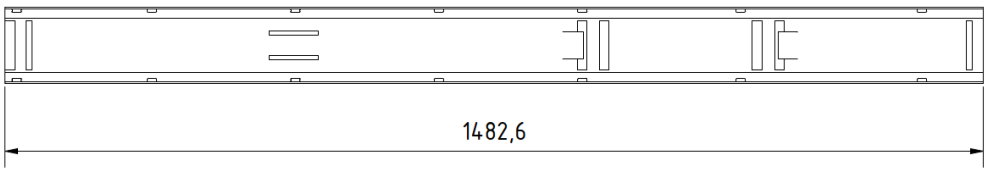
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.8
PMT EVO 2.0 EAST/WEST and PMT EVO 2.1 EAST/WEST systems Base rail with support profile 'Base'	

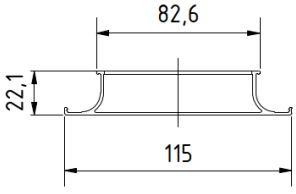


EVO 2.1 S 10°

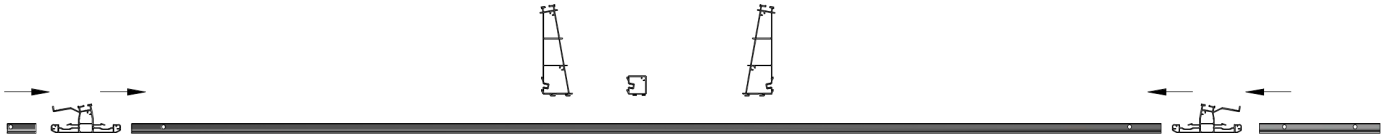


EVO 2.1 S 15°

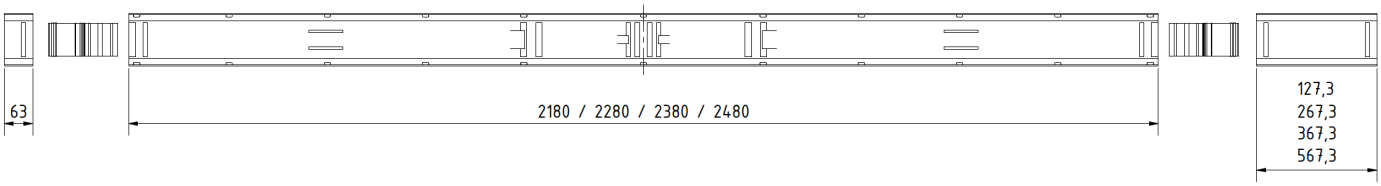




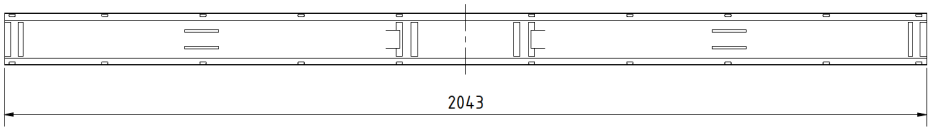
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.9
PMT EVO 2.0 SOUTH and PMT EVO 2.1 SOUTH systems Base rail with support profile 'Base', rear-panel tower and 'MAQBS'	

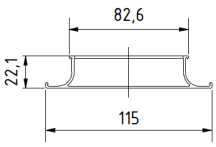


EVO 2.1 EW 10°



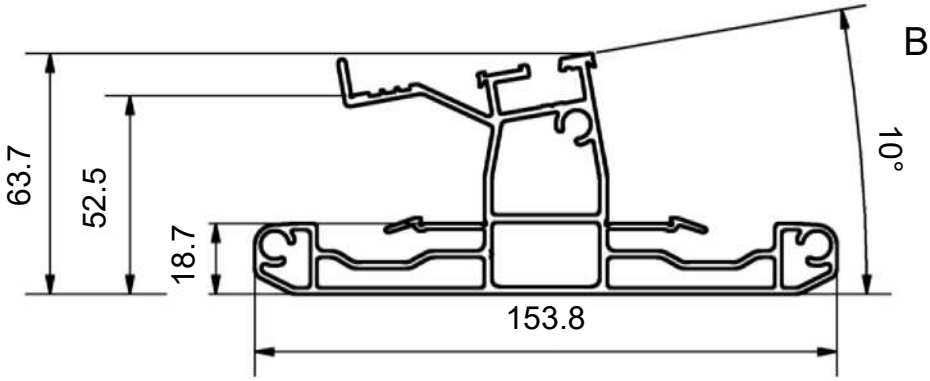
EVO 2.1 EW 15°

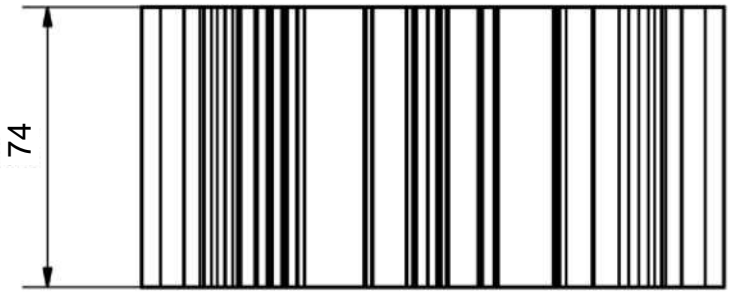




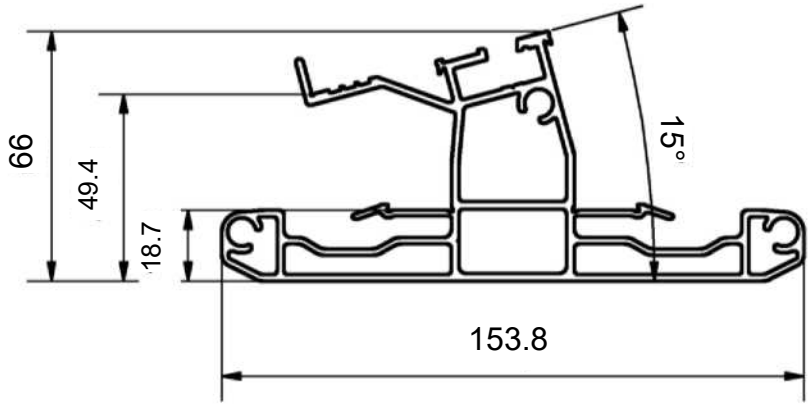
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.10
PMT EVO 2.0 EAST/WEST and PMT EVO 2.1 EAST/WEST systems Base rail with support profile 'Base', 'Tower' and 'MAQBS'	

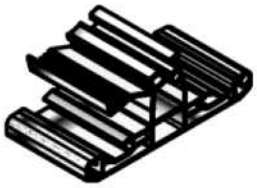
Base for 10° systems





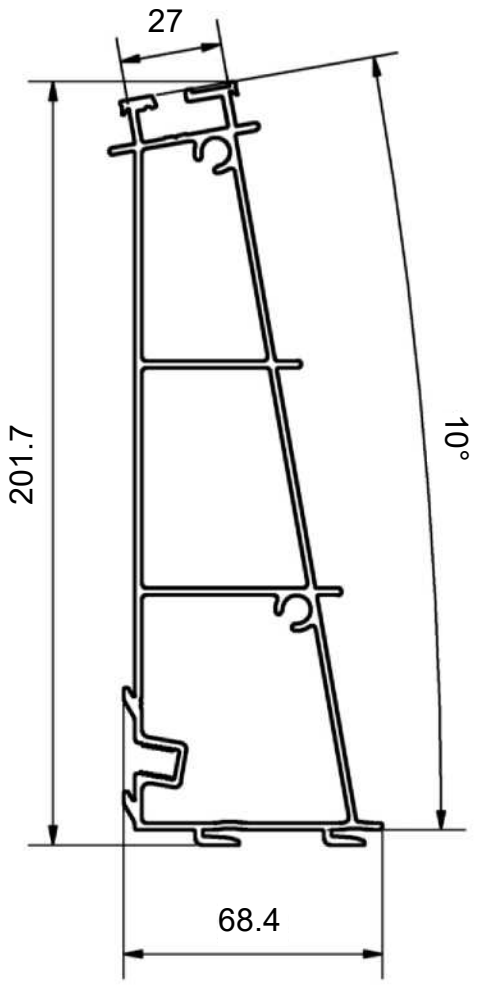
Base for 15° systems

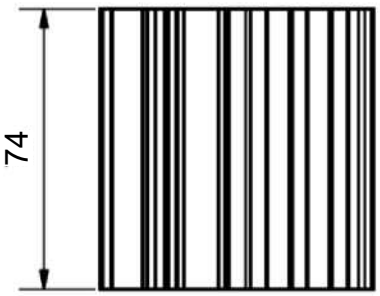




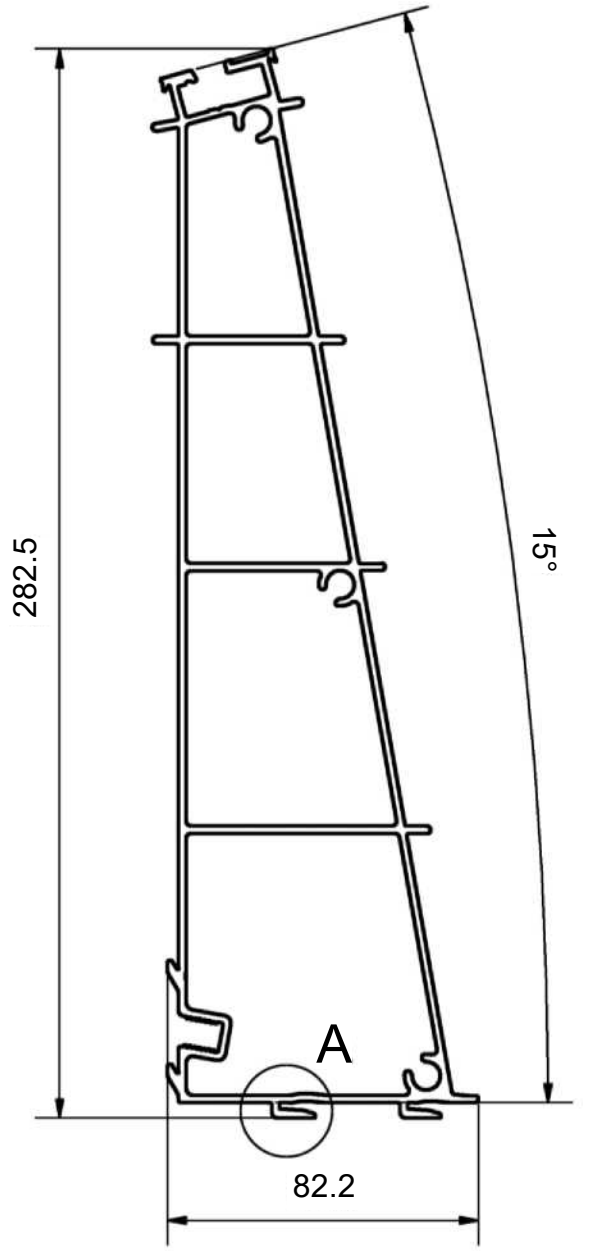
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.11
PMT EVO 2.0/2.1 SOUTH system / PMT EVO 2.0/2.1 EAST/WEST system Support profile 'Base' – 10° and 15°	

Tower for 10° systems

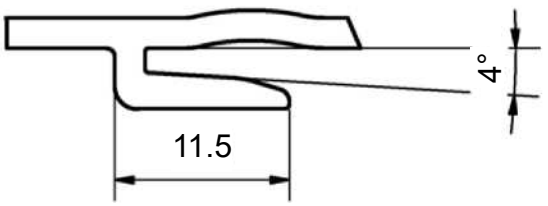




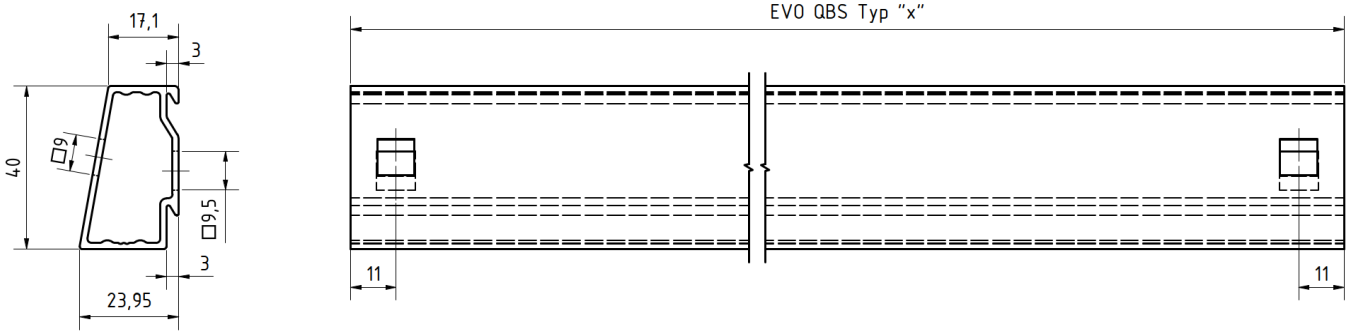
Tower for 15° systems

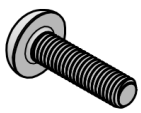


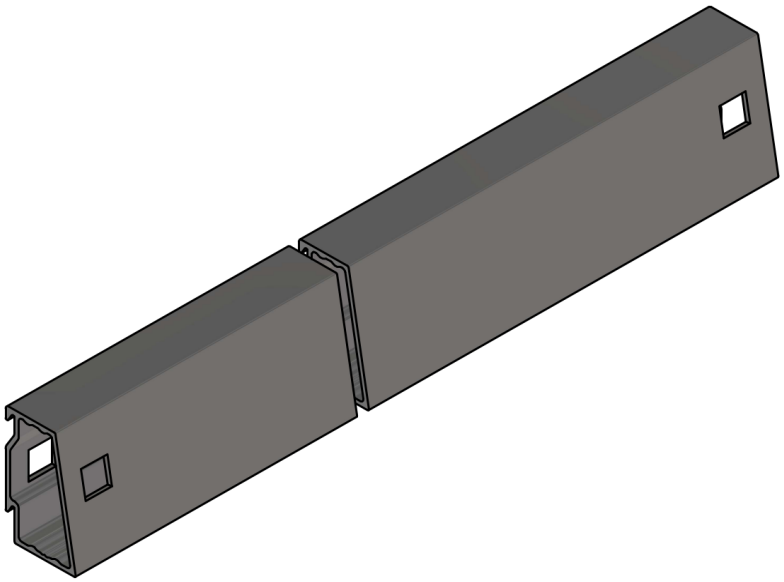
A (2:1)



Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.12
PMT EVO 2.0/2.1 SOUTH system / PMT EVO 2.0/2.1 EAST/WEST system Support profile 'Tower' – 10° and 15°	







Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

PMT EVO 2.0/2.1 SOUTH system / PMT EVO 2.0/2.1 EAST/WEST system
Cross member / ballast brace

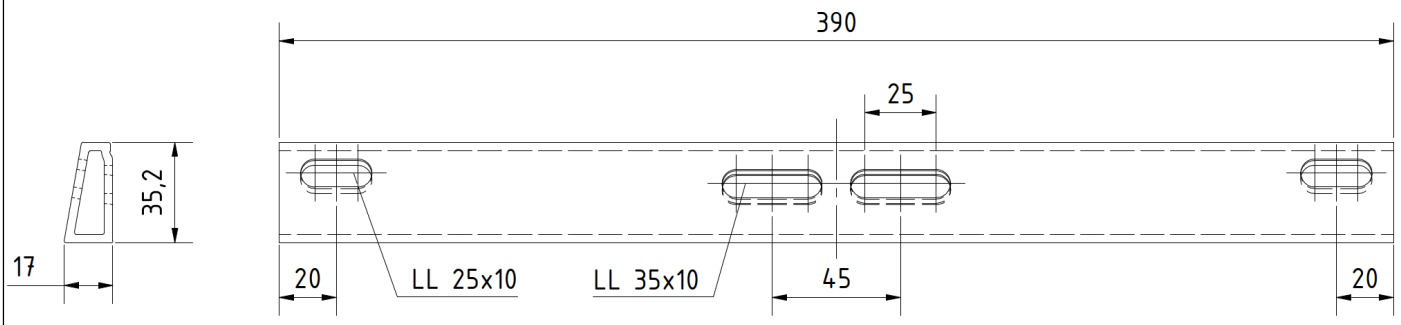
Annex 2.13

Designation	Length “x”
EVO QBS type 1570	1570
EVO QBS type 1601	1601
EVO QBS type 1614	1614
EVO QBS type 1648	1648
EVO QBS type 1682	1682
EVO QBS type 1717	1717
EVO QBS type 1752	1752
EVO QBS type 1787	1787
EVO QBS type 1832	1832
EVO QBS type 1865	1865
EVO QBS type 1898	1898
EVO QBS type 1931	1931
EVO QBS type 1962	1962
EVO QBS type 1990	1990
EVO QBS type 2017	2017
EVO QBS type 2030	2030
EVO QBS type 2067	2067
EVO QBS type 2102	2102
EVO QBS type 2130	2130
EVO QBS type 2162	2162
EVO QBS type 2195	2195
EVO QBS type 2228	2228
EVO QBS type 2261	2261
EVO QBS type 2294	2294
EVO QBS type 2329	2329
EVO QBS type 2360	2360
EVO QBS type 2393	2393
EVO QBS type 2426	2426

Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

PMT EVO 2.0/2.1 SOUTH system / PMT EVO 2.0/2.1 EAST/WEST system
Cross members / ballast braces – variants (lengths)

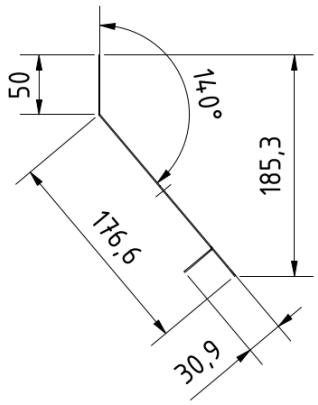
Annex 2.14

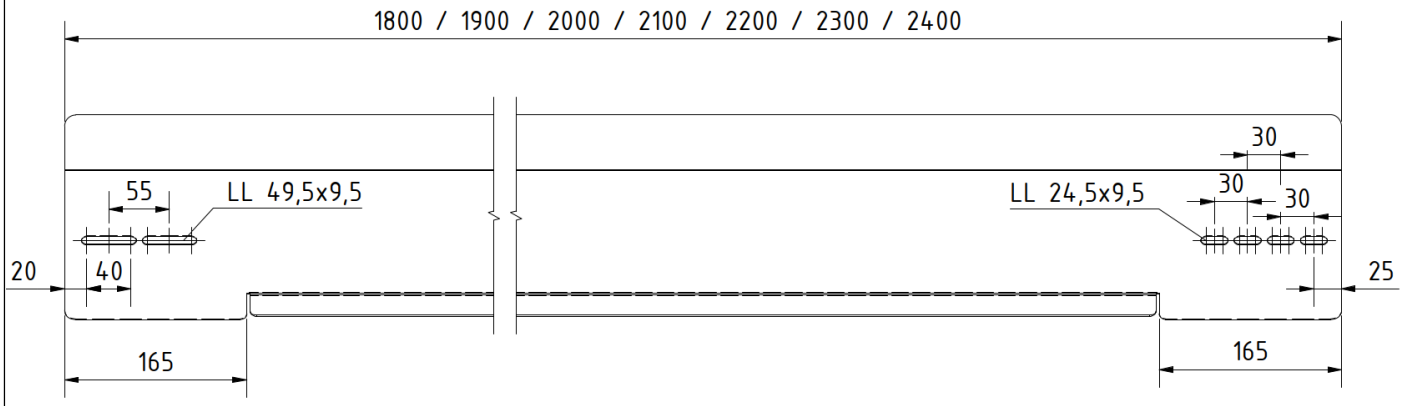


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

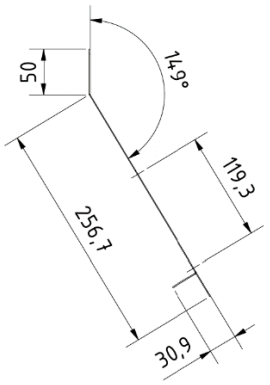
PMT EVO 2.0/2.1 SOUTH system / PMT EVO 2.0/2.1 EAST/WEST system
Cross member connectors

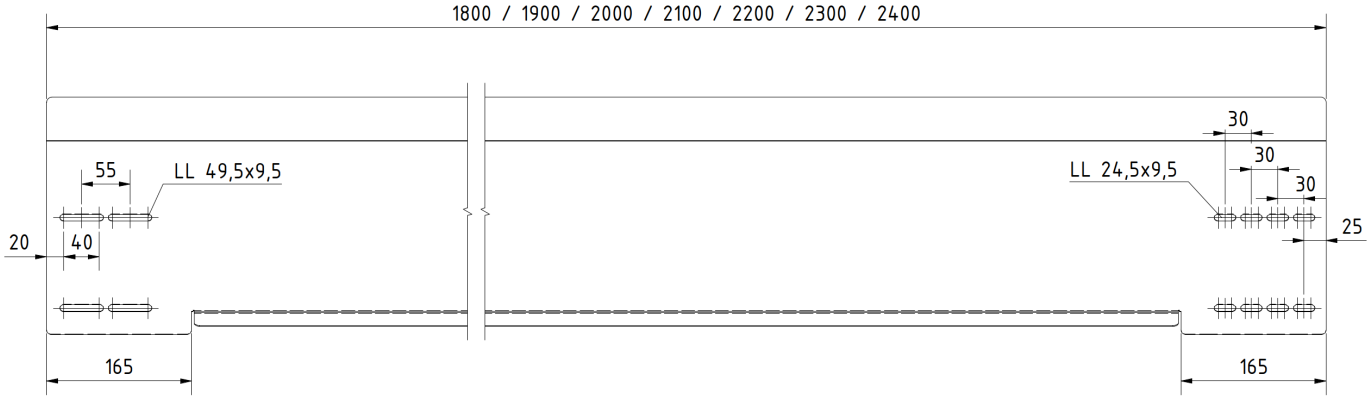
Annex 2.15



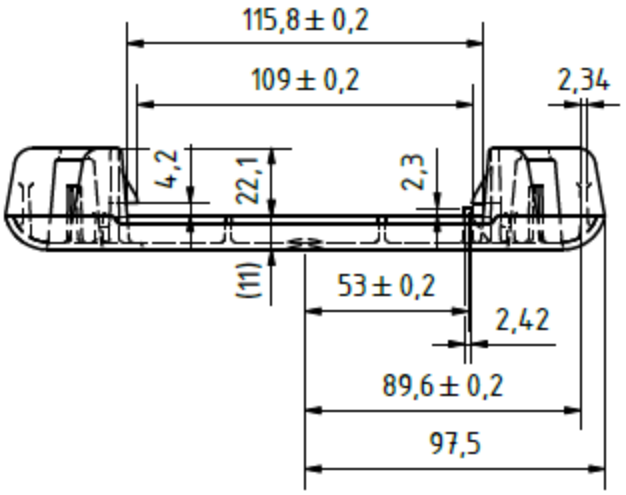


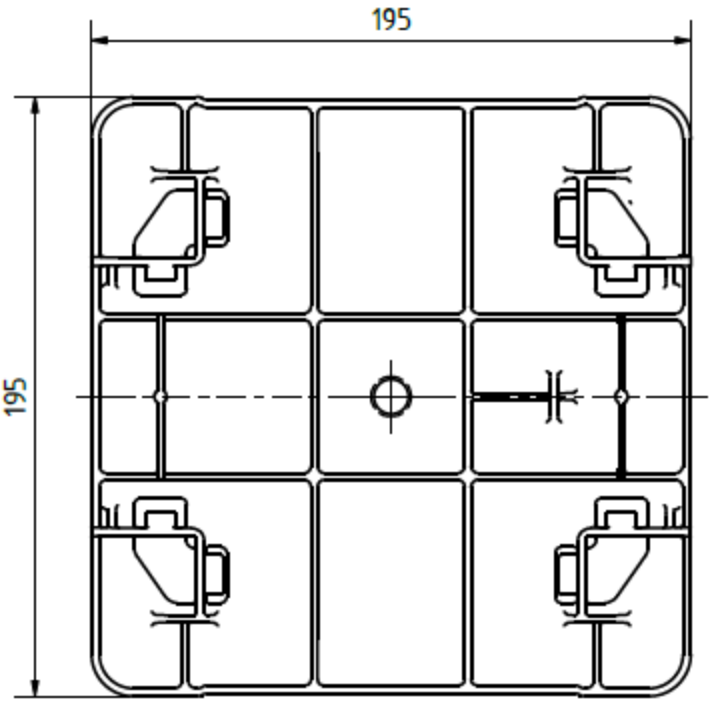
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.16
PMT EVO 2.0/2.1 SOUTH system / PMT EVO 2.0/2.1 EAST/WEST system Rear panel 10°	





Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.17
PMT EVO 2.0/2.1 SOUTH system / PMT EVO 2.0/2.1 EAST/WEST system Rear panel 15°	



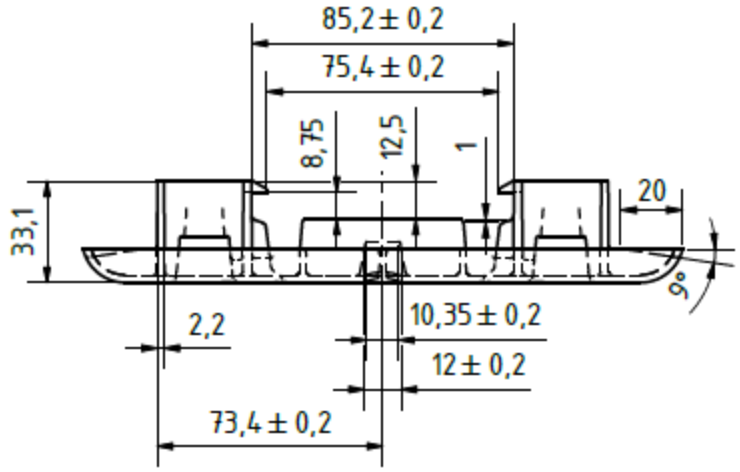


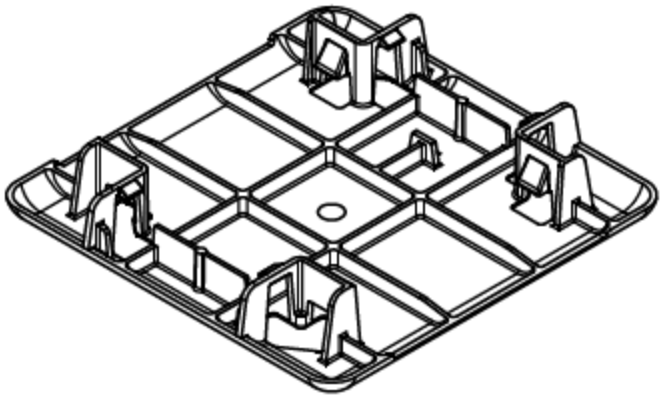
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

PMT EVO 2.1 SOUTH system / PMT EVO 2.1 EAST/WEST system
Support profile 'EVO Plate 2.1' – 10° and 15°

Annex 2.18

Deutsches Institut für Bautechnik DIBt

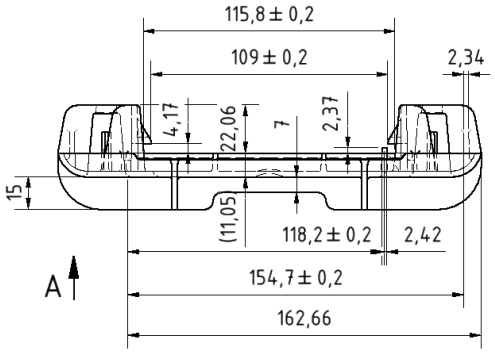


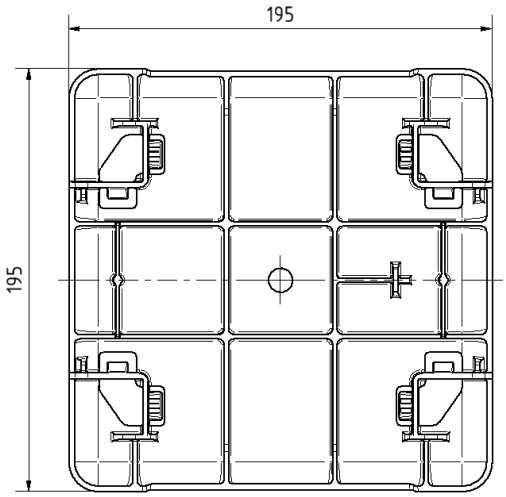


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

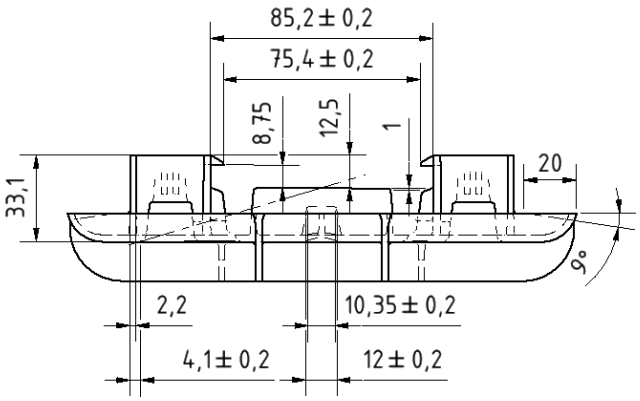
PMT EVO 2.1 SOUTH system / PMT EVO 2.1 EAST/WEST system
Support profile 'EVO Plate 2.1' – 10° and 15°

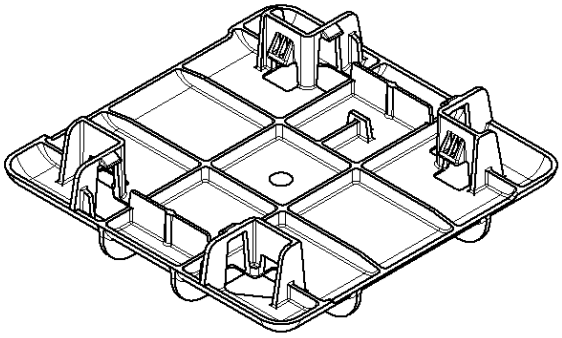
Annex 2.19





Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 2.20
PMT EVO 2.1 SOUTH system / PMT EVO 2.1 EAST/WEST system Support profile 'ProPlate Gravel' – 10° and 15°	



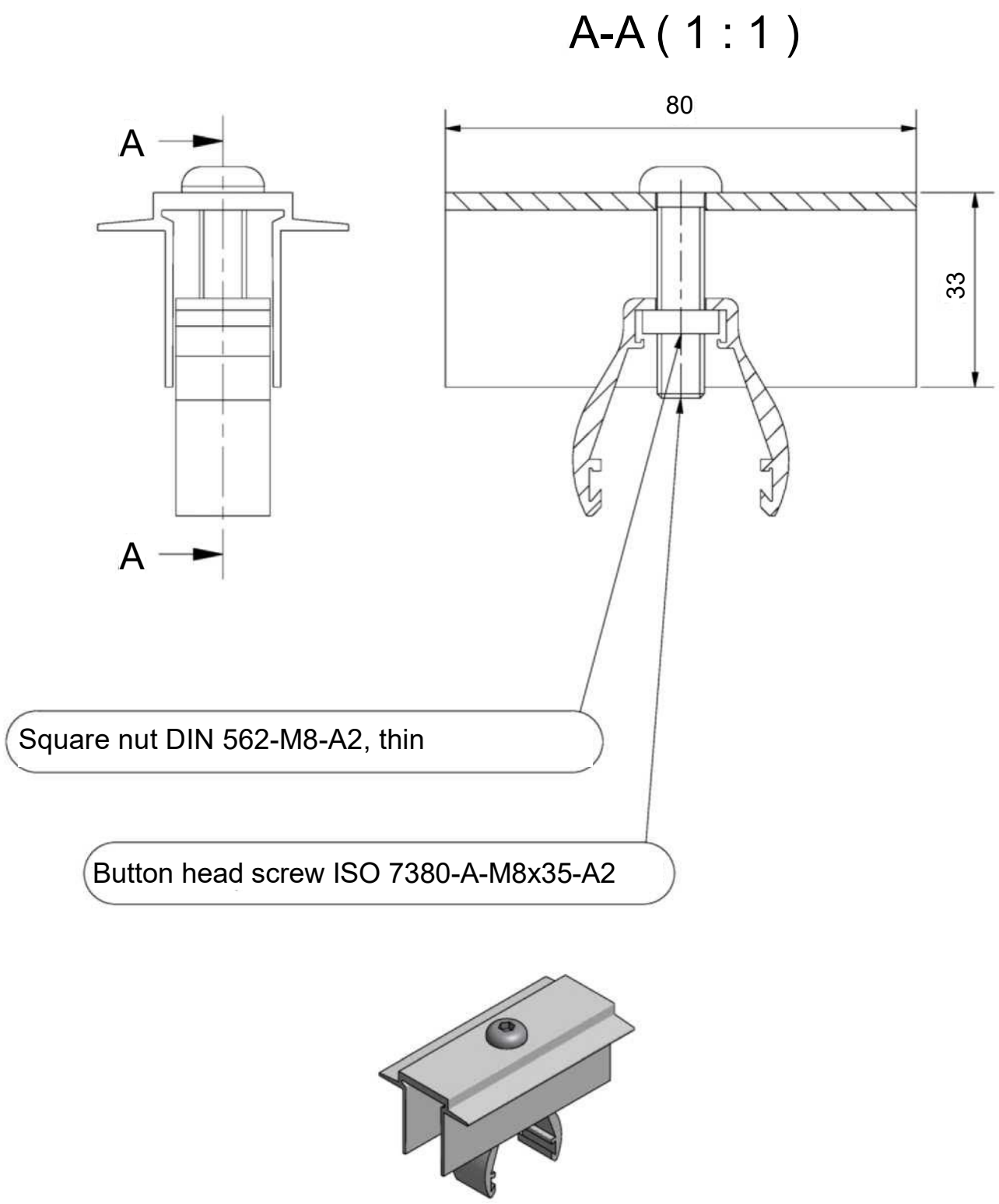


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs

PMT EVO 2.1 SOUTH system / PMT EVO 2.1 EAST/WEST system
Support profile 'ProPlate Gravel' – 10° and 15°

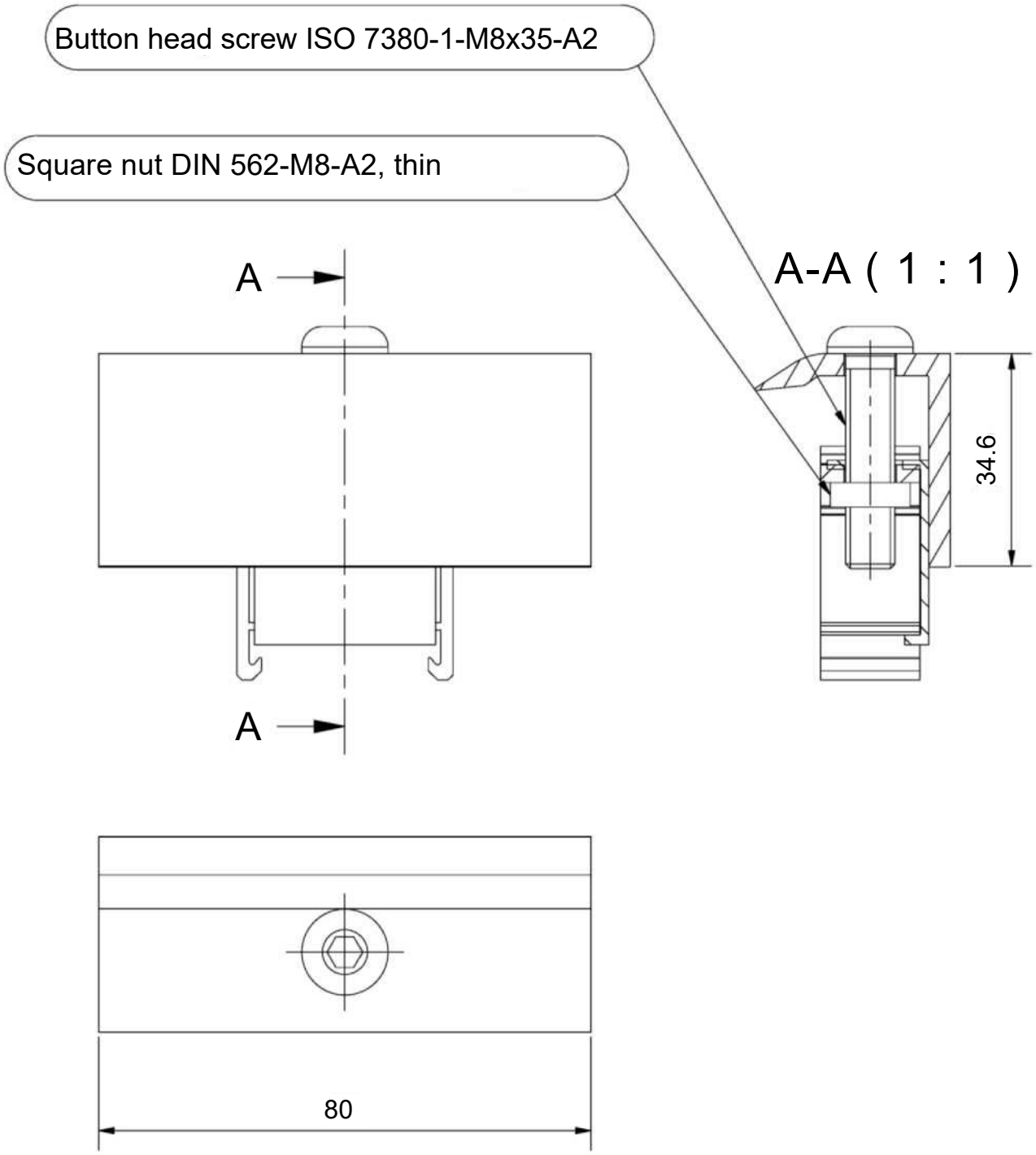
Annex 2.21

Deutsches Institut für Bautechnik DIBt

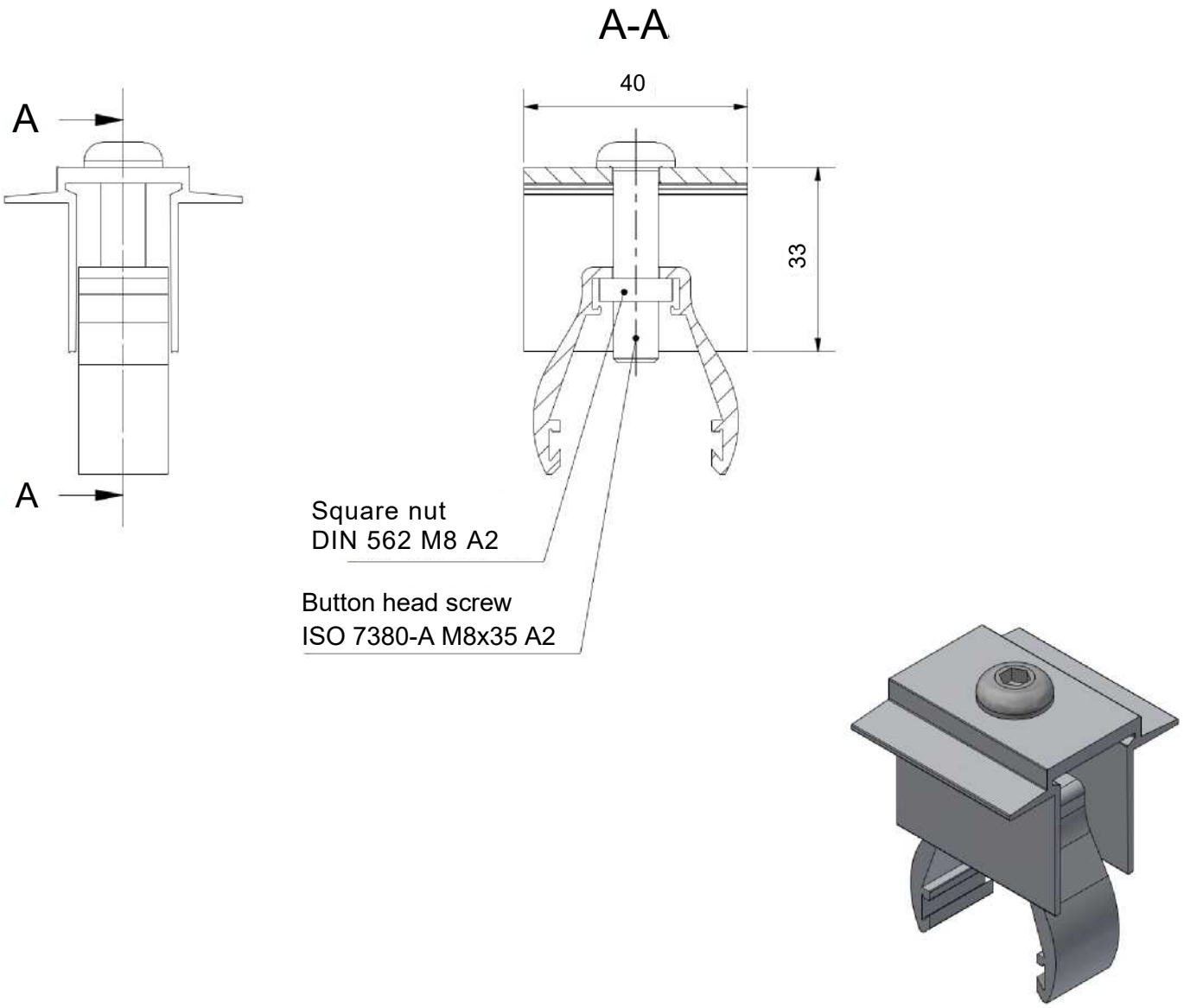


Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 3.1
Module middle clamp MH AK II Klick 30-50 in accordance with national technical approval no. Z-14.4-721	

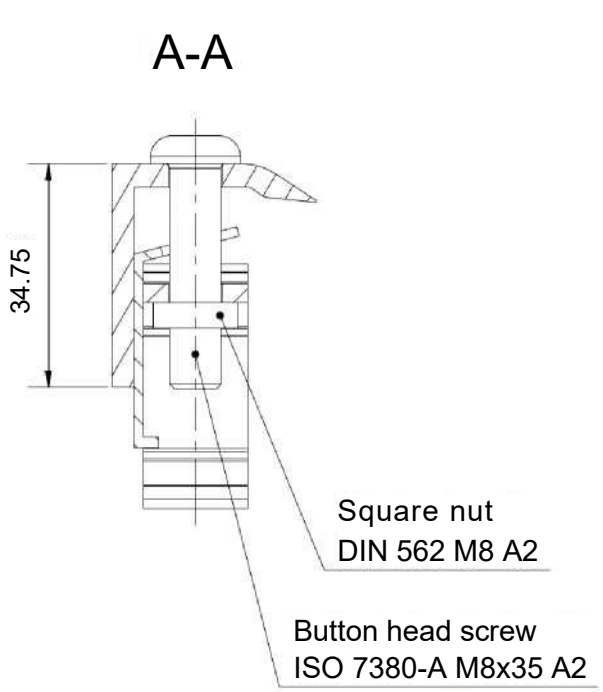
Deutsches Institut für Bautechnik DIBt

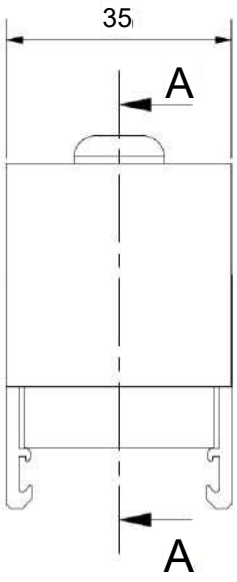


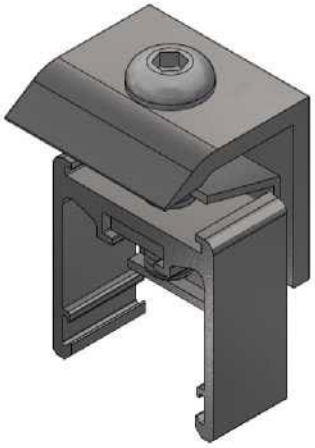
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 3.2
Module end clamp to module middle clamp MH AK II Klick 30-50 in accordance with national technical approval no. Z-14.4-721	



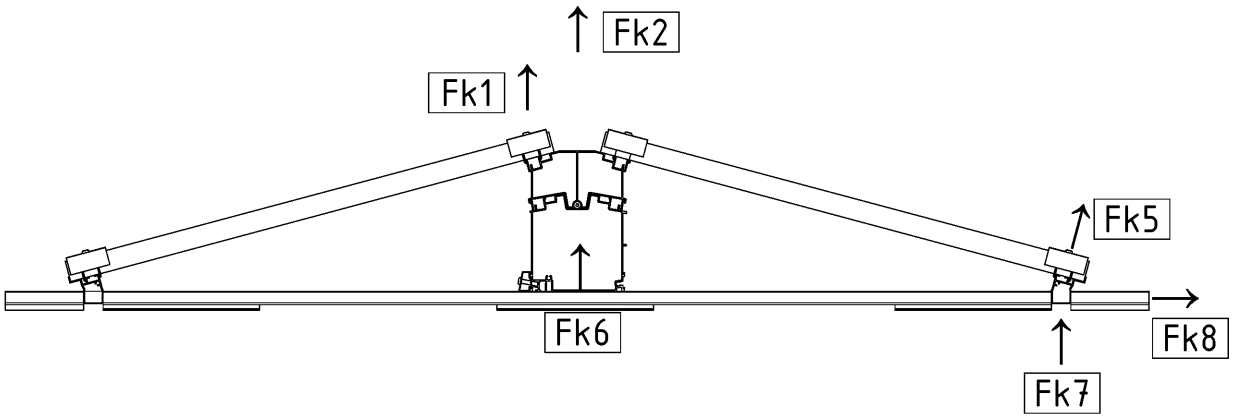
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 3.3
Module end clamp MH AK II Klick 30-50 in accordance with national technical approval no. Z-14.4-721	

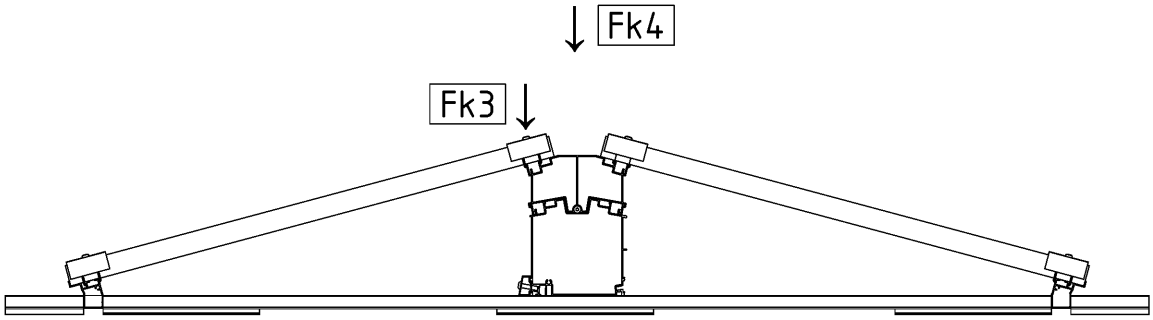






Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 3.4
Module end clamp to module middle clamp MH AK II Klick 30-50 in accordance with national technical approval no. Z-14.4-721	





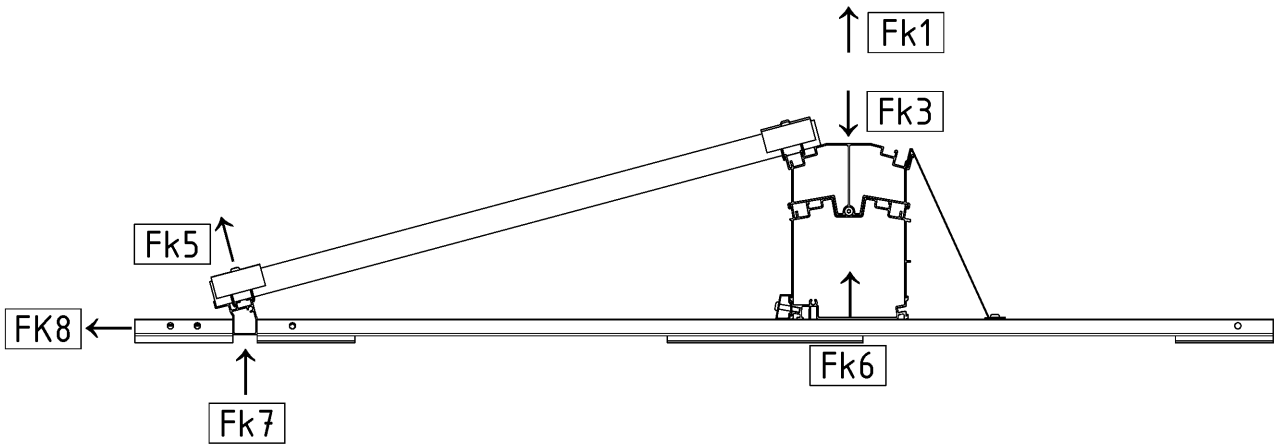
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 4.1
PMT EVOLUTION EAST/WEST system 10° and 15° Characteristic resistance values	

Deutsches Institut für Bautechnik DIBt

PMT EVOLUTION EAST/WEST system 10° and 15° Characteristic resistance values – 'Cube'				
	Tension[1] one-sided Fk1 [kN]	Tension[1] two-sided Fk2 [kN]	Compression[2] one-sided Fk3 [kN]	Compression[2] two-sided Fk4 [kN]
Tilt 10°	3.5	4.8	1.4	3.8
Tilt 15°	3.5	5.5	2.1	4.1
γ_M	1.25		1.1	
[1] Tension: perpendicular to module surface [2] Compression: perpendicular to roof surface				

PMT EVOLUTION EAST/WEST system 10° and 15° Characteristic resistance values – 'Base'	
	Tension perpendicular to module surface Fk5 [kN]
Tilt 10°	3.8
Tilt 15°	
γ_M	1.25

PMT EVOLUTION EAST/WEST system 10° and 15° Characteristic reistance values – Connections to base rail				
	Tension perpendicular 'Cube' to base rail Fk6 [kN]	Tension perpendicular 'Base' to base rail Fk7 [kN]		Tension in longitudinal direction of base rail Fk8 [kN]
		Edge section[3]	Middle section[4]	
Tilt 10°	1.65	1.5	3.7	4.15
Tilt 15°				
γ_M	1.6			1.25
[3] Edge section: Here, the base rail ends at the edge of the module surface. [4] Middle section: Here, the base rail runs on both sides of the 'Base'.				

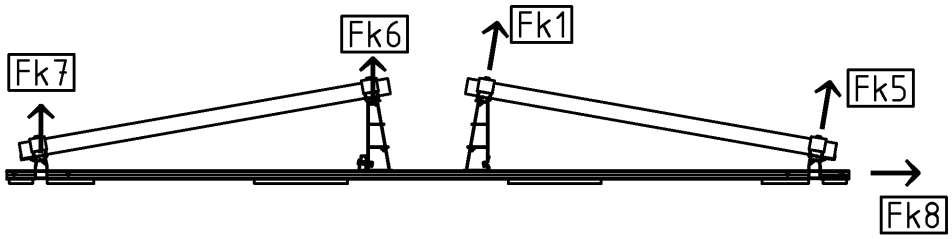


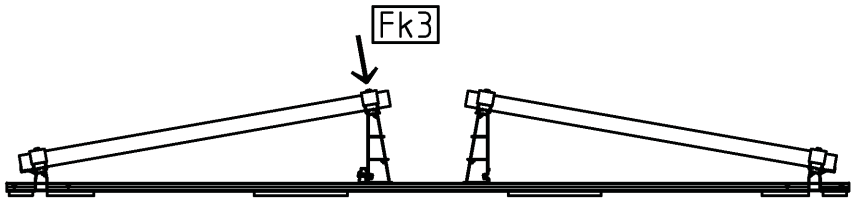
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 4.3
PMT EVOLUTION SOUTH system 10° and 15° Characteristic resistance values	

PMT EVOLUTION SOUTH system 10° and 15° Characteristic resistance values – 'Cube'		
	Tension[1] Fk1 [kN]	Compression[2] Fk3 [kN]
Tilt 10°	3.5	2.4
Tilt 15°	3.5	2.5
γ_M	1.25	1.1
[1] Tension: perpendicular to module surface [2] Compression: perpendicular to roof surface		

PMT EVOLUTION SOUTH system 10° and 15° Characteristic resistance values – 'Base'	
	Tension perpendicular to module surface Fk5 [kN]
Tilt 10°	3.8
Tilt 15°	
γ_M	1.25

PMT EVOLUTION SOUTH system 10° and 15° Characteristic resistance values – Connections to base rail				
	Tension perpendicular 'Cube' to base rail Fk6 [kN]	Tension perpendicular 'Base' to base rail Fk7 [kN]		Tension in longitudinal direction of base rail Fk8 [kN]
		Edge section[3]	Middle section[4]	
Tilt 10°	1.65	1.5	3.7	4.15
Tilt 15°				
γ_M	1.6			1.25
[3] Edge section: Here, the base rail ends at the edge of the module surface. [4] Middle section: Here, the base rail runs on both sides of the 'Base'.				





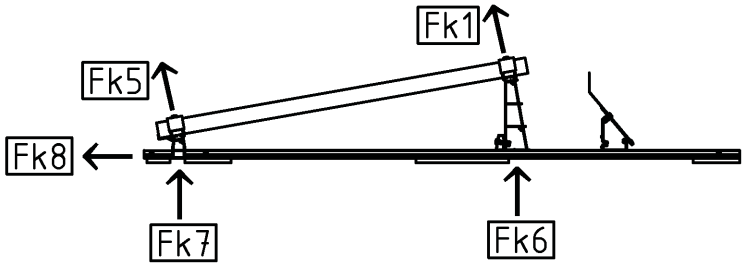
Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 5.1
PMT EVO 2.0 / 2.1 EAST/WEST system 10° and 15° Characteristic resistance values	

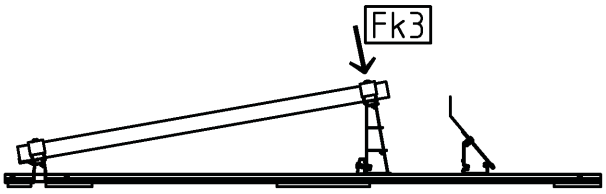
PMT EVO 2.0 EAST/WEST system 10° and 15° Characteristic resistance values – 'Tower'		
	Tension[1] Fk1 [kN]	Compression[2] Fk3 [kN]
Tilt 10°	3.5	6.3
Tilt 15°	2.8	4.2
γ_M	1.25	1.1
[1] Tension: perpendicular to module surface [2] Compression: perpendicular to roof surface		

PMT EVO 2.0 EAST/WEST system 10° and 15° Characteristic resistance values – 'Base'	
	Tension perpendicular to module surface Fk5 [kN]
Tilt 10°	3.4
Tilt 15°	3.3
γ_M	1.25

PMT EVO 2.0 EAST/WEST system 10° and 15° Characteristic resistance values – Connections to base rail				
	Tension perpendicular 'Tower' to base rail Fk6 [kN]	Tension perpendicular 'Base' to base rail Fk7 [kN]		Tension in longitudinal direction of base rail Fk8 [kN]
		Edge section[3]	Middle section[4]	
Tilt 10°	1.7	1.1	3.7	2.0
Tilt 15°	1.7	1.1	3.7	2.0
γ_M	1.6			1.25
[3] Edge section: Here, the base rail ends at the edge of the module surface. [4] Middle section: Here, the base rail runs on both sides of the 'Base'.				

Deutsches Institut für Bautechnik DIBt





Aerodynamic mounting systems 'PMT Evolution', 'PMT EVO 2.0' and 'PMT EVO 2.1' and their construction products for fixing PV modules on flat roofs	Annex 5.3
PMT EVO 2.0 / 2.1 SOUTH system 10° and 15° Characteristic resistance values	

PMT EVO 2.0 SOUTH system 10° and 15° Characteristic resistance values – 'Tower'		
	Tension[1] Fk1 [kN]	Compression[2] Fk3 [kN]
Tilt 10°	3.5	6.3
Tilt 15°	2.8	4.2
γ_M	1.25	1.1
[1] Tension: perpendicular to module surface [2] Compression: perpendicular to roof surface		

PMT EVO 2.0 SOUTH system 10° and 15° Characteristic resistance values – 'Base'	
	Tension perpendicular to module surface Fk5 [kN]
Tilt 10°	3.4
Tilt 15°	3.3
γ_M	1.25

PMT EVO 2.0 SOUTH system 10° and 15° Characteristic resistance values – Connections to base rail				
	Tension perpendicular 'Tower' to base rail Fk6 [kN]	Tension perpendicular 'Base' to base rail Fk7 [kN]		Tension in longitudinal direction of base rail Fk8 [kN]
		Edge section[3]	Middle section[4]	
Tilt 10°	1.7	1.1	3.7	2.0
Tilt 15°	1.7	1.1	3.7	2.0
γ_M	1.6			1.25
[3] Edge section: Here, the base rail ends at the edge of the module surface. [4] Middle section: Here, the base rail runs on both sides of the 'Base'.				