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Technical authority granting approvals
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and construction techniques

Date: 28 May 2024 Reference number:
I 85-1.14.4-101/21

National technical approval / General construction technique permit

Number:
Z-14.4-916

Applicant:
K2 Systems GmbH
Industriestraße 18
71272 Renningen, Germany

Validity
from: **28 May 2024**
to: **28 May 2029**

Subject of decision:
**Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for
fastening and mounting 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 eight pages and four annexes with eight pages.

Translation authorised by DIBt

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 covers the following construction products, which are used to connect and mechanically fasten the 'Dome' photovoltaic mounting system, see Table 1 and Annex 1. Positional stability is achieved through self-weight and additional ballast.

Table 1: Subject of approval

Mounting system 'Dome'	Construction products	Annexes
'Dome 6.10 SD' / 'Dome 6.15 SD' / 'Dome Zero Peak'	'DomeClamp EC Set 30-50'	3.1, 3.4, 4.1
	'DomeClamp MC Set 30-50'	
	'Dome 6.10 SD'	
	'Dome 6.15 SD'	
	Dome Zero Peak	
'Dome 6.10 Peak' / 'Dome 6.15 Peak'	'DomeClamp EC Set 30-50'	3.2, 3.3, 3.4, 4.2
	'DomeClamp MC Set 30-50'	
	'Dome 6.10 Peak'	
	'Dome 6.15 Peak'	

1.2 Subject of the permit and field of application

The subject of the permit is the planning, design and execution of connections and mechanical fastenings (in this decision: mid and end clamp sets, as well as mounting of the system using 'Dome' components) of the 'Dome' photovoltaic mounting system consisting of the construction products named in Table 1 used for mounting and transferring the load of photovoltaic modules on flat roofs. The photovoltaic mounting variants for flat roofs and the alignment of the photovoltaic modules are shown as examples in Annex 1.

Framed photovoltaic modules are fastened to support rails (see Annex 2) using the construction products listed in Table 1.

The mounting systems are designed for installation and alignment of the photovoltaic modules facing south or facing east/west on flat roofs. Depending on the module support, the photovoltaic modules are tilted either by 10° or by 15°. The mounting systems are designed in such a way that they do not perforate the flat roof. The module fasteners and the module support mountings are mounted on support rails.

The components of the construction products and the materials are listed in Table 2.

2 Provisions for the construction product(s)

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 10204¹.

2.1.2 System components, materials

The construction products of the connections and mechanical fastenings shall be made of the materials specified in Table 2.

¹ DIN EN 10204:2005-01 Metallic products – Types of inspection documents

Table 2: Materials

Construction products	System components	Materials
'DomeClamp EC Set 30-50'	'DomeClamp EC Set 30-50' top part	EN AW-6063 T66 ^a
	'DomeClamp Stance 18 Solo' bottom part	EN AW-6082 T6 ^a
	MC/EC spring 39-44 mm (assembly aid)	Stainless steel 1.4310
	Socket head cap screw M8x35 ^c	Stainless steel, A2-70
'DomeClamp MC Set 30-50'	'DomeClamp MC Set 30-50 Solo' top part	EN AW-6063 T66 ^a
	'DomeClamp Stance 18 Solo' bottom part	EN AW-6082 T6 ^a
	MC/EC spring 39-44 mm (assembly aid)	Stainless steel 1.4310
	Socket head cap screw M8x35 ^c	Stainless steel, A2-70
'Dome 6.10 SD'	'Dome 6.10 SD' base point	EN AW-6063 T66 ^a
	Socket head cap screw M8 ^c	Stainless steel ^b , A2-70
	'MK2 Steel' slot nut or 'MK2 Alu' slot nut	Stainless steel ^b 1.4310 or EN AW-6063 T66 ^a
'Dome 6.15 SD'	'Dome 6.15 SD' base point	EN AW-6063 T66 ^a
	Socket head cap screw M8 ^c	Stainless steel ^b , A2-70
	'MK2 Steel' slot nut or 'MK2 Alu' slot nut	Stainless steel ^b 1.4310 or EN AW-6063 T66 ^a
'Dome Zero Peak'	'Dome Zero Peak' base point	EN AW-6063 T66 ^a
	Socket head cap screw M8 ^c	Stainless steel ^b , A2-70
	'MK2 Steel' slot nut or 'MK2 Alu' slot nut	Stainless steel ^b 1.4310 or EN AW-6063 T66 ^a
'Dome 6.10 Peak', 'Dome 6.15 Peak'	'Peak' mounting systems	EN AW-6063 T66 ^a

^a Aluminium alloy in accordance with DIN EN 755-2² or an aluminium alloy with at least the same material properties in accordance with DIN EN 755-2². DIN EN 12020-2³ or DIN EN 755-9⁴ applies to the dimensional tolerances.

^b in accordance with DIN EN ISO 3506-1⁵ or DIN EN ISO 3506-2⁶ or DIN EN 10088-2⁷ in conjunction with DIBt decision no. Z-30.3-6⁸ shall apply accordingly. Specifications for the material properties are deposited with DIBt.

^c in accordance with DIN EN ISO 4762:2004-06⁹

2	DIN EN 755-2:2016-10	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 2: Mechanical properties
3	DIN EN 12020-2:2017-06	Aluminium and aluminium alloys – Extruded precision profiles in alloys EN AW-6060 and EN AW-6063
4	DIN EN 755-9:2016-10	Aluminium and aluminium alloys – Extruded rod/bar, tube and profiles – Part 9: Profiles, tolerances on dimensions and form
5	DIN EN ISO 3506-1:2020-08	Fasteners - Mechanical properties of corrosion-resistant stainless steel fasteners – Part 1: Bolts, screws and studs with specified grades and property classes
6	DIN EN ISO 3506-2:2020-08	Mechanical properties of corrosion-resistant stainless steel fasteners – Part 2: Nuts with specified grades and property classes – Coarse and fine pitch threads
7	DIN EN 10088-2:2014-12	Stainless steels – Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes
8	Z-30.3-6: 20 April 2022	DIBt decision: Products, structural components and fasteners made of stainless steels
9	DIN EN ISO 4762:2004-06	Hexagon socket head cap screws

The main dimensions shall be taken from the annexes in accordance with Table 1. Further specifications are deposited with DIBt.

The support rails made of EN AW-6063 T66 in accordance with Annex 2 are manufactured in accordance with DIN EN 755-2² and DIN EN 755-9⁴.

2.2 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.

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

- The dimensions and tolerances required in Section 2.1 shall be verified for each batch.
- Conformity of the specifications in the inspection certificate with the specifications given in Section 2.1 shall be verified.
- For the fasteners made of stainless steel, the provisions in accordance with DIN EN ISO 3506-1⁵, DIN EN ISO 3506-2⁶, DIN EN 10088-1⁷ or DIN EN ISO 4762⁹ in conjunction with decision no. Z-30.3-6⁸ shall apply accordingly.
- The principles for confirmation of conformity for fasteners for light-weight metal construction¹⁰ shall apply accordingly.

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 and the components,
- type of check or test,

¹⁰ Principles for confirmation of conformity for fasteners for light-weight metal construction (*Grundsätze für den Übereinstimmungsnachweis für Verbindungselemente im Metalleichtbau*): August 1999; DIBt Official Bulletin 6/1999

- 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 confused with compliant products. After the defect has been remedied, the relevant test shall be repeated immediately – where technically feasible and necessary to show that the defect has been eliminated.

2.3.3 External surveillance

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

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 (*Technische Baubestimmungen*) as well as the provisions of the national technical approvals / general construction technique permits or the European Technical Assessments cited below shall apply.

The construction technique comprises the following construction products:

- Mid and end clamp sets with socket head cap screw M8x35 in accordance with this decision
- Socket head cap screw M8 in accordance with this decision and DIN EN ISO 4762:2004-06⁹
- 'Dome' mounting profile in accordance with this decision
- 'Dome' components with slot nut in accordance with this decision
- Support rails with rail channel in accordance with DIN EN 755-2² and DIN EN 755-9⁴

With respect to corrosion protection, the Technical Building Rules as well as the provisions of decision no. Z-30.3-6⁸ shall apply.

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

3.2 Design

3.2.1 General

The verification concept set out in DIN EN 1990¹¹ shall apply.

The serviceability and the structural safety of the connections and mechanical fastenings shall be verified on a case-by-case basis by structural analysis in accordance with the Technical Building Rules.

¹¹ DIN EN 1990:2010-12

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

This decision only covers the application of connections and mechanical fastenings subject to static or quasi-static action with reference to DIN EN 1990¹¹ as well as the structural safety verification of the connections and mechanical fastenings for loading through tensile forces (e.g. as a result of wind suction) and through compressive forces (e.g. as a result of the self-weight of the system and snow load), as well as shear forces acting along the support rails in the plane of the photovoltaic modules (e.g. due to the self-weight of the system).

The structural safety verifications of the connections and mechanical fastenings shall be conducted in accordance with the specifications given in Section 3.2.2. The resistances given in Annexes 4.1 and 4.2 shall be used for this.

It shall be verified that the design value of an action E_d does not exceed the design value of the associated resistance R_d .

The following verifications shall be provided separately:

- Serviceability
- Structural safety of the support profiles
- Structural safety of the photovoltaic modules
- Structural safety of the photovoltaic module connection for shear forces acting transversely to the support rails (y-direction)
- Structural safety of the connection of the photovoltaic modules to the connections and mechanical fastenings
- Structural safety of the connection of the connections and the mechanical fastenings to the substructure
- Structural safety of the substructure
- Positional stability through a corresponding superimposed load (ballasting) and bracing of the mounting systems
- Introduction and transfer of the forces verified in Section 3.2.2 into the main structural system.

3.2.2 Resistances of the connections

The following verifications shall be carried out, taking into account the resistances in accordance with Annexes 4.1 and 4.2:

$$\frac{N_{z,d} \cdot \gamma_M}{N_{z,k}} \leq 1.0$$

where

- $N_{z,d}$ [kN] design value of acting compressive load or tensile force per connection
 $N_{z,k}$ [kN] characteristic value of tensile force resistance or compressive force resistance per connection in accordance with Annexes 4.1 and 4.2
 $\gamma_M = 1.33$ partial safety factor

$$\frac{V_{x,d} \cdot \gamma_M}{V_{x,k}} \leq 1.0$$

where

- $V_{x,d}$ [kN] design value of acting horizontal force in the direction of the support rails (x-direction) per connection
 $V_{x,k}$ [kN] characteristic value of horizontal force resistance in the direction of the support rails (x-direction) per connection in accordance with Annex 4.1
 $\gamma_M = 1.33$ partial safety factor

In the event of simultaneous application of vertical and horizontal forces (along the support rails), the following interaction verification must be carried out:

$$\frac{N_{z,d} \cdot \gamma_M}{N_{z,k}} + \frac{V_{x,d} \cdot \gamma_M}{V_{x,k}} \leq 1.0$$

3.3 Execution

The connections and mechanical fastenings shall be executed in accordance with the annexes.

The fastenings shall be made using a tightening torque of $M_{t,nom} = 14 \text{ Nm}$.

The construction products used for the connections and the mechanical fastenings, including the support rails and the photovoltaic modules to be fixed, shall be stored and mounted in clean, dry and grease-free condition.

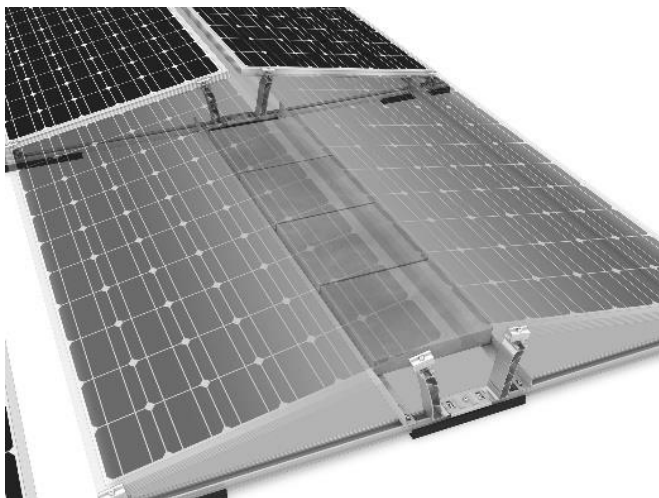
The manufacturer shall draw up installation instructions for the connections and the mechanical fastenings and issue these to the executing company.

The connections and mechanical fastenings shall only be executed by companies possessing the necessary experience for this, unless training of the assembly personnel is provided by specialists of companies experienced in this field.

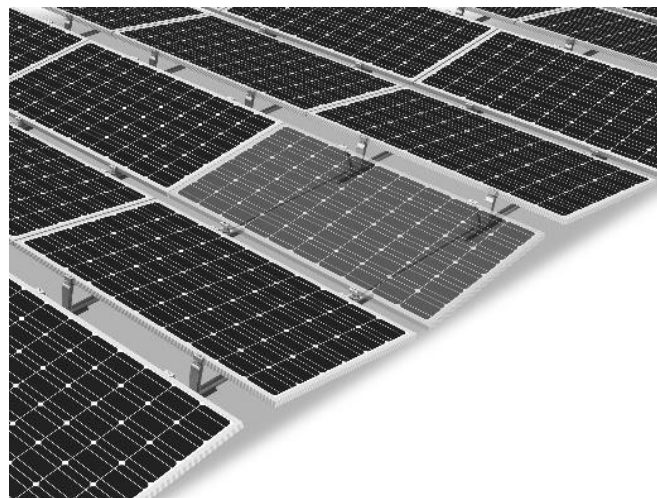
The executing company shall provide a declaration of conformity in accordance with Sections 16a(5) and 21(2) of the Model Building Code (*Musterbauordnung - MBO*) to confirm the conformity of the connections and mechanical fastenings with the general construction technique permit included in this decision.

Dr.-Ing. Ronald Schwuchow
Head of Section

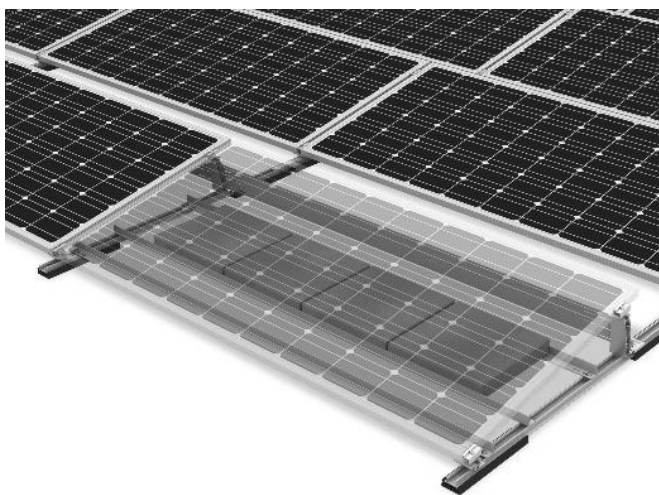
Drawn up by
Hetfleisch



D-Dome 6.10 (Classic or Xpress)



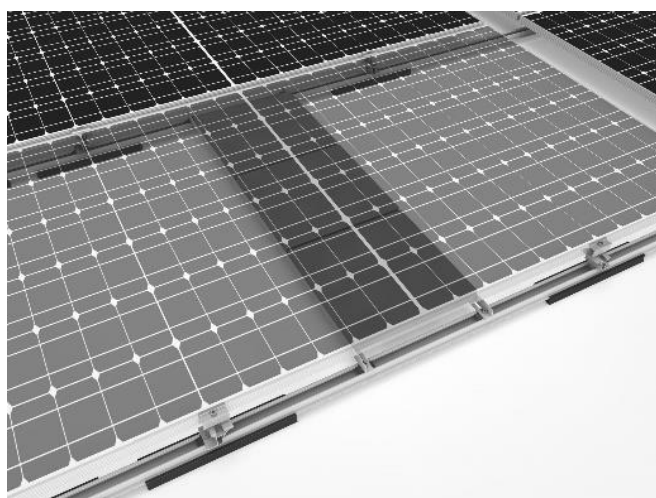
D-Dome 6.10 LS (Longside)



S-Dome 6.10/6.15 (Classic or Xpress)



S-Dome 6.10 LS/6.15 (Longside)



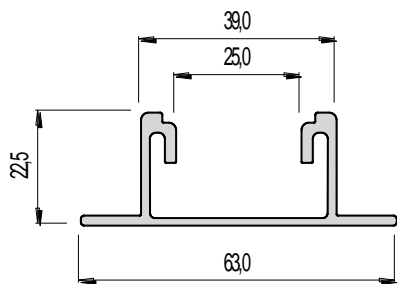
Dome Zero

in [mm]

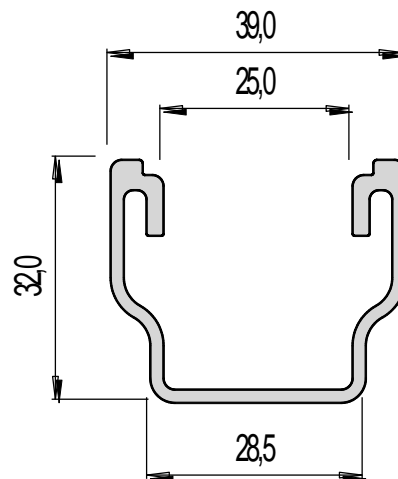
Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for fastening and mounting PV modules on flat roofs

System configurations

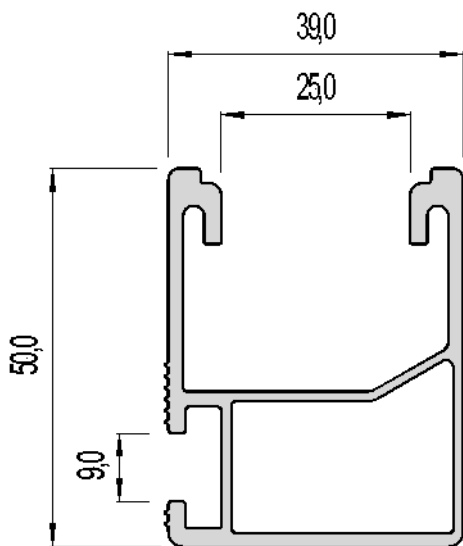
Annex 1



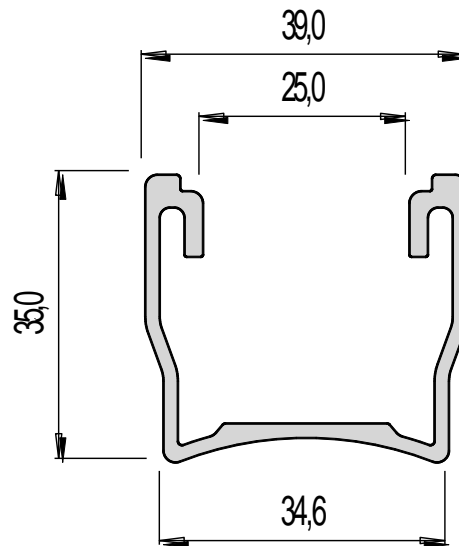
BasicRail 22



MultiRail



SingleRail 50



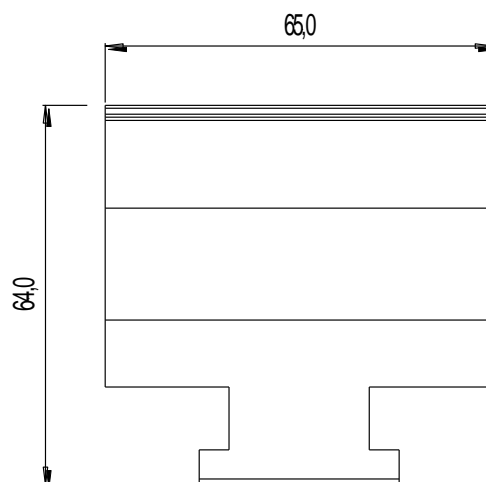
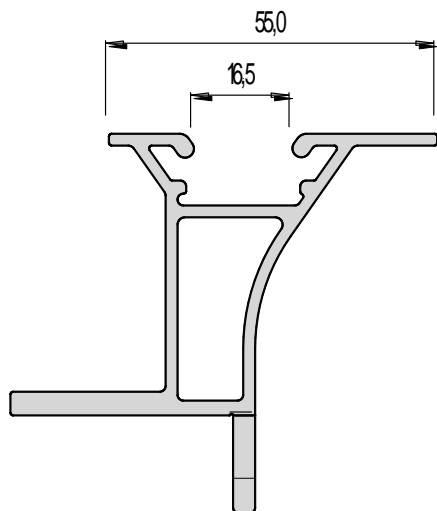
MultiRail CSM

in [mm]

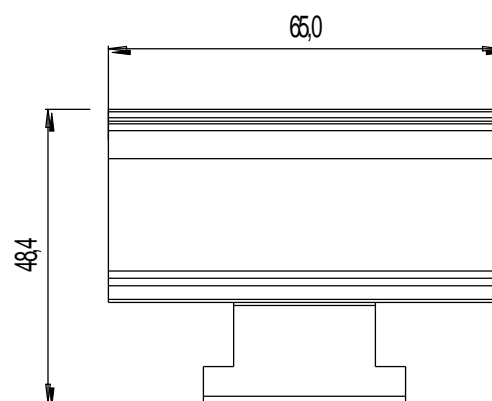
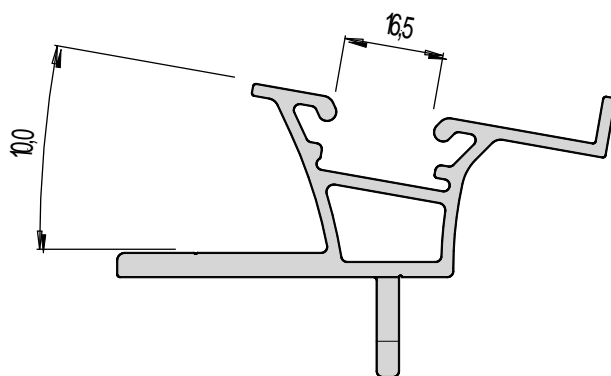
Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for fastening and mounting PV modules on flat roofs

Support rails

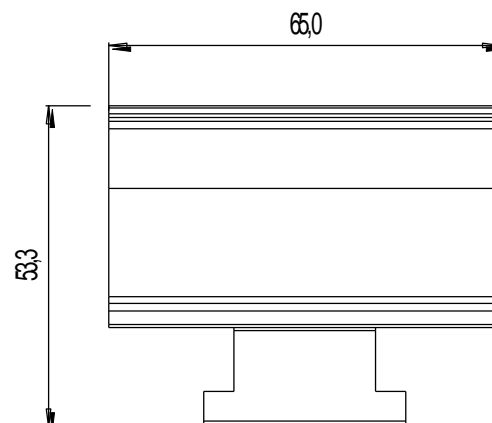
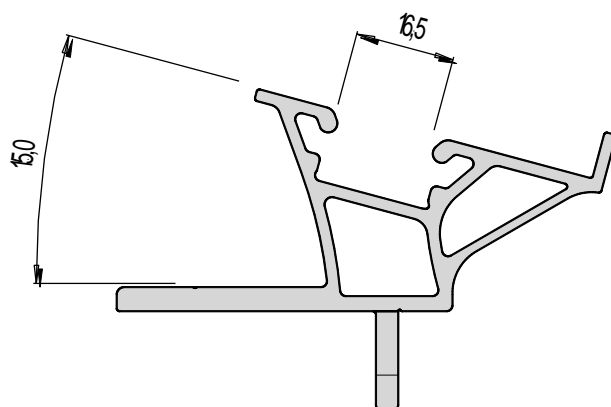
Annex 2



Dome Zero Peak



Dome 6.10 SD



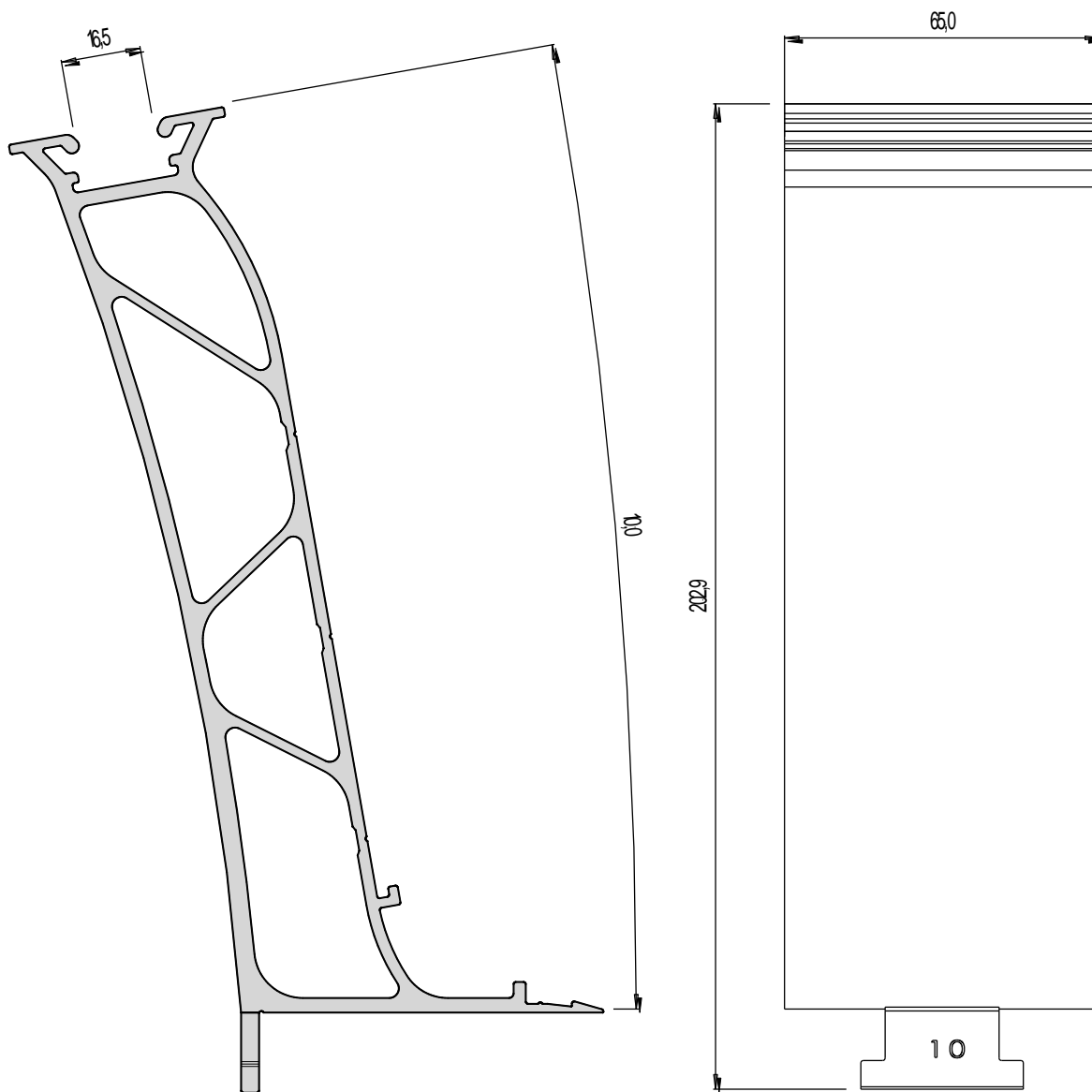
Dome 6.15 SD

in [mm]

Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for fastening and mounting PV modules on flat roofs

'Dome' components

Annex 3.1



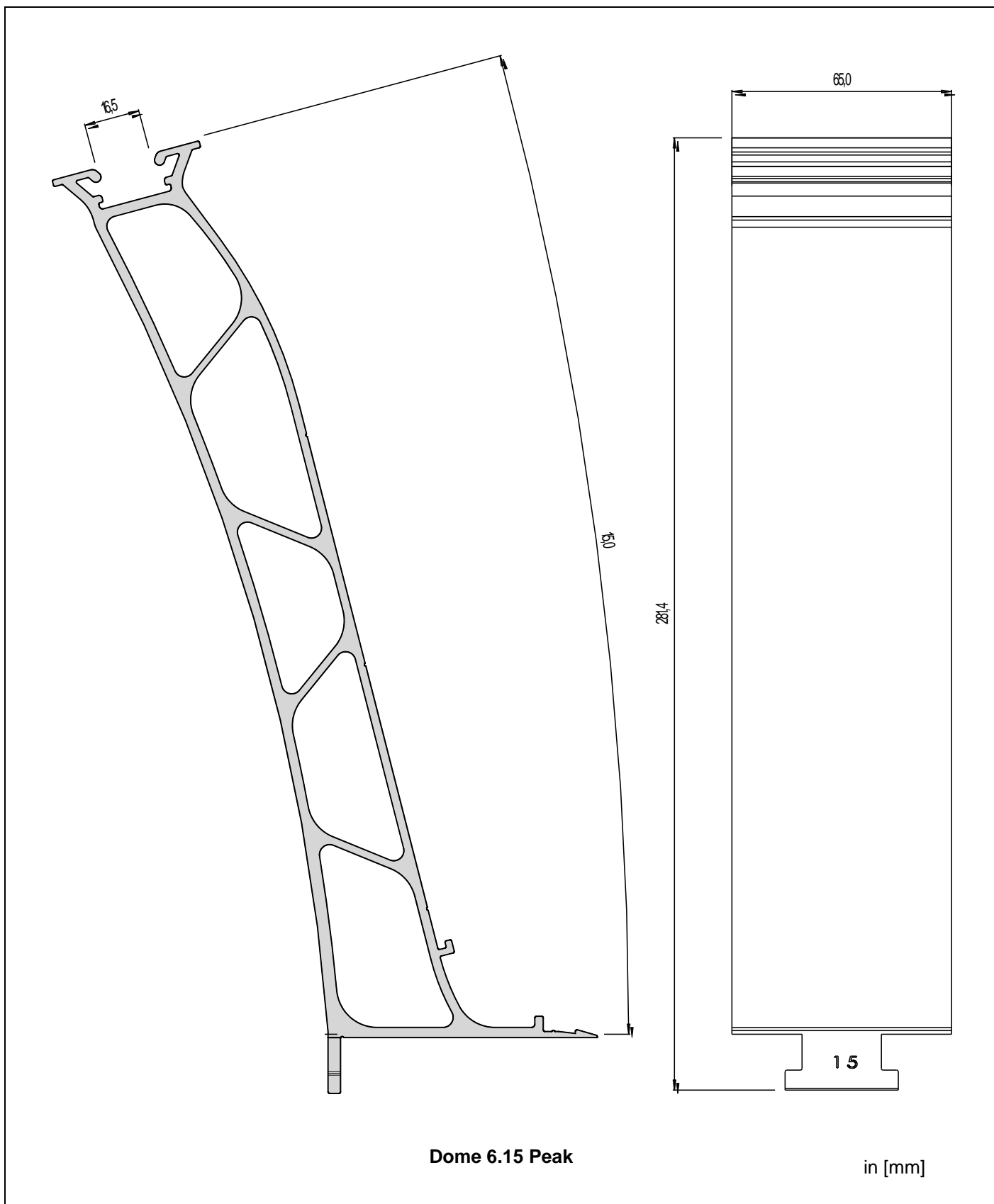
Dome 6.10 Peak

in [mm]

Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for fastening and mounting PV modules on flat roofs

'Dome' components

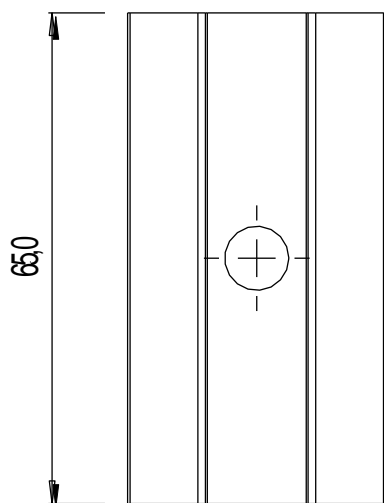
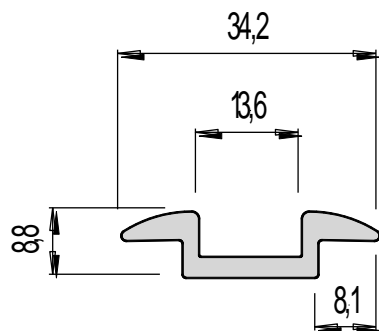
Annex 3.2



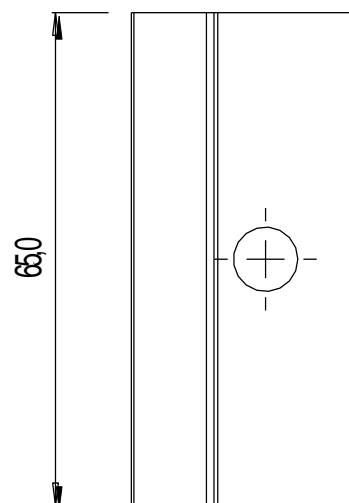
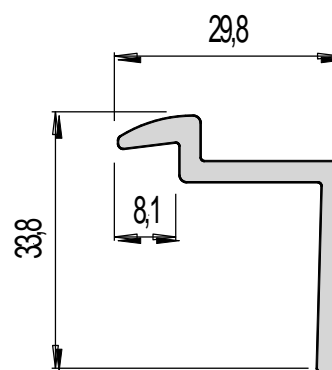
Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for fastening and mounting PV modules on flat roofs

'Dome' components

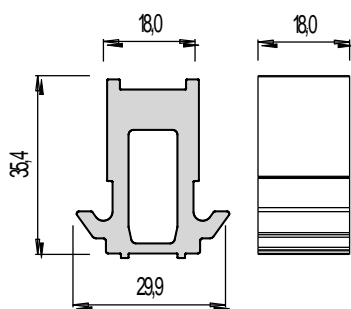
Annex 3.3



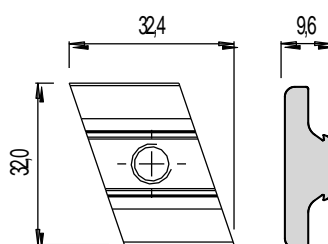
DomeClamp MC 30-50 Solo



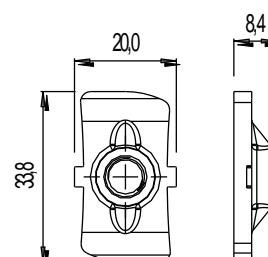
DomeClamp EC 30-50 Solo



DomeClamp Stance 18 Solo



**MK2-Alu
 (Aluminium)**



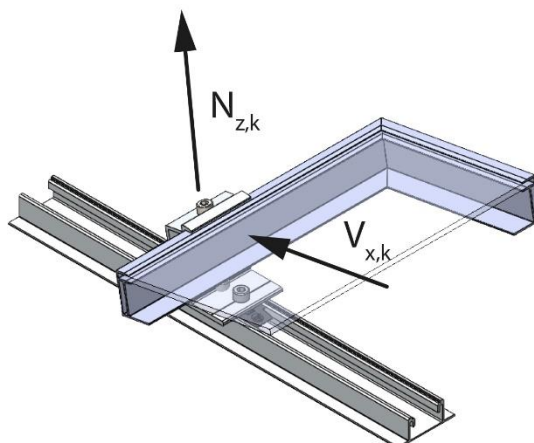
**MK2
 (stainless steel)**

in [mm]

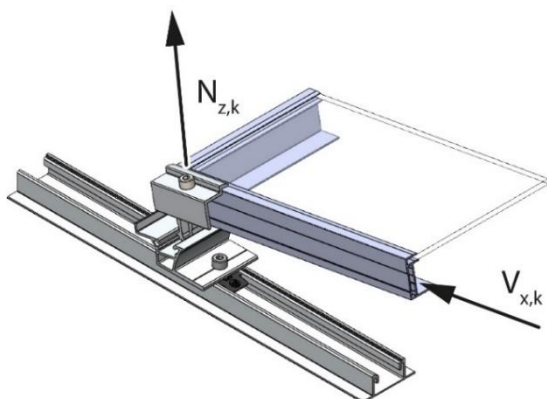
Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for fastening and mounting PV modules on flat roofs

'DomeClamp MC 30-50 Solo' mid clamp, 'DomeClamp EC 30-50 Solo' end clamp
 'DomeClamp Stance 18 Solo' component and base points 'MK2-Alu' and 'MK2'

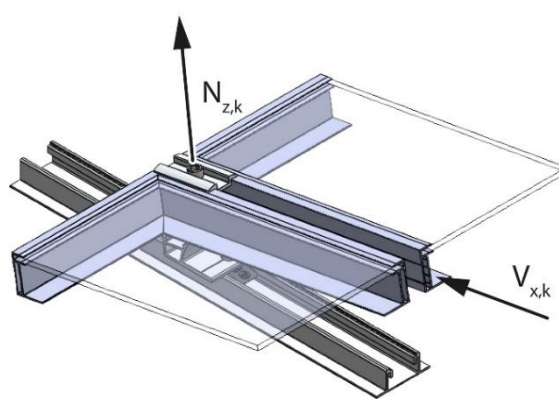
Annex 3.4



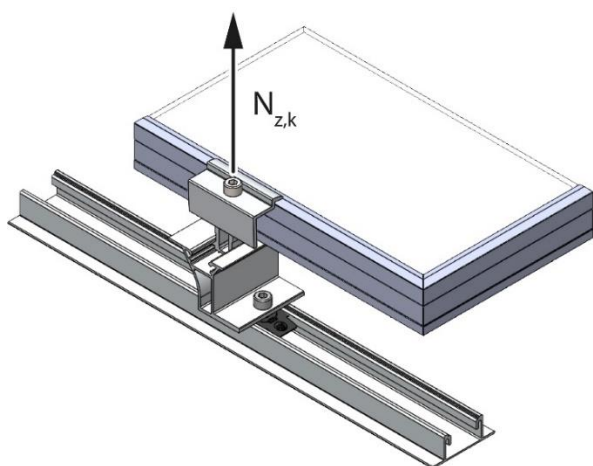
'Dome 6.10 SD' or 'Dome 6.15 SD' with 'DomeClamp EC Set 30-50' with 'Longside' mounting
 $N_{z,k} = 5.44 \text{ kN}$ $V_{x,k} = 2.28 \text{ kN}$



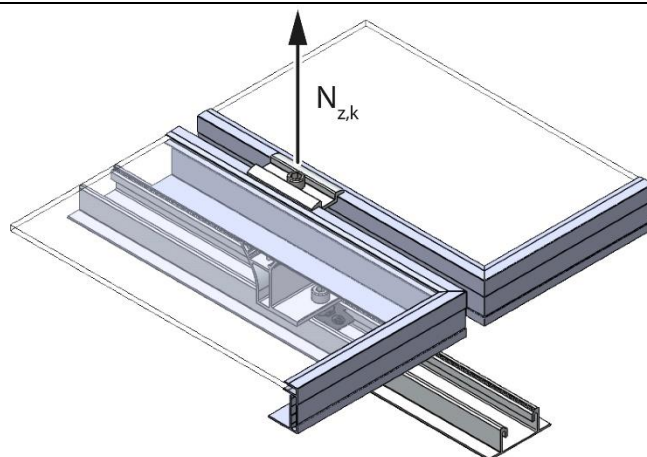
'Dome 6.10 SD' or 'Dome 6.15 SD' with
 'DomeClamp EC Set 30-50'
 with 'Classic' or 'Xpress' mounting
 $N_{z,k} = 5.44 \text{ kN}$ $V_{x,k} = 3.91 \text{ kN}$



'Dome 6.10 SD' or 'Dome 6.15 SD' with
 'DomeClamp MC Set 30-50'
 with 'Classic' or 'Xpress' mounting
 $N_{z,k} = 5.99 \text{ kN}$ $V_{x,k} = 3.91 \text{ kN}$



'Dome Zero Peak' with 'DomeClamp EC Set 30-50'
 $N_{z,k} = 5.44 \text{ kN}$

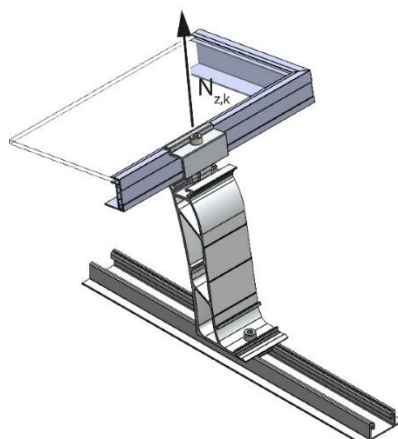


'Dome Zero Peak' with 'DomeClamp MC Set 30-50'
 $N_{z,k} = 5.99 \text{ kN}$ in [mm]

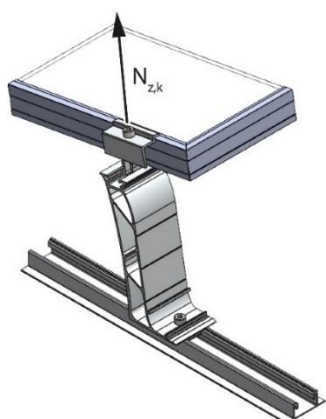
Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for fastening and mounting PV modules on flat roofs

Characteristic resistance values

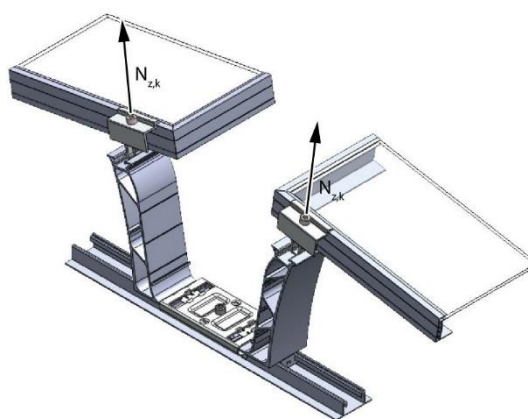
Annex 4.1



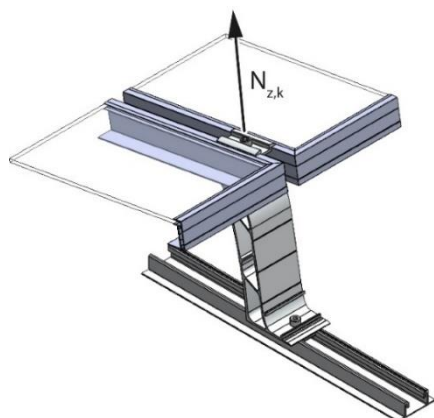
'Dome Peak 6.10' or 'Dome Peak 6.15' with 'DomeClamp EC Set 30-50' with 'S-Dome Longside' mounting



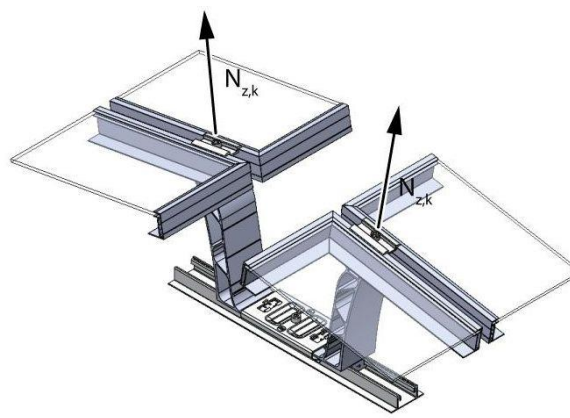
'Dome Peak 6.10' or 'Dome Peak 6.15'
 with 'DomeClamp EC Set 30-50'
 with 'S-Dome Classic' mounting



'Dome Peak 6.10'
 with 'DomeClamp EC Set 30-50' with 'D-Dome 6.10
 Xpress' mounting



'Dome Peak 6.10' or 'Dome Peak 6.15'
 with 'DomeClamp MC Set 30-50'
 with 'S-Dome Classic' mounting



'Dome Peak 6.10'
 with 'DomeClamp MC Set 30-50'
 with 'D-Dome Xpress' mounting

For all mountings:

$N_{z,k} = 2.99 \text{ kN}$ (tension)

$N_{z,k} = -14.76 \text{ kN}$ (compression)

in [mm]

Mounting systems S-Dome 6.10, D-Dome 6.10, S-Dome 6.15, D-Dome 6.15 and Dome Zero for fastening and mounting PV modules on flat roofs

Characteristic resistance values

Annex 4.2