Why RABLE mounting systems?

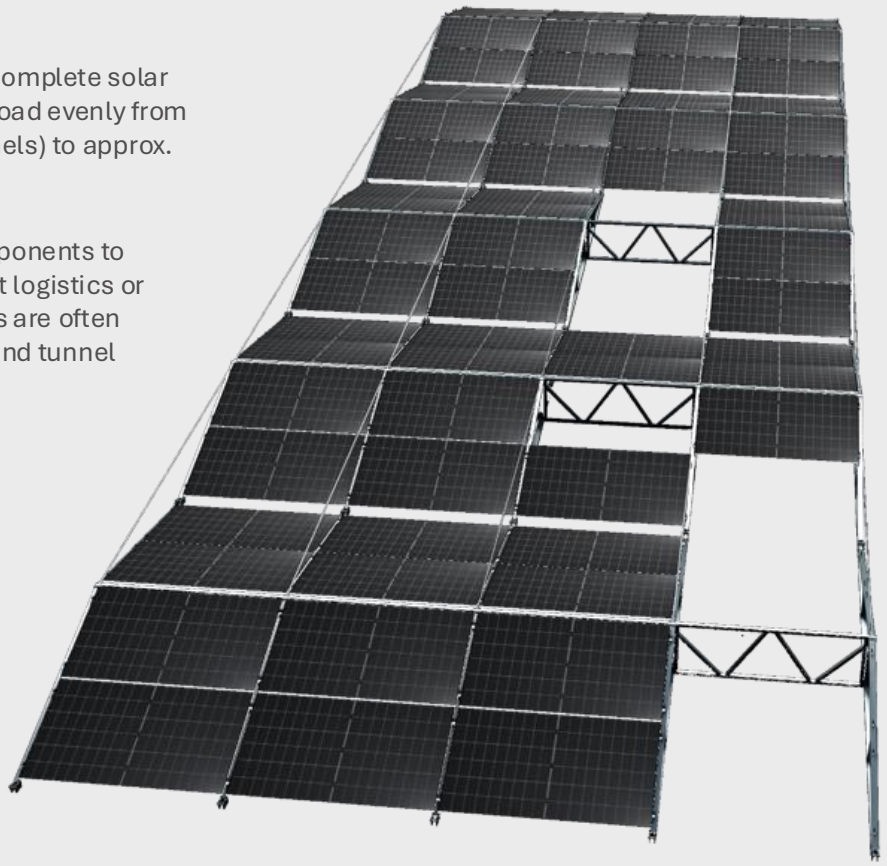
Solar energy for weaker roofs

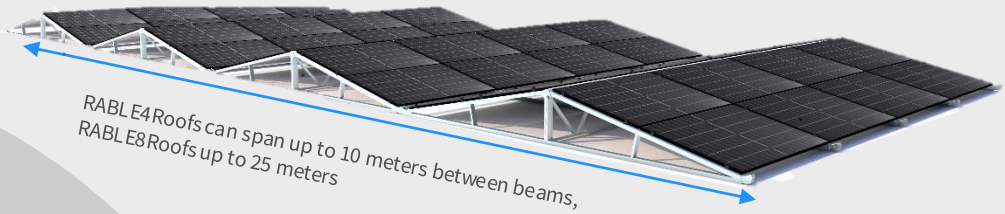
Ballastfree mounting system: Unique self-supporting system using an advanced truss principle. Prevents high pointloads on the roof.

Maximum span: The PV system's weight is supported by roof beams, allowing spans up to 25 meters.

Even weight distribution: The complete solar system with RABLE distributes load evenly from approx. 6 kg/m^2 (lightweight panels) to approx. 13 kg/m^2 (standard panels)

Rapid installation: Only 3 components to mount 4 solar panels. No ballast logistics or placement needed, and anchors are often unnecessary (based on Peutz wind tunnel data).





Fully certified

NEN 1010

Full metal construction with excellent grounding & equipotential bonding.

NEN 7250 + EN 1990 EN 1991

Supplied in accordance with force standards based on Eurocodes.

ETN

RABLE4Roofs has been certified for the the French market

EN 1990

15 years
warrantee

RABLE4roofs & RABLE8roofs

Technical properties

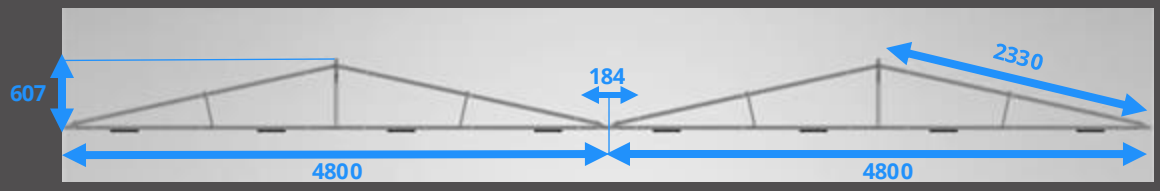
General		RABLE4Roofs		RABLE8Roofs
Roof type	Flat roofs, max. inclination 10º	Panels per system	4	8
Material	Magnelis galvanized	Length System (mm)	4800	9500
System Width	Panel length +24mm	Max. Span (m)	10	25
Panels	Universally applicable			
Configuration	East West			
System inclination	12,5°			

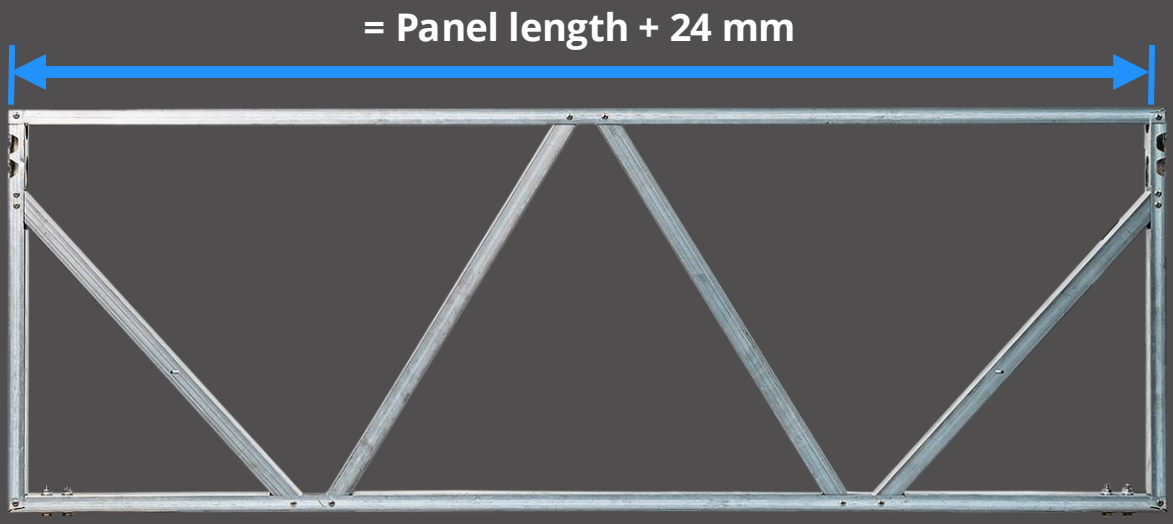
Unique Patented Truss Principle

Using the steel cable, a truss is formed in the length direction. The central framework creates a truss in the width direction. These two trusses over two axes form an extremely rigid structure.

The steel cable creates bending resistance in the length direction, allowing for substantial spans up to 25 meters distance between beams. The rigid structure ensures even weight distribution across the entire field, supported by the beams and trusses of the roof. The truss structure not only provides efficient load-bearing capacity but also minimizes pressure on roof plates, making the system suitable for roofs where no additional load on the plates is allowed.

- Weight of the substructure is a maximum of 3 kg/m^2
- Maximum roof load of 6 kg/m^2 with lightweight panels, or 13 kg/m^2 with regular panels
- Suitable for roofs where roof plates cannot bear extra weight

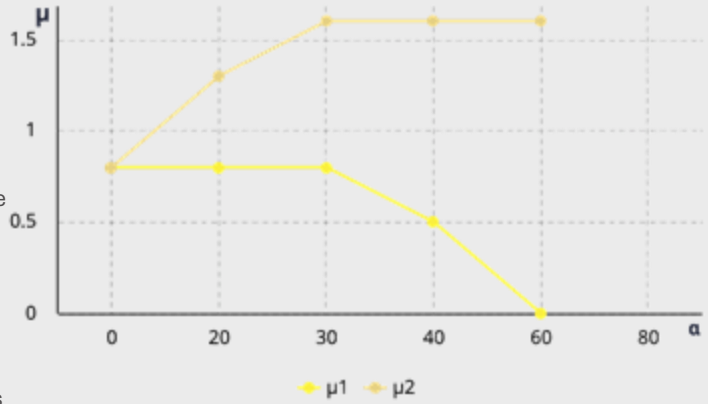




Expert Report

Snow load coefficient according to NEN-EN-1991 1-3 The reference period for PV systems is set at 15 years. The snow load (0.7 kN/m^2 in the Netherlands) may be reduced by 25%, not to be confused with the reduction for flat roofs, which may be reduced by 20%.)

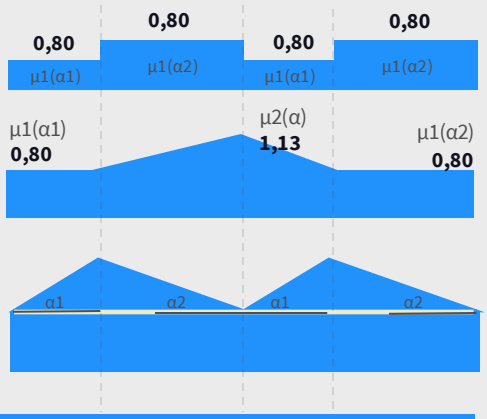
In addition, a 3% reduction may be applied according to Eurocode NEN-EN 1991-1-3 General loads - Snow load. This calculation is based on the slope angle of 12.5º which is applicable for EW-series of RABLE.



Roofs with more than one span

Roof pitch α1 = 10
Roof pitch α2= 15
Snow can slide down unimpeded = yes
Average Roof Pitch = (α1 + α2)/2 = 12.5º

μ1 gives 0,80 and μ2 gives 1,13 of which μ average results in 0,97
Snowload RABLE: 0,7 · 0,75 · 0,97 = 0,51 kN/m^2



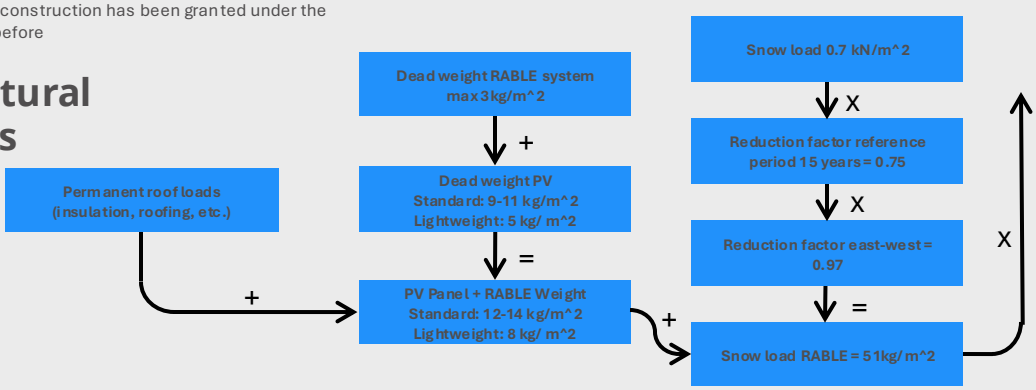
Load combination factors (acc. to NEN8700)

For the load combination factors, the factors for renovation should be used.
The above principles are common for the construction calculations. The inherent stiffness of the RABLE system is not considered in the construction of the roof. If, after calculating the roof construction with the above principles, the roof is insufficiently strong, it is possible to calculate the roof construction as well, including the stiffness of the RABLE system. In this way, a solution can almost always be found. Ask about the possibilities if desired.

	Permanent loads	Predominant variable load other than wind	Variable wind normative load
Vgl 6.10a			
CC1	1,15	1,10	1,20
CC2	1,30 (1,20)	1,30	1,40
CC3	1,40 (1,30)	1,50	1,60 (1,50)
Vgl 6.10b			
CC1	1,05	1,10	1,20
CC2	1,15	1,30	1,40
CC3	1,25 (1,20)	1,50	1,60 (1,50)

Table: load factors for buildings during renovation based on NEN 8700; values in brackets only apply to buildings for which an environmental permit for construction has been granted under the Building Decree 2003 or before

Input structural calculations RABLE distributed load



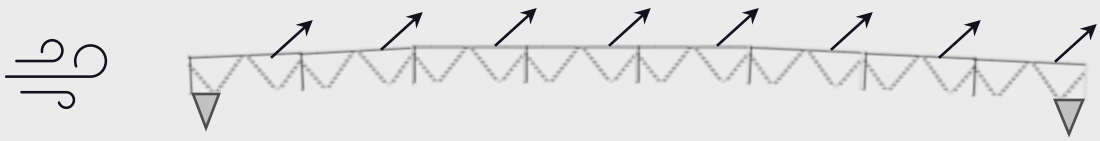
Expert report

Explanation of anchor plan

The lift coefficient on the RABLE substructure was determined based on wind tunnel tests. This coefficient and the maximum thrust pressure, which depends on factors such as building height, wind zone and building density, are used to calculate the upward force on the system. RABLE provides advice on the location of the anchors at all times. The following page explains the ballast- and anchor-free option with RABLE.

The strength and stiffness of the RABLE substructure are determined using the Finite Element Method (FEM). The number and position of the anchors are determined in combination with this stiffness and strength and the upward force (depending on the factors discussed above) on the system. This is based on a maximum anchor force of 150 kg per anchor.

Windzone 3 | Built environment| Low building



Windzone 1 | Unbuilt environment| High building

SCOPE 12 Inspectie DBD

Load-bearing capacity

The load-bearing capacity of the building's structure is insufficient to support a conventional solar power installation held in place by ballast. By using this newly developed mounting structure, ballast is not needed to keep the system in place. The entire (pilot) system is fixed to the structure at the four corners. According to the structural calculations, all weights remain within the margins of what the structure could bear.

Conclusion

This is an innovative installation with the potential for widespread application.

Corrossion Magnelis

RI.SE

Type Approval and decision on production control

SC0559-13

Steel flat products for cold forming coated with Magnelis® ZM310

Holder/Issued to

ArcelorMittal Europe - Flat Products

1160 LUXEMBOURG, LUXEMBOURG

Product description

Steel flat products for cold forming coated with Magnelis® ZM310. Products are manufactured in accordance with EN 10346:2015 with steel grades as specified in table 1, table 2 and table 3 of the standard. Magnelis® ZM310 is a corrosion protective alloyed coating composed of zinc, aluminium and magnesium.

Intended use

Products and structures manufactured from steel flat products for indoor- and outdoor applications. Products coated with Magnelis® ZM310 are suitable for corrosivity category C5, according to in SS-EN ISO 12944-2 described class, based on a deemed expected lifetime of 15 years.

Corrossion Magnelis

thyssenkrupp

thyssenkrupp Materials (UK) Ltd

Aluminium Alloy 6005A - T6 Extrusion — Material Data Sheet

Specifications

- Commercial: 6005A
- EN: 6005A

Aluminium alloy 6005A is a medium strength, heat treatable alloy with excellent corrosion resistance. Alloy 6005 has properties between those of alloys 6061 and 6082and can sometimesbe used interchangeably with these alloys, but 6005 has better extrusion characteristics and a better mill surface finish. It is difficult to produce thin-wall or complicated extrusions in 6005, but it is still more extrudable than 6082. 6005A tube has very good bending properties.

Application

6005 and 6005A typically find application in intricate extrusions like: tubing for furniture, railway and bus profile structures, pylons, platforms and pipelines, portable ladders and sections where greater strength is needed than given by 6060 and 6063.

Short side clamping

Easy and quick to install

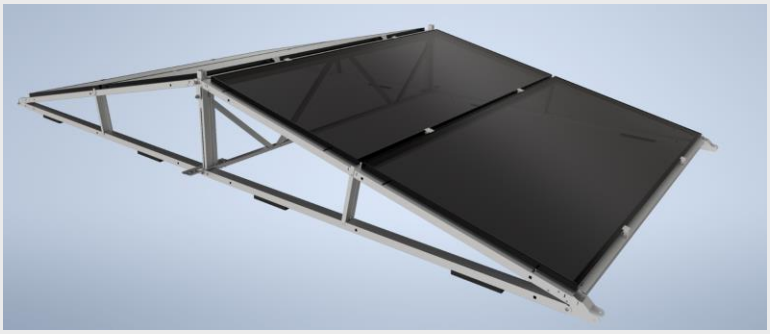
RABLE's mounting systems are designed for landscape placement of modules. RABLE supplies black or silver colored clamps where the panels are attached to the system on the short side.

Long side clamping (LC-bar)

Long-side Clamping Bar for bigger modules

For large panels, the panel manufacturer's manual prescribes that the module must be supported on the long side. For this purpose, RABLE supplies the LC bar, which supports the module on the long side.

Because larger solar panels usually have a higher energy yield Wp, the €/Wp remains roughly the same as with smaller panels.



+/- half a minute of installation time per bar
6 pieces per frame

RABLE for every surface

On exoskeleton and canopies

Mounting on an exoskeleton/beams
In addition to mounting on flat roofs, the RABLE mounting system is perfect for use on an exoskeleton. RABLE's mounting system is placed directly on the beams/structure.

With the help of custom exoskeleton clamps, our regular systems are attached to the beams. This prevents the system from blowing away.

Gasstations

Thanks to the spacious span and our lightweight mounting system, you can make optimal use of awnings for solar energy. This way you provide EV chargers and the station itself with sustainable power, directly on location.

RABLE voor elk oppervlak

Op steunpoten

Zonne-energie op ieder dak

Met **RABLE8roofs op steunpootjes** voorzie je moeiteloos daken met hoogteverschillen, sedum of grind van zonne-energie. Een flexibele oplossing voor uitdagende dakstructuren.

Slim ontwerp, minimale belasting

Het systeem wordt op **500 mm hoogte** geplaatst, waarbij het volledige gewicht direct wordt afgedragen op de balken. Zo worden de dakplaten niet belast.

Grote overspanning, flexibele plaatsing

RABLE8roofs op steunpootjes biedt maximale ontwerpvrijheid voor uitdagende daken. Met een overspanning tot **9,6 meter** worden zonnepanelen efficiënt geplaatst, terwijl het dakoppervlak optimaal benut blijft.