10,4 Kw på Eternit (10,4)

System Plan

YOUR PHOTOVOLTAIC SPECIALIST

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CUSTOMER

Name	
Address	

SYSTEM INFORMATION

Number of modules	26
System Output	10.4 kWp
Modules	26 x Hyundai HiE-S400VG - 400 Wp (FB) (10.4 kWp)

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Project data - building
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Roof

Roof Type	Pitched Roof
Ridge to eaves (m)	6.000
Ridge Length (m)	25.000
Roof Inclination (°)	30
Building Height (m)	6.000
Building Width (m)	10.392
Building Length (m)	25.000
Roof Orientation (°)	0

Roof Covering

Type of Roof Covering	Currugated Fibre Cement
Peak Spacing (mm)	177
Peak Height (mm)	51

Substructure

Substructure	Purlin (Wood)
Purlin Distance (cm)	108.00
Number of Purlins	6
Purlin Width (cm)	12.00
Purlin Height (cm)	20.00
Distance first Purlin (cm)	0.00
Distance last Purlin (cm)	47.90

Location

Country	Denmark
Address	Vesterbrogade 3 st tv, 7100, Vejle, Denmark
Terrain Category	II
Altitude (m.a.s.l.)	4
Windload Zone	27
Snowload Zone	DK

Project data - array
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Module field	**Module array 1**
Module	Hyundai HiE-S400VG - 400 Wp (FB)
Number of modules	26
L / W / H (mm)	1719 / 1140 / 35
Weight (kg)	22.0
Power	10.4 kWp
Mounting system	Flush 1 Layered Landscape
Layout (rows x columns)	2 x 13

Modules
10,4 Kw på Eternit (10,4)

Module	Hyundai Hyundai HiE-S400VG - 400 Wp (FB)
	

Electrical Data

Nominal Output Power Pmpp (Wp)	400
Maximum Power Voltage (V)	38.6
Maximum Power Current (A)	10.36
Open Circuit Voltage Uoc (V)	46.4
Short Circuit Current Isc (A)	10.97
Temperature Coefficient Pmpp (%/°C)	-0.34
Temperature Coefficient Isc (%/°C)	0.04
Temperature Coefficient Voc (%/°C)	-0.27
Module Efficiency (%)	20.41

Extreme Value

Max. System Voltage (V)	1500
Max Reverse Current (A)	20

Dimensions and Weight

Module Area (m^2)	1.96
Module Length (mm)	1719
Module Width (mm)	1140
Frame Thickness (mm)	35
Mounting Hole Diameter (mm)	9.0
Weight (kg)	22.0

Specifications

Connection Type	EVO2
Cable Length +/- (mm)	1500.0 / 1500.0
Owner	-
Item Number	01-000780

Bill of materials
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Item No.	Article	Number of units	Amount per pack
03-000012	Grounding connector set AF 18	13	10
03-000222	Stock screw set (for wood) M10 200 mm	78	50
03-000260	Slip guard/ End Cap Set C47 black	26	50
03-001237	End clamp 30-42 Set C black	52	20
03-001346	Middle clamp 30-42 Set C black	26	100
03-001369	C-rail 47-2 5.40 m	13	70

Optional:

Item No.	Article	Number of units	Amount per pack
03-000011	special long nut socket 18 mm	1	1
03-000099	Cable clip d=10mm	26	100
03-000100	special nut socket 8 mm	1	1
03-000134	Top cover C-rail 2.000 mm	1	50
03-000508	Cable-tie clip for profile flange 1-3 mm	26	100

Notes on the parts calculation

The components in the part list were determined based on the data entered. If conditions on site differ from this then the structural calculations and parts list must be recalculated. The installer must check the design before ordering.

The parts list is based on these assumptions:

- The structural calculations of the mounting structure (fasteners, rails etc.) is based on the design data entered, the results are only valid for the components in the parts list.

- The array corresponds to the given design

- A) equal spacing of the roof members (rafter, purlin) for the fixing points (roof hook, stock bolt)

- B) Equal spacing of the roof covering (trapezoidal peaks, seam spacing) for the fixing points (C rail direct mounting set, seam clamp)

- The calculations depend on the chosen panel (both size and frame colour), and the result is only valid for that panel

All the components listed in the parts list are needed for the installation. The optional part list includes the tools for the installation of the mounting structure as well as other useful components which are not essential, but which protect the cables and are aesthetically pleasing.

*The prices in the part list (whether in packaging units or in actually required quantities) exclude any discount and tax. This is also applies to the cost per kW of the system.

General Notes

The static calculation of the mounting system is based on the specification given in Eurocode 1. Further more, wind tunnel tests and the different national regulations for the choice of countries in the software is taken into account. Switzerland is an exception - there the load determination corresponds to the standards of SIA 261 (2003).

Special local cases in regards to Eurocode 1, e. g. snow accumulation, overhanging snow on the eaves, snow drop and loads due to ice or exposed building locations are not taken into account automatically by the software but have to be checked separately.

The mounting structure must be installed in accordance with the manual. It contains all the required information, e.g. required torque settings and installation of expanding joints.

The mounting structure including the structural calculations are certificated by TÜV Rheinland.

The structural calculations refer only to the Novotegra mounting system and not to the structure of the building. The building must be assessed by a structural engineer.

Please note that the panels must to be installed according to the manufacturer’s manual. You must adhere to the relevant local safety regulations and building standards.

Key
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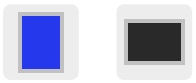
Roof

Obstacles: Chimney, skylight or dormer.



Modules.

Green roof half-sized substrate plate

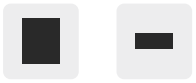
Green roof substrate plate

Beams: Rafter or purlin.

Dependent on selected covering: Corrugations or seams.

Mounting system components

Roof fastening: Roof hook/stock screw and double roof hook.



Module support and base foot

End and mid clamps

Rail connector, expansion joint and cross rail connector.

Vertical and horizontal rail, tie / wind deflector

Underlined ballast values indicate that a ballast trough is required

Advice/Warnings

Colour code which highlights a corrected error.

Colour code which highlights a warning in the design.

Roof design - installation plan Roof 1
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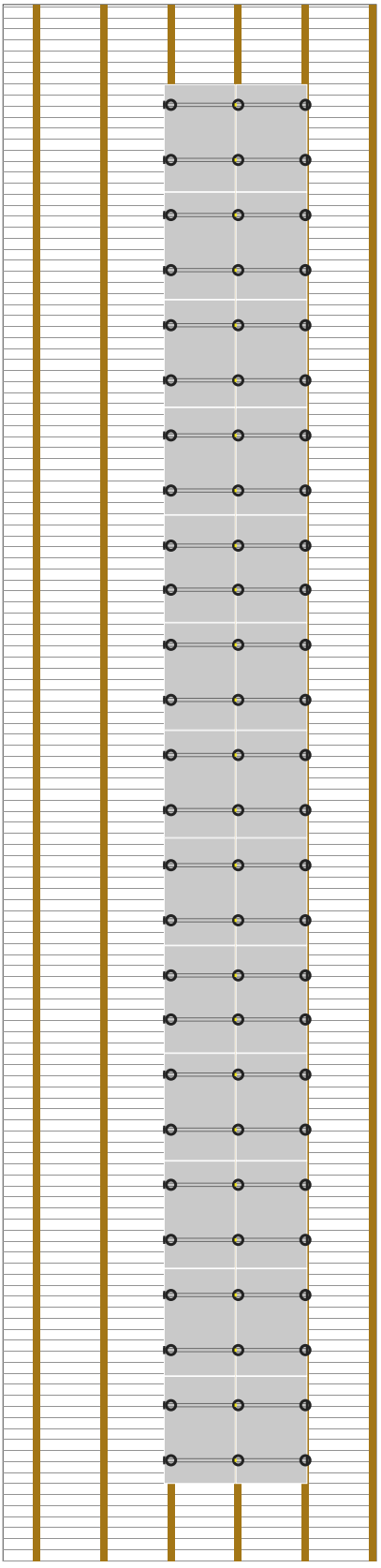

Roof design - rail cut plan (1/1)
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C-Schiene 47-2 5,40m

Rail lengths - upper rail (m) Roof 1
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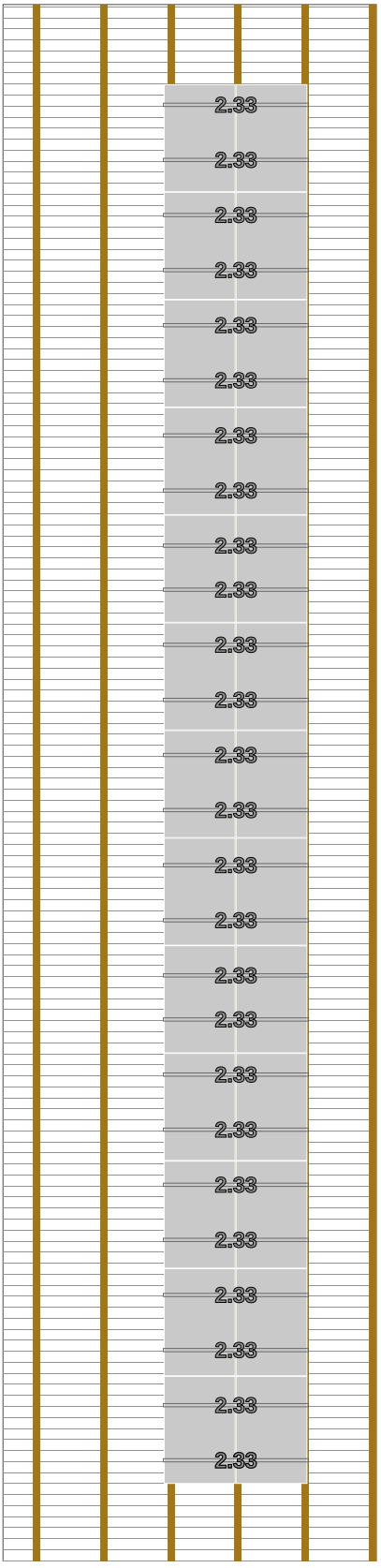

Warnings
Mounting depends on the roof covering and substructure. You must check on site whether this configuration will work given the permitted clamping areas of the panels and use a cross-rail system if not.

Load: Flush 1 Layered Landscape
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Characteristic loads, that is, the snow load shape coefficient

Load substructure	gUK =	0.02	kN/m²
Module load	gM =	0.11	kN/m²
Peak velocity pressure	qp(Z) =	0.93	kN/m²
Ground snow load	sk =	1.00	kN/m²
Snow load shape coefficient	μ =	0.80	
Snow load perpendicular to the module	sM =	0.60	kN/m²
Plant service life Wind load		50	years
Plant service life Snow load		50	years
Exposure coefficient Snow load	Ce =	1	
Orographic coefficient wind velocity	c0 =	1.00	
Damage consequence class (CC1)	kFI =	0.9	

Scheduled loads for the roof areas

Component group: Module fastening

Roof area	Cpe (suction)	Cpe (pressure)	Wind suction [kN/m²]	Wind pressure [kN/m²]	Snow load [kN/m²]	Load [kN/m²]
Corner	-1.20	0.70	-1.12	0.65	0.80	0.13
Eaves	-1.20	0.70	-1.12	0.65	0.80	0.13
Gable	-1.60	0.40	-1.50	0.37	0.80	0.13
Middle	-0.96	0.40	-0.90	0.37	0.80	0.13
Ridge	-0.96	0.40	-0.90	0.37	0.80	0.13

Scheduled loads for the roof areas

Component group: Upper rail

Roof area	Cpe (suction)	Cpe (pressure)	Wind suction [kN/m²]	Wind pressure [kN/m²]	Snow load [kN/m²]	Load [kN/m²]
Corner	-1.15	0.70	-1.08	0.65	0.80	0.13
Eaves	-1.12	0.70	-1.05	0.65	0.80	0.13
Gable	-1.53	0.40	-1.43	0.37	0.80	0.13
Middle	-0.91	0.40	-0.85	0.37	0.80	0.13
Ridge	-0.91	0.40	-0.85	0.37	0.80	0.13

Statics: Flush 1 Layered Landscape
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Components

Item Number	Name
03-001369	C-Schiene 47-2 5,40m
03-001346	Mittelklemme 30-42 Set C sw
03-000222	Stockschrauben-Set HP M10 200 mm

Results

Roof area	Component group	Components	Bearing distance	Rail distance	Load [%]	Occupancy
	Module fastening	03-001346	1.14 m	0.86 m	29 %	
	Upper rail	03-000222 03-001369	1.08 m	0.86 m	84 %	every purlin
	Module fastening	03-001346	1.14 m	0.86 m	29 %	
	Upper rail	03-000222 03-001369	1.08 m	0.86 m	84 %	every purlin
	Module fastening	03-001346	1.14 m	0.86 m	39 %	
	Upper rail	03-000222 03-001369	1.08 m	0.86 m	81 %	every purlin
	Module fastening	03-001346	1.14 m	0.86 m	29 %	
	Upper rail	03-000222 03-001369	1.08 m	0.86 m	81 %	every purlin
	Module fastening	03-001346	1.14 m	0.86 m	29 %	
	Upper rail	03-000222 03-001369	1.08 m	0.86 m	81 %	every purlin

Permitted rail cantilever from the last fastener

Roof area	Component group	Components	Cantilever [m]	Load [%]
Corner	Upper rail	03-001369	0.54 m	84 %
Eaves	Upper rail	03-001369	0.54 m	84 %
Gable	Upper rail	03-001369	0.54 m	81 %
Middle	Upper rail	03-001369	0.54 m	81 %
Ridge	Upper rail	03-001369	0.54 m	81 %

Module array 1
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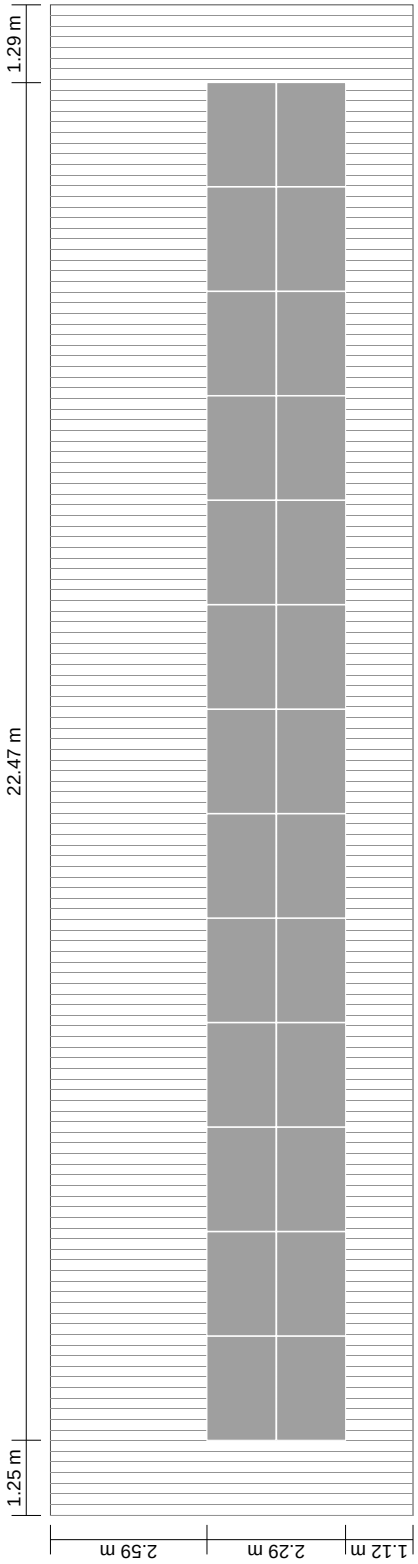

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