



| Connecting Strength

K2 Base Report



260189 - Reading Football Stadium

Customer	Reading Football Stadium
Project address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Company	Alt Solar
Address	Weir Lane Unit A, WR2 4AY, Worcester
Tel.	03301742702
E-Mail	design@alt-group.uk
Planner	AP
Issue date	11/08/2026
Version	K2 Base Version 3.2.102.0

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About us

K2 Systems. Innovative mounting system from a strong team.

Since 2004 we have been developing pioneering and highly functional mounting system solutions for photovoltaic installations around the world. Our systems are designed in our own product development department where we continually optimize and adapt mounting systems to the ever-changing market.

A knowledgeable and friendly team

Just like a mountain climbing team, K2 Systems is built on mutual trust. This applies to our customer service as well as within the company itself, because we believe a trusting partnership leads to successful photovoltaic projects.

Our employees place total focus on the needs and wishes of our customer. This is true in all company departments.

10 locations and worldwide sales network

In our international team, everyone works together to provide customers with competent, comprehensive and entirely personalized service.

This is especially true in the constant training our employees undergo with regards to product optimization, quality assurance, or innovations in construction techniques.

Quality management and certificates

K2 Systems stands for Connecting Strength, the highest quality, and precision-crafted and customized components. Our customers and business partners deeply appreciate all of these factors. Three independent authorities have tested, confirmed, and certified our skills and components. External authorities are not the only ones to have put K2 Systems to the test. Our internal quality control ensures that all our products are subject to a constant review process.

These measures all ensure the outstanding quality standards that exemplify products from K2 Systems, and which we maintain through largely exclusive "Made in Germany" or "Made in Europe" practices.



Product guarantee

K2 Systems offers a 12-year product warranty on all products in its integrated range. The use of high quality materials and a three-level quality inspection ensure these standards.

In a nutshell

As roof-top specialists, we offer effective and economical solutions for roofs all around the world and provide professional, fast and reliable support for our customers in the solar industry.

The static report is not including module and building verification.



Project overview

Roofs

Roof	System	Module	Height	Quantity	Total power
Area 1  Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	369	173.43 kWp
Area 2  Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	294	138.18 kWp
Area 3  Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	434	203.98 kWp
Area 4  Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	39	18.33 kWp
Area 5  Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	36	16.92 kWp
Area 6  Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	35	16.45 kWp
Area 7  Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	37	17.39 kWp
Total				1244	584.68 kWp

Project information

Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Customer	Reading Football Stadium
Author	AP



Project overview

Load settings

Design method	BS EN
Failure consequence class (CC)	CC3
Design working life	50 years
Terrain category	Town Terrain
Basic wind speed	21.5 m/s
Distance to shoreline	62.30 km
Distance inside town terrain	1.70 km
Snow load zone	2
Snow load on ground level	0.40 kN/m²



THE PROJECT IS VERIFIED.

The selected mounting system can be installed as planned
Thank you for choosing a K2 mounting system.

260189 - Reading Football Stadium

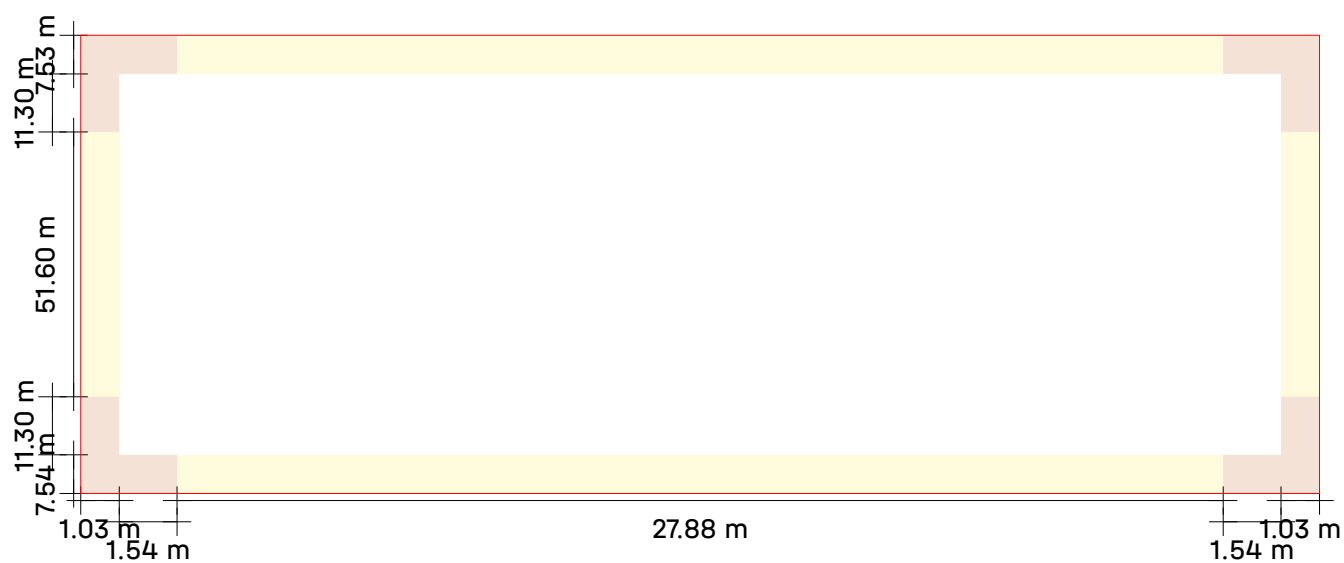


Project information

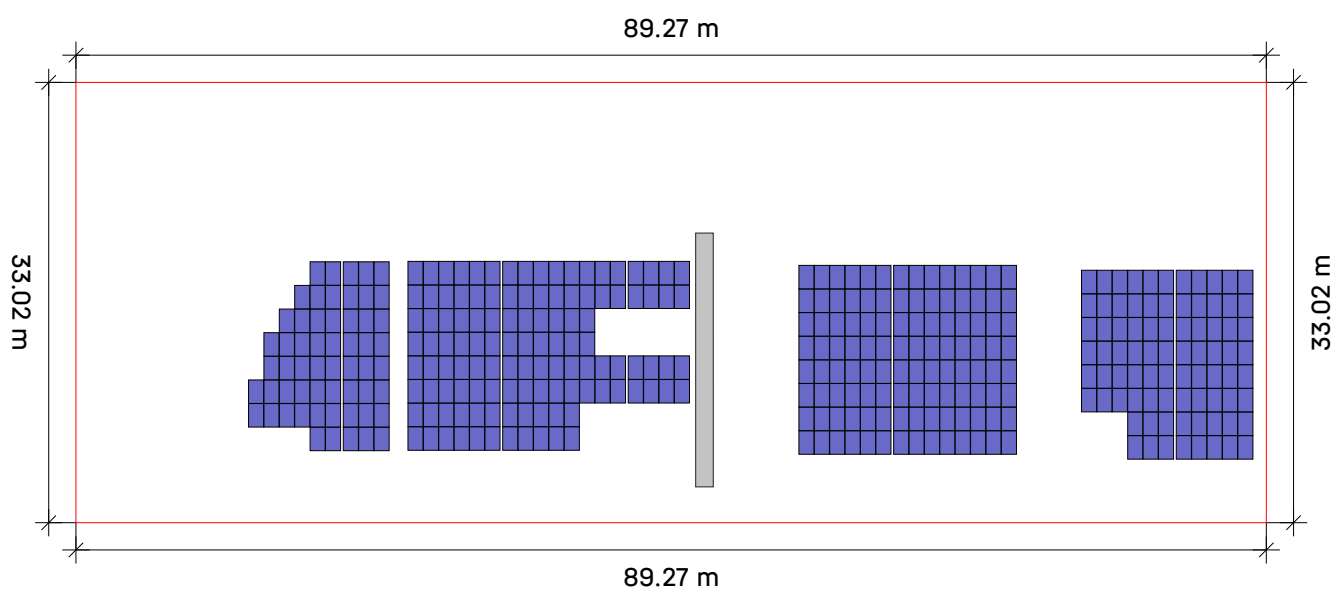
Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Customer	Reading Football Stadium
Author	AP



Area 1



Area 1



Roof	System	Module	Height	Quantity	Total power
Area 1 Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	369	173.43 kWp

Area 1 | Assembly plan

Base rail

Type	Whole rails		Rail cutting		
	Total rail length	Quantity 3.65 m	Part of rail / Rest	Length	Rest
22*A	3.542 m		3.650	3.542 from 3.650	0.098
52* B	7.004 m	1*3.65 m	3.650	3.354 from 3.650	0.286
4*C	2.388 m		3.650	2.388 from 3.650	1.252
4*D	4.696 m	1*3.65 m	1.252	1.046 from 1.252	0.196
24*E	5.850 m	1*3.65 m	3.650	2.200 from 3.650	1.440
6*F	4.696 m	1*3.65 m	1.440	1.046 from 1.440	0.384
24* G	9.312 m	2*3.65 m	3.650	2.012 from 3.650	1.628

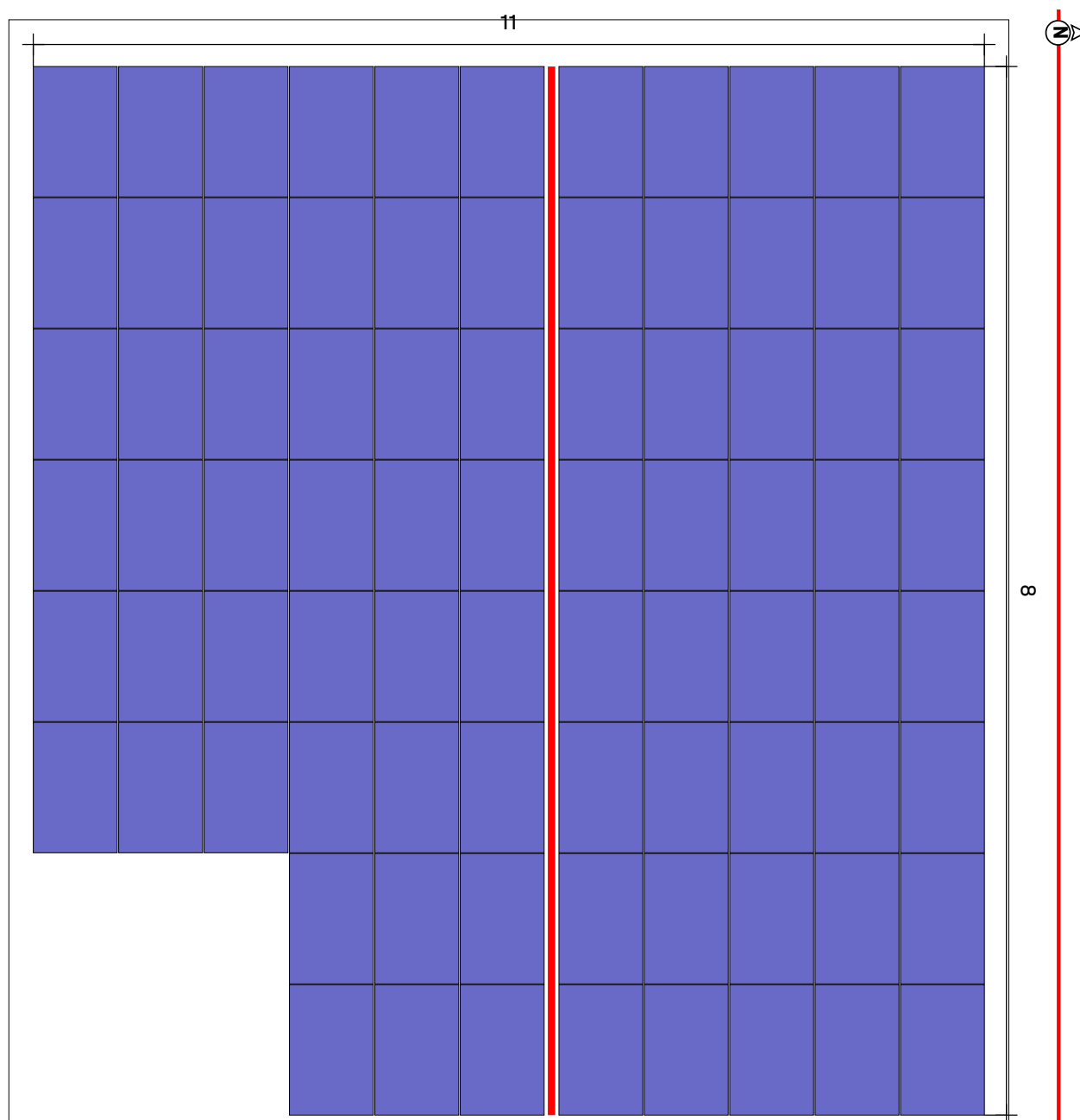
1 cm is viewed as lost for each cutting

Red numbers are leftover rails which will not be used any longer.

Module arrays

Module array	Width[m]	Length[m]	Width in modules	Length in modules
1	12.85	14.17	8	8
2	16.32	14.17	14	8
3	21.11	14.17	18	8
4	10.55	14.17	5	8

Area 1 | Module array 1



Roof ① Module array ①

Mounting system

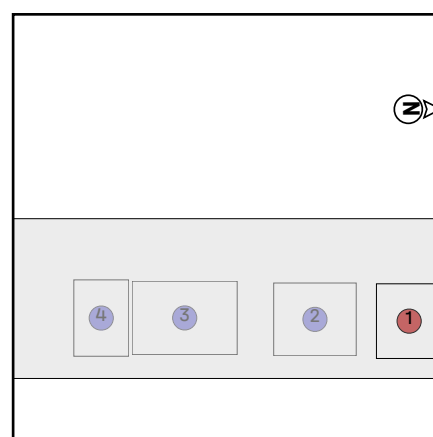
Module

Row spacing

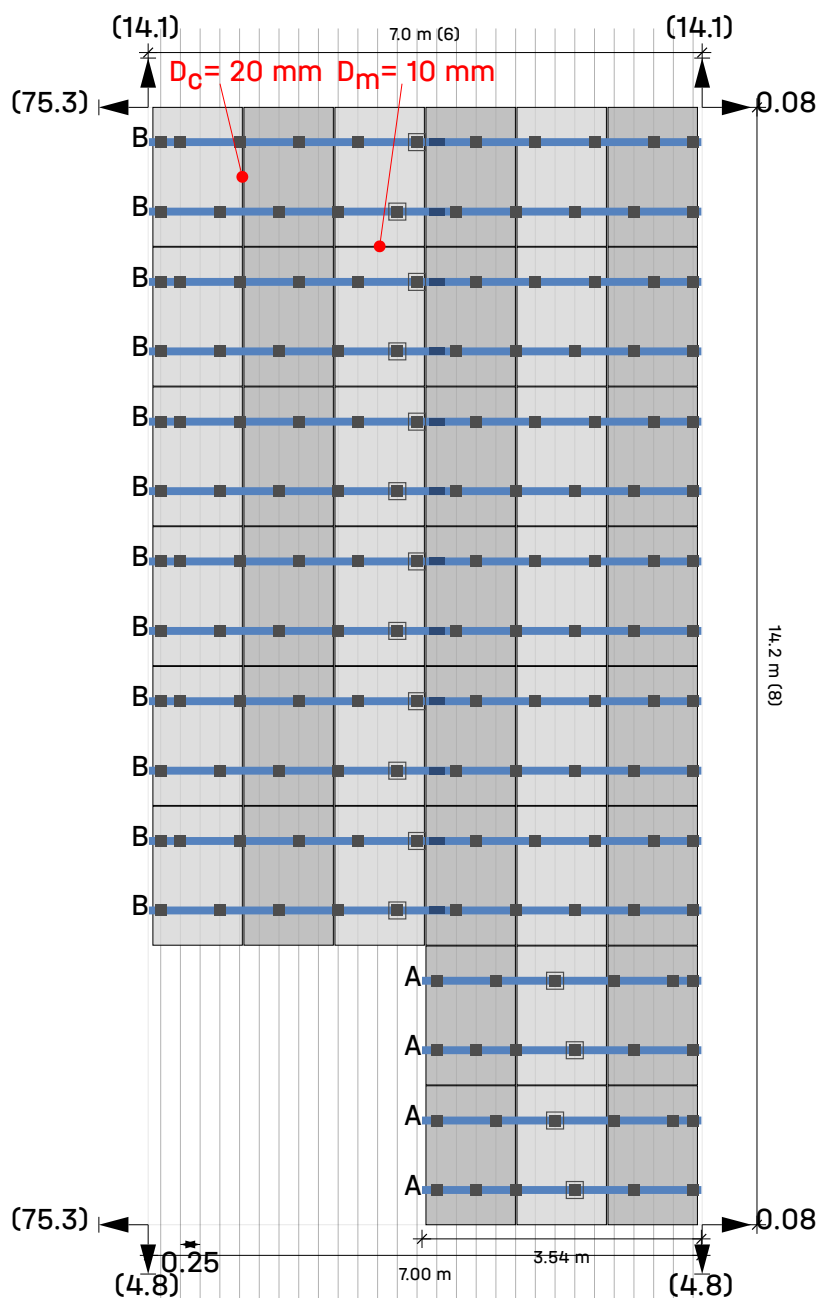
[K2 BasicRail](#)

82(38.54 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 1 | Module array 1 | Module block 1

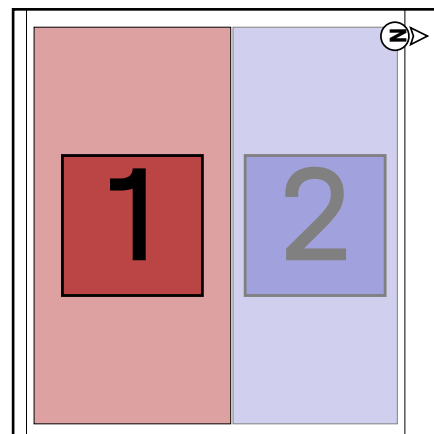


Roof ① Module array ① Module block 1

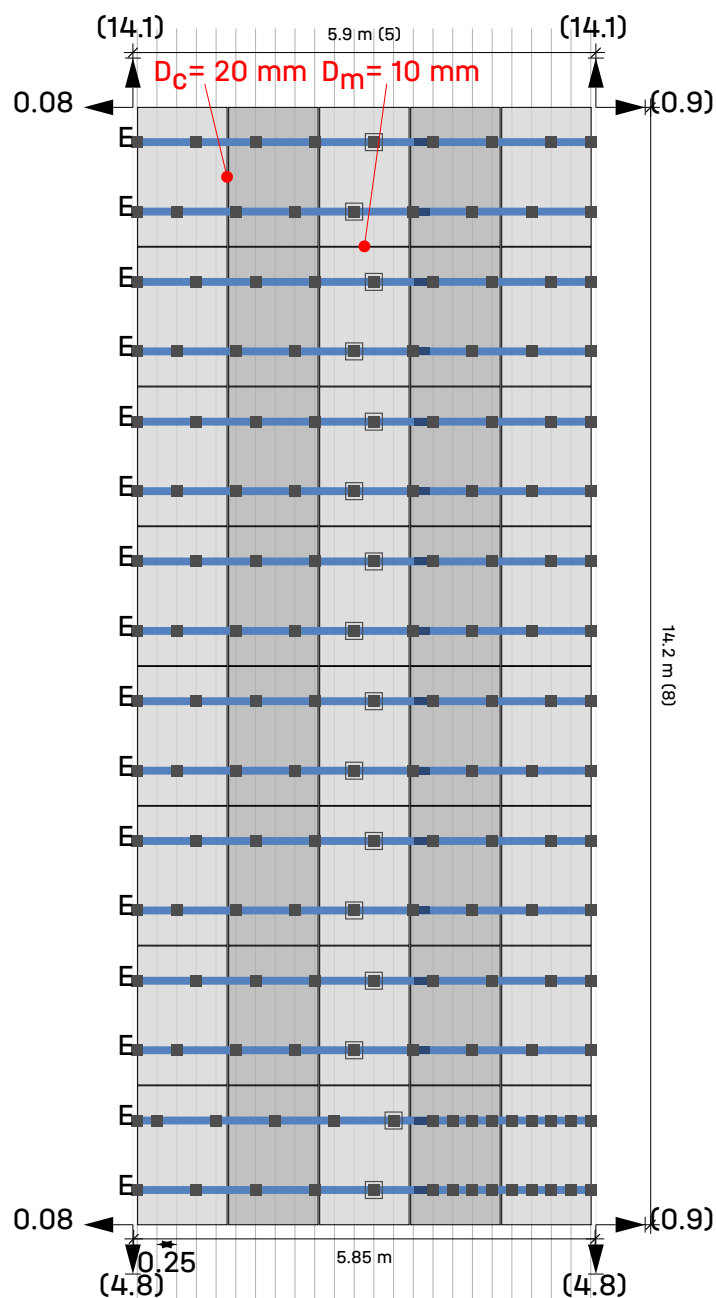
Modules (6 × 8) - 6 = 42

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 1 | Module array 1 | Module block 2

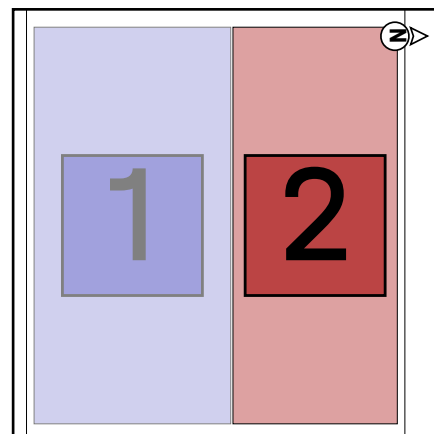


Roof ① Module array ① Module block 2

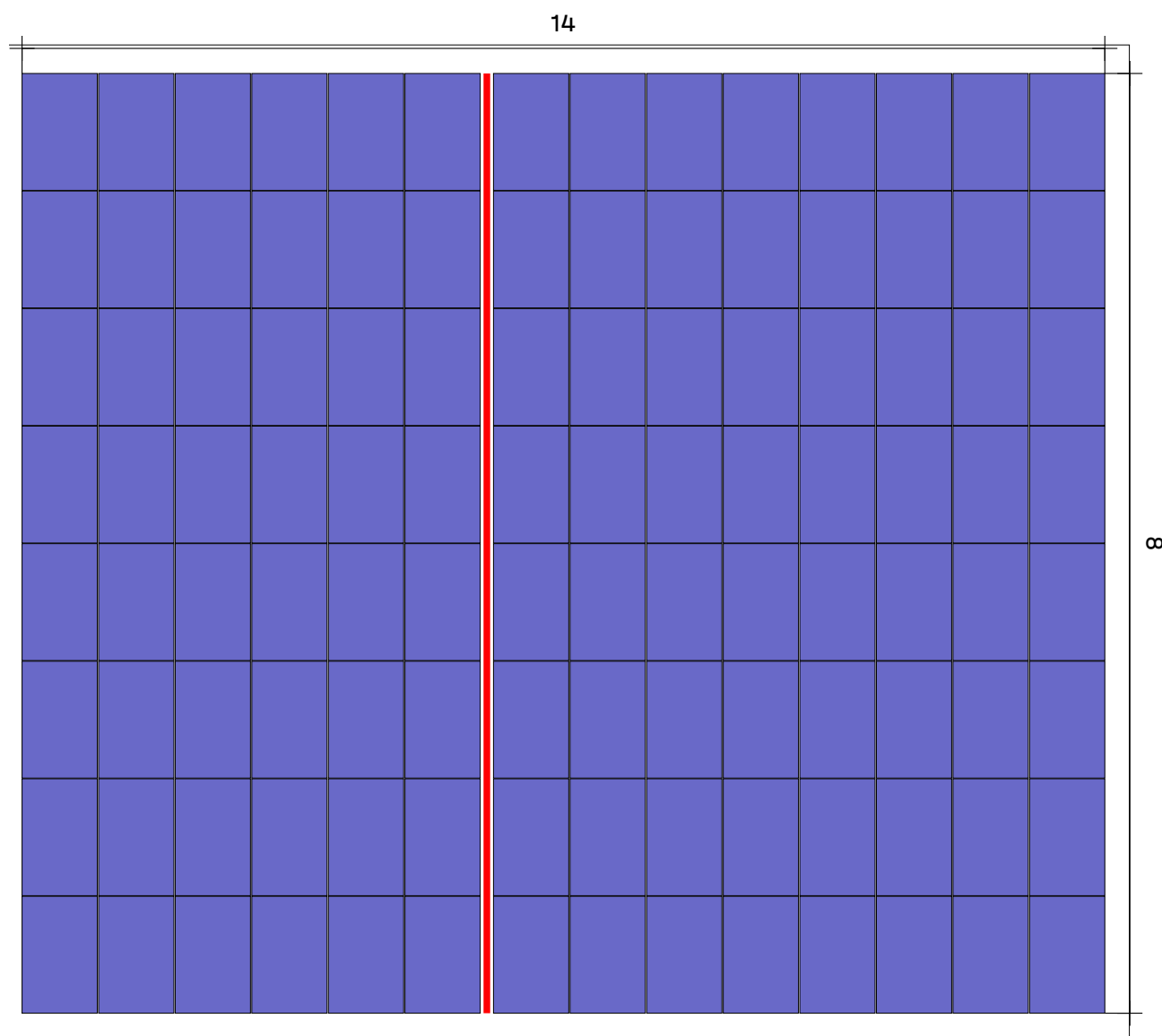
Modules $5 \times 8 = 40$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 1 | Module array 2



Roof ① Module array ②

Mounting system

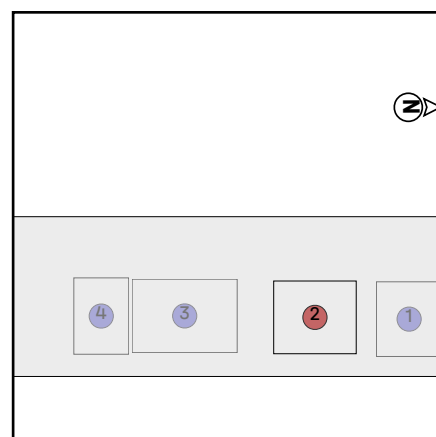
[K2 BasicRail](#)

Module

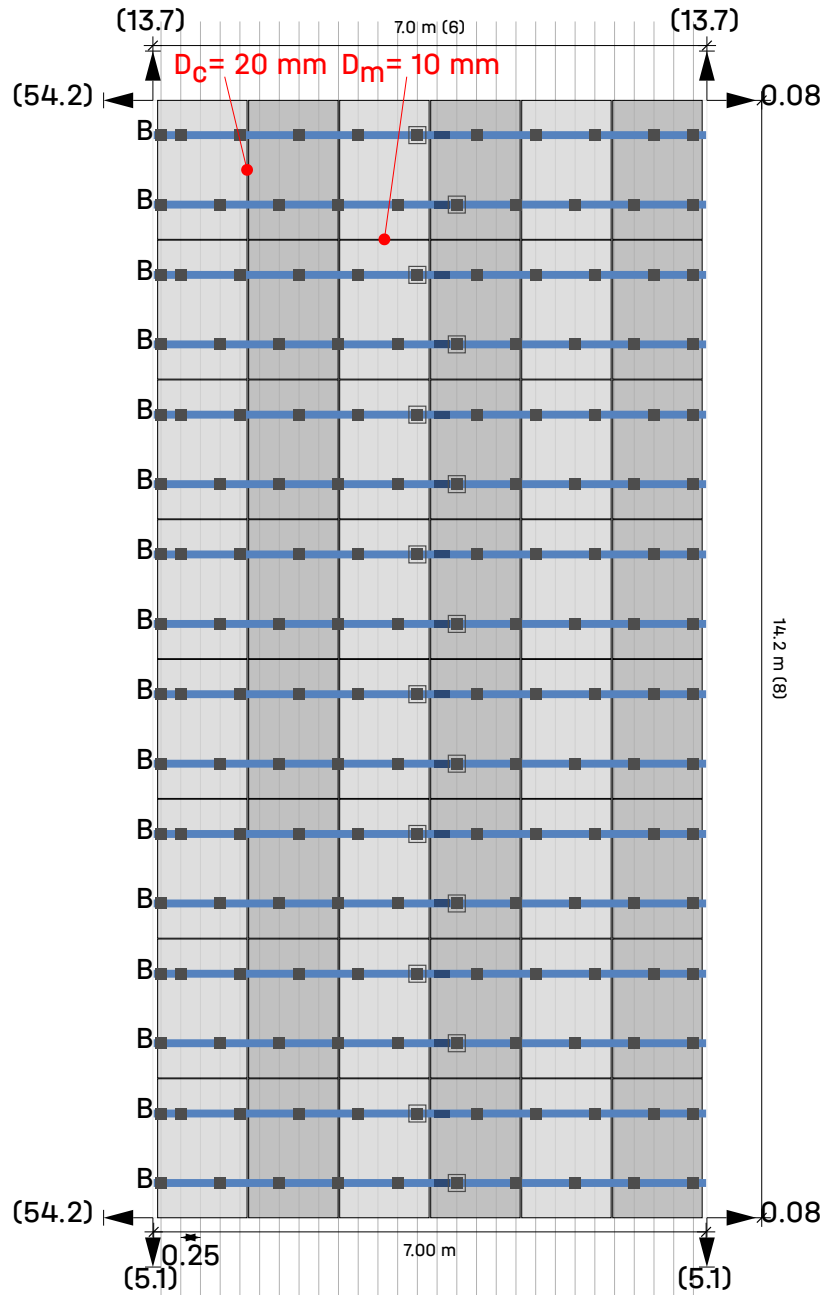
112(52.64 kWp) x
DM470G12RT-G48HBB

Row spacing

1.77 m



Area 1 | Module array 2 | Module block 3



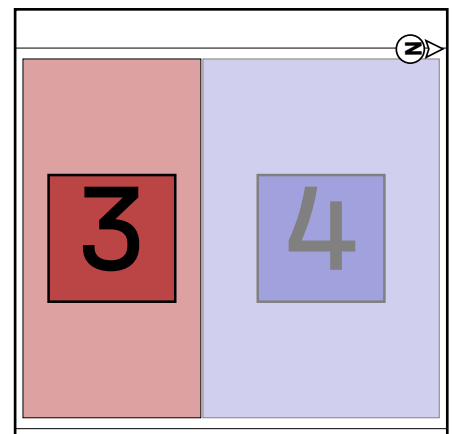
Roof ① Module array ② Module block ③

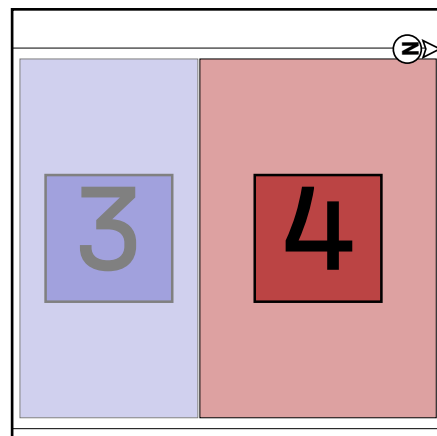
Modules

$6 \times 8 = 48$

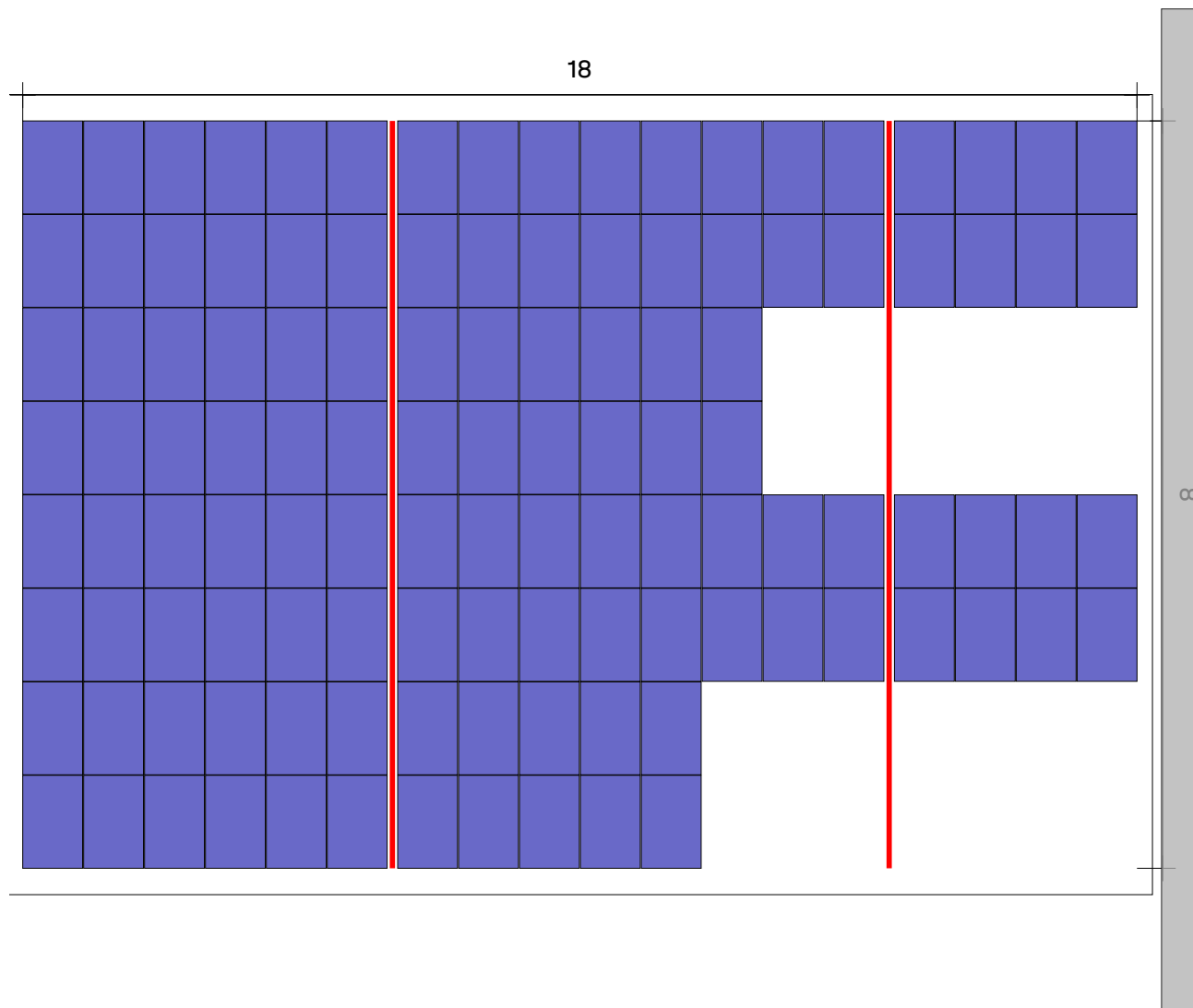
Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules





Area 1 | Module array 3



Roof ① Module array ③

Mounting system

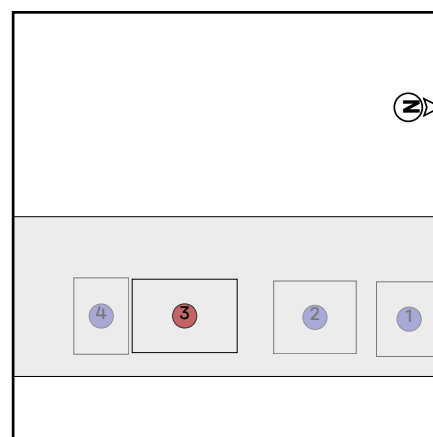
Module

Row spacing

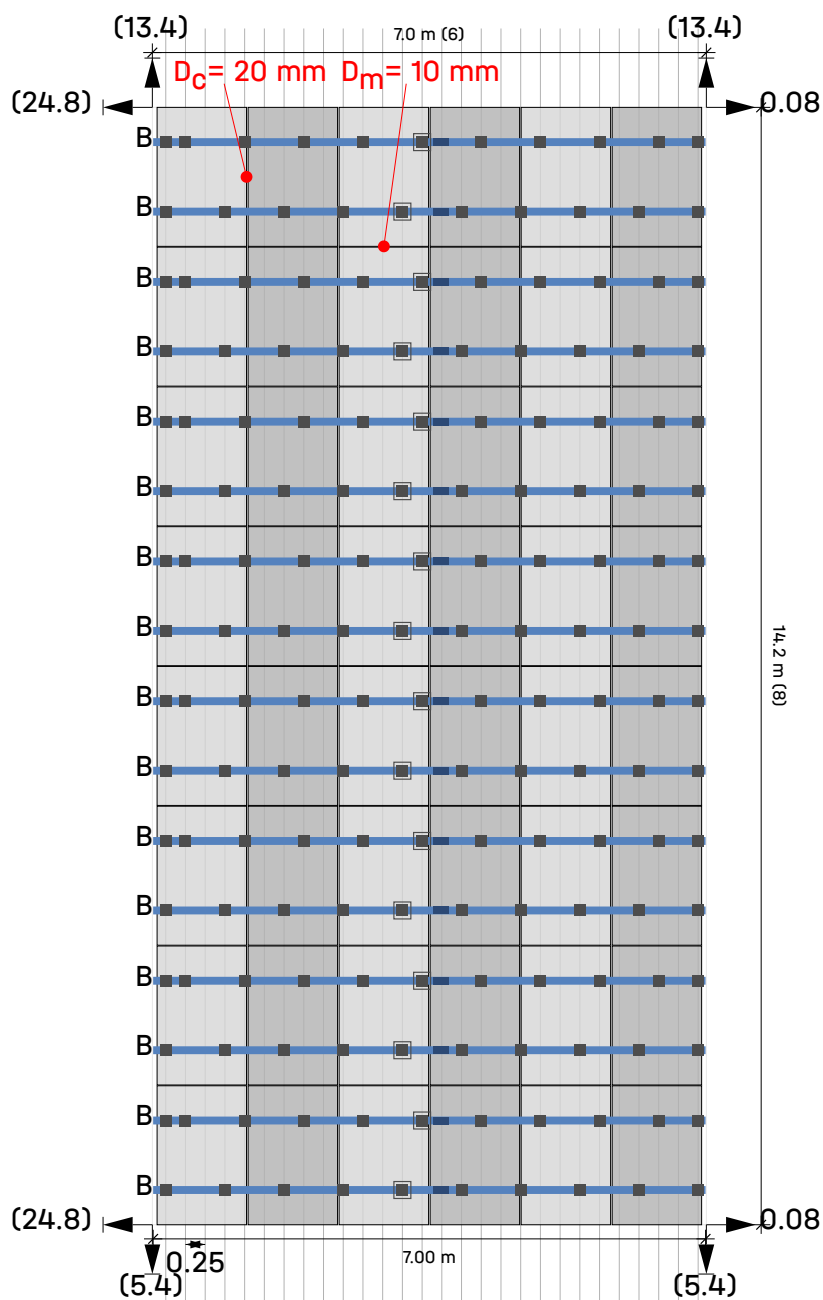
[K2 BasicRail](#)

118(55.46 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 1 | Module array 3 | Module block 5

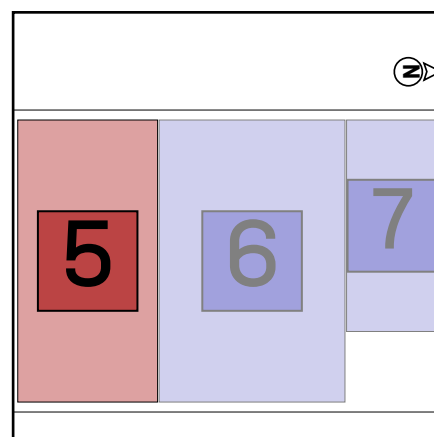


Roof ① Module array ③ Module block ⑤

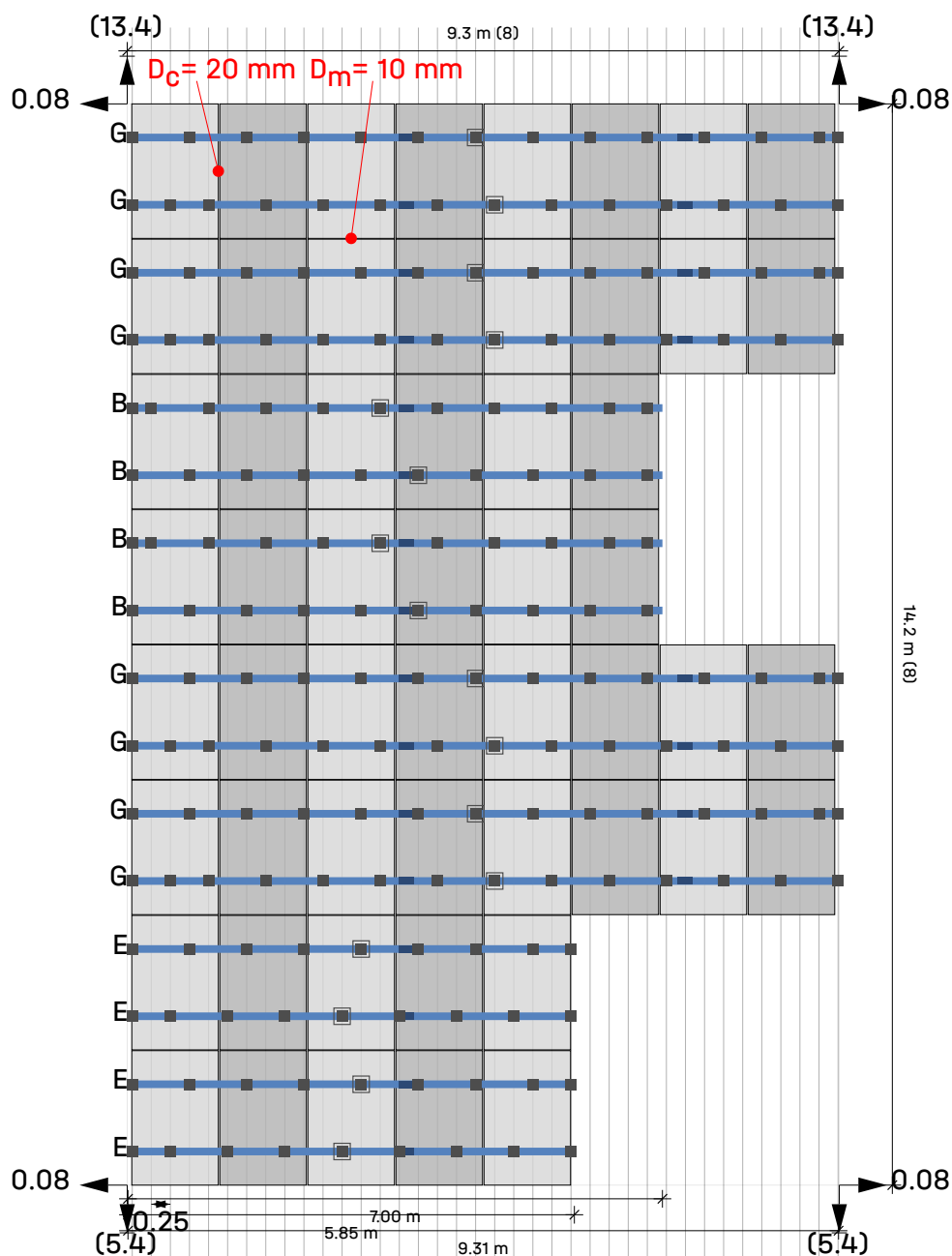
Modules $6 \times 8 = 48$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 1 | Module array 3 | Module block 6

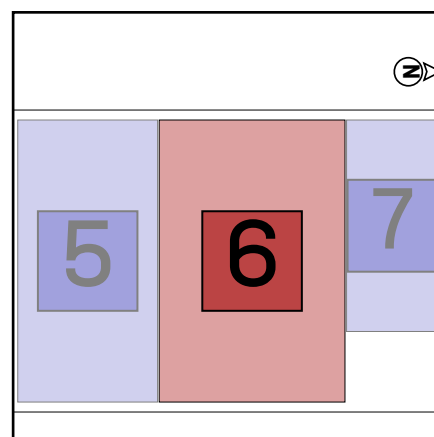


Roof ① Module array ③ Module block ⑥

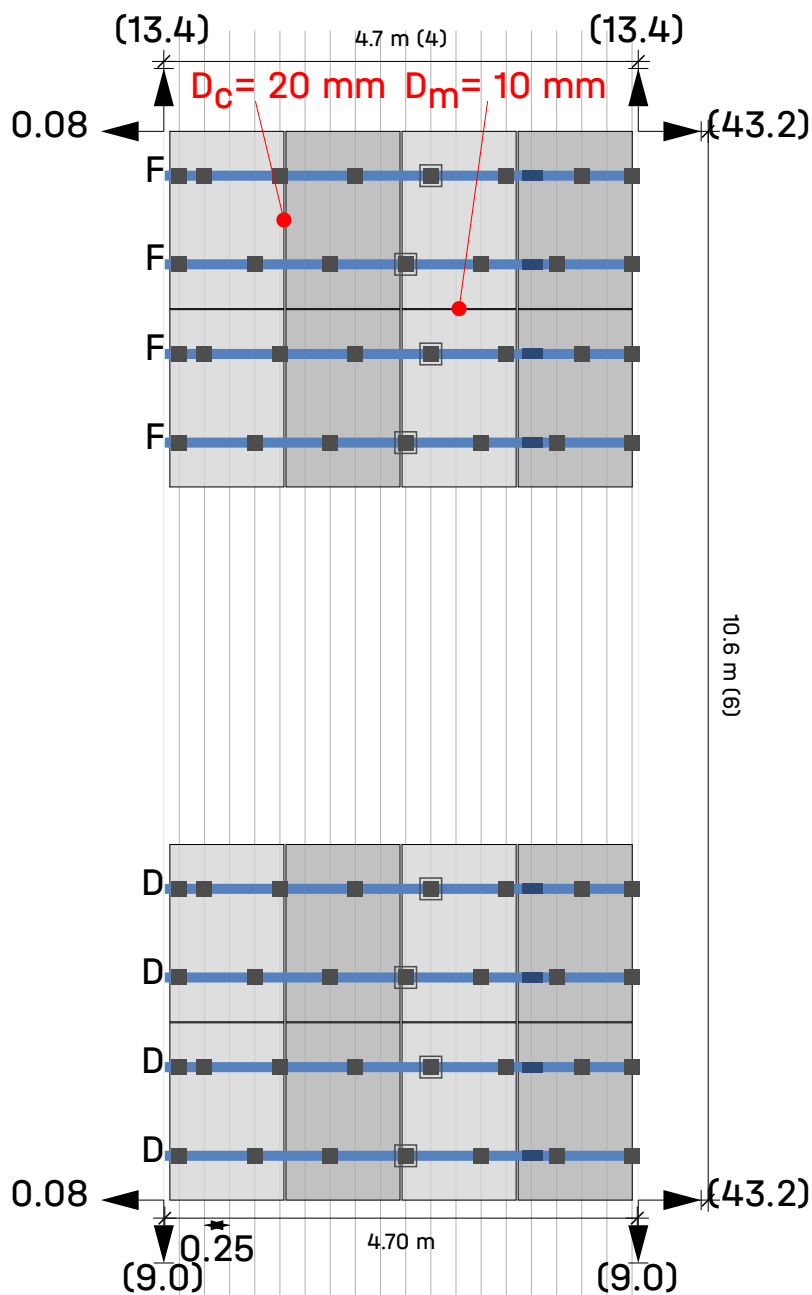
Modules $(8 \times 8) - 10 = 54$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 1 | Module array 3 | Module block 7

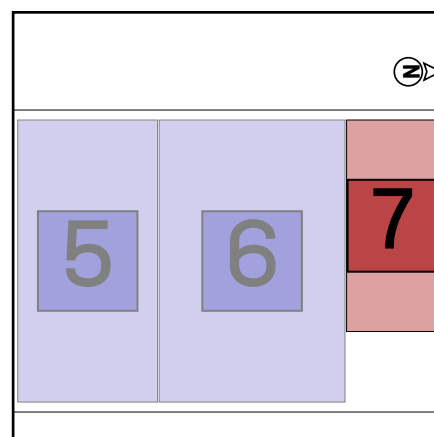


Roof ① Module array ③ Module block ⑦

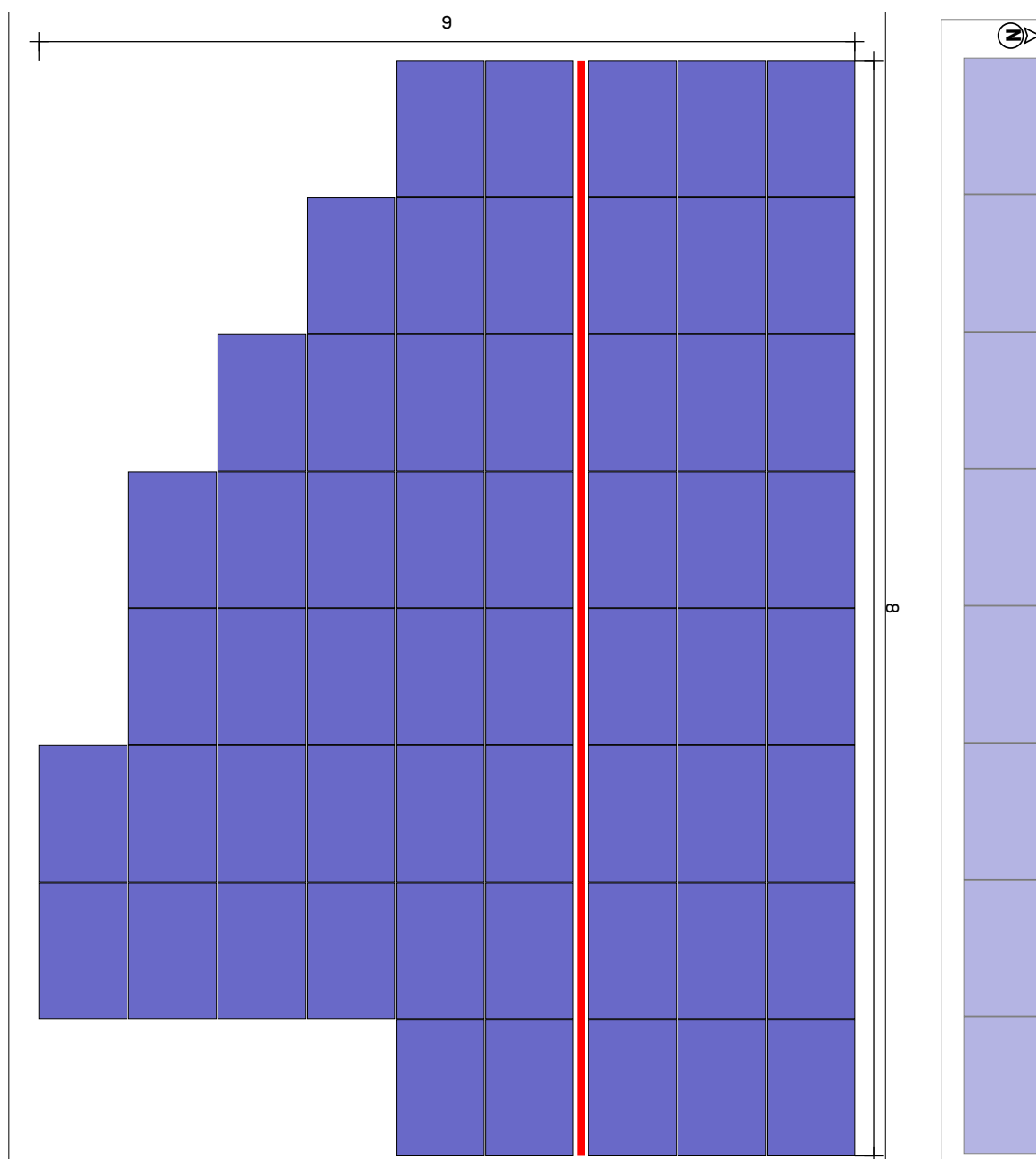
Modules $(4 \times 6) - 8 = 16$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 1 | Module array 4



Roof ① Module array ④

Mounting system

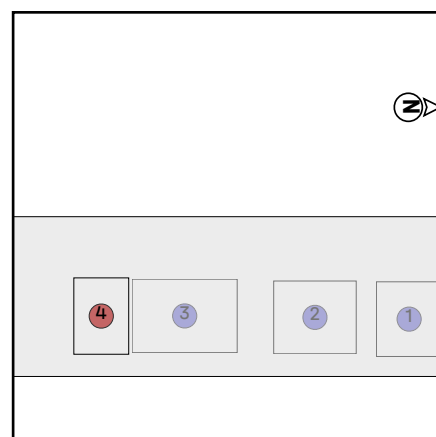
Module

Row spacing

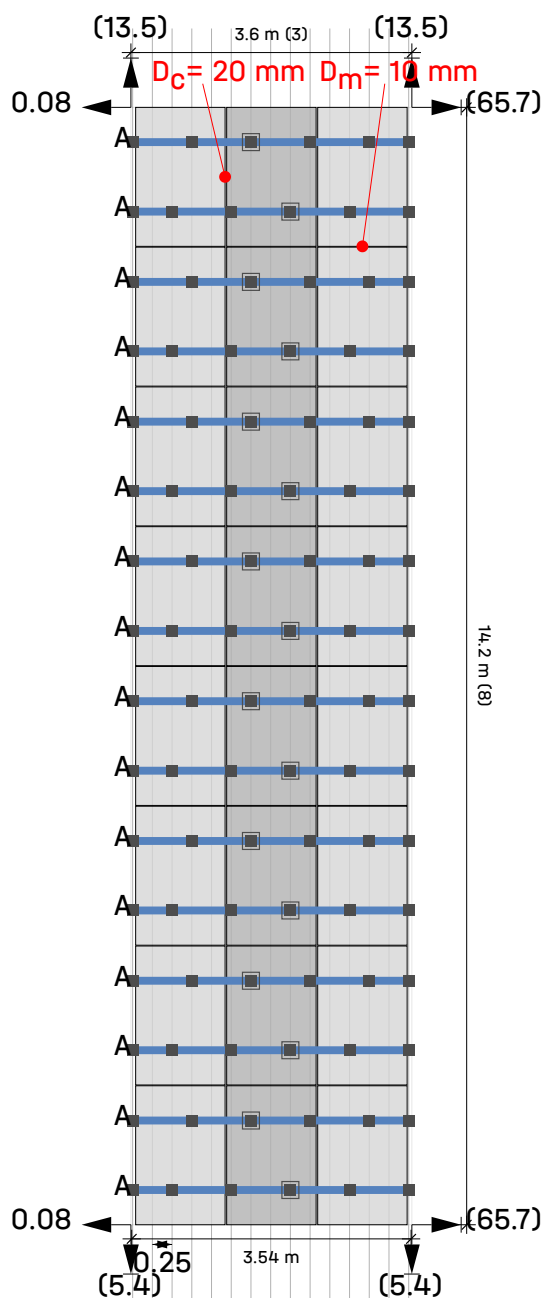
[K2 BasicRail](#)

57(26.79 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 1 | Module array 4 | Module block 9

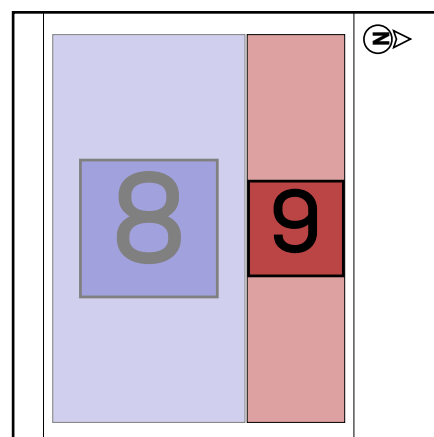


Roof ① Module array ④ Module block 9

Modules $3 \times 8 = 24$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules





Results | Area 1

Roof	System	Module	Height	Quantity	Total power
Area 1	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	369	173.43 kWp
 Trapezoidal					

Module

Name	DM470G12RT-G48HBB
Manufacturer	Hengdian Group DMEGC Magnetic Co. Ltd.
Output power	470 Wp
Dimensions	1,762×1,134×30 mm
Weight	24.0 kg

Components

Fastener	K2 BasicClip
Base rails	K2 BasicRail 22
Metal screw	Thread-forming metal screw 6×38_rs

Material values

For material information refer to the product catalogue:

[K2 Catalogue \(k2-systems.com\)](https://k2-systems.com)

Loads on modules (module dimensioning)

No. Module array	Array	A-TrA [m²]	ultimate state [Pa]				Serviceability [Pa]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
1	Gableboard	2.00	524.0	45.8	-1,322.3	0.0	317.6	27.8	-801.4	0.0
1	Corner region (eave)	2.00	524.0	45.8	-2,524.3	0.0	317.6	27.8	-1,529.9	0.0
2	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
3	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
4	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0



Results | Area 1

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ [%]	CL σ [%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L_{max} [m]	Fst D _{max} [m]
1	Field area	21.2	6.6	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	0.8	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	1.6	57.1	1.2	0.250	---	0.430	0.250
2	Field area	21.2	10.8	60.2	20.3	0.750	---	0.500	0.750
3	Field area	21.2	7.4	60.2	20.3	0.750	---	0.500	0.750
4	Field area	21.2	11.8	60.2	20.3	0.750	---	0.500	0.750

Pr **Profile**Fst **Fastener** σ **Stress**f **Deflection**F **Force**CL/ L_{max} **Maximum cantilever length [m]**Fst D_{max} **Maximum fastener spacing [m]**BR **Base rail**Usab. **serviceability limit state**CL **Cantilever**

Results | Area 1

Important information

- The quantity for K2 BasicRail BasicClips is calculated in such a way, that - according to the Assembly Instructions - a BasicClip can be installed on the crest to the left and right of a Rail Connector Set.
- The structure was statically verified in accordance with Eurocode 9: Design of aluminium structures (EN 1999-1-1:2021) and Eurocode 3: Design of steel structures (EN 1993-1-1:2025) and offers sufficient load-bearing capacity and stability for the loads specified in the chapter 'Maximum actions on the components'.
- Adjustment factor for wind load regarding service life period, f_W , is according to EN 1991-1-4/ NA
- Adjustment factor for snow load regarding service life period, f_S , is according to EN 1991-1-3/ NA
- The structural design complies with BS EN 1990 - Basis of Structural Design.
- Snow loads are determined in accordance with National Annex BS NA EN 1991-1-3 (2018) - UK National Annex to EC1 - Action on structures - general actions - snow loads.
- Wind loads are determined in accordance with National Annex BS NA EN 1991-1-4 - UK National Annex to EC1 - Action on structures, general actions - wind actions.
- Service life is recognised according to 'Eurocode EN 1991 - Action on structures, Snow loads' and 'Eurocode EN 1991 - Actions on structures, Wind actions'. Subject to the Building Regulations and for security-relevant reasons the installation has to be dismantled at the end of its service life.
- Failure consequence class is considered according to 'Eurocode EN 1990 - Basis of structural design'.
- The person responsible for the execution of the work must check the load assumptions made with the conditions on site. If deviations are found, the person who prepared the static calculation must be consulted immediately.
- Please note our General Terms and Conditions of Use (TCU-E) in their currently valid version, available at: <https://k2-systems.com/en/digital-services/general-terms-and-conditions-of-use-for-entrepreneurs-tcu-e/>
Please note in particular § 1, Special provisions for K2 Base, clause 3 ("Technical and specialist requirements on the Customer's premises."), § 6 ("Limitation of warranty") and § 7 ("Limitation of liability").
- All instructions and requirements of the static calculations must be observed.
- Compliance with the regulations and requirements of the building permit and the building trade associations must be ensured during the execution of all work.
- All connections and anchoring measures must be carried out using approved and standardized connecting elements or parts only.
- Subordinate components that have not been verified must be implemented structurally.
- The "General Rules" for corrosion protection design of the structure are strongly recommended for application during implementation.
- The structure may only be climbed by trained and authorized personnel wearing appropriate safety equipment. Unauthorized use of the structure poses a risk of falling.



Structural analysis report | Area 1

General information

Name	260189 - Reading Football Stadium
Mounting system	K2 BasicRail
Author	AP

Location information

Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Ground elevation	45.28 m

Roof information

Building height	13.88 m
Roof type	Monopitch roof
Roof pitch	5°
Roof covering	Trapezoidal
Min. roof edge distance	0.00 m
Crest distance	250.0 mm
Crest width	22.0 mm
Crest height	40.0 mm
Roof material	Steel
Sheet quality	S235
Sheet thickness	0.500 mm

Loads

Design method	BS EN
Failure consequence class (CC)	CC3
Design working life	50 years
Terrain category	Town Terrain
Distance to shoreline	62.30 km
Distance inside town terrain	1.70 km

Wind load

Velocity pressure, 50 years	$q_{p,50} = 0.729 \text{ kN/m}^2$
Adjustment factor for service life	$f_w = 1.000$
Velocity pressure, 25 years	$q_{p,25} = 0.729 \text{ kN/m}^2$

Structural analysis report | Area 1

Roof areas

No. Module array	Array	Load impact area [m ²]	maxCpe	minCpe	wind pressure [kN/m ²]	wind suction [kN/m ²]
1	Field area	10.00	0.000	-0.800	0.000	-0.583
1	Gableboard	10.00	0.000	-1.100	0.000	-0.801
1	Corner region (eave)	10.00	0.000	-2.100	0.000	-1.530
2	Field area	10.00	0.000	-0.800	0.000	-0.583
3	Field area	10.00	0.000	-0.800	0.000	-0.583
4	Field area	10.00	0.000	-0.800	0.000	-0.583

Snow load

Snow load zone	2
Snow guard	No
Snow load on ground level	$s_k = 0.400 \text{ kN/m}^2$
Shape coefficient for snow	$\mu_i = 0.800$
Factor for roof pitch	$d_i = 0.996$
Snow load on roof, 50 year	$s_{i,50} = 0.319 \text{ kN/m}^2$
Adjustment factor for service life	$f_s = 1.000$
Snow load on roof, 25 years	$s_{i,25} = 0.319 \text{ kN/m}^2$

Dead load

Weight of module	$G_M = 24.0 \text{ kg}$
Weight of mounting system per module	$= 2.00 \text{ kg}$
Module area	$A_M = 2.00 \text{ m}^2$
Dead weight of module per m ²	$= 12.01 \text{ kg/m}^2$
Dead weight of mounting system per m ²	$= 1.00 \text{ kg/m}^2$
Total dead load (excl. ballast) per m ²	$= 0.13 \text{ kN/m}^2$

Structural analysis report | Area 1

Load combinations

Ultimate limit state

Partial safety factor unfavourable permanent load	$\gamma_{G,sup} = 1.35$
Partial safety factor favourable permanent load	$\gamma_{G,inf} = 1.00$
Partial safety factor destabilising permanent load	$\gamma_{G,dst} = 1.10$
Partial safety factor stabilising permanent load	$\gamma_{G,stab} = 0.90$
Partial safety factor variable loads	$\gamma_Q = 1.50$
Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Importance factor permanent	$\kappa_{Fl,G} = 1.10$
Importance factor variable	$\kappa_{Fl,Q} = 1.10$
Characteristic dead weight	G_k
Characteristic snow load on the roof	$S_{i,n}$
Characteristic wind load	W_k
Load case combination 01	$LCC\ 01_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * S_{i,n}$
Load case combination 02	$LCC\ 02_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04	$LCC\ 04_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$
Load case combination 06	$LCC\ 06_{uls} = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Suction}$

Serviceability limit state

Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Load case combination 01	$LCC\ 01_{sls} = G_k + S_{i,n}$
Load case combination 02	$LCC\ 02_{sls} = G_k + W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{sls} = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$
Load case combination 04	$LCC\ 04_{sls} = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$
Load case combination 06	$LCC\ 06_{sls} = G_k + W_{k,Suction}$

Structural analysis report | Area 1

Maximum load on modules (Mounting system dimensioning)

No. Module array	Array	A-TrA [m ²]	ultimate state [kN/m ²]				Serviceability [kN/m ²]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
1	Gableboard	10.00	0.713	0.062	-1.195	0.011	0.445	0.039	-0.674	0.011
1	Corner region (eave)	10.00	0.713	0.062	-2.397	0.011	0.445	0.039	-1.403	0.011
2	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
3	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
4	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011

Max. load on fastener

No. Module array	Array	A-TrA [m ²]	ultimate state [kN]				Serviceability [kN]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
1	Gableboard	10.00	0.518	0.045	-0.869	0.008	0.323	0.028	-0.490	0.008
1	Corner region (eave)	10.00	0.173	0.015	-0.581	0.003	0.108	0.009	-0.340	0.003
2	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
3	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
4	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008

Resistance values of components

Base rail

Base rail	A [cm ²]	I _y [cm ⁴]	I _z [cm ⁴]	W _y [cm ³]	W _z [cm ³]
K2 BasicRail 22	2.380	1.52	7.74	1.08	2.46

Fastener

Fastener	R _{D,Uplift,Perpendicular} [kN]	R _{D,Pressure,Perpendicular} [kN]	R _{D,Pressure,Parallel} [kN]
K2 BasicClip	1.02	-	0.96
Thread-forming metal screw 6×38_rs	0.65	-	0.62



Structural analysis report | Area 1

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ [%]	CL σ [%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L_{max} [m]	Fst D _{max} [m]
1	Field area	21.2	6.6	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	0.8	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	1.6	57.1	1.2	0.250	---	0.430	0.250
2	Field area	21.2	10.8	60.2	20.3	0.750	---	0.500	0.750
3	Field area	21.2	7.4	60.2	20.3	0.750	---	0.500	0.750
4	Field area	21.2	11.8	60.2	20.3	0.750	---	0.500	0.750

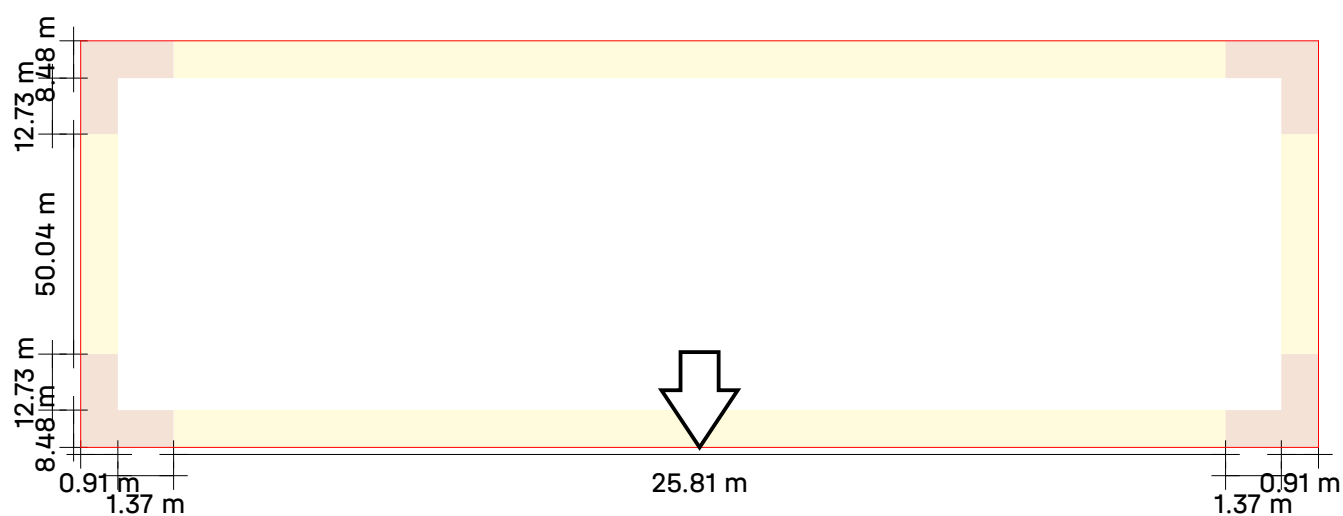
Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/ L_{max}	Maximum cantilever length [m]		



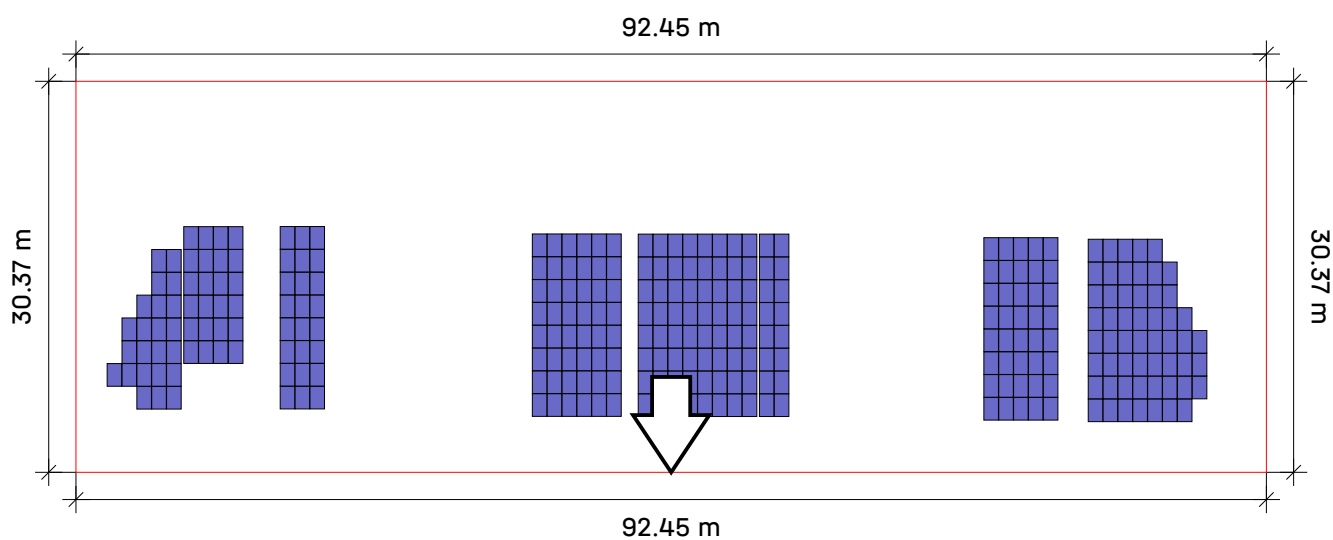
Area 1 | Bill of material

Position	Item no.	Item description	Quantity	Weight
1	1001164	K2 BasicClip	1,458	43.7 kg
2	1005193	Thread-forming metal screw 6×38_rs	2,916	20.4 kg
3	2004537	K2 Clamp MC 25-40	602	43.3 kg
4	2004543	K2 Clamp EC 25-40	272	19.6 kg
5	1003558	K2 BasicRail BasicLock 22 Set	136	6.8 kg
6	2004277	K2 BasicRail 22; 3.65 m	260	610.2 kg
7	1003571	K2 BasicRail BasicConnector Set	134	6.6 kg
Total				750.7 kg

Area 2



Area 2



Roof	System	Module	Height	Quantity	Total power
Area 2 Trapezoidal	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	294	138.18 kWp

Area 2 | Assembly plan

Base rail

Type	Whole rails		Rail cutting		
	Total rail length	Quantity 3.65 m	Part of rail / Rest	Length	Rest
20* A	3.542 m		3.650	3.542 from 3.650	0.098
20* B	7.004 m	1*3.65 m	3.650	3.354 from 3.650	0.286
20* C	2.388 m		3.650	2.388 from 3.650	1.252
16*D	4.696 m	1*3.65 m	1.252	1.046 from 1.252	0.196
4*E	8.158 m	2*3.65 m	1.252	0.858 from 1.252	0.384
20* F	5.850 m	1*3.65 m	3.650	2.200 from 3.650	1.440
22* G	9.312 m	2*3.65 m	3.650	2.012 from 3.650	1.628

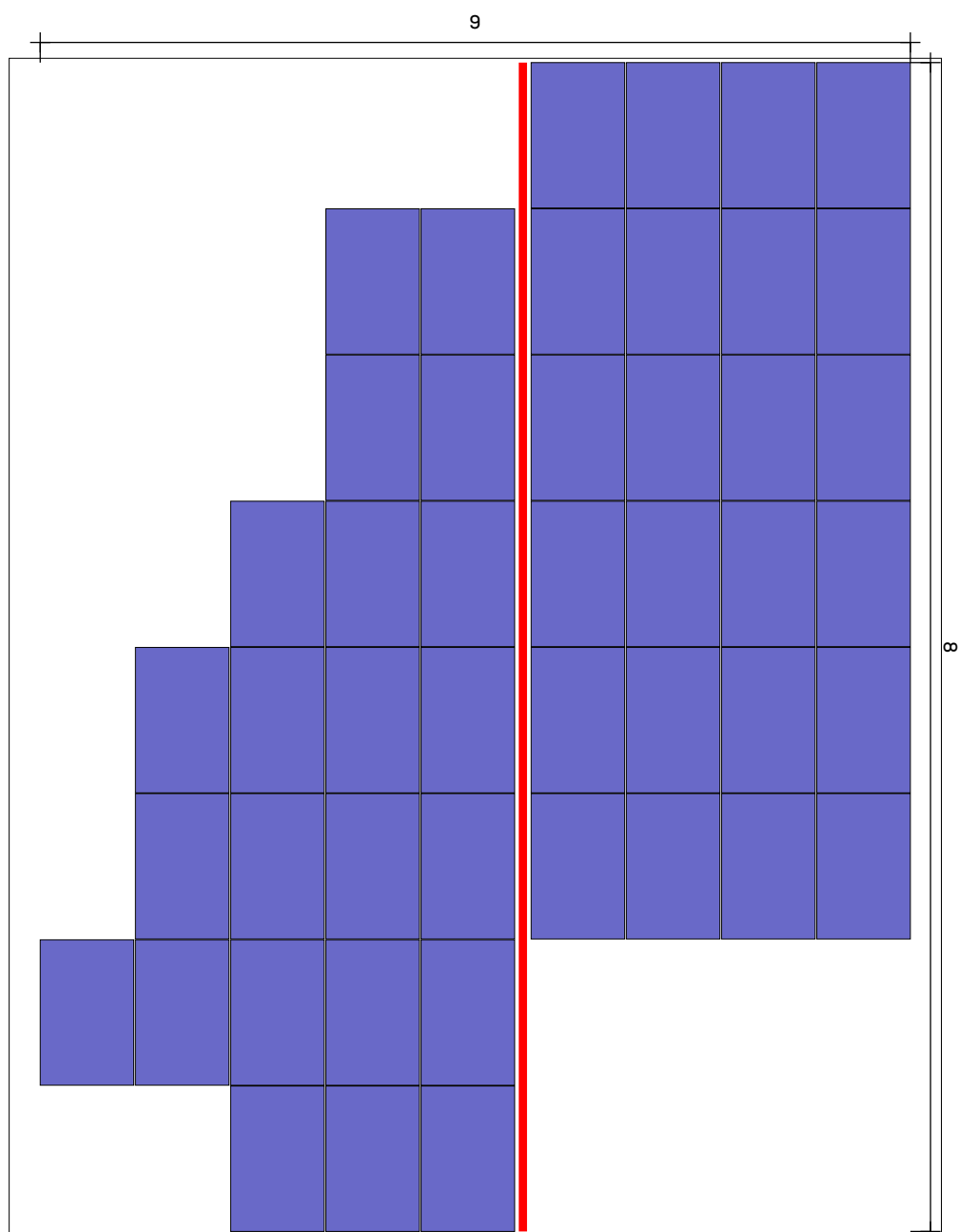
1 cm is viewed as lost for each cutting

Red numbers are leftover rails which will not be used any longer.

Module arrays

Module array	Width[m]	Length[m]	Width in modules	Length in modules
1	10.55	14.17	7	8
2	3.44	14.17	3	8
3	6.90	14.17	6	8
4	11.70	14.17	10	8
5	5.75	14.17	5	8
6	9.21	14.17	8	8

Area 2 | Module array 1



Roof ② Module array ①

Mounting system

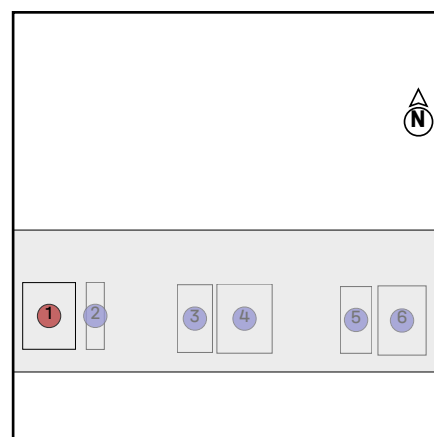
[K2 BasicRail](#)

Module

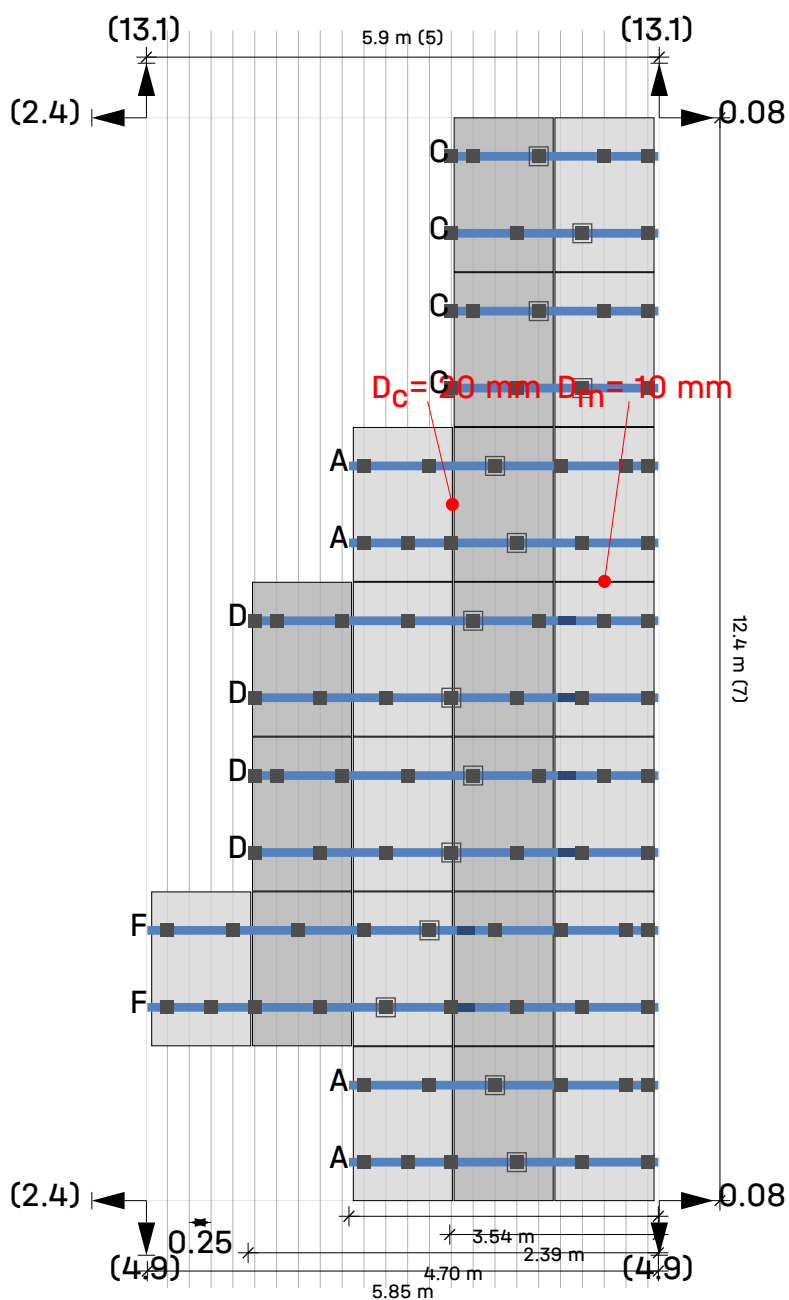
47(22.09 kWp) x
DM470G12RT-G48HBB

Row spacing

1.77 m



Area 2 | Module array 1 | Module block 1

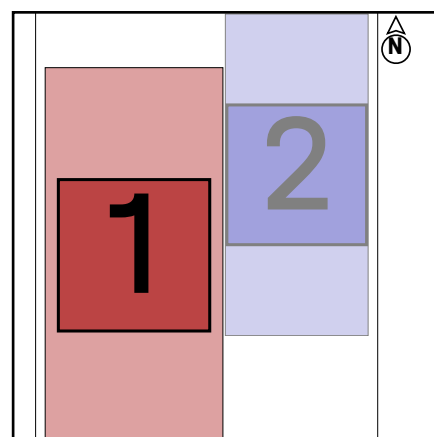


Roof ② Module array ① Module block 1

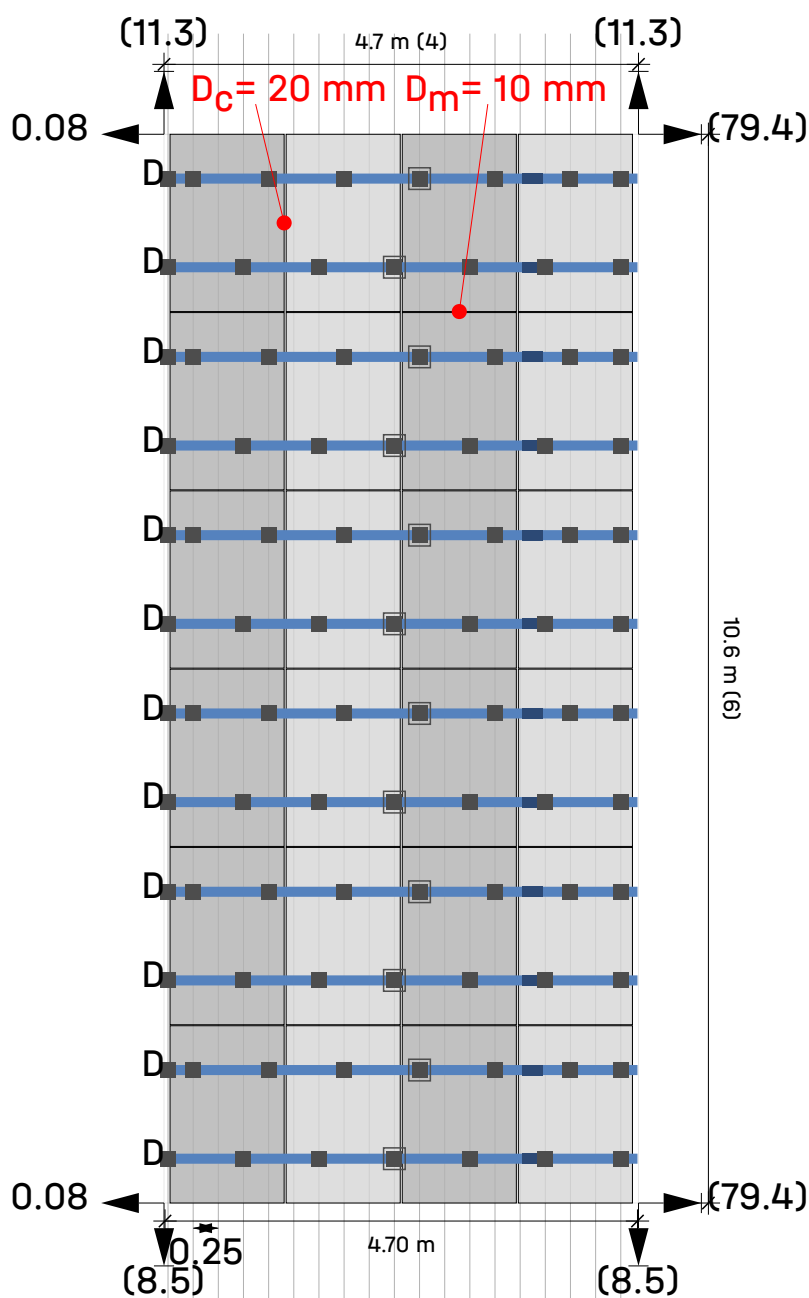
Modules (5 × 7) - 12 = 23

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 2 | Module array 1 | Module block 2

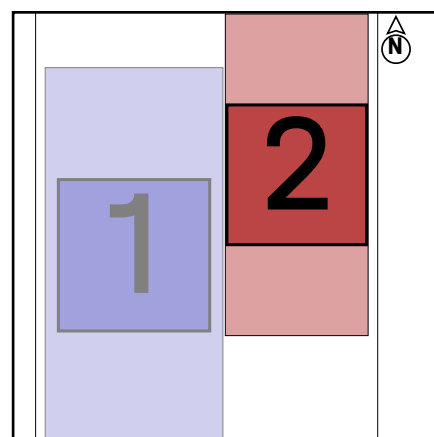


Roof ② Module array ① Module block 2

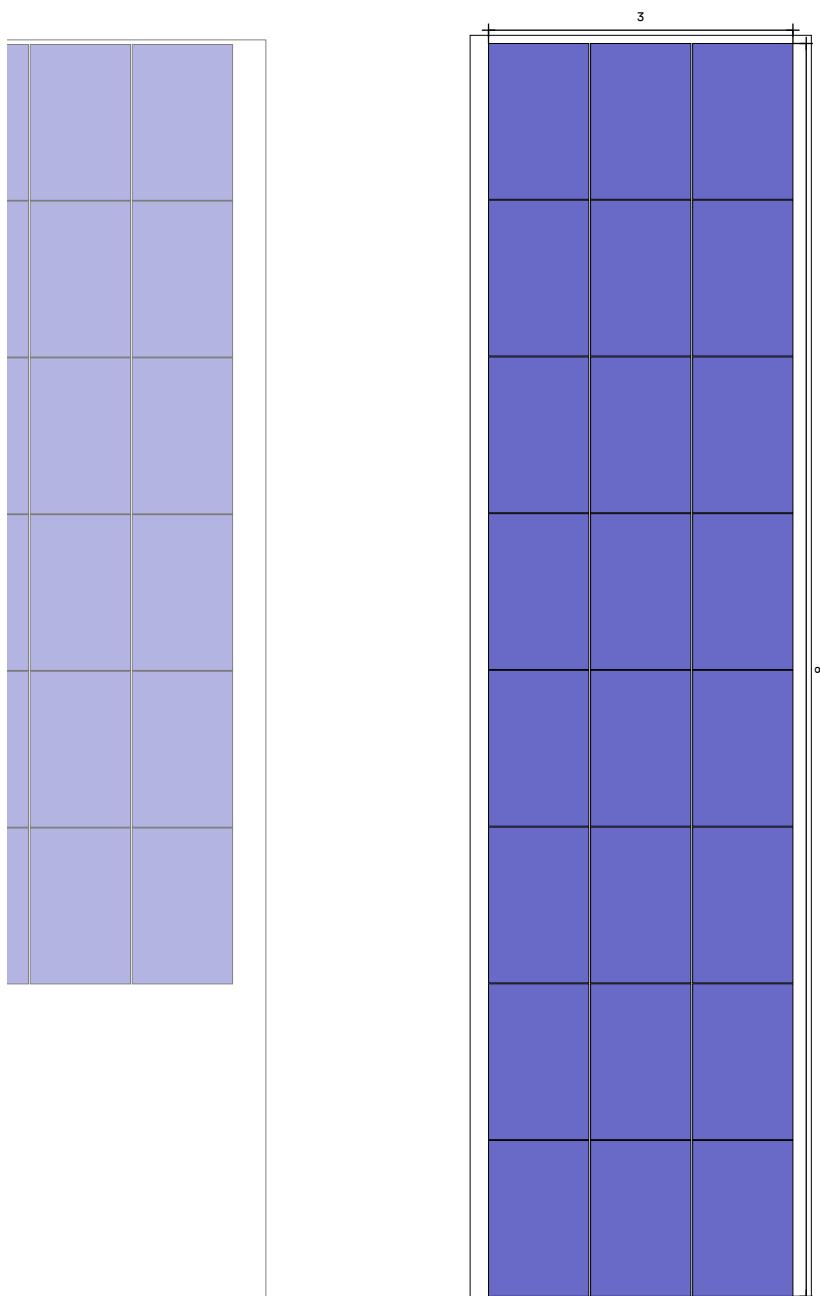
Modules $4 \times 6 = 24$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 2 | Module array 2



Roof ② Module array ②

Mounting system

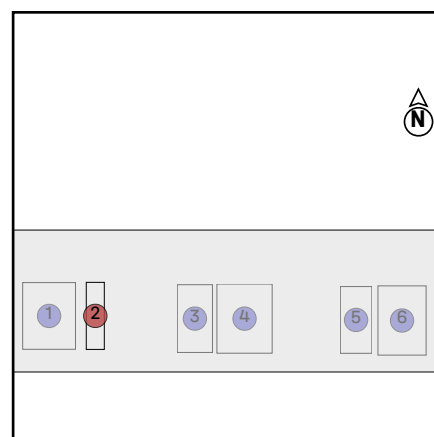
Module

Row spacing

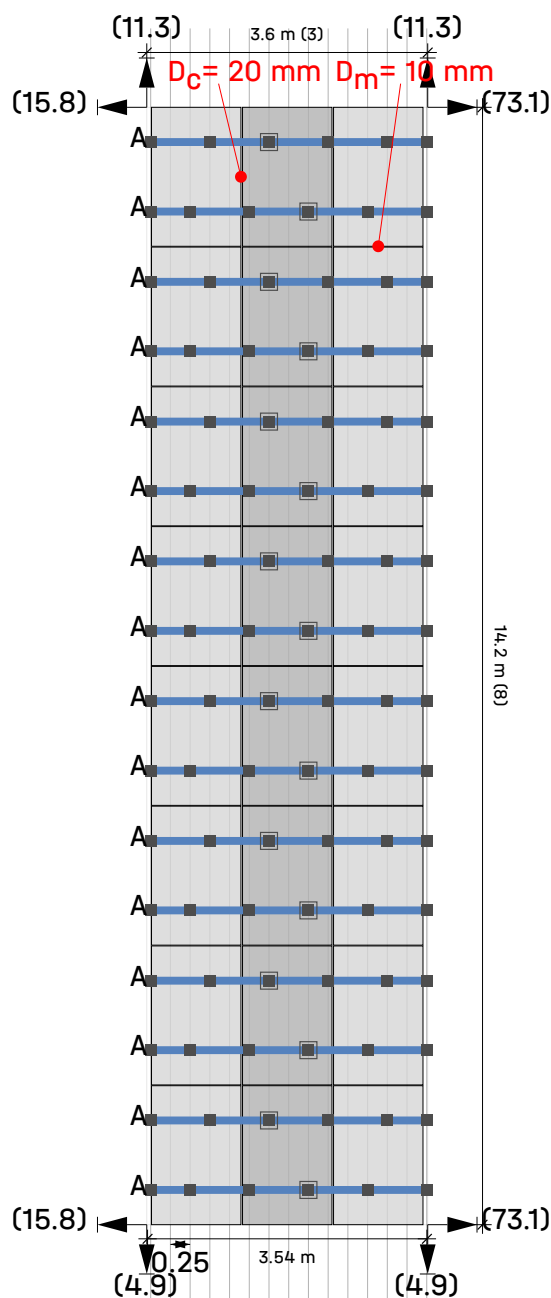
[K2 BasicRail](#)

24(11.28 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 2 | Module array 2 | Module block 3

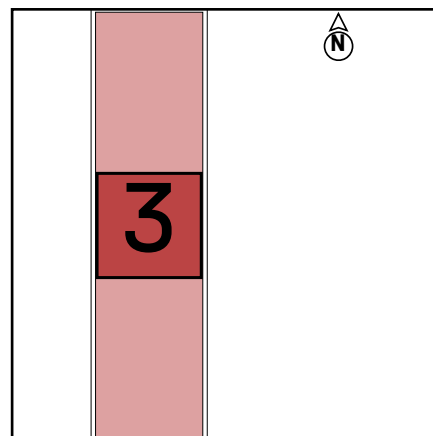


Roof ② Module array ② Module block 3

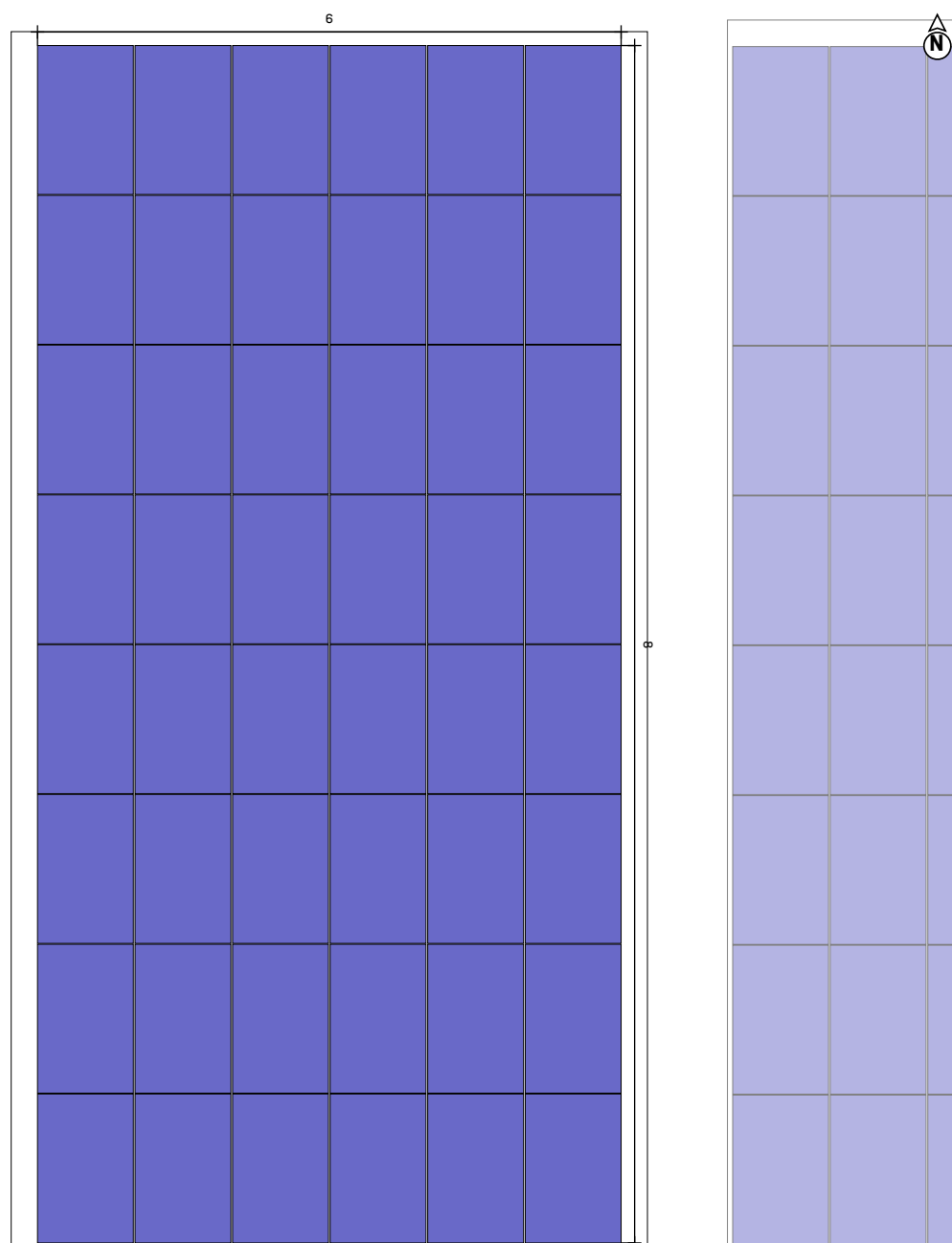
Modules $3 \times 8 = 24$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- Distance to roof edge [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 2 | Module array 3



Roof ② Module array ③

Mounting system

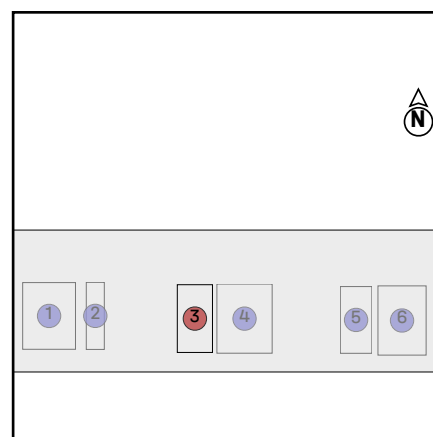
[K2 BasicRail](#)

Module

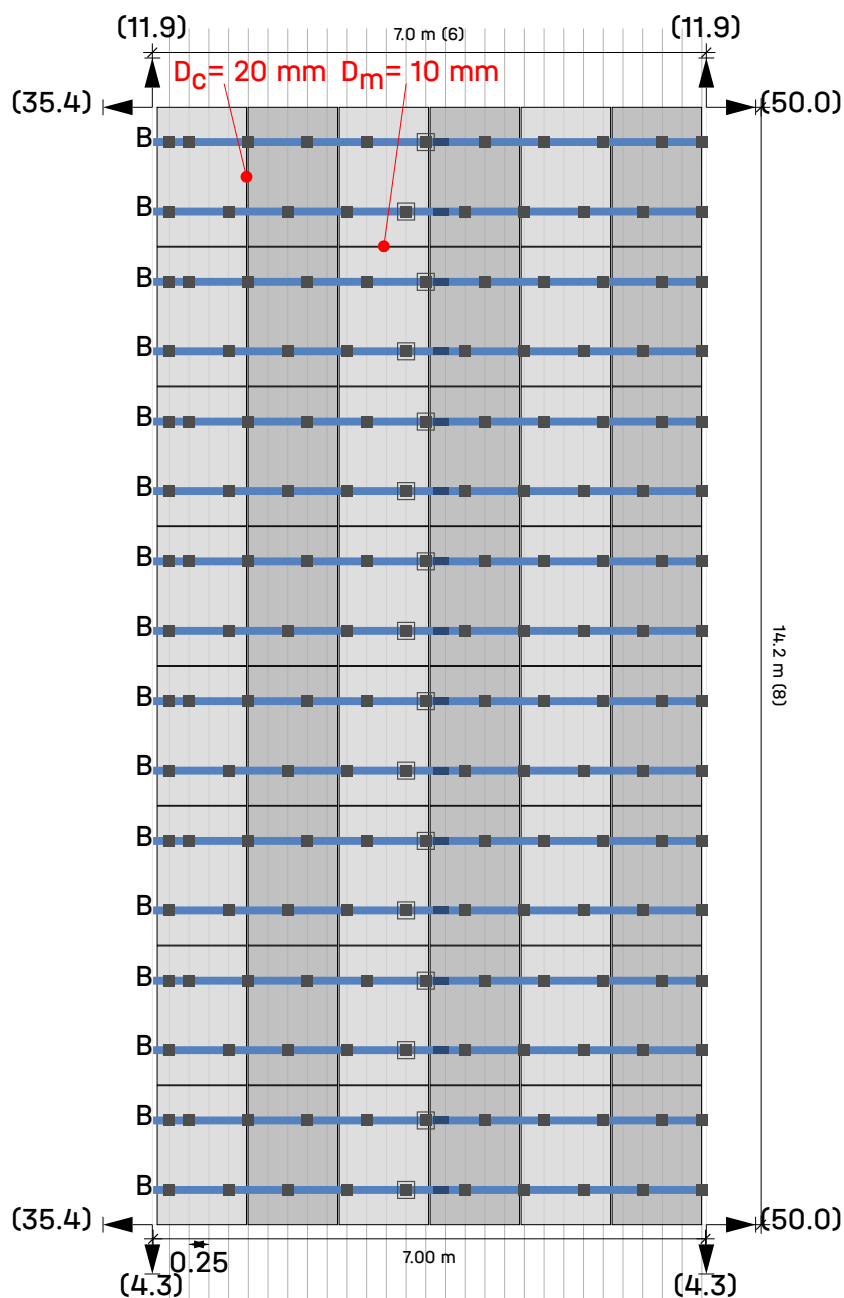
48(22.56 kWp) x
DM470G12RT-G48HBB

Row spacing

1.77 m



Area 2 | Module array 3 | Module block 4

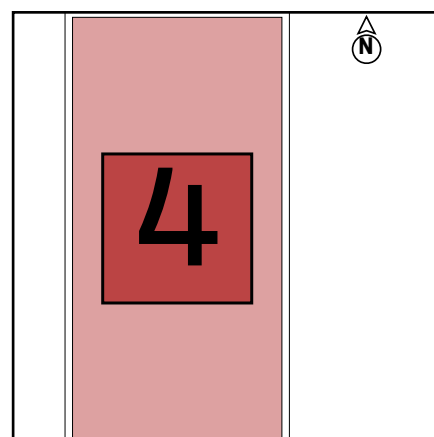


Roof ② Module array ③ Module block ④

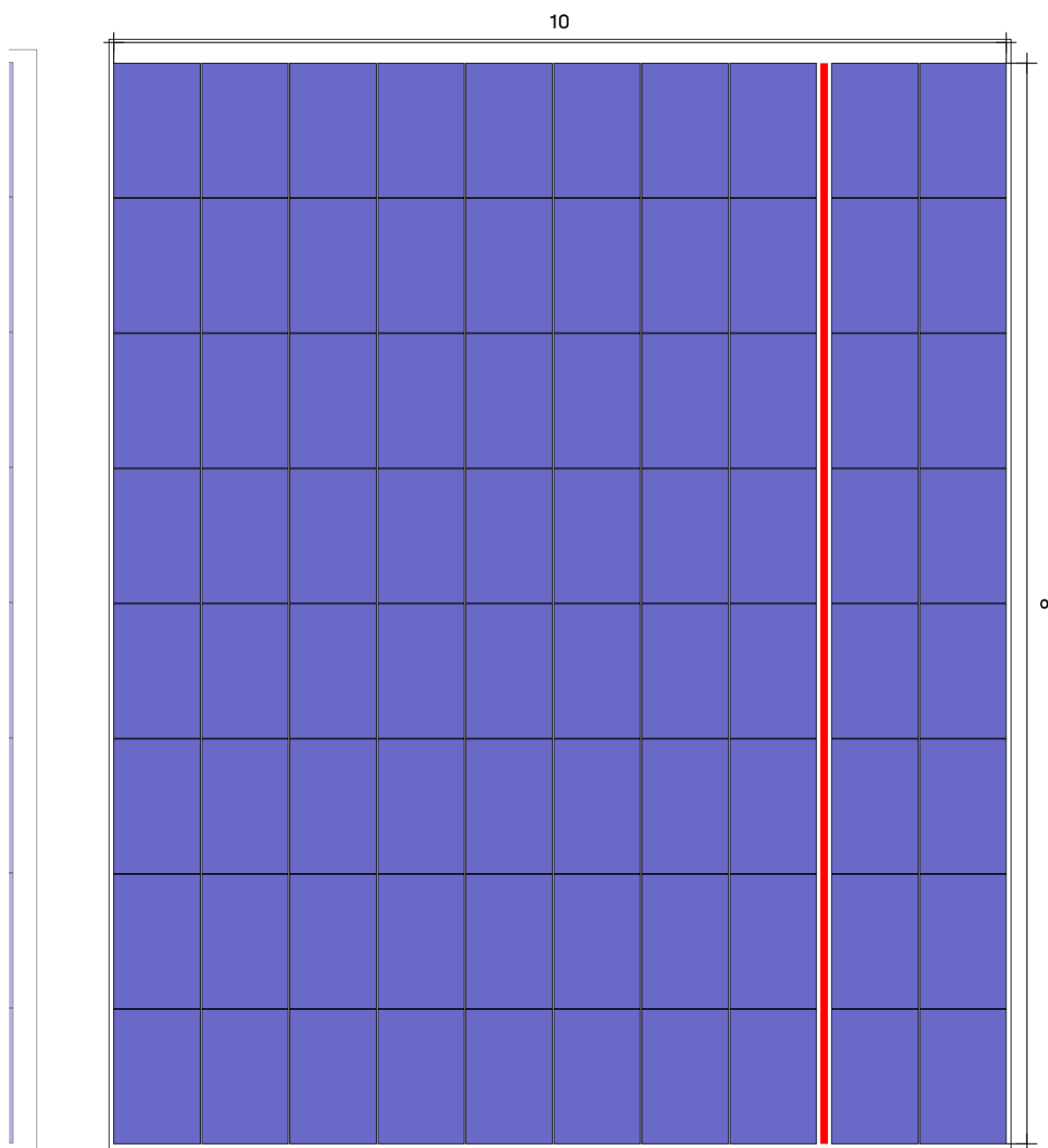
Modules $6 \times 8 = 48$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- Distance to roof edge [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 2 | Module array 4



Roof ② Module array ④

Mounting system

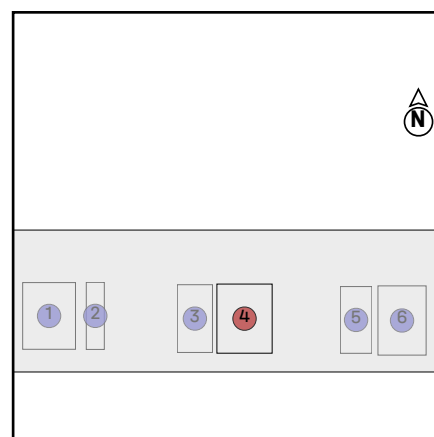
[K2 BasicRail](#)

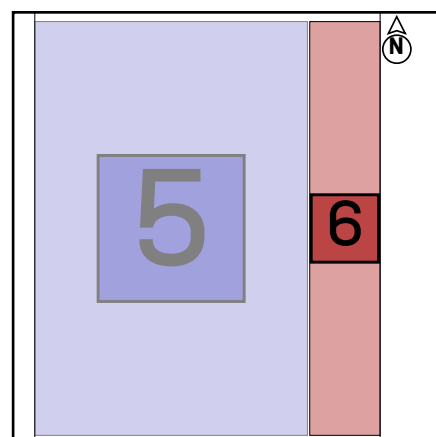
Module

80(37.6 kWp) x
DM470G12RT-G48HBB

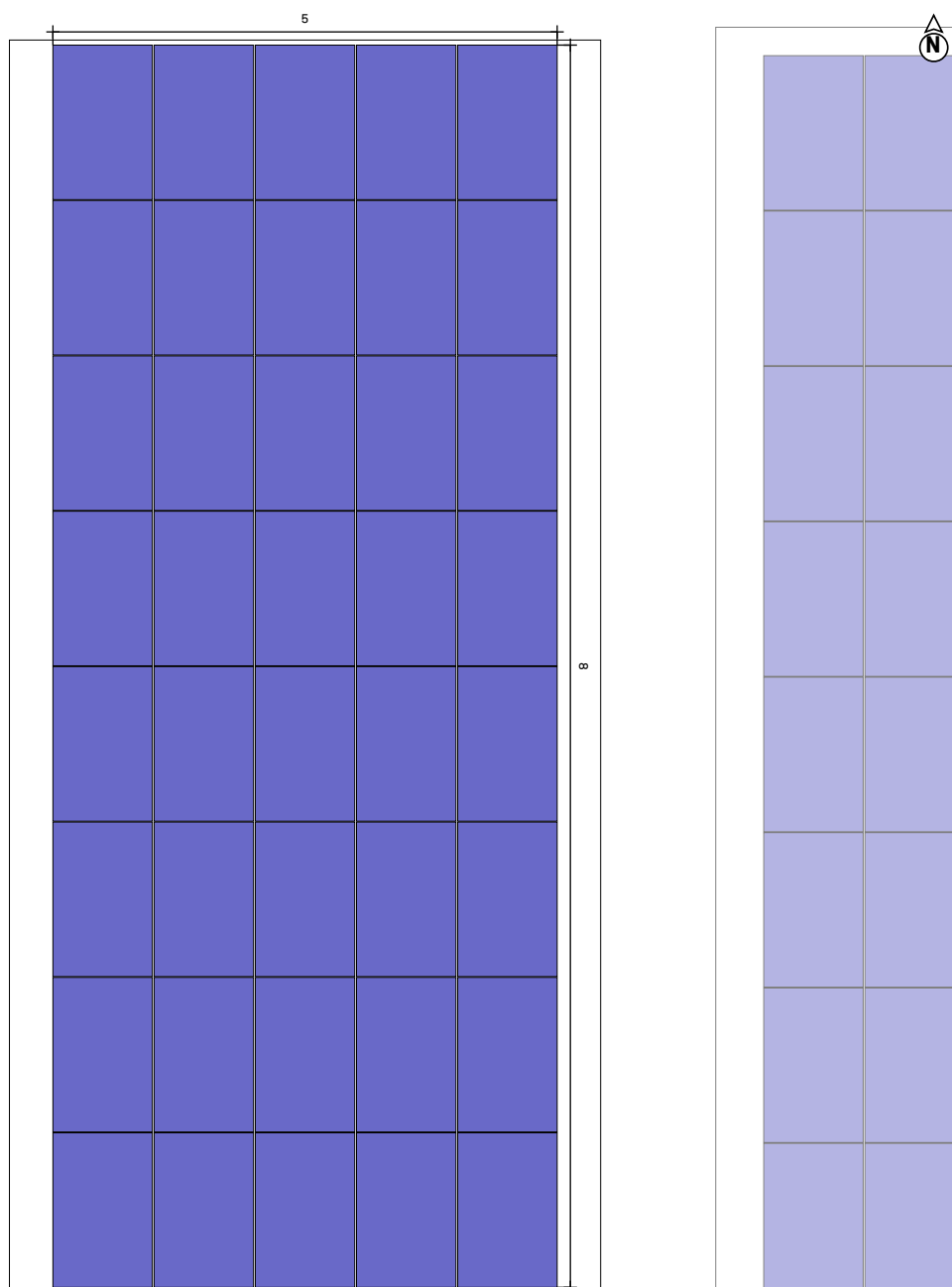
Row spacing

1.77 m





Area 2 | Module array 5



Roof ② Module array ⑤

Mounting system

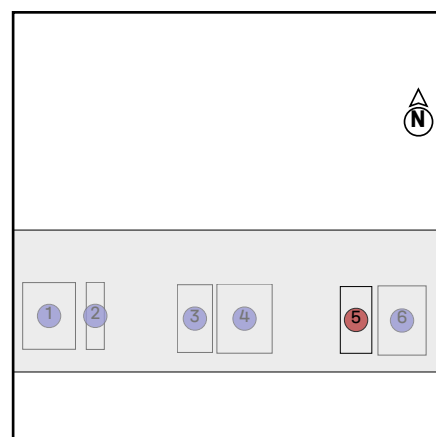
Module

Row spacing

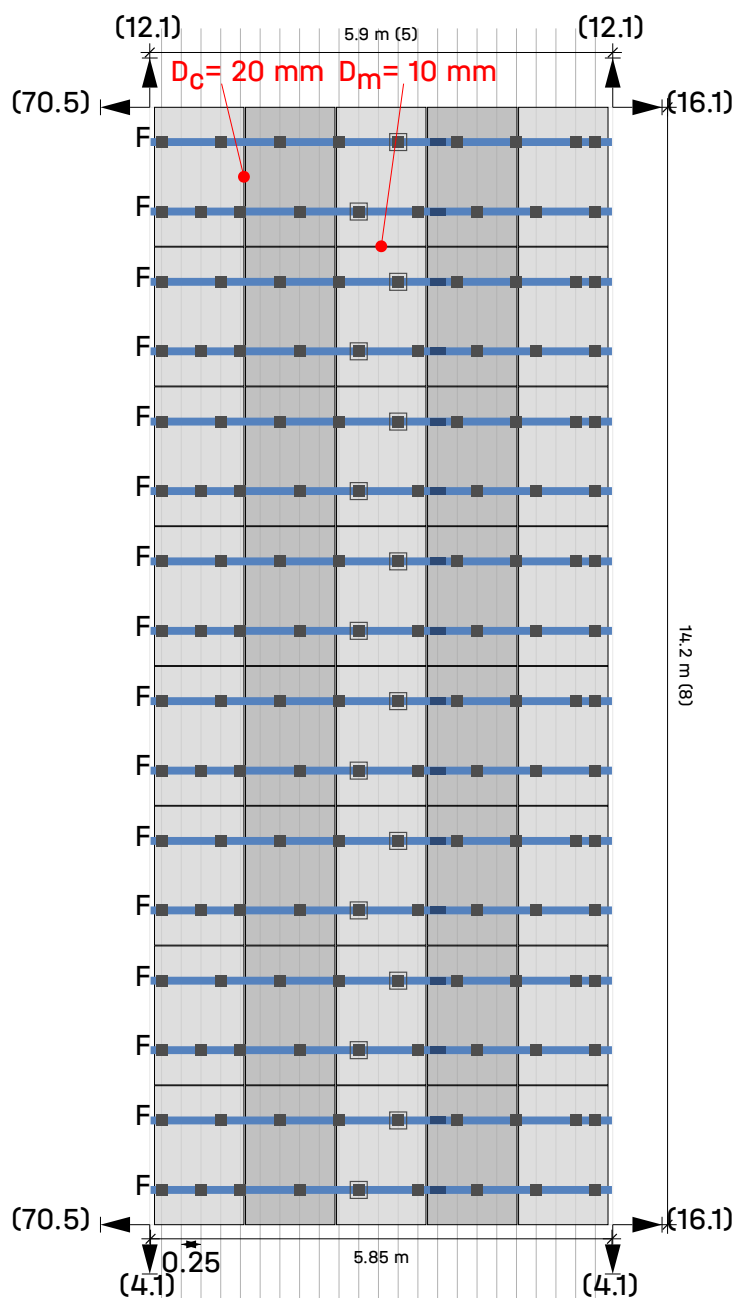
[K2 BasicRail](#)

40(18.8 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 2 | Module array 5 | Module block 7

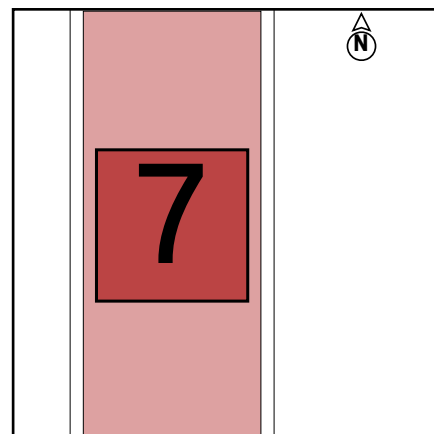


Roof ② Module array ⑤ Module block 7

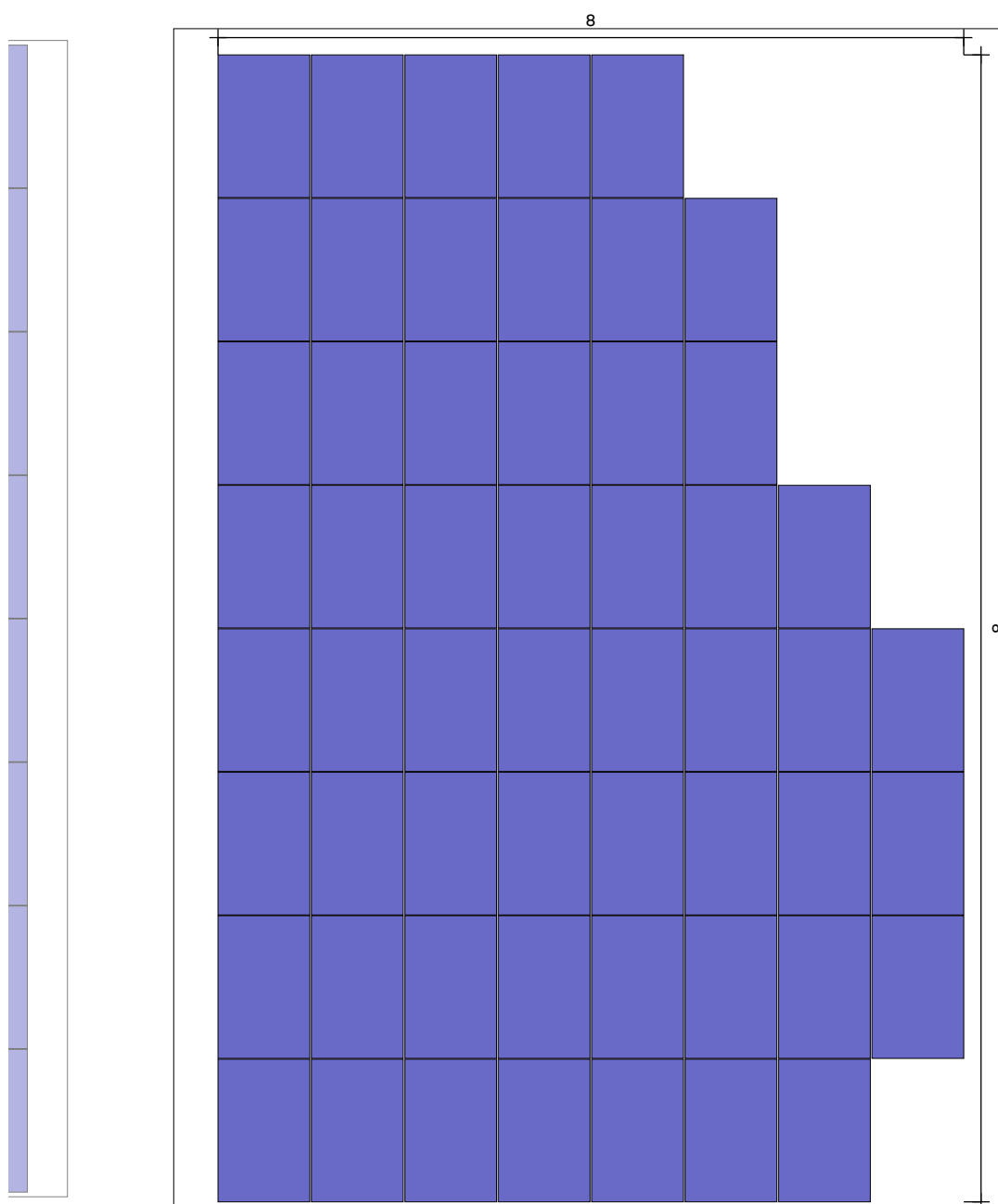
Modules $5 \times 8 = 40$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- Distance to roof edge [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 2 | Module array 6



Roof ② Module array ⑥

Mounting system

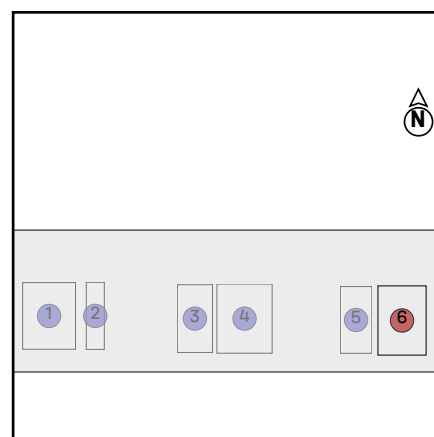
[K2 BasicRail](#)

Module

55(25.85 kWp) x
DM470G12RT-G48HBB

Row spacing

1.77 m



Results | Area 2

Roof	System	Module	Height	Quantity	Total power
<u>Area 2</u>	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	294	138.18 kWp
 Trapezoidal					

Module

Name	DM470G12RT-G48HBB
Manufacturer	Hengdian Group DMEGC Magnetic Co. Ltd.
Output power	470 Wp
Dimensions	1,762×1,134×30 mm
Weight	24.0 kg

Components

Fastener	K2 BasicClip
Base rails	K2 BasicRail 22
Metal screw	Thread-forming metal screw 6×38_rs

Material values

For material information refer to the product catalogue:

[K2 Catalogue \(k2-systems.com\)](https://k2-systems.com)

Loads on modules (module dimensioning)

No. Module array	Array	A-TrA [m²]	ultimate state [Pa]				Serviceability [Pa]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
1	Gableboard	2.00	524.0	45.8	-1,322.3	0.0	317.6	27.8	-801.4	0.0
1	Corner region (eave)	2.00	524.0	45.8	-2,524.3	0.0	317.6	27.8	-1,529.9	0.0
2	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
3	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
4	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
5	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
6	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0

Results | Area 2

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ [%]	CL σ [%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L_{max} [m]	Fst D _{max} [m]
1	Field area	21.2	5.6	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	14.2	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7		57.1	1.2	0.250	---		0.250
2	Field area	21.2	0.3	60.2	20.3	0.750	---	0.500	0.750
3	Field area	21.2	8.1	60.2	20.3	0.750	---	0.500	0.750
4	Field area	21.2	10.3	60.2	20.3	0.750	---	0.500	0.750
5	Field area	21.2	8.3	60.2	20.3	0.750	---	0.500	0.750
6	Field area	21.2	9.1	60.2	20.3	0.750	---	0.500	0.750

Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/ L_{max}	Maximum cantilever length [m]		



Results | Area 2

Important information

- The quantity for K2 BasicRail BasicClips is calculated in such a way, that - according to the Assembly Instructions - a BasicClip can be installed on the crest to the left and right of a Rail Connector Set.
- The structure was statically verified in accordance with Eurocode 9: Design of aluminium structures (EN 1999-1-1:2021) and Eurocode 3: Design of steel structures (EN 1993-1-1:2025) and offers sufficient load-bearing capacity and stability for the loads specified in the chapter 'Maximum actions on the components'.
- Adjustment factor for wind load regarding service life period, f_W , is according to EN 1991-1-4/ NA
- Adjustment factor for snow load regarding service life period, f_S , is according to EN 1991-1-3/ NA
- The structural design complies with BS EN 1990 - Basis of Structural Design.
- Snow loads are determined in accordance with National Annex BS NA EN 1991-1-3 (2018) - UK National Annex to EC1 - Action on structures - general actions - snow loads.
- Wind loads are determined in accordance with National Annex BS NA EN 1991-1-4 - UK National Annex to EC1 - Action on structures, general actions - wind actions.
- Service life is recognised according to 'Eurocode EN 1991 - Action on structures, Snow loads' and 'Eurocode EN 1991 - Actions on structures, Wind actions'. Subject to the Building Regulations and for security-relevant reasons the installation has to be dismantled at the end of its service life.
- Failure consequence class is considered according to 'Eurocode EN 1990 - Basis of structural design'.
- The person responsible for the execution of the work must check the load assumptions made with the conditions on site. If deviations are found, the person who prepared the static calculation must be consulted immediately.
- Please note our General Terms and Conditions of Use (TCU-E) in their currently valid version, available at: <https://k2-systems.com/en/digital-services/general-terms-and-conditions-of-use-for-entrepreneurs-tcu-e/>
Please note in particular § 1, Special provisions for K2 Base, clause 3 ("Technical and specialist requirements on the Customer's premises."), § 6 ("Limitation of warranty") and § 7 ("Limitation of liability").
- All instructions and requirements of the static calculations must be observed.
- Compliance with the regulations and requirements of the building permit and the building trade associations must be ensured during the execution of all work.
- All connections and anchoring measures must be carried out using approved and standardized connecting elements or parts only.
- Subordinate components that have not been verified must be implemented structurally.
- The "General Rules" for corrosion protection design of the structure are strongly recommended for application during implementation.
- The structure may only be climbed by trained and authorized personnel wearing appropriate safety equipment. Unauthorized use of the structure poses a risk of falling.



Structural analysis report | Area 2

General information

Name	260189 - Reading Football Stadium
Mounting system	K2 BasicRail
Author	AP

Location information

Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Ground elevation	45.28 m

Roof information

Building height	13.88 m
Roof type	Monopitch roof
Roof pitch	5°
Roof covering	Trapezoidal
Min. roof edge distance	0.00 m
Crest distance	250.0 mm
Crest width	22.0 mm
Crest height	40.0 mm
Roof material	Steel
Sheet quality	S235
Sheet thickness	0.500 mm

Loads

Design method	BS EN
Failure consequence class (CC)	CC3
Design working life	50 years
Terrain category	Town Terrain
Distance to shoreline	62.30 km
Distance inside town terrain	1.70 km

Wind load

Velocity pressure, 50 years	$q_{p,50} = 0.729 \text{ kN/m}^2$
Adjustment factor for service life	$f_w = 1.000$
Velocity pressure, 25 years	$q_{p,25} = 0.729 \text{ kN/m}^2$

Structural analysis report | Area 2

Roof areas

No. Module array	Array	Load impact area [m ²]	maxCpe	minCpe	wind pressure [kN/m ²]	wind suction [kN/m ²]
1	Field area	10.00	0.000	-0.800	0.000	-0.583
1	Gableboard	10.00	0.000	-1.100	0.000	-0.801
1	Corner region (eave)	10.00	0.000	-2.100	0.000	-1.530
2	Field area	10.00	0.000	-0.800	0.000	-0.583
3	Field area	10.00	0.000	-0.800	0.000	-0.583
4	Field area	10.00	0.000	-0.800	0.000	-0.583
5	Field area	10.00	0.000	-0.800	0.000	-0.583
6	Field area	10.00	0.000	-0.800	0.000	-0.583

Snow load

Snow load zone	2
Snow guard	No
Snow load on ground level	$s_k = 0.400 \text{ kN/m}^2$
Shape coefficient for snow	$\mu_i = 0.800$
Factor for roof pitch	$d_i = 0.996$
Snow load on roof, 50 year	$s_{i,50} = 0.319 \text{ kN/m}^2$
Adjustment factor for service life	$f_s = 1.000$
Snow load on roof, 25 years	$s_{i,25} = 0.319 \text{ kN/m}^2$

Dead load

Weight of module	$G_M = 24.0 \text{ kg}$
Weight of mounting system per module	$= 2.00 \text{ kg}$
Module area	$A_M = 2.00 \text{ m}^2$
Dead weight of module per m ²	$= 12.01 \text{ kg/m}^2$
Dead weight of mounting system per m ²	$= 1.00 \text{ kg/m}^2$
Total dead load (excl. ballast) per m ²	$= 0.13 \text{ kN/m}^2$

Structural analysis report | Area 2

Load combinations

Ultimate limit state

Partial safety factor unfavourable permanent load	$\gamma_{G,sup} = 1.35$
Partial safety factor favourable permanent load	$\gamma_{G,inf} = 1.00$
Partial safety factor destabilising permanent load	$\gamma_{G,dst} = 1.10$
Partial safety factor stabilising permanent load	$\gamma_{G,stab} = 0.90$
Partial safety factor variable loads	$\gamma_Q = 1.50$
Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Importance factor permanent	$\kappa_{Fl,G} = 1.10$
Importance factor variable	$\kappa_{Fl,Q} = 1.10$
Characteristic dead weight	G_k
Characteristic snow load on the roof	$S_{i,n}$
Characteristic wind load	W_k

Load case combination 01	$LCC\ 01_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * S_{i,n}$
Load case combination 02	$LCC\ 02_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04	$LCC\ 04_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$
Load case combination 06	$LCC\ 06_{uls} = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Suction}$

Serviceability limit state

Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Load case combination 01	$LCC\ 01_{sls} = G_k + S_{i,n}$
Load case combination 02	$LCC\ 02_{sls} = G_k + W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{sls} = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$
Load case combination 04	$LCC\ 04_{sls} = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$
Load case combination 06	$LCC\ 06_{sls} = G_k + W_{k,Suction}$

Structural analysis report | Area 2

Maximum load on modules (Mounting system dimensioning)

No. Module array	Array	A-TrA [m ²]	ultimate state [kN/m ²]				Serviceability [kN/m ²]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
1	Gableboard	10.00	0.713	0.062	-1.195	0.011	0.445	0.039	-0.674	0.011
1	Corner region (eave)	10.00	0.713	0.062	-2.397	0.011	0.445	0.039	-1.403	0.011
2	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
3	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
4	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
5	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
6	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011

Max. load on fastener

No. Module array	Array	A-TrA [m ²]	ultimate state [kN]				Serviceability [kN]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
1	Gableboard	10.00	0.518	0.045	-0.869	0.008	0.323	0.028	-0.490	0.008
1	Corner region (eave)	10.00	0.173	0.015	-0.581	0.003	0.108	0.009	-0.340	0.003
2	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
3	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
4	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
5	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
6	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008

Resistance values of components

Base rail

Base rail	A [cm ²]	I _y [cm ⁴]	I _z [cm ⁴]	W _y [cm ³]	W _z [cm ³]
K2 BasicRail 22	2.380	1.52	7.74	1.08	2.46



Structural analysis report | Area 2

Fastener

Fastener	$R_{D,Uplift,Perpendicular}$ [kN]	$R_{D,Pressure,Perpendicular}$ [kN]	$R_{D,Pressure,Parallel}$ [kN]
K2 BasicClip	1.02	-	0.96
Thread-forming metal screw 6×38_rs	0.65	-	0.62

Utilisation result

No.	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ [%]	CL σ [%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L_{max} [m]	Fst D _{max} [m]
1	Field area	21.2	5.6	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	14.2	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7		57.1	1.2	0.250	---		0.250
2	Field area	21.2	0.3	60.2	20.3	0.750	---	0.500	0.750
3	Field area	21.2	8.1	60.2	20.3	0.750	---	0.500	0.750
4	Field area	21.2	10.3	60.2	20.3	0.750	---	0.500	0.750
5	Field area	21.2	8.3	60.2	20.3	0.750	---	0.500	0.750
6	Field area	21.2	9.1	60.2	20.3	0.750	---	0.500	0.750

Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/ L_{max}	Maximum cantilever length [m]		

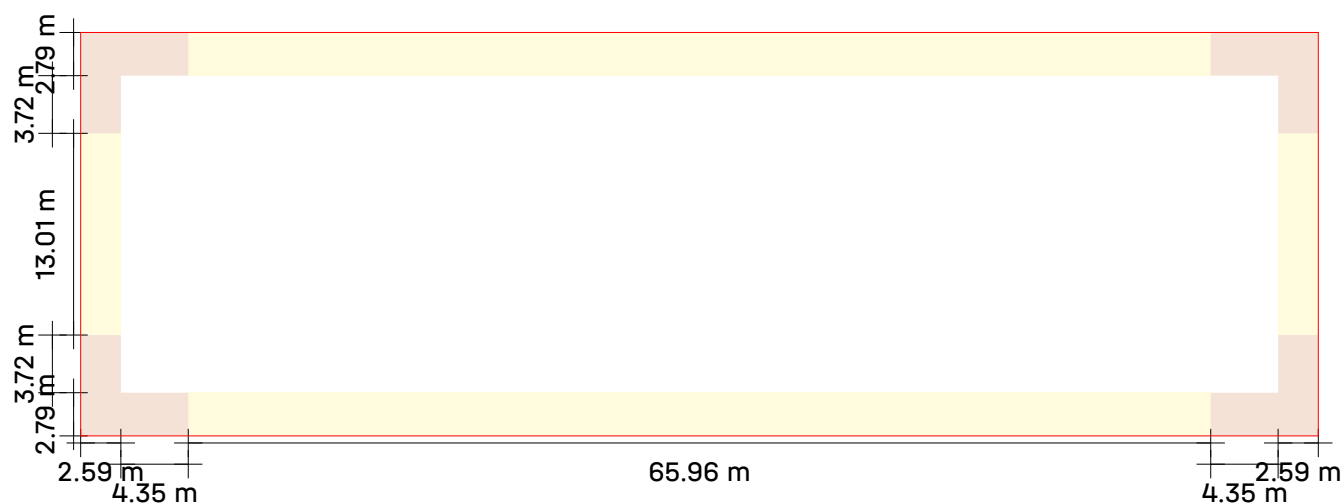


Area 2 | Bill of material

Position	Item no.	Item description	Quantity	Weight
1	1001164	K2 BasicClip	1,176	35.3 kg
2	1005193	Thread-forming metal screw 6×38_rs	2,352	16.5 kg
3	2004537	K2 Clamp MC 25-40	466	33.6 kg
4	2004543	K2 Clamp EC 25-40	244	17.6 kg
5	1003558	K2 BasicRail BasicLock 22 Set	122	6.1 kg
6	2004277	K2 BasicRail 22; 3.65 m	210	492.9 kg
7	1003571	K2 BasicRail BasicConnector Set	108	5.3 kg
Total				607.1 kg

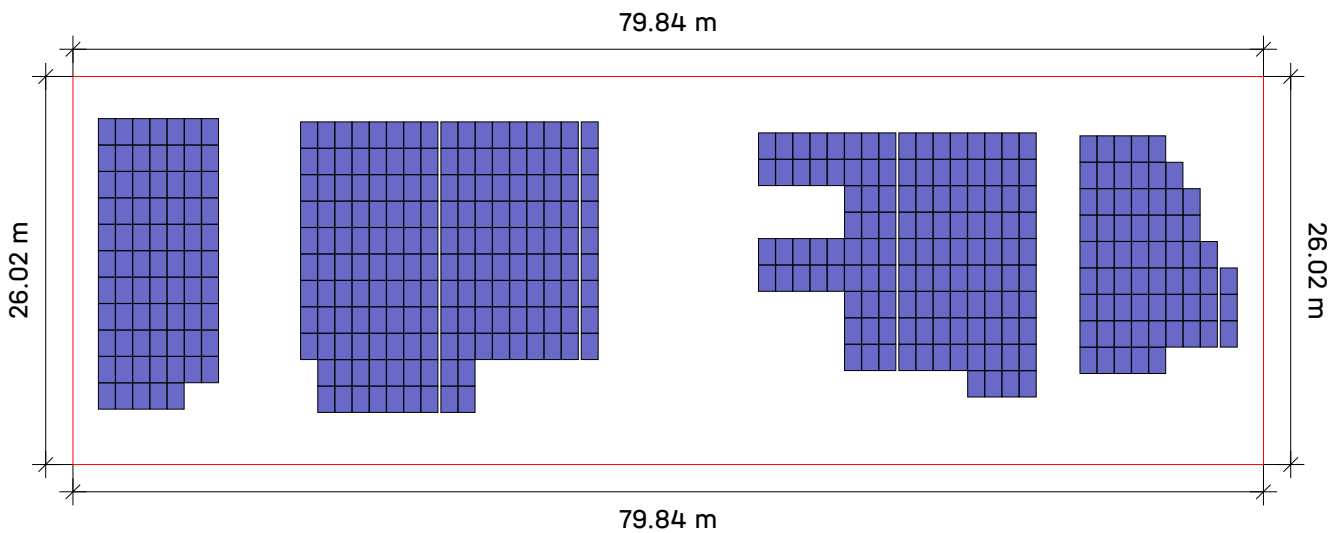


Area 3





Area 3



Roof	System	Module	Height	Quantity	Total power
<u>Area 3</u>  Trapezoidal	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	434	203.98 kWp

Area 3 | Assembly plan

Base rail

Type	Whole rails		Rail cutting		
	Total rail length	Quantity 3.65 m	Part of rail / Rest	Length	Rest
10*A	3.542 m		3.650	3.542 from 3.650	0.098
2*B	7.004 m	1*3.65 m	3.650	3.354 from 3.650	0.286
4*C	2.388 m		3.650	2.388 from 3.650	1.252
4*D	1.234 m		1.252	1.234 from 1.252	0.008
6*E	5.850 m	1*3.65 m	3.650	2.200 from 3.650	1.440
6*F	1.234 m		1.440	1.234 from 1.440	0.196
70* G	9.312 m	2*3.65 m	3.650	2.012 from 3.650	1.628
14*H	1.234 m		1.628	1.234 from 1.628	0.384
2*I	4.696 m	1*3.65 m	1.628	1.046 from 1.628	0.572
28* J	8.158 m	2*3.65 m	1.628	0.858 from 1.628	0.760

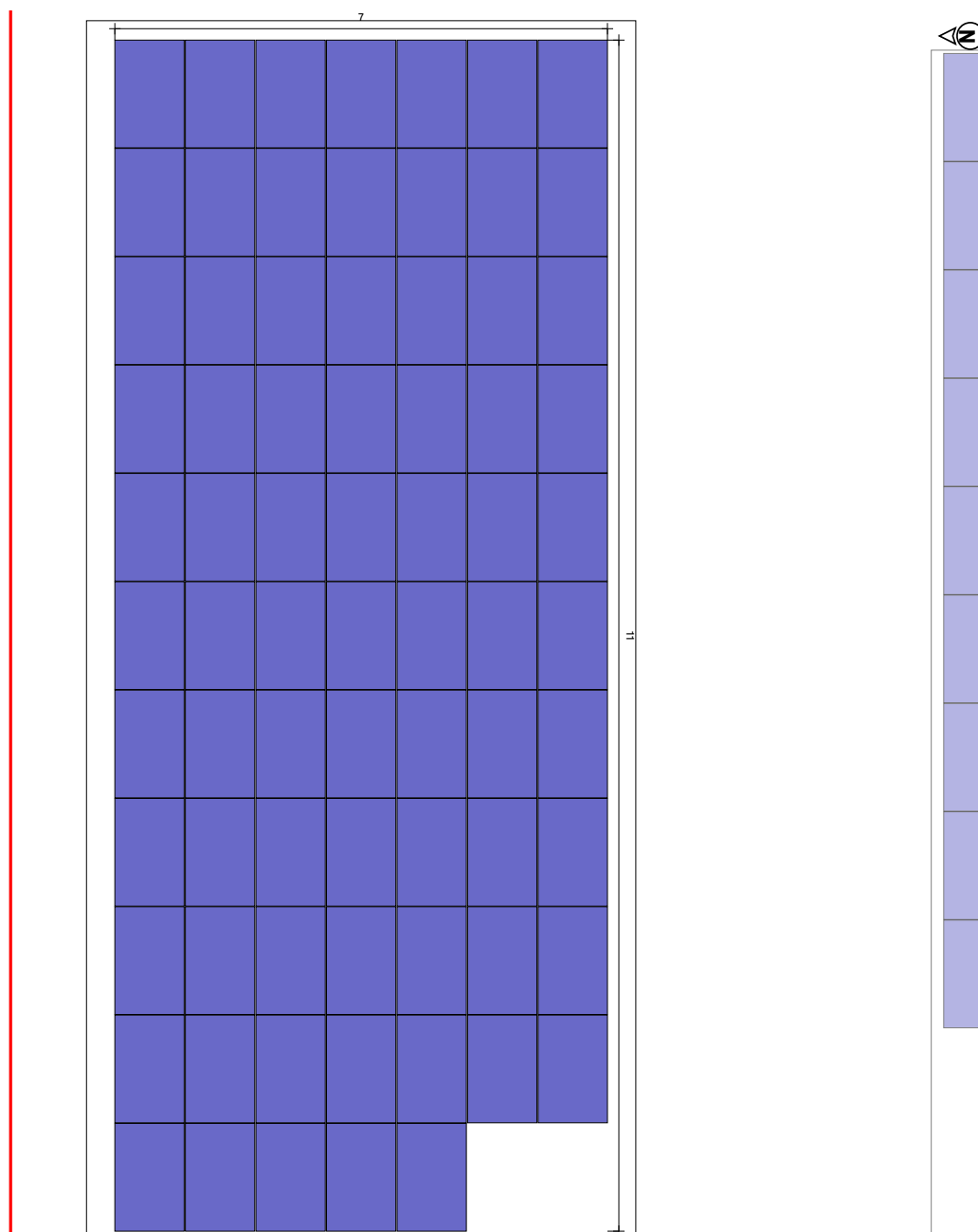
1 cm is viewed as lost for each cutting

Red numbers are leftover rails which will not be used any longer.

Module arrays

Module array	Width[m]	Length[m]	Width in modules	Length in modules
1	8.06	19.48	7	11
2	18.62	17.71	4	10
3	19.96	19.48	16	11
4	10.55	15.94	9	9

Area 3 | Module array 1



Roof ③ Module array ①

Mounting system

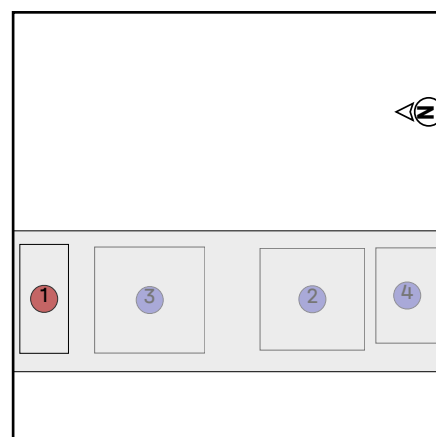
Module

Row spacing

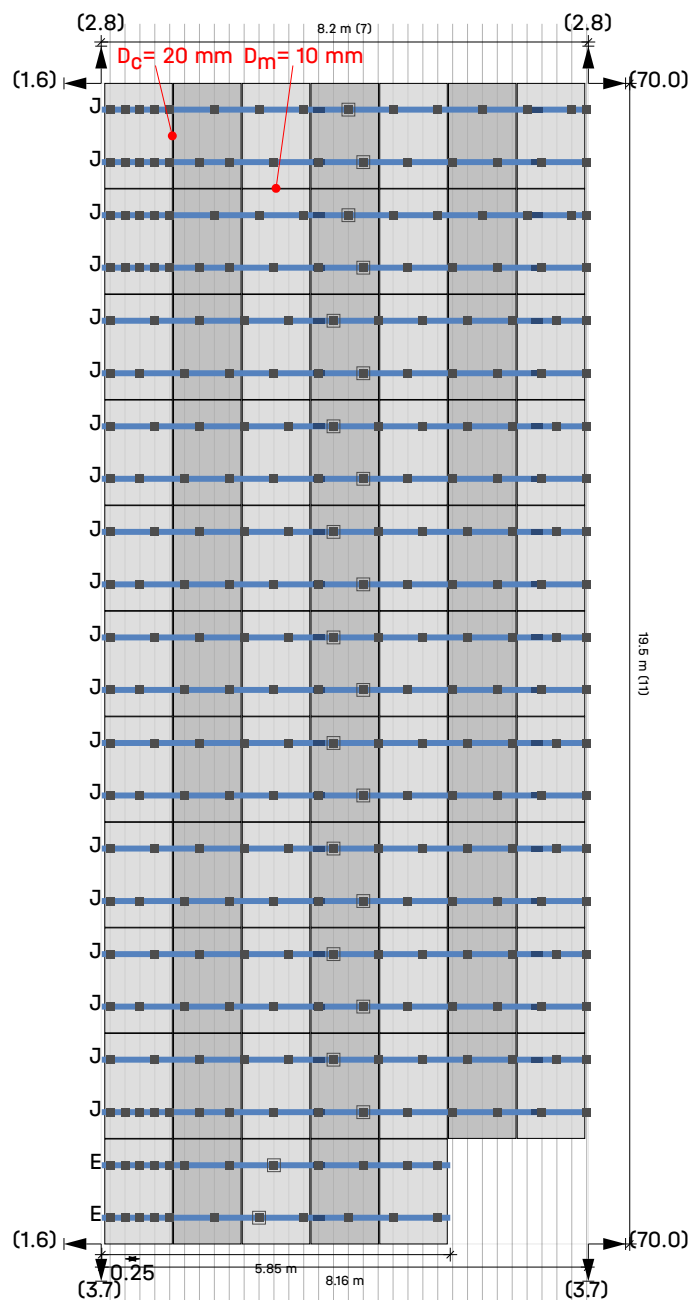
[K2 BasicRail](#)

75(35.25 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 3 | Module array 1 | Module block 1

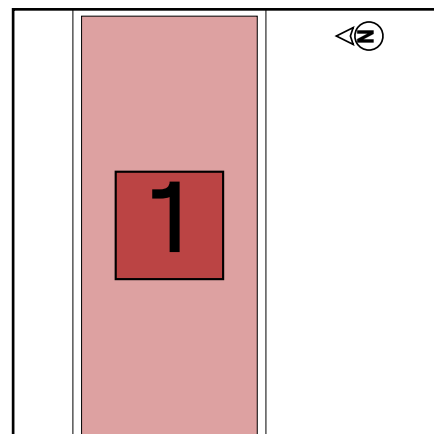


Roof **3** Module array **1** Module block **1**

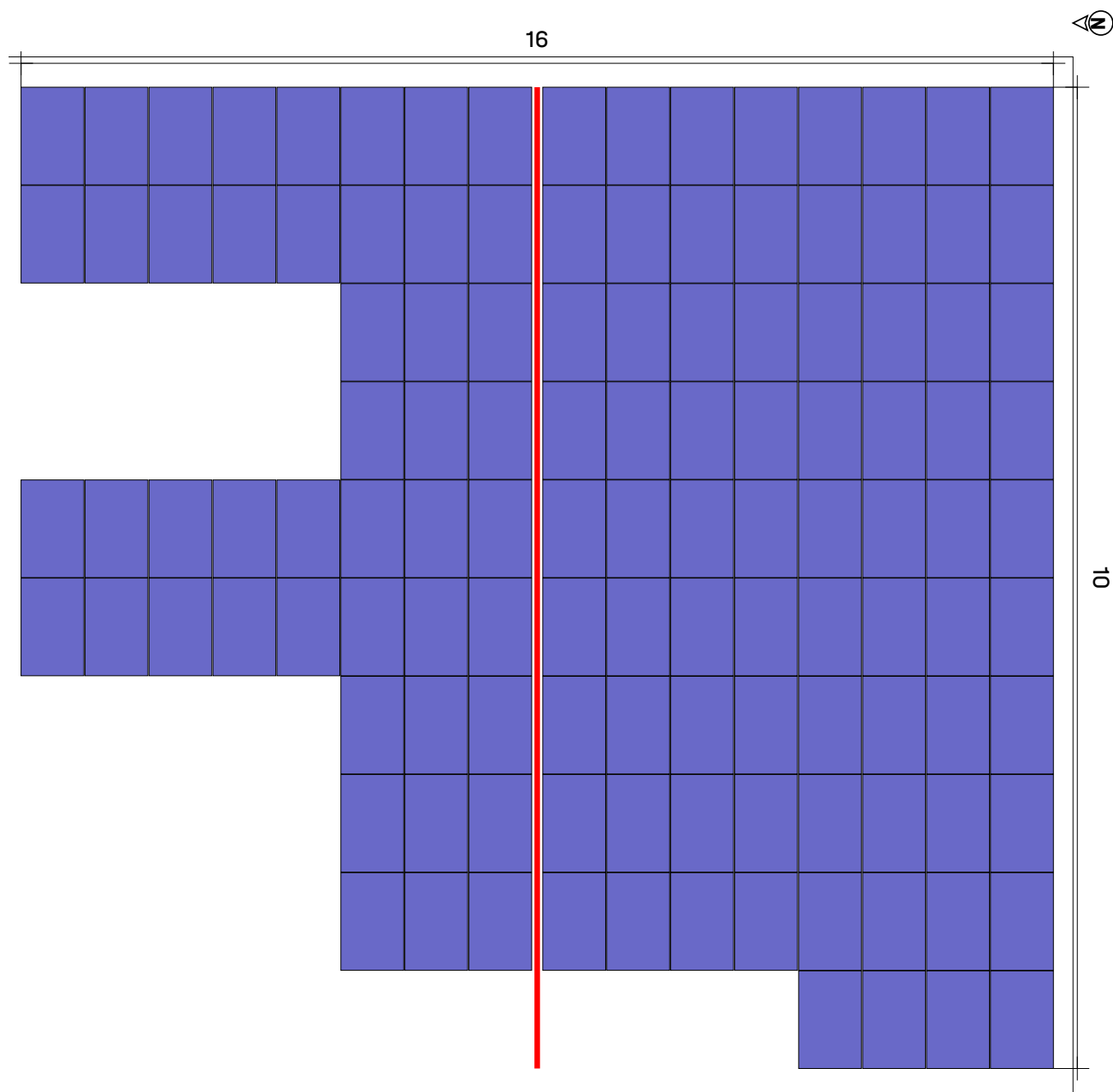
Modules $(7 \times 11) - 2 = 75$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- Distance to roof edge [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 3 | Module array 2



Roof ③ Module array ②

Mounting system

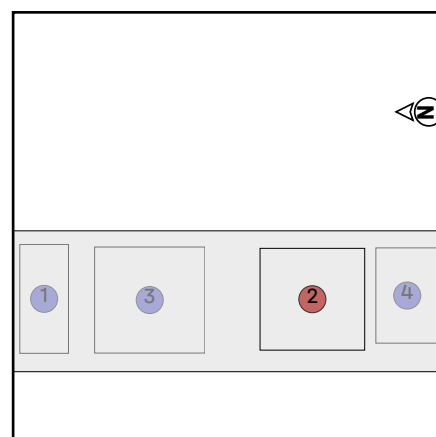
[K2 BasicRail](#)

Module

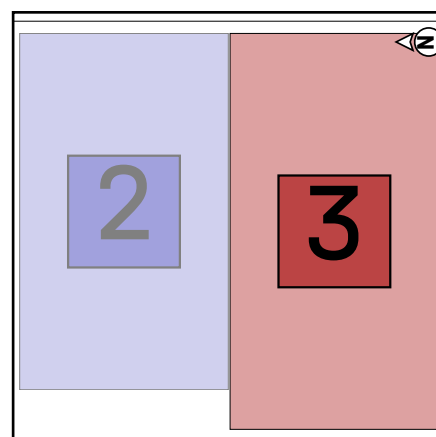
123(57.81 kWp) x
DM470G12RT-G48HBB

Row spacing

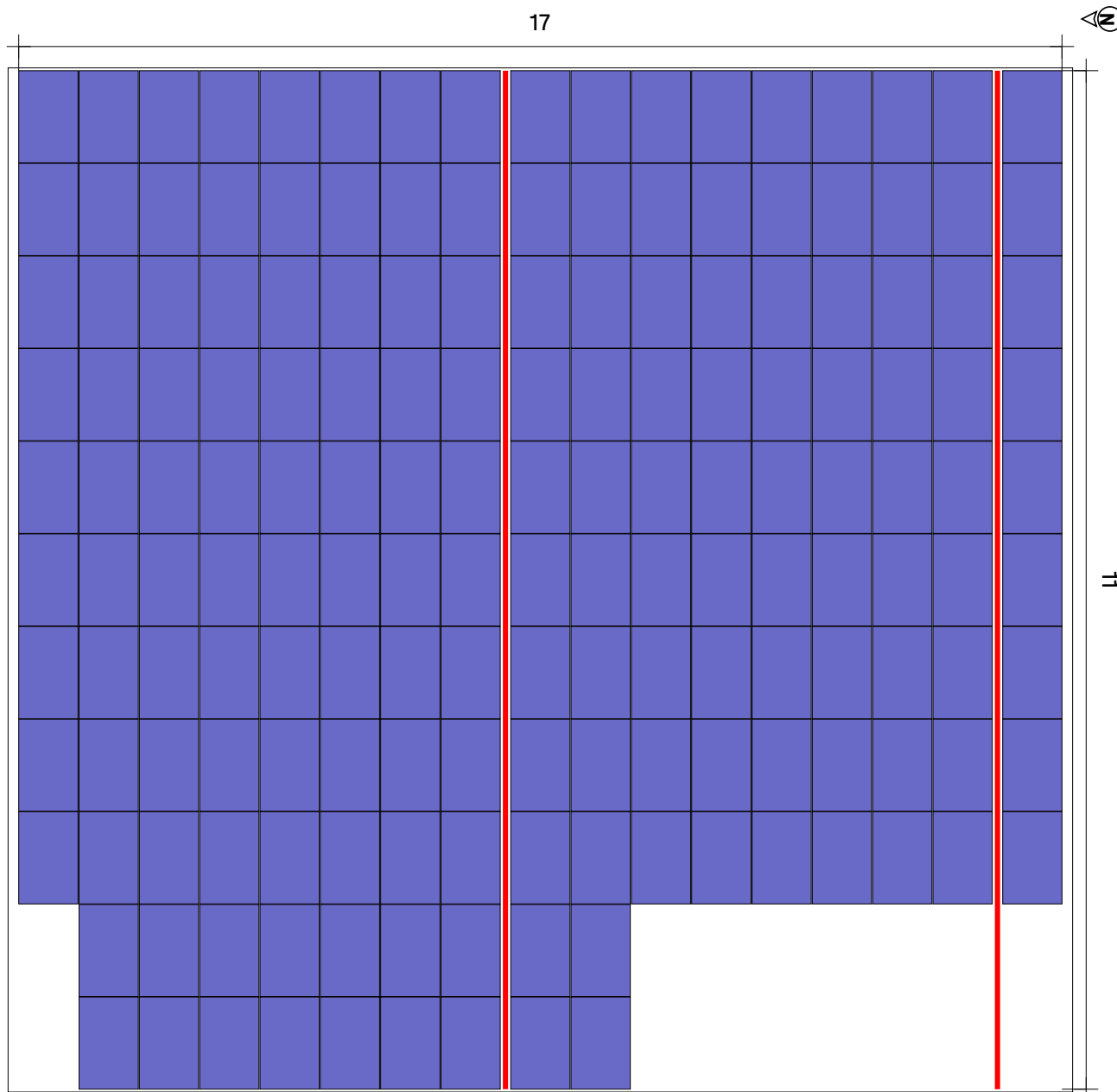
1.77 m



◀(Z)



Area 3 | Module array 3



Roof ③ Module array ③

Mounting system

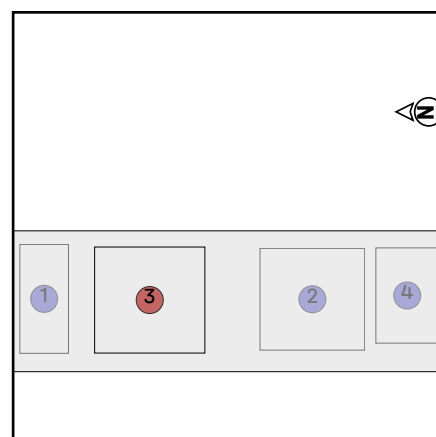
Module

Row spacing

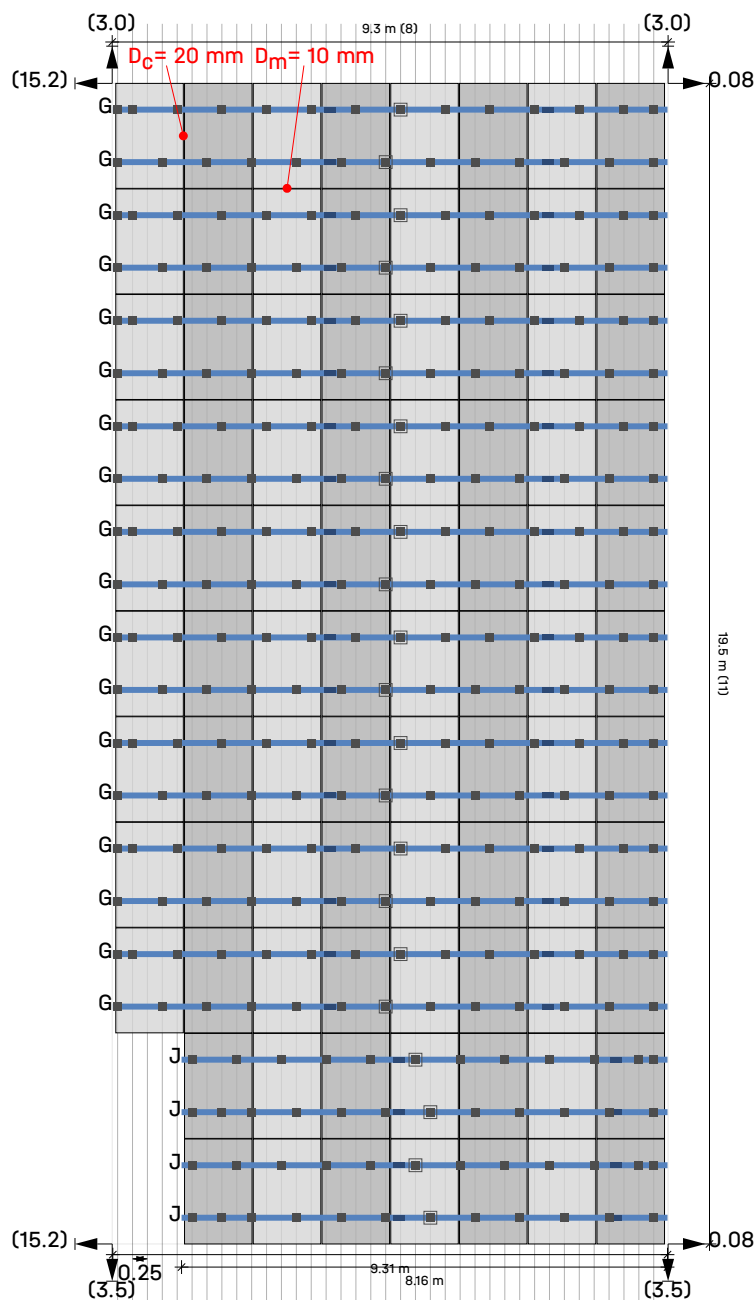
[K2 BasicRail](#)

171(80.37 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 3 | Module array 3 | Module block 4

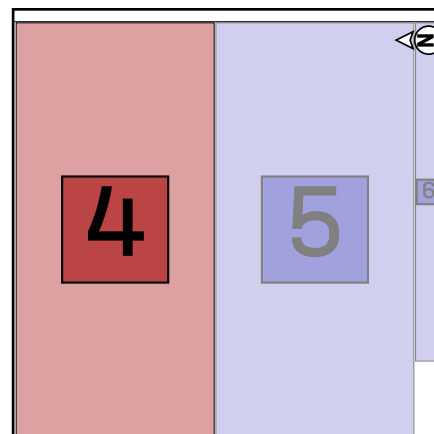


Roof ③ Module array ③ Module block 4

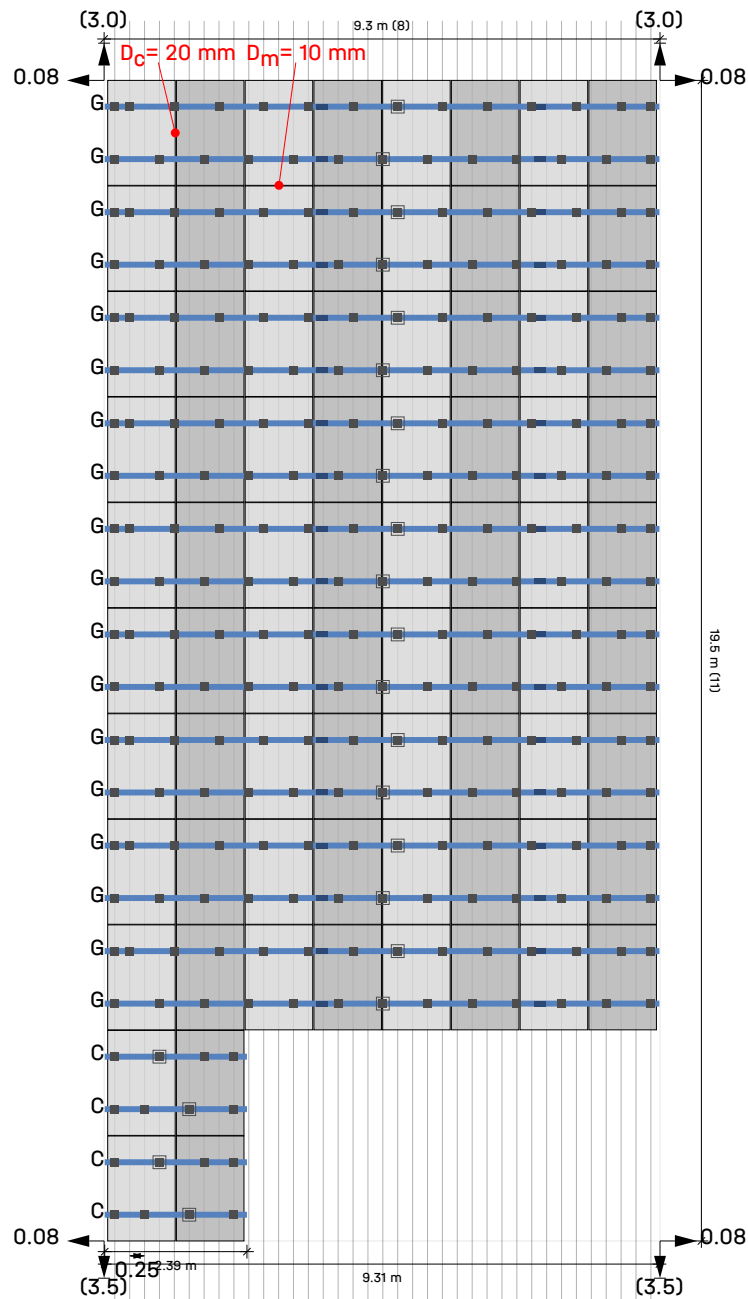
Modules $(8 \times 11) - 2 = 86$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- Dc Distance for clamping between modules
- Dm Distance between modules



Area 3 | Module array 3 | Module block 5

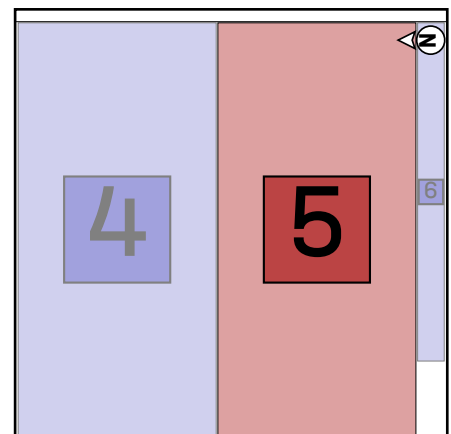


Roof ③ Module array ③ Module block 5

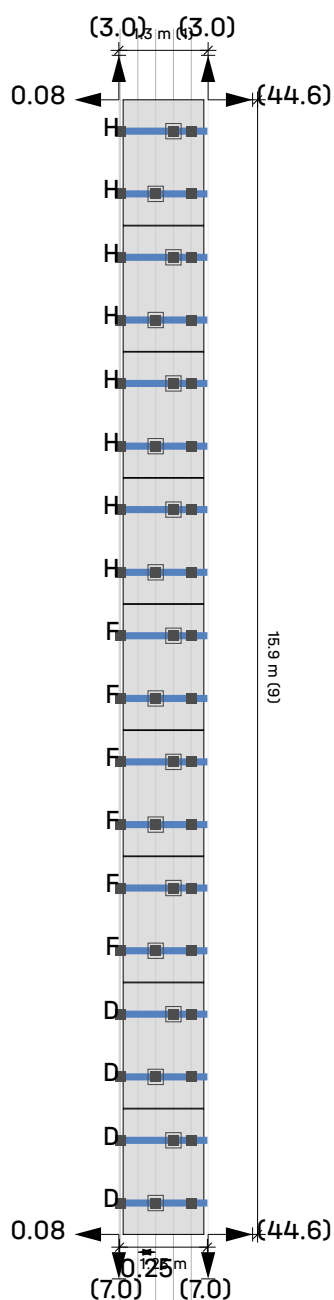
Modules $(8 \times 11) - 12 = 76$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 3 | Module array 3 | Module block 6

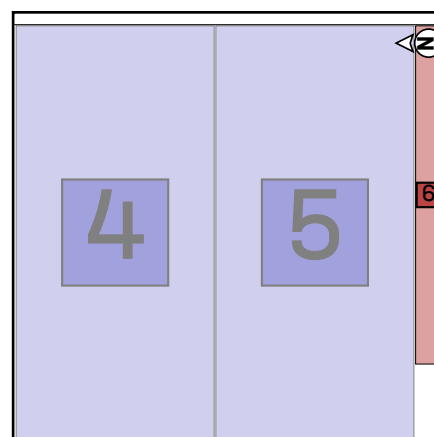


Roof ③ Module array ③ Module block 6

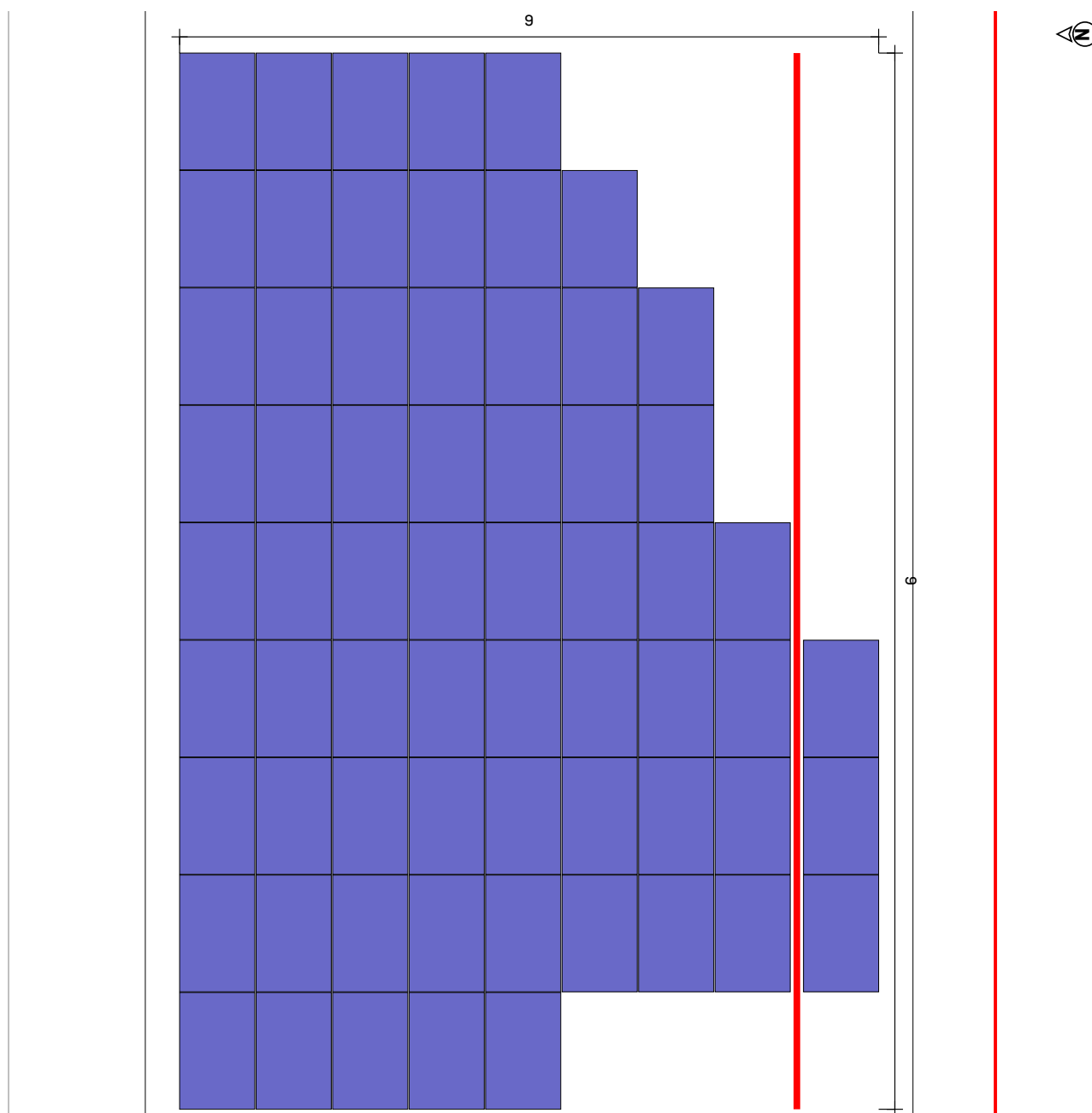
Modules $1 \times 9 = 9$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- Dc Distance for clamping between modules
- Dm Distance between modules



Area 3 | Module array 4



Roof ③ Module array ④

Mounting system

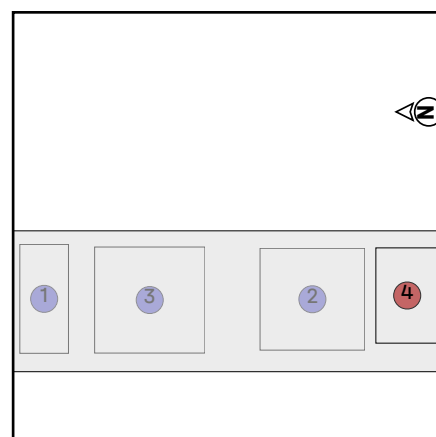
[K2 BasicRail](#)

Module

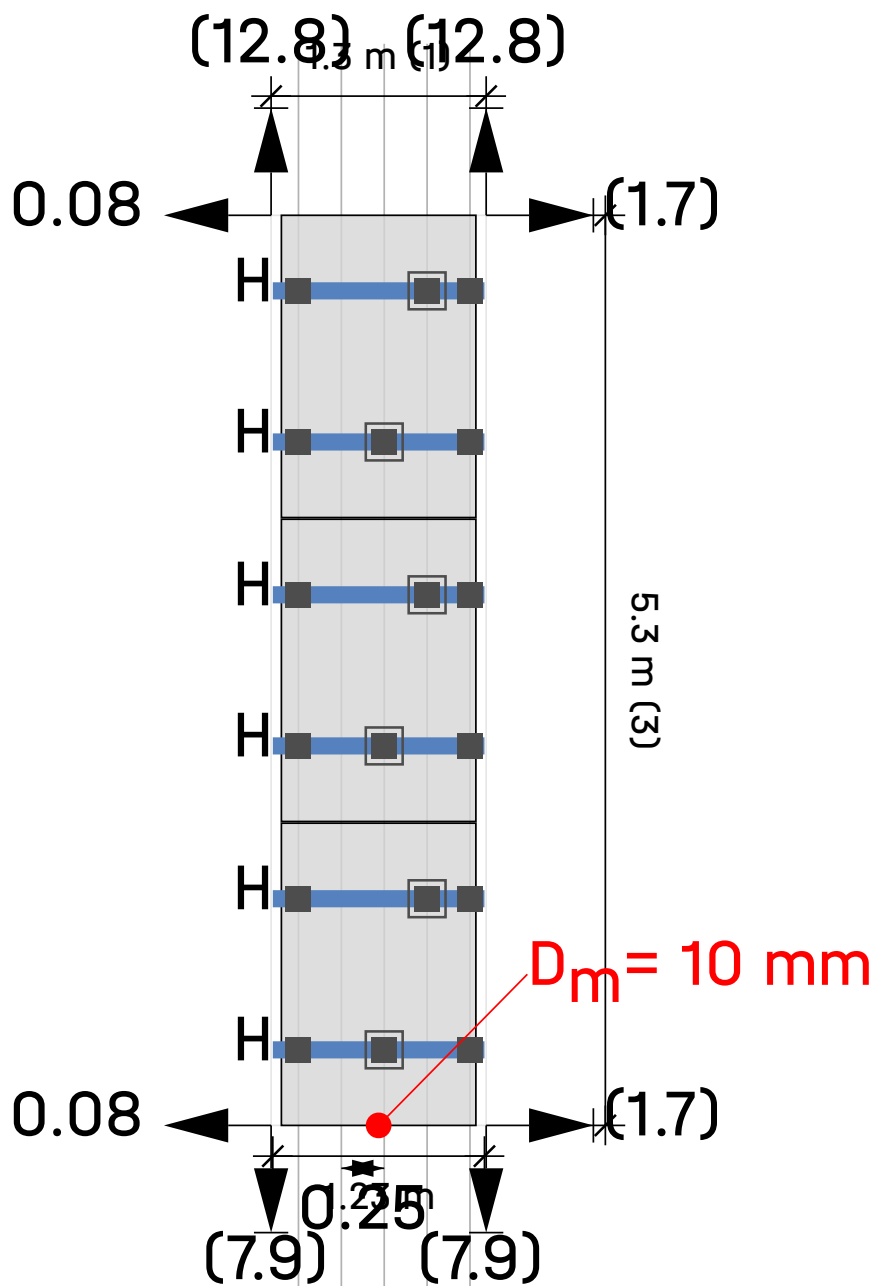
65(30.55 kWp) x
DM470G12RT-G48HBB

Row spacing

1.77 m



Area 3 | Module array 4 | Module block 8

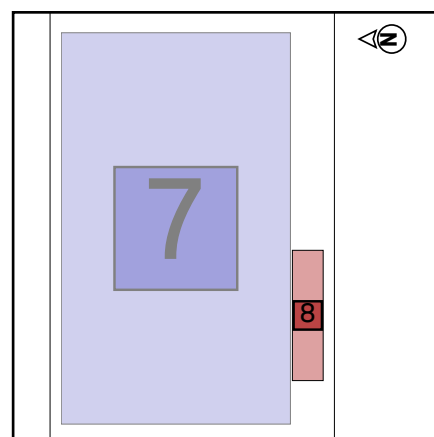


Roof ③ Module array ④ Module block 8

Modules $1 \times 3 = 3$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Results | Area 3

Roof	System	Module	Height	Quantity	Total power
<u>Area 3</u>	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	434	203.98 kWp
 Trapezoidal					

Module

Name	DM470G12RT-G48HBB
Manufacturer	Hengdian Group DMEGC Magnetic Co. Ltd.
Output power	470 Wp
Dimensions	1,762×1,134×30 mm
Weight	24.0 kg

Components

Fastener	K2 BasicClip
Base rails	K2 BasicRail 22
Metal screw	Thread-forming metal screw 6×38_rs

Material values

For material information refer to the product catalogue:

[K2 Catalogue \(k2-systems.com\)](https://k2-systems.com)

Loads on modules (module dimensioning)

No. Module array	Array	A-TrA [m²]	ultimate state [Pa]				Serviceability [Pa]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
1	Gableboard	2.00	524.0	45.8	-1,322.3	0.0	317.6	27.8	-801.4	0.0
1	Corner region (eave)	2.00	524.0	45.8	-2,524.3	0.0	317.6	27.8	-1,529.9	0.0
1	Corner region (ridge)	2.00	524.0	45.8	-2,884.9	0.0	317.6	27.8	-1,748.5	0.0
2	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
3	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
4	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
4	Gableboard	2.00	524.0	45.8	-1,322.3	0.0	317.6	27.8	-801.4	0.0

Utilisation result



Results | Area 3

No.	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ [%]	CL σ [%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L_{max} [m]	Fst Fst D_{max} [m]
1	Field area	21.2	8.3	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	5.3	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	10.5	57.1	1.2	0.250	---	0.430	0.250
1	Corner region (ridge)	7.7	12.1	65.6	1.4	0.250	---	0.401	0.250
2	Field area	21.2	8.2	60.2	20.3	0.750	---	0.500	0.750
3	Field area	21.2	10.1	60.2	20.3	0.750	---	0.500	0.750
4	Field area	21.2	7.0	60.2	20.3	0.750	---	0.500	0.750
4	Gableboard	30.3	1.9	85.8	30.0	0.750	---	0.449	0.750

Pr **Profile**Fst **Fastener** σ **Stress**f **Deflection**F **Force**CL/ L_{max} **Maximum cantilever length [m]**Fst D_{max} **Maximum fastener spacing [m]**BR **Base rail**Usab. **serviceability limit state**CL **Cantilever**



Results | Area 3

Important information

- The quantity for K2 BasicRail BasicClips is calculated in such a way, that - according to the Assembly Instructions - a BasicClip can be installed on the crest to the left and right of a Rail Connector Set.
- The structure was statically verified in accordance with Eurocode 9: Design of aluminium structures (EN 1999-1-1:2021) and Eurocode 3: Design of steel structures (EN 1993-1-1:2025) and offers sufficient load-bearing capacity and stability for the loads specified in the chapter 'Maximum actions on the components'.
- Adjustment factor for wind load regarding service life period, f_W , is according to EN 1991-1-4/ NA
- Adjustment factor for snow load regarding service life period, f_S , is according to EN 1991-1-3/ NA
- The structural design complies with BS EN 1990 - Basis of Structural Design.
- Snow loads are determined in accordance with National Annex BS NA EN 1991-1-3 (2018) - UK National Annex to EC1 - Action on structures - general actions - snow loads.
- Wind loads are determined in accordance with National Annex BS NA EN 1991-1-4 - UK National Annex to EC1 - Action on structures, general actions - wind actions.
- Service life is recognised according to 'Eurocode EN 1991 - Action on structures, Snow loads' and 'Eurocode EN 1991 - Actions on structures, Wind actions'. Subject to the Building Regulations and for security-relevant reasons the installation has to be dismantled at the end of its service life.
- Failure consequence class is considered according to 'Eurocode EN 1990 - Basis of structural design'.
- The person responsible for the execution of the work must check the load assumptions made with the conditions on site. If deviations are found, the person who prepared the static calculation must be consulted immediately.
- Please note our General Terms and Conditions of Use (TCU-E) in their currently valid version, available at: <https://k2-systems.com/en/digital-services/general-terms-and-conditions-of-use-for-entrepreneurs-tcu-e/>
Please note in particular § 1, Special provisions for K2 Base, clause 3 ("Technical and specialist requirements on the Customer's premises."), § 6 ("Limitation of warranty") and § 7 ("Limitation of liability").
- All instructions and requirements of the static calculations must be observed.
- Compliance with the regulations and requirements of the building permit and the building trade associations must be ensured during the execution of all work.
- All connections and anchoring measures must be carried out using approved and standardized connecting elements or parts only.
- Subordinate components that have not been verified must be implemented structurally.
- The "General Rules" for corrosion protection design of the structure are strongly recommended for application during implementation.
- The structure may only be climbed by trained and authorized personnel wearing appropriate safety equipment. Unauthorized use of the structure poses a risk of falling.



Structural analysis report | Area 3

General information

Name	260189 - Reading Football Stadium
Mounting system	K2 BasicRail
Author	AP

Location information

Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Ground elevation	45.28 m

Roof information

Building height	13.88 m
Roof type	Monopitch roof
Roof pitch	5°
Roof covering	Trapezoidal
Min. roof edge distance	0.00 m
Crest distance	250.0 mm
Crest width	22.0 mm
Crest height	40.0 mm
Roof material	Steel
Sheet quality	S235
Sheet thickness	0.500 mm

Loads

Design method	BS EN
Failure consequence class (CC)	CC3
Design working life	50 years
Terrain category	Town Terrain
Distance to shoreline	62.30 km
Distance inside town terrain	1.70 km

Wind load

Velocity pressure, 50 years	$q_{p,50} = 0.729 \text{ kN/m}^2$
Adjustment factor for service life	$f_w = 1.000$
Velocity pressure, 25 years	$q_{p,25} = 0.729 \text{ kN/m}^2$

Structural analysis report | Area 3

Roof areas

No. Module array	Array	Load impact area [m ²]	maxCpe	minCpe	wind pressure [kN/m ²]	wind suction [kN/m ²]
1	Field area	10.00	0.000	-0.800	0.000	-0.583
1	Gableboard	10.00	0.000	-1.100	0.000	-0.801
1	Corner region (eave)	10.00	0.000	-2.100	0.000	-1.530
1	Corner region (ridge)	10.00	0.000	-2.400	0.000	-1.748
2	Field area	10.00	0.000	-0.800	0.000	-0.583
3	Field area	10.00	0.000	-0.800	0.000	-0.583
4	Field area	10.00	0.000	-0.800	0.000	-0.583
4	Gableboard	10.00	0.000	-1.100	0.000	-0.801

Snow load

Snow load zone	2
Snow guard	No
Snow load on ground level	$s_k = 0.400 \text{ kN/m}^2$
Shape coefficient for snow	$\mu_i = 0.800$
Factor for roof pitch	$d_i = 0.996$
Snow load on roof, 50 year	$s_{i,50} = 0.319 \text{ kN/m}^2$
Adjustment factor for service life	$f_s = 1.000$
Snow load on roof, 25 years	$s_{i,25} = 0.319 \text{ kN/m}^2$

Dead load

Weight of module	$G_M = 24.0 \text{ kg}$
Weight of mounting system per module	$= 2.00 \text{ kg}$
Module area	$A_M = 2.00 \text{ m}^2$
Dead weight of module per m ²	$= 12.01 \text{ kg/m}^2$
Dead weight of mounting system per m ²	$= 1.00 \text{ kg/m}^2$
Total dead load (excl. ballast) per m ²	$= 0.13 \text{ kN/m}^2$



Structural analysis report | Area 3

Load combinations

Ultimate limit state

Partial safety factor unfavourable permanent load	$\gamma_{G,sup} = 1.35$
Partial safety factor favourable permanent load	$\gamma_{G,inf} = 1.00$
Partial safety factor destabilising permanent load	$\gamma_{G,dst} = 1.10$
Partial safety factor stabilising permanent load	$\gamma_{G,stab} = 0.90$
Partial safety factor variable loads	$\gamma_Q = 1.50$
Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Importance factor permanent	$\kappa_{Fl,G} = 1.10$
Importance factor variable	$\kappa_{Fl,Q} = 1.10$
Characteristic dead weight	G_k
Characteristic snow load on the roof	$S_{i,n}$
Characteristic wind load	W_k
Load case combination 01	$LCC\ 01_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * S_{i,n}$
Load case combination 02	$LCC\ 02_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04	$LCC\ 04_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$
Load case combination 06	$LCC\ 06_{uls} = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Suction}$

Serviceability limit state

Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Load case combination 01	$LCC\ 01_{sls} = G_k + S_{i,n}$
Load case combination 02	$LCC\ 02_{sls} = G_k + W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{sls} = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$
Load case combination 04	$LCC\ 04_{sls} = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$
Load case combination 06	$LCC\ 06_{sls} = G_k + W_{k,Suction}$

Structural analysis report | Area 3

Maximum load on modules (Mounting system dimensioning)

No. Module array	Array	A-TrA [m ²]	ultimate state [kN/m ²]				Serviceability [kN/m ²]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
1	Gableboard	10.00	0.713	0.062	-1.195	0.011	0.445	0.039	-0.674	0.011
1	Corner region (eave)	10.00	0.713	0.062	-2.397	0.011	0.445	0.039	-1.403	0.011
1	Corner region (ridge)	10.00	0.713	0.062	-2.758	0.011	0.445	0.039	-1.621	0.011
2	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
3	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
4	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
4	Gableboard	10.00	0.713	0.062	-1.195	0.011	0.445	0.039	-0.674	0.011

Max. load on fastener

No. Module array	Array	A-TrA [m ²]	ultimate state [kN]				Serviceability [kN]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
1	Gableboard	10.00	0.518	0.045	-0.869	0.008	0.323	0.028	-0.490	0.008
1	Corner region (eave)	10.00	0.173	0.015	-0.581	0.003	0.108	0.009	-0.340	0.003
1	Corner region (ridge)	10.00	0.173	0.015	-0.668	0.003	0.108	0.009	-0.393	0.003
2	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
3	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
4	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
4	Gableboard	10.00	0.518	0.045	-0.869	0.008	0.323	0.028	-0.490	0.008

Resistance values of components

Base rail

Base rail	A [cm ²]	I _y [cm ⁴]	I _z [cm ⁴]	W _y [cm ³]	W _z [cm ³]
K2 BasicRail 22	2.380	1.52	7.74	1.08	2.46



Structural analysis report | Area 3

Fastener

Fastener	$R_{D,Uplift,Perpendicular}$ [kN]	$R_{D,Pressure,Perpendicular}$ [kN]	$R_{D,Pressure,Parallel}$ [kN]
K2 BasicClip	1.02	-	0.96
Thread-forming metal screw 6×38_rs	0.65	-	0.62

Utilisation result

No.	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ [%]	CL σ [%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L_{max} [m]	Fst D _{max} [m]
1	Field area	21.2	8.3	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	5.3	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	10.5	57.1	1.2	0.250	---	0.430	0.250
1	Corner region (ridge)	7.7	12.1	65.6	1.4	0.250	---	0.401	0.250
2	Field area	21.2	8.2	60.2	20.3	0.750	---	0.500	0.750
3	Field area	21.2	10.1	60.2	20.3	0.750	---	0.500	0.750
4	Field area	21.2	7.0	60.2	20.3	0.750	---	0.500	0.750
4	Gableboard	30.3	1.9	85.8	30.0	0.750	---	0.449	0.750

Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/ L_{max}	Maximum cantilever length [m]		

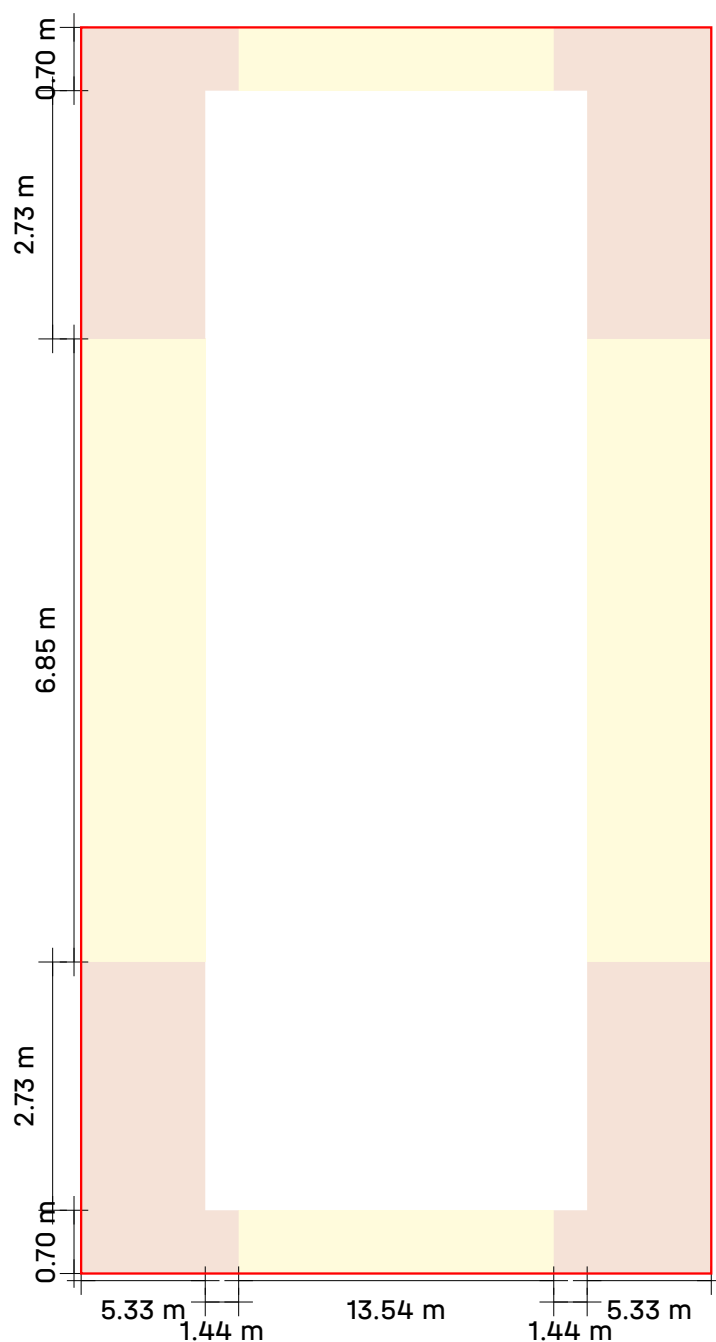


Area 3 | Bill of material

Position	Item no.	Item description	Quantity	Weight
1	1001164	K2 BasicClip	1,749	52.5 kg
2	1005193	Thread-forming metal screw 6×38_rs	3,498	24.5 kg
3	2004537	K2 Clamp MC 25-40	722	52.0 kg
4	2004543	K2 Clamp EC 25-40	292	21.0 kg
5	1003558	K2 BasicRail BasicLock 22 Set	146	7.3 kg
6	2004277	K2 BasicRail 22; 3.65 m	298	699.4 kg
7	1003571	K2 BasicRail BasicConnector Set	206	10.1 kg
Total				866.8 kg

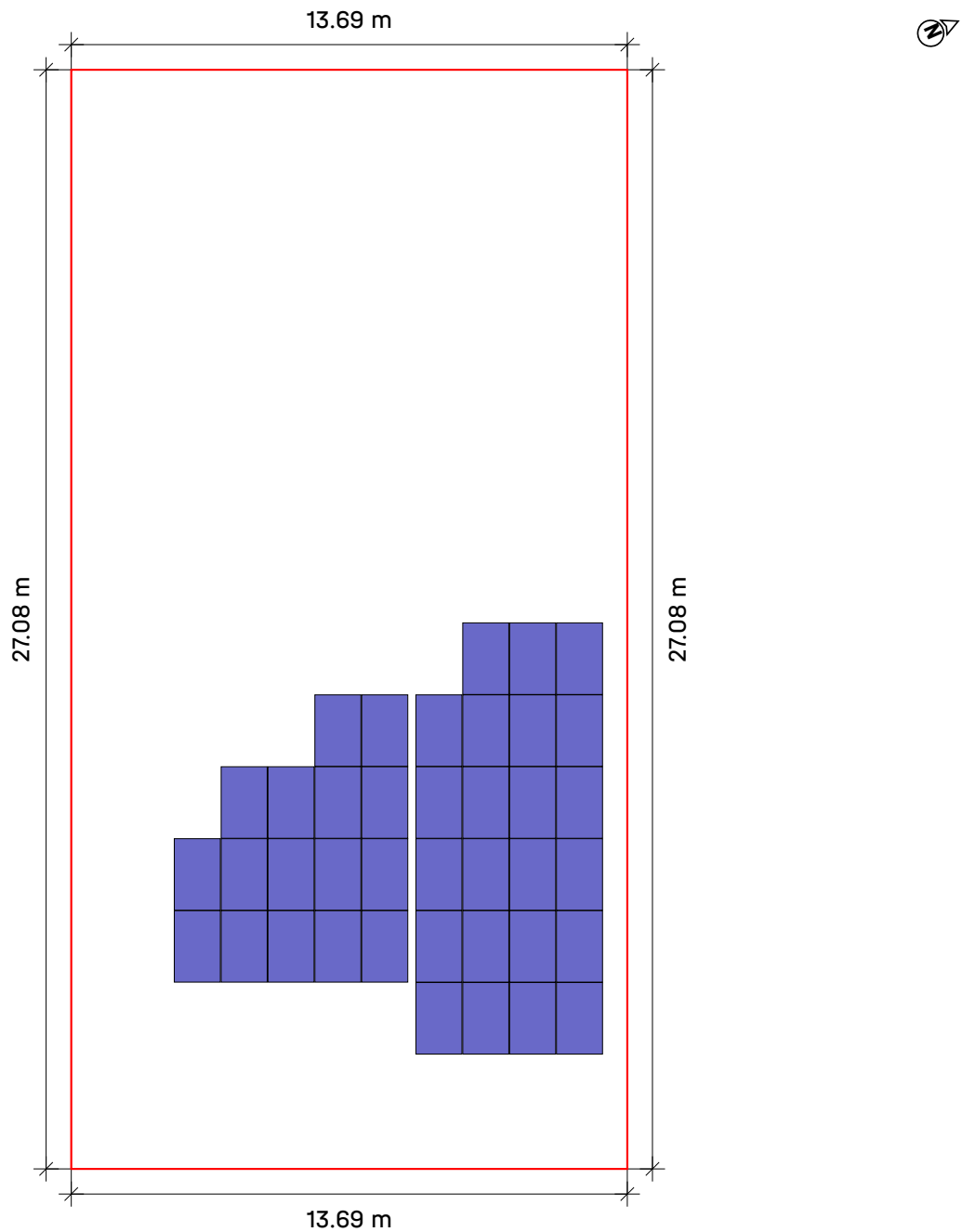


Area 4





Area 4



Roof	System	Module	Height	Quantity	Total power
<u>Area 4</u>	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	39	18.33 kWp
 Trapezoidal					

Area 4 | Assembly plan

Base rail

Type	Whole rails		Rail cutting		
	Total rail length	Quantity 3.65 m	Part of rail / Rest	Length	Rest
2*A	3.542 m		3.650	3.542 from 3.650	0.098
2*B	2.388 m		3.650	2.388 from 3.650	1.252
2*C	4.696 m	1*3.65 m	1.252	1.046 from 1.252	0.196
4*D	5.850 m	1*3.65 m	3.650	2.200 from 3.650	1.440
4*E	4.696 m	1*3.65 m	1.440	1.046 from 1.440	0.384
2*F	4.696 m	1*3.65 m	3.650	1.046 from 3.650	2.594
2*G	4.696 m	1*3.65 m	2.594	1.046 from 2.594	1.538
2*H	4.696 m	1*3.65 m	1.538	1.046 from 1.538	0.482

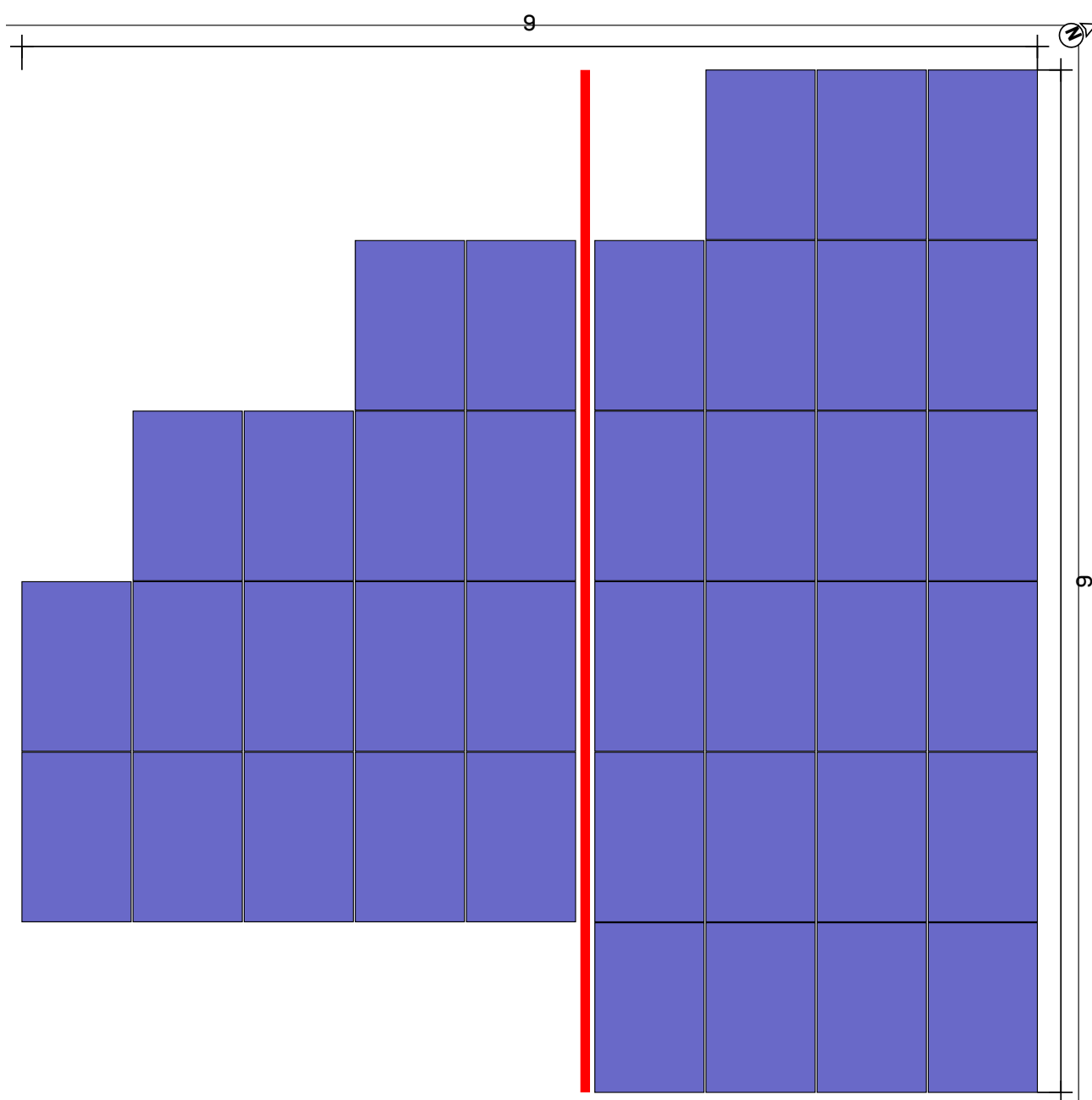
1 cm is viewed as lost for each cutting

Red numbers are leftover rails which will not be used any longer.

Module arrays

Module array	Width[m]	Length[m]	Width in modules	Length in modules
1	10.55	10.62	4	6

Area 4 | Module array 1



Roof ④ Module array ①

Mounting system

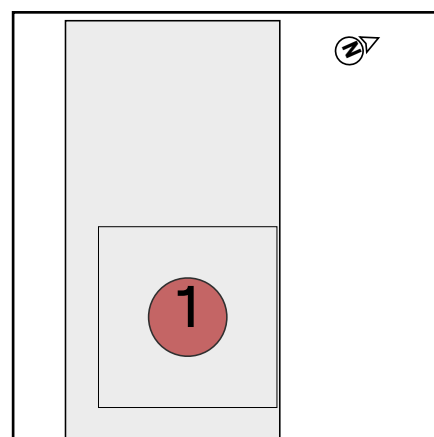
Module

Row spacing

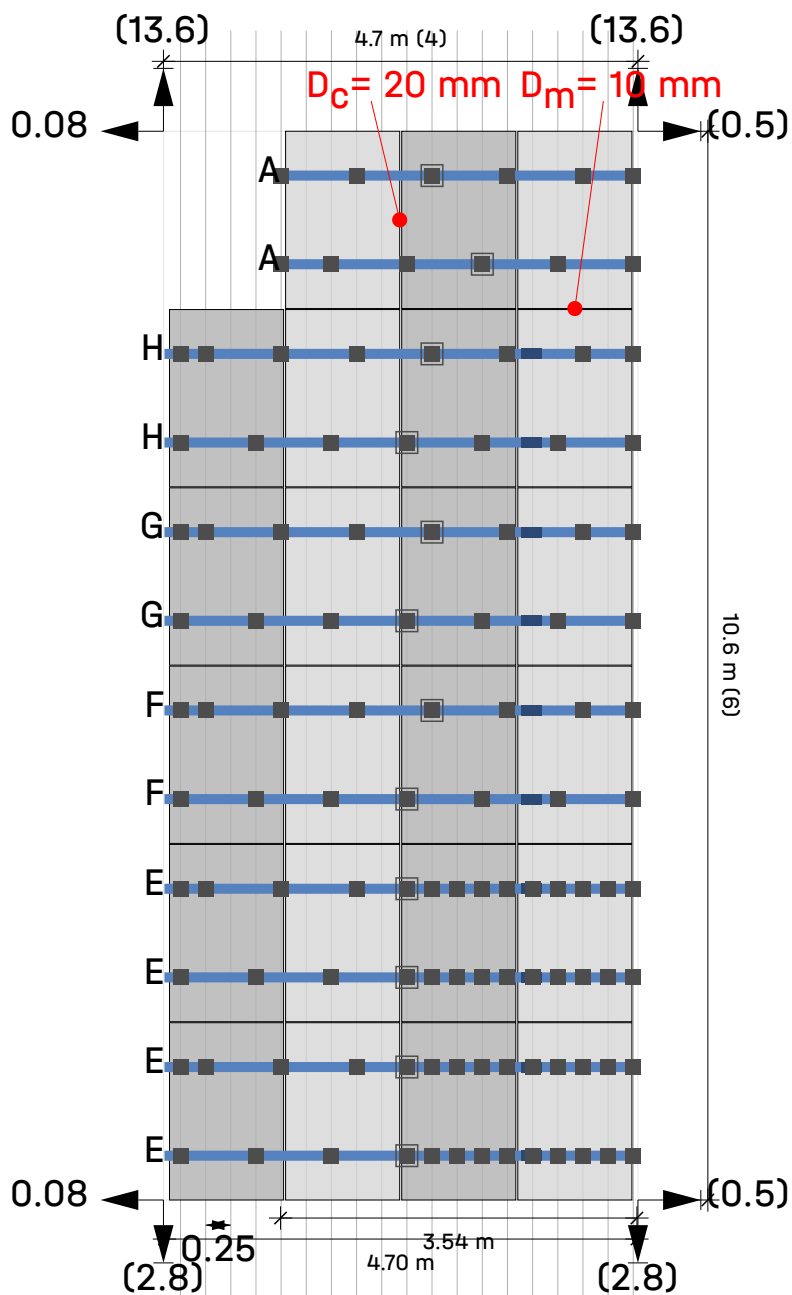
[K2 BasicRail](#)

39(18.33 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 4 | Module array 1 | Module block 2

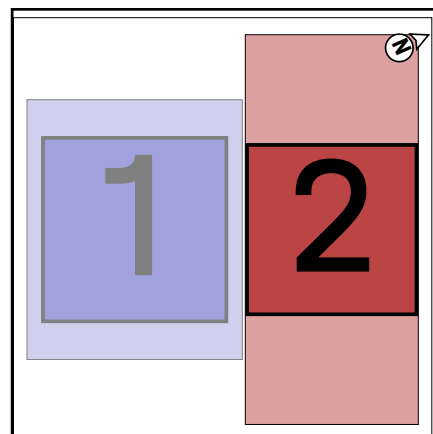


Roof ④ Module array ① Module block 2

Modules $(4 \times 6) - 1 = 23$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- ➔ Dist. to neighbour module block/array [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Results | Area 4

Roof	System	Module	Height	Quantity	Total power
<u>Area 4</u>	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	39	18.33 kWp
 Trapezoidal					

Module

Name	DM470G12RT-G48HBB
Manufacturer	Hengdian Group DMEGC Magnetic Co. Ltd.
Output power	470 Wp
Dimensions	1,762×1,134×30 mm
Weight	24.0 kg

Components

Fastener	K2 BasicClip
Base rails	K2 BasicRail 22
Metal screw	Thread-forming metal screw 6×38_rs

Material values

For material information refer to the product catalogue:

[K2 Catalogue \(k2-systems.com\)](https://k2-systems.com)

Loads on modules (module dimensioning)

No. Module array	Array	A-TrA [m²]	ultimate state [Pa]				Serviceability [Pa]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
1	Gableboard	2.00	524.0	45.8	-1,322.3	0.0	317.6	27.8	-801.4	0.0
1	Corner region (eave)	2.00	524.0	45.8	-2,524.3	0.0	317.6	27.8	-1,529.9	0.0

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ[%]	CL σ[%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L _{max} [m]	Fst D _{max} [m]
1	Field area	21.2	10.9	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	3.2	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	6.5	57.1	1.2	0.250	---	0.430	0.250



Results | Area 4

Pr	Profile
Fst	Fastener
σ	Stress
f	Deflection
F	Force
CL/L _{max}	Maximum cantilever length [m]

Fst D _{max}	Maximum fastener spacing [m]
BR	Base rail
Usab.	serviceability limit state
CL	Cantilever



Results | Area 4

Important information

- The quantity for K2 BasicRail BasicClips is calculated in such a way, that - according to the Assembly Instructions - a BasicClip can be installed on the crest to the left and right of a Rail Connector Set.
- The structure was statically verified in accordance with Eurocode 9: Design of aluminium structures (EN 1999-1-1:2021) and Eurocode 3: Design of steel structures (EN 1993-1-1:2025) and offers sufficient load-bearing capacity and stability for the loads specified in the chapter 'Maximum actions on the components'.
- Adjustment factor for wind load regarding service life period, f_W , is according to EN 1991-1-4/ NA
- Adjustment factor for snow load regarding service life period, f_S , is according to EN 1991-1-3/ NA
- The structural design complies with BS EN 1990 - Basis of Structural Design.
- Snow loads are determined in accordance with National Annex BS NA EN 1991-1-3 (2018) - UK National Annex to EC1 - Action on structures - general actions - snow loads.
- Wind loads are determined in accordance with National Annex BS NA EN 1991-1-4 - UK National Annex to EC1 - Action on structures, general actions - wind actions.
- Service life is recognised according to 'Eurocode EN 1991 - Action on structures, Snow loads' and 'Eurocode EN 1991 - Actions on structures, Wind actions'. Subject to the Building Regulations and for security-relevant reasons the installation has to be dismantled at the end of its service life.
- Failure consequence class is considered according to 'Eurocode EN 1990 - Basis of structural design'.
- The person responsible for the execution of the work must check the load assumptions made with the conditions on site. If deviations are found, the person who prepared the static calculation must be consulted immediately.
- Please note our General Terms and Conditions of Use (TCU-E) in their currently valid version, available at: <https://k2-systems.com/en/digital-services/general-terms-and-conditions-of-use-for-entrepreneurs-tcu-e/>
Please note in particular § 1, Special provisions for K2 Base, clause 3 ("Technical and specialist requirements on the Customer's premises."), § 6 ("Limitation of warranty") and § 7 ("Limitation of liability").
- All instructions and requirements of the static calculations must be observed.
- Compliance with the regulations and requirements of the building permit and the building trade associations must be ensured during the execution of all work.
- All connections and anchoring measures must be carried out using approved and standardized connecting elements or parts only.
- Subordinate components that have not been verified must be implemented structurally.
- The "General Rules" for corrosion protection design of the structure are strongly recommended for application during implementation.
- The structure may only be climbed by trained and authorized personnel wearing appropriate safety equipment. Unauthorized use of the structure poses a risk of falling.



Structural analysis report | Area 4

General information

Name	260189 - Reading Football Stadium
Mounting system	K2 BasicRail
Author	AP

Location information

Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Ground elevation	45.28 m

Roof information

Building height	13.88 m
Roof type	Monopitch roof
Roof pitch	5°
Roof covering	Trapezoidal
Min. roof edge distance	0.00 m
Crest distance	250.0 mm
Crest width	22.0 mm
Crest height	40.0 mm
Roof material	Steel
Sheet quality	S235
Sheet thickness	0.500 mm

Loads

Design method	BS EN
Failure consequence class (CC)	CC3
Design working life	50 years
Terrain category	Town Terrain
Distance to shoreline	62.30 km
Distance inside town terrain	1.70 km

Wind load

Velocity pressure, 50 years	$q_{p,50} = 0.729 \text{ kN/m}^2$
Adjustment factor for service life	$f_w = 1.000$
Velocity pressure, 25 years	$q_{p,25} = 0.729 \text{ kN/m}^2$

Structural analysis report | Area 4

Roof areas

No. Module array	Array	Load impact area [m ²]	maxCpe	minCpe	wind pressure [kN/m ²]	wind suction [kN/m ²]
1	Field area	10.00	0.000	-0.800	0.000	-0.583
1	Gableboard	10.00	0.000	-1.100	0.000	-0.801
1	Corner region (eave)	10.00	0.000	-2.100	0.000	-1.530

Snow load

Snow load zone	2
Snow guard	No
Snow load on ground level	$s_k = 0.400 \text{ kN/m}^2$
Shape coefficient for snow	$\mu_i = 0.800$
Factor for roof pitch	$d_i = 0.996$
Snow load on roof, 50 year	$s_{i,50} = 0.319 \text{ kN/m}^2$
Adjustment factor for service life	$f_s = 1.000$
Snow load on roof, 25 years	$s_{i,25} = 0.319 \text{ kN/m}^2$

Dead load

Weight of module	$G_M = 24.0 \text{ kg}$
Weight of mounting system per module	$= 2.00 \text{ kg}$
Module area	$A_M = 2.00 \text{ m}^2$
Dead weight of module per m ²	$= 12.01 \text{ kg/m}^2$
Dead weight of mounting system per m ²	$= 1.00 \text{ kg/m}^2$
Total dead load (excl. ballast) per m ²	$= 0.13 \text{ kN/m}^2$



Structural analysis report | Area 4

Load combinations

Ultimate limit state

Partial safety factor unfavourable permanent load	$\gamma_{G,sup} = 1.35$
Partial safety factor favourable permanent load	$\gamma_{G,inf} = 1.00$
Partial safety factor destabilising permanent load	$\gamma_{G,dst} = 1.10$
Partial safety factor stabilising permanent load	$\gamma_{G,stab} = 0.90$
Partial safety factor variable loads	$\gamma_Q = 1.50$
Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Importance factor permanent	$\kappa_{Fl,G} = 1.10$
Importance factor variable	$\kappa_{Fl,Q} = 1.10$
Characteristic dead weight	G_k
Characteristic snow load on the roof	$S_{i,n}$
Characteristic wind load	W_k

Load case combination 01	$LCC\ 01_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * S_{i,n}$
Load case combination 02	$LCC\ 02_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04	$LCC\ 04_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$
Load case combination 06	$LCC\ 06_{uls} = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Suction}$

Serviceability limit state

Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$

Load case combination 01	$LCC\ 01_{sls} = G_k + S_{i,n}$
Load case combination 02	$LCC\ 02_{sls} = G_k + W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{sls} = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$
Load case combination 04	$LCC\ 04_{sls} = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$
Load case combination 06	$LCC\ 06_{sls} = G_k + W_{k,Suction}$

Maximum load on modules (Mounting system dimensioning)

No. Module array	Array	A-TrA [m ²]	ultimate state [kN/m ²]				Serviceability [kN/m ²]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
1	Gableboard	10.00	0.713	0.062	-1.195	0.011	0.445	0.039	-0.674	0.011
1	Corner region (eave)	10.00	0.713	0.062	-2.397	0.011	0.445	0.039	-1.403	0.011



Structural analysis report | Area 4

Max. load on fastener

No. Module array	Array	A-TrA [m ²]	ultimate state [kN]				Serviceability [kN]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
1	Gableboard	10.00	0.518	0.045	-0.869	0.008	0.323	0.028	-0.490	0.008
1	Corner region (eave)	10.00	0.173	0.015	-0.581	0.003	0.108	0.009	-0.340	0.003

Resistance values of components

Base rail

Base rail	A [cm ²]	I _y [cm ⁴]	I _z [cm ⁴]	W _y [cm ³]	W _z [cm ³]
K2 BasicRail 22	2.380	1.52	7.74	1.08	2.46

Fastener

Fastener	R _{D,Uplift,Perpendicular} [kN]	R _{D,Pressure,Perpendicular} [kN]	R _{D,Pressure,Parallel} [kN]
K2 BasicClip	1.02	-	0.96
Thread-forming metal screw 6×38_rs	0.65	-	0.62

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ[%]	CL σ[%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L _{max} [m]	Fst Fst D _{max} [m]
1	Field area	21.2	10.9	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	3.2	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	6.5	57.1	1.2	0.250	---	0.430	0.250

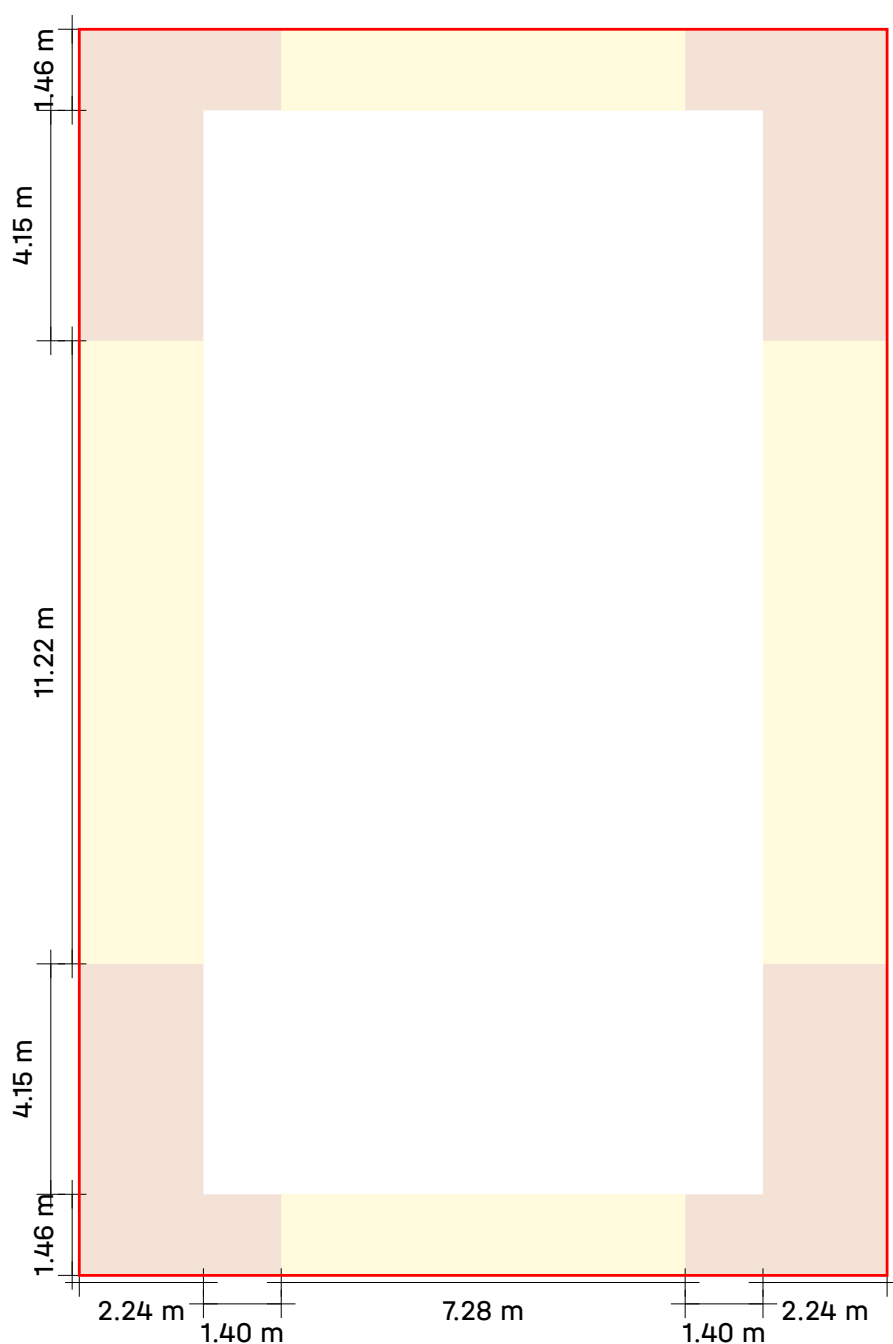
Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/L _{max}	Maximum cantilever length [m]		



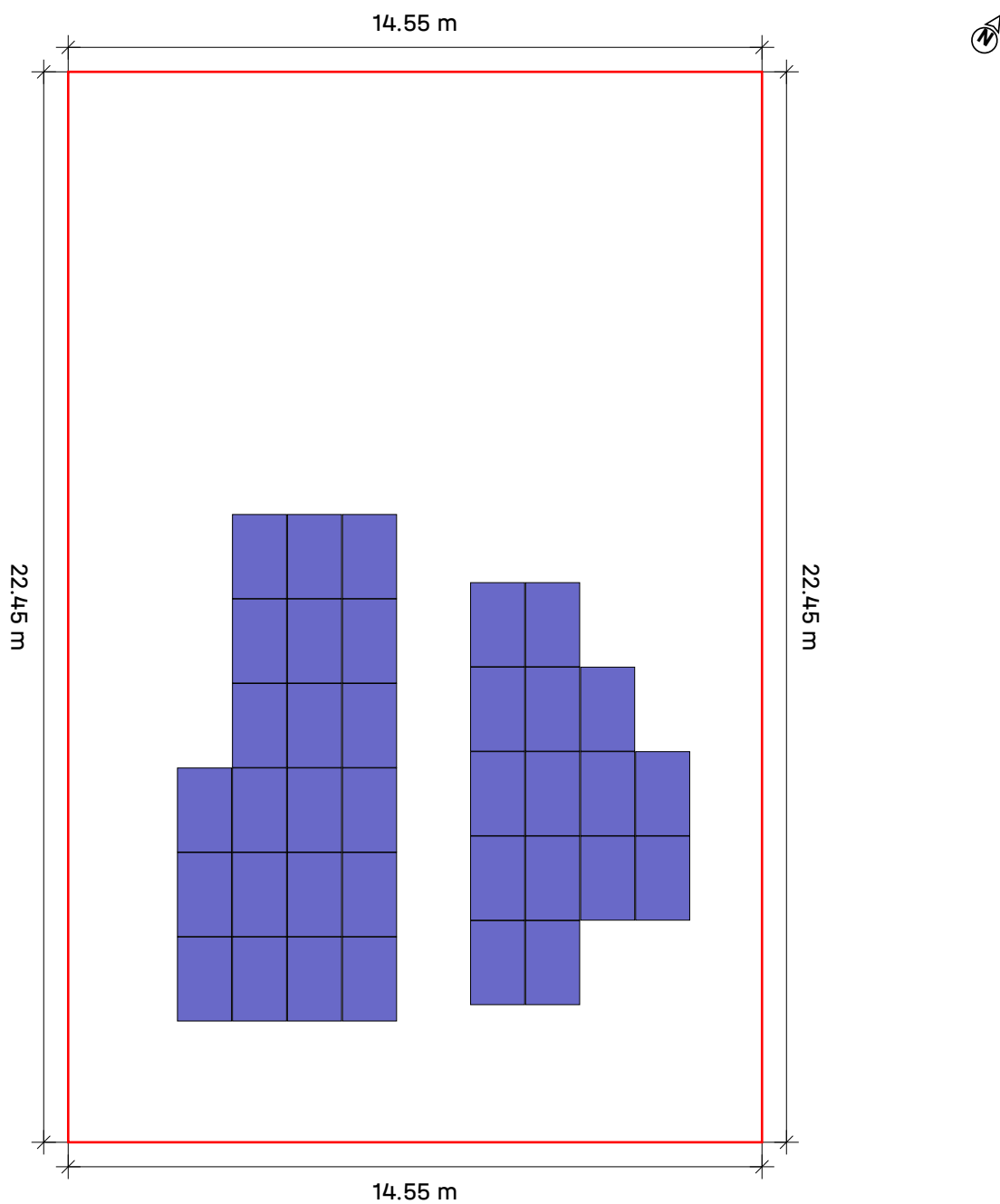
Area 4 | Bill of material

Position	Item no.	Item description	Quantity	Weight
1	1001164	K2 BasicClip	186	5.6 kg
2	1005193	Thread-forming metal screw 6×38_rs	372	2.6 kg
3	2004537	K2 Clamp MC 25-40	58	4.2 kg
4	2004543	K2 Clamp EC 25-40	40	2.9 kg
5	1003558	K2 BasicRail BasicLock 22 Set	20	1.0 kg
6	2004277	K2 BasicRail 22; 3.65 m	26	61.0 kg
7	1003571	K2 BasicRail BasicConnector Set	16	0.8 kg
Total				78.0 kg

Area 5



Area 5



Roof	System	Module	Height	Quantity	Total power
Area 5	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	36	16.92 kWp
Trapezoidal					



Area 5 | Assembly plan

Base rail

Type	Whole rails		Rail cutting		
	Total rail length	Quantity 3.65 m	Part of rail / Rest	Length	Rest
8*A	3.542 m		3.650	3.542 from 3.650	0.098
4*B	2.388 m		3.650	2.388 from 3.650	1.252
4*C	4.696 m	1*3.65 m	1.252	1.046 from 1.252	0.196
2*D	4.696 m	1*3.65 m	3.650	1.046 from 3.650	2.594
2*E	4.696 m	1*3.65 m	2.594	1.046 from 2.594	1.538
2*F	4.696 m	1*3.65 m	1.538	1.046 from 1.538	0.482

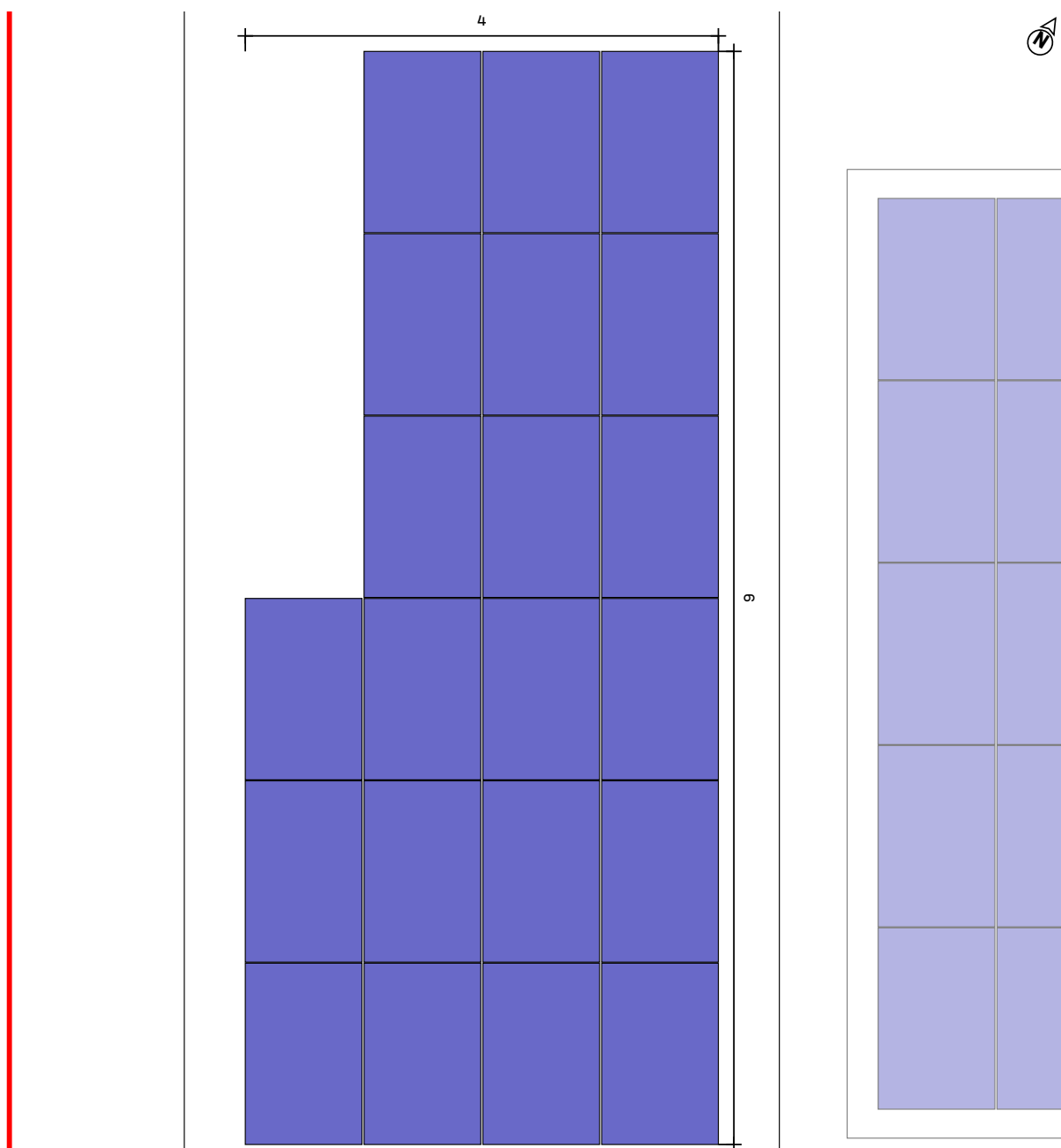
1 cm is viewed as lost for each cutting

Red numbers are leftover rails which will not be used any longer.

Module arrays

Module array	Width[m]	Length[m]	Width in modules	Length in modules
1	4.60	10.62	4	6
2	4.60	8.85	4	5

Area 5 | Module array 1



Roof ⑤ Module array ①

Mounting system

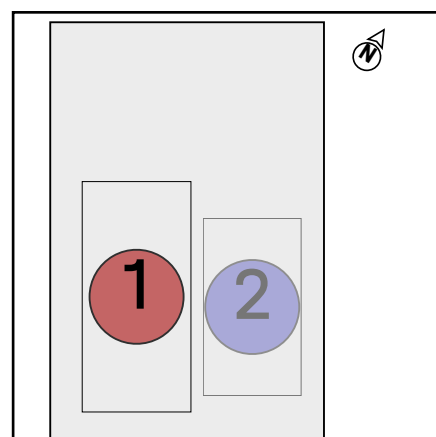
Module

Row spacing

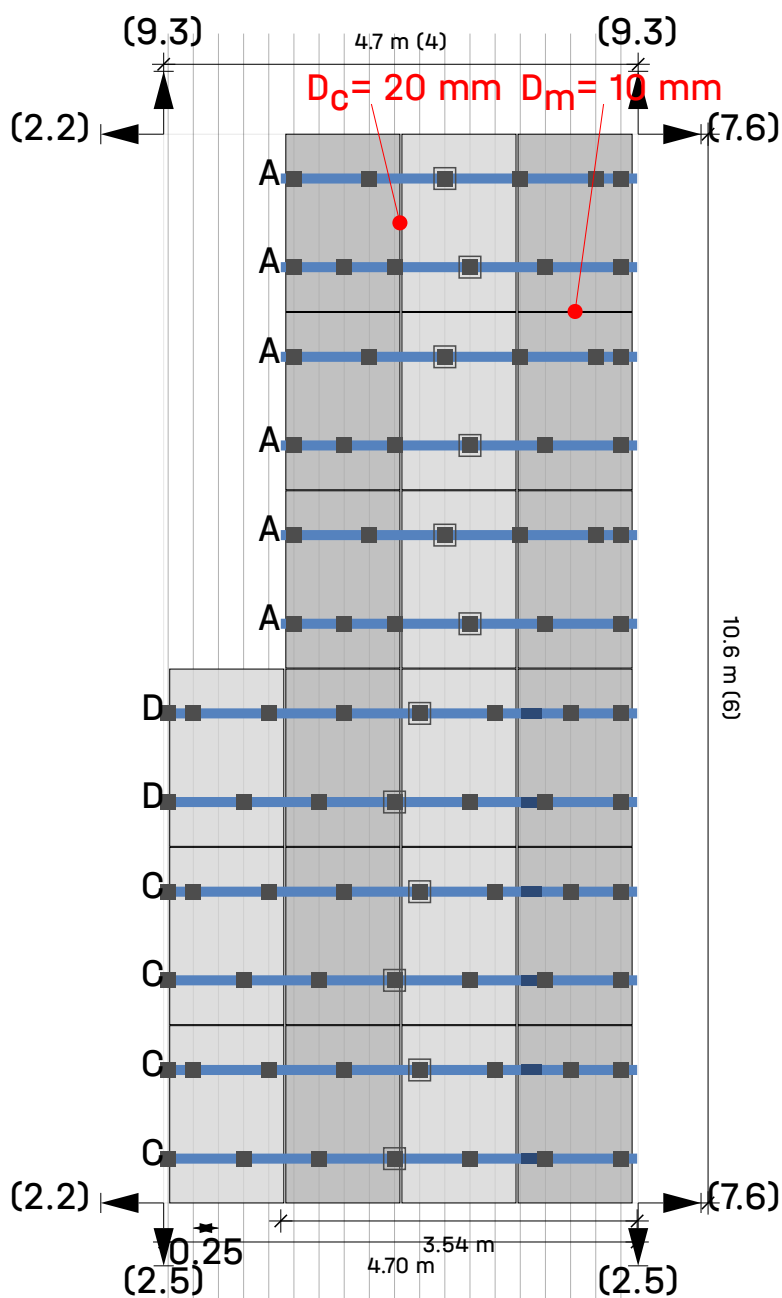
[K2 BasicRail](#)

21(9.87 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 5 | Module array 1 | Module block 1

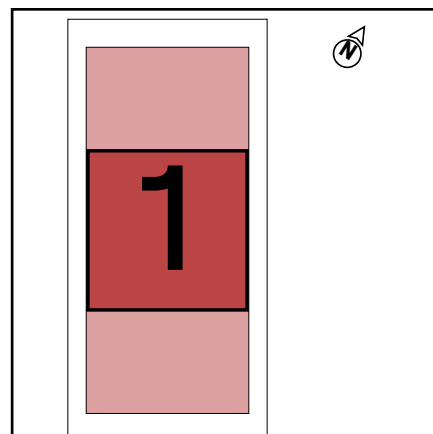


Roof ⑤ Module array ① Module block 1

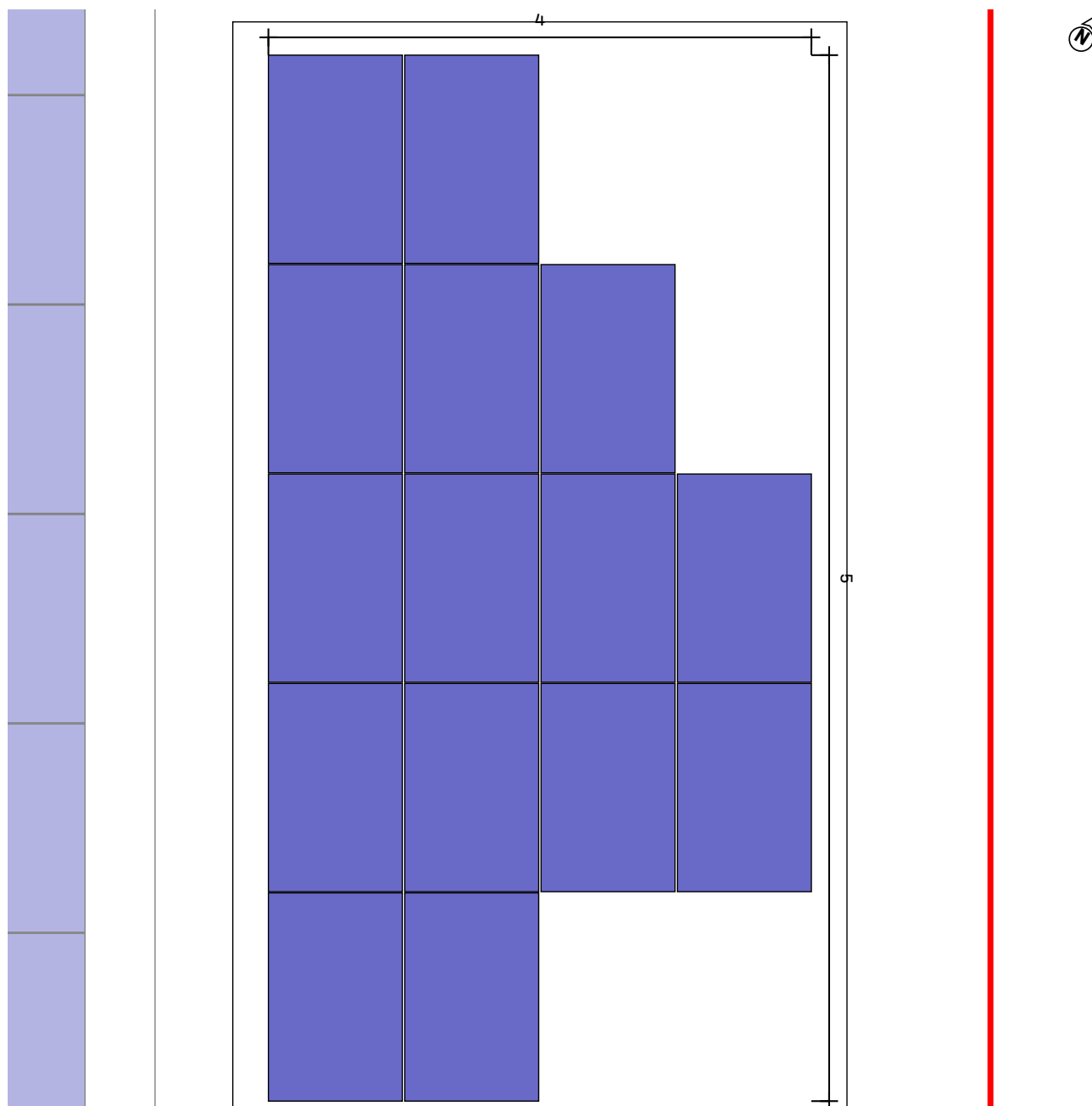
Modules (4 × 6) - 3 = 21

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- Distance to roof edge [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Area 5 | Module array 2



Roof ⑤ Module array ②

Mounting system

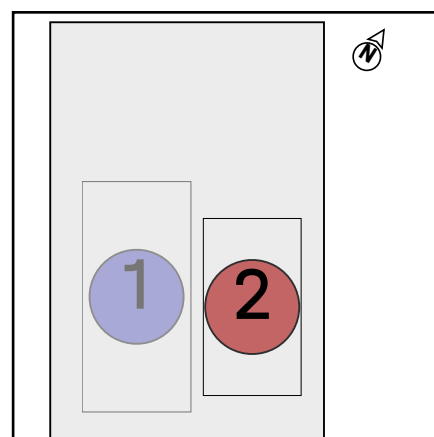
Module

Row spacing

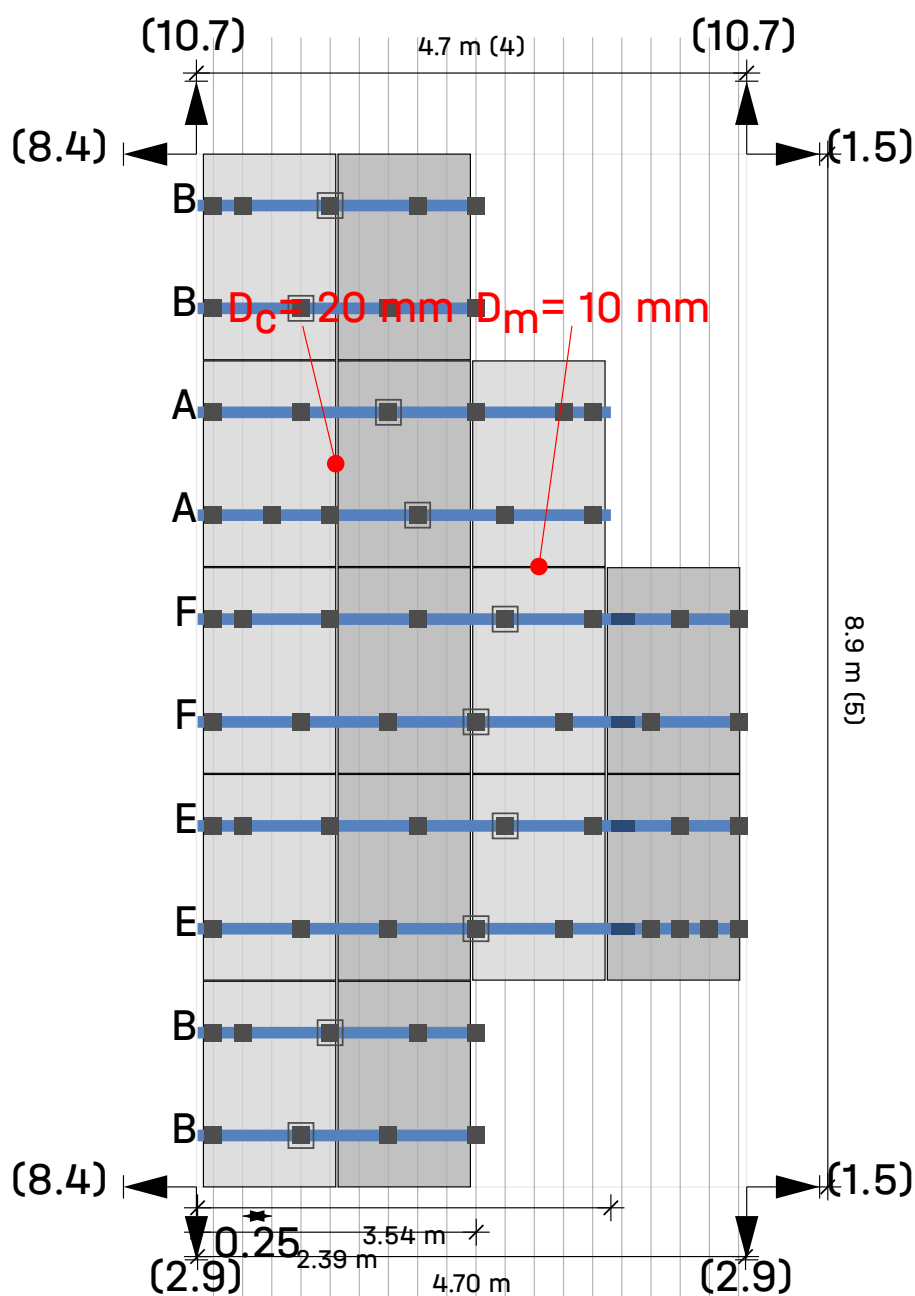
[K2 BasicRail](#)

15(7.05 kWp) x
DM470G12RT-G48HBB

1.77 m



Area 5 | Module array 2 | Module block 2

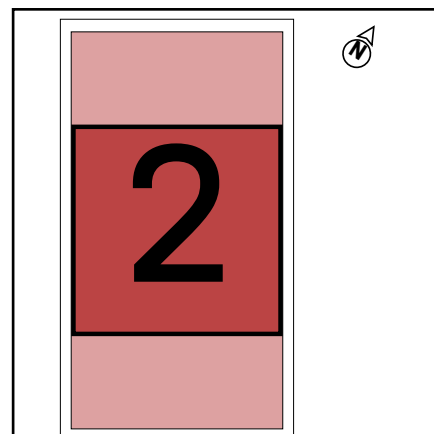


Roof ⑤ Module array ② Module block 2

Modules $(4 \times 5) - 5 = 15$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- Distance to roof edge [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Results | Area 5

Roof	System	Module	Height	Quantity	Total power
<u>Area 5</u>	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	36	16.92 kWp
 Trapezoidal					

Module

Name	DM470G12RT-G48HBB
Manufacturer	Hengdian Group DMEGC Magnetic Co. Ltd.
Output power	470 Wp
Dimensions	1,762×1,134×30 mm
Weight	24.0 kg

Components

Fastener	K2 BasicClip
Base rails	K2 BasicRail 22
Metal screw	Thread-forming metal screw 6×38_rs

Material values

For material information refer to the product catalogue:

[K2 Catalogue \(k2-systems.com\)](https://k2-systems.com)

Loads on modules (module dimensioning)

No. Module array	Array	A-TrA [m²]	ultimate state [Pa]				Serviceability [Pa]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
2	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
2	Gableboard	2.00	524.0	45.8	-1,322.3	0.0	317.6	27.8	-801.4	0.0
2	Corner region (eave)	2.00	524.0	45.8	-2,524.3	0.0	317.6	27.8	-1,529.9	0.0



Results | Area 5

Utilisation result

No.	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ [%]	CL σ [%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L_{max} [m]	Fst D _{max} [m]
1	Field area	21.2	4.9	60.2	20.3	0.750	---	0.500	0.750
2	Field area	21.2	4.6	60.2	20.3	0.750	---	0.500	0.750
2	Gableboard	30.3	1.0	85.8	30.0	0.750	---	0.449	0.750
2	Corner region (eave)	6.7	1.9	57.1	1.2	0.250	---	0.430	0.250

Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/ L_{max}	Maximum cantilever length [m]		

Results | Area 5

Important information

- The quantity for K2 BasicRail BasicClips is calculated in such a way, that - according to the Assembly Instructions - a BasicClip can be installed on the crest to the left and right of a Rail Connector Set.
- The structure was statically verified in accordance with Eurocode 9: Design of aluminium structures (EN 1999-1-1:2021) and Eurocode 3: Design of steel structures (EN 1993-1-1:2025) and offers sufficient load-bearing capacity and stability for the loads specified in the chapter 'Maximum actions on the components'.
- Adjustment factor for wind load regarding service life period, f_W , is according to EN 1991-1-4/ NA
- Adjustment factor for snow load regarding service life period, f_S , is according to EN 1991-1-3/ NA
- The structural design complies with BS EN 1990 - Basis of Structural Design.
- Snow loads are determined in accordance with National Annex BS NA EN 1991-1-3 (2018) - UK National Annex to EC1 - Action on structures - general actions - snow loads.
- Wind loads are determined in accordance with National Annex BS NA EN 1991-1-4 - UK National Annex to EC1 - Action on structures, general actions - wind actions.
- Service life is recognised according to 'Eurocode EN 1991 - Action on structures, Snow loads' and 'Eurocode EN 1991 - Actions on structures, Wind actions'. Subject to the Building Regulations and for security-relevant reasons the installation has to be dismantled at the end of its service life.
- Failure consequence class is considered according to 'Eurocode EN 1990 - Basis of structural design'.
- The person responsible for the execution of the work must check the load assumptions made with the conditions on site. If deviations are found, the person who prepared the static calculation must be consulted immediately.
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Please note in particular § 1, Special provisions for K2 Base, clause 3 ("Technical and specialist requirements on the Customer's premises."), § 6 ("Limitation of warranty") and § 7 ("Limitation of liability").
- All instructions and requirements of the static calculations must be observed.
- Compliance with the regulations and requirements of the building permit and the building trade associations must be ensured during the execution of all work.
- All connections and anchoring measures must be carried out using approved and standardized connecting elements or parts only.
- Subordinate components that have not been verified must be implemented structurally.
- The "General Rules" for corrosion protection design of the structure are strongly recommended for application during implementation.
- The structure may only be climbed by trained and authorized personnel wearing appropriate safety equipment. Unauthorized use of the structure poses a risk of falling.



Structural analysis report | Area 5

General information

Name	260189 - Reading Football Stadium
Mounting system	K2 BasicRail
Author	AP

Location information

Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Ground elevation	45.28 m

Roof information

Building height	13.88 m
Roof type	Monopitch roof
Roof pitch	5°
Roof covering	Trapezoidal
Min. roof edge distance	0.00 m
Crest distance	250.0 mm
Crest width	22.0 mm
Crest height	40.0 mm
Roof material	Steel
Sheet quality	S235
Sheet thickness	0.500 mm

Loads

Design method	BS EN
Failure consequence class (CC)	CC3
Design working life	50 years
Terrain category	Town Terrain
Distance to shoreline	62.30 km
Distance inside town terrain	1.70 km

Wind load

Velocity pressure, 50 years	$q_{p,50} = 0.729 \text{ kN/m}^2$
Adjustment factor for service life	$f_w = 1.000$
Velocity pressure, 25 years	$q_{p,25} = 0.729 \text{ kN/m}^2$

Structural analysis report | Area 5

Roof areas

No. Module array	Array	Load impact area [m ²]	maxCpe	minCpe	wind pressure [kN/m ²]	wind suction [kN/m ²]
1	Field area	10.00	0.000	-0.800	0.000	-0.583
2	Field area	10.00	0.000	-0.800	0.000	-0.583
2	Gableboard	10.00	0.000	-1.100	0.000	-0.801
2	Corner region (eave)	10.00	0.000	-2.100	0.000	-1.530

Snow load

Snow load zone	2
Snow guard	No
Snow load on ground level	$s_k = 0.400 \text{ kN/m}^2$
Shape coefficient for snow	$\mu_i = 0.800$
Factor for roof pitch	$d_i = 0.996$
Snow load on roof, 50 year	$s_{i,50} = 0.319 \text{ kN/m}^2$
Adjustment factor for service life	$f_s = 1.000$
Snow load on roof, 25 years	$s_{i,25} = 0.319 \text{ kN/m}^2$

Dead load

Weight of module	$G_M = 24.0 \text{ kg}$
Weight of mounting system per module	$= 2.00 \text{ kg}$
Module area	$A_M = 2.00 \text{ m}^2$
Dead weight of module per m ²	$= 12.01 \text{ kg/m}^2$
Dead weight of mounting system per m ²	$= 1.00 \text{ kg/m}^2$
Total dead load (excl. ballast) per m ²	$= 0.13 \text{ kN/m}^2$



Structural analysis report | Area 5

Load combinations

Ultimate limit state

Partial safety factor unfavourable permanent load	$\gamma_{G,sup} = 1.35$
Partial safety factor favourable permanent load	$\gamma_{G,inf} = 1.00$
Partial safety factor destabilising permanent load	$\gamma_{G,dst} = 1.10$
Partial safety factor stabilising permanent load	$\gamma_{G,stab} = 0.90$
Partial safety factor variable loads	$\gamma_Q = 1.50$
Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Importance factor permanent	$\kappa_{Fl,G} = 1.10$
Importance factor variable	$\kappa_{Fl,Q} = 1.10$
Characteristic dead weight	G_k
Characteristic snow load on the roof	$S_{i,n}$
Characteristic wind load	W_k

Load case combination 01	$LCC\ 01_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * S_{i,n}$
Load case combination 02	$LCC\ 02_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04	$LCC\ 04_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$
Load case combination 06	$LCC\ 06_{uls} = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Suction}$

Serviceability limit state

Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$

Load case combination 01	$LCC\ 01_{sls} = G_k + S_{i,n}$
Load case combination 02	$LCC\ 02_{sls} = G_k + W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{sls} = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$
Load case combination 04	$LCC\ 04_{sls} = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$
Load case combination 06	$LCC\ 06_{sls} = G_k + W_{k,Suction}$

Maximum load on modules (Mounting system dimensioning)

No. Module array	Array	A-TrA [m ²]	ultimate state [kN/m ²]				Serviceability [kN/m ²]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
2	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
2	Gableboard	10.00	0.713	0.062	-1.195	0.011	0.445	0.039	-0.674	0.011
2	Corner region (eave)	10.00	0.713	0.062	-2.397	0.011	0.445	0.039	-1.403	0.011



Structural analysis report | Area 5

Max. load on fastener

No. Module array	Array	A-TrA [m ²]	ultimate state [kN]				Serviceability [kN]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
2	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
2	Gableboard	10.00	0.518	0.045	-0.869	0.008	0.323	0.028	-0.490	0.008
2	Corner region (eave)	10.00	0.173	0.015	-0.581	0.003	0.108	0.009	-0.340	0.003

Resistance values of components

Base rail

Base rail	A [cm ²]	I _y [cm ⁴]	I _z [cm ⁴]	W _y [cm ³]	W _z [cm ³]
K2 BasicRail 22	2.380	1.52	7.74	1.08	2.46

Fastener

Fastener	R _{D,Uplift,Perpendicular} [kN]	R _{D,Pressure,Perpendicular} [kN]	R _{D,Pressure,Parallel} [kN]
K2 BasicClip	1.02	-	0.96
Thread-forming metal screw 6×38_rs	0.65	-	0.62

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ[%]	CL σ[%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L _{max} [m]	Fst D _{max} [m]
1	Field area	21.2	4.9	60.2	20.3	0.750	---	0.500	0.750
2	Field area	21.2	4.6	60.2	20.3	0.750	---	0.500	0.750
2	Gableboard	30.3	1.0	85.8	30.0	0.750	---	0.449	0.750
2	Corner region (eave)	6.7	1.9	57.1	1.2	0.250	---	0.430	0.250

Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/L _{max}	Maximum cantilever length [m]		

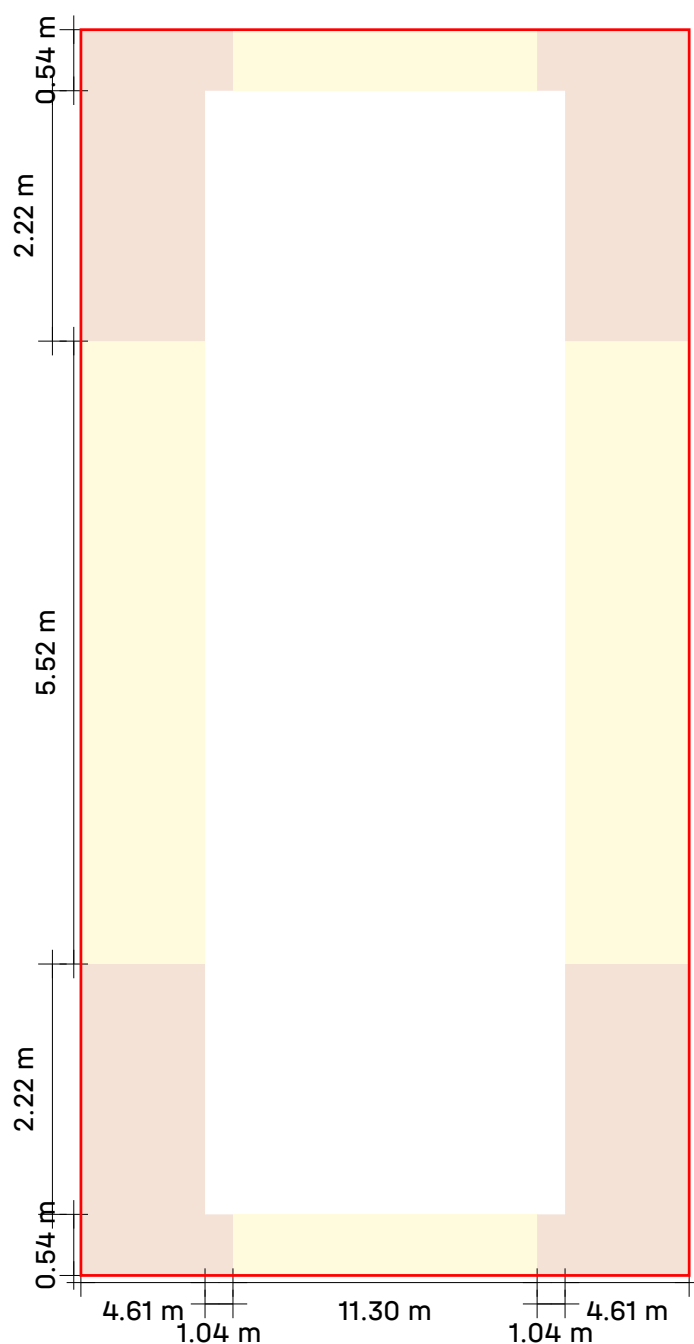


Area 5 | Bill of material

Position	Item no.	Item description	Quantity	Weight
1	1001164	K2 BasicClip	153	4.6 kg
2	1005193	Thread-forming metal screw 6×38_rs	306	2.1 kg
3	2004537	K2 Clamp MC 25-40	50	3.6 kg
4	2004543	K2 Clamp EC 25-40	44	3.2 kg
5	1003558	K2 BasicRail BasicLock 22 Set	22	1.1 kg
6	2004277	K2 BasicRail 22; 3.65 m	24	56.3 kg
7	1003571	K2 BasicRail BasicConnector Set	10	0.5 kg
Total				71.4 kg

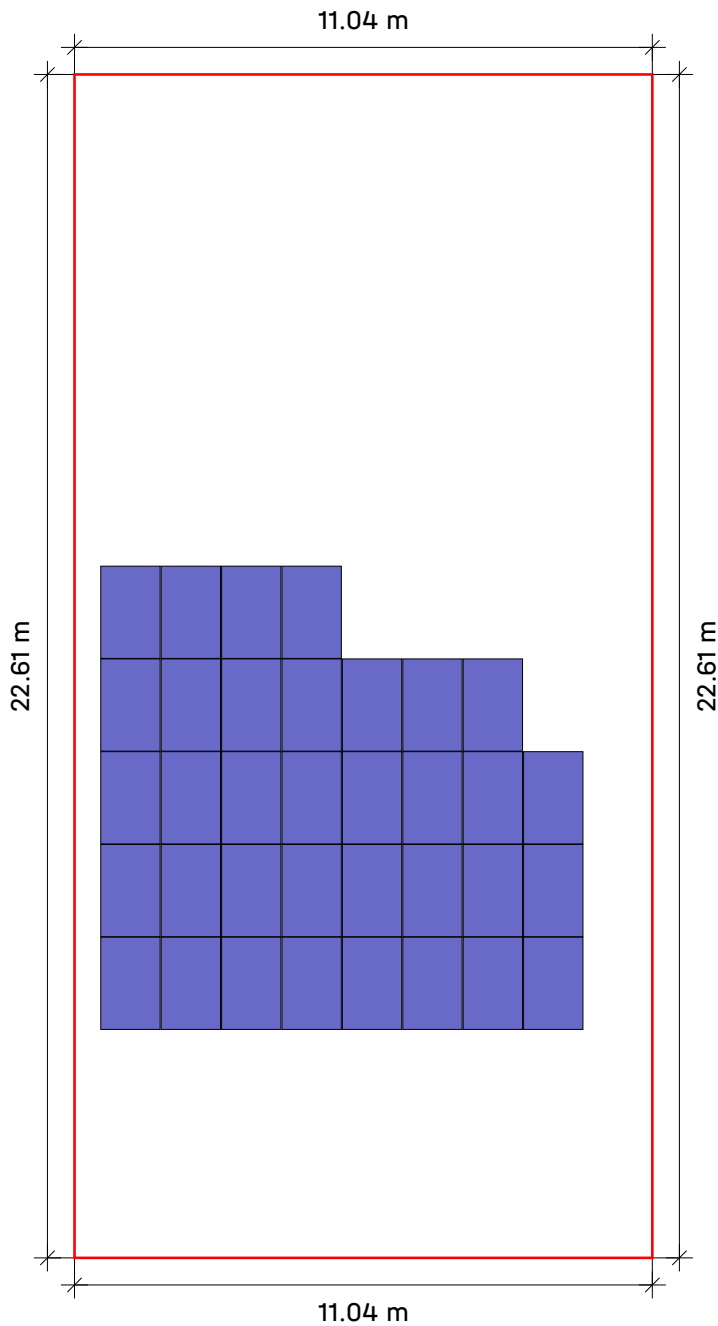


Area 6





Area 6



Roof	System	Module	Height	Quantity	Total power
<u>Area 6</u>	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	35	16.45 kWp
 Trapezoidal					



Area 6 | Assembly plan

Base rail

Type	Whole rails		Rail cutting		
	Total rail length	Quantity 3.65 m	Part of rail / Rest	Length	Rest
6*A	9.312 m	2*3.65 m	3.650	2.012 from 3.650	<u>1.628</u>
2*B	4.696 m	1*3.65 m	<u>1.628</u>	1.046 from 1.628	0.572
2*C	8.158 m	2*3.65 m	1.628	0.858 from 1.628	0.760

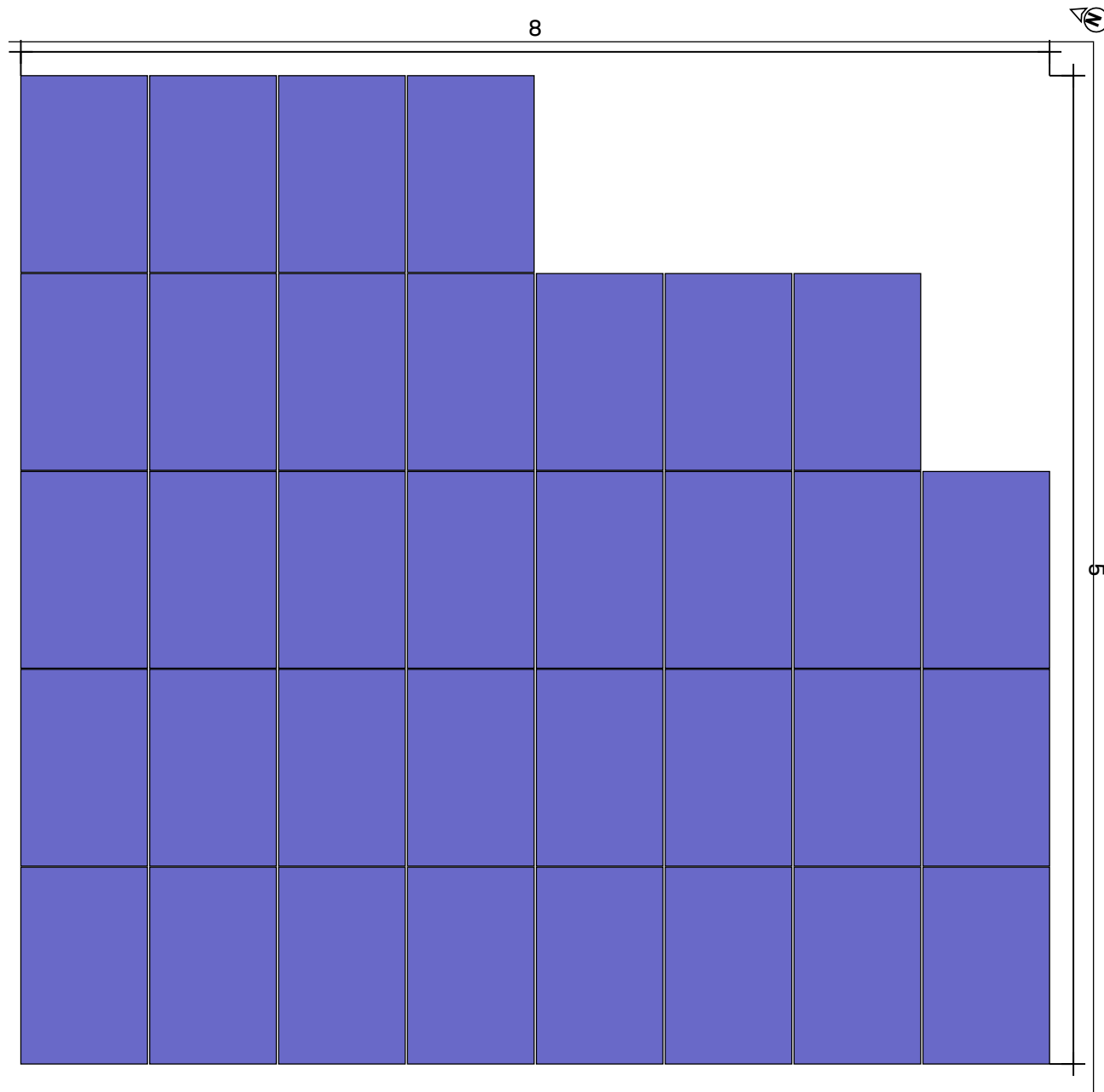
1 cm is viewed as lost for each cutting

Red numbers are leftover rails which will not be used any longer.

Module arrays

Module array	Width[m]	Length[m]	Width in modules	Length in modules
1	9.21	8.85	8	5

Area 6 | Module array 1



Roof ⑥ Module array ①

Mounting system

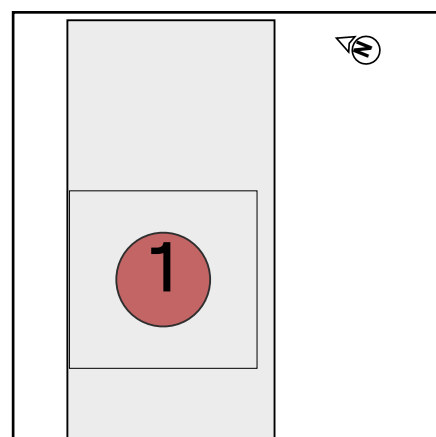
Module

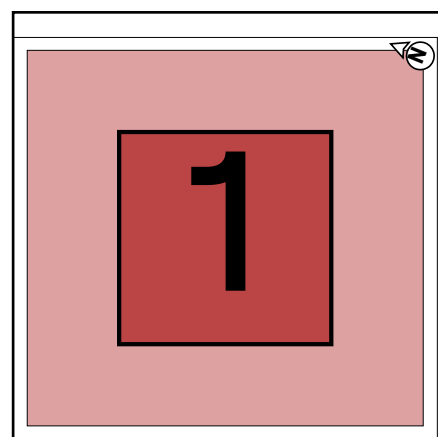
Row spacing

[K2 BasicRail](#)

35(16.45 kWp) x
DM470G12RT-G48HBB

1.77 m





Results | Area 6

Roof	System	Module	Height	Quantity	Total power
<u>Area 6</u>  Trapezoidal	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	35	16.45 kWp

Module

Name	DM470G12RT-G48HBB
Manufacturer	Hengdian Group DMEGC Magnetic Co. Ltd.
Output power	470 Wp
Dimensions	1,762×1,134×30 mm
Weight	24.0 kg

Components

Fastener	K2 BasicClip
Base rails	K2 BasicRail 22
Metal screw	Thread-forming metal screw 6×38_rs

Material values

For material information refer to the product catalogue:

[K2 Catalogue \(k2-systems.com\)](https://k2-systems.com)

Loads on modules (module dimensioning)

No. Module array	Array	A-TrA [m ²]	ultimate state [Pa]				Serviceability [Pa]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
1	Gableboard	2.00	524.0	45.8	-1,322.3	0.0	317.6	27.8	-801.4	0.0
1	Corner region (eave)	2.00	524.0	45.8	-2,524.3	0.0	317.6	27.8	-1,529.9	0.0

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ[%]	CL σ[%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L _{max} [m]	Fst D _{max} [m]
1	Field area	21.2	3.1	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	16.1	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	32.1	57.1	1.2	0.250	---	0.430	0.250



Results | Area 6

Pr	Profile
Fst	Fastener
σ	Stress
f	Deflection
F	Force
CL/L _{max}	Maximum cantilever length [m]

Fst D _{max}	Maximum fastener spacing [m]
BR	Base rail
Usab.	serviceability limit state
CL	Cantilever



Results | Area 6

Important information

- The quantity for K2 BasicRail BasicClips is calculated in such a way, that - according to the Assembly Instructions - a BasicClip can be installed on the crest to the left and right of a Rail Connector Set.
- The structure was statically verified in accordance with Eurocode 9: Design of aluminium structures (EN 1999-1-1:2021) and Eurocode 3: Design of steel structures (EN 1993-1-1:2025) and offers sufficient load-bearing capacity and stability for the loads specified in the chapter 'Maximum actions on the components'.
- Adjustment factor for wind load regarding service life period, f_W , is according to EN 1991-1-4/ NA
- Adjustment factor for snow load regarding service life period, f_S , is according to EN 1991-1-3/ NA
- The structural design complies with BS EN 1990 - Basis of Structural Design.
- Snow loads are determined in accordance with National Annex BS NA EN 1991-1-3 (2018) - UK National Annex to EC1 - Action on structures - general actions - snow loads.
- Wind loads are determined in accordance with National Annex BS NA EN 1991-1-4 - UK National Annex to EC1 - Action on structures, general actions - wind actions.
- Service life is recognised according to 'Eurocode EN 1991 - Action on structures, Snow loads' and 'Eurocode EN 1991 - Actions on structures, Wind actions'. Subject to the Building Regulations and for security-relevant reasons the installation has to be dismantled at the end of its service life.
- Failure consequence class is considered according to 'Eurocode EN 1990 - Basis of structural design'.
- The person responsible for the execution of the work must check the load assumptions made with the conditions on site. If deviations are found, the person who prepared the static calculation must be consulted immediately.
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- All instructions and requirements of the static calculations must be observed.
- Compliance with the regulations and requirements of the building permit and the building trade associations must be ensured during the execution of all work.
- All connections and anchoring measures must be carried out using approved and standardized connecting elements or parts only.
- Subordinate components that have not been verified must be implemented structurally.
- The "General Rules" for corrosion protection design of the structure are strongly recommended for application during implementation.
- The structure may only be climbed by trained and authorized personnel wearing appropriate safety equipment. Unauthorized use of the structure poses a risk of falling.



Structural analysis report | Area 6

General information

Name	260189 - Reading Football Stadium
Mounting system	K2 BasicRail
Author	AP

Location information

Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Ground elevation	45.28 m

Roof information

Building height	13.88 m
Roof type	Monopitch roof
Roof pitch	5°
Roof covering	Trapezoidal
Min. roof edge distance	0.00 m
Crest distance	250.0 mm
Crest width	22.0 mm
Crest height	40.0 mm
Roof material	Steel
Sheet quality	S235
Sheet thickness	0.500 mm

Loads

Design method	BS EN
Failure consequence class (CC)	CC3
Design working life	50 years
Terrain category	Town Terrain
Distance to shoreline	62.30 km
Distance inside town terrain	1.70 km

Wind load

Velocity pressure, 50 years	$q_{p,50} = 0.729 \text{ kN/m}^2$
Adjustment factor for service life	$f_w = 1.000$
Velocity pressure, 25 years	$q_{p,25} = 0.729 \text{ kN/m}^2$

Structural analysis report | Area 6

Roof areas

No. Module array	Array	Load impact area [m ²]	maxCpe	minCpe	wind pressure [kN/m ²]	wind suction [kN/m ²]
1	Field area	10.00	0.000	-0.800	0.000	-0.583
1	Gableboard	10.00	0.000	-1.100	0.000	-0.801
1	Corner region (eave)	10.00	0.000	-2.100	0.000	-1.530

Snow load

Snow load zone	2
Snow guard	No
Snow load on ground level	$s_k = 0.400 \text{ kN/m}^2$
Shape coefficient for snow	$\mu_i = 0.800$
Factor for roof pitch	$d_i = 0.996$
Snow load on roof, 50 year	$s_{i,50} = 0.319 \text{ kN/m}^2$
Adjustment factor for service life	$f_s = 1.000$
Snow load on roof, 25 years	$s_{i,25} = 0.319 \text{ kN/m}^2$

Dead load

Weight of module	$G_M = 24.0 \text{ kg}$
Weight of mounting system per module	$= 2.00 \text{ kg}$
Module area	$A_M = 2.00 \text{ m}^2$
Dead weight of module per m ²	$= 12.01 \text{ kg/m}^2$
Dead weight of mounting system per m ²	$= 1.00 \text{ kg/m}^2$
Total dead load (excl. ballast) per m ²	$= 0.13 \text{ kN/m}^2$



Structural analysis report | Area 6

Load combinations

Ultimate limit state

Partial safety factor unfavourable permanent load	$\gamma_{G,sup} = 1.35$
Partial safety factor favourable permanent load	$\gamma_{G,inf} = 1.00$
Partial safety factor destabilising permanent load	$\gamma_{G,dst} = 1.10$
Partial safety factor stabilising permanent load	$\gamma_{G,stab} = 0.90$
Partial safety factor variable loads	$\gamma_Q = 1.50$
Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Importance factor permanent	$\kappa_{Fl,G} = 1.10$
Importance factor variable	$\kappa_{Fl,Q} = 1.10$
Characteristic dead weight	G_k
Characteristic snow load on the roof	$S_{i,n}$
Characteristic wind load	W_k

Load case combination 01	$LCC\ 01_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * S_{i,n}$
Load case combination 02	$LCC\ 02_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04	$LCC\ 04_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$
Load case combination 06	$LCC\ 06_{uls} = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Suction}$

Serviceability limit state

Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$

Load case combination 01	$LCC\ 01_{sls} = G_k + S_{i,n}$
Load case combination 02	$LCC\ 02_{sls} = G_k + W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{sls} = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$
Load case combination 04	$LCC\ 04_{sls} = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$
Load case combination 06	$LCC\ 06_{sls} = G_k + W_{k,Suction}$

Maximum load on modules (Mounting system dimensioning)

No. Module array	Array	A-TrA [m ²]	ultimate state [kN/m ²]				Serviceability [kN/m ²]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
1	Gableboard	10.00	0.713	0.062	-1.195	0.011	0.445	0.039	-0.674	0.011
1	Corner region (eave)	10.00	0.713	0.062	-2.397	0.011	0.445	0.039	-1.403	0.011



Structural analysis report | Area 6

Max. load on fastener

No. Module array	Array	A-TrA [m ²]	ultimate state [kN]				Serviceability [kN]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
1	Gableboard	10.00	0.518	0.045	-0.869	0.008	0.323	0.028	-0.490	0.008
1	Corner region (eave)	10.00	0.173	0.015	-0.581	0.003	0.108	0.009	-0.340	0.003

Resistance values of components

Base rail

Base rail	A [cm ²]	I _y [cm ⁴]	I _z [cm ⁴]	W _y [cm ³]	W _z [cm ³]
K2 BasicRail 22	2.380	1.52	7.74	1.08	2.46

Fastener

Fastener	R _{D,Uplift,Perpendicular} [kN]	R _{D,Pressure,Perpendicular} [kN]	R _{D,Pressure,Parallel} [kN]
K2 BasicClip	1.02	-	0.96
Thread-forming metal screw 6×38_rs	0.65	-	0.62

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ[%]	CL σ[%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L _{max} [m]	Fst Fst D _{max} [m]
1	Field area	21.2	3.1	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	16.1	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	32.1	57.1	1.2	0.250	---	0.430	0.250

Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/L _{max}	Maximum cantilever length [m]		

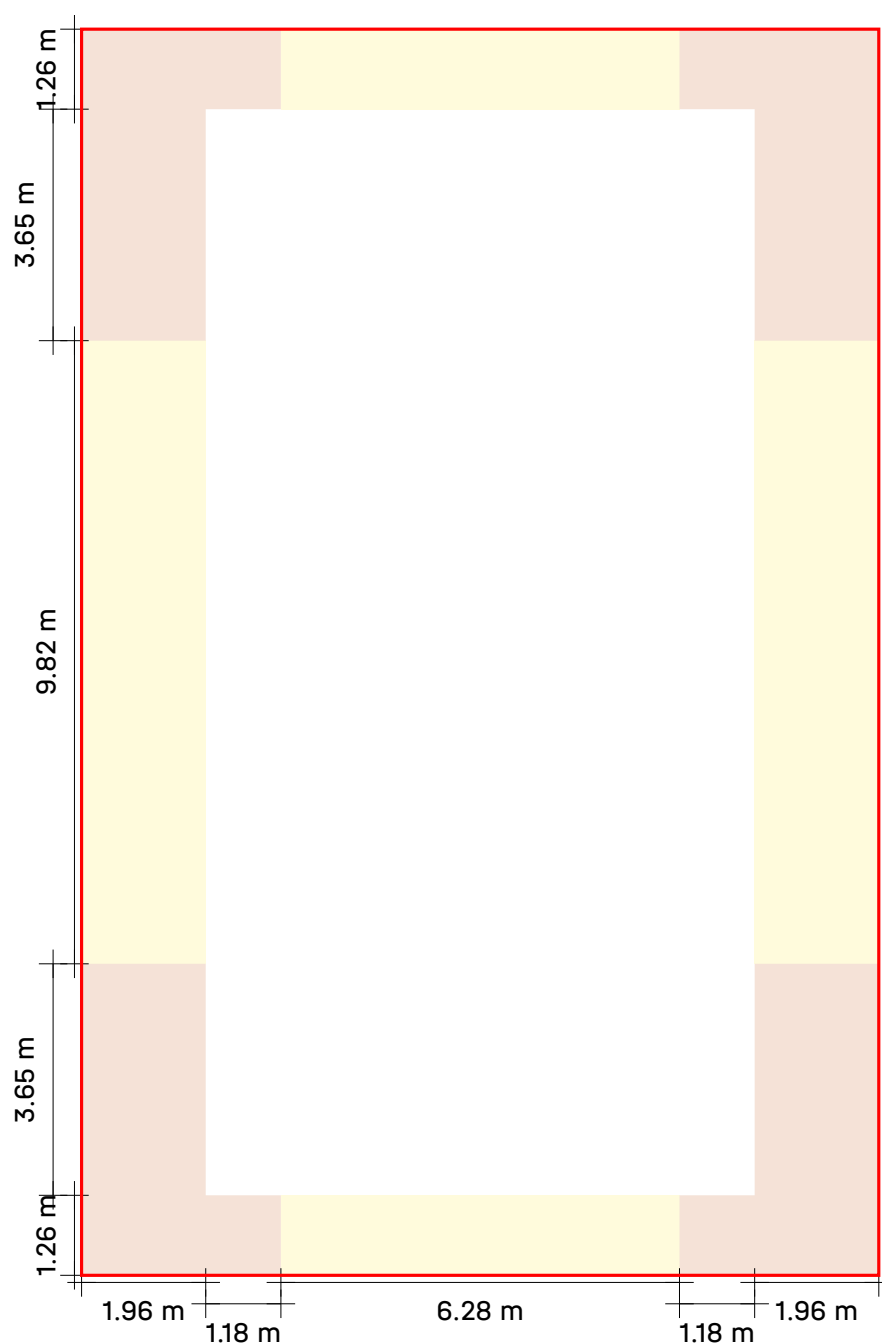


Area 6 | Bill of material

Position	Item no.	Item description	Quantity	Weight
1	1001164	K2 BasicClip	145	4.3 kg
2	1005193	Thread-forming metal screw 6×38_rs	290	2.0 kg
3	2004537	K2 Clamp MC 25-40	60	4.3 kg
4	2004543	K2 Clamp EC 25-40	20	1.4 kg
5	1003558	K2 BasicRail BasicLock 22 Set	10	0.5 kg
6	2004277	K2 BasicRail 22; 3.65 m	24	56.3 kg
7	1003571	K2 BasicRail BasicConnector Set	18	0.9 kg
Total				69.8 kg

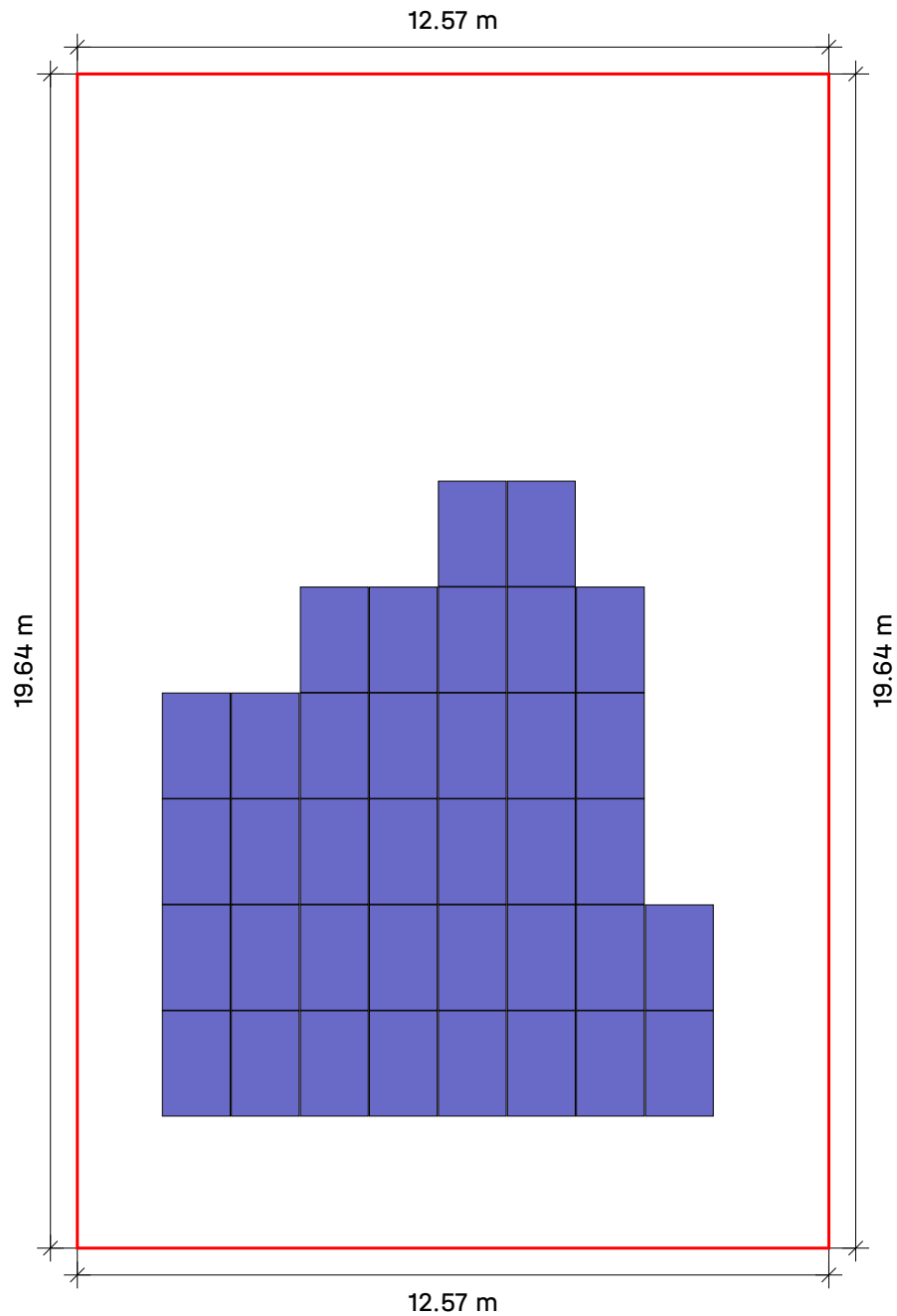


Area 7





Area 7



Roof	System	Module	Height	Quantity	Total power
<u>Area 7</u>	<u>K2 BasicRail</u>	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	37	17.39 kWp
 Trapezoidal					



Area 7 | Assembly plan

Base rail

Type	Whole rails		Rail cutting		
	Total rail length	Quantity 3.65 m	Part of rail / Rest	Length	Rest
2*A	2.388 m		3.650	2.388 from 3.650	<u>1.252</u>
2*B	8.158 m	2*3.65 m	<u>1.252</u>	0.858 from 1.252	0.384
2*C	5.850 m	1*3.65 m	3.650	2.200 from 3.650	<u>1.440</u>
2*D	8.158 m	2*3.65 m	<u>1.440</u>	0.858 from 1.440	0.572
4*E	9.312 m	2*3.65 m	3.650	2.012 from 3.650	1.628

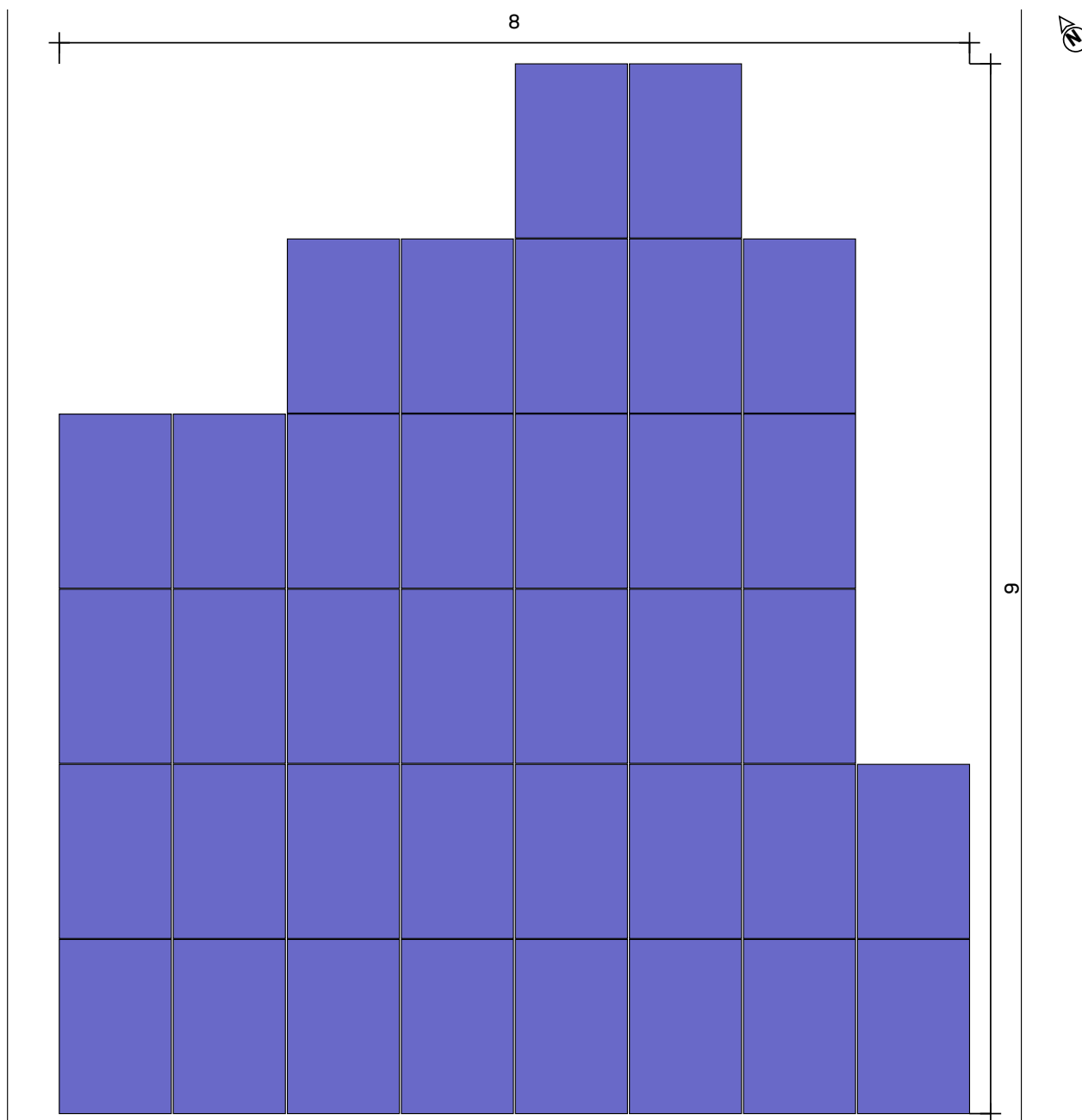
1 cm is viewed as lost for each cutting

Red numbers are leftover rails which will not be used any longer.

Module arrays

Module array	Width[m]	Length[m]	Width in modules	Length in modules
1	9.21	10.62	8	6

Area 7 | Module array 1



Roof **7** Module array **1**

Mounting system

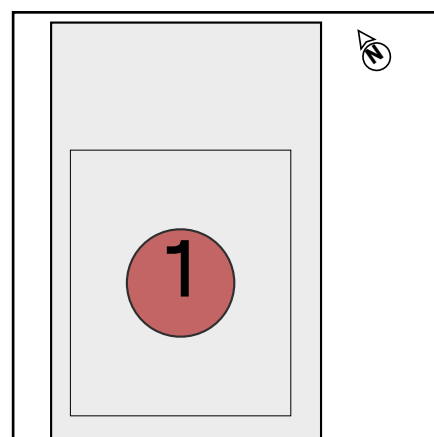
[K2 BasicRail](#)

Module

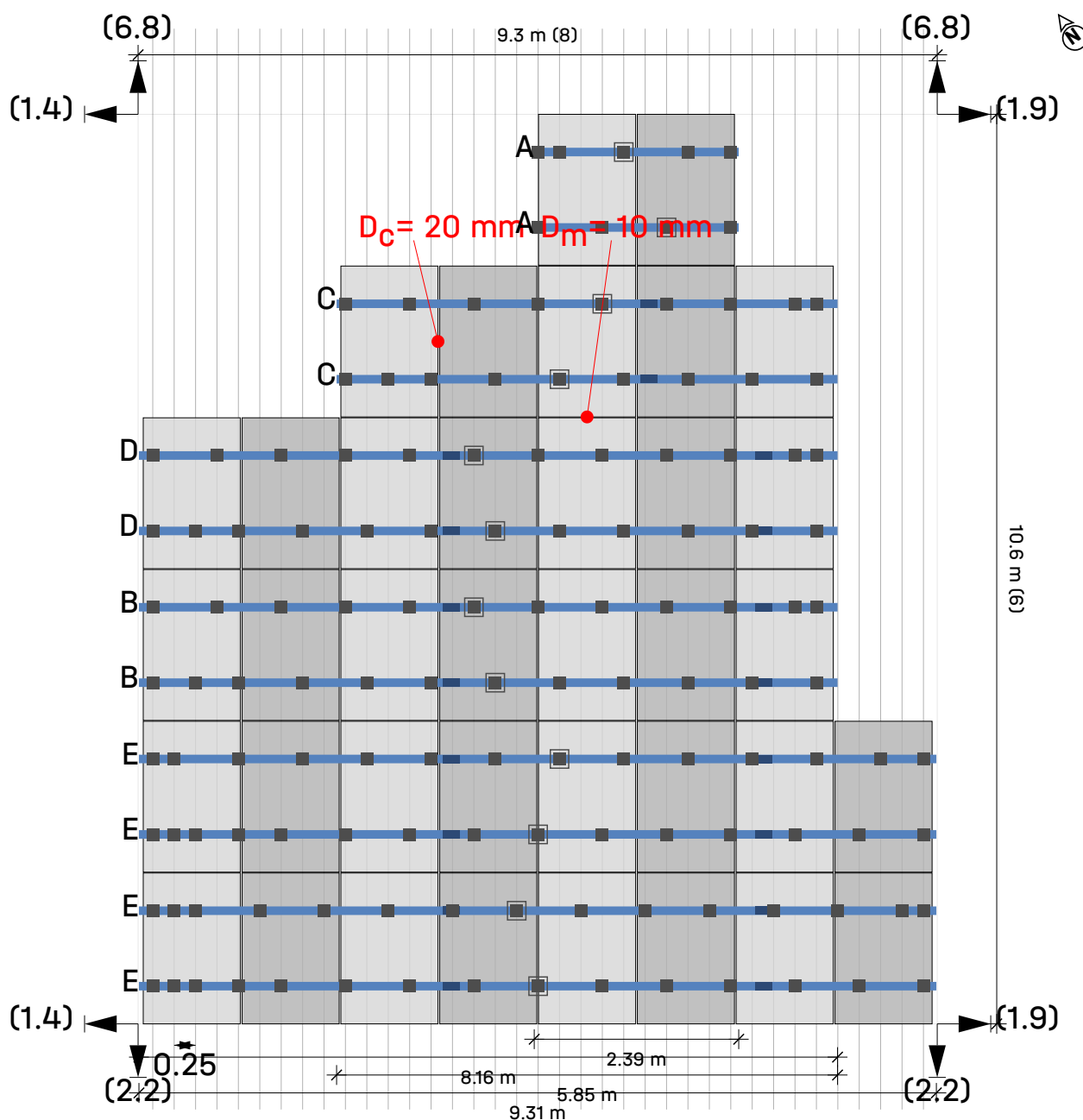
37(17.39 kWp) x
DM470G12RT-G48HBB

Row spacing

1.77 m



Area 7 | Module array 1 | Module block 1

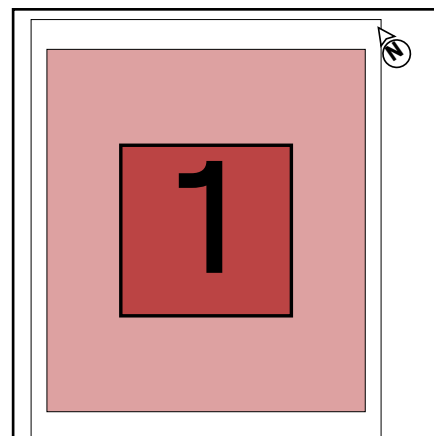


Roof ⑦ Module array ① Module block 1

Modules $(8 \times 6) - 11 = 37$

Legend

- Fastener
- BasicLocks
- Mounting rail: K2 BasicRail 22
- Distance to roof edge [m]
- D_c Distance for clamping between modules
- D_m Distance between modules



Results | Area 7

Roof	System	Module	Height	Quantity	Total power
Area 7	K2 BasicRail	DM470G12RT-G48HBB 1,762×1,134×30 mm 470 Wp	13.88 m	37	17.39 kWp
 Trapezoidal					

Module

Name	DM470G12RT-G48HBB
Manufacturer	Hengdian Group DMEGC Magnetic Co. Ltd.
Output power	470 Wp
Dimensions	1,762×1,134×30 mm
Weight	24.0 kg

Components

Fastener	K2 BasicClip
Base rails	K2 BasicRail 22
Metal screw	Thread-forming metal screw 6×38_rs

Material values

For material information refer to the product catalogue:

[K2 Catalogue \(k2-systems.com\)](https://k2-systems.com)

Loads on modules (module dimensioning)

No. Module array	Array	A-TrA [m²]	ultimate state [Pa]				Serviceability [Pa]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	2.00	524.0	45.8	-961.6	0.0	317.6	27.8	-582.8	0.0
1	Gableboard	2.00	524.0	45.8	-1,322.3	0.0	317.6	27.8	-801.4	0.0
1	Corner region (eave)	2.00	524.0	45.8	-2,524.3	0.0	317.6	27.8	-1,529.9	0.0



Results | Area 7

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ [%]	CL σ [%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L_{max} [m]	Fst Fst D_{max} [m]
1	Field area	21.2	11.5	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	7.0	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	14.0	57.1	1.2	0.250	---	0.430	0.250

Pr	Profile	Fst D_{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/ L_{max}	Maximum cantilever length [m]		

Results | Area 7

Important information

- The quantity for K2 BasicRail BasicClips is calculated in such a way, that - according to the Assembly Instructions - a BasicClip can be installed on the crest to the left and right of a Rail Connector Set.
- The structure was statically verified in accordance with Eurocode 9: Design of aluminium structures (EN 1999-1-1:2021) and Eurocode 3: Design of steel structures (EN 1993-1-1:2025) and offers sufficient load-bearing capacity and stability for the loads specified in the chapter 'Maximum actions on the components'.
- Adjustment factor for wind load regarding service life period, f_W , is according to EN 1991-1-4/ NA
- Adjustment factor for snow load regarding service life period, f_S , is according to EN 1991-1-3/ NA
- The structural design complies with BS EN 1990 - Basis of Structural Design.
- Snow loads are determined in accordance with National Annex BS NA EN 1991-1-3 (2018) - UK National Annex to EC1 - Action on structures - general actions - snow loads.
- Wind loads are determined in accordance with National Annex BS NA EN 1991-1-4 - UK National Annex to EC1 - Action on structures, general actions - wind actions.
- Service life is recognised according to 'Eurocode EN 1991 - Action on structures, Snow loads' and 'Eurocode EN 1991 - Actions on structures, Wind actions'. Subject to the Building Regulations and for security-relevant reasons the installation has to be dismantled at the end of its service life.
- Failure consequence class is considered according to 'Eurocode EN 1990 - Basis of structural design'.
- The person responsible for the execution of the work must check the load assumptions made with the conditions on site. If deviations are found, the person who prepared the static calculation must be consulted immediately.
- Please note our General Terms and Conditions of Use (TCU-E) in their currently valid version, available at: <https://k2-systems.com/en/digital-services/general-terms-and-conditions-of-use-for-entrepreneurs-tcu-e/>
Please note in particular § 1, Special provisions for K2 Base, clause 3 ("Technical and specialist requirements on the Customer's premises."), § 6 ("Limitation of warranty") and § 7 ("Limitation of liability").
- All instructions and requirements of the static calculations must be observed.
- Compliance with the regulations and requirements of the building permit and the building trade associations must be ensured during the execution of all work.
- All connections and anchoring measures must be carried out using approved and standardized connecting elements or parts only.
- Subordinate components that have not been verified must be implemented structurally.
- The "General Rules" for corrosion protection design of the structure are strongly recommended for application during implementation.
- The structure may only be climbed by trained and authorized personnel wearing appropriate safety equipment. Unauthorized use of the structure poses a risk of falling.



Structural analysis report | Area 7

General information

Name	260189 - Reading Football Stadium
Mounting system	K2 BasicRail
Author	AP

Location information

Address	Select Car Leasing Stadium M4, Junction, Madejski Stadium, Reading RG2 0FL, UK
Ground elevation	45.28 m

Roof information

Building height	13.88 m
Roof type	Monopitch roof
Roof pitch	5°
Roof covering	Trapezoidal
Min. roof edge distance	0.00 m
Crest distance	250.0 mm
Crest width	22.0 mm
Crest height	40.0 mm
Roof material	Steel
Sheet quality	S235
Sheet thickness	0.500 mm

Loads

Design method	BS EN
Failure consequence class (CC)	CC3
Design working life	50 years
Terrain category	Town Terrain
Distance to shoreline	62.30 km
Distance inside town terrain	1.70 km

Wind load

Velocity pressure, 50 years	$q_{p,50} = 0.729 \text{ kN/m}^2$
Adjustment factor for service life	$f_w = 1.000$
Velocity pressure, 25 years	$q_{p,25} = 0.729 \text{ kN/m}^2$

Structural analysis report | Area 7

Roof areas

No. Module array	Array	Load impact area [m ²]	maxCpe	minCpe	wind pressure [kN/m ²]	wind suction [kN/m ²]
1	Field area	10.00	0.000	-0.800	0.000	-0.583
1	Gableboard	10.00	0.000	-1.100	0.000	-0.801
1	Corner region (eave)	10.00	0.000	-2.100	0.000	-1.530

Snow load

Snow load zone	2
Snow guard	No
Snow load on ground level	$s_k = 0.400 \text{ kN/m}^2$
Shape coefficient for snow	$\mu_i = 0.800$
Factor for roof pitch	$d_i = 0.996$
Snow load on roof, 50 year	$s_{i,50} = 0.319 \text{ kN/m}^2$
Adjustment factor for service life	$f_s = 1.000$
Snow load on roof, 25 years	$s_{i,25} = 0.319 \text{ kN/m}^2$

Dead load

Weight of module	$G_M = 24.0 \text{ kg}$
Weight of mounting system per module	$= 2.00 \text{ kg}$
Module area	$A_M = 2.00 \text{ m}^2$
Dead weight of module per m ²	$= 12.01 \text{ kg/m}^2$
Dead weight of mounting system per m ²	$= 1.00 \text{ kg/m}^2$
Total dead load (excl. ballast) per m ²	$= 0.13 \text{ kN/m}^2$



Structural analysis report | Area 7

Load combinations

Ultimate limit state

Partial safety factor unfavourable permanent load	$\gamma_{G,sup} = 1.35$
Partial safety factor favourable permanent load	$\gamma_{G,inf} = 1.00$
Partial safety factor destabilising permanent load	$\gamma_{G,dst} = 1.10$
Partial safety factor stabilising permanent load	$\gamma_{G,stab} = 0.90$
Partial safety factor variable loads	$\gamma_Q = 1.50$
Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Importance factor permanent	$\kappa_{Fl,G} = 1.10$
Importance factor variable	$\kappa_{Fl,Q} = 1.10$
Characteristic dead weight	G_k
Characteristic snow load on the roof	$S_{i,n}$
Characteristic wind load	W_k
Load case combination 01	$LCC\ 01_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * S_{i,n}$
Load case combination 02	$LCC\ 02_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04	$LCC\ 04_{uls} = \gamma_{G,sup} * \kappa_{Fl,G} * G_k + \gamma_Q * \kappa_{Fl,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$
Load case combination 06	$LCC\ 06_{uls} = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{Fl,Q} * W_{k,Suction}$

Serviceability limit state

Combination coefficient with regards to wind	$\psi_{0,W} = 0.60$
Combination coefficient with regards to snow	$\psi_{0,S} = 0.50$
Load case combination 01	$LCC\ 01_{sls} = G_k + S_{i,n}$
Load case combination 02	$LCC\ 02_{sls} = G_k + W_{k,Pressure}$
Load case combination 03	$LCC\ 03_{sls} = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$
Load case combination 04	$LCC\ 04_{sls} = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$
Load case combination 06	$LCC\ 06_{sls} = G_k + W_{k,Suction}$

Maximum load on modules (Mounting system dimensioning)

No. Module array	Array	A-TrA [m ²]	ultimate state [kN/m ²]				Serviceability [kN/m ²]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift 	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.713	0.062	-0.835	0.011	0.445	0.039	-0.456	0.011
1	Gableboard	10.00	0.713	0.062	-1.195	0.011	0.445	0.039	-0.674	0.011
1	Corner region (eave)	10.00	0.713	0.062	-2.397	0.011	0.445	0.039	-1.403	0.011



Structural analysis report | Area 7

Max. load on fastener

No. Module array	Array	A-TrA [m ²]	ultimate state [kN]				Serviceability [kN]			
			Pressure ⊥	Pressure 	Uplift ⊥	Uplift	Pressure ⊥	Pressure 	Uplift ⊥	Uplift
1	Field area	10.00	0.518	0.045	-0.607	0.008	0.323	0.028	-0.331	0.008
1	Gableboard	10.00	0.518	0.045	-0.869	0.008	0.323	0.028	-0.490	0.008
1	Corner region (eave)	10.00	0.173	0.015	-0.581	0.003	0.108	0.009	-0.340	0.003

Resistance values of components

Base rail

Base rail	A [cm ²]	I _y [cm ⁴]	I _z [cm ⁴]	W _y [cm ³]	W _z [cm ³]
K2 BasicRail 22	2.380	1.52	7.74	1.08	2.46

Fastener

Fastener	R _{D,Uplift,Perpendicular} [kN]	R _{D,Pressure,Perpendicular} [kN]	R _{D,Pressure,Parallel} [kN]
K2 BasicClip	1.02	-	0.96
Thread-forming metal screw 6×38_rs	0.65	-	0.62

Utilisation result

No. Module array	Roof areas	Ultimate limit state			Usab.	Distances		Maximum values	
		Pr σ[%]	CL σ[%]	Fst F[%]	Pr f[%]	Fst [m]	BR [m]	CL L _{max} [m]	Fst D _{max} [m]
1	Field area	21.2	11.5	60.2	20.3	0.750	---	0.500	0.750
1	Gableboard	30.3	7.0	85.8	30.0	0.750	---	0.449	0.750
1	Corner region (eave)	6.7	14.0	57.1	1.2	0.250	---	0.430	0.250

Pr	Profile	Fst D _{max}	Maximum fastener spacing [m]
Fst	Fastener	BR	Base rail
σ	Stress	Usab.	serviceability limit state
f	Deflection	CL	Cantilever
F	Force		
CL/L _{max}	Maximum cantilever length [m]		



Area 7 | Bill of material

Position	Item no.	Item description	Quantity	Weight
1	1001164	K2 BasicClip	152	4.6 kg
2	1005193	Thread-forming metal screw 6×38_rs	304	2.1 kg
3	2004537	K2 Clamp MC 25-40	62	4.5 kg
4	2004543	K2 Clamp EC 25-40	24	1.7 kg
5	1003558	K2 BasicRail BasicLock 22 Set	12	0.6 kg
6	2004277	K2 BasicRail 22; 3.65 m	26	61.0 kg
7	1003571	K2 BasicRail BasicConnector Set	18	0.9 kg
Total				75.4 kg



Bill of material

Position	Item no.	Item description	Quantity	Weight
1	1001164	K2 BasicClip	5,019	150.6 kg
2	1005193	Thread-forming metal screw 6×38_rs	10,038	70.3 kg
3	2004537	K2 Clamp MC 25-40	2,020	145.4 kg
4	2004543	K2 Clamp EC 25-40	936	67.4 kg
5	1003558	K2 BasicRail BasicLock 22 Set	468	23.4 kg
6	2004277	K2 BasicRail 22; 3.65 m	868	2,037.2 kg
7	1003571	K2 BasicRail BasicConnector Set	510	25.0 kg
Total				2,519.3 kg



Thank you for choosing a K2 mounting system.

Systems from K2 Systems are quick and easy to install.

We hope these instructions have helped.

Please contact us with any questions or suggestions for improvement.

Our contact data:

k2-systems.com/en/contact

Our General Terms of Business apply. Please refer to k2-systems.com

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