

Mounting systems for solar technology



K2 SYSTEMS GMBH
CALCULATION BASIS

PROJECT: MMU Vine hall
AUTHOR: Hugo Silva
DATE: 07/07/2022

PROJECT DATA (ROOF 1)

GENERAL INFORMATION

Name	MMU Vine hall
Mounting System	S-Dome 6.10 Xpress
Customer	Cor Energy
Author	Hugo Silva

REMARKS

Best assumptions made for any missing information

LOCATION

Address	49 Stretford Rd, Hulme, Manchester M15 5JH, UK
Ground elevation	35.96 m
Roof type	Flat roof
Fastening method	with Ballast
Roof covering	Flat
Building height	15.80 m
Parapet wall height	0.20 m
Roof pitch	1 °
Min. roof edge distance	0.60 m
Material	Single ply membrane
Friction coefficient	0.50
Terrain category	Town Terrain

The friction coefficients given here must be checked onsite. If a lower value is found, this must be specified here for the ballast calculation!

LOADS

Design method	BS EN		
Failure consequence class (CC)	CC1	Design working life	25 years
Terrain category	Town Terrain		
distance to shoreline	45.00 km		
distance inside town terrain	9.30 km		
Peak velocity pressure	$q_{p,25} = 0.690 \text{ kN/m}^2$		
Snow load zone	1		
Snow load on ground level	$s_k = 0.300 \text{ kN/m}^2$		

MODULES

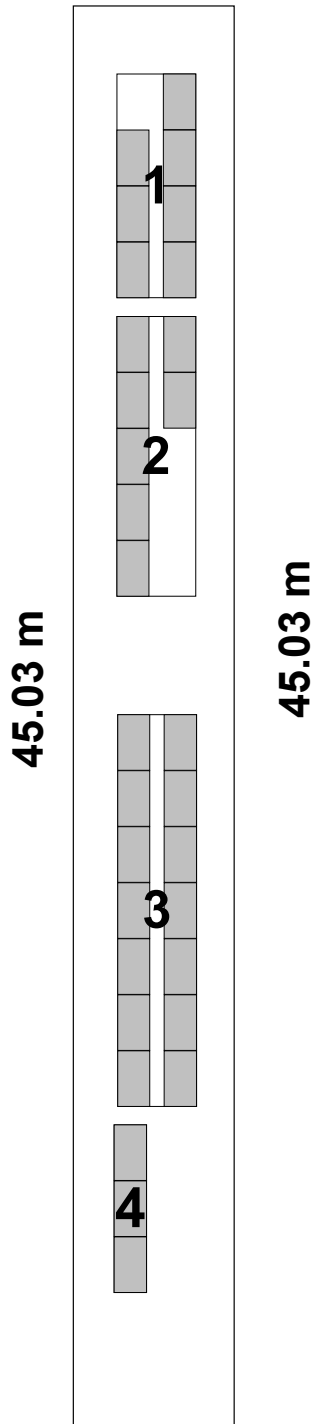
Manufacturer	Longi Solar	Quantity	31
Name	LR4-60HPH-375M	Total output power	11.625 kWp
Dimensions LxWxH	1755 x 1038 x 35.00 mm		
Weight	19.5 kg		
Output power	375 W		



ASSEMBLY PLAN (ROOF 1)



5.09 m



Dimensions in [m]

LEGEND

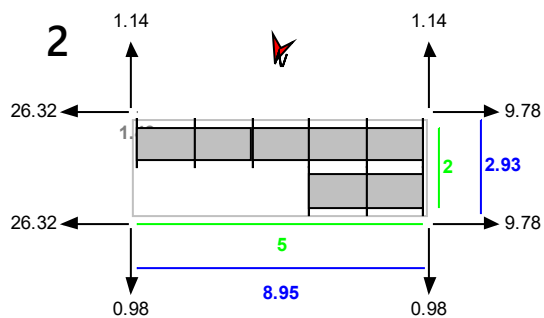
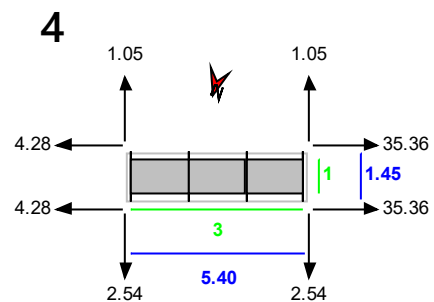
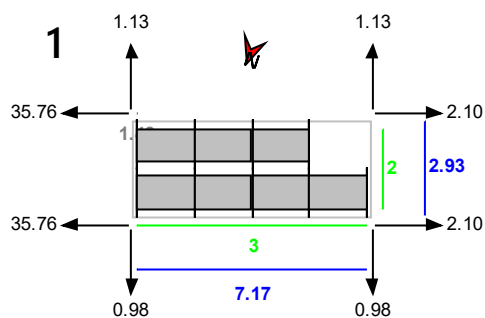
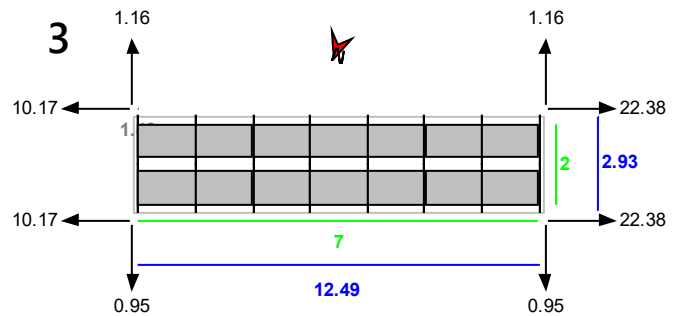
Distance to neighbouring module array [m]

Distance to roof edge [m]

Number of modules

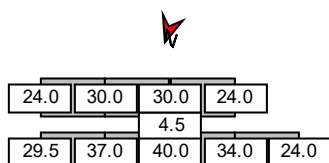
Length/width of module array [m]

Row distance [m]



BALLAST PLAN (ROOF 1)

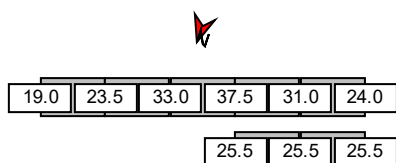
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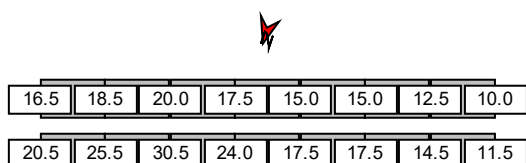
4



2



3



RESULTS (ROOF 1)

BALLAST CAPACITY

Speed Porter	40.0 kg
Porter	108.0 kg
module clamp	MiniClamp MC Set 30-50
end clamp	MiniClamp EC Set 30-50

VERIFICATION SYSTEM UTILISATION

Verification system utilisation [%]	pressure	45.31
	suction	34.10
Loads on modules (ultimate state) [Pa]	pressure	1362
	suction	-988
Loads on modules (Serviceability) [Pa]	pressure	1019
	suction	-697

SPECIFIC LOADS

Index (module block)	No. of modules (module block)	---	---	Ballast [kg] (module block)	Dead weight [kg] (module block)	Dead Load [kN/m ²] (module block)	Dead Load [kN/m ²] (roof surface area)	Own weight [kN/m ²]
module array 1	7	---	---	277.0	442.2	0.23	---	---
module array 2	7	---	---	244.5	409.7	0.21	---	---
module array 3	14	---	---	286.5	616.9	0.16	---	---
module array 4	3	---	---	228.0	298.8	0.36	---	---
all Blocks	31	---	---	1036.0	1767.6	---	0.08	---

NOTES

- The proof of position safety and load capacity of the system are carried out by checking the load cases lifting and shifting by wind and by further static calculations. You will find a short version of the wind tunnel report and a certificate for the further static calculations on our homepage.
- The structural design complies with BS EN 1990 - Basics 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'.
- Data and results must be verified with regard to local conditions and checked by a suitably qualified person. Please see our TCU under <https://k2-systems.com/en/base-tcu>, in particular § 2 ("technical and specialist requirements for the customer"), § 7 ("warranty provisions") and § 8 ("limitation of liability").

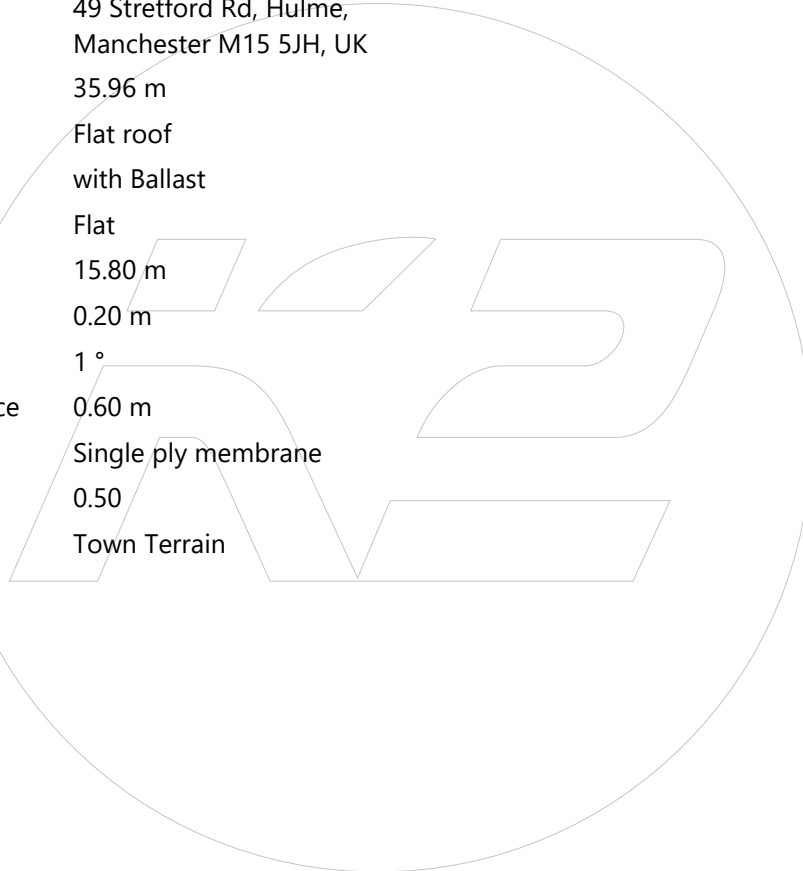
STRUCTURAL ANALYSIS REPORT (ROOF 1)

GENERAL INFORMATION

Name	MMU Vine hall
Mounting System	S-Dome 6.10 Xpress
Customer	Cor Energy
Author	Hugo Silva

LOCATION

Address	49 Stretford Rd, Hulme, Manchester M15 5JH, UK
Ground elevation	35.96 m
Roof type	Flat roof
Fastening method	with Ballast
Roof covering	Flat
Building height	15.80 m
Parapet wall height	0.20 m
Roof pitch	1 °
Min. roof edge distance	0.60 m
Material	Single ply membrane
Friction coefficient	0.50
Terrain category	Town Terrain



LOADS

Design method	BS EN		
Failure consequence class (CC)	CC1	Design working life	25 years

Terrain category Town Terrain

distance to shoreline 45.00 km

distance inside town terrain 9.30 km

Peak velocity pressure $q_{p,50} = 0.749 \text{ kN/m}^2$

Adjustment factor for service life $f_w = 0.921$

Peak velocity pressure $q_{p,25} = 0.690 \text{ kN/m}^2$

Snow load zone 1

Snow load on ground level $s_k = 0.300 \text{ kN/m}^2$

Shape Coefficient for Snow $\mu_i = 0.800$

Factor for roof pitch $d_i = 1.000$

Snow load on roof $s_{i,50} = 0.240 \text{ kN/m}^2$

Adjustment factor for service life $f_s = 0.929$

Snow load on roof $s_{i,25} = 0.223 \text{ kN/m}^2$

DEAD LOAD

Weight module	$G_M = 19.5 \text{ kg}$	Dead weight module	$= 10.70 \text{ kg/m}^2$
Weight mounting system per module area	$= 4.1 \text{ kg}$	Dead weight mounting system	$= 2.25 \text{ kg/m}^2$
Module area	$A_M = 1.82 \text{ m}^2$	Total Dead Weight (excl. ballast)	$= 0.13 \text{ kN/m}^2$

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 first variable load	γ_Q	1.50
Partial safety factor variable loads	γ_Q	1.50
Combination coefficient with regards to wind	$\psi_{0,W}$	0.60
Combination coefficient with regards to wind (additional varying influences)	$\psi_{1,W}$	0.20
Combination coefficient with regards to Snow	$\psi_{0,S}$	0.50
Importance factor variable	$\kappa_{FI,Q}$	0.85
Characteristic dead weight	G_k	
Characteristic snow load on the roof	$S_{i,n}$	
Characteristic wind load	W_k	
Load case combination 00:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * S_{i,n}$	
Load case combination 02:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,Pressure}$	
Load case combination 03:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$	
Load case combination 04:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$	
Load case combination 06:	$E_d = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,Suction}$	
Uplift Verification:	$E_d = \gamma_{G,stab} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,n,Uplift}$	
Displacement verification:	$E_d = \gamma_{G,stab} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,n,Displacement}$	

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 00: $E_d = G_k$

Load case combination 01: $E_d = G_k + S_{i,n}$

Load case combination 02: $E_d = G_k + W_{k,Pressure}$

Load case combination 03: $E_d = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$

Load case combination 04: $E_d = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$

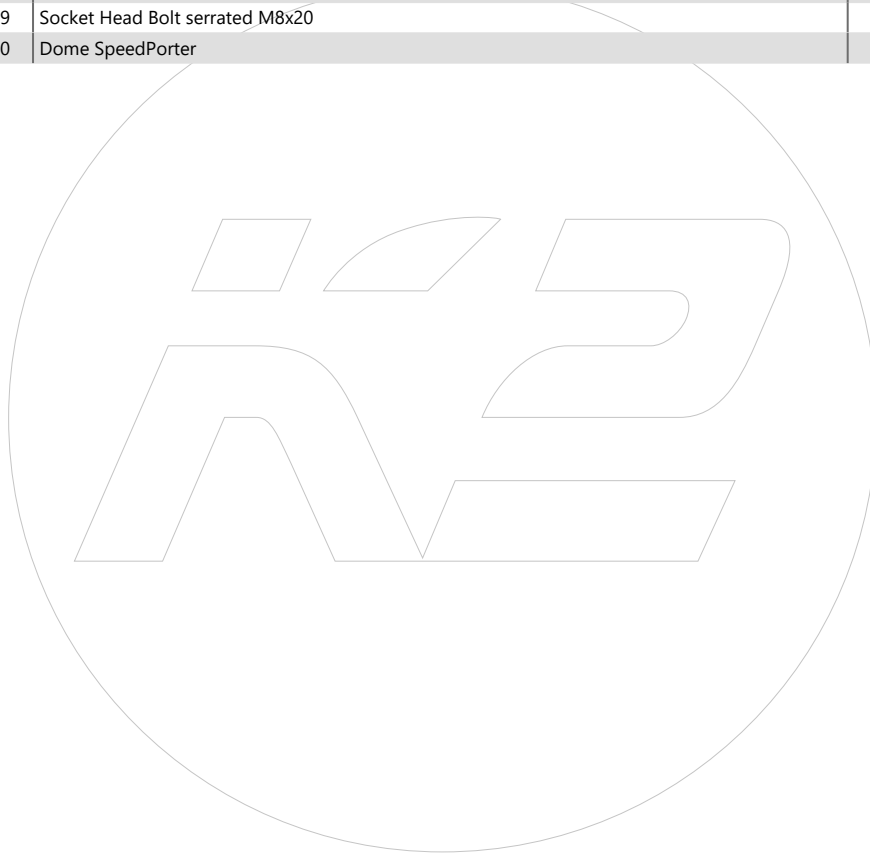
Load case combination 06: $E_d = G_k + W_{k,Suction}$

THE SYSTEM HAS BEEN SUCCESSFULLY CALCULATED.



BILL OF MATERIALS (ROOF 1)

Position	Item no.	Item description	Quantity	Weight
1	2003247	S-Dome 6.10 Base Set	38	75.5 kg
2	2004125	Dome 6.10 Peak	38	11.4 kg
3	2004123	Dome 6 Connector 195 Set	15	3.2 kg
4	2003249	S-Dome 6.10 Windbreaker short	31	55.8 kg
5	1005207	Thread-forming metal screw 6.0x25	76	0.5 kg
6	2002870	K2 Solar Cable Manager	31	0.1 kg
7	2002558	MiniClamp MC Set 30-50	48	2.8 kg
8	2002559	MiniClamp EC Set 30-50	28	1.8 kg
9	2003150	Dome Porter short	2	3.0 kg
10	1001643	MK2	4	0.1 kg
11	2001729	Socket Head Bolt serrated M8x20	4	0.1 kg
12	2002300	Dome SpeedPorter	82	6.2 kg
Total				160.5 kg



PROJECT DATA (ROOF 2)

GENERAL INFORMATION

Name	MMU Vine hall
Mounting System	S-Dome 6.10 Xpress
Customer	Cor Energy
Author	Hugo Silva

REMARKS

Best assumptions made for any missing information

LOCATION

Address	49 Stretford Rd, Hulme, Manchester M15 5JH, UK
Ground elevation	35.96 m
Roof type	Flat roof
Fastening method	with Ballast
Roof covering	Flat
Building height	15.80 m
Parapet wall height	0.20 m
Roof pitch	1 °
Min. roof edge distance	0.60 m
Material	Single ply membrane
Friction coefficient	0.50
Terrain category	Town Terrain

The friction coefficients given here must be checked onsite. If a lower value is found, this must be specified here for the ballast calculation!

LOADS

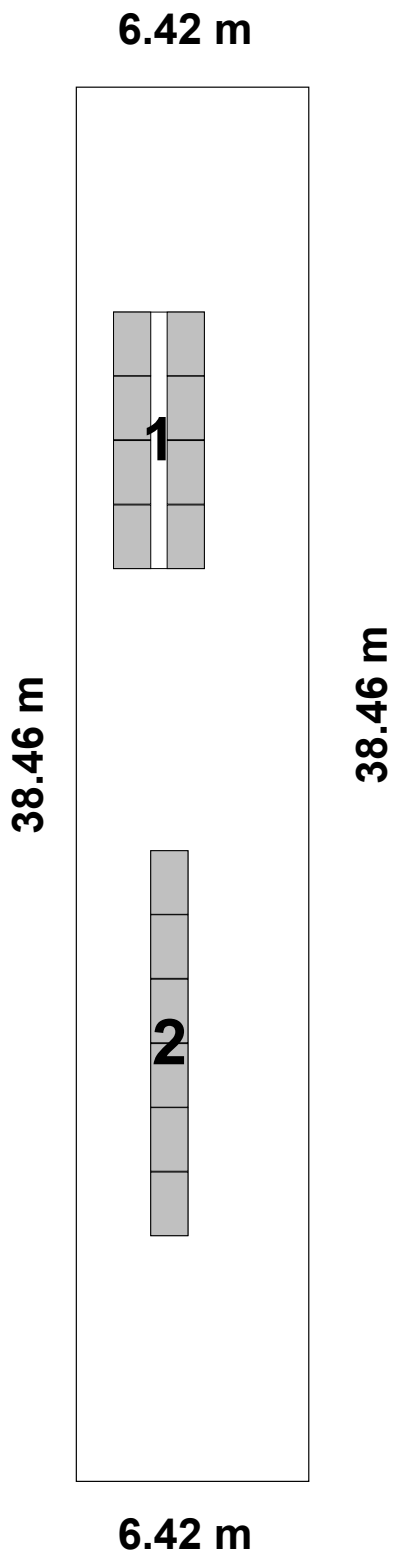
Design method	BS EN		
Failure consequence class (CC)	CC1	Design working life	25 years
Terrain category	Town Terrain		
distance to shoreline	45.00 km		
distance inside town terrain	9.30 km		
Peak velocity pressure	$q_{p,25} = 0.690 \text{ kN/m}^2$		
Snow load zone	1		
Snow load on ground level	$s_k = 0.300 \text{ kN/m}^2$		

MODULES

Manufacturer	Longi Solar	Quantity	14
Name	LR4-60HPH-375M	Total output power	5.250 kWp
Dimensions LxWxH	1755 x 1038 x 35.00 mm		
Weight	19.5 kg		
Output power	375 W		



ASSEMBLY PLAN (ROOF 2)



Dimensions in [m]

LEGEND

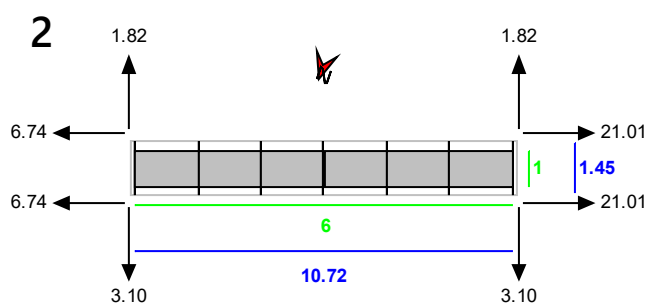
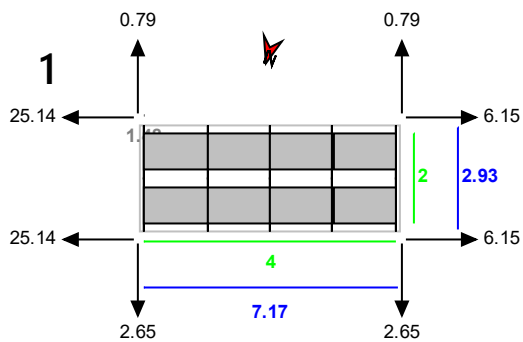
Distance to neighbouring module array [m]

Distance to roof edge [m]

Number of modules

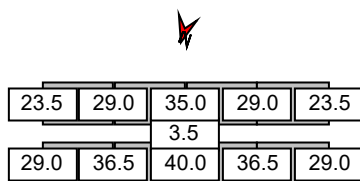
Length/width of module array [m]

Row distance [m]



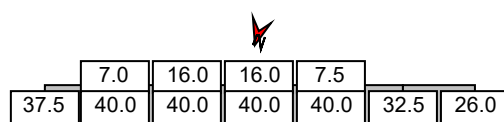
BALLAST PLAN (ROOF 2)

1



23.5	29.0	35.0	29.0	23.5
29.0	36.5	40.0	36.5	29.0

2



	7.0	16.0	16.0	7.5		
37.5	40.0	40.0	40.0	40.0	32.5	26.0

RESULTS (ROOF 2)

BALLAST CAPACITY

Speed Porter	40.0 kg
Porter	108.0 kg
module clamp	MiniClamp MC Set 30-50
end clamp	MiniClamp EC Set 30-50

VERIFICATION SYSTEM UTILISATION

Verification system utilisation [%]	pressure	43.75
	suction	34.10
Loads on modules (ultimate state) [Pa]	pressure	1362
	suction	-988
Loads on modules (Serviceability) [Pa]	pressure	1019
	suction	-697

SPECIFIC LOADS

Index (module block)	No. of modules (module block)	---	---	Ballast [kg] (module block)	Dead weight [kg] (module block)	Dead Load [kN/m ²] (module block)	Dead Load [kN/m ²] (roof surface area)	Own weight [kN/m ²]
module array 1	8	---	---	314.5	503.3	0,23	---	---
module array 2	6	---	---	302.5	444.1	0.27	---	---
all Blocks	14	---	---	617.0	947.4	---	0.04	---

NOTES

- The proof of position safety and load capacity of the system are carried out by checking the load cases lifting and shifting by wind and by further static calculations. You will find a short version of the wind tunnel report and a certificate for the further static calculations on our homepage.
- The structural design complies with BS EN 1990 - Basics 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.
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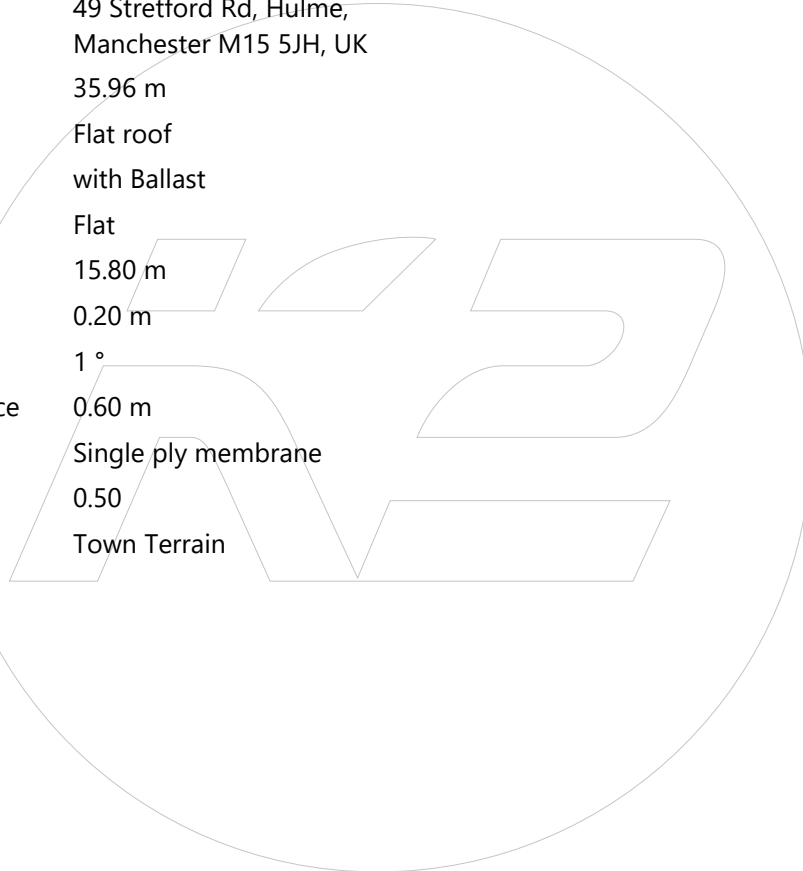
STRUCTURAL ANALYSIS REPORT (ROOF 2)

GENERAL INFORMATION

Name	MMU Vine hall
Mounting System	S-Dome 6.10 Xpress
Customer	Cor Energy
Author	Hugo Silva

LOCATION

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Ground elevation	35.96 m
Roof type	Flat roof
Fastening method	with Ballast
Roof covering	Flat
Building height	15.80 m
Parapet wall height	0.20 m
Roof pitch	1 °
Min. roof edge distance	0.60 m
Material	Single ply membrane
Friction coefficient	0.50
Terrain category	Town Terrain



LOADS

Design method	BS EN		
Failure consequence class (CC)	CC1	Design working life	25 years

Terrain category Town Terrain

distance to shoreline 45.00 km

distance inside town terrain 9.30 km

Peak velocity pressure $q_{p,50} = 0.749 \text{ kN/m}^2$

Adjustment factor for service life $f_w = 0.921$

Peak velocity pressure $q_{p,25} = 0.690 \text{ kN/m}^2$

Snow load zone 1

Snow load on ground level $s_k = 0.300 \text{ kN/m}^2$

Shape Coefficient for Snow $\mu_i = 0.800$

Factor for roof pitch $d_i = 1.000$

Snow load on roof $s_{i,50} = 0.240 \text{ kN/m}^2$

Adjustment factor for service life $f_s = 0.929$

Snow load on roof $s_{i,25} = 0.223 \text{ kN/m}^2$

DEAD LOAD

Weight module	$G_M = 19.5 \text{ kg}$	Dead weight module	$= 10.70 \text{ kg/m}^2$
Weight mounting system per module area	$= 4.1 \text{ kg}$	Dead weight mounting system	$= 2.25 \text{ kg/m}^2$
Module area	$A_M = 1.82 \text{ m}^2$	Total Dead Weight (excl. ballast)	$= 0.13 \text{ kN/m}^2$

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 first variable load	γ_Q	1.50
Partial safety factor variable loads	γ_Q	1.50
Combination coefficient with regards to wind	$\psi_{0,W}$	0.60
Combination coefficient with regards to wind (additional varying influences)	$\psi_{1,W}$	0.20
Combination coefficient with regards to Snow	$\psi_{0,S}$	0.50
Importance factor variable	$\kappa_{FI,Q}$	0.85
Characteristic dead weight	G_k	
Characteristic snow load on the roof	$S_{i,n}$	
Characteristic wind load	W_k	
Load case combination 00:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * S_{i,n}$	
Load case combination 02:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,Pressure}$	
Load case combination 03:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$	
Load case combination 04:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$	
Load case combination 06:	$E_d = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,Suction}$	
Uplift Verification:	$E_d = \gamma_{G,stab} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,n,Uplift}$	
Displacement verification:	$E_d = \gamma_{G,stab} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,n,Displacement}$	

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 00: $E_d = G_k$

Load case combination 01: $E_d = G_k + S_{i,n}$

Load case combination 02: $E_d = G_k + W_{k,Pressure}$

Load case combination 03: $E_d = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$

Load case combination 04: $E_d = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$

Load case combination 06: $E_d = G_k + W_{k,Suction}$

THE SYSTEM HAS BEEN SUCCESSFULLY CALCULATED.

BILL OF MATERIALS (ROOF 2)

Position	Item no.	Item description	Quantity	Weight
1	2003247	S-Dome 6.10 Base Set	17	33.8 kg
2	2004125	Dome 6.10 Peak	17	5.1 kg
3	2004123	Dome 6 Connector 195 Set	5	1.1 kg
4	2003249	S-Dome 6.10 Windbreaker short	14	25.2 kg
5	1005207	Thread-forming metal screw 6.0x25	34	0.2 kg
6	2002870	K2 Solar Cable Manager	14	0.0 kg
7	2002558	MiniClamp MC Set 30-50	22	1.3 kg
8	2002559	MiniClamp EC Set 30-50	12	0.8 kg
9	2002300	Dome SpeedPorter	44	3.3 kg
Total				70.8 kg



PROJECT DATA (ROOF 3)

GENERAL INFORMATION

Name	MMU Vine hall
Mounting System	S-Dome 6.10 Xpress
Customer	Cor Energy
Author	Hugo Silva

REMARKS

Best assumptions made for any missing information

LOCATION

Address	49 Stretford Rd, Hulme, Manchester M15 5JH, UK
Ground elevation	35.96 m
Roof type	Flat roof
Fastening method	with Ballast
Roof covering	Flat
Building height	15.80 m
Parapet wall height	0.20 m
Roof pitch	1 °
Min. roof edge distance	0.60 m
Material	Single ply membrane
Friction coefficient	0.50
Terrain category	Town Terrain

The friction coefficients given here must be checked onsite. If a lower value is found, this must be specified here for the ballast calculation!

LOADS

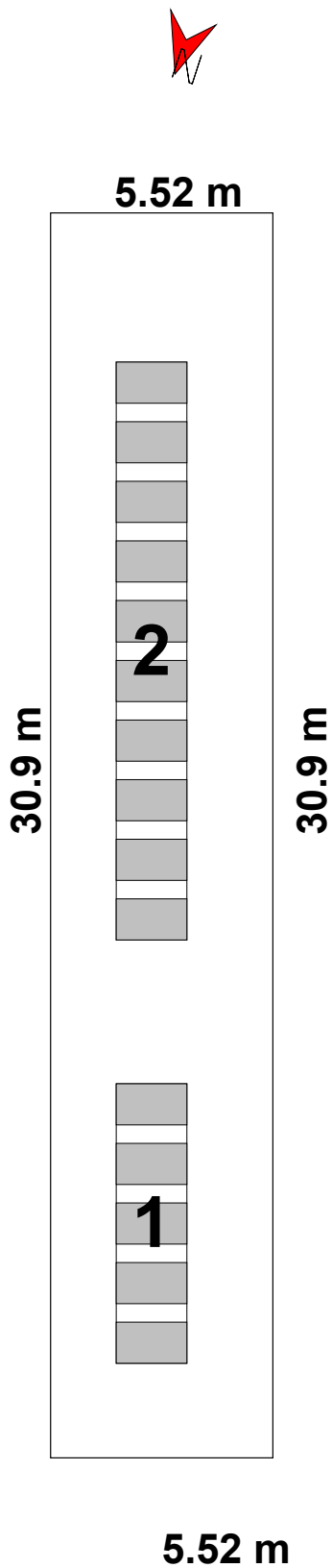
Design method	BS EN		
Failure consequence class (CC)	CC1	Design working life	25 years
Terrain category	Town Terrain		
distance to shoreline	45.00 km		
distance inside town terrain	9.30 km		
Peak velocity pressure	$q_{p,25} = 0.690 \text{ kN/m}^2$		
Snow load zone	1		
Snow load on ground level	$s_k = 0.300 \text{ kN/m}^2$		

MODULES

Manufacturer	Longi Solar	Quantity	15
Name	LR4-60HPH-375M	Total output power	5.625 kWp
Dimensions LxWxH	1755 x 1038 x 35.00 mm		
Weight	19.5 kg		
Output power	375 W		



ASSEMBLY PLAN (ROOF 3)



Dimensions in [m]

LEGEND

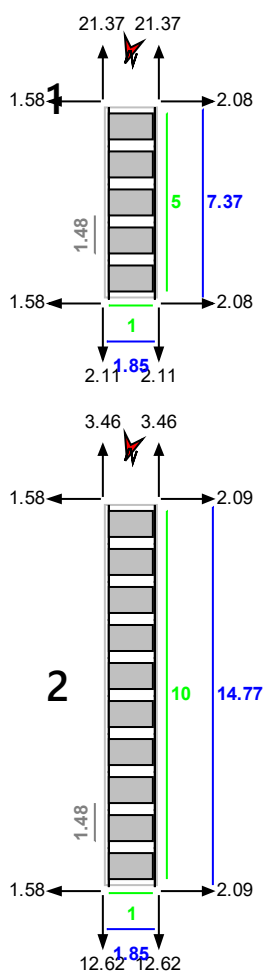
Distance to neighbouring module array [m]

Distance to roof edge [m]

Number of modules

Length/width of module array [m]

Row distance [m]



BALLAST PLAN (ROOF 3)

1



36.0	36.0
25.5	25.5
25.5	25.5
25.5	25.5
27.0	27.0

2

21.5	21.5
18.0	18.0
18.0	18.0
18.0	18.0
18.0	18.0
18.0	18.0
24.0	24.0
24.0	24.0
24.0	24.0
24.5	24.5

RESULTS (ROOF 3)

BALLAST CAPACITY

Speed Porter	40.0 kg
Porter	108.0 kg
module clamp	MiniClamp MC Set 30-50
end clamp	MiniClamp EC Set 30-50

VERIFICATION SYSTEM UTILISATION

Verification system utilisation [%]	pressure	28.13
	suction	34.10
Loads on modules (ultimate state) [Pa]	pressure	1362
	suction	-988
Loads on modules (Serviceability) [Pa]	pressure	1019
	suction	-697

SPECIFIC LOADS

Index (module block)	No. of modules (module block)	---	---	Ballast [kg] (module block)	Dead weight [kg] (module block)	Dead Load [kN/m ²] (module block)	Dead Load [kN/m ²] (roof surface area)	Own weight [kN/m ²]
module array 1	5	---	---	279.0	397.0	0.28	---	---
module array 2	10	---	---	416.0	652.0	0.23	---	---
all Blocks	15	---	---	695.0	1049.0	---	0.06	---

NOTES

- The proof of position safety and load capacity of the system are carried out by checking the load cases lifting and shifting by wind and by further static calculations. You will find a short version of the wind tunnel report and a certificate for the further static calculations on our homepage.
- The structural design complies with BS EN 1990 - Basics 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'.
- Data and results must be verified with regard to local conditions and checked by a suitably qualified person. Please see our TCU under <https://k2-systems.com/en/base-tcu>, in particular § 2 ("technical and specialist requirements for the customer"), § 7 ("warranty provisions") and § 8 ("limitation of liability").

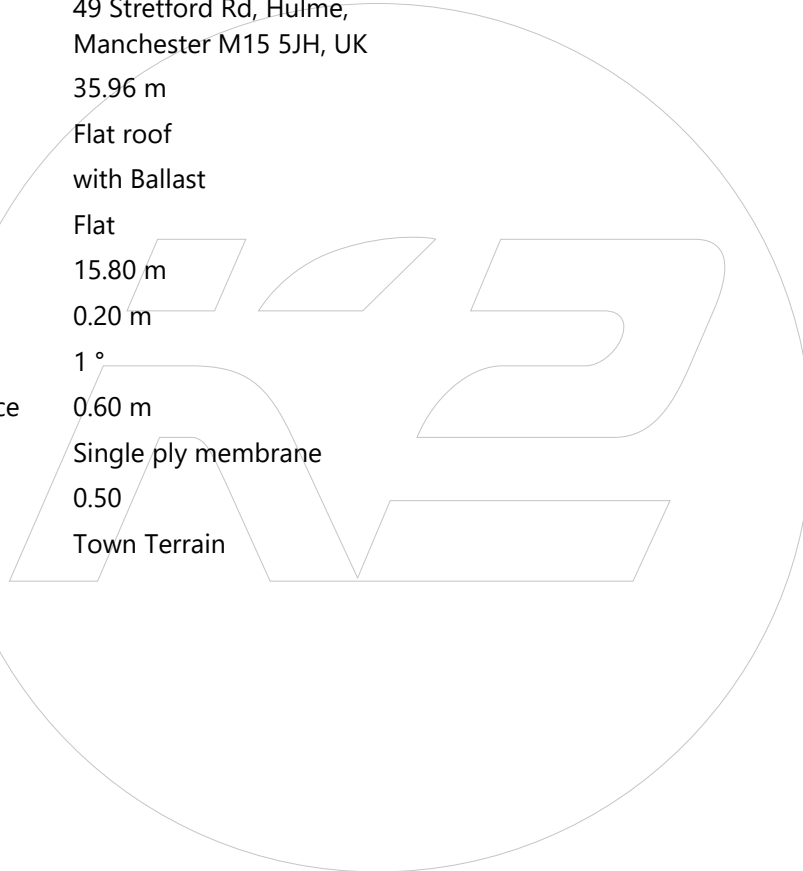
STRUCTURAL ANALYSIS REPORT (ROOF 3)

GENERAL INFORMATION

Name	MMU Vine hall
Mounting System	S-Dome 6.10 Xpress
Customer	Cor Energy
Author	Hugo Silva

LOCATION

Address	49 Stretford Rd, Hulme, Manchester M15 5JH, UK
Ground elevation	35.96 m
Roof type	Flat roof
Fastening method	with Ballast
Roof covering	Flat
Building height	15.80 m
Parapet wall height	0.20 m
Roof pitch	1 °
Min. roof edge distance	0.60 m
Material	Single ply membrane
Friction coefficient	0.50
Terrain category	Town Terrain



LOADS

Design method	BS EN		
Failure consequence class (CC)	CC1	Design working life	25 years

Terrain category Town Terrain

distance to shoreline 45.00 km

distance inside town terrain 9.30 km

Peak velocity pressure $q_{p,50} = 0.749 \text{ kN/m}^2$

Adjustment factor for service life $f_w = 0.921$

Peak velocity pressure $q_{p,25} = 0.690 \text{ kN/m}^2$

Snow load zone 1

Snow load on ground level $s_k = 0.300 \text{ kN/m}^2$

Shape Coefficient for Snow $\mu_i = 0.800$

Factor for roof pitch $d_i = 1.000$

Snow load on roof $s_{i,50} = 0.240 \text{ kN/m}^2$

Adjustment factor for service life $f_s = 0.929$

Snow load on roof $s_{i,25} = 0.223 \text{ kN/m}^2$

DEAD LOAD

Weight module	$G_M = 19.5 \text{ kg}$	Dead weight module	$= 10.70 \text{ kg/m}^2$
Weight mounting system per module area	$= 4.1 \text{ kg}$	Dead weight mounting system	$= 2.25 \text{ kg/m}^2$
Module area	$A_M = 1.82 \text{ m}^2$	Total Dead Weight (excl. ballast)	$= 0.13 \text{ kN/m}^2$

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 first variable load	γ_Q	1.50
Partial safety factor variable loads	γ_Q	1.50
Combination coefficient with regards to wind	$\psi_{0,W}$	0.60
Combination coefficient with regards to wind (additional varying influences)	$\psi_{1,W}$	0.20
Combination coefficient with regards to Snow	$\psi_{0,S}$	0.50
Importance factor variable	$\kappa_{FI,Q}$	0.85
Characteristic dead weight	G_k	
Characteristic snow load on the roof	$S_{i,n}$	
Characteristic wind load	W_k	

Load case combination 00:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * S_{i,n}$
Load case combination 02:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,Pressure}$
Load case combination 03:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * (W_{k,Pressure} + \psi_{0,S} * S_{i,n})$
Load case combination 04:	$E_d = \gamma_{G,sup} * \kappa_{FI,G} * G_k + \gamma_Q * \kappa_{FI,Q} * (S_{i,n} + \psi_{0,W} * W_{k,Pressure})$

Load case combination 06:	$E_d = \gamma_{G,inf} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,Suction}$
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Uplift Verification:	$E_d = \gamma_{G,stab} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,n,Uplift}$
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Displacement verification:	$E_d = \gamma_{G,stab} * G_k + \gamma_Q * \kappa_{FI,Q} * W_{k,n,Displacement}$
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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 00: $E_d = G_k$

Load case combination 01: $E_d = G_k + S_{i,n}$

Load case combination 02: $E_d = G_k + W_{k,Pressure}$

Load case combination 03: $E_d = G_k + W_{k,Pressure} + \psi_{0,S} * S_{i,n}$

Load case combination 04: $E_d = G_k + S_{i,n} + \psi_{0,W} * W_{k,Pressure}$

Load case combination 06: $E_d = G_k + W_{k,Suction}$

THE SYSTEM HAS BEEN SUCCESSFULLY CALCULATED.

BILL OF MATERIALS (ROOF 3)

Position	Item no.	Item description	Quantity	Weight
1	2003247	S-Dome 6.10 Base Set	30	59.6 kg
2	2004125	Dome 6.10 Peak	30	9.0 kg
3	2004123	Dome 6 Connector 195 Set	26	5.6 kg
4	2003249	S-Dome 6.10 Windbreaker short	15	27.0 kg
5	1005207	Thread-forming metal screw 6.0x25	60	0.4 kg
6	2002870	K2 Solar Cable Manager	15	0.0 kg
7	2002559	MiniClamp EC Set 30-50	60	4.0 kg
8	2002300	Dome SpeedPorter	60	4.6 kg

Total

110.2 kg



TOTAL BILL OF MATERIALS (ALL ROOFS)

Position	Item no.	Item description	Quantity	Weight
1	2003247	S-Dome 6.10 Base Set	85	168.9 kg
2	2004125	Dome 6.10 Peak	85	25.5 kg
3	2004123	Dome 6 Connector 195 Set	46	9.9 kg
4	2003249	S-Dome 6.10 Windbreaker short	60	108.0 kg
5	1005207	Thread-forming metal screw 6.0x25	170	1.0 kg
6	2002870	K2 Solar Cable Manager	60	0.2 kg
7	2002558	MiniClamp MC Set 30-50	70	4.1 kg
8	2002559	MiniClamp EC Set 30-50	100	6.6 kg
9	2003150	Dome Porter short	2	3.0 kg
10	1001643	MK2	4	0.1 kg
11	2001729	Socket Head Bolt serrated M8x20	4	0.1 kg
12	2002300	Dome SpeedPorter	186	14.1 kg
Total				341.5 kg