

Structural Calculations

Customer Name

Report Author

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Contractor Name

Sureserve Energy Services UK Limited

Address

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System Data

System Size

3.640 kW (DC)

Number of roofs

2

Module Details

8 x JAM54D41-455/LB

Weight loading calculations

Roof 1

Loading imposed by solar array and mounting	0.120 kN/m ²
Dead load from roof covering	0.3 kN/m ²
Roof pitch	21.23
Rafter depth	150 mm
Rafter breadth	50 mm
Rafter spacing	400 mm
Longest unsupported span	3 m
Longest permitted unsupported span	3.78 m

The roof rafters can bear the weight of the proposed system



According to the TRADA Eurocode 5 span tables, the maximum unsupported length of the roof timbers is within the permitted span that can bear the additional load.

Wind loading calculations

Wind loading calculations follow the methodology described in MCS's Guide to the Installation of Photovoltaic Systems. The forces on the fixings are calculated using the equation above, and compared to the force which would cause the fixings to pullout.

$$F = Q_p \times C_{pnet} \times C_a \times C_t \times A_{ref}$$

Roof 1

Q_p	908
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C_a	1
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C_t	1.0
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Area, A_{ref}	7.99 m
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	Forces acting at the roof center	Forces acting at the roof edge
Uplift, C_{pnet}	-1.3	-2.2
Uplift, F	9434.3 N	15965.7 N
Uplift per fixing	393.1 N	665.2 N
Pressure, C_{pnet}	1	1.1
Pressure, F	7257.1 N	7982.8 N
Pressure per fixing	302.4 N	332.6 N

Pullout force of each fixing	951.5 N
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The wind loading is less than the pullout force of the fixings



Q_p is derived from fig. 34 in MCS's Guide to the Installation of Photovoltaic Systems for a roof ridge None-m high, in windzone , in terrain, at a distance of over 20km from the sea. C_a is derived using an altitude of m. There is assumed to be 24 fixings. The fixing thread length screwed through the timber is assumed to be 55mm, with a diameter of 6mm. The pullout force was calculated using these values with the tables and formulae in BS5268 part 2 for C16 timber.

Weight loading calculations

Roof 2

Loading imposed by solar array and mounting	0.122 kN/m ²
Dead load from roof covering	0.3 kN/m ²
Roof pitch	21.23
Rafter depth	150 mm
Rafter breadth	50 mm
Rafter spacing	400 mm
Longest unsupported span	3 m
Longest permitted unsupported span	3.78 m

The roof rafters can bear the weight of the proposed system



According to the TRADA Eurocode 5 span tables, the maximum unsupported length of the roof timbers is within the permitted span that can bear the additional load.

Wind loading calculations

Wind loading calculations follow the methodology described in MCS's Guide to the Installation of Photovoltaic Systems. The forces on the fixings are calculated using the equation above, and compared to the force which would cause the fixings to pullout.

$$F = Q_p \times C_{pnet} \times C_a \times C_t \times A_{ref}$$

Roof 1

Q_p	908
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C_a	1
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C_t	1.0
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Area, A_{ref}	7.99 m
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	Forces acting at the roof center	Forces acting at the roof edge
Uplift, C_{pnet}	-1.3	-2.2
Uplift, F	9434.3 N	15965.7 N
Uplift per fixing	336.9 N	570.2 N
Pressure, C_{pnet}	1	1.1
Pressure, F	7257.1 N	7982.8 N
Pressure per fixing	259.2 N	285.1 N

Pullout force of each fixing	951.5 N
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The wind loading is less than the pullout force of the fixings



Q_p is derived from fig. 34 in MCS's Guide to the Installation of Photovoltaic Systems for a roof ridge None-m high, in windzone , in terrain, at a distance of over 20km from the sea. C_a is derived using an altitude of m. There is assumed to be 28 fixings. The fixing thread length screwed through the timber is assumed to be 55mm, with a diameter of 6mm. The pullout force was calculated using these values with the tables and formulae in BS5268 part 2 for C16 timber.