

From above rails layout and panel modulation- support centres generally at 600 mm centres

A simple analysis was conducted upon a 3mm aluminium panel of length 2000mm and supported at 60mm centres rail positions at head and base. The analysis was done based upon a 3D model created in the package PTC Creo using the sheet metal module to realistically create radius fold edges. Deformation / displacement was measured via the use of Finite Element Analysis within the same software. For the purposes of this study the supporting structure was not included.

Design requirements

CWCT code 3.5.2.8

Rainscreen panels shall not exceed displacement of 1/90 of the span when measured between the points of attachment. It is this reason that structural stiffeners are applied to the rear of rainscreen panels to control this. This is obviously also not the only design driver with stress also to be considered and ensure is maintained within the design code requirements. The properties of standard commercial grade aluminium are contained in Appendix B.

The worst- case design loadings were applied in the analysis as calculated in appendix A i.e. factored corner loads as follows.

Maximum design wind loading suction = $-1.39 \times 1,5 = -2.1 \text{KN /m}^2$

Maximum design wind loading direct = $1.04 \times 1,5 = 1.56 \text{KN/m}^2$

The above figures were factored to meet EN SF, but no reduction has been applied to factor for a pressure equalised system as the closed restricted joint system would mean this CWCT TN6 does not apply.

Item	Panel Height	Allowable L/90 (mm)	Analysis recorded (mm)	Panel thickness (mm)
1	600	6.7	4.5	3mm
2	700	7.8	8.3	3mm
3	800	8.9	5.8	4mm
4	900	10	10.6	4mm

Note

Above was based upon a panel 2000mm long in all widths

From the above figures it can be seen for a 3mm thick panel the largest height would be 700mm without stiffeners, and for 4mm it would be 900mm high

Conclusion/options

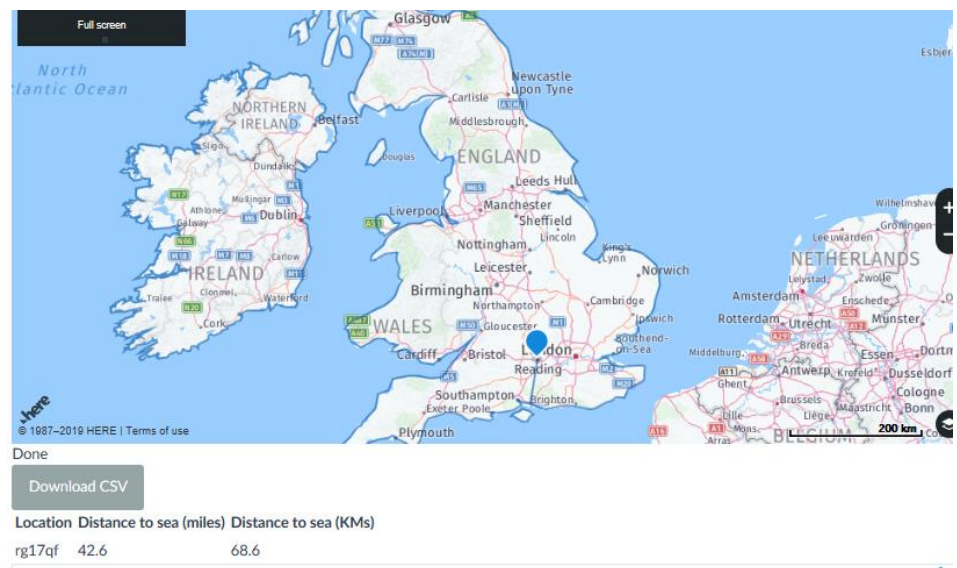
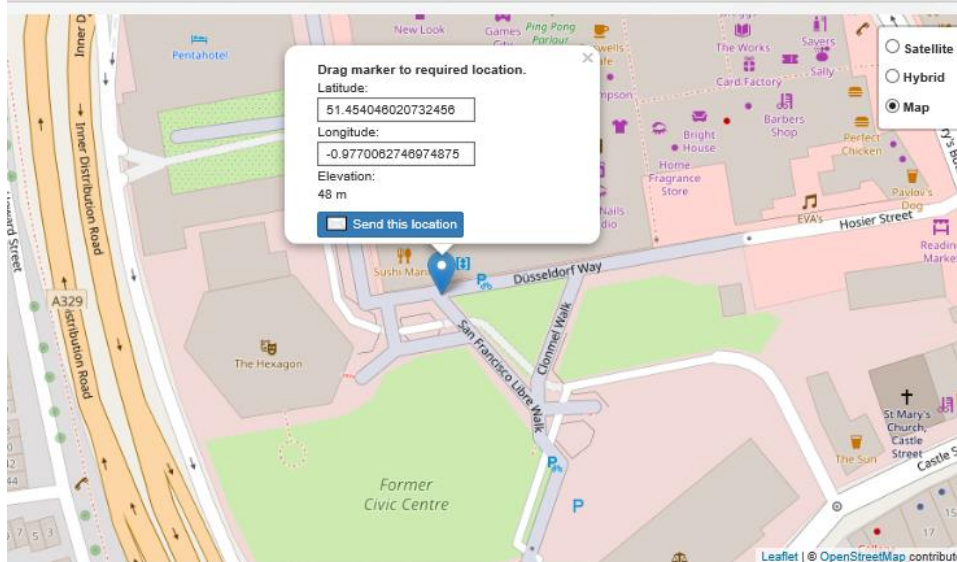
- Re modulate the panel heights to take account of the restrictions stated above if no stiffeners are to be deployed
- Based on the sample bay above of the 64 panels shown, 15 No (23%) were higher than 700 and only 8 (12%) No greater than 900

Appendix A -Wind load calculations

Postcode: RG1 7QF

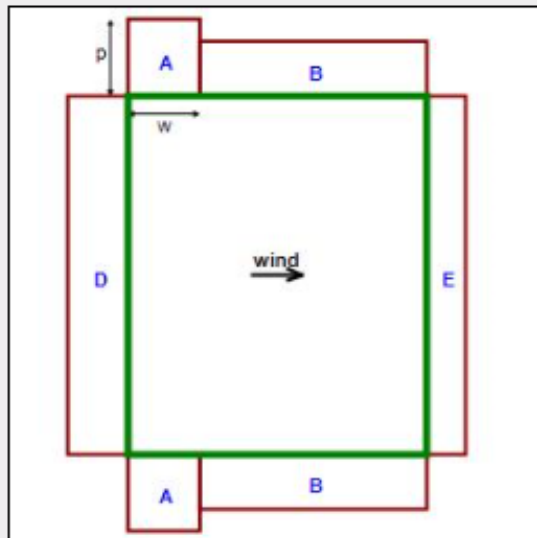
Height from ground to eaves: 33m

Altitude estimated 48m ASL



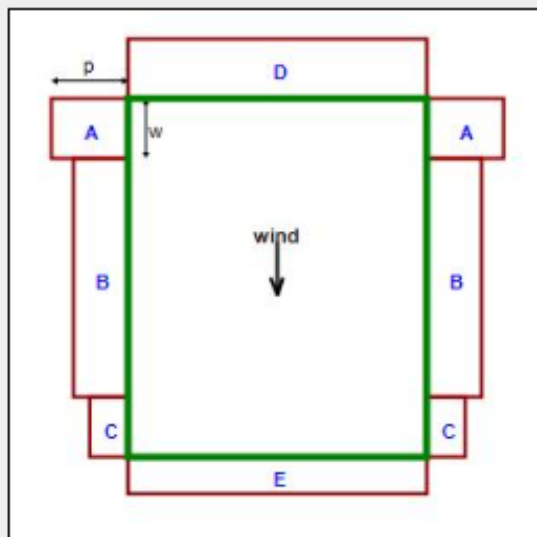
Distance to sea 68.6 Km

Wind Loading on Walls - Wind Parallel to Building Width



Zone	Max Net Pressure $p(\text{kN/m}^2)$	Width of Zone $w(\text{m})$
A	-1.319	7.20
B	-0.942	22.80
D	1.036	36.00
E	-0.664	36.00

Wind Loading on Walls - Wind Perpendicular to Building Width



Zone	Max Net Pressure $p(\text{kN/m}^2)$	Width of Zone $w(\text{m})$
A	-1.319	6.00
B	-0.942	24.00
C	-0.659	6.00
D	1.026	30.00
E	-0.639	30.00

EN SF factor 1.5

Maximum design wind loading suction = $-1.39 \times 1,5 = -2.1 \text{ kN/m}^2$

Maximum design wind loading direct = $1.04 \times 1,5 = 1.56 \text{ kN/m}^2$

Appendix B

Mechanical properties of Aluminium grade 1050 H14

SPECIFICATIONS

Commercial	1050A
EN	1050A

Aluminium alloy 1050 is a popular grade of aluminium for general sheet metal work where moderate strength is required.

Alloy 1050 is known for its excellent corrosion resistance, high ductility and highly reflective finish.

Applications - Alloy 1050 is typically used for:
Chemical process plant equipment
Food industry containers
Pyrotechnic powder
Architectural flashings
Lamp reflectors
Cable sheathing

CHEMICAL COMPOSITION

BS EN 573-3:2009
Alloy 1050A

Element	% Present
Iron (Fe)	0.0 - 0.40
Silicon (Si)	0.0 - 0.25
Zinc (Zn)	0.0 - 0.07
Magnesium (Mg)	0.0 - 0.05
Titanium (Ti)	0.0 - 0.05
Manganese (Mn)	0.0 - 0.05
Copper (Cu)	0.0 - 0.05
Other (Each)	0.0 - 0.03
Aluminium (Al)	Balance

ALLOY DESIGNATIONS

Aluminium alloy 1050A also corresponds to the following standard designations and specifications but may not be a direct equivalent:

SUPPLIED FORMS

Plain sheet
Plain sheet with a PVC coating on one side
Stucco sheet
Stucco sheet with a PVC coating on one side
Shate

- Sheet

GENERIC PHYSICAL PROPERTIES

Property	Value
Density	2.71 g/cm ³
Melting Point	650 °C
Thermal Expansion	24 x10 ⁻⁶ /K
Modulus of Elasticity	71 GPa
Thermal Conductivity	222 W/m.K
Electrical Resistivity	0.0282 x10 ⁻⁶ Ω .m

MECHANICAL PROPERTIES

BS EN 485-2:2008
Sheet
0.2mm to 6.00mm

Property	Value
Proof Stress	85 Min MPa
Tensile Strength	105 - 145 MPa
Hardness Brinell	34 HB
Elongation A	12 Min %

Properties above are for material in the H14 condition

WELDABILITY

When welding 1050 to itself or an alloy from the same subgroup the recommended filler wire is 1100. For welding to alloys 5083 and 5086 or alloys from the 7XXX series, the recommend wire is 5356. For other alloys use 4043 filler wire.