



VERTICAL MULLION – WIND LOAD CALCULATION REPORT

For preliminary sizing; final design must be checked by a competent engineer in accordance with the relevant standards.

Project	Sample Project
Subject	Vertical Mullion Structural Design
Prepared by	Civil Engineer
Approved by	Senior Civil Engineer
Date	13/08/2025

1) Inputs

q (kN/m ²)	1.100 (Pressure (positive))	B (cm)	120
L (cm)	320	E (GPa)	70
Material	Aluminum	Note	Aluminum X.X
f _y (MPa)	160	σ _{allow,d} (ULS) MPa	145.5 (γ _M =1.1)
W (cm ³)	50	I (cm ⁴)	200

2) SLS — Deflection (Serviceability)

w (kN/m)	1.320	L (m)	3.200
E (GPa)	70	f _{limit} (mm)	15.67
I _{req} (cm ⁴)	164.34 I _{req} = 5·w·L ⁴ / (384·E·f _{limit})		
Δ _{max} (mm)	12.87	Compliance	✅ OK (Δ _{max} /f _{limit} = 82%)

Internal forces (SLS): R = 2.112 kN, V_{max} = 2.112 kN, M_{max} = 1.690 kN·m [R = w·L/2, V = R, M = w·L²/8]

3) ULS — Strength (Ultimate Limit State)

Y _{Q,wind}	1.5	w _d (kN/m)	1.980 = γ _Q · w
M _d (kN·m)	2.534	σ _d (MPa)	50.69 = M _d / W

Allowable (MPa)

$$145.45 = f_y / \gamma_{M1}$$

Compliance OK ($\sigma_d / \text{allowable} = 35\%$)

4) Formulas Used

$$w = |q| \cdot B \quad (\text{kN/m}) \quad ; \quad I_{\text{req}} = 5 w L^4 / (384 E f_{\text{limit}})$$

$$\text{Simple beam (2 supports, pinned): } R = wL/2, \quad V_{\text{max}} = R, \quad M_{\text{max}} = wL^2/8$$

$$\text{ULS: } w_d = \gamma_Q \cdot w \quad ; \quad \sigma_d = M_d / W$$

$$\text{Deflection limit (EN 13830 5.7–5.8): } L \leq 3 \text{ m} \rightarrow L/200; \quad 3\text{--}7.5 \text{ m} \rightarrow 5 \text{ mm} + L/300; \quad L \geq 7.5 \text{ m} \rightarrow L/250$$