CURTAIN WALL STRUCTURAL CALCULATION

The following structural calculation is based on strict compliance to **ALUMEG** fabrication manual instruction, the good practise of curtain wall fabrication & installation, and CWCT relevant technical notes.

DESIGN CRITERIA FOR CURTAIN WALLS CATALOGUE:

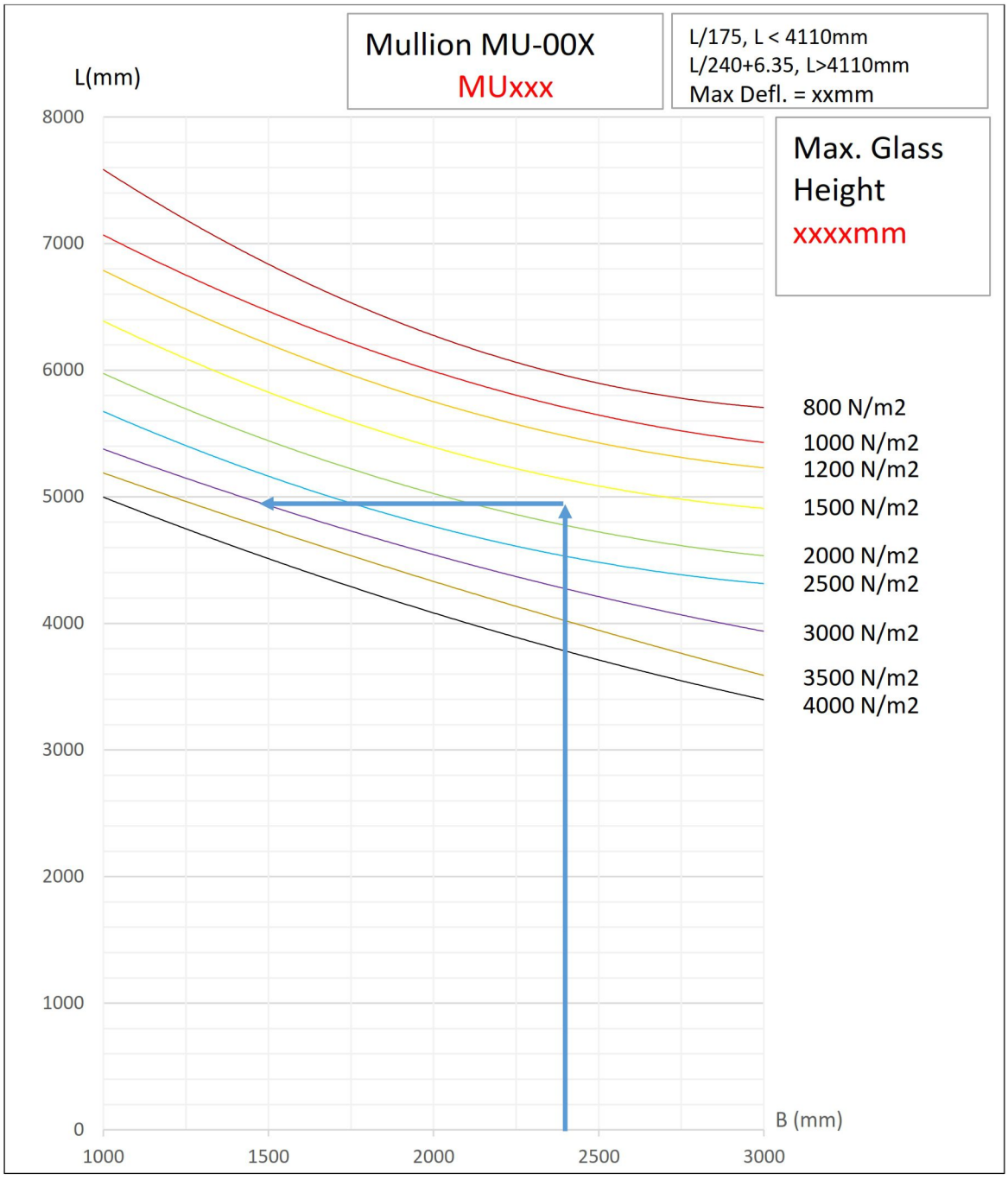
a) LOAD COMPUTATIONS:

Curtain walls design criteria will be as follow:

- Stress computation formula = $F = C_f \times K \times q$ (Kg/m^2)
- Wind loads will be obtained from Egyptian code for loads (ECP-201/2015)
- Choosing C_f as per opening in the curtain walls
    - $C_f = 1.30$, curtain walls have openings
    - $C_f = 0.80$, curtain walls have no openings
- Choosing K according to the curtain walls height from land level and gust factor (A, B, C), according to table (7-3)
- $q = 0.50 \times 10^{-3} \times \rho \times V^2 \times C_t \times C_s$ (kN/m^2), refer to page 85 in ECP
    - V = Basic wind speed (m/sec) from project specifications, or refer to table (7-1)
    - ρ = air density (1.25 Kg/m^3)
    - C_t = Topographic factor (unitless), refer to table (7-2)
    - C_s = Building factor (unitless), refer to appendix (7-A)

b) CHOOSING THE CURVE:

- Curves were created by governing the section type and maximum allowable deflection (19mm, 25mm, or according to AAMA limits) obtaining from the project specifications. Also, maximum curtain wall panel is illustrated.
- By using the stress value (F, illustrated in curves from 800 N/m2 to 4000 N/m2), the breadth of the and height of the curtain walls can be achieved.


Mullion MU-00X
MUxxx
L/175, L < 4110mm
L/240+6.35, L>4110mm
Max Defl. = xxmm
Max. Glass Height
xxxxmm
L(mm)
8000
7000
6000
5000
4000
3000
2000
1000
0
1000
1500
2000
2500
3000
B (mm)
800 N/m2
1000 N/m2
1200 N/m2
1500 N/m2
2000 N/m2
2500 N/m2
3000 N/m2
3500 N/m2
4000 N/m2

EXAMPLE FOR DESIGN CRITERIA FOR CURTAIN WALLS CATALOGUE:

ASSUME:

Curtain walls will be used in Cairo zone, at height 40m.
The project in flat area, exposure (A).
Deflection limitation is 25mm as per project specifications.
Floor height according to architecture drawings is 5.00m and mullion distribution is 2.00m apart.

LOAD COMPUTATIONS:

Curtain walls design criteria will be as follow:

- Stress computation formula = $F = C_f \times K \times q$ (Kg/m^2)
- Wind loads will be obtained from Egyptian code for loads (ECP-201/2015)
- Choosing C_f, assume that the curtain walls have no openings,
  - $C_f = 0.80$, curtain walls have no openings
- Choosing K = 1.60, according to table (7-3)
- $q = 0.50 \times 10^{-3} \times \rho \times V^2 \times C_t \times C_s$ (Kg/m^2), refer to page 85 in ECP
  - V = 33 m/sec, Cairo zone
  - ρ = air density (1.25 Kg/m^3)
  - C_t =1, refer to table (7-2)
  - C_s = 1, building is less than 60m, refer to appendix (7-A)
- $q = 0.50 \times 10^3 \times 1.25 \times (33)^2 \times 1 \times 1 = 0.68$ kN/m^2
- $F = 0.80 \times 1.60 \times 0.68 = 0.88$ kN/m^2 = 880 N/m^2

CHOOSING THE CURVE:

- Choosing the curve will be used as per:
  - Floor height = 5.00m, deflection limitation is 25mm
  - Start the choosing by using the minimum mullion to the bigger one and so on.
  - The wind stress = 880 N/m^2
  - Choosing the curve between 800 N/m^2 to 1000 N/m^2, which equal 880 N/m^2
  - Start from horizontal axis by 2.00m, draw vertical line until intersecting the area between curves (800 N/m^2 and 1000 N/m^2), then draw horizontal line until intersect the vertical axis, which leads to maximum height of the mullion.

Curve	B (mm)	Maximum H (mm)	Comment
MU85	2000	2450	Not Safe
MU100	2000	2700	Not Safe
MU125	2000	3350	Not Safe
MU150	2000	3900	Not Safe
MU175	2000	4650	Not Safe
MU200	2000	5000	Optimum
MU225	2000	5700	Not economic
MU250	2000	6100	Not economic