SLIDING WINDOW 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 PROCEDURE FOR SLIDING WINDOW STRUCTURAL CALCULATION:

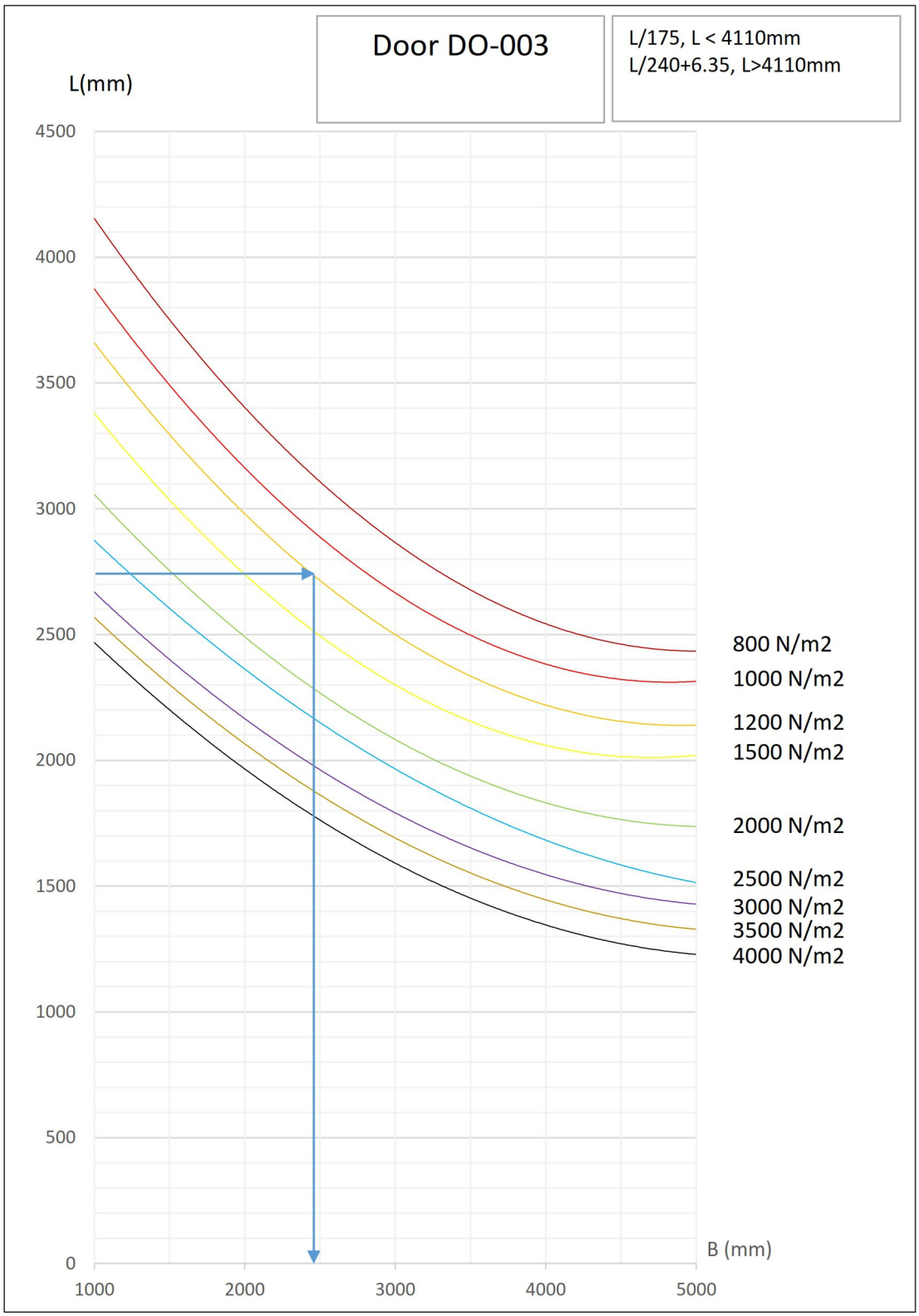
a) LOAD COMPUTATIONS:

Sliding door and window 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 of sliding door
    - $C_f = 1.30$, the sliding door is opened (critical case)
    - $C_f = 0.80$, the sliding door is closed (it is not critical case)
- Choosing K according to the sliding door 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
    - L / 175 for L < 4110mm
    - L / 240 + 6.35mm for L > 4110mm
      *L is the door height in mm
- By using the stress value (F, illustrated in curves from 800 N/m2 to 4000 N/m2), the height of the door in architecture drawings are given. So, breadth of the door panel will be achieved and hence, the total breadth of the door system and numbers of panels will be achieved.


Door DO-003
L/175, L < 4110mm
L/240+6.35, L>4110mm
L(mm)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
1000
2000
3000
4000
5000
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 SLIDING WINDOW STRUCTURAL CALCULATION

ASSUME:
Sliding Door will be used in Cairo zone, at height 40m.
The project in flat area, exposure (A).
Sliding door height according to architecture drawings is 2.20m. total breadth of door is 4.00m
Deflection limitation is L / 175 (taking into consideration in curves) as per project specifications.

LOAD COMPUTATIONS:
Sliding door 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 sliding door is opened (critical case), $C_f = 1.30$
- 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
- $F = 1.30 \times 1.60 \times 0.68 = 1.414$ $kN/m^2 = 1414$ N/m^2

CHOOSING THE CURVE:

- Choosing the curve will be used as per:
    - Slide door height = 2.20m, deflection limitation is 12.57mm, considered in curves
    - Start the choosing by sliding door type from (DO-001 to DO-008) using the optimum panel breadth and hence the total opening breadth.
    - The wind stress = 1414 N/m^2
    - Choosing the curve between 1200 N/m^2 to 1500 N/m^2, which equal 1414 N/m^2
    - Start from vertical axis by 2.20m, draw horizontal line until intersecting the curve 1414 (N/m^2), then draw vertical line until intersect the horizontal axis, which leads to maximum breadth of sliding door panel. Final, maximum NO. of door system will be achieved

Curve	H (mm)	Maximum B (mm)	NO. of panel
DO-001	2200	1050	Choose 4x1050mm
DO-002	2200	1100	Choose 4x1100mm
DO-003	2200	1200	Choose 4x1200mm
DO-004	2200	Can't be used	Can't be used
DO-006	2200	1150	Choose 4x1150mm
DO-007	2200	Can't be used	Can't be used
DO-008	2200	1050	Choose 4x1050mm