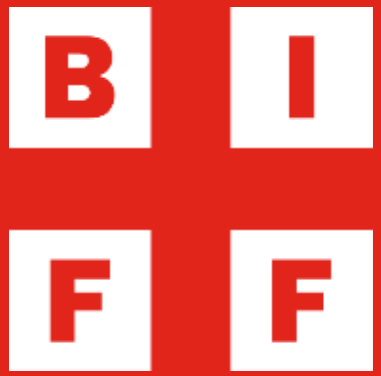

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INGÉNIERIE FAÇADE
PHYSIQUE DU BÂTIMENT | DIRECTION DE TRAVAUX
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Glass Façade and Structural Movements

BIFF SA
Raul CORRALES
rc@biffsa.ch

Contents

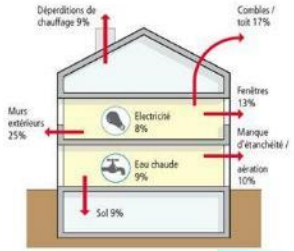
BIFF SA FACADE CONSULTANT

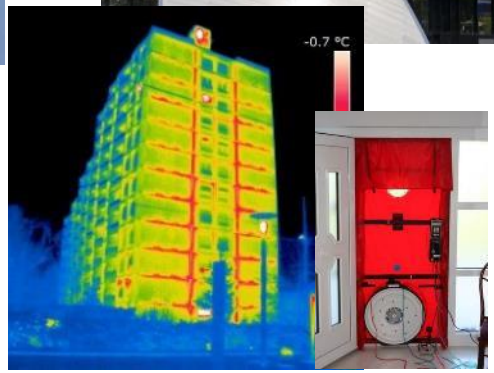
- TECHNICAL ANALYSIS:
- Engineering and technical design development for bespoke façade projects.

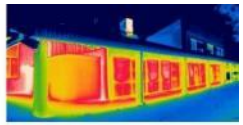
- BUILDING PHYSICS:
- Studies and analyses of existing buildings achieving tailored sanitation solutions

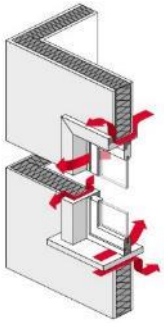
- WORKS SUPERVISION:
- Project management and prototype supervision with special attention to programme and cost

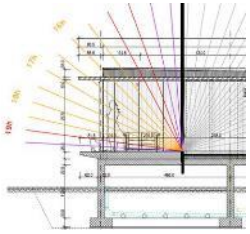
- EXPERTISE
- Determinate faults, seek out their cause, suggest remedies and budgeting cost repair. Address responsibility.

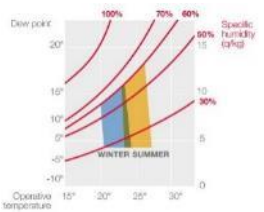












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ENVELOPPE DU BÂTIMENT

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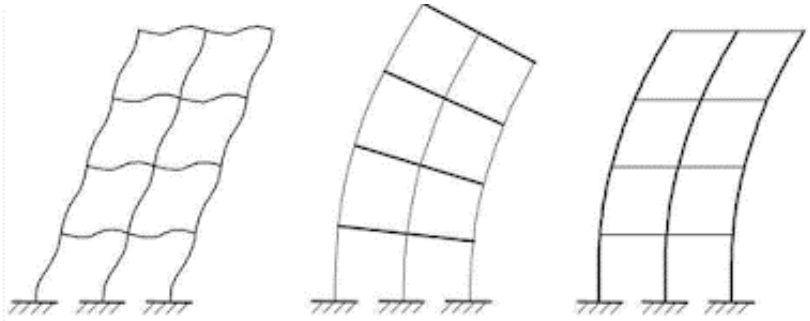
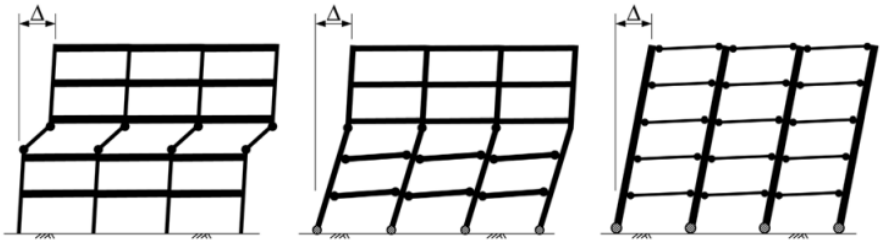
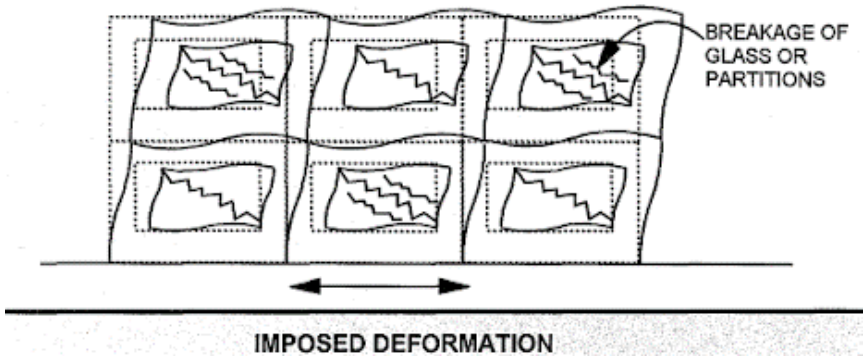
Wind
Weight
Seismic
Accidental forces
Temperature
Humidity
Subsoil and Foundation



(a) Shear deformation
(b) Global bending
(c) Local bending



(a) Story mechanism (b) Intermediate mechanism (c) Beam mechanism



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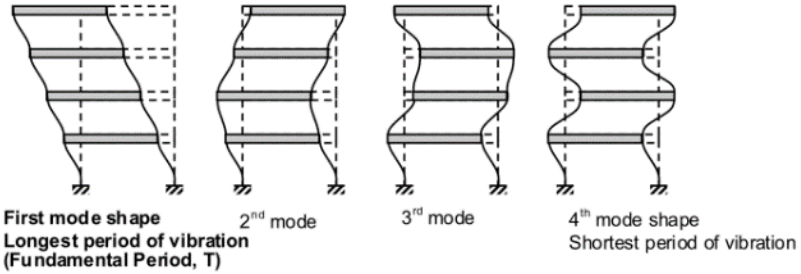

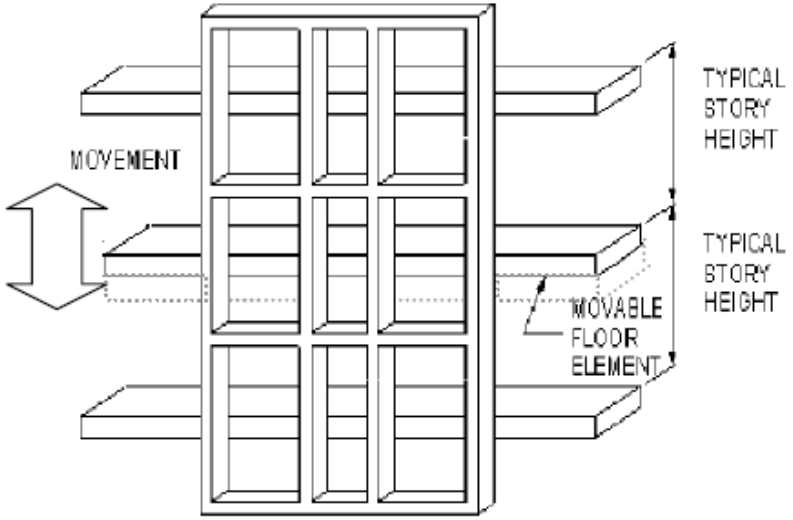

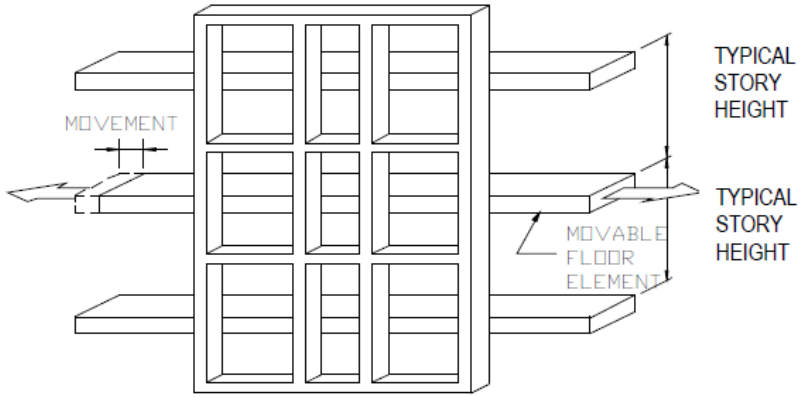

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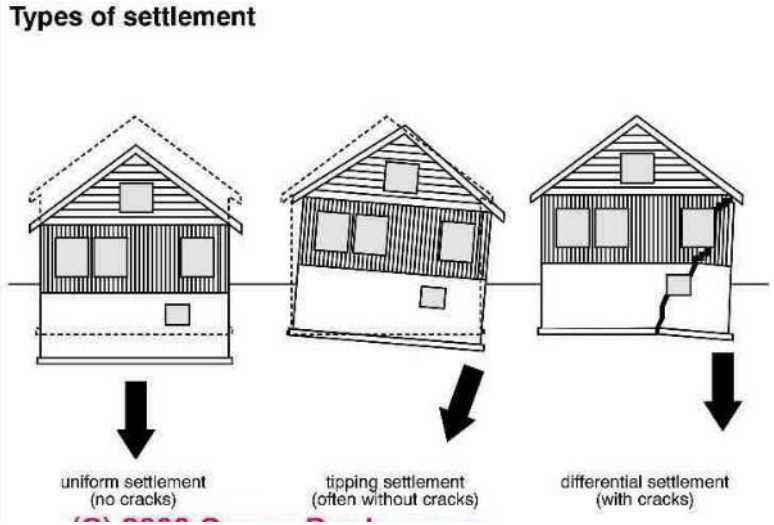
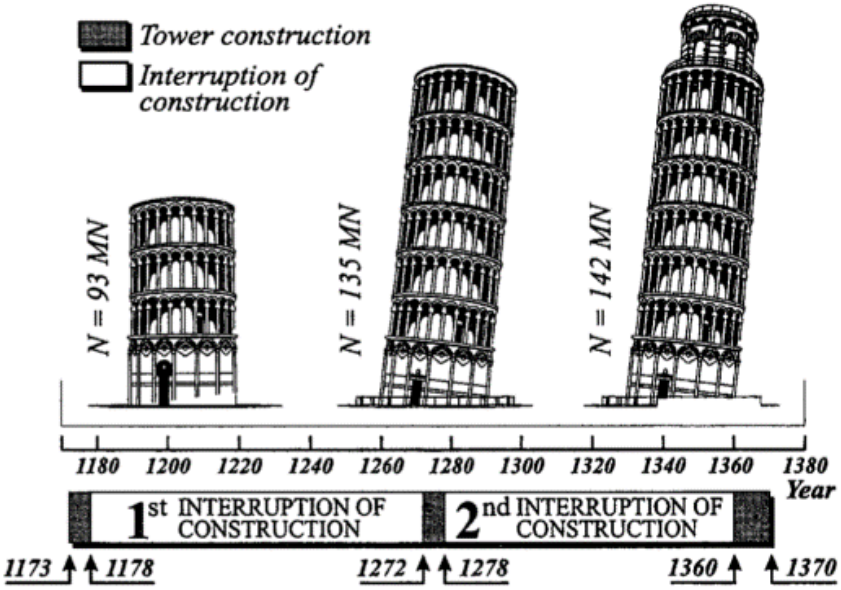




VERTICAL LOADS

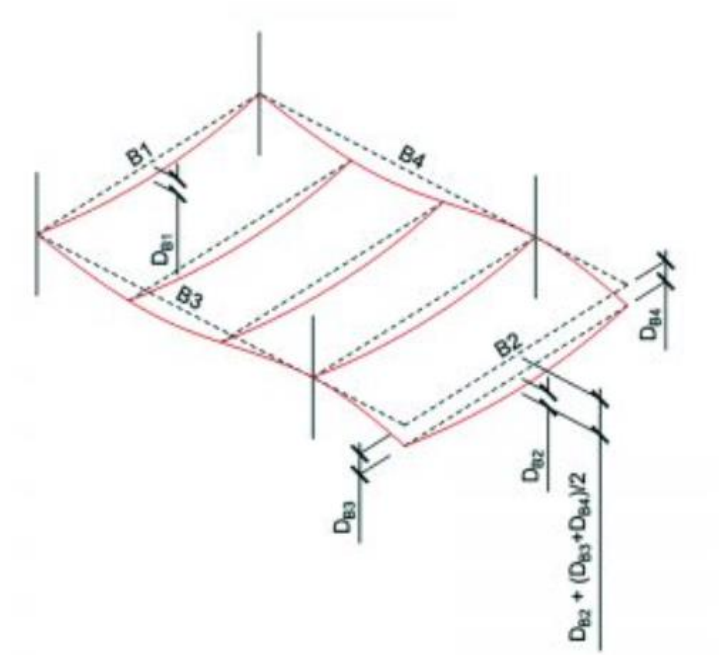
Dead load
- Self weight before glazing
- Self weight glazing
- Self weigh after glazing

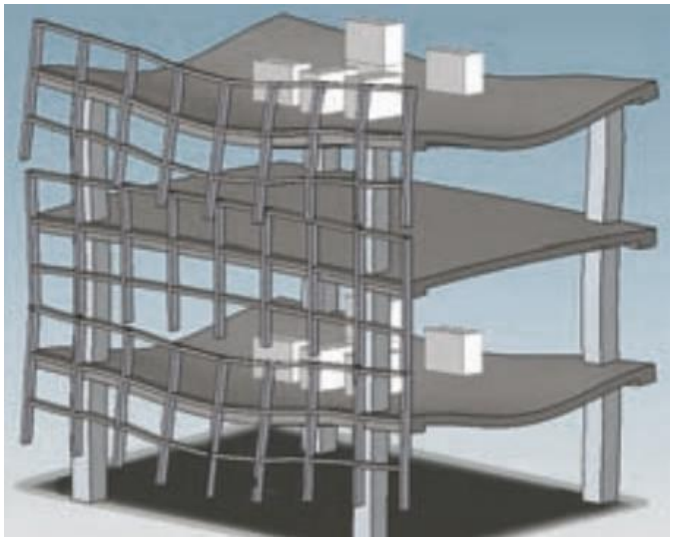
Live load (during service life)
- Wind load
- Snow load
- Service use load
- Accidental load

Colum shortening

Thermal and other vertical mouvements

Concrete→ long-term deflections due to creep and shrinkage





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GLASS TOLERANCES

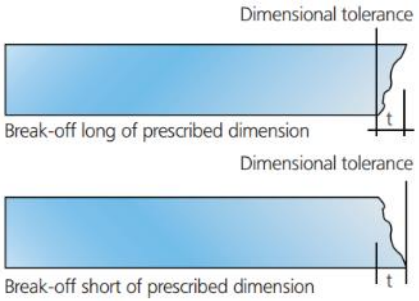
Dimensional tolerances
- Length
- Squareness
- Oblique edge

Laminated glass
- Displacement

Insulated glass units
- Misalignment
- U profiles

(@ Tolerance Handbook AGC)

Description of Glass	Dimensional Tolerance (t) [mm] for Final-Cut Sizes	Difference between Diagonals (v) [mm]
Thickness ≤ 6 mm and (W and H) ≤ 2000 mm	± 1.0	≤ 1.0
6 mm < Thickness ≤ 12 mm, or 2000 mm < (W or H) ≤ 3500 mm	± 2.0	≤ 2.0
6 mm < Thickness ≤ 12 mm and 3500 mm < (W or H) ≤ 5000 mm	± 3.0	≤ 3.0
Thickness > 12 mm or (W or H) > 5000 mm	± 4.0	≤ 4.0



Glass-Thickness in mm	Maximum Dimensional Tolerance (t) [mm]
4, 5, 6	± 1.0
8, 10, 12	± 2.0
15	+5 / -3
19	+6 / -3

Table 5: Dimensional tolerance (t) for oblique glass break-off

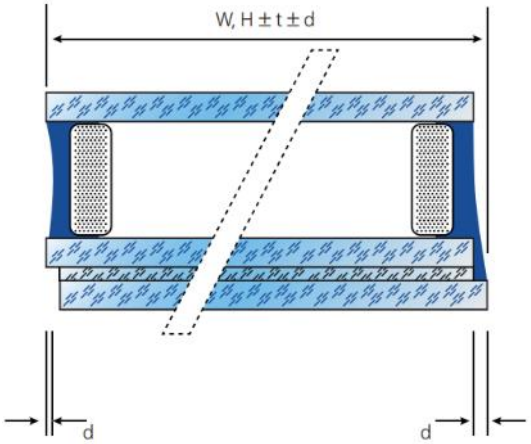
GLASS TOLERANCES

Dimensional tolerances
- Length
- Squareness
- Oblique edge

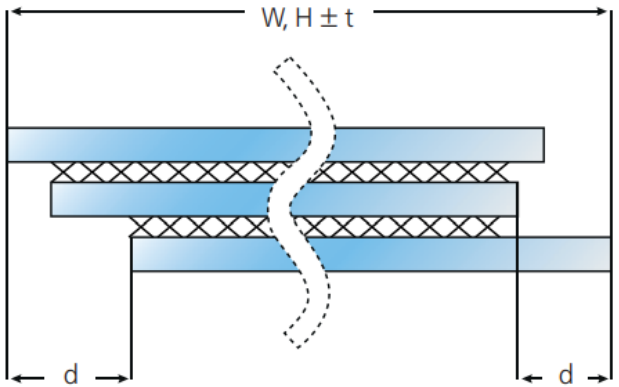
Laminated glass
- Displacement

Insulated glass units
- Misalignment
- U profiles

(@ Tolerance Handbook AGC)



Nominal Dimensions (W) or (H) [mm]	Maximum Permissible Displacement (d) [mm]
W, H ≤ 1000	2.0
1000 < W, H ≤ 2000	3.0
2000 < W, H ≤ 4000	4.0
W, H > 4000	6.0



Description of Glass	Maximum Dimensional Tolerance t [mm]	Misalignment d [mm]
All Pane Thicknesses ≤ 6 mm and (W and H) ≤ 2000 mm	± 2.0	≤ 2.0
6 mm < Thickest Pane ≤ 12 mm, or 2000 mm < (W or H) ≤ 3500 mm	± 3.0	≤ 3.0
Pane Thickness ≤ 12 mm and 3500 mm < (W or H) ≤ 5000 mm	± 4.0	≤ 4.0
Pane Thickness > 12 mm or (W or H) > 5000 mm	± 5.0	≤ 5.0

Table 24: Maximum dimensional tolerances (t) in mm for IGU

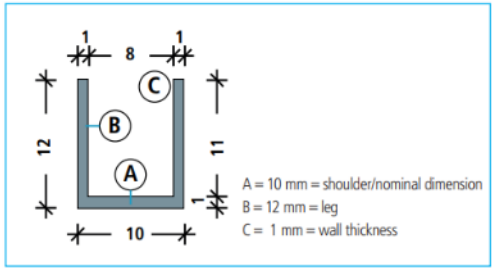
GLASS TOLERANCES

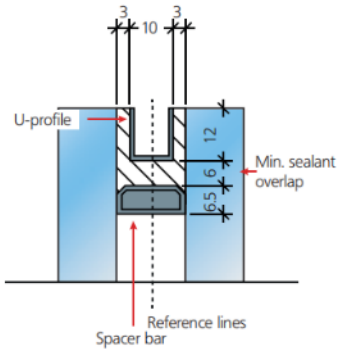
Dimensional tolerances
- Length
- Squareness
- Oblique edge

Laminated glass
- Displacement

Insulated glass units
- Misalignment
- U profiles

(@ Tolerance Handbook AGC)





- Length U-profile **100 mm – 200 mm** acc. to indication
- Minimum distance between glass edge and U-profile **3 mm**
- Cavity at least **16 mm**
- Min. sealant overlap **6 mm**
- Tolerance positioning U-profile **± 2 mm** related to the **reference lines**
- Positional tolerance **± 5 mm**

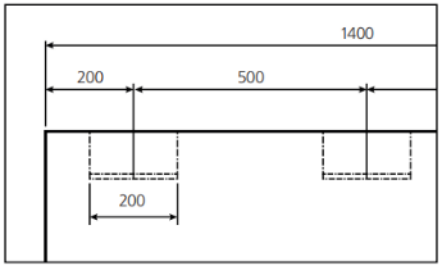


Fig. 31: Tolerances and model of execution for U-profiles

INSTALLATION TOLERANCES

Survey setting out

Façade setting out

Installation tolérances (per module)

- Vertical: ± 2 mm module < 3m high
- Vertical: ± 3 mm module > 3m high.
- Horizontal: ± 5 mm général axes

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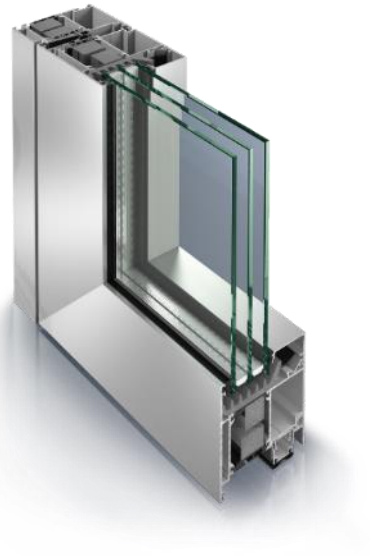
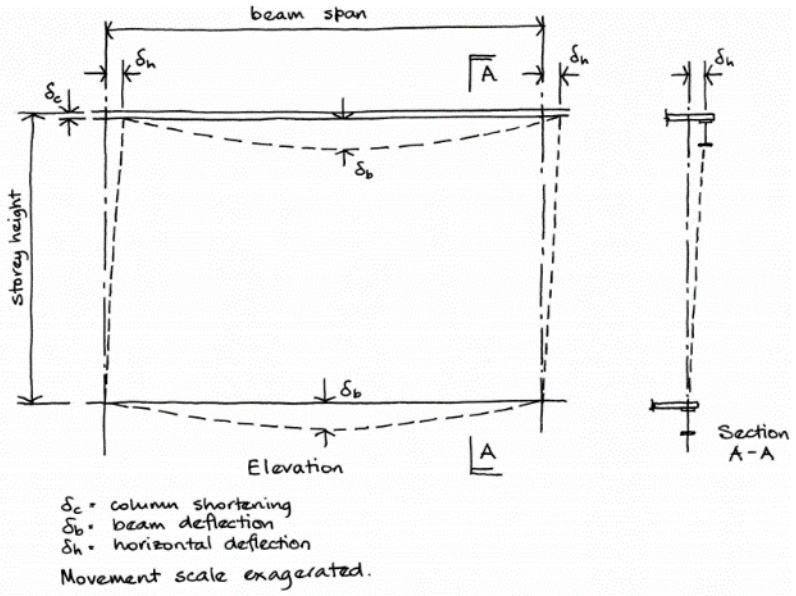


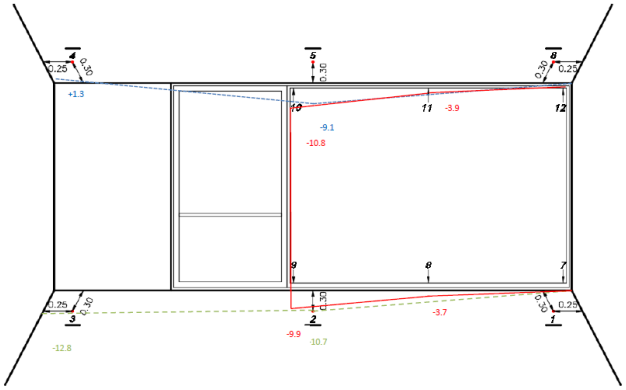
Window
Stick Curtain Wall
Unitized Curtain Wall
Glass mullions
Hunged Façades



VERTICAL LOADS

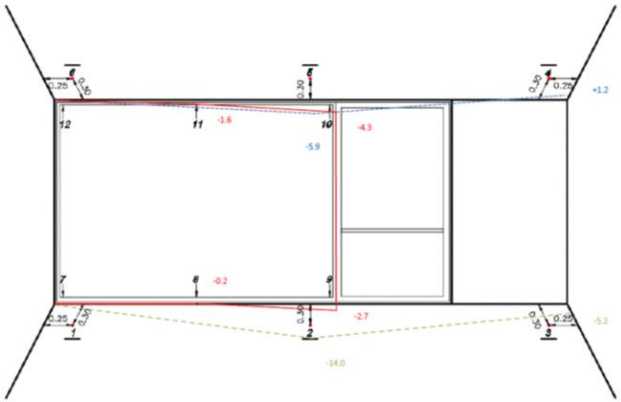
N° points selon schéma	Lectures °/mire	Altitudes relatives [m]	Différences
1	1.3812	100.0000	0.0
2	1.3919	99.9893	-10.7
3	1.3940	99.9872	-12.8
4	-1.4055	102.7867	1.3
5	-1.3951	102.7763	-9.1
6	-1.4042	102.7854	0.0
7	1.3412	100.0400	0.0
8	1.3449	100.0363	-3.7
9	1.3511	100.0301	-9.9
10	-1.3972	102.7784	-10.8
11	-1.4041	102.7853	-3.9
12	-1.4080	102.7892	0.0

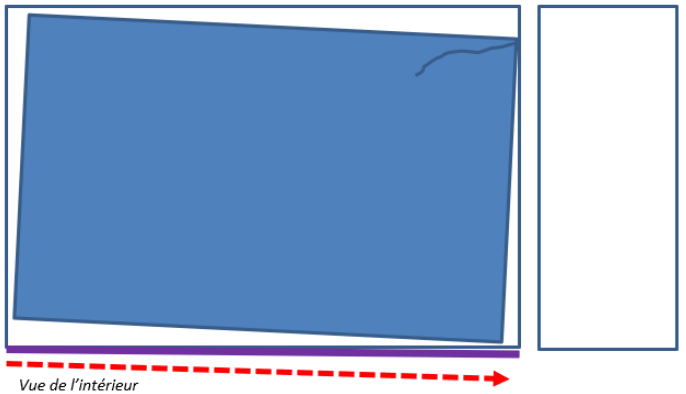
Légende:
- ⌐/¬ Cadre de fenêtre
- T Point sous-dalle (avec tige métallique)
- ⊥ Point dalle au sol

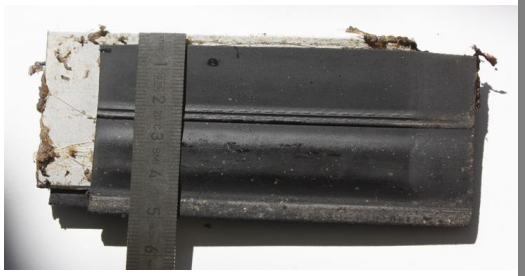


N° points selon schéma	Lectures °/mire	Altitudes relatives [m]	Différences
1	1.3790	100.0000	0.0
2	1.3930	99.9860	-14.0
3	1.3942	99.9948	-5.2
4	-1.4181	102.7971	1.2
5	-1.4110	102.7900	-5.9
6	-1.4189	102.7959	0.0
7	1.3430	100.0360	0.0
8	1.3452	100.0358	-0.2
9	1.3457	100.0333	-2.7
10	-1.4029	102.7815	-4.3
11	-1.4052	102.7842	-1.6
12	-1.4060	102.7858	0.0

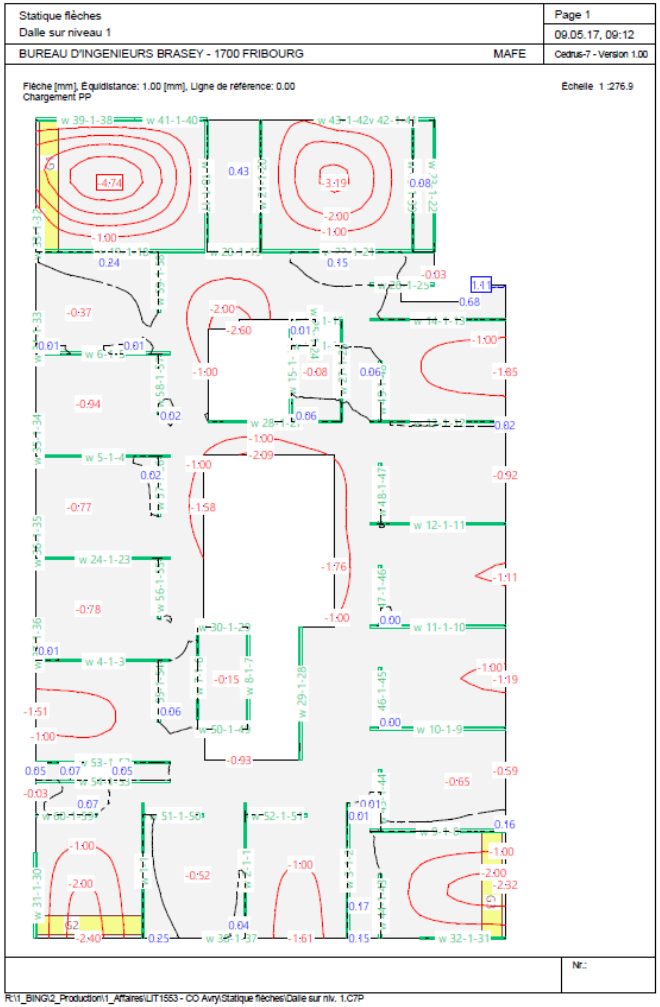
Légende:
- ⌐/¬ Cadre de fenêtre
- T Point sous-dalle (avec tige métallique)
- ⊥ Point dalle au sol

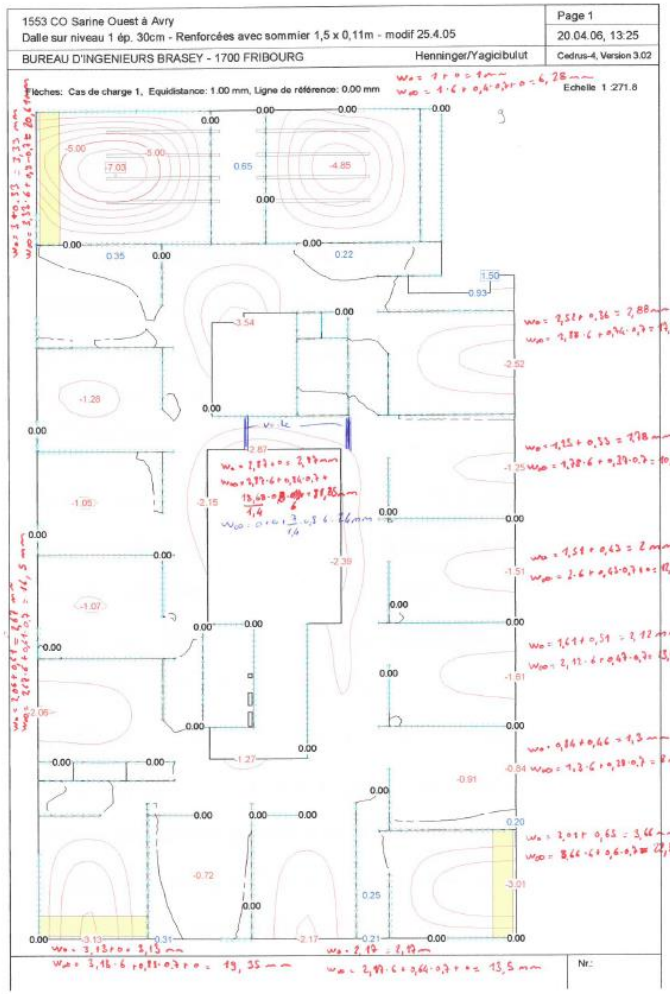






VERTICAL LOADS





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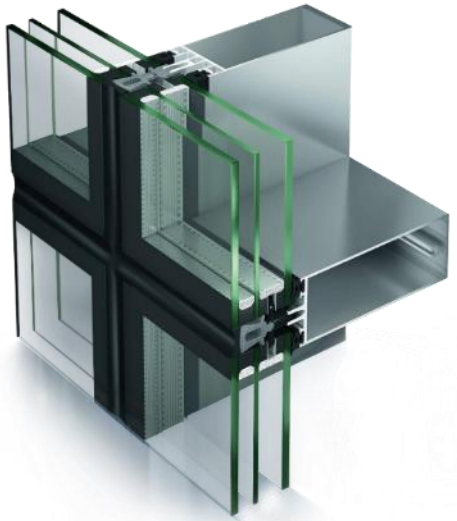

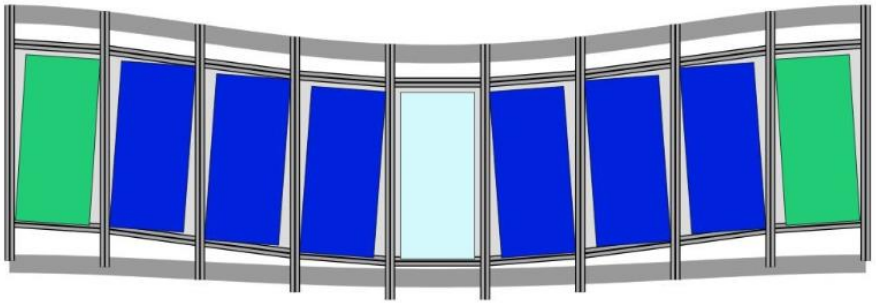

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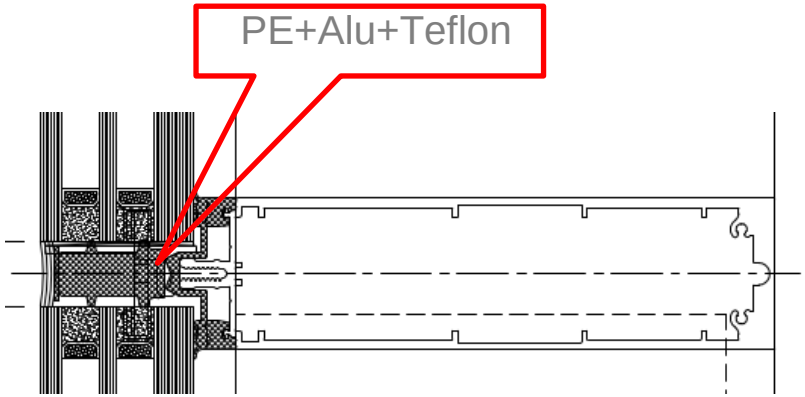

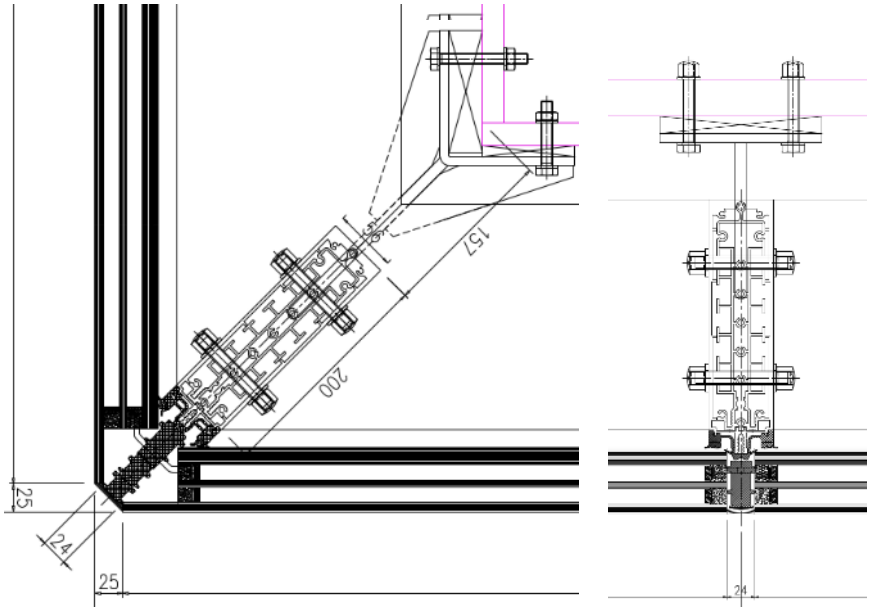

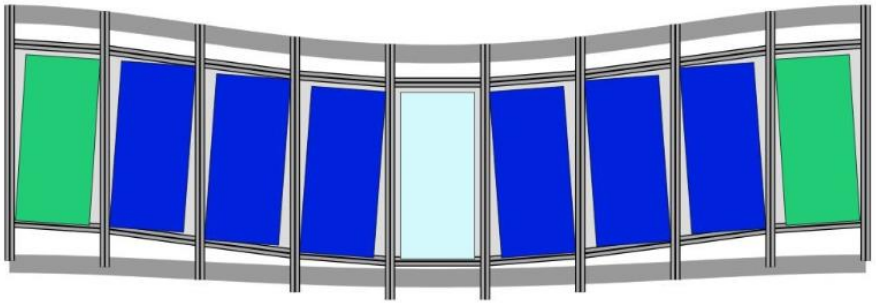

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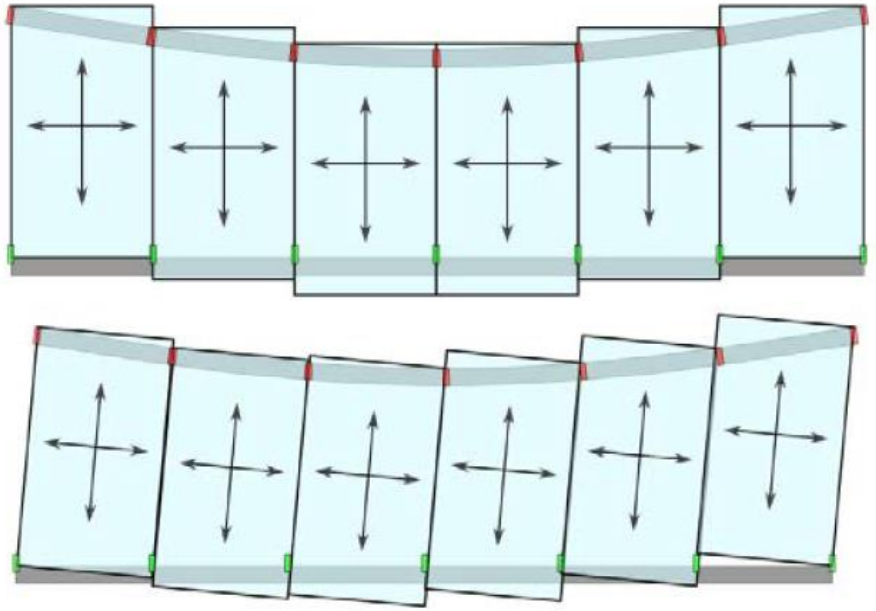

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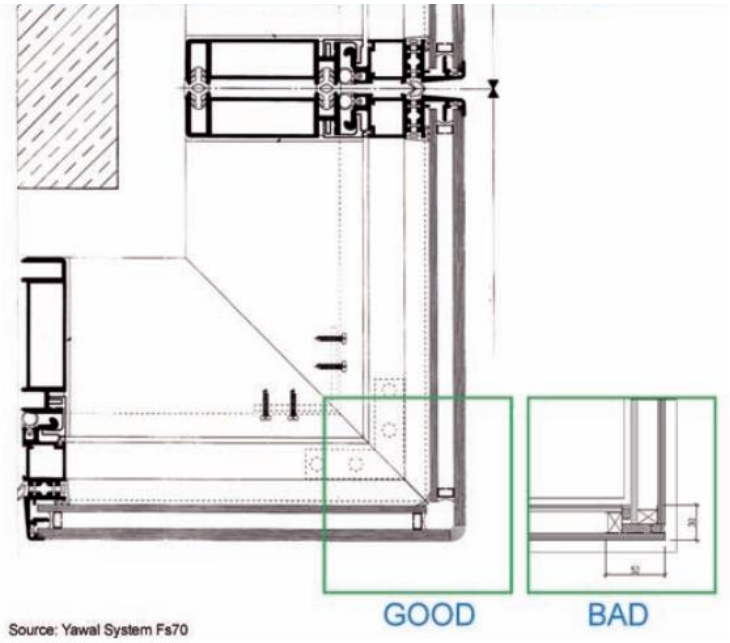
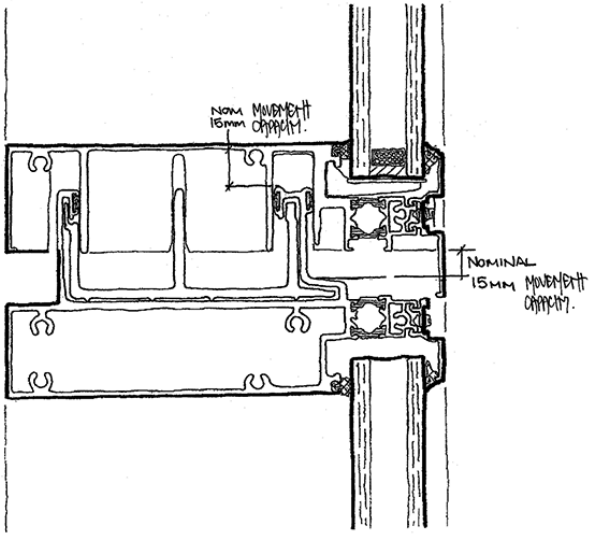


Source: Yawal System Fs70



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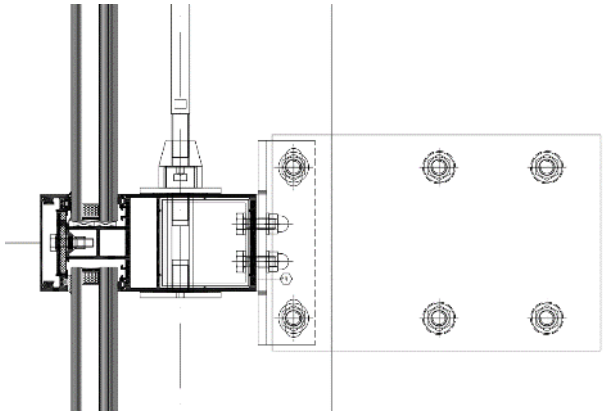

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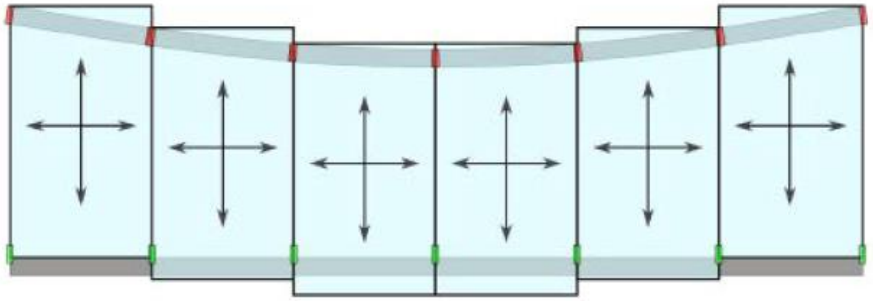

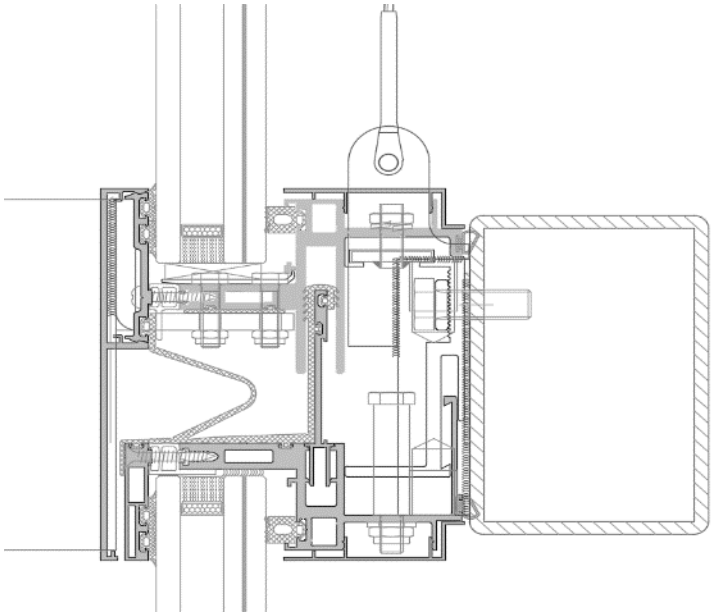

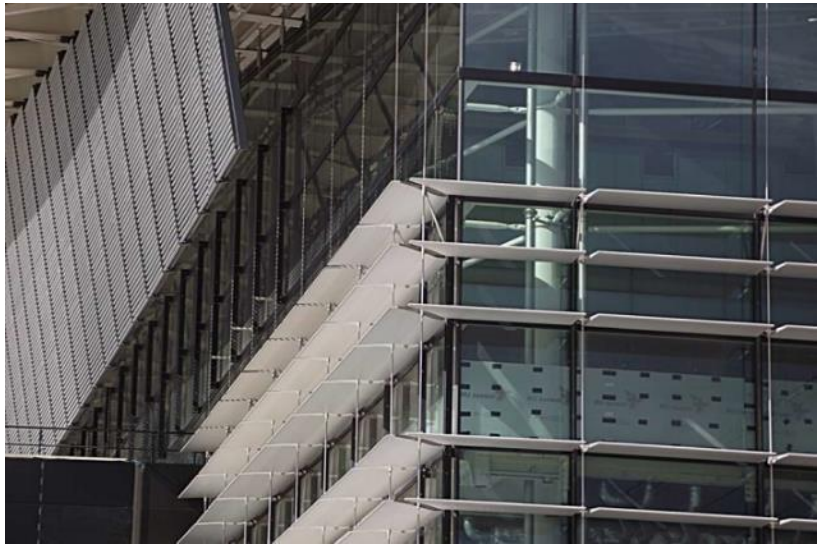

Glass Façade and Structural Movements

THANKS FOR YOUR ATTENTION

ANY QUESTION?

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