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Glass Façade and Structural Movements

BIFF SA FACADE CONSULTANT

STRUCTURAL MOVEMENTS

GLASS TOLERANCES

FACADE SYSTEMS AND FIXINGS
STRATEGIES TO ACCOMODATE MOVEMENTS

BIFF FACADE CONSULTANT

Swiss global specialist for façade envelopes

New construction & refurbishment complex projects.



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



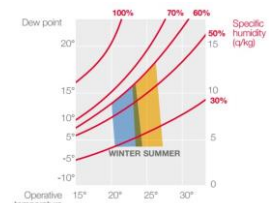
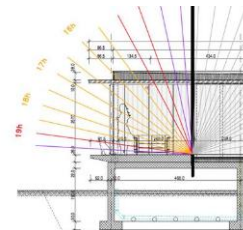
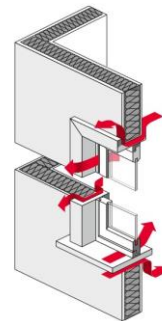
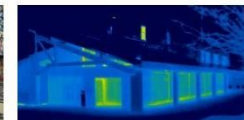
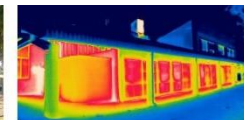
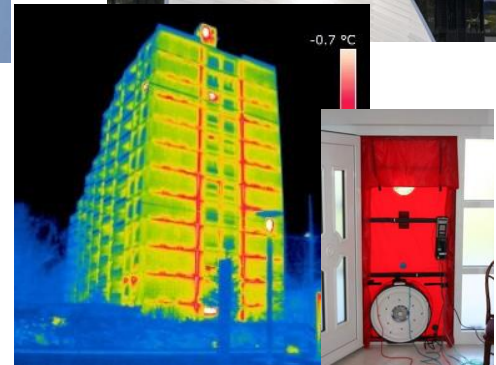
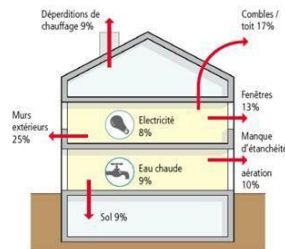
- **BUILDING PHYSICS:**
- Studies and analyses of existing buildings achieving tailored sanitation solutions



- **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.



Kanton Bern
Canton de Berne

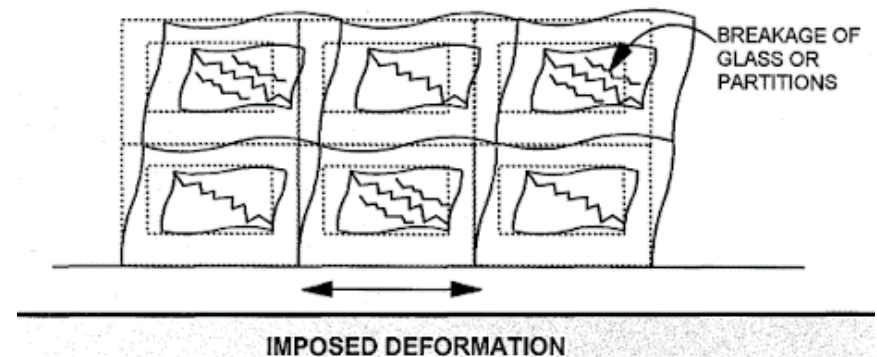
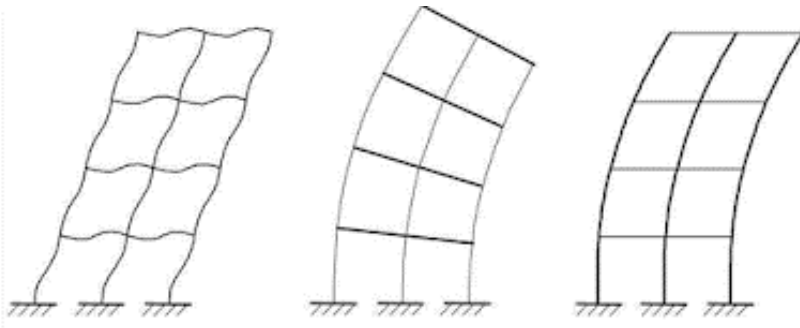
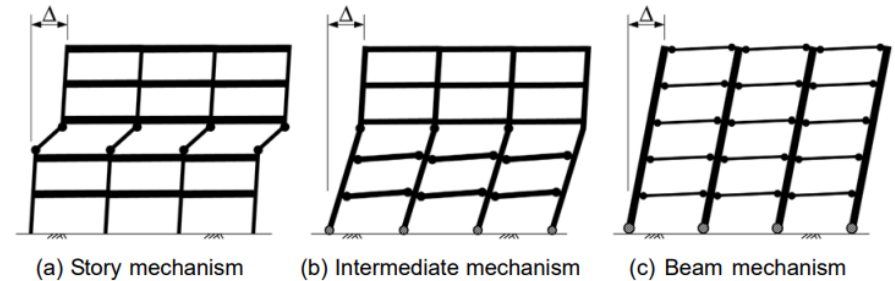


ADVANCED
BUILDING SKINS

Glass Façade and Structural Movements

Structural Movements

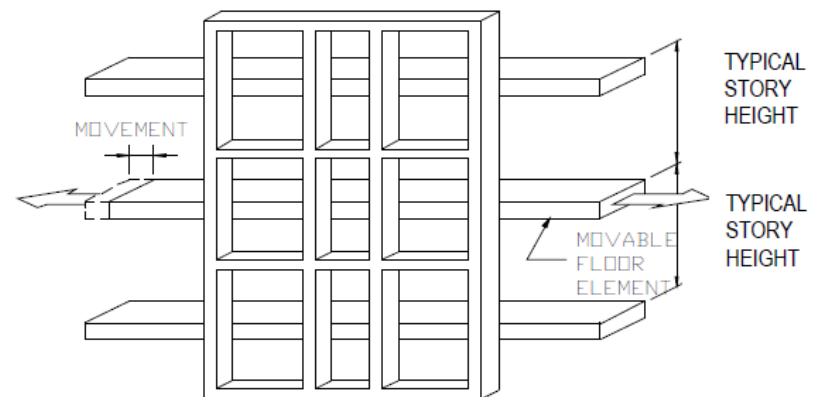
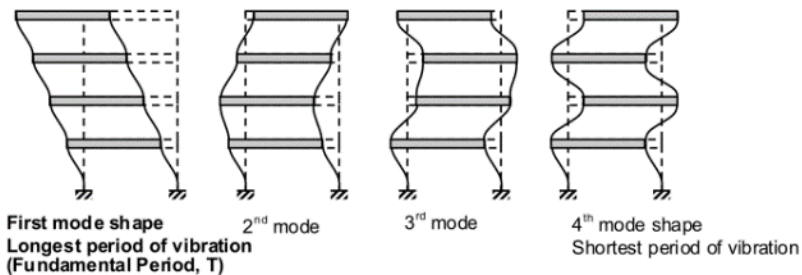
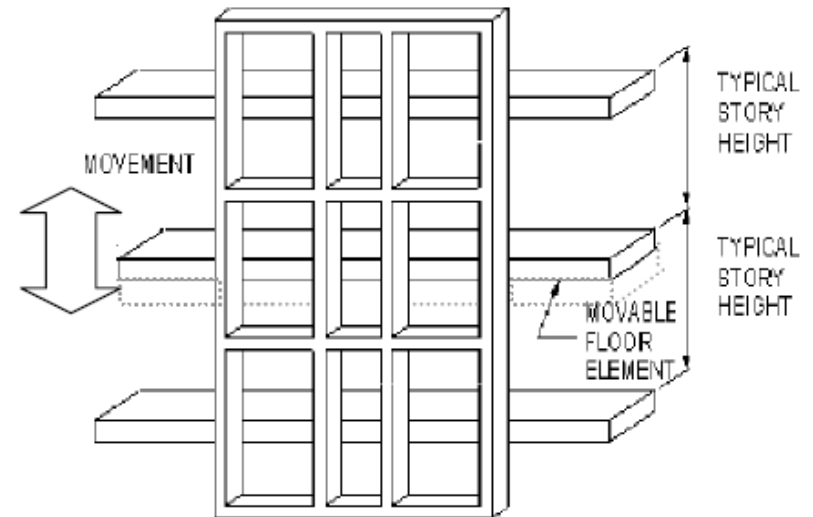
Wind
Weight
Seismic
Accidental forces
Temperature
Humidity
Subsoil and Foundation



Glass Façade and Structural Movements

Structural Movements

Wind
Weight
Seismic
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Subsoil and Foundation

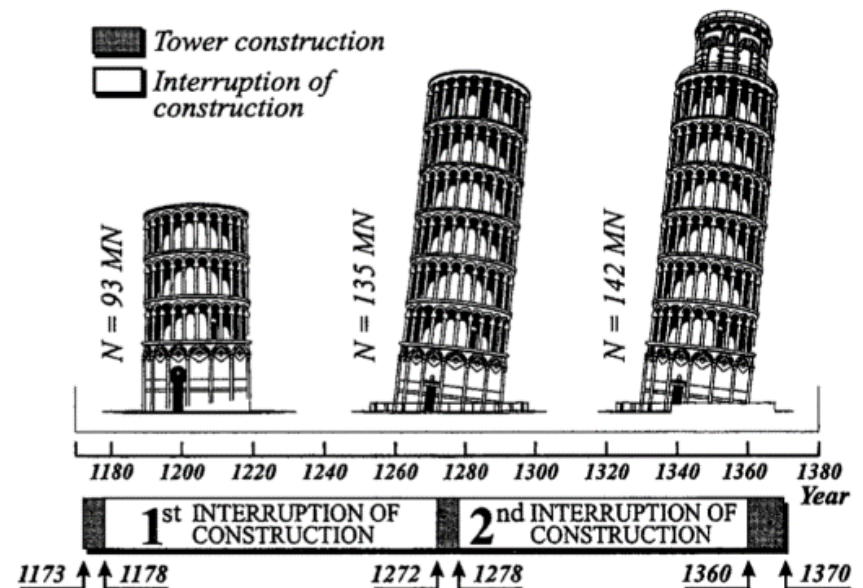
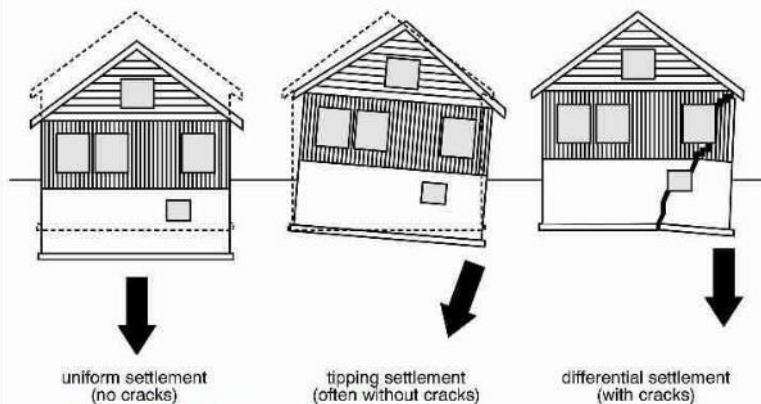


Glass Façade and Structural Movements

Structural Movements

Wind
Weight
Seismic
Accidental forces
Temperature
Humidity
Subsoil and Foundation

Types of settlement



Glass Façade and Structural Movements

Structural Movements – Vertical loads

Dead load

- Self weight before glazing
- Self weight glazing
- Self weight after glazing

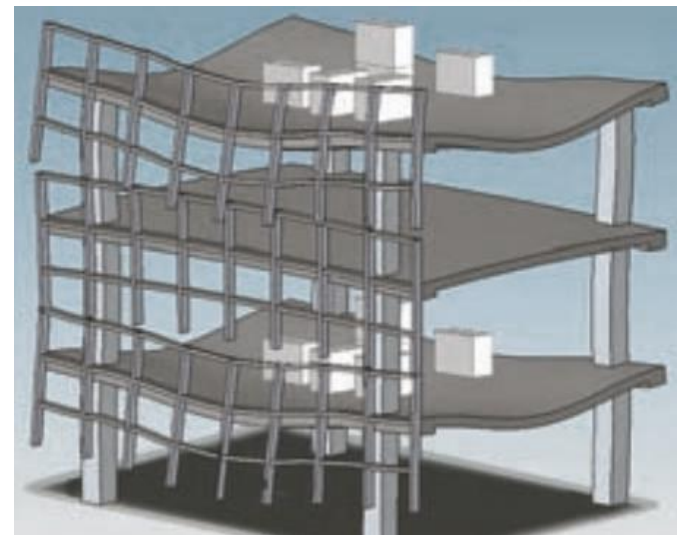
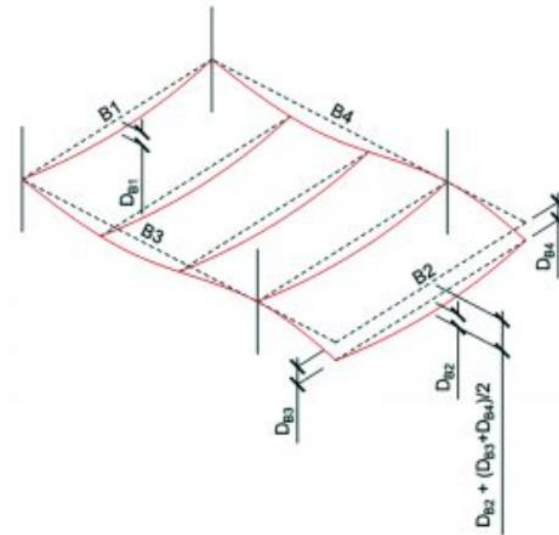
Live load (during service life)

- Wind load
- Snow load
- Service use load
- Accidental load

Column shortening

Thermal and other vertical movements

Concrete → long-term deflections due to creep and shrinkage



Glass Façade and Structural Movements

Glass tolerances

Dimensional tolerances

Length

Squareness

Oblique edge

Laminated glass

Displacement

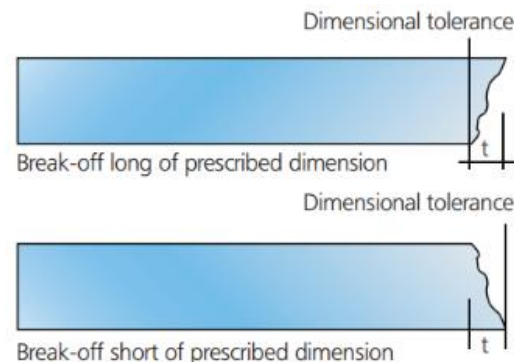
Insulated glass units

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 Façade and Structural Movements

Glass tolerances

Dimensional tolerances

Length

Squareness

Oblique edge

Laminated glass

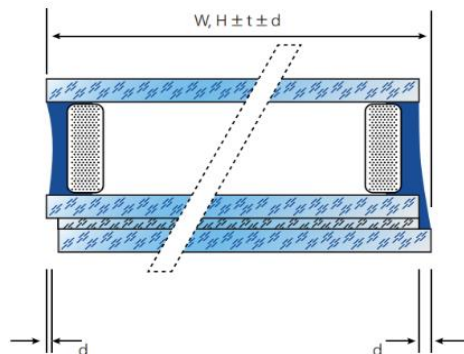
Displacement

Insulated glass units

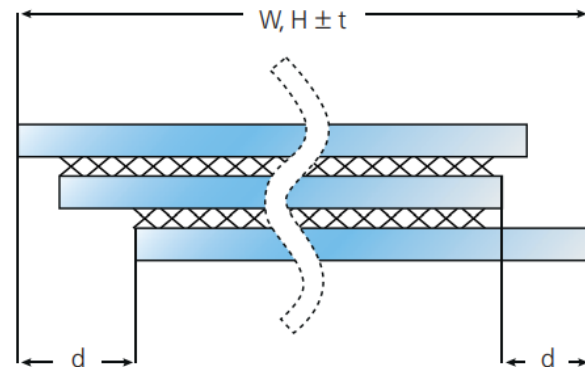
Misalignment

U profiles

(@ Tolerance Handbook AGC)



Nominal Dimensions (W) or (H) [mm]	Maximum Permissible Displacement (d) [mm]
$W, H \leq 1000$	2.0
$1000 < W, H \leq 2000$	3.0
$2000 < W, H \leq 4000$	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
$6 \text{ mm} < \text{Thickest Pane} \leq 12$ mm, or $2000 \text{ mm} < (W \text{ or } H) \leq 3500$ mm	± 3.0	≤ 3.0
Pane Thickness ≤ 12 mm and $3500 \text{ mm} < (W \text{ or } H) \leq 5000$ 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 Façade and Structural Movements

Glass tolerances

Dimensional tolerances

Length

Squareness

Oblique edge

Laminated glass

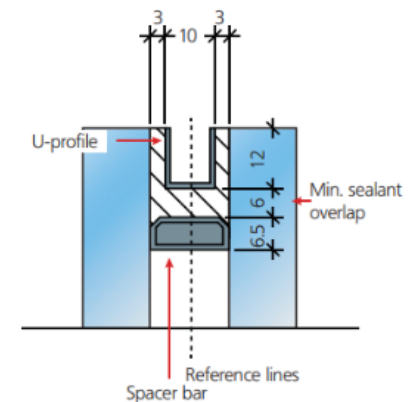
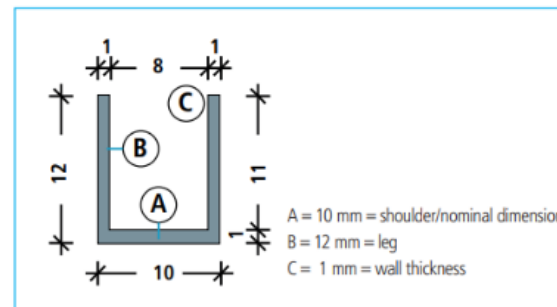
Displacement

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**

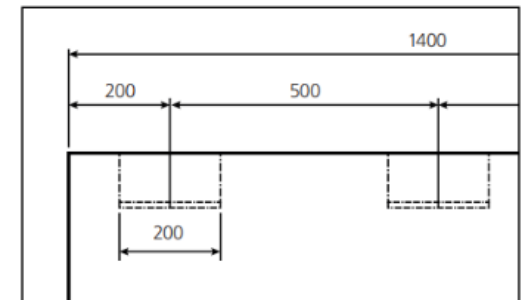


Fig. 31: Tolerances and model of execution for U-profiles

Glass Façade and Structural Movements

Installation tolerances

Survey setting out

Façade setting out

Installation tolérances (per module)

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



Glass Façade and Structural Movements

Façade systems and fixings

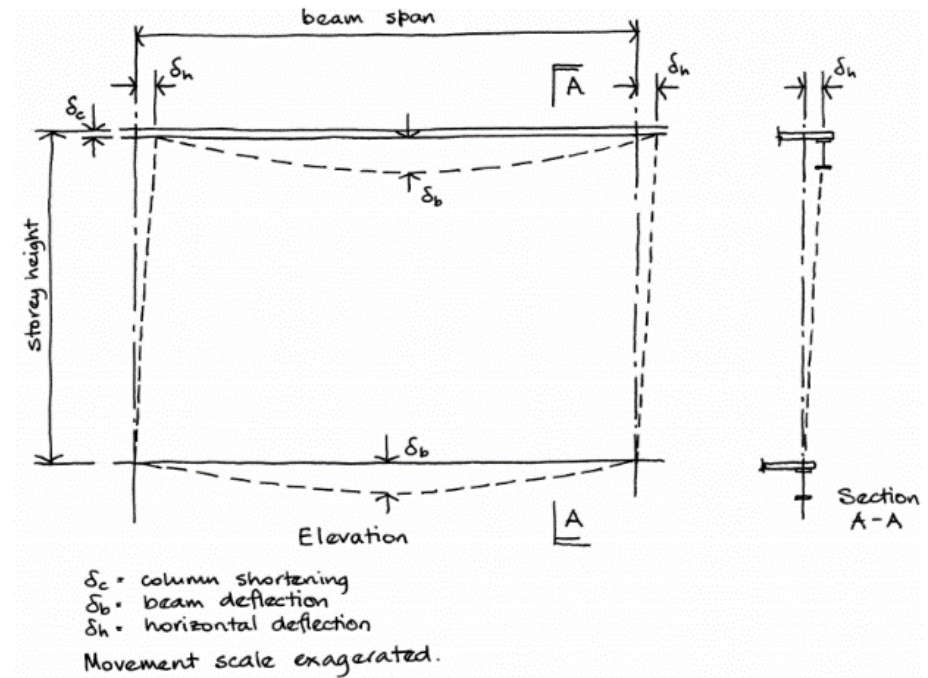
Window

Stick Curtain Wall

Unitized Curtain Wall

Glass mullions

Hunged Façades

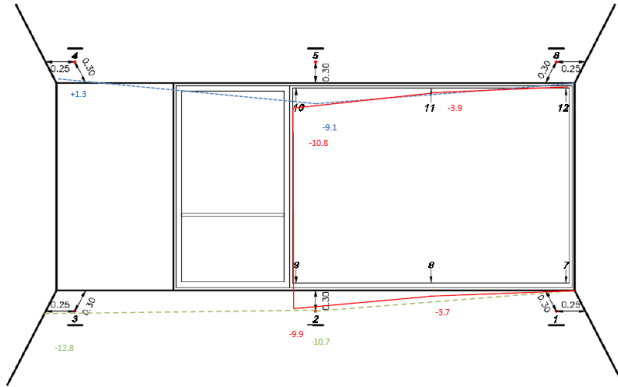


Glass Façade and Structural Movements

Façade systems and fixings

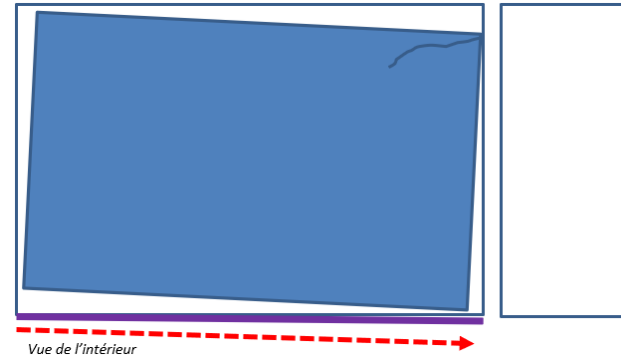
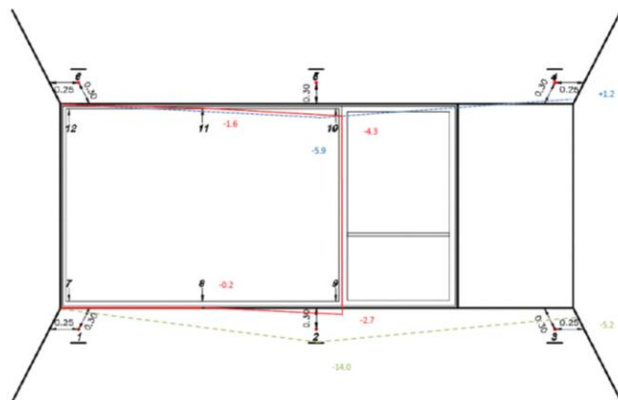
N° points non-critique	secteurs °/mire	Altitudes relatives [m]	Différences
1	1.8812	100.0000	-
2	1.8919	99.9893	-10.7
3	1.9940	99.9872	-11.9
4	-1.4055	102.7867	1.9
5	-1.8951	102.7763	-9.1
6	-1.4042	102.7854	0.0
7	1.8412	100.0400	0.0
8	1.8469	100.0363	-3.7
9	1.8511	100.0301	-9.9
10	-1.3972	102.7784	-10.8
11	-1.4041	102.7853	-9.9
12	-1.4080	102.7892	0.8

Légende:
 1/1 Cadre de fenêtre
 T Point sous-dalle (sans tige métallique)
 A Point dalle en sol

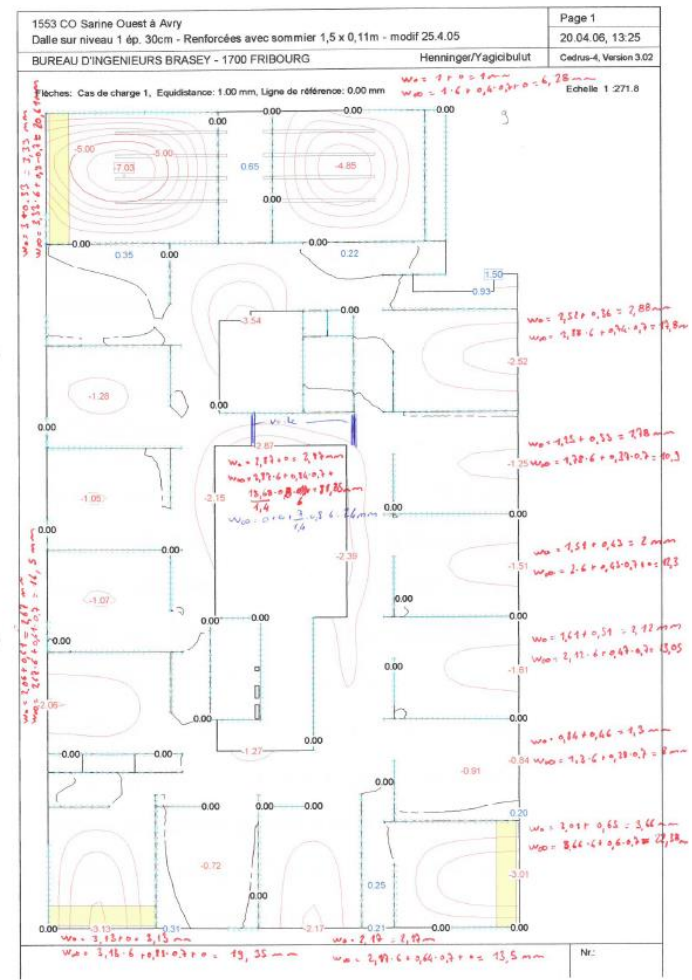
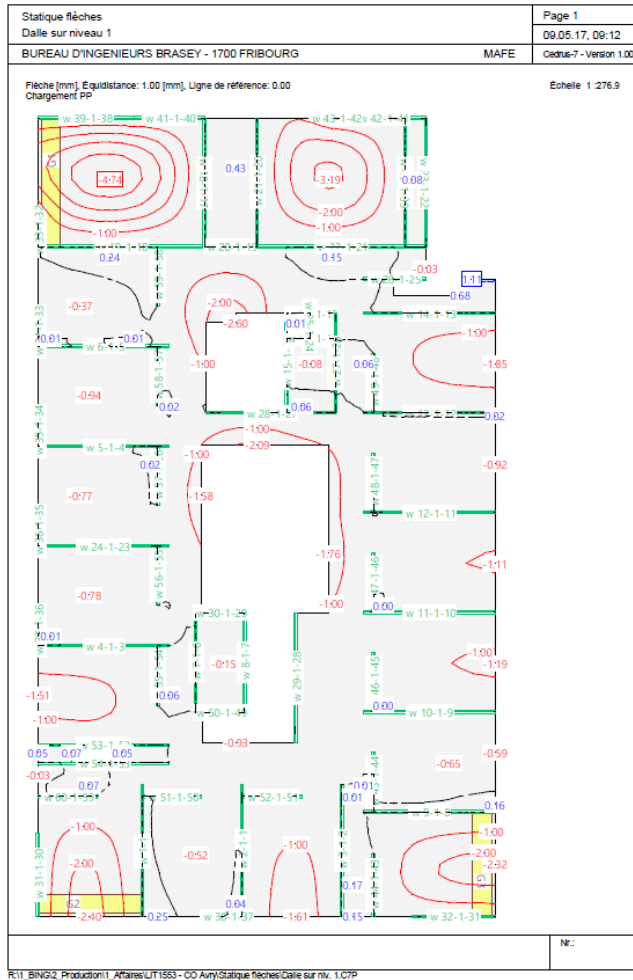


N° points non-critique	secteurs °/mire	Altitudes relatives [m]	Différences
1	1.8706	100.0000	-
2	1.8930	99.9890	-11.0
3	1.9942	99.9948	-5.2
4	-1.4081	102.7971	1.2
5	-1.4140	102.7900	-7.9
6	-1.4189	102.7959	0.0
7	1.8430	100.0360	0.0
8	1.8452	100.0358	-0.2
9	1.8457	100.0313	-4.7
10	-1.4029	102.7815	-4.9
11	-1.4052	102.7842	-1.6
12	-1.4089	102.7854	0.8

Légende:
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Façade systems and fixings



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Façade systems and fixings

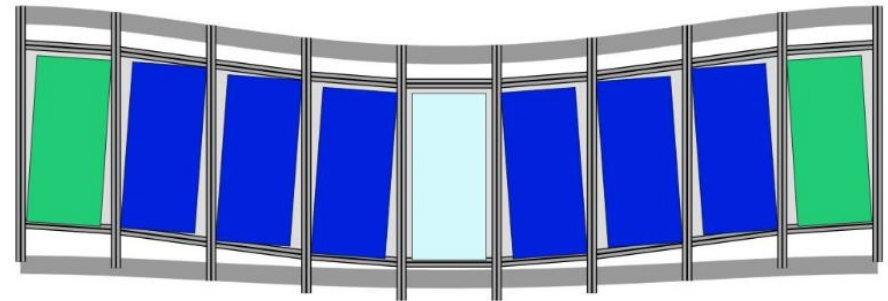
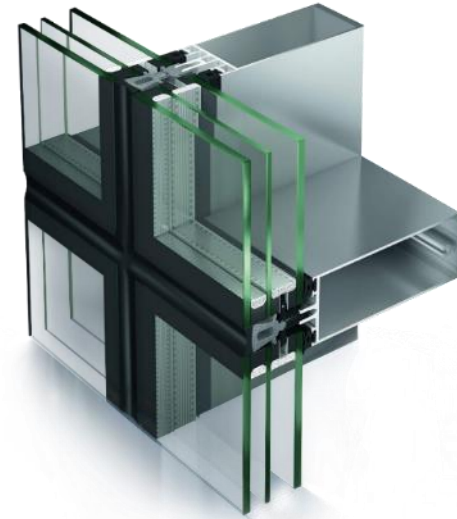
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Hunged Façades



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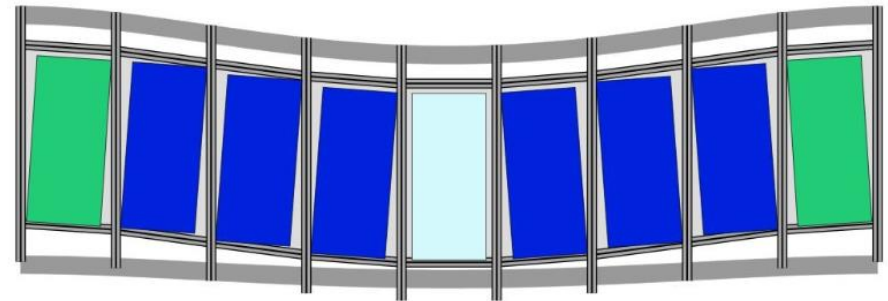
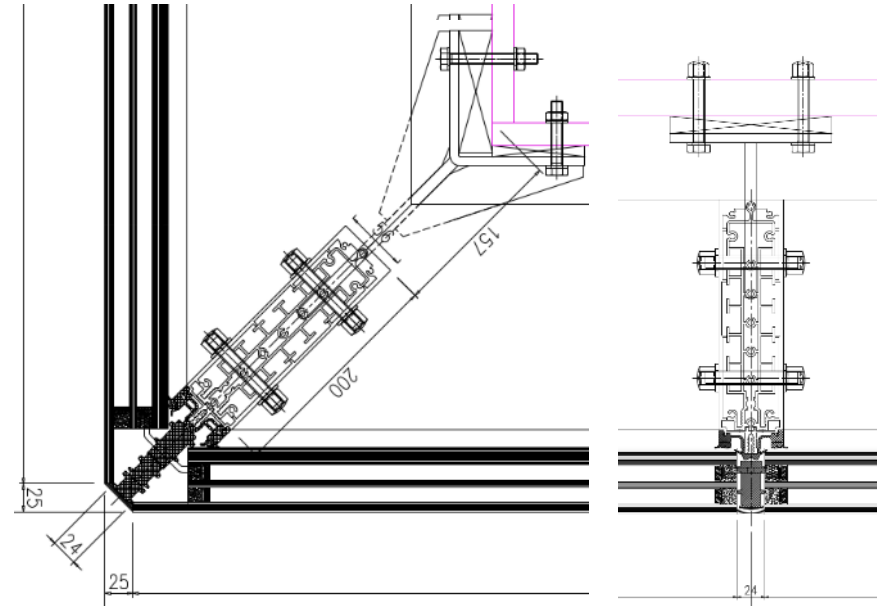
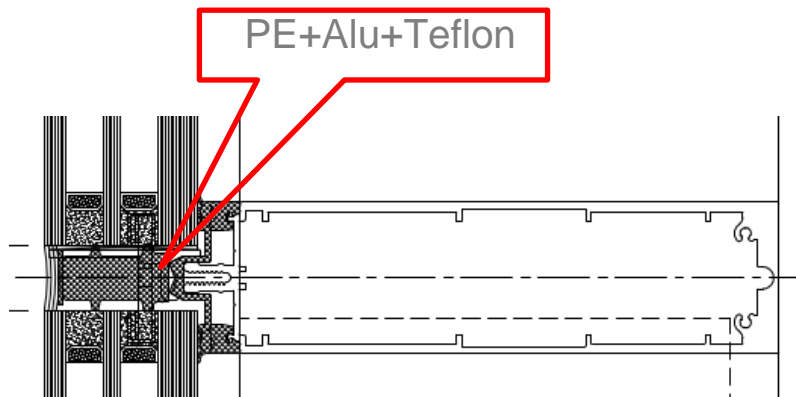
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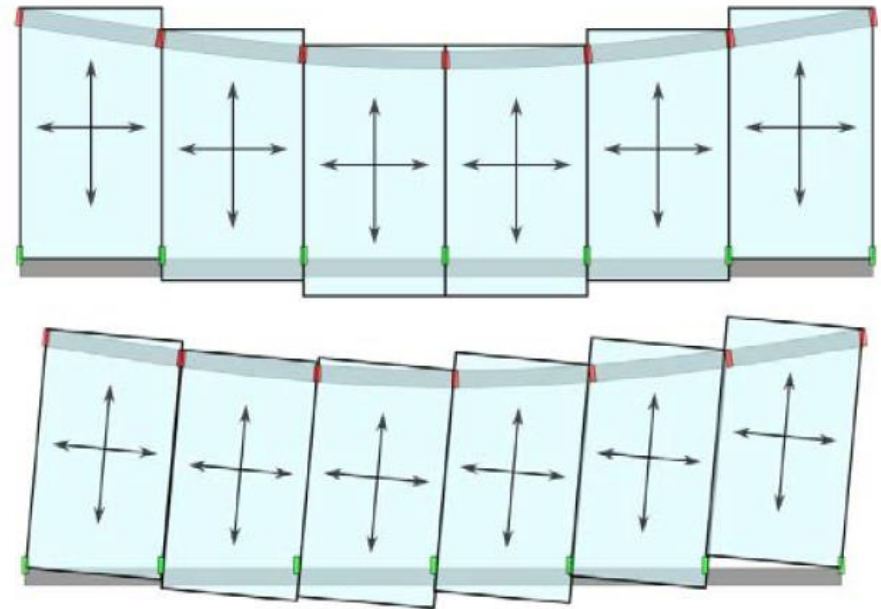
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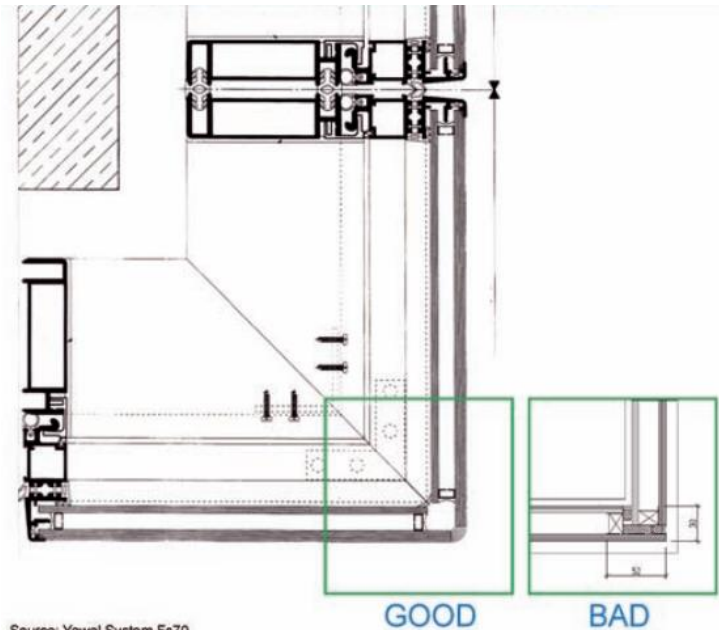
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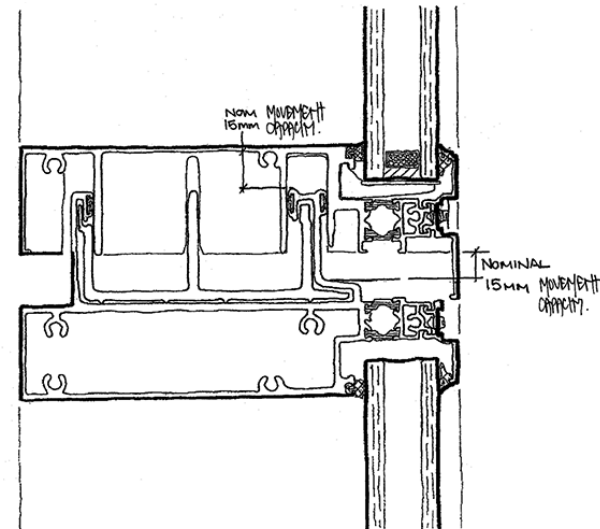


Source: Yawal System Fs70



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Canton de Berne



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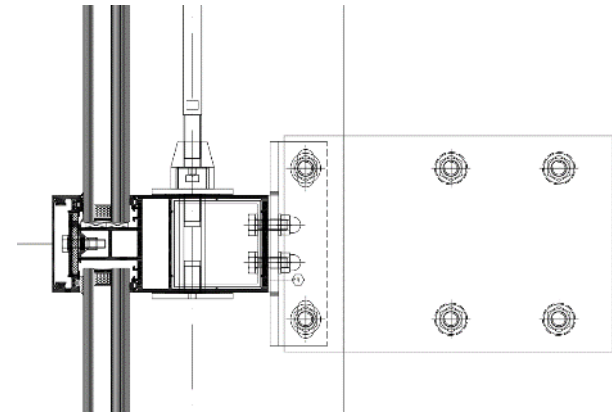
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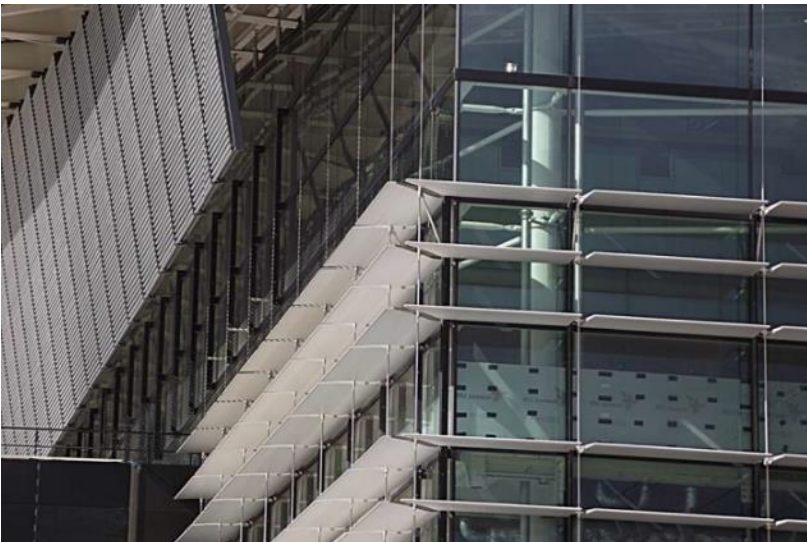
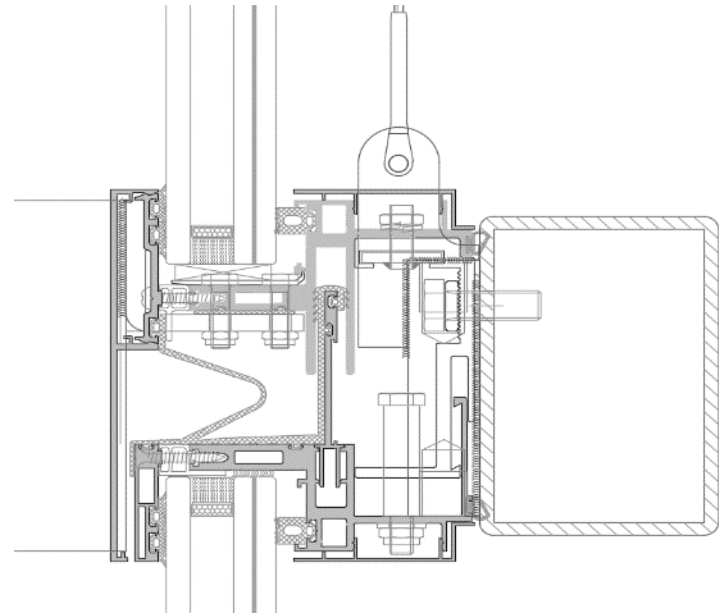
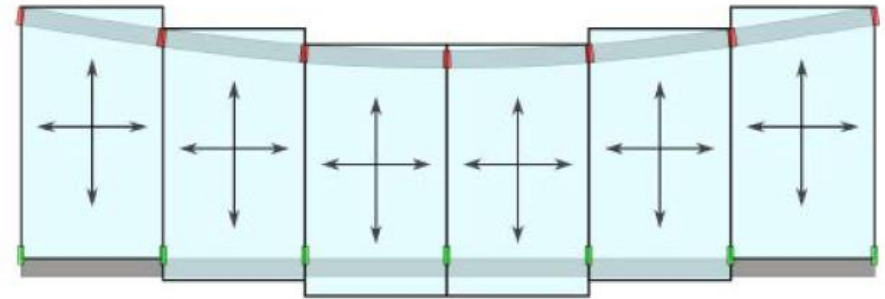
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THANK YOU - QUESTIONS?

