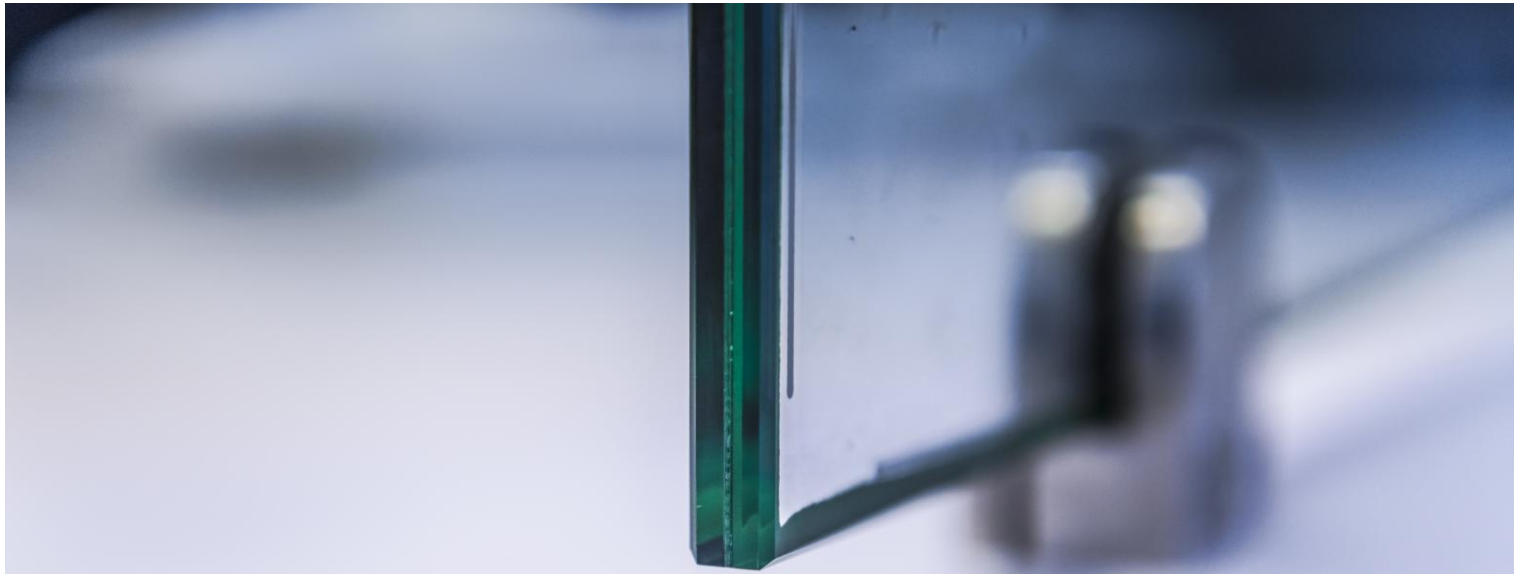


Vacuum Insulated Glass

Design, Applications & Certifications

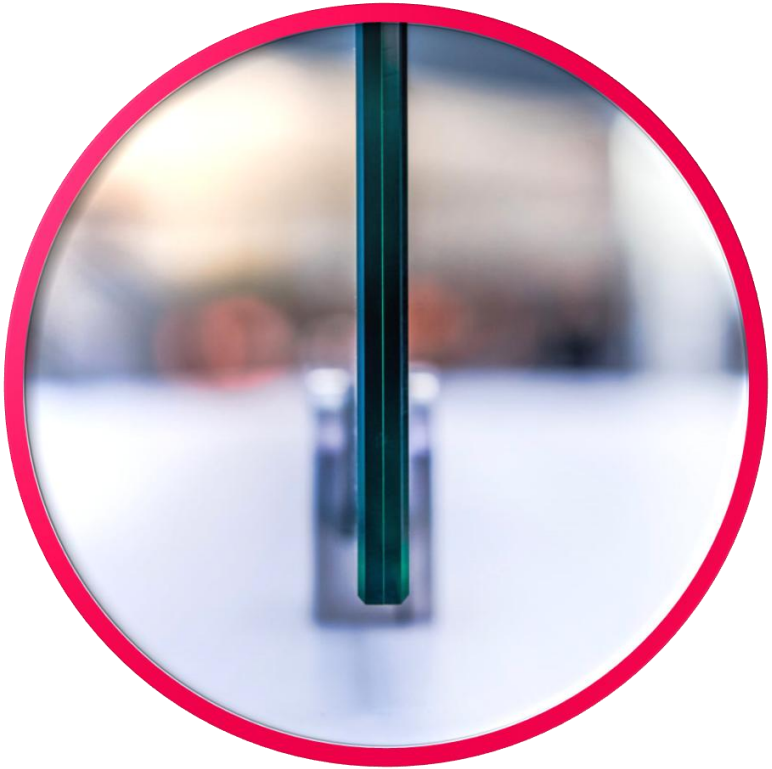
Louis DELLIEU

27/03/2025 - Fasády 2025

AGENDA

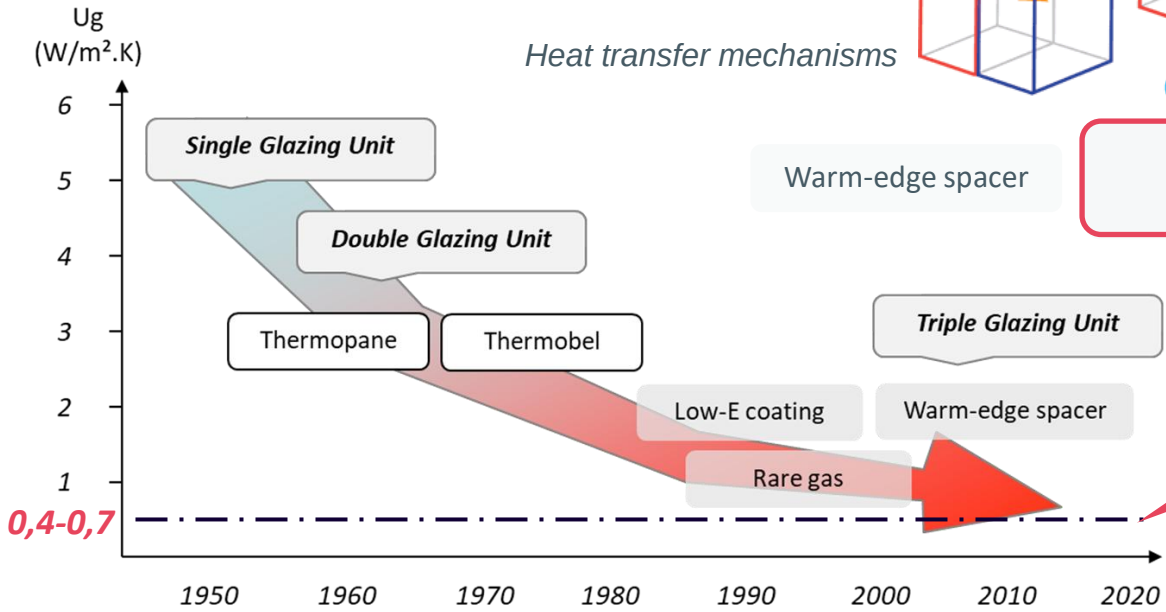
1. Introduction to Vacuum Insulated Glass (VIG) Technology
2. Design and Installation Requirements
3. Showcase of Project Examples
4. Overview of the Certification Framework
5. Key Takeaways and Conclusion

1. Introduction to VIG Technology

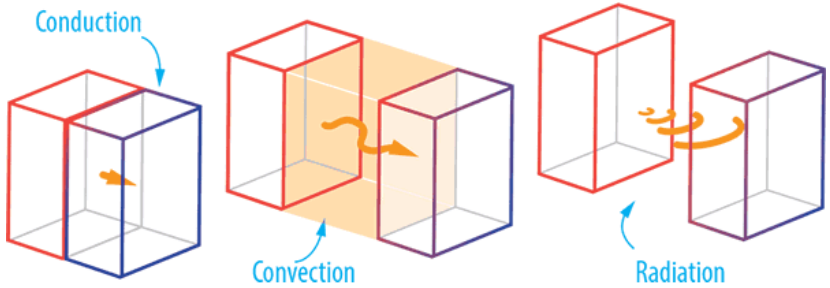


Introduction to VIG Technology

Insulated Glazing Unit evolution



Heat transfer mechanisms



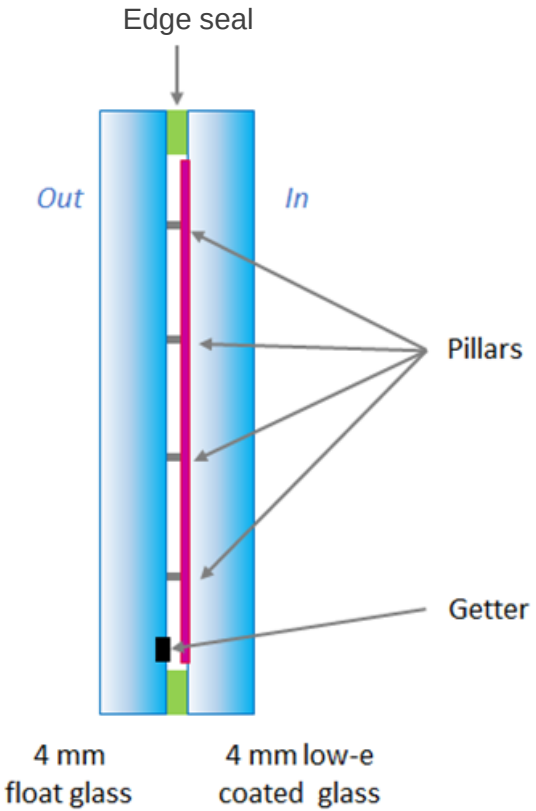
Warm-edge spacer

Vacuum
No convection

Low-E coating
Solar coating

Vacuum Insulating Glazing

Introduction to VIG Technology



- **Glass Panes**: Two sheets of glass (3, 4 or 6 mm), typically separated by a narrow vacuum gap.
- **Vacuum Gap**: A thin space between the glass panes, devoid of air, to minimize heat transfer (0,1 – 0,3 mm).
- **Edge Seal**: A durable, airtight ceramic or metallic seal around the edges to maintain the vacuum over time.
- **Support Pillars**: Micro spacers placed between the panes to prevent them from collapsing under atmospheric pressure (20 – 40 mm pitch).
- **Low-Emissivity Coating**: A special coating applied to one or both panes to enhance thermal insulation by reflecting infrared radiation.
- **Getter Material**: A substance placed inside the vacuum cavity to absorb any residual gases and maintain the vacuum quality.

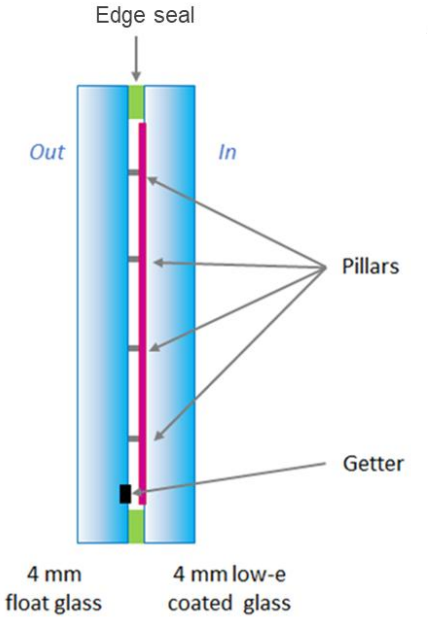
Introduction to VIG Technology

- **Thermal Insulation:** Superior energy efficiency with minimal heat transfer
  - Ug = 0,4 – 0,7 W/m²K, depending on pillars pitch and coatings.
- **Ultra-Thin Design:** Slim profile compared to traditional double or triple glazing.
  - From 6,7 mm to 12 mm in average
- **Enhanced Acoustic Performance:** Effective noise reduction for quieter interiors.
  - Rw = 36 dB
- **Durability:** Long-lasting vacuum seal and robust construction.
  - 15 to 20 years of warranty
  - 25 to 60 years of lifespan
- **Recyclability:** Fully recyclable without the need for dismantling.

2. Design and Installation Requirements

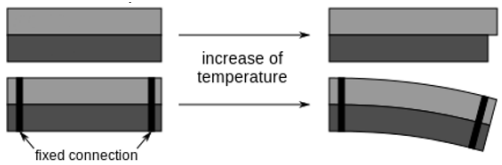
Design and Installation Requirements

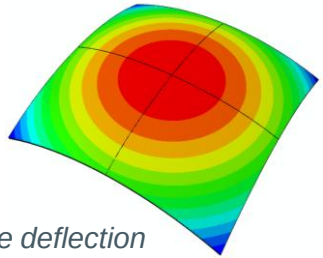
- When designing VIG, specific VIG loads, wrt standard IGU, are considered: pillars and thermal loads.
- Other external loads, e.g. barrier or wind loads, are similar between standard IGU and VIG.
- Contrary to standard IGU no climatic load occurs with VIG due to the absence of gas inside the cavity.



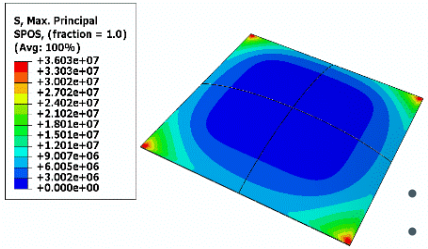
Most critical part while designing VIG → request specific installation procedures

Thermal load





Illustrative deflection

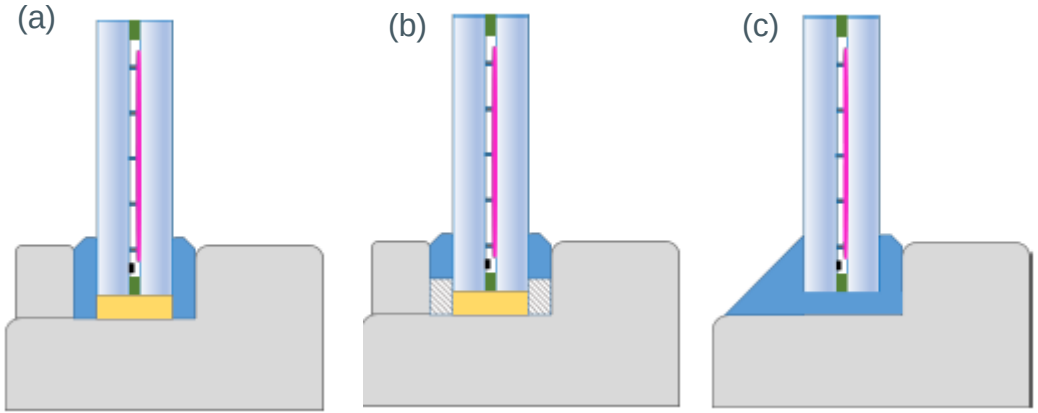


- Simply supported
- **36 MPa in the corner**

Design and Installation Requirements

- Thermal load deformation and high stress at the framed VIG corner can cause glass breakage.

- To prevent this, *soft and thick enough** EPDM gaskets or putty should be used to avoid hard contact between the VIG and its frame.



Installation examples with putty

a) Installation with putty
b) Installation with joint sealing foam
c) Installation with flashing putty

Important additional features

- Edge clearance can be reduced to 2-3 mm (no risk of water leak)
- Drainage not necessary

* The level of softness and thickness should be discussed with the VIG supplier.

3. Showcase of Projects Examples

Kanal – Brussels (BE)

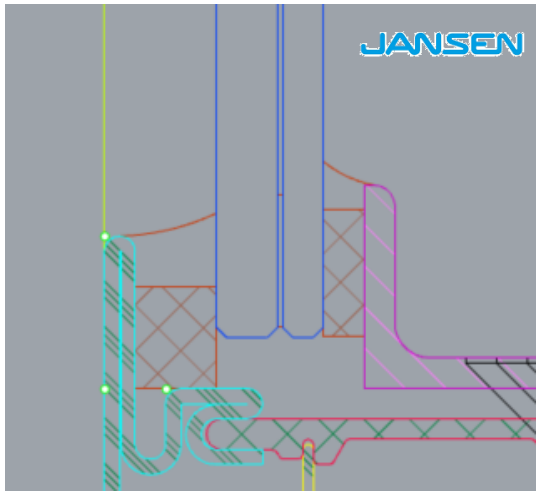
Project features

- 1 000 m² of new facade (1 m x 2 m) and 2 500 m² of restoration of existing facade(1,2 m x 1,2 m).
- Both existing and new framing made of steel.
- Used of low iron VIG 9,7 mm
- Designed to achieve minimal thickness with highest thermal insulation.

Kanal – Brussels (BE)

- For the **new** steel profile, a combination of low Young modulus PE foam and putty was used for the window installation.

VIG
Putty
PE Foam

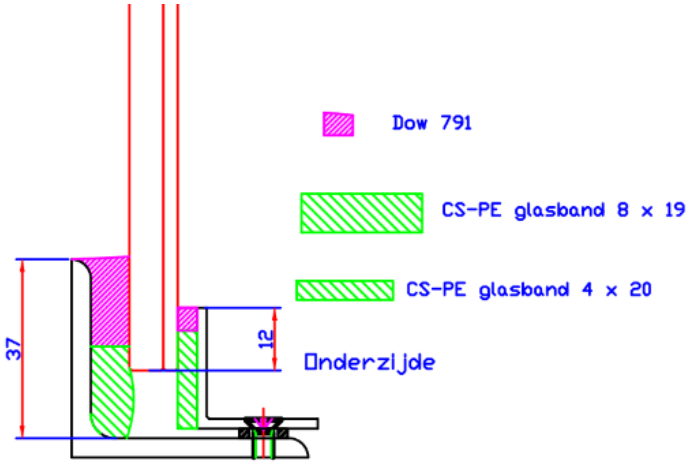


Features	Values
Thermal glass insulation Ug	0,7 W/m²K
Thermal window insulation Uw	1,48W/m²K
Noise glass insulation Rw	36 (-2;-3) dB
Light Transmission	84%
Thickness	9,7 mm
Weight	24,3 kg/m²

Kanal – Brussels (BE)

- For the **old** steel profile, a combination of low Young modulus PE foam and putty was used for the window installation.

- The Uw is higher due to the absence of thermal bridge element in the frame.



Features	Values
Thermal glass insulation Ug	0,7 W/m²K
Thermal window insulation Uw	1,62W/m²K
Noise glass insulation Rw	36 (-2;-3) dB
Light Transmission	84%
Thickness	9,7 mm
Weight	24,3 kg/m²

Belnine Project – Brussels (BE)

Project features

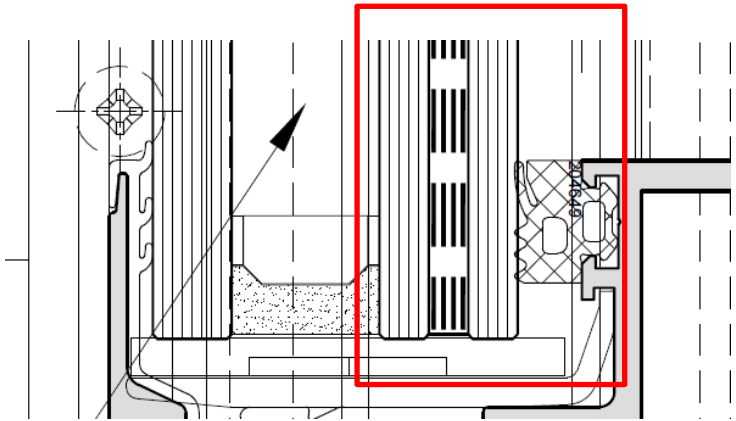
- 1 200 m² new façade (2,4 m x 1 m) for an 11-floor office building in Brussels (rue Belliard) with aluminium profile.
- Designed to achieve maximum natural entering light, acoustic comfort and high thermal insulation.
- VIG used as a double-glazing component such as:

  44.2 / 15 mm Ar 90% / VIG:4

Belnine Project – Brussels (BE)

- For the **new** alu profile, a thick and soft EPDM gasket was used for the window installation (see red squared zone).

- Important feature : **standard** EPDM gasket.



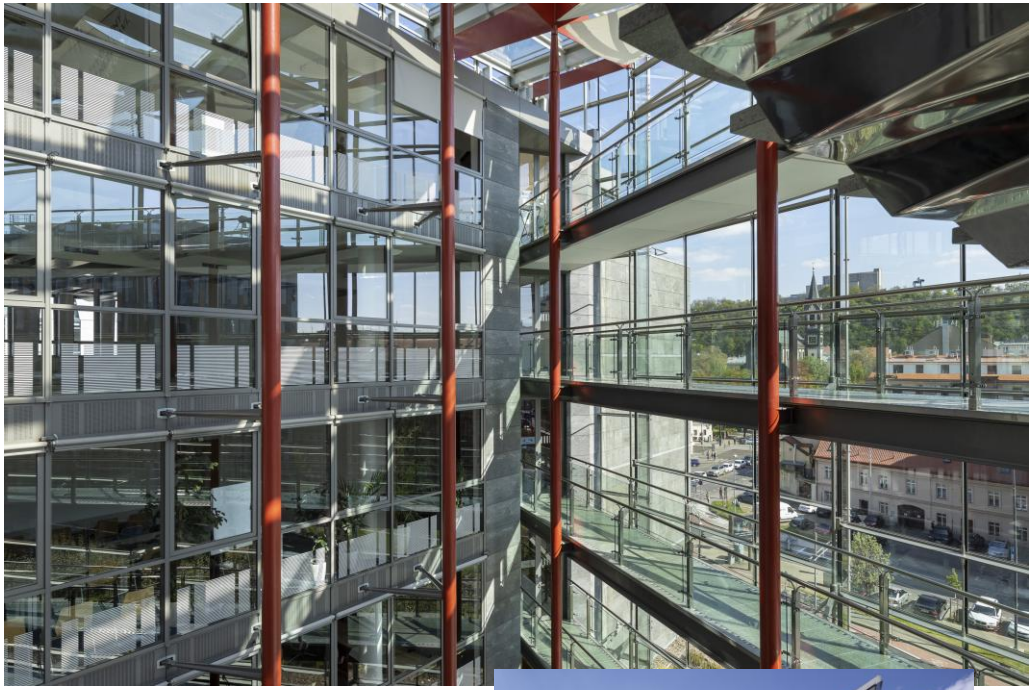
Features	Values
Thermal glass insulation Ug	0,4 W/m²K
Thermal window insulation Uw	1 W/m²K
Noise insulation Rw	43 (-2;-3) dB
Light Transmission	68,7 %
Safety (EN 12600)	1B1
Thickness	37 mm
Weight	55 kg/m²

Nile House – Praha (CZ)

Základní informace

- Původní zasklení:
  - Laminované sklo 66.2 (12,8 mm)
    - Ug = 5,4 W/m^{2}K
    - Solární faktor = 77 %
- Nové zasklení:
  - Vakuové zasklení 12 mm
    - Ug = 0,7 W/m^{2}K
    - Solární faktor = 60 %

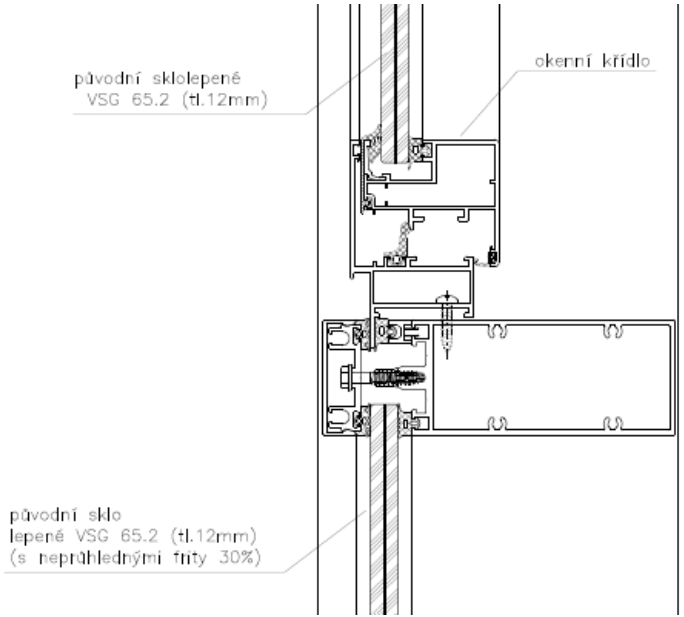
- Celková plocha přesklení: 295 m^2 (138 ks)
- Celková doba přesklení: 25 dní
- Rychlost výměny: 6 - 8 skel / den



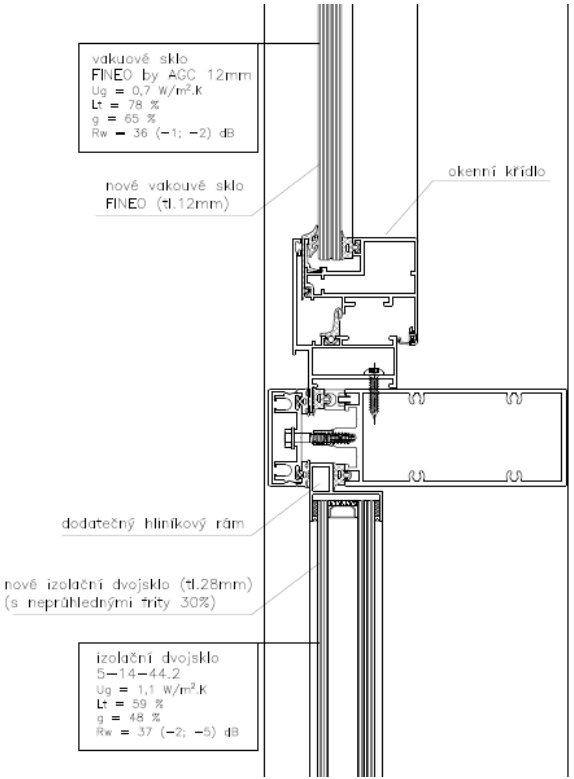
CA IMMO
URBAN BENCHMARKS.

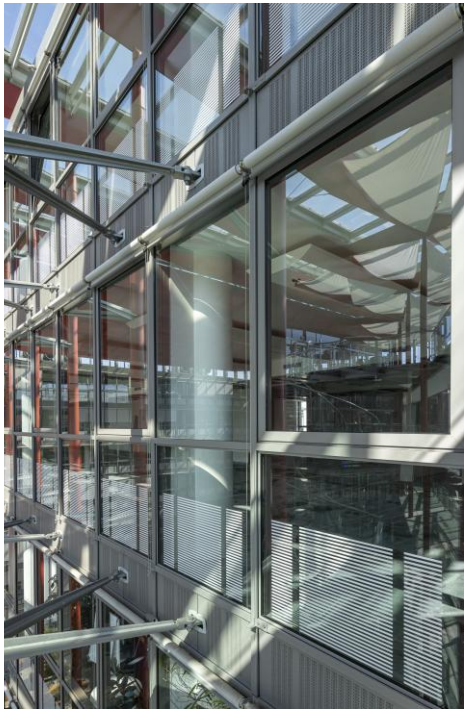
Nile House – Praha (CZ)

PŮVODNÍ DETAIL



NOVÝ DETAIL





Nile House – Praha (CZ)

- Průběh reinstalace

video

Residential – Listed Building


Brussels (BE)


Saint Honoré les Bains (FR)


Zurich (CH)


Scotland (UK)

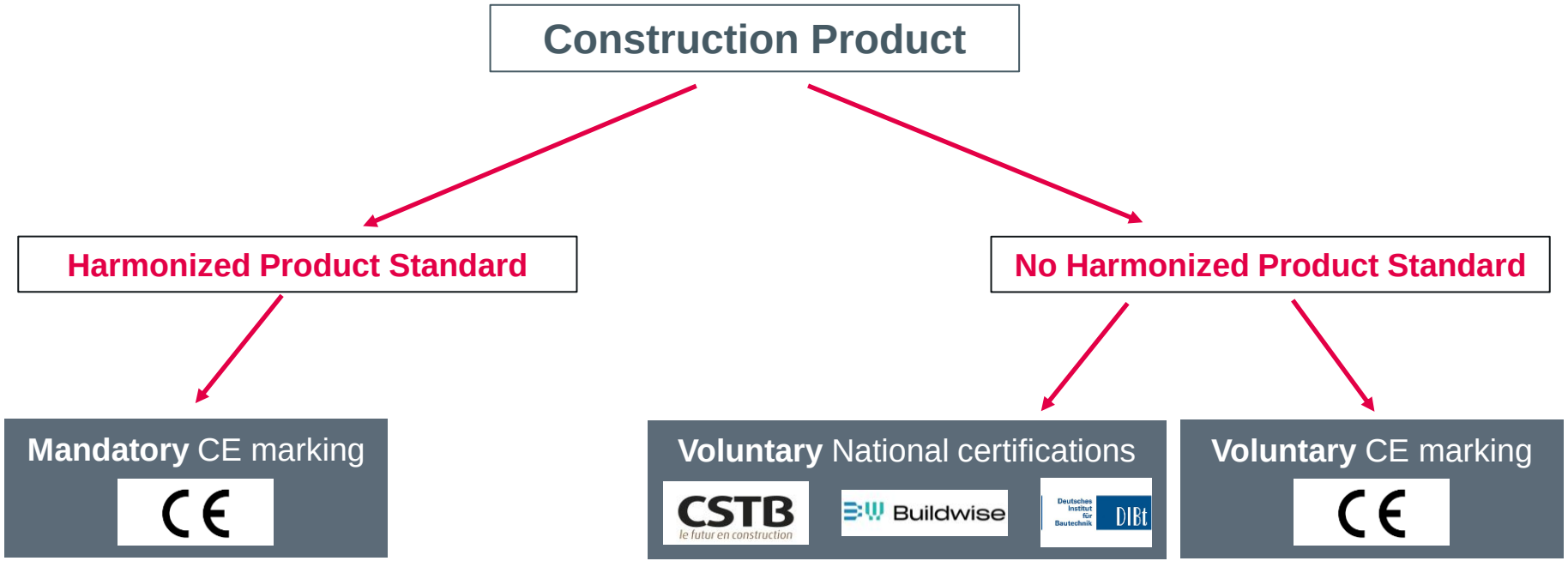

Stockholm (SE)


Leiden (NL)

4. Overview of the Certification Framework

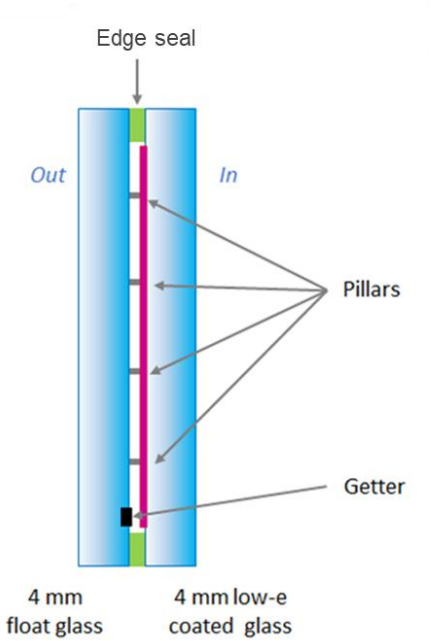
Certification

« I have a new construction product, what are the obligations to sell it ? »



Certification

VIG is not covered (yet) by an harmonized product standard – only voluntary certification route for now.



Construction Product

No Harmonized Product Standard

Voluntary national certifications

CSTB le futur en construction · Buildwise · Deutsches Institut für Bautechnik DIBt

Voluntary CE marking

CE

EAD 300021-00-0404

5. Key Takeaways and Conclusion

Key Takeaways and Conclusion

- VIG offers exceptional thermal and acoustic insulation while maintaining a **slim** and **lightweight** profile.

- Due to specific load considerations, particularly thermal loads, dedicated **installation rules** must be carefully followed to ensure optimal performance.

- VIG is an excellent solution for the **restoration** of old buildings, allowing the preservation of existing frames, as well as for **modern facades** with contemporary framing systems.

- Currently, **VIG certification remains voluntary**, but this is expected to change as a standardized framework is being developed.

Thank you.
Contact us: louis.dellieu@agc.com david.kelich@agc.com

FINEO by AGC

AGC
Your Dreams, Our Challenge