

Structural Silicone -Insulating Glass - -Windows -

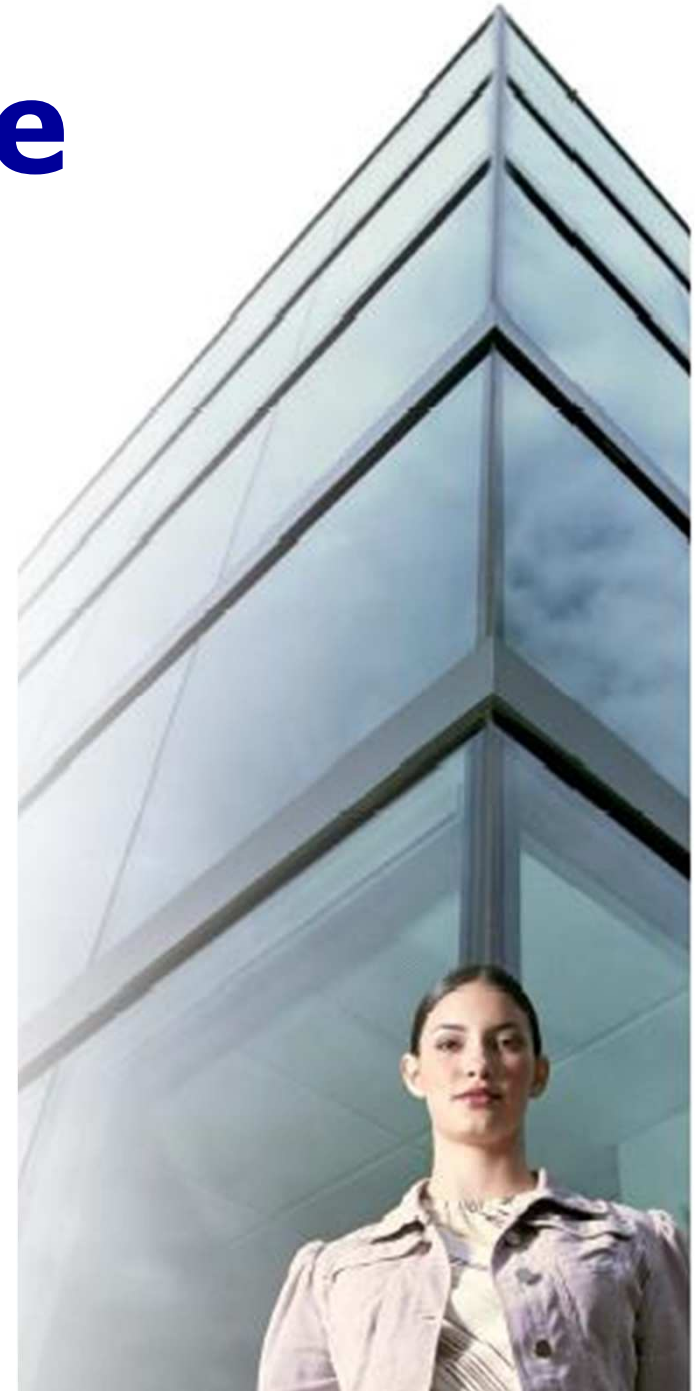
Sitharam

Insulation glass and Window OEM

MOMENTIVE™



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Licensee



Insulating Glass Units

- Silicone is widely used in the manufacturing of Insulating Glass Units, also called “IG Units”, “DGU’s” and “Double Glazing”. In this application, the silicone is called upon to serve multiple functions:
 - A **secondary seal** intended to seal and protect the spacer at the perimeter of the IG Unit assembly.
 - An **adherent** to structurally bond the pieces of glass together into one combined composite assembly.
 - An **adherent** to bond the spacer so that movement or “walking” of the spacer does not occur during service.



Moisture Vapor Transmission Rate

Sealant Type	Typical M.V.T.R. (gm/m ² /day)
PIB	0.17
Hot Melt Butyl	0.63
Polyurethane	15
Polysulfide	19
Silicone	100-110

Silicone is the most permeable,
so why use it ??



**The
reason:
Durability**

Non-silicone, not
a good idea !!

Sika-1A →



← DYNATROL

SilPRUF →

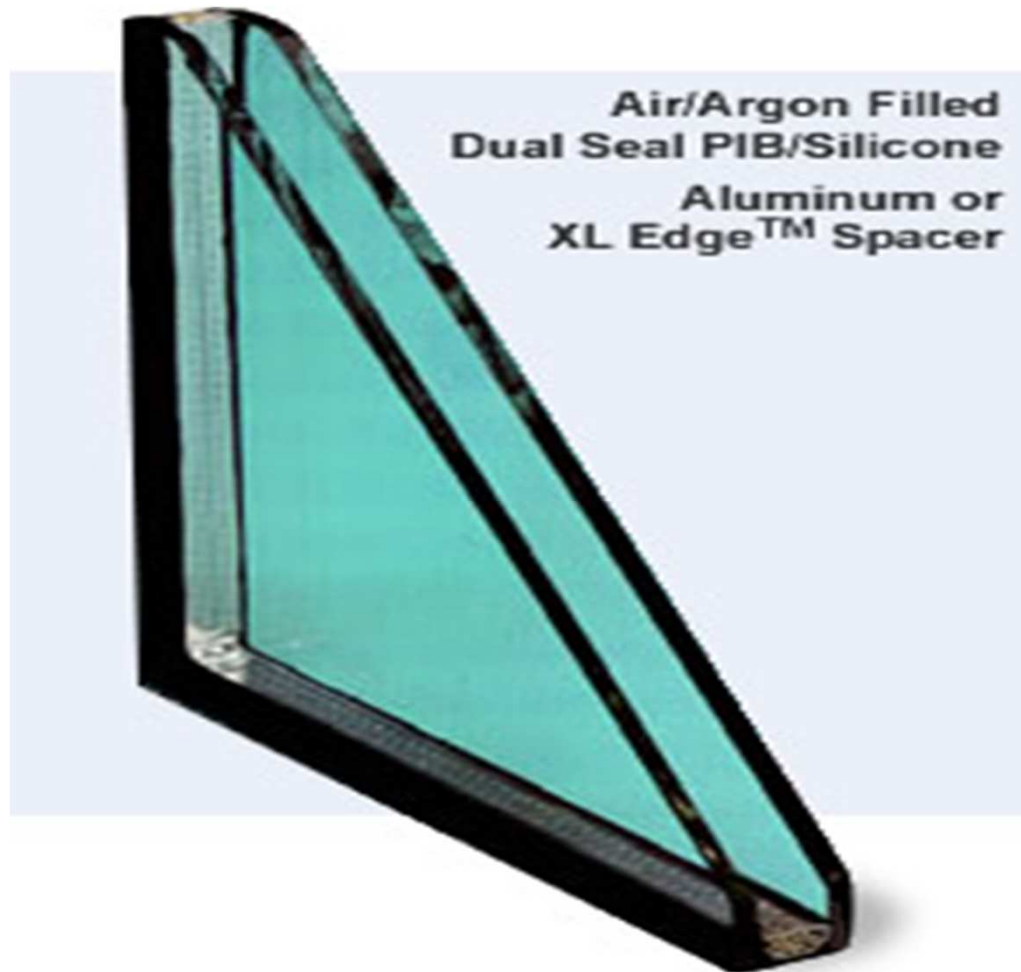


← SCS-1200

50,000 HRS = 5.7 years

IN Atlas Twin Arc Weather-O-Meter

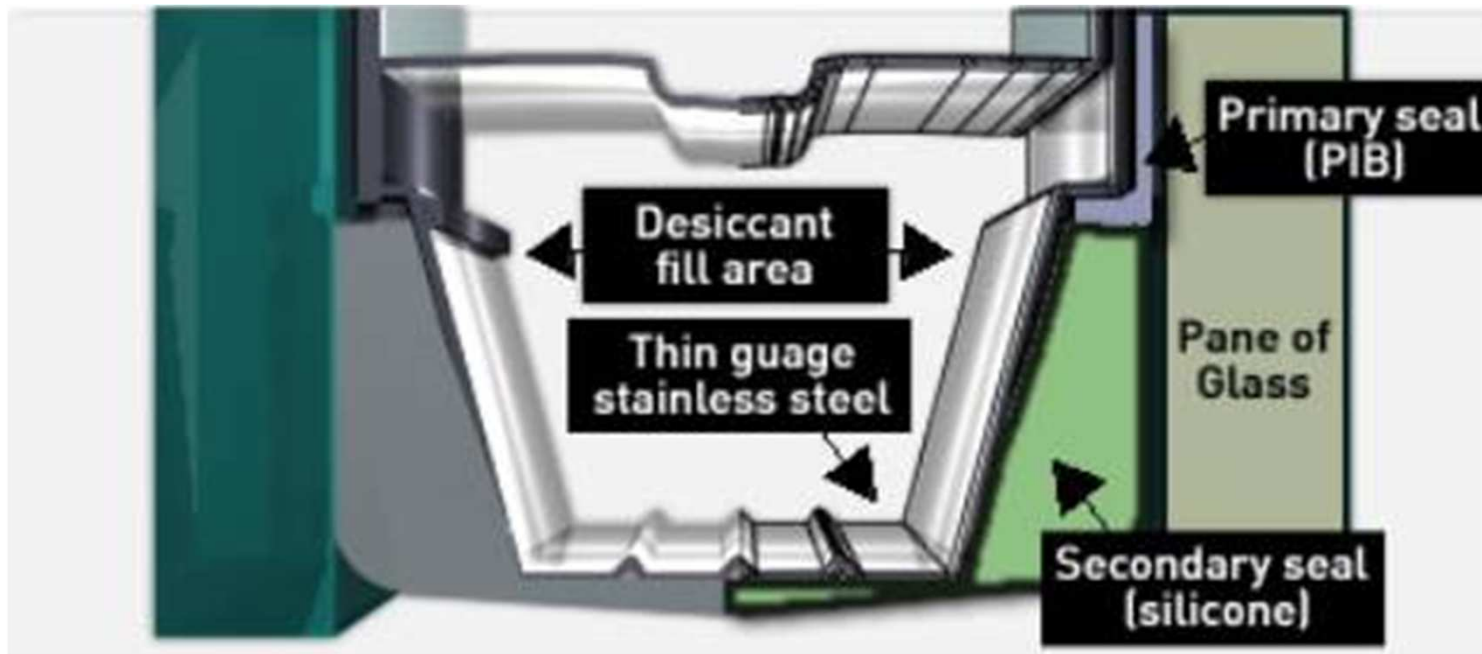
Proven Performance



Dual Seal
PIB/Silicone is
recognized as the
longest performing
option available

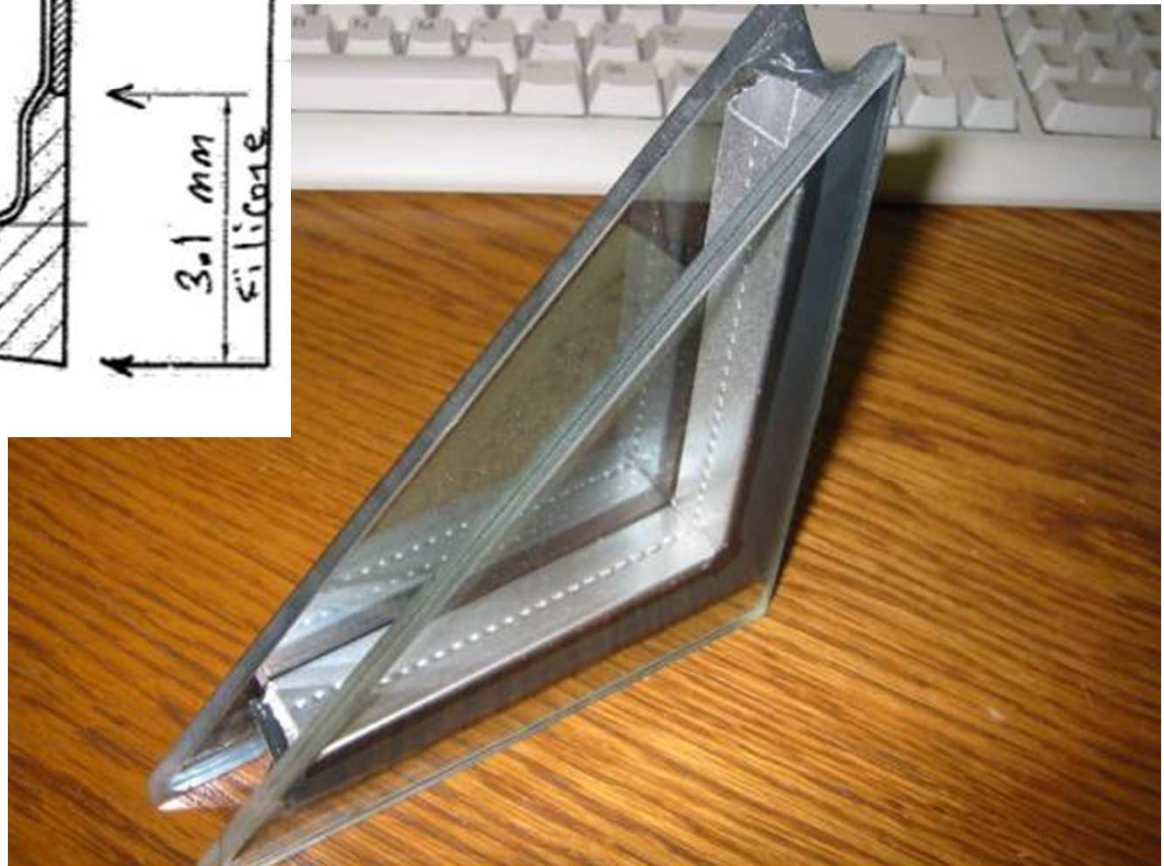
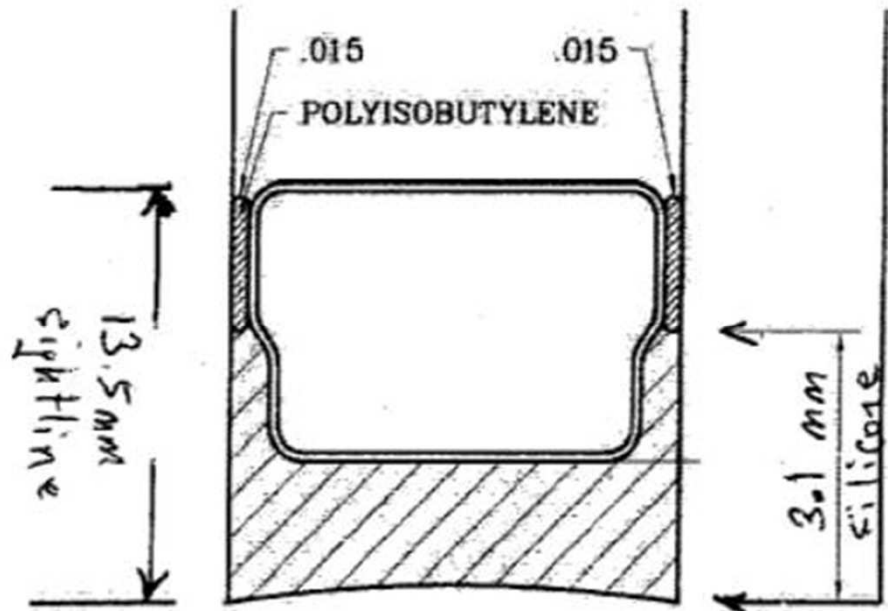
Spacer Designs – Common Metal

Residential Applications

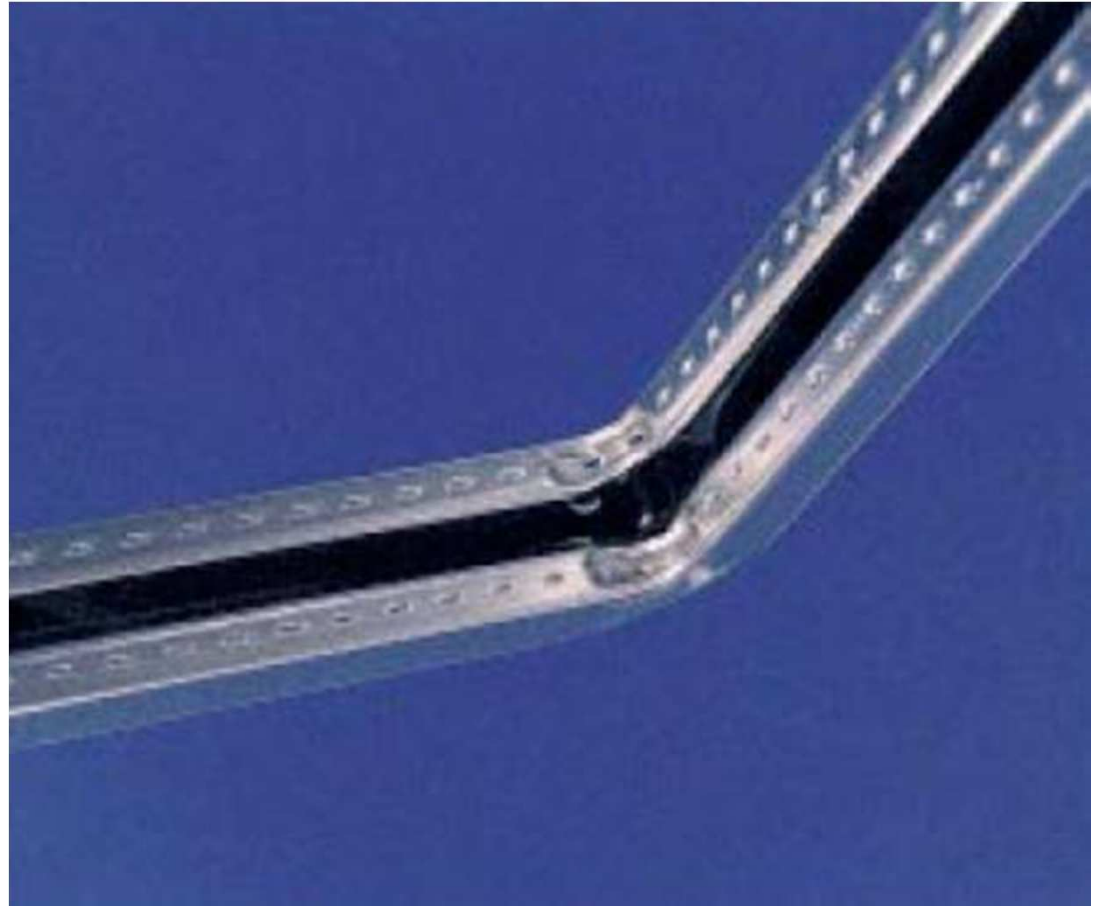


Spacer Designs – Common Metal

Commercial Applications



Spacer Designs – Thermal Break



“Warm Edge” technology

Spacer Designs – Composite

“Warm Edge” technology



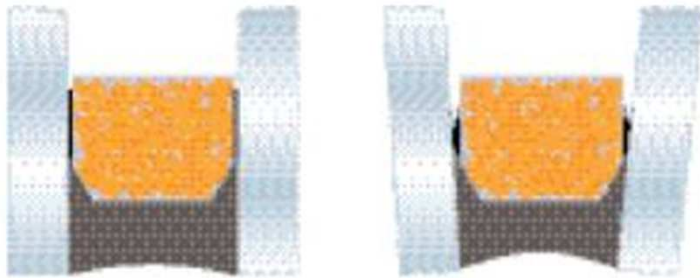
Spacer Designs – Silicone Foam



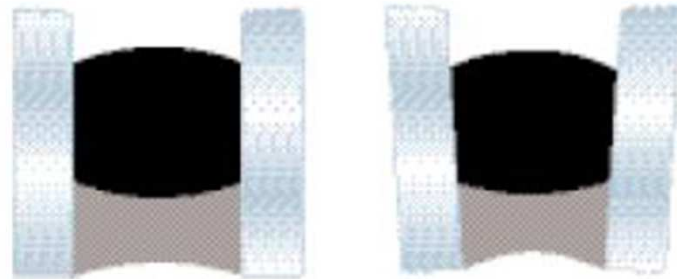
“Warm Edge” technology

Spacer Designs – Thermo Plastic

“Warm Edge” technology



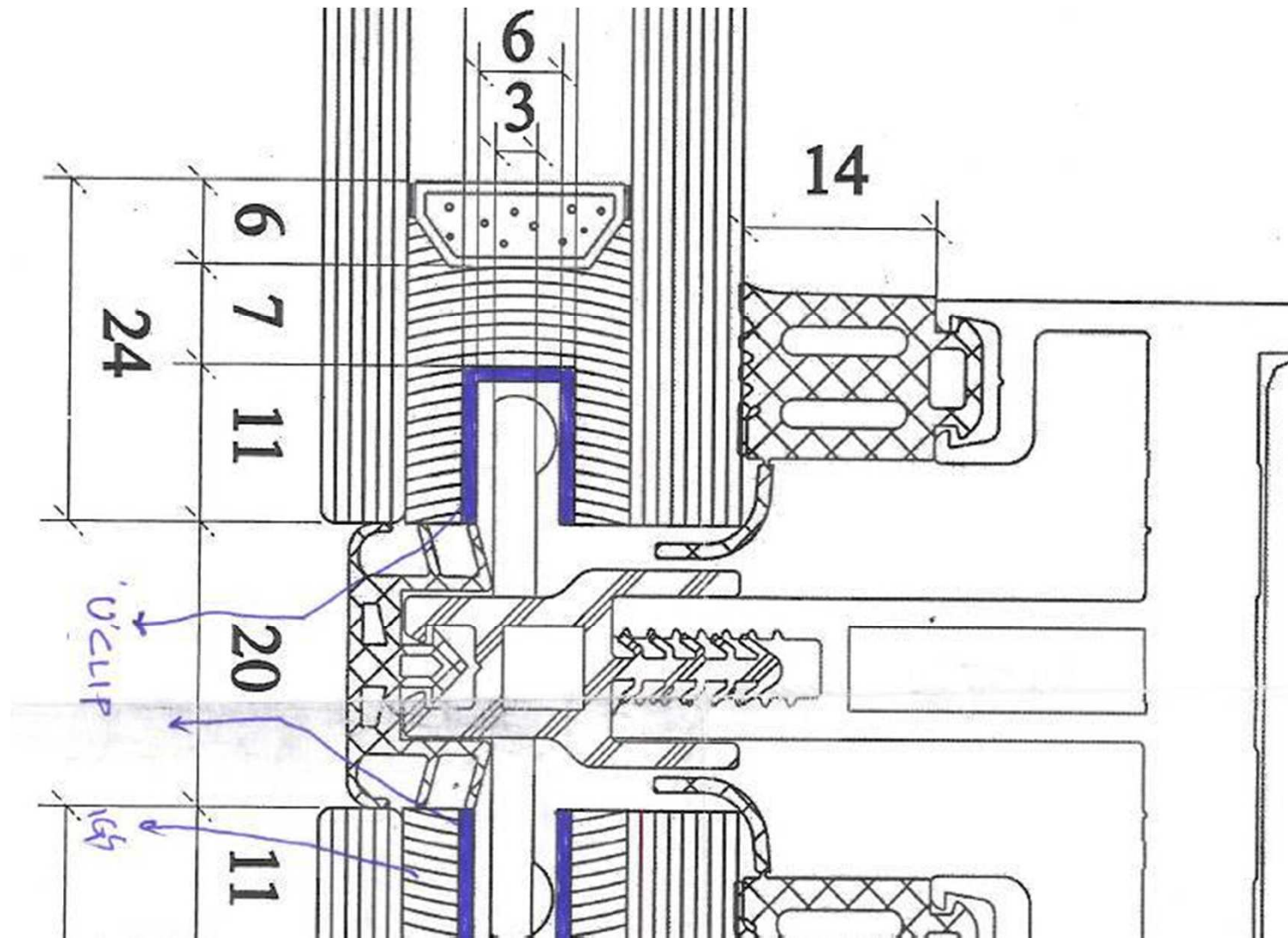
the glass/spacer bond places the primary seal in jeopardy of failure.



The flexibility of the Thermo Plastic Spacer allows for expansion and contraction without concentrated stress on the primary seal. The entire TPS spacer/seal expands.

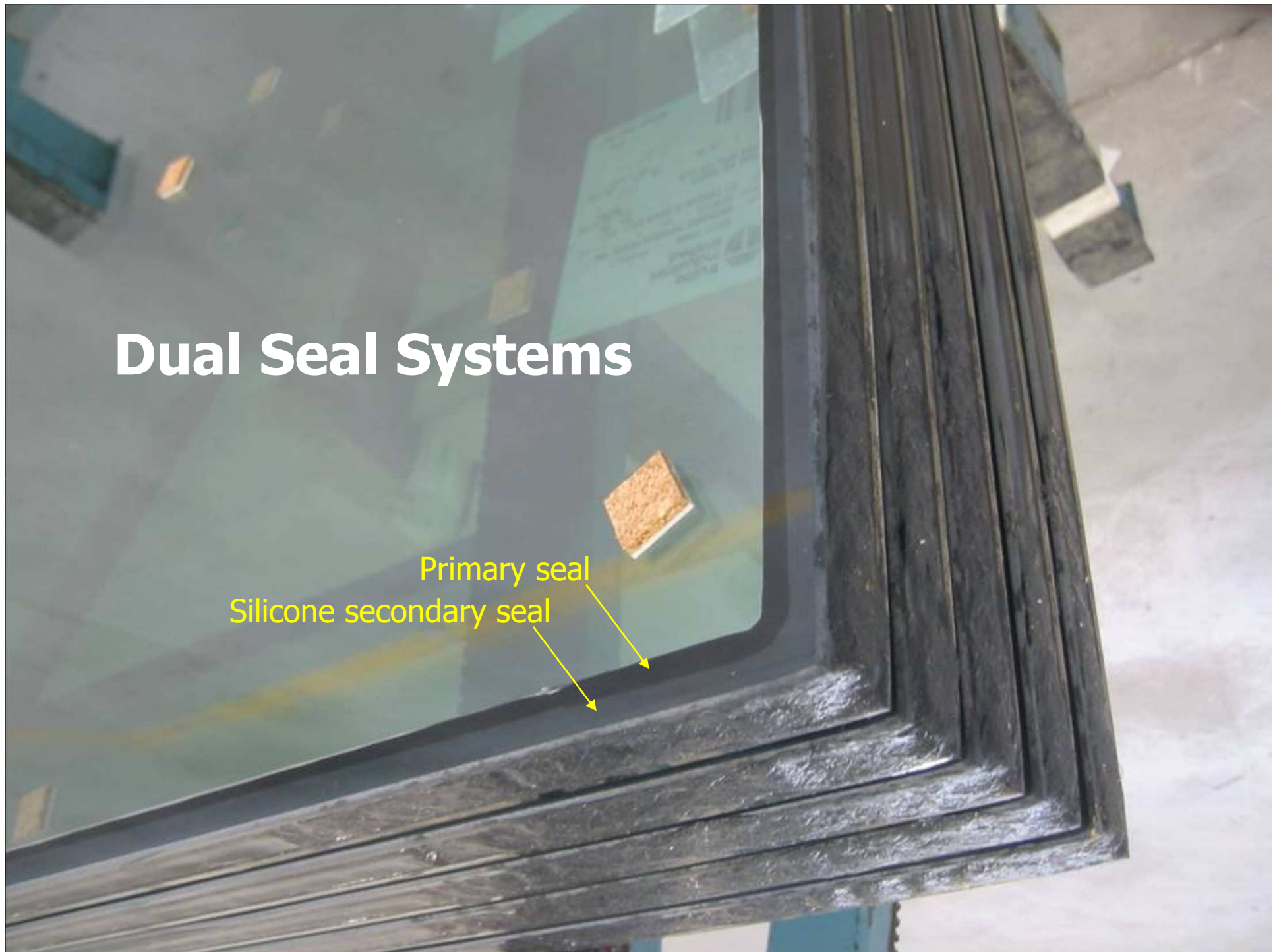


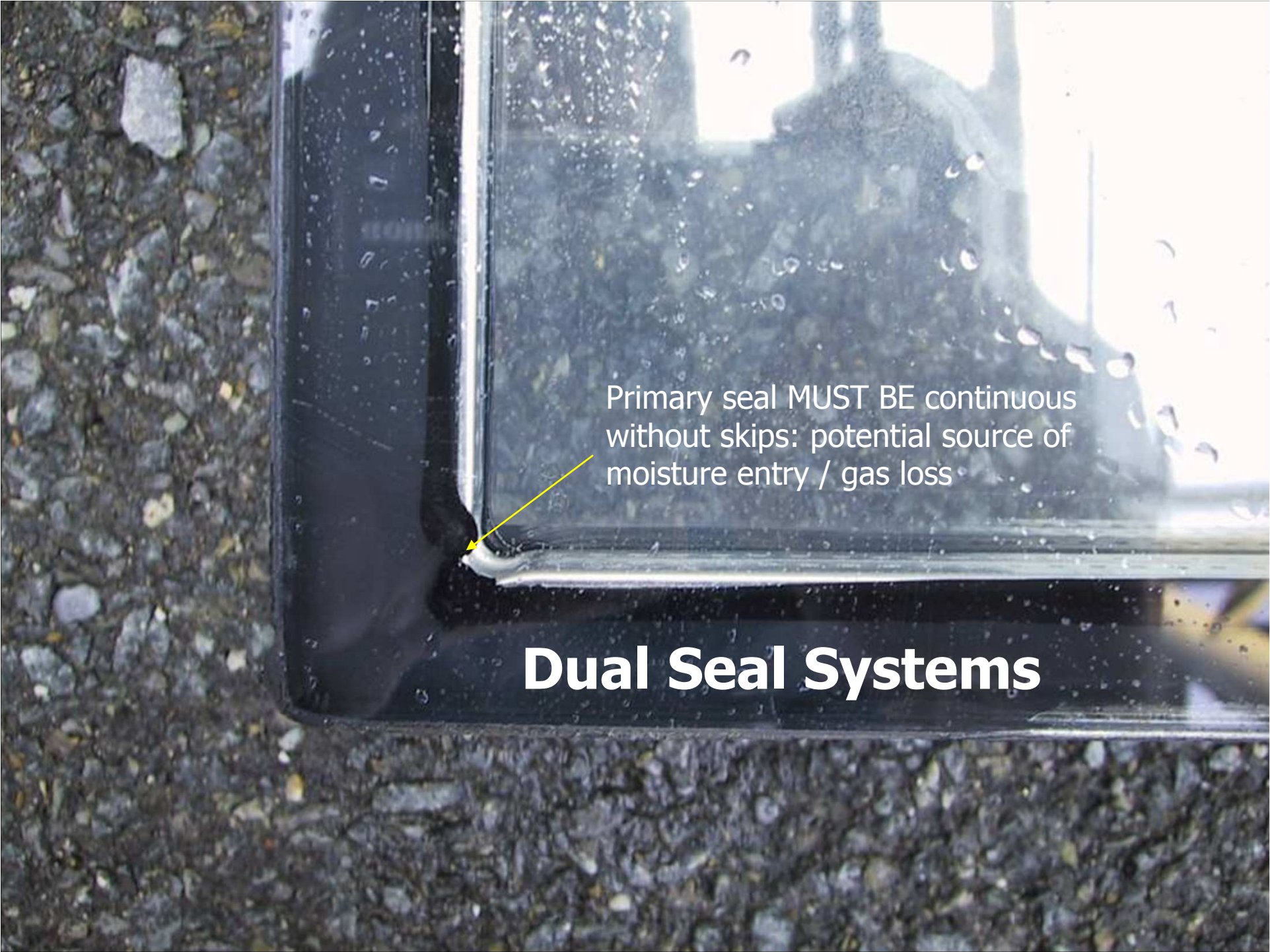
Spacer Designs – Thermo Plastic



Dual Seal Systems

Primary seal
Silicone secondary seal



A close-up photograph of a window frame's corner where it meets a gravel surface. A black, flexible seal is visible, which is the primary seal. A yellow arrow points to a small gap or 'skip' in the seal at the corner. The text 'Primary seal MUST BE continuous without skips: potential source of moisture entry / gas loss' is overlaid on the image, pointing to this gap. The window glass is visible in the background, showing some condensation or dirt.

Primary seal MUST BE continuous without skips: potential source of moisture entry / gas loss

Dual Seal Systems

Condensation



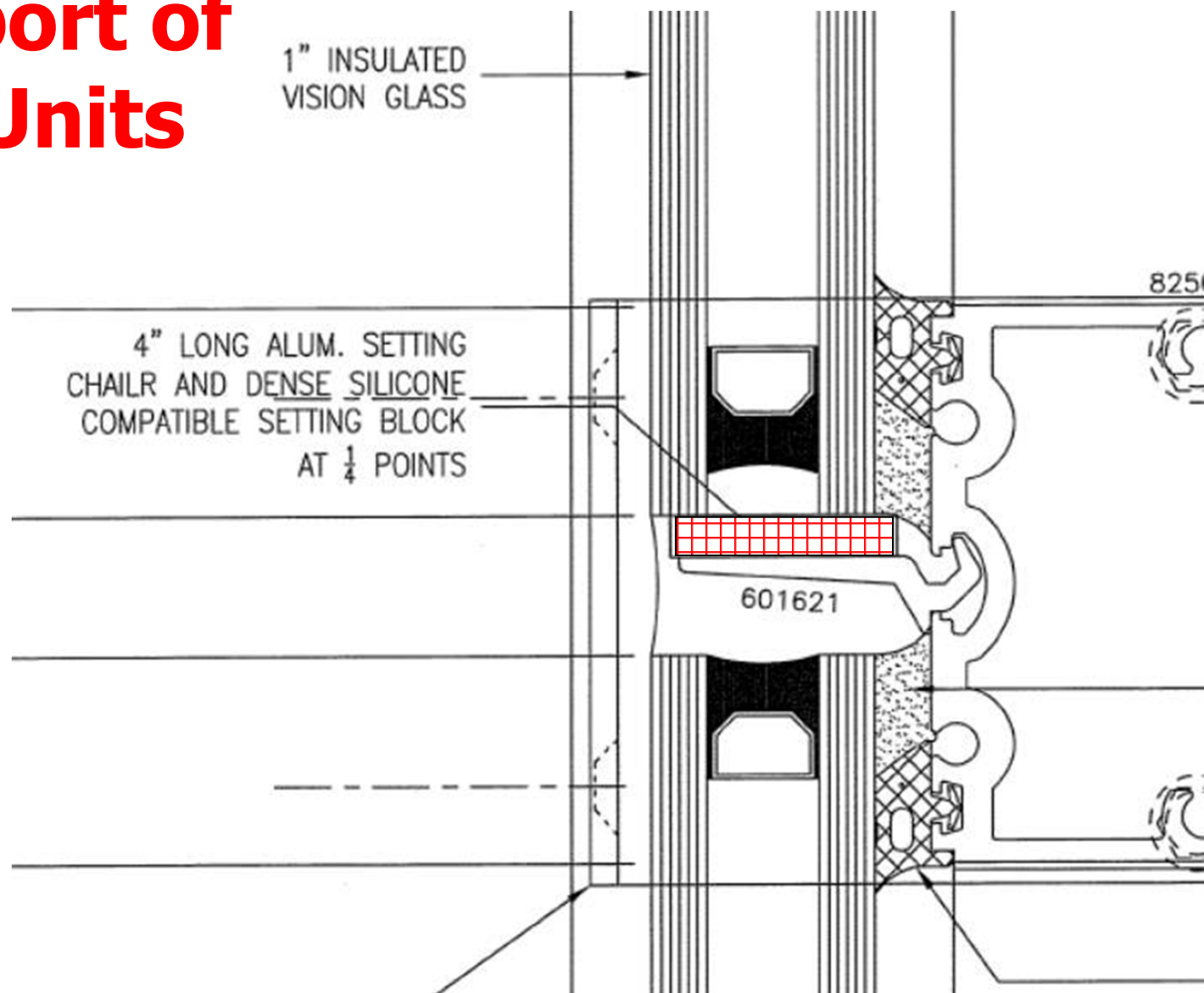
Spandrel Area



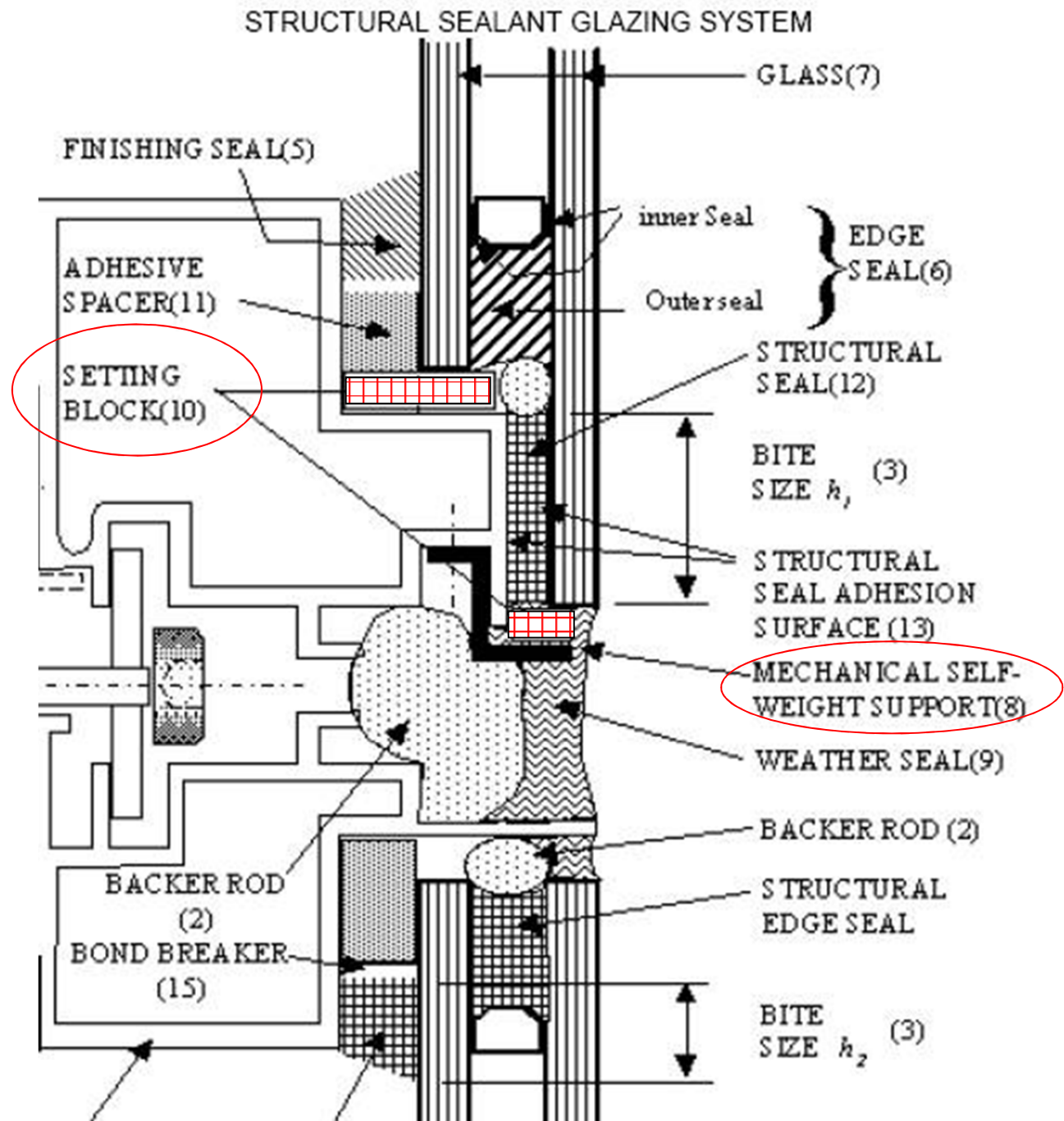
Spandrel Area



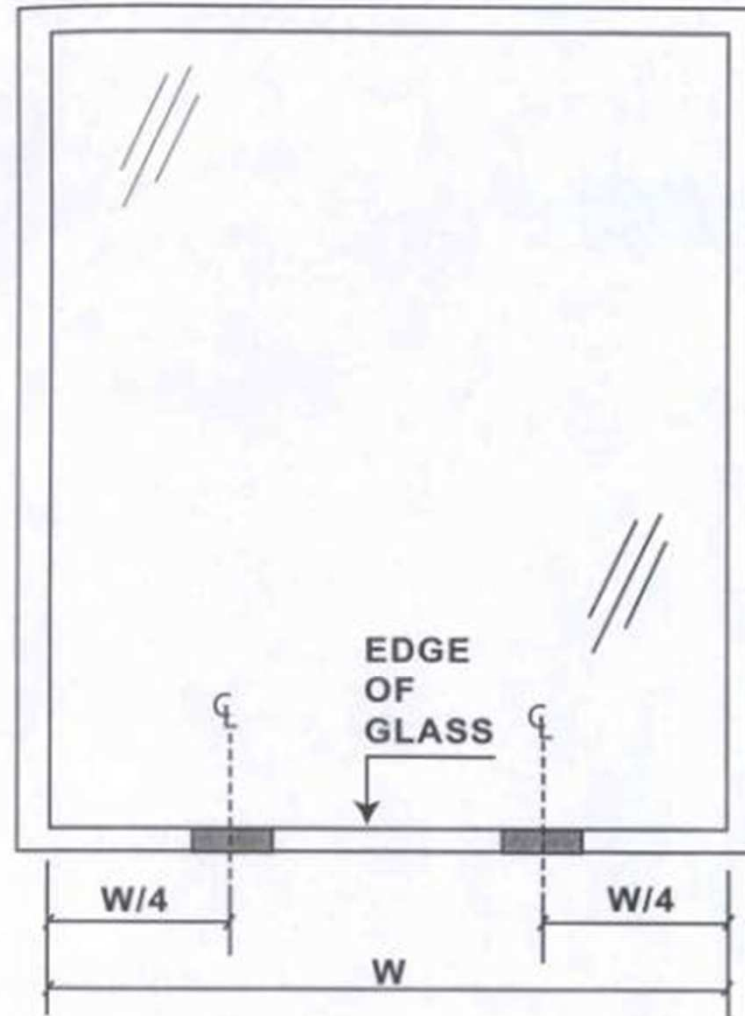
Support of IG Units



Support of IG Units



Support of IG Units

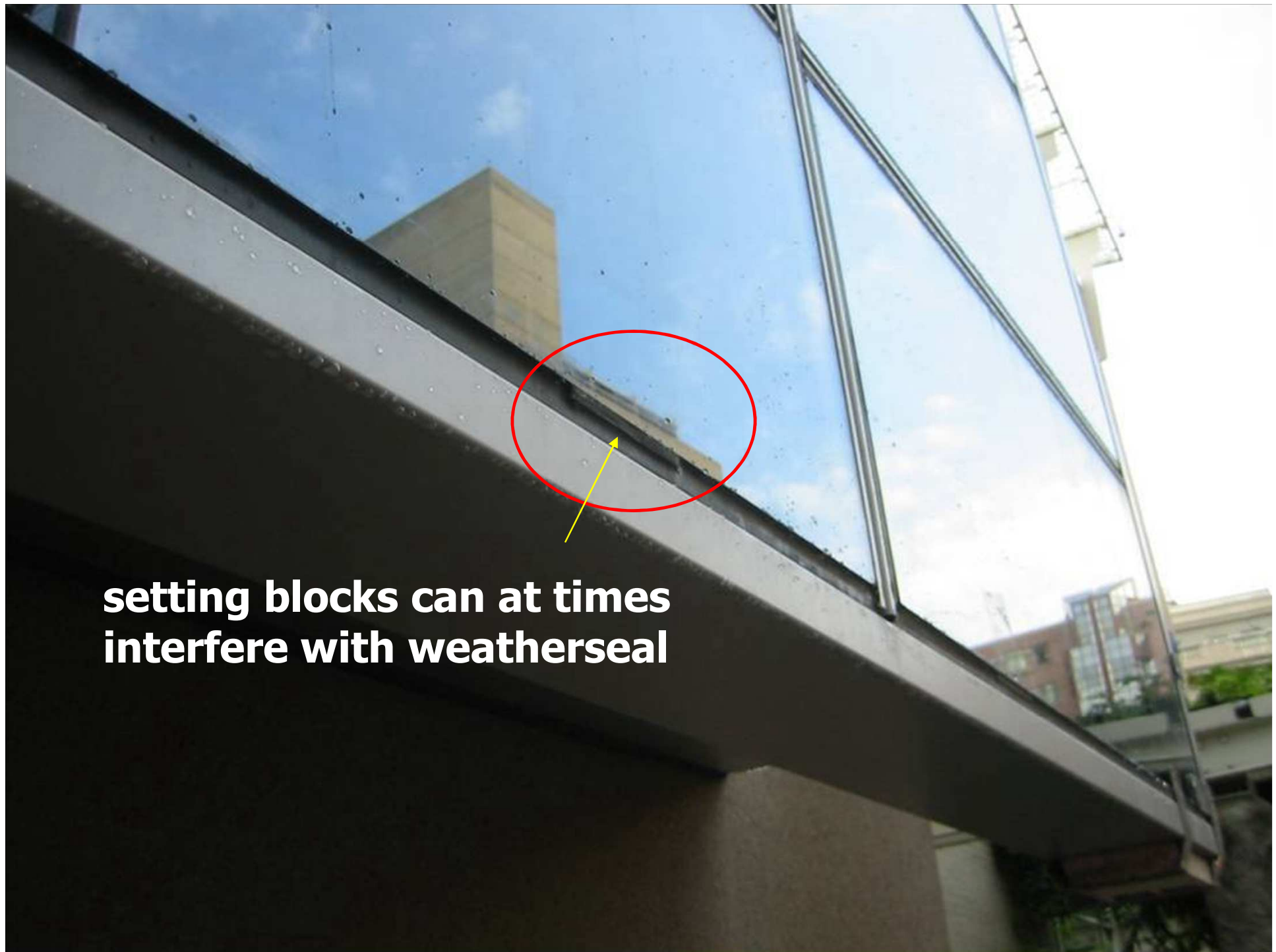


85 +/- 5 Shore A Durometer hardness blocks positioned within $W/8$ or 6" of glass edge, whichever is greater. Block length is dependent on glass area.

Figure 10
Setting Block Location for Fixed Framing (Preferred)



**Typical location
of setting blocks**

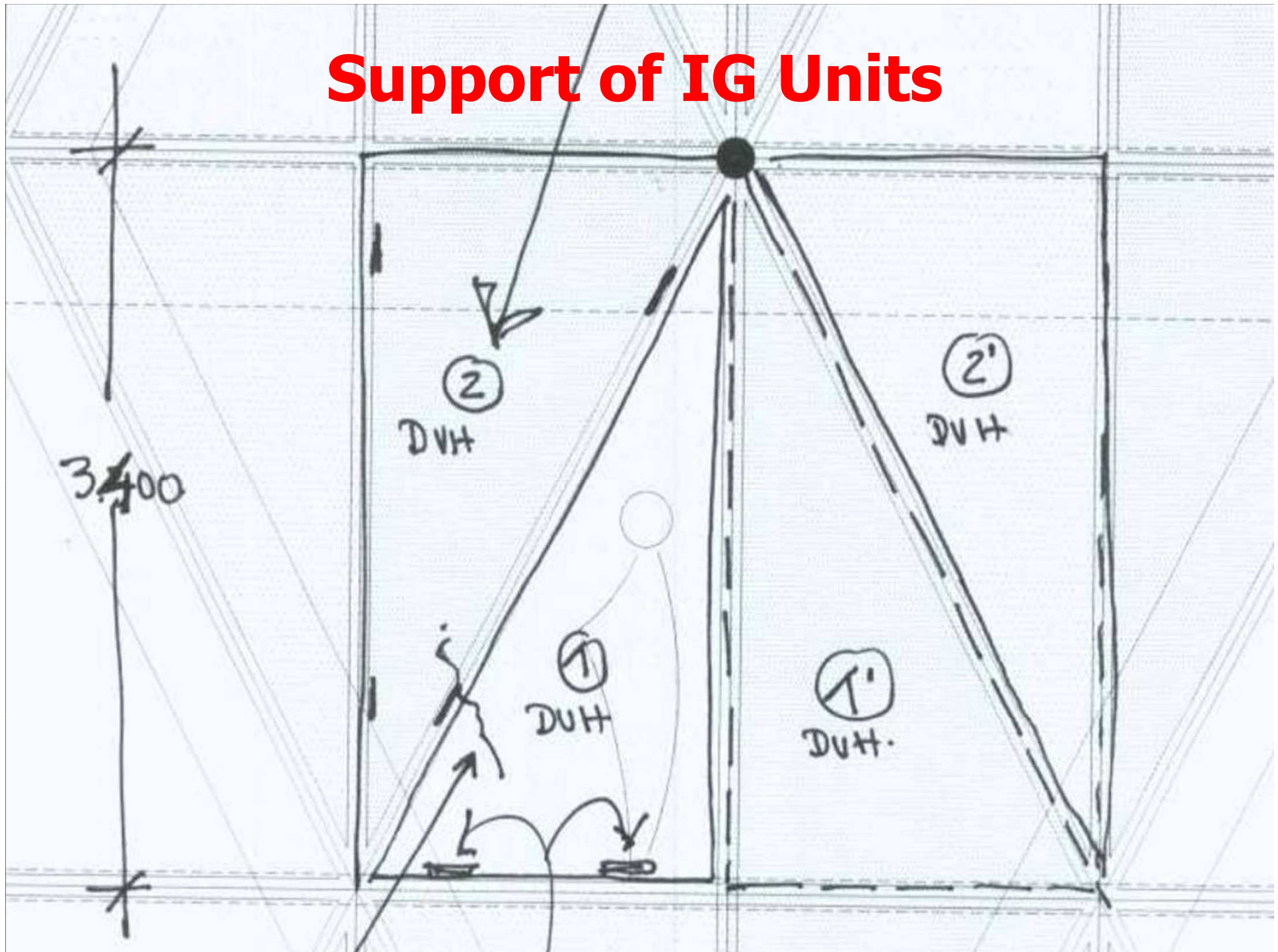


**setting blocks can at times
interfere with weatherseal**

Support of IG Units



Support of IG Units



IGU Manufacturing, Manual Filling





IGU Manufacturing, Automatic Filling



IGU Manufacturing - Moving



IGU Manufacturing - Moving





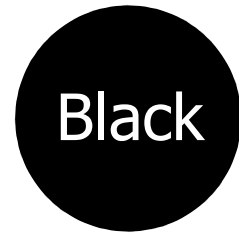
IGU Manufacturing - Crating

GE IGS Product Evolution

- **1964** **IGS3103** – 1PT Acetoxy
- **1986** **IGS3703** – 1PT neutral
- **1989** **IGS3211** – 1st generation **2PT**
- **1991** **IGS3723** – 2nd generation **2PT**
- **1993** **IGS3713-D1, IGS3719-D1** – 1PT neutral accel.
- **1997** **IGS3733** – new base for **2PT** slower snap hot/humid climates
- **2002** **IGS3729** – 1PT neutral accel, titanium fortified, grey
- **2004** **IGS3743** – 3rd generation **2PT** for IGS

IGS3103

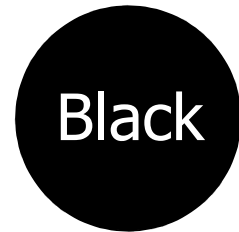
Key Product Characteristics



- Key Benefits
 - First Generation One Part Sealant
 - Lowest Cost Material
 - Simplicity of Usage
- Cure Type and Description
 - Acetoxy Cure System
 - Requires Atmospheric Moisture to Cure
- Initial Cure and Handling
 - Skin-over in 3-6 Minutes
 - 1/4" Cure in 24 Hours
- Cure Development – Fast cure
 - Tensile Strength 30 to 60 psi in 24 Hours
 - Tensile Strength 100 to 140 psi in 7-10 Days

IGS3703

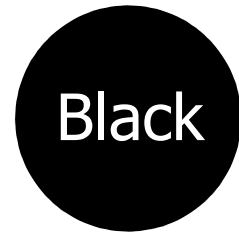
Key Product Characteristics



- Key Benefits
 - **Standard** Cure Speed
 - Improved Substrate Adhesion
 - Simplicity of Usage
- Cure Type and Description
 - **Neutral Alkoxy** Cure System
 - Requires Atmospheric Moisture to Cure
- Initial Cure and Handling
 - Skin-over in **20-30 Minutes**
 - 1/8" Cure in 24 Hours
- Cure Development
 - Tensile Strength **30 to 60 psi in 48 Hours**
 - Tensile Strength 100 to 140 psi in 7-10 Days

IGS3713-D1

Key Product Characteristics



- Key Benefits
 - Accelerated Cure Speed
 - Improved Substrate Adhesion
 - Simplicity of Usage
- Cure Type and Description
 - Neutral Alkoxy Cure System
 - Requires Atmospheric Moisture to Cure
- Initial Cure and Handling
 - Skin-over in 6-15 Minutes
 - 3/16" Cure in 24 Hours
- Cure Development
 - Tensile Strength 30 to 60 psi in 36 Hours
 - Tensile Strength 100 to 140 psi in 7-10 Days

IGS3723A/IGS3723B

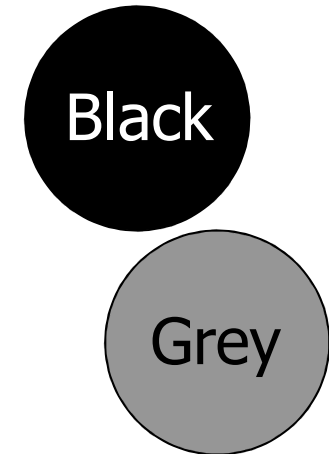
Key Product Characteristics

A black circular logo with the word "Black" written in white, sans-serif font in the center.

- Key Benefits
 - Fastest Curing Insulating Glass Sealant
 - Provides Increased or High Production Rate
 - Low Pumping Viscosity for Improved Groove Filling/High Productivity
 - Low Abrasion Filler for Reduce Equipment Wear
- Cure Type and Description
 - 2 Part Cure System
 - Condensation Cure System (Alcohol Cure Byproduct)
- Initial Cure and Handling
 - Snap Time 45 to 120 Minutes
 - Cure Speed Impacted by Mix Ratio
- Cure Development
 - Tensile Strength 30 to 60 psi in 2-4 Hours
 - Tensile Strength 120 to 150 psi in 2-4 Days

IGS3743A/IGS3743B

Key Product Characteristics



- Key Benefits
 - Improved Adhesion Development to Mill Finish Aluminum Spacers
 - Reduced Stringiness / Tailing
 - Low Pumping Viscosity for Improved Groove Filling/High Productivity
 - Low Abrasion Filler for Reduce Equipment Wear
- Cure Type and Description
 - 2 Part Cure System
 - Condensation Cure System (Alcohol Cure Byproduct)
- Initial Cure and Handling
 - Snap Time 60 to 180 Minutes
 - Cure Speed Impacted by Mix Ratio
- Cure Development
 - Tensile Strength 30 to 60 psi in 4-8 Hours
 - Tensile Strength 120 to 150 psi in 2-4 Days

GE Insulating Glass Sealants

Common Benefits

- All GE IG sealants (except IGS3103) are formulated with low abrasion calcium carbonate filler to provide reduced equipment wear and lower maintenance costs.
- All GE IG sealants are designed with low pumping viscosity to provide improved groove filling for fewer rejects and reduced equipment wear and lower maintenance costs.
- All GE IG sealants are designed with high static viscosity to eliminate slump and nozzle tailing for improved IG unit quality.
- All GE IG sealants are of 100% silicone polymer assuring the longest possible durability and life.

A photograph of a modern building with a curved facade and large glass windows. The building is white with blue-tinted glass panels. The text "ARTS ATRIUM" is visible on the upper part of the building. The building has a unique, flowing design with curved balconies and overhangs. Bare tree branches are visible on the right side of the image.

ARTS ATRIUM

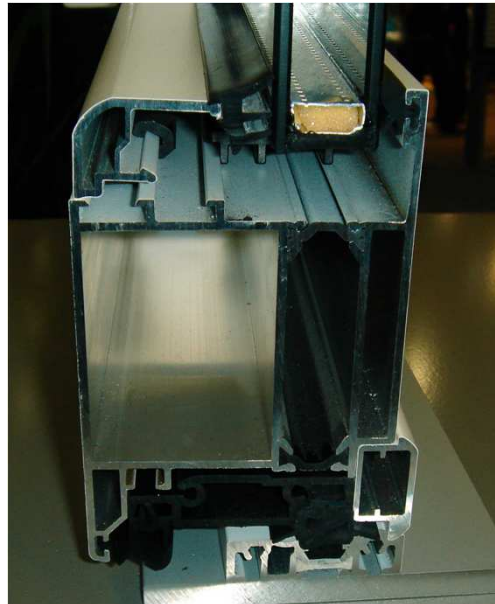
Insulating Glass

Windows systems

PVC



Aluminum

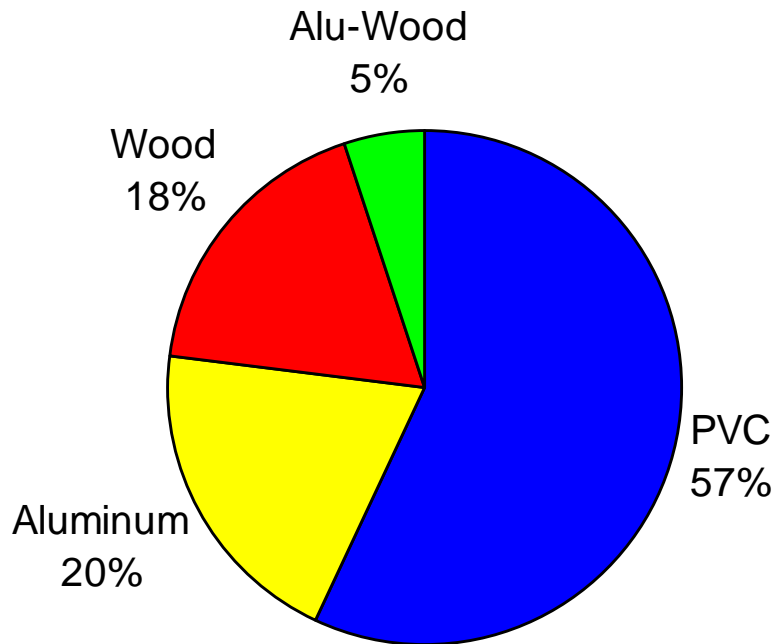


Wood



EMEA Market Segment overview – Window OEM

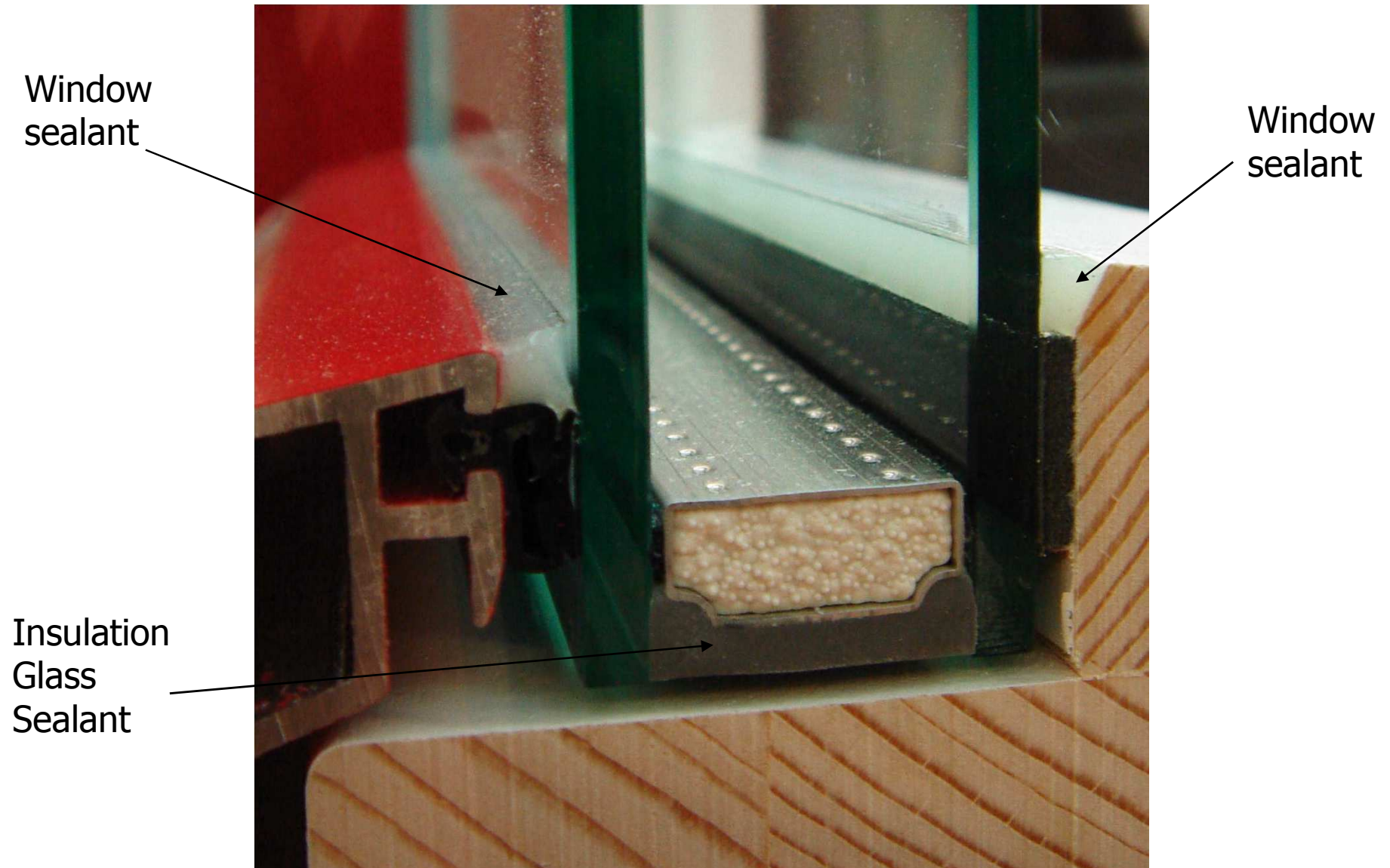
EU Market - Window frames



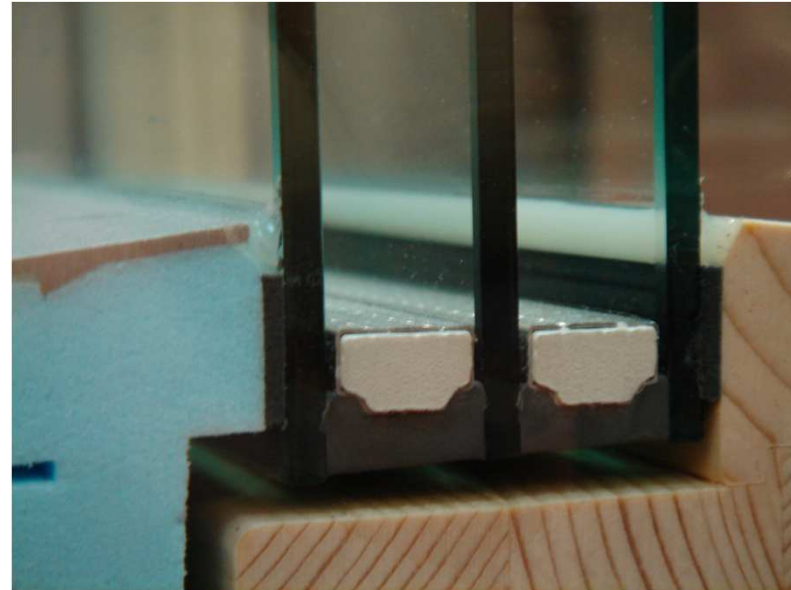
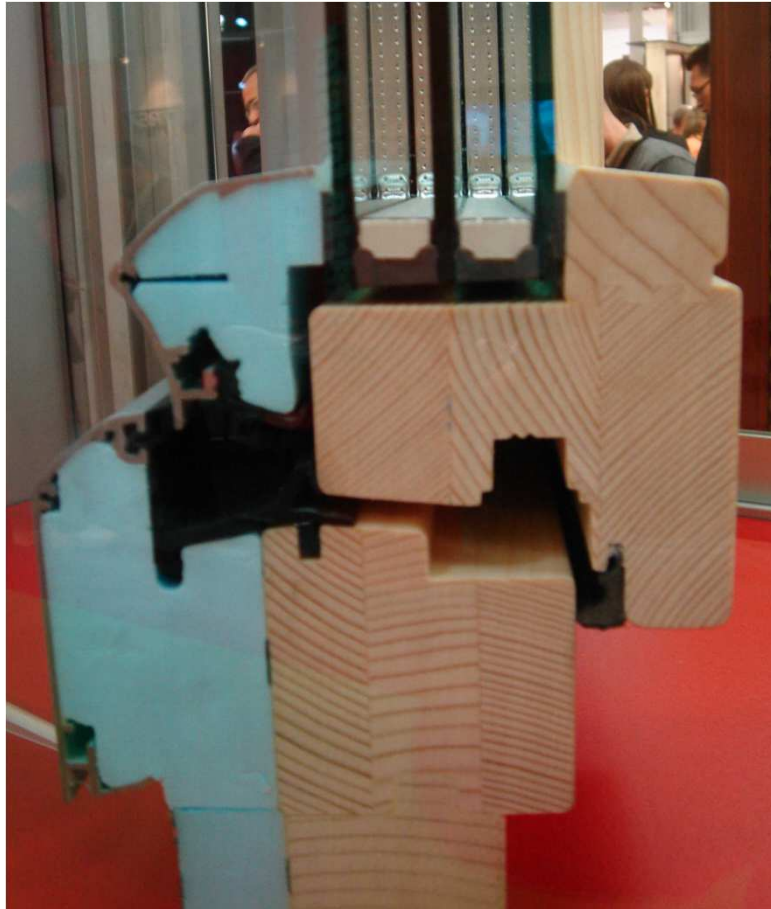
EU - 90 MM Window Units sold in '07

- **5 billion windows** in EU need upgrade in the next coming years to meet current and new energy standards
- **Germany 12.8 MM WU sold in '07,** -
 - turnover 7.6 billion Euro
 - 7.5 MM WU in renovation projects
 - 8000 window producers
- **PVC and Aluminum frames** utilize gaskets (EPDM, PVC) for sealing. Water drain in system design allow water entrance
- **Wooden frames** require high quality sealing. No water entrance allowed. Si in competition with PU, Acrylic, MS and other sealants. Si sealant not paintable.
- **Eastern EU countries** PVC frames booming replacing wooden frames.

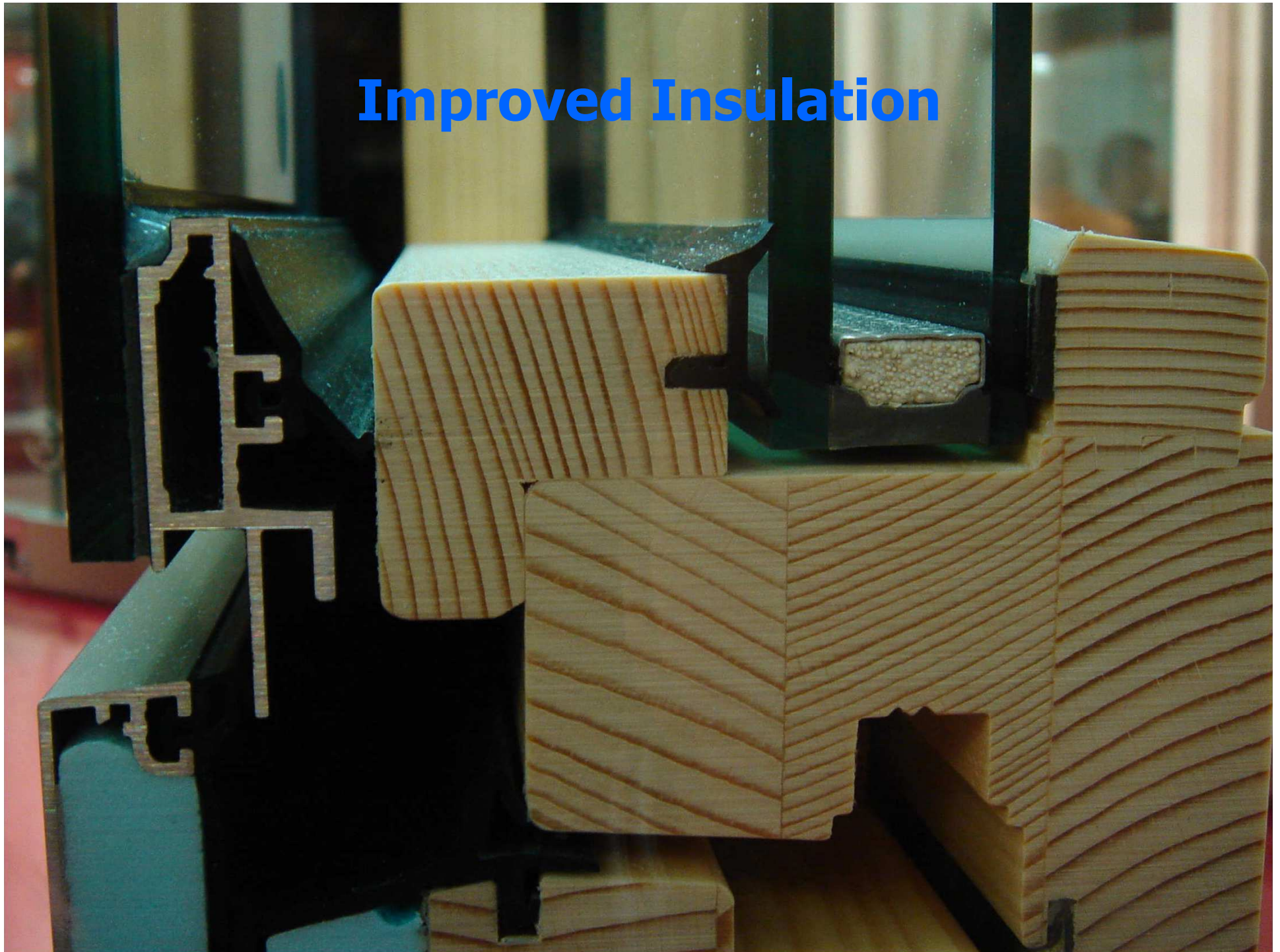
Silicones in Windows systems



Improved insulation by triple IG system

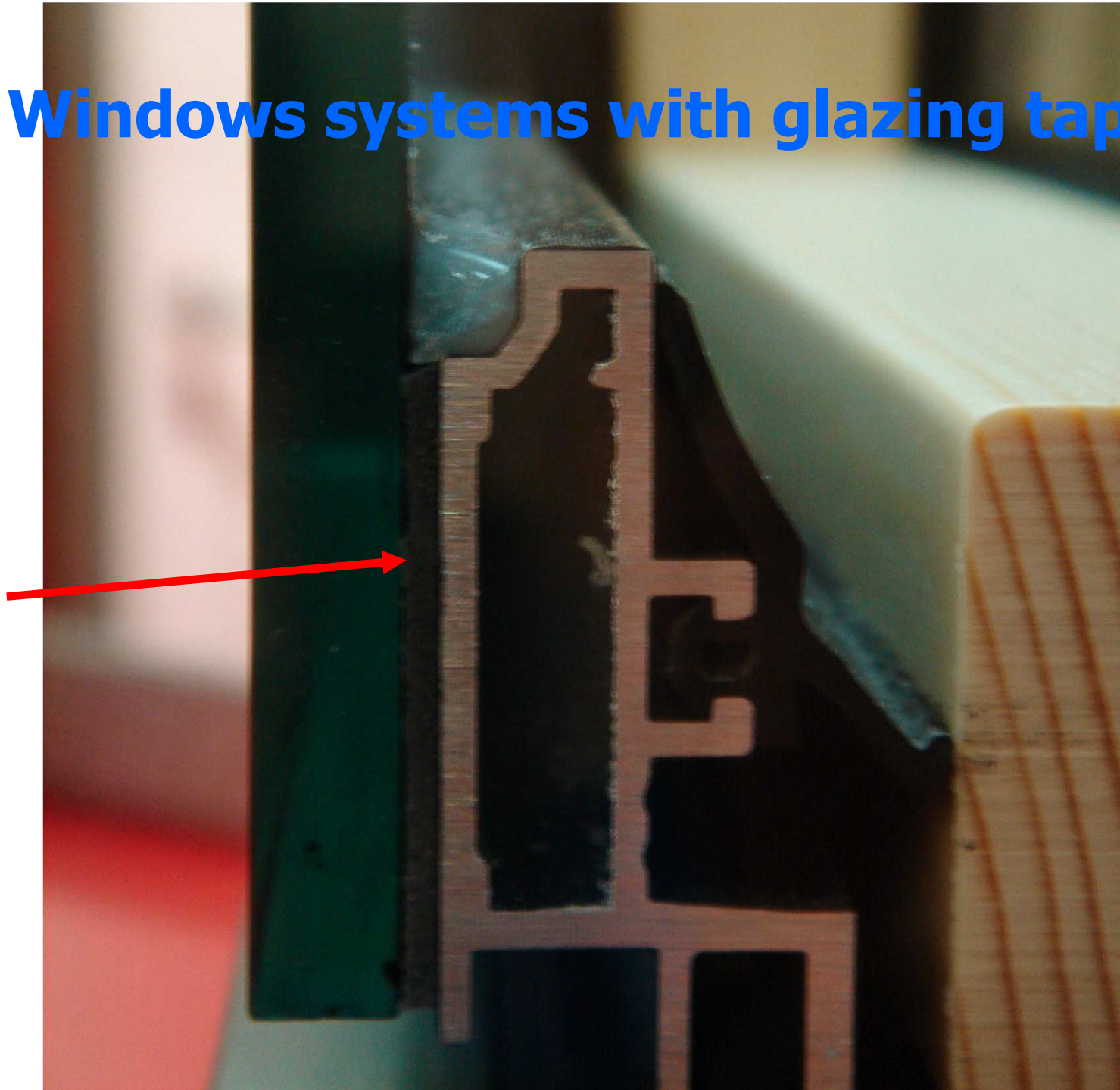


Improved Insulation

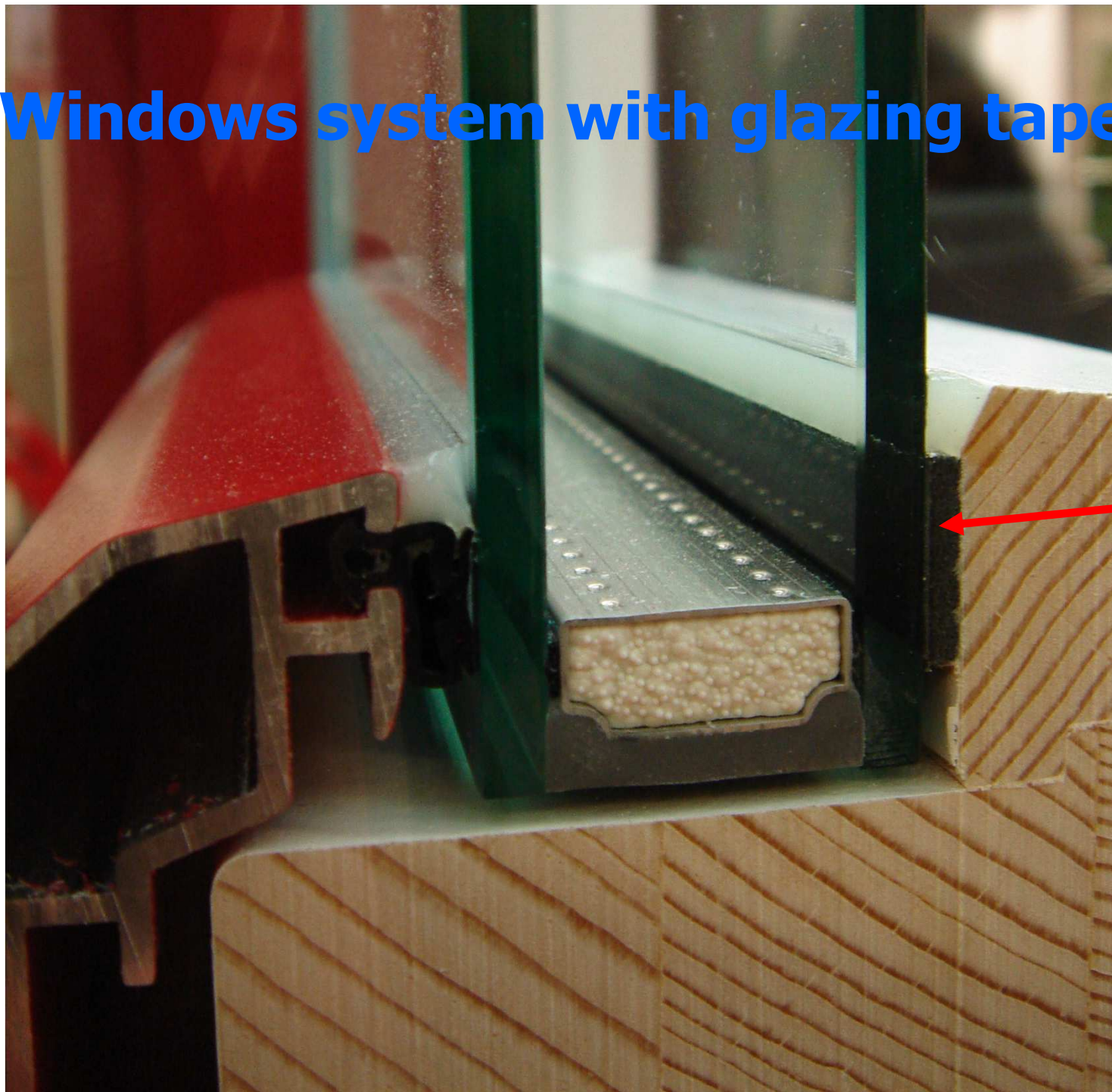


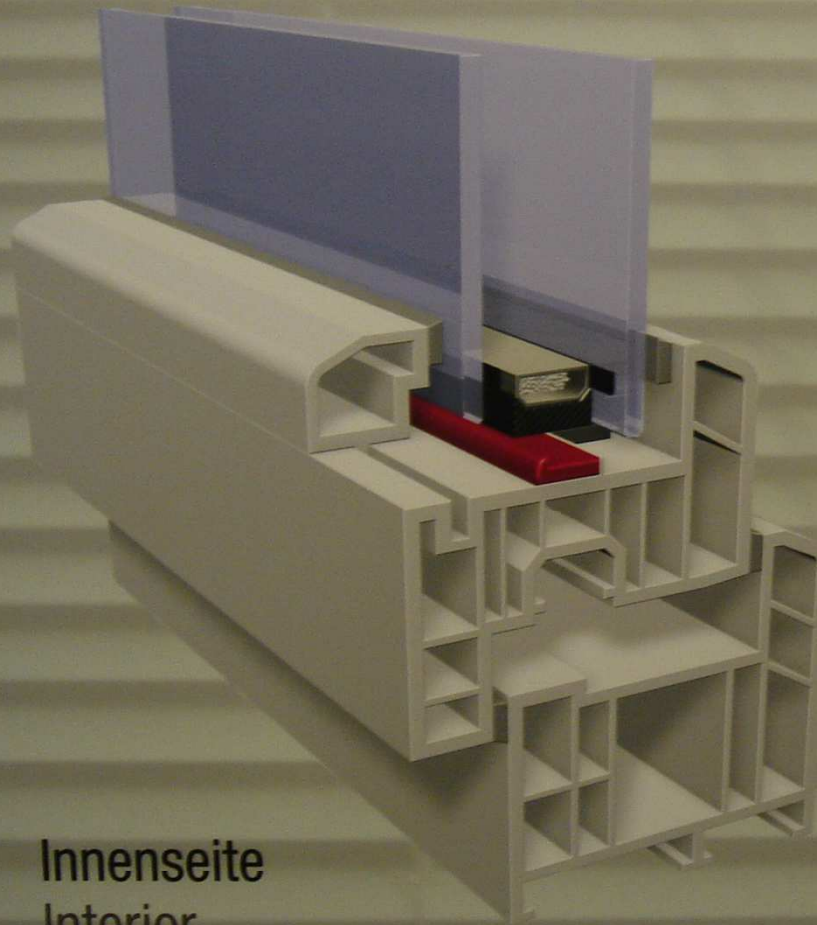
Windows systems with glazing tape

tape



Windows system with glazing tape





Innenseite
Interior

Glaskantenverklebung

- Verbesserung der thermischen Isolierung
- Maximale Beschleunigung der Verglasung bei weitgehend unverändertem Produktionsablauf

Glass edge bonding

- Improved thermal insulation
- Maximal acceleration of glazing speed with almost unchanged production process



A 3D cutaway diagram illustrating the exterior overlap bonding process. It shows a cross-section of a multi-chambered metal profile. A blue rectangular panel is being bonded to the top surface of the profile. A red adhesive layer is visible between the panel and the profile's top flange. The profile has several internal cavities and a complex, stepped structure. The background is a blurred image of a building facade with similar profiles.

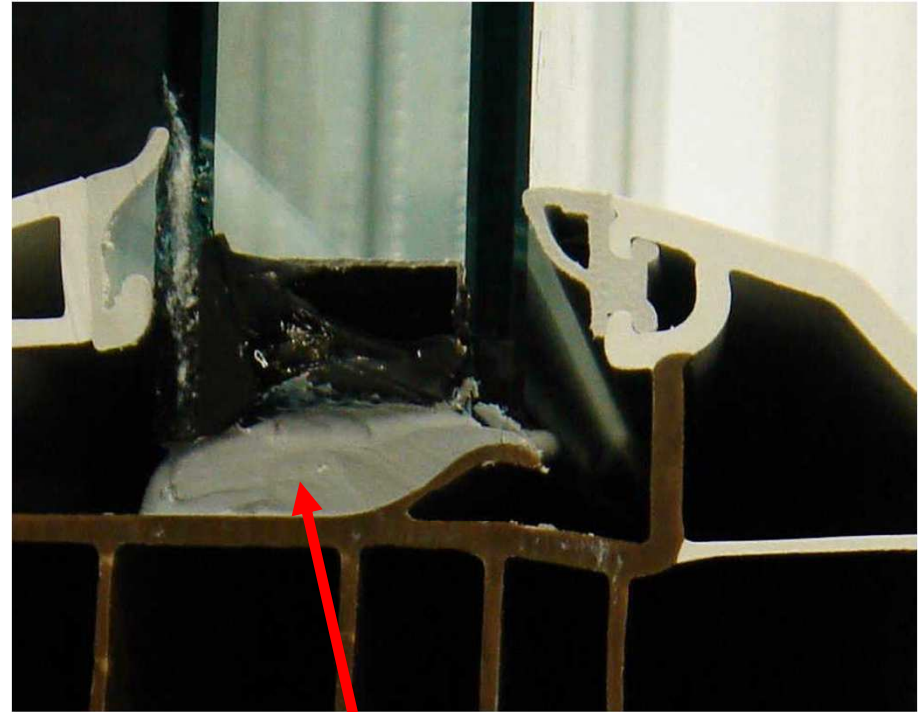
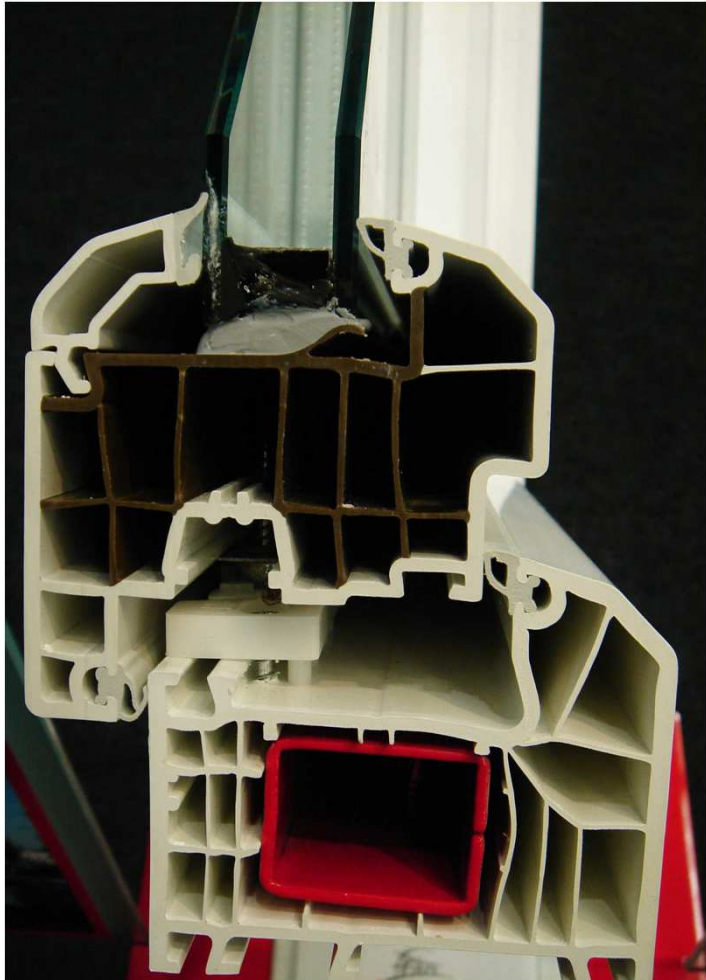
Aussenseitige Überschlagsverklebung

- Verringerung der Servicekosten
- Reduzierung der Reklamationskosten
- Flexibilisierung der Produktpalette

Exterior overlap bonding

- Reduction of service costs
- Reduction of complaint rate
- Flexibility of product portfolio

Window bedding sealant RapidStrength RGS7700



RapidStrength RGS7700

Questions ?



MOMENTIVE
performance materials



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