

Fenestration

- Window bonding
- References



Structural Window Bonding

- **Window bonding**
 - Evolution of bonding
 - Advantage of bonded windows
 - Advantage of bonding for window producer
 - Production
- Project with Sika
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Evolution of Bonding



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Structural windscreen bonding

- Stiffening the chassis
- Improvement of crash resistance
- Increase of glass area
- Industrial automatic production

Evolution of Bonding

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Structural bonding of facades

- Long-term stability and tightness
- UV-resistant glass bonding
- Handmade elements

Windscreen Bonding In Car Industry

- Fast automated production
- More Stiffness

Structural Glazing In Façade Construction

- UV-resistant glass bonding
- long services life required

Structural Bonding In Window Fabrication

- Fast automated production
- More stiffness
- More glass
- Higher energy savings
- Long services live



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 - More light
 - Energy saving
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Energy Saving

The **EnEV** is part of the German law
It describes requirements for thermal insulating of building components

Development of the U- Value in Germany

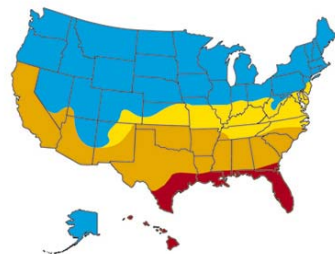




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Energy Saving

Energy Star (NA) from 1.7 to 1.3



■ Northern Mostly Heating
■ North/Central Heating & Cooling
■ South/Central Heating & Cooling
■ Southern Mostly Cooling



ZONE D
 ZONE C
 ZONE B
 ZONE A

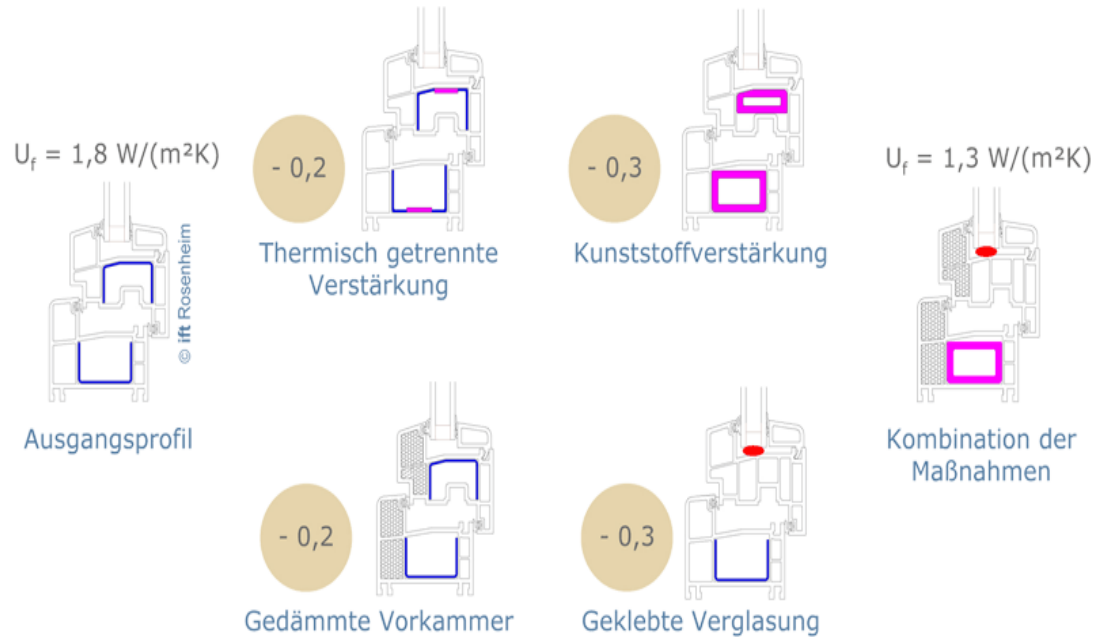
Climata	U- Factor	U-Value
Northern	0,3	1,7
Northern	0,32	1,85
Central		
Southern	0,35	2,0
Central		
Southern	0,60	3,5

Zones	U-value
A	2,0
B	1,8
C	1,6
D	1,4

Energy Saving



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Source: ift Rosenheim

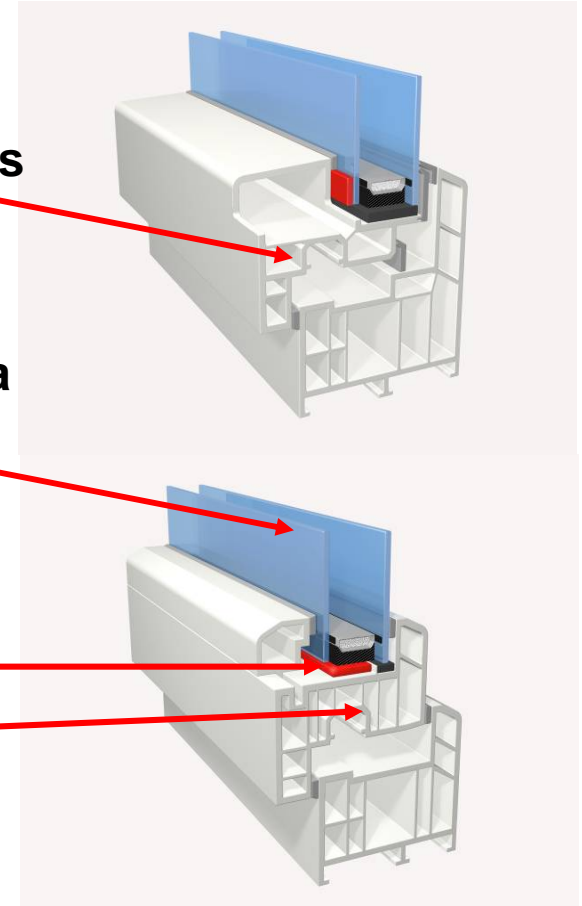
Energy Saving

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The glass holds the frame
And not the frame the glass
→ reduction of steel

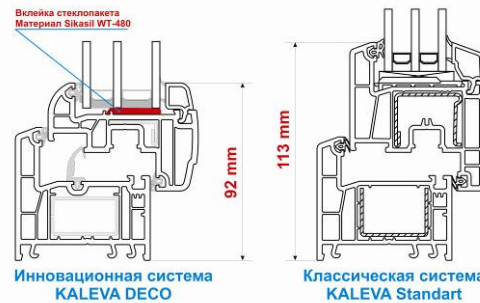
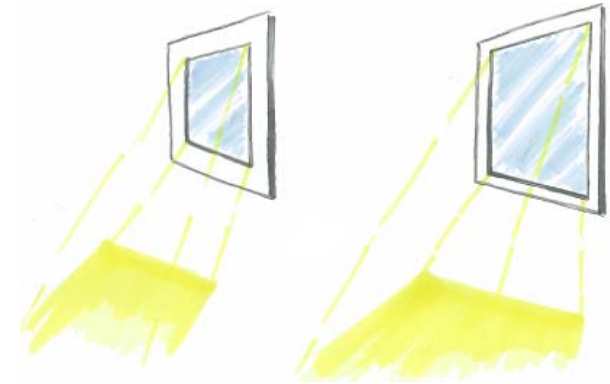
Increasing of the glass area
→ More solar energy gain
→ Better insulated window

Smaller chambers
→ reduction of convection



More Light

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Slimmer frames: more incidence of light

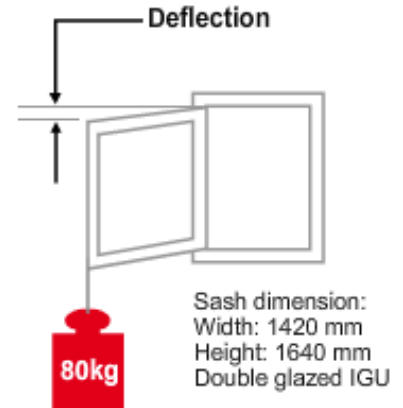
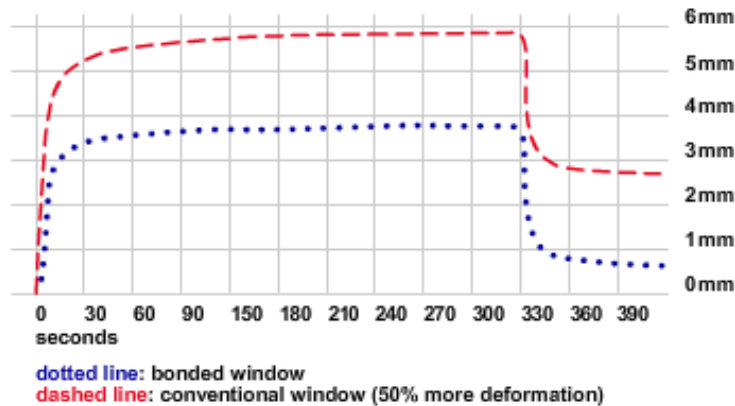
- Up to **30% more light** for more comfort of living and working, especially beneficial in building renovation



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Form stability

Resistance to vertical static load for 330 sec



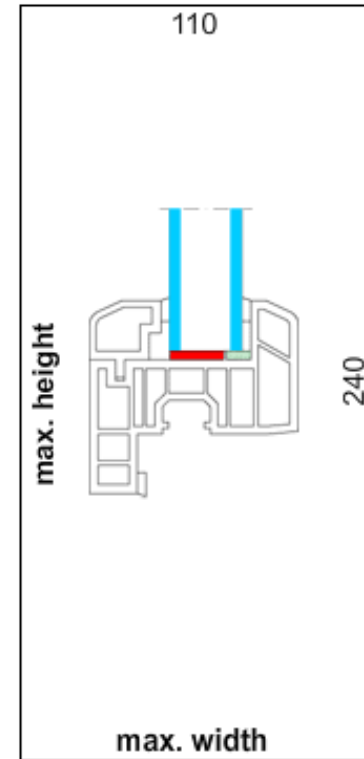
Stiffer Windows: less maintenance

- Increase of mechanical stability of Baumgartner Saphir by 50%

Form Stability



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Glass supports the sash: Bigger sash without steel reinforcement

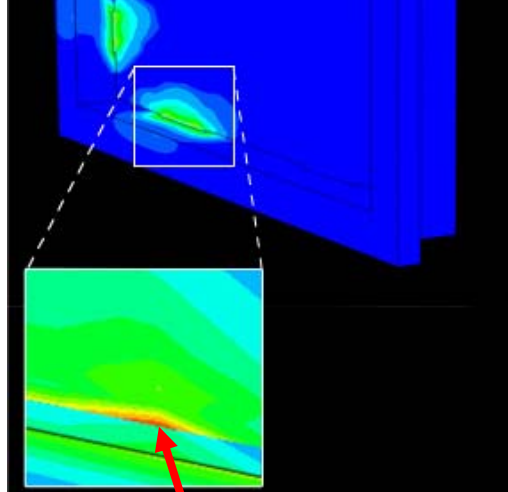
- Sash height up to 240m without steel reinforcement in



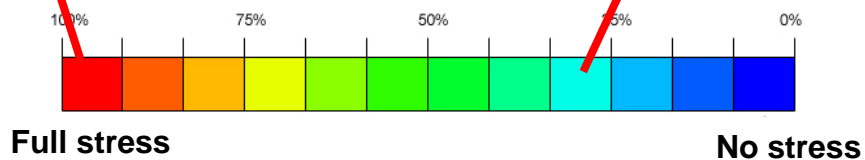
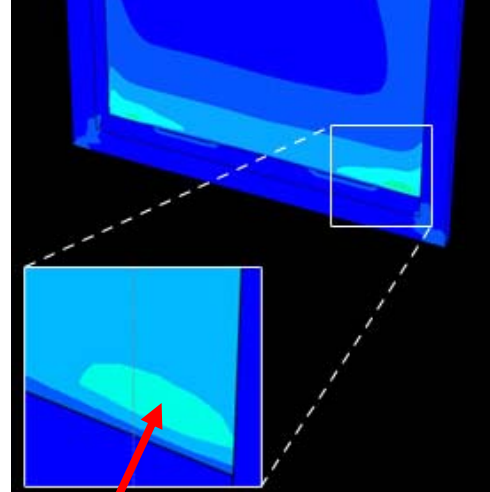
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Formstability

Standard window with blocks



Bonded window

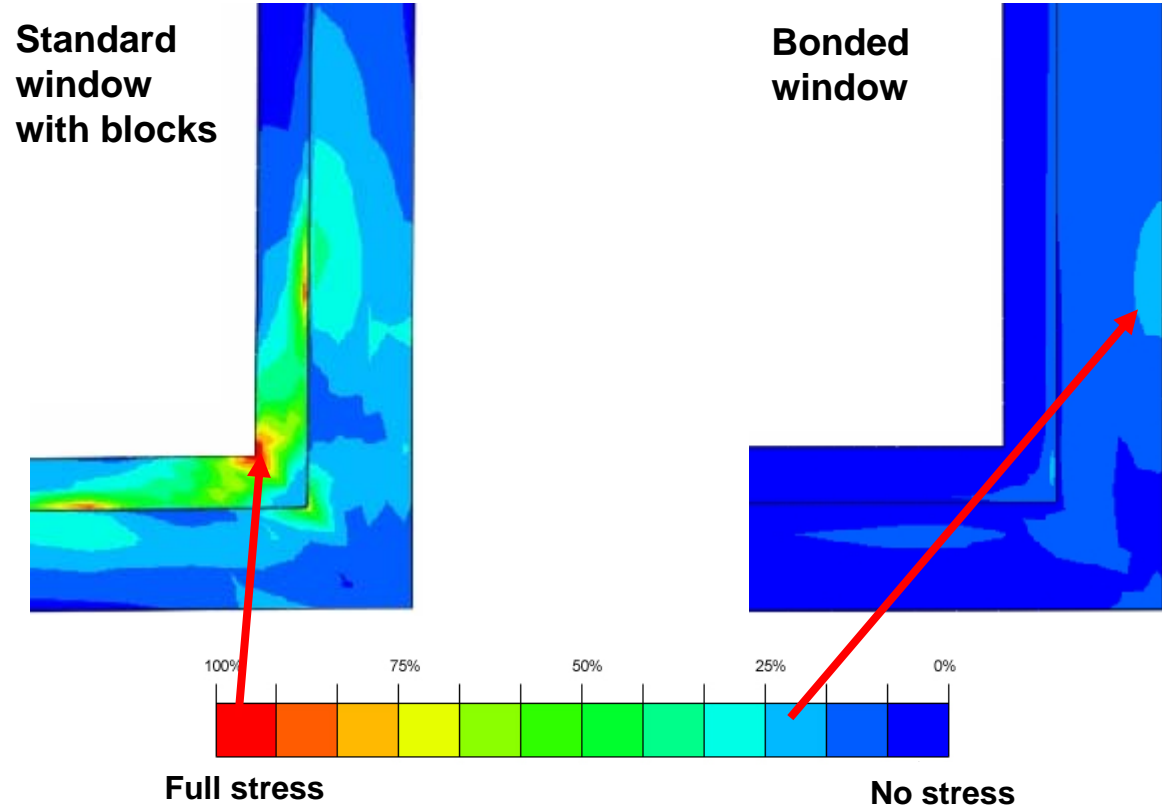


Glazing blocks replaced by adhesives : **Lower peak stress**

- Glass breakage reduced up to 90 %

Form Stability

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Glass bonding at the whole perimeter
 80% lower peak stress in corners
 → Less corner breakage

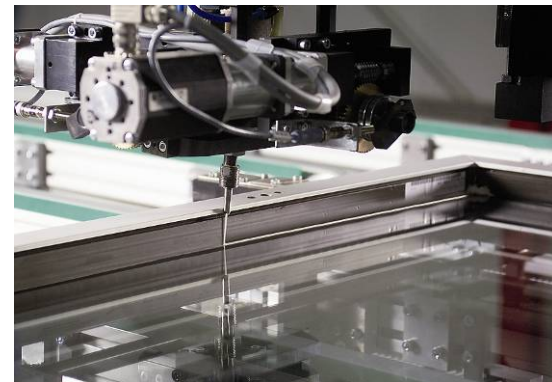
Advantages for Window Producer

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 - Higher productivity
 - Less complexity
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Productivity

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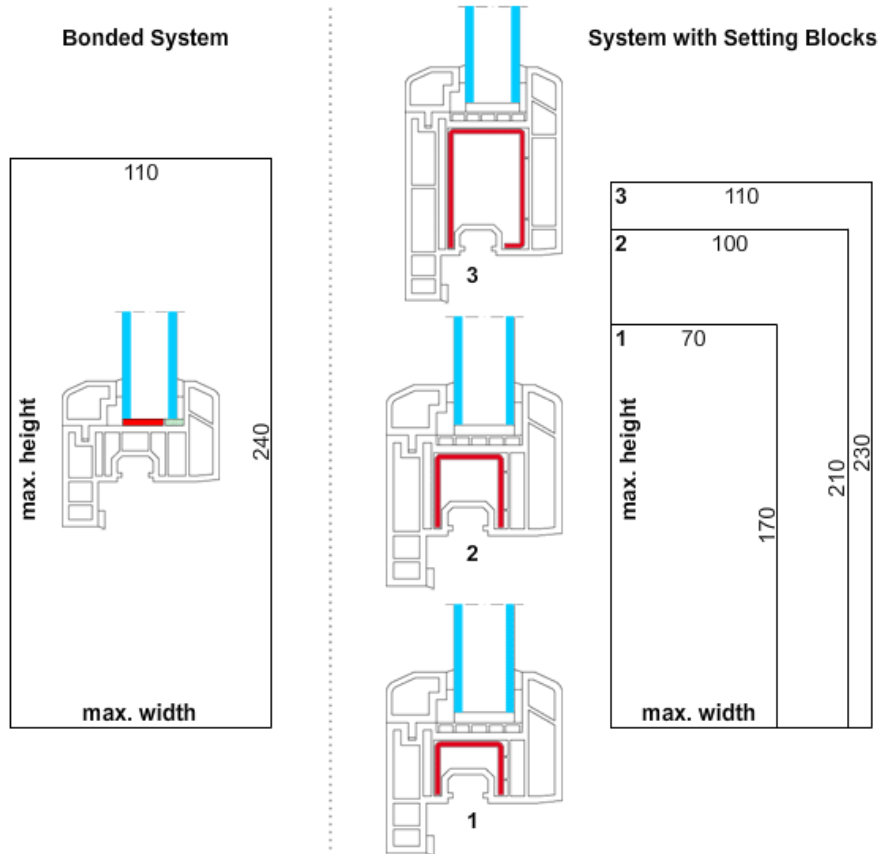


	Traditional	Bonded
350 units/ shift	1) Cutting [3] 2) Welding [2] 3) Fittings [4] 4) Glazing [7]	1) Cutting [2] 2) Welding [2] 3) Fittings [4] 4) Glazing [6]
Savings		- 11%

[] number of labor

Complexity

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Logistics efforts: system simplification

1 instead of 3 aspect widths, no steel for sash

Maintenance

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Scrub marks: setting effects, request readjustment

Outstanding form stability

➔ **no further maintenance during whole window service life**

Production

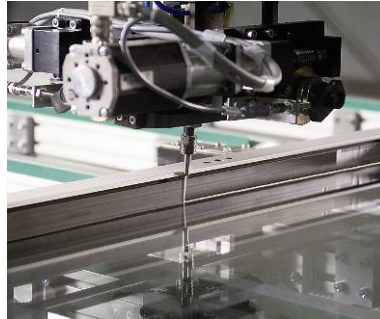


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Automation

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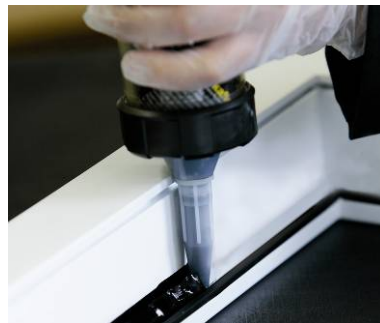
Fully automated

- Automated infeed and outfeed of sash frame
- Automated marriage of sash frame with IG unit
- Automated application of adhesive with 1-part or 2-part pump and mixing system



Semi- automatic

- Manual or automated infeed and outfeed of sash frame
- Automated application of adhesive with 1-part or 2-part pump and mixing system



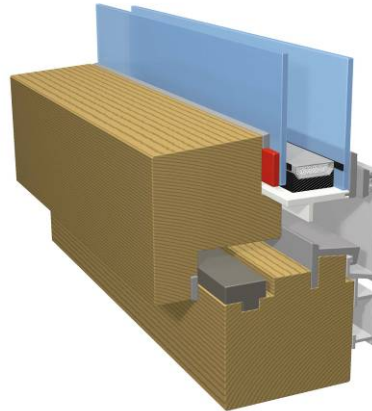
Manual

- Manual marriage of sash frame and IG unit
- Manual application of 1-part or 2-part adhesive with gun or pump and mixing system

Bonding Systems



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Interior overlap bonding

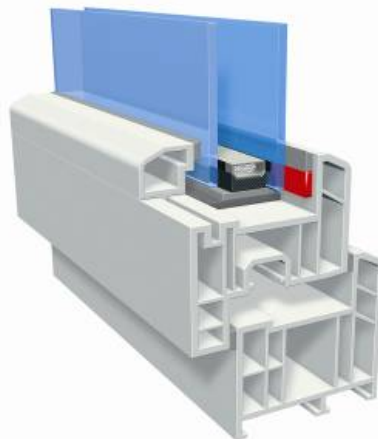
- Greatest potential for saving material
- Maximum of glass area
- Improved thermal insulating
- Reduction of production costs

Sikasil WT-485	2C Silicone	High curing speed for automated application
Sikasil WT-480	2C Silicone	High modulus long mixer open time
Sikasil WT-470	2C Silicone	High flexible medium curing speed
SikaFast 5XXX	2C Acrylates	Extremely high modulus, extremely fast curing



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Bonding Systems



Exterior overlap bonding

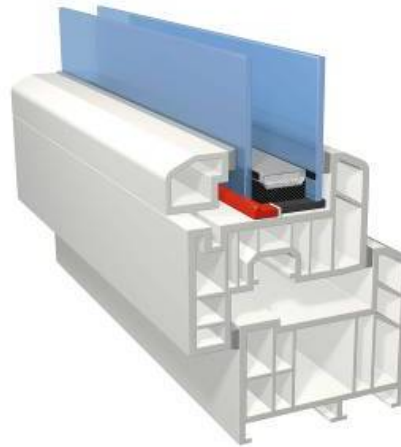
- Easiest start of window bonding
- Reduction of service costs
- Reduction of complaint rate
- Flexibility of product portfolio

Sikasil WT-485	2C Silicone	High curing speed for automated application
Sikasil WT-480	2C Silicone	High modulus long mixer open time
Sikasil WT-470	2C Silicone	High flexible medium curing speed

Bonding Systems



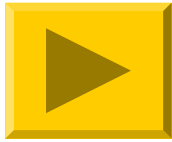
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Glass edge Bonding

- Greatest potential for saving material
- Maximum of glass area
- Improved thermal insulating
- Reduction of production costs

Sikasil WT-485	2C Silicone	High curing speed for automated application
Sikasil WT-480	2C Silicone	High modulus long mixer open time
Sikasil WT-470	2C Silicone	High flexible medium curing speed
Sika Prefix	Glazing Tape	Immediate fixation of glass

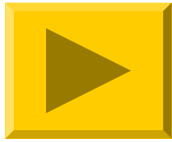


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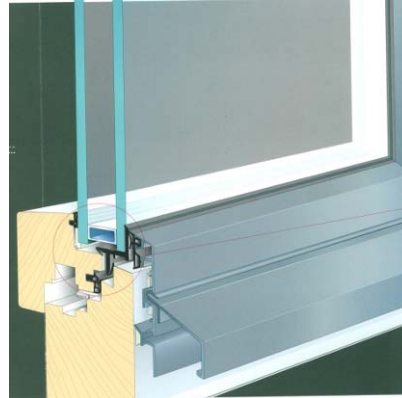


Producer: Internorm Austria
Frame Material: PVC
Adhesive: Sikasil



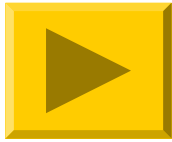
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**Producer: Baumgartner
Switzerland**

**Frame Material: Wood Aluminum
Adhesive: SikaFast**



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References



Producer: aluplast Germany
Frame Material: PVC
Adhesive: Sikasil



References

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Producer: EgoKiefer Switzerland
Frame Material: PVC
Adhesive: Sikasil

