



KINDLY
GLASS & MIRROR



Qingdao Kangdeli Industrial & Trading Co.,Ltd



Insulated Glass Unit



Insulated glass (IG), more commonly known as double glazing (or double-pane glass), consists of two or more glass window panes separated by a air or gas-filled space to reduce heat transfer across a part of the building envelope. We carry residential and commercial insulated glass, that are sometimes called thermo panes.

Single Glass Type Can Be

Clear Glass

(3mm – 1/8", 4mm – 5/32", 5mm – 3/16", 6mm - 1/4")

Hard Coated / Soft Coated Low-E Glass

(3mm – 1/8", 4mm – 5/32", 5mm – 3/16", 6mm - 1/4")

Bronze, Grey, Blue, Green Tinted Glass

(4mm – 5/32", 5mm – 3/16", 6mm - 1/4")

Bronze, Grey, Blue, Green Solar Control Glass

(4mm – 5/32", 5mm – 3/16", 6mm - 1/4")

Laminated Glass

(33.1mm, 44.2mm, 55.2mm)

Acid Etched Glass

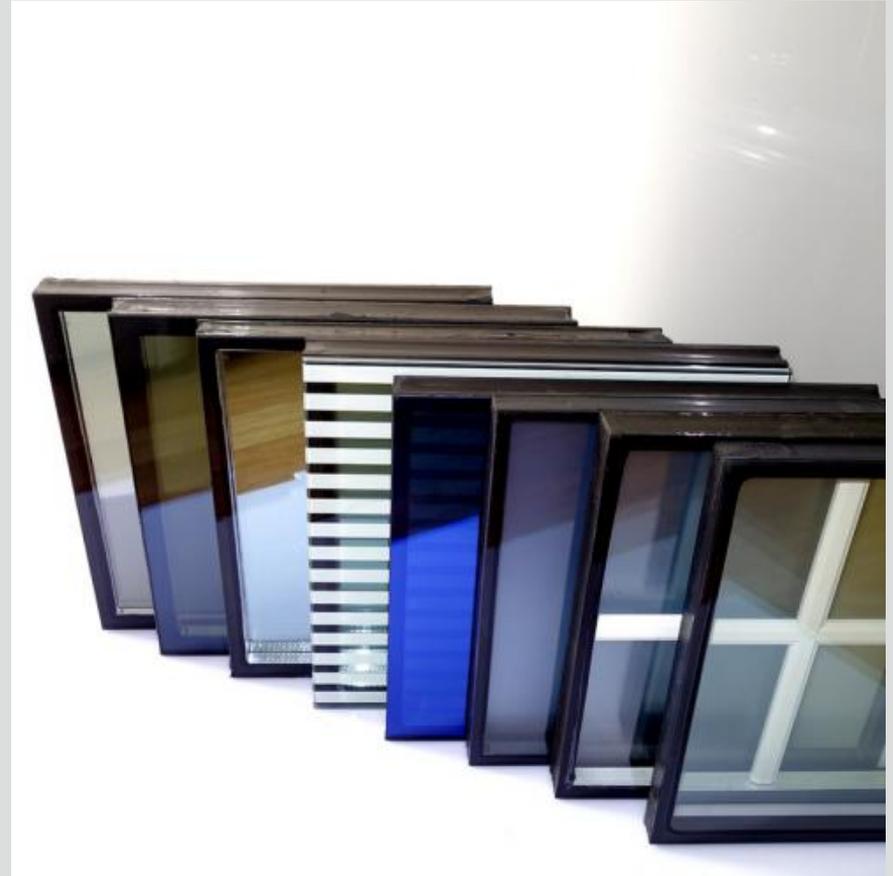
(3mm – 1/8", 4mm – 5/32", 5mm – 3/16", 6mm - 1/4")

Glazed Glass

(4mm – 5/32", 5mm – 3/16", 6mm - 1/4")

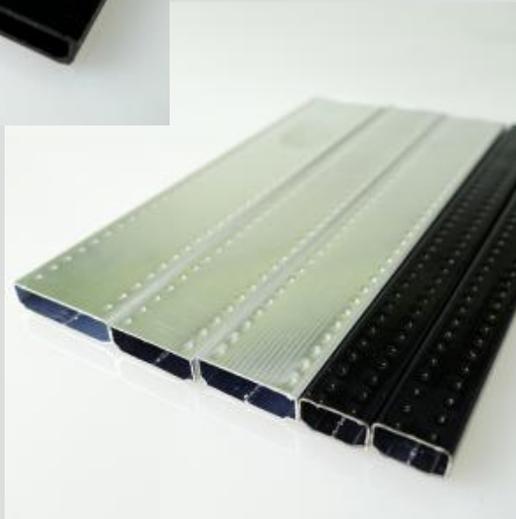
Fire-resistance Glass

(4mm – 5/32", 5mm – 3/16", 6mm - 1/4", 8mm - 5/16")





Thermo Spacer



**Bendable
Aluminium Spacer**

IG Thickness

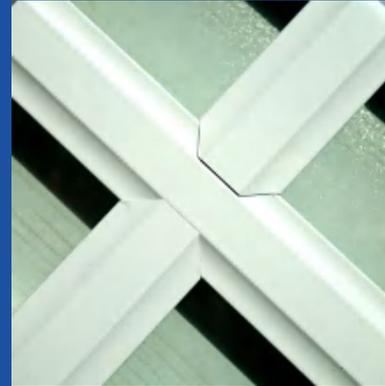
3/8" (6mm), 1/2", 3/4", 13/16", 7/8", 15/16, 1"

Spacer Finish

Aluminum and Plastic in Black, White and Grey color, etc.
TPS, Butyl Spacer, Super Spacer.

Decorative Grid

2 x 2, 2 x 3, 2 x 4, 2 x 5, 2 x 6, and more custom options.



V-type Crossing Bar

Sealant Type

- *Butyl
- *Butyl + Silicone
- *Polyurethane hot melt sealant
- *TPS (Thermo Plastic Spacer)



TPS Seal



Butyl Silicone Seal

Dimensions Processed by Kindly

Min.:300x300mm

Max.:2500x6000mm



Insulated Glass Benefits:

1. GREATER ENERGY EFFICIENCY AND COMFORT IN DIFFERENT CLIMATE

- Warm in winter and cool in summer.
- Double Glazing noticeably reduces the costs of heating or cooling and does not contribute to greenhouse gases.
- Double Glazing improves the Energy Rating your home receives.
- Gains of more than 50 percent of insulation can be had.
- Hi-transmission in low reflection and Lo-transmission in low reflection to reduce light pollution.

2. LESS NOISE TRANSMISSION TO KEEP QUIET

- Greatly reduce the level of noise getting into your home with IGU.
- Choose special glass designs and types such as acoustic laminated glass IGU to get even less noise transmission.

3. REDUCE OR ELIMINATE YOUR NEED FOR WINDOW COVERINGS TO KEEP YOUR PRIVACY

- You can use a lightweight or less expensive curtain set to cover your windows or doors wherever you need privacy.
- You can use inlaid louver IGU or glazed/acid designs to keep your own privacy space.

4. REDUCE CONDENSATION

- Problems with condensation exist in many homes, especially during the winter. Interior condensation is the result of humid warm air condensing on the cold surface of a single pane of glass. Double glazing stops this problem even in bathrooms.
- A typical cause of wood windows deteriorating is internal condensation. Double Glazing eliminates this condensation problem and will allow you to get more life from your windows.

5. MUCH MORE SAFER

- They are much more safer than other types of glass and do not shatter if they break.
- Choose tempered glass, laminated glass, fire resistance glass to increase the safety of your home.

6. INCREASED SECURITY

- Using thicker, safety glass with the help of double glazed items in your home makes it safer and more secure.
- or greater security, use bullet proof glass or wire laminated glass in tandem with your double-glazed windows and doors.

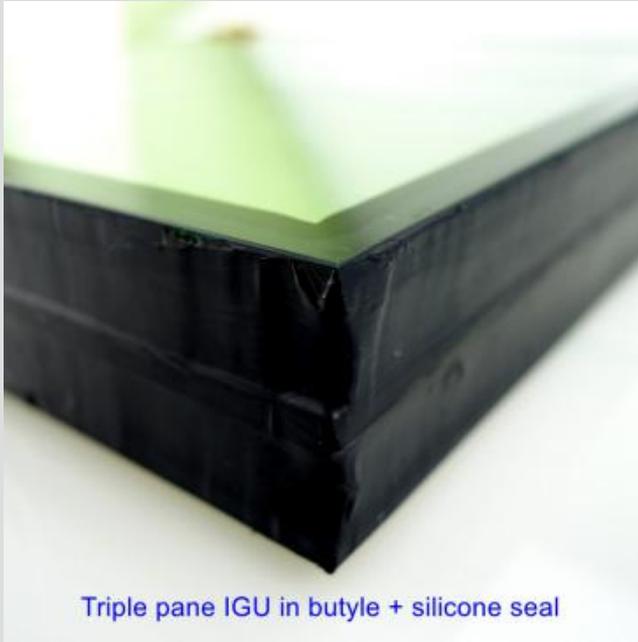


Insulated Glass Structure

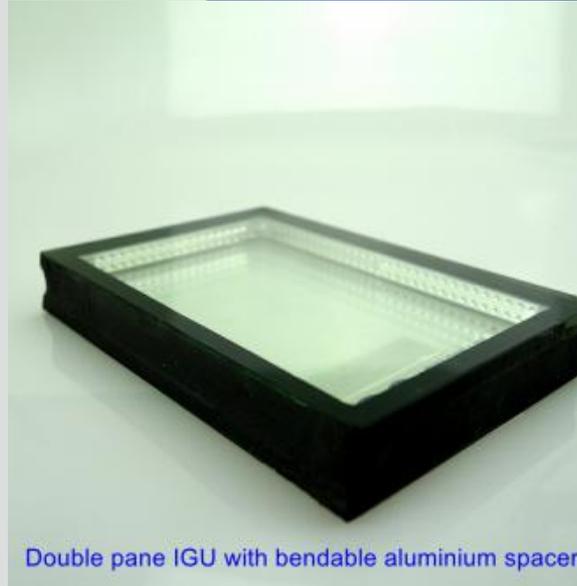
Double-pane insulated glass

Triple-pane insulated glass

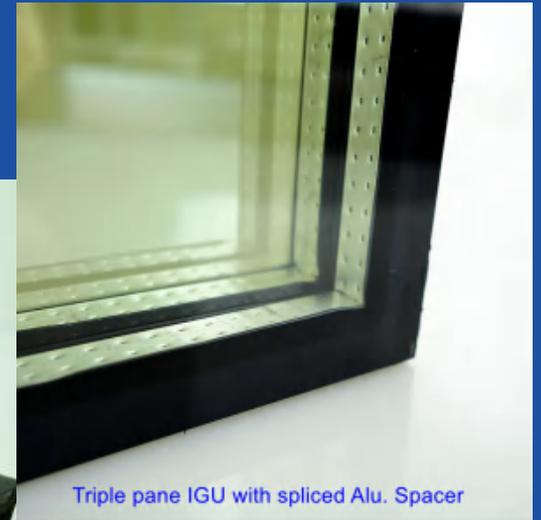
Quadruple-pane insulated glass



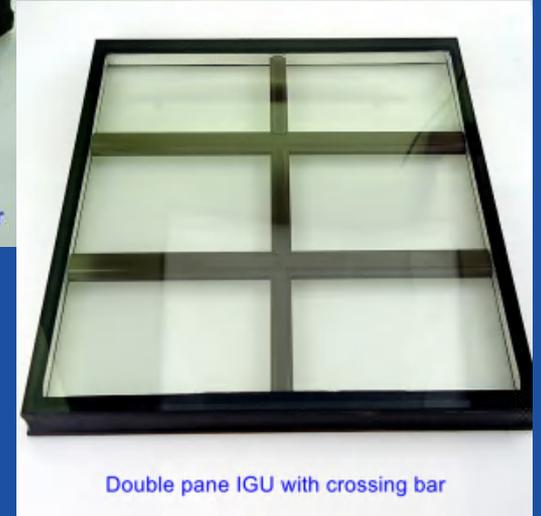
Triple pane IGU in butyle + silicone seal



Double pane IGU with bendable aluminium spacer



Triple pane IGU with spliced Alu. Spacer



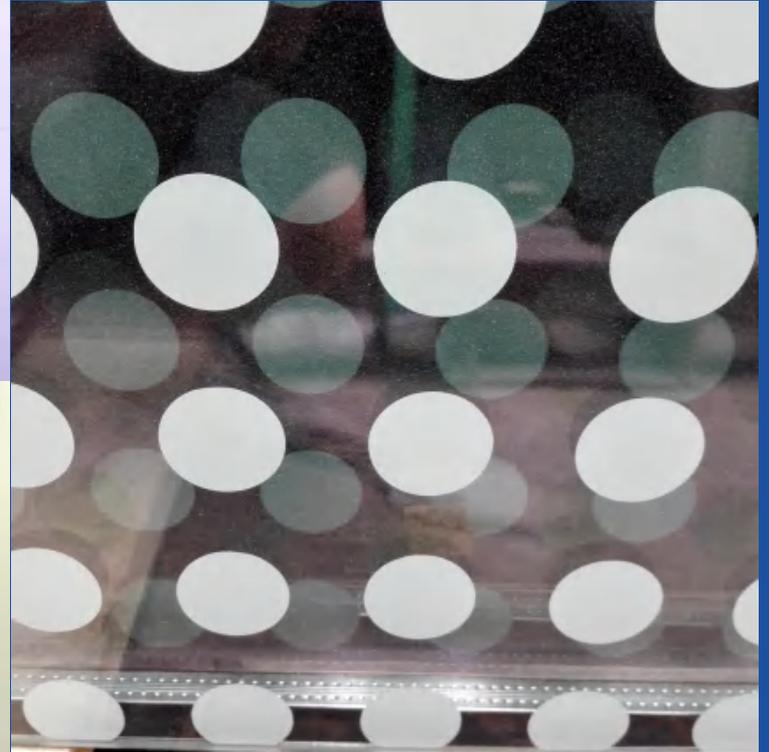
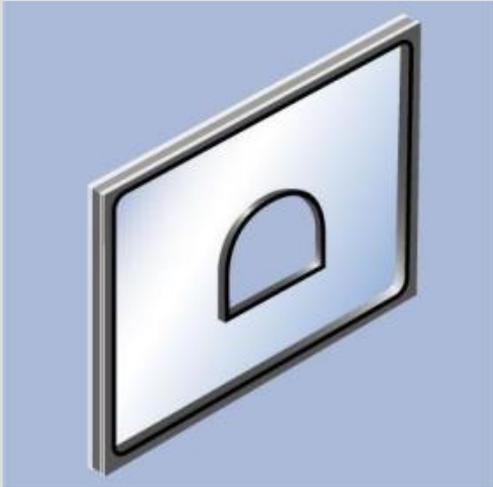
Double pane IGU with crossing bar

Insulated Glass Structure

Double-pane insulated glass

Triple-pane insulated glass

Quadruple-pane insulated glass



IGU Applications:

1. Building curtain wall
2. Windows and doors
3. Conveyance: Subway, Trains, Ships and Aircraft, etc.
4. Appliance: Ice locker, refrigerator, etc.
5. View glass floor
6. Special necessary place.



Butyl spacer mainly is made up of butyl sealant, dessicant and aluminium belt,etc.This kind of spacer can be used independently for sealing. It can also be coated with single-component hot-melt adhesive or polysulfide adhesive from the outside of the strip to enhance its structural performance.

Features:

*The bearing powder of the glass has been increased.The height of corrugated aluminum strip has been increased from 1.8mm to 4.8mm, and therefore the compressive resistance has been strengthened. Together with the application of high-polymer materials, the problem of insulated glass deformation under pressure has been signcantly reduced.

*Moisture-adsorption performance has been greatly enhanced through the use of the 3A molecular sieve.

*Tensile strength has been enhanced. The framework of the traditional strip was a single aluminim strip, buthe the framework of butyl spacer is comprised of aluminum strips, plastic insulation strips and aluminum sheets, thus facilitating a dramatic increase in tensile strength.

*The application of a special process stabilizes the strip performance so that it isn't affected by temperature variations.

Four Structures:

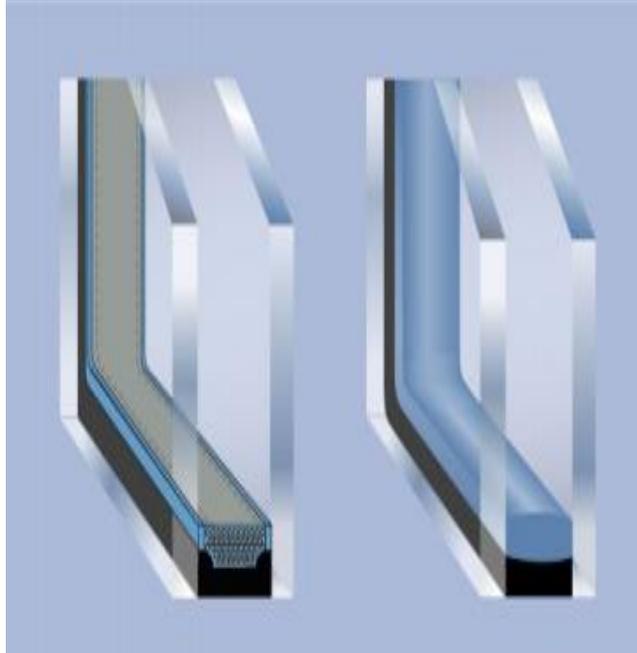
- 1.Plastic edge butyl spacer
- 2.Aluminum edge butyl spacer
- 3.Mosaic special butyl spacer
- 4.Fireproof butyl spacer



Butyl spacer inside structure

Aluminium Spacer

- *Double seal around
- *Triple IG is ok
- *Fixed width of spacer
6A,9A,12A,15A,20A
- *Limited shapes, angles $\geq 60^\circ$
- *Only spacer ring for inside applications



TPS-Thermo Plastic Spacer

- *Running around closed application by patented sloping connection
- *More congruentially variable edge group with triple IG's
- *Package strength adaptation, on 0.1 mm size accuracy for the production of a given e.g. VSG insulating glass-unit width
- *Special programmes possible, e.g. filling opening for cast resin units or production of free forms
- *Inside applications e.g. cat door
- *Special application for fire protection glass, train windows or emergency exit windows as well as Solarmodules

Super Spacer

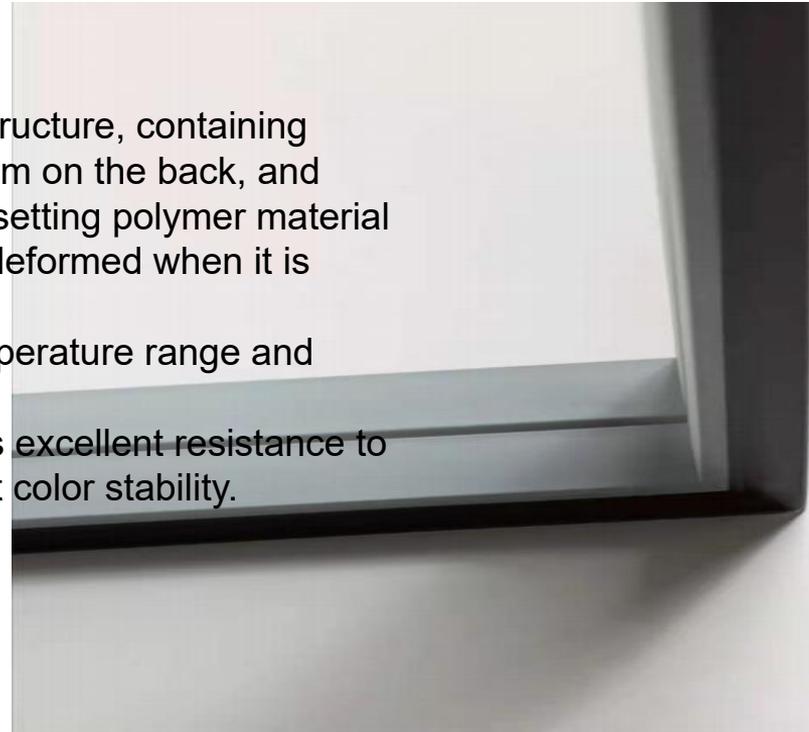
"Thermo edge" refers to the thermal conductivity of the spacers on the edge of the hollow glass. If the thermal conductivity of the spacer material is lower than that of the traditional aluminum strip, and the product of the material thickness and the thermal conductivity is less than $0.007w/k$, it is called a warm edge.

Most of the new spacers have better performance than aluminum, but still contain some metals, and completely non-metal spacers usually have the lowest thermal conductivity.

Super spacer is a thermosetting, elastic, microporous structure, containing silicone and desiccant, covered with a moisture barrier film on the back, and made by extrusion technology. The shape of this thermosetting polymer material is formed when it is heated and cured, and it will not be deformed when it is subjected to secondary heating.

Super spacers can maintain their elasticity in a wide temperature range and always maintain their original shape.

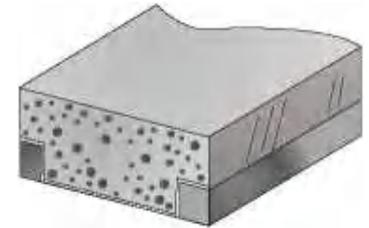
The silicone molecular structure of the Super Spacer has excellent resistance to ozone, ultraviolet rays and oxidation, as well as excellent color stability.



Super spacer hollow system structure description

TriSeal-Three-way sealing structure, suitable for high-performance doors, windows and curtain walls

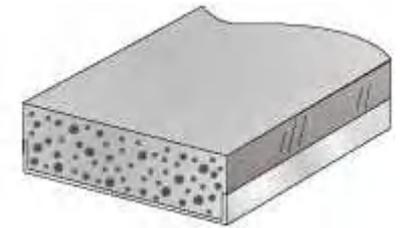
1. Thermosetting elastic microporous structure, without any metal, the body is silicone material, pre-filled with 3A molecular sieve.
2. The pressure-sensitive adhesive acrylic adhesive is bonded to the glass for the first seal.
3. Comes with butyl rubber for the second seal.
4. Multi-layer water vapor moisture-proof film.
5. Silicone glue, polysulfide glue, polyurethane glue, DSE/DSA or hot melt glue is the third seal.



Thickness: 7.3-10.5mm \pm 6%

Premium / Standard double-channel sealing structure, suitable for high-performance doors and windows

1. Thermosetting elastic microporous structure, without any metal, body is silicone or EPDM, pre-filled with 3A molecular sieve.
2. Pressure-sensitive adhesive acrylic adhesive to achieve initial bonding with glass.
3. Multi-layer water vapor moisture-proof film.
4. For the second sealant, hot melt butyl glue or reactive hot melt glue is recommended.



Thickness: 4.8-6.4mm \pm 6%



Super spacer performance characteristics

1. The lowest thermal conductivity

The thermal conductivity of super spacers is extremely low, and the thermal resistance is 1000+ times that of traditional aluminum spacers and 100 times that of stainless steel. This means that the hollow glass has less heat conduction and energy loss, making the surface temperature change very small. The surface temperature of the insulating glass made of super spacers is about 8 degrees higher than that of the insulating glass made of traditional aluminum strips.

2. Excellent anti-condensation performance

The insulating glass made of super spacers exhibits extremely high anti-condensation performance, which means that related health problems caused by mold can be basically eliminated, and the insulating glass is also cleaner and more transparent.

3. Excellent oxygen retention performance

Due to its flexibility and continuous sealing at the corners of the super spacer, the hollow glass made has excellent gas retention performance; the German Rosenheim laboratory has verified that the annual oxygen leakage rate is much lower than <math><1\%</math>;

4. Super long sealing durability

The thermosetting microporous elasticity of the super spacer can always return to its original shape after expansion and contraction. However, rigid spacers are not well adapted to the hollow "pump effect". Under the action of assembly stress, the edge of the glass is broken and the butyl rubber moves, which ultimately leads to the failure of the insulating glass seal. In the durability test, the service life of insulating glass made of super spacers is 2-3 times longer than the service life of rigid spacers. According to the ASTM E2188/2190 standard, after high temperature and high humidity climate cycle accelerated aging test, the hollow sealing performance remains intact after multiple rounds of testing.

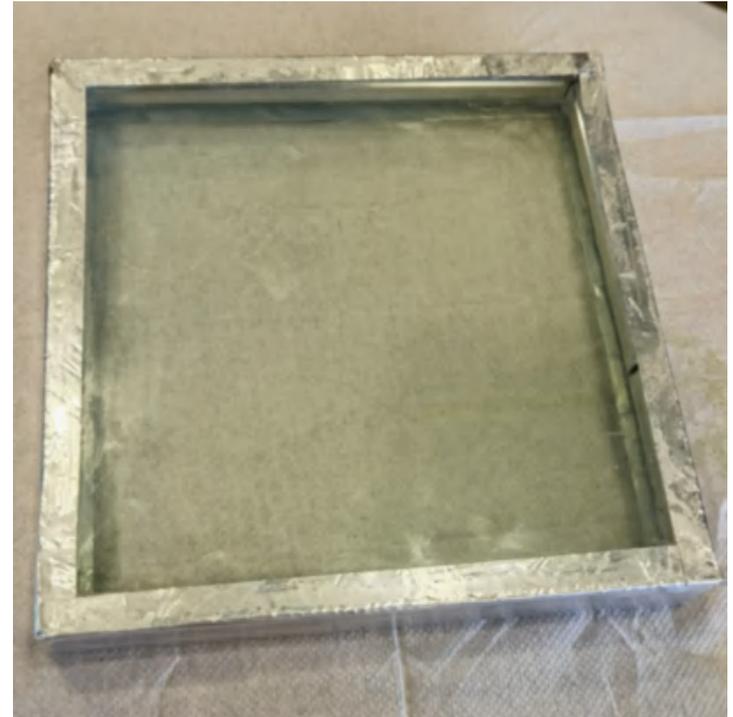
5. Flexible spacer system, suitable for fully automated hollow production

The world's first flexible spacer technology, and the flexible features of its products have truly realized the automation of insulating glass production. The laying of spacers is automatically completed by a manipulator, with simple technology, high efficiency, no manual intervention, and no human production errors. Fully automatic production line, producing up to 1000 pieces in 7 hours; High-speed automatic production line, producing up to 1480 pieces in 7 hours;

Polyurethane hot-melt sealant Matching with Thermo plastic spacer Aluminium foil edge

Product advantages:

1. Does not contain any organic solvents, solid content of 100%, green environmental protection;
2. moisture curing, no drying process, rapid energy saving;
3. Excellent initial strength, but also has cross-link curing function, the final bonding strength is higher;
4. excellent heat resistance, water resistance, chemical resistance, durability, etc.;
5. Adhesion process is simple and easy to use.
6. Flame retardant material.



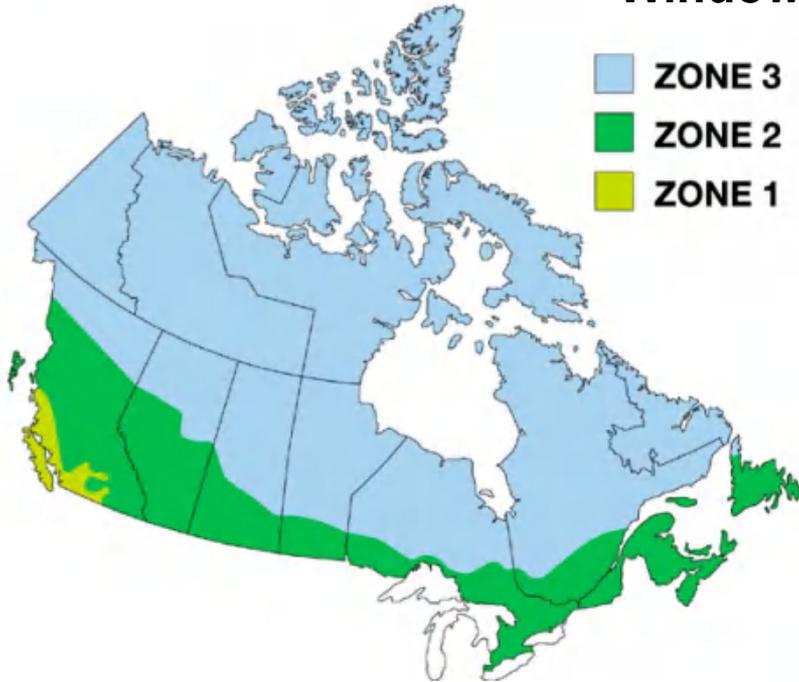
The following maps will show the four broadest categories of climate zones in different countries. Understanding your climate zone can help you determine the best energy-saving landscaping strategies for your home.

A well-designed landscape not only can add beauty to your home but also can reduce your heating and cooling costs. A well-placed tree, shrub, or vine can deliver effective shade, act as a windbreak, and reduce your energy bills. Carefully positioned trees can save up to 25% of the energy a typical household uses. Check out our Energy Saver 101 infographic for more ways your landscaping can help you save energy and water.

Climate

The energy-conserving landscape strategies you use depends on where you live. The United States can be divided roughly into four climate regions -- temperate, hot-arid, hot-humid, and cool. See the map to find your climatic region. Below you'll find landscaping strategies listed by region and in order of importance.

Climate zones



Windows Energy Performance Requirement Canada

Climate Zone	U Factor	ER Rating
1	1.60(0.28)	25
2	1.40(0.25)	29
3	1.20(0.21)	34

Windows Energy Performance Requirement Australia

Climate Zone	U(w/m ² K) Commercial Projects	U(w/m ² K) Resodental Projects
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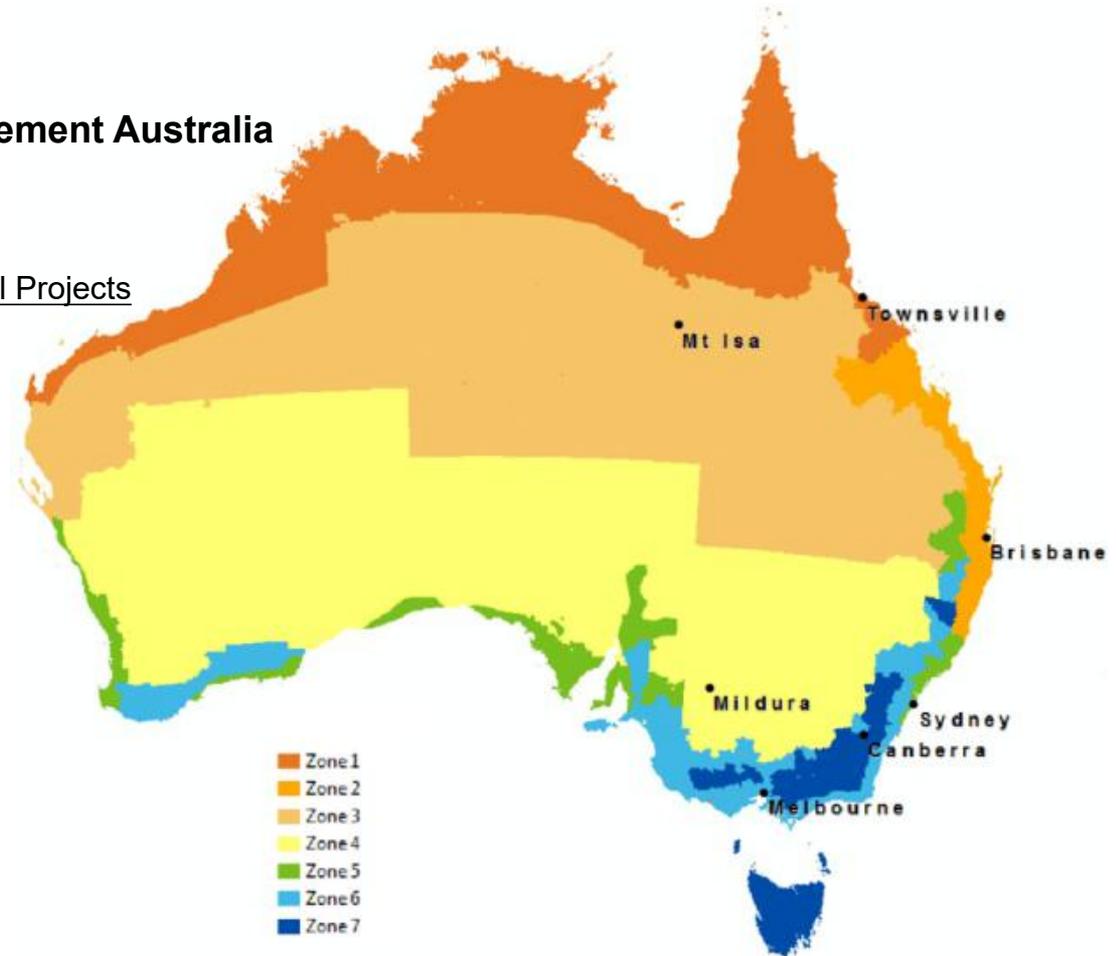
2 5	2	2-5.5
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1 3 4 6 7	1.1-2	1.5-5
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Cities/Regions Involved

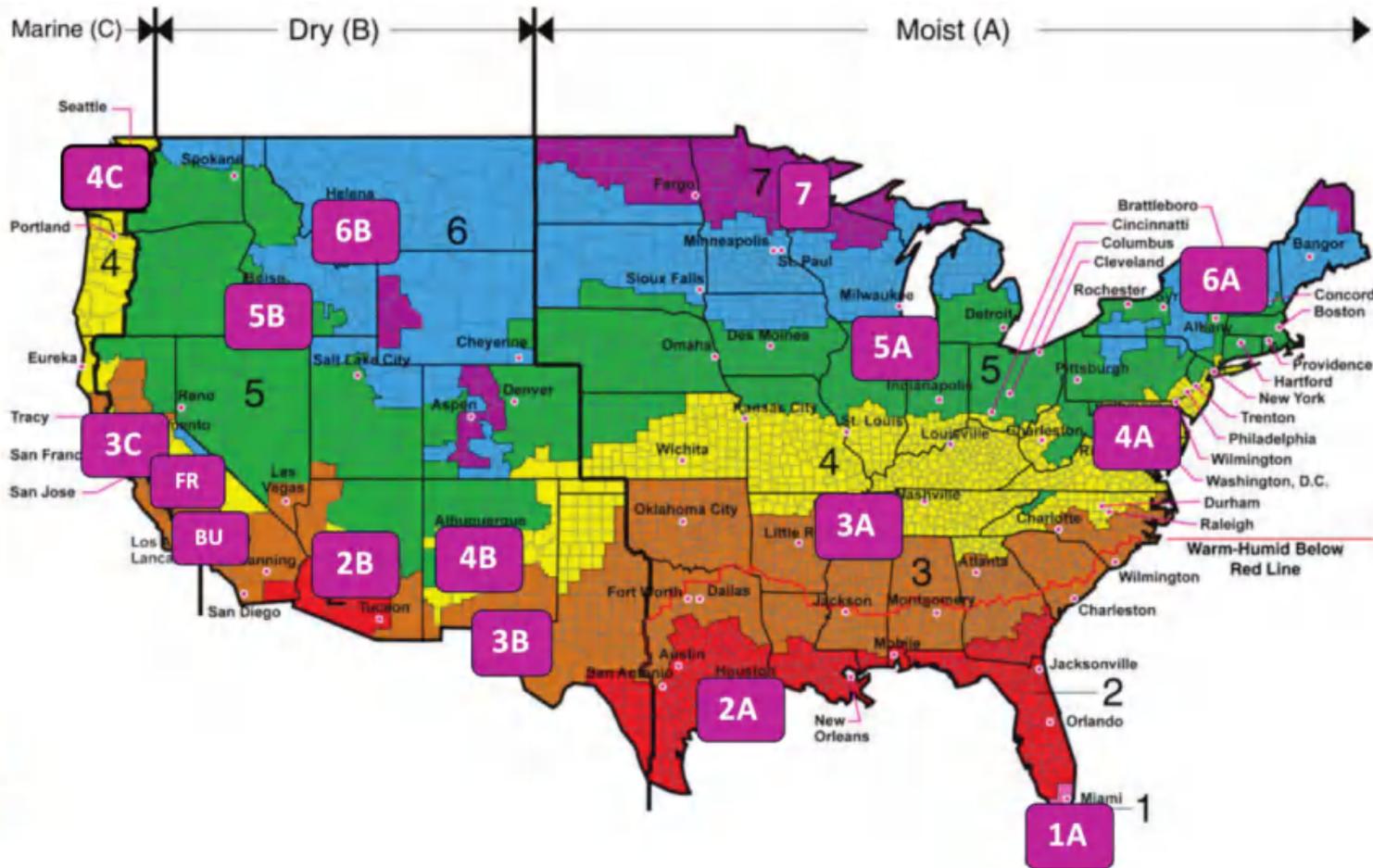
2 5	Sydney, Brisbane, Perth, Adelaide
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1 3 4 6 7	Melbourne, Darwin, ACT, Hobart
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CZ: City, State

- 1A: Miami, FL
- 2A: Houston, TX
- 2B: Phoenix, AZ
- 3A: Memphis, TN
- 3B: El Paso, TX
- BU: Burbank, CA
- FR: Fresno, CA
- 3C: San Francisco, CA
- 4A: Baltimore, MD
- 4B: Albuquerque, NM
- 4C: Seattle, WA
- 5A: Chicago, IL
- 5B: Boise, ID
- 6A: Burlington, VT
- 6B: Helena, MT
- 7: Duluth, MN
- 8: Fairbanks, AK



ASHRAE 90.1-2019 Prescriptive Fenestration Requirements U.S.A.

Climate Zone	1	2	3	4	5	6	7	8
Maximum U-value	Vertical Fenestration(0-40% of wall)							
Non-metal frame	Same as metal framing fixed or operable							
Metal frame, fixed	3.07	2.56	2.39	2.04	2.04	1.93	1.65	1.48
Metal frame, operable	3.69	3.41	3.07	2.56	2.56	2.39	2.04	1.82
Metal frame, entrance door	4.71	4.37	3.86	3.58	3.58	3.58	3.58	3.58
Maximum SHGC All vertical fenestration	0.23	0.25	0.25	0.36	0.36	0.38	0.40	0.40
	Skylights(0-3% of roof)							
Maximum U-value All skylights	3.69	3.69	3.12	2.84	2.84	2.84	2.33	2.10
Maximum SHGC All skylights	0.23	0.25	0.25	0.36	0.36	0.38	NR	NR

Temperate Region

- Maximize warming effects of the sun in the winter.
- Maximize shade during the summer.
- Deflect winter winds away from buildings with windbreaks of trees and shrubs on the north and northwest side of the house.
- Tunnel summer breezes toward the home.

Hot-Arid Region

- Provide shade to cool roofs, walls, and windows.
- Allow summer winds to access naturally cooled homes.
- Block or deflect winds away from air-conditioned homes.

Hot-Humid Region

- Channel summer breezes toward the home.
- Maximize summer shade with trees that still allow penetration of low-angle winter sun.
- Avoid locating planting beds close to the home if they require frequent watering.

Cool Region

- Use dense windbreaks to protect the home from cold winter winds.
- Allow the winter sun to reach south-facing windows.
- Shade south and west windows and walls from the direct summer sun, if summer overheating is a problem.

Microclimate

The climate immediately surrounding your home is called its microclimate. When landscaping for energy efficiency, it's important to consider your microclimate as well as your regional climate.

Your home's microclimate may receive more sun, shade, wind, rain, snow, moisture, and/or dryness than average local conditions. If your home is located on a sunny southern slope, for example, it may have a warm microclimate, even if you live in a cool region. Or, even though you live in a hot-humid region, your home may be situated in a comfortable microclimate because of abundant shade and dry breezes. Nearby bodies of water may increase your site's humidity or decrease its air temperature. Microclimatic factors also help determine what plants may or may not grow in your landscape.

Energy Performance Testing, Certification, and Labeling

The National Fenestration Rating Council (NFRC) operates a voluntary program that tests, certifies, and labels windows, doors, and skylights based on their energy performance ratings. The NFRC label provides a reliable way to determine a window's energy properties and to compare products.

The NFRC label can be found on all ENERGY STAR® qualified window, door, and skylight products, but ENERGY STAR bases its qualification only on U-factor and solar heat gain coefficient ratings, which are described below.

Heat Gain and Loss

Windows, doors, skylights can gain and lose heat through:

- Direct conduction through the glass or glazing, frame, and/or door
- The radiation of heat into a house (typically from the sun) and out of a house from room-temperature objects, such as people, furniture, and interior walls
- Air leakage through and around them.

These properties can be measured and rated according to the following energy performance characteristics:

- U-factor is the rate at which a window, door, or skylight conducts non-solar heat flow. It's usually expressed in units of Btu/hr-ft²-oF. For windows, skylights, and glass doors, a U-factor may refer to just the glass or glazing alone. NFRC U-factor ratings, however, represent the entire window performance, including frame and spacer material. The lower the U-factor, the more energy-efficient the window, door, or skylight.
- Solar heat gain coefficient (SHGC) is the fraction of solar radiation admitted through a window, door, or skylight -- either transmitted directly and/or absorbed, and subsequently released as heat inside a home. The lower the SHGC, the less solar heat it transmits and the greater its shading ability. A product with a high SHGC rating is more effective at collecting solar heat during the winter. A product with a low SHGC rating is more effective at reducing cooling loads during the summer by blocking heat gain from the sun. Your home's climate, orientation, and external shading will determine the optimal SHGC for a particular window, door, or skylight. For more information about SHGC and windows, see passive solar window design.
- Air leakage is the rate of air movement around a window, door, or skylight in the presence of a specific pressure difference across it. It's expressed in units of cubic feet per minute per square foot of frame area (cfm/ft²). A product with a low air leakage rating is tighter than one with a high air leakage rating. Note that air leakage also depends on proper installation of a window, which is assumed in all ratings.

Sunlight Transmittance

The ability of glazing in a window, door, or skylight to transmit sunlight into a home can be measured and rated according to the following energy performance characteristics:

- Visible transmittance (VT) is a fraction of the visible spectrum of sunlight (380 to 720 nanometers), weighted by the sensitivity of the human eye, that is transmitted through the glazing of a window, door, or skylight. A product with a higher VT transmits more visible light. VT is expressed as a number between 0 and 1. The VT you need for a window, door, or skylight should be determined by your home's daylighting requirements and/or whether you need to reduce interior glare in a space.
- Light-to-solar gain (LSG) is the ratio between the SHGC and VT. It provides a gauge of the relative efficiency of different glass or glazing types in transmitting daylight while blocking heat gains. The higher the number, the more light transmitted without adding excessive amounts of heat. This energy performance rating isn't always provided.

Low Transmission Low Reflective

SFC (French Green Tinted) Hard Coated LowE Glass Parameter

Monolithic	Thickness mm	Visible Light			Solar Energy		U Value W/m ² K			SHGC	SC
		Transmittance	Reflectance		Transmittance	Reflectance	Winter U Value	Summer U Value	Euro EN673		
			Outside	Inside							
Solar-F Cool	3.5	75	10	11	47	30	3.68	2.8	3.7	0.55	0.63
Solar-F Cool	5	71	9	11	40	7	3.75	2.91	3.7	0.5	0.58
Solar-F Cool	6	68	9	11	36	7	3.72	2.87	3.7	0.47	0.54
3.5Clear+0.76PVB+3.5SFC	7.76	73	10	11	42	1	3.56	2.73	3.6	0.52	0.6
5 SFC 2#+ 12Air+5 Clear	22	64	14	17	35	9	1.94	1.96	1.9	0.43	0.49
6 SFC 2#+12Air+6 Clear	24	61	13	17	31	8	1.92	1.95	1.9	0.39	0.45

All performance values are center-of-glass values calculated using the LBNL Window 6.3 program for your reference only.

Low Transmission Low Reflective

SC60(Light Grey) Hard Coated LowE Glass Parameter

Monolithic	Thickness mm	Visible Light			Solar Energy			U Value W/m ² ·k			SHGC	SC
		Transmittance	Reflectance		Transmittance	Reflectance	Tran of uv	Winter U Value	Summer U Value	Euro EN673		
			Outside	Inside								
SC 60	6	61	9	14	56	11	44	3.85	3.03	3.8	0.62	0.72
6 Clear + 0.76PVB + 6 SC60 4#	12.76	59	9	13	47	8	1	3.7	2.94	3.7	0.56	0.65
6 SC60 2#+6Air+6 Clear+6Air+6 Clear	30	50	15	24	38	15	26	1.89	1.99	2	0.49	0.56
6 SC60 2#+9Air+6 Clear+ 9Air +6 Clear	30	50	15	24	38	15	26	1.58	1.7	1.7	0.49	0.56
6 SC60 2#+9Air+6 Clear	21	55	12	19	45	13	33	2.17	2.26	2.3	0.55	0.63
6 SC60 2#+12Air+ 6 Clear	24	55	12	19	45	13	33	1.98	2.02	2	0.54	0.75
6 SC60 2#+9Argon+6 Clear	21	55	12	19	45	13	33	1.87	1.98	2	0.55	0.63
6 SC60 2# + 12Argon+6 Clear	24	55	12	19	45	13	33	1.75	1.79	1.7	0.54	0.75

All performance values are center-of-glass values calculated using the LBNL Window 6.3 program for your reference only.

Low Transmission Low Reflective

SY-48 Hard Coated LowE Glass Parameter

Structure		Light Properties		Thermal Properties			U-Value	
	Thickness	LT%	LR(Ext)%	EA%	SF%	SC	W/m ² . KAir	W/m ² . KAgron
SY-48 Single Glazing	5mm	52	7	53	49	0.56	4.4	
	6mm	51	7	54	49	0.56	4.3	
	8mm	51	6	55	48	0.55	4.3	
	10mm	50	6	56	47	0.54	4.2	
SY-48 Coating in Pos.2	5-12-5mm	46	9	58	41	0.47	2.3	2.0
	5-15-5mm	46	9	58	40	0.46	2.1	1.9
	6-12-6mm	46	9	59	40	0.46	2.3	2.0
	6-15-6mm	46	9	59	40	0.46	2.1	1.9
	8-12-8mm	45	9	61	39	0.45	2.3	2.0
	8-15-8mm	45	9	61	39	0.45	2.1	1.9

1.The value and performance data shown in the tables are test results and not performance guarantees.

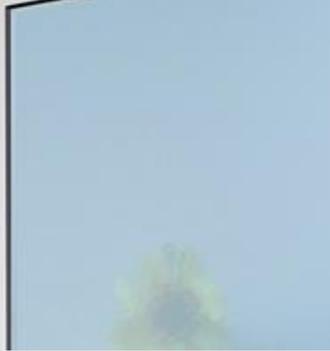
High Transmission Low Reflective Hard Coated LOWE

Structure		Light Properties		Thermal Properties			U Value W/m ² * K					
IGU with clear	Thickness	LT%	LR(Ext)%	EA%	SF%	SC	Air	K Argon				
Planibel G	4-9A-4	74	16	27	64	0.74	2.2	1.8				
	4-12A-4	74	16	27	64	0.74	1.9	1.6				
	5-9A-5	73	16	29	62	0.71	2.2	1.8				
	5-12A-5	73	16	29	62	0.71	1.9	1.6				
	6-12A-6	72	16	31	61	0.7	1.9	1.6				
	6-15A-6	72	16	31	61	0.7	1.7	1.5				
	8-12A-8	71	16	36	59	0.68	1.9	1.6				
	8-15A-8	71	16	36	59	0.68	1.7	1.5				
	10-12A-10	69	15	40	57	0.66	1.9	1.6				
	10-15A-10	69	15	40	57	0.66	1.7	1.4				
IGU with clear	Thickness	Visible Light			Solar Energy			U Value W/m ² * K		SHGC	SC	
	mm	Transmittance	Reflectance		Transmittance	Reflectance	Tuv	Air	Argon			
			Outside	Inside								
Energy Advantage	3-12A-3	75	17	18	59	15	45	1.9	1.6	0.65	0.75	
	4-12A-4	74	16	17	56	14	42	1.9	1.6	0.63	0.73	
	5-12A-5	74	17	17	55	14	41	1.9	1.6	0.63	0.73	
	6-12A-6	73	16	17	52	13	37	1.8	1.5	0.62	0.71	
	8-12A-8	71	15	15	47	12	32	1.8	1.5	0.58	0.67	

Planibel G Hard Coated LowE



**SGG Cool Lite SKN Soft
Coated Double Silver LowE**



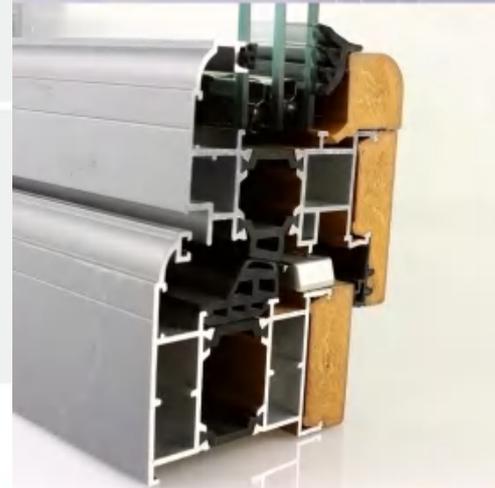
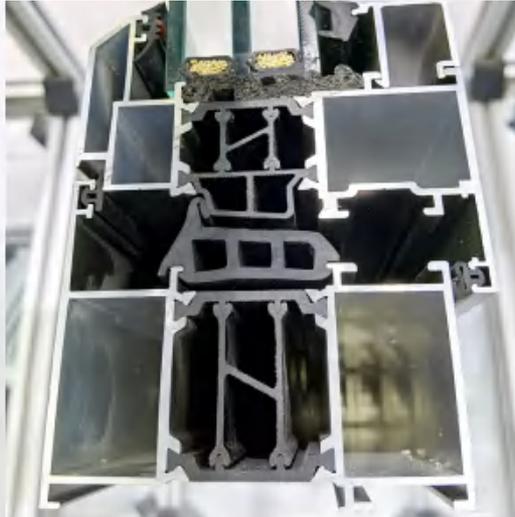
**Energy Advantage
Hard Coated LowE**



Ultra Clear Hard Coated LowE



Thermal bridge insulation aluminum/woods profile system
with Double panes IG
Triple panes IG
Quadruple panes IG
Bendable aluminium spacer IG
Thermo plastic spacer IG
Super spacer IG
Butyl spacer IG



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