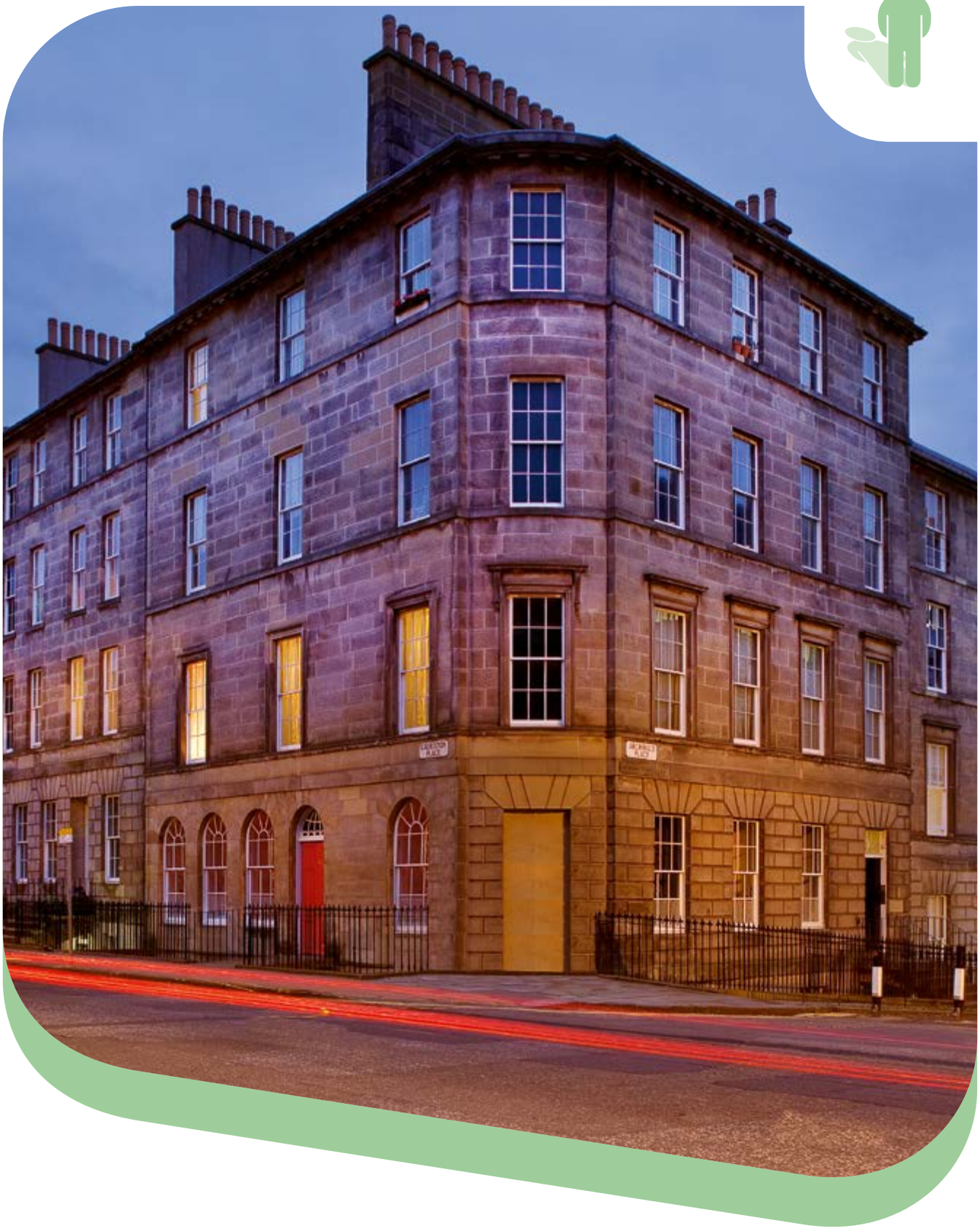
PILKINGTON



Pilkington **Spacia**™ Range

Vacuum Insulated Glazing

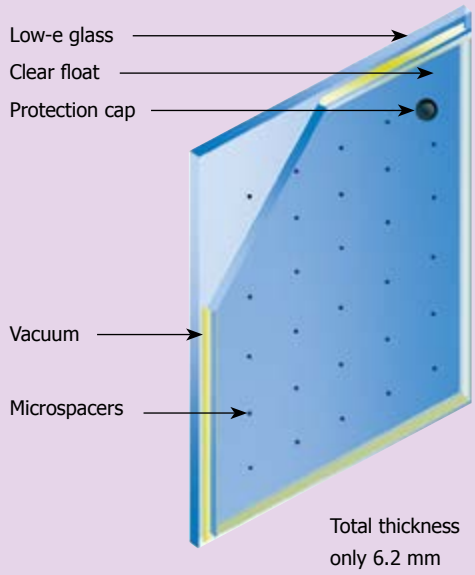
NSG GROUP

Pilkington **Spacia**™

Vacuum Insulating Glazing

Pilkington **Spacia**™ is the world's first commercially available vacuum glazing, offering the thermal performance of conventional double glazing in the same thickness as a single glass pane. Because of the thin profile, it is often a good fit for historic restoration projects as it balances historical preservation with modern comfort and environmental requirements.

Pilkington **Spacia**™ vacuum glazing unit construction



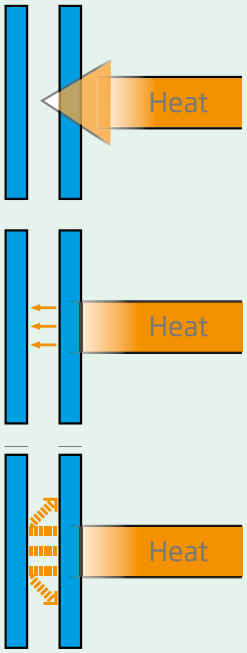
How it is made

Pilkington **Spacia**™ is different than conventional double glazing. While it does consist of an outer pane of low-emissivity glass and an inner pane of clear float glass, instead of leaving a gap for air or argon, the air between the two panes of glass is extracted creating a vacuum and leaving a space of only 0.2 mm. To maintain this space, the two panes are separated by a microspacer grid of tiny pillars, each measuring 0.5 mm in diameter. The grid ensures that the panes are kept a fixed distance apart. The edges are welded to achieve a hermetic seal. The result is excellent thermal performance from a unit that is only slightly thicker than single glass.

How it works

A vacuum provides excellent thermal efficiency and if the pressure is low enough, it will eliminate the conductive and convective heat exchange between the two panes of glass. In a standard double glazed unit with a low-e coating, the conduction/convection component can result in 70% of the heat lost and so eliminating this loss is significant. The vacuum space provided between the two panes with Pilkington **Spacia**™ significantly reduces thermal conduction and convection, and a low-e coating reduces thermal radiation.

Types of heat transfer



Thermal Conduction

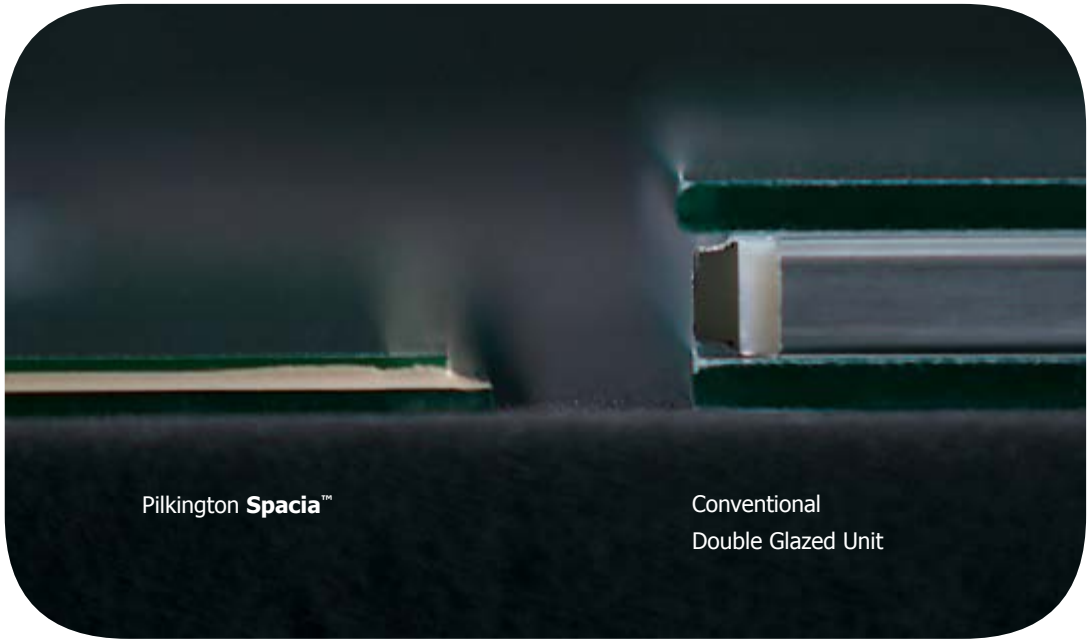
"Conduction" is the transfer of heat through an object. Since heat does not transfer in a vacuum, conduction is significantly reduced.

Thermal Convection

"Convection" is the transfer of heat through fluid motion. Convection is significantly reduced in a vacuum in which no air or water exists.

Thermal Radiation

"Radiation" is the transfer of thermal energy generated from an object to another object. Low-e coatings reduce thermal radiation.



Pilkington **Spacia**™ Product Lineup

The Pilkington **Spacia**™ products include many variations, including types designed for high thermal performance and others with enhanced sound and thermal performance.

Pilkington **Spacia**™ STIII

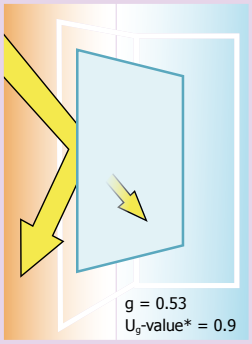
Pilkington **Spacia**™ STIII is the original double glazed unit with a low-e coating for improved thermal control. The vacuum space between two panes provides thermal insulation approximately four times greater than a single pane. Pilkington **Spacia**™ STIII helps to maintain room temperature and significantly reduces condensation resistance.

Pilkington **Spacia**™ Cool

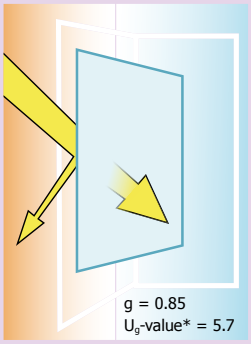
Pilkington **Spacia**™ Cool is a double glazed unit with a solar control low-e coating to reduce solar heat gain, which also provides an improved U_g-value.

Pilkington **Spacia**™ Cool reduces solar heat gain and improves thermal insulation more than five times greater than uncoated monolithic strength glass. The solar control properties work to retain comfortable room temperatures.

Pilkington **Spacia**™ Cool



Monolithic Clear Glass



Figures demonstrate improved solar performance over clear glass.

* W/m²K

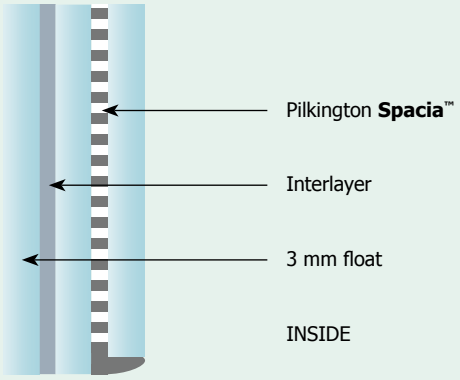
Pilkington **Super Spacia**™

Pilkington **Super Spacia**™ is slightly thicker with a total overall thickness of 8.2 mm but has the lowest U_g-value of all Pilkington **Spacia**™ products. Additionally, it has a wider pillar array than standard Pilkington **Spacia**™.

Pilkington **Spacia**™ Shizuka

Pilkington **Spacia**™ Shizuka is double glazed unit with a laminated lite of clear glass for added safety performance and improved sound reduction. This unit provides thermal insulation and almost 100% UV absorption, in spite of its thin structure.

Pilkington **Spacia**™ Shizuka vacuum glazing unit construction



Pilkington **Spacia**™ Shizuka Cool

Pilkington **Spacia**™ Shizuka Cool offers the same sound performance as standard Pilkington **Spacia**™ Shizuka, with added solar control performance. This double glazed, laminated clear glass unit has an added solar control low-e coating for excellent sound control and interior comfort.

Pilkington **Spacia**™ Opaque

The Pilkington **Spacia**™ Opaque has the appearance of a sand blasted or acid etched glass on one lite to allow for more design opportunities while still achieving ideal thermal performance and thicknesses. The maximum size is 1800 mm × 1200 mm.

Performance Data

Product	Thickness Available [mm]	Interior pane [mm]	Gap	Exterior pane [mm]
Pilkington **Spacia**™ STIII	6.2 8.2 10.2	3 mm clear 3 mm clear 5 mm clear	0.2 mm vacuum	3 mm low-e coated glass 5 mm low-e coated glass 5 mm low-e coated glass
Pilkington **Spacia**™ Cool	6.2 8.2 10.2	3 mm clear 3 mm clear 5 mm clear	0.2 mm vacuum	3 mm low-e coated glass 5 mm low-e coated glass 5 mm low-e coated glass
Pilkington **Spacia**™ Shizuka	9.2 9.7 10.7 11.7	Laminates a pane to the exterior face of any of the above versions		
Pilkington **Super Spacia**™	8.2	4 mm clear	0.2 mm vacuum	4 mm low-e coated glass

Product	Thickness [mm]	Minimum Size [mm]	Maximum Size [mm]
Pilkington **Spacia**™ STIII	6.2/8.2	200 × 400	1500 × 2400
Pilkington **Spacia**™ STIII	10.2	200 × 400	2000 × 3000
Pilkington **Spacia**™ Cool	6.2/8.2/10.2	200 × 400	1500 × 2400
Pilkington **Spacia**™ Shizuka	9.2/9.7/10.7/11.7	200 × 400	1240 × 2400
Pilkington **Super Spacia**™	8.2	200 × 400	1500 × 2400

Product	Thickness [mm]	Visible Light (%)			Solar Energy (%)			U_g-value [W/m²K]**
		Transmittance	Reflectance		Direct transmittance	Reflectance	Total solar heat transmittance (g-value)*	
			External	Internal				
Pilkington **Spacia**™ STIII	6.2	78	13	14	62	17	67	1.1
Pilkington **Spacia**™ Cool	6.2	70	23	20	48	34	53	0.9
Pilkington **Spacia**™ Shizuka	9.2	73	15	17	56	12	63	1.2
Pilkington **Super Spacia**™	8.2	69	23	20	47	32	52	0.7

* calculated value in general accordance with EN 410
** measured value in accordance with EN 674

Outer Pane	Cavity – Gas Fill	Inner Pane	U_g-value [W/m²K]***	
			Argon	Krypton
4 mm Pilkington **Optitherm**™ S3	16 mm	Pilkington **Spacia**™ STIII 6.2 mm	0.6	0.6
4 mm Pilkington **Optitherm**™ S3	12 mm	Pilkington **Spacia**™ STIII 6.2 mm	0.7	0.6
4 mm Pilkington **Optitherm**™ S3	8 mm	Pilkington **Spacia**™ STIII 6.2 mm	0.8	0.6
4 mm Pilkington **Optitherm**™ S1	16 mm	Pilkington **Spacia**™ STIII 6.2 mm	0.6	0.6
4 mm Pilkington **Optitherm**™ S1	12 mm	Pilkington **Spacia**™ STIII 6.2 mm	0.6	0.6
4 mm Pilkington **Optitherm**™ S1	8 mm	Pilkington **Spacia**™ STIII 6.2 mm	0.7	0.6
4 mm Pilkington **Optitherm**™ S3	16 mm	Pilkington **Spacia**™ Cool 6.2 mm	0.5	0.5
4 mm Pilkington **Optitherm**™ S3	12 mm	Pilkington **Spacia**™ Cool 6.2 mm	0.6	0.5
4 mm Pilkington **Optitherm**™ S3	8 mm	Pilkington **Spacia**™ Cool 6.2 mm	0.7	0.6
4 mm Pilkington **Optitherm**™ S1	16 mm	Pilkington **Spacia**™ Cool 6.2 mm	0.5	0.5
4 mm Pilkington **Optitherm**™ S1	12 mm	Pilkington **Spacia**™ Cool 6.2 mm	0.6	0.5
4 mm Pilkington **Optitherm**™ S1	8 mm	Pilkington **Spacia**™ Cool 6.2 mm	0.6	0.5

*** calculated in general accordance with EN 673

Features and Benefits

- Thermal performance of modern double glazing in the same thickness as a single pane of glass
- Minimum disruption to existing older window frames and sashes as it can be retro-fitted into the existing frames
- Cost effective method of improving the energy of older homes and buildings
- Improved acoustic performance over single glazing or standard IGU, enhancing the living and working environment
- Custom sizes available
- Proven technology; successfully used in Japan and other countries for over 20 years
- Pilkington provides a ten year warranty to the installer
- Some products in the Pilkington **Spacia**™ range are available in shapes. For more details of the available shapes, please refer to the Pilkington **Spacia**™ technical datasheet.

Noise Control

In addition to thermal insulation, the Pilkington **Spacia**™ range provides sound insulation to block out noises generated inside and outside a room, enhancing acoustic performance and creating the ultimate quiet environment. As sound transmission through a vacuum is low, Pilkington **Spacia**™ achieves higher levels of sound insulation than conventional single and double glazing.

Sound insulation of Pilkington **Spacia**™

Product	R_w (C; C_{tr}) dB
Pilkington **Spacia**™	
6.2 mm Pilkington **Spacia**™ STIII	35 (-1; -3)
9.2 mm Pilkington **Spacia**™ Shizuka	37 (-1; -3)
Conventional glazing	
Single glazing (6 mm float)	31 (-2; -3)
Double glazing (4 mm – 16 mm argon – 4 mm)	31 (-2; -5)

Note. The value for single glazing is a generally accepted value for generic products taken from EN 12758. They are conservative values that can be used in the absence of measured data. The values for Pilkington **Spacia**™ and the insulating glass unit have been measured in accordance with EN ISO 10140 and R_w (C; C_{tr}) determined in accordance with EN ISO 717-1.

Applications

With a narrow overall thickness and good acoustic performance, Pilkington **Spacia**™ is ideal for use in variety of building types. Various types of Pilkington **Spacia**™ are available for a multitude of glazing solutions.

Pilkington **Spacia**™ offers historic buildings the ability to maintain original design, while improving glazing performance. It may even allow the use of the original frames if these are in a reasonable or repairable condition.

- Ideal for use in historic buildings
- Sliding windows
- Secondary glazing
- As part of a triple glazed window*

* The risk of thermal fracture of glass due to solar radiation depends upon many factors, including location, orientation, frame construction and shading. The risk is generally higher for Pilkington **Super Spacia**™ in double glazing and Pilkington **Spacia**™ in triple glazing. Before considering the use of Pilkington **Spacia**™ in these applications, please consult NSG Group for advice.

CE Marking confirms that a product meets the requirements of its relevant harmonised European Norm and can be placed on the market in the EU. The CE Marking Declaration of Performance for each product can be found at www.pilkington.com/ce

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