

Pilkington **K Glass™ N**
Pilkington **Optitherm™**
Thermal insulation glass range



Pilkington **Optitherm™** S3

Thermal Insulation

Glass features heavily in modern building design. For both aesthetic and practical reasons it is as popular as ever. However, today's builders, regulators and wider communities are demanding more from glass. In particular, the focus on energy efficiency and tighter regulations are creating a greater need for thermal insulation glass.

It is a simple fact that heat loss from a building will naturally find the path of least resistance. This is typically through the window glass or, more correctly speaking poor or inadequate glazing. NSG Group has developed a comprehensive range of products which make it more difficult for heat to escape from a building, offering designers a wide choice of insulation levels and aesthetic options.

Through advances in low emissivity (low-e) glass, windows now play a big part in energy conservation and comfort, minimising heat loss and internal condensation.

The measure of heat loss is usually expressed in terms of U-value. This is the rate of heat loss in Watts per square metre per degree Kelvin temperature difference, between the inside and outside (expressed as W/m^2K). The lower the U-value, the better the insulation the product provides.

Solar energy enters the building mainly as short-wave radiation, but once inside, it is reflected back by objects towards the glass as long wave radiation. Low-e glass has a coating that provides an effective barrier to heat loss, by allowing a much higher transmission of short-wave radiation (from the sun) than long wave radiation (from heaters and objects in the room).

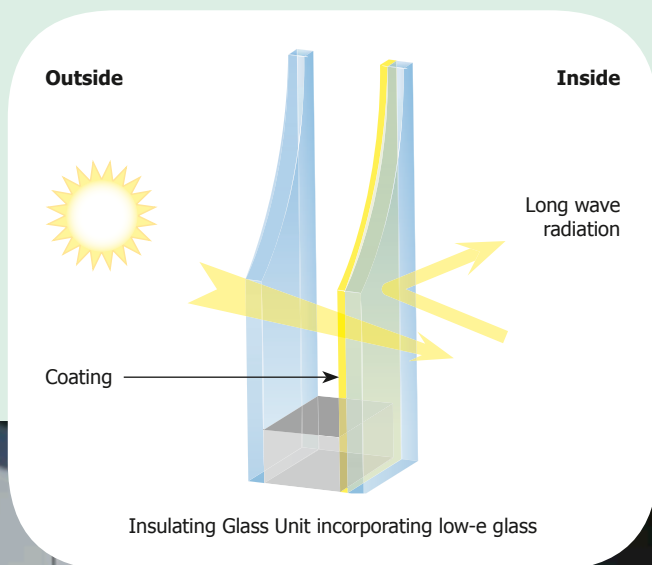
How it works

Low-e glass reduces the heat loss of the building by:

- (1) Reflecting the energy emitted by room heaters and surfaces back into the room (long wave radiation)
- (2) Allowing high transmission of the solar radiation (short wave radiation) through the glass to benefit from passive solar heat gain through the glass.

During the winter, low-emissivity glass can reduce heat loss while allowing high levels of valuable free solar gain to heat buildings with no significant loss in natural light.

In the summer, however, it can become uncomfortably hot. To maximise energy efficiency all year round, the ideal glazing solution often combines solar control and thermal insulation.



Effectively, low-e glass reflects energy back into a building to achieve much lower heat loss than ordinary float glass. In addition, different types of low-e glass allow different amounts of passive solar heat gain, which helps reduce heating requirements and costs, especially in colder months.

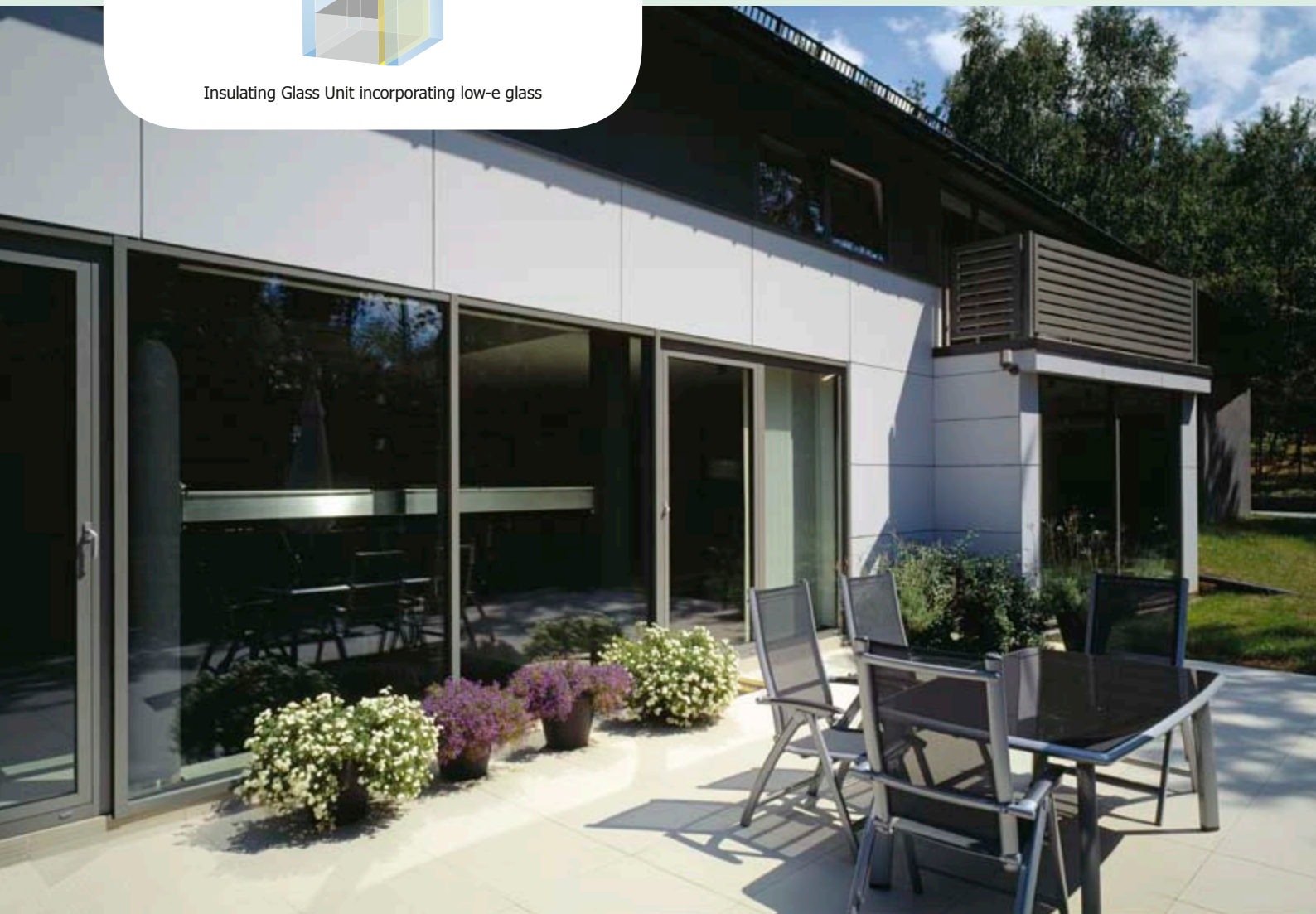
To maximise energy efficiency all year round, the ideal glazing solution often combines solar control and thermal insulation.

Calculating tool - available online

To help you calculate the parameters of Insulating Glass Units, we have developed the Pilkington Spectrum software. You simply select the components of the glass units, and the programme automatically calculates the main parameters and displays them graphically. You can also print technical data sheets for the specific combination you need.

You can access this tool by registering on-line at <https://spectrum.pilkington.com> or by downloading Pilkington Spectrum mobile app from app stores.

Pilkington **Optitherm™ S3**

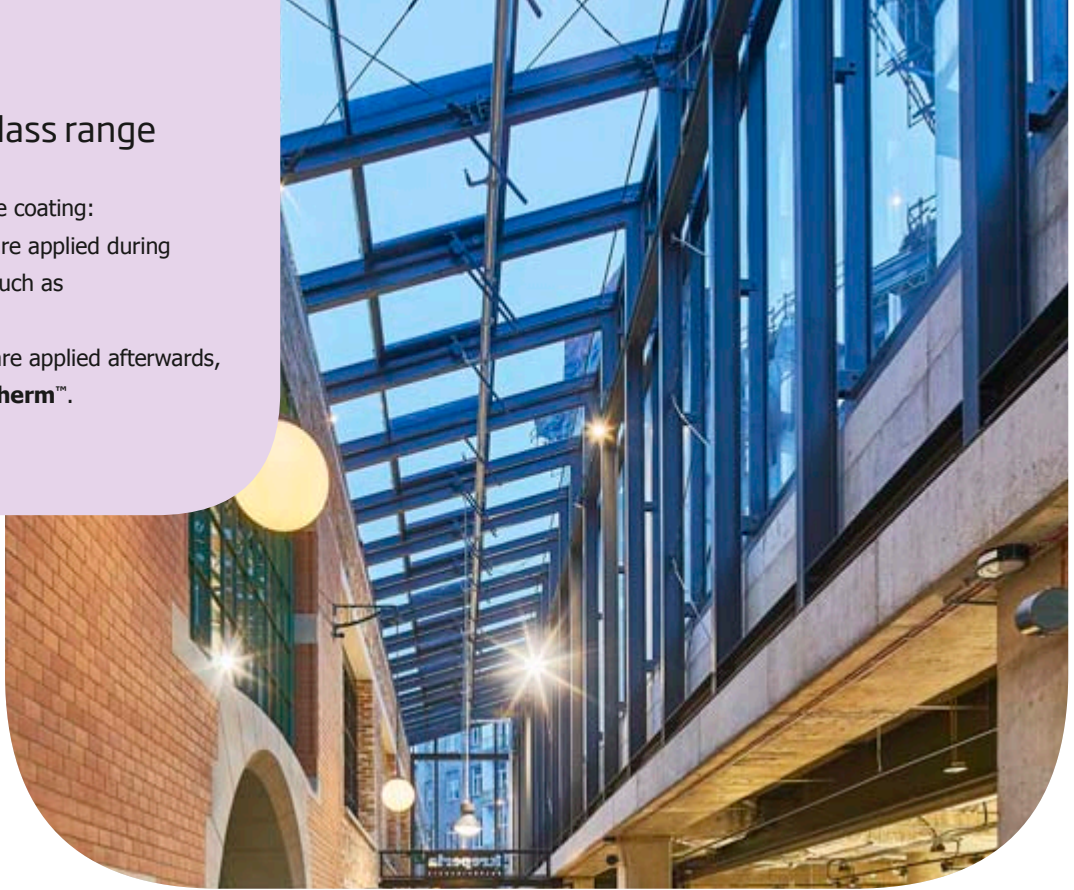


Low-emissivity glass range

We offer two types of low-e coating:

- on-line coatings, which are applied during the glass manufacture, such as Pilkington **K Glass™ N**;
- off-line coatings, which are applied afterwards, such as Pilkington **Optitherm™**.

Pilkington **K Glass™ N**



Pilkington **K Glass™ N**

Compared to conventional insulation glazing with clear float glass, Pilkington **K Glass™ N** offers substantial improvements on thermal insulation. In terms of energy savings its results are very good too. It retains heating warmth in a room while allowing high levels of solar energy to enter and this helps to reduce heating costs.

This on-line coated glass can be toughened, laminated, bent, used in monolithic applications or it can be processed to make Insulating Glass Units (IGUs). As it does not have to be edge-deleted, the process of manufacturing this glass into Insulating Glass Units is extremely fast and economical.

Product features summary:

- substantially improved thermal insulation compared to conventional insulation glazing with a U_g -value of 1.4 W/m²K in 4-16-4 standard constructions with argon (90%);
- high solar gain for overall energy saving performance;
- available in a range of different sizes and thicknesses (3 mm, 4 mm, 6 mm and 8 mm) for various applications;
- no edge-deletion necessary for economical manufacturing;
- an all-round solution which can be toughened, laminated and bent;
- robust in processing;
- ideal balance between thermal insulation and solar heat gain.

Why use on-line coated products?

Generally speaking, on-line coated products offer lower thermal insulation levels than off-line coated products. However, they have a range of other benefits; they are easier to handle and process and can be toughened or laminated without difficulty. They are also far more durable and achieve a higher degree of passive solar gain (g-value, the proportion of solar radiation transmitted through the glass by all means) which is particularly beneficial in cool but sunny conditions.



Pilkington **K Glass™ N**

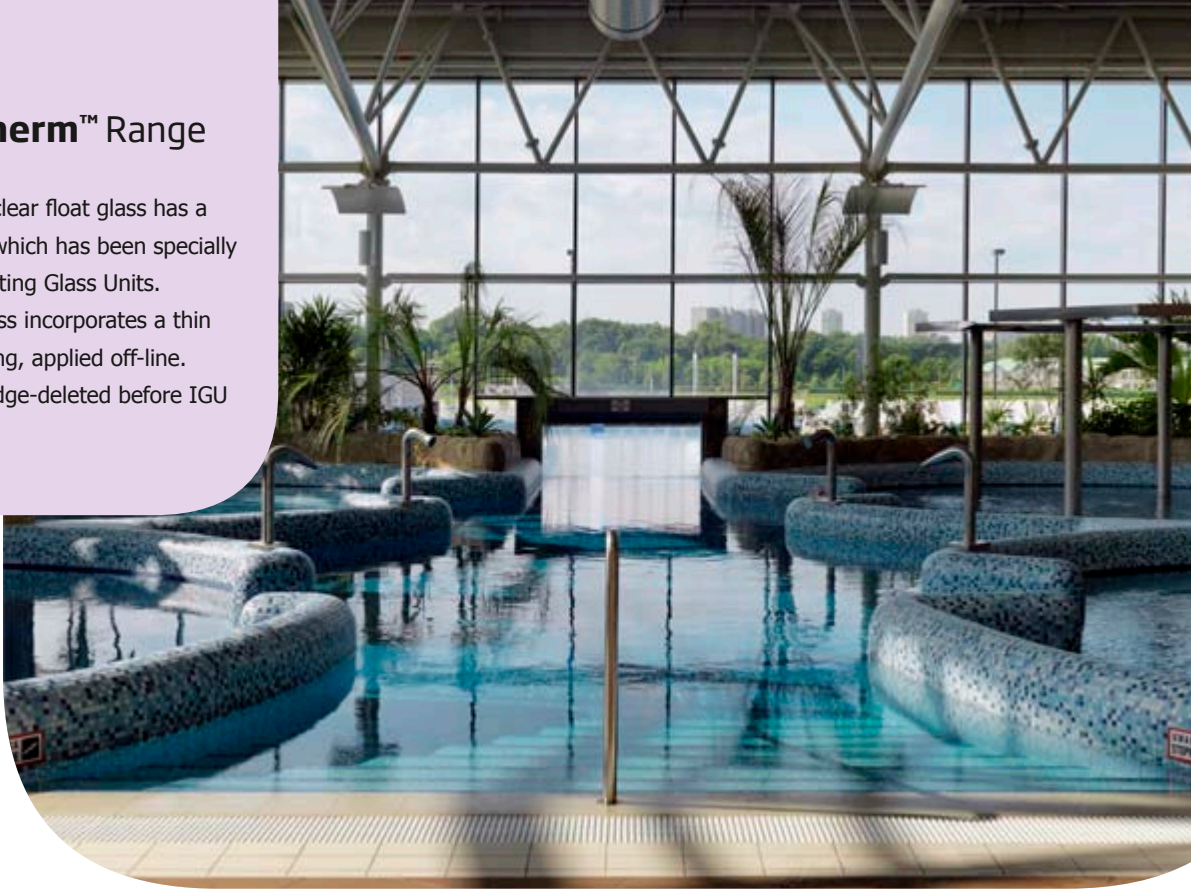
Pilkington **Optitherm**™ Range

This range of high-quality clear float glass has a transparent low-e coating which has been specially developed for use in Insulating Glass Units.

Pilkington **Optitherm**™ glass incorporates a thin magnetron sputtered coating, applied off-line.

This coating needs to be edge-deleted before IGU processing.

Pilkington **Optitherm**™ S3



Pilkington **Optitherm**™ S3

Combining thermal insulation with great neutrality, Pilkington **Optitherm**™ S3 has quickly become a market leading super neutral low-e glass. Pilkington **Optitherm**™ S3 must be incorporated in an Insulating Glass Unit, such as Pilkington **Insulight**™, with the coating on the inside surface. For safety or security applications, the glass can be laminated before coating. As well as having an impressive U_g -value of $1.1 \text{ W/m}^2\text{K}$, it offers very high light transmittance (82%) and low light reflectance (11%) to reduce energy consumption, even in the most aesthetically demanding environment.

For safety applications, we offer Pilkington **Optitherm**™ S3 Pro T which should be toughened and is colour matched to Pilkington **Optitherm**™ S3 after toughening.

Product features summary:

- U_g -value of $1.1 \text{ W/m}^2\text{K}$ in 4-16-4 standard constructions with argon (90%);
- super neutral in terms of light transmittance (82%) and low light reflectance (11%);
- available in a range of different sizes and thicknesses (from 4 mm to 10 mm*) for various applications;
- available in combination with Pilkington **Optilam**™ or Pilkington **Optiphon**™ for impact resistance, increased security or improved noise reduction;
- colour-matched Pilkington **Optitherm**™ S3 Pro T version offered for toughened applications;
- available with Pilkington **Activ**™ coating for additional self-cleaning benefit.

* 3 and 12 mm is available upon special request



Pilkington
Optitherm™ S3



Pilkington **Optitherm™** S1A

Pilkington **Optitherm™** S1A

For applications requiring a U_g -value of $1.0 \text{ W/m}^2\text{K}$, we offer Pilkington **Optitherm™** S1A. Despite its low U_g -value, this product still offers outstanding performance in terms of light transmission and colour neutrality. Pilkington **Optitherm™** S1A is the ultimate in thermal insulation for Insulating Glass Units and should be specified for any situation where excessive heat loss is a concern.

Product features summary:

- U_g -value of $1.0 \text{ W/m}^2\text{K}$ in 4-16-4 standard constructions with argon (90%);
- neutral in terms of light transmittance (76%) and medium light reflectance (16%);
- available in a range of different sizes and thicknesses (from 4 mm to 10 mm*) for various applications;
- available in combination with Pilkington **Optilam™** or Pilkington **Optiphon™** for impact resistance, increased security or improved noise reduction.

* 3 and 12 mm is available upon special request

Why use off-line coated products?

Most off-line coated products are able to give higher levels of thermal insulation and light transmittance, but they do require extra care in handling and processing. We can supply them in laminated form by applying the coating to pre-processed glass. Some can also be provided in toughenable form.



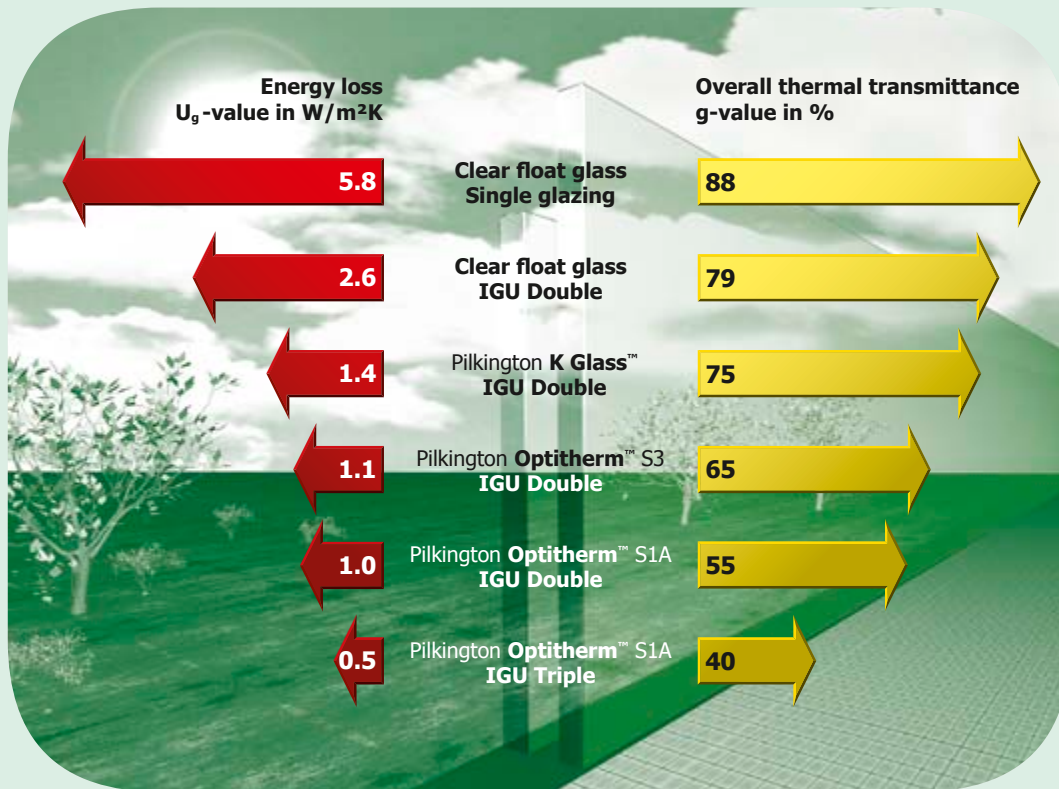
Pilkington **Optitherm™** S1A

Double and triple glazing options

When we discuss the performance of most of our products, we assume their incorporation into Insulating Glass Units (IGUs). Insulating Glass Units are glass panes separated by a gas-filled chamber and sealed around the edges. These units can incorporate two or three panes of glass to give double or triple

glazing. By using additional panes of glass (i.e. triple glazing) we enhance the unit's thermal insulation properties. We can further enhance the overall thermal performance of the unit and window with the use of a warm edge spacer between the panes of glass and the choice of gas used to fill the cavity.

The energy balance compared*:



* Energy gains (overall thermal transmittance) and energy losses from single glazing to high-end thermal Insulating Glass Units.

U_g -values are in accordance with EN 673, g-values are in accordance with EN 410. Values for IGUs Double are based on 4-16-4 standard constructions with argon (90%). Values for IGUs Triple are based on 4-16-4-16-4 standard constructions with argon (90%).



Combination options

We are committed to developing new product combinations, giving you the flexibility to use them in a greater range of applications.

We offer products that combine thermal insulation with other benefits including safety, security, noise control and self-cleaning. Many low-e coatings are also available on Pilkington **Optiwhite**™*, for higher light transmittance and g-value. And in addition to this, all glass types from our low-e glass range can be combined with the appropriate Pilkington Spandrel Glass façade panel to obtain an architecturally harmonious look.

* Pilkington **Optiwhite**™ is a low iron glass with improved light and solar properties. It can be used as a substrate for many Pilkington low-e products or on its own to take advantage of desirable solar heat and light transmittance.

Pilkington **Optitherm**™ S3

This publication provides only a general description of the products. Further, more detailed, information may be obtained from your local supplier of Pilkington products. It is the responsibility of the user to ensure that the use of these products is appropriate for any particular application and that such use complies with all relevant legislation, standards, codes of practice and other requirements. To the fullest extent permitted by applicable laws, Nippon Sheet Glass Co. Ltd. and its subsidiary companies disclaim all liability for any error in or omission from this publication and for all consequences of relying on it. Pilkington, "K Glass", "Optitherm", "Insulight", "Optilam", "Optiphon", "Activ" and "Optiwhite" are trademarks owned by Nippon Sheet Glass Co. Ltd, or a subsidiary thereof.



CE marking confirms that a product complies with its relevant harmonised European Norm.

The Declaration of Performance for each product, including declared values, can be found at www.pilkington.com/CE



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