

Pilkington **Optitherm™** S1 Plus  
Handling and Processing Guidelines



# Pilkington **Optitherm**<sup>™</sup> S1 Plus

## 1. Product description

Pilkington **Optitherm**<sup>™</sup> S1 Plus is an off-line coated thermal insulation product offering ultra low emissivity and achieving a  $U_g$ -value of only 1.0 W/m<sup>2</sup>K when incorporated in a double glazed unit. It is a single stock product and therefore can be used in both annealed and toughened applications.

Pilkington **Optitherm**<sup>™</sup> S1 Plus meets the requirements of the European Standard EN1096-3 Class C 'Glass in building – Coated glass' and when toughened will comply with EN 12150 'Thermally toughened soda lime silicate safety glass'.

Pilkington **Optitherm**<sup>™</sup> S1 Plus can only be used in insulating glass units. The coating for Pilkington **Optitherm**<sup>™</sup> S1 Plus is designed to be on glass surface #3 (counting from the outside). The coated surface of Pilkington **Optitherm**<sup>™</sup> S1 Plus can be identified by using a coating detector near the edge of the glass.

As off-line coatings can be damaged if not handled correctly, it is important that handling and processing is carried out in accordance with good practice, as described throughout these guidelines.

## 2. Product range

Pilkington **Optitherm**<sup>™</sup> S1 Plus products are available on clear float substrate in jumbo and LES sizes between 4 mm and 12 mm.

## 3. Delivery and storage

Pilkington **Optitherm**<sup>™</sup> S1 Plus is normally arranged on stillages so that the uncoated surface of each sheet faces outwards. The orientation of the glass should be checked when unpacking. The last sheet in a pack is 4 mm Pilkington **Optifloat**<sup>™</sup> Clear which serves to protect the coated sheets. All sheets are separated with an interleaving powder.

Pilkington **Optitherm**<sup>™</sup> S1 Plus must be unloaded and stored in dry and well-ventilated conditions, stacked upright and fully supported in a safe manner. The glass should be stood on edge strips of wood, felt or other relatively soft material, and care should be taken when unloading glass packs to ensure that plates in the pack do not move.

Pilkington **Optitherm**<sup>™</sup> S1 Plus has a storage shelf-life of six months from the date of delivery provided adequate storage conditions are met. Packs should be stored where the relative humidity does not exceed 70% and the ambient temperature does not fall below 15°C.

Significant temperature fluctuations during storage, that may lead to condensation should be avoided. Delivered packs should be allowed to acclimatise before opening, to help avoid condensation and potential damage to the coating.

## 4. Handling

Since the coated surface can be damaged if not handled correctly, precautions are necessary when unloading glass packs to ensure no movement of the sheets in the pack. Individual sheets should be moved using automatic equipment capable of lifting plates with clean suction cups on the glass side only.

No labels or markings should be applied on the coated side of the glass. When handling the glass, clean, dry glass handling gloves must be worn at all times to avoid leaving fingerprints or otherwise contaminating the surface.

Operators should be aware that any contact with hard materials is likely to result in damage to the coated surface.

If marks are present on the coating after handling, careful attempts can be made to remove them using a solvent such as IPA and a soft clean tissue. During processing, cut sizes should be handled at the edges, where the coating has been or will be edge deleted. For large pieces, sucker frames fitted with clean covers may have to be used on the coated surface where there is no alternative. When internally transporting cut sizes, a wide range of separating pads, clean, non-alkaline paper or cardboard strips may be used to prevent transit damage to the coating. Separating pads should only be applied around the very edges of the glass.

### 5. Cutting

Sheets of Pilkington **Optitherm™** S1 Plus must be loaded onto the cutting table with the coated surface uppermost. Automatic cutting is the preferred option using a quick evaporating cutting oil. When breaking out glass sheets, care should be taken so that the coating is not damaged. Fine glass splinters on the glass surface should be removed carefully.

Immediately after cutting, a sufficient amount of the original interleaving powder often remains in place to protect adjacent glasses from damaging the coating, nevertheless we recommend that cut sizes are separated by cork pads or other suitable separation materials.

### 6. Edge deletion

Prior to manufacturing Pilkington **Optitherm™** S1 Plus sheets into insulating glass units, the coating must be edge deleted to ensure good adhesion of the unit seal. The edge deletion process is ideally undertaken on-line (when cutting). The width of the edge deletion depends on the depth of the insulating glass unit seal.

### 7. Edge-working

Prior to toughening Pilkington **Optitherm™** S1 Plus, the glass sheet must be edge-worked. Ideally a vertical combined grinding/washing machine should be used. Manual cross-belt arissing, either wet or dry, is also possible. For edge-working processes that have belt-grips on the coated surface, the belts must be designed to be compatible with such coatings. The surface of the belt must also be kept clean and free of any debris to avoid damaging the coating.

As water quality is critical for the processing of all coated glass, additives such as coolants and biocides should be avoided.

### 8. Washing

Immediately after edge-working but before toughening, Pilkington **Optitherm™** S1 Plus should be washed through a multi-stage automatic washer using heated, demineralised, neutral pH water and soft cylindrical brushes. The brush fibre diameter should be no greater than 0.15 mm. A pre-rinse before entering the washing machine is advantageous.

Initial and intermediate washing stages should use deionised water, heated to a maximum of 40°C and with specific conductivity  $\leq 30 \mu\text{S}/\text{cm}$ . Fresh deionised water with specific conductivity  $\leq 10 \mu\text{S}/\text{cm}$  should be used at the final wash stage.

The washing machine should be designed so that the conveyor never stops with glass underneath the washing brushes, otherwise coating damage may occur. When using washing machines that were not initially designed for coated glass there may be a need to modify, raise or remove brush sections, barriers and internal drive rollers.

Washing is a critical part of the process and therefore careful attention should be given to regular maintenance routines and adjustments. Detergents should not be used in the water.

## 9. Thermal toughening

Pilkington **Optitherm**™ S1 Plus is a single stock product, therefore toughening or heat-strengthening has no significant effect on the performance characteristics of the coating. Any convection furnace capable of uniformly heating low-emissivity coated glass should be suitable for toughening Pilkington **Optitherm**™ S1 Plus. The higher reflectance of the coated glass surface (always facing uppermost) may require adjustment of the top and bottom furnace temperatures, cycle times and convection profiles. Individual furnace manufacturers should be consulted to advise of the optimum conditions prior to toughening. We do not recommend the use of radiation furnaces.

Dry or non-contact methods of applying toughening stamps may be used.

Sulphur Dioxide (SO<sub>2</sub>) should not be used in the furnace when tempering Pilkington **Optitherm**™ S1 Plus. Even residual SO<sub>2</sub> in the furnace from previously tempering other products may affect the coating.

## 10. Bending

Pilkington **Optitherm**™ S1 Plus has been designed to possess a wide toughening cycle tolerance, nevertheless customers who wish to attempt bending should carry out their own evaluation to ensure that the coating is not damaged since very high temperatures may be required in the bending process.

## 11. Heat soaking

To comply with EN 14179 'Heat soaked thermally toughened soda lime silicate safety glass' Pilkington **Optitherm**™ S1 Plus can be heat soaked in either gas or electric powered ovens without detriment to the coating. However, electric ovens are strongly preferred because there are no potentially corrosive combustion gases and there is a reduced risk of water vapour condensation inside the oven.

Care should be taken to minimise the length of time between toughening and heat soaking to reduce the likelihood of damage to the coating.

PTFE separating blocks may be used to separate glasses but these must only contact the glass on the edges where the coating has been, or will be, edge deleted.

## 12. Insulating glass units

Before insulating glass unit assembly, Pilkington **Optitherm**™ S1 Plus should be handled and washed according to the methods and criteria described in sections 4 and 8. The coated surface of Pilkington **Optitherm**™ S1 Plus should always face the cavity of an insulating glass unit and is designed to be used on glass surface #3 (counting from the outside). To achieve better thermal insulation, the cavity in the insulating glass units can be filled with an inert gas such as argon.

Suitable sealants and desiccants should be used in accordance with manufacturers' recommendations.

The adhesion of most sealants, including hot melt butyls, polysulfides, urethanes and two part silicones will be as expected for clear uncoated glass when applied to the edge deleted portions of the coated glass.

Appropriately designed racks should be used for the safe transportation of insulating glass units incorporating Pilkington **Optitherm**™ S1 Plus. The insulating glass units should be separated by cork pads or other suitable separation materials to prevent transport damage.

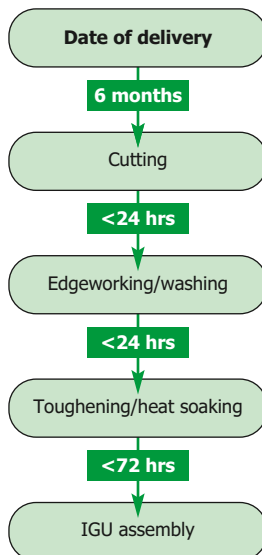
Insulating glass units must not be stored in direct sunlight or rain. If stored outside, the stack should always be covered with an appropriate opaque wrap to prevent breakage of glass due to overheating and water damage.

Care should be taken to avoid damage to the glass edges during transportation, storage and installation. Insulating glass units incorporating Pilkington **Optitherm™** S1 Plus should be glazed in accordance with National Standards or Codes of Practice.

### 13. Toughened cut sizes

The transportation of toughened pieces of Pilkington **Optitherm™** S1 Plus is possible with care. Once the toughened glass sheets have cooled down, they should be separated and immediately protected in plastic wrapping with fresh desiccant bags inserted inside the pack. The wrapping should not be opened until immediately before the glass sheets are to be used. Toughened pieces transported in this way must be converted into insulating glass units within seven days of toughening and within 72 hours of opening the wrapping.

### 14. Overview of processing times



### 15. Appearance

A customer inspection should be performed on receipt of a delivery and any defects must be reported immediately. Claims for defects identified after processing cannot be accepted since it is the responsibility of the customer to carefully inspect Pilkington **Optitherm™** S1 Plus during each processing stage. In the case of any claims, both samples and the batch number of the affected glass will be required.

Production tolerances can cause slight colour deviations between different batches. These are minimal within a production run. For projects where the coated glass has to be supplied over a longer period and therefore several coating runs, this should be indicated to the manufacturer to ensure that colour deviation is minimised.

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, "Optitherm" and "Optifloat" are trademarks owned by Nippon Sheet Glass Co. Ltd, or a subsidiary thereof.



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