



Pilkington **Pyroclear**[®]
Guidelines for glass quality



1.0 Introduction and field of application

Pilkington **Pyroclear**[®] is a new development based on NSG proprietary technology and process developments. It is an advanced toughened glass developed for integrity fire resistant glazing applications, specifically designed to overcome the recognized technical weaknesses in fire of standard modified toughened glass types. The prime recommended application for Pilkington **Pyroclear**[®] is as a barrier against flames, smoke and fumes in pre-flashover and early fire growth situations before conditions become untenable.

The high quality fire performance of Pilkington **Pyroclear**[®] comes from a combination of distinctive features which work together to give an enhanced level of reliability, demonstrated in many fire resistance tests to give a high level of consistency and repeatability. The key properties developed for good performance in fire also mean that the glass is well suited for resilience under blast conditions (as already demonstrated by successful range testing carried out in general accordance with ISO 16933).

To assist in the general assessment of the product, this quality document contains several references to BS EN 12150, the product standard for thermally toughened soda lime silicate safety glass. It should be understood, however, that whilst the product does conform to the requirements set out in BS EN 12510, consistent performance from a fire safety and blast mitigation perspective requires that the product is manufactured to parameters, which are far in excess of the requirements defined in the general product standard.

The Pilkington **Optifloat**[™] Clear substrate of Pilkington **Pyroclear**[®] meets the dimensional and minimum quality requirements (in respect of optical and visual faults) of BS EN 572-8 for finished cut sizes of basic soda lime silicate glass. The finished product, Pilkington **Pyroclear**[®], meets the quality requirements of BS EN 12150 and, if subsequently laminated, BS EN 14449.

Pilkington **Pyroclear**[®] incorporates a specially designed high quality processed edge system. This edge is protected by a specially selected

tape as an integral part of the glass which must remain on the glass at all times and not be removed. Evident traces of attempts of removal or replacement of the specified tape invalidate any claims.

2.0 Inspection conditions

2.1 For general applications quality inspection is routinely carried out by visual observation, that is looking through the glass in the plane of the glass sheet at normal incidence (i.e. at 90 degrees to the glass surface). In line with the Glass and Glazing Federation (GGF) Guidelines, the glass shall be viewed from a distance of not less than 3 metres away. The use of strong lamps and/or magnifying devices is not allowed. It is not permissible to find defects at close range and then mark them so as to be visible from the given viewing distance.

2.2 Internal Glazing/Internal Partitions

Inspection of internal glazing applications should be carried out under normal diffuse background lighting conditions, with illumination as usual and appropriate for the specific room (e.g. no spot lights), viewed at a right angle to the glass surface.

2.3 External Glazing/Façade Applications

Inspection of external glazing applications should be carried out under normal diffuse daylight conditions, (e.g. cloudy sky) not in direct sunlight or with aid of artificial light and with no visible moisture on the glass. Inspection shall be from the room side and relates only to transmission and not reflection.

3.0 Admissible Flaws

When viewed in accordance with section 2, the Pilkington **Pyroclear**[®] product shall be subject to the acceptance criteria described in 3.1 and 3.2.

3.1 Point Body Defects

(e.g. bubbles, seeds, spot faults and linear/extended faults) Pilkington **Pyroclear**[®] meets the requirements of the relevant parts of BS EN 572 for finished cut sizes of basic soda lime silicate glass when viewed from a distance of not less than 3 metres away.

3.2 Surface Defects

Any scar or visible faults on the surface glass visible from 3 metres are not allowed. A single individual fine scratch up to 15 mm long is permissible and the sum of individual fine scratches up to a maximum of 45 mm. Glass is often scratched during service and deep scratches can reduce the strength and integrity of the product. If a scratch in the surface of the glass is deep enough to be felt with a "finger nail" then we would recommend that the glass is replaced.

3.3 Local Bow and Edge Lift

Local bow can occur over relatively short distances on the edges of the glass. Local bow shall be measured over a limited length of 300 mm and shall be less than or equal to 0.25 mm. The method of measurement is defined in BS EN 12150.

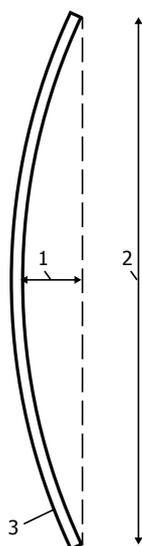
3.4 Overall Bow

The toughening process can bow the glass over the full length or diagonal of the panel. Overall bow is measured on the concave side of a vertically positioned pane and is the distance between the arc of the surface and the "imaginary" straight line along the edge of the pane or across the diagonal.

Overall bow shall be less than or equal to 2 mm/m when measuring across the full length or diagonal of the panel as defined in BS EN 12150, but shall not exceed 1 mm/m when measured across a 1 m span in any area which is more than 300 mm distance from the edge of the panel (Figure 1).

Figure 1. Representation of overall bow according to BS EN 12150-1

- Key:
- 1 – Deformation for determining overall bow
 - 2 – Width or length
 - 3 – Pilkington Pyroclear®



3.5 Anisotropy

Birefringent optical effects can be caused by the compressive and tensile stresses generated in the glass by the toughening process. This can appear as a geometric optical interference pattern under certain conditions of illumination by polarised light, such as background sky illumination or other particular light sources (such as certain fluorescent tubes). Only certain lighting conditions produce this interference effect. Such an optical strain pattern is common for all toughened glass and should not be mistaken for non uniform tint or colour. Strain optical patterns of this type shall not be considered as a defect.

3.6 Special Optical Effects

The thermal toughening process and subsequent handling, may have a superficial chemical and mechanical influence on the glass surfaces. For example, the wettability of glass surfaces may be affected due to various factors, e.g. roller contact, fingerprints, label adhesive, separating paper, vacuum sucker contact, glazing sealant material, silicone components, lubricant or environmental conditions. These local differences in surface wettability may become visible when humidity settles on glass surfaces due to condensation, rain or cleaning water. Such effects should not be taken as fundamental quality defects in the glass.

Pilkington **Pyroclear**® is permanently marked with the brand name, the designated product code (fire resistance in minutes followed by a three digit product code), glass thickness of monolithic Pilkington glass, applicable EN standard, fire resistance classification and year of production. Typical examples of the mark are illustrated in Figures 2 and 3.

Figure 2. Pilkington monolithic glass



Figure 3. Insulating Glass Unit



Note:

The general specification outlined in this document relates particularly to the shape, flatness and optical quality of an individual Pilkington **Pyroclear**® glass component. In applications where component glasses are incorporated into an Insulated Glass Unit or a laminated product, the final product should be evaluated in accordance with the relevant product standard (e.g. BS EN 1279 for IGU and BS EN 14449 for laminated product).

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, "Pyroclear" and "Optifloat" 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 CE marking label for each product, including declared values, can be found at www.pilkington.com/CE



Pilkington United Kingdom Ltd
Prescot Road St Helens WA10 3TT United Kingdom
Telephone 01744 692000 Fax 01744 692880
pilkington@respond.uk.com
www.pilkington.co.uk