



novaglaze gardner & newton ltd

## visual quality standard for installed insulating glass units constructed from flat transparent glass.

**as used by Pilkington and the Glass and Glazing Federation and accepted as the standard for the inspection of flat glass, ngn products to be inspected using the same criteria as toughened products.**

1. Transparent glass used in the manufacture of insulating glass units is identical to that used traditionally for single glass and will therefore, have similar level of quality.
2. Both panes of the sealed unit shall be viewed at right angles to the glass from the room side standing at a distance of not less than 2 meters (but for toughened, laminated or coated glasses not less than 3 meters) in natural daylight and not in direct sunlight with no visible moisture on the surface of the glass. The area to be viewed is the normal vision area with the exception of a 50mm wide band around the perimeter of the unit.

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3. Flat transparent glass, including laminated or toughened glass, shall be deemed acceptable if the following phenomena are neither obtrusive nor bunched: totally enclosed seeds, bubbles or blisters; hairlines or blobs; fine scratches not more than 25mm long; minute embedded particles.  
Obtrusiveness of blemishes shall be judged by looking through the glass, not at it, under lighting conditions as described in 2.
4. When thermally toughened glass is viewed by reflection, the effect of the toughening process may be seen under certain lighting conditions. The visibility of the surface colouration or patterns does not indicate deterioration in the physical performance of the toughened glass. Because of the nature of the toughening process, distortion will be accentuated when the glass is viewed in reflection or incorporated in insulating glass units.
5. Visible double reflection can occur under certain lighting aspect conditions, especially when viewed from an angle. This is an optical phenomenon arising from multiple surface reflections in sealed units.
6. The manufacture of flat laminated glass does not usually affect the visual quality of the glass incorporated in insulating glass units. However the faults generally accepted in paragraph 3 may be increased in number if several glasses and interlayers are used in the production of laminated glass. When viewed under certain light conditions, insulating glass units incorporating clear or tinted flat laminated glass may show a distortion effect caused by reflection on the multiple

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surfaces of the components of the laminated glass.

## 7. *brewster's fringes*

The appearance of the optical phenomenon known as Brewster's Fringes is not a defect of the glass, and can occur with any glass of high optical and surface quality. This phenomenon is a result of the high quality now being achieved world wide by modern methods of glass manufacture. Brewster's Fringes occur if wavelengths of light meet up with each other when they are exactly 180° out of phase - an example of the phenomenon known to physicists as the interference of light.

The effect is similar to, although usually much smaller than the interference fringes which can sometimes be seen on toughened glass windscreens.

Brewster's Fringes occur when the surfaces of the glass are flat and the two panes of glass are parallel to each other, i.e. when the light transmission properties of the installation are of a very high order. This phenomenon is not a defect of the product, being dependent on the laws of physics and not on the quality of the insulating glass. In fact it arises because modern glass made by the float process is flat, therefore, free of the distortion inherent in sheet glass.

The occurrence of Brewster's Fringes is in its nature rather like (though very much more than) the fact that under certain conditions, the observer will see a reflection of himself in any window or door and no-one could claim that this was a defect of glass.

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**NOTE: Patterned Glass - the above criteria do not apply to patterned glass as, due to the method of manufacture, imperfections such as seeds, bubbles are deemed to be acceptable.**

### ***curved toughened glass***

The glass will be toughened to a similar standard as BS 6206 Class A but no standard exists for curved toughened glass. Glass will be marked with the ngn toughening stamp and any regulatory requirements. The mark to be on each glass usually near a corner.

### ***curved shape capability***

Rectangles and simple rakes. All tolerances will vary depending on complexity of shape.

### ***edge condition***

Smooth ground edges giving a flat profile with small ground arris. Shells or chips at edges will be ground out prior to toughening and do not constitute reason for rejection. Corners may be dubbed. Some variation in edgework may be discernible on exposed edges where different machine and/or hand forming is a requirement for manufacture. Such variations shall be kept to a minimum.

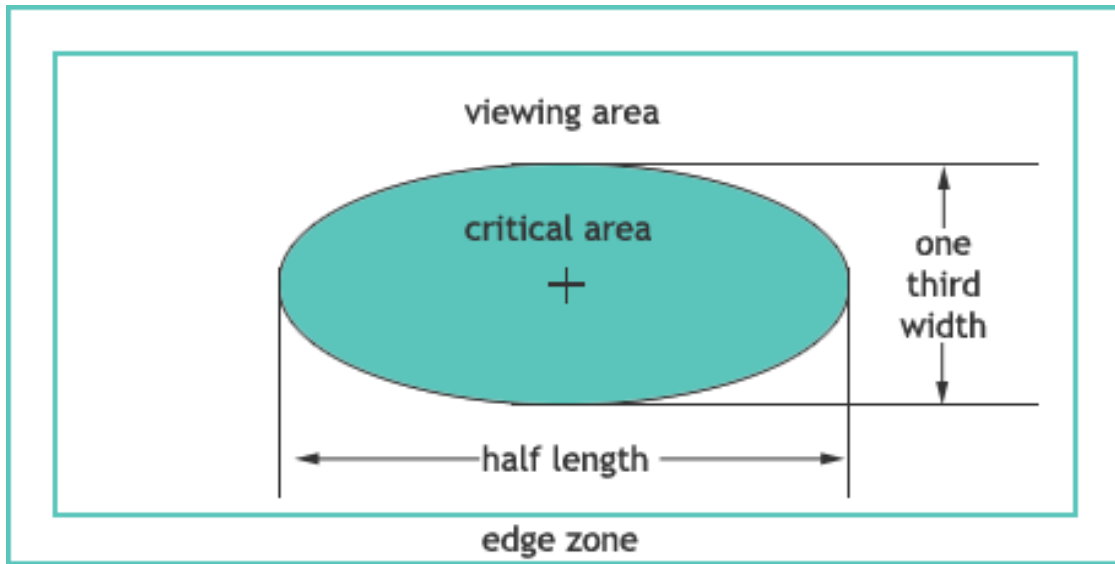
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## Diagram showing critical and viewing areas and edge zone



### **viewing area**

1. Scratches and sleeks not visible from 2 meter viewing distance acceptable.
2. Bubbles and inclusions not greater than 2.0mm at least 150mm apart acceptable.
3. Occasional white scars near to edge zone acceptable.

### **critical area**

1. Fine scratches and sleeks not visible from 2 meters acceptable.
2. Bubbles and inclusions up to 1.5mm at least 150mm apart acceptable.
3. No white scars permitted.

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