Curved Glass Dimensional Tolerances

A tolerance of +/- half of the thickness of the glass to a maximum of +/- 6mm is required by Glasshape in accordance with industry standards. There are no standards as such for curved glass as there are with flat glass but Glasshape manufactures to the guidelines accepted internationally and by the Glass and Glazing Associations which are accepted as an industry standard.

Glasshape bends glass by either heating and rolling the glass while in a plastic state, or by the process of “sag bending” which has been evolving for many years now. Glass is a visco-elastic material whose mechanical properties change rapidly when heated between 600º and 700º C becoming a plastic substance. (The science of glass bending uses this plastic phase to produce shapes which are both complex yet free from wrinkles and other optical aberrations starting from flat float glass.)

Optical distortion sets the limit for most shaping. All bending requires precise control of stress levels to ensure the product meets regulatory, environmental, robustness and optical requirements. A degree of distortion, both when looking through and in reflection, is inevitable in curved glass, particularly when viewing a moving object through the glass.

All curved glass should be site inspected from a minimum distance of 3m and viewed at right angles to the glass. It should also be noted that curved glass will split direct sunlight into striped shadow. Some variation in edgework may be discernible on exposed edges where different machine or hand forming is required for manufacturing. Such variation will be kept to a minimum.

Glazing of Curved Glass

Standard glazing techniques for flat glass also apply to curved glass with added consideration of the following:

- Glass radius and rebate radius are rarely exactly the same. Additionally radius at head may differ from that at the sill. Rebate needs to be of sufficient size to accommodate all variances. Where variances occur wet seal is recommended.
- For annealed curved glass and annealed laminated glass wet seal is the preferred method of glazing to avoid breakage from over tight wedge.
- Attention needs to be paid to the frame that the curved glass is being glazed into. In particular attention to the blocking of the frame into the sub-sill in the center of the bow, as this area may droop over time if not blocked sufficiently.
- Setting blocks and distance pieces: Same as for flat glass with the exception that a central setting block/s may be required to avoid tipping, depending on the radius.
- Curved glass vacuum lifters are recommended for assisting with moving the glass into position. Note that flat glass vacuum lifters are not recommended for use on curved glass as they may lose their vacuum suddenly.
Reflection
As a standard IGU has four reflective surfaces, a higher level of reflectivity occurs and multiple images in reflection may be created. This will be more apparent when viewed on an angle to the glass and is an inherent property of the unit.

Due to the sealed airspace of an IGU differences in temperature and atmospheric pressure from the time of manufacture will cause the IGU to act as a lens. This can cause significant changes in the images reflected from the windows due to glass deflection. The appearance is of a convex distortion when the glass is bowing outwards and a concave distortion when bowing inwards. The effect will be more noticeable when reflective coatings are incorporated within the IGU, and in larger units. These distortions are a result of the laws of physics and cannot be eliminated.

Haze
Haze is the scattering of light rays when visible light passes through a transparent material. The amount of haze in ordinary glass is very low and is not detected by the human eye.

High performing IGU’s often incorporate Low E coated glass. With any coated glass it is possible to see the presence of the coating under certain lighting conditions. When bright sunlight shines directly onto partly shaded, coated glass and there is deep shade on both sides of the glass, haze may be visible and usually has the appearance of a blue-grey film or dust on the glass. The shaded area will be free of the effect, giving a clean appearance in the shadow.

The effect will be more noticeable on some types of coated glass than on others. Vacuum or sputter coated Low E glass products generally have a very low amount of haze, Pyrolytic coatings tend to have higher levels of haze that can be more readily seen by the human eye. Haze is not a manufacturing flaw, rather an industry known and recognised inherent feature of IGU’s.