Thermal Cracks

It is important to understand that a sealed unit is just that! Sealed. Therefore, at the point of sealing the unit, the volume of air trapped inside the sealed unit is fixed. It will expand and contract under the influence of temperature and pressure. When ambient conditions change due to weather, the volume of air will change causing the sealed unit to exhibit
inwards and outward movement of the glass or spacer or both.

Deflection is a phenomenon common to ALL sealed units. It can manifest itself either as
deviation of the glass, resulting in a distorted reflection, as an inward or outward deviation of the spacer bar or in extreme cases the sealed unit may crack – particularly on fanlight size units where decorative products have been applied to one of the panes such as bevels, lead or film.

With hot melt sealing systems, the air is rapidly heated and therefore expands, escaping from the internal unit until sealed off. This is exacerbated in smaller units such as fanlights where the edge seal temperature affects the whole volume of air within due to it's
closeness to the centre of the unit. Whereas on larger units, such as patio doors for
example, the edge seal is further away from the centre of the unit and has less influence via heat on the total volume of air within the sealed unit.

The most common type of deflection reported is inward deflection of the glass or spacer bar. This will be most pronounced on a cold winters day with high barometric pressure on a unit manufactured in a warmer environment (such as a warm factory or during the summer months) with a warm edge seal and low ambient pressure. These conditions give rise to the greatest difference in pressure between the internal volume of air within the greatest
difference in pressure between the internal volume of air within the unit versus the
external pressure on the unit. The greater the pressure on the outside of the unit causes the glass to flex inwards.

In these cases, especially when the daytime sun temperatures are high and the night time temperatures are low, (usually autumn and spring weather changes), inwards deflection can result in breakage. These tend to occur on decorative fanlights more due to the
influence on the surface of the pane of glass with the decorative additions. This is because the pane with the decorative additions cannot flex in the same way as the clear pane and as the pressure alters between the inside and outside of the sealed unit, the glass that has reached the full extent of its flexing capability breaks with a characteristic arc.

It is impossible to eliminate deflection completely and in extreme weather conditions of low temperatures and low pressures, the units have to contract as they also have to expand in periods of high temperatures and high pressures. It is a physical fact as sure as ice melts and freezes.