

# Atmospheric Pressures on Sealed Insulating Glazed Units

When sealed units are manufactured, the panes of glass are flat and separated by a spacer around the edges. A quantity of air (or other gas) is trapped inside the unit. The nature of sealed units requires that the seal is sufficiently good to stop moisture vapour from gaining access to the interior of the insulating unit and forming condensation. Any sealing system, which performs this function adequately, will also prevent any other gas from entering or leaving the interior of the insulating unit.

The pressure within this unit, will be determined by the atmospheric pressure on that particular day and the gas temperature. As a consequence of being sealed and with a particular pressure inside, there are changeable external forces that may cause the glass to move from its original plane.

Outside of the IGU, atmospheric pressure varies greatly, as high and low pressure systems come and go. The variation in pressure is commonly between 950mbar for the deeper low pressures and 1030 for high pressures.

With the cavity being warmed by the sun and these varying pressures, the forces achieve an equilibrium by moving the glass panes in and out. I.e. if glazed with low pressure and a high pressure weather front moves in, the panes of glass will be pushed together. If glazed on a high pressure day and a low pressure front is present, the pressure inside will push the panes outward. This movement may show up as distortion within the pane.

Warm gas temperatures within the cavity will increase the pressure in an IGU and cold gas temperatures reduce it.

e.g.

If high pressure on a cold day the panes will likely 'dish' inwards.

If low pressure on a warm day then the panes may bellow out.

If high pressure on a warm day there will be less noticeable movement.

If low pressure on a cold day, then there will be less noticeable movement.

If the glass is stiff in relation to the size of pane, for instance in smaller sizes of unit, then the pressure differential generates stress in the glass. This stress, sustained over the period of the weather system which generated the pressure differential, can be sufficient, in some cases, to cause a fracture of the glass. This is more likely to be the case if the edge seal is a rigid material since this helps to stiffen the glass. Breakages can occur however in units with more flexible seals. If the movement is large or the spacer bar is small, the glass can touch, in some circumstances causing breakage.

If the glass is relatively flexible, as with larger pane sizes, the pressure imbalance causes deflection of the panes, pushing them inwards (or outwards depending on the direction of the pressure imbalance). The edges of the panes are, however, attached to each other by the edge seal and cannot move apart (or together) so the unit becomes bowed (or dished) and reflections in the glass become distorted.

One way to eliminate this effect is to balance out the areas. Obviously this should be undertaken whilst no extreme weather was currently in force around the area where the glass has been glazed, otherwise the problem is not likely to be remedied. Techniques applied by some installers involve creating a small hole from the outside to the inside of the sealed unit, the pressures will balance instantly, and the unit is then sealed up. Usually there would be sufficient desiccant within the unit to 'dry' out the air exchange unless the equalization is done at a time of particularly high humidity.

Where glass is being transported at very high or low altitudes, the extremes of pressure should be carefully factored to ensure no damage is caused to the IGU or its seals. Breather tubes are sometimes employed to balance out any difference in pressure whilst the glass is being transported, upon arriving at its final destination they are removed and the unit can then be sealed permanently.

Careful consideration of any warranty or guarantee on the sealed unit should be considered and any detriment to said guarantee/warranty should be fully discussed with the client prior to any action or work being undertaken. Equalisation carried out by someone other than the IGU manufacturer is likely to invalidate the warranty.