

Troubleshooting Guide -



External condensation and related effects on sealed units

With the cold clear nights, low sun and damp bright mornings autumn is truly upon us, but along with the spectacular beauty of the turning trees comes a potential problem for installers - mysterious patterns of condensation and even ice appearing on hitherto unblemished sealed units. Disappearing within a few hours of sunrise for most householders these transient effects don't present a problem, quite the opposite in fact, this provides a healthy sign that the glass is doing its job.

However we understand there will always remain a few customers who, previously completely satisfied with their installations often can become alarmed or concerned that they have faulty product installed. Usually this is simply a lack of understanding of the product and processes involved – I believe providing that understanding most problems can be alleviated before they arise.

Here follows therefore an explanation of these temporary and harmless visual phenomenon, hopefully to the benefit of the customer as well as your sales staff and customer service teams.

Why does condensation form on the *outside* of my windows?

Under particular weather and temperature conditions dew or frost forms on any unheated surface whether that be the ground, roofs, car windows etc. Regarding domestic glazing, in the past this effect may have been less pronounced or not at all, because inefficient sealed units or single glass have let heat escape from the inside of the house to the outside, thus warming the outer leaf slightly. Even relatively modern double glazing can 'leak' heat to warm the outer leaf sufficiently, and when this is the case condensation will not form.

As glass technology moves on however, performance levels are such that an *EnergiMAX*[™] or similar unit is around 5 times more efficient than single glazing and over 50% better than conventional low E glasses such as Pilkington K. With triple glazing we can technically make a unit that is TEN times more insulating than single glass, such that heat loss through the unit is virtually zero.

With the rising popularity of these unit configurations, especially in A-rated installations, the heat loss is absolute minimal. It therefore follows that the outer leaf remains cold, and therefore it is likely that for some of the colder months of the year condensation, and even ice may form on the outside of your windows.

It's important to note that this is a completely natural and understandable phenomenon, it does not harm the installation and will disappear as the day warms up. It's simply the laws of physics at work – condensation and dew are attracted to cold, smooth surfaces.

Why do I see a 'border' effect?

Sealed units are at their most efficient at the centre, where the cavity, coatings and inert gas filling best do their job. Towards the very edges, the spacer bar and the window frame itself can themselves conduct a little more heat than at the centre. We offset this by the use of warm edge spacer bars and thermal frame inserts, but this slight extra transmission of heat as well as that radiated from the frame is sufficient to create a warmer edge and thus a condensation free border at edge of the glass.

Why are not all windows affected, they were all installed the same time?

Local 'microclimate effects' can be responsible for differing effects on even adjacent units. Trees, shrubs, overhangs can all block off part of the night sky, and insulate the glass slightly. Some windows maybe shaded for fractionally longer when the sun rises, or some may be closer to internal heat sources or ventilation. Many of these factors would simply not be noticeable to the untrained eye, but certainly you will see differing effects on the different elevations of your building.

I can see small marks, clear patches or even circles in the condensation?

These aren't faults, neither are they permanent, they are just surface effects are from the various bits of equipment that have come into contact with the glass both here and at the glass manufacturing plant itself. Microscopic layers of film residue from cork pads, suction cups etc, and even hand or finger prints will show up when condensation forms on the glass. They are external effects which will disappear over time and has no effect on the performance of the unit.



fig 1 –
External
condensation
, border
effect and
pad residue
on A Rated
EnergiMAX™
DGU
installation

I've got *internal* condensation, why is this?

The use of highly efficient sealed units has vastly reduced the incidence of internal condensation, largely due to the same physics which causes external condensation. As we have seen *EnergiMAX*[™], units prevent the heat from escaping, or put another way stop the cold from 'getting in'. For this reason the internal face of the glass is much warmer than it otherwise would be, and condensation is less likely to form. The exceptions to this may be the perimeter effect, whereby more cold 'gets in' around the edges of the glass, thus allowing condensation to form at the edges or corners in extreme cases.

Again, the use of warm edge spacer bars largely eliminates this; however as with any internal condensation **good ventilation** is the key. Regardless of how good the window system is therefore, excessive volumes of moisture in the air from drying clothes, bathrooms, cooking etc may ultimately end up forming as condensation on your glass.

In Summary

Condensation, and in very cold scenarios, ice can form on the external pane of some modern glass units. Likened to snow settling on a well-insulated roof, this is a sign that your new windows are doing the job you bought them for, to retain heat in the home and to save money on heating bills.

The extent to which external condensation is seen depends on the many factors including the weather, temperature, geography – both micro and macro, and the type of glass fitted. Broadly speaking the warmer the temperature and the *worse* performing glass you have, the less condensation you will see.

In the meantime, living in the UK however, we have both an interested and varied climate, coupled with a binding legal requirement to fit ever increasingly efficient window installations, and a customer driven demand to save energy and to 'go green'

For these reasons it is clear that external condensation and ice are here to stay, for the meantime at least. We are far better to embrace these transient visual effects as a sign of lower fuel bills and better green credentials, than to fight against them.