



THE CHALLENGE OF REPLACING WINDOWS IN LISTED PROPERTIES

By Andrew Madge, Managing Director of Gowercroft Joinery

Finding appropriate replacements for old and degraded single-glazed windows in heritage and listed properties can be a challenge, particularly when trying to combine building conservation requirements with modern lifestyle aspirations.

When the original wooden window frames are too rotten to be repaired, the traditional approach has usually been to specify like-for-like handmade single-glazed timber replacements, which usually means having to accept a relatively poor level of thermal and acoustic performance or opt for secondary glazing solutions to compensate.

In an ideal world, most of today's owners of old and period properties would like to benefit from modern performance standards, including durability, sustainability and a good level of energy efficiency, in order to create a pleasant living environment

but without spoiling the original aesthetic.

Energy efficient double-glazing

Although superior energy efficiency can be achieved through standard factory fitted double-glazed units (typically with a 16 – 20mm Argon filled cavity), the giveaway 'double shadow' on the glazing and the thicker profiles required to accommodate heavy double-glazed units are almost invariably unacceptable for period properties.

This has led to the popularity of 'low sightline' slim double-glazing, which aims to combine some of the features of a slim window with better thermal performance. This is achieved by using a heavier inert gas such as Krypton or Xenon to reduce the thermal conductivity sufficiently to create an effective smaller cavity in between the

panes. The sightline, (which is the area from the edge of the glass to the top of the spacer bar), is typically reduced to just 5-6mm to allow thinner window sections.

However, this type of window is now the subject of debate, not least within the Glass and Glazing Federation (GGF), because in order to achieve such a slim sightline it is necessary to reduce the amount of sealant and desiccant used in the perimeter of the unit. This can cause instability and increase the likelihood of unit failure. In fact, there is an ongoing discussion as to whether some of these units even comply with the Construction Products Regulations (CPR)¹.

As a result of these still unresolved matters, striking the right balance between performance and aesthetics has become even more challenging and complicated for specifiers.

1. <https://www.ggf.org.uk/low-sightline-insulated-glass-units/>. 2. https://www.changeworks.org.uk/sites/default/files/Double_Glazing_in_Listed_Building.pdf

Vacuum glazing

An alternative option which is now beginning to attract interest in the heritage sector is 'vacuum glazing', where all the air is extracted to form a vacuum cavity between a pane of low emissivity (low-e) glass and a pane of clear float glass. With no air or gas between the panes, there is nothing to transfer heat, so the energy efficiency is much greater. The same applies to sound.

Originally developed in Japan twenty years ago as a lightweight, energy efficient solution for buildings in earthquake zones, Pilkington Spacia™ is the first commercially available vacuum glazing in the UK, which offers U-values of 1.1 W/m²K on its standard units and as low as 0.9W/m²K on its higher performance Spacia™ Cool units.

With a total thickness of 6.2mm, (the vacuum cavity being just 0.2mm), it is roughly a quarter of the thickness of a conventional double-glazed unit and half the thickness of a typical slimline double-glazed unit. It is also approximately two thirds of the weight, which makes it narrow and light enough to fit into most existing timber window frames without any discernible double reflection.

However, the vacuum process can only be achieved by creating a hole in the inner pane, which is located 50 mm from the edge of the glass and covered by a permanent 12 mm black plastic cap. For some conservation officers, this can be a distraction, but for many others it is barely noticeable behind the curtain sweep. Similarly, the 0.25 mm micro-spacers, which sit at 20mm intervals to keep the two panes a fixed distance apart, are visible on close inspection, but not in day to day use.

The sustainability of a glazed unit imported from Japan could also potentially be challenged, until one considers that the embodied energy required in the production of inert gasses used in the manufacture of most conventional double glazing is far higher than the energy involved in global shipping.²

Despite its imperfections, vacuum glazing technology is now opening up opportunities for architects and specifiers looking to replace the glazing on old windows, whilst preserving as much of the original joinery as possible. It is also being adopted by specialist joinery companies wanting to create traditional looking windows with modern performance benefits for those period homes where the original frames cannot be salvaged.

A modern period window

As modern methods of fabrication can so easily destroy the overall aesthetic that conservation officers are trying to preserve, it is vitally important that any thin glazing solution is combined with traditional joinery and hardware, and that any modern performance enhancing features are as un-intrusive as possible.



Glazing comparison table

Single Glazing	Double Glazing	Slim Double Glazing	Vacuum Cavity Glazing
4-8mm thick glass which can be float, crown or cylinder depending on the production method.	Two sheets of 4-6mm float glass separated by a spacer bar. Space between two panes (cavity) typically 16-20mm and filled with inexpensive inert gas.	Two sheets of 4mm float glass separated by a spacer bar. Cavity between glass panes is reduced to 4-6mm and filled with more expensive inert gas.	An inner pane of clear float glass and an outer pane of low-e glass separated by microdots. Cavity between glass panes is reduced to 0.2mm and air is extracted to give a vacuum.
Pros: <ul style="list-style-type: none"> • Traditional, with no double reflection • Inexpensive • Long lifespan 	Pros: <ul style="list-style-type: none"> • Inexpensive • Good energy efficiency • Moderate lifespan 	Pros: <ul style="list-style-type: none"> • Limited double reflection • Moderate energy efficiency 	Pros: <ul style="list-style-type: none"> • No discernible double reflection • Good energy efficiency • Better sound insulation • Long lifespan • Ultra-thin glazing: Pilkington Spacia™ is 6.2mm.
Cons: <ul style="list-style-type: none"> • Poor energy efficiency • Poor acoustic performance 	Cons: <ul style="list-style-type: none"> • Non-traditional with pronounced double reflection • Heavier and thicker glazing typically 24mm requires larger frame sections 	Cons: <ul style="list-style-type: none"> • Poor lifespan • Expensive • Limited unit size 	Cons: <ul style="list-style-type: none"> • Plug on face of unit and tiny microdots within glass • Expensive

Gowercroft Joinery is the first window manufacturer to have incorporated Pilkington Spacia™, into a traditionally crafted range of Heritage windows made with modern materials like Accoya®, (a modern modified timber whose cellular structure has been treated to increase its durability, stability and longevity) sprayed with a unique formulation of protective paint, guaranteed to deliver zero maintenance for 10 years.

Whilst the range does not claim to use real putty to secure the glass panes like the windows of yesteryear - in a modern high-performance window this would be incongruous - the putty line is replicated in the outer profile. Although more regular looking than traditional putty, it does significantly improve security and coating longevity. Similarly, modern seals that are designed to keep the windows weather-resistant are neatly concealed within the joinery.

Arguably, any attempt to provide an acceptable modern solution for a listed property will involve some degree of compromise.

The perfect window for 'modern living' in a heritage home may not yet have been designed to everyone's satisfaction, but conservation officers, specifiers and owners of listed properties do now have options, including some highly functional, future-proofed and genuinely sympathetic modern products.

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