

The challenge of replacing heritage windows

Owners of listed properties have long searched for appropriate replacements for old single-glazed windows.

When the repair of an existing window frame is impractical, home owners require replacements that closely match the look of the originals, but in an ideal world most people would also like to have the benefits of modern performance, durability, sustainability and a good level of energy efficiency to create a pleasant living environment.

Those listed property owners who opt for exact like-for-like single-glazed replacement timber windows often have to compromise on the comforts of thermal and acoustic performance or else opt for secondary glazing solutions to compensate.

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 often considered to be aesthetically unacceptable for period properties.

This has led to the popularity of 'low sightline, slim double-glazing', which aims to combine the aesthetics of a slim window with better thermal performance. This is achieved by using a more dense inert gas like 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 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 much 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 a number 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 a more challenging and complicated matter for owners of listed properties.

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 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, (and the vacuum cavity being just 0.2mm), Pilkington Spacia™ 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 its 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 homeowners this can be a distraction, but for others it is barely noticeable. 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.

The sustainability of a glazed unit which is imported from Japan can also be questioned, 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 opening up all sorts of opportunities for homeowners looking to preserve as much of the original joinery as possible. It is also being adopted by some specialist joinery companies wanting to create traditional looking windows with modern performance benefits for those period homes where the original frames cannot be repaired.

Gowercroft Joinery is the first window manufacturer to have embraced Pilkington Spacia™ by incorporating it into its Winston sliding sash and Richmond casement windows. These are made from Accoya®, a modern modified timber whose cellular structure has been treated to increase its durability, stability and longevity and then sprayed with a unique formulation of protective paint guaranteed to deliver zero maintenance for up to 10 years.

As modern methods of fabrication can so easily destroy the overall aesthetic that conservationists are trying to preserve, it is vitally important that any thin glazing solution is combined with traditional looking craftsmanship and hardware, and that any modern performance enhancing features are as unintrusive as possible.

For instance, instead of using real putty to secure the glass panes, Gowercroft has replicated the putty line with its outer profile, which is more regular looking than traditional putty but significantly improves security and coating longevity. Similarly, modern seals designed to keep the window weather-resistant are neatly concealed within the joinery.

Any attempt to provide an acceptable modern solution for a listed property inevitably involves some degree of compromise so, although the perfect window for 'modern living' in a heritage home may not have been delivered to everyone's satisfaction yet, listed property owners do have options, including some highly functional, future-proofed and genuinely sympathetic modern products.

Continued >>

SINGLE GLAZING

4-8mm thick glass which can be float, crown or cylinder depending on the production method.

Pros:

- Traditional, with no double reflection
- Inexpensive
- Long lifespan

Cons:

- Poor energy efficiency
- Poor acoustic performance

DOUBLE GLAZING

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.

Pros:

- Inexpensive
- Good energy efficiency
- Moderate lifespan

Cons:

- Non-traditional with pronounced double reflection
- Heavier and thicker glazing typically 24mm requires larger frame sections

SLIM DOUBLE GLAZING

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.

Pros:

- Limited double reflection
- Moderate energy efficiency

Cons:

- Poor lifespan
- Expensive
- Limited unit size

VACUUM CAVITY GLAZING

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:

- No discernible double reflection
- Good energy efficiency
- Better sound insulation
- Long lifespan
- Ultra-thin glazing: Pilkington Spacia™ is 6.2mm

Cons:

- Plug on face of unit and tiny microdots within glass
- Expensive

For more information about

Gowercroft Joinery

Tel: 01773 300 510

Fax: 01773 300 511

info@gowercroft.com

www.gowercroft.co.uk

For more information about Pilkington Spacia™ visit www.pilkington.co.uk/spacia

¹ Link to GGF statement: <https://www.ggf.org.uk/low-sightline-insulated-glass-units/>
The Construction Products Regulation (CPR) became law in 2013 and requires all glass units to comply to the harmonised European standard EN-1279-5. By reducing the edge-seal sight line of the units to 5-6mm, manufacturers are increasing the difficulty of achieving all of the required testing for EN-1279-5 standard; as there is reduced space in a low sight line unit for sealant and desiccant around the perimeter of the unit. The increased breakdown rates of low sight-line double glazing were highlighted in a Guest Blog on The Double Glazing Blogger in 2017 and this caused a lot of discussion in the industry. There also evidence of a significant drop off in U-value over a 12-month timescale in the Changeworks Report; Double Glazing in Listed Buildings.

For more information of gas retention in slim line double glazed units:
https://www.changeworks.org.uk/sites/default/files/Double_Glazing_in_Listed_Building.pdf
Research report 2: Thermal performance Report commissioned by Changeworks on behalf of Historic Scotland, March 2010.

² https://www.changeworks.org.uk/sites/default/files/Double_Glazing_in_Listed_Building.pdf



Richmond flush casement and heritage-style doorsets made from Accoya® with Pilkington Spacia™ currently only installed to the left hand side of the property.



Interior view of Richmond flush casement with Georgian glazing bars. Pilkington Spacia™ glass with no discernible double reflection.



Case Study: Replacement windows at Harvington Hall Farmhouse

Harvington Hall Farmhouse is Grade II Listed property, which is located to the east of Harvington Hall, a Grade I listed medieval and Elizabethan moated manor house.

The old farmhouse is believed to date from the early 17th Century, though parts of the building had been remodelled c1700 and extended in the mid-19th Century. However, some late 20th Century alterations have been made, including low quality softwood casement windows with glazing bars and steel side hung casement windows from the 1950s, which were generally in poor condition.

The existing timber window frames were swollen and difficult to open. There was significant decay due to the high internal humidity, mainly was caused by condensation forming on the inside of the single glazing, which had to be cleaned down regularly to avoid moisture pooling on the cills.

According to the owner, the whole house smelt of damp, was always cold and the air inside was stale and musty.

Various options for the windows were reviewed with the local conservation officer, including the repair of the existing timber frames coupled with secondary glazing or the introduction of slimline double-glazed units, which were considered possibly too heavy for the existing frames.

The pre-application advice had listed Pilkington Spacia™ as an approved glass for the refurbishment of certain listed buildings, as the 6.2mm vacuum glazed units were the slimmest available that could fit into the existing frames. However, as the timber frames were so very badly degraded, it was decided that completely new windows would be the most sensible option.

Having decided to use vacuum glazing, the owner got in touch with Gowercroft Joinery, a Pilkington Spacia™ dealer which specialises in the manufacture of high-end windows with a traditional hand-crafted aesthetic.

After discussing the project, it was apparent that their Richmond flush casement would be a good fit, as it had an overall sympathetic period look with slender sections and traditional styled ironmongery. Modern features required for the performance of the window like the seals and gaskets were neatly concealed within the joinery.

The planning application was passed without issue and a total of 25 Richmond casement replacement windows and two heritage-style doorsets were installed in Accoya® with Pilkington Spacia™ glass.

The impact of these changes to the fabric of the building has been positive, bringing a unity to the fenestration and, according to the owner, the air feels "healthier" and the house is warmer and more comfortable. 🌿