Replacing outer glass (includes vacuum and insulation glazing)

Author: Author: Jørgen Rose (SBI)

Windows

What is the solution?

If the historical glazing is damaged, if it is not possible to install an additional window level or if the standard requires the use of safety glass, the historical glazing must be replaced. As this is destroyed in the process, the method should only be used if the steps already described are not enough to meet today's requirements. After removing the window putty, a new insulating or thermal insulation glazing can be installed. It is important to ensure that the new glazing is adapted to the historical window construction with mullions, transom and skylight. The renovation of the single window results in the greatest energy savings in comparison. If the window construction is to be retained as a single window construction, the replacement of the historical glazing is often unfortunately unavoidable.

Why does the solution work?

Replacing the outer glazing in the window can be done using different types of glazing. If the renovation requires as little change as possible to the appearance of the building from the outside, the new glazing should as far as possible be the same as the original. In this case, the new solution will have the same characteristics regarding energy as the original solution, however there may be an increase in the overall air tightness of the building. If slight changes to the appearance are acceptable the replacement glazing can be chosen as thermal insulating glazing, e.g. a slim 2–layer solution that significantly will improve the energy characteristics of the window. If the existing window is either a box type window or has a coupled frame, the energy improvement of replacing the outside glazing with a new 2-layer glazing will be relatively low. Therefore, 2-layer solutions should generally be chosen for situations where

there is only 1 layer of glazing in the original solution.

Description of the context:

Holyrood Park Lodge is a Category B listed Victorian lodge building built in 1857 in a neo-gothic style, located in a prominent position at the entrance to Holyrood Park in Edinburgh. Primarily designed for the constables who policed the Royal Park, it is bounded by the Palace of Holyroodhouse on one side and the Scottish Parliament on the other. Since 2007 the lower floor hosts visitor information and shop center for the Holyroodhouse area.

Pros and cons of the solution:

Pros: Air tightness will most likely improve; Double-glazed units replacing single-glazed units will significantly improve the energy aspects. Cons: Replacing the glazing will alter the appearance of the building from both the outside and the inside.

Additional information about the solution:

In Hollyrood Park Lodge the frame of the existing windows was in good condition and therefore the decision was made to keep them. The glazing was replaced by new slim-profile double-glazed units, which significantly improved the energy characteristics of the windows without changing notably the appearance. The U-value is reduced by approx. 70% while the new glazing also improves the indoor climate by removing draughts.

Available pictures or puplications of the solution:

New windows seen from the outside. Image: Historic Environment Scotland.

New glazing units added to Holyrood Park Lodge. Image: Historic Environment Scotland.

New windows seen from the inside. Image: Historic Environment Scotland.

	Existing window	Refurbished window
Type	Single window	Single window
Glazing – Inner		
Glazing - Outer	Single	Double (slim-profile)
Shading/shutters		
U_{window}	4.48	1.26
$U_{glazing}$	5.8	0.8
U_{frame}	2.3	2.3
g-value	0.86	0.50
Air tightness	Single sealing	Single sealing
Installation year	1858	2017

Basic energy properties of windows before and after renovation.

Holyrood Park Lodge. Image: Historic Environment Scotland.

HPL Draught stripping

Link to best practice example (Hiberatlas):

https://www.hiberatlas.com/en/holyrood-park-lodge--2-120.html