Repair or replace lost shutters

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Windows

What is the solution?

Internal and external shutters are a very common technical element in the original configuration of historic buildings: they add character and aesthetic appeal to the interiors and the façade of the building. Some traditional windows have both shutter systems. These elements, simple but highly effective, have long been used to reduce thermal gains from solar radiation during the summer season, when windows receive direct sunlight, and to cut down heat losses from transmission and ventilation in winter (by up to 51%). The first admissible action for shutters is to repair them. Overhauling and repairing existing shutters helps to reduce energy use. Sometimes it is just enough repainting them and reintegrating or reinforcing the parts that have undergone a serious process of decay and adjusting the hardware. Where shutters have been removed but the framing and housing remains, the option of having replacement shutters custom made can be considered. A new shutter can be made according to traditional joinery techniques, preferably with wooden material, already used in the past to make historical shutters thanks to its good insulating properties. New wooden shutters can also be insulated and draughtproofing incorporated to further improve the energy efficiency of the opening system (thermal shutters). For example, Paul Baker, in the “Technical paper 1”, used an environmental chamber to measure the U-value of seven different retrofit measures including a traditional shutter and a modified one with a Spacetherm insulation blanket (with super insulating “silica aerogel” particles) of 9 mm thickness inserted into panels and covered with plywood (insulated area was 55%). Both measures had a strong impact in reducing the heat flow through the glazing. The traditional shutter showed a 51% reduction in heat loss, while insulating the panels of the shutters produced an

improvement of 60% and a U-value equivalent to low emissivity double glazing.

Why does the solution work?

The performance of shutters in reducing energy use for heating and cooling applications is a function of the style, type and size. Generally speaking, in the cold season external shutters slightly reduce the night-time heat losses preventing leak of the accumulated heat during the day. In the warm season they help to mitigate summer overheating: during the day they are closed when there is a greatest sun exposure, and then they are reopened in the evening to favour the leak of accumulated heat. Internal shutters, on the other hand, have the function of insulating the window during the cold season, maintaining heat inside the building. These are not very effective in reducing summer heat gain because they intercept solar radiation only after passing through the glass pane. Both types of shutters, once closed, improve users' safety, privacy and the U-value of the window, but they block the incoming natural daylight. In addition, shutters can also help to reduce external noise levels. From the conservation point of view, repair or replace lost shutters does not involve a loss of historic character: it is therefore a low impact solution for the heritage.

Pros and cons of the solution:

Pros: cheap solution if shutters are already installed; external shutters protect against both solar gain and heat loss and provide security and weather protection; internal shutters are good at reducing heat loss but are less effective against heat gain; they increase the thermal resistance of the window; they improve users' safety and privacy; they offer reasonable noise protection; they improve thermal comfort in hot climates and summer seasons; they improve solar control of the façade (higher for external shutters and lower for internal shutters); very low impact on heritage. Cons: closed shutters preclude the entrance of natural light; lack of privacy when shutters are open.