

Conservation Guidelines Windows

Foreword

This series of booklets has been produced by the Department of the Environment to increase awareness of the value of our architectural heritage and to provide information on the basic principles and methods of conservation and restoration.

The titles in the series are listed on the back of each booklet.

These texts are not intended to be comprehensive technical or legal guides. The main aim is to assist architects, builders, owners and others, in understanding the guiding principles of conservation and restoration. They will facilitate the identification of the most common problems encountered in heritage buildings, and indicate the best solutions. It should be appreciated that specialised aspects of conservation and restoration will require professional expertise and more detailed information.

The Department acknowledges, with appreciation, the efforts of the authors of the individual booklets, the Irish Georgian Society who coordinated their production, the Conservation Advisory Panel established under the Operational Programme for Local Urban and Rural Development and all others involved.

Summary of Conservation Principles

- Research prior to planning work
- Minimum intervention - repair rather than replace
- Respect the setting.

Summary of Conservation Procedure

- Research and analyse history of building
- Survey building and identify original material
- Plan work according to conservation principles
- Use experts where necessary
- Record all work
- Install maintenance procedures.

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Introduction

This booklet is concerned with the windows of historic or heritage buildings. This built heritage, whether commercial, institutional, public or private, contributes greatly to the character of urban and rural areas in Ireland. Irish architecture from the 18th century to recent times has had simple brick, stone or rendered facades, relying on the particular proportion and subdivision of windows to be the main aesthetic feature.

When the windows of the original design are removed or altered, the buildings are deprived of their character, and the streetscape suffers; often the wider context is affected as well.

Particularly at risk are the top floors of many town centre buildings which are frequently unused or underused; these houses are extremely vulnerable to insensitive conversion and inappropriate renovation.

Another unfortunate trend has been the loss of traditional windows in thatched houses; thatching itself has enjoyed a revival in recent years, but replacing traditional windows with double glazed units hardly seems necessary in buildings with such high insulation properties.

Replacement windows in period buildings, differing totally from the originals, are not unique to Ireland. However, the control of such replacements has been less rigorous here than in some other European countries,

where their use is strictly controlled, and in the case of some cities, like Stockholm, where they are not permitted at all.

Unsatisfactory replacement windows may come in the form of uPVC, aluminium, tropical hardwood or badly designed softwood windows. The most common replacement type is now the top-hung swing-out window which directly catches sky reflections. These, and other replacement types, often have unsightly plastic 'spacers' or 'inserts' in lieu of glazing bars.

Most modern replacement windows do not match the profile, character, materials or historical value of the original windows. The resulting amalgam of shapes and proportions can have a negative effect on our streetscapes and are generally unacceptable in period buildings and historic areas.

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Windows

Brief History

Until the early 18th century the most common window type in Ireland was the side hung casement with metal or wood frame, usually a cross-window with wood or stone mullions and glazed with a lattice or squared pattern of leaded glass. The sliding sash window evolved in France, Holland and England in the mid 17th century, and came into widespread use early in the following century in Holland, Britain, the North American Colonies and Ireland, where it became the dominant window type for almost three hundred years.

From the early 19th century, but especially in Victorian times with the Picturesque and Gothic Revival styles, casement windows began to make a reappearance. The mullioned cross-window was used in a variety of buildings from 'Gothick' castles to estate cottages, some with leaded lights, others made from cast iron, and others with the conventional timber glazing bar. Victorian architects relied less on the traditional proportions for glazing, but the proportions of window openings remained constant. Margin lights down the sides became a feature in houses of this period, commonly glazed with coloured glass in stairwell windows. In the provinces builders often held on to older styles after they were discarded by fashion conscious city-dwellers, so the occurrence of decorative fanlights, for

example, continued after the practice had ceased in Dublin.

The timber sash window remained the most widely used type all over Ireland until the mid 20th century. Double hung sashes were commonly fitted in Local Authority housing estates and public buildings until the 1950s, and more recently have been revived for infill development.



Typical timber sash windows

Timber casements of the first half of the 20th century, recognisable by their chunky proportions and liberal use of decorative leaded glass, and stained glass in top-lights, remain in many houses. Steel windows

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became more usual in the 1930s with the general embrace of modernism in architecture; the streamlined look of the time is reflected in the thin members of steel casement windows and their use of curved glass. Stock casement windows were made in Ireland until 1980, but lost out to the emerging aluminium window industry. This continues to happen, and the appearance of many buildings is detrimentally affected by the loss of their original steel windows.



Houses with original steel windows.

Glass

Handmade crown or cylinder sheet glass was used in the glazing of windows until the start of this century. These glass types are curved or rippled in appearance thus giving individuality to each pane, an effect impossible to reproduce in today's machined float or 'greenhouse' glass. Period glass adds immeasurably to the character of an historic building.

Fanlights

Fanlights were first introduced in the early part of the 18th century to allow more light into the hall and they soon became a standard element of the doorcase treatment. There was also scope for individuality and the designs were varied and intricate, the term fanlight coming from the resemblance of the patterns to ladies fans. The fluid and geometric designs in Ireland make a wonderful array; many of the styles are unique to this country. Owing to the widespread use of plate glass after 1845, glazing bars were often omitted in favour of plain glass fanlights.



Late 18th century fanlight and doorcase.

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Early fanlights were made of timber with radiating spokes and thick glazing bars; later, strong and light metal compounds were used. Glazing was usually done from the inside with the moulded bars on the outside (the opposite to sashes). These fanlights were never made in the stained glass manner with lead comes, but glazed into a zinc alloy skeleton onto which moulded lead was applied as a decorative finish. In most cases the fanlight had a glazed, rather than a solid central hub. Round headed windows should similarly have glazed hubs.



Round-headed window with incorrect solid hub



Round-headed window with glazed hub

Fanlights can be repaired, and should be if at all possible. If a new fanlight is necessary it should be made to the same design as the original, if known, or, if not, to the same period. Accurate copies can be made and these should be painted white or off-white to show off the delicacy of the design.

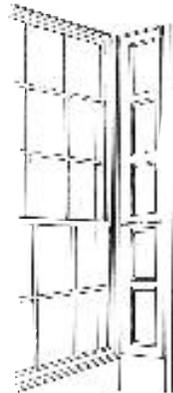
Design Elements and Faults

In the typical Georgian timber sash window the number of panes in the upper and lower sashes and the proportions of the panes themselves were all determined by adherence to classical proportions. Panes in a Georgian window should always appear to be vertical and the panes in each window should be the same size.

It was common for shutter panels to reflect the pattern of the window panes, particularly in Dublin houses. Therefore even if the original windows have been replaced it is usually possible to make an accurate restoration by using the information presented by the shutter panelling.

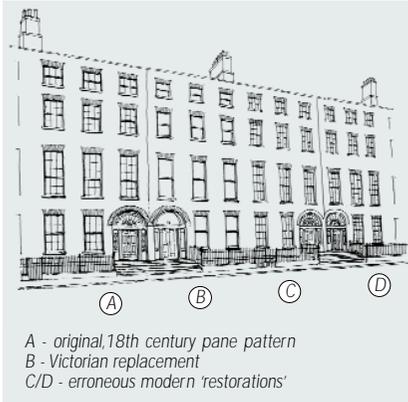


Incorrect six over six pane pattern in replacement window.



Correct nine over six pattern as evidenced by the shutter panels.

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Incorrect modern replacement

A common design error occurs when well-intentional modern restoration is not based on research, as illustrated in sketch above. The house on the left has the correct original pane pattern, at first floor level, of nine over six, corresponding to its internal shutter divisions. The next house shows the typical Victorian replacement of just two large equal sashes, made possible by the advent of plate glass. The other two houses have restored the small panes, but retained the Victorian division, resulting in the symmetrical but incorrect six over six in the third house and nine over nine in the fourth house. In this last house an incorrect nine over nine pane arrangement is shown on the ground floor as well.

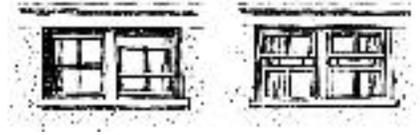
Opening casements

In traditional architecture the opening sections of casement windows were arranged

symmetrically, and, when closed, matched the profiles of the fixed lights. The insensitive replacement of traditional casement windows with asymmetrical opening casements and non-matching profiles should be avoided.



Traditional casement window Inappropriate replacement



Top hung opening lights (on the right) disrupt the visual integrity of buildings and terraces.

Top and bottom hung opening casements are unsuitable replacements for the traditional sash window and can completely disrupt the visual integrity of an historic building or terrace.

uPVC replacement windows

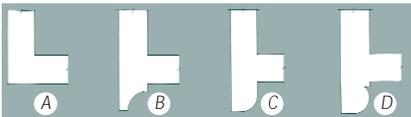
The visual impact of uPVC replacement windows is totally out of keeping with the design and character of historic buildings and areas and in such cases their use is inappropriate. The sealing effect of such

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windows on historic buildings can lead to condensation and all its inherent dangers.

Horns

There were no window horns (extensions to the bottom of the top sash) in the 18th century. They were introduced as a strengthening device when the glazing bars became lighter and it is a common error to incorporate them into 18th century restoration designs. Late Georgian windows sometimes have small (often convex) horns. Elaborate scrolled horns, associated with plate glass Victorian windows should not be used in the restoration of Georgian buildings.

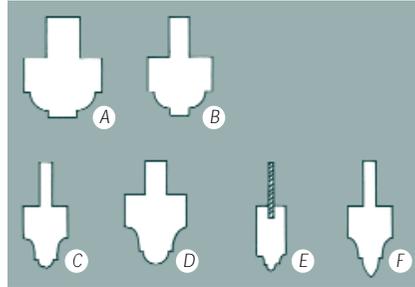


Horns

- A - 18th century: no horns
- B - 1820s: concave end
- C - 1830s: convex end
- D - 1860s: scrolled end

Glazing bars

The design of glazing bars or astragals varied from period to period and it is essential that the original design profile is adhered to in the restoration of a window. Original windows often survive at the rear of a building and elements can be copied, or suitable windows for copying may be found in a nearby house of similar date and scale.



Some Glazing Bar types

- A and B - early to mid 18th century
- C, D and E - mid to late 18th century
- Note composite metal/timber bar of example E
- F - early to mid 19th century

Roof lights

Traditionally, attics were lit by dormer windows, or small iron framed rooflights, the latter typically with one or two small panes. Large single pane rooflights, as illustrated below, catch sky reflections and upset the proportions of solid to void in Georgian buildings. Particularly, they should not be used on front elevations.



Inappropriate single pane rooflights

Common Problems

1. Timber decay

Period windows were made of superior timber, whether soft or hard wood, selected for grain and resin content to ensure quality and longevity. This quality shows in the fact that so many sash windows of over one hundred years old are still in existence, and in pristine condition. Always check that the suspected rot or decay is not in fact simply the result of lack of paint, with the timber intact underneath, as can be verified by a quick sanding. As in all house repair work, it is essential to get to the root cause of the problem - for example, if windows are being affected by leaks elsewhere no short term solution will suffice.

2. Wet and dry rot

Wet rot causes timber to go soft and lose its strength. It is identified by ripples in paint work, discolouration, and soft, friable timber. Bottom rails and cills where water is allowed to stand are particularly vulnerable. Another reason for this type of decay is when water ingresses due to putty break-down and cracked paint, where adjoining masonry is damp for long periods of time, and where condensation persistently forms on the glass. The bedding of the stone cill, with an inward incline, or a gap caused by settlement, can also be the cause of water ingress. Dry rot is rarely found in windows as ventilation inhibits its growth. The infected wood should be cut out and carefully replaced.

3. Condensation

Hermetically sealing an historic, or any, building, by fitting airtight windows will lead to condensation. Traditionally constructed houses suffer no condensation. Being built with thick walls, which had good insulation properties, the houses had a constant temperature, and also had dry air from coal fires, and an air flow from windows and chimneys.

Condensation will not occur when there is good ventilation; this is better provided by a properly operating sash window than by a timber casement or sealed window.

4. Draughts

Sometimes windows rattle, or do not properly join at the meeting rail, and there are problems of thermal and sound insulation. Correct placing of the slips in the frame and ensuring that they close snugly top and bottom, may remedy the problem. The use of the original shutters is an easy way of eliminating draughts, and also helps with insulation problems.

Sealing

'Weather sealing/stripping' or draught stripping is a method of lessening the amount of air entering around windows. Some proprietary types are supplied and fitted by specialists, while others are available from builders' suppliers. With weather seals, draughts can be kept down to the same level

as offered by double glazed units, and thermal performance is improved, typically lessening heating bills by 4% in a suburban house. Be aware that the optimum width between panes to help with heat and noise reduction, 20 mm, is not used in the standard double glazed units produced for installation into existing multi-paned sash windows. Timber windows, given weather-stripping, reduce noise by 10dB, the same as uPVC or aluminium double-glazed replacements.

Secondary windows

Internal secondary glazing provides better sound as well as heat insulation. It is the most satisfactory solution to thermal performance. The design must be properly thought out, with the members painted a dark colour, and arranged so that they are concealed behind the glazing bars and meeting rail. Drawbacks include doubling of glass reflection, and the impossibility of using shutters. As stated above, the intention is to avoid a hermetic seal.

5. Loose joints

The wedges holding corner joints on sashes can come loose due to breakdown of glue. These are either dovetail or mortice and tenon joints. Cramping and regluing of the joint with brass screws fixed from the inside, will give the sash another lease of life.

6. Putty

It is important to ensure that putty is correctly applied to avoid cracking. It must be evenly spread, and allowed to cure before painting. As the deterioration of windows is commonly caused by water ingress through old or defective putty, and such putty should be replaced when repainting, and not just painted over.

7. Sash cord, pulleys and weights

Sashes may be immovable because of over-painting, painting of the cord (which ultimately weakens it), and painting or rusting of the pulley, as well as building settlement or other structural factors. Replacing broken cord is quite easily done by a person familiar with such work. Mark the weights for each sash when removing them - the top sash weights are slightly heavier than the sash, to help it stay at the top of the frame, while the weights for the lower sash are a kilo or so lighter than the sash itself, to ensure that it sits firmly on the sill.

Security

The security of windows is naturally a concern for all. There are many patented locks and catches suitable for sash windows, with the nightly use of the original shutters a cost-free deterrent. Ease of escape is as much a security measure as deterring intruders. The difficulty of breaking double glazed windows, and the tiny openings of many of these styles, have a very serious

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drawback - that of ease of escape in time of fire. Windows which only have an opening top section present problems of escape for the elderly or incapacitated.

Maintenance

Periodic inspection of the moving parts of windows is just as necessary as that of vehicles or machines. Check that the window moves easily, the sash cord is taut, the paint and putty are not cracked and that the catches work. Windows should be repainted and the putty attended to at least every five years. When repainting the window, the elements (sashes, frames and slips) should be painted in a sequence which avoids the sashes sticking.

Cleaning aids

A simple hinge adjustment can be made to the sash window, affixed to the lower sash, allowing it to swing open for cleaning. This safety hinge is commonplace in Scotland, and works simply and well. It is available through specialist contractors. In comparison to many replacement windows which have tiny openings, sashes can open wide, enabling reasonably easy cleaning. Sashes can also be dismantled from the inside by removing slips and beads.

Repair

Too often replacement of timber sash windows is considered rather than repair.

Repair of parts of the window, by scarfing new sections onto either sash or frame (typically at the lower corners) is a method common in many countries and can be done by sympathetic joiners or cabinet-makers. Such repair is relatively simple and prolongs the life of the window by many years.

Replacement

If the only solution found after a careful weighing up of the factors is to replace the windows, there are many joinery shops which can make facsimile windows.

Contrary to common misconception, sash windows are relatively simple to make.

For the sake of historical accuracy it is important that the window is carefully examined in order that no mistakes are made in detailing and that it matches existing windows. Accurate instructions must be given to the craftsmen. A checklist should be drawn up, noting dimensions, checking that the pane arrangement and the style for the glazing bars correspond, and also whether the presence or absence of horns is correct (and their correct type if present). Where possible the old window should be used as a template. If all the original windows are gone, nearby properties may be found to have retained windows which can be used as patterns.

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Fitting double glazed units into multi-paned sashes can be unsatisfactory from a visual point of view, - potential problems including thicker glazing bars and double reflections. The use of plastic spacers or inserts in single pane doubleglazed sashes is even more obtrusive.

The huge initial cost of replacement windows must be carefully assessed: it has been shown that the installation costs of uPVC or aluminium windows may not be justified by lower maintenance costs in the long term. The plastics used in windows have been

estimated to have a life of 30-40 years (with repolishing after 15-20 years), aluminium has an expectancy of 50-60 years (recoating after 15-20 years); both are susceptible to pollution, and cannot be repaired to enhance them or prolong their life. Plastic and aluminium frames offer less insulation than timber, and even the use of double glazing does not solve thermal inefficiency.

The traditional window is a vital element of our historic buildings. These buildings deserve the best and, for them, plastic or aluminium replacement windows are inappropriate.



House showing beauty of traditional windows

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Dos and Don'ts

- Do*
- concentrate on repair instead of replacement
 - find, and remedy, the root cause of any problem
 - avoid rust forming on metal windows
 - remember that shutters can be used for insulation
 - keep usable details as patterns for present or future work
 - research prior to restoration.

- Don't*
- dip historic timber windows in caustic mix
 - burn off paint
 - scrape off paint unless it is interfering with the function of the window
 - ignore condensation; it is a danger sign.

Do believe in the worth of historic windows.

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