

INFORM

INFORMATION FOR HISTORIC BUILDING OWNERS

Domestic Decorative Glass



Whilst fundamentally serving a functional purpose to allow light into a property, glass can be a key decorative element of any building in which it is found. Glassmaking is an art which is thousands of years old, but this INFORM will focus on 19th and 20th Century domestic glass. The purpose is to illustrate the types of domestic decorative glass that are likely to be found, and highlight other repair and maintenance issues.

Coloured and Stained Glass

Glass can be manufactured, or altered after manufacture, to become decorative. It can be etched, coloured or rolled to produce richly ornamental surfaces. Stained glass is often used as a generic term to describe all forms of coloured glass. Only glass which has been stained or painted after its initial manufacture is actually 'true' stained glass.

Coloured Glass

Glass can be coloured in the original manufacturing process. This is achieved through the addition of chemicals to provide specific colours, for example Cobalt produces blues, whilst Manganese produces a purple colouration. To ensure depth of colour and consistency, this involves a highly skilled process.

Stained glass has a coloured material applied to its surface and it was usually fired in a kiln to ensure a more robust finish. From the 14th Century there is a long history of using silver stain (silver sulphides and nitrates) to give yellow and orange colours on clear glass. Enamels were also used as early as the 6th Century. By the 16th Century the processes started to incorporate a range of metal oxides to give a much broader colour palette.



Etched Glass

Etched glass was introduced in the latter half of the 19th Century and was developed to provide a highly detailed decorative finish. These etching techniques are commonly still in use today. Etching is undertaken by blasting an abrasive material against the surface of the glass, the designed element being etched through a stencil. Etching can also be achieved by using hydrofluoric acid, protecting those areas which are not to be etched by the application of a stencilled layer. The emerging frosted surface from both techniques allows for a degree of privacy, whilst also creating a diffuse lighting effect to the interior.



Engraved Glass

Exercising a high degree of skill, engravers used rotary grinding wheels to create various profiles (square, round and mitred) to be cut into the glass. This approach was particularly popular in the late 19th Century, and was often used in conjunction with etched glass.





Rolled Glass

The technique of running hot glass through shaped rollers enabled a variety of regular patterns to be formed on the surface. This allowed many geometric forms, and natural themes of leaves and plants to be easily created and mass produced. As original glass should be retained whenever possible, care needs to be taken not to mistake the original material for modern replacement glass, and being aware of the various manufacturing techniques helps in this identification. It is recognised however that some patterns may not be available if there is a need to replace broken panes. In such circumstances the nearest pattern to the original should be chosen.



Construction techniques for making coloured and stained glass panels

A range of techniques have been used in the making of stained or coloured glass. Initially, a full scale drawing of the design (known as a cartoon) is made to identify the glass components, framework and supports. Most coloured or stained glass designed windows were put together using a framework manufactured from 'comes'. These were usually made from lead (which is very workable), but sometimes other metals such as zinc have been used. The came is made with an H cross-section. This accepts glass into both the grooves, which are then closed over to securely grip the glass. Rounded section comes were traditionally used as they were considered to be more resilient. As they are easier to work, flatter sectioned comes have often been used in more recent times. Each piece of appropriately coloured glass was cut to match the designer's intent in the cartoon, whilst leaving space for the surrounding comes.

Some of the individual glass components may have been painted and subsequently fired in a kiln. The complete set of individual components were then laid out on the cartoon so they could be pieced together.

The joints between the lead comes were then soldered together, which was a highly skilled job. Once assembled, a sealant was applied over the panel to seal all the flanges between comes and glass. Copper wires were then soldered to the comes to allow the panels to be fixed to horizontal supports called saddle bars. These bars were then built into the surrounding timber frame or masonry to secure the panel. Saddle bars were traditionally made of iron, but increasingly



craftsmen and craftswomen now utilise more corrosion resistant materials, such as bronze. In a domestic dwelling, the entire assembly was normally fixed into a wooden frame to be secured as a window or as a decorative door panel.

Repair and maintenance

Due to the many lead came joints that can become loose or disturbed over time, good repair and maintenance relies on the building owner getting into the habit of making frequent inspections. Early identification of problems and quick remedial work can ensure less damage to the glass, and lower maintenance costs. It is recommended that good photographs of decorative glass are taken and kept for future reference should serious damage occur.

There are three elements which are susceptible to damage – the glass itself, the applied surface decoration, and the structure supporting the glass in the form of comes, saddle bars or frames.

Deterioration of the glass itself is uncommon unless a manufacturing defect is involved. Surface dirt can be an issue when surface debris is deposited and left uncleaned, eventually dulling the glass itself.

Like many other building materials, decorative glass is also most at risk from water, in the form of rain, condensation and relative humidity, which can accelerate the rate of decay. Combined with deposits of dirt, it can also encourage biological growth, which further attacks the decorative surfaces. Extreme care should be taken when cleaning painted glass and harsh detergents should not be used.

Coloured or rolled glass should be carefully cleaned using water and a soft cotton cloth. Stained glass should only be cleaned by a suitably experienced conservator since the stability of the applied staining could be a risk. Air pollution can cause deterioration by forming weak acids on the glass surface. Over a prolonged period, ultraviolet light can also cause changes in the glass chemistry and colour through direct exposure to sunlight.

Loose or rattling glass is an early indicator of a potentially more serious problem and should be fixed as soon as possible – particularly where





the glass is part of a door or opening sash window and subject to regular movement. Slamming doors shut should be avoided. If a door or window is tight or swollen, the fit should be corrected by a competent joiner before damage to the glass occurs.

A direct impact on the glass, or stress occurring due to structural movement or vibration are the most common causes of breakage. Where glass has been broken, the retention of the original material is important, especially if it is decorated. In many instances broken glass can be repaired by a specialist using epoxy-based materials especially developed for the purpose. Whilst the original colours are unlikely to be fully matched, replacement glass should always be thought of as a last resort.

Thermal movement, caused by natural differences in the materials can also be a problem. Although some degree of movement of the glass panel will be taken up within the cames, the full frame should have some room for expansion and contraction to take place. It should be noted that over time this need can cause a basic failure of

the window assembly and it should be regularly checked to identify early repair needs.

The lead used in making cames is also subject to a slow rate of corrosion. A white powdered appearance on the surface indicates that some corrosion has started. This will accelerate in an acidic and saltwater environment. Soldered joints may also break apart, or the surface sealant between the glass and came can be worn away or washed out over time. The accumulated weight of glass within a frame can also be significant. The supports must be structurally sound and able to carry the full load of the leaded and stained glass. Saddle bars can come loose, or can become detached from the frame when the ties are broken or loose. The window can then buckle and deform under its own weight as it is inadequately supported. All of these defects should receive early attention once they are identified to stop them from escalating in need and repair cost. The advice of a specialist should be sought, as, in extreme cases, it may be necessary to remove the entire window, disassemble its parts, install new cames and reassemble it.

Secondary protection systems

As a method of attempting to protect historic glass and improving energy efficiency, secondary glazing is not an ideal solution. The addition of a secondary layer of glass or polycarbonate material can cause significant problems by creating a microclimate where the environment between the glass and the secondary glazing is altered in comparison to the surrounding atmosphere. Moisture levels and temperature ranges can fluctuate more widely than normal due to a greenhouse effect. This can lead in many cases to accelerated decay. Crude installations are also unsightly and restrict natural ventilation, whilst



providing little thermal gain. The advice of a specialist will be required to help overcome such difficulties.

Further reading and information

- *Scotland's Listed Buildings: What Listing Means to Owners and Occupiers*, Historic Scotland (2006) Free publication <http://historic-scotland.gov.uk/index/publications/pubsforowners.htm>
- *The Repair of Wood Windows*, Technical pamphlet 13, SPAB (1992)
- *Domestic Decorative Glass – History, manufacture and conservation of decorative glass*, Glasgow West Conservation Trust Manual (2001)
- The preservation and repair of historic stained and leaded glass, Preservation Brief 33, Department of the Interior, National Park Service (1993) <http://www.cr.nps.gov/hps/tps/briefs/brief33.htm>

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Published by Technical Conservation, Research and Education Group, July 2007

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