

ENVIRONMENTAL PROTECTIVE GLAZING FOR ENDANGERED STAINED GLASS WINDOWS

“The installation of a protective glazing system is a crucial part of the preventive conservation of architectural stained glass”

Corpus Vitrearum Guidelines for the Conservation and Restoration of Stained Glass, 2nd ed, 2004

Why Environmental Protection?

Our fragile heritage of stained glass is endangered through its exposure to atmospheric moisture in the form of rain and condensation. The presence of moisture encourages loss of painted detail, corrosion of medieval glass and biological growth such as moulds and algae, which hold moisture longer on the surface of the glass thus accelerating the rate of deterioration.

How does it work?

Internally ventilated environmental protective glazing (EPG) allows air from within a building to pass freely over both sides of the stained glass. The air, being of equal temperature on both sides, keeps the glass dry and in as near museum conditions as can be achieved within the architectural setting.

What are the benefits?

Relieved from their practical function of being a climatic barrier, the protected stained glass windows are displayed as works of art in EPG that significantly retards further deterioration.

Conservation treatments can be minimised, for example re-leading can often be avoided and the existing leadwork conserved.

Non-invasive treatments, such as cold painting to replace lost or faded painted detail, can be introduced to enhance the visual appearance.

Read on for more details of Barley Studio's Environmental Protective Glazing systems.



Loss of painted detail due to action of moisture



Corrosion of glass and paint surface due to moisture



Green algae growing on glass surface due to damp conditions

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Principles of Environmental Protective Glazing

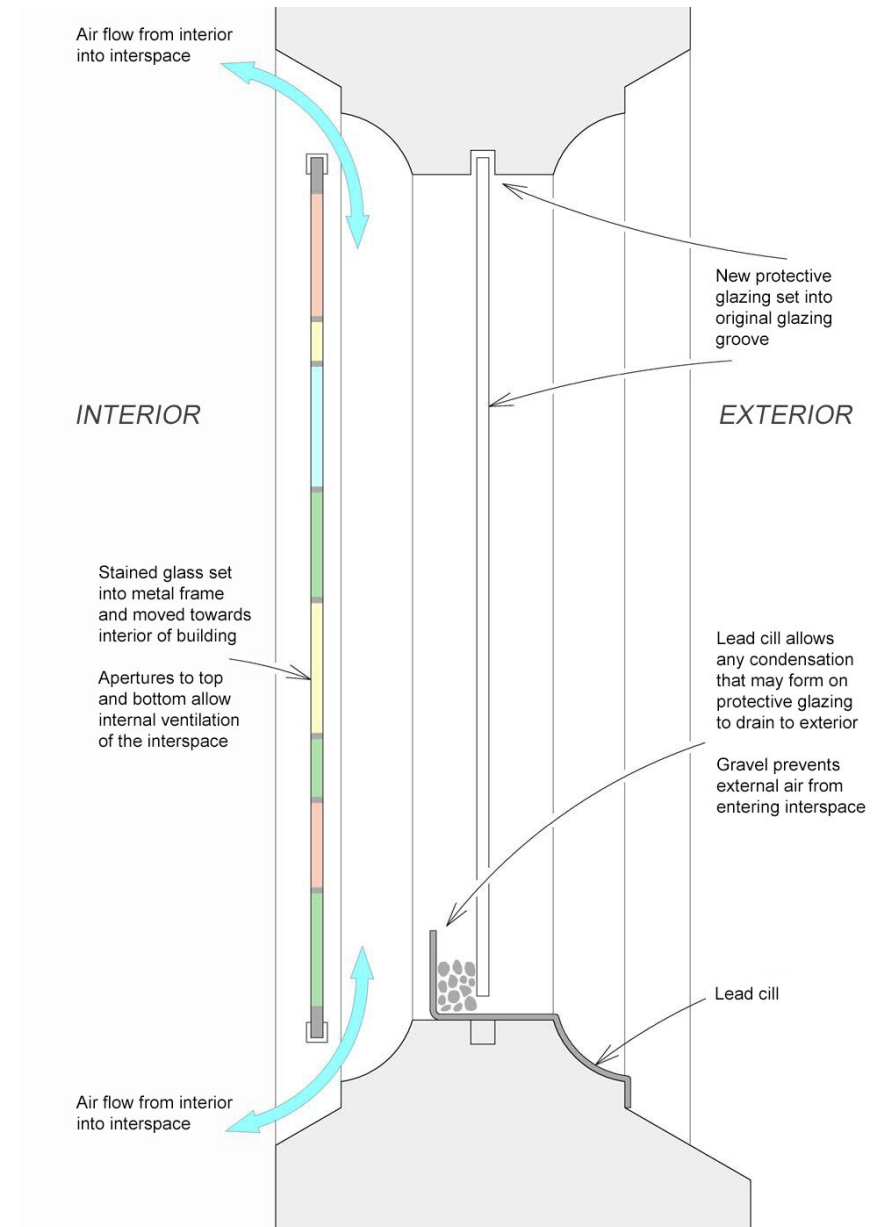
Over 50 years of international research and monitoring has shown time and again that the best environmental conditions for the historic glass are achieved through internal ventilation of the interspace, although there are different ways to achieve this aim depending on the particular installation.

In the simplest and most often used internally ventilated system, the original glass is taken out of its existing position within the window and new protective glazing (appropriate clear glass) is set in its place. The stained glass is then framed and reset in front of the new protective glazing, to the interior of the building, allowing for internal ventilation of the interspace.

Internal ventilation ensures that damaging condensation no longer forms on the internal surface of the stained glass, and reduction in daily temperature cycles also helps to prevent thermal stresses on the glass. External ventilation might be preferred in specific cases, where internal ventilation is difficult or impossible to achieve. In some cases a period of environmental monitoring by a recognised body may be recommended before or after installation.

“Protective systems vary according to needs, and may range from an externally installed and ventilated layer to the internally ventilated isothermal glazing system, which is the most effective method currently available.”

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Materials and Techniques

The installation of environmental protective glazing is a reversible intervention to the architecture of the building, and the aesthetic impact of the change in the external appearance can be mitigated through appropriate choice of the outer protective layer. Options should be evaluated for each project, and include the use of kiln-distorted glasses to reduce surface reflections and the introduction of leadwork to a simplified version of the stained glass design.

Further protection can also be introduced along with the environmental protection, for example by using laminated safety glass as the secondary layer for additional mechanical protection (removing the need for wire guards) or using ultra-violet protective glass to provide uv protection both to the glass and to the interior of the building.

Environmental protective glazing systems installed by Barley Studio can be found in Lichfield, Ely and Durham Cathedrals, York, Southwell and Howden Minsters, stately homes such as Longleat House and Blickling Hall and parish churches such as St Nicholas', Stanford on Avon, Northamptonshire and St Mary's, Fairford, Gloucestershire, that house some of the finest collections of late medieval windows in the world. Internationally, Keith has designed systems for The Museum of Fine Art, Boston and St Patrick's Cathedral and The Metropolitan Museum, New York.



Lichfield Cathedral Lady Chapel, with Environmental Protective Glazing (full-pane, kiln-distorted glass) and wire guards protecting the world-famous 'Herkenrode' windows

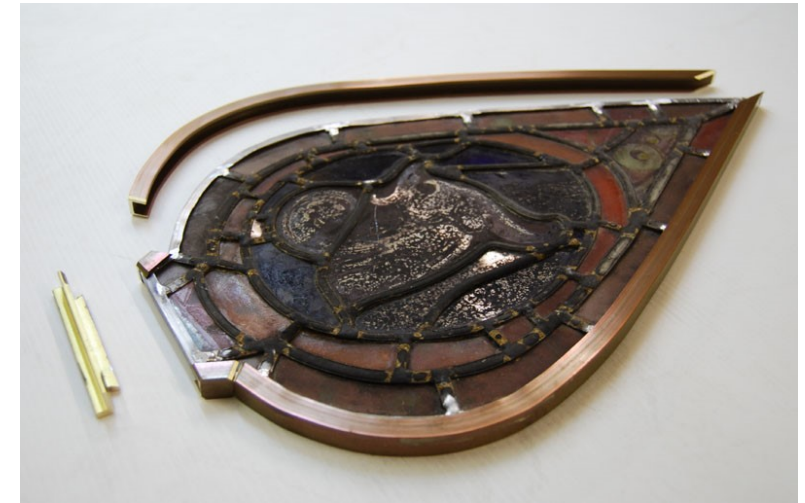
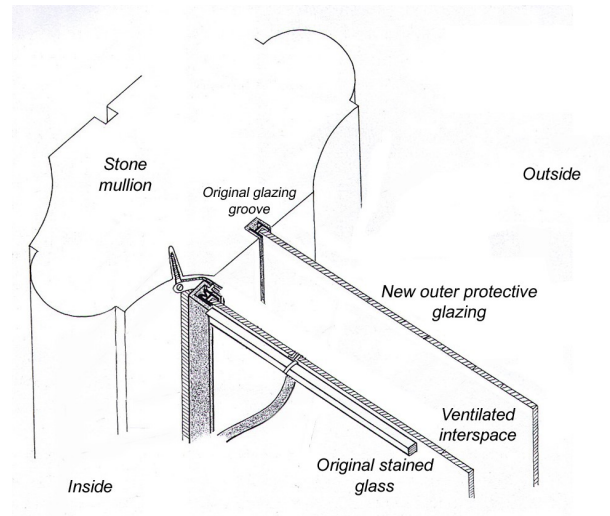
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Barley Studio's Site Specific EPG Systems

Since 1974 Keith Barley MBE FMGP ACR has been designing and installing site-specific Environmental Protective Glazing (EPG) systems both around the UK and internationally. Keith's passion for the environmental protection of endangered stained glass was supported by a Winston Churchill Travelling Fellowship project, allowing him to assimilate the best ideas and materials found on windows throughout Europe.

Over forty years of experience in designing Environmental Protective Glazing systems has shown the importance of considering the individual needs of the glass, and its surrounding fabric, for every project. Barley Studio's site specific EPG systems have proven longevity, with some frames now in place for over thirty years. These systems are now used by leading cathedral glass conservation studios such as Canterbury, York and Lincoln as well as many independent studios throughout the country.

Using this experience, our systems have evolved towards the materials and methods we use today, with every system custom designed and made for the specific installation. In most cases, frames are produced in manganese bronze U-section, which is strong enough to support the weight of the glass and also has excellent cold bending properties, so that the frame can be fitted perfectly around each panel. Bronzed brass bars are attached to the frame in place of the original support bars or ferramenta. The framed panels are screw fixed to the surrounding stonework using phosphor bronze clips, which are strong enough to support the weight of the panels while providing some flexibility, protecting the glass in the event of any future movement in the stonework.



Manganese bronze U-section shaped to fit stained glass panel



*Environmental protection given to individual panel
on quarry glazed background*

