STAINED-GLASS PROTECTION

Proper ventilation is one of the essential factors to consider when installing glazing systems to protect stained-glass windows.

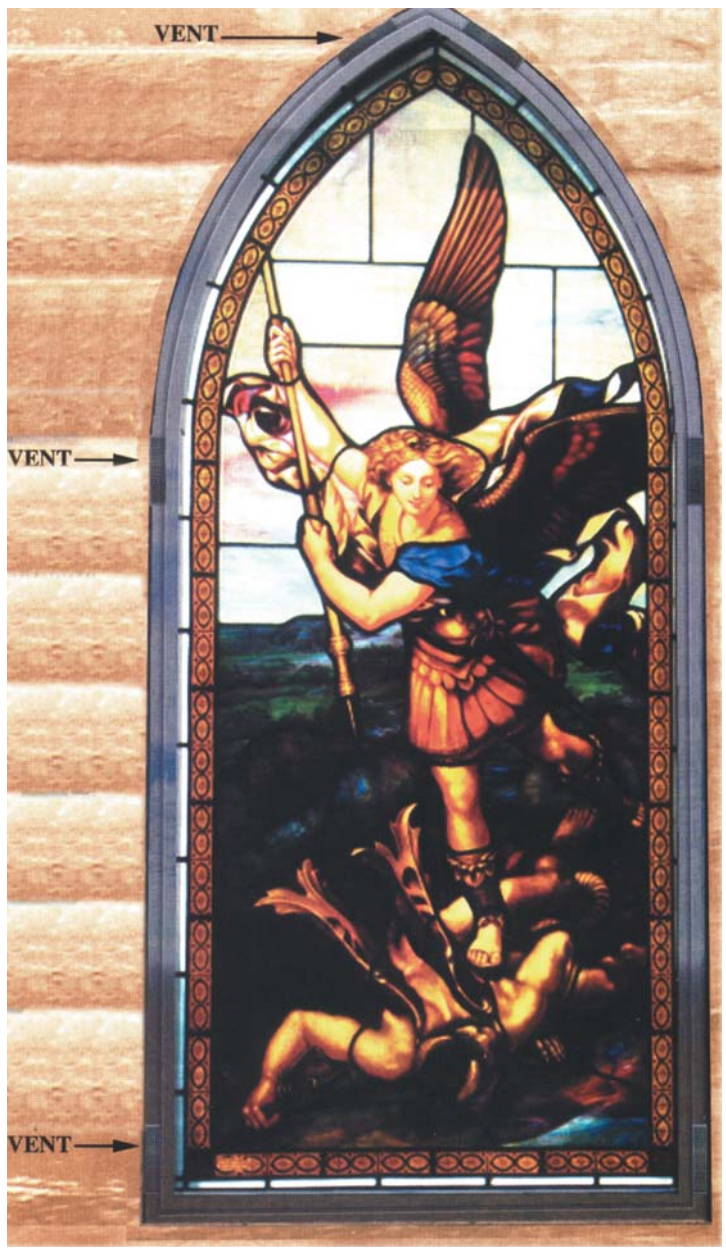
By Ron Bovard

Stained-glass windows artistically illuminate and beautify the interior of a building and form an integral component of the architectural texture of the building's exterior. Traceries of a compound window frame, as well as the texture of the stained-glass windows' leaded panes, can be obscured by protective glazing, reducing the exterior reveal or even eliminating the aperture. This can drastically reduce or even eliminate the visibility of significant and costly architectural features on a building's façade.

The professed savings in heating from protective glazing on buildings such as churches that are intermittently heated has been shown to be exaggerated. Research conducted on 160 churches in the Chicago area and published in 1996 by Inspired Partnerships Inc. clearly shows that the return on a bank certificate of deposit or even a passbook savings account exceeds the return on investment of protective glazing on stained-glass windows for energy savings alone in intermittently heated buildings. There are really only a few reasons to add protective covering to stained-glass windows in churches that are heated intermittently, such as protection from storm damage or vandalism.

This rose window aluminum protective glazing system was designed to match the frame's tracery in an outset system at First United Methodist Church, Iowa City, IA.

Churches that have never had protective glazing should not add it for reasons other than protection from vandalism and storm damage. Once a building, especially in cold climates, has had protective glazing, however, I do not recommend they adopt a system without the glazing. The reasoning here is that the occupants are no longer used to drafts from air infiltration through a stained-glass window and to the water that enters their building from condensation inherent in any single-glazed system and from leaks in wind-driven rain. Stained-glass windows, due to expansion and contraction cycles loosening the glazing cement packed between the flanges of the lead came and the stained glass, tend to leak after a few years. My experience is that clients who have become used to protective glazing systems become dissatisfied once it is removed and not replaced with a new system.



An aluminum-frame ventilation system was installed in this stained-glass window in a private chapel in Wichita, KS.

Traditionally, the condensation and leakage was handled by condensation-collection pans at the bottom of the stained-glass window. The stone frames of a medieval Gothic cathedral usually have the water-collection trough built in. Some large frames have the water-collection trough sloped from both sides to the middle with a weep hole through the frame for the collected water to run through to the exterior of the building, in some cases through a gargoyle's mouth.

In America, many older churches that originally had condensation-collection pans, often made of copper, have had them removed during remodeling some time after the addition of protective glazing as they no longer had a function.

Dangers of Glazing

Studies on the effects of improperly designed protective glazing systems in the U.S. indicate that since protective covering has been installed, more damage has been caused to stained glass in church windows and their frames from improperly designed protective glazing systems than from storm damage, fires and vandalism combined. On a single-glazed stained-glass window, condensation forms on the interior of the window. In an unvented, sealed protective glazing system, the moisture from condensation is trapped between the stained glass and protective glazing. The dust in this airspace can stay moist, and if it is continuously damp, the dust is conducive to the growth of microorganisms that secrete organic acids that attack the stained glass, oxidize the lead and metal frames and rot wooden frames.

Stained glass collects significant solar gain. An analogy I use to compare the solar gain of clear glass versus stained glass is the difference between standing barefoot on white concrete on a sunny day and stepping onto black asphalt. In unvented protective glazing systems, the solar gain is trapped between the stained-glass window and protective glazing. This exaggerates expansion and contraction cycles. Solar gain is more of a problem in the winter than in the summer because the sun is lower in the sky and shines more directly on the stained-glass windows.

The 1996 Inspired Partnerships' research found that air reaches temperatures of up to 165-deg. F when trapped in the space between the unvented protective glazing and the stained-glass window.

Expansion and contraction cycles deteriorate most building materials, including stained-glass windows, causing reinforcing systems to fail, bulging and cracking of the stained glass and premature metal fatigue and deterioration of the lead in a stained-glass window. In a tightly sealed glazing system in a new properly cemented stained-glass window, the increased pressure from the heated air space between the window and protective glazing can contribute to the deflection of the stained-glass window. Proper venting is critically important for the preservation of your stained-glass heritage. One sq.in. of ventilation at the top and bottom of the stained-glass window is the minimum ventilation recommended for 16 sq.ft. of stained glass in a protective glazing system.

From our observations made while restoring stained-glass windows with these types of problems, the less the space between the window and the unvented protective covering, the more severe the damage becomes. However, a minimum of a 1-in. air space between the window and protective glazing is needed for the effective conservation of the stained-glass window. The greater the space, the less severe the damage. A quick inspection will give clear evidence if a moisture problem exists. From the outside of the building, look at the surface of the lead behind the single-glazed protective covering. If you detect a white "lead oxide" powder (the equivalent of rust