

ARTEFUL WINDOWS

The background of the image is composed of several large, overlapping geometric shapes. A large teal triangle occupies the upper left and center. To its right is a yellow trapezoidal shape. Below the teal triangle is a large red trapezoidal shape. A small green triangle is visible on the right edge, partially obscured by the yellow shape. The text 'ARTEFUL WINDOWS' is printed in white, bold, sans-serif capital letters, slanted upwards from left to right, across the teal section.

AN ART GLASS GLOSSARY

Natural earth materials—silica sand, soda ash, lime—are used in making glass. Raw materials are heated to a molten state, then the hot glass is mixed with metallic oxides, which produces the apparent color of the glass. This color appears all the way through and the product is called “art glass” or “colored sheet glass.” Stained glass is different from art glass, although the terms are often used interchangeably.

Today’s glass types include stained, colored, painted, etched, and beveled. Glass can also be subtly or deeply textured. So many varieties are available to artisans from companies including Armstrong Glass Co., Blenko, Bullseye Glass, Kokomo Opalescent Glass, Spectrum Glass, Uruboros Glass, Wissmach Art Glass, and Youghioghny Glass.



Antique Glass Irregular hand-made blown glass, replicating old glass.

< By the end of the 19th century, new manufacturing methods opened the door to creation of a great variety of glass types: cathedral, opalescent, textured, and iridescent.

Cathedral Glass Describes transparent glass that is monochromatic —e.g., single-color sheet glass— transparent or streaky, with smooth or textured surfaces.

Cold Texture Glass Specialty glasses with a texture introduced on the glass sheet at room temperature; includes glue-chip (frosted), etched, and sandblasted glass.

Art Glass

Imprecise term used in different contexts to mean any use of glass in an artistic manner; or decorative glasswork such as vases; or colored or textured glass used to create windows or panels.

▼ Notice the colored art glass in this ca. 1890s bathroom.



Bevel Glass Cold glass (usually clear, thick plate) with edges that have been ground and polished to an angle other than 90 degrees. Transmitted light is refracted and a prism effect results. Bevels are available in a variety of sizes, shapes, and geometric configurations (called “clusters”) for incorporation into leaded-glass work.

< A typical mid 19th-century beveled leaded-glass door panel.

Came Channeled strips of lead, zinc, or other metal used to bind glass pieces within a pattern. This framework is structural but also an integral part of the design.

Lead or zinc comes hold pieces of glass in place. >



Copper Foil Thin, narrow strips of adhesive-backed copper tape used to wrap the edges of glass pieces that have been cut to fit a pattern (usually for interior work). Once wrapped, solder is applied. Assembling a stained-glass project in this manner is called the “copper foil technique.” Louis Tiffany is credited with its development.

Dalles Thick (usually 1”) slabs of cathedral glass.

Iridescent

Surface treatment in which a layer of metallic oxide is bonded to the hot glass surface just after sheet forming, resulting in a colorful, shimmering effect.

Frame The wood, metal, or masonry surrounding and supporting a window panel.

Jewel A piece of glass that has been cut and faceted or press-molded into a geometric shape like a jewel. Often incorporated into leaded-glass artwork.

Dalle de Verre An art glass medium in which dalles are broken into pieces with a carbon hammer and set in an epoxy base to adhere them in a decorative design. Used in large-scale installations.

Leaded Glass Sheet glass pieces joined with metal strips, usually made of lead, called “came.” Solder is applied to the joints of the came to bond the work together. A leaded-glass window is made from small pieces of glass fastened together with lead strips. Any kind of glass (clear, colored, beveled) may be held together by lead (or copper, brass, or zinc) channel.

Surviving leaded-glass sash in a stairway window. >



Opal or Opalescent Glass Glass into which a chemical (usually fluorine or phosphorus) has been introduced at the raw-materials stage, which causes a degree of crystallization to create opacity. The degree of opacity (and "whiteness") is variable depending upon composition and temperatures used. White glass commonly is called "opal." Solid-color opalescent glass ("opaque glass") is both colored and crystallized, creating a single-color sheet that is more opaque than cathedral glass. Mixed Opalescent Glass is white glass mixed with one or more other colors to create a variegated, multi-colored sheet. Also called "streaky glass."

Re-bar Reinforcement bars, round (saddle) or flat, tied or soldered to the came to stabilize a large panel and keep it from bowing, bending, or sagging. Today hidden re-bar systems are available.



Painted Glass Glass on which special paints (containing frit—ground glass particles) have been applied in an illustrative or decorative manner and then heated in a kiln to a temperature high enough to fuse the pigments permanently to the glass surface. Medieval stained glass was painted glass.

< Stained (painted) glass in the old English style, by Neumann Studios.

Rondel A mouth-blown piece of glass that has been spun into a circular shape, often irregular. Rondels are sometimes incorporated into leaded-glass artworks. Common, machine-made facsimiles are called pressed rondels.

Rolled Texture Glass Specialty glasses created by embossing by the roll as the sheet is formed. Hammered, granite, and muffle glasses, as examples, are textured on one side.

Seedy (Seeded) Glass Glass in which air bubbles are entrapped; air or a gas is injected into the molten glass prior to forming the sheet. It can range from almost clear to semi-transparent.

Solder A fusible alloy, traditionally tin and lead, used to join metallic parts (as a verb, the act of applying solder). Solder is used to bond metals in both the leaded and copper foil techniques of stained glass work. Newer solders are lead-free and are quick setting.

Stained Glass Once reserved for hand-painted glass, today the term refers to any glass colored or stained (as by fusing metallic oxides into it) for decorative applications (as in windows); also glass that has been colored, enameled, painted, or stained, especially by having pigments baked onto its surface or by having various metallic oxides fused into it; also colored glass used to form pictorial designs, notably for church windows, both by painting and by setting contrasting pieces in a lead framework. Historically and most precisely, the term refers to clear or tinted glass hand-painted with fine glass pigments that "stain" or enamel the surface upon being fired in a kiln. "Stained glass" today refers broadly to the art, the craft, and the industry.



PROTECTIVE GLAZING?

Installing protective glazing—aka a storm window—is an issue of debate. An exterior panel can protect the artistic glass, and provide security and energy savings. Improperly installed, however, it can also cause heat and moisture buildup that accelerates deterioration. Sometimes secondary glazing is chosen in areas where windows are susceptible to vandalism or extra security is needed, but metal screening or grilles are alternatives in such situations. To keep dirt and debris from gathering in the layers of glass, protective glazing may be warranted when a panel historically had plating, as with Tiffany windows. If the panel was painted on the exterior, protective glazing is needed. And if epoxy glass repairs were made, I would suggest protective glazing to provide a UV filter. Because of variances in size, climate, orientation, and depth of the window well, each installation is unique. The design of the storm panel has to take into account the prime window's function (operable or fixed, presence of screens, etc.). In all cases, the storm panel should be made of glass, and vented to allow heat to dissipate. The installation also needs weep holes to get rid of water from rain incursion or condensation. Plastics tend to degrade and oxidize despite manufacturers' claims. I do not specify any plastics in my restoration work. By all means, contact a storm-window provider who specializes in historic buildings.

ABOVE: This example shows improper protective glazing (plastic panels), which may cause damage to the windows. Most plastics will become brittle and turn yellow with UV exposure.

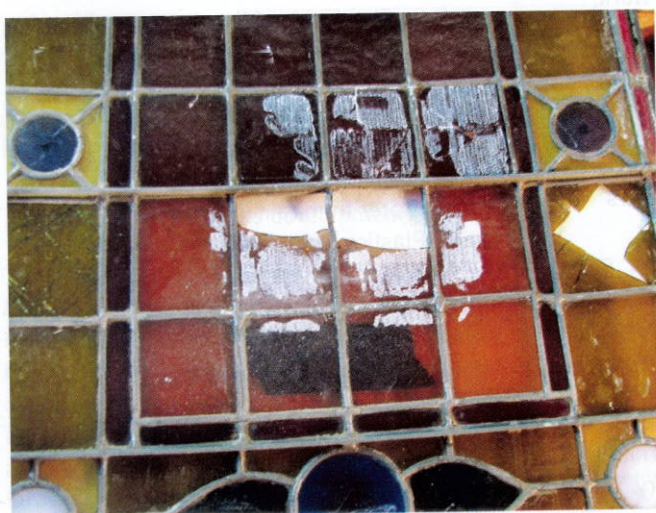
TAKING CARE OF YOUR GLASS



LEFT: Deferred maintenance and inadequate past installation results in this condition. **RIGHT:** Evidence of deteriorated wood and window sash.



1 INSPECTION, MAINTENANCE, IN-SITU REPAIRS, and full restoration all are in the cards for vintage stained and leaded glass. Maintenance starts with an annual inspection, best done in spring. Look for deteriorated frames, loose or missing putty, cracked glass panes, cracked solder joints, and loose glass. Remember that maintenance of the frame (usually wood in residential work) is important for the stability of the stained or leaded glass window panels. If the frame deteriorates, pulling apart or allowing water to get in, the glass will suffer.



CLEANING STAINED GLASS

DO NOT USE

Ammonia-based cleaners

Vinegar-based cleaners

Chemical solvents

Air- or sand-pressure equipment

Caustic or abrasive cleaners

Putty knives

Scouring pads

YOU MAY USE

Non-phosphate, plant-based detergent

#0000 steel wool (only on unpainted glass)

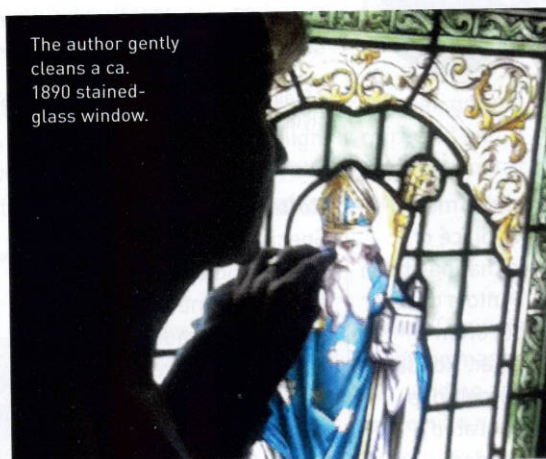
Distilled water

Soft brass-bristle brushes (only on unpainted glass)

Cotton balls and Q-tips

Soft toothbrushes

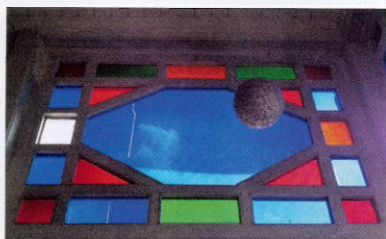
Soft cotton cloths



The author gently cleans a ca. 1890 stained-glass window.

No matter what you find, do NOT resort to duct tape or caulk! These stop-gap measures will hasten the failure of the glass system. If you do find evidence of bulging or bowing, lots of missing putty, or daylight visible between the pieces of glass and their comes (channels), call a professional art-glass studio for their inspection and advice. Some repairs can be done in-situ—without removing the window—and will save you money in the long run.

LEFT: The use of duct tape will leave an adhesive residue that is very difficult to remove and often creates more glass breakage.



FAR LEFT: The upper window needs glass replacement. **LEFT TOP:** A transom damaged by high winds is in need of glass replacement. **LEFT BOTTOM:** This panel suffers from brittle waterproofing putty as well as buckling. **MIDDLE:** Notice the broken solder joints and bulging in this zinc-channel door panel; it will need to be removed to repair it. **ABOVE:** This leaded door panel suffers from broken solder joints and loose waterproofing putty.

2 CLEANING THE GLASS is also part of routine maintenance. While you may clean plain glass windows once or twice a year, that's not necessary or advised for art glass. True, gentle cleaning will allow more light into the room. Here's how to do it:

Inside, lightly dust the glass panels often to keep dust, cobwebs, and debris from building up and bonding to the glass. Use a soft cloth, a feather duster, or even a vacuum cleaner on low suction with a soft brush attachment. Do not vacuum your glass if it is painted.

There are times and locales when dirt, soot, and pollution residues collect on the glass surface. Carefully wash the glass with distilled water and a cotton cloth. (Distilled water lacks mineral content.) Use a spray bottle and lightly dampen the window. Wipe gently with the cotton cloth. If you have true stained (painted) glass, use cotton balls instead, gently, with the distilled

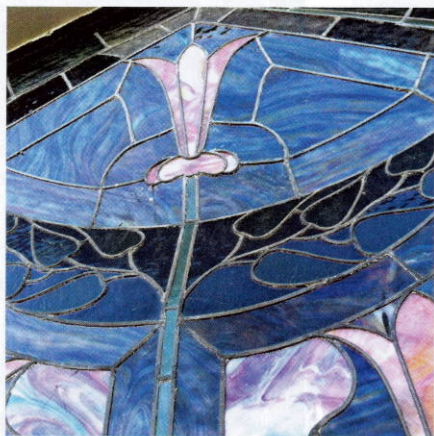
water. Paint on glass easily flakes if you use a harsh cleanser or too much elbow grease, or any kind of scrubber. If the color on the glass seems unstable, stop and call a studio or conservator. Don't use chemicals, which are unnecessary and may contain waxes that damage the glass. If the dirt is stubborn or oily, you can try a drop of liquid, non-phosphate detergent in your spray-bottle of water.

In-situ and stop-gap repairs help preserve the window without harming it or accelerating deterioration. Broken pieces of glass can be replaced while the window remains in place. Partial reputting and minor solder repairs can be done in place.

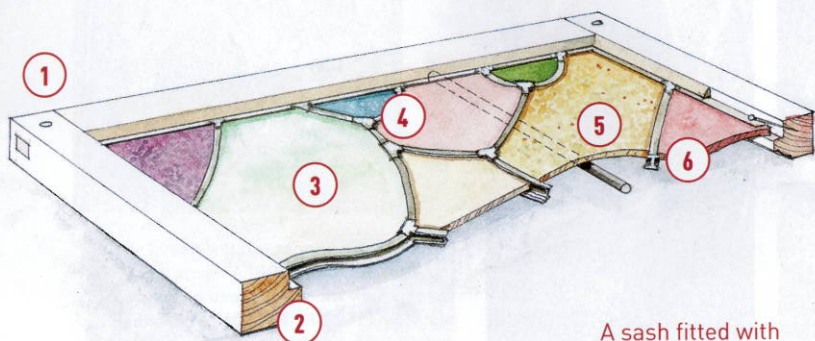
If came (metal channels) need a lot of attention or the window needs to be reputted, or if additional structural support needs to be added, the sash should be removed and brought to a studio for the work, then reinstalled.

3 FULL-SCALE RESTORATION of a window involves complete replacement of the lead or zinc came, repair of cracked and missing glass, and installation of saddle or flat re-bar for structural support.

Long-deferred maintenance will result in cracked came and solder joints, glass breakage, loose wire ties, non-existent putty, and even bulging or sagging of the panel. All of these need to be addressed by a reputable glass artisan.



LEFT: Notice the bulging section, and missing and cracked glass in this 1920s staircase window. **RIGHT:** The bottom left side has been restored on this pair of 1920s panels. (Right side is before restoration.)



PARTS OF A STAINED GLASS WINDOW

- | | |
|----------|------------------|
| 1. Sash | 4. Solder joints |
| 2. Frame | 5. Saddle bar |
| 3. Glass | 6. Cames |

A sash fitted with stained or leaded glass may have re-bars soldered in place, saddle bars (tied to cames) to keep glass in a prime window from blowing into the building, or both.

CODES & SAFETY GLASS

Stained and leaded glass is best installed on its own, as it has been for hundreds of years. Some people install insulated or safety glass before inspection, and later replace it with the art glass they prefer; to go this route, specify that the panes need to be cold-set, installed without adhesive. In most codes, there is an exception for leaded glass, so check locally. When code requirements, direct weather, or noise suggest the need for safety glass, options include hanging a panel in front of the window, along with various custom framing and sash retrofit methods. In some wood sash, the insulated glass can be removed, the stained glass put in its place, and the existing stops slid in to secure the panel. Everything should be reversible for the time the window needs repair. Embedding art glass within the insulated unit is a terrible idea, as insulated glass units are so prone to failure. If layering is necessary, be sure to allow air movement between panes to avoid condensation.

—Ted Ellison, theodoreellison.com

STAINED GLASS FAQs



HOW OLD DO YOU THINK IT IS?

An educated guess is made based on the age of the house, the stylistic nature of the window (often very tied to a particular era), the materials that were used, and inscription markings by the artist or studio or manufacturer. Sometimes a glass expert can date a piece just from the type of glass or construction technique used.

ABOVE: The studio name and location are visible on a corner of this 1890s panel.

IS IT WORTH REPAIRING?

Most examples can be repaired or restored, so there's no need to throw something away. (At the very least, it can be stabilized and brought inside as an art piece.) Even glass panels exposed to fire can be repaired. Not all the art glass in old houses is precious; much of it is simply manufactured colored sheet glass or a design churned out by a large firm. Still, it is part of the history of the house and indicative of style. Other examples do have historic glass that's not easy to come by, or were made by a known glass artist.



WHY DID IT CRACK?

Cracked window glass may be the result of trauma (a baseball or hail), or of stress from a rotted frame or bowing. Heat can also cause cracking, usually a problem with glass lampshades (never use more than a 40-watt-equivalent bulb), but improperly vented storm panels can create overheating of window glass, often resulting in damage to the lead and discoloration.

ABOVE: This is a good example of how intensive heat from high wattage bulbs can compromise copper foil and glass, weakening the top ring and lamp cap as seen pictured here.

WHAT WILL IT COST? AND WHOM SHOULD I HIRE?

Repair cost varies with the size and complexity of the piece, and how damaged it is. Estimates are case by case. Try to hire a local stained-glass artist or conservator; word of mouth is the best referral, so ask your local preservation organization, museum, or sympathetic architect. The price will be driven up if you'll need a building permit, extra bonding insurance, or scaffolding.

Rhonda L. Deeg is a member of the Stained Glass Association of America, American Glass Guild, Preservation Trades Network, and the National Trust for Historic Preservation, Indiana Landmarks, and the Indiana Glass Artisans. preservationrho.wix.com/rld-glass-art

FOR RESOURCES, SEE PAGE 95.