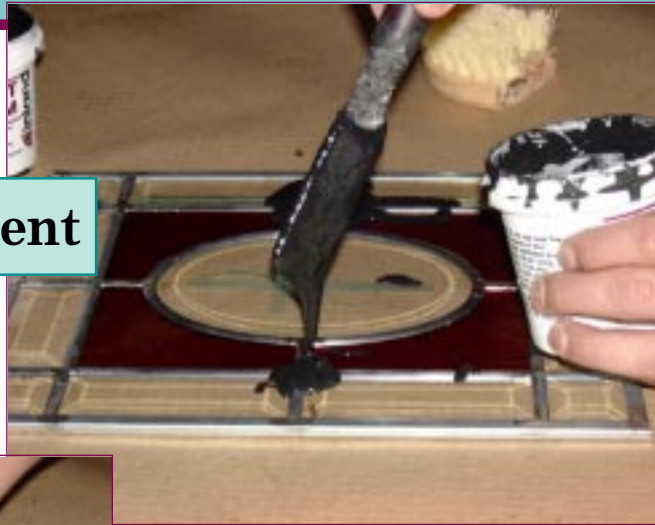


CEMENTING

How to Weatherproof and Strengthen Leaded Glass Panels

why you need to cement



detailed instructions



tips and helpful hints



How to Cement Leaded Glass Windows

One of the least understood processes associated with the making of a leaded glass window is the cementing or grouting of the panel. This article has been written with the hopes of shedding some light on the subject.

The reasons for cementing a window are to weatherproof and strengthen the panel. Even if a window will never be exposed to the weather, it is still necessary to provide the window with the extra support it needs through the cementing process. Consider the fact that glass is heavy (about 1 ½ lb. per square foot for 1/8" glass) and lead is pliable. If you combine these two with the force of gravity, the window will sag and ultimately crack.

In addition to the structural considerations behind cementing a window, the favorable aesthetic effect proper cementing has on a panel should not be overlooked. The brushing action in combination with the carbon black in the mixture darkens both the lead came and the solder joints which tends to soften the harsh lead line giving the panel an overall finished look.

Even though cementing a leaded window may not be everyone's idea of a good time, it is however an essential step in the window making process and unfortunately there is no easy alternative except maybe to have someone else do it.

Things to consider

Because this is an inherently messy procedure, you don't want to do your cementing on the coffee table. The area you normally use for your window assembly may be able to be used for this purpose providing you protect your work table and other items from the dust and debris generated while cementing.

If your work table space is limited, you may want to cement on a separate piece of wood such as masonite, particle board, plywood, etc. that is removed after the cementing process is finished. Another suggestion is to do your cementing out of doors when the weather permits.

No matter where you decide to cement a panel, it is essential that you wear a snug fitting filter mask of good quality. The dust that is present in the air while cementing can cause a variety of potentially serious respiratory ailments (refer to page 6). The dust can be aggravating to allergies and asthma. They may even contain lead oxides which are scrubbed from the comes by the brushing action.

How to cement

If you are not familiar with the terms used to describe lead and metal comes, you may want to refer to the Terminology section on page 6 before you begin.

1. Open the tub of Inland Cement and mix thoroughly using a putty knife or paint stick. Make sure that you scrape the bottom often. When ready to use, it should be smooth, have no lumps, and have the consistency of cake batter.

2. Pour small pools of cement on to five or six areas of the window.



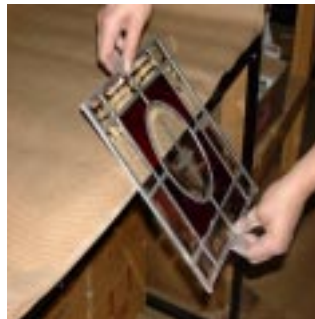
3. Using a natural bristle scrub brush, push the cement under the leaf of the came by brushing at a right angle to the comes in the interior of the window. As you approach the lead or zinc on the borders, decrease the angle of the brushing to keep from distorting them. After cementing, push the border came back against the glass.

SPECIAL NOTE: A scrub brush with plastic bristles will react to the solvents in your glazing compound causing the bristles to soften, fall out, or even melt. Another good choice is to take a 3" natural hair paint brush and cut the bristles off very short (less than one inch).

4. After you are sure the cement is in all the comes, pick up the excess cement on the panel by scrubbing parallel to the comes, then scraping the excess back into the tub.

5. Spread whiting (calcium carbonate, also referred to as chalk) over the panel with your hands while wearing rubber gloves. This keeps the cement from oozing, and allows the cement to begin setting up. You now need to turn the panel over to complete the same process on the other side.

A window should never be put into a horizontal position unless it is supported. To turn a panel over:



Slide the panel toward you until it rests half on and half off the table. The edge of the table should run through the middle of the panel.

With a sweeping motion, bring the panel from the horizontal position to vertical while keeping the middle of the panel supported by the edge of the table.

Turn the panel around while holding it from the top. (*It is a good practice to handle all windows and sheets of glass in this manner.*)

Put it back on the table by reversing the procedure describe in steps one and two.

6. Sweep any excess whiting away from around the panel before proceeding. If the panel has been properly cemented, you will notice some cement has come through the comes from the other side. This is important because in order for the panel to be strong and weatherproof, the cement needs to be next to the heart of the came as well as under the leaf.

7. Repeat steps 2 through 4 on the second side.

8. Spread more whiting on the panel and use a second clean bristle brush to clean off the excess cement. The whiting acts as a natural absorbent and mild abrasive which cleans and polishes the glass, came, and the solder. Scrub vigorously, but don't press too hard or lean on the work. Work in a direction parallel to the comes so that you are removing the excess along the edges and not removing the cement you worked under the came!



SPECIAL NOTE: A You may want to add a small amount of saw dust to the whiting to keep the dust down to a minimum. You can use the whiting more than once, and also extend its life by adding fresh whiting from time to time. Store unused whiting in a covered plastic container.

9. Continue scrubbing this side until the excess whiting is removed from the glass and the tops of the comes. You will notice that some cement will still be sticking to the edges of the came. Don't let this trouble you, as it will be removed later.

10. **IMPORTANT:** At this point, if you have used came which is 3/8" wide or wider, gently press the leaf down close to the glass surface. A stopping knife or one of the many new style lathekins are ideal for this purpose. The leaf should be pressed down to a uniform height and should not appear lumpy or irregular. Be sure to clean the cement out of the outside of the channel on the border lead if you have used an "H" came.

11. Sweep the excess whiting off to the side of the table then turn the panel over (see step 5) and repeat step 10. When all the whiting and cement is removed, use a fid or lathekin to scrape the excess cement from the edges of the came, being careful not to dig the cement from under the leaf. Some people use wooden or nylon dowels about a quarter inch in diameter which have been sharpened to a point with a pencil sharpener as an alternative to the fid. While doing this, continue to scrub the panel. Repeat on the opposite side. When the brush loses more than half of its bristles, discard it.



12. Black Cement will darken the lead comes. The more you scrub the panel with the natural bristle brush, the darker both the lead comes and the solder joints will become. With enough stamina, a homogenous black lacquer-like finish can be obtained, eliminating the need for a black patina application. This occurs only with lead came (and blackened glazing compounds), not with zinc, copper or brass comes (or uncolored glazing compounds).

13. At this point all traces of the cement should be removed from the face of the comes, next to the leaf of the comes, and from the glass surface. When successfully done, the window will really sparkle and shouldn't require a wet cleaning. When finished, let the window lay flat for a minimum of 24 to 48 hours to let it dry and harden before installing it or adding reinforcement bars. Check it a few times while drying for any additional cement that may have oozed out from under the came and remove promptly.

14. You're not finished yet. Make sure to sweep up the area around you and to remove any globs of cement from the table. Once the cement hardens on the table, it is very difficult to remove.

Tips and considerations

- ◆ Because the cement dries to a hard consistency, be sure you have enough time to complete the whole cementing process.
- ◆ If the cement begins to harden in the tub it can be thinned with equal amounts of boiled linseed oil and pure turpentine. Be careful to avoid *quick drying* linseed oil, as it will not give you sufficient time to work with the panels.
- ◆ If you find the cement to be too thin for your particular purpose, it can be thickened with small amounts of whiting. If you thicken the mixture too much, at this point it should be thinned with more boiled linseed oil only.
- ◆ When using heavily textured glasses such as antique crackle and ripples, keep in mind that it will be difficult if not impossible to remove all the cement in the deep undercuts and fissures in the glass. If this presents a problem, you may want to mask off the glass with contact paper or masking tape.
- ◆ Glue chip and sandblasted glass can sometimes pick up a dark color from the cement. This may be avoided by using the Inland Natural (gray) Cement or you can mask off the glass. This natural colored cement should also be used with zinc and brass comes if the panel is not going to have a black patina application, since its color more closely resembles that of zinc/brass.
- ◆ Since most black patina contains small amounts of hydrochloric (aka muriatic) acid, don't be surprised if you see the patina bubbling around the cement. This is the acid reacting with the cement. The reaction will cease when the panel is washed with hot water and a detergent. Dry the panel with a clean, soft cloth while it is still warm from the hot water rinse to make the panel sparkling clean.

Repairing a cemented panel

Inland cement is the only product of its kind that is made specifically for stained glass windows. The cement will set up hard but will still allow for natural expansion and contraction. Some people may object to the hardness of the cement saying it will make the window difficult to repair. The vast majority of windows requiring repair need it due to sags and cracks resulting from improper cementing, insufficient support, poor workmanship, or low quality weak lead. If a window cemented with Inland Cement should ever need repair, you may find the following helpful:

1. First, try soaking the window in a liberal application of boiled linseed oil (available from better hardware stores). This can help to loosen the old glazing compounds. Let it sit for 4-6 hours, but take appropriate precautions when using linseed oils. There can be extreme fire hazards!
2. If the above does not work adequately, apply muriatic acid (also available from better hardware stores) with an eye dropper next to the came around the area needing attention. The muriatic acid will attack and "honeycomb" the whiting in the cement making the cement weak and brittle. The window should then be quite easy to pull apart and repair. Wipe up excess acid with a paper towel or an old towel and dispose of properly.
3. Muriatic acid is also dangerous. Read and follow all directions on the container. Avoid breathing vapors. Because zinc, copper and brass comes are more sturdy, you probably won't have any difficulty cutting the comes at the solder joints and pulling the panel apart for repair. Do not attempt to use muriatic acid on zinc comes as the zinc will be dissolved by the acid.

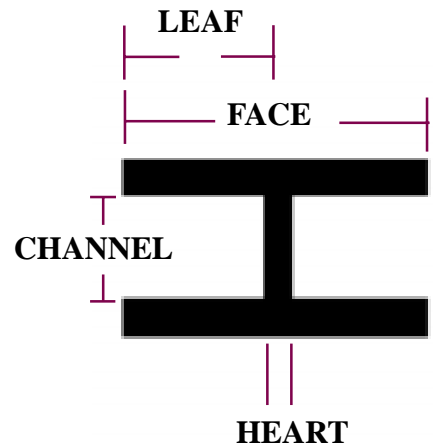
Terminology

Lead came is a metal strip that is used to join glass pieces together and it comes in many forms. The most popular are the "H" and the "U" profiles. "H"-shaped is used between two pieces of glass. "U"-shaped came is used when you have a piece of glass that is not going to be soldered to another, most often on the perimeter of a piece. Both "H" and "U" comes come in flat and rounded profiles. Brass Capped came has a lead core with a jacket of brass or brass plated zinc. There are also many different antique and restoration profiles available.

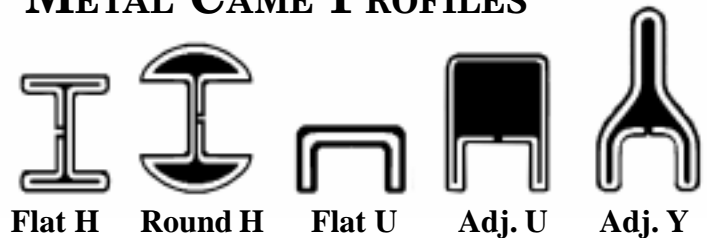
Lead came comes in a variety of sizes and is sold in rolls and strips. The face is the part of the came which is seen when viewing the finished piece. The size of a came refers to the face width. For example, 1/4" Flat "H" has a face that is 1/4" wide. The channel is the space where the glass fits into the came. The heart on "H" came is the center wall that sits between the two faces. You will find with experience that different projects will require different sizes and types of comes.

Metal comes are available in zinc, brass, and copper. "H"-shaped is used between two pieces of glass. "U"-shaped and "Y"-shaped came is most often used on the perimeter of a piece. Both "U" and "Y" are available in adjustable versions when working with different thicknesses and uneven edges.

LEAD CAME PROFILES



METAL CAME PROFILES



Final notes

Thanks to Delphi Stained Glass instructor Steena Gaut, Tory and the rest of her leaded glass class students for allowing us to take pictures for this article.



WARNING: The user is advised that lead solders and comes contain a chemical known to the State of California to cause birth defects or other reproductive harm.