Preservation Practices

Glazing Choices For Sealed Packages

by Hugh Phibbs

There are documents, such as the Declaration of Independence and the U.S. Constitution, that have been stored in sealed housings for many years. The glass and metal containers that have been used provide non-reactive atmospheres for the protection of these documents. The old housings are being replaced by more modern ones; still this experience demonstrates the feasibility of this sort of protection for fragile materials.

Simpler designs for sealed packages which protect items from extremes of relative humidity, without the use of inert gases have been described in an earlier Preservation Practices (*PFM*, Oct. 1994), as well as in the seventh annual Science of Preservation Framing supplement (*PFM*, Feb. 1999). These packages comprise a layer of metal/plastic laminate which is bonded to the glazing with either double-sided pressure-sensitive tape and heat, or with hot melt plastic adhesive.

When the hot melt design is made with glass, a seal which approaches airtight can be achieved. One problem which may be encountered here is that of the glass breaking. If the glass is cracked, without any movement of the material on either side of the crack, the seal may be maintained for a surprisingly long time. If there is any displacement of the glass, and an opening in the sheet results, the seal will be lost. Packages made with acrylic sheet will not provide the same degree of protection against fluctuating or extreme relative humidity.

Both glass and acrylic sheet are classed as semi-crystalline materials, but glass is the harder substance and has a much more organized crystalline structure which allows it to function as a vapor barrier. Acrylic sheet will allow moisture to penetrate and pass through it. This fact has implications for the use of acrylic in sealed packages.

A sealed package made with acrylic sheet can be expected to dry out slightly in the winter, when most buildings are drier, and to wet up slightly in the summer when moist conditions are more frequent. This should not present a problem in most cases, since the degree of dryness in residences during the winter is higher than the degree of moisture in the summer.

Few people today are willing to live with relative humidity at 70% or higher at 70° F, while they are more likely to accept relative humidity in the 10 to 30% range at a similar temperature. Therefore, the likelihood that the package will become wetter over time is small. If a package becomes slightly drier in the long term, most support materials and media should not be adversely affected.

There is another aspect to the use of acrylic sheet in making such packages which must be recognized. When the package is experiencing exterior conditions which are drier or wetter than those to which its contents have been conditioned, the acrylic can become deformed. Acrylic sheet will not only pass moisture through itself, it can also take up and give off moisture. In the process, like wood and paper, it can change shape.

If a sealed package encounters prolonged conditions which are wetter than

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those on the inside of the package, the outer surface of the acrylic will swell as it takes up water from the environment and the sheet will warp away from the inside of the package. This will not be a problem; indeed it will provide added separation between the contents of the package and the inside of the acrylic sheet.

If a sealed package made with acrylic sheet is kept in conditions which are drier than those of the materials inside the package, the acrylic will warp inward as its outside surface loses moisture into the air. This presents a problem; if the warping is not too severe and the package is not moved while it is in this condition, the item in the package may not be harmed. However, if the package is moved and the acrylic is in contact with the item inside, there may be a greater potential for harm from abrasion.

If items which have been sealed with acrylic glazing are to be moved after they have been exposed to dry conditions, the flatness of the acrylic sheet should be checked with a non-abrasive straight edge so that the extent of any inward warping can be estimated and checked against the separation which the matting or spacing provides.

If the glazing is bowed in, one can also test for possible contact by placing a fingertip on the low point of the glazing. If it appears that the fingertip is touching the framed item, there is probably contact between the acrylic sheet and the item's surface. If there appears to be contact between the acrylic sheet and the work, the frame should be taken to a place with good environmental conditions and the framing package opened.

If more spacing elements cannot be added at that time, the acrylic sheet can be cleaned and turned over so that it bows away from the surface of the framed item. The metal/plastic sheet should be slit at the point at which it comes around the side of the glazing and onto the front surface of the glazing. This will allow the metal/plastic sheet to be reused to create a temporary, sealed package.

The mat package can be laid on this sheet and tape can be applied to the outer edges of the back of the sheet. It can then be pulled (with the portion of the sheet which comprised the edges of the old package) around and onto the front of the glazing where it can be attached and carefully trimmed. This should serve to protect the contents of the package during transit, and until a new package can be provided.

The ultimate solution to this problem is laminated glass. The lites of glass will function as a vapor barrier, and the laminate will hold them together even if they become cracked. Here, the problem arises from the iron which is used to make flat glass strong, and the green tint it imparts. This tint may be tolerable in non-laminated glass, but can become distracting when two lites are laminated.

Since low iron, water white glass is becoming more widely available, it could be laminated with ultraviolet absorbing polymers to form an extremely useful product. Indeed, that type of glass with added anti-reflective coating is widely used in museums today. However, its expense will limit its use for the foreseeable future.

Even our best efforts to design packages which will preserve valuable and unique works should be continually improved. We must learn by monitoring the results of our work; noting successes and failures. As manufacturers add to the choices we have among materials, we should examine each for a possible role in enhancing the preservation potential of our frame designs. ■