Mirrorlite™ Vendor Interview – Courtesy of Inventables

What are the smallest dimensions the mirrors can be made?

The smallest panels that were made are about 3×5″. Small sizes are not cost effective and are not competitive with glass. Mirrorlite becomes competitive with, and desirable in comparison to, glass in the larger sizes.

What are the largest dimensions?

Panel width is limited to 70".
Panel length, theoretically, is limitless. We have made single optical mirror panels as long as 30 ft.

The sample we have is approximately 1/2" thick. Can it be made with a thinner frame?

It can, but thickness is related to size because the panel gains its stability from the internal frame. Our standard mirror thicknesses range from 1" for the smaller panels to 2 1/2" for the larger (over 60×108″).

What is the film substrate that is used? Are other options available?

Vendor uses an optically clear 1 mil (92 gauge) polyester film that has been metallized with aluminum (vacuum deposited). Our highest grade optical film (XLX) is also treated with a protective coating that gives it scratch resistance and environmental resistance (oxygen barrier). We have used other films and other metals, and find that this is our best option.

What are the advantages and disadvantages of the different options?

Film: other options do not have the required optical and physical properties.
Reflective metal: In the past, in addition to aluminum, vendor has used silver as a reflective metal. This was used for its higher reflectivity in the visual wavelength range (400-700nm), and was applied to the higher quality optical (rear projection) installations. Silver, however, being a more volatile metal than aluminum, oxidizes more readily and requires a higher grade of protection — which adds cost to its already higher value. The recent development and perfection of higher lumen projectors has all but eliminated the need for a higher reflective mirror. Because these new projectors have come down in price dramatically, they are more and more accessible, as is our standard-grade aluminum mirror.

How is the film made reflective?

Vacuum deposition (evaporation) of aluminum onto the thin film substrate.

Is the reflective coating applied before or after it is stretched over the frame?

Reflective coating is applied before it is stretched over the frame.

Is there a special technique for stretching the film?

Yes.

How reflective is it?

86 – 90%
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What environmental conditions can the mirrors withstand (temperature, humidity, etc.)?

Panels, and each of their components, are subjected to a battery of environmental quality control tests, which include:
*Thermal resistance: image area shows no deterioration after -20°C for a period of 1 1/2 hour, transition period 1 1/2 hour, and +50°C for a period of 1 1/2 hour. Repeat cycle 10 times then return to normal (room) temperature.
*Humidity resistance: image area shows no deterioration after 24 hours at 49°C, 95% RH and/or 120 hours at 40°C, 90%RH.
*Corrosion resistance: image area shows no deterioration after 100 hours exposure to salt fog (5% solution) at 40°C. (This applies only to XLX grade film.)

We saw mention of rear projection mirrors. Do these allow light to pass through them from behind? Can you explain the difference?

Rear projection mirrors are optical mirrors that are used in rear projection installations in which a translucent screen is projected on from behind. One or more mirrors are used to fold the optical path (focal distance of the projector, or the distance the projector must be in order to focus properly on the screen.) The reason why the path is folded is to save space, especially considering the high cost of real estate! Rear projection is preferable to front projection (think: classic movie theater) in environments where ambient lighting is uncontrolled or too bright. This is why you will see RP in use, for example, on most news programs where the anchor sits before a screen onto which are projected various images. If the image were to be projected from the front, it would be washed out by the strong lighting on the set.
For some applications vendor uses a “scrim film” which is metallized to approximately 30% light transmission. This means that panels made with this film are reflective surfaces when lit from the front, and become transparent when lit from behind. Although this type of mirror is not used in the traditional rear projection installation, it is used in theatrical applications for special effects, as well as in commercial applications as security mirrors.
One application was for a point-of-purchase display: “Mirrorlite Infinity Box” is a cube or other three-dimensional box with mirror panels facing inside on all but one face. The front face is semi-transparent. The object to be displayed is placed in the box. When an interior light is off, the front face is a mirror. As the light is brought up, the mirror becomes a window, and an infinity of the object on display appears. This POP display can be applied to the cosmetics industry especially.

What was the original reason for developing this glassless mirror?

The glassless mirror was originally developed as a joint project by ICI (Imperial Chemical Industries) and British Aerospace in the early 1960’s. BA’s goal was to lighten the payload on its aircraft, and thought they could accomplish this by replacing glass bathroom mirrors with a lightweight substitute. ICI was just then developing the thin-film industry and joined BA in birthing the glassless mirror. BA then offered licenses to a handful of companies worldwide to produce the mirrors for them, of which we were one. Eventually, they decided that the bathroom mirror idea wasn’t for them, and they decided to hand over the licenses to the licensees. Because we were one of the original licensees and worked closely with both BA and ICI in the product’s development, we were given our license with the understanding that all other ex-licensees would come to us for technical assistance. We would also supply them with components. Of all the licensees, only we took the mirror’s concept from its original rudimentary form and evolved it into today’s high-quality product. All the other ex-licensees but one resisted change or opted or opted to move in different directions.