



Technical Bulletin

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Design, Handling, Inspecting, Fabricating, Installing and Maintenance of Pilkington **MirroView**[™] and Pilkington **MirroView**[™] 50/50

Summary

The Pilkington **MirroView**[™] and Pilkington **MirroView**[™] 50/50 products are hard, neutral color, pyrolytic reflective coatings on clear glass. These products are intended for installation in front of a flat screen display, such as a TV or a touch screen and are used to conceal the display when it is turned off. Pilkington **MirroView**[™] is available in 3 mm (1/8") and 6 mm (1/4") thickness while currently Pilkington **MirroView**[™] 50/50 is available only in 6 mm (1/4") thickness. The coatings used for both products are tough and durable, and for most situations can be handled, fabricated, installed and maintained in a similar manner as uncoated glass.

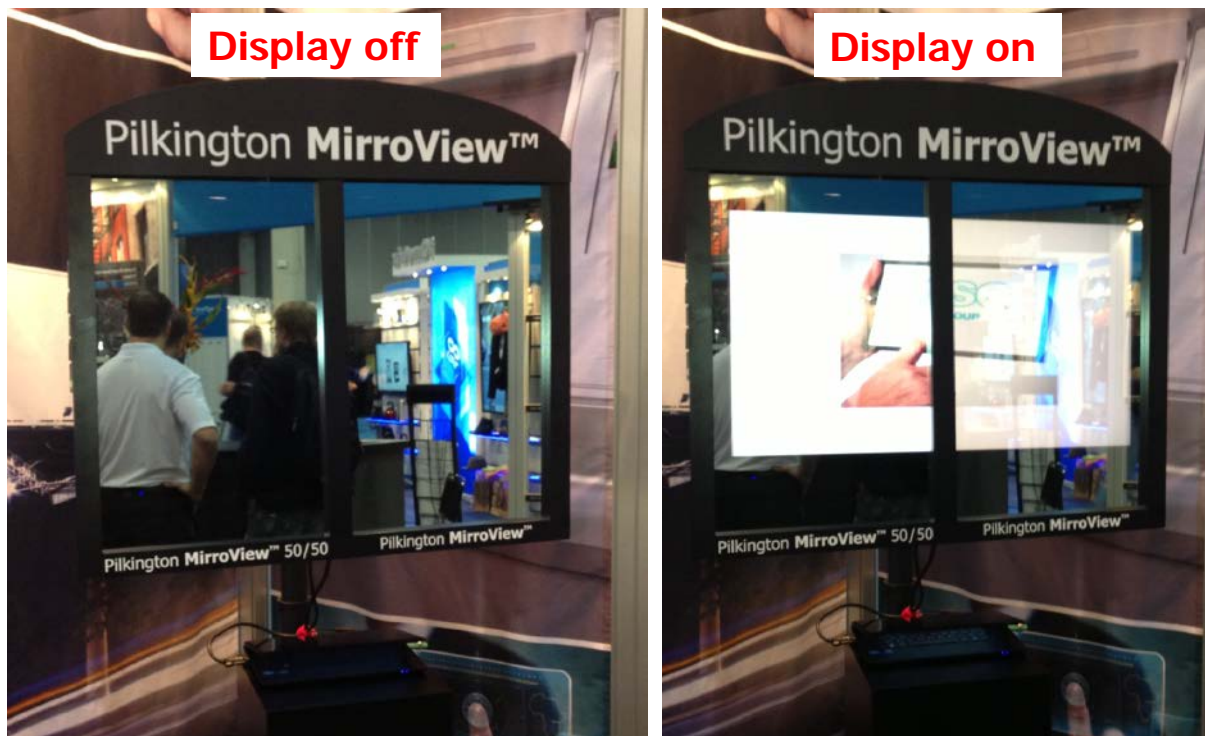
When the display is not operating, the Pilkington **MirroView**[™] and Pilkington **MirroView**[™] 50/50 products appear to be a normal mirror. When the display is turned on, the brightness of the screen image is readily seen and the formerly visible reflected mirror image can be easily ignored. Pilkington **MirroView**[™] is designed for situations with lower ambient light such as bathrooms, bars etc while Pilkington **MirroView**[™] 50/50 is designed for higher ambient light environments such as in retail. The performance of both products is illustrated in the two figures below, showing a TV in its off and on state with Pilkington **MirroView**[™] 50/50 installed on the left hand side and Pilkington **MirroView**[™] installed on the right.

As can be seen in the figures, when the TV is turned off, both products perform very well as mirrors. However when the TV is turned on a difference in light transmission can be observed. As the installation was in a high ambient light environment, some reflection can be seen from the Pilkington **MirroView**[™]. In lower ambient light conditions this effect would not be observed.

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TV in off/on states with Pilkington **MirroView™** 50/50 (left hand side) and
Pilkington **MirroView™** (right hand side) installed in front

Design

Pilkington **MirroView™** is quite different from, but has similar properties to, Pilkington **MirroPane™** one-way mirror. The Pilkington **MirroView™** coating has slightly more reflectivity (74%) than that of Pilkington **MirroPane™** (68%), and being on clear glass, the visible transmission is greater (20% versus 11%). Pilkington **MirroPane™** is designed to be effective as a one-way mirror with only an 8 to 1 light intensity ratio across the glass. To be equally effective Pilkington **MirroView™** would require a 17 to 1 light ratio, and even then the higher light transmission of the Pilkington **MirroView™** coating would allow excess light into the dark side if large glass sizes were used. The Pilkington **MirroView™** 50/50 coating is somewhat different from the aforementioned coatings and has reflectance of 50% with a light transmission of 49%. This is designed for environments with high ambient light where the higher reflection of the Pilkington **MirroView™** could result in the television being difficult to see.

- For optimum performance Pilkington **MirroView™** and **Pilkington MirroView™** 50/50 should be installed with the hard, pyrolytic coating on the outside, facing the viewer. Having the coating facing the inside is also possible but the reflected image will be less crisp.
- The installation should have the display, e.g. TV screen, tuned to maximum brightness when operating to compensate for the lower visible transmission of the glass.

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- Where possible, the mirror and display should be installed at such a position and angle so that reflections in the mirror, when viewed normally with the display operating, will not be overly bright (such as those of a window in front of a sunlit exterior).
- It is important that a box type construction is created with the TV behind the Pilkington **MirroView™** and no ambient light is allowed to enter from the sides or behind. This would negatively impact the performance of the product.
- Typically in an installation there will be an air gap between the TV and the Pilkington **MirroView™** product; the distance between the two is not critical as there will be no loss of light transmission due to the gap. However for picture clarity, particularly when viewing off-angle this should be minimized as much as possible.
- To select the correct Pilkington **MirroView™** product for your project a small mock-up would be recommended, however in many situations the products can be used interchangeably. For low ambient light conditions the standard Pilkington **MirroView™** would be recommended and for higher ambient light Pilkington **MirroView™** 50/50.
- Neither product should be glazed side-by-side with a standard mirror as the reflection characteristics of both are different and so a mismatch would be observed.
- In many applications the products are used as large mirrors with the TV representing only a small portion of the overall area. In this situation it would be recommended to mask the back of the “mirror-only” areas with black paint, vinyl or similar.

Pilkington **MirroView™** is available in 3 mm (1/8”) and 6 mm (1/4”) thickness and Pilkington **MirroView™** 50/50 is currently available only in 6 mm (1/4”) thickness. Typical performance data for the products is shown below.

Product	Nominal Glass thickness		Visible transmittance (%)	Visible reflectance coated side (%)	Visible reflectance glass side (%)
	in.	mm			
Pilkington MirroView™	1/8	3	20	76	70
	1/4	6	20	74	66
Pilkington MirroView™ 50/50	1/4	6	45	53	50

In addition to being used in display technologies, such as TVs or touchscreens, Pilkington **MirroView™** is suitable for other applications such as infinity mirrors – see image below.

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The Pilkington **MirroView™** and Pilkington **MirroView™** 50/50 products are not intended for use in exterior glazing where installations such as large curtain walls or structural glazing could reveal a slight non-uniformity of coating which would typically not be perceptible in interior applications.

Unpacking

The coated surface is hard and is not easily damaged, so cases can be opened normally.

Do not mark the coated surface with adhesive labels or wax crayons, and do not drag suction cups or metal objects across the surface. The coating will not be damaged by such materials, but it may be difficult to fully remove fine wax, rubber or metal residues due to the submicroscopic roughness of the coating.

Surface Identification

Both coatings are highly reflective so the coated side can readily be identified by holding a pen or pencil point against the surface and looking for one or two reflected images. When only one reflected image is seen, and the pencil point is touching the reflected image point, then the pen or pencil is touching the coated side. If two reflected images of the pen or pencil point are

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seen (one about 20 times brighter than the other), and the point is touching the less bright image, then the point is touching the glass side.

The coating is not electrically conductive so a hand-held ohm-meter or continuity meter can NOT be used to identify the coated side by touching two probes to the coating.

With practice the coating can be felt by the slight increased drag when finger tips or a finger nail are rubbed on the coated side.

Inspection

The glass can be inspected, in reflection, for uniformity of coating by placing it in front of a mat black non-reflective background with a uniformly lit white surface behind the viewer, reflected in the glass. This simulates the viewing condition where a person looks at their reflection with the display turned off.

Inspections should also be performed in transmitted light by viewing through the glass to a uniformly bright surface with a dark background behind the viewer (to eliminate distracting reflections) to simulate ideal viewing of an operating display.

Coating Quality Specification for Cut Sizes

When viewed in reflection or transmission, as described above, from a distance of 10 feet (3 m), the coating may have barely perceptible variations, but it will not have objectionable, bands, streaks or color differences as detailed in ASTM C 1376-03, "Specification for...Coatings on Glass".

There shall be no single visible spots on the coating greater than 3/32" (2.4 mm) diameter in the outer area, or greater than 1/16" (1.6 mm) dia. in the central area.

There shall be no more than 2 readily apparent blemishes in a 3" (75 mm) dia. circle, or no more than 5 in a 12" (300 mm) dia. circle.

FABRICATION

Cutting

The glass can be cut with the coating side up or down depending on preference, but coating side up is recommended to minimize the risk of marking the coating. Cutting wheel pressures will be very similar to those for uncoated glass.

When hand cutting on the coated surface the scoring process may feel slightly different but no change in wheel types is needed from those used with uncoated glass of the same thickness.

If the glass is to be dragged across rollers or over a poorly inflated air-float table it is preferable to have the coating side up to avoid rub marks. However, care must be taken that straight edges, metal tape measures, or cutting bars are not dragged across the coated top surface, as marking may occur which would require special cleaning techniques (see ATS #143).

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Edge preparation such as seaming or polishing should be done with the coated side facing up, as the rotation of seaming table castors could cause a swirling pattern mark where the castor wheel touches the coating when facing down.

Washing

Automatic washing machines using hot water and detergent, such as Alconox, can be used, as on uncoated glass. See Pilkington North America, Inc. ATS Bulletin #133 for details on hand washing techniques.

Razor blades and steel wool must not be used on the coated surface.

Abrasive cleaners should be only be used with great caution as they can often cause bright or dark spots which would only be visible under certain lighting conditions.

Heat Treating

Pilkington **MirroView™** and Pilkington **MirroView™** 50/50 can be tempered for safety glazing or increased impact resistance, however being highly reflective, tempering distortions due to the coating will be more visible. Where safety glazing is required then annealed laminated glass can be used with typically less distortion than tempered monolithic. Guidance on lamination is provided below.

The emissivity of the coating is the same as that of glass. Initial tempering furnace settings and quench flow rates should be similar to those used for the same thickness Pilkington **Optifloat™** Clear glass.

The glass can be tempered with the coating down when needed. However, care must be taken to prevent any sliding actions which could cause marking from the furnace rolls, or from the loading and unloading conveyors.

Laminating

Laminated glass must be fabricated with the coating out, away from the PVB interlayer, to preserve the high reflectivity. The coating could, physically, be laminated with the coating touching the interlayer if needed, but there would be some decrease in reflectivity and an increase in transmission. Impact testing should be repeated to ensure correct adhesion and preservation of the safety fracture properties of laminated glass.

Packing

When packing Pilkington **MirroView™** and Pilkington **MirroView™** 50/50 for shipping with the coating exposed, it is preferable to use paper or hardwood flour as an interleaving medium. Over long distances, the acrylic beads in Lucor powder can be abraded and leave a deposit on the coating which is difficult to remove.

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Care should also be taken to minimize the contact of Styrofoam packing materials with the coated surface. Styrofoam packing materials can leave a rub mark on the coating that is difficult to remove.

Installation

Procedures are similar to those used for plain glass. The coating is compatible with commonly available glazing sealants.

Maintenance

Pilkington **MirroView™** and Pilkington **MirroView™** 50/50 can be cleaned and maintained by hand washing with non-abrasive, ordinary, glass cleaning solutions. For hand washing, a mild detergent and water solution is recommended. Uniformly apply the solution to the glass and wash with a clean, soft cloth, sponge, or pad. Rinse thoroughly with clean water and wipe or squeegee dry immediately. Make sure no metal parts of the cleaning equipment touch the reflective glass surface, and that no abrasive particles are trapped between the glass and the cleaning materials.

Stubborn stains can be removed with organic solvents such as mineral spirits, de-natured alcohol, acetone, or MEK, following appropriate safety procedures. The solvent wash should be followed immediately by a detergent wash and clear water rinse to remove solvent and dirt residues.

Do not use harsh chemical cleaners, abrasives, opaque liquid cleaning solutions such as Soft Scrub® by Clorox, steel wool, or razor blades on the reflective surface.

Do not use any strong acidic cleaners on Pilkington **MirroView™** and Pilkington **MirroView™** 50/50 coatings.

The Pilkington **MirroView™** and Pilkington **MirroView™** 50/50 coatings can be cleaned like ordinary glass, but the reflective surface will show dirt and other deposits more readily. The reflective coating should never be allowed to become dirtier than is visibly acceptable. It should be cleaned as frequently as is necessary to prevent it from ever appearing unacceptably dirty. In this way problems with the accumulation and hardening of dirt deposits can be prevented.

If the glass is cleaned on a regular basis, there should be no need for special washing techniques.

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Contact Pilkington North America, Inc. Architectural Technical Services, tel: 419 247 4448 for further information.

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