



Technical Bulletin

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Handling, Inspecting, Fabricating & Glazing Pilkington **Eclipse™** Gold & Pilkington **Eclipse™** Sunset Gold

Summary

Pilkington **Eclipse™** Gold coating is a gold color, pyrolytic coating on either clear or bronze glass. The coating has been optimized for its gold appearance in outdoor reflection when glazed on the #2 surface. It can be glazed monolithically, or incorporated into an insulating glass (IG) unit, with the reflective coating on the #2 (room side) surface of the outer light. It was not designed for use on the #1 surface where accumulations of normal window dust and dirt would be more visible than on non-coated glass. But the coating is sufficiently durable for #1 surface applications as it does meet the European standard EN 1096-2 for exposed coatings.

The Pilkington **Eclipse™** Gold coating does not have any low emissivity properties but it can be combined with Pilkington **Energy Advantage™** low-e glass in an (IG) unit for improved solar control and thermal insulation.

When laminated the coating should normally not be touching the pvb interlayer. The coating can be laminated against the pvb interlayer, if physically required, but the visible and solar transmission, and SHGC, will increase, and the reflectivity will decrease, with a resulting reduction in the gold color.

Pilkington **Eclipse™** Gold and Pilkington **Eclipse™** Sunset Gold glasses can be used in spandrel panels. Applying ceramic frits to the reflective coating would significantly change the visible reflective properties. The optimum spandrel design will be an IG with the Pilkington **Eclipse™** Gold coating on #2 surface and a medium grey color ceramic frit or silicone based opacifier on the #4 surface, with both lites heat treated to resist thermal stress

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GLASS HANDLING

Pilkington **Eclipse™** Gold Glasses should be cut, washed, and generally processed with the reflective coated surface facing up. Note heat treatment (see below) can be with the coating down against clean rollers if needed for ceramic frit application to the glass surface.

INSPECTION

It is the responsibility of the fabricator to carefully inspect Pilkington **Eclipse™** Gold glasses, both before and after washing, as well as before any further fabrication. Glass not rejected by the fabricator during inspection prior to fabrication will be considered acceptable by Pilkington. Pilkington **Eclipse™** Gold glasses should be inspected in transmitted and reflected light, both from the reflective coating and the glass side of the lite.

When inspected in transmitted light, there should be a bright, uniform, diffused light (similar to an overcast sky) behind the glass. The objects which are seen in reflection (walls, ceilings, etc.) on the viewing side of the coated glass should be dark color or matte black and should have low level illumination on them to minimize masking reflections.

When inspected in reflected light the glass should be placed in front of a uniform, dark background to minimize transmitted images and the reflected image of a uniform diffuse light source or brightly illuminated white wall or screen (similar to an overcast sky) should be visible to the inspector.

Coated glass should also be inspected with a portable, bright spot light to simulate sunlight. This lighting can show marks, washing machine streaks, or finger prints which would otherwise not be visible in diffuse inspection lighting.

UNPACKING

Pilkington **Eclipse™** Gold is shipped in either standard cases, end caps or stoces. Like other Pilkington glass products, the glass surfaces are protected with a powdered interleaving material that resists moisture staining and abrasions between the individual lites.

Pilkington **Eclipse™** Gold should never be removed from cases by "end opening" the case since sliding glass surfaces past each other may damage the coating or the glass surface.

Pilkington **Eclipse™** Gold can be handled with suction cups. The cups must be clean and dry to prevent damage to or marking of the reflective surface. The cups should not be slid across the reflective surface.

SURFACE DETECTION

The coating does not conduct electricity and so standard low-e detectors cannot be used to detect the coated surface. As the coating is on one side of clear or bronze glass the normal

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double image reflection of a pencil point touching the glass-side surface can be readily used for coated side identification.

CUTTING

Stock Sheets

The fabricator is responsible for cutting stock sheets to eliminate imperfections from the finished cut piece.

Best results will be obtained by laying out the desired pattern in the middle of the stock sheet and making trim cuts on all 4 edges. Standard procedures used in cutting ¼" (6 mm) float glass should be practiced. All stock sheet edges must be trimmed a minimum of 1" (25 mm) to obtain a clean-cut edge. Special care should be exercised in cutting to avoid sliding metal tools (tape measures, etc.) over the reflective surface.

Pilkington **Eclipse™** Gold glasses should be cut with the coated side up to eliminate coating damage that could result from glass particles on the cutting table.

Cutting oils should be light, evaporating lubricants, such as "Low Odor Base Solvent" No. 529-66 available from Ashland Chemical, Charlotte, NC, phone: 800 522 1409. Keep the quantity of cutting oil to a minimum to reduce contamination of gloves and to allow easier washing of the coated surface.

WASHING

Pilkington **Eclipse™** Gold is a hard pyrolytic reflective coating. As with any coated product, care should be taken while washing the glass to prevent damage to the coating. The following recommendations are for washing reflective glass:

Mechanical Washing

Pilkington Eclipse™ Gold glasses should be washed, with the coating side up, in a rotating cylindrical brush flat glass washing and drying machine. Pilkington recommends using a detergent solution of hot 50-60°C (120-140°F) clean water and a commercial detergent designed for glass washing. The final rinsing should be with clean, de-ionized water heated to at least 43°C (110°F). As with all washing machines, either the water should be changed on a routine basis or a continuous overflow system should be used.

Drying air should be filtered and controlled in such a manner so as not to leave water droplets on the glass surfaces. Polypropylene brush rolls are recommended for glass washing machines. Brushes must be properly adjusted to avoid the possibility of reflective surface damage. When selecting the proper brush for washing Pilkington **Eclipse™** Gold glasses, consider that polypropylene brushes usually have a lower coefficient of friction, and are softer, and more flexible than nylon. Brush height settings should be such that only the bristle tips, rather than the sides of the bristles, sweep uniformly across the glass surface.

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Never allow the glass to remain stationary under the rotating brushes.

It is recommended that a test lite be run through the washer before starting production. The glass should then be inspected as detailed above.

Hand Washing

Pilkington **Eclipse™** Gold glasses can be cleaned and maintained by hand washing with non abrasive cleaners. For hand washing Pilkington **Eclipse™** Gold glasses, 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. Do not use HF (Hydrofluoric) or other acids, harsh chemical cleaners, abrasives, steel wool, or razor blades on the Pilkington **Eclipse™** Gold reflective surface.

LAMINATING

Pilkington **Eclipse™** Gold glasses can be laminated. However, laminating with the gold coated surface towards the plastic interlayer will result in a small but noticeable reduction in reflectivity, an increase in transmission and a reduction in reflected color. These changes will adversely change the solar control performance. It is recommended that each laminator conduct in-house adhesion tests, prior to actual production, to determine if an adequate bond to the coating has been obtained.

HEAT TREATMENT

Heating

Pilkington **Eclipse™** Gold can be heat strengthened, fully tempered or bent, after it is cut to size. Please refer to ATS Bulletin #177 for bending details. Pilkington recommends that Pilkington **Eclipse™** Gold glass be properly cleaned and dried prior to heat treating. The glass should be visibly clean at this stage to eliminate hand prints, fingerprints or other marks, which could be burnt into the surface during heat-treating.

The reflective coating can be facing up or down when heat treating in a horizontal furnace. The furnace rollers need to be clean, with no skidding or slippage, when the glass is processed with the coating facing down against the rollers.

The Pilkington **Eclipse™** Gold coating has an emittance of 0.84, the same as glass. On 6 mm clear glass it has only 19% solar absorption, so it should be heat treated with furnace settings initially similar to those used for the same thickness of clear glass, which has 16% solar absorption. Individual furnaces will have different heating characteristics, depending on their Infra Red peak wavelength and other factors, so some adjustments may be needed.

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Pilkington **Eclipse™** Sunset Gold is on bronze glass and so furnace settings can initially be those used for heat treating uncoated bronze glass of the same thickness.

The first piece of tempered reflected glass processed should be examined for break pattern and distortion immediately after it has cooled down. Remember, changes to the rate of feeding cold glass (individually or in continuous batches) into a hot furnace will have more effect on the glass temperature reached in the heating cycle than the presence or absence of a Pilkington **Eclipse™** Gold coating.

Quenching

The forced convection heat transfer during the quench is generally not affected by the presence of the coating, but normal air flow adjustments may be required to prevent bowing and to obtain an acceptable break pattern.

Optical distortions such as bow, warp, ripple, or roller wave are inherent in all heat treated glass products. Reflective glass accentuates these distortions. Care must be taken not to overheat Pilkington **Eclipse™** Gold glasses. Overheating the Pilkington **Eclipse™** Gold glasses will cause excessive visible distortion and could damage the reflective coating. If excessive distortion or coating damage is experienced, a cooler glass temperature during the heat treating process will be required. This is best achieved by shortening the furnace cycle time rather than changing top and bottom furnace temperature settings. Note that at no time should the glass temperature exceed 670°C (1240°F).

Sample lights of Pilkington **Eclipse™** Gold should be tested to ensure compliance with applicable safety standards and inspected for distortion prior to starting production. Confirmation that Pilkington **Eclipse™** Gold will meet or exceed all applicable safety glazing standards is the responsibility of the fabricator.

Note that heat-treated (tempered or heat strengthened) glass when lit by blue-sky polarized light, can often show a faint and soft dappled shadow pattern from the furnace quench air when viewed by the naked eye (see ATS #157 for details). Higher daylight transmitting glasses with reflective coatings show this phenomenon more readily. Such quench marks are an inevitable consequence of the heat treating process.

OPACIFICATION

Water based spray silicone materials, in a wide variety of colors, can be used on the Pilkington **Eclipse™** Gold coating as opacifiers. Samples must be viewed for visible change of coating reflectivity and color. As with all construction products, the material supplier should be asked to supply adequate proof of long term durability.

Applying ceramic frits to the reflective coating would significantly change the visible reflective properties so the optimum spandrel design will have IG with the Pilkington **Eclipse™** Gold coating on #2 surface and a grey ceramic frit or silicone based opacifier on the #4 surface. Pilkington **Eclipse™** Gold reflective glasses can have fluorine free ceramic frits or enamels applied to the glass side or to the reflective coated side. A test piece should be run with the desired frit to ensure satisfactory results. The glass can be successfully processed with the

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coating facing down provided the furnace rollers are clean, and there is no sliding or skidding of the glass on the rollers due to excessively rapid speed changes or reversals, or speed mismatches between roller sections.

SPANDREL GLASS

Pilkington recommends that, in general, glass be heat-treated when used in spandrel applications to resist thermal stress. Pilkington recommends that for optimum uniformity between vision and spandrel glass, Pilkington **Eclipse™** Gold spandrels be fabricated by constructing an insulating glass (IG) unit similar to the vision unit, with the reflective coating on the same surface (typically #2) as the vision units, and with a grey color ceramic opacifier applied to the #4 surface of the IG unit.

Using heat-treated insulating glass with ceramic enamel on the #4 surface (room-side) will eliminate read-through, minimize banding effects, and ensure a stable spandrel design. In order to withstand the high temperatures in spandrel panels the insulating glass secondary sealant used should be silicone and meet a high performance standard such as IGCC Level "A". See: ATS Bulletin #124.

Pilkington acknowledges that a number of factors make it impossible to achieve complete uniformity between vision and spandrel glass areas. See mock-up recommendations below.

INSULATING GLASS

When Pilkington **Eclipse™** Gold is used on the second surface of insulating glass units no edge deletion of the reflective coating is required. Test results to date indicate that Pilkington **Eclipse™** Gold reflective glass is compatible with typical IG P.I.B., polysulfide, urethane and silicone sealants. The fabricator of Pilkington **Eclipse™** Gold has the ultimate responsibility of testing to ensure that the proper sealant is used for each application. Specific questions concerning compatibility should be directed to, and confirmed with, the individual sealant manufacturers.

STRUCTURAL SEALANT GLAZING

Structural sealant glazing allows for a clean, unobstructed, exterior building appearance when compared to traditional glazing methods which capture the glass edges in a frame. Because Pilkington **Eclipse™** Gold (on clear glass) has higher daylight transmittance, some "read through" of the insulating glass sealant, spacer and the structural seal may be visible under certain lighting conditions when structural sealant glazing systems are used.

GLAZING CONSIDERATIONS

Pilkington **Eclipse™** Gold products were not designed for use in #1 surface installations. The coating has less gold color in reflection when viewed from the coated side. With #1 surface glazing normal window dust and dirt would be more obvious than on non-coated glass. The coating is sufficiently durable for #1 surface applications, as it meets the European standard EN

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1096-2 for exposed coatings. It is generally preferable to glaze Pilkington **Eclipse™** Gold products with the coating on the #2 surface.

Pilkington **Eclipse™** Gold (on clear glass) has a higher solar reflection and a lower solar absorption than many competitive glasses, therefore, Pilkington **Eclipse™** Gold (on clear glass) can usually be annealed glass when single or double glazed, and the glass is properly glazed with clean-cut and undamaged edges. (See ATS #139 or the Thermal Stress Calculator on www.pilkington.com/na for thermal stress analysis),

MOCK-UP CONSTRUCTION

The construction of a full-scale mock-up is recommended, where the glass can be examined, from both sides, in transmission and reflection. A full-size mock-up, including both vision and spandrel glass, should be constructed and viewed on site, representing the proposed building location and viewing geometry, and should be approved prior to final glass product selection and production. This will show the final installed appearance of the glass far better than viewing small hand held samples under interior lighting conditions.

REFLECTIVE COATING QUALITY SPECIFICATIONS

Uniformity

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

Pinholes

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) diameter in the central area.

Scratches

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

Quality Standard of Base Glass

The base glass shall meet the requirements for "glazing select" quality in the ASTM C 1036 05.

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Optical Properties

Optical properties of Pilkington **Eclipse™** Gold and Pilkington **Eclipse™** Sunset Gold may be found in the current edition of the Pilkington Product Brochure and on our website in the Sun Management Calculator at www.pilkington.com/na.

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

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