



PILKINGTON
NSG Group Flat Glass Business

Technical Information

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SPANDREL PANEL GLAZING

Spandrel panels are the glazed opaque areas in a curtain wall where the glazing material is required to hide insulation, the edges of floor slabs, ceiling details, HVAC equipment, etc. The spandrel glazing is usually required to resemble the glazed vision area in appearance from the building's exterior. It is seldom possible to get a perfect match because of the different lighting conditions behind the spandrel and the vision glazing but with attention to detail, good uniformity can be achieved.

This Bulletin discusses various aspects of spandrel panel glazing and some of the difficulties that can be encountered, and must be addressed. The use of a durable and stable opacifier on the #4 surface of Heat Treated, Insulating Glass (IG), is generally recommended to allow spandrel panels to most closely match the appearance of the adjacent vision glazing, and to accommodate the following factors:

THERMAL STRESS

Glass in spandrel panels generally needs to be Heat Treated: Heat Strengthened (HS) or Fully Tempered (FT), to withstand the thermal stresses created by solar radiation. It may be possible to use annealed glass if the following conditions are met:

1. The space behind the spandrel panel is adequately ventilated,
2. The spandrel glass is always in complete shade,
3. The framing details, such as 4 sided structural silicone glazing, prevent glass edge to center temperature differences in excess of 28°C (50°F) from occurring,
4. The glass cut edge quality is very high. Consider specifying fully polished edges.

If annealed glass is to be considered then a detailed thermal stress analysis should be made.

HEAT TREATMENT

Heat Strengthened glass will generally supply adequate resistance to thermal stress in the outer lights of an IG spandrel, even though it is only half as strong as FT glass. HS is usually recommended over FT because of the reduced risk of spontaneous breakage which is occasionally seen in FT glass. HS glass may also show less reflective distortion, though it will probably not have any less quench pattern (visible in polarized light). Note that HS is not a "Safety Glass" and, if broken, its pattern resembles that of ordinary annealed glass.

The inner light of an IG spandrel is more severely stressed by solar radiation, plus it will be somewhat weakened by the addition of a ceramic frit opacifier, so this inner light may require full tempering. FT inner lights are generally recommended when relatively high solar transmitting outer glass is used, with a low emissivity coating on surface #2 or #3. This combination will readily create inner glass temperatures well over 100 °C (212 °F) in still air conditions, even with low outside temperatures

INSULATION

Spandrel glass panels usually have insulation behind the glass pane. It is recommended that this insulation material not be directly adhered to, or placed in direct contact with, the glass.

OPACIFIERS

Opacifiers are applied to prevent “read-through” of the building details behind the spandrel glass. Even low transmission glasses, with less than 10% visible light transmission, will sometimes allow contrasting color details behind a spandrel to be visible in some lighting conditions if no opacifier is used.

Black plastic film opacifiers, vinyl or polyester (Mylar), can be applied with water base or solvent base adhesives. Some of these materials have shown visible bubbling over time due to the high temperatures experienced in spandrels. Polyester films with solvent based adhesives are reported to be more durable.

Oil based or latex paints may not prove durable enough for opacification when used on the #2 or #4 surface as the sun’s Ultra-Violet (UV) radiation can eventually break down the molecules of paint bonding to the glass.

Water based spray silicone materials, in a wide variety of colors, have been successfully used as opacifiers. As with all construction products the material supplier should be asked to supply adequate proof of long term durability.

Opaque ceramic frits are effective at blocking “read-through” even though their coverage may not be 100% complete and some diffuse light will be transmitted. These inorganic materials are usually very durable and typically do not suffer UV damage. Frits are conveniently applied when the glass is being heat treated.

Pilkington **Eclipse Advantage**TM reflective low-e glass can have fluorine free frits applied to the glass side surface, or the reflective coated surface, as an opacifier. The **Eclipse Advantage**TM coating is compatible with most frits. The glass temperature should not be allowed to exceed 1120°F (605 °C) when frits are applied to either surface. Pilkington **Eclipse Advantage**TM glass should be carefully examined for uniformity in diffuse reflected light, before installation, to ensure the application has been successful.

The opacifier color should be carefully selected to give optimum blending appearance with the vision glass. Generally a medium to dark grey color has been found to be the most effective.

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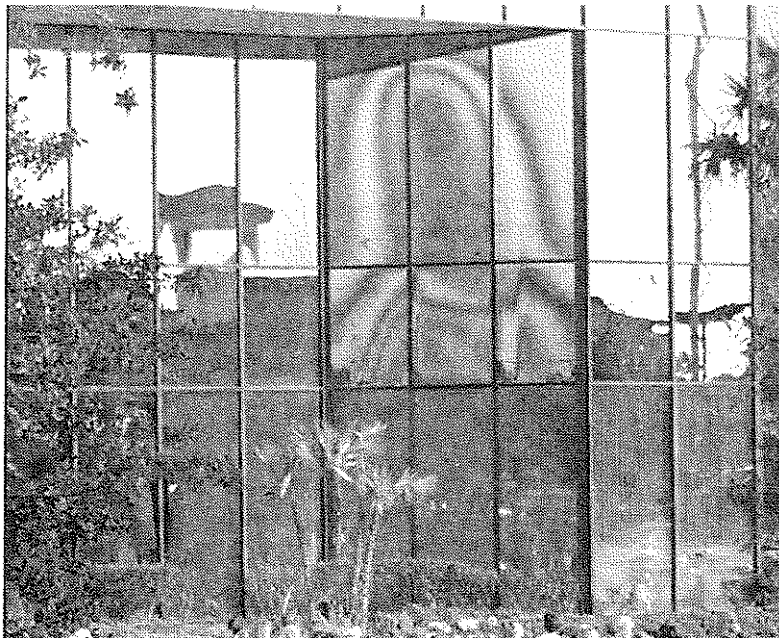
SCRIM BACKING

Scrim materials can be combined with opacifiers, or applied on top of them, to prevent fall-out of broken spandrel glass under light loads (4 psf as in ASTM C-1048). The need for scrim backing originated with the rare occurrences of spontaneous breakage in tempered glass. The use of HS spandrel glass lessens the need for scrim.

SHADOW BOX SPANDRELS

If the glass is not opacified then a “shadow box” construction can be considered. The space behind the glass must be uniformly dark, made of materials which will be stable under UV light and high temperatures - over 100 °C (212 °F), with a moisture barrier or sealed metal spandrel pan. The space between the glass and the insulation must be vented to the exterior to prevent condensation of moisture on the cool glass surface (#2) at night or when not exposed to sunlight. If the materials are not stable, volatiles can easily out-gas. This will condense on the cooler glass and make stains which would be visible from the exterior, because an effective opacifier has not been used. These construction requirements are difficult to satisfy in practice.

Condensation of volatiles is suspected to be the cause of the visible deposits on the #2 surface of single glazed spandrel shadow boxes in the central area of the photo below of a Clearwater, FL building.



INSULATING GLASS SHADOW BOXES

The optimum general solution is to glaze the spandrel area with Heat Treated Insulating Glass, which acts as a stable shadow box, using dark grey color frit opacifier on the #4 surface. The IG seal system needs to be of high quality to withstand the very high temperatures encountered. A silicone and butyl dual seal construction, certified to IGCC level A, is the minimum level of performance needed. This design is easy to fabricate, reliable, and can give a very good appearance match with the vision glass.

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

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