TECHNICAL BRIEFING - SPANDREL PANEL DESIGN

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Spandrel panels are the 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.

The following sections discuss various aspects of spandrel panel glazing and some of the difficulties that can be encountered. A good design must take all these factors into account. The use of a durable and stable "opacifier" on the #4 surface of a heat strengthened, insulating glass unit (IGU), is recommended for spandrel panels to most closely match the appearance of the vision glazing and to accommodate the following factors:

Thermal Stress
Glass in spandrel panels generally needs to be heat treated; either heat strengthened or toughened, to withstand the thermal stresses created by solar radiation. If the space behind the spandrel panel is adequately ventilated, or the glass is always in complete shade, or if framing details such as 4 sided structural silicone glazing, prevent glass edge to center temperature differences in excess of 40°C from occurring, then it may be possible to use annealed glass, subject to making a detailed stress analysis. If annealed glass is used in spandrel glazing then the glass cut edge quality must be very high, with consideration given to the use of fully polished edges.

HEAT TREATMENT
Heat strengthened (HS) glass will generally supply adequate resistance to thermal stress even though it is only half as strong as fully toughened (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. Note that HS is not a "Safety Glass" and, if broken, its pattern resembles that of ordinary annealed glass.

INSULATION
Spandrels are usually insulated. It is recommended that the insulating 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 painted 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 will not prove durable enough for opacification when used on the #2 or #4 surface as the sun's UV radiation will eventually break down the molecules of paint bonding to the glass.

Water based spray silicone materials, in a wide variety of colours, 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. These inorganic materials are usually very durable and typically do not suffer Ultra-Violet (UV) damage. Frits are conveniently applied at the same time as the glass is being heat treated.

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

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 “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 (up to 93°C), 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 which 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.

INSULATING GLASS SHADOW BOXES

The optimum solution is to make a HS glass IGU spandrel, with a dark frit opacifier on the fourth surface. The IGU seal system needs to be of high quality to withstand the severe thermal stresses. 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.

Further Information

Please visit viridianglass.com or freecall 1800 810 403