



VIRACON®
GLASS IS EVERYTHING™



T E C H T A L K

R E F L E C T I V E G L A S S

REFLECTIVE GLASS

This Tech Talk provides you with important information on storage, maintenance, installation, and inspection guidelines for monolithic reflective glass to prevent glass staining and damage.

Guidelines

SURFACE PROTECTION GUIDELINES

Be careful of welding sparks pitting the glass during construction, since this causes permanent glass damage. Also, if silicone concrete sealers or glazing sealants contact the glass surface in vision areas, they must be removed. The removal process can cause glass damage, especially on the coated side.

Glass staining after installation can occur from the run-off of unsealed concrete panels or mortar joints. The resulting concentrated alkaline solution can cause serious glass etching in a matter of days.

Concentrated liquid cleaners used as a lubricant for gasketglazed installations can also cause glass staining and coating deterioration. Even though the glass is rinsed, some of the cleaner can get trapped between the gasket and the glass. This cleaner eventually seeps out, attacking the glass. As a result, it is important to use lubricants recommended by the gasket manufacturer.

Since roomside glazing surfaces feature coatings, it is important to use a clear plastic material or other protective material to shield the surfaces against damage during construction. Do not allow the protective material to touch the glass surface. Also, vent the air space between the shielding material and the glass to reduce the risk of moisture staining or thermal stress breakage. Lastly, remove the protective materials and wash the glass as soon as possible following construction.

STORAGE GUIDELINES

If reflective glass is stored in crates, stocce packs or under conditions where it touches or is separated by interleaving materials, ensure that it is kept dry at all times.

Once water is allowed to penetrate between the glass panes, the potential for staining and etching increases. If the interfaces become wet, separate the glass plies to allow them time to dry.

Since water vapor is a gas, it readily penetrates be-

tween glass plies that are in contact with each other. To prevent moisture condensation, keep the glass temperature above the dew point of the surrounding air. For glass stored indoors, maintain a uniform indoor temperature. For glass stored near loading docks, do not expose the glass to cold outdoor air temperatures longer than 15 to 20 minutes.

At the job site, store glass away from rain and direct sunlight. Do not obstruct air movement around the crates. Do not wrap stored glass in polyethylene sheets or other impermeable material. If construction delays occur, make arrangements to have the unprotected glass stored off site to prevent staining damage. For additional information concerning glass staining, refer to Viracon's *Glass Staining Tech Talk*.

CLEANING GUIDELINES

Reflective glass features a thin, metallic coating on the glass surface. As a result, take special care cleaning these surfaces. For routine cleaning, use a soft, clean, grit-free cloth and a mild soap, detergent or window cleaning solution. Rinse immediately with clean water and remove any excess water from the glass surface with a squeegee.

Do not allow any metal or hard parts of the cleaning equipment to contact the glass surface. Also, do not use abrasive cleaners, razor blades, putty knives or metal parts of cleaning equipment, since these will scratch the reflective coating. Fingerprints, grease, smears, dirt, scum, and sealant residue are more noticeable on reflective glass, requiring more frequent cleaning.



JUNIPER NETWORKS

LOCATION: SUNNYVALE, CALIFORNIA // GLASS TYPE: VRE19-59, VE19-2M, VE1-2M

PHOTOGRAPHER: VIRACON, RYAN HOFFMAN

Viracon's Glass

VISION/SPANDREL MATCH

Often a project may require spandrel glass to harmonize with the vision areas of a building. However, this is sometimes difficult to achieve when high-light transmitting or low-reflective glass types are used. Instead, the use of lowlight transmitting and high-reflective glass types provide the least contrast between vision and non-vision spandrel areas under a variety of lighting conditions.

Variable sky conditions can also influence our perception of glass color and general appearance. On a bright, sunny day, the exterior light intensity is approximately 50 to 100 times greater than the interior lighting level. When viewing the glass from the outside, the dominant visual characteristic is the exterior reflection.

On gray, overcast days, a greater visual disparity is created between vision and spandrel areas. This is due to the transparency of the vision glass and the perception of depth created by interior lighting. The non-vision areas tend to look flat and two-dimensional by contrast.



BROCKMAN HALL FOR PHYSICS, RICE UNIVERSITY

LOCATION: HOUSTON, TEXAS // GLASS TYPE: VE1-2M

PHOTOGRAPHER: MARK SCHEYER

Because spandrel glass is virtually opaque, it can only be viewed in reflection. On the other hand, vision glass possesses a degree of transmission. As the transmission of the vision glass increases during overcast conditions, interior lighting becomes more prevalent.

Viracon recommends viewing glass samples or full-size mockups to match vision and spandrel glass areas when the vision glass light transmission exceeds 14 percent.

Greater contrast between vision and spandrel areas occurs when using uncoated, tinted glass (green, bronze, blue, etc.) or high transmission, Low-E coatings. Under these conditions, insulating spandrel units can create the illusion of depth and approximate the vision glass more closely.

By keeping the vision and spandrel glass construction similar, (the same exterior glass color, coating, etc.), the contrast can be minimized under various lighting conditions. As a result, Viracon recommends a neutral colored ceramic frit on the number four surface.

Product Standards

GLASS DISTORTION

According to ASTM C1048, inherent factors involved in heat processing may distort reflected objects viewed on the glass surface. The ability to perceive this distortion is also dependent on the glass size or aspect ratio. Square-shaped glass sizes tend to have more bow and warp than glass sizes with length-to-width ratios exceeding 1:1.

The use of reflective coatings also enhances reflective surface distortion in heat-treated glass products. Insulating glass units may exhibit visible distortion as a result of air expansion or contraction within the air space under normal temperature cycling.

When viewing the glass in reflection, the perceived level of glass distortion can be influenced by the images reflected on the glass surface. For elevations where the glass reflects the sky, there may be no visible signs of distortion. On the other hand, for elevations where nearby buildings are viewed in reflection from the glass surface, the glass may appear heavily distorted. This is due to horizontal and vertical lines, such as mullions, columns, and power lines, that are reflected off of the glass and used as a reference point for the eye.

Also, the angle and distance from where the individual views the building has an effect on the perceived level of glass distortion. As with color, this perceived distortion is difficult to quantify. Consequently, instrumentation is used to provide factual analysis.

Another factor inherent in heat treating glass is roll ripple or roll wave distortion. While ASTM does not require or list the allowable amount of roll wave distortion in heat-treated glass, Viracon has established an internal specification. This specification is .003" (.076 mm) peak to valley within the main body of the sheet and .008" (.20 mm) within 10.5" (267 mm) of a leading or trailing edge.



UNITED STATES COAST GUARD HEADQUARTERS (USCG)

LOCATION: WASHINGTON, DC // GLASS TYPE: VE3-2M, VE1-2M

PHOTOGRAPHER: HOACHLANDER DAVIS PHOTOGRAPHY

REFLECTIVE GLASS INSPECTION GUIDELINES

Viracon's coated glass products comply with ASTM Standard C 1376.

- **Pinholes**—Inspect glass from a distance of 10 ft. (3 m) in transmission, at a viewing angle of 90 degrees to the specimen, against a bright, uniform background. If a pinhole is readily apparent, the following criteria apply: Pinholes larger than 1/16" (1.6 mm) in diameter are not allowed in 80 percent of the central glass area. Pinholes larger than 3/32" (2.4 mm) are not allowed in the outer 20 percent of the glass area. No more than two readily apparent blemishes are allowed in a 3" (75 mm) diameter circle and no more than five readily apparent blemishes are allowed in a 12" (300 mm) diameter circle.

- **Uniformity**—When viewing coated glass from a minimum distance of 10 ft. (3 m), color variation may occur from one unit to another. This can be caused by variations within the float glass substrate and normal production variations and this is not considered a defect. All Viracon commercial glass products conform to industry color standards.
- **Distortion**—Various factors involved in heat processing, insulating air spacers and frame binding may distort reflected objects viewed on the glass surface. These are not considered defects of the coated glass or the final fabricated product.
- **Scratches**—Inspect glass from a distance of 10 ft. (3 m). Scratches up to 2" (50 mm) are allowed in 80 percent central glass area, and scratches up to 3" (75 mm) are allowed in the outer area. Concentrated scratches or abraded areas are not allowed.

SPANDREL GLASS INSPECTION GUIDELINES

- View spandrel glass from a distance of 15 ft. (4.6 m) under natural daylight conditions. Color and reflectance may vary when viewed under a uniform, opaque background. This is not considered a defect.
- When viewing spandrel glass under similar conditions, reflected pinholes and scratches are not considered defects if they are unobtrusive.

RESPONSIBILITY

Viracon recommends that the glazing contractor obtain a written sign-off from the general contractor after each day of glazing is completed. This ensures that damage to glass by other trades does not become the responsibility of the glazier.

Insulators of reflective glass products are encouraged to pre-inspect reflective glass products prior to fabrication. Coating defects, which are beyond the quality standards mentioned here, become the responsibility of the insulating glass manufacturer after the units have been fabricated into sealed units.

Industry standards allow for certain types of coating imperfections in finished units. The imperfections can be minimized by installing the glass with the imperfections toward the bottom of the window opening, below the normal vision area.



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The information contained in this publication is presented in good faith. It is believed to be accurate at the time of publication. Viracon reserves the right to change product specifications without notice and without incurring obligation.

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