Spandrelite™ Glass

This document will provide the fabricator with the technical information necessary to successfully fabricate the Spandrelite™ glass product. The recommended procedures for proper processing of Spandrelite glass are described including storage, safety, and sound environmental management.

General:

Spandrelite glass by Vitro Architectural Glass is a pre-painted stock sheet that is easy to cut, fabricate and heat-treat. *Spandrelite* glass is available in three standard hues (Black, White, and Warm Gray) that complement a full range of architectural glasses.

Spandrelite glass utilizes proprietary low VOC water-based ceramic coatings that are more environmentally responsible than solvent-based alternatives. As a ceramic frit, *Spandrelite* glass will have exceptional durability with resistance to scratches, fading and peeling. Like other coatings, including those with ceramic frit, it must be heat treated (heat-strengthened or tempered) to achieve the designed appearance and performance characteristics. During the heat-treating process, the painted surface permanently bonds to the glass surface.

Spandrelite glass is intended for exterior applications with the allowable surface positions described in this document. The product may be used for commercial wall claddings or spandrel applications where it can help enhance the appearance of ordinary façade designs. *Spandrelite* glass obscures unsightly yet essential building components while resisting heat, moisture, UV damage, and thermal shock.

Note: Spandrelite glass is not appropriate for use in vision applications or any application where it is backlit and light is seen transmitted through the glass. These applications may cause allowable imperfections, striations, or small pin holes to be observed, even when the painted surface meets all specifications for intended use.

When processing *Spandrelite* glass, the product should always be conveyed with the painted surface facing up and away from conveyor rolls and other conveyance surfaces, EXCEPT when cutting. The glass must be cut with the painted surface down against the cutting table because a sufficient glass score is not obtainable through the painted surface.

Spandrelite glass must not be mixed with any other spandrel products to ensure that potentially unacceptable visual mismatch does not occur. When using Spandrelite glass you must complete all work for one project in-house. If not, a mock-up must be evaluated for acceptable visual uniformity at the jobsite with all parties involved for the white, warm gray, and black *Spandrelite* glass products. This sample should be retained for future reference.

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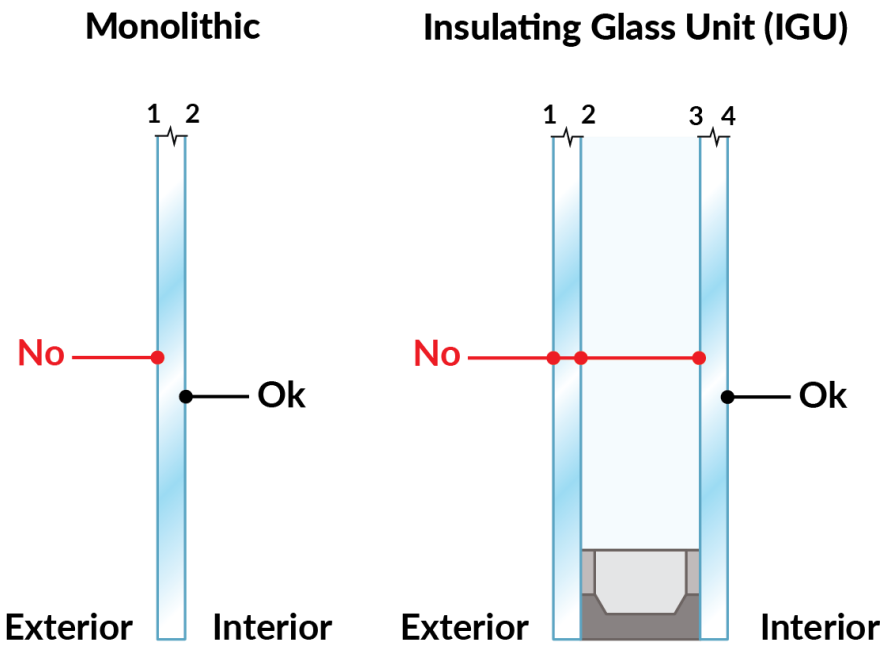
Health & Safety:

Spandrelite glass utilizes low VOC water-based ceramic coatings that do not present any significant health and safety hazard over other spandrel coated products. Due to its water-based formulation, *Spandrelite* glass will outgas lower amounts of volatile organic compounds than solvent-based spandrel alternatives. Proper personal protective equipment including eye protection and cut resistant gloves, cuffs, apron and safety shoes should be worn when handling glass. Vitro field representatives can provide suggestions for the types of equipment available. A Vitro Architectural Glass Safety Data Sheet (SDS) on this product is available for your reference.

***Spandrelite* Glass Allowable Surface Positions:**

When incorporated into an Insulating Glass Unit (IGU), *Spandrelite* glass must be positioned on the building interior surface of the unit only. Monolithic applications are permitted with the coating on the second (2nd) surface. First (1st) surface applications are not permitted. In the case of a double pane IGU, the *Spandrelite* glass painted surface must be located on the fourth (4th) surface. See '*Spandrelite* Glass Allowable Surface Positions' diagram below.

Spandrelite Glass Allowable Surface Positions



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No coatings, frits, or any other substances are permitted to be placed on top of the *Spandrelite* glass painted surface before heat-treatment. Doing so will void the product Warranty.

When properly heat-treated, the *Spandrelite* glass painted surface provides a uniform attractive finish. Regardless of the particular configuration or application using *Spandrelite* glass, Vitro recommends that a full-size mock-up be viewed under the specific job-site conditions and retained as a basis for acceptable product.

Storage:

Storage of the product must be indoors away from exposure to the elements and in an area where fumes from sources such as de-mineralizers, acid storage, batteries, etc., cannot affect the product. As with all glass products, exposure to high humidity or direct water contact during storage should be avoided. There are no special handling requirements that have been identified for this product.

Spandrelite glass that arrives at your facility wet should not be accepted. Notify the glass carrier first and then Vitro.

As a general rule, care should be taken to avoid major fluctuations in temperature and humidity that may result in the formation of condensation on the glass or painted surface. These are generally encountered during glass transportation and storage. *Spandrelite* glass should not be impacted by minor inadvertent moisture contact. However, the presence of surface moisture may cause multiple glass sheets to adhere and make single lite free fall difficult. When surface moisture is present, Vitro recommends that the container be set aside until the glass surface is dry in order to limit the potential of multiple lites sticking together. If fans are available, they should be used to expedite the drying process.

Glass should be processed through heat treating within six months of receipt. FIFO should be practiced. Ideal storage conditions are temperatures less than 86°F, and 70 - 75% relative humidity. Inventory should be routinely inspected, if not used in a timely manner, for any visible degradation of the painted surface. If the storage area is not environmentally controlled, air movement is an important factor to help prevent degradation. Large fans can be installed to assist with air circulation. One vendor of storage solutions, fans, and monitoring systems is BigAss Fans: http://www.bigassfans.com.

Handling:

No special handling guidelines have been identified but Vitro suggests avoiding all unnecessary contact with the painted surface. The *Spandrelite* glass surface should never be handled with bare hands. Clean, non-marking, dry gloves must be worn when handling the product.

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If a lift assist using suction cups is attached to the painted surface during handling, the suction cups must be clean and dry. Care should be taken to ensure the suction cups do not slip on the painted surface. Evaluations should be made of the painted surface after cup contact to ensure the cups do not damage the painted surface or leave a residue.

If self-adhesive stickers/labels are used to identify the glass during production, the adhesive side of the sticker should not be in contact with the painted surface. No tape should be placed on the painted surface at any time before or during processing of *Spandrelite* glass as it can leave a memory that shows after heating.

Cutting:

Spandrelite glass can be cut using conventional scoring and breakout equipment. **The painted surface must be face down against the table surface during cutting so that the unpainted surface of the glass gets scored. The glass cannot be scored sufficiently through the painted side.** The cutting table surface must be clean (free of glass chips and debris) and not saturated with cutting oil prior to processing.

When cutting *Spandrelite* glass, it is recommended that cutting fluid be used in moderation to lubricate the cutting wheel and achieve the optimal scoring of the glass. Any of the cutting fluids on the Vitro approved list for Solarban® products can be used with *Spandrelite* glass. Excessive cutting fluid should be avoided so that it will not run down the glass when it is placed in a vertical position. See TD-149, *Acceptable Cutting Fluids and Detergents for use with Vitro's MSVD Sungate® and Solarban® Coated Glass Products* for a list of acceptable cutting fluids.

Vitro recommends using the standard cutting parameters for uncoated 6mm glass including the standard wheel angle, pressure, and cutting speed. No special set-ups are required. See TD-119, *Guidelines for Glass Scoring and Breakout Quality* for additional information and recommendations regarding conventional glass cutting.

Vitro recommends a minimum 1" trim be taken in order to properly breakout *Spandrelite* glass. Vitro recommends that you take trim on all four (4) sides when cutting. This will reduce the chance of any paint overspray that may be present on the glass edges of received product from potentially being transferred to the furnace rollers.

It is recommended that *Spandrelite* glass cut-size that is staged between processing steps be separated with foam-covered cork tabs or polyfoam strips in the corners of lites if different dimensions are stacked adjacent to one another. Attach the adhesive side of the tab to the non-painted surface. Cutting fluid should not be allowed to dry on cut-size glass before the next processing step.

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Spandrelite glass trim cannot be returned to glass manufacturing plants. It is recommended that all glass trim from cutting operations be recycled if possible first, and then discarded in an approved landfill as regular nonhazardous waste second. See 'Disposal' section.

Note: These guidelines are suggested starting points and further adjustments may be needed to optimize the cutting and break-out results for your specific cutting machine and process setup. As always, the cut edge quality should be visually inspected for excessive chips, shark's teeth, and other defects that will affect the glass strength and appearance.

Seaming:

Spandrelite glass should have the glass edges seamed using conventional seaming equipment. Seaming will be similar to that of other glass products. The painted surface must always face up away from the conveyor or table during seaming to avoid the possibility of debris scratching the painted surface. The seaming table must be cleaned frequently. Contact with the painted surface must be minimized during seaming. Contact should be made from the edges or with the unpainted surface as much as possible. Only clean, non-marking, dry gloves should be worn when handling the product.

Dry seaming is the preferred and recommended method, but wet seaming is also acceptable. If wet seaming is used, the glass should be washed and dried immediately thereafter to ensure that none of the seaming liquid is allowed to dry on the glass. The optimal seaming belt abrasive is 120 grit. Inspect belt quality more frequently when dry seaming *Spandrelite* glass and change belts when necessary.

Washing:

Spandrelite glass can be washed using standard float glass washer settings. The painted surface must always face up away from the conveyor when using horizontal washing equipment or facing the operator (away from rollers) in vertical washing equipment to avoid the possibility of debris scratching the painted surface. Low-e-type brushes, although not required, are still preferred. Good washer practices should be followed including having a pre-spray section that floods the painted surface with clean water, maintaining wash water temperature between 110 and 140°F, and maintaining total dissolved Solids (TDS) of the final rinse tank below 20 ppm. See TD-144, *Recommended Techniques for Washing Glass* for additional information and recommendations regarding conventional glass washing.

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Wash water detergents on the approved list for Solarban® products may be used. See TD-149, *Acceptable Cutting Fluids and Detergents for use with Vitro's MSVD Sungate® and Solarban® Coated Glass Products* for a list of acceptable detergents.

Note: At no time should any portion of the glass be allowed to stop inside the washer.

Even if water, brush rotation, and air-knife blower(s) are programmed to stop when glass stops, there is a risk that some of the *Spandrelite* glass painted surface will have a different appearance if glass is stopped in the washer. This difference may not be visible until after heating.

Note: Spandrelite glass MUST exit the washer completely dry to help ensure uniform appearance post-heating, prevent streaking, and prevent adherence issues.

Heat Treating:

Spandrelite glass must be heat strengthened or fully tempered to fuse the paint to the glass substrate. It can be heat treated in a manner very similar to uncoated glass of the same thickness and substrate but may require more heating time in the furnace to get the paint to fire properly. *Spandrelite* glass should be processed on one furnace for all tempering runs for each project, if possible, to help ensure consistency of the final product. All attempts should be made to minimize the number of tempering batch runs for each project.

Note: The glass must be run painted surface up through the furnace to prevent paint transference to the ceramic rollers.

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The white product will likely require more cycle time than the black or gray to ensure full fusing of the paint to the glass surface. The additional amount of time should be confirmed based on testing described in the 'Adequate Paint Firing' section below.

To heat the *Spandrelite* glass product, start with your 6mm Clear uncoated glass recipe. For the black product, increase the total heating time by approximately 10%, keeping the heat set points unchanged. For the gray product, increase the cycle time by about 15%, and for the white product, increase heating time by about 20%, again leaving all other parameters unchanged. See Summary Table below.

***Spandrelite* Glass Heating Time Guidelines**

Product	6mm Clear	Black	Warm Gray	White
Heating Time (Cycle Time)	Standard Recipe	6mm Clear Standard + 10%	6mm Clear Standard + 15%	6mm Clear Standard + 20%

If you can adjust the convection heating across the width of the furnace, apply more heat to the middle third to half of the plate width to ensure the paint adheres properly to the glass in the center. If the glass becomes too hot (causing distortion, edge kink, roller-wave, etc.), reduce the total heating time by 2 seconds per millimeter of glass thickness and repeat until all quality metrics are met.

If you notice any blistering of the paint, ensure the product is completely dry after washing and that the furnace convection heat is not too high. You may need to lower the heating set points and extend the heating time to ensure sufficient heat penetrates through the glass body without overheating the painted surface.

Do not run *Spandrelite* glass through the heating process more than once as mechanical properties, color, and gloss can be adversely affected.

Refinements will be made by the furnace operator as they gain experience with this product as it processes through the fabricator's specific equipment. The final tempering/heat strengthening recipes will reflect the settings required to produce a quality product that satisfies the requirements of either heat strengthened or fully tempered glass as defined in ASTM C1048, as well as the particle size requirements of fully tempered glass approved for safety glazing as defined in ANSI Z97.1, all the while maintaining acceptable distortion characteristics.

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Insulating:

Spandrelite glass is approved for Spandrel and IGU applications. See TD-145, *Spandrel Glass Types and Recommendations* for additional information and recommendations. NOTE, however, that *Spandrelite* glass can only be installed on the inside building surface of an IGU (4th surface if dual pane IGU) or the 2nd surface of a monolithic application. The painted surface of *Spandrelite* glass must not be installed inside the sealed airspace of an IGU.

Edge deletion is not required since the painted surface will not be installed on an interior surface of an IGU where the painted surface would be in contact with a spacer material or IGU sealant.

For glazing sealants, the glazing sealant manufacturer is responsible for testing/verifying that their products are compatible with the *Spandrelite* glass painted surface. Vitro will provide samples if requested. When properly fired, the *Spandrelite* glass painted surface has properties similar to the glass. See TD-160, *Acceptable Sealants in Structural Silicone Glazing Applications for Spandrelite* for a list of currently approved glazing sealants for use with *Spandrelite* glass.

Other Fabrication Considerations:

Bending

The *Spandrelite* glass product should not be used in bent applications. Doing so will void the product warranty.

Lamination

Lamination of this product with the *Spandrelite* glass painted surface touching the interlayer is not approved and voids the *Spandrelite* glass warranty. This could change the appearance of the painted surface leading to visual mismatch complaints. Lamination with interlayer touching the unpainted side of the *Spandrelite* glass is acceptable.

Thermal Stress

Breakage due to thermal stress is not typically a concern since the product MUST be heat-treated. However, there is one potential exception to this. From TD-145, *Spandrel Glass – Types and Recommendations*:

> *Vitro recommends that glass used in spandrel applications be heat strengthened except for the interior lite of an insulating glass unit spandrel when the application uses a low-e coating and a medium to dark opacifier combined with insulation on or very near the back of the spandrel unit. In these instances, tempered glass for the interior lite of spandrel unit may reduce the probability of breakage due to thermal stresses.*

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In the case where gray or black *Spandrelite* glass is on the building facing interior surface of an IGU, and a low-e coating is used facing an airspace in the IGU, tempering of the *Spandrelite* glass may be necessary, and a thermal stress evaluation should be considered.

Wind Load

At the time of this publication, ASTM E1300 *Standard Practice for Determining Load Resistance of Glass in Buildings* does not apply to *Spandrelite* glass. Vitro recommends consulting with a licensed professional engineer familiar with glass design for *Spandrelite* glass load resistance calculations. Vitro may revise this policy later when more information is available.

Quality Guidelines:

Adequate Paint Firing

Testing must be done on a regular basis to ensure heat-treated *Spandrelite* glass product conforms to all quality requirements. Any product that does not meet requirements should be quarantined and/or destroyed and corrective action must be taken. Vitro recommends that all quality checks be recorded, and records maintained for ten years.

Note: When fully tempering the Spandrelite glass product, even if you pass the particle weight test according to ANSI Z97.1 or CPSC 16 CFR 1201, you cannot be sure you have achieved full fire of the paint with the glass substrate based on that test alone. The same can be said for passing the GASP stress test in the case of the heat-strengthened product. Further testing is required to ensure full paint fire.

Vitro requires that the 'Permanent Marker Pen Test' from ASTM Standard C1048, Section 10.2 *Test for Porosity* be performed to ensure the paint has fully fused to the glass substrate in representative areas across the entire plate. Additionally, Vitro recommends performing some form of Scratch (mechanical durability) testing.

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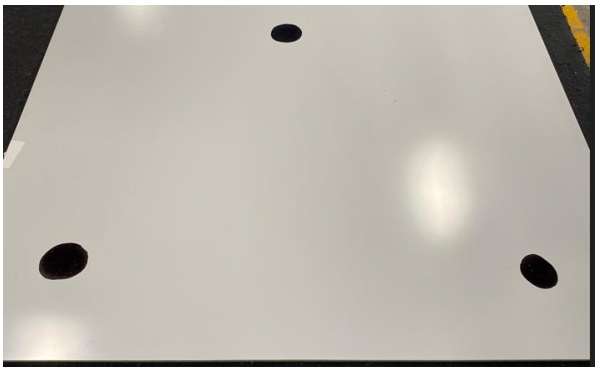
Marker Test

For the marker test, apply a black permanent ink mark to the painted surface of the lite in five evenly spaced locations, one toward each corner and one in center (for white and gray products). For the black *Spandrelite* glass product, you can use a silver-colored permanent marker. When viewed from the unpainted side, the mark should not be visible. If there is any doubt, try to clean the mark off the painted surface with glass cleaner and clean cloth, then re-view from the unpainted side. The marks should be noticeably reduced in appearance. Use standard ambient lighting when performing this test, no spotlighting or backlighting. An opaque background is best. You are looking to ensure the ink doesn't bleed through the paint to the glass surface. See photos below from a successful marker test.



Paint Side
Only Three of Five Marks Shown

Glass Side
No Visible Mark Seen

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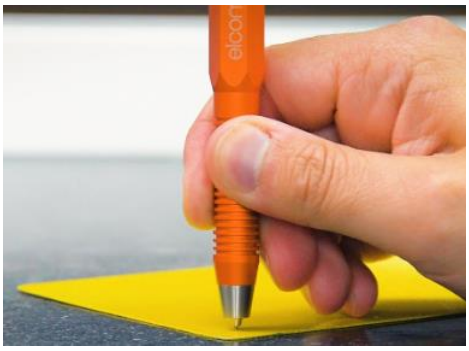
Scratch Test

Vitro also recommends performing a Scratch Test on the *Spandrelite* glass product. The painted surface is intentionally scratched with a pointed object. A sclerometer set to 20N force is very useful for this test and should be drug across the painted surface in multiple locations. Scratches made in the paint should not be visible from the unpainted side using ambient lighting. One outlet for obtaining a sclerometer is through Elcometer:

Sclerometer Hardness Tester | 3 ranges | Elcometer 3092 (elcometerusa.com)



Drag Sclerometer Across Painted Surface
Damage to Paint Should Not be Visible from Unpainted Side

Gloss Measurements

It is also recommended that gloss readings be recorded and maintained for all products ***that have already passed the permanent marker and/or scratch testing***. Variation in gloss can correlate to unacceptable variation in unit-to-unit appearance. Gloss meter readings (45-degree Specular) can vary considerably from meter to meter, so it is recommended you standardize on one meter only for all project gloss readings. A 45-deg meter is optimal for mid-range gloss surfaces, but a 60-degree meter can be used as a second choice. You should take approximately three gloss readings each from ten *Spandrelite* glass pieces that have passed porosity testing, and that appear uniform visually under various lighting and viewing conditions. Average the readings. For the remainder of the batch run and/or project, it is recommended that you target gloss readings to fall within average value +/- 15 Gloss Units, making sure you use the same meter for all subsequent measurements. Sample approximately 10% of production for acceptable gloss range. One representative Gloss Meter that can be used is the Model #YG45 manufactured by 3NH.

Visual Inspection

After heat treatment, *Spandrelite* glass should be evaluated visually for pinholes, scratches, abrasions, voids, and contaminants per ASTM C1376 Specification guidelines, using the quality specifications designated for glass classified as 'Kind CS' for coated spandrel/non-vision glass.

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Initially, the glass should be inspected using transmitted lighting, viewing the glass from the non-painted side. A diffused light source of 1700-2500 lux should be used behind the glass, not spotlight or sunlight, placed no closer than 12" to the glass. Standing approximately 15 feet away from the sample, no blemishes should be readily apparent. If blemishes are apparent, reinspect at glass surface, using the table below to determine if blemishes are acceptable. No more than two readily apparent blemishes are allowed in a 3" diameter circle, and no more than five readily apparent blemishes are allowed in a 12" diameter circle.

Reinspect Readily Apparent Blemishes Viewable from 15 Feet Using the Following Criteria

Pinholes	<= 1/8"
Spot	<= 1/8"
Coating Scratch (length)	<= 3"
Mark/Contaminant (length)	<= 3"
Coating rub (length plus width)	None allowed
Crazing (length plus width)	<= 2"
Corrosion	None allowed

Some striation lines are expected to be seen occasionally in the white or gray product after heating, when viewed in transmission. They are not an immediate cause for rejection. As long as you cannot see them when viewed in reflection (no backlighting) from 15 feet away, they should not create a visual difference once installed. In other words, striation lines should not be evaluated using the backlighting prescribed in ASTM C1376.

Touch-Up Paint

Touch-Up Paint is available on Shopify from Vitro in all three *Spandrelite* glass colors. This can be used to correct minor blemishes and scratches that may be seen when performing the visual inspection checks described above. The paint can be applied with a small paint brush that comes with the cap and should only be applied after heating the product. Allow to air dry. For information on obtaining Touch-Up Paint, consult:

https://samples.vitroglazings.com/collections/special-applications/products/touch-up-paint?variant=50506619125991

Or visit Vitro's sample website.

Overall Bow/Warp

Just like with 6mm commercial product, ASTM C1048 requirements for overall bow/warp should be met.

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Color Monitoring

Job color uniformity within each color of *Spandrelite* glass processed, both within and between tempering runs, is critical. If evaluating color with a spectrophotometer, it is recommended that, at a minimum, *Spandrelite* glass product be evaluated for color at run start-up, and periodically throughout each production run with an initial recommendation of 5% sampling of all products produced within one batch run, evenly distributed. The spectrophotometer should be calibrated before each run. It should be of d/8 construction and operated in Specular Component Included (SCI) mode. The glass color should be evaluated by taking readings from the non-painted surface of the monolithic piece, after heating. A minimum of three readings, preferably across the diagonal of the lite, are recommended. Readings (L*, a*, b*) within one lite should be compared to reference target values that you have gained from your process averages, using a standard DE*ab calculation (see TD-516, *Solarban® Color Uniformity* for reference), and DE*ab should not exceed 4.0. If you desire specific color reference value guidelines (Reflected Glass Side L*, a*, b*) for the *Spandrelite* glass, please consult with Vitro Technical Services. ***Spandrelite* glass must not be mixed with any other spandrel products to ensure potentially unacceptable visual mismatch does not occur. When making multiple batch runs of the gray *Spandrelite* glass product for the same project, it is strongly recommended that visual mock-ups be checked for acceptable uniformity using glass from different batches. This is to ensure that color and gloss are sufficiently uniform. When making multiple batch runs using either the white or black *Spandrelite* glass products, visual mock-ups should be checked using glass from different batches to ensure that any gloss differences are acceptable. Failure to evaluate mock-ups in these cases will result in the burden of proof of acceptable visual uniformity falling on Vitro's customers.**

Recycling

Spandrelite glass can be recycled. Consult with vendors in your area.

Disposal

The disposal of *Spandrelite* glass does not present any additional health or safety hazards. *Spandrelite* glass is not "hazardous" as defined by the federal Resource Conservation and Recovery Act (RCRA). Arrange for proper disposal in landfill, complying with applicable Federal, State, and local regulations, if a recycling vendor cannot be contracted to remove product waste.

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Additional Information

Every effort has been made to ensure the accuracy of the information in this document. This information is intended to assist in the proper application and use of *Spandrelite* glass and does not constitute a warranty of this product for any particular purpose.

If you require additional information or technical support with this product or any other flat glass products, please contact your Sales Representative or the Technical Service Group at 412-820-8500.

HISTORY TABLE		
ITEM	**DATE**	**DESCRIPTION**
Original Publication	4/1/25	Initial Release
Revision #2	10/3/25	Information on Wind Load and Glazing Sealants. Refinements in Quality Guidelines