Temporary Protective Film Fabrication Guidelines

GENERAL OVERVIEW

1.1 Temporary Protective Film (TPF) is a full surface coverage, low adhesive, recyclable polyethylene film that is applied to select Solarban® Solar Control Low-e Glass.

1.2 TPF protects the micro-thin *Solarban* low-e coating from mechanical damage that can be experienced during transportation and subsequent fabrication into glazing units.

1.3 TPF is fabricator friendly and can be easily removed from the glass prior to heat treatment. The film requires no special setups and can be disposed of in a variety of ways.

1.4 Glass with TPF does process somewhat differently through the fabrication process. This document provides the general fabrication guidelines in order to successfully process glass with TPF. These guidelines may require slight modification depending on the characteristics of a given process and equipment.

NOTE: The temporary protective film can be removed at the beginning of the fabrication process. However, the Solarban coating will no longer be protected and extra **CAUTION** must be used during the handling, stacking, loading & unloading of harp racks, storing of work in process, and running the Solarban glass through process equipment. In this case, the fabricator accepts all responsibility should the Solarban coating get damaged.

TEMPORARY PROTECTIVE FILM (TPF) CHARACTERISTICS AND GENERAL FABRICATION GUIDELINES

2.1 The protective film is designated as “Temporary Protective Film” or TPF.

- TPF is a polyethylene (LDPE) polymer thin film that is applied directly to the coated surface shortly after the *Solarban* coating is deposited onto the glass.
- The adhesive used in the TPF is low tack and the TPF is easily removed by peeling it off the surface.
- TPF is provided with a differentiating color in the film for easy product identification. There are two suppliers of film that have been approved by Vitro for this application; there is a blue color film and an opaque/cloudy appearance film.
- The maximum width of film currently available in the market place is 100”. Product produced on the new Vitro Jumbo Coater could incorporate a splice depending on if the processed width is greater than 100”. If the processed glass is 130” wide, the splice will be located approximately in the center of that dimension.
    - *Note: 96”x130” could be produced on the jumbo coater with the glass processed with the 130” dimension across the coater and would incorporate a splice.*

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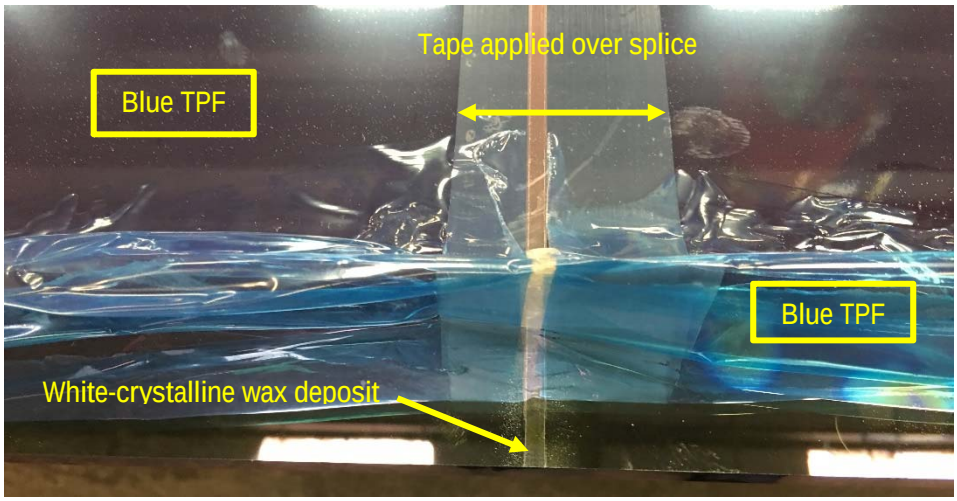
- The splice in the film incorporates a couple of additional features that provides coating protection in the splice area. (see below picture)
    - o There is a white-crystalline wax deposited under the film splice
    - o There is a tape applied over the film/wax splice area



TPF splice area photo with film/tape lifted up at edge

2.2 Precautions:

- TPF provides protection for the coated surface; however, *Solarban* coated glass products must always be run with the coated side up!
- TPF must never be allowed to enter the tempering furnace!
- TPF splice applications incorporate a white-crystalline wax by design that will be visible after TPF removal and should not be considered a defect!
- TPF should remain on the coated surface through the pre-furnace fabrication processes to avoid handling and process damage!
- TPF may appear to have surface damage (scratches, pitting, etc.) which is not a concern unless the TPF has been broken through in which case the coating may be damaged. Therefore, close inspection of this glass during processing should be done.
- TPF splice applications incorporate a white-crystalline wax by design that will flash off and disappear after heat treatment and will not affect production or the quality of the end product. Any small amounts of residue left behind after heat treatment will clean off in subsequent washing of the glass. It should not be considered a defect prior to the heat treatment process.

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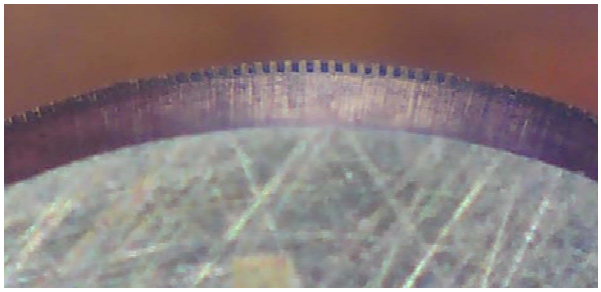
CUTTING

3.1 TPF should remain on the coated surface during cutting.

3.2 Although cutting fluid is not required when cutting through the TPF, cutting fluid SHOULD still be used to lubricate the cutting wheel and achieve the optimal scoring of the glass. Any of the cutting fluids on the approved list can be used with TPF. Excessive cutting fluid should be avoided so as not to get under the film and dry which could be more difficult to remove in subsequent glass washing.

3.3 Results from research studies indicate that a regular grind cutting wheel is optimal for cutting the TPF and scoring the glass consistently and achieving a high quality edge. See TD-119 for additional information and recommendations regarding conventional glass cutting.

- For TPF that incorporates a splice, testing has shown a serrated wheel design provides optimum results. The Bohle Cutmaster Platinum (#BO 03A135P) cutting wheel has provided excellent results in conjunction with utilizing increased pressure parameters.



3.4 Suggested cutting parameters for glass with TPF are 5 – 10° sharper wheel (lower angle value). Pressure may also have to be increased by 5-10 lbs especially as the wheel wears. Cutting speed also affects the cut/score and each parameter may need to be altered to achieve the best result for particular cutting equipment and process.

- A 135°-140° cutting wheel for 6mm glass with no TPF splice and 5-10 lbs additional pressure over un-filmed glass.
- A 128°-135° cutting wheel for 6mm glass with a TPF splice and potentially 5-10 lbs additional pressure beyond normal TPF settings (typically in the range of 15-22lbs = 70-95N, but may require more)

3.5 The cutting speed plays an important role in the amount of pressure that could be necessary to achieve good cut edge quality. Slower cutting speeds will require more pressure than was recommended above and faster speeds could require less depending on the machine and other parameters.

- For TPF with a splice, testing has shown that the recommended pressure settings (15-22lbs = 70-95N) have worked when cutting speeds are elevated (approximately 100 ips). Slower cutting speeds may require additional pressure.

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3.5 The cutting wheel may need to be changed more frequently to achieve optimal results. The cutting wheel will cut through wrinkles in the TPF given proper process settings.

3.6 All adjacent score lines should cross so the TPF is completely cut through allowing the glass to breakout and separate properly.

3.7 Recommend minimum 1" trim in order to properly breakout the glass with TPF.

3.8 If the desire is to have clean glass cullet, the TPF should be removed from the glass trim prior to discarding it in the cullet bin. The TPF can be removed from the glass trim either before or after glass breakout.

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, sharks teeth, and other defects that will affect the glass strength and appearance.

EDGE DELETION

4.1 Post heat-treatment automated edge deletion on the IG line is recommended for TPF coated glass, as this approach addresses edge deletion near the final steps in the fabrication process after the TPF is removed.

4.2 Manual edge deletion table and hand-style edge deletion may also be performed post-furnace. Consider the following deletion wheels:

3M Scotch-Brite™ SST Unitized Wheel
Norton Bear-Tex Convolute Wheel
Edgeworks 607-8783-LPX (more aggressive wheel)

4.3 Edge deletion through the TPF performed at the automated cutting system is also achievable and can obtain good results as long as one of the following practices is followed:

4.3.1 Cutting equipment manufacturers are now developing new technologies and upgrading current systems to perform edge deletion through the TPF. For more information on qualifying systems, please consult the automated cutting table manufacturer.

4.3.2 Cutting systems currently equipped with automated edge deletion may require some upgrades as follows: a) a higher capacity vacuum system for the removal of more debris generated during the deletion of the TPF and underlying coating, b) a more aggressive abrasion wheel such as Edgeworks 607-8783-LPX may also be required along with increased frequency of dressing the wheel to remove residue buildup.

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4.3.3 Edge deletion through the TPF at the cutting table may be performed without capital investment or modifications by slowing the edge deletion bridge speed to approximately 10 meters (~400 inches) / minute (± 1 meter / minute), and somewhat increasing the wheel's down force. Some TPF debris will likely accumulate on the cutting table surface. Regular cleaning of the cutting table's surface will be required with this approach. The vacuum system will also require more frequent cleaning, otherwise the debris will quickly overwhelm the canister and the vacuum will become clogged. The vacuum system must be functioning properly at all times in order to collect the silver based coating dust.

4.4 Regardless of the approach used, fabricators must assure that the edge deletion process completely removes the conductive silver layer(s) of the coating, that the width of the deletion is sufficient (coating covers no more than 50% of the PIB seal) but doesn't encroach into the vision area (sight line) of the unit, and that the deletion band is aesthetically acceptable for structural glazing units as applicable.

4.5 For more specific information regarding edge deletion, see TD-141 on edge deleting Solarban coatings.

SEAMING

5.1 TPF should remain on the coated surface during the seaming process.

5.2 Dry seaming is the preferred and recommended method of seaming glass with TPF.

5.3 Wet seaming, especially with excessive coolant, may dislodge the edges of the TPF. Liquid may also get under the film and dry making it harder to remove in subsequent glass washing.

5.4 The optimal seaming belt abrasive spec is 120 grit (for 6mm) depending on glass thickness.

WASHING

6.1 TPF should remain on the coated surface during the washing process.

6.2 Standard float glass washer settings may be utilized on glass with TPF although low-e type brushes are still preferred. Good washer practices should still be followed including TDS of the final rinse should be maintained below 20ppm.

6.3 TPF should remain on the surface during post-washing handling and transport when the washer is not directly in line with the furnace entry conveyor.

6.4 If the TPF has holes or tears, or partially comes loose during or prior to washing, it is recommended to remove the TPF and process the glass through the furnace. Do not allow the glass to sit for an extended time period which allows moisture, which may get under the film, to react with the coating.

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***Note:** For TPF with a splice, the white-crystalline wax deposit on the coating will remain on the glass after TPF removal, but will flash off during the heating process. This white-wax mark will disappear after heat treatment and it will not affect production or the quality of the end product. Any small amounts of residue left behind after heat treatment will clean off in subsequent washing of the glass. It should not be considered a defect prior to the heat treatment process.*

REMOVAL

7.1 TPF must be removed prior to entering into the furnace!

7.2 Do not try to start the removal of the TPF with bare hands or gloves.

7.3 Removal is simplified with the use of double-sided tape and/or a tacky roller (similar to that used to remove lint from clothing). Start at any one of the corners of the lite and peel the TPF towards the center of the glass.

7.4 Once the edge of the film is a safe distance from the surface (2–3 in.), removal by hand can be performed. Avoid dragging the removed film across the coated surface.

7.5 Static charge can build up on coated glass with TPF and consideration should be given to minimize this utilizing standard methods.

7.6 Localized removal of the TPF may be required in order to apply the logo to the glass.

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DISPOSAL

8.1 TPF can be disposed of in a variety of ways:

8.1.1 The polyethylene (PET) TPF can be recycled directly. Contact your local recycler about disposal options. A list of PET recyclers in your area or region can be provided upon request.

8.1.2 Though not preferable, TPF can normally be disposed of in landfills. Refer to local waste disposal codes regarding landfill disposal of TPF.

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ADDITIONAL INFORMATION

9.1 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 *Solarban* coated glass with TPF and does not constitute a warranty of this product for any particular purpose.

9.2 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		
Revision	Date	Description
	05/12/2016	Initial Draft
	08/16/2016	Revised Draft based on fabrication trials
0	08/26/2016	Initial Release
1	10/04/2016	Updated to Vitro logo and format
2	10/11/2018	Updated information related to TFP splice and associated cutting parameters