

Handling Do's and Don'ts to Reduce Glass Breakage

There are a variety of methods used to fabricate insulating glass units. These range from highly sophisticated automated assembly lines to manual assembly, with varying hybrid processes that incorporate varying degrees of automation falling between these two extremes. The less automated the assembly process, the more likely it is that the glass is going to be exposed to surface and edge damage due to increased handling. The "Stack and Butter" assembly technique is a good example of how increased handling can result in the glass being more susceptible to low stress breakage due to handling induced glass damage.

In the Stack and Butter assembly process, the glass and spacers are layered on a work table one piece at a time until the desired "stack" height is reached. The sealant is then troweled or gunned onto the edges of the stacked units. The sealant is allowed to cure, and then the individual units are separated, usually with razor knives. In each phase of the Stack and Butter assembly process, there is potential for damage to the glass edge and surface which results in reduced glass strength and increased incidence of glass breakage.

Glass breaks when induced stress, caused by thermal gradients or mechanical bending, exceeds the strength of the glass at a particular point. As previously stated, surface and edge damage to the glass greatly reduce the ability of the glass to resist the applied stress. Surface damage such as scratches, or over score from an automatic cutter, and edge damage such as V-chips, flake chips, edge serration hackle, and shark teeth may not be readily visible to the naked eye, but **they will weaken the glass and its ability to resist stress.**

Therefore, it is important to take precautions when extensive handling of the glass is required - as in a "stack and butter" assembly operation - to prevent damage to the edges and surface of the glass. Any method of fabricating insulating glass units can be effective if proper care is taken to prevent glass damage. Remember: **Eternal housekeeping vigilance is the price of reducing breakage.**

The attached list of Do's and Don'ts "housekeeping" practices are offered to help reduce handling damage induced breakage. Plant managers, line supervisors, and production personnel may find "Do's and Don'ts" helpful when auditing or inspecting their manufacturing facilities for best glass handling practices.

Related to Fabrication

Do

Check spacer bends, muntin anchor holes, and cut ends of spacer for excessive deformation or burrs.

Inject corner keys and spacer joints with polyisobutylene (PIB) for better sealing of these areas.

Smooth soldered joints to prevent lumping or high spots.

Use a base sturdy enough to stack the required units to be assembled on without any sagging or warp.

Use some sort of padding on the weights used to apply pressure to the stack. Keep optimizer and cutting tables, A-racks and harp racks free of glass chips, and excessive tools. Replace worn padding. **A Shop-Vac can be your best friend!**

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Related to Fabrication, Do (continued)

Fully insert corner keys to reduce the moisture vapor path, and improve the long term durability of the IG unit.

When separating units, cut all four sides of the sealant between each unit in the stack.

Inspect and replace razor blades frequently or use razor blade tool to pry units apart.

Routinely and periodically inspect glass from optimizers for over score on cuts.

Don't

Use a spacer or muntin bar with a deformation, or high spot over 0.003", which can cause potential glass damage. Do not **punch** spacers for muntin bar clips.

Spread spacer at corner joint to facilitate insertion of corner key.

Use any soldered joint with a high spot of over 0.003".

Cut or stack glass on a work table or bench that is not flat or strong enough to support the weight being applied.

Set weights with exposed metal on the stack. Metal to glass contact can mean surface damage and failed units.

Drag glass across cutting table - lift off the table to avoid scratching its surface. Allow glass chips to build up on cutting tables, A-racks and harp racks.

Neglect application of sealants to ensure a properly sealed unit.

Cut only three sides and pull or wedge the fourth side apart; this will damage the stack.

Use damaged (nicks, burrs, or jagged edges) razor blades or use razor blade tool to pry units apart.

Permit optimizer over score cutting which results in severe edge damage at the over score location. Such glass is significantly weakened and susceptible to breakage due to handling and in-service conditions.

Related to Storage

Do

Store on racks that are designed with 90 degrees between the base and vertical support to keep the individual lights from slipping out of alignment with the unit.

Keep nails, bolts, and staples recessed on racks and crates to prevent contact with glass.

Inspect cushioning materials on racks and crates periodically -- replace worn cushioning.

Brush or vacuum the bases, and replace broken boards frequently, add rubber strips to cushion the glass.

Store units of equal height on the same rack.

Store units on racks with proper protection for the glass.

Don't

Set glass on a rack that has chips or debris on the base.

Use racks or carts that are in poor condition.

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Related to Storage, Don't (continued)

Stack smaller units horizontally on racks with larger units sitting vertically.

Store units of unequal height on the same skid without proper separation between the size changes, as the smaller units edges will be damaged by the larger units, or the surface of the larger units will be damaged by the smaller units.

Store units directly against metal frames, protrusions, or stands.

Allow the glass to shift or bounce in transit.

Related to Both Fabrication & Storage

Do

Practice good housekeeping and inspection religiously on a periodic basis.

Wear the proper safety equipment when handling lites of glass.

Don't

Allow handling equipment, cutting tables, racks, razor blade tools, etc. to deteriorate.

Stand or step on cases or carts of glass. Not only is it unsafe, but it could damage the edges of the glass.

References:

Vitro Poster - Guidelines for Cut Edge Quality

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HISTORY TABLE		
ITEM	DATE	DESCRIPTION
Original Publication	April 1996	
Revision #1	1/15/2002	Revised and transferred to TD-112
Revision #2	9/9/2014	Revised pg. 3 "Don't section"
Revision #3	10/4/2016	Updated to Vitro Logo and format

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