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## EnerSEAL® 332 MANUAL HOT MELT APPLICATION GUIDE

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### APPLICATION NOTE

EnerSEAL™ 332 can be processed on any standard HOT MELT extrusion machine currently used in the insulating glass industry. The product must be applied on a clean and dry substrate. The product must completely fill the sealing gap down to the spacer (no air pockets). Care should be taken on sealing each corner and sealant should be pressed together while still molten by means of an ENAPAD2 502 troweling pad to prevent any gaps, holes and cold joints in sealant at corners, which can lead to premature unit failure. In case of a single seal IG unit glass/spacer bar assembly must be tightly maintained (clips, clamping table) during EnerSEAL 332 application. The minimum depth required of the sealing joint is  $>3/16''$  (4.76 mm). **Recommended extrusion temperature: +347 °F (175 °C) to +365 °F (185 °C)**. It is important that sealant is applied within recommended temperature range, so it is advisable that application temperature be checked daily with a digital thermometer at gun nozzle while gunning sealant.

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### LIMITATIONS

- Be sure that units fabricated with EnerSEAL 332 are glazed in accordance with industry glazing guidelines such as IGMA's TM-3000.
- Never apply to wet or contaminated surfaces – glass and spacer bonding surfaces should be clean and dry prior to sealant application.
- Never dispense and apply in confined areas, without adequate ventilation.
- Always use in application fill depths sufficient for customer's intended performance life. In no cases should design fill depth be  $<3/16''$  nominal.
- Coated glass may require edge deletion, so consult your glass supplier for their recommendations. Deletion should cover full depth of sealant pocket, with

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### EQUIPMENT PREPARATION AND SET-UP

- a) Equipment should be suitable for the intended purpose i.e. capable of heating EnerSEAL 332 to a temperature of 365 °F (185 °C) as measured when dispensed.
- b) For better handling a smaller diameter 5/8" ID hose is recommended:
  - a. Make sure the heated hose is of sufficient length to apply hot melt to the largest IG unit size made.
  - b. Consider hose support devices to reduce strain on the applicator.
- c) Make sure hot melt pumps "Set Point" temperature is high as possible without slumping at gunning tip.
  - a. Set point temperatures are typically not accurate. Observe hot melt flow and measure extruded hot melt as it exits gun tip.
  - b. **Recommended extrusion temperature: +347 °F (175 °C) to +365 °F (185 °C)**.
- d) Glass racks should have silicone strips on base to prevent units sticking; Contact Tremco for a source.

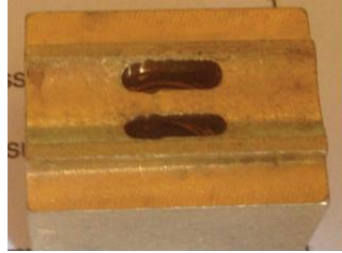
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## DISPENSING GUN AND BRASS NOZZLE TIPS

- a) To reduce heat loss, eliminate any extended pipe on dispensing gun.
- b) To maximize hot melt flow and wet-out and to increase tooling time:
  - a. The nozzle tip face should be flat not concave (reference pictures below).
  - b. Nozzle tip face should be smaller i.e. use 3/8" tip for 1/2" cavity.
- c) Design triple pane nozzle tips for each major combination of glass and spacer.



Flat nozzle tip



Concave nozzle tip

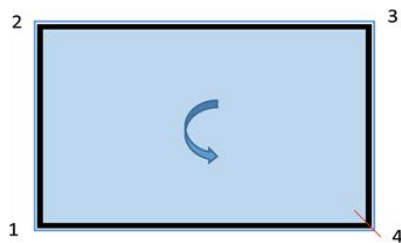


Short pipe

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## HOT MELT APPLICATION

- a) Before applying EnerSEAL 332 the IG units should be prepared per Technical Bulletins G 1.1 Glass Processing Recommendations for Insulated Glass Units and SSG 3.2 Recommendations for Residential Window and Door In-Plant Glazing
- b) Topped unit must be compressed to fully wet-out acrylic adhesive.
- c) Mylar sealing tape:
  - a. Apply to 4th corner and any pierced holes as indicated in the EnerEDGE Application Guide.
  - b. Make sure mylar sealing tape is not adhered to inside glass surfaces.
- d) Don't apply from a cold gunning tip.
  - a. Confirm temperature is in range as indicated above.
  - b. Purge to get hot sealant before starting application.
  - c. Set gun in a heated cradle or cured silicone 'holster'.
- e) Start application at start-finish point or 4th corner for argon filled units.
  - a. Apply hot melt continuously along each side and the corners. Make sure it flows into and fills the cavity.
  - b. Eliminate any cold-joints and voids by pinching hard at all four corners.
  - c. Use Tremco Troweling Pads (ENAPAD2 502) to facilitate this process.



Typical rotation for hot melt application



Eliminating cold joints and voids

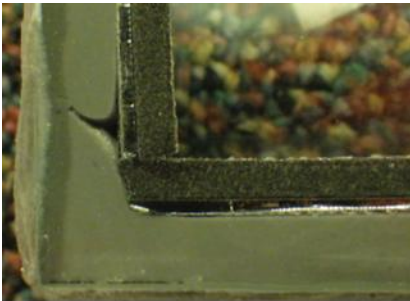
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## POST APPLICATION INSPECTION

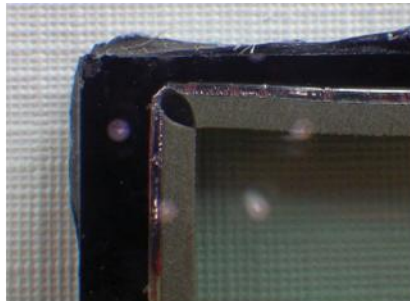
- a) Inspect in a bright, well-lit area.
- b) Inspect all 4 corners, top and bottom sides:
  - a. Spot check blind surfaces 3 & 4 on triple-glazed units when establishing quality, new operators, etc

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## EXAMPLES OF POOR QUALITY SEALANT APPLICATION



Cold joint/void



Thin sealant application



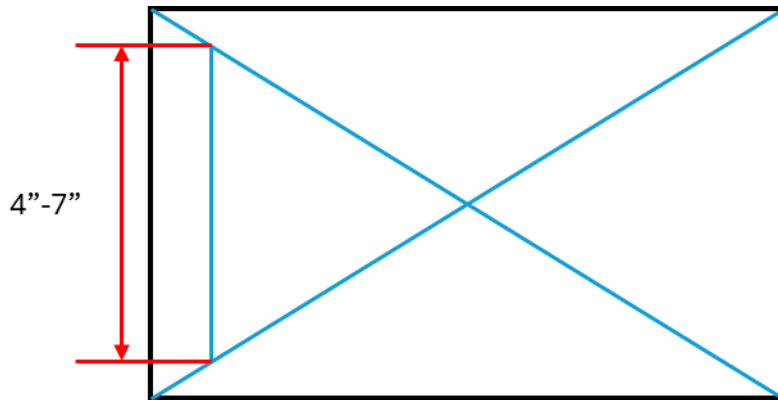
Sealant blow by

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## BUTTERFLY ADHESION TEST

This test method is designed to evaluate the adhesion of Tremco EnerSEAL 332 and/or other high quality hot melt butyl sealants to glass and spacer materials. Please follow all safety procedures specified for handling raw cut glass and hot applied sealants.

- a) Randomly select a production unit, or make one, preferably no larger than 24" x 36" (610 mm x 914 mm) and with glass thickness less than 3/16" (3 to 4 mm).
- b) Allow test specimen if recently made to cool, then sit for 16-24 hours at 72 ±5 °F (22 ±3 °C). Avoid situations where seasonal temperatures are hotter or colder than the conditions above. In that case store the specimen in an office or other temperature controlled environment.
- c) Do not break the glass with a hammer; cut the glass with a glass cutter as follows:
  - a. cut glass corner-to-corner X on one side;
  - b. break glass under tension; (see photo below)
  - c. cut glass to remove the point of one of the four triangles so 2 to 4" inches (50 to 100 mm) remain.
  - d. break glass under tension and;
  - e. cut a 4 to 7" (100 to 175 mm) section from Step (d).



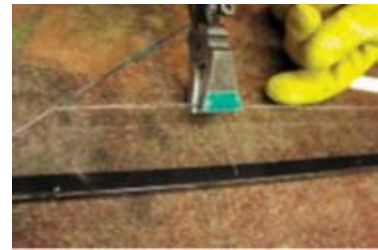
- d) For thermoplastic hot melt products, slowly (5 to 6 sec) pull and rotate the glass 180°. A slow steady motion is essential.
- e) For reactive hot melt (RHM) products, slowly (5 to 6 sec) pull and rotate the glass 45°. A fast pull may cause adhesion loss due to the high cohesive strength of these products.
- f) Observe and record adhesion of sealant to glass and spacer.



*Step 3a*



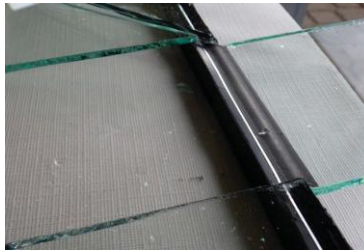
*Step 3b*



*Step 3c and*



*Step 3e*



*Step 4*



*Step 5*

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### PASS/FAIL CRITERIA

All sealants should maintain adhesion to glass and spacer material during the test. Cohesive failure of the sealant is acceptable. For reactive hot melt, high cohesive strength may cause adhesive failure if over stretched.

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### RECORD RESULTS

For IGMA/IGCC/NAMI compliance adhesion test results should be logged. Include manufacturer code, bath or lot number and date of test. For failed tests, record corrective action taken.

## EnerEDGE® ENHANCED GASS FILLING METHOD—PROCESS TO SEAL AND FILL

- a) Apply EnerEDGE® spacer in the normal fashion.
  - a. Optionally apply mylar tape to spacer's 4th corner intersection as 'best practice'.
- b) Top and press IGU assembly in roller press, in the normal fashion.
- c) Apply hot melt sealant completely around all perimeter's sides, including over the spacer's 4th corner. See EnerSEAL 332 application guide above.
  - a. Pinch 4 corners to eliminate cold joints per current practices.
  - b. While just-applied hot melt is still hot and IGU is in an accessible position, come 1 to 2" away from corner area and scoop away a short 1 to 2" section of the secondary sealant, and trowel out material to mylar.

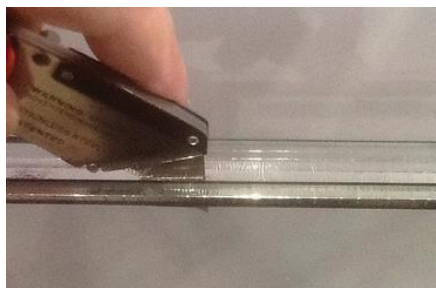


Step 3b Hot melt removed to vapor barrier

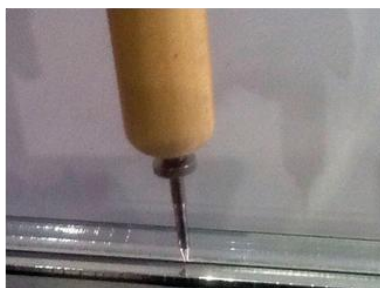
Teflon stick to scoop hot melt

- d) Rack IGU and gas fill using the following procedure. Note: these steps are shown below without sealant for clarity.
  - a. Using a sharp blade slice into spacer as indicated below (Step 4a).
  - b. Use FDR awl and bushing kit to pierce spacer as indicated below (Step 4b).
  - c. Leave FDR bushing in spacer for use with gas filling lance as indicated below (Step 4c).
- e) Gas fill and patch with hot melt.

Since the area where hot melt is removed still has just-gunned hot melt 'at the glass-spacer-sealant contact area (triple point), the potential effect of cold joints creating a sealant void is greatly diminished, as is argon loss.



Step 4a



Step 4b



Step 4c

Tremco Construction Products Group (CPG) brings together the Commercial Sealants & Waterproofing and Roofing & Building Maintenance divisions of Tremco CPG Inc.; Dryvit, Nudura and Willseal brands; Prebuck LLC; Tremco Barrier Solutions, Inc.; Weatherproofing Technologies, Inc.; Weatherproofing Technologies Canada, Inc.; and Pure Air Control Services, Inc.



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