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Preventing Insulating Glass Failures Manual

DRAFT

Table of Contents

Section	TITLE	# OF PAGES	PAGE
A	Introduction	4	4
B	Testing	4	2
C	Glass Washing and Cutting Techniques	3	3
D	Muntins	4	6
E	General Desiccant Handling	3	7
F	Spacers	1	10
G	PIB	2	11
H	Two-Part Sealants	2	13
I	Butyl Sealants	4	15
J	One-Component Curing IG Sealants	4	19
K	Foam Spacer	1	23
L	Flexible Sealant Spacers	1	24
M	Racking, Packaging, Shipping	3	25
N	Glazing Installation	3	28

Table of Contents

0.0 Introduction	1
1.0 Scope	1
2.0 Glass Washing and Cutting Techniques	3
3.0 Muntins	7
4.0 General Desiccant Handling	9
5.0 Fabrication with Spacer Bar	13
6.0 Fabrication with PIB (Polyisobutylene) Primary Seal	14
7.0 Fabrication with Ambient-Applied Sealants	17
8.0 Fabrication with Hot Melt Butyl or Reactive Hot Melt Sealants	20
9.0 Fabrication with Flexible Foam Spacer	28
10.0 Fabrication with Flexible Sealant/ Spacer Systems	29
11.0 Racking, Packaging and Shipping	31
12.0 Glazing and Installation	34
13.0 Industry Testing	37
14.0 Referenced Standards	38
0.0 Introduction	1
1.0 Scope	1
2.0 Glass Washing and Cutting Techniques	3
3.0 Muntins	7
4.0 General Desiccant Handling	9
5.0 Fabrication with Spacer Bar	13
6.0 Fabrication with PIB (Polyisobutylene) Primary Seal	14
7.0 Fabrication with Ambient-Applied Sealants	17
8.0 Fabrication with Hot Melt Butyl or Reactive Hot Melt Sealants	20
9.0 Fabrication with Flexible Foam Spacer	28
10.0 Fabrication with Flexible Sealant/ Spacer Systems	29
11.0 Racking, Packaging and Shipping	31
12.0 Glazing and Installation	34
13.0 Testing	37
14.0 Referenced Standards	38

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0.0 Introduction

0.1 Guidelines for Preventing Insulating Glass Unit (IGU) Seal Failures

The intent of this document is to provide insulating glass ~~manufacturer~~fabricators with best practice recommendations for fabricating, shipping, and glazing insulating glass units (IGUs). All material in this document should be read carefully. A ~~manufacturer~~fabricator or user might choose to post a topic in a work area ~~as~~as-is or incorporate it into a training manual.

NOTE 1: *The term IGU appears frequently in this publication. IGU is the industry-accepted abbreviation for insulating glass units.*

1.0 Scope

1.1 To develop guidelines to use for testing, fabrication, packaging, shipment and glazing of ~~insulating glass unit~~IGUs to assist in achieving long term performance.

1.2 To provide guidance to minimize seal failure using existing technology for edge seal design along with selection of sealants, desiccants, spacers, gases, glass and other components used for the ~~manufacture~~fabrication of ~~insulating glass~~IGUs.



**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

2.0 Testing

IG Sample Preparation for Certification Testing

Do

Don't

Do reference IGMA Certified Products Directories (or other product directories) specific to the certification agency and utilize the same method of construction for test samples to match your product listing.

Do include a completed fabrication sheet with test samples.

Do package samples for shipping in a secure wood crate surrounded with foam or equivalent packing materials, or as required by the certification agency.

Do allow samples to condition for a minimum of 30 days from date of manufacture to start of testing. (30-day hold may be waived by IG manufacturer).

Don't exceed the certification programs requirements for airspace (gap) width or deviate from the specified glass thickness.

Don't deviate from the specification requirements for certification.

Don't deviate from standard construction methodology or written quality control procedures established by your company.

Don't allow more than 90 days prior to testing.

For further information, refer to the IGMA Certification Program Manual or contact your Certification Program Provider.

Testing

IGU Sample Preparation for Certification Testing

Refer to the certification agencies Certified Products Directory (CPD). Fabricate the test samples using the same method and materials that match the product listing that is to be tested.

Fabricate the test samples according to the certification programs requirements for cavity space (gap) width and glass thickness.

Follow all internal standard fabrication methodologies and/or written quality control procedures established by your company.

Ensure compliance with all the requirements of the certification agency.

Include a fabrication sheet with the test samples that documents the construction.

Package samples for shipping in a secure wood crate surrounded with foam or equivalent packing materials, or as required by the certification agency. Refer to section ___ Racking, Packaging and Shipping for additional guidance.

Allow samples to condition for a minimum of 28 days from date of fabrication prior to the start of testing. (28-day hold may be waived by IGU fabricator).

Ensure that your fabrication equipment is operating according to supplier specifications.

Take appropriate steps to avoid large altitude changes when shipping to the lab. Reference IGMA/NGA TB-1601-24 for more guidance.

For further information, refer to the appropriate certification program manual or contact your Certification Program Provider.

32.0 Glass Washing and Cutting Techniques

2.1 General Glass Washing Considerations

- Ensure your washer is functioning properly per the washer manufacturer's instructions and guidelines.
- Do not use excessively hot wash water (130 - 140 °F / 54 - 60 °C). Monitor water temperature minimum of hourly. Maintain wash water temperature per glass manufacturer recommendations, typically between 120 °F and 140 °F (49 °C - 60 °C). Avoid temperatures exceeding 140 °F (60 °C).
- Typically glass coating are placed face up on horizontal washers and facing outward on a vertical washers (away from rollers).
- Do not stop glass lites in the glass washer.
- On horizontal washers, feed the glass lites at an angle to the air knives.
- Use a clear freshwater rinse for the final rinse or de-ionized when required.

**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section C
Glass Washing and
Cutting Techniques**

- [Only use recycled rinse water if it is properly treated with a carbon filter or other treatment.](#)
- [Use sufficient freshwater to flood the lite of glass in the final rinse](#)
- [Inspect the glass cleanliness to ensure it is completely clean and dry.](#)
- [Avoid touching the surface of the glass lites that will contact the IGU sealants.](#)
- [Clean the washer on a regular basis.](#)

General Glass Cutting and Washing Considerations

Do

Don't

~~Do consult glass supplier, glass washer supplier and sealant manufacturer for proper glass cleaning process recommendations, including detergent, brush type and rinse water quality.~~

~~Don't use spray lubricants near the glass washer or in the IG manufacturing area.~~

~~(Spray silicone and Teflon® are particularly detrimental to adhesion)~~

~~Do consult glass supplier on the care and handling of low "E" or other coated glasses.~~

~~Don't wash glass with residual sealant or residue on the surface or edges.~~

2.2 Glass Cutting and Handling Considerations

- [Wear proper personal protective equipment \(PPE\) while handling glass. At minimum, use gloves while handling glass to prevent bare hands from touching the glass surfaces.](#)
- [To prevent glass contamination, only use water soluble or evaporating cutting fluids. Consult the glass supplier for cutting fluid recommendations for coated glass substrates.](#)
- [To ensure good edge quality, maintain sharp cutting wheels, proper pressure, and speed on the glass cutter.](#)
- [Conduct frequent checks for accuracy of cuts, dimensions, squareness and glass damage. Ensure the glass edge is free of shell chips, hackle, and shark's teeth. Reference IGMA TR-3401 document for more information.](#)
- [Protect the glass edge to ensure it is not damaged during handling and packaging.](#)
- [Package the glass using separators between stacked glass. Ensure the glass is dry before stacking. Provide proper support along the rack bottom to prevent glass edge damage.](#)
- [When recommended by the glass and sealant supplier, ensure coated glass is fully edge deleted.](#)

Handling and Cutting

Do

Don't

~~Do wear proper glass handling/safety equipment when handling glass.~~

~~Don't handle glass with bare hands.~~



**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section C
Glass Washing and
Cutting Techniques**

~~Do use a water-soluble or evaporating cutting fluid. Consult glass supplier for cutting fluid recommendations for coated glass.~~

~~Do maintain sharp cutting wheels on the glass cutter.~~

~~Do check for accurate cuts, dimensions and squareness or glass damage.~~

~~Do ensure glass edge is free of chips, shell, etc.~~

~~Do use proper glass separators when stacking glass.~~

~~Do edge delete glass coating when recommended by glass and/or sealant manufacturer.~~

~~Don't allow contaminated glass to be sealed.~~

~~Don't nip glass.~~

~~Don't allow out of tolerance or damaged glass to be fabricated.~~

~~Don't put glass on racks that can damage the bottom edge of the light.~~

~~Don't stack glass wet or without an appropriate glass separator.~~

~~Don't damage glass edges during handling.~~

Washing**Do**

~~Do make sure the washer is functioning properly. Consult your washer supplier for definition of functioning properly.~~

~~Do use HOT wash water (130-140°F / 54-60°C). Check temperature hourly.~~

~~Do ensure that glass coatings are placed face up on a horizontal washer or face out on a vertical washer.~~

~~Do feed the light of glass at an angle to the air knives on a horizontal washer.~~

~~Do use clear, fresh water rinse for final rinse or de-ionized when required.~~

~~Do use enough fresh water to flood the light of glass in the final rinse.~~

~~Do inspect glass cleanliness to ensure it is completely clean and dry.~~

Don't

~~Don't stop glass lites in the glass washer.~~

~~Don't use recycled rinse water unless it is properly treated with carbon filter or other treatment.~~

~~Don't touch the surface of the glass lites that will contact the sealant.~~

43.0 Muntins

43.1 Fabrication

- [Ensure the muntins are cut accurately, square, without high spots, and to size.](#)
- [Do not touch, mar, or damage the sealant bonding surface.](#)
- [Wear gloves to avoid contamination.](#)
- [Consult the muntin supplier for acceptable cleaning solutions.](#)
- [Consult your muntin supplier for appropriate procedures regarding touch up of scratches and/or blemishes.](#)
- [Do not overspray spacers while touching up muntins \(overspray could induce contamination\).](#)
- [Only use the muntin end-clips specified by spacer system supplier](#)
- [Inspect and do not use defective muntin clips.](#)
- [Ensure the muntin clips / pins are inserted into the muntins / spacer properly.](#)
- [Prevent spacer deformation during end-clip hole punching and / or drilling. This can cause pressure points on the glass.](#)
- [Minimize contact with the IGU sealant.](#)
- [Avoid tilting flexible spacers while inserting the muntin assembly.](#)
- [When using flexible sealant spacers, align muntins properly with the reference grid.](#)

Muntin Installation

Do

- ~~Do make sure the muntins are cut accurately and to size.~~
- ~~Do make sure that the muntins are cut square and have no high spots.~~
- ~~Do use the correct muntin endclips for the spacer system as specified by the spacer supplier~~
- ~~Do make sure muntin clips/pins are inserted into the muntins /spacer properly.~~
- ~~Do minimize contact with the IG sealant.~~
- ~~Do consult your muntin supplier for appropriate procedures regarding touch up of scratches and/or blemishes.~~
- ~~Do consult muntin supplier for acceptable cleaning solutions.~~

Don't

- ~~Don't touch, mar or damage the sealant bonding surface.~~
- ~~Don't spray muntins while in spacers (over spray could induce contaminates).~~
- ~~Don't use defective muntin clips~~
- ~~Don't deform spacer during end clip hole punching or drilling that can cause pressure points on the glass.~~
- ~~Flexible Sealant Spacers: Don't tilt flexible spacers when inserting muntin assembly.~~
- ~~IGMA does not recommend touch-up painting of muntins.~~
- ~~Flexible Sealant Spacers: Don't use endclips with pins or points.~~



~~Muntin Installation~~

~~Do~~

~~Don't~~

~~Do wear gloves to avoid contamination.~~

~~Do ensure the muntin bar is the correct size for the IG unit.~~

~~Flexible Sealant Spacers:~~

~~Do align muntins properly with the reference grid.~~

54.0 Muntins General Desiccant Handling

4.1 Beaded Products

General Desiccant Handling Considerations

Beaded Products

Do

- Do inspect the drums or bags for holes and seal damage due to mishandling during shipment
- Do check desiccant daily for activity. Record these data in a notebook including the date, time, lot identification of the desiccant and the temperature rise.
- Do use only the desiccant test kit provided by the supplier of the desiccant being used.
- Do wear protection for your eyes and hands during the fill operation.
- Do consult desiccant supplier for proper desiccant for type of sealant being used. Be aware of components which may introduce an organic vapor into the airspace and which may require a desiccant change.¹
- Do seal units within one hour of spacers being filled and locate your filling station away from humid areas such as the glass washing station.
- Do use the proper amount of desiccant determined by an equivalency formula after certification testing.²
- Do inspect spacer fill level to insure the proper amount is being used.

Don't

- Don't use bags or drums damaged in shipment or storage.
- Don't use partially deactivated desiccant that fails the temperature rise criteria set by your company
- Don't interchange parts or tables from different suppliers' test kits.
- Don't leave drum lid open when not in use because the desiccant will adsorb moisture from the atmosphere readily.
- Don't use desiccant that is not recommended for the sealant.
- Don't leave desiccant filled spacers unsealed for greater than one hour, less in humid conditions
- Don't overfill spacer so that corner key insertion causes the spacer to flare out.

- [Inspect the drums or bags for holes and seal damage due to mishandling during shipment](#)
- [Check desiccant daily for activity per supplier recommendations. Record the date, time, lot identification of the desiccant, and test results.](#)
- [Use only the desiccant test kit or method provided by the supplier of the desiccant being used.](#)
- [Wear protection for your eyes and hands during the fill operation.](#)

INSULATING GLASS MANUFACTURING Preventing IG Failures

Section E General Desiccant Handling

- [Ensure drum lid is sealed when not in use because the desiccant will readily adsorb atmospheric moisture.](#)
- [Consult desiccant supplier for proper desiccant for type of sealant being used. Be aware of components which may introduce an organic vapor into the airspace and which may require a desiccant change.](#)
- [Seal units within one hour of spacers being filled and locate your filling station away from humid areas such as the glass washing station.](#)
- [Use the proper amount of desiccant determined by an equivalency formula after certification testing. Consult certifying body and/or desiccant supplier for more information.](#)
- [Inspect spacer fill level to ensure the proper amount is being used.](#)

[†]Desiccant Selection Based on Sealant Used

Sealant	Recommended Desiccant
Hot-Melt	3A
Polyurethane	3A
Ambient-applied polyurethane	3A or 3A/13X or 3A /silica gel blend
Polysulfide single seal	3A/13X or 3A /silica gel blend
Polysulfide/PIB	3A or 3A/13X or 3A/silica gel blend
Other/PIB	3A

²Typical Test Unit Equivalency Examples 14"x 20" (350 x 508 mm) test window using 0.25" x 0.5" (6 x 12 mm) spacer)

Test Unit- Sides Filled	Desiccant Fill in grams from column 1	Perimeter of test window	Desiccant Usage Factor (grams/inch)
4	71	68 inches/1.7 m	1.04 g/in or 40.9 g/m
2-long	42	68 inches/1.7 m	0.62 g/in or 24.4g/m
1-long and 1 short	36	68 inches/1.7 m	0.53 g/in or 20.9 g/m
1-long	21	68 inches/1.7 m	0.31 g/in or 12.2 g/m

Multiply the perimeter of the production window by the desiccant usage factor that corresponds to the number of sides filled in the certification window. This determines the minimum amount of desiccant, in grams, which should be used in the production window.

4.2 Pre-Incorporated: Matrix or Spacer Products

General Desiccant Handling Considerations

Pre-incorporated Desiccant: Matrix or Spacer Products

Do	Don't
Do ensure the desiccant matrix selected is consistent with the sealant characteristics.	Don't use any matrix available because each matrix may contain different ratios of desiccant or different desiccants.
Do reject any packages damaged in shipment or if the vapor seal is questionable.	Don't use material from a damaged package or if the moisture activity is questionable.
Do check each package of desiccated material for activity. ³ Record the data in a notebook including date, time, lot/batch number and the test result.	Don't use partially deactivated matrix. This includes matrix exposed to the atmosphere for a number of hours.
Do use the "first in, first out" inventory system when selecting a desiccated material.	Don't use matrix drums past their expiration date.
Do locate your matrix spacer filling operation away from high humidity areas in your shop such as glass washing stations.	Don't allow frames with applied matrix to hang for more than two hours in the plant. Less time if the environment is humid.
Do complete unit construction within two hours of the matrix application on the spacer channel.	
Do apply a consistent bead of matrix at a depth (or grams/ft) recommended by the supplier.	Don't allow skips or uneven application of the matrix in the channel.
Do check the application rate once per shift and when the spacer width is changed.	

³ Each matrix manufacturer may have a preferred method for checking the activity (residual water capacity) in the desiccant. Consult your supplier.

INSULATING GLASS MANUFACTURING
Preventing IG Failures

Section E
General Desiccant
Handling

- Ensure the desiccant matrix selected is compatible with the sealants.
- Reject any packages damaged in shipment or if the vapor seal is questionable.
- Check each package of desiccant/ desiccated material for activity per supplier recommendations. Record the data in a notebook including date, time, lot/batch number and the test result.
- Use the “first in, first out” inventory system when selecting a desiccated material.
- Complete unit construction within one hour of the matrix application on the spacer channel.
- Apply a consistent bead of matrix at a depth (or grams/ft) recommended by the supplier. Avoid skips or uneven application.
- Check the application rate once per shift and when the spacer width is changed.

5.0 Fabrication with Spacer Bar

Fabrication With Spacer Bar

Spacer Handling

Do

- ~~Do check for smooth (burr-free), accurate cuts~~
- ~~Do check for spacer cleanliness and adhesion~~
- ~~Do use gloves when handling spacer~~
- ~~Do check spacers for breathing~~
- ~~Do check to be sure corners keys fit snugly and do not pull out easily~~
- ~~Do center the spacer properly on the glass.~~
- ~~Do use proper type of corner keys for application/assembly system~~
 - ~~— fixed~~
 - ~~— folding~~
- ~~Do make sure muntin bars fit squarely~~

Don't

- ~~Don't allow burrs or high spots in the spacer—especially corners on bent spacers.~~
- ~~Don't allow spacer with residual cutting oils to be used~~
- ~~Don't handle spacer with bare or wet hands~~
- ~~Don't allow spacers with plugged breather holes to be used~~
- ~~Don't use improper size corners keys which cause spacer to flare~~
- ~~Don't allow muntin bars to cause high spots~~

The following general guidelines should be used when fabricating ~~insulating glass units~~ IGUs using rigid spacer bar-type spacers:

- Use spacer that is clean, dry, and contaminant-free.
- Use clean, dry gloves when handling spacer to avoid contamination.
- Ensure spacer lengths are dimensionally accurate, and cuts are smooth and burr-free.
- Spacers should be uniform in width within tolerances recommended in IGMA TM-2000.
- Ensure spacer has adequate air flow into its hollow core in order to ensure moisture access to desiccant. See IGMA TM-2000 for more information.
- If the spacer bar is bent to form the spacer frame, ensure dimensional growth (corner flare) in the corners is minimized to prevent excessive PIB thinning and glass to metal contact after IGU pressing.
- For bent spacer, use the correct inline connectors for the given application or assembly system.
- If the spacer frame is formed using corner keys, ensure the proper corner keys for the given application or assembly system are used, whether they are fixed or folding in nature.
- Ensure all corner keys and inline connectors fit snugly, so that they do not pull out of the spacer easily and do not cause significant spacer deformation. Seal joints with an appropriate material (e.g. PIB, foil tape, etc.)

- Ensure any muntin bars fit squarely and are appropriately secured in place. Do not allow muntin bars to cause high spots that may interfere with glass to primary sealant bonding.
- Ensure capillary or breather tubes inserted into spacers are not blocked with desiccant and allow gas exchange.
- Ensure that any holes created in the spacer to facilitate desiccant filling are well sealed using an appropriate sealant material.
- Ensure the spacer is properly positioned on the glass lite, after applying PIB on both sides of the spacer, taking care not to move or disrupt the PIB during the placement process.

6.0 Fabrication with PIB (Polyisobutylene) Primary Seal

~~Use spacer that is clean, dry, and contaminant free.~~

~~Ensure spacer lengths are dimensionally accurate and cuts are smooth and, burr-free, and accurate. Spacers should be uniform in width—there should be no high or low spots, especially in any bent corners.~~

~~Use clean, dry gloves when handling spacer to avoid contamination.~~

~~Ensure spacer has adequate ventilation to its hollow core in order to ensure moisture access to desiccant.~~

~~Do not use spacer with plugged breather holes.~~

~~Make sure all corner keys and inline connectors fit snugly and do not cause spacer deformation.~~

~~Center the spacer properly on the glass lite.~~

~~Use the proper corner keys for the given application or assembly system, whether they are fixed or folding in nature.~~

~~Use the proper inline connectors for the given application or assembly system~~

~~Ensure any muntin bars fit squarely and are appropriately secured in place. Do not allow muntin bars to cause high spots that may interfere with glass to primary sealant bonding.~~

~~Ensure ~~Do not use~~ spacer with plugged breather capillary or breather tubes in spacers allow gas exchange holes.~~

Fabrication with PIB (Polyisobutylene) Primary Seal

- Inspect containers to ensure they are free of damage, dents, or contamination.
- Inspect opened packages to ensure the material is free from contamination.
- Confirm the material is within shelf life and record the lot number of the material being used. Ensure stock is rotated on a first-in, first-out basis to consume sealant prior to its expiration date.
- Confirm the PIB application temperatures comply with ~~vendor~~ supplier recommendations.
- Confirm the extruder is set at the proper application pressure and the belt speed is properly adjusted to deliver the specified amount of PIB.
- Center the PIB application on the spacer, applying a bead with a convex or semicircular shape, free of cavities, depressions, or other surface defects. Ensure the PIB does not extend onto the shoulder of the spacer or into the interior of the unit.
- Perform periodic quality checks to verify the correct amount of PIB is applied to both sides of the spacer according to the specification.
- Inspect the PIB bead for skips or voids and repair them prior to pressing.
- Handle the PIB/spacer with proper techniques to avoid damage, fingerprints, or contamination. Avoid contact with other materials.
- Press the glass to ensure full and complete contact of the PIB to both the glass and the spacer. Do not over-compress.
- Inspect the PIB wet-out, width, thickness, and sightline position to confirm compliance with the specification.
- Inspect the finished units for skips, trapped air, or voids, and repair or reject them as necessary.
- Ensure products are stored and applied according to supplier recommended temperatures.

**PIB Primary Sealant
Initial Inspection**

Do

~~Do inspect containers for damage.~~

Don't

~~Don't use dented or damaged drums or contaminated material.~~

**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section G
PIB**

~~Do inspect opened packages for contamination.~~

~~Don't use packages contaminated with dirt, torn release paper, etc.~~

~~Do check expiration dates.~~

~~Don't use material which is past shelf life.~~

PIB Primary Sealant Application

Do

Don't

~~Do use proper PIB application temperature.~~

~~Don't apply PIB over or under manufacturer's recommended temperature.~~

~~Do ensure that extruder is set at proper application pressure and belt speed is properly set.~~

~~Don't apply incomplete bead, having skips or voids.~~

~~Do center PIB properly on spacer.~~

~~Don't allow PIB to extend onto the shoulder of the spacer or into the interior of the unit.~~

~~Do apply PIB bead with a convex or semicircular shape.~~

~~Don't allow cavities, depressions or other defects in the sealant surface.~~

~~Do apply PIB with proper profile and dimensions.~~

~~Don't allow cavities, depression, non-conforming profile dimensions.~~

~~Do handle PIB/spacer with proper techniques.~~

~~Don't allow spacers or PIB to contact other materials.~~

~~Do press glass to ensure full and complete contact of PIB to glass and spacer.~~

~~Don't under or over compress unit.~~

~~Do ensure that PIB sightline and thickness is consistent with the sealant manufacturer's guidelines.~~

~~Don't allow setting of spacer to be out of tolerance.~~

~~Do visual inspection of final unit for proper wet-out of PIB to show that material has contacted the glass surface properly.~~

~~Don't allow nonconforming units—i.e. voids or skips in PIB bead.~~

7.0 Fabrication with Ambient-Applied Sealants

7.1 Two-Component Sealants

- Inspect drums/pails of sealant components to be installed for large dents (steel) or tears (fiber). These could lead to improper seal of O-rings or wiper gaskets, or possible blow out of fiber containers.
- Document Batch numbers of Base and Catalyst being used and be sure the material is in shelf life. Ensure stock is rotated on a first-in, first-out basis to consume sealant prior to its expiration date.
- Open drums and inspect sealant components for any debris or a compromised seal, potentially leading to cured material at the surface, or significant separation (especially in catalyst).
- Install sealant components on their respective pumps, being sure to purge properly removing any potential trapped air from pail/drum changeover.
- Be sure equipment ratio settings, suggested by sealant supplier are targeted. Ratio control can be different based on equipment manufacturer, whether mechanically or by program settings. Sometimes the Specific Gravity of the sealant components are required in programming. Work with your sealant supplier and equipment manufacturer, if necessary, for support.
- Purge material out the application head, collect a wet butterfly sample to check for proper mix, looking for uniform color, no striations present of un-mixed material.
- At the same time as wet butterfly, collect a sample in a cup to be tested for snap time. This is a quick check to verify sealant components are feeding at expected ratios, curing/snapping in expected time, based on sealant suppliers' recommendations. This can vary across sealant suppliers, ratio settings, including temperature and humidity having an effect. Ensure products are stored and applied according to the supplier's recommended temperatures.
- It is recommended a **W**wet **B**butterfly and **S**snap **T**imes to be checked at start of shifts, after shutdowns for breaks, or any time there is a drum/pail Batch switch out. It is also recommended to log these checks with Base and Catalyst Batch, date, time, operator initials, pass/fail for wet butterfly, and time to snap (i.e. 30mins).
- Reference IGMA TM-2400 for more information.

7.2 One-Component Sealants

- Inspect drums/pails of sealant components to be installed for large dents (steel) or tears (fiber). These could lead to improper seal of O-rings or wiper gaskets, or possible blow-out of fiber containers.
- Document Batch numbers and be sure the material is in shelf life. Ensure stock is rotated on a first-in, first-out basis to consume sealant prior to its expiration date.
- Open drums and inspect sealant for any debris or a compromised seal, potentially leading to cured material at the surface, or significant separation.
- Purge sealant properly removing any potential trapped air from pail/drum changeover.

**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section H
Two-Part Sealants**

- [Ensure products are stored and applied according to the supplier recommended temperatures.](#)
- [Reference IGMA TM-2400 for more information.](#)

Fabrication With Two-Component Sealants

Base and Catalyst Sealant Initial Inspection

Do

- Do inspect drums and pails for damage.
- Do check expiration dates on pails and drums.
- Do check that base and catalyst lot numbers match.
- Do check base and catalyst for fill levels.
- Do properly stir catalyst prior to use if recommended by sealant manufacturer.

Don't

- Don't use dented or damaged drums.
- Don't use material that is past shelf life.
- Don't use unmatched lot numbers without first consulting sealant manufacturer.
- Don't use under filled containers.
- Don't use unstirred catalyst if stirring is recommended.

Base and Catalyst Sealant Ratio/Mixing

Do

- Do take ratio checks daily.
- Do use manufacturer's recommended techniques for ratio checks.
- Do inspect sealant for proper mix using manufacturer's recommended techniques.
- Do check sealant for cure rate and tack free times.
- Do use quality control log for documenting test results.

Don't

- Don't use sealant outside of manufacturer's mixing ratio recommendations.
- Don't rely only on color for ratio checks.
- Don't use unmixed sealant exhibiting streaks or striations.
- Don't use sealant exhibiting cure rate outside of manufacturer's specification.
- Don't perform testing without documenting results.

Two-Component Base and Catalyst Sealant Application

Do

- Do use recommended application guns and blocks to apply sealant.
- Do apply sealant completely from spacer shoulder to glass edge.

Don't

- Don't damage glass edges with the application tip or block pressure.
- Don't allow any voids in the sealant bondline.



**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section H
Two-Part Sealants**

~~Do check corners to ensure no voids or skips are present.~~

~~Do follow the sealant manufacturer's recommended guidelines for proper sealant depth.~~

~~Do check adhesion at prescribed intervals recommended by sealant manufacturer.~~

~~Do keep records of all tests.~~

~~Don't allow sealant voids or skips.~~

~~Don't move units before sealant has set.~~

8.0 Fabrication with Hot Melt Butyl or Reactive Hot Melt Sealants

~~Sealants – Handgun Application~~

~~Fabrication With Hot Melt Butyl Sealants~~

The following general guidelines should be used when fabricating any IGU using hot melt butyl or reactive hot melt sealants:

- Inspect drums or pails for dents or damage. Do not use drums or pails that may damage the hot melt unloader's platen or cause it to become stuck.
- Keep drums or pails sealed prior to use; ensure stock is rotated on a first-in, first-out basis to consume sealant prior to its expiration date.
- Store drums in accordance with sealant supplier's recommendations.
- Follow the sealant supplier's recommended guidelines for application temperature and sealant dimensioning. Failure to adhere to these recommendations may result in sealant degradation, slump, and/or poor adhesion to glass and spacer.
- Periodically test sealant adhesion to glass and spacer using sealant supplier's recommended test methods. Consult with your sealant supplier if poor adhesion is observed.
- Apply sealant consistently to avoid skips, voids, or cold joints in the edge seal.
- After gas fill, ensure the patch sealant is recommended by the sealant supplier and is applied hot enough to properly seal the gas filling ports. Follow your sealant supplier's recommended methods.
- Keep all spray lubricants and solvents out of the IGU assembly area. Overspray may result in contamination of spacer, glass, or sealant and result in adhesive failure. Only perform maintenance with these items when the line is shut down and production is paused.
- ~~Do~~ Implement quality control program monitoring such items as date, lot # of sealant, application amounts for example; consult with sealant supplier for recommendations.
- For further information, refer to the IGMA Insulating Glass Manufacturing Quality Procedures Manual (TM-4000).

~~8.1 Special Considerations For Using Linear Extruders In Combination With Rigid Box Spacer Or U-Channel Spacer:~~

- Check the formation of the roll-formed spacer (if used) as compared to the equipment supplier's specifications. Common items to check are the spacer width, twist, splay, parting material, and corner and muntin punches.
- Apply the sealant manufacturer's recommended sealant amounts to the spacer sides and back. This amount should be periodically verified via direct measurement.
- Ensure sealant supplier-approved gloves are used to handle the spacer when sealant is applied. Take care to ensure the sealant is not deformed or damaged due to handling prior to pressing.
- Minimize the time spacer with sealant applied is allowed to remain open to the environment. Airborne contaminants may interfere with sealant adhesion to glass. Humidity present in the environment may cause premature saturation of the desiccant.

**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section I
Butyl Sealants**

- Using the oven press manufacturer's suggested methods, periodically check that the sealant reaches an appropriate reactivation or melting temperature (as recommended by the sealant supplier) during heating and compression in the oven press.
- Periodically check the overall thickness and moisture vapor transition path (also referred to as "wet-out") of the IGU to verify proper oven/press settings and sealant compression. Over- and/or under-compression may result in poor edge seal durability.
- Vent and cool the IGUs ~~units to within 10 °F of ambient temperature~~ prior to ~~gas filling~~ gas filling and sealing. Sealing while the IGU is hot may result in negative glass deflection and excessive stress on the edge seal.
- Ensure the patch sealant is recommended by the sealant supplier and is applied hot enough to properly seal the gas filling ports. Follow your sealant supplier's recommended methods.

Table of contents:

- 1) ~~Hand-gun~~ Handgun sealant application
- 2) ~~Linear extrusion application~~
 - A. ~~Box spacer~~
 - B. ~~Channel-shaped spacer~~

Hand-Gun Handgun Sealant Application

Do	Don't
Do inspect drums for dents or damage.	Don't use drums with dents larger than 1/4" deep.
Do follow the sealant manufacturer's recommended <u>fabricator's recommended</u> guidelines for proper sealant application and depth.	Don't apply the sealant below the sealant manufacturer's <u>fabricator's recommended</u> application temperature. This may result in poor adhesion to glass and spacer.
Do apply the sealant at the proper application temperature as recommended by the sealant manufacturer <u>fabricator</u> .	Don't apply the sealant above the sealant manufacturer's <u>fabricator's recommended</u> application temperature. This may cause excess thermal degradation of sealant resulting in poor sealant performance.
Do adhesion test to glass and spacer	Don't leave voids in the sealant coverage.
Do apply sealant consistently to prevent skips or voids in the sealant.	Don't allow nonconforming units.
Do inspect units for cold joints, skips and voids.	

9.1a Fabrication with Hot Melt Butyl Sealants – Linear Extruded with Box Spacer

Linear Extruder with Box Spacer

Do

Don't

- ~~Do inspect drums for dents or damage.~~
- ~~Do apply the recommended sealant amounts on the spacer sides and back. Follow the sealant manufacturer's recommended fabricator's recommended guidelines.~~
- ~~Do measure sealant thickness on spacer at least once per shift.~~
- ~~Do use gloves recommended by the sealant manufacturer fabricator when handling or contacting sealants for folding and setting the spacer frame on the glass.~~
- ~~Do use the proper oven/press temperatures as suggested by the sealant manufacturer fabricator.~~
- ~~Do check unit thickness for proper compress of sealant.~~
- ~~Do vent and cool units before sealing the vent hole.~~
- ~~Do seal vent holes with sealant approved by supplier of bond line sealant.~~
- ~~Do inspect units for sealant consistency and proper wet out.~~

- ~~Don't use drums with dents larger than 1/4" deep.~~
- ~~Don't use less than the recommended amount of sealant.~~
- ~~Don't run the oven/press too cool or too hot.~~
- ~~Don't under-compress or over-compress units.~~
- ~~Don't seal the units while they are still hot. Sealing the units hot cause negative deflection or excess seal stress due to the negative pressure.~~
- ~~Don't allow nonconforming units.~~

9.1b Fabrication with Hot Melt Butyl Sealants – Linear Extruded with Channel-Shaped Spacer

Channel Shaped Spacer Fabrication

Do

Do check the formation of the roll formed spacer as compared to specifications. Common items to check are the spacer width, twist, splay, parting material, corner and muntin punches.

Do keep all spray lubricants out of IGU Department. Spray lubricants may contaminate the spacer, glass or sealant and result in adhesive failure.

Do apply the specified amounts of sealant and matrix on the Intercept spacer. Check with the material suppliers for usage information.
Do apply a consistent bead of sealant and matrix.

Do control the amount of time the spacer frames hang on the overhead conveyor. Do keep airborne dust and dirt to minimum in order to prevent sealant contamination.

Do use non-stick gloves when folding and setting the spacer frame on the glass

Do insure ensure that the unit IGU sealant reaches the correct temperature during heating and compression.

Do allow the units to fully cool to plant temperature before sealing the vent hole. Follow the sealant manufacturer/fabricator's recommendations regarding proper vent hole closure methods.

Don't

Don't manufacture/fabricate units using a spacer frame that is out of tolerance. The sealant is compressed between the spacer frame and the glass in the oven/press. If the spacer frame is out of tolerance, the sealant depths may be negatively affected.

Don't use any lubrication on the roll former components that contact the spacer material. The lubricants may cause a contamination issue with the sealant or matrix.

Don't apply excessive amounts of sealant. Thicker sealant may increase the rate of flow of moisture through the moisture barrier.

Don't allow the frames to hang on the overhead conveyor for long periods of time. The desiccated matrix will adsorb moisture while exposed to ambient conditions and may reduce the drying capacity over the unit life.

Don't use bare hands or water when handling the spacer frames. They may cause contamination that leads to premature/premature adhesive failure.

Don't run the oven/press too cool or too hot. Cool sealant will not bond well with the glass and the spacer. Excessive heat may cause the units IGUs to over-compress resulting in a poor moisture barrier or a glass to metal condition.

Don't seal the units IGUs while hot. This may result in deflection after the units cool.

10.0 One Component Curing IGU Sealants – Curable Hot Melt (HM)

Fabrication With One Part Sealants – Curable HM

Incoming Material Inspection

Do

- ~~Do inspect incoming drums and pails for damage.~~
- ~~Do check expiration dates on pails and drums, rotate stock on FIFO (first in first out) basis and store drums per manufacturer/fabricators' recommendations.~~
- ~~Do keep drums sealed prior to use.~~
- ~~Do inspect material upon opening drum before placing on pump.~~

Don't

- ~~Don't use dented and damaged drums.~~
- ~~Don't use material which is past shelf life or store drums in conditions which may affect material quality.~~
- ~~Don't prematurely expose curing sealants to moisture or expose sealants to contaminants.~~
- ~~Don't use contaminated material.~~

10.1 One Component Curing IGU Sealants – Considerations

General One Part Sealant Application Considerations

Do

- ~~Do wear proper safety equipment.~~
- ~~Do use gloves recommended by the sealant manufacturer/fabricator when handling sealants.~~
- ~~Do use recommended application guns and block to apply sealant.~~
- ~~Do follow recommended spacer, desiccant and glass fabrication practices.~~
- ~~Do ensure that sealant fills the entire spacer cavity — flush to the shoulder of the spacer and glass edge.~~
- ~~Do inspect unit corners to ensure no voids in sealant or chips are present in the glass.~~
- ~~Do apply sealant at sealant manufacturer/fabricator's recommended application rates and depth.~~
- ~~Do check adhesion to glass and spacer~~
- ~~Do maintain equipment and implement preventative maintenance program.~~

Don't

- ~~Don't allow hot material to contact skin.~~
- ~~Don't use bare hands or wet hands when coming in contact with sealants that may cause contamination of the sealant.~~
- ~~Don't damage glass edges with the application tip or pressure block or use incorrectly sized or worn tips resulting in inadequate sealant coverage.~~
- ~~Don't utilize materials or processes that may contribute to poor seal quality.~~
- ~~Don't allow voids in sealant sightline.~~
- ~~Don't trap air or create voids when sealing.~~
- ~~Don't improperly apply sealant resulting in poor quality seals.~~
- ~~Don't wait until equipment breaks or improperly applies sealant before maintaining or repairing.~~

**INSULATING GLASS MANUFACTURING
Preventing IG Failures****Section J
One-Component Curing
IG Sealants****Application Considerations with Extruder****Do**

Do ensure that extruder is applying material at recommended temperatures.

Do ensure that application is complete with no skips or voids and at manufacturer/fabricator's recommended rates.

Do ensure that final corner is covered and sealed with recommended sealant thickness coverage.

Do adjust oven press height to achieve target unit overall thickness and desired sealant "wet-out" per sealant manufacturer/fabricator's recommendations.

Do adjust oven temperature and speed to achieve target unit edge temperature for desired "wet-out" per manufacturer/fabricator's recommendations.

Do vent units through oven press.

Don't

Don't rely on operator "feel" for correct application temperature.

Don't allow any voids or thin spots in sealant.

Don't stretch or pull material to cover spacer causing thin spots or voids.

Don't underpress or overpress units resulting in poor quality seal.

Don't run the oven too cool causing poor sealant adhesion or too hot allowing units to overcompress or bow out spacers.

Don't seal the vent hole while units are still hot which may result in excess seal stress due to negative pressure and may result in negative deflection of the units.



**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section J
One-Component Curing
IG Sealants**

Quality Inspections and Processes

Do

~~Do complete adhesion test of sealants to spacer and glass surfaces in accordance with manufacturer/fabricator's recommendations; review processes and materials if results do not meet expectations.~~

~~Do implement quality control program monitoring such items as date, lot # of sealant, application amounts for example; consult with sealant manufacturer/fabricator for recommendations.~~

~~For further information, refer to the IGMA Insulating Glass Manufacturing Quality Procedures Manual (TM-4000-02).~~

Don't

~~Don't accept units that exhibit adhesion measurements or properties less than manufacturer/fabricator's recommendations.~~

~~Don't ignore potential benefits of quality program.~~

9.0 Fabrication with Flexible Foam Spacer

Fabrication With Foam Spacer

Foam Spacer IG Fabrication

Do

- ~~Do apply spacer straight and parallel to edge of glass for maintaining a consistent sealant setback~~
- ~~Do maintain minimum sealant depth as required for different sealants~~
- ~~Do make corners at 90°, keeping them tight and square.~~
- ~~Do apply pressure after IG matching for proper wet-out of structural acrylic adhesive~~
- ~~Do use properly sized tape if applicable.~~
- ~~Do protect the desiccated spacer from the atmosphere at all times~~

Don't

- ~~Don't allow tape to interfere with sealant bond line area.~~
- ~~Don't use anything but industry approved sealants for foam spacers~~
- ~~Don't stretch the spacer material during application.~~
- ~~Don't contaminate the acrylic PSA (pressure sensitive adhesive).~~
- ~~Don't leave acrylic adhesive smears in sealant bond line area~~
- ~~Don't leave unit open excessively before matching~~

11.0 Fabrication with Flexible Foam Spacers

The following general guidelines should be used when fabricating ~~insulating glass unit~~ IGUs using flexible foam spacers:

- Apply spacer straight and parallel to edge of glass for maintaining a consistent sealant setback.
- Ensure spacer is applied without stretching the material or leaving acrylic adhesive residue in the bond line.
- Maintain minimum sealant depth as required for different industry approved sealants.
- Make corners at 90°, keeping them tight and square.
- Use properly sized tape in the final corner, if applicable
- Close IGU with matching life shortly after spacer application to minimize spacer exposure to moisture.
- Apply pressure after IGU matching for proper wet-out of pressure sensitive adhesive.
- Check desiccant activity on open material periodically using fabricator's recommended test methods.
- Store partially used material in humidity-controlled areas or in a closed, air-tight container, per supplier specifications.
- Check material expiration date prior to use. Do not use expired material.
- Minimize contact with the acrylic pressure sensitive adhesive to prevent contamination.

10.0 Fabrication with Flexible Sealant/ Spacer Systems

Fabrication With Flexible Sealant/Spacer Systems

Table of contents:

- | | |
|---|---------------------------------|
| 1) Material Handling/Storage | 4) Pressing IG Units |
| 2) Sealant Application | 5) Sealing IG Units |
| 3) Glass Application – Topping | |

Material Handling and Storage

Do

- ~~Do ensure the desiccated spacer is protected from ambient moisture prior to use – store indoors.~~
- ~~Do inspect the condition of the box, bag and effectiveness of the bag seal.~~
- ~~Do condition material for application temperature (65-85°F / 18-29°C).~~
- ~~Do check desiccant activity periodically using manufacturer’s recommended test methods~~
- ~~Do check material adhesion periodically using the Butterfly test.~~
- ~~Do repackage material according to manufacturer’s requirements for protecting the desiccant from moisture.~~
- ~~Do rotate inventory to use older material first.~~
- ~~Do use material within its shelf life.~~

Don’t

- ~~Don’t open too many containers.~~
- ~~Don’t use material which fails the manufacturer’s desiccant activity tests~~
- ~~Don’t use material, which fails the butterfly test.~~
- ~~Don’t leave packages open over night.~~

12.0 Fabrication with Flexible Sealant/Spacer Systems

The following general guidelines should be used when fabricating ~~insulating glass unit~~IGUs using Flexible Sealant/Spacer Systems:

- ~~• Inspect condition of the box, bag, and effectiveness of bag seal~~
- ~~• Ensure the desiccated spacer is protected from ambient moisture prior to use – store indoors.~~
- ~~• If needed, condition material for application per supplier recommendations.~~
- ~~• Check desiccant activity periodically using supplier’s recommended test methods. Do not use material if fails testing.~~
- ~~• Check material adhesion periodically using the butterfly test method.~~
- ~~• Store partially used material in humidity-controlled areas or in a closed, air-tight container.~~
- ~~• Check material expiration date prior to use. Do not use expired material.~~



~~INSULATING GLASS MANUFACTURING~~
~~Preventing IG Failures~~

~~IGMA Publication: TM-4100-03~~

~~Section L~~
~~Flexible Sealant~~
~~Spacers~~

11.0 Racking, Packaging and Shipping

~~Racking, Packaging And Shipping~~

~~Racks~~

~~Do~~

~~Do use stable racks.~~

~~Do use racks with a 90° angle between the base and the back of the rack.~~

~~Do use an appropriate cushioning material on the rack bottom and backrest.~~

~~Do support all lites of glass in the IG unit.~~

~~Do place units on the rack so they are parallel to the backrest and to each other.~~

~~Do place the separator material uniformly on the units.~~

~~Do secure the load before moving the rack away from the line.~~

~~Do secure the load after the units are cured.~~

~~Thermoplastic IG Sealants: Do use load spreaders when stacking IG units greater than 12 inches deep.~~

~~Don't~~

~~Don't use oversize or undersize racks.~~

~~Don't use damaged racks.~~

~~Don't use dirty racks.~~

~~Don't use racks with protruding objects.~~

~~Don't stack units of different sizes on the same pile without corner separators.~~

~~Don't allow excess sealant to "glue" adjoining units together.~~

~~Don't move racks without securing the load first.~~

~~Don't band or strap the final load too tightly.~~

11.1

Racks

- Use stable, undamaged racks of appropriate size and construction, ensuring a ~~ninety° degree~~90° angle between the base and backrest, with a lean/tilt of approximately 3°-7° ~~degrees~~, free of protruding objects.
- Maintain rack cleanliness and avoid excess sealant bonding adjoining units together.
- Apply suitable cushioning on the racks bottom and backrest and use separator materials uniformly when applicable. Corner separators should be used when stacking units of different sizes.
- Place units parallel to the backrest and to each other, ensuring all lites of glass in IGU units are supported.
- Avoid overloading or tightly banding racks to prevent damaging the primary sealant.
- Secure the load only after sufficient cure of the secondary and prior to moving the rack.

**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

Section M
Racking, Packaging,
Shipping

Wooden Boxes

Do

Don't

- ~~Do use stable boxes.~~
- ~~Do use cushioning material at the corners and midpoints (or quarter points) of the empty box.~~
- ~~Do place the first unit in the box parallel to the back of the box and also parallel to each other thereafter.~~
- ~~Do place the separator material uniformly on the units.~~
- ~~Do check that box label matches unit labels.~~
- ~~Do place cushioning material at the corners and midpoints (or quarter points) before closing up box.~~
- ~~Do check that packaging is appropriate for destination (export, air freight, etc.).~~

- ~~Don't use a box with broken or inferior quality wood.~~
- ~~Don't exceed the weight limit for boxes being used.~~
- ~~Don't use nail or staple guns without adequate training.~~
- ~~Don't move the box from the line until the units are temporarily or permanently secured.~~
- ~~Don't over-tighten banding around the box.~~

**11.2
Wooden Boxes**

- Use stable boxes free from broken or low-quality wood.
- Apply cushioning at the corners and midpoints of the empty box.
- Ensure the load does not exceed the box's maximum weight limit.
- Place the first unit parallel to the back of the box and align all subsequent units accordingly.
- Only use nail or staple guns with proper training to avoid damaging the contents.
- Apply separator materials uniformly between units, and do not move the box until the units are secured.
- Ensure the box label matches the unit labels.
- Avoid over-tightening the banding around the box.
- Confirm packaging is suitable for the destination and shipping method.

Loading, Shipping and Storage

Do

- ~~Do handle the racks and boxes with the appropriate size forklifts and cranes.~~
- ~~Do train personnel in the safe handling of boxes and racks with forklifts, cranes, four-wheelers, etc.~~
- ~~Do load and brace racks and boxes tightly in a trailer.~~
- ~~Do brace the loads to limit the movement forward, backwards, and sideways during shipment.~~
- ~~Do use lifting cables long enough to make at least a 45° angle from horizontal.~~

Don't

- ~~Don't store finished IG units outside exposed to the elements.~~
- ~~Don't store finished goods in a wet or leaky warehouse.~~
- ~~Don't permit shrink-wrap to distort window frame.~~

11.3

Loading, Shipping and Storage

- Use appropriately sized forklifts and cranes to handle racks and boxes.
- Store finished goods in a clean, dry area, protected from the elements.
- Ensure personnel are trained in the safe handling of racks and boxes using forklifts, cranes, and four-wheelers.
- Load and brace racks and boxes securely in trailers.
- Prevent shrink-wrap from distorting window frames.
- Brace loads to restrict movement in all directions during shipment.
- Use lifting cables long enough to create at least a 45° angle from horizontal.

12.0 Glazing and Installation

Glazing & Installation

Moving / Handling IG

Do

~~Do use suction cups and/or a wooden rolling block to rotate glass if handling large and/or heavy units.~~

~~Do make certain that if glass needs to be placed on a hard surface i.e., concrete, always rest the glass on 2 wooden blocks, located at the quarter points.~~

Don't

~~Don't have glass come in contact with hard surfaces i.e., concrete, metal, hard plastics, etc.~~

~~Don't cause damage to the glass edges or the seal of the IG-unit.~~

~~Don't place directly on floors, especially if concrete, metal or other non-yielding material.~~

12.1

Moving and Handling

- Use proper personal protective equipment (PPE) when handling the IGU.
- Use suction cups and/or a rolling block to rotate glass if handling large and/or heavy units.
- When setting glass on hard surfaces (i.e., concrete, metal, hard plastics, etc.) always rest the glass on 2 two non-metallic blocks at the quarter points of the IGU. This will help to prevent damage to the glass edges and the seal of the IGU.

Compatibility of Glazing Materials

Do

~~Do test glazing materials for compatibility with the insulating glass sealant *Consult IG sealant manufacturer for compatibility recommendations.~~

~~Do select glazing sealants that remain pliable under intended weathering exposure.~~

~~Do use sealants, tapes, gaskets, or sealing fins that retain a tight seal in the glazing cavity.~~

~~For further information, refer to the IGMA Glazing Guidelines (TM-3000-03).~~

Don't

~~Don't use incompatible glazing materials.~~

~~Don't use sealants that contain linseed, mineral or vegetable oils or other plasticizer materials that release migrating organic compounds. Care should be used when glazing insulating glass units with materials that contain large amounts of organic solvents.~~

~~Don't subject the glass edge to loads that exceed 10 lbs/linear inch.~~

12.2

Compatibility of Glazing Materials

Test glazing materials for compatibility with the IGU sealants. *Consult the IGU sealant supplier for compatibility recommendations.

**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section N
Glazing Installation**

- [Test glazing materials for compatibility with the IGU sealants. *Consult the IGU sealant supplier for compatibility recommendations.](#)
- [Avoid using sealants that contain linseed, mineral or vegetable oils, or other plasticizer materials that release migrating organic compounds. Care should be used when glazing IGUs with materials that contain large amounts of organic solvents.](#)
- [Glazing sealants should remain pliable under the intended weather exposure of the final product.](#)
- [Select sealants, tapes, gaskets, etc. that will retain the proper seal in the glazing cavity.](#)
- [Ensure the edge pressures of the IGU do not exceed 10 lbs/linear inch \(1751 N/m\).](#)
- [For further information, refer to the IGMA Glazing Guidelines \(TM-3000\) and AAMA SSGDG-1-17-Structural Silicone Glazing \(SSG\) Design Guidelines.](#)

[For further information, refer to the IGMA Glazing Guidelines \(TM-3000\).](#)

Setting Blocks mw

Do

Don't

~~Do use a minimum of two setting blocks and make certain they that support both lites of the IG-unit.~~

~~Do use setting blocks compatible with the IG-unit edge seal.~~

~~Do use setting blocks made of Neoprene, EPDM, silicone or other elastomeric material that are compatible with the IGU edge seal.~~

~~Do use setting blocks with a Shore A hardness of 85 +/- 5.~~

~~Do place setting blocks at the quarter points to obtain equal weight distribution of the glass on the blocks.~~

~~Do use setting blocks that are a minimum of 1/8" (3 mm) thick and are at least 0.1" in length per sq. ft. of glass area (2.7 cm per m²).~~

~~Don't place setting blocks closer than W/8 (w = width dimension) or 6" from the corner, whichever is larger.~~

12.3 Setting Blocks

- [Use a minimum of two setting blocks that support both lites of the IGU](#)
- [Use setting blocks produced from materials that are compatible with the IGU edge seal system such as Neoprene, EPDM, silicone, or other elastomeric material.](#)

**INSULATING GLASS MANUFACTURING
Preventing IG Failures**

**Section N
Glazing Installation**

- [Use setting blocks with a Shore A hardness of 85 +/-5.](#)
- [Place the setting blocks at the quarter points of the IGU to obtain equal weight distribution of the glass on the blocks.](#)
- [Use setting blocks that are a minimum of 1/8" \(3 mm\) thick and are at least 0.1" \(2.5 mm\) in length per square foot of glass area \(2.7 cm/m²\)](#)
- [For further information, refer to the IGMA Glazing Guidelines \(TM-3000\).](#)

Vent/Weep System

Do

Do incorporate proper venting with two or more 1/4" (7 mm) diameter holes or 3/16" x 3/8" (5 mm x 9 mm) slots, or larger, that are equally spaced at the lowest point of the sill section of sash or frame

Do clean burrs from vent holes.

[For further information, refer to the IGMA Glazing Guidelines \(TM-3000\).](#)

**12.4
Vent/Weep System**

- [Incorporate proper venting by using two or more 1/4" \(7 mm\) diameter holes or 3/16" x 3/8" \(5 mm x 9 mm\) slots, or larger. Ensure the holes/slots are equally spaced at the lowest point of the sill section of the sash or frame.](#)
- [Ensure the holes/slots remain clean and clear from any obstructions that could restrict or prevent water flow.](#)
- [For further information, refer to the IGMA Glazing Guidelines \(TM-3000\).](#)

Don't

Don't cover vent holes on the inside of sash that would restrict water flow.

Don't block vent holes with internal structural members.

Glass Protection & Cleaning

Do

Don't

~~Do protect glass from damage during installation and building construction.~~

~~Do remove paint, plaster and sealant spills or splashes from glass immediately.~~

~~Do protect glass from weld splatter, sand blasting, and concrete or other caustic materials.~~

~~Do clean glass surface soon after installation.~~

~~Do clean installed glass with commercial glass cleaning products or a dilute solution of hand dishwashing detergent.~~

~~Don't leave spilled materials on glass.~~

~~Don't leave splattered materials on glass.~~

~~Don't entrap abrasive particles (like grit from stucco) between glass and cleaning materials.~~

~~Don't use cleaning products not designed for cleaning glass. Use products designed for cleaning insulating glass.~~

~~Don't touch glass with any metal parts of cleaning equipment. Don't use razors, putty knives or trowels on clean glass surfaces.~~

12.5

Glass Protection & Cleaning

- Ensure that all cleaning materials are compatible with the IGU sealant. *Consult the IGU sealant supplier for compatibility recommendations.
- Ensure that all cleaning materials are approved for use on glass surfaces.
- Protect the glass from damage during storage, installation, and building construction. Weld splatter, sand blasting, concrete, or other caustic materials will damage the glass surface.
- Ensure that any paint, plaster, sealant/solvent spills are cleaned and removed from the glass immediately.
- Avoid trapping abrasive particles like grit from stucco or dirt between the glass and cleaning materials as these can cause scratching of the glass.
- Avoid touching the glass with any metal parts of cleaning equipment such as razor blades, putty knives, or trowels as these can scratch the glass.
- For further information, refer to the IGMA Glazing Guidelines (TM-3000).

13.0 Industry Testing

- Refer to the certification agency's Certified Products Directory (CPD). Fabricate the test samples using the same method and materials that match the product listing that is to be tested.

- [Fabricate the test samples according to the certification programs requirements for cavity space \(gap\) width and glass thickness.](#)
- [Follow all internal standard fabrication methodologies and/or written quality control procedures established by your company.](#)
- [Ensure compliance with all the requirements of the certification agency.](#)
- [Include a fabrication sheet with the test samples that documents the construction.](#)
- [Package samples for shipping in a secure wood crate surrounded with foam or equivalent packing materials, or as required by the certification agency. Refer to Section 11 Racking, Packaging and Shipping for additional guidance.](#)
- [Allow samples to condition for a minimum of 28 days from date of fabrication prior to the start of testing. \(28-day hold may be waived by IGU fabricator\).](#)
- [Ensure that your fabrication equipment is operating according to supplier specifications.](#)
- [Take appropriate steps to avoid large altitude changes when shipping to the lab. Reference IGMA/NGA TB-1601-24 for more guidance.](#)
- [For further information, refer to the appropriate certification program manual or contact your Certification Program Provider.](#)
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14.0 Referenced Standards

[14.1 References to the standards listed shall be to the edition indicated. Any undated reference to a code or standard appearing in this section shall be interpreted as referring to the latest edition of that code or standard.](#)

14.2 AAMA, Fenestration and Glazing Industry Alliance (FGIA) Standards

[AAMA SSGDG-1-17-Structural Silicone Glazing \(SSG\) Design Guidelines](#)

14.3 ~~IGMA~~, IGMA, Fenestration and Glazing Industry Alliance (FGIA) Standards

[IGMA TR-3401, Preventing Glass Breakage During IG Design, Manufacture, Transport, Installation and Use](#)

[IGMA TM-2000, Test Methods and Quality Assurance Criteria for Box Spacers Used for Insulating Glass Units](#)

[IGMA TM-2400, Test Methods of Insulating Glass Sealants](#)

[IGMA TM-4000, Insulating Glass Manufacturing Quality Procedures](#)

[IGMA TM-3000, North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use](#)

~~[AAMA SSGDG-1-17-Structural Silicone Glazing \(SSG\) Design Guidelines](#)~~

14.4 IGMA (Fenestration and Glazing Industry Alliance (FGIA) Standards) and National Glass Association (NGA)



~~INSULATING GLASS MANUFACTURING~~
~~Preventing IG Failures~~

~~IGMA Publication: TM-4100-03~~

~~Section N~~
~~Glazing Installation~~

[IGMA/NGA TB-1601-24, Guideline for the Use of Capillary Tubes](#)

~~End of Document~~