

Insulating Glass Quality Guide

Quality Control Information for use with 2-Part Silicone Secondary IG Sealants

Importance

The development and implementation of adequate quality control procedures is important in maintaining product consistency. Effective implementation of procedures and documentation is the responsibility of the user. The following information, test procedures and schedule of testing should be used as a guideline. The importance of testing and record keeping can speed the identification of material and equipment problems and provide workers with a means to identify problems before producing units that may not meet the standards needed for high quality.

Note: The ASTM C1249 Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications, which provides an overview of sealant design topics for IG systems, should be used in conjunction with this manual. Copies can be obtained at www.astm.org.

Receipt of Product

Receipt of product and usage of product from inventory should be conducted in a first in first out method. Labeling containers with the date of receipt can assist in tracking proper product flow throughout the production process.

Initial Quality Testing

Momentive performs rigorous quality testing on manufactured material prior to release for sale or shipment. However, once material ships from our manufacturing location, unforeseen circumstances can arise which could affect the material; example: prolonged exposure to high heat, dented or cracked containers, exposure to moisture, etc..). Thus, it is a good practice to quarantine material upon receipt until quality control tests the product. This is minimally a snap test conducted with material taken directly from the newly received containers. Once the product has passed the initial quality control check it can be released to inventory.

Daily Production Quality Testing

It is recommended that a log is created to track daily production quality testing. This log should minimally include: Date, Time, Temperature, Humidity, Mix ratio setting, Batch numbers and Container numbers, Snap time, Butterfly results, and tack free time. Maintaining such a test log gives users familiarity with the normal behavior of the material and can allow some forewarning of abnormal behavior should conditions arise.

Frequency of Testing

It is recommended to test whenever production equipment has been idle for an extended period of time such as overnight, lunch breaks, break times or when empty product containers are being changed out.

Test Procedures

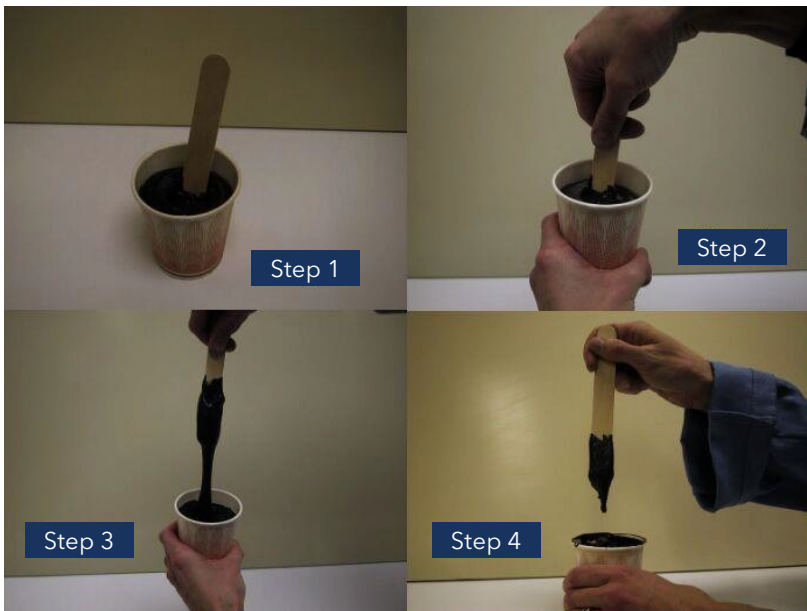
Snap Test (Work Life)

Snap time is a measurement of the cure speed of 2-part silicone sealants. Cure speed is affected primarily by the ratio of the A and B components, and to a lesser extent by the temperature and humidity. The snap time is the time it takes for catalyzed, mixed sealant to cure to a state where the mixture begins to behave more like an elastomer than a liquid – that is, the material tears within itself when the stick is removed from the sealant. Measurement and control of snap time is critical to maintaining consistency of performance of 2 part sealants.

- **Step 1** – Fill a small cup approximately half to 3/4ths full with freshly mixed 2-part sealant directly from the equipment and insert a tongue depressor. (Except for Initial Quality Testing, use product directly from the packaging, weighing the appropriate ratio of the two components, and hand mix them together).
- **Step 2** – After approximately 25 minutes has passed, begin to monitor the cup at 5-minute intervals stirring the contents of the cup with a tongue depressor and withdraw the tongue depressor.
- **Step 3** – Observe the material being pulled out of the cup by the tongue depressor. Initially it will pull out to a thin “string”. As the material cures its viscosity will increase and become more difficult to pull.
- **Step 4** – The snap time is the time when the material no longer “strings” when pulled out of the cup but snaps off.
- **Step 5** – Record the time of the initial snap to the nearest minute.

Note: This test is subjective and subject to variation between operators. Stirring of the sample is necessary to assure uniformity of cure in the cup. Appearance of the snap is subject to judgment; individual operators may obtain results that span up to several minutes. Agreement among operators on appearance of the snap is suggested to minimize variation.

Note: If snap times deviate from expected, the Snap Test can be run by combining materials in a known weight ratio. Materials should be weighed, combined, and thoroughly mixed and tested as described above. This test can assist in determination of potential equipment variation.



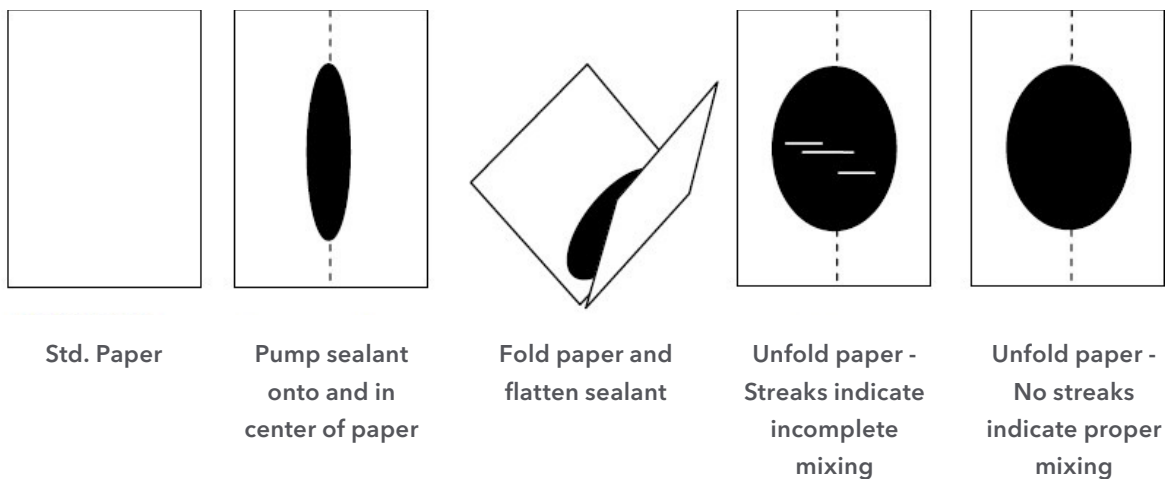
Note: This method is also depicted in ASTM C1249 Appendix X2:

Butterfly Test

The Butterfly Test is a measurement of the mix quality of 2-part silicone sealants. Complete mixing as indicated by uniform color of the mixed sealant is necessary to assure proper performance of the mixed sealant. Mix quality is affected primarily by the type and cleanliness of the mixer. Pumping uniformity of the two components to be mixed, pressure variations in the pumping equipment, sticking check valves, and other mechanical malfunctions are potential causes of poor or incomplete mixing. The length of the test paper should be long enough to accommodate entire pump cycle.

- **Step 1** - Fold paper in half along the longer dimension, crease and unfold.
- **Step 2** - Purge mixer to assure fresh material is in the mixer.
- **Step 3** - Dispense a ½" to 1" wide bead freshly mixed material directly from the mixer onto the crease in the paper.
- **Step 4** - Immediately fold the paper in half along the crease and press the sealant out by hand to a width of a few inches between the paper halves.
- **Step 5** - Unfold the paper and inspect the appearance of the mixed sealant.

Note: This method is also depicted in ASTM C1249 Appendix X1.



Appearance Ratings:

- Uniform color and texture - Ideal appearance is a uniform color and smooth appearance to the naked eye.
- Longitudinal streaks - Faint longitudinal streaks (parallel to the paper crease) may be present. If color contrast of the streaks increases with time mixer should be cleaned or replaced. Run Tack Free Time Test to assure all material attains tack free state.
- Lateral band(s) - A lighter or darker color band may appear perpendicular to the paper crease.
- This can indicate a variation in mix ratio potentially caused by unequal pressures in the catalyst and base, check valve malfunction, or other mechanical cause. Run Tack Free Time Test to assure all material attains tack free state.
- Large cured chunks of sealant - May appear when mixer has been used too long or insufficiently purged. Change the mixer.
- Coarse texture of sealant surface - Mixer not sufficiently purged. Purge mixer and repeat test.

Note: This test is subjective and subject to variation between operators. A smooth texture and uniform color provides assurance of a thorough mix and uniform mix ratio.

Tack Free Time (TFT) Test

The TFT is a relative measurement of the cure speed of 2-part silicone sealants. Variations in the TFT can indicate variations in mix ratio, mix quality, material quality, and other process variables, which may have an effect on the performance of the material. The TFT test can be performed on Butterfly Test samples or on actual production units.

Note: The material will typically become tack-free a half hour to an hour after the material has snapped. Refer to the daily test log for recorded snap time(s) and begin inspection for TFT as applicable.

- **Step 1** - Lightly touch the surface and observe if material is transferred. A tack-free condition exists when no material transfer occurs and with no visible disturbance to the material surface.
- **Step 2** - If material transfer occurs or the material surface is disturbed, check again after 15 minutes. Repeat as necessary. Record the TFT on the daily log.