



# Standard Test Method for Compatibility of Insulating Glass Edge Sealants with Liquid- Applied Glazing Materials<sup>1</sup>

This standard is issued under the fixed designation C 1294; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers a laboratory procedure for quantitatively measuring the compatibility of liquid-applied glazing materials with an insulating glass unit edge sealant. Compatibility is determined by measuring the changes in the insulating glass edge sealant adhesive and cohesive properties. Hereinafter insulating glass is referred to as IG.

1.2 This test method does not address the issue of the integrity of the hermetic seal or changes to the vision area in an IG unit. Such factors as possible unit fogging or primary sealant reaction in a dual-seal system due to volatile components permeating the IG sealant are not considered in this test method.

1.3 The committee with jurisdiction over this standard is not aware of any comparable standards published by other organizations.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*

C 717 Terminology of Building Seals and Sealants<sup>2</sup>

## 3. Terminology

3.1 *Definitions*—Refer to Terminology C 717 for definitions of the following terms: adhesive failure, cohesive failure, compatibility, compound, elongation, glazing, seal, sealant, substrate.

## 4. Summary of Test Method

4.1 This test method includes the measurement of tensile force, elongation, and percent cohesive or adhesive failure and

observations of the specimen's general physical appearance and observation of elongation.

4.2 Test specimens are exposed to 70°C (158°F) heat for four weeks while contacting the liquid-applied glazing material being evaluated.

4.2.1 Control specimens are exposed only to the 70°C (158°F) heat.

4.3 Compatibility is determined by comparing the measured and observed properties of the test specimens to the control samples.

## 5. Significance and Use

5.1 Liquid-applied glazing materials, bedding sealants, glazing compounds (that is, glazing sealants) are designed to provide a seal between the IG unit and the window or wall framing. Frequently there is physical contact between these materials and an IG unit edge sealant. Depending on the particular IG unit edge sealant, there can be a detrimental physical or chemical interaction between it and the liquid-applied glazing material. Detrimental effects may include: weakening, softening, hardening, or adhesive failure of the IG edge sealant, or visual obstruction inside the IG unit.

## 6. Apparatus and Accessory Materials

6.1 *Oven*, forced draft, capable of maintaining a constant temperature of  $70 \pm 3^\circ\text{C}$  ( $158 \pm 5^\circ\text{F}$ ).

6.2 *Tensile Testing Machine*, capable of producing a tensile load on the specimen at the rate of  $5 \pm 0.51$  mm ( $0.2 \pm 0.02$  in.) per minute.

6.2.1 *Fixed Member*—A fixed or essentially stationary member carrying one grip.

6.2.2 *Moveable Member*—A moveable member carrying a second grip.

6.2.3 *Grips*—The grips should be suitable to firmly grasp the test fixture that holds the test specimen and should be designed to eliminate eccentric specimen loading. Specimen loading should be parallel to the centerline of the short axis of the sealant. A swivel or universal joint near each end of the specimen should be provided for alignment purposes.

6.2.4 *Grip Fixture*—A fixture capable of being held by the grips and furnishing a tensile force to and maintaining proper alignment with the test specimen.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.07.

6.3 *Spatulas*, for use in mixing and applying sealant.

6.4 *Paper Cup or Can*, for use in mixing multicomponent sealants when applicable.

6.5 *Plastic Cartridge*, (Semco), to extrude sealant when applicable.

6.6 *Triple-Beam or Electronic Balance*, accurate to  $\pm 0.01$  g ( $3.5$  by  $10^{-4}$  oz) for weighing multicomponent sealant mixes and finished test specimens.

6.7 *Glass Substrates*, clear float glass, 6 by 25 by 75 mm (0.25 by 1 by 3 in.). A total of ten substrates is required for each glazing material tested.

6.8 *Spacer*, nominally 13 mm (0.50 in.) wide IG, aluminum spacer with preferably an anodized aluminum surface. Spacers should be cut into 50-mm (2-in.) lengths.

6.9 *Test Fixture* (Fig. 1) to hold the specimen components in place while the IG sealant is applied and cured.

6.10 *Aluminum Foil*, standard kitchen wrapping foil is suitable.

6.11 *Container*, a shallow aluminum or glass pan or tray is suitable. The container must be large enough to hold all the test specimens. A container is required for each combination of IG edge sealant and liquid-applied glazing material compound being tested.

## 7. Specimen Preparation

7.1 Prepare a set of five test specimen assemblies for each IG edge sealant or liquid-applied glazing material, or both, being tested.

7.2 Construction of the test specimens is done by placing the 13 by 50-mm (0.50 by 2-in.) IG spacers into the recesses in the test fixture. The glass substrates are installed on either side of the spacer and the assembly is clamped together with

machine screws through the ends of the side bars. The test fixture holds the samples stationary while the IG edge sealant is applied. The IG edge sealant siteline should be approximately 6 mm (0.25 in.) after the specimen is prepared.

7.3 Take special care to strike off the sealant flush with the glass substrates.

7.4 Cure the test specimens for a total of 7 days at  $22 \pm 2^\circ\text{C}$  ( $72 \pm 2^\circ\text{F}$ ) and 50 % relative humidity.

7.5 The samples should be removed from the test fixture after the end of the first day of the seven-day cure period.

7.6 Measure the width and length of the sealant contact area in millimetres (inches) with the glass substrates for use in calculating the tensile strength of the assembly per unit area.

## 8. Procedure

8.1 Spread the liquid-applied glazing material onto the bottom of the aluminum or glass pan to a thickness of approximately 6 mm (0.25 in.).

8.2 Press sealed edges of three of the IG edge specimens into the liquid-applied glazing material to a depth of approximately 1.6 mm (0.0625 in.).

8.3 Cover the container with aluminum foil and place in the oven for four weeks at  $70 \pm 2^\circ\text{C}$  ( $158^\circ\text{F}$ ).

8.4 Place the remaining two control specimens into another foil-covered container with no liquid-applied glazing material and place in the oven for four weeks at  $70 \pm 2^\circ\text{C}$  ( $158 \pm 3^\circ\text{F}$ ). One set of control specimens are sufficient for each IG edge sealant when more than one liquid-applied glazing material is being tested. Do not expose more than one IG edge sealant control or one type of liquid-applied glazing material in a single container.

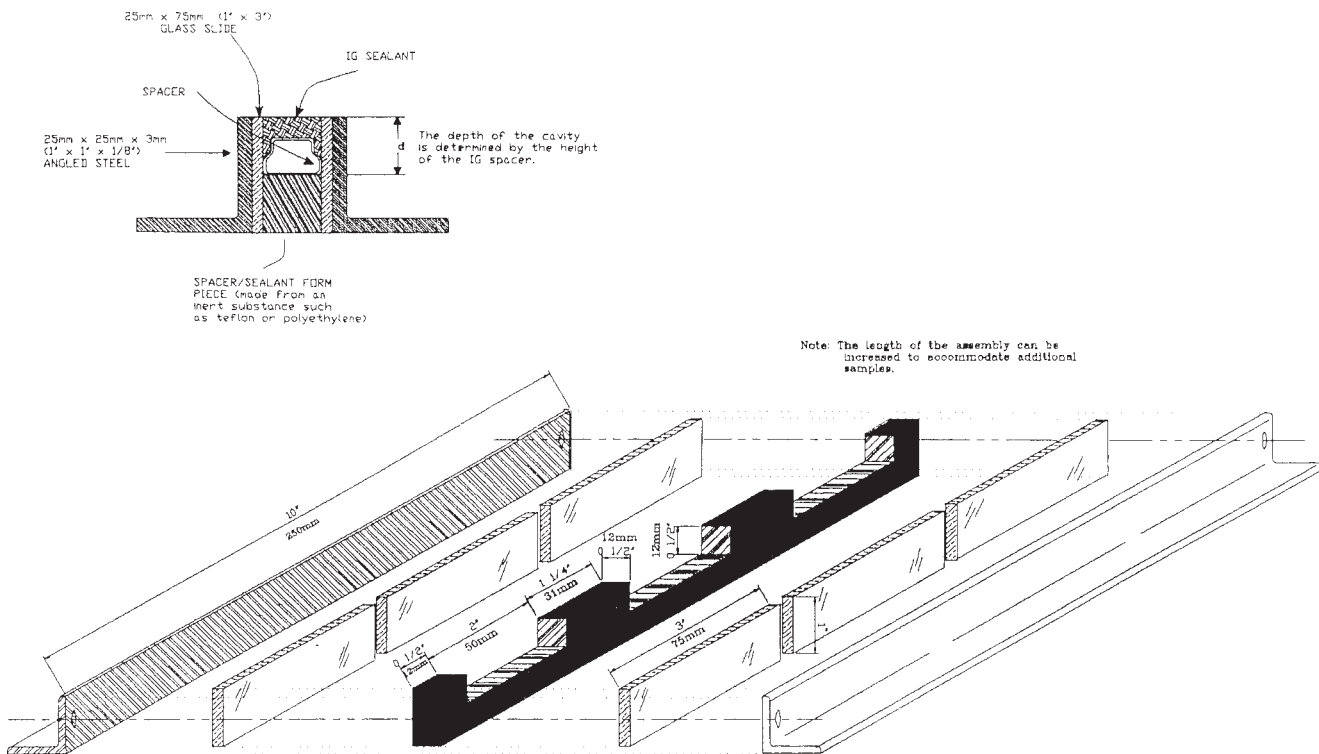


FIG. 1 Sample Assembly IG Compatibility Test

8.5 After four weeks in the oven, remove the containers from the oven and condition at  $22 \pm 2^\circ\text{C}$  ( $70 \pm 3^\circ\text{F}$ ) and 50 % relative humidity for a minimum of 1 h and a maximum of 24 h.

8.6 Following the conditioning, remove the aluminum foil from the top of the pan. Carefully trim the liquid-applied glazing material from the outside face of the three test specimens. Take care not to disturb the IG edge sealant.

8.7 Further condition the specimens for a minimum of 1 h but not more than 4 h at  $22 \pm 2^\circ\text{C}$  ( $70 \pm 3^\circ\text{F}$ ) and 50 % relatively humidity.

8.8 After completion of conditioning, observe the test specimens for softening, tackiness, adhesive failure, swelling, cracking, or any other observed difference in the IG edge sealant specimens from the control specimens.

8.9 After observation, pull each specimen on a tensile test machine at a rate of 5 mm (0.2 in.) per minute. Record the tensile load in newtons (pounds-force) and maximum elongation in millimetres (inches) at failure. Determine the percent of cohesive failure.

**9. Report**

9.1 Observations and test results are reported on the form shown in Fig. 2.

9.2 Report the following information:

9.2.1 Any variation from the test method (for instance, a change in curing or conditioning cycles).

9.2.2 The actual IG edge sealant minimum contact area, in  $\text{mm}^2(\text{in.}^2)$ .

9.2.3 Tensile force at failure, in N (lbf).

9.2.4 Calculate the tensile stress in pascals ( $\text{lbf}/\text{in}^2$ ) at failure.

9.2.5 Elongation in millimetres (inches) of movement. Actual elongation cannot be calculated due to variable sealant thickness in each specimen. Elongation for this test method is total sample movement prior to failure.

9.2.6 The mode of failure in percent cohesive/adhesive failure on each substrate.

9.2.7 Any observation from 8.8.

Start Date _____	Job Reference _____	Log No. _____
_____	_____	_____
Completion Date _____	Customer _____	Submitter _____
_____	_____	_____
Test Materials:		
I.G. Edge Sealant Name _____	Liquid-Applied Glazing Material Name _____	
_____		
I.G. Edge Sealant Type _____	Liquid-Applied Glazing Material Type Identifying Number _____	
Identifying Number _____		

Results						
Measurements				Observations		
Test Specimen Number	Tensile Force Newtons (lbf)	Contact Area $\text{mm}^2 (\text{in}^2)$	Tensile Strength Pascals (psi)	Elongation mm (inches)	Cohesive/Adhesive Failure Percent	Comment
1						
2						
3						
Avg						
4 (Control)						
5 (Control)						
Avg						

Description of variation from Procedure (if any) \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

COMPATIBILITY TEST FORM

**FIG. 2 Compatibility Test Form**

## 10. Precision and Bias

10.1 A statistical analysis made from the results obtained from a round-robin test of the tensile properties in which each of four laboratories tested two glazing sealants and two IG edge sealants in accordance with the prescribed test for the effect of the glazing sealant on the edge sealant resulted in the following:

10.1.1 The repeatability (within a given laboratory) interval for two materials tested by four laboratories is 34.63 N (7.79 lb). In future use of this test method, the difference between two test results obtained in the same laboratory on the same material will be expected to exceed 34.63 N only about 5 % of the time.

10.1.2 The reproducibility (between given laboratories) two materials tested by four laboratories is 103.9 N (23.4 lb). In future use of this test method, the difference between two test results obtained in a different laboratory on the same material will be expected to exceed 103.9 N only about 5 % of the time.

## 11. Keywords

11.1 bedding sealant; compatibility; glazing sealant; insulating glass; sealant.

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