Designation: C 1087 – 00 (Reapproved 2006)

Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems[1]

This standard is issued under the fixed designation C 1087; 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 (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers a laboratory screening procedure for determining the compatibility of liquid-applied structural sealant glazing sealants when in contact with accessories such as dry glazing gaskets, spacers, shims, and setting blocks after exposure to heat and ultraviolet light.

1.2 This test method includes the observation of three parameters as follows:

1.2.1 Changes in the color of the sealant,

1.2.2 Changes in the adhesion of the sealant to glass, and

1.2.3 Changes in the adhesion of the sealant to the accessory being tested.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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.*

NOTE 1—At this time, no comparable ISO standard exists.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

C 717 Terminology of Building Seals and Sealants

3. Terminology

3.1 *Definitions*—Definitions of the following terms used in this test method are listed in Terminology C 717: adhesive failure (adhesion loss), bead, bond breaker, cohesive failure, compatibility, gasket, glazing, sealant, setting blocks, shim, spacer, structural sealant, and structural sealant glazing.

4. Summary of Test Method

4.1 The test specimens are placed beneath ultraviolet lamps so that the radiation will hit the sealant directly on one specimen, and through the glass, on the other specimen (see Fig. 1).

4.2 The control specimens for this test method are prepared and tested identically to the test specimens except that the accessory is eliminated.

4.3 After the specimens are exposed, the test specimens are compared to the control specimens.

4.4 In the testing of the specimens, any color change in the sealant between the test specimen and the control is noted as are any changes in the adhesion of the sealant to either the glass or to the accessory. This test method requires the preparation of eight test specimens (four controls and four test specimens for each accessory being evaluated).

5. Significance and Use

5.1 In structural sealant glazing systems, the sealant functions as the structural adhesive and may also function as the primary weather seal. As the structural adhesive, the integrity of the adhesive bond is critical.

5.2 Changes in color and adhesion after exposure are two of the criteria that can be used to determine the compatibility of the system. Experience has shown that accessories that cause loss of adhesion or discoloration in this test method may also cause these occurrences in actual use.

6. Apparatus and Materials

6.1 *Glass Panels*, clear float glass, approximately 76.2 by 50.8 by 6.4 mm (3 by 2 by ¼ in.). Eight panels are required for each material being tested.

6.2 *Bond Breaker Tape*, 25.4 by 76.2-mm (1 by 3-in.) piece for each panel. The bond breaker tape must be compatible with the sealants being tested.

6.3 *Thermometer*, for example, 28.9 to 100°C (20 to 212°F).

6.4 *Ultraviolet (UV) lamps*, UVA-340 lamps.

[1] This test method is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.20 on General Test Methods.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

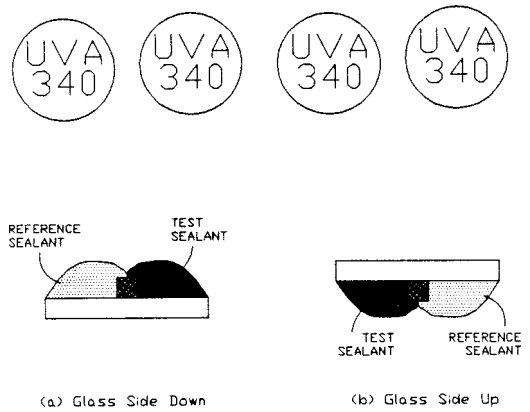

FIG. 1 Orientation of Test Specimen Under Lamps

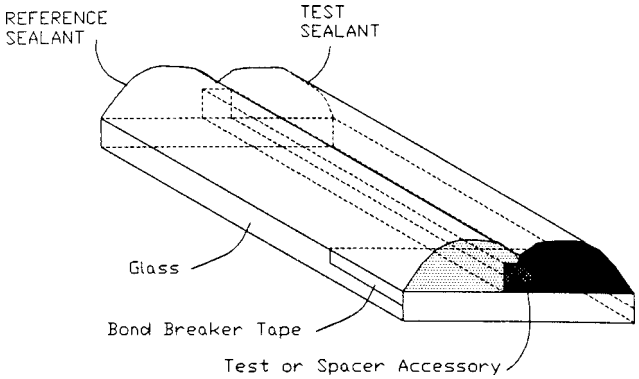

FIG. 3 View of Test Specimen

6.5 *UV Exposure Apparatus*—A suitable UV exposure apparatus will consist of four UVA-340 lamps in a symmetrical array situated 254 mm (12 in.) from the surface of the test specimens (see Fig. 2). The apparatus shall be capable of maintaining a temperature at the test specimens of 48 ± 2°C (118 ± 3.6°F). Infrared lamps or other sources of heat may be used to maintain the required temperature.

6.6 *Cleaning Solvent*—Any solvent capable of cleaning the glass is acceptable (for example, 50/50 mix of isopropyl alcohol and distilled water).

6.7 *Test Sealant*, an appropriate amount of the sealant to be used in the system.

6.8 *Reference Sealant*—A light or translucent sealant of the same composition as the test sealant. If none is available, contact the sealant supplier for recommendations on a suitable alternative.

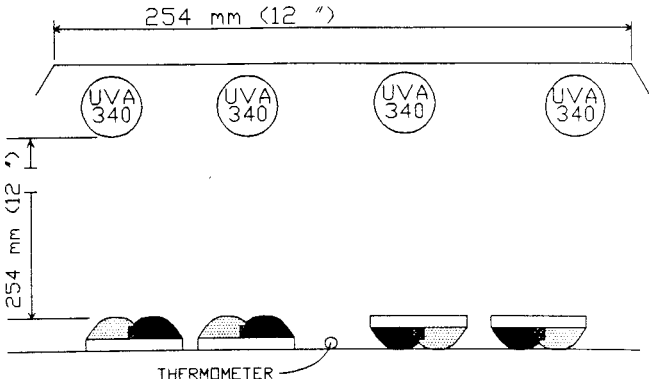

FIG. 2 UV Exposure Apparatus

7. Preparation of Test Specimens

7.1 Standard conditions of temperature and relative humidity used during the preparation are defined as 23 ± 2°C (73.4± 3.6°F) and 50 ± 10 % relative humidity.

7.2 Prior to use, clean the glass thoroughly with the cleaning solvent and dry with a clean rag before the solvent is allowed to evaporate.

7.3 Place a piece of compatible bond breaker tape to cover 1 in. of the top surface of the glass at one end (see Fig. 3).

7.4 Prepare a total of eight samples (four controls without accessory and four test specimens with accessory).[3] Cut a piece of accessory material approximately 6.4 by 51 by 6.4 mm (¼ by 2 by ¼ in.) and place it on the center of the piece of glass as shown in Fig. 3. Both the reference sealant and the test sealant are tested in contact with the accessory.

7.5 Apply a bead of the test sealant on one side of the accessory and a bead of translucent or light color reference sealant along the other side of the accessory. Tool the sealant so that good contact with the glass occurs and the sealant is on top of the accessory. The thickness of the sealant on top of the accessory shall be approximately 3.2 mm (⅛ in.).

7.6 The control specimens for this test are prepared and tested identically to the test specimens except that the accessory is eliminated.

8. Conditioning

8.1 Condition all the specimens for one week at standard conditions. After conditioning for seven days at standard conditions, place two test specimens (with accessory) and two control specimens (without accessory) with glass side down, and place two test specimens (with accessory) and two control specimens (without accessory) with glass side up, under the UV lamps, in accordance with Fig. 1 (*a*) and 1 (*b*) for 21 days.

8.2 In order to provide an appropriate intensity of UV radiation, replace the UVA-340 lamps after eight weeks of use. In order to provide more uniform UV radiation, replace one lamp every two weeks, in accordance with the rotation scheme shown in Fig. 4. *(Discard lamp No. 3, move lamp No. 2 to lamp*

[3] Control specimens need not be duplicated if more than one accessory is being evaluated at one time.

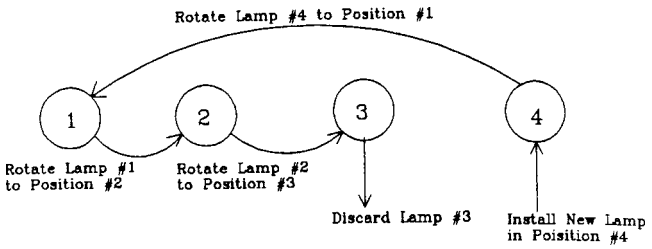

FIG. 4 UV Lamp Rotation

position No. 3, move lamp No. 1 to lamp position No. 2, move lamp No. 4 to lamp position No. 1 then install the new lamp in lamp position No. 4.)

8.3 The test chamber shall maintain an air temperature of 48 ± 2°C (118 ± 3.6°F) when measured at the surface of the test specimens (see Fig. 2). Check test specimen surface temperatures at one-week intervals.

9. Procedure

9.1 Record orientation of sample under ultraviolet lights (Fig. 1).

9.2 At the end of the conditioning period described in Section 6, remove the specimens from the exposure apparatus and allow the warm samples to reach room temperature. (Cool for 4 h.)

9.3 Grasp the end of the sealant that is above the bond breaker tape. Pull the sample on a 90° angle to the glass surface exerting force on the sealant/glass interface.

9.3.1 Record the mode of failure in percent cohesive failure, *C*, for both the test and reference sealant as follows:

$$C = 100 - \% AL \quad (1)$$

where *AL* is the adhesion loss.

9.4 Check the adhesion of the sealants to the accessory. Pull the sealant on a 90° angle to the accessory surface exerting force on the sealant accessory interface.

9.4.1 Record the mode of failure in percent cohesive failure (*C*).

9.5 Observe the test and reference sealant.

9.5.1 Using Table 1 as a guide, record and describe any color change in the test and reference sealants.

9.5.2 Record any other noticeable changes.

9.6 Record data on report form (Fig. 5).

10. Precision and Bias [4]

10.1 *Precision*—Round-robin testing was performed by three laboratories using two different sealants and four different accessory gaskets. Statistical analysis was performed by combining all four accessory gaskets together for each set of tests, resulting in eight" materials trialed," instead of two for each laboratory.

10.2 *Repeatability, I(r)*—In future use of this test method, the difference between two test results obtained in the same laboratory on the same material (the repeatability) will be expected to exceed *I(r)* only about 5 % of the time. Results for *I(r)* are given in Table 2.

10.3 *Reproducibility, I(R)*—In future use of this test method, the difference between two test results obtained in different laboratories on the same material (the reproducibility) will be expected to exceed *I(R)* only about 5 % of the time. Results for *I(R)* are given in Table 2.

10.4 *Bias*—Since there is no accepted reference material suitable for determining the bias for the procedures in this test method for measuring the color change and adhesion properties, no statement on bias is being made.

TABLE 1 ASTM Test Method C 1087 Stain and Color Change Descriptions

No.	Color Change	Change Description
0	None	No change from the control.
1	Very, very slight	Change so slight that you are not sure it is real.
2	Very slight	Faint color—generally yellow.
3	Slight	Light color—commonly yellow, orange, pink, or brown.
4	Severe	Distinct color—possibly red or purple in addition to yellow, orange, pink, or brown.
5	Very severe	Dark color—may be black as well as other colors mentioned.

Note 1—The colors listed in Table 1 are only the most commonly occurring colors. Any change of appearance from the controls should be reported.

11. Keywords

11.1 color change; compatibility; staining; structural glazing; structural sealant; ultra violet exposure

[4] Supporting data are available from ASTM Headquarters. Request RR:C24-1020.

Start Date_____ Job Reference_____ Log No._____

Completion Date _____ Customer _____ Submitter _____

Test Materials ID		Control Specimens Without an Accessory				Test Specimens With an Accessory			
Reference Sealant: Test Sealant: Accessory:		Figure 1(a) Orientation Glass Side Down		Figure 1(b) Orientation Glass Side Up		Figure 1(a) Orientation Glass Side Down		Figure 1(b) Orientation Glass Side Up	
Specimen Numbers		1	2	3	4	5	6	7	8
Color Change	Reference Sealant								
	Test Sealant								
% of Cohesive Failure of Sealant on Glass Substrate	Reference Sealant	%CF	%CF	%CF	%CF	%CF	%CF	%CF	%CF
	Test Sealant	%CF	%CF	%CF	%CF	%CF	%CF	%CF	%CF
% of Cohesive Failure of Sealant on Accessory	Reference Sealant					%CF	%CF	%CF	%CF
	Test Sealant					%CF	%CF	%CF	%CF

FIG. 5 ASTM C1087 Compatibility Test Report Form

TABLE 2 Precision Summary

Specific Evaluation	*I(r)*	I(R)
Color change, glass side up	0.803	2.166
Color change, glass side down	0.782	1.826
% cohesive failure of sealant to glass, glass side up	21.88 %	39.08 %
% cohesive failure of sealant to glass, glass side down	19.00 %	21.75 %
% cohesive failure of sealant to accessory, glass side up	4.75 %	28.08 %
% cohesive failure of sealant to accessory, glass side down	17.00 %	36.46 %