



Designation: C1249 – 18 (Reapproved 2023)

Standard Guide for Secondary Seal for Sealed Insulating Glass Units for Structural Sealant Glazing Applications¹

This standard is issued under the fixed designation C1249; 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 guide covers design and fabrication considerations for the edge seal of conventionally sealed insulating glass units, herein referred to as IG units. The IG units described are used in structural silicone sealant glazing systems, herein referred to as SSG systems. SSG systems typically are either two or four sided, glazed with a structural sealant. Other conditions such as one, three, five, six sided may be used.

1.2 This guide does not cover the IG units of other than conventional edge seal design (Fig. 1); however, the information contained herein may be of benefit to the designers of such IG units.

1.3 In an SSG system, IG units are retained to a metal framing system by a structural seal (Fig. 2). The size and shape of that seal, as well as numerous other SSG system design considerations, are not addressed in this guide.

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

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 The committee with jurisdiction for this standard is not aware of any comparable standard guides published by other organizations.

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

C639 Test Method for Rheological (Flow) Properties of Elastomeric Sealants

C679 Test Method for Tack-Free Time of Elastomeric Sealants

C717 Terminology of Building Seals and Sealants

C794 Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants

C1087 Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems

C1135 Test Method for Determining Tensile Adhesion Properties of Structural Sealants

C1184 Specification for Structural Silicone Sealants

C1369 Specification for Secondary Edge Sealants for Structurally Glazed Insulating Glass Units

E631 Terminology of Building Constructions

E773 Test Method for Accelerated Weathering of Sealed Insulating Glass Units (Withdrawn 2010)³

E2188 Test Method for Insulating Glass Unit Performance

E2189 Test Method for Testing Resistance to Fogging in Insulating Glass Units

E2190 Specification for Insulating Glass Unit Performance and Evaluation

2.2 IGMA Standards:⁴

TR-1000-75(91) Voluntary Test Methods for Chemical Effects of Glazing Compounds on Elastomeric Edge Seals

¹ This guide is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.10 on Specifications, Guides and Practices.

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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.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from Insulating Glass Manufacturers Alliance (IGMA), 1500 Bank St., Ottawa, ON K1H 1B8, Canada, <https://www.igmaonline.org/>.

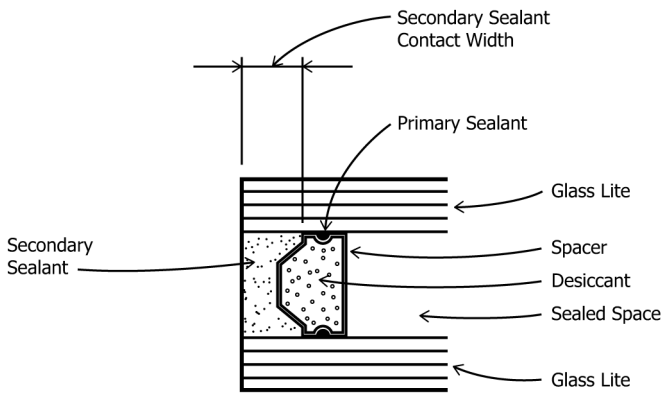


FIG. 1 Sealed IG Edge Seal: Basic Components

TM-4000 Insulating Glass Manufacturing Quality Procedures

2.3 NFRC Document:⁵

NFRC 706 Requirements for Participating Insulating Glass Certification Programs

3. Terminology

3.1 Definitions:

3.1.1 Refer to Terminology C717 for definitions of the following terms used in this guide: adhesive failure, bead, cohesive failure, compatibility, cure, elongation, gasket, glazing, joint, lite, modulus, non-sag sealant, seal, sealant, sealant backing, setting block, shelf-life, silicone sealant, spacer, structural sealant, substrate, tooling, and working life. Refer to Terminology E631 for the definition of sealed insulating glass as used in this guide.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *desiccant*—a hygroscopic material that adsorbs water or may adsorb solvent vapors, or both (see Fig. 1).

3.2.1.1 *Discussion*—The desiccant maintains a low relative humidity in sealed insulating glass.

3.2.2 *primary seal*—A joint seal of which the sealant resists moisture vapor permeation into the desiccated space of sealed insulating glass (see Fig. 1).

3.2.2.1 *Discussion*—It also resists inert gas permeation (for example, argon) from the IG unit sealed space if the intent is to use an inert gas.

3.2.3 *secondary seal*—a joint seal of which the sealant structurally unites the two glass lites and spacer of sealed insulating glass (see Fig. 1).

3.2.4 *spacer*—a fabricated shape that creates an appropriate distance between two lites of glass in sealed insulating glass (see Fig. 1).

3.2.4.1 *Discussion*—As a component of the edge seal system, the spacer also resists vapor migration into sealed insulating glass and provides a container for a desiccant.

3.2.5 *structural seal*—a joint seal of which the sealant structurally adheres an IG unit to a metal framing system (see Fig. 2).

3.2.5.1 *Discussion*—The structural seal transfers applied loads to the framing system as well as accommodates differential movements between the IG unit and the framing system.

3.3 Symbols:

3.3.1 A = area, m^2 ($in.^2$).

3.3.2 C_s = sealant contact width, shear, mm ($in.$).

3.3.3 C_t = sealant contact width, tension, mm ($in.$).

3.3.4 D = design factor, dimensionless.

3.3.5 F_s = allowable shear stress, Pa (psi).

3.3.6 F_t = allowable tensile stress, Pa (psi).

3.3.7 F_y = yield stress, Pa (psi).

3.3.8 H = height, m (ft).

3.3.9 L = perimeter length, m (ft).

3.3.10 M = mass per unit area, N/m^2 (lb/ft^2).

3.3.11 P = applied load, Pa (lb/ft^2).

3.3.12 W = width, m (ft).

4. Significance and Use

4.1 It should be realized that the design of an IG unit edge seal for use in SSG systems is a collaborative effort of at least the IG unit fabricator, sealant manufacturer, and design professional, among others.

4.2 This guide provides information on silicone sealants that are used for the secondary seal of IG units that are glazed into SSG systems.

4.3 Information is also provided on the other major components of the IG unit edge seal, compatibility of components, durability, and quality assurance (QA).

5. Insulating Glass Unit

5.1 *Insulating Glass Unit Components*—The edge seal of an SSG system IG unit consists of the two lites of glass, spacer, desiccant, primary sealant, and secondary sealant (Fig. 1) (1).⁶ This type of IG unit is referred to commonly as a dual-seal unit in that it has separate primary and secondary seals. A single-seal IG unit is inappropriate at this time for SSG systems and should not be used. The following sections describe the components of a dual-seal IG unit briefly.

5.2 Glass and Architectural Coatings:

5.2.1 *Glass*—All types of glass have been used in the fabrication of IG units, including monolithic, laminated, tempered, heat-strengthened, tinted, heat-absorbing, light reducing, patterned, and wired. Almost all glass is produced by the float manufacturing process, in which the glass ribbon that emerges from the furnace is floated on a bath of molten tin, allowing gravity to produce essentially flat parallel surfaces.

5.2.2 *Architectural Coatings*—These coatings, which are applied to the surface of the glass prior to IG unit fabrication, are generally grouped into one of two categories: low-emissivity or reflective. They are both metallic or metallic

⁵ Available from National Fenestration Rating Council (NFRC), 6305 Ivy Ln., Suite 140, Greenbelt, MD 20770, <https://www.nfrccommunity.org/page/ProgramDocs>.

⁶ The boldface numbers in parentheses refer to the list of references at the end of this guide.