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Vacuum Insulating Glass (VIG) ANSI Interpretation and SGCC Frequently Asked Questions (FAQ)

VIG is a developing technology and these guidelines will be subject to future updates and revisions.

The ANSI Z97.1 committee has issued two TI's (Technical Interpretation(s)) on VIG (Vacuum Insulating Glass) testing. Please visit <https://www.ansiz97.com/ansi-z971-2015-r2020-interpretationmodification-requests> (TI-17.0223.001 and TI-16.06.001) for these and other ANSI Z97.1 Technical Interpretations (also attached as **Appendix A**). See below FAQs SGCC has assembled.

1. Q- Does SGCC certify vacuum insulating glass (VIG), and how is it tested?
 A- SGCC provides certification to ANSI Z97.1-2015. There has been some question as to how vacuum insulating glass (VIG) would be tested. On July 14th, 2016 and February 23, 2017, the ANSI committee rendered the Technical Interpretations (TI 2016.0624.001 VIG and TI 2017.0223.001). In summary, a VIG must be tested in a "final product" condition as a unit after the complete VIG process. Special instruction is provided for handling what is referred to as "composite perimeter fragments". With passing test results in accordance with ANSI Z97.1-2015 and these TI's, SGCC would offer certification.
2. Q- How long is the testing?
 A- VIG testing for SGCC certification should take no longer than normal (tempered, laminated) testing. If advanced arrangements are made with the test lab, we have seen testing complete in a matter of days from receipt at the lab.
3. Q- What are the requirements for samples?
 A- See ANSI TI 2016.0624.001 and TI 2017.0223.001 VIG which requires testing in a "final product" condition. Other sample requirements (size and quantity) are the same as normal tempered and laminated glass. Each nominal thickness combination should be tested and certified separately and this will cover any nominal thickness combinations within the certified products. For example testing of 4+4mm and 5+5mm would certify any combination of 4 or 5 mm. Vacuum space width shall not be a factor in certification other than to determine overall nominal thickness to be certified.
4. Q- What is the cost?
 A- The selected lab would need to be consulted for testing fees, but we would expect the fee to be at or near normal tempered or laminated glass testing. Certification fees would be the same as the SGCC published fees.
5. Q- Is low-E required in the test samples?
 A- Application of SGCC guidelines would be the same as for non-VIG. See SGCC guideline "Certification of Tempered Coated Glass" .

6. Q- How would VIG be evaluated after impact?

A- Laminated glass in a VIG is evaluated as ANSI Type 1. Tempered glass in a VIG is evaluated as ANSI Type 2. All ANSI protocols are applicable (See ANSI TI 2016.0624.001 and TI 2017.0223.001)

7. Q- How is VIG Tempered and Laminated Certified

A- VIG Tempered (VIGT), VIG Laminated (VIGL) or VIG Tempered Laminated (VITL) are each tested and certified separately. One will not certify the other.

8. Q- What is the testing procedure for a VIG when only one lite/ply is broken during impact?

A- Similarly to Tempered monolithic glass, if no breakage has occurred following impact testing a center punch test is to be performed on the glass specimen. Therefore, if only one ply were to break upon impact during testing, the ply that did not break would then be center punched and results would be interpreted in accordance with ANSI Z97.1-2015 Section 2.

9. Q- What requirements does SGCC need on the label for VIG certified products?

A- SGCC Labeling Requirements, found in the Certified Products Directory, can be used for VIG specimens as well. The permanent Label must contain the correct SGCC® number, ANSI Z97.1-2015 and/or 16 CFR 1201, the nominal thickness, the letter U or L indicating Certified size and the ANSI impact class (A or B). Note VIG is not applicable to the Canadian standard (CAN/CGSB 12.1).

SGCC will update information as it becomes available. If you have any additional questions or input at this time, please feel free to contact SGCC (SGCC@amscert.com).

Appendix A

*ANSI Z97.1 committee Technical Interpretation(s) (TI) on VIG
(TI-17.0223.001 and TI-16.06.001)*

ASC Z97 ANSI ACCREDITED STANDARDS COMMITTEE

Safety Requirements for Architectural Glazing Materials

Chairman: K. Olah, e-mail: kbolah@icloud.com | Secretary: J.C. Schimmelpenningh, e-mail: JCSCHI@eastman.com

Technical Interpretation TI-2016.0624.001

Document: **ANSI Z97.1-2015**
Referenced Section(s): Section 3 Definitions

Date: January 13, 2016

Section 5.1.4 Interpretation of Results

This section describes the impact test Specimen Evaluation Criteria for the different types of safety glazings (laminated glazing, tempered glass, organic coated glazing and plastic glazing).

Interpretation Request: (What needs clarification/modification/removal?)

There is no reference to Vacuum Insulating Glass (VIG) in ANSI Z97.1-2015. It is unclear how to test safety glazing used in VIG products to this standard.

Request Rationale:

For safety glazing used in an insulating glass unit (IGU), each lite of safety glazing is tested and labelled independently to ANSI Z97.1-2015 prior to assembly into the IGU. Due to the complex manufacturing process of VIGs, there is a chance the safety glazing lites can be affected (altered) during the manufacturing (vacuum) process. In order to verify that the safety characteristics of the safety glazing lites have not been altered, each safety glazing lite needs to undergo the VIG process independently prior to testing to ANSI Z97.1-2015. For example, a tempered lite that is to be installed in a VIG unit would undergo the VIG manufacturing process independent from being installed in the VIG, and then the tempered lite would be tested to ANSI Z97.1-2015. The purpose would be to verify the VIG manufacturing process does not "de-temper" the glass.

Suggested Revised Language:

Section 3 Definitions – the following definition and note need to be added to this section:

Vacuum Insulating Glass (VIG): A manufactured assembly of two lites of glass, hermetically sealed together around the edges, encapsulating a narrow highly evacuated space. NOTE: When testing VIG units to this standard, each lite of safety glazing must undergo the VIG manufacturing process independently and tested as a single lite."

Interpretation:

Definition of VIG would need to be proposed with new revision and cannot be added to the standard at this time. The interpretation contains a modified version of the proposed definition for descriptive purposes of the glazing unit.

Vacuum Insulating Glass (VIG) is a manufactured assembly of at least two lites of glass separated by pillars, sealed at the edges with the gap between the glass lites under vacuum. VIG units shall be tested in accordance with section 5.1. Specimens shall be tested as a final product. Specimens shall be impacted in accordance with the protocol for asymmetrical glazing.

Laminated glass in a VIG is evaluated as Type 1. Tempered glass in a VIG is evaluated as Type 2. For Type 2, the average of the thinnest measurement of each of the ten geometrically largest particles shall be used for allowable mass for the pass/fail criteria.

Secretariat – Glazing Industry Standards Council, Topeka Kansas

Rationale:

VIG is a new technology and should be considered as a single unit much the same as a laminated glass as it is permanently fused at the edges in order to maintain the "vacuum". Lites have been noted as de-tempering with the additional process of creating a VIG and therefore the final unit needs to be tested. The requirement for all lites to break ensures the entire unit can be evaluated as safety glass. The glass mass requirement takes into account the thinnest glass of the unit and requires the largest pieces to be examined regardless of the lite they come from. This interpretation does not apply to common insulating glass units.

Keywords: Compliance, Impact, Rating, Vacuum Insulating Units, label

Date of rendered interpretation: July 14, 2016

ASC Z97 ANSI ACCREDITED STANDARDS COMMITTEE

Safety Requirements for Architectural Glazing Materials

Acting Chairman: John. Kent, e-mail: john@amscert.com | Secretary: J.C. Schimmelpenningh, e-mail: jcschi@eastman.com

TECHNICAL INTERPRETATION

TI-2017.0223.001

Document: **ANSI Z97.1-2015**

Date: February 23, 2017

Referenced Section(s): Section 3 Definitions

Section 5.1.3. (1) and (4) Impact Procedure

ANSI Z97.1 committee TI-2016.0624.001 established a need for testing VIG as a "final product". Upon testing of final product VIG, testing laboratories are seeing results that there is uncertainty as how to interpret.

Interpretation Request: (What needs clarification/modification/removal?)

Clarification is needed to ensure consistent reporting of results from various laboratories

Suggested Revised Language:

5.1.3 Impact Procedure

(1) "Place and center ... (20Nm+ 5Nm)."

Note: For VIG, a border of 1-inch shall be marked around the entire perimeter/edge of the test specimen (see section 5.2.4). Marking this area with a dark marker is suggested.

(4) "Classify the test specimen ... released and fall free."

Note: When testing VIG and composite perimeter fragments are observed, first a tenacious effort shall be made to "break free" any particles suspected to be in the "10 largest" search. If this is not possible, then fragments in the perimeter area shall be physically geometrically measured for area and that measured area, by calculation, added to the selected 10 largest crack free particles to determine if the test specimen complied or did not comply. As an alternate to physical area measurement, some form of digital photography and/or calculation method is acceptable.

Interpretation:

5.1.3 Impact Procedure

(1) Place and center ... (20Nm+ 5Nm).

Note: For VIG, a border of 1-inch shall be marked around the entire perimeter/edge of the test specimen (see section 5.2.4). Marking this area with a dark marker is suggested.

(4) Classify the test specimen ... released and fall free.

Note: When testing VIG and composite perimeter fragments are observed, first an effort shall be made to separate any crack free particles suspected to be in the "10 largest" search. If this is not possible, then crack free fragments in the perimeter area shall be physically geometrically measured for area and that measured area, by calculation, added to the selected 10 largest crack free particles to determine if the test specimen complied or did not comply. As an alternate to physical area measurement, some form of digital photography and/or calculation method is acceptable.

Rationale:

Per TI-2016.0624.001, VIG units shall be tested as final product units. The permanently bonded nature of the unit causes the break pattern to be somewhat hybrid in nature between tempered glass and laminates. The edges of the systems tend to break as composite perimeter edge fragments, while the rest of the glass falls away in particles that are rated in the same manner as tempered. It is the consensus of the steering committee that the edge sections need to be evaluated for particle size after breakage. Glass shards that are not separated by a break pattern which are in the one (1) inch marked border area are the concern from a cutting and laceration and test evaluation standpoint. The language above is deemed to address the characterization of the composite perimeter edge fragments and provide a method of evaluation after impact for VIG evaluation. This interpretation applies to VIG units only.

Notes are adopted for clarification and to promote consistency in laboratory evaluation.

Keywords: Compliance, Edge Clamping, Impact, Rating, Vacuum Insulating Units

Date of rendered interpretation: February 23, 2017