



safety glazing certification council

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Guidance for the SGCC Certification of Laminated Glass

(Approved 09/13/2023)

Summary

The concept for the SGCC Certification of laminated glass is that initial testing must be performed on two sets of laminated glass units comprised of 1.) thinnest nominal overall thickness constructed from two lites of the thinnest nominal glass thickness to be used in a laminated glass construction for which certification is desired and 2.) thickest nominal overall thickness constructed from two lites of the thickest nominal glass thickness to be used in a laminated glass construction for which certification is desired. Certification of a laminate with a nominal overall thickness of 16 mm or greater (containing two lites of minimum 8 mm glass) will automatically qualify laminates constructed with thicker glass. Glass thickness is defined by ASTM C1036. The glass Kind for each set must be the same based on the glass Kind for which certification is required. The interlayer in each of those sets shall be the thinnest for which certification is desired and shall be one of the interlayers listed on the SGCC Approved Interlayer list. Ongoing certification shall be conducted through testing of the thinnest nominal laminate thickness certified from that set with the same glass Kind and the same thickness and type of interlayer used in the original certification.

Despite thickness or generic class of interlayer, a product can only be certified to the performance requirements that it will consistently meet. Therefore, as an example, product AAAA (6mm LTG (b) (0.38) (CI) (B)) which will only pass Category I of CPSC and impact class B of ANSI, will need to be certified separately from product BBBB (6mm LTG (b) (0.76) (CII)(A)) which will pass Category II of CPSC and impact class A of ANSI. A laminate meeting the higher impact class (Cat II or Class A) automatically qualifies to meet the requirements of the lower impact class (Cat I or Class B) without further testing. But not vice versa, i.e if you test/certify initially to Impact class B of ANSI, you will need to certify products from impact class A of ANSI separately.

Definitions

Inserts: Layers of sheeting or materials, continuous or non-continuous, within an encapsulated system. ***See diagram below for further guidance.***

Interlayer: A layer or multiple layers of material acting as an adhesive between lites of glass and/or plastic which add(s) additional performance to the finished product, for example, penetration resistance, glass or plastic shard retention, solar control, acoustical insulation, color, design, or combinations thereof.

Laminate: an assembly consisting of two or more lites of glass and/or plastic that are bonded together by interlayer material.

Lite: a panel or sheet of glass or a panel or sheet of laminated glass.

Ply: an individual layer of glass or plastic in a laminate.

Kind: A classification of flat glass based on strengthening. Kinds are: Annealed (AN), Heat-strengthened (HS), Fully tempered (FT) or chemically strengthened (CS).

SGCC List of Accepted Interlayers

SGCC shall maintain a list of accepted interlayers per generic code (please see the SGCC website <https://www.sgcc.org/laminated-glass>). Testing of an interlayer covers all thicker and colored interlayers of the same type. Impact certification of laminated glass containing one brand of accepted interlayer will allow use of other SGCC accepted interlayer brands within the same generic code.

See Appendix A for *How to get on the SGCC Accepted Interlayer List.*

Generic Interlayer/Film Categories

Table 1: Table of Accepted Interlayer Generic Codes.

Generic Code	Description
(b)	Polyvinyl Butyral (PVB)
(ip)	Ionoplast
(lc)	Liquid Resin-Multi Component
(lu)	Liquid Resin – UV Cure
(p)	Polyethylene Terephthalate (PET)
(f)	Fluorinated Ethylene Propylene
(u)	Polyurethane (PU/TPU)
(el)	Epoxy-Liquid Crystal Polymer
(ev)	Ethylene-vinyl Acetate (EVA)
(su)	Solid Resin UV Cure

Nominal Thickness

Nominal laminate thickness is not an exact or minimum thickness. It is a summation of the nominal thicknesses of the individual glass lites in the laminate; therefore, deviation around these values is expected. Using metric glass thicknesses, the convention of “glass 1 + glass 2 (mm), Interlayer thickness mm) and SGCC interlayer designation” gives tremendous flexibility and allows for rapid understanding and summation of overall thickness, thus leading to quick understanding of approvals based on thicknesses of components. Some examples follow in Table 2.

Table 2: Examples of laminated glass abbreviated nomenclature.

Detailed Configuration	Summary Nomenclature mm
3 mm (1/8 inch) glass 0.76 mm (0.030 inch) PVB interlayer 3 mm (1/8 inch) glass	3,3-0.76b
6 mm (1/4 inch) glass 1.52 mm (0.060 inch) TPU interlayer 6 mm (1/4 inch) glass	6,6-1.52u
4 mm (5/32 inch) glass 1.52 mm (0.060 inch) IP interlayer 6 mm (1/4 inch) glass	4,6-1.52ip

Testing of 16 mm (5/8 in.) laminated glass (i.e., 8,8-0.76b) or thicker covers all thicker laminated glasses with the same generic interlayer type. This guideline is in recognition that 1) such products are typically used for applications which require strength characteristics beyond normal human impact safety glazing and 2) SGCC testing has historically shown consistent compliance of such products.

Table 3: Typical Interlayer Nominal Thickness

Metric (mm)	Traditional (in)
0.38	0.015
0.51	0.020
0.64	0.025
0.76	0.030
0.89	0.035
1.14	0.045
1.27	0.050
1.52	0.060
1.905	0.075
2.286	0.090

Note: (Formerly L.6) Thickness of the interlayer shall be measured by the SGCC® standard method.

Testing of the thinnest interlayer of a type covers all thicker interlayers in laminates for that Class (Cat II or Class A; Cat I or Class B). This guideline is in recognition that 1) increase in interlayer thickness increases impact capability and 2) SGCC testing has historically shown consistent compliance of such products.

When two sets of laminated glass are tested, all nominal laminate thicknesses between and inclusive of the nominal thicknesses tested will be included in the certification. These laminates may have symmetrical or asymmetrical construction provided the overall nominal

laminated glass thickness is not below or above those configurations used to gain certification. The nominal thickness of the individual glass lites cannot be less than the nominal thickness of the glass plies used in initial testing of the thinnest nominal laminated glass thickness and cannot be greater than the nominal thickness of the glass plies used in initial testing of the thickest nominal laminated glass thickness unless units with 2 lites of 8 mm or greater have been used in the initial testing. For example: initial testing with 4mm | interlayer | 4mm does not certify 3mm | interlayer | 5 mm, AND initial testing with 3mm | interlayer | 5mm does not certify 4mm | interlayer | 4mm

The interlayer must be of the same type and the minimum thickness for which certification was achieved. For example, two sets of laminates are submitted and passed with 4,4-0.76b and 8,8-0.76b, laminated glass thicknesses with any combination of 4,5,6, and 8 mm glasses and a minimum thickness of 0.76 mm PVB are covered under the current certification. And, since the example above is certified for a nominal laminated glass thickness of 16 mm, a laminate with any glass lite at or thicker than 8 mm is also certified.

Initial Testing

Initial testing for certification of laminated glass at each fabrication facility will require two laminated glass sets to be submitted with the same glass Kind, and the same type and thickness of interlayer. The first set of laminates shall be constructed with the thinnest nominal glass thickness and the thinnest interlayer of each generic category of interlayer for which certification is desired (i.e., 2.7 mm glass | 0.76 mm interlayer | 2.7 mm glass). The second set of laminates shall be constructed with the thickest nominal glass thickness and the thinnest interlayer of each generic category of interlayer for which certification is desired (i.e., 8 mm glass | 0.76 mm interlayer | 8 mm glass). This is graphically described in Figure 1. A single set of laminates may be submitted for initial testing. Unless these laminates are made of 8 mm or greater lites of glass, their certification would be limited to that single nominal laminated glass thickness as tested and must use the same nominal glass thickness as what was tested. If testing was conducted with glass lites 8 mm or greater, certification would cover the laminate construction as tested plus any laminate having glass thicker than what was tested, but not anything thinner.

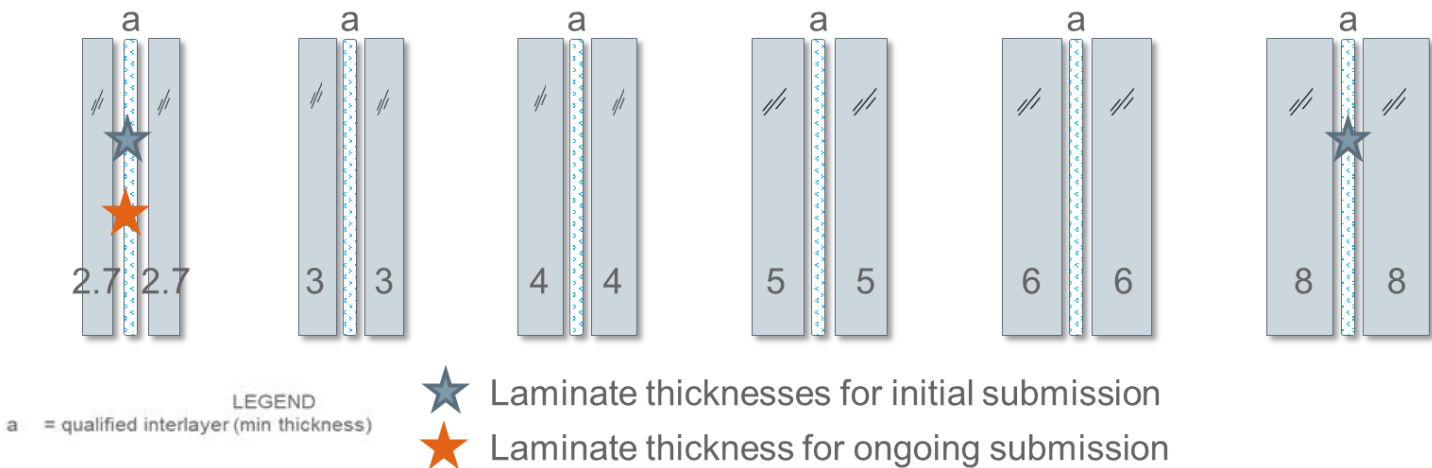


Figure 1 – Example of initial and ongoing laminated glass thickness submissions for certification (symmetrical glasses)

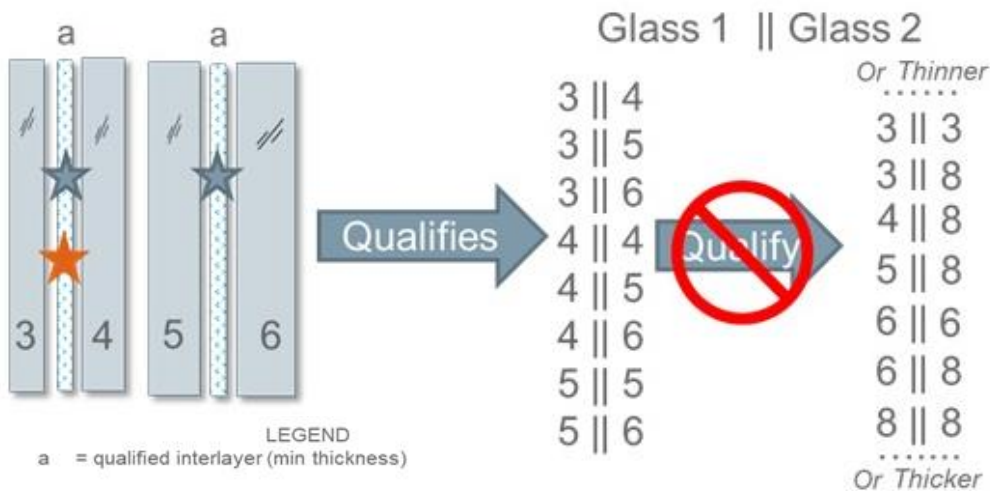


Figure 2 – Example of initial and ongoing laminated glass thickness submission with asymmetrical glasses

A product can only be certified to the performance requirements it will consistently meet, for example, an 0.38 mm (0.015 inch) interlayer meeting ANSI Class B will need to be certified separately from 0.76 mm (0.030 inch) and greater interlayer meeting ANSI Class A for each nominal thickness and each generic category of interlayer for which certification is desired.

Ongoing Certification

Ongoing certification testing shall be performed with the thinnest nominal laminate thickness certified from that set with the same glass Kind and the same thickness and type of interlayer used in the original certification.

Regular audit sample selection procedures shall apply for laminated glass. For “Participant” selected samples, ongoing testing shall be with the thinnest interlayer and the thinnest product certified for each generic interlayer category. For “Auditor” selected samples, ongoing testing shall be with any thickness product of the same glass Kind and generic interlayer category, at the discretion of the SGCC auditor.

Glass Modifications to Existing Certified Laminates

Glass Kind: Laminated glass is also certified by its base glass Kind (strength) or heat treatment (AN= annealed, HS= heat-strengthened, FT= tempered, CS= chemical strengthened). Certification with annealed (AN) glass will cover heat-strengthened (HS), fully tempered (FT), and chemical strengthened (CS). Testing to HS will only cover HS and FT. Testing to FT will only cover FT. Testing to CS will only cover CS. Figure 3 and Table 5 are provided to help visualize and quickly determine if a change in glass Kind requires testing.

Table 4 – Reference table for testing requirements for a change in glass Kind.

From	To	Acceptance
AN	HS	Automatic
AN	FT	Automatic
AN	CS	Automatic
HS	AN	TEST
HS	FT	Automatic
HS	CS	TEST
FT	AN	TEST
FT	HS	TEST
FT	CS	TEST
CS	FT	TEST
CS	HS	TEST
CS	AN	TEST

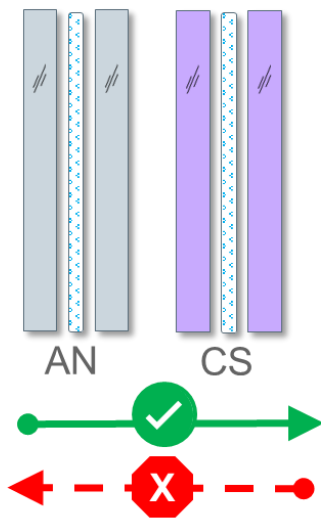


Figure 3: Diagram showing testing needs to change glass Kind for CS glass

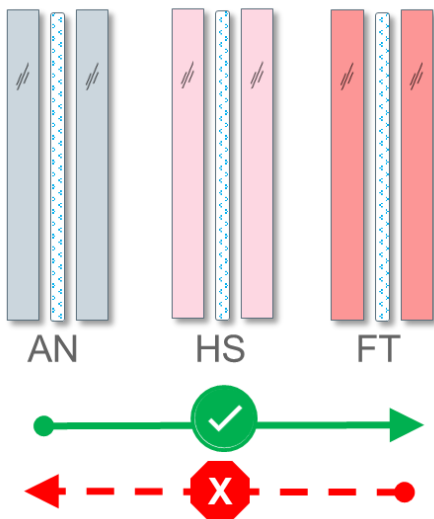


Figure 4 Diagram showing testing needs to change glass Kind for AN, HS and FT.

Glass changes other than glass Kind can also be modified without the need to test, provided a base configuration has been tested and meets the initial requirements. Figure 5 illustrates the configurations that are acceptable without additional weathering and impact testing.

Acceptable Modifications to Glass are the following: *See diagram below for further guidance.*

- Glass Metalized Coating: any change from uncoated to Low-e, reflective, sputtered (soft coat), pyrolytic (hard coat). The coatings are either toward the interlayer or on the exterior surfaces of the laminate.
- Decorative Coatings: Decorative coatings and prints which are inorganic and chemically bonded (fused) to glass (ceramic enamels) and within a laminated glass product, do not need additional testing and are included in certification if the base testing passes. Decorative coatings and prints which are organic or not chemically bonded (fused) to glass (elastomeric coatings, surface applied films or tapes) within a laminated glass product will require weathering and impact testing.
- Glass Color change
- Glass texture change (external to interlayer orientation only). This must be towards the exterior of the laminate and not in contact with the interlayer.

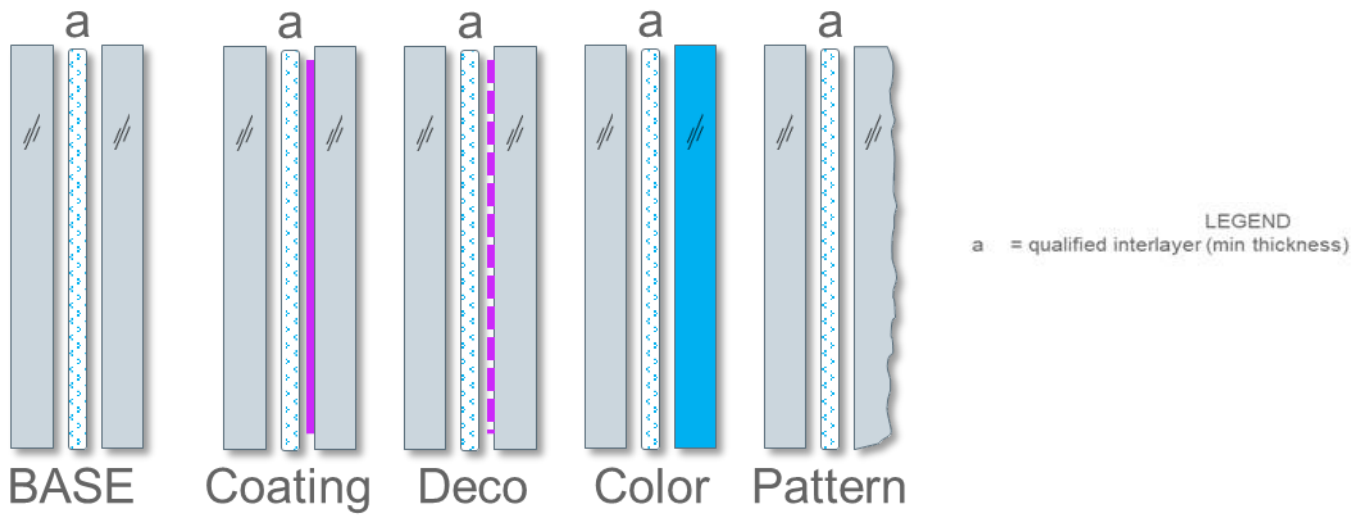


Figure 5: Allowable changes in or on glass without the need for additional weathering or additional impact testing.

A summary of the interlayer or insert changes which either qualify for automatic acceptance, or require weathering and/or impact testing are outlined and detailed in Figure 6.

Test Type	Base	Thickness	Color	Coating Print	Encap 1	Encap 2	Insert
Description	Qualified base product	Increase in interlayer thickness	Glass or interlayer color change	Coating or print applied to glass toward interlayer	Insert between qualified interlayers	Insert between qualified and unqualified interlayer	Insert between glass and interlayer
Weathering	Required	Not Required	Not Required	See note	Not Required	Required	Required
Impact	Required	Not Required	Not Required	See note	Not Required	Required	Required

NOTE: For inorganic coatings, weathering and impact testing **is not** required. For organic coatings, weathering and impact testing **is** required.

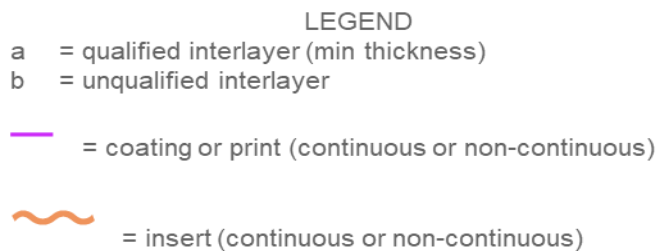


Figure 6: Changes to laminates with regard to interlayer contact to glazing or inserts

In summary, color changes, decorative or metalized coatings on glass such as pyrolytic (hard coat), sputtered (soft coat), ceramic enamels; and acid etch or sandblast (thinnest section no less than thickness qualified), in contact with the interlayer, or inserts are automatically accepted without the need for further testing if the interlayer is already on the SGCC accepted interlayer list with the following exceptions:

- a.) The interlayer on either side of an insert is not the same or greater thickness than the interlayer qualified as a single layer with regard to the performance class tested (Class A (Cat II) or Class B (Cat I)).
- b.) The insert material is placed between an interlayer and the glass. In this case weathering and impact testing must be done (even if the interlayer is already accepted).

If an interlayer is not already accepted by SGCC, then weathering and impact testing must be done.

The fabricator maintains sole responsibility for establishing compatibility, durability, and retention of impact properties for all materials used in any laminated composite or encapsulated interlayer system.

Sample Certified Products Directory (CPD) Listing

SGCC#	TEST STD	MIN CONFIGURATION	MAX CONFIGURATION	TYPE	KIND	MAX SIZE	ANSI CLASS
AAAA	Composite	3,3-0.38(b)	8,8-0.38(b)	LSG	AN	U	B
BBBB	Composite	3,3-0.76 (b)	6,6-0.76(b)	LSG	HS	U	A
CCCC	Composite	5,5-0.89(ip)	8,8-0.89(ip)	LSG	FT	U	A

The configuration columns shall indicate the range of the overall nominal thickness of the laminate and any limitations. For example, SGCC BBBB above is certified for all nominal thickness laminates from 6 mm to 12 mm.

SGCC Labeling Requirements

SGCC labeling guidelines shall apply with the addition of the nominal laminate thickness.

Sample Labels: (Minimum Requirements)

Federal Code (CPSC) designation 16 CFR 1201 – Performance Category (I or II)
 The words “American National Standard Z97.1-2015” or the characters “ANSI Z97.1-2015”
 SGCC number–ANSI Z97 test size classification (U or L) – drop height class (A or B)

Examples of labels:

ABC Glass	ABC Glass	ABC Glass
16 CFR 1201 I	Laminated	Plant Code
ANSI Z97.1 – 2015	16 CFR 1201 II	16 CFR 1201 II
SGCC AAAA UB	ANSI Z97.1 – 2015	ANSI Z97.1 – 2015
	SGCC BBBB UA	SGCC CCCC UA1

Optional label content: Supplier’s Name, distinctive mark, plant location code, glass type as defined in ANSI Z97-15 section 5.1.4 (Type 1,2,3, or 4) or spelled out (Laminated, Tempered, Organic Coated or Plastic), and date of manufacture.

Indoor Use Only Label Requirement (example)

ABC Glass
 16 CFR 1201 I
 ANSI Z97.1-2015
 SGCC AAAA UB
 INDOOR USE ONLY

Appendix A

How to get on the SGCC Accepted Interlayer List

SGCC shall maintain a list of accepted interlayers per generic category. For a specific model of interlayer to be placed on the accepted list, weathering, and impact data to the applicable reference standard (ANSI Z97.1, CPSC 16CFR 1201, or ASTM C1900) must be submitted to SGCC for review and acceptance.

(Formally Laminated Guideline L.10) For certification to ANSI Z97.1 section 5.4, weathering tests on laminated glasses shall be performed on the thinnest construction of all components in clear glass with clear interlayer. Weathering tests shall only be required initially. Weathering data will be accepted from the glass fabricator, or a supplier, i.e. interlayer manufacturer. Since SGCC's acceptance of weathering data is a "one-time" event, no formal weathering lab approval will be required. However, at time of weathering data submittal, the weathering test facility shall submit an explanation why they are competent to perform such tests. Justification of competence shall be judged on any facility's history and experience. (Revised 1/30/2012)

Weathering data is accepted from interlayer manufacturers with a signed affidavit stating the weathering was carried out in accordance with either ANSI Z97.1 and/or ASTM C1900. The data showing zero-time values and delta values for visible light transmittance, yellowness, haze, and color (Delta E) must also be provided. All weathered laminates must be below 7.24 mm overall thickness. Testing of an interlayer covers all thicker and colored interlayers of the same type. Weathering data may also be submitted by independent third parties. Impact test reports must be provided by an SGCC licensee or by an interlayer supplier. Impact testing must be done at an SGCC Approved Testing Laboratory. A list of accepted interlayer brands per generic category shall be maintained and published by SGCC. Impact certification of laminated glass containing one brand of accepted interlayer will allow use of other SGCC accepted interlayer brands within the same generic category. **Any change in chemical formulation, aside from a change in color additive, requires requalification of the interlayer material.**

Once passing test results have been achieved, the report(s) should be forwarded to SGCC for review and an Approval Letter for Interlayer Acceptance will be issued to the supplier. Once approved, the *SGCC List of Accepted Interlayers (SD-99)* list will be updated and published to the SGCC public website.