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Standard Specification for Laminated Architectural Flat Glass[1]

This standard is issued under the fixed designation C 1172; 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.

ε[1] NOTE—Editorial changes were made in Section 4 in August 1996.

1. Scope

1.1 This specification covers the quality requirements for cut sizes of flat laminated glass consisting of two or more lites of glass bonded with an interlayer material for use in building glazing.

1.2 Depending on the number, thickness and treatment of plies, and the number and thickness of interlayers, the glass shall be laminated safety glass, laminated security glass or laminated bullet resistant glass.

1.3 The dimensional values, except thickness designations, stated in inch-pound units are to be regarded as the standard. The values given in parenthesis are for information only.

1.4 The following safety hazards caveat pertains only to the test method portion, Section 8, of this specification. *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 Reference to these documents shall be the latest revision unless otherwise specified by the authority applying this specification.

2.2 *ASTM Standards:*

C 162 Terminology of Glass and Glass Products[2]

C 1036 Specification for Flat Glass[2]

C 1048 Specification for Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass[2]

E 308 Practice for Computing the Colors of Objects by Using the CIE System[3]

2.3 *ANSI Standard:*

Z97.1 Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Tests[4]

2.4 *Federal Document:*

CPSC 16CFR1201 Consumer Product Safety Commission Safety Standard for Architectural Glazing Materials[5]

3. Terminology

3.1 *Definitions*—Refer to Terminology C 162, Specifications C 1036 or C 1048, as appropriate.

3.1.1 *blemishes in flat glass*—Refer to Specifications C 1036 or C 1048, as appropriate.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *adhesion chips*—See *fuse*.

3.2.2 *blow-in*—a separation of glass and interlayer at or close to the laminate edge caused by penetration of the autoclaving medium into the edge during manufacturing.

3.2.3 *boil (bubble)*—a gas pocket in the interlayer material or between the glass and interlayer.

3.2.4 *covered edge*—the perimetric area of the laminate covered by the channel or sash when installed.

3.2.5 *decorative glass*—glass with an ornamental appearance created by a textured glass surface (patterned glass), design printed interlayer, application of decal(s) to the glass or interlayer, or other embellishments performed on or to the glass or interlayer material to give the glass an ornamental appearance.

3.2.6 *delamination*—a condition in which one or two of the lites of glass loses the bond between the glass lite and the interlayer.

3.2.7 *discoloration*—areas of the interlayer that are blushed or whitish in appearance indicating excessive moisture content in the interlayer and consequently poor or no adhesion.

3.2.8 *edge boil*—see *boil*.

3.2.9 *edge cover*—See *covered edge*.

3.2.10 *exposed edge*—the perimetric area of the laminate exposed to the environment after installation.

3.2.11 *fuse*—a glass particle or crystalline material that is permanently bonded to a surface of a lite.

3.2.12 *glass edge bite*—See *covered edge*.

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[2] *Annual Book of ASTM Standards*, Vol 15.02.

[3] *Annual Book of ASTM Standards*, Vol 06.01.

[4] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

[5] Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

3.2.13 *hair*—a slender, pigmented filament from human or animal epidermis or other thread-like filament.

3.2.14 *inside dirt*—foreign material trapped inside the laminate.

3.2.15 *interlayer*—a layer of material acting as an adhesive between plies of glass which adds additional performance to the finished product, for example, impact resistance, solar control, acoustical insulation.

3.2.16 *interlayer scuff*—See *dirt streak*.

3.2.17 *laminate*—See *laminated glass*.

3.2.18 *laminated bullet resistant glass*—multiple lites of flat glass, bonded by interlayer material, that resist penetration from medium- to super-power arms and high-power rifles.

3.2.19 *laminated glass*—an assembly consisting of two or more lites of glass, conforming to Specification C 1036 or C 1048 that are bonded together by interlayer material.

3.2.20 *laminated safety glass*—two or more lites of flat glass, bonded by interlayer material. In the case of breakage, the interlayer serves to retain the glass fragments, limit the size of the opening and reduce the risk of cutting or piercing injuries.

3.2.21 *laminated security glass*—two or more lites of flat glass, bonded by interlayer material, that resist manual penetration, including physical attack from hand-held or hand-thrown objects.

3.2.22 *lint*—short fibers of yarn or fabric trapped within the laminate.

3.2.23 *lite or light*—a panel or sheet of glass or a panel or sheet of laminated glass.

3.2.24 *mismatch*—misalignment of the edges of two lites of glass, when laminated.

3.2.25 *nonsymmetrical*—a term used to describe the construction of a laminate comprised of different glass types or thickness, or both.

3.2.26 *offset*—intentional mismatch (see *mismatch*).

3.2.27 *ply*—one sheet or panel of glass in a laminate.

3.2.28 *separation*—an area of the laminate that has become delaminated (see *delamination*).

3.2.29 *shiner*—an area on a glass edge that has not been ground or polished.

3.2.30 *short interlayer*—a condition of the laminate in which the interlayer does not extend to the edge.

3.2.31 *slippage*—See *mismatch*.

3.2.32 *streak*—a defect in interlayer caused by interlayer inhomogeneity or a smudging effect on the interlayer of the laminate.

3.2.33 *surfaces*—surfaces of glass faces are counted as Nos. 1, 2, 3, and 4, respectively. The No. 1 surface is the surface that is to the exterior; the Nos. 2 and 3 surfaces are those separated by and bonded to the interlayer material; the No. 4 surface is the surface that is to the interior.

3.2.34 *symmetrical*—a term used to describe the construction of a laminate comprised of only one glass type and thickness.

3.2.35 *template*—a pattern used as a guide to define the overall size and shape of a cut lite.

3.2.36 *two-ply flat glass (laminates)*—See *laminated glass*.

3.2.37 *unlaminated area*—an area of the laminate that failed to laminate during the laminating process. This blemish is discernible due to the textured appearance of the interlayer material.

4. Classification

4.1 *Kinds*—Laminated flat glass furnished under this specification shall be of the following kinds, as specified:

4.1.1 *Kind LA*—Two or more lites of flat annealed transparent glass conforming to the applicable requirements of Specification C 1036 and bonded by an interlayer material.

4.1.2 *Kind LC*—Two or more lites of flat glass, one or more of which are chemically strengthened glass bonded by an interlayer material.

4.1.3 *Kind LD*—Two or more lites of flat glass, one or more of which are decorative glass, conforming to the applicable requirements of Specifications C 1036 and C 1048 (if one or more of the lites are tempered or heat-strengthened glass) and bonded by an interlayer material.

4.1.4 *Kind LHS*—Two or more lites of flat glass, all of which are heat-strengthened glass conforming to the applicable requirements of Specification C 1048 and bonded by an interlayer material.

4.1.5 *Kind LM*—Two or more lites of flat glass, one or more of which are mirror glass conforming to the applicable requirements of Specifications C 1036 and C 1048 (if one or more of the lites are tempered or heat-strengthened glass) and bonded by an interlayer material.

4.1.6 *Kind LP*—Two or more lites of flat glass, one or more of which are pattern glass conforming to the applicable requirements of Specifications C 1036 and C 1048 (if one or more of the lites are tempered or heat-strengthened glass) and bonded by an interlayer material.

4.1.7 *Kind LR*—Two or more lites of flat glass, one or more of which are reflective glass, conforming to the applicable requirements of Specifications C 1036 and C 1048 (if one or more of the lites are tempered or heat-strengthened glass) and bonded by an interlayer material.

4.1.8 *Kind LSP*—Two or more lites of flat glass, one or more of which are spandrel glass, conforming to the applicable requirements of Specifications C 1036 and C 1048 (if one or more of the lites are tempered or heat-strengthened glass) and bonded by an interlayer material.

4.1.9 *Kind LT*—Two or more lites of flat glass, all of which are fully tempered glass conforming to the applicable requirements of Specification C 1048 and bonded by an interlayer material.

4.1.10 *Kind LW*—Two or more lites of flat glass, one or more of which are wired glass, conforming to the applicable requirements of Specification C 1036 and bonded by an interlayer material.

4.1.11 *Kind LX*—Laminated glass with combinations not previously defined.

5. Ordering Information

5.1 Purchasers should select the preferred options permitted in this specification and include the following information in procurement documents:

5.1.1 Title, number, and date of this specification.

5.1.2 Kind of laminated flat glass as referred to in this