



Designation: C1464 – 21

Standard Specification for Bent Glass¹

This standard is issued under the fixed designation C1464; 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 specification covers the requirements for bent glass used in general building construction, furniture, display, and various other non-automotive applications.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

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

1.4 *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 Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

C162 Terminology of Glass and Glass Products

C1036 Specification for Flat Glass

C1048 Specification for Heat-Strengthened and Fully Tempered Flat Glass

C1172 Specification for Laminated Architectural Flat Glass

C1376 Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass

C1422/C1422M Specification for Chemically Strengthened Flat Glass

¹ This specification is under the jurisdiction of ASTM Committee C14 on Glass and Glass Products and is the direct responsibility of Subcommittee C14.08 on Flat Glass.

Current edition approved Sept. 1, 2021. Published November 2021. Originally approved in 2000. Last previous edition approved in 2016 as C1464 – 16. DOI: 10.1520/C1464-21.

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.

2.2 ANSI Standard:³

ANSI-Z97.1 Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test

2.3 Federal Standard:⁴

CPSC 16 CFR 1201 Consumer Product Safety Commission Safety Standard for Architectural Glazing Material

3. Terminology

3.1 Definitions:

3.1.1 Refer to Terminology C162, Specifications C1036, C1422/C1422M, C1376, and C1172, as appropriate.

3.1.2 *blemishes in flat glass*—refer to Specifications C1036, C1048, C1422/C1422M, C1376, and C1172, as appropriate.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *arc*—see *girth*.

3.2.2 *bend axis*—the imaginary pivot point around which a radius sweeps, and which may be extended along a line, to further describe how a surface is being shaped.

3.2.3 *bend profile*—a profile of the curvature taken at a cross section of the shape perpendicular to the bend axis.

3.2.4 *bent glass*—flat glass that has been shaped while hot into a body having curved surfaces.

3.2.5 *chord*—a straight line segment that joins two points of an arc.

3.2.6 *complex bend*—a profile shape composed of curvature not easily defined by multiple radii that can result in a bent shape on one or more axis, typically defined by model or mold; see Fig. 1.

3.2.7 *compound bend*—a profile shape composed of curvature of more than one radius, curved on two or more axes.

3.2.8 *concave surface*—the curved major surface closest to an imaginary center point of a circle.

3.2.9 *convex surface*—the curved major surface farthest away from an imaginary center point of a circle.

3.2.10 *craze*—the splitting or bunching of a coating resulting from pivot of the major glass surfaces about the centerline

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, <http://www.access.gpo.gov>.

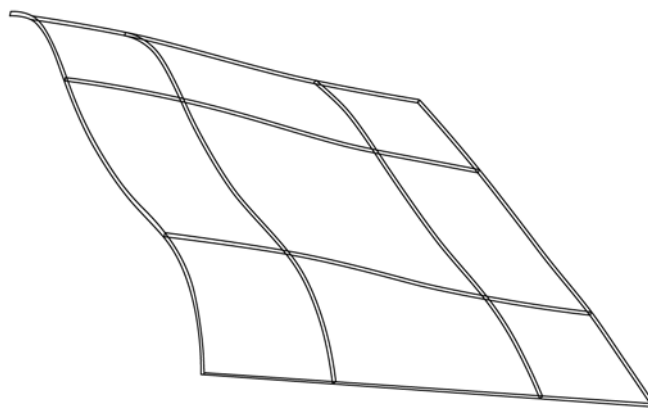


FIG. 1 Complex Bend

as the glass is bent, and which is a function of the properties of the coating, thickness of glass, and the tightness of curvature.

3.2.11 *crossbend*—deviation from a straight edge along a line perpendicular to the curvature measured on the concave side.

3.2.12 *cylindrical bend*—a profile shape composed of a single curvature with a constant radius and no straight sections, all curved on a single axis.

3.2.13 *degree of angle*—the angular measurement of a segment of a curve.

3.2.14 *depth*—on a circular bend, the distance from the midpoint of a chord to the arc measured along its radius perpendicular to the circumference.

3.2.15 *elliptical bend*—a curved profile shape composed of two or more tangential radii on a single axis.

3.2.16 *girth*—the distance around the concave or convex surface measured perpendicular to the height including any flats.

3.2.17 *height*—the length measurement of the edge perpendicular to the horizontal arc or girth.

3.2.18 *multiple bend*—a profile shape composed of a curvature of two or more radii, all curved on a single axis, with at least two of the curvatures possibly separated by a flat (plane) area, and with or without one or more additional flat (plane) areas tangent to the curvatures.

3.2.19 *pock marks*—process surface blemishes that consist of small, shallow areas, circular in shape, on the surface of the glass.

3.2.20 *ring marks*—process surface blemishes that consist of shallow marks typically running along the perimeter of the glass surface.

3.2.21 *rotation*—a condition where vertical edges (perpendicular to arc) are not parallel to bending axis.

3.2.22 *serpentine bend*—profile shape composed of concave and convex curvatures of one or more radii on a single axis with or without flat areas tangent to the curvatures.

3.2.23 *shape*—contoured form including curvature, arc(s), and even flats.

3.2.24 *single bend*—a profile composed of a single radius curved on a single axis, possibly with one or two flat (plane) areas tangent to the curvature.

3.2.25 *spherical*—a profile shape composed of curvature of one radius, curved on more than two axes.

3.2.26 *twist*—one or more of the corners of the glass are not in the same plane.

4. Classification

4.1 *Kinds*—Bent glass furnished under this specification shall be of the following kinds, as specified (see **Note 1**):

NOTE 1—Not all configurations or combinations are possible. Consult with the fabricator or manufacturer before specifying.

4.1.1 *Kind BA*—Bent glass shall be annealed flat glass, either transparent, patterned, coated, or wired glass in accordance with the applicable requirements of Specification **C1036**, **C1048**, or **C1376** as further processed to conform with the requirements hereinafter specified for bent glass.

4.1.2 *Kind BCS*—Chemically strengthened bent glass shall be flat glass, either transparent or patterned, in accordance with the applicable requirements of Specification **C1036**, as further processed to conform with the requirements hereinafter specified for bent glass and then in accordance with the applicable requirements of Specification **C1422/C1422M** for chemically strengthened flat glass.

4.1.3 *Kind BFT*—Fully tempered bent glass shall be flat glass, either transparent coated or patterned, in accordance with the applicable requirements of Specification **C1036**, and **C1376** if applicable, as further processed to conform with the requirements hereinafter specified for bent glass and then in accordance with the applicable requirements of Specification **C1048** for fully tempered glass.

4.1.4 *Kind BHS*—Heat-strengthened bent glass shall be flat glass, either transparent coated or patterned, in accordance with the applicable requirements of Specification **C1036**, and **C1376** if applicable, as further processed to conform with the requirements hereinafter specified for bent glass and then in accordance with the applicable requirements of Specification **C1048** for heat-strengthened glass.