



SURFACE VEHICLE RECOMMENDED PRACTICE	J673™	JUL2021
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Superseding J673 JUN2015		
(R) Automotive Safety Glazing Materials		

RATIONALE

This update considers new developments in safety glazing materials and clarifies scope and limitations, definitions, and dimensional tolerances.

1. SCOPE

This SAE Recommended Practice is a guidance document, which covers current safety glazing materials applicable for use in motor vehicles and motor vehicle equipment. Nominal specifications for thickness, flatness, curvature, size, and fabrication details are included.

This guidance document does not precede or replace customer specifications and requirements.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.2 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

ISO 3536 Road Vehicles - Safety Glazing Materials - Vocabulary

2.3 ANSI Accredited Publications

Copies of these documents are available online at <http://webstore.ansi.org/>.

SAE J3097/ANSI Z26.1 Standard for Safety Glazing Materials for Glazing Motor Vehicles and Motor Vehicle Equipment Operating on Land Highways - Safety Standard

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3. DEFINITIONS

3.1 GLAZING

Glazing is the transparent material (such as glass) used for windows.

3.2 GLAZING MATERIAL

Transparent panes or sheets, made from glass, plastic, or combinations thereof, set in frames for use in vehicles and which comply with specified requirements for visibility, strength, and durability.

3.2.1 TOUGHENED GLASS

(Other terms such as “heat treated glass,” “tempered glass,” “case-hardened glass,” and “chemically tempered glass” are used also.) Glazing material consisting of a single layer of glass which has been subjected to special treatment to increase its mechanical strength and/or to condition its fragmentation after shattering.

3.2.2 CHEMICALLY STRENGTHENED GLASS

This refers to glass that has been subjected to a chemical process, which allows toughness requirements to be met at thinner thicknesses.

3.2.3 GLASS-PLASTIC GLAZING MATERIAL

Glazing material which may comprise one or more layers of glass and one or more layers of plastic in which a plastic surface faces inward toward the passenger compartment when installed in a vehicle.

3.2.4 PLASTIC GLAZING MATERIAL

Glazing material that contains as an essential ingredient one or more layers of organic polymeric substances.

NOTE: Two types are recognized:

- Rigid plastic: Organic polymeric material which maintains its structural stiffness over the intended use range.
- Flexible plastic: Organic polymeric material which remains conformable over the intended use range.

3.3 LAMINATED GLASS

Glazing consisting of two or more layers of glass bonded together by one or more interlayers.

NOTE: Two types are recognized:

- Ordinary: When none of the layers of glass, of which it is composed, has been treated.
- Treated: When at least one of the layers of glass, of which it is composed, is tempered safety glass or glass which has been treated in any controlled process in order to give it increased resistance to mechanical and thermal stress.

3.3.1 INTERLAYER

Any material used to hold together the component layers of laminated glass. An interlayer may also provide additional functionality.

3.3.2 OVERLAP

Overlap (or offset or slip) is the distance between the edges of glazing plies at a particular location.

3.4 SAFETY GLASS

Safety glazing materials are predominantly inorganic in composition, including (but not limited to) laminated glass and tempered glass, that meets the applicable requirements of SAE J3097/ANSI Z26.1.

3.4.1 SAFETY GLASS WITH PLASTICS

Either tempered safety glass or laminated safety glass with a layer of plastic on the inner side.

3.5 SAFETY GLAZING MATERIAL

A product consisting of organic and/or inorganic materials so constructed or treated to minimize the likelihood of injury to persons as a result of contact with these safety glazing materials when used in a vehicle, and which complies with specified requirements for visibility, strength, and durability.

3.5.1 SAFETY GLAZING PLASTICS

Any safety glazing material, predominantly synthetic organic in character, that meets the applicable requirements of SAE J3097/ANSI Z26.1, including single-ply and laminated products, whether rigid or flexible.

3.6 Dimensional Characteristics

3.6.1 CURVATURE

Curvature is the inverse of the radius of the surface's osculating circle in a specified plane.

3.6.2 OVERALL SIZE

Overall size (or size) is generally defined by fabricators and customers as the greatest linear dimension in a specified direction.

3.6.3 THICKNESS

Nominal thickness, with acceptable commercial ranges above and below nominal.

4. SIZES

There are no standard sizes applicable to safety glasses for use in motor vehicles and motor vehicle equipment. The feasibility of proposed safety glass sizes developed by the motor vehicle/motor vehicle equipment manufacturer must be determined by conference with the glass manufacturer.

4.1 Thickness

A range of thicknesses are acceptable for use in motor vehicles and motor vehicle equipment provided they meet the requirements of all applicable laws, regulations, codes, and practices in effect at the time an automotive safety glass is manufactured. Typical glass thicknesses are between approximately 0.1 mm and 10 mm with the thinner thicknesses used in laminates.

5. USE OF DESCRIPTIVE TERMS

As the definition indicates, safety glazing materials, in comparison with annealed float glass, are intended to reduce the likelihood of injury or the severity of injury in the event of their breakage. Therefore, terms such as "nonbreakable," "nonshatterable," and "nonsplinterable" should not be interpreted by the driving public as meaning that absolute protection is afforded to the occupants of the vehicle by the safety glazing materials so described, as the descriptive terms might seem to warrant. No such terms are used in the safety standard.

Bullet-resistant glazing should not be termed "bullet-proof," since no bullet-resistant glazing is completely resistant to penetration by all types of missiles fired from all types of armament.

6. DEGREE OF SAFETY

One safety glazing material may be superior for protection against one type of hazard, whereas another may be superior against another type. Since accident conditions are not standardized, no one type of safety glazing material can be shown to possess the maximum degree of safety under all conditions, against all conceivable hazards.

7. TYPICAL COMMERCIAL TOLERANCE INFORMATION

7.1 Dimensional Tolerances for Thickness

Commercially available flat or curved safety glass ordinarily has a thickness tolerance of $\pm 0.1 \times (n)$ -mm ("n" being the number of layers of glass).

7.2 Dimensional Tolerances for Curved Automotive Safety Glass

Tolerances on the physical dimensions of curved automotive safety glass parts are generally specified as follows, with reference to the numeric design data, or to a master die model derived from numeric data supplied by the motor vehicle and motor vehicle equipment manufacturer:

7.2.1 Contour

Peripheral contour (or edge contour) may be specified in terms of maximum departure of the peripheral face of the glazing from the design surface. Central area surface contour may be specified in terms of permissible deviations of curvature from the designed contour. For example, this contour may be measured from the vertical centerline chord of the glass, taken at the point of maximum designed depth of curvature.

NOTE: Manufacturing tolerances on size and curvature will vary with design and should be established between the glass fabricator and customer. Designs for complex curved parts should recognize and accommodate necessary tolerances on size and shape.

7.2.1.1 Central Area Surface Contour

Central area surface contour may be specified in terms of permissible linear deviation of the glazing from the design surface. For example, central area surface contour may be defined as the distance from the vertical centerline chord of the glazing to the glazing surface at the point of maximum design depth.

Curved safety glass parts are generally checked for size and curvature on a checking gauge made to receive the desired surfaces of the glass, as illustrated in Figures 1 and 2. The checking gauge should be accurate, rigid, and permanent. For example, size may be checked with the aid of lines, stops, or notches on the gauge, indicating minimum and maximum size limits.

Peripheral or edge contour is usually checked by inserting a thickness feeler gauge, taper gage, or dial or digital indicator or other means of measuring the surface-contour at the specified location. The width of the face of the checking ledge can vary with design and should be established by conference.

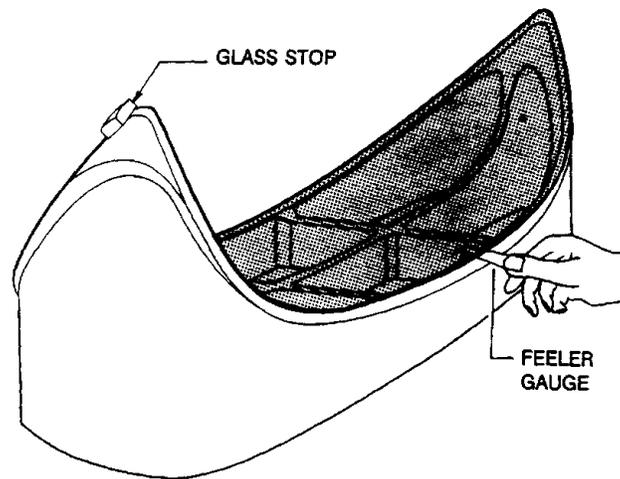


Figure 1 - Concave-type checking gauge

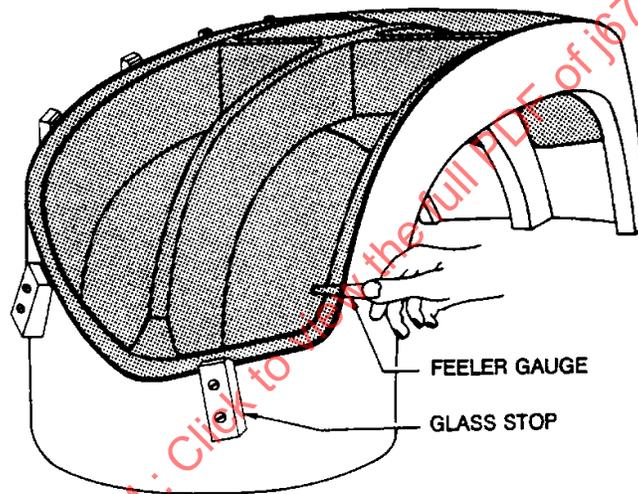


Figure 2 - Convex-type checking gauge

The checking gauge may be fitted with a digital indicator or other means of measuring the surface contour at the specified location.

7.3 Specifying Dimensional Tolerances

7.3.1 Overall Size

Unless otherwise specified, overall size tolerance for flat laminated safety glazing and flat tempered safety glazing is ± 0.8 mm (± 0.03 inch), except for vertically sliding door glass where the height dimension may be greater. Size tolerances for curved safety glazing are affected by shape and therefore should be discussed and agreed upon between fabricator and customer. Size tolerances for curved laminated safety glazing and curved tempered safety glazing are affected by shape and degree of curvature and should be checked with the component fabricator.

7.3.2 Overlap

Unless otherwise specified, maximum overlap on crown edges (Edge No. 1 and 2) is 1.1 mm (0.04 inch). Unless otherwise specified, on all other edge finishes maximum overlap is 1.5 mm (0.06 inch).

7.3.3 Tong Marks

Unless otherwise specified, center of tong marks should be no more than 8 mm (0.3 inch) from edge of glazing.

7.3.4 Mold Marks

Unless otherwise specified and depending on the size and complexity of the part, mold marks should be no more than 8 mm (0.3 inch) from edge of glazing.

7.3.5 Drilled Holes

For tempered safety glazing, the dimensions and tolerances for the size and location of drilled holes will vary with glazing design and thickness and should be determined by conference between customer and fabricator.

7.4 Edges

For various applications and locations, Figure 3 to Figure 6E.

7.5 Edge No. 1

Crown edge, satin finish (such as diamond wheel) (Figure 6A) indicates an approximate radius fine grind along the edges. Unless otherwise specified, this finish is suitable for all exposed edges.

7.6 Edge No. 2

Crown edge, semi-satin finish (Figure 6B) indicates a modification of Edge No. 1 where the finish is not so fine, and larger shiners (wheel skips) are permissible in center area of the crown. Unless otherwise specified, this finish is suitable for unexposed edges sliding in channels.

7.7 Edge No. 3

Semi-crown edge, semi-satin finish (Figure 6C) indicates a modification of Edge No. 2 where the central part of the edge need not be touched with the edging wheel. This finish is suitable for edges enclosed in fixed channels, or stationary installations.

7.8 Edge No. 4

Seamed edge (Figure 6D) indicates that the original cut edge of the glass is ground off to an angle of approximately 45 degrees. Typically, the width of the seam is 0.8 mm (0.03 inch). Typically, a seamed edge is the minimum type of edge work acceptable for tempered safety glass. Unless otherwise specified, this finish is suitable for edges enclosed in fixed channels or stationary installations.

7.9 Edge No. 5

Plain edge (Figure 6E) indicates that the glass part has no further work done upon the original cut edges, except that the sharp edges may be removed if desired. Unless otherwise specified, this finish is unacceptable for tempered safety glass but otherwise acceptable for edges enclosed in fixed channels.

8. MARKINGS

Markings shall be in accordance with the requirements of all applicable laws, regulations, codes, copyrights, and practices to which automotive safety glasses are required to conform at the time of manufacture.

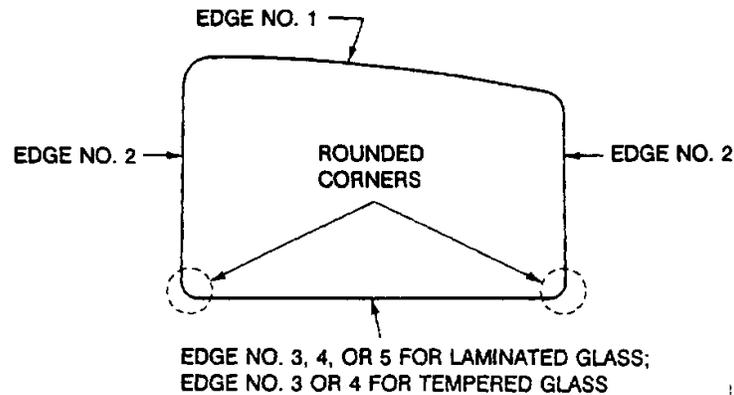


Figure 3 - Illustrative vertically sliding door or quarter window

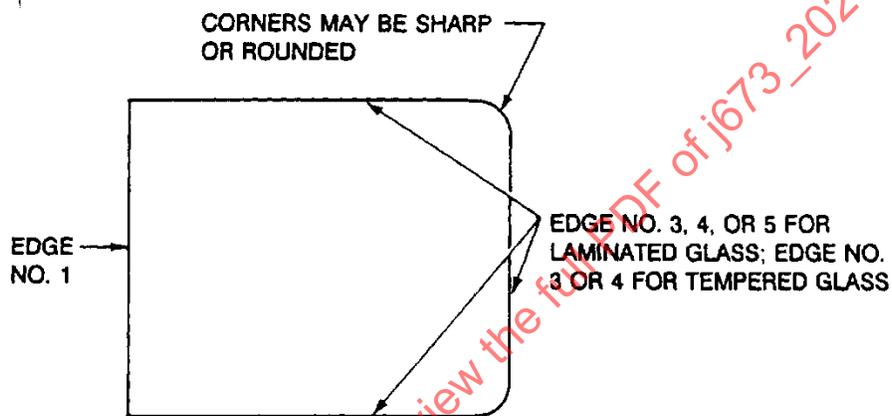
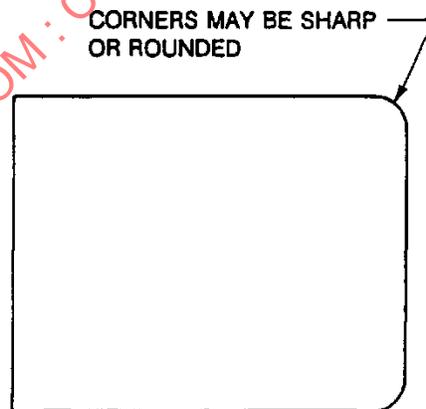


Figure 4 - Illustrative sliding window with channel on three sides



**Figure 5 - Illustrative sliding window with channel on four sides -
Edge No. 3, 4, or 5 for laminated glass all around;
Edge No. 3 or 4 for tempered glass all around**

Notes for Figures 6A to 6E:

NOTE 1: L = laminated glass; T = tempered glass.

NOTE 2: Edge finish radius' stated in this recommended practice are for informational purposes only and are not radius specifications for different edge constructions. In general, edges shall not be specified with radius' less than 1/2 of the glass ply thickness.