



Engineering Office

Engineering Standard

MATERIAL STANDARD

Number

MS-3694

Change R

EASL Req'd

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GLASS - SAFETY - HEAT TREATEDA - GENERAL

- 1 - This standard covers a grade of heat treated safety glass used for curved parts including rear windows. Although this standard applies specifically to sheet glass, float glass meeting the requirements of this standard may also be used.
- *2 - The material consists of a monolithic sheet of specially heat treated glass. It cannot be cut, drilled, or polished after heat treatment. When broken at any point, the entire piece immediately breaks into innumerable small pieces, which may be described as granular, usually with no large jagged edges.

MS-3694-A covers clear heat treated safety glass per Federal Motor Vehicle Safety Standard 205.

MS-3694-B covers heat absorbing, heat treated safety glass per Federal Motor Vehicle Safety Standard 205.

MS-3694-C covers clear heat treated safety glass per "Economic Commission for Europe" ECE Regulation 43.

MS-3694-D covers heat absorbing, heat treated safety glass per "Economic Commission for Europe" ECE Regulation 43.

B - REQUIREMENTS1 - MS-3694-A, Clear Heat Treated Safety Glassa - Federal Motor Vehicle Safety Standard 205

This material shall conform in all details to the requirements of the Federal Motor Vehicle Safety Standard 205. It shall also conform to the requirements of the American National Standard Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways, (including supplement 226.1a-1969) 226.1-1966 (R1973) except where requirements of this code conflict with the requirements of Federal Motor Vehicle Safety Standard 205. In cases of conflict the requirements of MVSS 205 shall govern.

The following test requirements of ANSI Z26.1 apply to this material.

- (1) - Test Nos. 1, 2, 3, 4, 6, 7, 8 and 18.

(Continued)

*Denotes area of change from previous issue.

Date	Mdl Yr, Eff. Code & Disp Code			PCN No.	Change	Text Changes and Cancellations
2-24-82	83	V-3/R		00205-290	R	Standard revised
10-1-79	80	V-3/B		90911-288	Q	Standard revised
Date Issued	4-29-60			Dept 2560	Contact R. E. LaBrecque	

IMPORTANT: This standard is for use in supplying certain parts under purchase orders of Chrysler Corporation or its subsidiaries. This standard is limited in its application to those drawings or engineering illustrations which call out this standard number, or which refer to this standard within some other standard or specification. Original equipment and replacement parts for some vehicles sold by Chrysler Corporation or its dealers are not covered by this standard.

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200-36-A (3-81)

Volume P Section 1 Page No. 50(1)

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B - REQUIREMENTS (Continued)

1 - a - (2) - The material shall be legibly and permanently marked in letters at least 1.7 mm (0.070 in.) in height in accordance with Section 6 of ANSI Standard Z26.1. This marking shall also include the symbol DOT and the manufacturers code number issued by NHTSA. Intensity of marking shall not exceed that of master samples approved by the Glass and Optics Laboratory, Metallurgical Processes Department, Chrysler Engineering Office.

b - Glass used in the fabrication of safety glass parts shall meet the requirements of the appropriate section of Material Standard MS-3028, Glass - Annealed - Flat.

c - Glass Defects - Permissible

Glass defects described in the following paragraphs are the maximum permissible. No one piece of glass shall contain all of these defects. In general, if two or more defects are grouped within a 150 mm (6.0 in.) circle, the maximum permissible size for each defect shall be reduced to one-half size for a group of two, and one-third size for a group of three.

- (1) - Scattered seeds 0.8 mm (0.03 in.) diameter; Occasional bubbles 1.5 x 3.0 mm (0.06 x 0.12 in.); an occasional elliptical bubble 1.5 x 6.0 mm (0.06 x 0.25 in.) if no surface distortion is present; single stones to 1.5 mm (0.06 in.) diameter if well fused.
- (2) - Minor surface blemishes such as an occasional dig, pit or crush not to exceed 1.5 x 6.0 mm (0.06 x 0.25 in.).
- (3) - Occasional light scratches, light rubs or string such as would not attract the attention of an observer looking through the glass.
- (4) - Occasional light ream or draw lines such as will not cause perceptible interference with vision through the glass at an angle of 30° to the surface of the glass when examined in car position.

d - Glass Defects - Not Permissible

Skim, heavy seeds, perceptible ream, large stones, pronounced string, heavy scratches, or other defects detrimental to the product are not permitted.

e - Thickness

The nominal thickness and tolerances in thickness of heat treated safety glass covered by this standard shall be as follows:

(Continued)

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B - REQUIREMENTS (Continued)**1 - MS-3694-A, Clear Heat Treated Safety Glass (Continued)****e - Thickness (Continued)**

Nominal Thickness	Thickness - Metric		Thickness - English	
	Minimum	Maximum	Minimum	Maximum
3 mm	2.80 mm	3.20 mm	0.110 in.	0.126 in.
3.2 mm	3.00 mm	3.40 mm	0.118 in.	0.133 in.
4 mm	3.80 mm	4.20 mm	0.149 in.	0.165 in.
5 mm	4.62 mm	5.08 mm	0.182 in.	0.200 in.
5.5 mm	5.38 mm	5.84 mm	0.212 in.	0.230 in.
6 mm	6.10 mm	6.60 mm	0.240 in.	0.260 in.

Maximum thickness variation shall not exceed 0.33 mm/metre
(0.004 in. per linear foot).

f - Visibility Distortion

The characteristics of heat treated safety glass covered by this standard shall be such that there is no perceptible interference with vision through the glass at an angle of 30° to the surface of the glass when examined in car position.

g - Direction of Wave

Sheet glass shall be oriented so that the pattern wave is as specified on the part drawing.

 h - Projection Test

The glass shall meet the requirements of the following test.

(1) - Equipment

The equipment for this test consists of:

- (a) - A good quality, 500 watt, lantern slide projector, or similar assembly of light source and lenses which is capable of projecting a sharply defined image on a screen at a distance of 7.6 metres (25 ft). The objective lens of this system shall have an aperture approximately 50 mm (2.0 in.) in diameter and a focal length of 300 mm (12 in.)
- (b) - A flat, white projection screen of appropriate size.
- (c) - A dark room of sufficient length to accommodate the set-up.

(Continued)

Volume P-1

Page 50(3)



B - REQUIREMENTS (Continued)

1 - MS-3694-A, Clear Heat Treated Safety Glass (Continued)

h - Projection Test (Continued)

(2) - Test Procedure

The projection lantern shall be focused on the screen at a distance of 7.6 metre (25 ft). The specimen shall be placed between the lantern and the screen, close to and as nearly parallel with the screen as possible. The specimen shall be moved toward the lantern always as nearly parallel to the screen as possible. When the first light or dark patch appears in the shadow of the specimen, the distance from the specimen to the screen shall be noted.

(3) - Evaluation of Results

No light or dark patch shall appear in the shadow of the specimen before the specimen shall have been moved a distance of 630 mm (25 in.) from the screen.

Ream, string or draw lines visible under test conditions shall be evaluated for perceptibility under paragraph B-1-c-(4).

i - Color

Only small variations in color shall be permitted. Such slight variations present shall not be noticeable when looking through or at the glass when it is glazed in the vehicle. Strain patterns visible under certain lighting conditions causing polarization are inherent in this type of glass and not cause for rejection.

j - Luminous Transmittance

(1) - All glass furnished to this standard shall be tested in accordance with the luminous transmittance test described in paragraph 5.2 of the ANSI Standard Z26.1-1966 or subsequent revisions thereof.

(2) - Interpretation of Results

Safety glazing materials intended for use at levels requisite for driving visibility in the motor vehicle shall show regular (parallel) luminous transmittance not less than the amount shown below at normal incidence both before and after irradiation.

MS-3694-A Clear Heat Treated Safety Glass - 85 per cent.

MS-3694-B Tinted Heat Treated Safety Glass - 70 per cent.

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Engineering and Research Office

Material Standard

MS -3694

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B - REQUIREMENTS (Continued)

1 - MS-3694-A, Clear Heat Treated Safety Glass (Continued)

k - Scratch Polishing

Local polishing to remove minor surface defects shall not produce distortion or a bulls-eye perceptible in normal daylight when the part is viewed from a distance of 750 mm (30 in.) at an angle of 30° to the glass surface.

l - Surface Irregularities

Surface irregularities shall not be sufficient to impair visibility nor to produce an unsightly appearance.

m - Edge Preparation

All edges of the glass shall be as specified on the part drawing.

(1) - Exposed Edges - (Round Satin Finish Edge)

All exposed edges shall meet the requirements specified by MVSS No. 205. Refer to Figure 1.

"Round Satin Finish" edges shall be free of defects other than occasional flake chips 1.5 mm (0.06 in.) diameter and occasional shiners 3.0 mm (0.12 in.) diameter of 1.5 mm (0.06 in.) wide by 13 mm (0.5 in.) long, as shown in Figure 1.

(2) - Unexposed Edges Sliding in Channels (Round Semi-Satin Finish Edge)

All edges which are concealed but intended to slide in guides or channels shall have "Round Semi-Satin Finish" edges as shown in Figure 2. The edges are similar to the "Round Satin Finish" edges and may be produced in the same operation. Permissible defects include extended shiners and 5.0 mm (0.20 in.) flake chips provided the contour is smooth and free of jagged projections which could damage the glass run or interfere with the smooth operation of the part.

(Continued)



B - REQUIREMENTS (Continued)

1 - MS-3694-A, Clear Heat Treated Safety Glass (Continued)

m - Edge Preparation (Continued)

(3) - Non-Exposed, Non-Sliding Edges (Seamed Edges)

Non-exposed, non-sliding edges glazed in channels or mouldings shall have "Seamed" edges as shown in Figure 3. The seamed edge is produced by grinding a bevel at an angle of approximately 45° to a width of 0.8 to 1.5 mm (0.03 to 0.06 in.) to remove sharp edges.

Seamed edges may contain flake chips 6.0 mm (0.25 in.) maximum dimensions providing they will be completely covered by the channel or moulding. Occasional cutting flare and localized heavy seam are permissible provided the completed part meets the tolerance limits and the flare or heavy seam is covered by the channel or moulding.

n - Holes

Circular holes through heat treated safety glass shall have a diameter at least 1.5 mm (0.06 in.) greater than the thickness of the glass unless otherwise specified on the part drawing. Edges of holes shall be free of defects other than occasional flake chips 1.5 mm (0.06 in.) maximum dimension. Occasional flake chips to 5.0 mm (0.20 in.) maximum dimension are permitted on the edges of holes if concealed by the body structure.

o - Tong Marks and Mold Marks

Tong marks or mold marks on the glass surface resulting from heat treatment or forming are to be light indentations. Heavy indentations causing optical distortion extending into central areas of the part are not permitted. The tong marks or mold marks shall not extend more than 6.0 mm (0.25 in.) from the edge of the glass unless otherwise specified on the drawing.

p - Dimensional Tolerances

The tolerances on heat treated safety glass shall be as follows:

(1) - Variations from ordered dimensions shall not exceed the limits specified on the part drawing.

(2) - Bowing or warping of flat glass parts shall not exceed 2.5 mm/metre (0.03 in. per linear foot) in any direction. Parts less than 300 mm (12 in.) maximum dimension may not be bowed more than 0.5 mm (0.03 in.)

(Continued)



B - REQUIREMENTS (Continued)

1 - MS-3694-A, Clear Heat Treated Safety Glass (Continued)

p - Dimensional Tolerances (Continued)

- (3) - The length and width of curved parts shall be measured along the outside surface of the glass.
- (4) - Conformance to design curvature as specified on the part drawing shall be determined by placing the glass on the approved checking fixture. Maximum departure from the fixture shall not exceed the limits specified on the part drawing. Kinks or rapid changes in departure which might effect installation or seal are not permitted.

q - Fragmentation Test

Heat treated safety glass parts shall meet the requirements of the following test.

(1) - Procedure

(a) - Movable Glass

The heat treated safety glass part shall be broken by impact of a sharp center punch. The point of impact shall be 13 mm (0.5 in.) in from the mid-point of the longest exposed edge.

(b) - Fixed Side and Rear Windows

The heat treated safety glass part shall be broken by impact of a sharp center punch. The point of impact shall be 13 mm (0.5 in.) in from the midpoint of the lower edge.

(2) - Interpretation of Results

(a) - Movable Glass

No individual fragment free of cracks weighing more than 4.25 grams shall appear in the area of glass above the daylight opening (DLO) line shown on the part drawing. Weighing of the largest fragment shall be completed within three minutes of fracture of the glass.

(Continued)



B - REQUIREMENTS (Continued)

1 - MS-3694-A, Clear Heat Treated Safety Glass (Continued)

q - Interpretation of Results (Continued)

(2) - Interpretation of Results (Continued)

(b) - Fixed Side and Rear Windows

No individual fragment free of cracks shall weigh more than 4.25 grams except as noted below. Weighing of the largest fragments shall be completed within three minutes of fracture of the glass.

In rear windows, due to crack propagation effects, particles weighing more than 4.25 grams may occur in an area within a 125 mm (5.0 in.) radius of the upper corners. In this event, an identical part shall be broken in the same manner as the first except that the point of impact shall be 13 mm (0.5 in.) in from the midpoint of the upper edge. In this second sample, no individual particle free of cracks shall weigh more than 4.25 grams except within an area of 125 mm (5.0 in.) radius extending from the lower corners.

2 - MS-3694-B, Heat Absorbing Heat Treated Safety Glass

Heat absorbing heat treated safety glass covered by this standard shall conform to the requirements for clear heat treated safety glass, MS-3694-A except as specified below.

a - Light and Solar Energy Transmission

Heat absorbing glass of 6.0 mm (0.25 in.) or greater nominal thickness shall be such that polished specimens 6.00 mm (0.236 in.) thick shall have a luminous transmittance of not less than 70% and a radiant energy transmittance of energy from the sun of not more than 50%. Heat absorbing glass having a nominal thickness of less than 6.0 mm (0.25 in.) shall be such that polished specimens of 3.00 mm (0.118 in.) thickness shall have a luminous transmittance of energy from the sun of not more than 68%.

- (1) - Heat absorbing glass shall be tested for regular (parallel) luminous transmittance at normal incidence calculated to International Commission on Illumination "Illuminant A" (International Commission on Illumination "Illuminant A" consists of a tungsten lamp operated at a temperature of 2856 Kelvin).

(Continued)

Volume p-1

Page 50(8)

B - REQUIREMENTS (Continued)

- 2 - a - (2) - Radiant transmittance for energy from the sun shall be calculated from the measured spectral transmittance of the glass, using the values for spectral distribution of solar energy received at sea level by a surface perpendicular to the sun's rays through an air mass of 2 which are given by Perry Moon in "Proposed Standard Solar-Radiation Curves for Engineering Use". Journal, Franklin Institute, Volume 230, Page 604, Table III, 1940.

b - Color

- (1) - Material shall match the color of Chrysler Engineering Office approved samples. The color of these approved samples as determined in accordance with the American National Standard Institute Methods of Measuring and Specifying Color ANSI Standard Z 138.2-1969 (R 1974) for a 6.0 mm (0.236 in.) thickness is Dominant Wave length 494 +5 nanometres, Purity 4.5 +2%
- (2) - Only small variations in color shall be permitted. Such a slight variation in color shall not be noticeable when looking through or at the glass when it is glazed in the vehicle.

* **3 - MS-3694-C, Clear Heat Treated Safety Glass**

Clear heat treated safety glass covered by this standard, MS-3694-C, is intended for European use only. It shall conform in all details to the requirements of the Economic Commission for Europe, ECE Regulation 43. It shall conform also to all the requirements of MS-3694-A except where these requirements conflict with the requirements of ECE Regulation 43. In cases of conflict the requirements of ECE Regulation 43 shall govern.

* **4 - MS-3694-D, Heat Absorbing, Heat Treated Safety Glass**

Heat absorbing, heat treated safety glass covered by this standard, MS-3694-D, is intended for European use only. It shall conform in all details to the requirements of the Economic Commission for Europe, ECE Regulation 43. It shall conform also to all the requirements of MS-3694-B except where those requirements conflict with the requirements of ECE Regulation 43. In cases of conflict the requirements of ECE Regulation 43 shall govern.

C - CONTROL

- 1 - This material shall be purchased only from the sources which appear on the Chrysler Engineering Approved Source List included as an addendum to this standard.
- 2 - For additional information, address inquiries to the Metallurgical Processes Department, Chrysler Engineering Office.
- 3 - This standard refers to the following standard: Material Standard MS-3028

(Continued)

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MS -3694

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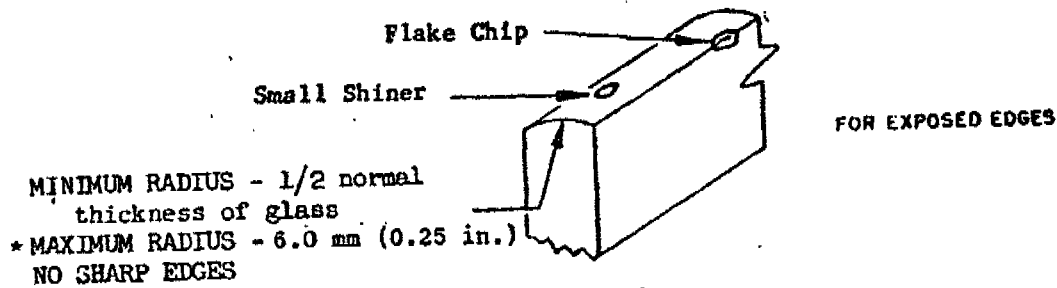


FIG. 1

ROUND SATIN FINISH EDGE

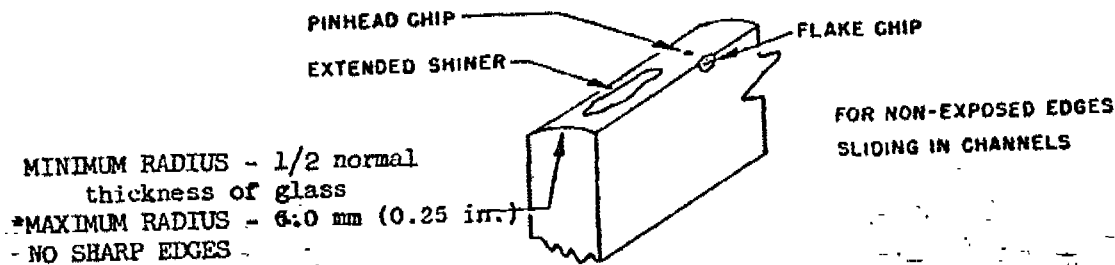


FIG. 2

ROUND SEMI-SATIN FINISH EDGE

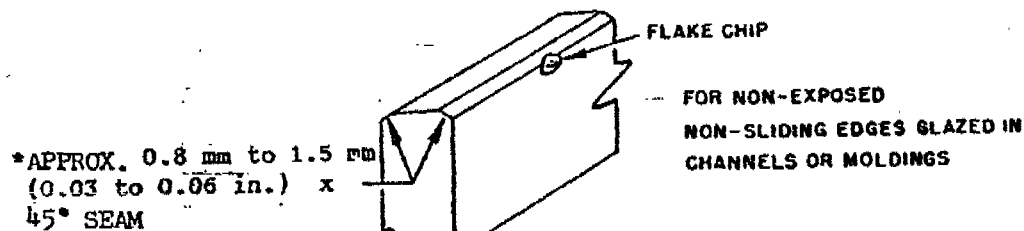


FIG. 3

SEAMED EDGE

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Volume p-1

Page 50(10)