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INTERNATIONAL
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SURFACE VEHICLE RECOMMENDED PRACTICE

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Light Transmittance of Automotive Windshields Safety Glazing Materials

Foreword—This Document has not changed other than to put it into the new SAE Technical Standards Board Format.

1. Scope—The purpose of this test is to determine the light transmittance of automotive windshield safety glazing materials positioned at the angle of installation.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J182 SEP73—Vehicle Fiducial Marks
SAE J941e FEB75—Motor Vehicle Drivers' Eye Locations
SAE XJ1181—Motor Vehicle Vision Origin Points

3. Definitions

3.1 Safety Glazing Materials—For the purposes of this procedure, the term *safety glazing materials* means glazing materials so constructed, treated, or combined with other materials as to reduce, in comparison with ordinary sheet, plate, or float glass, the likelihood of injury to persons by these safety glazing materials whether they may be broken or unbroken.

3.2 Luminous Transmittance—The luminous transmittance (t) of glazing materials is the ratio, expressed as percentage, of the amount (Fr) of incident light flux that reaches a viewing point after passing through a glazing material to the amount (Fo) of light that reaches the same point with the glazing material absent. Transmittance is expressed in the term:

$$t = \frac{Fr}{Fo} \times 100 \qquad \text{(Eq. 1)}$$

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3.3 **V Point 1**—The V point 1 is located at X = (L31) + 2.67, Y = 0.85(W7) + 0.075(W3) + 0.89, Z = (H70) + 26.18 for a back angle (L40) of 25 deg. If the back angle is other than 25 deg, adjust the X and Z coordinators in accordance with Table A-4 in SAE J941e (February, 1975). (See SAE XJ1181[1]—Motor Vehicle Vision Origin Points.)

3.4 **L31**—SgRP—front, X coordinate.

3.5 **W7**—Steering wheel center Y coordinate. The steering column center is the point located by the intersection of the steering column axis with the plane tangent to the upper surface of the steering wheel rim.

3.6 **W3**—Shoulder room—front. The minimum dimension measured laterally between the trimmed surfaces on the X plane through the SgRP—front within the belt line and 10.0 in (254 mm) above the SgRP—front.

3.7 **H70**—SgRP—front, Z coordinate.

3.8 **L40**—Back angle—front. The angle measured between a vertical line through the SgRP—front and the torso line. If the seatback is adjustable, use the normal driving and riding position specified by the manufacturer.

3.9 **H122**—Windshield slope angle. The angle between the vertical reference line and a chord of the windshield are running from the lower DLO to the upper DLO at the vehicle zero Y plane. In the case of wrap over glass, the angle to be measured will be formed by a chord 18.0 in (457 mm) long, drawn from the lower DLO to the intersecting point on the windshield.

4. ***Procedure***—This section specifies the requirements of a test procedure.

4.1 **Instrumentation**

4.1.1 LIGHT SOURCE—A tungsten filament lamp operated at a color temperature of 2856 °K, *CIE Illuminant A*.

4.1.2 PHOTORECEPTOR—One which has a relative spectral sensitivity in agreement with the spectral luminous efficiency of the CIE 1931 standard observer for photopic vision. A diffusing screen may be placed immediately in front of the detector where required to improve the uniformity of illumination over the sensitive surface.

4.1.3 PHOTORECEPTOR-INDICATOR UNIT—The photoreceptor response as read on the indicating meter shall be a linear function of the incident light intensity within ±2% of the full scale (100% transmittance) reading or 10% of the reading, whichever is smaller.

4.1.4 OPTICAL SYSTEM—The optical system shall be corrected for chromatic aberrations and shall be capable of producing a light beam collimated within 2 deg and to be sufficiently uniform to conform to the other requirements of the procedure. The optical system of the photometer shall be designed to minimize polarization effects.

4.1.5 ARRANGEMENT OF COMPONENTS—The components shall be arranged so that the major axis of the area on the glazing material surface traversed by the measuring beam shall be not less than 7 mm (0.28 in) nor more than 40 mm (1.57 in). During all measurements, including calibration, the optical axis of the photoreceptor shall be coincident with the optical axis of the measuring beam and this common axis shall be horizontal and parallel to the appropriate orthogonal plane used to locate dimensional relationships within the vehicle and shall pass through V point 1.

1. SAE XJ1181—Approval pending.

4.1.6 CALIBRATION—The apparatus shall be calibrated for the range of interest prior to each use with appropriate standards of known illuminant *A* transmittance at a specific angle.

4.2 Test Conditions

4.2.1 The glazing material surfaces shall be thoroughly clean when measurements are made.

4.2.2 Check the photometer reading to zero and full scale (100%) then complete the calibration procedure specified in Section 1.1.6.

4.2.3 The windshield shall be mounted at the windshield slope angle (H122). If the glazing is installed in a vehicle, the car shall be placed on a plane surface and leveled using the fiducial marks described in SAE J182 (September, 1973), Vehicle Fiducial Marks, at the design attitude specified by the vehicle manufacturer.

4.2.4 Eliminate all light from primary and reflected sources other than the measuring beam. Stray light from within the measuring apparatus may not exceed 1%.

4.2.5 Align the optical axis of the photoreceptor to be coincident with the optical axis of the measuring beam emerging from the glazing material.

4.2.6 Calculate the percent light transmittance at V point 1 by dividing the average value of three separate measurements obtained with the glazing material in place, by the average value of three separate measurements obtained without the glazing material in place, and multiply the ratio by 100.

PREPARED BY THE SAE BODY ENGINEERING COMMITTEE