Plastic Materials for Use in Optical Parts Such as Lenses and Reflectors of Motor Vehicle Lighting Devices—SAE J576d

SAE Standard
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LAND SEA AIR SPACE

PREPRINT

PLASTIC MATERIALS FOR USE IN OPTICAL PARTS SUCH AS LENSES AND REFLECTORS OF MOTOR VEHICLE LIGHTING DEVICES—SAE J576d

SAE Standard

Report of Lighting and Nonmetallic Materials Committee approved January 1955. Revised and upgraded to Standard Status June 1976.

1. Scope—This SAE Standard provides test methods and requirements to evaluate the suitability of plastic materials intended for optical applications in motor vehicles. The tests of this Standard are intended to determine physical and optical characteristics of the material only and are not intended to cover the performance of plastics when molded and installed in a finished assembly. Performance expectations of such a finished assembly, including its plastic components, are to be based on tests for lighting devices, as specified in SAE Standards and Recommended Practices for motor vehicle lighting equipment.

2. Definitions

2.1 Material—For the purpose of this Standard the term "material" includes type and grade of plastics, composition, and manufacturer's designation (number) and color.

2.1.1 COATED MATERIAL—A coated material is a material as defined in 2.1 which has a coating applied to the outer surface of the finished sample to impart some protective properties. "Coating" includes manufacturer's name, formulation designation (number), and recommendations for application. A trace quantity (100 ppm maximum in wet state) of an optical brightener shall be added to a coating formulation in order to test for presence of the coating.

2.2 Material Exposure

2.2.1 EXPOSED—Materials used in lenses or optical devices exposed to direct sunlight as installed on the vehicle.

2.2.2 SHADED—Materials used in lenses or optical devices exposed to direct sunlight only at angles less than 45 deg above the horizontal as installed on the vehicle, but exposed to other environmental and service factors.

2.2.3 PROTECTED—Material used in inner lenses for optical devices to provide protection as installed on the vehicle.

3. Test Requirements

3.1 Materials to be Tested—These tests shall be made on each material (defined in 2.1 and 2.1.1) offered for use in optical parts employed in motor vehicle lighting devices. A test of one color and formulation shall cover variations in dye concentration but shall not cover changes in dye materials, polymers, or coatings.

3.2 Samples Required

3.2.1 GENERAL—Samples of plastic shall be injection molded into polished molds to produce 3 in (76 mm) diameter discs with two faces flat and parallel. Each exposed surface of the samples should contain a minimum uninterrupted area of 5 in^2 (3226 mm^2).

3.2.2 THICKNESS—Samples shall be furnished in the following thicknesses:

THICKNESS		TOLERANCE	
in	mm	in	mm
0.062	1.57	±0.005	±0.13
0.125	3.18	±0.005	±0.13
0.250	6.35	±0.005	±0.13

3.2.3 NUMBER OF SAMPLES REQUIRED—Outdoor Exposure Test: 1 sample/each thickness, each site × 2 sites for each material = 2 samples/each thickness for each material.

Control: 1 sample each thickness for each material = 1 sample each.

NOTE: The control sample must be kept properly protected from influences which may change its appearance and properties.

3.3 Outdoor Exposure Test

3.3.1 EXPOSURE SITES—Florida (warm, moist climate) and Arizona (warm climate).

3.3.2 SAMPLE MOUNTING—One sample of each thickness of each material at each test station shall be mounted so that the exposed upper surfaces of the sample is at an angle of 45 deg to the horizontal, facing south. The exposed surface of the sample shall contain a minimum uninterrupted area of 5 in^2 (3226 mm^2), and they shall be mounted in the open no closer than 12 in (305 mm) to their background.

3.3.3 EXPOSURE TIME AND CONDITIONS—The time of exposure shall be as noted in 3.3.3.1 for each type of material exposed. During the exposure time the samples shall be cleaned once every three months by washing with mild soap or detergent and water, and then rinsing with distilled water. Rubbing shall be avoided.

3.3.3.1 *Exposure Time Based on Material Usage*

Exposed—(Defined by 2.2.1): 3 years
Shaded—(Defined by 2.2.2): 2 years
Protected—(Defined by 2.2.3): 6 consecutive months starting in May

3.4 Luminous Transmittance and Color Measurements—Measurements shall be made in accordance with ASTM E308, Recommended Practice for Spectrophotometry and Description of Color in CIE 1931 System.

4. Material Performance Requirements—A material in the range of thicknesses as stated by the material manufacturer, and as defined by 2.1 or 2.1.1 shall conform to the following conditions.

4.1 Before Exposure to Any Tests—The trichromatic coefficients shall conform with the requirements of SAE J578 in the range of thicknesses stated by the material manufacturer.

4.2 After Outdoor Exposure

4.2.1 LUMINOUS TRANSMITTANCE—The luminous transmittance of the exposed samples using CIE Illuminant A (2896 K) shall not have changed by more than 25% of the luminous transmittance of the unexposed control sample when tested in accordance with ASTM E308.

4.2.2 TRICHROMATIC COEFFICIENTS—The trichromatic coefficients shall conform with the requirements of SAE J578 in the range of thicknesses stated by the material manufacturer.

4.2.3 APPEARANCE—The exposed samples, when compared with the unexposed control samples, shall not show surface deterioration, dimensional changes, color bleeding or delamination.