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Determination of the Fogging Characteristics of Interior Automotive Materials

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1. Scope

1.1 This recommended practice describes two methods for determining the tendency of interior materials used in automobiles and other vehicles to (a) produce a light scattering deposit (fog) on a glass surface, or (b) produce a measurable deposit (mass) on aluminum foil.

1.2 This document is applicable to the measurement of a fog condensate on glass or aluminum foil surfaces within the limits of the test conditions.

1.3 It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to its use.

1.4 Rationale

This document has been edited for the following reasons: to eliminate redundancy, to commonize terminology, to consolidate methodology, eliminate specimen weighing in the gravimetric procedure, and to eliminate references to specific equipment suppliers per SAE policy.

2. References

2.1 Applicable Publications

The following publications form a part of this specification to the extent specified herein.

2.1.1 ASTM Publications

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 523—Standard Test Method for Specular Gloss
ASTM D 883—Standard Terminology Relating to Plastics
ASTM D 1125—Standard Test Methods for Electrical Conductivity and Resistivity of Water
ASTM D 1600—Standard Terminology for Abbreviated Terms Relating to Plastics

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2.1.2 ISO PUBLICATION

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 2813—Paints and Varnishes—Determination of specular gloss of non-metallic paint films at 20 degrees, 60 degrees and 85 degrees

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 DIN PUBLICATION

Available from Deutsches Institut für Normung e.V., Burggrafenstrasse 6, 10787 Berlin, Germany, www.din.de.

DIN 75-201—Determination of the Windscreen Fogging Characteristics of Materials in Motor Vehicles

2.2.2 BSI PUBLICATION

Available from British Standards Institution, Customer Services, 389 Chiswick High Road, London W4 4AL, United Kingdom, Tel: +44-0-20-8996-9001, www.bsi-global.com.

BS AU 168—Determination of the Windscreen Fogging Characteristics of Organic Trim Materials in Motor Vehicles

2.2.3 ISO PUBLICATION

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO/DIS 6452—Rubber- or plastic-coated fabrics—Determination of fogging characteristics of trim materials in the interior of automobiles

2.2.4 JASO PUBLICATION

Available from Japanese Automobile Standards Organization, 10-2, Gobancho, Chiyoda-ku, Tokyo 102-0076, Japan, Tel: +81-3-3262-8211, www.jsae.or.jp.

JASO M313-88—Standard Methods for the Testing of Automotive Vinyl and Leather (fogging method is included in the set of standards)

3. Definitions

Definitions are in accordance with ASTM D 883 and abbreviations with ASTM D 1600, unless otherwise indicated.

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3.1 Fog

Fog is an undesirable light-scattering deposit (fine particulate, oily material, and/or water condensation droplets) on the interior glass surface of a vehicle.

3.2 Fog Number

When using the photometric method, the quotient, expressed as the average of the 60 degree reflectance values of a glass plate with fogging deposits and the average of the 60 degree reflectance values of the same glass plate without fogging deposits, multiplied by 100.

3.3 Fog Mass

When using the gravimetric method, the difference between the weight in grams of the aluminum foil and condensate after testing, and the original weight of the clean foil.

4. Apparatus and Materials Required

Suitable equipment, supplies, and training materials can be obtained from the sources listed in Appendix C.

4.1 Fog Test Units

A controlled heating unit with multiple chambers and with a typical temperature range from 60 °C to 120 °C. Cooling of the glass plate for each beaker in the unit is required with a typical temperature range from 20 °C to 40 °C.

The heating unit and the cooling system must be able to maintain the temperatures to within ± 0.5 °C.

The cooling plates, which are laid upon the glass plates, should apply a weight of approximately 1 kg to ensure an adequate seal with the beaker.

4.2 Glass Plates

Float glass plates 3 mm ± 0.2 mm thick must be used. Glass plates for 400 mL beakers must be at least 83 mm x 102 mm. Glass plates for the 1000 mL beakers must be at least 110 mm x 110 mm.

The glass must have the tin and non-tin surfaces identified.

The tin and non-tin surfaces of the glass plates can be identified by viewing the surfaces in a darkened room under a UV light at 254 nm wavelength. The tin surface will fluoresce (have a white/yellow hue) when it is exposed to the UV light. The non-tin surface will have a blue/purple hue when it is exposed to UV light. The tin surface shall be engraved for identification purposes. The non-tin surface is the test surface and faces the sample during the test. A new glass plate must be used for each test.

4.3 Beakers

Berzelius tall-form beakers (400 mL or 1000 mL capacity without pouring spout) are acceptable. The top of the beaker shall have a flat portion to accept the annular seal.

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4.4 Metal Rings

Rings having a uniform weight and made of stainless steel or another inert material with a diameter to fit inside of the beaker may be used. The metal ring prevents solid test specimens from curling and producing non-uniform heating. The approximate dimensions and weights of the rings are 51 mm ± 0.7 mm ID; 57 mm OD and 38 g ± 2 g for 400 mL beakers and 73 mm ± 1 mm ID; 79 mm OD and 55 g ± 2 g for 1000 mL beakers.

4.5 Annular Seals

Silicone rubber seals, as recommended by the manufacturer, with a diameter to match the beaker rim must be used. The seals must be inspected before each use. If they are not soft and pliable or if they have cracks or voids, they are unacceptable and should be discarded.

4.6 Diisodecyl Phthalate (DIDP)

Diisodecyl phthalate (DIDP) may be used as an internal laboratory performance guide.

4.7 Glossmeter

When performing the photometric method, a suitable 60 degree glossmeter (gloss reflectometer) meeting the requirements of ASTM D 523 (Section 6.2), or ISO 2813 must be used.

4.8 Black Matte Surface

When performing the photometric method, the black matte surface the glass plates are placed upon to obtain gloss readings shall have a specular reflectance reading of less than 0.5 gloss units when measured with the 60 degree glossmeter.

4.9 Measuring Template (Optional)

When performing the photometric method, a template constructed from acrylic (or equivalent) may be used to precisely position the glossmeter on the glass plate. Refer to DIN 75-201 for detailed information. If a measuring template is used, a notation must be made on the Data Report (Appendix A).

4.10 Microscope (when required)

A suitable microscope with a 40 to 100 X magnification may be used to view the fog residue on the glass plate with the photometric method.

4.11 Analytical Balance

When weighing foils for the gravimetric method, a suitable analytical balance capable of weighing accurately to five places beyond the decimal point or a minimum accuracy of 0.00001 g is required.

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