



Non-Contact Staining Measurement of Elastomers

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This procedure is used to determine the migratory, noncontact staining potential of automotive elastomeric materials exposed to heat.

1.2 Applicability. This procedure can be applied to all elastomeric compounds which might generate objectionable stains in vehicle paint.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 7724-1

SAE J1545

SAE J1767

2.2 GM Standards/Specifications.

GMW14162

2.3 Additional References.

- Advanced Coating Technologies, 273 Industrial Drive, Post Office Box 735, Hillsdale, MI, 49242 (517) 439-1485.
- Technical Finishing (TFI).
- Part number S9184-50C from Sargent Welch, Cleveland, OH, (800) 252-1234.

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Glass bottles with a 38 mm opening and 120 mL capacity (e.g., part number S9184-50C from Sargent Welch, Cleveland, OH, (800 252-1234)).

3.2.2 The painted sheet metal panels shall be representative of the mating surface that the elastomer in service. Painted panels may be primer, basecoat, or basecoat/clearcoat. If basecoat or basecoat/clearcoat, the basecoat shall be white. All paint systems shall be representative of the production paint system that the elastomer will contact in service. Panels must have appropriate size for the fixture used.

The paint system and details of paint panel preparation will be defined by the GM Release Engineer or GM Materials Engineer.

Panels may be prepared by the assembly plant or other suitable source, such as Advanced Coating Technologies (ACT), Technical Finishing (TFI) or the respective paint supplier for the assembly plant.

Panels must be of sufficient size to cover the glass bottle and have enough space to measure unstained area.

3.2.3 Xenon Arc apparatus, to meet the requirements in 4.3.4.

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3.2.4 Spectrophotometer that fulfills the requirements to ISO 7724-1, or SAE J1545 and SAE J1767.

3.3 Test Vehicle/Test Piece.

3.3.1 Sample with surface area equal to (1000 to 1100) mm².

3.4 Test Time.

Calendar time: 2 days

Test time: 48 h

Coordination time: 24 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation. Not applicable.

4.2 Conditions.

4.2.1 Environmental Conditions. After paint is applied and prior to test, paint panels must be conditioned at (23 ± 3) °C for at least 72 h. If paint panels are not to be used within 168 h of paint application, they must be stored in a sealed container at temperatures at or below -30 °C. Condition for 72 h at 23 °C prior to usage.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 The test sample is placed leaning against the side of the glass bottle. A paint panel is centered over the opening of the bottle with the painted surface facing down. A weight is used to hold the panel in position.

4.3.2 Each glass bottle, test sample, and paint panel assembly are placed in a circulation oven at 120 °C for (24 +0/-1) h.

4.3.3 Remove each set-up from the oven and allow to cool to room temperature. When cool, remove paint panels.

4.3.4 To develop latent stain, the panels shall be exposed to Ultraviolet (UV) following the heat exposure. The paint panel should not be exposed to other light sources any more than necessary. Either:

- UV exposure (4 ± 0.5) h at (13 ± 2) W/m² or
- GMW14162/B/4 MJ/m² minimum.

4.3.5 Determine color change Delta b (Δb) to ISO 7724-1, or SAE J1545 and SAE J1767 (CIELAB (L*a*b* color space), 10 degree observer, metering orifice ≤ 25 mm, Illuminant D65, Specular Component Included (SPI)) or, CIELAB (L*a*b* color space, D65 illuminant, Specular Component Included (SPI)). Measurements are taken on both the stained and non-stained areas. Take measurements of the darkest and lightest areas within the circle and average the measurements (three readings per stain is sufficient). The difference is then calculated as follows:

$$\Delta b = b^*s - b^*ns$$

Where:

b*s is the b* value of the stained area.

b*ns is the b* value on the non-stained area.

Visual color change that is considered objectionable shall override the Delta b (Δb) measurement. Part must not exhibit objectionable color change.

4.4 Validity of Trials. Run test procedure using 1 g of Vanderbilt Agerite Stalite S as test sample. Perform five trials and average the results. The averaged Δb value should be between 5.0 and 10.0 for test to be valid.