



Flake Resistance Test of Color Identification for Parts Marking

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 specification defines the test methods and requirements of materials to color identify transmission and driveline components using materials such as opaque stains, dyes, marking pens, and inks to ensure these materials do not generate flakes adversely impacting system function.

1.2 Applicability. Any component internal to transmission or driveline including metallic and elastomeric parts.

1.3 Remarks. White color inks/dyes/stains tend to flake producing sediment and contribute to foaming. Therefore, this color should not be used in transmission applications.

2 References

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

2.1 External Standards/Specifications.

ISO 17025 SAE J2490

2.2 GM Standards/Specifications.

9986153 GMW3059 GMW16871 GMW17497

2.3 Additional References.

- Statement of Requirements (SOR)

3 Resources

3.1 Facilities. Test facilities and equipment shall be accredited to ISO 17025.

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. Not applicable.

3.3 Test Vehicle/Test Piece. A minimum of ten (10) pieces per color shall be tested unless otherwise specified.

3.4 Test Time. Unless otherwise specified.

Calendar time: 3 d

Test time: 72 h

Coordination time: 1 h

3.5 Test Required Information.

3.5.1 Color identification material may be applied by marking pen, dipping, spraying, or brushing.

3.5.2 Color identification material should be homogenously applied and uniform in appearance. The color identification material shall not adversely affect the dimension, function, or performance of the transmission, its components, or the transmission fluid. Color identification material is not intended to be permanent.

3.5.3 Opaque stain specific requirements: Dilute opaque stain concentrate with a proper solvent defined by the stain manufacturer to a ratio developed for the application. Stir, mix, or agitate and use within 24 h after mixing. The ratio shall be agreed upon by Materials Engineering.

3.5.4 Available colors include but are not limited to: black, yellow, light blue, dark blue, dark green, light green, orange, pink, brown, gold, gray, purple, silver, and violet.

3.5.5 Materials Engineering shall approve the specific color identification material type for each application/part.

Note: Red color is used to identify scrap parts and should not be used otherwise.

3.5.6 All materials tested to this standard shall be compatible with the Statement of Requirements (SOR) prescribed fluid per GMW16871. Fluid compatibility status is listed in GMW17497.

3.5.7 All materials supplied to this standard shall comply with GMW3059, Restricted and Reportable Substances, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

3.6 Personnel/Skills. Person familiar with flake resistant testing and the equipment to run the test.

4 Procedure

4.1 Preparation. Not applicable.

4.2 Conditions.

4.2.1 Environmental Conditions. Standard test temperature is 150 °C unless otherwise specified.

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 Requirements of Color Identification for Metallic Parts (Generic). Soak coated parts in Dexron® VI Automatic Transmission Fluid (ATF) per 9986153 (default fluid) or per SOR prescribed fluid at 150 °C for 72 h with mechanical agitation. Filter the fluid with 44 µm mesh (unless otherwise specified). Maximum sediment size should be measured at end of test. Acceptance criteria is to be defined by the product team.

4.3.2 Requirements of Color Identification for Elastomeric Parts. Color identification on elastomer parts should be avoided if possible. For applications where color identification is mandatory, the color of choice shall be approved by Transmission and/or Driveline Groups with minimum color contrast consistent for error proofing, and documented in supplier's control plan. Bright colors such as white, pink and yellow shall be avoided. When applied to elastomeric seal surfaces, color identification materials shall meet the following requirement.

4.3.2.1 Stretch seals (Two (2) pieces from every basket of parts coated, ten (10) pieces for initial approval) to the maximum extent that a part will experience during assembly or to reach a 50% elongation. Then squeeze the seal between your thumb and index finger with moderate force, and pull the seal from your fingers, equivalent to seal circumferential length. No coating flakes allowed larger than 1 mm observed (unless otherwise defined by the product team) with minimum 10x magnification. If this test fails, seals in the basket shall be discarded. Any tested seals shall never be shipped to customer. Test frequency may be adjusted to quarterly basis after capability established and approved by Transmission and/or Driveline Groups.

4.3.2.2 On quarterly basis, soak coated seals (five (5) pieces) per 4.3.1. Stretch the soaked seals and test as described in 4.3.2.1. No coating flakes allowed larger than 1 mm as observed with minimum 10x magnification and documented by microscope pictures and retain for 3 years.

4.4 Requirements of Ink Identification for Friction Plates. When applied to friction material, identification materials shall meet the following requirement.

4.4.1 No degradation in friction performance as determined by the results of testing per SAE J2490 when tested in SOR prescribed fluid.

4.5 Requirements of Color Identification for Metal Springs. Color identification on metal springs should be avoided if possible. But when necessary, color identification materials shall meet the following requirement.

4.5.1 In a room temperature bath of Dexron® VI ATF per GM 9986153 (default fluid) or SOR prescribed fluid, cycle ten (10) color identified springs between the maximum and minimum working heights for 10 000 cycles.