GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW14333

Resistance to Fuels of Exteriors Automotive Materials and Components

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. The objective of this standard is to determine the effects of fuels on exterior automotive materials and components.

1.1.1 Summary of Test Procedure. Using this method, resistance of sample parts to automotive fuels is determined by evaluation after repeated short immersions.

1.2 Applicability. Painted or mold-in-color vehicle components in locations with potential fuel exposure. Typically, this test is included as part of the performance requirements for painted plastic components.

1.3 Remarks. Using this method, resistance of sample parts to automotive fuels is determined by evaluation after repeated short immersions.

2 References

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

2.1 External Standards/Specifications.

ASTM D1744	DIN 51777-1	ISO 1817	ISO 10336

2.2 GM Standards/Specifications.

GMW3221	GMW14914

3 Resources

3.1 Facilities. Not applicable.

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 Apparatus for conditioning according to GMW3221.

3.2.2 Stop watch with 0.1 s divisions.

3.2.3 Suitable glass beakers to allow immersion of sample.

3.2.4 Sharp knife.

3.2.5 Test fuel composition per the following:

- ISO 1817 Liquid 2 with additional 20 ppm formic acid.
- 25.35%, 2.2.4-trimethylpentane (analytical grade).
- 42.25% toluene (analytical grade).
- 12.68% di-isobutylene (analytical grade).
- 4.22% ethanol (analytical grade).

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- 15.00% methanol (analytical grade).
- 0.50% water.
- 20 ppm formic acid (analytical grade).

Note: Also refer to GMW14914, Test Fuels for Global Applications.

3.2.5.1 This fuel composition must be used for all technology approvals. Additional applications of this procedure must be agreed upon by the responsible engineer. (i.e., Production Part Approval Process (PPAP) testing or problem solving, etc.)

3.2.6 Preparation of Fuel Test Fluid (Gasoline).

3.2.6.1 Mixture A. In a first step, the components trimethylpentane, toluene, and/or di-isobutylene, have to be mixed in a way that the final composition of the fluid corresponds to the composition as given in 3.2.5.

3.2.6.2 Water Content. Since the final fuel test fluid contains a specified amount of water, the primary water content of Mixture A shall be determined using the Karl Fischer Titration method (ISO 10336, ASTM D1744 or DIN 51777-1).

3.2.6.3 Mixture B. The volume parts of methanol and/or ethanol respectively shall be added to Mixture A with the appropriate volume parts of test fluid blend to give a composition approximating to that specified in 3.2.5.

3.2.6.4 Water Content (if Applicable). The water content of Mixture B shall be determined using the Karl Fischer Titration. Afterwards, distilled or deionised water shall be added to attain the required concentration.

3.2.6.5 Mixture C (Additives). Lastly, the acid (dissolved in absolute ethanol) or corrosive content shall be added to reach the final fuel test fluid (Mixture C).

3.2.6.6 Water Content (if Applicable). Water content of Mixture C shall again be determined to ensure compliance per 3.2.5. The test fluid shall be stored in a sealed brown or opaque glass bottle or suitable metal container.

Note: During the use of the test fluid, all orders and regulations concerned with safety must be observed i.e., flammability of fluids regulations and those relating to dangerous work materials.

3.3 Test Vehicle/Test Piece.

3.3.1 Plastic Parts. Wherever possible, complete components shall be tested. Where size, configuration, etc., restricts testing, sections of convenient size, cut from the components, shall be used. In such cases, the cut edges produced during preparation shall be suitably masked by the use of tape etc., prior to testing.

3.3.2 Organic Coatings. For organic coatings, specially prepared test panels can be used. The test panels shall be 250 mm ± 5 mm × 20 mm ± 2 mm × 1 mm ± 0.5 mm and should be made from substrate representative of production intent. The quality of the organic coating and its procedure of application shall be as per current final finish procedures appropriate to the envisaged application of the material under test. The organic coating shall be in accordance to the relevant material specification.

3.3.3 Self Adhesive Films. For self-adhesive films, the film shall be applied, as per production procedures to production intent surfaces prepared per 4.1.1, unless otherwise previously agreed.

3.3.4 Number of Test Pieces. A minimum of three (3) test pieces shall be tested.

Note: Samples shall be free from visual defects which could add to the severity of the test**.**

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation.

4.1.1 Test Sample Conditioning and Preparation. Test pieces shall be tested after conditioning to GMW3221 for periods as defined per 4.1.1.1.1 through 4.1.1.4.

4.1.1.1 Metallic Substrates.

4.1.1.1.1 For oven dried organic coatings, minimum of 24 h after coating and baking.

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