



Resistance of Coatings to Chemical Etching and Distortion

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 standard describes the test procedures to evaluate the sensitivity of paint coatings or films to etching, distortion or discoloration from exposure to assembly plant chemicals or severe outdoor environmental conditions.

1.2 Applicability. Paint coatings or films exposed to assembly plant chemicals or severe outdoor environmental conditions.

1.3 Remarks. Restricted and Reportable Substances for Parts. All materials supplied to this standard must comply with the requirements listed in **GMW3059, Restricted and Reportable Substances for Parts**.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

9985670	9986181	9986478	GMW16625
9985809	9986284	GMW3059	

2.3 Additional References.

Applicable Coating Material Specification

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 Thermal Gradient Bar; BYK - CHEMIE Model 2612, 250 C, RS232 Computer model or equivalent.
(See BYK 524 S. Cherry, P.O. Box 5670, Wallingford, CT 06492, (203) 265-2086).

3.2.2 Air-circulating electric oven.

3.2.3 Temperature measuring equipment (Datapaq system with thermocouples and thermistors or equivalent).

3.2.4 Pipette for application of test materials.

3.2.5 Clean, lint-free, nonabrasive wiping cloths.

3.2.6 Humidity cabinet.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Materials. Unless otherwise indicated in the Applicable Coating Material Specification, the coating or film shall be exposed to the materials in 3.3.2 and 3.3.3 during basic qualification. Testing of additional materials may be required for specific plant applications.

Note: Typical materials as in 3.3.2 and 3.3.3 are to be tested. Other regional specific materials may be selected by the responsible engineer. Confirm all materials with the engineer prior to beginning the test method.

3.3.2 Environmental Materials.

3.3.2.1 Acid rain mixture per GMW16625 at pH 3 and pH 4.

3.3.2.2 Sulfuric acid solutions in water: 10% by weight and a pH 0 and pH 2.0. (Adjust per GMW16625).

3.3.2.3 Calcium sulfate solution in water: 0.75% by weight and adjusted to pH of 4.0 with sulfuric acid.

3.3.2.4 Deionized water.

3.3.2.5 Egg Albumin: 2% by weight in deionized water. Utilize Fisher Scientific Egg Albumin, Soluble Impalpable Powder, and A388-500 or agreed upon equivalent.

3.3.2.6 Fuel Oil Soot: 4.0 g sodium metavanadate ($\text{NaVO}_3 \cdot \text{H}_2\text{O}$), 10.0 g ferrous sulfate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) and 8.0 g sulfuric acid, the reagents are added to deionized water to give a final volume of 100 mL and a pH value of approximately pH 1.2.

3.3.2.7 Basic Solution: The preparation of the solution is done by dissolving 4.0 g sodium hydroxide, 4.64 g sodium phosphate-dodecahydrate, and 0.33 g sodium chloride, in deionized water to make 1 L. This solution has a calculated pH of pH 13.0.

3.3.3 Plant Materials.

3.3.3.1 Motor oil, any commercial 5W-30 grade.

3.3.3.2 Windshield washer fluid, 9985670 concentrate of one to one (1:1) with tap water or commercial mixed materials, full strength.

3.3.3.3 Brake fluid, 9986478.

3.3.3.4 Poly alkaline glycol oil, 9986181.

3.3.3.5 Engine coolant, 9985809.

3.3.3.6 Diesel Emissions Additive (DEA) 9986284.

3.4 Test Time. As is required to complete testing requirements.

3.5 Test Required Information. See 5.3.

3.6 Personnel/Skills. Test technician capable of running test.

4 Procedure

4.1 Preparation. Test Panels shall be prepared using the specified processing such as film build and bake. Recommended panel size is 100 mm × 300 mm or larger. For tests with most materials, etching or distortion of the coating surface can be most easily observed on black panels. Where the primary effect is expected to be discoloration, white panels must be used. Because of test variability and rating subjectivity, control panels of similar current technologies should be run concurrent with the coating to be tested. Unless otherwise indicated, coated test panels or film samples shall be aged a maximum of 24 h at room temperature prior to exposure.

4.2 Conditions.

4.2.1 Environmental Conditions. Exposure to assembly plant chemicals or severe outdoor environmental conditions.

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 Test Procedure. Prior to testing, wipe panels with a 50/50 water-Isopropyl Alcohol (IPA) mixture. For all testing, apply 0.05 mL of the specified test solutions via pipette to the test panel. Multiple solutions can be evaluated on the same panel. Spotted panels are then tested per one or more of the following methods (see 4.3.1 a thru 4.3.1 d), unless otherwise indicated in the applicable coating material specification.

- a. Method One (1) and Method Two (2) shall be used for testing of environmental materials (except item 3.3.2.6; Fuel Oil Soot).

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