GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW15283

Cycle - Immersion Corrosion Test for Stainless Steel Molding Materials

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 a test procedure intended to simulate the corrosive environment encountered by the exterior stainless steel moldings on automobiles operating where highly corrosive agents are used for winter road deicing and/or where high corrosion load near coastal regions does exist.

1.2 Applicability. Not applicable.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ASTM D1193

2.2 GM Standards/Specifications.

None

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.

3.1.3 An automatic cycle timer and elevating mechanism to raise and lower test samples to specified requirements of section performance of test.

3.1.4 Heat Source. Air-circulating oven capable of maintaining (+41 ± 2) °C and < 30% relative humidity (RH). Airflow across samples should reach 0.25 m/s (50 ft/minute) or less.

3.2 Equipment.

3.2.1 Electrometric meter to be used for checking pH of solution.

3.2.2 Analytical balance with ± 0.1 mg sensitivity.

3.2.3 300 ml glass beaker with a height of 115 mm minimum.

3.2.4 Type J or K thermocouple.

3.2.5 Clear plastic grid 50 mm x 50 mm with 3 mm squares as outlined by 0.25 mm thick lines.

3.2.6 Test Solution.

Sodium Sulfate (Na_2So_4), anhydrous, reagent grade.

(Na_2So_4) Þ (0.5 ± 0.002) g.

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Sodium Sulfite (Na_2SO_3), anhydrous, reagent grade.

(Na_2SO_3) Þ (0.25 ± 0.002) g.

Sodium Thiosulfate ($Na_2S_2O_3$), anhydrous, reagent grade.

($Na_2S_2O_3$) Þ (0.1 ± 0.002) g.

Sodium Chloride (NaCl), reagent grade.

(NaCl) Þ (52.5 ± 0.1) g.

Calcium chloride dihydrate ($CaCl_2$ H_20) reagent grade Þ (52.5 ± 0.1) g.

Deionized water (per ASTM D1193 Type IV).

Note: These reagents should be stored in a desiccator container (over calcium sulfate).

3.3 Test Vehicle/Test Piece. Not applicable.

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 Solution Preparation.

4.1.1.1 Weigh out all reagents to the designated accuracy.

4.1.1.2 Add (25 ± 5) ml of deionized water to a clean 3 l beaker and slowly add the first 4 reagents in the order listed (i.e., Sodium Sulfate, Sodium Sulfite, Sodium Thiosulfate, Sodium Chloride); each reagent must be dissolved and thoroughly mixed before the next reagent is added. Label as Solution A.

4.1.1.3 Add (525 ± 5) ml of deionized water to a clean 1 l beaker and slowly add the calcium chloride reagent. Dissolve and thoroughly mix solution until clear. Label as Solution B.

4.1.1.4 Add Solution B to Solution A with continuous stirring of the composite solution; too rapid an addition of Solution B may cause the precipitation of calcium sulfate. If a precipitate forms, gravity filter through No. 42 Whatman filter paper and discard precipitate. Filter paper in comparable quality to No. 42 Whatman filter can also be used.

4.1.1.5 Adjust the pH of the solution to 9.3 ± 0.1 at room temperature of (+25 ± 5) °C immediately after preparation (using dilute NaOH and/or dilute HCL reagent grades).

Note: Shelf life of the test solution: Store the solution in stoppered brown glass bottles. The solution shall be used within 8 days following initial preparation with proper adjustments of pH at room temperature of (+25 ± 5) °C being made just prior to use in testing program.

4.1.2 Sample Preparation.

4.1.2.1 Cut samples to ≈ 50 mm x 50 mm in a shear; punch a 5.5 mm diameter hole in the top edge and polish all the edges.

4.1.2.2 Wash samples in Alconox or comparable detergent solution to achieve as near a water break-free surface as possible (i.e., scrub samples with nylon brush; soak samples (20 to 30) minutes; rescrub samples; re-soak samples 5 additional minutes using an Alconox or comparable solution 8 g/l, at (+43 ± 2) °C. Rinse cleaned samples, each with fresh room temperature of (+25 ± 5) °C water.

4.1.2.3 Immediately examine the samples visually for any pits, scratches, roughness, or other surface defects and record. Then begin test within 1 minute of cleaning.

4.2 Conditions.

4.2.1 Environmental Conditions.

4.2.1.1 All testing shall be performed in the air circulating oven maintained at (+41 ± 2) °C and < 30% RH. Airflow across samples should be reach 0.25 m/s (50 ft/minute) or less.

4.2.1.2 Measure the pH at room temperature of (+25 ± 5) °C.

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