GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW15487

Determining the Resistance to Abrasion of Organic Coating

1 Scope

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 shall be used to determine the resistance to abrasion of paints, varnishes and other organic coatings which have been applied to metallic or rigid non-metallic substrates.

1.2 Foreword. Not applicable.

1.3 Applicability. Organic coatings which have been applied to metallic or rigid non-metallic substrates.

2 References

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

2.1 External Standards/Specifications.

DIN EN 196-1 DIN EN ISO 11124-2 ISO 3310-1

2.2 GM Standards/Specifications.

GMW3221

2.3 Additional References.

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.

3.2 Equipment.

3.2.1 Suitable saw or shears for preparation of test pieces.

3.2.2 Suitable test rig for measuring coating thickness.

3.2.3 Test sieve to ISO 3310-1, 0.8 mm for test sand.

3.2.4 Abrasion test rig (see Figure A1).

3.2.5 Test Sand. Sand shall be conform to DIN EN 196-1, grain group (0.5 to 1.0) mm. The sand shall be sieved by a sieve as specified in 3.2.3. The retained material shall be selected for the testing sand that shall be used in this standard.

3.2.6 Chilled Iron Grit. Chilled iron grit shall conform to DIN EN ISO 11124-2, grain class (4.0 to 5.0) mm. The following iron grit shall be used: Chilled iron grit DIAMANT angular, code GH-K, grain class (4.0 to 5.0) mm, from Eisenwerk Würth GmbH & Co., Jagstfelder Str. 14, 74177 Bad Friedrichshall, Germany.

3.3 Test Vehicle/Test Piece. Square test pieces of at least 40 mm side lengths shall be taken; smaller components shall be placed together and adhered to the test piece holder to make up the minimum side length. The test pieces shall be taken from the finished part. If it is impracticable, tests shall be conducted on

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specially prepared test panels. These panels shall be prepared with the same coatings and correct layer thicknesses as the finished part. For initial sample approval, arbitration purposes, and routine quality control, at least three (3) test pieces shall be tested.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

Abrasion resistance as determined by this test method shall be defined as a measure of the effect of sand/chilled iron grit falling from a defined height onto the inclined surface of the coating. A defined volume of sand/chilled iron grit falls through a tube onto the surface. This process shall be repeated until an area of 35 mm^2 of the coating has been removed. The quantity of the needed sand/chilled iron grit must be measured. This value (in Liters (L)) divided by the thickness (in microns (µm)) is the abrasion resistance of a coating.

4.1 Preparation.

Test pieces shall be tested immediately after conditioning to GMW3221 for periods as follows:

For Oven-dried Organic Coatings: (24 to 30) h after coating and baking.

For Air-dried Organic Coatings: (72 to 96) h after coating and drying.

Parts From the Supplier: To be tested without conditioning, in the condition received.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

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 shall be performed at a temperature of (+23 ± 5) °C. Care shall be taken to ensure that the test piece has attained this temperature.

4.3.2 The coating thickness shall be determined to within ± 2 µm.

4.3.3. The quantity of specific test sand used for the test shall be dictated by the thickness of the coating being tested as follows:

- < 15 µm coating thickness 2.0 L ± 10 mL
- > 15 µm coating thickness 3.0 L ± 15 mL

After sand has been used for 100 passes, it shall be discarded.

The quantity of specific chilled iron grit for **anti-chip testing** with coating thickness > 100 µm is 2 L ± 10 mL ((8200 ± 40) g)

Chilled iron grit shall be discarded after 25 passes.

4.3.4 Procedure. The test piece shall be assembled to the holding panel, which is subsequently mounted to the test apparatus such that the test piece lies at an angle of 45° and the vertical distance between the base of the guide tube and the test piece surface is 25.4 mm (see Appendix A, Figure A1). The guide tube shall be vertical and rigidly attached to the main frame of the apparatus.

Test samples with a curvature radius (r) ≥ 100 mm shall be attached to the test device such that the contact point of the tangent running parallel to the support lies exactly on the axis of symmetry of the steel guide tube (see Figure 1).

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