



Organic Coating Performance for Underhood and Underbody Components

1 Scope

1.1 Material Description. This standard gives performance requirements for organic-coat finishes on the surfaces of underhood and underbody components. It also gives opportunity to specify the type of coating material to be used.

1.2 Symbols. Not applicable.

1.3 Applicability. These coatings are typically used on chassis components, as well as other underhood and underbody components.

1.4 Remarks. Eight types of paint are covered by this specification: Types A and B are both cathodic e-coats in two different thickness ranges. Type C is dip primer other than cathodic e-coat. Type D is powder coating. If Type E is specified, the applicator is free to choose Type A, B, C or D but must stay with this choice. Type F is to be further specified on the drawing using notes or a paint material specification. Type G is solvent- or water-based, spray-applied paint. Type H is a dip or dip spin high-performance coating commonly specified for high-strength control arms, links and cradles/framing. Type H coatings are normally used on bare steel substrates.

2 References

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

2.1 External Standards/Specifications.

ISO 2808

2.2 GM Standards/Specifications.

GMW3059	GMW14729	GMW15282	GMW16177
GMW3286	GMW14829	GMW15357	GMW17332
GMW14333	GMW14872	GMW15487	GMW17698
GMW14700	GMW15272	GMW15891	GMW17699

3 Requirements

3.1 Requirements on Test Specimens. Not applicable.

3.2 General.

3.2.1 Coatings shall be free of Chrome VI.

3.2.2 Chrome VI used as an adhesion promoter is impermissible.

3.2.3 Post-treatment, if performed, shall be Chrome VI-free.

3.2.4 Parts must be cleaned and receive a pretreatment using approved materials as shown in the GM Approved Materials Source List. Appropriate preconditioning procedures are required, e.g., tri-cationic zinc phosphate. The phosphate crystal morphology shall exhibit a maximum, predominant crystal size of 25 µm. Voids or streaking are not permitted.

Only phosphate materials approved to GM Engineering Standard GMW17699 (zinc phosphate) may be used. All requirements of GMW17699 must be met. Processing parameters should conform to those recommended by the chemical suppliers. De-ionized (DI) or reverse osmosis (RO) water rinses must be included and properly maintained in order to meet the processing performance requirements of this specification. Alternate processes must receive Engineering approval.

3.3 Coating Thickness. If parts have cavities that are prone to corrosion (e.g., cradle), a coating type must be selected which is able to protect the cavity areas with a minimum coating thickness of 10 µm for Types A, B and C. Type H shall have interior cavity thickness defined in the GM Approved Materials Source List. Types A, B, C and H are usually chosen for this type of application.

3.3.1 Type A. Cathodic e-coat, coating thickness: 16 µm to 22 µm.

3.3.2 Type B. Cathodic e-coat, coating thickness: 23 µm to 35 µm.

3.3.3 Type C. Dip primer (except cathodic e-coat), coating thickness: ≥ 30 µm.

3.3.4 Type D. Powder coating, coating thickness: ≥ 40 µm.

3.3.5 Type E. Coating thickness to be as specified for Type A, B, C or D, whichever has been chosen for the application.

3.3.6 Type F. For this type, the thickness shall be defined on the drawing or in the specified paint material standard.

3.3.7 Type G. Spray paint (e.g., electrostatic application of solvent-based paints or water-based paints). Coating thickness: ≥ 40 µm.

3.3.8 Type H. Coatings for high-strength chassis underbody components. The high-strength components are fabricated from bare, non-zinc pre-coated steel substrates and normally welded. The parts must be descaled by sandblasting or acid cleaning to remove weld oxides. Treatment operations must not have negative impact to the part performance. Residues (for example, of the blasting material or acid radicals) must be prevented.

The parts shall be coated with approved materials after cleaning. Approved coatings and thickness are identified in the GM Approved Materials Source List under this specification number. Coating systems typically consist of a corrosion-resistant primer and topcoat. Typical total coating thickness is 20 µm to 40 µm.

3.3.9 Coating Thickness. Coating thicknesses (dry film builds) are to be measured per ISO 2808. Individual paint layers are to be measured and reported independently.

3.4 Crosshatch Test. Paint adhesion shall be tested according to GMW14829, Rating 0 or 1 at delivery conditions and after high-humidity exposure (see 3.6).

For Types C, F and G paints that are cured at 115 °C or less on components exposed to service conditions in excess of 80 °C: Parts shall be exposed for 120 h ± 5 h in a drying oven at +120 °C ± 3 °C before conducting the Crosshatch Test.

3.5 Corrosion Testing.

3.5.1 Cyclic Corrosion Test. See Table 1 for the testing criteria for parts by location on the vehicle. Perform this test on parts after exposure to cyclic corrosion testing per GMW14872.

3.5.1.1 Types A through G. The parts shall meet the performance requirements of GMW15272. Part performance records shall be kept for reference and be available for review. Records shall indicate the part performance and the coupon mass loss at regular intervals (i.e., 5 cycles and 10 cycles).

3.5.1.2 Type H. The parts shall have a corrosion rating of 9 or better at exposure 0 and A. The parts shall have a rating of 8 or better at exposure D. Corrosion rating per the GM Engineering Corrosion Standards Rating Scale in GMW15357. Part performance records shall be kept for reference and be available for review. Records shall indicate the part performance and the coupon mass loss at regular intervals (i.e., 5 cycles and 10 cycles).

Note: Cyclic Corrosion Test must be done for Production Part Approval Process (PPAP).

3.5.2 Salt Spray Fog Test. The salt spray fog test may continue to be used as part of a development program when directed by GM Materials Engineering.

3.5.2.1 Bare Substrates.

3.5.2.1.1 Parts shall be exposed to salt spray fog per GMW3286 for 336 h (Types A through G) and 1000 h for Type H.

3.5.2.1.2 There shall be no corrosion (except along scribe lines), blisters or any change of surface. Total corrosion creepback according to GMW15282 shall be 3 mm maximum for Types A through G and < 1 mm for Type H. Slight rust is permitted but shall not exceed 20% of the length of exposed edges.

3.5.2.2 Zinc and Zinc Alloy-Coated Substrates. Salt spray fog test for 240 h (Types A through G).

3.5.2.2.1 There shall be no corrosion or any change of surface allowed. Slight white corrosion is permitted at edges, but shall not exceed 20% of the length of edges. Red rust shall not exceed 5% of the length of edges. Creep corrosion within 8 mm from edges is permitted and shall be a maximum of one-third of the painted surface.