



Painted Aluminum Road Wheels – Paint Performance Requirements

1 Scope

1.1 Material Description. This specification defines the performance requirements for pre-treatment, paint materials, and processing required to paint/coat aluminum road wheels. In some cases, this specification might be applied for aluminum wheel trim. Coating/Paint durability requirements are also included.

Note: For chrome aluminum wheels and wheel trim, refer to GMW15774. For chrome plated plastic wheel trim (including claddings) refer to GMW14668.

1.2 Symbols. Not applicable.

1.3 Applicability. Painted aluminum road wheels and wheel trim.

1.3.1 Classification/Wheel Types.

- **Type A.** Wheels with any clear paint(s) over bright metal sections of the disc outer and/or rim flange, for example, bright polished wheels and machined-faced wheels.
- **Type B.** Fully color painted wheels without any areas of clear paint(s) over bright metal on the disc outer and/or rim flange.

1.4 Remarks. This specification applies to all surfaces that are designated on the engineering part drawing to meet these requirements. Painted parts must meet these requirements prior to going into the field and must also satisfy GM's and its customers' expectations for appearance and cosmetic durability. All deviations from this specification must be agreed upon by GM and must be documented on the part drawing.

2 References

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

2.1 External Standards/Specifications.

ISO 4892-1	ISO/IEC 17025	SAE J2633	SAE J2635
ISO 4892-2	SAE J1976		

2.2 GM Standards/Specifications.

GMW3059	GMW14333	GMW14700	GMW15282
GMW3286	GMW14334	GMW14704	GMW15287
GMW14124	GMW14458	GMW14729	GMW15774
GMW14270	GMW14668	GMW14829	GMW15919

2.3 Additional References.

- GM Drawing Number 9591083
- GM Research Report CES-176

3 Requirements

3.1 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

3.2 Resources.

3.2.1 Calibration. The equipment used at the test facilities shall be in good working order and shall have a valid calibration label.

3.2.2 Facilities. All Tier 1 suppliers shall have ISO/IEC 17025 accreditation for their test facility for General Motors to accept data. Proficiency data shall be kept current and made available at the request of the GM Materials Engineer.

3.2.3 Equipment. All equipment and test procedures utilized to supply data to this specification shall be documented on the Scope of Accreditation for the facility.

3.2.4 Test Vehicle/Test Piece. Test pieces, wherever possible, shall be the finished part. If size, shape, etc., of the finished part is impracticable, tests shall be conducted on specially prepared coated test panels, as agreed upon by the appropriate GM Materials Engineer.

3.2.5 Test Time. There shall be no deviations from the minimum test times documented in this specification unless it is agreed upon by the GM Materials Engineer. Suppliers are encouraged to run parts in test to the point of nonconformance to understand ultimate performance.

3.2.6 Test Required Information. These test requirements are intended for routine acceptance and control of production painted parts using materials and processes previously found to be satisfactory. These test requirements do not represent the complete testing necessary for engineering approval.

3.3 Conditions. Parts should be tested at the earliest 72 h after final bake unless otherwise specified in a reference specification. A shorter aging time may be used, provided it is recognized that it represents a more severe condition of test. Laboratory conditions such as humidity and temperature, should be recorded to help understand any test anomalies.

3.4 Data. Proficiency data should be included in the test reporting format if it is required by the customer, e.g., filiform testing.

3.5 Safety. This procedure may involve hazardous materials, operations, and equipment. This method does not propose to address all the safety problems associated with its use. It is the responsibility of the user of the method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3.6 Documentation. Samples of components or material released to this specification shall be tested for conformity with the requirements of this specification and approved by the responsible GM department prior to the start of delivery of production-level components or materials.

Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture, requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

The entire verification test shall be repeated and documented by the supplier prior to start of delivery of a modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

Deviations from the requirements of the test procedures shall have been agreed upon. Such requirements shall be specified on component drawings.

4 Manufacturing Process

4.1 Appearance. Appearance must meet GM Drawing Number 9591083. Overspray must not interfere with retention of adhesive balance weights. Appearance of the clear and color must compare favorably to the approved engineering standards. For matching caps/trim and wheel counterparts, each supplier is responsible for utilizing production parts from their own process and from the other supplier's process as an ongoing quality control procedure to ensure color/texture match. The frequencies shall be included in the control plans. GM shall be consulted to review discrepancies.

4.1.1 Production Part Approval Process (PPAP). Color/appearance submissions shall be produced with production processing equipment and materials, and the processing parameters shall be documented at the time of color/appearance approval. All deviations from production intent shall be identified at the time of color/appearance approval.

4.2 Pre-treatment. Clean and pre-treat using the appropriate procedure. All products must meet GMW3059, and final coatings shall be Chrome VI-free. The selection of the pre-treatment system is left to the discretion of the wheel/trim supplier, providing all requirements of this specification are met, including Section 6. Pre-treatment materials shall be used in accordance with the supplier's recommendations for processing (e.g., bake or flash times and temperature, minimum thickness and bath monitoring).

Note: Production pre-treatment processes that use more than one chemical supplier are unacceptable. De-ionized (DI) water chemical companies are excluded from this requirement.

Pre-treatment coatings for bright metallic surfaces must be uniformly water clear and not change the color or appearance of the aluminum. There should be no evidence of a loose or powdery surface following coating application. There should be no visible stains or discoloration on the part subsequent to the final pre-treatment stages.

Parts should not be touched or handled in any way following pre-treatment and prior to painting unless clean cotton gloves are used.

Each pre-treatment system is required to contain a deoxidization process.

4.3 Organic Coating Requirements. The selection of powder, or powder and liquid clear paint systems for this application, is left to the discretion of the wheel/trim supplier, providing all requirements of this specification are met, including Section 6. Coating materials shall be used in accordance with the supplier's recommendations for processing (e.g., bake or flash times and temperature, minimum thickness and bath monitoring).

Accent color coatings, inks, etc., must be compatible with the primer and clear topcoat materials used on the part. They shall have no detrimental effects that might alter the appearance or durability of the part assembly. All pigments used in paints, inks, etc., must meet 4.4.12.

Edge film thickness data should be submitted with the validation (PPAP) data and incorporated into the control of the processing. The location of the measurement area will be determined by GM Supplier Quality or Materials Engineering.

4.3.1 Type A Requirements. Apply (acrylic) powder or (acrylic) liquid clear coatings to areas specified on the part drawing. All color paints, inks, etc., shall be coated with a clear topcoat in order to meet the cosmetic durability requirements.

Wheels and trim that are machined, polished, etc., after paint material has been applied must be reprocessed through the pre-treatment steps prior to any subsequent clearcoat application.

Apply clear topcoat(s) to areas specified on the part drawing. Dry film thickness for an acrylic powder or liquid, is to be 40 µm minimum. Acrylic powder is required for the clear topcoat.

An alternate coating system with an acrylic liquid clearcoat over polyester powder clearcoat may be used with GM Engineering approval. The dry film thickness of the liquid acrylic clearcoat and the powder polyester clearcoat shall be a minimum of 80 µm.