



Metallized Interior Decorative Components

1 Scope

This specification covers the material requirements for first surface, vacuum-deposited metal coatings which are visible and intended for decorative interior plastic trim components.

1.1 Material Description. Decorative constructions approved to this specification will require the use of a primer that enables adhesion, a metal layer from evaporative deposition (sputter-ion coating, low-temperature arc vapor deposition or physical vapor deposition (PVD)) that provides decoration and reflectivity, and a topcoat that protects the metallized finish.

The primer and topcoat finishes shall be fully cured with time and temperature cycles suited to the part composition. They shall provide maximum durability, appearance and metal adhesion. Materials used must be compatible with vinyl, fabric and other interior trim materials.

The metal layer shall be produced by evaporative deposition onto the primed surface. Its appearance shall be uniform and free from all shadows and color fringes on all significant surfaces except attachment tabs or pins. No runs, sags, wrinkles or skips shall occur on visible surfaces. The total surface finish (primer, metal and topcoat) must be a minimum of 25 µm in thickness.

1.2 Symbols. Not applicable.

1.3 Applicability. The typical decorative interior applications may include, but are not limited to, integrated center stack (ICS) surrounds; heating, ventilating, air conditioning (HVAC) trim, steering wheel switch plate and buttons, console trim, instrument panel trim, door handles and miscellaneous trim.

1.4 Remarks. Construction approval of the supplier responsible for the application of the primer, metal layer and topcoat construction must be completed before Integration Vehicle Engineering Release (IVER).

2 References

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

2.1 External Standards/Specifications.

ISO 105-A02	ISO 105-B06	ISO 20433	ISO/IEC 17025
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2.2 GM Standards/Specifications.

GMW3059	GMW14124	GMW14698	GMW15581
GMW3208	GMW14162	GMW14729	GMW16259
GMW3221	GMW14334	GMW14797	GMW16853
GMW3417	GMW14444	GMW14829	
GMW6992	GMW14445	GMW15572	

2.3 Additional References.

Subsystem Technical Specification (SSTS)

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.2 Emissions Testing of Interior Materials and Parts. For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

3.3 Testing Requirements. All approvals must be based on test specimens that represent the production part construction and geometry. Three (3) specimens per test shall be the minimum required. Test panels must be identical to the production-intent process, referencing substrate, primer, metal layer, topcoat and cure. All paint materials must be sprayed to nominal film builds as recommended by the paint source.

Additionally, there may be other unique component test requirements from GMW14444 and Engineering Subsystem Technical Specifications (SSTS) that metalized components may be required to meet.

3.3.1 Standard Conditions (GMW3221 Code B). Painted samples shall be subjected to the tests listed in following subsections after a minimum aging period of 72 h at room temperature following the baking or drying cycle.

3.4 Visual Evaluation of Automotive Trim (GMW6992 Code D). The color, gloss, reflectivity, aesthetics and other related qualities shall be approved by the GM Design Appearance Quality Department as an acceptable match to the Production Part Approval Process (PPAP) master when viewed under conditions set forth in GMW6992.

3.5 Construction Requirements. The following requirements describe the initial documentation and testing for new metalized constructions.

3.5.1 Sample Preparation and Identification. The plastic substrate, primer, metalized layer and topcoat shall be identified as follows:

3.5.1.1 Plastic Substrates.

- Molder/location
- Vendor
- GM specifications: GMW15581P ABS+PC T3/T6, GMW15572P ABS T2/T4, GMW16259
- Product code
- Thickness in millimeters (mm)

3.5.1.2 Primer.

- Painter/location
- Vendor
- Product code
- Process guidelines including thickness in microns (μm), cure and coats applied

3.5.1.3 Metal Layer.

- Vendor/location
- Metal
- Process guidelines, including evaporation method, chamber and environment conditions

3.5.1.4 Topcoat.

- Painter/location
- Vendor
- Product code
- Process guidelines including thickness in microns (μm), cure and number of coats applied.

3.5.2 Deviation from Defined Test Methods. Deviations from the conditions of any test method shall be agreed upon between supplier and vehicle manufacturer. All deviations shall be specified on the component drawings, material construction specification form and Statement of Requirements and shall be indicated as such on test certificates and reports.

3.5.3 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.

3.5.3.1 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.

3.5.3.2 If not otherwise agreed, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.5.4 Lab Accreditation. Lab testing shall be performed by a laboratory that conforms to ISO/IEC 17025 and is acceptable to the responsible GM department. Test reports must conform to ISO/IEC 17025, Sections 5.10.2 and 5.10.3. Supplier shall submit a letter of compliance.

3.5.5 Panel Testing. Initial testing shall be completed on plaques that represent the production-intent substrate, primer, metalized layer and topcoat. Parts may be used to complete these requirements if the surface geometry permits. Material supplier is required to submit all test specimens to the responsible GM Materials Engineer. The GM Program Materials Engineer, in conjunction with (as appropriate) the GM Materials Engineer responsible for interior paint raw material approval, has the final authority to determine the disposition of the results as meeting the requirements.

3.5.5.1 Cure. The cloth used to perform the cure test shall be a crock cloth per ISO 20433. The solvent used (to be performed on complete finished sample) shall be a minimum of 92% ethyl alcohol, denatured.

There shall be no coating degradation when viewed with a 10x magnifying glass after the following test:

- Five (5) back-and-forth rub strokes, approximately 50 mm in length, as applied with firm finger pressure, using cloth saturated with solvent

Note: There may be some visible transfer of color agents associated with this procedure, but there must not be any film degradation visible when viewed with a 10x magnifying glass.

3.5.5.2 Adhesion (GMW14829 (As-received)). Test specimens per GMW14829. Specimens shall have an appearance rating of 1, with a minimum of 95% topcoat remaining in the crosshatched area. Brittleness of coating, as evidenced by chipping or flaking during test line scribing, shall be cause for rejection.

3.5.5.3 Humidity Resistance (GMW14729 Option A or B). Test specimens shall be exposed to 168 h of GMW14729 Option A or B. After the 168 h of humidity, the exposed samples shall be blotted dry with absorbent paper or cloth. There shall be no evidence of blistering, water spotting or blooming when examined 1 minute to 5 minutes after removal from the humidity cabinet.

3.5.5.3.1 The specimen shall be tested per GMW14829 within 1 h after removal from the humidity cabinet. Crosshatch adhesion shall have an appearance rating of 1, with a minimum of 95% topcoat remaining in the crosshatched area. Brittleness of coating, as evidenced by chipping or flaking during test line scribing, shall be cause for rejection.

3.5.5.4 Heat Aging. The surface finish must not develop any perceptible color or gloss change, loss of adhesion, crazing, distortion or exuding after subjecting the specimen to 168 h at the classification temperature in an air-circulating oven.

3.5.5.4.1 The classification temperature shall be defined as the highest of three (3) temperatures that is below the plastic material heat distortion temperature as defined in the plastic materials specification: 85 °C, 95 °C or 105 °C. Oven temperatures shall not vary more than 2 °C. If the heat distortion temperature is specified at both 1820 kPa and 455 kPa, the value reported at 455 kPa shall be used. If the material has no specified heat distortion temperature, the classification temperature shall be determined by the GM Materials Engineer, referencing the part location in GMW14444 classification.

3.5.5.4.2 Specimens shall be tested per GMW14829 within 1 h after removal from oven. Crosshatch adhesion shall have an appearance rating of 1, with a minimum of 95% topcoat remaining in the crosshatched area. Brittleness of coating, as evidenced by chipping or flaking during test line scribing, shall be cause for rejection.

3.5.5.5 Environmental Cycling (GMW14124 Cycle M/GMW14829). The surface finish must withstand two (2) consecutive cycles of GMW14124 Cycle M, with the classification temperature as the maximum set point. There shall be no objectionable distortion, warpage, sag, crazing, delamination or any other undesirable effects.

3.5.5.5.1 Specimens subjected to environmental cycling shall be tested per GMW14829 at the conclusion of the second cycle. Crosshatch adhesion shall have an appearance rating of 1, with a minimum of 95% topcoat remaining in the crosshatched area. Brittleness of coating, as evidenced by chipping or flaking during test line scribing, shall be cause for rejection.