



Performance Requirements – Long Range Radar Emblem

1 Scope

1.1 Material Description. This specification covers the performance requirements of an exterior emblem that is located in the vehicle grille, and used with an adaptive cruise control system.

1.2 Symbols. Not applicable.

1.3 Applicability. This standard applies to all radar transparent emblems.

1.4 Remarks. A protective hard coating is required on the first surface for weathering and abrasion resistance. The preferred ultraviolet (UV) hard coating is approved to GMW17208 Type 1. Optional materials GMW17208 Type 2 (Ultraviolet (UV) Cure), GMW17145 (Thermal Cure) and 9984267 (Thermal Cure). Optional materials may only be used on new applications if approved by Bill of Materials (BOM) Family Owner and materials engineering. The hardcoating dry film thickness (DFT) must meet the minimum DFT recommended by the supplier. Hardcoating/substrate performance must meet GMW14797.

2 References

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

2.1 External Standards/Specifications.

SAE J2527

2.2 GM Standards/Specifications.

9984267	GMW14124	GMW14729	GMW17145
GMW3059	GMW14270	GMW14797	GMW17208
GMW3286	GMW14334	GMW14873	GMW17642

3 Requirements

3.1. After any of the exposures in Table 1, there shall be no objectionable surface deterioration (including, but not limited to chalking, crazing, tackiness, distortion, blistering) or objectionable color or gloss change. There shall be no loss of adhesion between layers (delamination), or between the emblem and the substrate. Prior to evaluation, wash samples using a sponge saturated with a solution consisting of a mild liquid detergent, such as unscented liquid Ivory or Joy (or equivalent) dishwashing soap, and deionized or distilled water at a ratio of 5:95.

Table 1: Finished Part Performance Requirements

Properties	Test Methods
Thermal Stress/Accelerated Humidity	240 h humidity, 75 °C and 95% relative humidity.
Humidity Resistance	GMW14729, 7 days exposure. Evaluate after 24 h ambient exposure.
Neutral Salt Spray Resistance	GMW3286, 96 h, unscribed specimens.
Moisture and Cold Resistance	GMW14124, Cycle A, 15 cycles.
Humidity Thermal Cycle Resistance	GMW14124, Cycle F, 3 cycles.
Heat Aging Resistance	168 h at 70 °C in an air-circulating oven.

Properties	Test Methods
Cleaning/Solvent Resistance	GMW14334, B-Rating 1.
Accelerated Weather Resistance Color Change Maximum $\Delta E \leq 3.0$	Xenon Arc Apparatus. Samples shall be exposed to 2500 kJ/m ² (for Production Part Approval Process (PPAP)). For information only and post validation audit, expose to 4500 kJ/m ² per SAE J2527 with extended ultraviolet (UV) filters. Wash weathered specimens prior to measuring and making observations. Wash with scrubbing action, using a sponge that is saturated with a solution consisting of soap and deionized water at 23 °C $\pm$ 3 °C
Natural Weathering ^{Note 1} Color Change Maximum $\Delta E \leq 3.0$	1 and 2 years exposure angles in Florida (5°) and Arizona (45°), direct weather open rack per GMW14873.

Note 1: See 3.2.

3.2. Not required for PPAP. Test samples will be on exposure in Florida and Arizona and will be submitted to Materials Engineering upon completion.

3.3 Thermal Shock Plus Rain-X Original Immersion.

3.3.1 Scope. Test three emblem assemblies through cold and hot cycles followed by chemical immersion in Rain-X Original Glass Treatment (yellow bottle) to ensure environmental robustness. Required for initial approval.

3.3.2 Procedure: Thermal Shock Plus Rain-X Original Immersion.

3.3.2.1 Cold soak emblems at -40 °C for 4 h. After 4 h, immediately put the emblems into thermal chamber at 70 °C for 20 minutes followed by -40 °C for 20 minutes. Repeat this hot/cold cycle four (4) times for a total of five (5) cycles. After the final cold cycle, remove parts and let them come to ambient temperature for 30 minutes.

3.3.2.2 Place enough Rain-X Original Glass Treatment in a shallow container and fill to a level that will cover the emblem when emblem is submerged.

3.3.2.3 Submerge the emblem into the solution for 1 minute assuring that there is adequate solution to cover the interfaces between the acrylic insert and the bezel (if applicable).

3.3.2.4 Remove emblem and lightly shake and tilt emblem to remove any residual solution. (There will still be solution between the components.)

3.3.2.5 Do not dry the part.

3.3.2.6 Place in a rack or fixture that would allow the emblem to sit in a vertical position unless otherwise directed.

3.3.2.7 Place in humidity chamber (GMW14729, Option A) for 24 h.

3.3.2.8 Repeat 3.3.2.2 thru 3.3.2.7 two more times (a total of three immersion cycles).

3.3.2.9 Remove emblem from the chamber and inspect the emblem.

3.3.3 Requirement: Thermal Shock Plus Rain-X Original Immersion. No objectionable first or second surface deterioration (including, but not limited to chalking, crazing, tackiness, distortion, blistering, objectionable color or gloss change, deposited metal corrosion, or adhesion loss).

3.4 Liquid Dye Penetration Test.

3.4.1 Scope. Test standard's test population of ten emblem assemblies through the liquid dye penetration test to visually detect contamination intrusion into the part. This test uses full emblem assemblies that are assembled using non-decorated (no decorative coatings/deposited metals) clear lenses so any intrusion of dark food coloring may be visible after test. Some constructions may not be compatible with this test method. Omission requires approval of Bill of Materials (BOM) Family Owner (BFO) and materials engineering.

3.4.2 Materials Required: Liquid Dye Penetration Test.

- Pressurized container large enough to submerge part(s) for test. See Figure A1 in Appendix A for an example.

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