

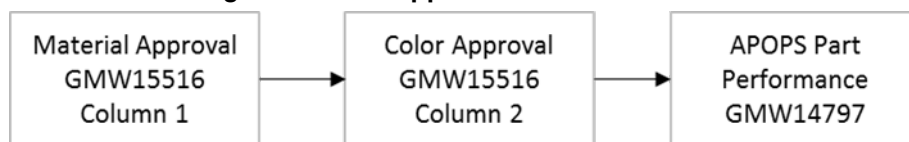


Interior Paint for Styrenics

1 Scope

1.1 Material Description. The requirements listed in this specification must be met by all interior paint systems used in all GM vehicle interiors. Paint systems must follow the steps in Figure 1 to complete the paint approval process of a part.

Figure 1: Paint Approval Process of a Part



Note: AOPS = Approved Paint on Parts.

1.2 Symbols.

1.2.1 Paint Types. For a paint material approval, the paint system is required to be listed as approved in the GM Materials Approved Source List system. Paint systems approved to this specification shall be required to carry a type suffix to indicate classification and the haptic feel that it has to the human skin. The suffix system shall be:

- Type C: Non-Haptic Paint, PGF Gloss Capable
- Type C(LE): Laser Etch
- Type C(BC): Basecoat/Clearcoat
- Type D: Non-Haptic Paint, PGC Gloss Capable
- Type F: Satin Touch per GMHM012 Master, PGC Gloss Capable
- Type M: Metallic
- Type M(BC): Metallic Basecoat/Clearcoat
- Type M(LE): Metallic Laser Etch

Type F haptic feel must be approved by the GM Design Quality Paint Development Lead prior to evaluating the paint system performance. Paint types with an assigned GM haptic master shall have all paint system performance testing (Table 1, Column 1) reviewed by the region that originated the haptic master prior to GM Materials Approved Source List approval. After the system approval, color approvals are approved by any GM region.

1.3 Applicability. This specification covers requirements for an interior, waterborne or solventborne, one (1) or two (2) component paint system for use on parts made of paintable styrenics including acrylonitrile butadiene styrene (ABS), polycarbonate (PC), and acrylonitrile butadiene styrene plus polycarbonate (ABS+PC) blends. All substrates must be tested per GMW16172 to confirm paintability.

1.4 Remarks. It is strongly recommended that paints approved to this specification are direct adhesion to styrenics. However, in some applications such as Type F, styrenic substrates can be pretreated by using a primer. All new colors must be evaluated per Table 1, Column 2.

2 References

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

2.1 External Standards/Specifications.

ASTM D523	ISO 2808	ISO 20433
ISO 105-A02	ISO 2813	

2.2 GM Standards/Specifications.

GMW3059	GMW14162	GMW14729	GMW15891
GMW3208	GMW14270	GMW14797	GMW16172
GMW3221	GMW14334	GMW14829	GMW16727
GMW3417	GMW14445	GMW15572	GMW16853
GMW14125	GMW14698	GMW15581	

2.3 Additional References.

- GMHM012 Master Plaque (available at www.thierry-corp.com)

2.3.1 Cleaners.

- Ammoniated Window Cleaner (North America)
- Armor-All (North America)
- Armor-All Protectant (North America)
- Fantastik (North America)
- Formula 409 (North America)
- Sonax Interior Cleaner 321200 (Europe)
- Sonax Stain Remover 653200 (Europe)
- Sonax Window Cleaner 338241 (Europe)

3 Requirements

3.1 Sample Conditioning. All samples are to be conditioned prior to each requirement test to GMW3221, Code B. Painted samples shall be subjected to all testing after a minimum aging period of 72 h following the baking or drying cycle.

3.2 Paint System Requirements. The paint system tested on the panels must be identical to the production intent paint system.

3.3 Sample Preparation and Identification. The plastic substrates and paint system shall be identified per 3.3.1 and 3.3.2.

3.3.1 Plastic Substrates. Use only substrates as defined in Table 1.

- Vendor
- Compound number

3.3.2 Paint System.

- Vendor
- Primer name (if applicable)
- Paint formulation
- Processing conditions, including all reduction parameters, surface preparation, flash and cure times and temperatures and dry film thickness for each film of paint applied

3.4 Testing. Perform all testing as indicated in Table 1 and Table 2.

3.4.1 GM Confirmation Testing. For all Table 1, Column 1 Material Approvals (in addition to 3.4), three (3) panels per combination listed in Table 1 must be submitted for sunscreen and insect repellent resistance testing and resistance to fine scratching to be performed by GM Materials Engineering.

3.4.2 Test Report. Use the appropriate table in Appendix A (Tables A1, A2 and/or A3) to record all test results. For laser etch paints, it is only required to test over the GMW16727 substrate. GMW15572 and GMW15581 substrates are not required. Paint systems that require laser etching to substrate should choose a substrate approved to GMW16727 that contains Ultraviolet (UV) stabilizer for testing. Testing for laser etch paints shall either be done on wedge panels or laser etched samples. A wedge panel is defined as a panel that has equal

size strips of each individual paint layer exposed and tested. The test samples must meet all **Sunscreen and Insect Repellent Resistance** and **Effects of Cleaners and Lotions** requirements when tested at all different paint layer interfaces. The number of layers tested and approved for the laser etch paint system shall be clearly documented in the Remarks Section of the GM Materials Approved Source List approval.

All testing to be completed on flat plaques unless noted as **Grain** in Table 2. Grained plaque testing to be done over GMGA001 Darwin grain. If GMGA001 is not available, consult with GM Materials Engineering for a similar regional animal grain with similar grain depth and a random pattern. Grained plaque testing is not required for Type M approvals.

Table 1: Required Testing Combinations

Purpose:		Combinations to Test:		
Column 1	Paint System Approval	Substrate: GMW15572-ABS-T2	Substrate: GMW16727-PC	Substrate: GMW15581-ABS+PC-T3
		Colors: If Type D/F: Red and Blue Paint at Primary Gloss C (PGC) Gloss If Type C: Red and Blue Paint at Primary Gloss F (PGF) Gloss If Type M/M(BC): Nova Silver or Similar Bright Metallic Note: For Resistance to Fine Scratch, must also test Black Paint.		
Column 2	Color Approval	Requested Color and Substrate		

Note: ABS = acrylonitrile butadiene styrene, PC = polycarbonate, ABS+PC = acrylonitrile butadiene styrene plus polycarbonate.

Table 2: Testing Requirements

Test	Standard	Requirement	1	2
			Number Samples	
Film Thickness	ISO 2808	Paint supplier specify range ^{Note 1} . Report actual values of samples.	1 ^{Note 2}	1
Appearance	Visual check	No objectionable defects, must match standard	1 ^{Note 2}	1
Gloss	ISO 2813 or ASTM D523	Report 60° value	1 ^{Note 2}	1
Cure	GMW15891, 92% minimum denatured ethyl alcohol	Rating ≤ 1 for monocoats, Rating = 0 for base/clear	1 ^{Note 2}	1
Initial Adhesion	GMW14829 Method A	Rating ≤ 1	3 ^{Note 2}	3
Humidity	Perform the following cycle: 144 h per GMW14729, Recover 1 h at room temperature, perform GMW14829, Method A	Rating ≤ 1, No objectionable defects	3 ^{Note 2}	3
Oven Age + Humidity	Perform the following cycle: 168 h in Oven ^{Note 3} , Recover 1 h at room temperature, 24 h per GMW14729, Recover 1 h at room temperature, perform GMW14829, Method A	Rating ≤ 1, No objectionable defects	3 ^{Note 2}	3

Test	Standard	Requirement	1	2
			Number Samples	
Effects of Cleaners and Lotions	For each cleaner Note 4 , apply ten (10) drops for 1 minute to paint at room temperature. Per ISO 20433, perform ten (10) double strokes of approximately 50 mm in length. Evaluate color transfer to the crock cloth and color change on the test plaque.	Rating ≥ 4 per ISO 105-A02	1 Note 2	1
Sunscreen and Insect Repellent Resistance	GMW14445 followed by GMW14698, 1 mm hemispherical tip, 8 N load Type M Only: 30 minutes after removal from oven, run 50 double strokes of Color Crock per ISO 20433 over exposed sunscreen exposed area	Rating ≤ 2 Note 5 For Scratch and Color Crock (Type M), no penetration of surface when evaluated with and without 10x magnification	3 Note 2 Flat and Grain	3
Color Crock	ISO 20433 Dry Rubbing Method, ten (10) double strokes	Rating ≥ 4 per ISO 105-A02	1 Note 2	1
Wear Resistance	GMW3208, CS-10 wheel, 500 g load, 1000 cycles per nominal 25 μ m dry film build	No wear through to substrate or adverse effects. If primer used, no wear through to primer	1 Note 2	1
Scratch and Mar Resistance - Initial	GMW14698, 1 mm hemispherical tip, 13 N load	No penetration of surface when evaluated with and without 10x magnification. No obvious visually apparent marring	1 Note 2	1
Scratch and Mar Resistance - After Oven Age	168 h in Oven Note 3 , Recover 1 h at room temperature followed by GMW14698, 1 mm hemispherical tip, 13 N load	No penetration of surface when evaluated with and without 10x magnification. No obvious visually apparent marring	1 Note 2	1
Resistance to Fine Scratching	For Types C/D/F Only: GMW14125, Appendix K, Record Gloss at 60° and 85°	Initial Gloss at 60°: ≤ 1.8 Gloss Units for Types D/F ≤ 4.0 Gloss Units for Type C Gloss Change at 85° ≤ 1.5 Gloss Units	3 Note 6	3
Perspiration Resistance	GMW14334/C followed by GMW14698, 1 mm hemispherical tip, 8 N load	Rating ≥ 4 to 5 per ISO 105-A02 No objectionable defects No penetration of surface when evaluated with and without 10x magnification	1 Note 2	N/A
Odor	GMW16853	See GMW16853	1	N/A
Fogging	GMW16853	See GMW16853	1	N/A
Emissions	GMW16853	See GMW16853	1	N/A
Colorfastness to Artificial Light	GMW14162, Method D, 1240 kJ/m ² or GME Only: GMW14162, Method B, 44 MJ/m ²	Delta E ≤ 3.0 No objectionable defects Rating ≥ 4 per ISO 105-A02 or GME Only: No objectionable defects Rating ≥ 4 to 5 per ISO 105-A02	3 Note 2	1