GM WORLDWIDE ENGINEERING STANDARDS	**Material Specification**	**GMW16146**

New Accent Paint Color Evaluation

1 Scope

The specification covers the durability and performance requirements for evaluation of new accent colors or pigmentation changes in approved accent color, basecoat or clearcoat technologies for exterior trim. This specification does not apply for topcoat colors which will be supplied to GM assembly plants or colors developed for exterior part sources that match topcoat colors for vehicle body.

1.1 Material Description. Materials qualified to this standard must meet the performance requirements as shown in Appendix A, Table A1, Table A2, and Table A3 and documents as shown in the examples in Appendix B, Figure B1, Table B1, Figure B2, and Figure B3. Additional testing may be requested in writing, by the responsible engineer.

1.1.1 Material Identification. Color description is to include:

- Color name; GM-XXXX.
- Color coding; WA-XXXX finish code.
- Supplier code and batch number used for testing.
- Applicable basecoat and clearcoat technologies, e.g., 998XXXX, L number or other regional or global specifications.

Note: XXXX is used as a placeholder for the color code number entered into the appearance database.

1.1.1.1 Qualified to this Material Specification. Testing per this specification is required by a change in pigment type or a combination of pigments not previously used together. In addition, a change in the level of a pigment or a change in Pigment to Binder (PB) ratio may also require this specification to be completed. The GM paint engineer will make the final decision whether or not to test such changes to the PB ratio.

1.2 Symbols. Not applicable.

1.3 Applicability. The intent of the testing is to ensure that all future GM colors, in approved topcoat technologies, will meet performance criteria as affected by pigmentation. This testing generally includes evaluation of colorfastness, chip resistance, flexibility, and resistance to Ultraviolet (UV) transmission.

1.3.1 Performance criteria are dictated by the substrate/paint combination. Generally, all paints which apply to this standard must meet the requirements of GMW3005, Generic Topcoat Qualification.

1.3.2 All new accent colors are to complete two (2) years of outdoor exposure. If the new accent color uses pigments that have previously been evaluated, one (1) year is acceptable, provided that the color passes all other short term tests, including Xenon (4500 kJ/m^2). Pigments do not include metal flakes.

1.3.3 For tint clearcoat colors, a minimum of two (2) years of outside exposure prior to production is required for all clearcoat technologies proposed, provided that all other short term tests including Xenon (4500 kJ/m^2) have passed.

1.4 Annual Color Durability Review. Formal reviews of all exposure panels must be held and reports generated. Refer to all figures and tables in Appendix A and Appendix B. All panels shall be retained by the supplier.

1.4.1 Additional reviews will be held for individual pigment performance on proposal of use by a topcoat supplier.

2 References

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

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2.1 External Standards/Specifications.

ASTM D279	ASTM D2697-03	ASTM D4212	SAE J2527
ASTM D2196	ASTM D3763	ISO 2811	
ASTM D2369-04	ASTM D3960	SAE J1545	

2.2 GM Standards/Specifications.

GMW3005	GMW3059	GMW14729	GMW15187
GMW3008	GMW3221	GMW14829	GMW15545
GMW3011	GMW14700	GMW14873	

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

3.1 A full description of the material and documentation of performance compliance is required. Performance is specified in GMW3005.

3.1.1 Requirements on Test Specimens. All samples are to be conditioned prior to each test to GMW3221, Code A.

3.2 Chemical Requirements. Pigment Stability Verification. The supplier must document that the items in 3.2.1 and 3.2.2 are stable as shown in the example in Appendix B, Figure B1.

3.2.1 The pigment is nonbleeding (ASTM D279).

3.2.2 The pigment is not photochromatic.

3.3 Mechanical Requirements. Not applicable.

3.4 Physical Requirements. Formula (theoretical) values for weight solids (ASTM D2369-04), volume solids (ASTM D2697-03), and Volatile Organic Compound (VOC) (ASTM D3960) at viscosity used to spray the test panels; density (ISO 2811); initial and application viscosity (ASTM D4212) for Newtonian fluids or (ASTM D2196) for non-Newtonian fluids, document all data as shown in the example in Appendix B Figure B1. Identify pigment hardness (Appendix B, Figure B1).

3.4.1 Black/White Hiding Filmbuild. Unless otherwise agreed upon, hiding must be no more than 33 μm (1.3 mils) for waterborne basecoat colors; 38 μm (1.5 mils) for solvent basecoats and 50 μm (2.0 mils) for monocoats.

3.4.2 Pigmentation. Pigmentation is to be provided by detailed chemical name, color description and supplier code; each pigment as a percent of total pigment; average flake size if applicable and validation of the applicable pigment exposure requirement from 1.3.2 in terms of time of completion, where available; and the pigment-to-binder ratio. Further identification of specific pigment and source must be provided upon special request.

3.4.2.1 Pigment Ranges. The supplier must also provide pigmentation ranges as defined in the material safety data sheets (MSDS) for all new and approved colors.

3.4.2.2 Pigment Requirements. Any new pigment or pigment combination not previously used in any GM color or a pigment or pigment combination not previously used in the proposed resin system, must have two (2) years Florida exposure data reviewed and approved prior to use.

3.4.3 UV Fortification Package. Identification of the chemical class, supplier code and amount of screener and/or hindered amine light stabilizers in each color, as a percent of weight solids.

3.5 Bake and Film Build Nomenclature:

- Target (T) = Desired operating condition.
- Low (L) = Minimum such that all requirements are met.
- High (H) = Maximum such that all requirements are met.
- (T/T) = Target film build/Target bake temperature.

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Note: The film build minimum (L) for all colors must be equal to or greater than the technology minimum, and must also meet all chemical, physical, performance, and appearance requirements. See Table 1.

Table 1: Film Build Technology Minimum

Technology	Minimum Film Build
Adhesion Promoter	7.5 microns (0.3 mils)
Powder Primer Surfacer	38 microns (1.5 mils)
Liquid Primer/Primer Surfacer: • Waterborne • Three (3) Wet non-compressed • Solventborne • Primer for parts	15 microns (0.6 mils)
Liquid Monocoat	38 microns (1.5 mils)
Powder Monocoat	38 microns (1.5 mils)
Solventborne Basecoat	15 microns (0.6 mils)
Waterborne Basecoat	15 microns (0.6 mils)
Clearcoat	38 microns (1.5 mils)

Note: Additional film build may be required to meet all process and appearance requirements.

3.6 Application Equipment. Document the equipment and parameters used for preparing the test panels.

3.7 Rigid Topcoat Systems for Metal. Use unpolished Cold Rolled Steel (CRS) panels, see Test Substrates in GMW3005, with a current approved phosphate and electrodeposition primer. Apply surfacer as appropriate for the application. See Pretreatment Coating for Metallic Substrates in GMW3005. Reference GMW3011 for phosphate primer and GMW3008 for electrodeposition primer.

3.8 Rigid and Flexible Topcoat Systems on Plastic. Use Thermoplastic Olefin (TPO) substrate per GMW15187, power washed, with adhesion promoter, as indicated in GMW3005. Topcoats applied direct to substrate must be tested over the specific substrate intended for production.

3.9 Control Panels. The supplier is expected to incorporate control procedures into panel preparation such that there are no unusual incidents of contamination at outdoor exposure sites.

3.10 Test Requirements. The test requirements for this specification are shown in Appendix A, Table A1 through Table A3. Where applicable, combined laboratory testing may be performed on the same panel, i.e., gravelometer and humidity/adhesion tests may be performed on upper/lower halves of one (1) panel. Performance testing may not be combined with any panel which is intended for evaluation of appearance after Florida exposure or Xenon test.

3.11 Initial Testing. Initial testing is viewed as part of the color approval process. Initial testing includes:

- UV transmission
- Gravelometer
- Adhesion/humidity adhesion and BYK Wavescan

Note: Test requirements are detailed in the corresponding GM test specifications. Example reports are as shown in Appendix B, Figure B1, Table B1 and Figure B2.

3.12 UV Transmission Requirements (GMW15545).

3.12.1 UV Transmission Film Builds. For UV transmission testing of new colors, minimum film build (L) baked for 20 minutes at substrate target temperature.

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