



Waterborne Basecoat Compatible Primer Component for Semi-Compressed Integrated Topcoat System

1 Scope

This specification covers the qualification and performance requirements of Waterborne (WB) Basecoat Compatible Primer (BCP) that is applied to rigid substrates.

1.1 Material Description. These primers are WB technologies and are components of rigid topcoat systems that are used in conjunction with 9986475 and 9984515.

1.1.1 Specified herein are material requirements per the Manufacturing Engineering (ME) Vehicle Systems Paint Materials Group. These specifications are used to verify the materials have been processed to produce a finished product of quality consistent with that proven in initial qualification testing.

1.2 Symbols. Not applicable.

1.3 Applicability. These waterborne primers are typically applied to electro-coated surfaces or appropriately primed rigid plastics. Following the primer application, an ambient flash is employed to dehydrate the primer prior to WB basecoat (BC) (9986475) application. The WB BC is then applied and dehydrated in a heated flash. Following the 9984515 clearcoat (CC) application, the entire system consisting of primer layer, BC layer and CC layer is baked simultaneously in a single bake, as described in 3.2.

1.4 Remarks. Each combination of BCP, BC and CC must be tested and approved as a topcoat system. The individual components are not interchangeable between suppliers unless otherwise tested and approved. In addition, the topcoat system is part of the total coating system and must meet qualifications set forth in this specification and those shown on Engineering Drawings. Validation Testing for Plant-Specific Layering, Ancillary Materials and Processing must be conducted before release.

2 References

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

2.1 External Standards/Specifications.

ASTM D1186	ASTM D3960	IATF 16949	ISO 2811
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2.2 GM Standards/Specifications.

9984515	GMW3005	GMW15545	GMW17405
9986475	GMW3059	GMW15777	GMW17434
GMW3002	GMW14270	GMW17328	

2.3 Additional References.

- Advanced Product Quality Process
- Engineering Drawings
- Performance Specifications
- Validation Testing for Plant-Specific Layering, Ancillary Materials and Processing

3 Requirements

Individual material sources may differ in their physical or chemical properties. Upon submission, all material properties, system performance, and system processing properties shall meet the performance specifications as outlined by the responsible engineer. The percent volume non-volatiles for each primer color must not exceed $\pm 1.5\%$ of the established baseline. The percent volume non-volatile data will be acquired from the Certificate of

Analysis (COA). Film build target and range baseline for a given primer color are established during the GMW3002 qualification process. Volume non-volatile and film build baseline properties shall form the basis of all subsequent lots. Deviation from these established baseline properties must be approved by the appropriate GM engineer.

3.1 Requirements on Test Specimens. Material submitted for qualification to this specification must meet all the material, performance and processing requirements of GMW3005, Type A and/or Type B, Class 1 and GMW3002 as applicable for WB three wet, also known as 3-Wet or 3Wet, primer.

3.2 Processing Requirements. Primers covered under this specification are intended to be applied wet on wet under the BC and CC layers. Processing or material requirement differences are specified.

3.2.1 Booth Conditions. Booth humidity level during application is to be controlled. A nominal operating range of $65\% \pm 5\%$ relative humidity (RH) at $24\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ ($75\text{ }^{\circ}\text{F} \pm 5\text{ }^{\circ}\text{F}$) defines a humidity ratio range of 0.012 per pound of moisture per pound of dry air ± 0.0005 per pound of moisture per pound of dry air. Supplier shall establish the optimum booth conditions and humidity ratio tolerance level required to maintain consistent appearance without formulation adjustments.

3.2.2 BCP Application. The BCP primer is typically applied to the vehicle exterior in one-coat application. Should interior application be required, determination of flash time limitations between interior and exterior coats and appropriate sequence of operations must be demonstrated.

3.2.3 Ambient Flash Before Exterior BC Application. Typical ambient flash times from exterior BCP application to exterior BC application ranges from 3 minutes to 11 minutes. Supplier shall demonstrate the influence of environmental conditions and flash time robustness to achieve required dehydration solids levels for consistent appearance and to prevent defects. Specific flash times and environmental conditions shall be per agreement with the responsible approving materials engineer.

3.2.4 Bake. Following subsequent application of BC and CC, the BCP shall be co-baked with the other constituents of the integrated topcoat paint system. The nominal bake for this system is 20 minutes at a target temperature of $129\text{ }^{\circ}\text{C}$ to $135\text{ }^{\circ}\text{C}$ ($264\text{ }^{\circ}\text{F}$ to $275\text{ }^{\circ}\text{F}$) substrate temperature. Supplier shall provide bake time and temperature charts showing the bake processing window wherein all performance requirements are met per GMW3005. To account for typical variation across the vehicle, performance must be retained across a bake range of 15 minutes to 80 minutes and temperature range of $-6\text{ }^{\circ}\text{C}$ to $+14\text{ }^{\circ}\text{C}$ from the target temperature.

3.2.5 Oven Ramp. Targeted oven ramp for the integrated topcoat system is nominally a 15 minute ramp with exterior surface temperatures targeted to include ramp rates and a plateau as shown in Appendix A, Figure A1.

3.3 Chemical Requirements.

3.3.1 Solids Level. This product is to be comprised of between 24% to 39% solids by total volume of paint, including water, as determined by ISO 2811.

3.3.2 Volatile Organic Compound (VOC) Level. This product is to be comprised of a VOC content of; 8% to 18% by weight as determined by ASTM D3960.

3.4 Physical Requirements.

3.4.1 Film Thickness (ASTM D1186). The coating must meet all specified appearance and durability requirements within the film build ranges as in Table 1. The actual acceptable range for a color or specific pigmentation will be dictated by appearance and hiding capability established during the workability phase of annual color testing (GMW17434).

Table 1: Film Thickness Range (Target)

Coating	Primary Durability/Appearance (Zones A, B, C) ^{Note 1}	Secondary Durability/Appearance (Zones D, E) ^{Note 1}
BCP (Color Dependent)	10 μm to 30 μm (18 μm nominal)	May not be required for all colors. If it is required to meet specific color needs, 10 μm to 30 μm (18 μm nominal).

Note 1: Appearance zones are specified in GMW15777. Exception: Film builds on specific carlines must be reevaluated for durability.