



Waterborne Basecoat Compatible Primer Component of Non-Compressed Integrated Topcoat System

1 Scope

This specification covers the qualification and performance requirements of waterborne basecoat compatible primer (BCP) that is applied to rigid substrates.

1.1 Material Description. These primers are waterborne technologies and are components of rigid topcoat systems that are used in conjunction with 9984515 and 9986329.

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, heated flash is employed to dehydrate the primer prior to waterborne basecoat application per 9986329. Specific heated flash temperatures are dependent on supplier technology and heated flash design conditions needed to achieve prescribed dehydration levels. The waterborne basecoat is then applied and dehydrated in a heated flash. Following the coating layer of clearcoat application per 9984515, the entire system consisting of primer layer, basecoat layer and clearcoat layer is baked simultaneously in a single bake, as described in 3.2.

1.4 Remarks. Each combination of basecoat compatible primer, basecoat (BC) and clearcoat (CC) must be tested and approved as a topcoat system. The individual components are not interchangeable between suppliers unless otherwise tested. 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 ISO 2811

2.2 GM Standards/Specifications.

9984515	GMW3059	GMW15777	GMW17434
9986329	GMW14270	GMW17328	
GMW3005	GMW15545	GMW17405	

2.3 Additional References. None.

3 Requirements

Individual material sources may differ in physical or chemical properties. Upon submission, all material properties, system performance and system processing properties shall be established and documented. Such properties shall form the basis of all subsequent lots.

3.1 Requirements on Test Specimens. Material submitted for qualification to this specification must meet all the material performance requirements of GMW3005, Type A and/or B, Class 1.

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 as follows.

3.2.1 Booth Conditions. Booth humidity level during application is to be controlled. A nominal operating range of 65% relative humidity (RH) $\pm$ 5% RH at 24 °C $\pm$ 3 °C (75 °F $\pm$ 5 °F) defines a humidity ratio range of 0.012 per pound $\pm$ 0.0005 per pound of moisture per pound of dry air, unless otherwise agreed to by material engineer.

Supplier shall establish the optimum booth conditions and humidity ratio tolerance level required to maintain consistent appearance without formulation adjustments.

3.2.2 Ambient Flash between Coats. 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 Heated Flash. Typical heated flash times are 5 minutes at 60 °C to 99 °C (140 °F to 210 °F) air temperature. Supplier shall demonstrate the air flow and temperature conditions which yield the vehicle surface temperature profile and dehydration solids levels required for appearance and to prevent defects. The surface temperature profile and dehydration solids shall be included for all potential vehicle surfaces, including exterior, interior and heavy metal areas. Specific heated flash temperatures or air flows may be dependent on supplier technology, as agreed to by the responsible approving materials engineer.

3.2.4 Cooling After Heated Flash. Supplier shall demonstrate the maximum and minimum surface temperatures required prior to basecoat application following the heated flash to ensure a uniform and defect-free surface. The surface temperatures shall be included for all potential vehicle surfaces, including exterior, interior and heavy metal areas.

3.2.5 Bake. Following subsequent application of basecoat and clearcoat, 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 °C to 140 °C (264 °F to 285 °F) substrate temperature. Supplier shall provide bake time and temperature charts showing the bake processing window wherein all performance requirements are met. To account for typical variation across the vehicle, performance must be retained across a bake range of 15 minutes to 80 minutes and 6 °C to 14 °C (43 °F to 57 °F) at target temperature.

3.2.6 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 Performance Requirements.

3.3.1 Chemical Requirements.

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

3.3.1.2 Volatile Organic Compound (VOC) Level. This product shall be comprised of a VOC content of 8% to 18% by weight, as determined by ISO 2811.

3.3.2 Physical Requirements.

3.3.2.1 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 per GMW17434.

Table 1: Film Thickness Range and 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	May not be required. If it is required to meet specific program needs, 10 µm to 30 µm.

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

3.3.2.2 Minimum Film Build. Minimum film build of each BCP primer color shall be demonstrated by delamination testing per GMW17328. Prepare samples at target and high-bake electro-coat conditions on electro-coat materials and with a control as required by the appropriate Materials Engineer. Report the data and results.

3.3.2.3 Ultraviolet Transmission through Cured Paint Film (GMW15545).