



One Component Solventborne 2-Wet Monocoat

1 Scope

This specification covers the qualification and performance requirements of one component, high solids, solventborne monocoat (MC) used wet-on-wet over the 2-Wet (or 2Wet) solventborne primer technology.

1.1 Material Description. Each combination of specific 2Wet primer and MC must be tested and approved as a topcoat system. The individual components are not interchangeable and not approved as stand-alone coatings

1.2 Symbols. Not applicable.

1.3 Applicability. These solventborne MCs are designed to be applied wet on wet over an unbaked 2Wet primer. Following the MC application, an ambient flash is employed to remove excess volatiles from the coating prior to baking. The entire coating system is baked simultaneously in a single bake, as described in 3.3.4.

1.4 Remarks. Validation testing for plant specific layering, ancillary materials, and processing must be conducted prior to release.

2 References

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

2.1 External Standards/Specifications.

ASTM D1186 IATF 16949

2.2 GM Standards/Specifications.

9986569	GMW3059	GMW15545	GMW17405
GMW3005	GMW14270	GMW15777	GMW17434

2.3 Additional References.

 None.

3 Requirements

3.1 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 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) as outlined in GMW17405. Such properties shall form the basis of all subsequent lots.

3.2 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 2.

3.3 Processing Requirements. MC covered under this specification are intended to be applied wet on wet over 2Wet Solventborne Primers, 9986569. Processing or material requirement differences are specified.

3.3.1 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.

3.3.2 Monocoat (MC) Application. The MC is typically applied to the vehicle interior and exterior. Determination of flash time limitations between interior and exterior coats and appropriate sequence of operations must be demonstrated.

3.3.3 Ambient Flash Before Exterior MC Application. Typical ambient flash times from exterior 2Wet primer application to exterior MC application ranges from 5 minutes to 9 minutes. After application of the MC a further ambient flash of 7 minutes to 12 minutes is required prior to oven baking. The supplier shall demonstrate the influence of environmental conditions and flash time robustness to achieve required applied 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.

3.3.4 Bake. Following subsequent application of MC, the coating shall be co-baked with the other constituents of the integrated topcoat paint system. A target bake must be identified by the supplier such that the topcoat meets all appearance and performance criteria over a minimum range of film build, time and temperature (basic box). The size of the box and the upper/lower limit temperature variance from target will be dictated by the type of technology. The requirements to define the lower limit (LL) and upper limit (UL) temperatures are defined in GMW3005. All deviations from this minimum performance window must be discussed with the responsible engineer prior to test initiation.

3.3.5 Oven Ramp. Targeted oven ramp for the integrated topcoat system is nominally a 15 minute ramp to target temperature with exterior surface temperatures targeted to include ramp rates and a plateau. This aspect should be agreed with the approving GM engineer.

3.4 Chemical Requirements.

3.4.1 Solids Level. This product typically has an applied Volume Solids of > 48%, however this may be agreed otherwise by the approving GM engineer during the final technology submission.

3.5 Physical Requirements.

3.5.1 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) Note 1	Secondary Durability/Appearance (Zones C, D) Note 1
Monocoat (MC) (Color Dependent)	45 µm to 65 µm (55 µm average)	May not be required for all colors. If required to meet specific color needs, 35 µm to 55 µm (45 µm average)

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

3.5.2 Minimum Film Build. To ensure sufficient film continuity, minimum technology film build of any MC color shall not be < 45 µm, unless agreed otherwise by the approving GM engineer during the technology submission phase.

3.6 Ultraviolet (UV) Transmission Through Cured Paint Film (GMW15545). Prepare the wedge sample for the MC and hold the 2Wet primer layer to the minimum film build determined in 9986569 (PRIMER).

3.6.1 Generate UV transmission curves at 5 µm increments from 35 µm MC film build to MC film build that meets UV transmission requirements described as follows:

- ≤ 0.05% transmission from 290 nm to 390 nm
- Straight line from 0.05% transmission at 390 nm to 0.10% transmission at 430 nm
- Straight line from 0.10% transmission at 430 nm to 0.80% transmission at 500 nm

3.6.2 Report the minimum MC film build that meets the transmission requirements for each MC color.

3.6.3 If the multi-layered test sample does not meet the performance requirements stated in GMW3005, rerun samples at increased film build of the MC layer and/or increased film build of the 2Wet primer layer until the criteria is met. This information will be used to establish the primer and MC minimum film thicknesses as a 2Wet topcoat system to ensure it meets the UV transmission requirements specified here.