



Low Bake Waterborne Basecoats

1 Scope

This specification covers the qualification and performance requirements of a low bake, one or two component waterborne basecoat technology that may be applied to either rigid or flexible substrates. These basecoats can be used under one or two component clearcoats.

1.1 Material Description. Each combination of specific basecoat and clearcoat must be tested and approved as a basecoat/clearcoat topcoat system. The individual components are not interchangeable. In addition, the topcoat system is part of the total coating system and must meet the requirements as outlined in GMW3005, those set forth in this specification, and on the engineering drawings. Performance on finished parts must be demonstrated per GMW14671 (metal parts) and GMW14797 (plastic parts).

1.2 Symbols. Not applicable.

1.3 Applicability. These waterborne basecoats are designed to be applied over a baked primer. Waterborne basecoats according to this specification can be classified into one of the following categories.

- **Type 1:** Target bake of 110 °C (230 °) with a bake latitude of approximately 105 °C to 135 °C (220 °F to 275 °F).
- **Type 2:** Target bake of 100 °C (210 °F) with a bake latitude of approximately 93 °C to 135 °C (200 °F to 275 °F).

2 References

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

2.1 External Standards/Specifications.

ISO/TS 16949

2.2 GM Standards/Specifications.

GMW3005	GMW14671	GMW14797	GMW15777
GMW3059	GMW14729	GMW14829	GMW17434
GMW14124			

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 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 targets and ranges baselines for a given basecoat color are established during the Annual Color Program, GMW17434. 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 Submission. The submission requirements of GMW3005 must be completed prior to approval of the topcoat system. The supplier must clearly define the usage target.

3.1.1 Additional Submission Requirements. Table 1 of this specification must be completed prior to approval of the product.

3.2 Durability Performance. Systems approved under this specification must meet the minimum performance requirements of a Class 1 topcoat as described in GMW3005. Topcoat Type A or Type B testing requirements shall be determined by the targeted usage.

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3.3 Processing Requirements. These topcoats are designed to be applied over a baked primer.

3.4 Appearance. The topcoat system must meet or exceed GM specification as designated in GMW15777.

Table 1: In-Line Reprocess Matrix

OEM Film and Bake	Aging Before Recoat	Adhesion Promoter Before Recoat	Recoat Film and Bake	Initial Adhesion GMW14829	Humidity + Adhesion GMW14729 GMW14829	Environmental Cycle ^{Note 1} GMW14124 GMW14729 GMW14829
L/H	72 h	No	T/T			
L/H	72 h	Yes	T/T			
H/L	72 h	No	T/T			
H/L	72 h	Yes	T/T			
L/H	2 weeks	No	T/T			
L/H	2 weeks	Yes	T/T			
H/L	2 weeks	No	T/T			
H/L	2 weeks	Yes	T/T			

Note 1: Cycle A for substrates with flexural modulus > 800 MPa, Cycle I for substrates with flexural modulus < 800 MPa.

H = High

L = Low

OEM = Original Equipment Manufacturer

T = Target

3.5 Additional Requirements.

3.5.1 Panel Preparation. Panels are to be prepared for Type A or Type B materials per GMW3005.

3.5.2 Processability. General processability must be demonstrated per GMW3005. The process used to create the test panels must be production capable.

3.5.3 Film Build. The acceptable range for a color will be established during annual pigmentation evaluation (GMW17434) and will be released by Manufacturing Engineering Vehicle Systems - Paint as the GMW17434 Annual Color Program. Refer to the approving paint engineer for additional information in regard to exceptions for the typical film build ranges.

3.5.4 Flash. A flash time of 1 to 2 minutes at ambient booth temperature between coats of basecoat is typical. Waterborne basecoats require dehydration prior to clearcoat application that typically removes 85% to 95% of the water. Typical heated flash time before clear is 4 to 6 minutes. The typical flash method is convection air at 88 °C to 99 °C (190 °F to 210 °F) air temperature with a turnover ratio of 5 to 6 times per minute. The parts must be cooled down to 32 °C to 38 °C (90 °F to 100 °F) prior to clearcoat application, which typically requires 2 to 4 minutes in a cool down tunnel. Refer to the approving paint engineer for additional information in regards to exceptions for the typical processing flash time ranges.

3.5.5 Bake. These waterborne basecoats from a design standpoint are defined by Type 1 Bake and Type 2 Bake.

3.5.5.1 Type 1 Bake. Products approved to Type 1 Bake have a target bake of 110 °C (230 °F) with a bake latitude of approximately 105 °C to 135 °C (220 °F to 275 °F). Time at substrate temperature typically varies from 20 minutes to 90 minutes. Refer to the approving paint engineer for additional information in regard to exceptions for the typical processing bake temperature and time ranges.

3.5.5.2 Type 2 Bake. Products approved to Type 2 Bake have a target bake of 100 °C (210 °F) with a bake latitude of approximately 93 °C to 135 °C (200 °F to 275 °F). Time at substrate temperature typically varies from 20 minutes to 90 minutes. Refer to the approving paint engineer for additional information in regard to exceptions for the typical processing bake temperature and time ranges.