GM ENGINEERING STANDARDS	Material Specification	9984905

Low Bake Adhesion Promoter - Solventborne for Thermoplastic Polyolefin (TPO)

1 Scope

This specification covers the requirements for a low bake 80 °C (180 °F) solventborne adhesion promoter for Thermoplastic Polyolefin (TPO). The adhesion promoter may be conductive or nonconductive depending on the needs of the user.

1.1 Material Description. This adhesion promoter is part of a total product system and must meet requirements set forth in the specifications for other materials with which it is used. This specification shall be used in conjunction with the GMW14797, Approved Paint on Plastics Systems (APOPS) a section of the GM Approved Materials Source List, which lists approved substrate, cleaning, priming, and topcoat combinations.

1.1.1 Specified herein the 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. Adhesion promoters covered under this standard are typically applied to TPO substrates and are typically used under a GMW3005 approved low bake topcoat system.

1.4 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ASTM D3763	ISO/TS 16949

2.2 GM Standards/Specifications.

9984801	GMW14270	GMW15919	GMW17105
GMW3005	GMW14797	GMW16745	
GMW3059	GMW15777	GMW17065	

2.3 Additional References.

Advanced Product Quality Planning (APQP)

Product Engineering Documents

3 Requirements

3.1 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

3.2 Submission. Materials submitted for qualification to this specification must meet the requirements of GMW17105. Refer to GMW17105 for qualification under topcoat. The film build condition variance identified in GMW17105 Table 2 shall be those of the adhesion promoter, and the bake condition variance shall be those of the topcoat as defined by GMW3005. Additionally, the requirements listed in 3.3 through 3.6 shall be met on all surfaces of the part or as designated by the applicable Product Engineering Documents.

3.3 Additional Submission Requirements.

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3.3.1 Conductivity. If the adhesion promoter is conductive, conductivity of the coating film shall be determined and documented on a baked adhesion promoter only sample per GMW17065. Refer to GMW17105 for conductivity requirements.

3.3.2 Thermal Shock Test for Paint Adhesion. Perform Thermal Shock Paint Adhesion per GMW15919. No paint removal allowed.

3.3.3 Multiaxial Impact. Perform Multiaxial Impact per ASTM D3763 at 0 °C (32 °F) and 2.2 m/s. Run in triplicate. All failures must be ductile.

3.3.4 Water Jet. Perform Water Jet per GMW16745, Method B. Maximum paint removal of 60 mm^2 allowed.

3.4 Surface Preparation. Powerwash per 9984801 using an approved cleaner. Any deviation must be approved by the Vehicle Systems Paint approving engineer.

3.5 Processing. For exterior grade parts, this adhesion promoter is processed using either of the following two methods. The method must be agreed upon with the approving engineer.

- **Method A:** The adhesion promoter is applied then baked prior to application of an approved topcoat system.
- **Method B:** The adhesion promoter is applied, flashed and co-baked with an approved topcoat system.

3.5.1 Film Build. Apply uniformly to achieve a film thickness of 5 µm to 15 µm (0.2 mil to 0.6 mil) of adhesion promoter. In addition, the adhesion promoter coating should be pigmented with a tracer or contrasting pigment to visibly ensure coverage is achieved. The composition of the pigment package and pigment to binder ratio must be documented.

3.5.2 Bake. The bake for the preceding two methods shall be as follows:

- **Bake A:** Bake a minimum of five (5) minutes at 80 °C (180 °F) part temperature. The adhesion promoter shall provide a smooth, adhesion promoting surface for application of subsequent approved GMW3005 topcoat system.
- **Bake B:** After adhesion promoter application, a flash time of three (3) minutes is typical before topcoat application, then co-bake with a GMW3005 approved topcoat system whose bake is 80 °C (180 °F) or above per the approved bake chart for the topcoat system used.

3.6 Appearance. Must meet the requirements of GMW15777 after topcoat.

3.7 Additional Requirements. Product approval is required under established guidelines outlined in ISO/TS 16949. At product approval, the supplier is expected to have reviewed to GM's satisfaction specific documentation outlined in Advanced Product Quality Planning (APQP). Examples of this documentation are to include Design Failure Mode and Effects Analysis (DFMEA), Process Failure Mode and Effects Analysis (PFMEA), Key Product Characteristics (KPC), Key Control Characteristics (KCC) and Manufacturing Control Plans.

4 Manufacturing Process

All shipments of material or parts under contract or purchase order manufactured to this specification shall be equivalent in every respect to the initial samples approved by Engineering. There shall be no changes in either formulation or manufacturing processes permitted without prior notification and approval by Engineering. Lack of notification by the supplier constitutes grounds for rejection of any shipment. While samples may be taken from incoming shipments and checked for conformance to this specification, the supplier shall accept the responsibility for incoming shipments meeting the specification without dependence upon purchaser's inspection. In addition, the supplier shall be responsible for submitting a Certificate of Analysis with each batch of material arriving at a plant.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

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