



Surface Preparation

1 Scope

1.1 Material Description. This specification defines the minimum performance and processing requirements for approval of all automotive exterior composite surface preparations and some interior composite preparations. The materials and processes used in surface preparation must be qualified as a system.

1.1.1 Surface Preparation System. The types of chemicals and their combination to be used in the surface preparation system define a system. The three (3) distinct surface preparation systems are:

- Cleaner Only.
- Cleaner and Rinse Aid (Surfactant or Surface Modifying).
- Emerging Technologies.

Materials qualified and approved to this specification must also have General Motors Approved Paint on Plastics System (APOPS) approval prior to production release to an assembly plant or an outside source for application on parts. APOPS requirements are defined in GMW14797.

1.2 Symbols. Not applicable.

1.3 Applicability. Typical applications include the cleaning of plastic substrates prior to paint application.

1.4 Remarks. None.

2 References

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

2.1 External Standards/Specifications.

IATF 16949 SAE J2527

2.2 GM Standards/Specifications.

GMW3059	GMW14333	GMW14729	GMW14829
GMW14124	GMW14700	GMW14797	GMW14873
GMW14270			

2.3 Additional References. None.

3 Requirements

The Manufacturing Engineering (ME) Vehicle Systems Paint materials engineer responsible for technology qualification shall be contacted prior to test initiation to determine potential usage for the product and to define the specific test protocol to be followed. The primary submission requirements as follows:

- Submission.** To initiate a material approval, the pretreatment supplier must provide a submission letter to the ME Vehicle Systems Materials group.
 - The submission letter must contain the following information:
 - Purpose of the submission
 - Description of the product(s)
 - Comparison to current approved products
 - Site of origin
 - History of product evolution

- Material Safety Data Sheet (MSDS)
 - Key data for evaluating environmental impact (Volatile Organic Compounds (VOC), Weight percent (Wt%), Volume percent (Vol%), discharge metals, pH, etc.)
 - Substrate/paint layering combination to be used for evaluation (i.e., specific substrates, primer and/or topcoat system).
- b. **Material Test Request.** After receipt of the submission letter, the responsible ME Vehicle Systems Paint materials engineer will issue a material test request number. No testing for qualification to this specification is to be performed unless a material test request number has been assigned.

3.1 Panel Preparation. The following procedures must be followed when preparing panels for material development.

3.1.1 Substrate. The substrates used to qualify the material must be approved by General Motors Company. Two (2) substrates are to be used for all panels in the qualification process and agreed upon with the approving engineer.

3.1.2 Surface Preparation. The system to be qualified must be used.

3.1.3 Adhesion Promoter. A 998XXXX approved adhesion promoter must be used for Thermoplastic Polyolefin (TPO) substrates. The material is to be processed at the target bake and film build conditions as agreed upon with the approving engineer.

3.1.4 Primer. A 998XXXX approved primer must be used when required for adhesion and/or ultraviolet (UV) blocking to the substrate. The material is to be processed at the target bake and film build conditions as agreed upon with the approving engineer.

3.1.5 Topcoat. All panels must be topcoated with a 998XXXX approved topcoat system. The material is to be processed at the target bake and film build conditions as agreed upon with the approving engineer.

3.1.6 The combination of substrate, adhesion promoter or primer (as required), and topcoat must be an APOPS approved combination.

3.1.7 All pertinent processing information must be recorded including all washer parameters listed in Table 3, as well as paint film builds and bake chart profiles.

3.2 Material Qualification Testing. Material combinations are to be qualified according to their system identification. All testing is to be performed on 100 mm × 300 mm (4 in × 12 in) panels or surrogate parts as agreed upon with the approving engineer.

3.2.1 System A – Cleaner Only. Prepare panels per the cleaner variables listed in Table 1. Where typically Concentration Low (L) = 1% and High (H) = 5%; Temperature L = 50 °C (122 °F) and H = 67 °C (153 °F); Time L = 60 s and H = 120 s. Deviations to the previous variables must be agreed upon with the approving engineer.

Table 1: System A Qualification

Concentration	Concentration Temperature	Time
L	L	L
H	H	H

3.2.2 System B – Cleaner and Rinse Aid (Surfactant or Reactive). Prepare panels per the cleaner and rinse aid variables listed in Table 2. Where typically cleaner concentration L = 1% and H = 5%; cleaner temperature L = 50 °C (122 °F) and H = 67 °C (153 °F); cleaner time L = 60 s and H = 120 s; rinse aid concentration L = 0.03% and H = 0.07%; rinse aid time L = 20 s and H = 60 s. Deviations to these variables must be agreed upon with the approving engineer.

Table 2: System B Qualification

Preparation	Cleaner			Rinse Aid	
	Concentration	Temperature	Time	Concentration	Time
1	L	L	L	L	L
2	H	H	H	H	H
3	L	L	L	H	H

3.2.3 The following tests are to be performed. Four (4) colors, White, Black, Red Mica and Light Metallic are to be used. Multiple tests may be performed on one (1) panel with agreement of the approving engineer.

3.2.4 Initial Tape Adhesion (GMW14829).

3.2.5 Humidity Exposure of 96 h followed by tape adhesion (GMW14729 and GMW14829).

3.2.6 Resistance to Fuels (GMW14333). Method A – all substrates. Method B – TPO only.

3.2.7 Automotive Environmental Cycle (GMW14124).

3.2.7.1 Cycle A, 15 cycles followed by 24 h humidity exposure followed by tape adhesion (GMW14124, GMW14729 and GMW14829). To be performed on substrates with a flexural modulus of > 800 MPa.

3.2.7.2 Cycle I, 15 cycles followed by 24 h humidity exposure followed by tape adhesion (GMW14124, GMW14729 and GMW14829). To be performed on substrates with a flexural modulus of > 800 MPa.

3.2.8 Chip Resistance (GMW14700). Method A or B. Perform on substrates with a flexural modulus of > 800 MPa.

3.2.9 Weather Testing. Perform only for System B, Preparation 3 as defined in Table 2 and only on substrates with flexural modulus of < 800 MPa. Prepare panels with and without rinse aid.

3.2.9.1 SAE J2527 – Xenon apparatus, 2500 kJ. (4 colors × 2 conditions × 2 tests = 16 panels).

- Test 1.** Perform 96 h humidity exposure and tape adhesion following xenon exposure (GMW14729 and GMW14829).
- Test 2.** Perform an appearance evaluation; record gloss and L, a, b readings before and after xenon exposure and report gloss retention.

3.2.9.2 Florida Exposure, GMW14873, Procedure 1. Exposure of 12 months required with and without rinse aid, followed by 96 h humidity exposure and tape adhesion (GMW14729 and GMW14829), Environmental Cycle (GMW14124 as defined in 3.2.7.1 or 3.2.7.2) and Resistance to Fuels (3.2.6). Retain one (1) panel for appearance evaluation; record gloss and L, a, b readings prior to submission to Florida and after Florida exposure.

Note: Florida exposure panels = 2 preparations × 4 colors × 4 tests = 32 panels.

Note: Approximate number of total panels required = 3 preparations × 7 panels for testing × 4 colors = 84 panels + 16 xenon panels + 32 Florida exposure panels = 132 total panels.

3.2.10 System C – Emerging Technologies. Any technology other than a conventional cleaner or rinse aid may require more extensive testing than is outlined in this specification. Consult with the appropriate ME Vehicle Systems Paint materials engineer for the requirements for qualification.

3.3 Processing Requirements. The following minimum requirements must be met for the surface preparation unit treating plastic parts for subsequent painting operations. It is intended that all said parts meet these minimum requirements. However, recognizing that this may not always be possible, deviations from such may be granted by the approving engineer for the involved part(s). In situations where there are no such engineers (e.g., a first-time bidding unit for GM business at large), deviations may be granted by the approving engineer.

3.3.1 Surface preparation (power wash) must be performed immediately prior to any other surface modification (i.e., flame or plasma) or painting operations. Handling after surface pretreatment is not allowed.

3.3.2 Immediately after the final Deionized (DI)/Reverse Osmosis (RO) rinse, the surface shall exhibit a continuous water film (water break free).