



Purge Solvent for Solventborne Enamel

1 Scope

1.1 Material Description. This specification defines the basic physical, chemical and performance requirements of purge solvents for solventborne paint materials. These include primers, basecoats, and clearcoats (1-component or 2-component).

1.1.1 Material Identification. Materials approved to these specifications are not compliant with regulations for hazardous air pollutants (HAP). Materials that comply with regulations for HAPs are approved under 9984304.

1.2 Symbols. Not applicable.

1.3 Applicability. Materials approved under this spec are used to flush and clean the interiors of the paint lines.

2 References

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

2.1 External Standards/Specifications.

40 CFR 261, Subpart D	ASTM D891B	ASTM D1353-96	ASTM E203-92A
ASTM D56-79			

2.2 GM Standards/Specifications.

9984304	GMW3059	GMW15586	GMW17089
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2.3 Additional References.

- Environmental Protection Agency (EPA) Method 24.
- TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

All relevant requirements are highlighted in Appendix A, Purge Solvent Submission Checklist.

3.1 Requirements on Delivery.

3.1.1 Chemical Requirements. Materials approved to this specification must be formulated for remanufacturing. Submission samples must include all chemical species anticipated. Purge blends are not interchangeable and must be evaluated and approved for use with plant-specific material, equipment, and cycles.

3.1.1.1 Composition Identification. A gas chromatograph (GC) will be used to qualify and quantify the constituents of the blend. Once approved, a constituent cannot vary by more than $\pm 2.5\%$ by weight. This permits a range of 5% by weight.

3.1.1.2 Flash Point (ASTM D56-79). No minimum requirement. Flash must be reported for each material.

3.1.1.3 Non-Volatiles (ASTM D1353-96). Maximum is 0.15% by weight.

3.1.1.4 Volatile Organic Compounds (VOC). VOC is a plant specific requirement. VOC calculation results shall meet plant permit requirements. United States Environmental Protection Agency (EPA) Method 24 will be used to calculate VOC.

3.1.1.5 Water Content (ASTM E203-92A).

3.1.1.5.1 There shall be no free water.

3.1.1.5.2 Maximum water content of purge used for 2-component isocyanate materials is 0.2%.

3.1.1.5.3 Maximum water content of purge used for 1-component materials is 0.5%.

3.1.2 Mechanical Requirements. Not applicable.

3.1.3 Physical Requirements.

3.1.3.1 Appearance (Visual Observation). Color must be water white. Material should be clear liquid that is free of haze and insoluble materials. Filtration with a 1 µm filter must be certified.

3.1.3.2 Specific Gravity (ASTM D891B). Maximum is 0.876 at 25 °C (77 °F). Variation from batch must be no greater than ±0.02 from the approved formulation.

3.1.3.3 Resistivity (Ransburg Meter 70367 or Equivalent). Need to meet supplier paint equipment requirement. As a reference, Fanuc P-500 and P-700 require minimum of 0.1 MΩ. Some Behr equipment requires minimum of 0.3 MΩ. Resistivity requirement will be documented on a plant-specific basis by Manufacturing Engineering Vehicle Systems (ME VS) Paint Materials engineer.

3.1.4 Additional Requirements. The supplier must provide pertinent data regarding composition, physical characteristics, usage, emissions, and test information as part of a basic submission package.

3.1.4.1 Productive Material Review Process (PMRV). All materials must be evaluated through the Productive Material Review Process initiated by ME VS Paint Materials prior to plant implementation

3.1.4.2 Material Safety Data Sheet (MSDS). A full-disclosure Material Safety Data Sheet must be provided to GM. Volatile Organic Compound (VOC) Method 24 data shall be included on MSDS.

3.1.4.3 Change Notification. A supplier Notice of Proposed Change must be forwarded to ME VS Paint Materials to describe proposed material changes prior to any trials or production implementation.

3.1.4.4 Source Shipment Responsibility. All shipments must be made in clean, sealed containers which are clearly identified. A Certificate of Analysis (COA) must accompany all batch shipments.

3.1.4.5 Certificate of Analysis (COA). Information provided on the COA must include product code, batch number, manufacturing date, composition identification, percent non-volatiles, percent water content, appearance, specific gravity, and resistivity. Additional information will be provided as required. The COA must be signed and kept on record by the supplier. See Appendix B for form.

3.2 Processing Requirements.

3.2.1 Chemical Requirements. Not applicable.

3.2.2 Mechanical Requirements. Not applicable.

3.2.3 Physical Requirements.

3.2.3.1 These purge solvents shall aggressively clean all residual paint from the internal surfaces of conventional and electrostatic application equipment during color changes and before shutdown of the equipment.

3.2.3.2 Purge solvents must not be used for paint reduction. They may not be used for booth or manual equipment cleaning otherwise it will negatively impact purge capture/reclaim process

3.2.4 Additional Requirements.

3.2.4.1 Usage. The supplier or Chemical Manager is required to track amount of recovered solvent and report recycle amounts monthly (or as required) to plant engineering and environmental. The report must include usage in gallons (total and per job) and Volatile Organic Compounds (VOC) (total and per job). It must also include all pertinent information required for emission calculations.

3.3 Performance Requirements.

3.3.1 Chemical Requirements. Not applicable.

3.3.2 Mechanical Requirements. Not applicable.

3.3.3 Physical Requirements. Not applicable.

3.3.4 Additional Requirements.

3.3.4.1 Odor Testing. When required by the plant Environmental Engineer, new purge blend odor shall be compared to a control purge material (designated by the responsible GM engineer). Plant Environmental Engineer will identify the approved laboratory to submit the purge solvent samples to run the testing. A change in formulation must be re-evaluated for odor.

3.3.4.2 Test Data. Supplier must provide ME VS Paint Materials written reports of performance test results as part of the submission package.

3.3.4.3 Test Colors. Unless otherwise agreed upon with the responsible engineer, testing must be done with two primer colors, three basecoat colors and tinted clearcoat. Specific supplier source(s) will be determined at test initiation. Paint must be reduced to spray viscosity with the exact solvent blend used at the target plant.

Primer colors (or agreed-upon alternates) are WA224E Gray, WA9753 Bright. White, and WA8774 Bright Red may be added when applicable. Topcoat colors are a clean white, a medium red tone mica color, and a dark metallic. A red tinted clear should be used in addition to clearcoat.

3.3.4.4 Efficiency Screen Test. Apply 2 mil (50.8 μm) of wet paint with a drawdown bar on clear glass panel (film build depends on solids of paint material). Minimum paint area must be 100 mm high by 150 mm long (4 x 6 in). Flash paint at room temperature for 2 minutes. Place the panel on a fixture at a 45 degree angle. From a 25 ml burette with tip positioned 25 mm (1 in) above the glass panel, apply ten drops of purge solvent (one drop per second) on the paint film in the same spot, which should be approximately 50 mm (2 in) from the top of the panel and allow purge solvent to run down the panel. Observe cleaning efficiency as compared to a control(s). Cure paint and photocopy panel for documentation. Material must be equal to or better than the control. Report the technologies, product codes, and WAXXXX color codes for all materials used in the test.

3.3.4.4.1 Test Condition 1 (All Test Paints). Flash paint at room temperature for 2 minutes and run test.

3.3.4.4.2 Test Condition 2 (2-Component Paints). Establish maximum room temperature flash time that allows cleaning equivalent to that of Test Condition 1. Start with a 30 minute flash and increase time (1 h to 4 h, etc.)

3.3.4.5 Paint Compatibility Test. Purge is evaluated for compatibility with paint under various process conditions. There can be no cratering on the panels as tested in the following:

3.3.4.5.1 Mixing Compatibility. Reduce a paint sample 25% by volume with test purge solvent and spray a standard steel test panel with the paint at specified film build 1.0 mil $\pm$ 0.2 mil or 25.4 μm $\pm$ 5 μm for primer or basecoat; 2.0 mil $\pm$ 0.2 mil or 50.8 μm $\pm$ 5 μm for clearcoat. Cure the film at the recommended bake schedule and examine the surface for cratering.

3.3.4.5.2 Overspray Compatibility. Spray a standard steel test panel with the test paint at specified film build (standard steel test panel with 1.0 mil $\pm$ 0.2 mil or 25.4 μm $\pm$ 5 μm for primer or basecoat and 2.0 mil $\pm$ 0.2 mil or 50.8 μm $\pm$ 5 μm for clearcoat). Mist coat the wet film with the test purge solvent. Cure the film at the recommended bake schedule and examine the surface for cratering.

3.3.4.5.3 Underspray Compatibility. Mist coat a standard steel test panel with the test purge solvent and then spray the panel with paint at specified film build 1.0 mil $\pm$ 0.2 mil or 25.4 μm $\pm$ 5 μm for primer or basecoat, and 2.0 mil $\pm$ 0.2 mil or 50.8 μm $\pm$ 5 μm for clearcoat. Cure the film at the recommended bake schedule and examine the surface for cratering.

3.3.4.6 Bell Testing GMW15586. When Efficiency Screen Testing results (3.3.4.4) are not conclusive to verify the cleaning capability of the new proposed purge, run GMW15586. New purge solvent should perform equivalent to or better than control purge solvent during Bell Testing.

3.3.4.7 Equipment Compatibility. Contact the equipment manufacturer for information on potentially sensitive components.

To evaluate new purge solvent compatibility with plastic paint applicator components, run Effect of Purge Solvents on Plastics, GMW17089. Plastic parts should not swell or show visual changes such as cracking, deterioration, or discoloration when in contact with purge solvents. GMW17089 method can be used to compare purge solvent effects on other materials such as rubber (o-rings, hoses, etc.)

Document which equipment was evaluated and provide information to ME VS Paint Engineer as part of the submission package.

3.3.4.8. Plant Trial. The purge material must be assessed and must perform satisfactory in plant trials with the intended coating materials, equipment and purge/reclaim process. Failure to do so shall constitute reason for rejection regardless of compliance with the other requirements of this specification.

3.3.4.8.1 Current Draw. Current draw of the high voltage units during plant trials must be recorded and reported to ME VS Paint Materials. Data should be taken from the displays at the automation console or at the high voltage units. Compare current draw of the proposed purge with that of the current production material under normal operation conditions for the specific plant equipment. Run also current draw comparison during super purge cycles. A significant increase indicates a tendency to pinhole the solvent lines.

3.4 Requirements on Other Stages During Life Cycle.

3.4.1 Additional Requirements. It is the responsibility of the Chemical Manager and/or purge solvent supplier to assess the impact of a new purge solvent on equipment and systems to insure that it has equal or better performance than the current purge.

3.4.2 Waste System Compatibility. The proposed purge may not have adverse impact on booth chemicals, sludge handling, and disposal.

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