



Effect of Metal Lubricants on Paint Pretreatment

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

This standard details the test procedures to validate removability of metal applied lubricants in the pretreatment paint system and ensure compatibility with subsequent paint processes and materials.

1.1 Purpose. To determine the removability of lubricants which are applied to sheet metal for corrosion protection and/or formability of metal substrates (e.g., oils, drawing compounds, and blankwashes). This is a prerequisite for subsequent problem free, defect free processing of the body through pretreatment and electrodeposition applications in the paint shop.

1.2 Applicability. To lubricants being applied to sheet metal.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ASTM D609

2.2 GM Standards/Specifications.

GMW3011

GMW15192

GMW16170

2.3 Additional References.

ACT Test Panel Technologies, 273 Industrial Drive, Hillsdale, MI 49242

3 Resources

3.1 Facilities. The Test Procedure for Lubricant Cleanability (Section 4), has been validated by ACT Test Panel Technologies (273 Industrial Drive, Hillsdale, MI 49242), and approved by the Vehicle System – Paint Material and Facility and the Global Pretreatment and Electrocoat (E-Coat) Technical Team.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment. Laboratory simulated cleaner baths and phosphate system (see Figure 1), substrate panels and samples of materials for test evaluation.

3.2.1 Pretreat Cleaner Bath Equipment. (See Figure 2).

- Stainless steel or hard polypropylene tank with lid, capacity approximately 380 L (100 USG), ~90 cm (35.4 in) depth × 60 cm (23.6 in) wide × 86 cm (33.9 in) height.
- Twelve (12) spray systems, VeeJet H3/8U stainless steel nozzles (two (2) vertical rows of three (3) nozzles located on the front and back insides of tank). Distance from nozzle to panel surface is approximately 30 cm (12 in).
- Eductors (Immersion Cleaners).
- Recirculating pump with in-line 0 bar (0 psig) to 2.07 bar (30 psig) pressure gage to nozzles.

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- e. Immersion heater.
- f. Temperature controller/thermocouple probe.
- g. Timer.
- h. Panel rack reciprocator (100 mm stroke length at 25 mm/s).
- i. Racks capable of holding test panels vertically with ~25.4 mm (1 in) space between.
- j. Small containers, 3 L to 18 L (1 gal to 5 gal) capacity.
- k. Electrodes and power source, to fit small container.
- l. Wet film measuring device.

3.2.2 Test Panels.

- a. Galvanized steel or aluminum test panels.
- b. Phosphated/thin film coated panels: 100 mm × 300 mm (4 in × 12 in) and 100 mm × 150 mm (4 in × 6 in).

3.2.3 Other Equipment/Chemicals.

- a. Toluene.
- b. Draw bars: Numbers eight (8) and zero (0) (having a latex rubber tubing inserted over the bar).
- c. Oven: Capable of ~50 °C (122 °F).

3.3 Test Vehicle/Test Piece. Substrate panels and samples of materials for test evaluation.

3.4 Test Time. Required time to test to all requirements.

3.5 Test Required Information. Before any testing is initiated, review testing scope and detail with requesting engineer.

3.6 Personnel/Skills. Test technician capable of testing to requirements.



Figure 1: Example of Pretreatment Laboratory Line used for Panel Preparation

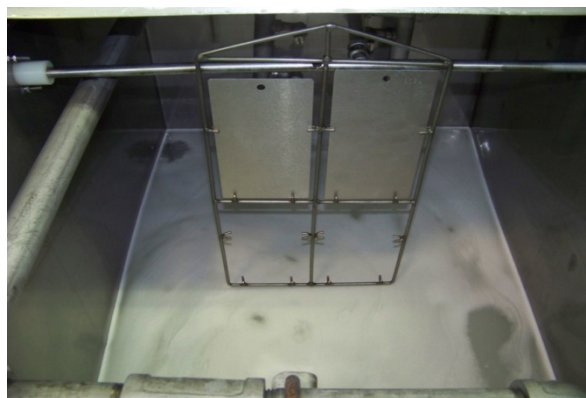


Figure 2: Example of Spray Cleaner Bath Tank with Panels

4 Procedure.

4.1 Preparation. (See 4.7).

4.2 Conditions. (See 4.7, 4.8, and 4.9).

4.2.1 Environmental Conditions. Not applicable.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.4 Pretreatment, Lube Cleanability Test Procedure. Preparation of panels using uncoated metals to determine how much of the contaminate (lube) the paint pretreatment and cleaner stages can handle and remove. This method is used to check the product-specific removability properties under the described conditions. The test applies to spray, dip or combination of spray/dip processes.

- Two (2) 10.16 cm (4 in) × 15.24 cm (6 in) ACT Electrogalvanized ((EZG) E60) for each bath loading.
- Two (2) 10.16 cm (4 in) × 15.24 cm (6 in) ACT Hot Dipped Galvanized ((HDG) G70 7 0U) for each bath loading.
- Two (2) 10.16 cm (4 in) × 15.24 cm (6 in) ACT aluminum (GMW15192).

4.5 Control Cleaning Solutions.

- Henkel Parco 1523; not applicable.
- Henkel Ridoline 1569 Rodisol 15 60; GM Europe.
- Pittsburgh Paint Group (PPG) CK 2010/2010LP; GM North America, GM Korea.
- PPG CK 177; All.

4.6 Control Lubricant. FUCHS RP 4107 S.

4.7 Panel Preparation.

4.7.1 Clean test panels per ASTM D609 procedure C and rinse with toluene to remove all oils. Apply lube to a coating weight of approximately $1.7 \text{ g/m}^2 \pm 0.2 \text{ g/m}^2$, using latex rubber covered number zero (0) draw bar or equivalent method. This may require more than one pass over the clean panel surface depending upon the lube used. Verify oil coating weight after determining lube application method. This is a weight/area oil film.

Therefore:

- $(L \times W)$ of test panel (one side) = m^2 .
- Weigh the panel after application of oil.
- The g/m^2 should meet above.

4.7.2 Place panels in a vertical position at $\sim 22^\circ\text{C}$ (72°F) and age for 24 h. Then place panels in an oven and age vertically for seven (7) days at $\sim 50^\circ\text{C}$ (122°F). (See Figure 3).

4.7.3 Prepare an additional set of panels using FUCHS RP 4107 S as the control lubricant.

4.7.4 An additional set of non-lubed, non-aged panels are to be processed through the various cleaner lube bath conditions, as further controls.