



Strike-In, Solvent Pop and Sag Resistance

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.

1.1 Purpose. This procedure outlines the steps for preparing panels to spray wedged topcoats and the methods to evaluate strike-in, solvent pop and sag. This applies to the laboratory comparison of these properties for paint applied to metal or plastic parts, although testing is performed on metal panels.

1.2 Applicability. Basecoat and clearcoat material applications.

1.3 Remarks. None.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References.

Approved Paint Shop Toolbox List

Plant Bill of Material (BOM)

3 Resources

3.1 Facilities.

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. All equipment used for panel preparation and testing must be listed by general description, manufacturer and model number. Electrocoated flat or formed sag panels can be obtained from the company, ACT Panels, (hole size of 0.6 cm (0.25 in)). Refer to the following file for the approved paint shop toolbox list: ([https://pqrs.gm.com/secured/download?filename=BoO-Paint General 26-OCT-2017_RevE.docx&type=docs](https://pqrs.gm.com/secured/download?filename=BoO-Paint+General+26-OCT-2017_RevE.docx&type=docs)).

3.2.1 Film Build Gage. Elcometer models, or equivalent, capable of providing a 99% confidence level where the average of no more than ten readings is accurate to $\pm 0.6 \mu\text{m}$ (0.02 mil).

3.2.2 Distinctness of Image (DOI) Meter.

- BYK-Gardner Wave-Scan Dual Models AW-4840
- BYK-Gardner Micro-Wave-Scan AW-4824, or equivalent

3.2.3 Oven. Test technician must document oven type used (for testing performed in North America, gas-fired ovens shall be utilized).

3.2.4 Automatic paint application machine with the appropriate spray equipment (e.g., Spraymation).

3.3 Test Vehicle/Test Piece. Panels used to evaluate strike-in, solvent pop and sag.

3.4 Test Time. Required timing to successfully meet requirements.

3.5 Test Required Information. See 5.3.

3.6 Personnel/Skills. Test technicians skilled to prepare and meet requirements.

4 Procedure

This procedure is intended as an outline for spraying a wedge of paint to a 100 mm x 450 mm (4 in x 18 in) primed steel panel (flat or formed) coated to the required film build using automatic application equipment. Panel types are shown in Appendix A, Figure A1 and Figure A2. It is the responsibility of the testing laboratory to determine the exact procedure and parameters used for spraying reproducible wedges. All test panels must be sprayed in conjunction with a suitable control sample, and all test parameters must be thoroughly recorded.

Note: For the test results to be valid, a control sample must be sprayed under the same conditions as the test sample and must have nearly identical film builds.

4.1 Preparation. The following describes the steps necessary to prepare and evaluate pop/sag for a basecoat/clearcoat paint technology (see Appendix A, Figure A3 and Figure A4 for two types of sag panels).

The test sample and control samples will be sprayed at target application viscosity. Target spray weight non-volatiles, weight per gallon (WPG), viscosity and reduction solvent will be established by agreement before testing begins. Spray-outs must be applied over the appropriate underlying layer(s). The wedge may be a single or multi layered assessment (see Appendix A, Figure A5).

4.1.1 General Spray Parameters. The following information is a guide (actual settings will be those agreed to by both the GM engineer and supplier which best align to the GM plant). These settings may vary depending upon the equipment used and the application conditions in the paint supplier's laboratory.

4.1.1.1 Target Distance. Equal to 300 mm (12 in).

4.1.1.2 Index Lab Distance. Equal to 50 mm (2 in) (11 passes).

4.1.1.3 Traverse Speed. Equal to 46 cm/s (90 ft/minute).

4.1.1.4 Delay between Strokes. Equal to Zero (0) s.

4.1.2 Gun Application. Atomization pressure 413 kPa to 483 kPa (60 psi to 70 psi).

4.1.3 Bell Application. Bell speed 40 K to 50 K, shaping air pressure adequate to produce a 355 mm to 508 mm (14 in to 20 in) effective fan pattern, unless otherwise noted in the final report.

4.1.4 Panel Preparation. Either an atomizing gun or bell gun may be used as described in the following.

4.1.4.1 Apply one strip of 12 mm (0.5 in) tape for each film build to be recorded along the length of a 100 mm x 450 mm (4 in x 18 in) panel coated to item (see 4.1).

4.1.4.2 Mount vertically on the magnetic panel holder of the automatic spray equipment, see Appendix A, Figure A4.

4.1.4.3 Atomizing Gun Application. Spray panels using the application sequence detailed in Table 1.

Table 1: Film Build Wedge; Atomizing Gun

Application/Paint Coat Number	Gun Trigger Position by Pass
One (1)	On for all passes (full coat)
Two (2)	Off first eight (8); On final three (3)
Three (3)	Off first six (6); On final five (5)
Four (4)	Off first four (4); On final seven (7)
Five (5)	On for all passes (full coat)

4.1.4.4 Bell Gun Application. Spray panels using the application sequence detailed in Table 2. Adjust the machine and spray paths to achieve the wedge as described in 4.1.4.6.

Table 2: Film Build Wedge; Bell Gun

Application/Paint Coat Number	Gun Trigger Position by Pass
One (1)	On for all passes (full coat)
Two (2)	Off first eight (8); On final three (3)
Three (3)	Off first six (6); On final five (5)
Four (4)	Off first four (4); On final seven (7)
Five (5)	On for all passes (full coat)

4.1.4.5 All parameters for either atomizing gun or bell application must be documented in the report.

4.1.4.6 Adjust the fluids so that the wedge range is a minimum of $\pm 50\%$ of the target film build.

Note: If the sag level is expected to be 45 μm (1.8 mil), the wedge film build range should be a minimum of 23 μm to 69 μm (0.9 mil to 2.7 mil). The actual target sag level film build must be agreed upon with the responsible GM engineer prior to starting the panel preparation. The plant bill of material (BOM) may be referenced.

4.1.4.7 Flash time between basecoat applications must be minimized.

4.1.4.8 When using solvent-based basecoat technologies, flash time between basecoat and clearcoat application must be minimized. For water-based basecoat technologies, flash according to the standard parameters for that product prior to the clearcoat application.

4.1.4.9 Flash panels in their proper vertical orientation as prescribed prior to bake.

4.2 Conditions.

4.2.1 Environmental Conditions.

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.

4.3.1 Sag/Pop (Processing Instructions). Bake panels vertically, see Appendix A, Figure A4, at the prescribed temperature for that product +12 °C (+25 °F), oven temperature is critical. To ensure uniform bake conditions for all test panels, the following precautions must be taken.

4.3.1.1 Minimize opening and closing the oven door.

4.3.1.2 No more than one panel per 10 minute period should be introduced into the oven.

4.3.1.3 The oven should be preloaded with as many oven racks as seems reasonable; these racks will act as heat sinks, helping to ensure constant temperature during the loading process.

4.3.1.4 All bakes must be thermocoupled.

4.3.1.5 If neither the sample panels nor the control panels have demonstrated pop, the test must be repeated with elevated temperatures. At least one panel in the set must demonstrate pop. Conversely, if both panels are severely popped over the entire length of the panel, the test should be repeated with extended flash times.

4.3.1.6 For testing clearcoat, if the basecoat technology is different between the control and the test clearcoat, the clearcoat wedges must be sprayed over a uniform thickness of their respective basecoats. The basecoats should be similar in color and film build applied at the established target. See Appendix A, Figure A4 and Figure A5.

4.3.2 Strike-in Solventbased Basecoat Wedge Preparation and Evaluation. The following describes the steps necessary to prepare and evaluate a solvent based strike-in wedge for a basecoat/clearcoat technology.

4.3.2.1 Prepare two 100 mm x 450 mm (4 in x 18 in) panels coated to item (see 4.1) by applying two (2) strips of 12.5 mm (0.5 in) tape along the long edge of each panel. One panel will receive a one (1) minute flash on the basecoat wedge and the other panel will receive a three (3) minute flash on the basecoat wedge.