

PAINT/GLASS BONDING COMPATIBILITY

GM4352M

1 SCOPE. This specification covers the testing requirements for determining the compatibility of paint materials and processing with approved glass bonding materials. These requirements cover initial qualification and testing of variances in the paint layers, paint processing or stationary glass bonding pinchweld primers.

2 REFERENCED STANDARDS.

GM1000M	GM9520P	9982075
GM4389M	GM9521P	9984070
GM4465P	GM9522P	9984126
GM9505P	9981062	

3 REQUIREMENTS.

3.1 RESTRICTED AND REPORTABLE CHEMICALS (GM1000M). All material supplied to this specification must comply with the requirements listed in GM1000M, "Restricted and Reportable Chemicals."

4 SAMPLE PREPARATION AND IDENTIFICATION.

4.1 TEST AUTHORIZATION AND REPORTING REQUIREMENTS.

4.1.1 GM Test Identification Number. At the time of test initiation the appropriate GM engineering group must issue a test identification number. This number is to be used to track the status of the testing as well as for documentation and record keeping purposes.

4.1.2 The appropriate GM Engineer must complete Test Initiation Form #1. The appropriate testing category will be indicated, which in turn will define testing requirements per Table 1 (Fahrenheit) or Table 1A (Celsius).

4.1.3 The appropriate GM Engineer must complete the following categories per Form #2 for all layers: 998XXXX, supplier, supplier code, WA numbers and required bake schedules. The GM Engineer must indicate specific bake times and temperatures when necessary. The supplier must submit the following information per Form #2 with the test report: actual bake schedules, material batch numbers and actual film builds. An authorized supplier representative must sign-off that the work has been done in accordance with this specification.

4.1.4 Supplier must review test data with appropriate GM engineering group. All test data must be reported in a format equivalent to that shown in Forms #3, 4 and 5. The approving engineer will sign-off that the results were reviewed and whether or not requirements were met.

NOTE: The Forms #1 through #5 are available through the on line MATSPC system under this specification number.

4.2 TEST MATERIALS AND PROCESSING.

4.2.1 Test Panels. The base substrate must be phosphated, cold rolled steel. Shear coupons must be cut to size prior to painting to minimize edge effects.

4.2.2 Paint Materials. For all paint materials used, production representative batches must be used. For application of these materials (i.e., nominal film build) refer to the appropriate material specifications. The following information relating to each paint material used for each layer must be stated in the final test report:

Layer type (i.e., ELPO, topcoat, etc.)

998XXXX

Supplier

Supplier product code

Batch number

Dry film build

4.2.3 Paint Processing (Bake Schedule). The bake schedule for the test layer is outlined in Table 1 of this specification. Except where indicated, use the target bake schedule as stated in the appropriate material specification for all nontest layers. All bake schedules are specified in metal temperature (use thermocouple to verify bake schedules with the appropriate GM engineering group. If bake schedule is different than outlined in Table 1 of this specification, the actual bake schedule must be documented in writing and verified by the appropriate GM engineering group).

4.2.4 Glass Bonding Materials. For testing of variances in the paint layers or processing, specify the appropriate urethane adhesive and pinchweld primer. Before initiating testing, verify the use of glass bonding materials with the appropriate GM engineering group. For application of glass bonding materials refer to the appropriate material specifications. The following information for each glass bonding component must be stated in the final test report:

Glass bonding material description (pinchweld primer and urethane adhesive)

998 number

Supplier

Supplier code

Batch number

4.2.5 Glass Bonding Material Processing. Apply the pinchweld primer and urethane adhesive per the appropriate GMXXXXP procedures referenced in this specification.

NOTE: For topcoat qualification, maximum aging after bake and prior to pinchweld prime application is 1 h. For other testing, primer must be applied within 72 h of paint application and bake.

5 TEST CATEGORIZATION. Test requirements, as defined in Table 1 (1A), are specific to the type of submission category below. Details of individual tests required are given in Section 6 of this specification.

NOTE: All technologies referenced below are designated by a 998 number, a FID number and a Material Safety Data Sheet. Any modification to an existing technology must be approved by the appropriate GM engineering group with a written description of the modification and a new Material Safety Data Sheet if affected by the modification.

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5.1 ROW A. Qualification of new or licensed monocoat, basecoat and/or clearcoat technology. All monocoat, basecoat and/or clearcoat technologies must be qualified for use with approved glass bonding materials. Perform the required tests outlined in Table 1, Section A, of this specification. (Table 1, Section H, should be run concurrently for additional colors.)

NOTE: Pinchweld prime must be applied within 1 h after topcoat bake.

5.2 ROW B. Qualifications of a modification to an existing monocoat, basecoat and/or clearcoat technology. It is the decision of the appropriate GM engineering group as to the required testing; Table 1, Section A or Section B. (Table 1, Section H, should be run concurrently for additional colors.)

5.3 ROW C. Qualification of a new/licensed ELPO, primer surfacer (color keyed or color specific) or seal coat technology used as a bonding surface. Perform the required tests as outlined in Table 1, Section C, of this specification. (For color specific primer surfaces, Table 1, Section H, should be run concurrently for additional colors.)

5.3.1 Approved 9984126 masking tape should be used per Row J to evaluate Quick Knife Adhesion before and after humidity. If no plant-designated tape is specified for technology qualification, use American Tape PG 21.

5.4 ROW D. Qualification of a modification to an existing ELPO, primer surfacer (color keyed or color specific) or lacquer seal coat technology used as a bonding surface. It is the decision of the appropriate GM engineering group as to the required testing; Table 1, Section C or Section D. (For color specific primer surfacers, Table 1, Section H, should be run concurrently for additional colors.)

5.4.1 Approved 9984126 masking tape should be used per Row J to evaluate Quick Knife Adhesion before and after humidity. If no plant-designated tape is specified for technology qualification, use American Tape PG 21.

5.5 ROW E. Qualification of new/licensed ELPO, primer surfacer, or lacquer seal coat technology not used as a bonding surface. All ELPO, primer surfacer, and lacquer seal coat technologies must be qualified for use as a layer below topcoat which is compatible with glass bonding materials. Perform the required tests as outlined in Table 1, Section E, of this specification.

5.5.1 For color keyed and color specific primer surfacers, a representative topcoat color associated with each primer surfacer color should be tested. Verify with the appropriate GM engineering group which topcoat is to be tested with each primer surfacer. Non color keyed or non color specific primer surfacers use the topcoat colors white and light blue metallic.

5.6 ROW F. Qualification of a modification to an approved ELPO or primer surfacer, or new surfacer colors used as a layer below topcoat. It is the decision of the appropriate GM engineering group as to the required testing; Table 1, Section E or Section F.

5.6.1 For color keyed and color specific primer surfacers a representative topcoat color associated with each primer surfacer color should be tested. Verify with the appropriate GM engineering group which topcoat is to be tested with each primer surfacer. For ELPO or noncolor keyed or noncolor specific primer surfacers use the topcoat colors white and light blue metallic.

5.6.2 For new surfacer colors (pigmentations) in approved technologies, run ROW F with an associated topcoat.

5.6.3 For modified ELPO's, run ROW F with white and light metallic.

5.7 ROW G. Qualification of paint layering. Each paint layering system must be approved before it is used in production. Each layer may have been approved independently with other layers, but the exact combination of products were not tested as a layering system. If all layers have been previously approved according to this specification, perform the required tests as outlined in Table 1, Section G, of this specification for the new layering combination.

5.8 ROW H. Qualification of new topcoat or primer colors (annual programs). Each topcoat color or primer surfacer used as a bond surface must be qualified for use with the glass bonding materials (urethane adhesive and primer) released for production. Each topcoat color or primer surfacer used as a bond surface must be tested over a current production ELPO (9984070 or equivalent). Results over primer surfacer will be accepted. Follow the bake schedule and other requirements outlined in Table 1, Section H, of this specification.

5.9 ROW I. Qualification of approved pinchweld primers. Each previously approved pinchweld primer must be qualified for use with the specific plant paint system released for production (including topcoat, primer surfacer and ELPO).

5.9.1 Topcoats. Perform bakes and other tests for qualification of a pinchweld primer with topcoat as outlined in Table 1, Section I (1a and 1b). Use white and light blue metallic topcoats for I.1a and all other colors for I.1b.

5.9.2 Primer Surfacer. If required, perform bakes and other tests for qualification of a pinchweld primer with ELPO as outlined in Table 1, Section I.3.

5.10 ROW J. Validation of approved 9984126 masking tape for usage in the windshield bond area for plant-specific application. Masking tape can be applied directly over electrodeposition primer, surfacer, or topcoat. The layer to which the tape is applied should be given the minimum bake. After the tape is applied, the next layer(s) of paint is applied over the tape and baked at the upper bake limit. Use white topcoat over the tape for maximum solvent soak. Tape is removed after the last bake sequence and the panel is examined visually for evidence of residue of the panel prior to evaluating windshield bonding performance.) Apply a plant-specific pinchweld primer and urethane adhesive directly to the panel without solvent wiping and test as indicate in Table 1. When masking to surfacer, test with a red surfacer instead of gray for plants using color-keyed or color-specific products. All paint applications should be at target dry film.

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5.11 ROW K. Validation of plant-specific variance to eliminate masking or shielding of the windshield bond area when the polishing area is further than 607 mm from the windshield bond area. Polish must be approved to 9982075. Use white topcoat at target bake and film as indicated in Table 1, Section K. Panels must be evaluated for Tape Link-Up and Quick Knife Adhesion under three conditions:

- Control - No polish.
- Apply 76 μm (approx 5 cc) wet polish and air dry 30 minutes. Wipe one pass with dry cloth leaving visible dry polish residue.
- Apply 76 μm (approx 5 cc) wet polish and air dry 30 minutes. Wipe one pass with cloth dampened with 9981062 naphtha and wipe one pass.

6 SPECIFIC TEST REQUIREMENTS.

6.1 TAPE LINK UP TIME (GM9520P). Perform tape test on panel prepared with pinchweld primer at 30 minute intervals until sample *passes*. The sample passes when there is no transfer of primer to masking tape. This test is used as information for quality control procedures. Guideline: link up should occur within 8 h.

6.2 QUICK KNIFE ADHESION TEST (GM9522P).
Urethane bead dimension - 6 x 6 mm.

6.2.1 Initial Test. There shall be no more than 6 mm separation of pinchweld primer to paint, intercoat adhesion between paint layers, or intracoat paint separation from the knife scribe line when cuts are 12 mm apart.

6.2.2 Humidity, 168 h (GM4465P). Age panels for 72 h @ $23 \pm 2^\circ\text{C}$ followed by 168 h @ 38°C and 100% RH. There shall be no more than 6 mm separation of pinchweld primer to paint, intercoat adhesion between paint layers, or intracoat paint separation from the knife scribe line when cuts are 12 mm apart.

6.3 SHEARS (GM9521P). Prepare shears per GM9521P.

6.3.1 Initial Test. When pulled at a rate of 130 mm/minute the minimum shear strength allowed is 1655 kPa (250 psi).

6.3.1.1 There shall be no adhesive separation between any layers of the system.

6.3.2 Humidity, 168 h (GM4465P). Age prepared shears for 72 h @ $23 \pm 2^\circ\text{C}$ followed by 168 h @ 38°C and 100% RH. When pulled at a rate of 130 mm/minute the minimum shear strength allowed is 1655 kPa (250 psi). There shall be no adhesive separation between any layers of the system.

6.3.3 Cycled Shears (GM9505P, Cycle I). Age prepared shears for 72 h @ $23 \pm 2^\circ\text{C}$ followed by 5 cycles as outlined in GM9505P, Cycle I. Allow at least 4 h ambient recovery of shears before pulling of samples. When pulled at a rate of 130 mm/minute the minimum shear strength allowed is 1655 kPa (250 psi). There shall be no adhesive separation between any layers of the system.

7 SOURCE SHIPMENT RESPONSIBILITY.

It will be the responsibility of the supplier to insure that the material is not exposed to temperatures during shipment which would cause the material to fail to meet any of the requirements of this specification.

8 INITIAL SOURCE APPROVAL. No shipment shall be made by any supplier until representative initial production samples have been approved by engineering as meeting the requirements of this specification.

8.1 Completed copies of the Material Safety Data Sheet meeting GM information requirements must be submitted with any new submissions or whenever a composition change has occurred.

9 INSPECTION AND REJECTION. 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 this 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. This document shall be prepared and provide data in accordance with the requirements detailed in GM4389M.

10 APPROVED SOURCES. Engineering qualification of an approved source is required for this specification. Only sources listed in the GM Materials File under this specification number have been qualified by engineering as meeting the requirements of this specification. Sources are available through the on-line MATSPC System.

11 GENERAL INFORMATION. This specification was approved by the Paint Materials Specification Committee and General Ballot Committee in June 1991. The latest revisions include:

Rev	Date	Description
A	7/92	Editorial, Table
B	11/95	Change max to min in 6.3