



ENGINEERING STANDARDS

Material Specification

LIMITED USE
HN1688

Body and Fascia Paint Materials Productability Simulation

Do Not Use on New Programs; No Replacement

1. GENERAL DESCRIPTION

1.1 INTRODUCTION

This Productability risk assessment is an assessment made by GM Holden of the risks involved in introduction of a paint material into the GM Holden vehicle body painting facility at Elizabeth. It is used to predict the material's capability to achieve Quality and Production metrics that are repeatable and sustainable within normal production process variation.

This specification details the testing requirements of the paint supplier and the documentation required for each submission to GM Holden to allow productability risk assessment approval. The information supplied in the submitted documentation will be used to advise GM Holden Manufacturing of the target application parameters required to achieve optimal appearance and quality.

1.2 GENERAL REQUIREMENTS

- 1.2.1 It is required at the plant trial stage and during the colour production run that the basecoat colour and appearance achieved will equal or better the results achieved in the FRA, especially on vertical surfaces for both metal and plastic paints.
- 1.2.2 The documentation required for each submission is supplied in the FRA Submission Form. This must be submitted with the FRA each time. Incomplete submissions will not be accepted. An electronic copy can be made available by the GM Holden Materials Engineer. Testing to GM9620M is required for each new basecoat colour using the forms shown in GM9620M.
- 1.2.3 The supplier is responsible for ensuring they are working with the "current" revision of GM Holden Specifications & Test Methods.
- 1.2.4 The supplier must submit a development plan and documentation defining the proposed process parameters for each new colour to Holden for approval, prior to commencement of the FRA.

1.3 SUBMISSIONS

- 1.3.1 A maximum of two submissions will be allowed, before the basecoat pigmentation will need to be adjusted. Adjustment is defined as minor change in the ratios of the current pigmentation used in the first two submissions, without introducing additional pigments.
- 1.3.2 A maximum of two further submissions will be allowed for "adjusted" basecoat colours. If the colour fails at this point it will be reviewed for viability to determine if it can be redeveloped within the program timeframe. Redevelopment is defined as

introducing alternate pigments in addition to or replacement of, those already contained within the first four submissions.

1.3.3 A maximum of four (4) submissions is to be received for any one colour.

1.3.4 A print out of all assessment data shall be attached to the FRA paperwork for each simulation. An excel spread-sheet template, provided by Holden, shall also be completed with each submission by the supplier.

2. REFERENCES

2.1 In addition to this HN specification, the materials shall meet the following specifications:

GMW14797	GMW3005	GM9620M
GMW15777	GMW3002	GMW3059

3. DETAILED REQUIREMENTS

3.1 Process Parameters

3.1.1 All testing is to be performed at the supplier's production simulation facility.

3.1.2 The responsible GM Holden Paint Engineer will provide existing plant processing details and any scheduled changes limitations on plant process parameters upon request.

3.1.3 It is the Paint Supplier's responsibility to ensure they have current information on the processes and parameters which reflect GM Holden's paint process at Elizabeth Body Paint Shop and GM Holden Plastics Operation. Specific requirements of the paint material will be provided in the relevant material specification.

3.1.4 The supplier is responsible to perform set up and debug for the production simulation equipment prior to the scheduled trial.

3.1.5 The quantity of test panels to be prepared shall be sufficient to perform all testing required such that the supplier can accurately complete the documentation required.

3.1.6 Test panels shall be prepared using the full paint system intended for the Elizabeth painting facility. This includes substrate, pre-treatment, and paint layers, including repair paint layers, processed at the correct film builds and cure

cycles for GM Holden Body Paint Shop (BPS), End of Line Repair (EOLR) and Holden Plastics Operation (HPO).

- 3.1.7 The film thicknesses used for each simulation and repair panel must fall within Holden (BPS, EOLR & HPO) plant application limitations and the relevant referenced GMW specification for paint performance.

3.2 Physical Evidence

- 3.2.1 The onus of proof of productability shall reside with the supplier.
- 3.2.2 If requested by GM Holden, the supplier must provide physical proof of a product's productability to GM Holden at the earliest possible opportunity in the approval process.

4. PRODUCT INFORMATION

All Section 4 information shall be entered in the FRA Submission Form (excel file), available from the GM Holden Paint Materials Engineer.

4.1 Product Identification

- 4.1.1 The supplier is required to provide product identification for the full paint system used to test the basecoat properties. The information required is shown in the FRA Submission Form.
- 4.1.2 Submission history of the FRA for a basecoat colour must have clear notation on the FRA forms to show it is a subsequent submission along with details of explanation.

4.2 Formulating Range

- 4.2.1 The product's formulation range information must include all pigments used in the formulation, with information to be provided on type, colour, flake size, exposure data and %v/v.
- 4.2.2 Deviations from this FRA formulating range during the life of the product supplied to GM Holden will require repeat testing of Sections 5 and 6 unless an exemption is granted by the relevant GM Holden Paint Engineer.
- 4.2.3 The maximum number of pigments used in a basecoat colour will be limited to 8. This will comprise of up to 3 effect pigments and 5 colourants (including Black & White). Trace amounts of poor fade resistant pigments are not allowed.
- 4.2.4 Changes to the pigment composition are not allowed for the following:
- 4.2.4.1 Original Holden Design approved colour concept to 1st round FRA.
- 4.2.4.2 Holden Design approved 2nd supplier colour match to 2nd supplier FRA.

- 4.2.4.3 The production material supplied to Holden Vehicle Assembly Plant to that approved at the FRA stage.

4.3 Product Characteristics

- 4.3.1 The supplier is required to provide information regarding product characteristics of basecoat. The information required is shown in the FRA Submission Form.
- 4.3.2 The quoted product characteristics must be used for the testing required in Sections 5 and 6.
- 4.3.3 The opacity (black and white hiding) must be 25 microns or less, if not, the additional multiple layer repairs panel is to be prepared as indicated in Appendix D and additional single coat panels of 10 and 15 microns over "e-coat only" substrate are also to be prepared.
- 4.3.4 Paint with opacity of greater than 25 microns will require a high opacity repair panel as per HN1688 Section 6 and Appendix D.
- 4.3.5 Opacity for all colours must be demonstrated using opacity film thickness wedge as per Appendix D.
- 4.3.6 The hiding reading will be visually and instrumentally assessed as part of each new colour FRA. Colours with opacity of higher than 25 microns will be considered high risk.

5. SIMULATION STUDIES

5.1 Simulation Application Parameters and Assessment

- 5.1.1 The supplier is required to provide their Laboratory paint application information on the parameters required for the basecoat in order to achieve optimal appearance and performance. The supplier's application settings are used as a simulation of GM Holden Body and Fascia Plants. The information required is shown in Appendix A.
- 5.1.2 The quoted application parameters must be used for preparation of all simulation panels. Prior to beginning the FRA process the paint supplier must obtain written

confirmation of the parameters to be used during FRA for each GM Holden program.

5.1.3 Panels used must be representative of Holden standard processes in terms of paint application, substrates, paint materials, film thicknesses, sanding & preparation and bake cycles.

5.1.4 Pre-topcoat application sanding of primer and ELPO layers is not allowed for these appearance panels. The selected parameters must fall within the range noted in App A.

5.1.5 All panel assessments shall be conducted using criteria set out in Section 7.2, unless noted otherwise.

5.2 Body Paint Simulation

5.2.1 This panel will be assessed on the ability to colour match the approved GM Holden Design concept chip (also Bell/Bell applied) and meet Holden appearance and quality specifications.

5.2.2 Preparation

5.2.2.1 This simulation shall be performed on an A3 size panel (450X300mm) metal panel representing plant processes using parameters as listed 5.1.3.

5.2.2.2 A Black and White opacity checker must be attached over the primer to show opacity at the applied film thickness.

5.3 Fascia and Rocker Paint Simulation

5.3.1 This simulation shall be performed on a 100X150mm un-grained plastic plaque representing plant processes noted in HN1688 Section 3.1 and application as per HN1688 Appendix C. This panel will be assessed on the ability to colour match the

approved GM Holden Design Body Paint Simulation and Holden appearance and quality specifications.

- 5.3.2 A Black and White opacity checker must be attached over the primer to show opacity at the applied film thickness. A full recoat repair simulation will be assessed for colour match and appearance.

5.4 Colour Capability Study: 17 Panel Process Variable DOE, Body & Fascia/Rocker

- 5.4.1 This study shall be conducted separately for both the Body and Fascia/Rocker paint operations, for metallic basecoat colours only

5.4.2 Preparation

- 5.4.2.1 DOE shall be performed using the following substrates:

Body: Metal panels 100X300 mm

Fascia: Plastic plaques 100X150mm

- 5.4.2.2 The primer and clearcoat shall be applied as per normal Target process parameters.

5.4.3 Assessment

- 5.4.3.1 Assessment shall be conducted using criteria set out in Section 7.2. The Target (T9, T10, and T11) panels shall be used as reference for this assessment. Basecoat 1st coat is to be applied using Target values (the settings used for colour simulation sign off of the Body or Plastic panels). Basecoat 2nd coat will be varied according to the 2³ factorial matrix table shown in FRA submission form (Colour and Data Tab). Provide separate

graphical representation of the L, a and b values vs. the reference panel for each panel on all colour angles.

5.4.3.2 The colour shall also be visually rated per 7.3.

5.4.3.3 Holden will rank the overall outcome as low, medium or high risk.

5.5 Colour Capability Study; Film Build Ladder - Body & Fascia/Rocker

5.5.1 The basecoat (for non-metallic colours only) shall be assessed visually and instrumentally evaluated for colour and appearance capability using a range of basecoat film builds as specified in the Film Build Ladder listed in Appendix C

5.5.2 This study shall be conducted separately for both the Holden Body and Fascia/Rocker paint operations.

5.5.3 Preparation

5.5.3.1 Panels shall be prepared using the following substrates:

Body: Metal panels 100X300 mm

Fascia: Plastic plaques 100X150mm

5.5.3.2 The primer and clearcoat is to be applied as per normal Target process parameters. These conditions represent the variation of the BPS and HPO

application process and demonstrate the ability of the basecoat to perform under a wide range of conditions.

5.5.4 Assessment

- 5.5.4.1 Assessment shall be conducted using criteria set out in Section 7.2. The Target (T9, T10, and T11) panels shall be used as reference for this assessment.
- 5.5.4.2 The colour shall also be visually rated per 7.3.
- 5.5.4.3 Holden will rank the overall outcome as low, medium or high risk.

5.6 Spits/Dirt Generation

- 5.6.1 The paint supplier shall demonstrate the ability of the paint to resist generation of spits/dirt due to drying whilst being applied by Bell application using the settings listed in Appendix C Table 2.1

5.6.2 Preparation

- 5.6.2.1 Prepare the substrate panel using an A3 size metal panel (450x300mm) and the relative layers representing GM Holden Ecoat and primer.
- 5.6.2.2 Apply the first Bell coat as per the simulation panel in Section 5.2.
- 5.6.2.3 The second Bell applied coat shall involve "triggering off" the paint flow to the Bell at either end of the panel and "triggering on" towards the centre of the panel, refer to Appendix G.
- 5.6.2.4 No Clearcoat is applied prior to baking the panel at the process representative cure cycle.
- 5.6.2.5 This study will be performed against a reference (Silver) basecoat which is known to achieve acceptable First Time OK (FTOK) in the GM Holden Body Paint Shop (BPS)

5.6.3 Assessment

- 5.6.3.1 The spits/dirt number and size shall be reported vs. the reference basecoat. Photos showing dirt/paint build up on the Bell cap vs. the reference basecoat will be submitted in the FRA report by the paint supplier.

5.7 Booth Stoppage Simulation

5.7.1 This panel will be assessed on the ability to colour match the approved GM Holden Design Body Paint Simulation and appearance requirements.

5.7.2 Preparation

5.7.2.1 This simulation shall be performed on a 100X300mm metal plaque representing plant processes.

5.7.2.2 The panel will be prepared in accordance with the simulation panel process Section 5.2 with the exception that the flash off time between basecoat coats will be 2 minutes.

5.7.2.3 This panel will be assessed on the ability to colour match the approved GM Holden Design Body Paint Simulation (Section 5.2) and to meet GM Holden appearance and quality specifications in section 7.2.

5.8 Repairability – Full body recoat

5.8.1 Full recoat repairs are conducted through the topcoat booth using the Automated Bell;Bell process. The supplier is required to simulate in-line repair conditions using