



ENGINEERING MATERIAL SPECIFICATION

Material Name	Specification Number
ENAMEL, COMPLIANCE VOC, THERMOSET BASECOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS - EXTERIOR	ESB-M33J3-A1
ENAMEL, COMPLIANCE VOC, THERMOSET CLEARCOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS . EXTERIOR	ESB-M33J3-A2
ENAMEL, COMPLIANCE VOC, THERMOSET CLEARCOAT, WET-ON WET-WITH ESB-M36J1-A1 AND ESB-M36J1-A2	ESB-M33J3-A3
ENAMEL, COMPLIANCE VOC, THERMOSET BASECOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS, REDUCED VISCOSITY - EXTERIOR	ESB-M33J3-A4
ENAMEL, COMPLIANCE VOC, THERMOSET CLEARCOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS, REDUCED VISCOSITY - EXTERIOR	ESB-M33J3-A5
ENAMEL, COMPLIANCE VOC, THERMOSET CLEARCOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-A1, ETCH RESISTANT - EXTERIOR	ESB-M33J3-B1
ENAMEL, COMPLIANCE VOC, THERMOSET BASECOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-B3, ETCH RESISTANT - EXTERIOR	ESB-M33J3-B2
ENAMEL, COMPLIANCE VOC, THERMOSET CLEARCOAT BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-B2, ETCH RESISTANT - EXTERIOR	ESB-M33J3-B3
ENAMEL, COMPLIANCE VOC, THERMOSET BASECOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-B5, ETCH RESISTANT, REDUCED VISCOSITY - EXTERIOR	ESB-M33J3-B4
ENAMEL, COMPLIANCE VOC, THERMOSET CLEARCOAT BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-B4, ETCH RESISTANT, REDUCED VISCOSITY - EXTERIOR	ESB-M33J3-B5
ENAMEL, COMPLIANCE VOC, THERMOSET TINTED CLEARCOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-A1 - EXTERIOR	ESB-M33J3-C1
ENAMEL, COMPLIANCE VOC, THERMOSET TINTED CLEARCOAT, WET-ON-WET WITH ESB-M33J3-A1 AND ESB-M36J1-C1	ESB-M33J3-C2
ENAMEL, COMPLIANCE VOC, THERMOSET TINTED CLEARCOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-A4, REDUCED VISCOSITY - EXTERIOR	ESB-M33J3-C3
ENAMEL, COMPLIANCE VOC, THERMOSET TINTED CLEARCOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-A1, ETCH RESISTANT - EXTERIOR	ESB-M33J3-C4
ENAMEL, COMPLIANCE VOC, THERMOSET TINTED CLEARCOAT, BASECOAT/CLEARCOAT WET-ON-WET PROCESS WITH ESB-M33J3-B2, ETCH RESISTANT - EXTERIOR	ESB-M33J3-C5

Date	Action	Changes
1996 07 22	Revised	Revised para 3.8.5.2, 3.8.9, 3.9.5.6 E. Nunez
1996 06 07	Revised	Upd & Rev para 5.3.2-5.3.4 E.Nunez M.Perchard
1986 09 29	CEQ1-AF538810	Released ESB-M33J3-A1 & A2

WP 3948-a

Page 1 of 25

■ 9009160 0043126 313 ■



1. SCOPE

The materials defined by these specifications are coatings with low volatile organic compounds (VOC) content, which consist of a pigmented high solids thermoset basecoat enamel over which is applied a clear or tinted clear high solids thermoset clearcoat in a wet-on-wet process. These materials are monobaked.

Unique tricoat colors are also included in the scope of these specifications. Tricoat colors include a pigmented high solids thermoset basecoat enamel, a second non-hiding high solids thermoset basecoat enamel followed by a clear or tinted clear high solids thermoset clearcoat.

Depending upon specific plant processing capabilities, unique tricoat colors may be applied in a wet-on-wet-on-wet process and monobaked or in a wet on bake operation. The wet on bake operation includes the application of a pigmented high solids thermoset basecoat enamel which is baked followed by the application of a non-hiding high solids thermoset basecoat and a clear or tinted clear high solids thermoset clearcoat in a normal wet on wet process.

2. APPLICATION

These specifications were released originally for materials used as the topcoat finish on automobile bodies, hoods, fenders and other exterior parts, and shall be satisfactory for use over specified primers, or over previously baked enamel, as in paint repair or two toning operations. The basecoat portion is used alone, without clearcoat, as an interior baking enamel for some applications.

ESB-M33J3-A1, -A2, -A3, -B1, -B2, -B3, -C1, -C2, -C4, and C5

The materials defined by these specifications are supplied at normal viscosity and solids level as shown in this document.

ESB-M33J3-A4, -A5, -B4, -B5, and -C3

The materials defined by these specifications are supplied with reduced viscosities such that they are ready for use in the assembly plants. The reduced viscosities and associated reduced solids levels shall be agreed upon by the supplier, the affected assembly plant, Body and Assembly Paint Operations and NAAO Production Purchasing prior to delivery of the materials to the respective assembly plant. The materials shall meet all other requirements of the respective parent ("A1", "A2", "B2" and "B3", "C1", "C2", etc. level) specifications.



3. REQUIREMENTS

Shall meet all the requirements of this section. Test shall be made on the basis of comparison with approved production material applied and tested under identical conditions.

Note: The following requirements apply to the complete basecoat/clearcoat enamel system. For purposes of the specification, paint systems which utilize a standard basecoat/clearcoat, a basecoat/midcoat/clearcoat and/or a system with a tinted clearcoat shall be considered the "complete basecoat/clearcoat enamel system". For basecoat-only applications refer to para 3.9.

3.1 QUALITY SYSTEM REQUIREMENTS

Material suppliers and part producers must conform to Quality System Requirements, QS-9000. Material specification requirements are to be used for initial qualification of materials. A Control Plan for ongoing production verification is required. This plan must be reviewed and approved by the relevant Ford Materials activity and/or Ford Supplier Technical Assistance (STA) prior to production parts submission. Appropriate statistical tools must be used to analyze process/product data and assure consistent processing of the materials.

Part producers using this material in their products, must use Ford approved materials and must conform to a process control plan which has been approved by STA and/or the relevant Materials Activity.

3.2 COMPOSITION

3.2.1 ESB-M33J3-A1, -A4, -B2 and -B4, Basecoat (Non Volatile Portion)

Resin Solids: The thermosetting vehicle system shall retain initial appearance and resistance properties over long-term, provide good adhesion to primer, and be compatible with the clearcoats.

Midcoat: The thermosetting vehicle system shall retain initial appearance and resistance properties over long-term, provide good adhesion to both baked and wet basecoat and be compatible with the clearcoats.

Ultraviolet Light Absorber(s)/Stabilizer(s): The basecoat and midcoat shall contain these materials if required to provide initial appearance and resistance properties to the enamel over long-term.

Pigments: Pigments are exterior quality automotive grades. The pigment blend shall provide a satisfactory color match to the Ford master panel on file.



- 3.2.2 ESB-M33J3-A2, -A5, -B1, -B3, -B5, -C1, -C3, -C4 and -C5, Clearcoat and Tinted Clearcoat (Non-Volatile Portion)

Resin Solids: The thermosetting vehicle system shall maintain initial appearance and resistance properties, and yield a smooth appearance with high gloss and good leveling.

Ultraviolet Light Absorber(s)/Stabilizer(s): The clearcoat/tinted clearcoat shall contain these materials in amounts sufficient to provide initial appearance and resistance properties to the enamel over long-term.

- 3.2.3 ESB-M33J3-A3 and -C2, Clearcoat and Tinted Clearcoat (Non-Volatile Portion)

These materials are formulated to provide additional compatibility with two-component urethane clearcoat, ESB-M36J1-A4, but shall be identical in performance to ESB-M33J3-A2. The clearcoat will be used only for cut-in at door openings, inside hood and trunk, prior to the two-component urethane clearcoat application.

- 3.2.4 Specific Composition

The supplier will furnish such data upon request.

- 3.2.5 Volatile Components

The proportions of solvents in the paint shall be so formulated that the enamel will level out satisfactorily without sagging, popping, or roughness after baking at the specified film thickness, and give satisfactory adhesion when the enamel is applied over a previously baked coat of the enamel.

- 3.2.5.1 Resistivity 0.05 to 4.00 megaohms

Volatile solvents and other components affecting electrical conductivity shall be adjusted such that the resistivity at application viscosity shall be within specified limits.

3.3 PHYSICAL PROPERTIES

- 3.3.1 Volume Non-Volatile Content (at application viscosity)

The volume solids at application viscosity shall be calculated using the manufacturer's formula.

- 3.3.1.1 Pigmented Basecoat and Midcoat 37 % min
(Weighted average of all basecoats
used in the production facility)



- 3.3.1.2 Pigment in Tinted Clearcoat 0.5 % max
- 3.3.1.3 Clearcoat/Tinted Clearcoat 49 % min
- 3.3.2 Viscosity
(FLTM BI 111-01)

The viscosity of the materials defined in these specifications shall be within +/- 15 % of that shown on the initial sample report, using a #4 Ford Cup at 26 +/- 1 C.

Note: At application viscosity, the enamels shall be in compliance with VOC requirements at the facilities where being implemented.

3.3.3 Viscosity Stability

3.3.3.1 Pigmented Basecoat - Shelf Stability

After standing for 90 days at a room temperature of 26 +/- 1 C, material must be free of settling which cannot be dispersed by normal agitation. A viscosity increase of more than 15 s on a #4 Ford Cup is not permitted.

3.3.3.2 Clearcoat/ Tinted Clearcoat - Shelf Stability

The clearcoat solution shall not become turbid after standing for 90 days at a room temperature of 26 +/- 1 C. A viscosity increase of more than 12 s on a #4 Ford Cup is not permitted.

3.3.3.3 Pigmented Basecoat - Accelerated Shelf Stability
(FLTM BI 102-03)

The material must be free of settling which cannot be dispersed by normal agitation. A viscosity increase of more than 15 s on #4 Ford Cup is not permitted.

3.3.3.4 Clearcoat/Tinted Clearcoat - Accelerated Shelf
Stability
(FLTM BI 102-03)

The material shall not become turbid. A viscosity increase or more than 12 s on #4 Ford Cup is not permitted.



3.4 PREPARATION OF TEST PANELS

3.4.1 Substrate

Parker Bonderite 40 or equivalent unpolished 100 mm x 300 mm cold rolled steel panels are required.

3.4.2 Electrocoat Primer (use type required)

3.4.2.1 Gray Medium-Build Cathodic Electrocoat Primer

Panels shall be coated with current production Gray Medium-Build Cathodic Electrocoat Primer to achieve a dry film thickness 20 - 23 micrometre. The bake schedule is 10 minutes at 182 C metal temperature.

3.4.2.2 Gray High-Build Cathodic Electrocoat Primer

Panels shall be coated with current production Gray High-Build Electrocoat Primer to achieve a dry film thickness of 30 - 33 micrometre. The bake schedule is 10 minutes at 182 C metal temperature. When evaluating ESB-M33J3-A1/A3 over this electrocoat primer, panels shall be prepared either with or without spray primer in accordance with assembly plant practice.

3.4.3 Spray Primer

Using electrocoat-primed panels, apply current production epoxy-free primer-surfacer by spray to a dry film thickness of 25 - 30 micrometre. (The color of the spray primer shall be consistent with spray primer currently used in production.) Bake primer 20 minutes at 149 C ambient temperature (10 minutes minimum metal temperature).

3.4.4 Enamel

Note: When applying enamels, use the appropriate system combinations and enamel colors as identified in para 5.1 and 5.2, respectively.

Apply basecoat to required dry film thickness by spray. Flash for two (2) minutes. Apply clearcoat to required dry film thickness by spray. Bake using appropriate bake schedule as per para 3.4.6.



	Basecoat & Midcoat Dry Film Thickness	Clearcoat Dry Film Thickness
Low Film Thicknesses	10-15 micrometre	36-41 micrometre
Standard Film Thicknesses	15-25 micrometre	46-51 micrometre
High Film Thicknesses	25-30 micrometre	56-61 micrometre

3.4.5 Catalyzed Repair

Catalyze basecoat and clearcoat according to manufacturer's recommendations. Prepare panels as per para 3.4.1 through 3.4.4, use standard film thicknesses and bake original coat at standard bake conditions (see para 3.4.6). Mask half of panels vertically and wipe left half clean with M14J503 naphtha. Apply catalyzed basecoat to a dry film thickness of 15 - 25 micrometre and flash for 2 minutes. Apply catalyzed clearcoat to a dry film thickness of 46 - 51 micrometre. Remove masking, flash-off the panels, and bake 20 minutes at 99 C ambient (minimum of 10 minute metal temperature).

3.4.6 Enamel Baking Schedules

All submission panels shall be baked in a gas fired oven.

Standard bake temperature shall be defined by the manufacturer, and submitted along with product composition information.

3.4.6.1 Minimum bake: 17 minutes at supplier recommended temperature - 6 C, ambient
10 minutes at supplier recommended temperature - 6 C, metal

3.4.6.2 Standard bake: 17 minutes at supplier recommended temperature, ambient
10 minutes at supplier recommended temperature, metal

3.4.6.3 Maximum bake: 30 minutes at supplier recommended temperature + 13 C, ambient
23 minutes at supplier recommended temperature + 13 C, metal

3.4.6.4 The catalyzed enamel repair bake is 20 minutes at 99 C ambient. A minimum of 10 minutes at 99 C metal temperature is required.



3.5 APPEARANCE

Note: Appearance panels should be sprayed out at low film thickness using standard plant processing parameters.

3.5.1 Color
(FLTM BI 109-01 + X-Rite)

Shall match the Ford master panel after all the baking cycles described in para 3.4.6.

3.5.2 Gloss, All Colors, min 90
(FLTM BI 110-01, 20 deg Glossmeter)

Bake panels per standard bake para 3.4.6.

3.5.3 Gloss After Rebake
(FLTM BI 110-01, 20 deg Glossmeter)

Bake panels per standard bake para 3.4.6.

No more than 4 units decrease in gloss is permitted when panel is rebaked per para 3.4.6.

3.5.4 Distinctness of Image, min 70
(FLTM BI 10-3)

Bake panels per standard bake para 3.4.6.

3.5.5 General

The enamel shall cure to a presentable, serviceable, mar-resistant film showing no craters, pinholing, seediness, abnormal roughness or excessive metallic mottling. It shall have reasonable tolerance for ordinary cleaning (such as automatic car washes) and exhibit excellent polishing characteristics when wheel polished with a wide range of various compounds and cleaners.

3.6 FILM PROPERTIES

3.6.1 Dry Hiding
(FLTM BI 158-01)

3.6.1.1 Pigmented Basecoat 15-25 micrometre*

* When an exception to this hiding requirement is needed for special colors, concurrence must be obtained from all affected Ford activities.

The basecoat is required to provide complete visual hiding over a black and gray straight-line hiding chart.