ENAMEL, COMPLIANCE VOC, HIGH SOLIDS, THERMOSET BASECOAT, WET ON WET PROCESS WITH WSS-M33J7-B5 CLEARCOAT, ETCH & SCRATCH RESISTANT, EXTERIOR — **WSS-M33J7-B4**

ENAMEL, COMPLIANCE VOC, HIGH SOLIDS, THERMOSET CLEARCOAT, WET ON WET PROCESS WITH WSS-M33J7-B4 BASECOAT EXTERIOR — **WSS-M33J7-B5**

1. SCOPE

The materials defined by these specifications are coatings which consist of a pigmented thermosetting basecoat enamel over which is applied a clear thermosetting clear coat in a wet-on-wet process. These materials are mono baked.

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. These materials have been formulated to provide windshield bonding without the use of flange primer (direct glazing) and allow for flush glass designs. The basecoat portion is used alone, without clear coat, as an interior baking enamel for some applications.

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials.

Test shall be made on the basis of comparison with approved production material, to be chosen by approving materials engineer

Note: For purposes of the specification, paint systems, which utilize a standard basecoat/clear coat, shall be considered the "complete basecoat/clear coat enamel system". For basecoat-only applications refer to Para 3.14.

3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.2 COMPOSITION

3.2.1 Resin

Basecoats shall be thermosetting, synthetic resins, and clear coats will be thermoset-ting, acrylic-modified synthetic resins or equivalent. Each will be appropriately fortified so as to meet the durability requirement of 10 years.

Date	Action	Revisions
2006 10 26	Activated	K.G. Latham, G.Schuh

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3.2.2 Pigments

Pigments are exterior quality automotive grade selected to meet durability Requirements.

3.2.3 Solvents

The volatility of the solvents will be such that there shall be no paint sagging, roughness or dry spray at specified film thicknesses. Solvents shall be HAPS compliant if it is required by local government regulations.

3.2.4 Ultra violet absorber

All approved materials shall contain with Initial Sample Report an UV-spectroscopic analysis. This shall be recorded and filed by Paint Engineering Laboratories of the Ford Motor Company.

Subsequent material UV-spectroscopic analysis shall correspond to the data of the Initial Sample.

The clear coat shall contain sufficient amounts of suitable Ultra Violet light absorber packages. These will be selected by the supplier to provide 10 year long term durability.

3.2.5 Conditioning

All panels shall be aged for 72 h at 23 +/- 2 °C or 16 h at 43 +/- 2 °C before testing for resistance properties unless otherwise specified.

In the event of differences between test results, the results after aging at room temperature shall govern.

All tests according to this specification shall be performed in a controlled atmosphere of 23 +/- 2 °C and 50 - 65% relative humidity if not otherwise specified.

3.2.6 Flash Point

The flash point shall conform to the safety regulations applicable to the plant and/or country where the material shall be used.

3.2.7 Special Data

All initial and batch submissions must indicate density, non volatile content, and density of the cured film as supplied on the sample report.

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3.3 PHYSICAL PROPERTIES

3.3.1 Non-volatile at application viscosity (FLTM BI 102-01) (1 hour @ 105 °C then 30 minutes @ 140 °C) — Initial Sample +/- 1.0%

Minimum solid content basecoat unless otherwise released — 40.0%

Minimum solid content clear coat unless otherwise released — 50.0%

These solid limits apply to basecoats adjusted to recommended supplier application viscosity using Ford Cup 3, at 25 °C (FLTM BI 111-01) and clear coat adjusted to a viscosity of 50 s Ford Cup 3, at 25 °C (FLTM BI 111-01).

Vendor may specify solvents but shall be Ford Product Engineering approved prior to use.

3.3.2 Density (ASTM D 1475) — Initial Sample +/- 0.02 g/ml

3.3.3 Viscosity (FLTM BI 111-01, Ford Cup 3, 25 °C)

Application Viscosity — Initial Sample +/- 2 sec

3.3.4 Shelf Stability

During a storage of 3 months at room temperature, the clear coat as received shall not gel or show any turbidity upon standing and must be free from settling which cannot be dispersed by normal agitation. The viscosity of the material shall not increase in excess of 20 seconds (FLTM BI 102-03, Ford Cup 3, 25 °C)

Note: After test, the material shall pass all specification requirements.

3.3.5 3.3.8 Resistivity (ASTM D 5682) — 0.05 to 2.00 megohms

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

3.3.6 Density of the cured film (FLTM BI 154-02) — Initial Sample +/- 0.05 g/ml

3.4 PREPARATION OF TEST PANELS

(FLTM BI 103-02, Method B, b)

3.4.1 Substrate

Ford Engineering Approved Standard Steel Test Panels coated with Ford Engineering approved zinc phosphate and prepared in with accordance with Ford Engineering Materials Specification WSS-M3P1-D.

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3.4.2 Cathodic Electrocoat

Ford Engineering approved current production materials.

Apply the above primer to a minimum dry film thickness of 22 micrometer and bake as defined in relevant material specification.

3.4.3 Primer Surfacer

Ford Engineering approved current production material.

Apply the above primer to a minimum dry film thickness of 30 micrometer, and bake as defined in relevant material specification.

Do not sand the primer surface.

3.4.4 Base Coat

Apply approved base coat to a dry film thickness of 15 - 30 micrometer.

3.4.5 Clear Coat

Apply clear coat under test to a dry film thickness of 35 - 45 micrometer.

Minimum total dry film thickness

Base coat and clear coat	50 micrometer

3.4.6 Flash-Off Time

1 minute 40 seconds between base and clear coat application

3.4.7 Baking Cycles

Base coat and clear coat baked simultaneously

3.4.7.1 Standard Bake Tests

Bake 10 minutes at 140 °C metal temperature.

3.4.7.2 Rebake Tests

Standard Bake and then bake 10 minutes at 150 °C metal temperature.

3.4.7.3 In Plant Repair (Catalyzed Low Bake Repair – LBR, approved L. B. Basecoat and approved Low Bake catalyzed clearcoat to be used)

Enamels containing acid catalyst as requested.
Bake 10 minutes at 100 °C metal temperature.

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3.5 PROCESS WINDOW DEFINITION - NEW RESIN TECHNOLOGIES ONLY

The supplier shall perform a Design of Experiments (DOE) (Response Surface Analysis is recommended) to determine the process window of the control and candidate materials. The three variables/parameters to be included in the design are bake temperature, bake time, and clearcoat film thickness (basecoats applied at hiding). An initial screening experiment should be run to determine what levels should be tested for the variables/parameters. This screening experiment should be reviewed with the materials engineer to set up the final DOE. Responses to the DOE will be based on the materials tested and will be chosen from tests listed within the specification. Minimal critical testing required: cross-hatch adhesion, condensing humidity, acid spot resistance, mar resistance, stone chip (FLTM BI 157-06 Erichsen), intercoat adhesion, ICA 4. Information will be used by materials engineer to determine acceptable plant processing conditions. See also Para 4.2.

3.6 APPEARANCE

Note: Appearance panels will be sprayed using standard plant processing parameters. Consideration should be given to an application process window DOE to assess impact of key process variables/parameters on final appearance.

3.6.1 Color
(FLTM BI 109-01)

Color of clear coat film shall remain water white after all baking cycles described in para 3.4.7.

Color of base coat and clear coat shall match the relevant approved Master Appearance Sample (MAS) Panel.

3.6.2 Wavescan (QMS) Targets (Appearance)

Combined Orange Peel, DORI and Gloss values for the material under test when measured with a reliable instrument such as Wave Scan DOI must meet the targets outlined below. The combined (QMS) value is calculated by taking 50% of the Orange Peel value, 35% of the DORI value, and 15% of the Gloss value.

Targets:

	Horizontal	Vertical
Light Metallics	60	50
Dark Metallics	65	55
Light Solids	65	55
Dark Solids	65	55

3.6.3 Gloss
(FLTM BI 110-01, 20° glossmeter)

3.6.3.1 Standard Bake, min 90

3.6.3.2 Rebake Gloss

A decrease of not more than 4 units gloss is permitted when panel is rebaked per para 3.4.7.2

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3.6.4 Leveling

The surface of the material under test shall be equal to or better than current approved production material for smoothness when applied and baked under identical conditions. Orange peel values taken from (QMS) data obtained using Wave Scan DOI or equivalent shall be reported

3.6.5 Holdout

There shall be no evidence of dulling or change of image clarity when enamel color coat is applied over sanded and unsanded primer surfacer, and no difference in gloss of the color coat between sanded and unsanded primer. There shall be no prominence of sand scratches. Tests shall be made at both maximum and minimum bake cycles.

There shall be no evidence of color shift or telegraphing when enamel color coat is applied over sanded or unsanded primer surfacer

3.6.6 General

The enamel shall cure to a presentable, serviceable, mar-resistant film showing no craters, 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.

3.7 FILM PROPERTIES

3.7.1 Film Thickness
(FLTM BI 117-01)

Base coat	15 - 30 micrometer
Clear coat	35 - 50 micrometer
Base Clearcoat plus clear coat, min	50 micrometer

Coating must be sufficient to meet all performance requirements of this specification.

3.7.2 Dry Hiding Power — 15 - 30 micrometer
(FLTM BI 158-01)

The basecoat is required to provide complete visual hiding over black and grey hiding chart. When an exception to this hiding requirement is needed for special colors, concurrence must be obtained from all affected Ford activities

3.7.3 Final Hardness

3.7.3.1 Penetration, full system,
age 72 h at 23 +/- 2 °C

Tukon, min — 7.5 KHN
(FLTM BI 112-02)

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