PAINT PERFORMANCE: ALUMINUM WHEELS, ROAD AND SPARE **WSS-M2P122-E1**

PAINT PERFORMANCE: ALUMINUM WHEELS, INTERIOR STOWED MINI SPARE **WSS-M2P122-E2**

PAINT PERFORMANCE: STEEL WHEELS, ROAD AND SPARE **WSS-M2P122-E3**

PAINT PERFORMANCE: STEEL WHEELS, INTERIOR STOWED MINI SPARE **WSS-M2P122-E4**

1. SCOPE

These specifications define the performance requirements for colored/clear coatings over wheels.

2. APPLICATION

These specifications were released originally for full or partially painted wheels.

3. REQUIREMENTS

For MCDCC testing, the use of test panels is preferred. However, wheels may be used with agreement from both Materials Engineering and Core Engineering. To prevent delays, it's recommended that permission be obtained early in the process before starting testing. The type of sample used should be noted on the MCDCC.

For DVP testing, all requirements of this specification must be met with production intent wheels unless otherwise noted in Table 1.

3.1 APPROVED SOURCES

This specification is performance based and does not have approved sources.

3.2 COATING

The supplied coating shall be a continuous film, free of blisters, bubbles, foreign material and similar imperfections.

3.2.1 Aging

Prior to testing, test specimens prepared for investigations according to this specification must be aged at least 72 hours at 23 +/- 2 °C (preferred) or 16 hours at 45 +/- 1 °C.

3.2.2 Cure Profile

A part time/temperature curve from the production process for the part is required for each oven. Paint supplier bake windows for each material/oven shall be submitted with the curve in order to verify cure conditions.

Date	Action	Revisions	Rev. 04
2018 07 06	Revised	Revised humidity resistance	C. Moghadam, NA
2018 01 24	Editorial	See Summary of Revisions	C. Moghadam, NA
2016 08 23	Released		C. Taylor, NA / Global Team

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3.3 FILM PROPERTIES

3.3.1 Film Thickness
(FLTM BI 117-01, ASTM B487)

The applied coating thicknesses must be sufficient to meet all the requirements of this specification, the Wheel DVP testing (Design Verification Plan), and the appearance requirements developed at AAR (Appearance Approval Report).

The table below provides typical F point film thickness ranges in micrometers. **These film thicknesses are not requirements.** Recommended film thicknesses for premium colors will be noted on the MCDCC.

	Standard Paint *(Full Hiding Basecoat)*		Premium Paint *(Partial Hiding Basecoat)*		Machined or Polished with Clearcoat		E-Coat with Monocoat
E-Coat	-		-		-		17-24
Primer (Powder)	50-150		50-150		-		-
Basecoat	Liquid		Liquid		-		-
	15-30		3-8		-		-
Clearcoat	Powder	Liquid	Powder	Liquid	Powder	Liquid	-
	50-150	38-50	50-150	38-50	70-150	38-50	-
Monocoat (Liquid)	-		-		-		38-50

C points (corner points) must meet the acceptance criteria defined in the Global Wheel FS (Functional Specification).

DV (Design Verification) testing film thicknesses should be listed on the drawing.

To promote robust paint adhesion, a zinc phosphate pretreatment per WSS-M3P36-A1 is recommended prior to electrocoating steel wheels, while a suitable pretreatment passivation shall be used prior to painting aluminum wheels.

3.3.2 Initial Hardness

Hardness values at the target film and bake conditions shall meet the recommendations of the paint supplier and be recorded and available upon request. Paint shall be sufficiently cured at time of packing to withstand normal handling without damage.

Properly cured paint finish shall be hard enough to dry sand easily with 360 grit paper without gumminess or severe scratching.

3.3.3 Color (Except -E2 & -E4)
(FLTM BI 109-01 Visual Assessment, SAE J1545, Three-Angle CMC)

Shall match the Master Approved Sample color panel or the initial sample as approved by Design Center.

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3.3.4 Gloss Report (Except -E2 & -E4)
(FLTM BI 110-01, ASTM D 523)

Shall match the Master Approved Sample color panel or the initial sample as approved by Design Center.

Gloss	A:	20° Glossmeter	min 92
	B:	60° Glossmeter	76 - 84
	C:	60° Glossmeter	66 - 74
	D:	60° Glossmeter	58 - 66
	E:	60° Glossmeter	47 - 53
	F:	60° Glossmeter	32 - 38
	G:	60° Glossmeter	17 - 23
	H:	60° Glossmeter	7 - 13
	J:	60° Glossmeter	4 – 6
	Q:	60° Glossmeter	3.8 – 4.2
	K:	60° Glossmeter	2 – 4
	N:	60° Glossmeter	1.8 – 2.4
	P:	60° Glossmeter	1.6 – 2.0
	R:	60° Glossmeter	1.2 – 2.0
	L:	60° Glossmeter	0.5 - 2.0

3.3.5 Gas Soak (Except -E2 & -E4)
(Immerse samples for 1 h at 23 +/- 2 °C in commercially available grade of lead free gasoline.)

After 5 minute recovery time, no color change in excess of Gray Scale rating 4-5 (AATCC Evaluation Procedure 1/ISO 105-A02), no gloss change (FLTM BI 110-01, 25% max for A & B gloss surfaces), and no surface distortion or permanent softening permitted. Adhesion shall meet the requirements of paragraph 3.4.

3.3.6 Ultraviolet Light Transmission (Except -E2 & -E4)

For each color, measure the light transmission of the basecoat and clearcoat layering system at the minimum recommended film builds using an integrating sphere spectrophotometer. Report transmission at 360 nm and 400 nm. Submit transmission curve and table of values over entire range measured. Samples should be free films or films on quartz slides. Glass slides are not allowed.

3.4 PAINT ADHESION Grade 2 max

(FLTM BI 106-01, Method B, carbide tip scribe only,
If wheel geometry does not allow Method B, contact Materials Engineering or Core Wheels Engineering for approval of alternate methods)

Lightly hand sand paint film surface (10 double rubs, moderate pressure) with P600 paper until dull, before scribe operation and checking adhesion. Clean film surface with 50/50 mixture IPA/water before testing.

Rating should include loss of adhesion to substrate and loss of adhesion between paint layers. If there is adhesion loss beyond Grade 2, document which layers the loss is between.

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3.5 HIGH PERFORMANCE ADHESION (Except -E2 & -E4)

3.5.1 Thermal Shock (FLTM BI 107-05) — Rating 20

If testing multiple locations on one wheel section, the section must be cut into 3 individual pieces before performing the thermal shock test.

Rating should include loss of adhesion to substrate and loss of adhesion between paint layers. If there is adhesion loss beyond Grade 2, document which layers the loss is between.

Alternate Method

3.5.2 Resistance Against High Pressure Cleaner (FLTM BO 160-04, Method B) — 2 mm^2 max

Prior to testing the painted surface shall be X-scribed through to the substrate (30° angle).

Rating should include loss of adhesion to substrate and loss of adhesion between paint layers.

3.6 HEAT RESISTANCE (7 days at 80 +/-2 °C, AATCC Evaluation Procedure 1/ISO 105-A02) — Rating 4-5 min; A & B Gloss Surfaces: < 25% Gloss Loss

Return to room temperature before evaluation.

After exposure, adhesion testing performance must be met per paragraph 3.4 within 60 minutes after exposure.

3.7 FLUID SPOTTING RESISTANCE
(FLTM BI 168-01, Methods A and B,
AATCC Evaluation Procedure 1/ISO 105-A02)

3.7.1 Body & Exterior Trim Fluids (listed in FLTM BI 168-01) — Rating 4-5

After exposure, adhesion testing performance must be met per paragraph 3.4. No color dulling, surface distortion or permanent softening permitted.

3.7.2 Brake Fluid (DOT 3 or DOT 4) — Report Only

3.7.3 Wheel Cleaner Resistance (Motorcraft Wheel and Tire Cleaner, P/N ZC-37-A) — Rating 4-5

After exposure, adhesion testing performance must be met per paragraph 3.4. No color dulling, surface distortion or permanent softening permitted.

3.7.4 Tire Sealant Resistance (Temporary Mobility Kit, P/N 4G7Z-19L523-AA) — Rating 4-5

After exposure, adhesion testing performance must be met per paragraph 3.4. No color dulling, surface distortion or permanent softening permitted.

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