



IN-MOLD PAINTED STEERING WHEEL PERFORMANCE

WSS-M98P12-C1

1. SCOPE

This specification defines the material performance requirements for the steering wheel "Class A" in-mold painted polyurethane material. It does not address leather wrap, switches, or internal materials; they are beyond the scope of this specification and are addressed separately.

2. APPLICATION

This specification was originally released for materials used in the construction of in-mold painted polyurethane steering wheels.

3. REQUIREMENTS

3.1 APPROVED SOURCES

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

3.2 PERFORMANCE CRITERIA

Excluded from this specification are top grain (WSS-M1F22-D/latest) and split (WSS-M1F21-D/latest) leather wrap; driver's side airbag, bezel, shroud, and switches (MIC WSS-M15P4-G/latest or painted WSS-M2P188-B1/latest); wood wheel and bezel/emblem appliqué (WSS-M15P34-E/latest), and plated bezel (WSS-M1P83-E1/latest).

3.3 SAMPLE PREPARATION

Each test specimen necessary for all of the testing below will be prescribed in table 1.

Steering wheels shall be built to production intent and conditioned as prescribed in section 3.4 for all part validation below. Some testing will require a flat surface area for proper evaluation so therefore foam plaques can be molded and used for evaluation as long as the foam block is representative of production wheel composite. The foam plaque material content must be identical to the steering wheel as well as the film build (must be verified via section 3.6.1) and production process conditions (heat, cure time, etc).

3.4 CONDITIONING AND TEST CONDITIONS

All test values are based on material conditioned for not less than 24 h prior to testing in a controlled environment of 23 +/- 2 °C and 50 +/- 5% relative humidity. Testing of the material should occur in the conditioning environment or soon after removal.

3.5 DV/PV TEST PLAN

PEC/FEC/PV testing must be conducted in compliance with program milestones unless otherwise specified by Ford Engineering.

Testing must be conducted on parts at DV and PV unless specified otherwise by Ford Engineering. See Table 1 for sample sizes and required testing.

Date	Action	Revisions	Rev. 00
2017 07 05	Released		



Documents

Wageningen, NA



3.6 FILM PROPERTIES

3.6.1 Paint Film Thickness Requirements

20 - 45
micrometer

Test Method must be pre-approved by Ford Materials Engineering. Cross section evaluation under microscope is appropriate.

3.7 APPEARANCE

Color, gloss, grain, tactile effect and surface finish shall match master Trim Sample and/or Master appearance sample as approved by Corporate Design.

The coating shall exhibit no craters, pinholes, solvent popping, seediness, abnormal roughness, excessive flow or any other detrimental defect.

3.7.1 Color (FLTM BI 109-01, Visual Assessment and/or SAE J1545, MA58 Three-Angle CMC)

The color, pattern, and finish shall match the approved Design Center master sample, or shall be as specified on the Engineering Document.

3.7.2 Gloss (FLTM BI 110-01, ASTM D 523)

As released by Engineering:

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	33 – 38
G:	60° Glossmeter	17 – 23
H:	60° Glossmeter	7 – 13
J:	60° Glossmeter	4 – 6
K:	60° Glossmeter	2 – 4
L:	60° Glossmeter	0.5 – 2.0
N:	60° Glossmeter	1.8 – 2.4

3.8 RESISTANCE PROPERTIES

3.8.1 Adhesion (FLTM BI 106-01, Method D, knife)

5 % max
No complete Diamond
removed

Lightly hand sand paint film surface (10 double rubs, moderate pressure) with P600 paper until dull, before knife operation and checking adhesion.

Adhesion shall be performed on the full wheel in the largest grained "flat" area. Typically, this will be on the "back" face of the wheel in the spoke area. Due to the contour of the part, substrate material may be removed when performing this test. This is not cause for rejection; adhesion of the paint to the substrate material must be evaluated.



3.8.2 Water Resistance
(FLTM BI 104-01, 96 h)

No blistering,
softening

After exposure, adhesion shall be tested according to para 3.8.1 within 30 minutes of removal from water on all paint systems.

3.8.3 Flexibility

Required for substrates with a flexural modulus less than 450 MPa.

Specimen shall be taken from the steering wheel rim as follows: cut along the parting lines in the 12:00 region and remove a sample of the material from the "front" at least 100 mm in length. The material sample shall be cleanly removed from the metal support. The test specimen will be taken from this sample and must use the material along the parting line of the outer diameter.

3.8.3.1 Room Temperature (23 +/- 2 °C)

Test Method: Cut 13 x 100 mm sample from the specimen. Grasp sample firmly at each end, place over mandrel painted side up, and bend around mandrel 180 degrees min. Use a 25 mm diameter mandrel.

No cracking of "Class A" surface when bent over mandrel.

3.8.3.2 Cold Temperature (- 30 +/- 2 °C)

Test Method: Cut 13 x 100 mm sample from the specimen. Place sample, mandrel and gloves into a freezer at - 30 +/- 2 °C for 4 h min. Open freezer, put on gloves and grasp sample firmly at each end, place over mandrel painted side up, and bend around mandrel 180° min. Use a 25 mm mandrel. (A room temperature pair of gloves may be worn inside the gloves that have been conditioned at - 30 °C.)

No cracking of "Class A" surface when bent over mandrel.

3.8.4 Long Term Heat Exposure
(AATCC Evaluation Procedure 1)

Rating 4 min

7 days at 107 +/- 2 °C

Appearance Evaluation: No evidence of cracks, blisters, peeling, delamination, or change in gloss when compared with original unaged sample.

After exposure, immerse one of the weathered panels in water for 24 h per FLTM BI 104-01 and then perform adhesion test per para 3.8.1 within 30 minutes of removal from the water on all paint systems. Part must meet the adhesion requirements of 3.8.1 and show no blistering or softening.

3.8.5 Short Term Environmental Cycling
(FLTM BO 040-01 Procedure A, 100 °C)

Rating 4 min

After exposure, immerse one of the weathered panels in water for 24 h per FLTM BI 104-01 and then perform adhesion test per para 3.8.1 within 30 minutes of removal from the water on all paint systems. Part must meet the adhesion requirements of 3.8.1 and show no blistering or softening.