THERMOPLASTIC POLYOLEFIN ELASTOMER (TPO), HIGH MELT FLOW, LOW DENSITY, <17% MINERAL FILLED, MOLD-IN-COLOR ONLY, MOLDING COMPOUND, FASCIA / THIN-WALLED EXTERIOR — **WSS-M4D1005-B1**

THERMOPLASTIC POLYOLEFIN ELASTOMER (TPO), HIGH MELT FLOW, LOW DENSITY, <17% MINERAL FILLED, FULLY PAINTED ONLY, MOLDING COMPOUND, FASCIA / THIN-WALLED EXTERIOR — **WSS-M4D1005-B2**

1. SCOPE

The material defined by these specifications are <17% mineral filled thermoplastic molding compounds for mold-in-color (B1) and painted (B2) applications, based on thermoplastic polyolefin elastomer.

2. APPLICATION

WSS-M4D1005-B1 This specification was released originally for material used for mold-in-color exterior bumper applications (where the fascia thickness is less than 3mm), requiring high melt flow rate. Any color additives need to be reviewed and approved by the raw material supplier and Ford Materials Engineering. The UV/process/heat stabilizers must be in the base resin from the material supplier, not in the color concentrate, specifically for mold-in-color applications at the press.

WSS-M4D1005-B2 This specification was released originally for material used for painted exterior bumper applications (where the fascia thickness is less than 3mm), requiring high melt flow rate. Any color additives need to be reviewed and approved by the raw material supplier and Ford Materials Engineering. The process/heat stabilizers must be in the base resin from the material supplier.

2.1 LIMITATIONS

Material approved to WSS-M4D1005-B1 is likely to contain additives that may negatively affect paint adhesion, therefore should not be used for painted applications.

Material approved to WSS-M4D1005-B2 is unlikely to contain UV stabilizers, therefore long term exposure to direct sunlight could cause chalking and loss of gloss.

3. REQUIREMENTS

3.1 APPROVED SOURCES

This specification requires the use of approved sources. Only the sources identified on the Ford Approved Source List (ASL) can be used when this specification is listed on the drawing, CAD file, or other documents. The list of approved sources is located within Ford at www.mats.ford.com or available externally through a Ford Materials Engineer.

Date	Action	Revisions	Rev. 2
2018 05 08	Editorial	See Summary of Revisions	G. Eaton, NA
2015 12 15	Editorial	See Summary of Revisions	K Mueller, NA
2015 07 31	Released		K Mueller, FNA

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3.1.1 Many 4D resin specifications prior to 2011, identified certain requirements with the symbol (s), which indicated that the mean and +/- 3 sigma values were to be reported. The specification minimum, maximum or range was established using 3 sigma data. For 2011 and beyond, refer to Table 1 for number of samples required for each test.

3.1.2 This specification is based on virgin material and does not allow the addition of recycled content (PIR/PCR).

3.1.4 The use of regrind is permitted, for economic / environmental reasons. Part manufacturers using this specification must complete DV and PV testing with the allowable amount of regrind and the maximum allowable regrind content must be specified on the engineering drawing. Any changes to what is specified on the drawing (no specific amount implies zero regrind) must be approved by Materials and PD Engineering through the formal Ford Motor Company process (SREA).

3.1.5 Performance Criteria: Exterior mold-in-color substrates approved to WSS-M4D1005-B1 must comply with all the requirements of WSS-M98P13-C/Latest. Painted substrates approved to WSS-M4D1005-B2 must comply with all the requirements of paint performance WSS-M2P181-C/Latest. Parts must fulfill applicable SDS/CDS requirements.

3.1.6 The material supplier must retain 30-50 lbs. (14-23 kg) of pelletized material / lot produced for 6 months (WSS-M4D1005-B2 only).

3.1.7 Unless otherwise agreed to by Ford Materials Engineering, Control Plan and Certificate of Analysis (CoA) lot testing requirements must include, but are not limited to:

- Melt Flow Rate
- Determination of Ash
- Impact Strength, Notched Charpy at 23°C
- Flexural Modulus
- Molding Shrinkage (WSS-M4D1005-B1 / B2)
- Post Shrinkage (WSS-M4D1005-B2)

3.1.8 Materials requiring High Strain Rate, Creep or fiber oriented Tensile Modulus may be required to test to the requirements of WSS-M99D68-A1/Latest, *Thermoplastic Property Determination For CAE, High Strain Rate Tensile, Creep and Tensile Modulus.* Material Suppliers should be prepared to submit data upon request.

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3.2 SAMPLE PREPARATION

All tests shall be carried out on production materials manufactured from the production process unless correlation to a non-production process has been reviewed and approved by Ford Materials Engineering.

Unless otherwise specified all tests shall be carried out on injection molded, one-end gated test specimens. The test specimens A and D shall be molded using molding conditions defined in ISO 1873-2. No additional annealing is allowed. See Tables 1 and 2 for the number of samples required. Specimens shall be as follows:

Specimen A	150 minimum x 10 x 4.0 +/- 0.2 mm (ISO 527-2, Specimen Type 1A)
Specimen B	355 x 100 x 1.0 +/- 0.1 mm
Specimen C	145 x 60 x 3.2 +/- 0.2 mm
Specimen D	80 x 10 x 4.0 +/- 0.2 mm (may be cut from the center of Specimen A)
Specimen E	100 mm diameter x 3.2 mm
Specimen F	80 mm diameter x 3.2 mm
Specimen G	90 mm x 200 mm
Specimen H	50 +/- 1 mm diameter x 3.2 +/- 0.2 mm
Specimen I	100 mm x 150 mm, min

For Appearance Testing: Use an ungrained, non-polished, tool to prepare specimens for C through N gloss surfaces. Use a smooth, polished tool to prepare specimens for A and B gloss surfaces.

3.3 APPEARANCE (WSS-M41005-B1 only)

3.3.1 Accelerated Weathering Resistance — Requirements per Table

Preferred Method
(ASTM D7869 *Standard Practice for Xenon Arc Exposure Test with Enhanced Light and Water Exposure for Transportation Coatings*, Use an ungrained, non-polished, tool to prepare specimen for C through N gloss, use a smooth, polished tool to prepare specimensfor A and B gloss, ISO 105-A02/AATCC Evaluation Procedure 1)

or

(SAE J2527 *Performance Based Standard for Accelerated Exposure of Automotive Exterior Materials Using Controlled Irradiance Xenon-Arc Apparatus*, Boro/Boro, Atlas Water Cooled, Rotary Drum Xenon-Arc Apparatus only. Modified Type "S" borosilicate inner and outer filters, 0.55 W/m^2 radiant exposure monitored at 340 nm, Specimen C, ungrained, non-polished mold, use a smooth, polished tool to prepare specimens for A and B gloss,ISO 105-A02/AATCC Evaluation Procedure 1)

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Type	ASTM D7869 (preferred)	SAE J2527 Boro/Boro	Requirements
New Color	2250 h	3000 h	Fade Resistance: Rating 4 min There shall be no cracking, crazing, dulling, or other deterioration A&B Gloss Materials: Gloss Change 25% max (FLTM BI 110-01)
*New Material Supplier or New Material Grade	2250 h	3000 h	Fade Resistance: Rating 4 min There shall be no cracking, crazing, dulling, or other deterioration A&B Gloss Materials: Gloss Change 25% max (FLTM BI 110-01)
	3000 h and 3750 h	4000 h, 5000 h, and 6000 h	Fade Resistance: Report Only Report any cracking, crazing, dulling, or other deterioration A&B Gloss Materials: Report Gloss Change (FLTM BI 110-01)

*New Material Supplier or New Material Grade: New resin from unknown or known Material Supplier. New Manufacturing Locations (new GSDB) for previously approved materials and existing colors are not required to test exterior weathering.

All initial approvals may be based on the above accelerated weathering exposure. Results from Florida Outdoor Weathering (3.3.2) takes precedence over Accelerated Weathering.

3.3.2 Outdoor Weathering of Exterior Materials - Florida
Initial Qualification for new resin technology

(SAE J1976, 5° South, direct weathering inland, Specimen I, use an ungrained, non-polished, tool to prepare specimen for C through N gloss, use a smooth polished tool to prepare specimens for A and B gloss, ISO 105-A02/AATCC Evaluation Procedure 1)

3.3.2.1 1 and 3 year Florida — Rating 4 min
Florida Submission Required
for Approval to ASL

3.3.2.2 5 year Florida — Report Only

After exposure the material shall show no color change in excess of the specified AATCC Rating. In addition, there shall be no cracking, crazing or other deterioration.

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