THERMOPLASTIC POLYOLEFIN ELASTOMER (TPO)
15% MINERAL FILLED, MOLDING COMPOUND, MOLD-IN-COLOR, EXTERIOR **WSS-M4D873-B1**

THERMOPLASTIC POLYOLEFIN ELASTOMER (TPO)
15% MINERAL FILLED, MOLDING COMPOUND, PAINTABLE EXTERIOR **WSS-M4D873-B2**

1. SCOPE

The material defined by this specification is a 15% mineral filled thermoplastic injection molding compound based on thermoplastic polyolefin elastomer (TPO). For mold-in-color with added UV stabilization for exterior, use WSS-M4D873-B1, or use WSS-M4D873-B2 for painting, provided that suitable surface pretreatment is used.

2. APPLICATION

WSS-M4D873-B1 This specification was released originally for material used for exterior parts, mold-in-color, which are exposed to sunlight such as bumper shells and body side moldings. 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-M4D873-B2 This specification was released originally for material used for painted exterior applications, such as bumper shells and body side moldings. This specification was developed to be used in conjunction with WSS-M4D873-B1 to match shrinkages when moulding both painted and unpainted components in one tool.
Any colo\r 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

WSS-M4D873-B1

- This material should not be used for painted applications since it contains performance additives that negatively affect paint adhesion.
- This material should not be used for fascias in FNA.

WSS-M4D873-B2

- This material is unlikely to contain UV stabilizers, therefore long term exposure to direct sunlight could cause chalking and loss of gloss.
- This material should not be used for fascias in FNA.

Date	Action	Revisions	Rev 3
2017 02 17	Editorial	See Summary of Revisions	J. Crist, NA
2013 03 14	Revised	Editorial, See Summary of Revisions	V. Cerato, FU
2011 10 26	Activated		V. Cerato, FoE

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3. REQUIREMENTS

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).

3.1.1 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 to establish specification limits.

3.1.2 These specifications are based on virgin materials, however materials with recycled content as defined by WRS-M99P42-A1 (post-consumer and/or post industrial recyclates and repolymerised recycled materials) should be used whenever technically feasible and following all materials and PV testing required by Ford Materials Engineering.

3.1.3 The use of regrind is permitted, for economic / environmental reasons, with compliance as indicated in Ford Engineering CAD and Drafting Standard E-4.

3.1.4 Performance Criteria:

WSS-M4D873-B1- Parts using this specification shall meet the appropriate performance specifications WSS-M98P13-C / Latest.

WSS-M4D873-B2- Parts using this specification shall meet the appropriate performance specifications WSS-M2P181-C / Latest.

Parts must fulfill applicable SDS/CDS requirements.

3.1.5 As specified in WSS-M99P1111-A, paragraph 3.2, Ford Materials Engineering may request a Control Plan and Certificate of Analysis (CoA) containing lot testing requirements which must include, but are not limited to:

Melt Flow Rate
Filler Content
Impact Strength, Notched Charpy at 23°C
Flexural Modulus
Mould shrinkage
Post shrinkage

3.2 SAMPLE PREPARATION

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 annealing is allowed. See Tables 1 and 2 for the number of samples required.

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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 (ISO 3795)
Specimen C	145 x 60 x 3.2 +/- 0.2 mm
Specimen D	Center of Specimen A, 80 x 10 x 4.0 +/- 0.2 mm
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

3.3 APPEARANCE (WSS-M4D873-B1 ONLY)

3.3.1 Weathering Resistance — Rating 4 min
(SAE J2527 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,
3000 h total exposure or as otherwise defined,
Specimen C, from smooth polished mold,
ISO 105-A02 / AATCC Evaluation Procedure 1)

For color durability submissions, test all program colors.

3.3.2 1 and 2 year Florida — Rating 4 min
Initial Qualification for new resin technology
(SAE J1976, 5° south, direct weathering inland,
Specimen C from smooth polished mold,
ISO 105-A02 / AATCC Evaluation Procedure 1)

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.

A slight loss of gloss or chalking will be allowed provided an acceptable appearance can be achieved as specified below by washing with mild detergents and water (ratio 5:95 by volume) or equivalent after the outdoor exposure only.

All initial approvals may be based on the accelerated weathering exposure, pending real world outdoor exposure results for final approval.

3.3.3 Resistance to Scratch and Mar
(FLTM BO 162-01, Specimen I)

Scratch	Rating 2 at 2 N, max
Whitening/Color Change	Rating 1 at 7 N, max
Marring	Rating 2 at 2 N, max

These values are derived from colored and grained samples in agreement with Materials Engineering. Details regarding color house, let down ratio, colors, grain, etc can be found in the approval package.

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