



THERMOPLASTIC POLYOLEFIN ELASTOMER (TPO), 20% TALC FILLED, MEDIUM HIGH IMPACT, MOLDED IN COLOR, INTERIOR

WSS-M4D550-A12

1. SCOPE

The material defined by this specification is a low gloss, medium high impact, rigid thermoplastic polyolefin elastomer (TPO) injection molding compound, mineral (talc) filled, UV stabilized and scratch resistant for interior use. Materials approved to this specification are ductile at -30 °C.

2. APPLICATION

This specification was released originally for materials used for hard pillar trim.

2.1 LIMITATIONS

- This material should not be used as an instrument panel substrate with a seamless passenger airbag.
- This material is not to be used in applications requiring painting because it contains an internal scratch additive.

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.

3.2 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.

3.3 INFRARED SPECTROPHOTOMETRY AND/OR THERMAL ANALYSIS

IR spectra and thermograms from initial material approval shall constitute the reference standard and shall be kept on file at the designated material laboratory. The material supplier shall ensure that all future material supplied to the specification shall produce IR spectra and thermograms that correspond to the reference standard when tested under the same conditions.

Date	Action	Revisions	Rev 00
2015 09 11	Released		

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3.4 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

- 3.4.1 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.
- 3.4.2 This specification is based on virgin material and does not allow the addition of recycled content (PIR/PCR).
- 3.4.3 Materials used in interior applications must meet the requirements outlined in WSS-M99P2222-D1/Latest, *Performance, Vehicle Interior Environment Quality Material/Component Requirements*. Data must be included in material submission package.
- 3.4.4 Materials requiring High Strain Rate, Creep or fiber oriented Tensile Modulus must test to the requirements of WSS-M99D68-A1/Latest, *Thermoplastic Property Determination For CAE, High Strain Rate Tensile, Creep and Tensile Modulus*. Data must be included in the material submission package.
- 3.4.5 Performance Criteria:
Parts using this specification shall meet the appropriate performance specifications, WSS-M15P4-F/Latest for mold in color applications and WSS-M15P45-B/Latest for wrapped applications and all SDS requirements.
- 3.4.6 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

3.5 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.



3.6 APPEARANCE

- 3.6.1 Weathering Resistance Rating 4 min
(FLTM BO 116-01, 3609.6 kJ/m² exposure
Specimen C, ungrained, non-polished mold,
ISO 105-A02 / AATCC Evaluation Procedure 1)

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

Use regional choice for initial approval and report the color house used. See Table 2 for additional color durability submission requirements.

- 3.6.2 Determining the Tackiness of Interior Materials Rating 4 min
(FLTM BO 061-01, Specimen C, ungrained,
non-polished mold. Expose per para. 3.6.1)

Evaluate the test specimens every 526.4 until 3609.6 kJ/m². If Rating falls below a Rating 4 at any interval this is cause for rejection.

- 3.6.3 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

Whitening/Color Change	Report Value at 15 N
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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.

3.7 MATERIAL PROPERTIES

- 3.7.1 Determination of Ash 13 - 22%
(ISO 3451-1, Method A, Talc, 1 h at 850 +/- 50 °C)
- 3.7.2 Density 0.97-1.10 g/cm³
(ISO 1183, Method A)
- 3.7.3 Tensile Strength at Yield 17 MPa min
(ISO 527-1 and ISO 527-2, Specimen A,
50 mm/minute test speed)
- 3.7.4 Elongation at Yield 3% min
(ISO 527-1 and ISO 527-2, Specimen A,
50 mm/minute test speed)
- 3.7.5 Tensile Modulus 1.8 GPa min
(ISO 527-1 and ISO 527-2, Specimen A,
1 mm/minute test speed)
- 3.7.6 Flexural Modulus 1.7 GPa min
(ISO 178, Specimen D,
64 mm support span, 2 mm/minute test speed)