



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

WSS-M4D550-A10

1. SCOPE

The material defined by this specification is a low gloss, medium impact, rigid thermoplastic polyolefin elastomer (TPO) injection molding compound, mineral (talc) filled, UV stabilized and high scratch resistant for interior use.

2. APPLICATION

This specification was released originally for material used for an unpainted instrument panel with a non-seamless passenger airbag.

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 internal anti-scratch additive.

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 meet specification limits.
- 3.1.2 This specification is based on virgin materials. Materials with post-consumer, post industrial, or repolymerised recycled materials as defined by WRS-M99P42-A1 are preferred and should be used whenever feasible.
- 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 Materials used in interior applications must meet the requirements outlined in WSS-M99P2222-C1/Latest, *Performance, Vehicle Interior Environment Quality Material/Component Requirements*. Data must be included in material submission package.

Date	Action	Revisions	Rev. 6
2015 08 21	Revised	Editorial, removed high in title to align with scope	L. Soreide, NA
2013 04 25	Revised	Editorial, updated recycling code	Y. Bankowski, NA
2000 05 18	Activated		M. Masserant, NA



- 3.1.5 Performance Criteria:
Parts using this specification shall meet the appropriate performance specification, WSS-M15P4-F/Latest for Hard, Interior, Molded-in-Color component performance or WSS-M15P45-B/Latest.

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 Table 1 for the number of specimens 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 (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

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

Every 526.4kJ/m² remove the samples from the weatherometer and allow them to cool for one hour. Conduct a tactile evaluation and report any tackiness. Visually evaluate and report any spewing or other exudation.

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

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

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

Scratch	Rating 2 at 2N, max
Whitening/Color Change	Rating 1 at 15N, max
Marring	Rating 2 at 2N, 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.

3.4 MATERIAL PROPERTIES

- 3.4.1 Filler Content 16 - 22 %
(ISO 3451-1, Method A, 1h at 850 +/- 50°C,
test portion 2 – 2.5g)



ENGINEERING MATERIAL SPECIFICATION

WSS-M4D550-A10

3.4.2	Density (ISO 1183, Method A)	1.01 – 1.07 g/cm ³
3.4.3	Tensile Strength at Yield (ISO 527-1 & ISO 527-2, Specimen A 50 mm/minute test speed)	18 MPa min
3.4.4	Tensile Modulus (ISO 527-1 & ISO 527-2, Specimen A, 1 mm/minute test speed)	1.6 GPa min
3.4.5	Flexural Modulus (ISO 178 Specimen D 64 mm support span, 2 mm/minute test speed)	1.8 GPa min
3.4.6	Impact Strength, Notched Charpy (ISO 179-1/eA, Specimen D)	
3.4.6.1	23 +/- 2 °C	24 kJ/m ² Report Break Type
3.4.6.2	-40 +/- 2 °C	1.7 kJ/m ² Report Break Type

The test specimen must be conditioned for minimum of 6 h at the above specified temperature prior to impact test. Low temperature testing shall be done within the cold chamber, if not possible, test may be conducted outside, but within 5 seconds.

3.4.7	Heat Deflection Temperature (ISO 75-1 & ISO 75-2, Specimen D flatwise, 0.34 +/- 0.1 mm deflection, at 1.80 MPa)	54 °C min
3.4.8	Heat Aging Performance (ISO 188, except 150 +/- 50 air changes/h, 1000 h at 120 +/- 2 °C. Unaged property values shall be determined at the time of the aged properties determination)	
3.4.8.1	Tensile Strength at Yield Change (Test Method per para 3.4.3)	+/- 25% max
3.4.8.2	Impact Strength, Notched Charpy, Change (Test Method per para 3.4.6, specimens to be notched before heat aging)	+/- 25% max
3.4.9	Odor (FLTM BO 131-03, Specimen G, Variant C)	Rating 3 max
3.4.10	Fogging Photometric (SAE J1756, Specimen F, 3 h at 100 °C heating, 21 °C cooling plate, post test conditioning 16 h)	

Fog Number 70 min

Formation of clear film, droplets or crystals is cause for rejection.

