



ACETAL (POM) COPOLYMER, MOLDED-IN-COLOR, INTERIOR, UV STABLE

WSS-M4D840-B1

1. SCOPE

The material defined by this specification is a molded-in-color thermoplastic acetal copolymer for interior use.

2. APPLICATION

This specification was released originally for materials used for decorative and/or functional interior automotive applications such as loudspeaker grilles, bin latches, and moving parts such as links and sliders.

2.1 LIMITATIONS

These materials are not intended for painted applications.

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 REQUIREMENTS FOR PRODUCTION MATERIALS

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

3.3.2 The use of regrind is permitted, for economic / environmental reasons. Part manufacturers using this specification must complete DV and PV testing with 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).

Date	Action	Revisions	REV. 01
2015 09 16	Revised	See Summary of Revision	B. Haggart, FNA
2011 09 02	Activated		B. Haggart, FNA



- 3.3.3 Materials approved to these specifications do not require testing to WSS-M99P2222-D1/latest *Performance, Vehicle Interior Environment Quality Material/Component Requirements*. If collective parts exceed 100 cm² or 100 g then testing will be required per the appropriate performance specification.
- 3.3.4 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.
- 3.3.5 Performance Criteria:
Parts using this specification shall meet the appropriate performance specification, WSS-M15P4-F/Latest for Hard, Interior, Molded-in-Color component performance.

3.4 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 9988-2. Annealing is allowed for unaged specimens for property comparison to Heat Aging samples only. 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

3.5 APPEARANCE

- 3.5.1 Weathering Resistance Rating 4 min
(FLTM BO 116-01, 2406.4 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.
For color durability submissions, test all program colors.

3.6 MATERIAL PROPERTIES

- 3.6.1 Density 1.39 – 1.43 g/cm³
(ISO 1183, Method A)
- 3.6.2 Tensile Strength at Yield 57 MPa min
(ISO 527-1 and ISO 527-2, Specimen A
50 mm/minute test speed)



3.6.3	Elongation at Yield (ISO 527-1 and ISO 527-2, Specimen A, 50 mm/minute test speed)	6.9 % min
3.6.4	Tensile Modulus (ISO 527-1 and ISO 527-2, Specimen A, 1 mm/minute test speed)	2.6 GPa min
3.6.5	Flexural Modulus (ISO 178, Specimen D, 64 mm support span, 2 mm/minute test speed)	2.1 GPa min
3.6.6	Impact Strength, Notched Charpy (ISO 179-1/1eA, Specimen D)	
3.6.6.1	At 23 +/- 2 °C	3.7 kJ/m ² min Report Break Type
3.6.6.2	At -40 +/- 2 °C	2.4 kJ/m ² min Report Break Type
The test specimens must be conditioned for min of 6 h at the above specified temperature prior to impact test. Low temperature testing shall be done within the cold box, if not possible, test can be conducted outside, but within 5 seconds.		
3.6.7	Heat Deflection Temperature (ISO 75-1 and ISO 75-2, Specimen D flatwise, 0.34 +/- 0.1 mm deflection, at 1.80 MPa)	80 °C min
3.6.8	Heat Aging Performance (ISO 188, 150 +/- 50 air changes/h, 1000 h at 120 +/- 2 °C. Unaged specimens shall be annealed at 120 °C for 72 hours prior to testing and property values determined at the time of the aged properties)	
3.6.8.1	Tensile Strength at Yield Change (Test Method per para 3.6.3)	+/- 25% max
3.6.8.2	Impact Strength, Notched Charpy, Change (Test Method per para 3.6.6.1, specimens to be notched before Heat Aging)	+/- 25% max
3.6.9	Odor (FLTM BO 131-03, Specimen G, Variant B)	
	Condition 1	Rating 3 max
	Condition 2	Rating 3 max
	Condition 3	Rating 3 max