



ACRYLONITRILE BUTADIENE STYRENE (ABS)
MOLDING COMPOUND, GENERAL PURPOSE, INTERIOR

WSS-M4D483-D1

ACRYLONITRILE BUTADIENE STYRENE (ABS)
MOLDING COMPOUND, RECYCLED, 100% PIR RESIN CONTENT

WRS-M4D483-D2

1. SCOPE

WSS-M4D483-D1: The material defined by this specification is a molded in color, general purpose injection molding compound based on acrylonitrile butadiene styrene (ABS) that has been UV stabilized for unpainted interior applications. General purpose ABS is defined as must having a mean Vicat Softening Temperature range from 94 °C to 98 °C.

WRS-M4D483-D2: The material defined by this specification is an injection molding compound based on 100% Post-Industrial Recyclate (PIR) acrylonitrile butadiene styrene (ABS) for non-visible applications.

2. APPLICATION

WSS-M4D483-D1 This specification was released originally for material used for unpainted interior trim parts such as visible seat components, door trim insert and floor console.

WRS-M4D483-D2 This specification was released originally for materials containing post-industrial resin content.

2.1 LIMITATIONS

WRS-M4D483-D2:

- These materials are for non-visible, interior applications.
- When used for decorated interior applications, this material may require additional in-process testing. Contact Ford Materials Engineering for these requirements.

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.

3.1.2 WSS-M4D483-D1 This specification is based on virgin materials.

3.1.3 WRS-M4D483-D2 This specification must contain 100% PIR content as defined by WRS-M99P42-A1, *Molding Compound, Identification of Recycled Content*.

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

Date	Action	Revisions	Rev. 2
2015 02 16	Released	Released WRS-M4D483-D2	D. Stark, NA
2014 03 27	Editorial	Removed reference to proposed pending D2 and D3 suffixes.	Soreide, NA
2013 05 15	Released		Soreide, NA



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 Materials used in interior applications must meet the requirements outlined in WSS-M99P2222-D1/Latest, *Performance, Vehicle Interior Environment Quality Component and Allergen Requirements*. Data must be included in material submission package.
- 3.1.6 Performance Criteria:
Parts using this specification shall meet the appropriate performance specifications: WSS-M15P4-F/Latest for mold-in-color interior parts, WSS-M2P188-B1/Latest for painted interior parts, and WSS-M15P34-E/Latest for interior parts with appliques.
- 3.1.7 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

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 2580-2. 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 2.0 +/- 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 (**WSS-M4D483-D1 only**) Rating 4 min
(FLTM BO 116-01, 601.6 kJ/m² exposure
Specimen C from smooth 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.

3.4 MATERIAL PROPERTIES

3.4.1	Density (ISO 1183, Method A)	1.02 – 1.16 g/cm ³
3.4.2	Tensile Strength at Yield (ISO 527-1 & ISO 527-2, Specimen A, 50 mm/minute test speed)	33 MPa min
3.4.3	Elongation at Yield (ISO 527-1 & ISO 527-2, Specimen A, 50 mm/minute test speed)	1.4 % min
3.4.4	Tensile Modulus (ISO 527-1 & ISO 527-2, Specimen A, 1 mm/minute test speed)	1.7 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 179-1/1eA, Specimen D)	
3.4.6.1	At 23 +/- 2 °C	8.0 kJ/m ² min Report Break Type
3.4.6.2	At -40 +/- 2 °C	3.0 kJ/m ² min Report Break Type

The test specimen must be conditioned for minimum of 6 hours 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)	73 °C min
-------	---	-----------

All specimens dry as molded. If not tested immediately after molding, specimens must be stored in a sealed, moisture-proof container filled with silica gel.

3.4.8	Vicat Softening Temperature (ISO 306, Specimen D, Bath - silicone oil, temperature raise 50 +/- 5 °C/h. Dial gage reset to 'O' after addition of 5 kg weight, at 50 N load)	WSS-M4D483-D1: 91 °C – 98 °C individual value 94 °C – 98 °C mean value WRS-M4D483-D2: Report Only
-------	---	---

