



**POLYPROPYLENE (PP) COPOLYMER, MEDIUM
IMPACT COMPOUND, BLOW MOLDED, UNDERHOOD**

WSS-M4D932-B1

**POLYPROPYLENE (PP) COPOLYMER, MEDIUM
IMPACT COMPOUND, INJECTION MOLDED, UNDERHOOD**

WSS-M4D932-B2

1 SCOPE

The material defined by this specification is an unfilled thermoplastic molding compound based on polypropylene copolymer. These are non UV-stable materials.

2 APPLICATION

WSS-M4D932-B1 This specification was released originally for material used for blow molded windshield washer solution reservoirs. This material has a lower melt flow rate and is typically used for blow molded or extruded applications.

WSS-M4D932-B2 This specification was released originally for material used for injection molded windshield washer solution reservoirs. This material has a higher melt flow rate and is typically used for injection molding applications.

LIMITATIONS

This material does not contain UV stabilizers, long term exposure to direct sunlight could cause chalking and loss of gloss.

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 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. 2
2017 03 27	Editorial	See Summary of Revisions	C. Saige, NA
2016 05 02	Editorial	See Summary of Revisions	M. Corley, EU
2014 02 18	Released		T. Mower, M. Corley, EU



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 2 for number of samples required for each test.
- 3.4.2 This specification is based on virgin materials, however materials with recycled content as defined by WRS-M99P42-A1 (post-consumer and/or postindustrial recyclates and repolymerised recycled materials) should be used whenever technically feasible and following all materials and PV testing required by Ford Materials Engineering.
- 3.4.3 The use of regrind is permitted, for economic / environmental reasons. Part manufacturers using this specification must complete DV and PV testing with the 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).
- 3.4.4 Performance Criteria: Parts using this specification shall meet the appropriate performance specifications, WSS-M15P50-B/Latest.
- 3.4.5 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
Impact Strength, Notched Charpy at 23°C
Flexural Modulus

3.5 SAMPLE PREPARATION

Unless otherwise specified all tests shall be carried out on test specimens cut (in accordance with the ISO methods specified) from blow molded parts. Specimens are tested with the as-molded thickness of the part and are not machined to meet the thickness requirements of the Standard Test Methods except where necessary for fixturing. Greater variation in test values can be anticipated when evaluating materials that are thinner than recommended by an applicable Industry Standard/Test Method. The test specimens A and D shall be molded using molding conditions defined in ISO 1873-2. See Table 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 (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

**3.6 MATERIAL PROPERTIES**

3.6.1	Density (ISO 1183, Method A)	0.885- 0.92 g/cm ³
3.6.2	Tensile Strength at Yield (ISO 527-1 and ISO 527-2, Specimen A, 50 mm/minute test speed)	20 MPa, min
3.6.3	Elongation at Yield (ISO 527-1 and ISO 527-2, Specimen A, 50 mm/minute test speed)	5 %, min
3.6.4	Tensile Modulus (ISO 527-1 and ISO 527-2, Specimen A, 1 mm/minute test speed)	0.9 GPa, min
3.6.5	Flexural Modulus (ISO 178, Specimen D, 64 mm support span, 2 mm/minute test speed)	0.8 GPa, min
3.6.6	Impact Strength, Notched Charpy (ISO 179-1/1eA, Specimen D)	
3.6.6.1	At 23 +/- 2 °C	12 kJ/m ² , min Report Break Type
3.6.6.2	At -40 +/- 2 °C	2.0 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.		
3.6.7	Heat Deflection Temperature (ISO 75-1 and ISO 75-2, Specimen D, flatwise, 0.34 +/- 0.1 mm deflection. At 1.80 MPa)	41 °C, min
3.6.8	Heat Aging Performance (ISO 188, 150 +/- 50 air changes/h, 1000 h at 100 +/- 2 °C. After heat aging test specimens are to be conditioned in a desiccator For 3 - 5 h at 23 +/- 2 °C. Unaged property values shall be determined at the time of the aged properties determination)	
3.6.8.1	Tensile Strength at Yield, Change (Test Method per para 3.6.2)	+/- 25%, max
3.6.8.2	Impact Strength, Notched Charpy, Change (Test Method per para 3.6.8.1, specimens to be notched before Heat Aging)	+/- 25%, max