



**POLYPROPYLENE (PP) HOMOPOLYMER, 33% TALC FILLED,
MOLDING COMPOUND, 37% PCR/PIR RESIN CONTENT,
25% RECYCLED MATERIAL BY WEIGHT**

WRS-M4D939-A2

1. SCOPE

The material defined by this specification is a 33% talc filled injection molding compound based on 25% recycled polypropylene homopolymer from post-consumer sources (PCR) and/or post industrial sources (PIR).

2. APPLICATION

This specification was released originally for material used for air-conditioning and heater housing.

2.1 LIMITATIONS

- This material does not contain UV stabilizers; long term exposure to direct sunlight will cause chalking and gloss loss.

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 WRS-M4D939-A2 must contain 25% Post Consumer Recycled (PCR) and/ or post industrial sources (PIR) content as defined by WRS-M99P42-A1. The remaining portion of the material can come from virgin sources.
- 3.1.3 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).
- 3.1.4 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.
- 3.1.5 Performance Criteria:
Parts using this specification shall meet the appropriate performance specification, WSS-M15P4-F.

Date	Action	Revisions	Rev. 0
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- 3.1.6 As specified in WSS-M99P1111-A, paragraph 3.2, Ford Materials Engineering may request a Control Plan and Certificate of Analysis (CofA) 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

3.2 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 1873-2. No annealing is allowed. See Table 1 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

3.3 MATERIAL PROPERTIES

3.3.1	Determination of Ash (ISO 3451-1, Method A, 30 min at 550 +/- 50 °C, test portion 1 – 2 g, Mineral)	30 - 36%
3.3.2	Density (ISO 1183, Method A)	1.10 - 1.17 g/cm ³
3.3.3	Tensile Strength at Yield (ISO 527-1 and ISO 527-2, Specimen A, 50 mm/minute test speed)	27 MPa min
3.3.4	Elongation at Yield (ISO 527-1 and ISO 527-2, Specimen A, 50 mm/minute test speed)	3.0% min
3.3.5	Tensile Modulus (ISO 527-1 and ISO 527-2, Specimen A, 1 mm/minute test speed)	3.0 GPa min
3.3.6	Flexural Modulus (ISO 178, Specimen D, 64 mm support span, 2 mm/minute test speed)	2.5 GPa min

