POLYPROPYLENE (PP) HOMOPOLYMER, 30% GLASS FIBER FILLED MOLDING COMPOUND, EXTERIOR **WSS-M4D732-B2**

POLYPROPYLENE (PP) COPOLYMER, 30% GLASS FIBER FILLED MOLDING COMPOUND, EXTERIOR **WSS-M4D732-B7**

1. SCOPE

The materials defined by these specifications are 30% glass fiber filled thermoplastic injection molding compounds based on polypropylene with added UV stabilization and scratch additives for exterior use.

2. APPLICATION

These specifications were released originally for material used in mold-in-color exterior applications, specifically for cowl top ventilator grills. Any color additives need to be reviewed and approved by the raw material supplier and Ford Materials Engineering. The UV/process/heat stabilizers must be in the base resin from the material supplier, not in the color concentrate, specifically for mold-in-color applications at the press.

2.1 LIMITATIONS

These materials should not be used for painted applications since they contain performance additives that negatively affect paint adhesion. Production level materials must be used in preparing test parts / panels. The use of improper sample prep materials can influence test results.

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 values. For 2011 and beyond, refer to Table 1 for number of samples required for each test.

3.1.2 These specifications are based on virgin materials, however materials with recycled content as defined by WRS-M99P42-A1 (post-consumer and/or post industrial recyclates and repolymerised recycled materials) should be used whenever technically feasible and following all materials and PV testing required by Ford Materials Engineering.

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 Performance Criteria
Parts using these specifications shall meet the appropriate performance specifications WSS-M98P13-C / Latest.

Date	Action	Revisions	Rev. 2
2014 05 29	Revised	See Summary of Revisions	G. Eaton, NA
2013 09 09	Released	Released B2	G. Eaton, NA
2013 05 15	Released	Released B7	V.Gerato, FoE

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3.1.5 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:

Tensile Strength at Yield
Impact Strength, Notched Charpy at -40°C
Flexural Modulus

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 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	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
(SAE J2527 Atlas Water Cooled,
Rotary Drum Xenon-Arc Apparatus only.
Modified Type "S" borosilicate inner and outer filters,
0.55 W/m^2 radiant exposure monitored at 340 nm,
3000 h total exposure or as otherwise defined,
Specimen C, from smooth polished mold,
ISO 105-A02 / AATCC Evaluation Procedure 1)

For color durability submissions, test all program colors.

3.3.2 1 and 2 year Florida — Rating 4 min
Initial Qualification for new resin technology
(SAE J1976, 5° south, direct weathering inland,
Specimen C from smooth polished mold,
ISO 105-A02 / AATCC Evaluation Procedure 1)

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

A slight loss of gloss or chalking will be allowed provided an acceptable appearance can be achieved as specified below by washing with mild detergents and water (ratio 5:95 by volume) or equivalent after the outdoor exposure only.

All initial approvals may be based on the accelerated

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weathering exposure, pending real world outdoor exposure results for final approval.

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

Scratch	Rating 2 at 2 N, max
Whitening/Color Change	Rating 1 at 7 N, max
Marring	Rating 2 at 2 N, 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 MATERIALS PROPERTIES

3.4.1 Determination of Ash — 27 - 32 %
(ISO 3451-1, Method A, Glass Fiber,
1h at 850 +/-50°C,
test portion 2 to 2.5g)

3.4.2 Density — 1.08 – 1.16 g/cm^3
(ISO 1183, Method A)

3.4.3 Tensile Strength at Yield
(ISO 527-1 and ISO 527-2, Specimen A,
50 mm/minute test speed)

B2	B7
75 MPa min	65 MPa min

3.4.4 Tensile Modulus — 4.9 GPa, min
(ISO 527-1 and ISO 527-2, Specimen A,
1 mm/min test speed)

3.4.5 Flexural Modulus — 4.5 GPa min
(ISO 178, Specimen D,
64 mm support span, 2 mm/minute test speed)

3.4.6 Impact Strength, Notched Charpy
(ISO 179-1/1eA, Specimen D)

	B2	B7
3.4.6.1 At 23 +/- 2 °C	6.0 kJ/m^2 min	10.0 kJ/m^2 min Report Break Type
3.4.6.2 At -40 +/- 2 °C	3.0 kJ/m^2 min	4.5 kJ/m^2 min Report Break Type

3.4.7 Heat Deflection Temperature — 135°C min
(ISO 75-1 and ISO 75-2, Specimen D, flatwise,
0.34 +/- 0.1 mm deflection. At 1.80 MPa)

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