



**POLYPROPYLENE (PP)
20% LONG GLASS FIBER (9-13 mm) REINFORCED,
STRUCTURAL, MOLDED IN COLOR, UV STABLE, INTERIOR**

WSS-M4D865-B5

1. SCOPE

The material defined by this specification is an injection molding compound composed of a polypropylene matrix, with 20% by weight long glass fiber reinforcement with typical fiber length between 9-13 mm.

2. APPLICATION

This specification was released originally for material used for U222/U228 Navigator/Expedition overhead consoles.

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). Note: 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 to establish specification limits.

3.1.1 This specification is 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. The use of regrind is permitted, for economic / environmental reasons, with compliance as indicated in WSS-M99P1111-A.

3.1.2 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.

3.1.3 Performance Criteria:
Parts using this specification shall meet the appropriate performance specification, WSS-M15P4-F/Latest.

3.1.4 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
Filler Content
Impact Strength, Notched Charpy at 23°C
Flexural Modulus

Date	Action	Revisions	Rev 2
2015 11 11	Editorial	See Summary of Revisions	M. Corley, EU
2014 11 07	Editorial	Editorial – See Summary of Revisions	L. Soreide, NA G. Eaton, NA
2013 01 03	Released		



3.1.5 Processing Criteria:

Proper processing parameters and equipment should be used to preserve maximum fiber length in molded parts as specified and measured by the raw material supplier.

Raw material supplier must be involved upfront for mold flow, CAE, and tooling design and should be present at all molding trials.

Proper processing parameters should be used to obtain a resin rich surface and prevent glass fibers visible on the surface.

WSS-M99D514-A1 is to be used for thermoplastic compounds using long glass fiber masterbatch pellets. WSS-M99D514-A2 is to be used for thermoplastic compounds using Direct Long glass Fiber Technology (DLFT) or Injection Molding Compounding (IMC).

3.2 SAMPLE PREPERATION

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 (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 Gloss
(FLTM BI 110-01, ASTM D 523
molded from smooth polished mold, Specimen I)

Rating 2-4, or as
specified on
Engineering Drawing

Gloss Description	Gloss Code*	Gloss Level
Very High	A	92 min
	B	76 - 84
	C	66 - 74
High	D	58 - 66
	E	47 - 53
	F	33 - 38
	G	17 - 23
Medium	H	7 - 13
	J	4 - 6
	K	2 - 4
Low	L	0.5 - 2.0
	N	1.8-2.4

*A use 20 degree, B-N use 60 degree



- 3.3.2 Weathering Resistance Rating 4 min
(FLTM BO 116-01, 3609.6 kJ/m² exposure
Specimen C from smooth polished mold,
ISO 105-A02 / AATCC Evaluation Procedure 1)

Every 526.4 kJ/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 the specified AATCC rating. In addition, there shall be no cracking, crazing or other deterioration.

Use regional choice colors for initial approval and report the color house used. For color durability submissions, test all program colors.

- 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 MATERIAL PROPERTIES

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|-------|---|-------------------------------|
| 3.4.1 | Glass Fiber Content,
(ISO 3451-1, Method A, 1h at 650 +/- 25°C,
test portion, 2 – 2.5g) | 18% - 22% |
| 3.4.2 | Density
(ISO 1183, Method A) | 1.01 – 1.05 g/cm ³ |
| 3.4.3 | Tensile Strength at Break,
(ISO 527-1 and ISO 527-2, Specimen A,
test speed: 5 mm/minute) | 64 MPa min |
| 3.4.4 | Tensile Modulus
(ISO 527-1 and ISO 527-2, Specimen A,
test speed: 1 mm/min) | 4.1 GPa min |
| 3.4.5 | Flexural Modulus
(ISO 178, Specimen D,
64 mm support span, 2 mm/minute test speed) | 4.3 GPa min |