



POLYBUTYLENE TEREPHTHALATE (PBT), 15% GLASS FIBER REINFORCED, MOLDING COMPOUND

WSS-M4D750-B1

1. SCOPE

The material defined by this specification is a 15% glass fiber reinforced thermoplastic polyester molding compound based on polybutylene terephthalate (PBT).

2. APPLICATION

This specification was originally released for material used in electrical connectors.

2.1 LIMITATIONS

This material does not contain UV stabilizers, long-term exposure to direct sunlight will 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.

Approval of new sources requires the completion of the latest version of the FMD template. Data should be submitted at the same time as the specification data package. Only one FMD package is required per trade name approved. FMD data is not required for each manufacturing site. FMD is required for new site approvals that do not have an existing FMD record.

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/OR 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.

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 1 for number of samples required for each test.

Date	Action	Revisions	Rev 0
2017 07 27	Released		



- 3.4.2 This specification is based on virgin material and does not allow the addition of recycled content (PIR/PCR).
- 3.4.3 Materials requiring High Strain Rate, Creep or fiber oriented Tensile Modulus may be required to test to the requirements of WSS-M99D68-A1/Latest, *Thermoplastic Property Determination For CAE, High Strain Rate Tensile, Creep and Tensile Modulus*. Material Suppliers should be prepared to submit data upon request.
- 3.4.4 Performance Criteria:
- Parts using this specification for non-visible interior applications must meet the appropriate performance specification: WSS-M15P4-G/Latest.
- Parts using this specification for underhood applications must meet the appropriate performance specification: WSS-M15P50-C1/C2/Latest.
- 3.4.5 Ford Materials Engineering may request a Control Plan and Certificate of Analysis (C of A) containing lot testing requirements which must include, but are not limited to:
- Filler Content
Impact Strength, Notched Charpy at 23 °C
Flexural Modulus

3.5 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 7792-2. 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 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

3.6 MATERIAL PROPERTIES

- 3.6.1 Melt Flow Rate 32 - 38 g/
(ISO 1133, 250 °C, 2.16 kg) 10 minutes

The material shall be dried for 4 h minimum at 130 - 135 °C in a mechanical convection oven immediately preceding the test.

- 3.6.2 Glass Fiber Content 14 - 16 %
(ISO 3451-1, Method B, 1 h at 650 +/- 25 °C, except use 5% by volume hydrochloric acid solution for 15 minutes. Rinse the glass fibers several times with distilled water before drying in an oven for 2 h at 120 +/- 2 °C. After cooling, weigh the crucibles and calculate the percent glass fibers.)



3.6.3	Density (ISO 1183, Method A)	1.38 - 1.42 g/cm ³
3.6.4	Tensile Strength at Break (ISO 527-1 and ISO 527-2, Specimen A, 5 mm/minute test speed)	85 MPa min
3.6.5	Tensile Modulus (ISO 527-1 and ISO 527-2, Specimen A, 1 mm/minute test speed)	5.5 GPa min
3.6.6	Flexural Modulus (ISO 178, Specimen D, 64 mm support span, 2 mm/minute test speed)	5.2 GPa min
3.6.7	Impact Strength, Notched Charpy (ISO 179-1/1eA, Specimen D)	
3.6.7.1	At 23 +/- 2 °C	5.2 kJ/m ² min Report Break Type
3.6.7.2	At -40 +/- 2 °C	4.8 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. Test specimens must be reviewed by Materials Engineering.

3.6.8	Heat Deflection Temperature (ISO 75-1 and ISO 75-2, Specimen D, flatwise, Bath – silicone oil, 0.34 +/- 0.1 mm deflection at 1.80 MPa)	194 °C min
3.6.9	Heat Aging Performance (1000 h at 140 +/- 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)	
3.6.9.1	Tensile Strength, Change (Test Method per para 3.6.4)	+/- 20% max
3.6.9.2	Impact Strength, Notched Charpy, Change (Test Method per para 3.6.7, specimens to be notched before Heat Aging)	+/- 20% max
3.6.10	Flammability (ISO 3795 Specimen B, smooth surface)	

Burn Rate

100 mm/minute max