



UNSATURATED POLYESTER (UP), MODIFIED, 50% GLASS FIBER REINFORCED SHEET MOLDING COMPOUND (SMC)

WSA-M3D164-A

1. SCOPE

The material defined by this specification is 25 mm, minimum long glass fiber reinforced modified polyester sheet molding compound.

2. APPLICATION

This specification was released originally for material used for a fuel tank protective heat shield.

3. REQUIREMENTS

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIAL

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.4 MOLDED TEST SPECIMEN

3.4.1 Preparation of Test Specimens

All test specimens shall be prepared from cross-ply molded plaques or equivalent. The plaques are to be manufactured from the same material and under equivalent conditions as production parts.

Prepared specimens must show no evidence of fiber tear or loose fiber strands protruding from the specimens. No additional annealing of specimens is allowed.

3.4.2 Density 1.78 - 1.86 g/cm³
(ISO 1183, Method A/ASTM D 792, Method A1)

3.4.3 Filler Content

3.4.3.1 Ash Content, max 63%
(ISO 3451/1, Method A, 1 h at 650 +/- 25 °C)

3.4.3.2 Glass Fiber Content, By Weight, min 50%

Test Method: 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.

3.4.3.3 Glass Fiber Length, min 25 mm
(Optical evaluation method)

Date	Action	Revisions
2004 12 15	Revised	Inserted 3.0; Deleted 3.1, 3.2, 3.3, 3.6, 3.7 & 4
1991 04 17	Released	NC00E10117270000



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3.4.4	Tensile Strength at Break, min (ISO R 527/ASTM D 638, 150, min x 25 x 2.5 +/- 0.2 mm specimen, 5 mm/minute test speed)	190 MPa
3.4.5	Flexural Modulus, min (ISO 178/ASTM D 790, Method I, Procedure A, 60 x 10 x 2.5 +/- 0.2 mm specimen, 40 mm support span, 2 mm/minute test speed)	14.5 GPa
3.4.6	Flexural Strength, min (ISO 178/ASTM D 790, Method I, Procedure A, 60 x 10 x 2.5 +/- 0.2 mm specimen, 40 mm support span, 2 mm/minute test speed)	345 MPa
3.4.7	Shear Modulus at 23 °C (ASTM D 4065, forced constant amplitude, fixed frequency of 1 Hz +/- 15%, strain level below 1%. Specimen approx. 60 x 10 x 2.5 +/- 0.2 mm cut from the center of specimen A. Specimen length between clamps 35 - 40 mm. Soak time at each temperature interval - 3 minutes minimum)	3.92 - 3.98 GPa

Additionally, a Shear Modulus vs. Temperature curve shall be plotted for -50 to +260 °C temperature range, at 5 °C minimum intervals. The plotted curve must be within tolerance range shown on page 4.

3.4.8	Impact Strength, Izod, min (ISO 180, Method A/ASTM D 256, Method A, 63.5 x 12.7 x 2.5 +/- 0.2 mm specimen, 10 specimens minimum)	
3.4.8.1	At 23 +/- 2 °C	1.3 kJ/m ²
3.4.8.2	At -40 +/- 2 °C	1.0 kJ/m ²

The test specimens must be conditioned for minimum of 6 h at the above specified temperature prior to impact test. Low temperature testing shall be done within the cold box, if not possible, test can be conducted outside, but within 5 s.

3.4.9	Heat Deflection Temperature, min (ISO 75, Method A/ASTM D 648, 120 x 10 x 2.5 +/- 0.2 mm specimen. At 1.82 MPa)	> 250 °C
3.4.10	Water Absorption, max (ISO 62, 24 h/ASTM D 570, 24 h, 50 x 50 x 2.5 +/- 0.2 mm specimen)	0.35%
3.4.11	Heat Aging Performance (ISO 188/ASTM D 573, 150 +/- 50 air changes/h, 1000 h at 180 +/- 2 °C. Unaged property values shall be determined at the time of the aged properties determination)	
3.4.11.1	Tensile Strength at Max Load Change, max (Test Method per para 3.4.4)	-25%