

**EPOXY VINYL ESTER, EVE MATRIX, 32% GLASS
FIBER REINFORCED SHEET MOLDING COMPOUND****WSS-M3D180-A1****1. SCOPE**

The material defined by this specification is 12.5 mm minimum long glass fiber reinforced epoxy vinyl ester (EVE) sheet molding compound (SMC).

2. APPLICATION

This specification was released originally for material used for compression molded under the hood engine sealing covers.

3. REQUIREMENTS**3.0 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 All requirements of this specification, identified by symbol (s), shall be met with date representing 3 sigma values.

3.4 MOLDED TEST SPECIMEN**3.4.1 Preparation of Test Specimens**

All test specimens shall be prepared from compression molded plaques. Molded on an 305 mm x 305 mm flat panel tool. The plaques are to be manufactured from the same material and under equivalent conditions as production parts. The plaques shall have the following dimensions:

305 mm x 305 mm, minimum x 3.5 mm +/- 0.25 mm

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 (ISO 1183, Method A) 1.70 - 1.95 g/cm³

(s) 3.4.3 Filler Content

3.4.3.1 Ash Content (ISO 3451/1, Method A, 1 h at 650 +/- 25 °C) 55 - 70%

3.4.3.2 Glass Fiber Content, By Weight 26 - 34%

Date	Action	Revisions
2005 01 05	Revised	Inserted 3.0; Deleted 3.1, 3.2, 3.3, 3.6, 3.7 & 4
1996 03 05	Activated	



Test Method: ISO 3451/1, Method B, 1 h at 650 +/- 25 °C, except use 5% by volume hydrochloric acid solution for 15 min. 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 (Optical evaluation method)	50/50 Loading 25 mm/12.5 mm
(s)	3.4.4	Tensile Strength at Break, min (ISO R 527, 150 minimum x 10 x 3.5 +/- 0.25 mm specimen, 5 mm/min test speed)	40 MPa
(s)	3.4.5	Flexural Modulus, min (ISO 178, 60 x 10 x 3.5 +/- 0.25 mm specimen, 40 mm support span, 2 mm/minute test speed)	8.5 GPa
(s)	3.4.6	Flexural Strength, min (ISO 178, 60 x 10 x 3.5 +/- 0.25 mm specimen, 40 mm support span, 2 mm/minute test speed)	130 MPa
	3.4.7	Shear Modulus at 23 °C (ASTM D 5279, 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)	4.7 - 1.5 ⁹ dyne/sq cm
		Additionally, a Shear Modulus vs. Temperature curve shall be plotted for -50 to +150 °C temperature range, at 5 °C minimum intervals. The plotted curve must be within tolerance range shown on page 6.	
(s)	3.4.8	Impact Strength, Izod, min (ISO 180, Method A, 63.5 x 12.7 x 3.5 +/- 0.25 mm specimen, 10 specimens minimum)	
	3.4.8.1	At 23 +/- 2 °C	30 kJ/m ²
	3.4.8.2	At -40 +/- 1 °C	35 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.	
(s)	3.4.9	Heat Deflection Temperature, min (ISO 75, 120 x 10 x 2.5 +/- 0.2 mm specimen, edgewise, 0.32 +/- 0.01 mm deflection. At 1.80 MPa)	275 °C
(s)	3.4.10	Water Absorption, max (ISO 62-1980, Method 4 24 h 50 x 50 x 3.5 +/- 0.25 mm specimen)	-0.1%