



GLASS FIBER REINFORCED POLYESTER RESIN

S-M3D1009-A

1. SCOPE

The material defined by this specification is a polyester resin reinforced with glass fibers, either randomly distributed or in the form of chopped strand mat, molded under low pressure conditions and incorporating on one surface a polyester resin gel coat free from glass fiber.

2. APPLICATION

The material is generally used for molding exterior body panels such as headlamp bezels for commercial vehicles by hand lay-up similar "open" techniques.

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 MECHANICAL PROPERTIES

Test specimens shall be cut from fully cured flat sheets produced as additional parts of production moldings, or from special panels manufactured separately using standard materials and fabrication conditions, both without the gel coat layer. Test specimens shall be conditioned to ISO R 291, 23 +/- 2 °C and 50 +/- 5% relative humidity for 24 h prior to testing. Results for clauses 3.1.1 through to 3.1.4 inclusive shall be the average of at least 10 random samples.

3.1.1	Tensile Strength, min (ISO R 527 Type 2 test specimens, pulling speed 5 mm/minute-1)	50 MN/m ²
3.1.2	Impact Strength, min (ISO R 180, Method A)	Notched 700 J/m
3.1.3	Flexural Strength, min (ISO R 178)	85 MN/m ²
3.1.4	Modulus of Elasticity, min (ISO R 178 Tangent)	3.75 GN/m ²
3.1.5	Hardness Barcol, min (ASTM D 2583)	33
3.1.6	Water Absorption, max (ISO 62, Method B, 24 h total immersion at 23 +/- 0.5 °C)	50 mg 3 mm Thickness

Date	Action	Revisions
2005 06 21	Revised	Inserted 3.0; Deleted 3.2.10 & 4; Removed Inactive S-M3D1009-B
1995 01 16	Revised and Retyped	Was 7 pages
1973 01 16	Released	BC/M1517DL





3.2 MOLDED PART REQUIREMENTS

The following test requirements are applicable to fully cured molded parts and/or test specimens cut from molded parts complete with gel coat conditioned to ISO R 291, at 23 +/- 2 °C and 50 +/- 5% relative humidity for 24 h prior to testing.

3.2.1 Surface Finish (Gel coated surface)

Moldings shall be free from protruding fibers, dirt, voids, pits, bubbles, cracks, blisters and resin rich or resin denuded areas. The gel coat shall adhere well to the underlying laminate and shall not exhibit any surface tackiness.

3.2.2 Long Term Waviness (Gel coated surface)

Parts shall exhibit no more waviness than the Ford minimum acceptance part approved by the affected Product Engineering office. Test parts shall be painted with a paint having a specular gloss level A that is 92 units minimum by 60° meter.

3.2.3 Tensile Strength, min 45 MN/m² (ISO R 527, Type 2 test specimens, pulling speed 5 mm minute-1)

The result shall be the average of four pieces cut from the flattest possible areas.

3.2.4 Flexural Strength, min 80 MN/m² (ISO R 178)

The result shall be the average of four pieces cut from the flattest possible areas.

3.2.5 Glass Fiber Content, ww/, min 25%

Sample: About 5 g sample material from which the gel coat has been removed by sanding is preconditioned at 100 °C for 1 h before weighing.

Method: After muffling at 575 +/- 25 °C in a silica crucible till the residue is white, it is cooled and weighed. Further heating, cooling and weighing cycles are performed until constant weight (within 0.01 g).

The residue is well washed with dilute (1:1) hydrochloric acid and the glass separated by filtration. After rinsing with water then acetone and drying at 100 °C for 1 h the glass fiber is cooled and weighed accurately.

Result: Express the result as the mean of four determinations expressed as percentage glass fiber by weight.

3.2.6 Thermal Cycling

There shall be no visible cracking, separation, warping or exudation in either gel coat or laminate following ten cycles of the following conditions:

- 1) -40 +/- 1 °C for 1 h
- 2) 23 +/- 2 °C for 1 h
- 3) 80 +/- 2 °C for 3 h
- 4) 38 +/- 1 °C and 98 +/- 2% relative humidity for 16 h