POLYAMIDE (PA) 66, 30% LONG GLASS FIBER REINFORCED MOLDING COMPOUND — **WSB-M4D677-A**

POLYAMIDE (PA) 66, 40% LONG GLASS FIBER REINFORCED MOLDING COMPOUND — **WSB-M4D678-A**

POLYAMIDE (PA) 66, 50% LONG GLASS FIBER REINFORCED MOLDING COMPOUND — **WSB-M4D679-A**

POLYAMIDE (PA) 66, 60% LONG GLASS FIBER REINFORCED MOLDING COMPOUND — **WSB-M4D680-A**

1. SCOPE

The materials defined by these specifications are type 66 polyamide (nylon) molding compounds, reinforced with long glass fibers (12.5 mm nominal length).

2. APPLICATION

These specifications were released originally for materials used for deck lid cams.

NOTICE: This material absorbs and retains moisture. Part design and tolerances must accommodate changes in part dimensions and physical properties due to moisture absorption or loss in the service/assembly environment.

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials.

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).

3.3 CONDITIONING AND TEST CONDITIONS

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5% relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

All test values indicated herein are based on material and specimens with moisture content not exceeding 0.2% (test according to ISO 960, Method B/ASTM D 789).

All test materials immediately after processing have to be sealed in containers that are impermeable to water vapor. If the moisture content exceeds 0.2%, condition the material for a minimum of 16 h at 40 - 50 °C at a reduced pressure below 133 Pa.

Date	Action	Revisions
2005 11 11	Revised	Inserted 3.0; Deleted 3.1, 3.2, 3.8, 3.9 & 4
2000 11 08	Revised	Updated — A. Cockman
1989 10 27	Released	NB00I10043054001 — A. K. Christoff

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3.4 MOLDING COMPOUND

3.4.1 Glass Fiber Content
(ISO 3451/4, 1 h 650 +/- 25 °C)

WSB-M4D677-A	28 - 32%
WSB-M4D678-A	38 - 42%
WSB-M4D679-A	48 - 52%
WSB-M4D680-A	58 - 62%

3.4.2 Melt Temperature, min
(ISO 1218, Method B/ASTM D 789)

WSB-M4D677-A	255 °C
WSB-M4D678-A	255 °C
WSB-M4D679-A	255 °C
WSB-M4D680-A	255 °C

3.5 MOLDED TEST SPECIMEN

3.5.1 Preparation of Test Specimens

Unless otherwise specified all tests shall be carried out on injection molded one-end gated test specimens.

The following dimensions are required:

A. 150 min x 10 x 4.0 +/- 0.2 mm (Tensile Bar, ISO 3167)
B. 120 x 10 x 4.0 +/- 0.2 mm

Specimens with shorter dimensions shall be cut from the center portion of the test specimen A and/or B. The specimens shall be prepared according to ISO 294. No annealing allowed.

3.5.2 Density
(ISO 1183, Method A/ASTM D 792, Method A1)

WSB-M4D677-A	1.33 - 1.38 g/cm^3
WSB-M4D678-A	1.43 - 1.48 g/cm^3
WSB-M4D679-A	1.54 - 1.59 g/cm^3
WSB-M4D680-A	1.66 - 1.73 g/cm^3

3.5.3 Tensile Strength at Max Load, min
(ISO R 527/ASTM D 638M, 150 min x
10 x 4.0 +/- 0.2 mm specimen,
5 mm/min test speed)

WSB-M4D677-A	140 MPa
WSB-M4D678-A	180 MPa
WSB-M4D679-A	205 MPa
WSB-M4D680-A	235 MPa

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3.5.4 Flexural Modulus, min
(ISO 178/ASTM D 790M, Method I, Procedure A, 80 x 10 x 4.0 +/- 0.2 mm specimen, 64 mm support span)

WSB-M4D677-A	6.2 GPa
WSB-M4D678-A	9.3 GPa
WSB-M4D679-A	11.3 GPa
WSB-M4D680-A	15.5 GPa

3.5.5 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 4.0 +/- 0.2 mm cut from the center of specimen A.)

WSB-M4D677-A	1.4 - 2.5 GPa
WSB-M4D678-A	1.9 - 3.2 GPa
WSB-M4D679-A	2.2 - 3.7 GPa
WSB-M4D680-A	2.8 - 4.8 GPa

Additionally, a Shear Modulus vs. Temperature curve shall be plotted for -50 to +200 °C temperature range, at 5 °C minimum intervals. The plotted curve must be within tolerance range shown on page 7 (WSB-M4D677-A), page 8 (WSB-M4D678-A), page 9 (WSB-M4D679-A), and page 10 (WSB-M4D680-A).

3.5.6 Impact Strength, Izod, min
(ISO 180, Method A/ASTM D 256, Method A, 63.5 x 10 x 4.0 +/-0.2 mm specimen, 10 specimens for each test)

3.5.6.1 At 23 +/- 2 °C

WSB-M4D677-A	14.5 kJ/m^2
WSB-M4D678-A	21.5 kJ/m^2
WSB-M4D679-A	28.0 kJ/m^2
WSB-M4D680-A	38.0 kJ/m^2

3.5.6.2 At -40 +/- 2 °C

WSB-M4D677-A	14.5 kJ/m^2
WSB-M4D678-A	21.5 kJ/m^2
WSB-M4D679-A	28.0 kJ/m^2
WSB-M4D680-A	38.0 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.

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