



ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

POLYAMIDE (PA) 66, HEAT STABILIZED 30 % GLASS
FIBER REINFORCED, REDUCED MOISTURE
ABSORPTION MOLDING COMPOUND

WSK-M4D642-A3

1. SCOPE

The material defined by this specification is a heat stabilized 30 % glass fiber reinforced polyamide 66 molding compound with reduced moisture absorption.

2. APPLICATION

This specification was released originally for material used for adjuster screws of head lamp.

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

3.1 STATISTICAL PROCESS

Suppliers must conform to the requirements of Ford Quality System Standard Q-101. A mutually acceptable Control Plan as described therein is required for material/source approval. Appropriate statistical tools must be used to analyze process/product data so that variation in the final product is continuously reduced.

3.2 INFRARED SPECTROPHOTOMETRY AND/OR THERMAL ANALYSIS

Ford Motor Company, at its option, may conduct infrared and/or thermal analysis of material/parts supplied to this specification. The IR spectra and thermogram established for initial approval shall constitute the reference standard and shall be kept on file at the designated material laboratory. All samples shall produce IR spectra and thermograms that correspond to the reference standard when tested under the same conditions.

3.3 CONDITIONING AND TEST CONDITIONS

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).

Date	Action	Changes
1991 02 01	EP00E01089481000	Released M. Siewert

WP 3948-a

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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.

Conduct tests in a controlled atmosphere of 23 +/- 2 C and 50 +/- 5 % relative humidity. Individual specimens shall not be removed from closed containers until immediately before testing.

3.4 MOLDING COMPOUND

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| 3.4.1 | Glass Fiber Content
(ISO 3451/4, test temperature 600 +/- 25 C, test portion 1 g) | 28 - 32 % |
| 3.4.2 | Melt Temperature
(ISO 1218, Method B/ASTM D 789 or DSC - ASTM E 794) | 250 - 265 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 mm 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.

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| 3.5.2 | Density
(ISO 1183, Method A/ASTM D 792, Method A1) | 1.34 - 1.39 g/cm ³ |
| 3.5.3 | Tensile Strength at Max Load, min
(ISO R 527/ASTM D 638M, 150 x 10 x 4.0 +/- 0.2 mm specimen, 5 mm/minute test speed) | 170 MPa |
| 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) | 8 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. Specimen length between clamps 35-40 mm. Soak time at each temperature interval - 3 minutes minimum) | 1.61 - 2.68 GPa |