



ENGINEERING MATERIAL SPECIFICATION

Material Name	Specification Number
POLYPROPYLENE (PP) COPOLYMER, 40 % MINERAL FILLED, COLOR PIGMENTED MOLDING COMPOUND, GENERAL PURPOSE	WSK-M4D788-A1
POLYPROPYLENE (PP), COPOLYMER, 40 % MINERAL FILLED, COLOR PIGMENTED MOLDING COMPOUND, INTERIOR	WSK-M4D788-A2
POLYPROPYLENE (PP), COPOLYMER, 40 % MINERAL FILLED, COLOR PIGMENTED MOLDING COMPOUND, EXTERIOR	WSK-M4D788-A3

1. SCOPE

The materials defined by these specifications are 40 % mineral (talc) filled, black, and color pigmented injection molding compounds based on polypropylene copolymer. WSK-M4D788-A2 and WSK-M4D788-A3 materials contain weathering requirements necessary for interior and exterior applications, respectively.

2. APPLICATION

These specifications were released originally for materials used for:
WSK-M4D788-A1 - interior of glove box and other general purpose applications,
WSK-M4D788-A2 - various interior applications such as pillar trims,
WSK-M4D788-A3 - various exterior applications such as gasket radio antenna, etc.

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 thermograms 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.

Date	Release No.	Release/Revision
1991-01-02	EP00E01089480000	Released L. Rodigas

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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 96 h prior to testing and tested under the same conditions unless otherwise specified.

3.4 MOLDING COMPOUND

3.4.1 Melt Flow Rate 4.0 - 8.0 g/10 minutes
(ISO 1133/ASTM D 1238,
230 C, 2.16 kg)

3.4.2 Mineral Content 38 - 42 %
(ISO 3451/1, Method A, talc filler
3 h at 650 +/- 25 C, test portion
1 to 2 g)

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 1.21 - 1.27 g/cm³
(ISO 1183, Method A/ASTM D 792,
Method A1)

3.5.3 Tensile Strength at Yield, min 20 MPa
(ISO R 527/ASTM D 638M, 150 min x
10 x 4.0 +/- 0.2 mm specimen,
50 mm/min test speed)

3.5.4 Flexural Modulus, min 3.5 GPa
(ISO 178/ASTM D 790M, Method I,
Procedure A, 80 x 10 x 4.0 +/- 0.2 mm
specimen, 64 mm support span)

3.5.5 Shear Modulus at 23 C 1.30 - 2.18 GPa
(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.



Additionally, a Shear Modulus vs. Temperature curve shall be plotted for - 50 to + 140 C temperature range, at 5 C minimum intervals. The plotted curve must be within tolerance range shown on page 7.

- 3.5.6 Impact Strength, Izod, min
(ISO 180, Method A/ASTM D 256, Method A,
80 x 10 x 4.0 +/- 0.2 mm specimen,
10 specimens for each test)
- | | | |
|---------|-----------------|-----------------------|
| 3.5.6.1 | At 23 +/- 2 C | 2.8 kJ/m ² |
| 3.5.6.2 | At - 40 +/- 2 C | 1.8 kJ/m ² |
| 3.5.7.3 | At 10 +/- 2 C | 2.3 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.

- 3.5.7 Heat Deflection Temperature, min
(ISO 75/ASTM D 648, 120 x
10 x 4.0 +/- 0.2 mm specimen)
- | | | |
|---------|-------------|-------|
| 3.5.7.1 | At 1.82 MPa | 70 C |
| 3.5.7.2 | At 0.45 MPa | 125 C |
- 3.5.8 Heat Aging Performance
(ISO 188/ASTM D 573, 150 +/- 50 air
changes/h, 1000 h at 120 +/- 2 C.
Unaged property values shall be
determined at the time of the aged
properties determination)
- | | | |
|---------|---|----------|
| 3.5.8.1 | Tensile Strength at Yield
Change
(Test Method per para 3.5.3) | +/- 25 % |
| 3.5.8.2 | Impact Strength, Izod
Change, max
(Test Method per para 3.5.6.1,
specimens to be notched before
heat aging) | - 15 % |

3.6 FLAMMABILITY
(ISO 3795)

Burn Rate, max	100 mm/minute
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The specimen size required for material approval is 355 x 100 x 1.0
+/- 0.1 mm with a smooth surface.