



ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

THERMOPLASTIC POLYOLEFIN ELASTOMER (TEO)
COLOR PIGMENTED MOLDING COMPOUND, EXTERIOR

WSK-M4D777-A5

1. SCOPE

The material defined by this specification is a rigid thermoplastic polyolefin elastomer (TEO) injection molding compound, color pigmented, with added UV-stabilization for exterior use.

2. APPLICATION

This specification was released originally for material used for grille inserts on front bumper and lower end panels on rear bumper of Mondeo.

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.

3.1.1 All requirements of this specification, identified by symbol (s), shall be met with data representing 3 sigma values.

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.

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.

3.4 MOLDING COMPOUND

(s) 3.4.1 Melt Flow Rate 1.5 - 5.0 g/10 minutes
(ISO 1133, 230 C, 2.16 kg)

Date	Release No.	Release/Revision
93 07 01	EP00E10258822000	Released L.Rodigas

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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) | 0.88 - 0.93 g/cm ³ |
| 3.5.3 | Hardness, Durometer D
(ISO 868, 15 s dwell) | 54 - 62 |
| (s) 3.5.4 | Tensile Strength at Yield, min
(ISO R 527, 150 minimum x
10 x 4.0 +/- 0.2 mm specimen,
50 mm/min test speed) | 18 MPa |
| (s) 3.5.4.1 | Elongation at Yield, min
(Test Method according
to para 3.5.3) | 10 % |
| (s) 3.5.5 | Flexural Modulus, min
(ISO 178, 80 x 10 x 4.0 +/- 0.2 mm
specimen, 2 mm/min test speed,
64 mm support span) | 850 MPa |
| 3.5.6 | 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) | 300 - 500 MPa |

Additionally, a Shear Modulus versus 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 7.



- (s) 3.5.7 Impact Strength, Izod, min
(ISO 180/1A, 80 x 10 x 4.0
+/- 0.2 mm specimen, 10 specimens
for each test)
- | | | |
|---------|-----------------|-----------|
| 3.5.7.1 | At 23 +/- 2 C | 40 kJ/m2 |
| 3.5.7.2 | At - 40 +/- 1 C | 3.5 kJ/m2 |
| 3.5.7.3 | At 0 +/- 2 C | 7.0 kJ/m2 |

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) 3.5.8 Heat Deflection Temperature, min
(ISO 75, 120 x 10 x 4.0
+/- 0.2 mm specimen, 0.32 +/-
0.01 mm deflection)
- | | | |
|---------|-------------|------|
| 3.5.8.1 | At 1.80 MPa | 38 C |
| 3.5.8.2 | At 0.45 MPa | 58 C |
- 3.5.9 Heat Aging Performance
(ISO 188, except 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)
- | | | |
|---------|---|----------|
| 3.5.9.1 | Tensile Strength at Yield
Change
(Test Method per para 3.5.4) | +/- 25 % |
| 3.5.9.2 | Impact Strength, Izod
Change, max
(Test Method per para 3.5.7.1,
specimens to be notched before
heat aging) | - 15 % |

3.6 WEATHERING RESISTANCE

After exposure in accordance with 3.6.1, 3.6.2 and 3.6.3, the material shall show no color change in excess of specified Gray Scale rating (AATCC Evaluation Procedure 1/ISO 105-A02).

In addition, there shall be no cracking, crazing or other deterioration.