

POLYURETHANE RRIM - HIGH HEAT, 20% MICA, 1320 MPa FLEXURAL MODULUS

GMP.PUR.041

1 SCOPE. This specification covers the properties of a paintable, reaction injection molded polyurethane compound reinforced with 20% MICA and able to be processed through ELPO oven temperatures with no detrimental effects.

1.1 PAINTABILITY. Approved paint systems that can be used on this material are listed in the GM Approved Paint On Parts Systems (GM APOPS) data base.

1.2 APPLICATIONS. Typical applications include the following: Painted exterior body panels such as fenders, truck sides and body claddings.

2 REFERENCED STANDARDS.

GM9077P	ASTM D638	ASTM D792
GMW3059	ASTM D696	ASTM D2584
ASTM D256	ASTM D790	ASTM D3769

3 TEST PROCEDURES. Tests shall be conducted using the latest issue of the test methods indicated. Suitable precautions should be taken to ensure that applicable safe limits are not exceeded when conducting test procedures, processes, and/or handling the materials required by this specification.

3.1 Properties shall be determined using test specimens die cut from edge gated reaction injection molded test plaques that have been post cured by baking for 60 minutes @ 184°C within 8 h of molding. The plaques shall be 250 mm min x 300 mm min x 3.8 ± 0.2 mm.

3.2 Tests shall be conducted 40 h min. after post cure and immediately following a conditioning period of 24 h min @ $22 \pm 3^\circ\text{C}$ and $50 \pm 5\%$ RH unless otherwise specified.

3.3 An equal number of specimens shall be cut from both the longitudinal and transverse plaque directions for each mechanical property. The specimens shall be tested and the results averaged. The average value is the material property value. This value is compared to the required value shown in the Compound Properties table(s).

3.3.1 Prior to making measurements and observations on weathered specimens, wash the specimens with a solution consisting of 2 g No 7 Car Wash Concentrate (distributed by Armor All products, Alliso Viejo, CA 92656) and 1 L deionized water at $22 \pm 3^\circ\text{C}$. Use a soft sponge saturated with the solution and scrub the samples with a firm action.

4 COMPOUND PROPERTIES.

4.1 RESTRICTED AND REPORTABLE SUBSTANCES FOR PARTS (GMW3059). All materials supplied to this specification must comply with the requirements listed in GMW3059, **Restricted and Reportable Substances for Parts**.

4.2 COMPOUND CERTIFICATION. Material suppliers must certify molding compound properties to the specific GM Test Sampling Plan approved for their material.

4.3 COMPOUND PROPERTIES (NATURAL AND BLACK). See Table 1.

5 SUGGESTED COMPOUND VERIFICATION.

Inherent compound properties and test procedures that may be used to identify this material are listed below. The test value and test procedure requirements are identical to those listed in Section 4, Compound Properties.

Filler Content
Infrared Characterization Scan
Specific Gravity

6 COMPOUND AND SOURCE APPROVAL.

Each vehicle group and component division will have its own approved compound list derived from the corporate plastics file (MATSPC). No shipment shall be made by a new source until a sample of the compound manufactured at a production facility has been approved by the appropriate vehicle group and/or component division. Shipment receipt and certification requirements will vary among receiving locations.

6.1 A completed copy of the Material Safety Data Sheet meeting GM information requirements must be submitted with any new submissions or whenever a composition change has occurred.

7 IDENTIFICATION. The molding compound shall be identified by the specification code, the manufacturer's identification code and lot number, along with any additional vehicle group and component division requirements.

8 INSPECTION AND REJECTION. The purchaser reserves the right to sample incoming shipments even though it is the responsibility of the supplier to meet the requirements stated without dependence upon the purchaser's inspection. The supplier (whether prime contractor or subcontractor) will forfeit qualification if a change is made in material, processing methods, testing methods, or location of manufacture without prior written request to and subsequent approval from the purchaser.

9 GENERAL INFORMATION. This standard was originated by the Plastics Committee in March 1999 and first published in October 1999.

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TABLE 1 - COMPOUND PROPERTIES (NATURAL AND BLACK)

Properties	Test Values	Test Methods
Mineral Filler (MICA)	18 - 22%	TGA, GM9077P, ASTM D2584 or GM9077P except use muffle furnace temperature of 550 to 650°C
Moisture Growth	0.36 % max	Measure on 100 x 100 mm specimens cut from test plaques defined in 2.1. Average the growth in the length and width directions after 96 h immersion in water @ 23 ± 2°C.
Specific Gravity	1.22 - 1.29	ASTM D792
Flexural Modulus @ -30°C @ +22°C @ +70°C	2585 MPa max 1115 - 1525 MPa 750 MPa min	ASTM D790, Method I, 1.3 mm/minute, 50 mm span, 25 mm wide specimen, tangent calculation
Tensile Strength at Break	24 MPa min	ASTM D638, Type I bar, 50 mm/minute
Heat Sag	6.1 mm max	ASTM D3769, 150 mm overhang @ 177°C
Coefficient of Linear Thermal Expansion	76 E-06/°C max	ASTM D696, 20 - 100°C temperature range, measure in material flow direction.
Notched Izod Impact	67 J/m min	ASTM D256, Method A
Mold Shrinkage Perpendicular to Flow 24 h after molding after 60 minutes @ 184°C Parallel to Flow 24 h after molding after 60 minutes @ 184°C See Note 1.	0.60 - 0.76% 0.53 - 0.70%	Measured on test plaques 150 mm min long x 100 mm min wide.

Note 1: This property assures reproducible mold shrinkage, but does not indicate the shrinkage to be used to cut tools for production parts.