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| GM | WORLDWIDE ENGINEERING STANDARDS | Material Specification | GMW17187 |

# Thermoplastic Elastomers – Poly(ether-ester) Block Copolymers – General Purpose

## 1 Scope

**1.1 Material Description.** This specification covers the properties of general purpose, natural polyester thermoplastic elastomers. These materials are not heat or Ultra Violet (UV)-stabilized. These materials can be processed by injection molding and extrusion.

Material types are delineated by Flexural Modulus. The types and corresponding modulus ranges are identified in Appendix A, Table A1.

**1.2 Symbols.** The material abbreviation according to ISO 18064 is >TPC-ET<.

**1.3 Applicability.** Typical applications include hoses, tubing, seals, and jacketing for wire and cable. The typical operating temperature range is from -50 °C to +125 °C, depending on application and product grade.

**1.4 Remarks.** None.

## 2 References

**Note:** Only the latest approved standards are applicable unless otherwise specified.

**2.1 External Standards/Specifications.**

| | | | |
|---|---|---|---|
| ISO 34-1 | ISO 527 | ISO 3795 | ISO 18064 |
| ISO 178 | ISO 868 | ISO 11357 | |
| ISO 179-1eA | ISO 1133 | ISO 14910-2 | |
| ISO 306 | ISO 1183 | ISO 15512 | |

**2.2 GM Standards/Specifications.**

| | | | |
|---|---|---|---|
| GMW3013 | GMW3221 | GMW14270 | GMW16853 |
| GMW3059 | GMW3232 | GMW14444 | |
| GMW3205 | GMW3235 | GMW15634 | |

**2.3 Additional References.**

Safety and Industrial Hygiene (S&IH) Technical Standard (TS), S&IH TS 3.4-160-02

## 3 Requirements

Materials approved to this specification shall meet the requirements of GMW3013, **General Requirements for Handling of Technical Terms of Delivery for Plastics.**

**3.1 Requirements on Test Specimens.** Tests shall be conducted using the latest issue of the test methods indicated. Suitable precautions shall be taken to ensure that applicable safe limits are not exceeded when conducting test procedures, processed, and/or handling the materials required by this specification.

Unless otherwise specified, preparation of specimens and standard test methods shall be in accordance with ISO 14910-2.

All test values herein are based on material with a moisture content of 0.1% maximum at the time of molding.

Immediately after molding, specimens shall be sealed in a moisture-proof container/envelope and aged for a minimum of 21 days at +23 °C ± 2 °C. Samples shall then be removed from the moisture proof container/envelope and conditioned for a period of 24 h minimum per GMW3221 Code B.

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Test immediately following this conditioning period, unless otherwise specified. All tests shall be performed on unannealed specimens. In addition, tests specified at temperatures **under**+23 °C ± 2 °C shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum. Tests specified at temperatures **over**+23 °C ± 2 °C shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 20 minutes minimum.

The minimum values specified in the property tables must be met by test specimens in black, natural, or in a standard sampled color, if natural or black are not available. For colored grades, where other pigment and additive systems (e.g., stabilizers) are used, the impact values shall not decrease by more than 10% from the specified minimum value.

**3.2 Emissions Testing of Interior Materials and Parts.** For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

**3.3** All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

**3.4 Requirements on Delivery.** Important physical, mechanical, and thermal properties that characterize the material are summarized in Table 1.

**Note:** For each product, the requirements to Table 1 shall be documented by a Certification Statement according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

**3.5 Compound Properties.** Refer to Table 1. A minimum of six (6) lots shall be tested to Table 1. The following are also required for full specification approval. The minimum number of lots per test required is one (1):

- Young's Modulus
- Poisson's Ratio
- Coefficient of Linear Thermal Expansion (CLTE)
- Stress-Strain Curve at 23 °C

**Table 1: Compound Properties (Natural)**

| Property | Test Method | Unit | Type 1 | Type 2 | Type 3 |
|---|---|---|---|---|---|
| Flexural Modulus | ISO 178, 64 mm span, 2 mm/minute test speed, chord modulus using 0.5 mm to 2.5 mm strain | MPa | 20 to 40 | 50 to 70 | 90 to 130 |
| Shore D Hardness | ISO 868, 15 s delay | Shore D | 25 ± 5 | 35 ± 5 | 45 ± 5 |
| Density | ISO 1183 | g/cm$^3$ | Target Range 1.12 to 1.22 | | |
| Tensile Stress at Break | ISO 527, Type 1BA dumbbell, 50 mm/minute | MPa | 5 minimum | 12 minimum | 15 minimum |
| Elongation at Break | ISO 527, Type 1BA dumbbell, 50 mm/minute | % | 150 minimum | 170 minimum | 300 minimum |
| Tensile Stress at 10% Elongation | ISO 527, Type 1BA dumbbell, 50 mm/minute | MPa | 2 minimum | 3 minimum | 6 minimum |
| Tear Strength | ISO 34-1, Method B, angle die, 500 mm/minute | kN/m | 30 minimum (Parallel) | 70 minimum (Parallel) | 75 minimum (Parallel) |
| | | | 40 minimum (Perpendicular) | 70 minimum (Perpendicular) | 65 minimum (Perpendicular) |

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