



## Thermoplastic Elastomer - Styrenic, General Purpose, Filled

### 1 Scope

**1.1 Material Description.** This specification covers the properties of black and natural, heat stabilized, filled thermoplastic elastomers consisting of polypropylene (PP) and styrene/ethylene/butylene/styrene (SEBS) rubber. These materials are not weatherable and are not intended for use in exposed applications.

Material types are delineated by hardness values. The types and corresponding hardnesses are defined in Appendix A, Table A1.

**1.2 Symbols.** The material abbreviation according to ISO 18064 is >TPS-SEBS<.

**1.3 Applicability.** Typical applications include active aero shutters.

**1.4 Remarks.** Not applicable.

### 2 References

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

#### 2.1 External Standards/Specifications.

|          |          |            |           |
|----------|----------|------------|-----------|
| ISO 34-1 | ISO 812  | ISO 1431-1 | ISO 18064 |
| ISO 37   | ISO 868  | ISO 3451-1 |           |
| ISO 188  | ISO 1183 | ISO 3795   |           |

#### 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 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.

**3.1.1** Tests specimens shall be die cut from fan gated injection molded plaques having a nominal thickness of 2.0 mm  $\pm$  0.2 mm. Die cut specimens are to be tested with the long axis of the test specimen perpendicular to the direction of flow. Plaque dimensions must be sufficient to permit this.

Tests shall be conducted 40 h minimum after molding and immediately following a conditioning period of 24 h minimum per GMW3221, Code B, unless otherwise specified. All tests shall be performed on unannealed specimens. In addition, tests specified at temperatures under or over +23 °C  $\pm$  2 °C shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

The minimum values specified in the property tables must be met by test specimens in natural, black, or in a standard sampled color if natural or black are not available. For colored grades where other pigment and additive

systems (e.g., stabilizer) are used, the impact values shall not decrease 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 Certification Statement according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

**3.5 Compound Properties.** See 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 (Black and Natural)**

| Property                              | Test Method                                                                     | Unit               | Type                                                                                                                         |             |             |             |             |              |
|---------------------------------------|---------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|-------------|-------------|--------------|
|                                       |                                                                                 |                    | 1                                                                                                                            | 2           | 3           | 4           | 5           | 6            |
| Shore A Hardness                      | ISO 868, 15 s delay                                                             | Shore A            | 40 ± 5                                                                                                                       | 50 ± 5      | 60 ± 5      | 70 ± 5      | 82 ± 5      | 90 ± 5       |
| Density                               | ISO 1183                                                                        |                    | 1.08 to 1.22                                                                                                                 |             |             |             |             |              |
| Ash Content                           | ISO 3451-1, Method A at +600 °C, specify filler type exclusive of carbon black. | %                  | Report<br><br>Filler type and content for each material/grade to be documented in certification package at material approval |             |             |             |             |              |
| Tensile Stress at Break               | ISO 37, Type 1 dumbbell, 500 mm/minute                                          | MPa                | 4.0 minimum                                                                                                                  | 5.0 minimum | 6.0 minimum | 8.0 minimum | 9.0 minimum | 12.0 minimum |
| Elongation at Break                   | ISO 37, Type 1 dumbbell, 500 mm/minute                                          | %                  | 600 minimum                                                                                                                  | 600 minimum | 600 minimum | 600 minimum | 550 minimum | 500 minimum  |
| Tensile Stress at 100% Elongation     | ISO 37, Type 1 dumbbell, 500 mm/minute                                          | MPa                | 0.5 minimum                                                                                                                  | 1.0 minimum | 1.5 minimum | 2.0 minimum | 3.0 minimum | 4.0 minimum  |
| Tear Strength                         | ISO 34-1, Method B angle die, 500 mm/minute                                     | kN/m               | 10 minimum                                                                                                                   | 12 minimum  | 16 minimum  | 20 minimum  | 27 minimum  | 33 minimum   |
| Low Temperature Brittleness           | ISO 812, Type B                                                                 | °C                 | -40 maximum                                                                                                                  |             |             |             |             |              |
| Properties After Long Term Heat Aging | ISO 188, 1000 h at +110 °C in an air-circulating oven followed by indicated     | Change in Property |                                                                                                                              |             |             |             |             |              |

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