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| GM | WORLDWIDE ENGINEERING STANDARDS | Material Specification | GMW15188 |

# Polyolefin Alloy – Weather Resistant, 1700 MPa Flexural Modulus, High Flow

## 1 Scope

**1.1 Material Description.** This standard covers the properties of a nominal 1700 MPa flexural modulus polyolefin alloy, high flow, pellet form, injection molding compound. For the purpose of this specification, polyolefin alloy is defined as an alloy of polypropylene plastic and ethylene/propylene (EP) or ethylene propylene diene monomer (EPDM) rubber.

**1.1.1 Additional Characteristics.** Materials certified to this standard may have additional characteristics, e.g., paintable, elastomer modified, etc. Possible additional characteristics are defined in GMW3013.

**1.2 Symbols.** The material abbreviation according to ISO 18064 is >TPO-(PP+EPDM)-M20<.

**1.3 Applicability.** Typical applications include: bumper fascias and rockers for Mold-In-Color (MIC) applications for accent colors, and two (2) tone accent colored painted fascia where the MIC portion is the accent color.

## 2 References

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

**2.1 External Standards/Specifications.**

| | | | |
|---|---|---|---|
| ASTM D3763 | ISO 294-1 | ISO 1183 | ISO 18064 |
| ASTM E831 | ISO 294-2 | ISO 1873-2 | SAE J1545 |
| ISO 75-1 | ISO 294-3 | ISO 3167 | SAE J1767 |
| ISO 75-2 | ISO 294-4 | ISO 3451-1 | SAE J1976 |
| ISO 75-3 | ISO 306 | ISO 4892-1 | SAE J2527-A |
| ISO 178 | ISO 527-1 | ISO 4892-2 | |
| ISO 179/1eA | ISO 527-2 | ISO 6603-2 | |
| ISO 294 | ISO 1133 | ISO 11359 | |

**2.2 GM Standards/Specifications.**

| | | | |
|---|---|---|---|
| GMW3013 | GMW3221 | GMW14650 | GMW14698 |
| GMW3059 | GMW14270 | GMW14688 | GMW16847 |

## 3 Requirements

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

**3.1 Requirements on Test Specimens.** Reference GMW3221. Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 1873-2. Test methods and specimen dimensions are also to be in accordance with ISO 1873-2 with the following additions:

- Use ISO 3167, Type A, thickness 4 mm for tensile and flexural properties.

All tests shall be performed on specimens 40 h minimum after molding and immediately following a conditioning period of 24 h minimum in a controlled atmosphere per GMW3221, Code A, unless otherwise specified. All tests shall be performed on unannealed specimens. The values specified in Table 1 shall be met by test specimens in natural or black. 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.

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**3.1.1 Chemical Requirements.** All parts manufactured from molding compounds shall be resistant to the media they contact at their place of use.

**3.1.2 Requirements on Materials.** See Table 1 and Table 2. A minimum of six (6) lots shall be tested to Table 1. A minimum of one (1) lot shall be tested to Table 2. The following are also required for full specification approval (the minimum number of lots per test required is one (1)):

- Poisson's Ratio.
- Stress vs. Strain Curves at -30 °C, 23 °C, and 85 °C.
- Multiaxial Impact Curves.

**3.2 Requirements on Delivery.** Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1 and Table 2.

**Note:** The requirements to Table 1 and Table 2 shall be documented for self-certification of the product according to GMW3013. The color shall be specified on drawings, in material specifications and otherwise.

**3.3 Performance Requirements.** Performance requirements, e.g., flammability, fogging or resistance to odor, shall be specified on part drawings or in component specifications.

**3.4 Additional Material Testing.** Materials approved to this specification will be required to have basic material properties generated so warp analysis modeling can be conducted. See the GM Material Engineer for details.

**3.5** All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

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

| Properties | Standard | Unit | Values |
|---|---|---|---|
| Mineral Filler Content (Ash) | ISO 3451-1, Method A at +600 °C | % by mass | 14 to 24 |
| Density | ISO 1183, Method A | g/cm³ | 1.00 to 1.04 |
| Melt Flow Rate (MFR) 230/2.16 | ISO 1133 | g/10 minutes | 19 to 27 |
| Melt Volume-Flow Rate (MVR) 230/2.16 | ISO 1133 | cm³/10 minutes | 22.1 to 31.4 |
| Flexural Modulus | ISO 178, 80 mm × 10 mm × 4 mm specimen, 2 mm/minute test speed, 64 mm support span | MPa | 1550 to 1850 |
| Tensile Modulus | ISO 527-1, ISO 527-2, specimen 1A, 1 mm/minute test speed | MPa | Report Results |
| Tensile Stress at Yield | ISO 527-1, ISO 527-2, specimen 1A, 50 mm/minute test speed | MPa | ≥ 13 |
| Multiaxial Impact Strength at +23 °C | ASTM D3763, specimen C, 2.2 m/s impact velocity | J at maximum load | ≥ 15<br>All failures must be ductile |
| Multiaxial Impact Strength at -30 °C | ASTM D3763, specimen C, 2.2 m/s impact velocity | J at maximum load | ≥ 15<br>All failures must be ductile |
| Multiaxial Impact Strength at +23 °C | ISO 6603-2/40/20/C/4.4. Sample to be either square 60 mm × 60 mm minimum, or circle 60 mm diameter minimum. Sample thickness to be 2 mm ± 0.1 mm. | J | Report Energy at Maximum Force and Type of Failure |
| Multiaxial Impact Strength at -30 °C (or lowest temp. where only type YD or YS failures are observed) | ISO 6603-2/40/20/C/4.4. Sample to be either square 60 mm × 60 mm minimum, or circle 60 mm diameter minimum. Sample thickness to be 2 mm ± 0.1 mm. | J | Report Energy at Maximum Force and Type of Failure<br>Report Test Temp. |

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