



Polyamide – Recycled, Non-Heat Stabilized – Sealant Carriers

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Material Description. This standard covers properties of various types of recycled, non-heat stabilized, polyamide, including both impact modified and non-impact modified grades, which are used in sealant carrier components. This specification covers different polyamide chemistries which are identified in Table 1.

1.2 Symbols. The material abbreviations according to ISO 11469 are listed in Table 1.

1.3 Applicability. Typical applications include: sealant carriers.

1.4 Remarks. The specification is classified by level of impact modifiers and recycled content source:

- **T1:** Polyamide 66, impact modified, post-industrial recycled (PIR) content
- **T2:** Polyamide 66, non-impact modified, post-industrial recycled (PIR) content
- **T3:** Polyamide 66 + Polyamide 6, impact modified, post-industrial recycled (PIR) content

2 References

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

2.1 External Standards/Specifications.

ISO 75	ISO 294	ISO 3146	ISO 15512
ISO 179-1/1eA	ISO 527-1/2	ISO 11357-3	ISO 16396-2
ISO 188	ISO 1183	ISO 11469	

2.2 GM Standards/Specifications.

GMW3013	GMW3221	GMW14335	GMW16172
GMW3059	GMW14270	GMW14797	

2.3 Additional References. Not applicable.

3 Requirements

3.1 Requirements on Test Specimens. Materials approved to this specification shall meet the requirements of GMW3013.

Unless otherwise specified, injection molding of test specimens shall be accomplished per ISO 294 with the conditions for injection molding from ISO 16396-2. Test methods and specimen dimensions are also to be in accordance with ISO 16396-2.

All values indicated herein are based on material considered to be in the dry-as-molded state with moisture content of 0.2% maximum (ISO 15512 Method A or Method B, or GMW14335). Immediately after molding, per ISO 16396-2, specimens shall be sealed in moisture-proof containers and stored at 23 °C ± 2 °C for at least 24 h. All tests shall be performed on unannealed specimens immediately after their removal from the containers in a controlled atmosphere per GMW3221, Code A, unless otherwise specified. In addition, tests specified at temperatures below or above 23 °C ± 2 °C shall be conducted at the specified temperature using specimens conditioned at the specified temperature for 4 h minimum.

The values specified in Table 1 shall be met by test specimens in natural, black or in a standard sampled color if natural or black are not available.

3.2 Requirements on Delivery. Important physical, mechanical and thermal properties that characterize the material are summarized in Table 1. The color shall be specified on drawings, in material specifications and otherwise.

3.3 Compound Properties (Natural, Black and Integrally Colored). See Table 1. The following are also required for full approval. The minimum number of lots per test required is one unless otherwise specified. See the Polyamide tab on the Plastics Submission Template and GMW3013 for test details and parameters.

- Poisson's Ratio
- Stress/strain data points and curves at the following temperatures:
- -30 °C, +23 °C, +85 °C, +110 °C
- **Note:** See GMMPD tab on Plastics Submission Template (located in GM SupplyPower) for test details.
- Coefficient of Linear Thermal Expansion (CLTE) data
- **Note:** See GMMPD tab on Plastics Submission Template (located in GM SupplyPower) for test details.
- Differential Scanning Calorimetry (DSC) curve
- Fourier Transform Infrared (FTIR) spectroscopy curve
- Mold shrinkage

3.4 Initial Source Approval. No shipments shall be made by any supplier until representative initial production samples have been approved by the appropriate Materials Engineering department(s) as meeting the requirements of this specification.

3.5 Performance Requirements. Performance requirements shall be specified on part drawings or in component specifications. All parts manufactured from these materials shall be resistant to the media the parts contact, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols, at their places of use.

3.6 Paintability. Plastics used for painted applications are required to meet Paint Performance Requirements for New Plastic Materials per GMW16172. Additionally, painted plastic parts are required to meet Painted Plastic Parts Performance Requirements per GMW14797.

3.7 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.

Table 1: Compound Properties (Natural and Black)

			Polyamide 66, High Impact Grade, T1	Polyamide 66, Non-Impact Grade, T2	PA66+PA6, Impact Grade, T3
Property ^{Note 1}	Standard	Units	Value	Value	Value
ISO Symbol	ISO 11469	-	>PA66-I<	>PA66<	>PA66+PA6-I<
Density	ISO 1183	g/cm ³	Target Range 1.08 to 1.14	Target Range 1.12 to 1.16	Target Range 1.09 to 1.13
Moisture Content	GMW14335 or ISO 15512, Method A or Method B	%	≤ 0.2		
Tensile Modulus	ISO 527-1/2	MPa	2100 to 2900	2700 to 3300	2200 to 3200
Tensile Strength at Yield	ISO 527-1/2	MPa	≥ 50	≥ 65	≥ 45
Tensile Elongation at Yield	ISO 527-1/2	%	≥ 2	≥ 5	≥ 3
Tensile Strength at Break	ISO 527-1/2	MPa	≥ 45	≥ 60	≥ 45