



Plastic Molding Compounds

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 Purpose/Material Description.

1.1.1 This classification system covers plastic materials suitable for injection molding and extrusion. The material description is based on the principle that plastics should be described, insofar as is possible, in terms of specific performance characteristics desired in the resin, and that an infinite number of such descriptions can be formulated by the use of one or more standard statements (based on standard tests), each designating a quality level of a property or characteristic.

1.1.2 Users of plastic resin can, by selecting different combinations of performance characteristics, specify different combinations of properties desired in various resins.

1.1.3 Possible standard statements are defined in 8.1.

1.1.4 To permit line callout, e.g., designation on a part drawing, in the math data or in a component specification, of the material descriptions mentioned, the system includes an International Organization for Standardization (ISO) symbol for the general type of plastic resin to be used and a letter-number suffix for each property or characteristic.

Example: The complete GMW15702 for an automotive resin might be specified as follows: GMW15702-120014-ABS (A2, A64, BJ730, D113, EM230/216/20, RT3.4, SS52). The callout that is referenced on a part drawing in math data or in a component specification would be GMW15702-120014-ABS. See Section 8 Coding System for additional explanation.

Note: While this cell type format provides the means for a specific characterization and specification of each property and combination of properties for a broad range of materials, it is subject to possible misapplications since impossible property combinations can be coded if the user is not familiar with available commercial materials.

To prevent this kind of misapplication for plastic resin, it is required that the actual certification data relevant to the specified call out be uploaded to the GM Materials Approved Source List (GMMASL).

1.2 Symbols. The symbol of the plastic resin shall be indicated per ISO 1043, ISO 11469, ISO 18064 and/or SAE J1344 on the part drawing and/or in the math data file.

1.3 Applicability. Plastic resins used in the automotive industries.

1.4 Remarks. This standard provides a system for specifying significant properties of commonly used plastics, including unpigmented and pigmented, unfilled and filled products. It is intended to apply to resins (not parts) primarily as used in the automotive industries.

Note: The resin supplier must provide a certification statement meeting the resin requirements per the callout of this standard. This certification must be loaded into the GM Materials Approved Source List (GMMASL).

2 References

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

2.1 External Standards/Specifications.

ASTM D747

ISO 178

ISO 815

ISO 4892-1

ASTM D789	ISO 179-1/1eA	ISO 868	ISO 4892-2
ASTM D792	ISO 179-1/1eU	ISO 1043	ISO 11357-3
ASTM D1203	ISO 180/1eA	ISO 1133	ISO 11469
ASTM D3012	ISO 188	ISO 1183	ISO 15512
ASTM D3763	ISO 294-1	ISO 1431-1	ISO 18064
ISO 34-1	ISO 306	ISO 1817	SAE J1344
ISO 37	ISO 307	ISO 3146	SAE J1681
ISO 75-1	ISO 527	ISO 3167	SAE J2412
ISO 75-2	ISO 527-1/2	ISO 3451-1	SAE J2527
ISO 105-G02	ISO 604	ISO 3451-4	UL 94
ISO 176	ISO 812	ISO 3795	

2.2 GM Standards/Specifications.

GMW3013	GMW3235	GMW14334	GMW15725
GMW3059	GMW3417	GMW14444	GMW16583
GMW3205	GMW6992	GMW14650	GMW16853
GMW3221	GMW14162	GMW14688	GMW17141
GMW3232	GMW14270	GMW15634	

2.3 Additional References.

Plastic Submission Template

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

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 submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.

3.4 Material Specification.

3.4.1 The material specification for the selected resin is defined by a line callout per Section 8 of this standard.

3.4.1.1 This line callout is used on the part drawing, in the part math data file and/or in the component specification.

3.4.1.2 It shall consist of a material designation per this GMW15702 (see Section 8) followed by a symbol per 1.2.

3.4.1.3 Resins described by this line callout shall conform to additional requirements outlined in Section 6, that is, the resin used under this line callout must be listed as approved source in GM Materials Approved Source List (GMMASL) under this line callout.

3.4.2 Data must be submitted on the Plastic Submission Template, which can be found in GM SupplyPower.

3.5 Compound Requirements.

3.5.1 The compound shall be tested per and conform to the requirements of GMW3013.

3.5.2 Compounds furnished to a specification based on this standard shall be virgin resins of uniform composition and physical properties, suitable for use in plastic parts for automotive applications. Recycled resin can only be submitted if the callout was written explicitly for that resin.

3.6 Finished Part Performance.

3.6.1 Unless otherwise specified, all finished parts for Interior applications shall meet the requirements according to GMW14444.

3.6.2 Unless otherwise specified, all finished parts for Exterior applications shall meet the requirements according to GMW14650.

3.6.3 Unless otherwise specified, all finished parts for applications in the engine compartment or near the exhaust system shall meet the requirements according to GMW15725.

3.7 Test Requirements.

3.7.1 The test methods to be used shall comply with the named test methods and parameters of GMW3013.

3.7.2 The requirements stated by the line callout shall be determined by the latest issue of the test methods indicated.

3.7.3 If not indicated otherwise in the test procedure, tests shall be conducted 40 h minimum after molding and immediately following a conditioning period of 24 h at $+23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ and $50\% \pm 5\%$ Relative Humidity (RH).

3.7.4 For nylon materials, all tests shall be conducted on dry, as-molded test specimens which have been sealed in water vapor impermeable containers immediately after molding and not exposed to ambient humidity until immediately prior to testing.

3.7.5 Specimens for the ISO tests specified herein shall be injection molded in accordance with ISO 294-1, unless otherwise specified.

3.8 Quality Requirements.

3.8.1 The certification data to the line callout is stored in GM Materials Approved Source List (GMMASL) in conjunction with the approved product name (approved source) under the line callout.

3.8.2 This certification data is the agreed quality between the resin supplier and GM Material Engineering under this line callout.

3.8.3 This certification data is the specification for the quality control requirements.

3.8.4 It is the responsibility of the resin supplier to inform GM Materials Engineering of any update required to this certification data (including but not limited to all changes described in 5.3 Inspection and Rejection).

4 Manufacturing Process

The manufacturing process shall comply with the requirements per GMW3013.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.

A new approval must be received for any changes, e.g., properties, manufacturing process, location of manufacture, etc. If not otherwise agreed, all testing and documentation normally required for initial release must be completed.

It is the responsibility of the supplier to inform the customer in a timely manner, without solicitation, and to include documentation of all modifications of materials and/or processes and to apply for a new approval.

5.4 Safety Data Sheets (SDS). For new product submissions, or when a change in chemical composition of an existing product has occurred, a complete copy of the SDS must be submitted in compliance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) requirements or other country-specific SDS requirements.

6 Approved Sources

Materials supplied to this specification must be approved by General Motors.

A list of approved materials can be found in the GM Materials Approved Source List. To access this list, reference GMW14270 for latest location. This GM material file is provided to third parties to reduce redundant testing of materials. If an approved material is used, the part supplier can use the GM material file reference for Production Part Approval Process (PPAP) material approval. If the decision is made to use a not yet approved material,

contact GM Materials Engineering for details on the approval process. The material approval process must be completed prior to PPAP start date of the part supplied to General Motors.

6.1 Plastic Submission Template (Certification Data Sheet and Test Sampling Plan). The Plastic Submission Template is available from GM SupplyPower.

6.2 Certification Process. Refer to GMW3013.

6.3 Required Properties.

6.3.1 The Plastic Submission Template includes all possible properties for all automotive resins. Required property data shall be agreed upon by the resin supplier and GM Materials Engineering.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

ABS	Acrylonitrile Butadiene Styrene
E/P	Polyethylene/Polypropylene Copolymer
EEBC	Polyether Ester Block Copolymer
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
GMMASL	GM Materials Approved Source List
HDT	Heat Deflection Temperature
IMDS	International Material Data System
ISO	International Organization for Standardization
PA6	Polyamide 6
PA66	Polyamide 6,6
PBTP	Polybutylene Terephthalate
PC	Polycarbonate
PCR	Post Consumer Recycled
PE	Polyethylene
PIR	Post Industrial Recycled
POM	Polyoxymethylene
PP	Polypropylene
PPAP	Production Part Approval Process
PUR	Polyurethane
PVC	Polyvinyl Chloride
RH	Relative Humidity
SDS	Safety Data Sheet
SE	Self-Extinguishing
TES	Thermoplastic Elastomer - Styrenic
TPE	Thermoplastic Elastomer (includes EEBC, TES and TPO)
TPO	Thermoplastic Olefin
TPU	Thermoplastic Polyurethane
SVOC	Semi-Volatile Organic Compounds
VOC	Volatile Organic Compounds

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Material per GMW15702-XXXXXX-Symbol (Coded Properties)

Example:

GMW15702-000001-PA46-GF30 (A22, A42, A64, BA730, DD140, KM850, KS1800, RT8, SSA280, WS180)

Where:

GMW15702 = Engineering Standard

XXXXXX = 6 digit code provided by responsible GM Material Specialist

Symbol = Symbol according to 1.2

(Coded Properties) = Properties are coded per 8.1. This part of the callout is optional on the part drawing/in the math data. It is required in the Remarks field of the GMMASL Record.

8.1 System for Specifying Significant Properties of Commonly Used Plastics.**8.1.1 Material Description.**

8.1.1.1 The material description is based on the principle that plastics should be described, insofar as is possible, in terms of specific performance characteristics desired in the resin, and that an infinite number of such descriptions can be formulated by the use of one or more standard statements (based on standard tests), each designating a quality level of a property or characteristic.

8.1.1.2 Users of plastic resin can, by selecting different combinations of performance characteristic, specify different combinations of properties desired in various resins.

- Suffix Symbols A through G are normally applicable to the resin as received.
- Suffix Symbols H through U are normally applicable to test specimens molded from the resin as received.
- Suffix Symbols V through Z covering environmental performance requirements are also normally applicable to test specimens molded from the resin as received.

8.1.1.3 For a summary of all designated codes for compound properties, see Table 1. See 8.1.2 for the details of each designation.

Table 1: Compound Properties

Suffix Symbol	Characteristic
A	Resin Type
B	Reinforcement and/or Filler
D	Specific Gravity
E	Viscosity
F	Melt Point
G	Moisture Content
H	Oxidative Stability
I	Properties for Thermoplastic Elastomers
J	Hardness
K	Tensile Strength, Tensile Modulus
L	Elongation
M	Flexural Modulus
N	Flexural Strength
P	Stiffness
Q	Compressive Strength

Suffix Symbol	Characteristic
R	Impact Strength
S	Deflection Temperature
T	Brittleness Temperature
U	Flammability
V	Interior Emissions
W	Heat Resistance
X	Fluid Resistance
Y	Weather Resistance and Color Development
Z	Other Characteristics

8.1.2 Detailed Description of Designations.

8.1.2.1 Resin Description (Suffix A). The resin description shall be as indicated by the numeral(s) following the Suffix A-symbol (see Table 2). One or more suffix symbols may be used to describe the required resins.

Example: A3, A42 = A heat stabilized, copolymer resin.

Table 2: Resin Description ^{Note 1}

Designation	Characteristic
1	Alloy
2	Blend
3	Copolymer
4	General Purpose/Homopolymer
5	Impact Modified
6	Single Stage
7	Transparent
8	Two Stage
9A	Post Consumer Recycled (PCR) Content
9B	Post Industrial Recycled (PIR) Content
9C	PCR/PIR Blend
20	Flake
21	Liquid
22	Pellet
23	Powder
24	Sheet
25	Rope
26	Bulk
27	Granular
40	Blowing Agent
41	Fungicide
42	Heat Stabilizer