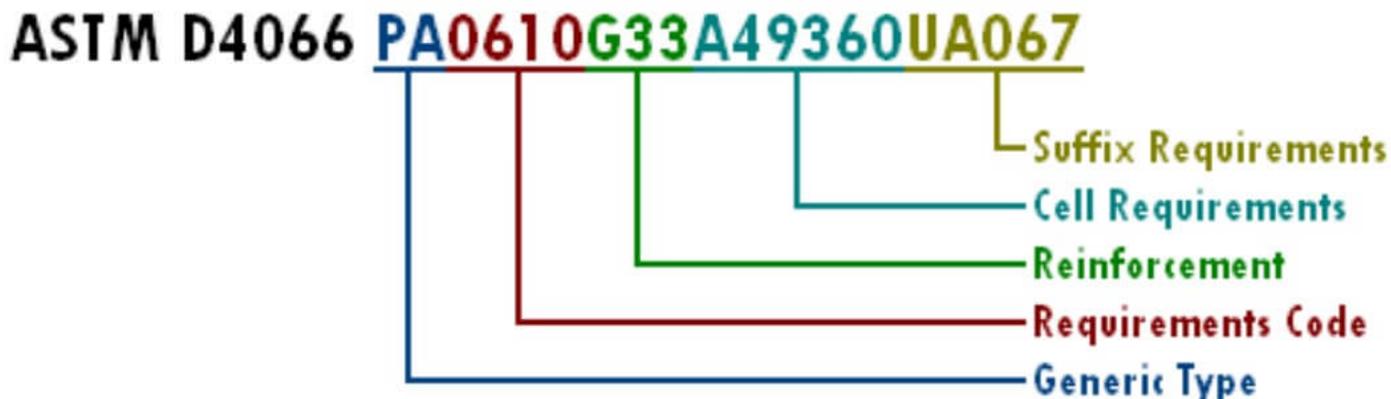


ASTM D 4000 Callout: A Fast, Effective Alternative to the OEM Approved Material Source List



Most large OEM's have their own internal engineering teams to help evaluate and approve materials that will be used in the construction of their product. Plastics is no exception with OEM's maintaining an approved material source list assigned to defined physical, thermal, and environmental performance specifications. This formal approval process can be time consuming and expensive. The approved material source list is based on the traditional merchant model of virgin resin companies selling their plastic to processors serving their OEM customers.

Recycled materials are routinely approved using this same system. However, as is the case with AGS Technology, how can the OEM's take quick advantage of utilizing recycled materials for application specific opportunities when they may be lower volume and are not going to be made available to other custom processors? An effective alternative to the approved material source list is the use of ASTM D 4000 line callouts.

ASTM International is a standards organization that develops and publishes technical standards for a wide range of materials including plastics. *ASTM D 4000 Standard Classification System for Specifying Plastic Materials* defines a broad system to help classify generic polymer families and the corresponding specifications. ASTM D 4000 is available for purchase from ASTM International.

The process of decoding a callout requires a copy of ASTM D 4000. For many generic polymer families (eg. PA), ASTM D 4000 will reference other ASTM standards written for the broad plastic type (eg. ASTM D 4066 Standard Classification System for Nylon Injection and Extrusion).

ASTM callouts are separated into five parts: Generic Type, Requirements Code, Reinforcement, Cell Requirements, and Suffix Requirements.

Part 1 Generic Type Code: The first two or more letters (eg. PA, POM, PMMA) reference the generic family as defined by Table 1 of ASTM D 4000.

Part 2 Requirements Code (Group, Class, & Grade): The first two numbers are the group numbers, followed by the class number, and grade number. For example, within the generic Nylon type there are groups according to composition (eg. Nylon 66, Nylon 6, Nylon 612). These groups are further divided into classes (eg. general purpose, heat stabilized, impact modified) as well as grades (recycled, 35% glass, 40% mineral).

Part 3 Reinforcement-Filler Code: The next character specifies the reinforcement-filler (eg. G=Glass, M=Mineral, T=Talc) and the two digits following the reinforcement-filler represent the percentage (eg. G33=33% glass reinforced).

Part 4 Cell Requirements Code: Six characters in length with the first character specifying which cell table is to be used (eg. Table A). The cell table contains the physical property requirements of the material and the remaining five digits refer to the column number for each row listed in the table. Match the designated row digit with the column header to read the value.

Part 5 Suffix Requirements Code: Suffixes are made up of a group of two letters followed by three numbers. Suffix values override previous callout requirements and may or may not appear in a callout. The first letter specifies a category (eg. G=specific gravity) and the second letter a test method and tolerance (GA=ASTM D792, tolerance +/- 0.02). The three digit code that follows may represent a raw value, an additional cell classification, or may list additional conditions relating to the test in addition to the value (eg. GA140=140 x factor of 0.010 = 1.40). Consult ASTM D 4000 for the interpretation of suffix codes.

The OEM approved material source list is an important system to help ensure plastics will meet the end use requirements of an application. AGS Technology has received OEM approvals (eg. General Motors MATSPC) for its Injectoblend™ line of recycled plastics using these formal systems. However, the ASTM D 4000 callout system can also be an equally effective alternative to clearly define application specific performance requirements for speedy implementation when it makes sense.

ASTM D 4000 PA0120G33A53380

<u>ASTM D 4000</u> Plastic	<u>PA</u> Generic (Nylon) ASTM D 4066	<u>01</u> Group (66)	<u>2</u> Class (Heat Stabilized)	<u>0</u> Grade (Other)	<u>G</u> Glass Reinforced (Glass)	<u>33</u> Percent Glass (33% \pm 2%)
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<u>A</u> Cell Table ASTM D 4066	<u>5</u> Tensile (175 MPa)	<u>3</u> Flexural Modulus (7500 MPA)	<u>3</u> Izod Impact (75 J/m)	<u>8</u> Deflection Temperature (235°C)	<u>0</u> Unspecified
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Designation Order No.	Property	0	1	2	3	4	5	6	7	8	9
1	Tensile strength, ISO 527, min, MPa ^C	unspecified	35	70	105	140	175	210	245	280	specify ^D value
2	Flexural modulus, ISO 178, min, MPa	unspecified	1 500	4 500	7 500	10 500	13 500	16 500	19 500	22 500	specify ^D value
3	Izod impact, ISO 180/1A, min, kJ/m ²	unspecified	2.5	5.0	7.5	10.0	12.5	15.0	22.5	30.0	specify ^D value
4	Deflection temperature, ISO 75, Method A, 1.82 MPa, min, °C ^E	unspecified	50	85	110	135	160	185	200	235	specify ^D value
5	To be determined	unspecified

Requirements from Table A of Classification D 4066

Decoding ASTM D 4000 PA0120G33A53380

PA0120 = Nylon 66 heat stabilized from Table PA of ASTM Classification D 4066.

G33 = Glass reinforced with 33% glass nominal \pm 2%

A = Table A (D 4066) for property requirements

5 = Tensile Strength, ISO 527, 175 MPa minimum

3 = Flexural Modulus, ISO 178, 7500 MPA minimum

3 = Izod Impact, ISO 180/1A, 75 J/m minimum

8 = Deflection Temperature, ISO 75, 235°C minimum

0 = Unspecified