Designation: D5740 – 16

Standard Guide for Writing Material Standards in the Classification D4000 Format[1]

This standard is issued under the fixed designation D5740; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

This guide has been prepared to aid in the writing of material standards using the Classification D4000 format. The following template is included which might be used directly for a draft document simply by filling in the blanks. See appendixes for additional explanatory information.

Standard Classification System for and Basis for Specification for _____ Molding and Extrusion Materials (_____)

1. Scope*

1.1 This classification system covers ___ materials suitable for _____. The inclusion or exclusion of recycled plastics in this classification system must be addressed here.

1.2 The properties included in this standard are those required to identify the compositions covered. Other requirements necessary to identify particular characteristics important to specialized applications are to be specified by using suffixes as given in Section 5.

1.3 This classification system and subsequent line callout (specification) are intended to provide a means of calling out plastic materials used in the fabrication of end items or parts. It is not intended for the selection of materials. Material selection can be made by those having expertise in the plastic field only after careful consideration of the design and the performance required of the part, the environment to which it will be exposed, the fabrication process to be employed, the costs involved, and the inherent properties of the material other than those covered by this standard.

NOTE 1—Insert Note 1 here to show the appropriate ISO equivalency statement.

1.4 The following precautionary caveat pertains only to the test method portion, Section 11, of this classification system: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D618 Practice for Conditioning Plastics for Testing
D883 Terminology Relating to Plastics
D1600 Terminology for Abbreviated Terms Relating to Plastics
D3892 Practice for Packaging/Packing of Plastics
D4000 Classification System for Specifying Plastic Materials
D5205 Classification System and Basis for Specification for Polyetherimide (PEI) Materials
D5630 Test Method for Ash Content in Plastics
D6779 Classification System for and Basis of Specification for Polyamide Molding and Extrusion Materials (PA)
D7209 Guide for Waste Reduction, Resource Recovery, and Use of Recycled Polymeric Materials and Products (Withdrawn 2015)[3]

NOTE 2—Omit D7209 if use of recycled plastic is not allowed.

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

[1] This guide is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.94 on Government/Industry Standardization.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

***A Summary of Changes section appears at the end of this standard**

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2.2 *ISO Standards:*[4]
ISO 3451–1 Plastics—Determination of Ash Content—Part 1: General Methods

3. Terminology

3.1 Except for the terms defined below, the terminology used in this classification system is in accordance with Terminologies D883 and D1600.

4. Classification

4.1 ___ materials are classified into groups according to their composition. These groups are subdivided into classes and grades as shown in the Basic Property Table (Table __). An example of a basic property table can be found in Classification System D6779. The property table contains a footnote referring to Section ___ for reference to specimen source and preparation.

NOTE 3—An example of this classification system is given as follows: The specification ___ indicates the following:

_ = ___ as found in Terminology D1600,
_ = ___ (group),
_ = ___ (class), and
_ = requirements given in Table __ (grade).

4.1.1 Reinforced, filled, and lubricated versions of ___ materials that are found in Table _____ are classified according to the reinforcement used and the nominal level, by weight percent, of the reinforcement. The grade is identified by a single letter that indicates the filler or reinforcement used and two digits, in multiples of 5, that indicate the nominal quantity in percent by weight. Thus, a grade containing 35 % glass reinforcement would be indicated by _____ G35. This specification indicates

_ = ___ as found in Terminology D1600,
_ = ___ (group),
_ = ___ (class), and
_ = 35 % glass reinforcement and requirements given Table __ (grade).

The reinforcement letter designations and associated tolerance levels are shown in the following table:

TABLE 1 Reinforcement-Filler[A] Symbols[B] and Tolerances

Symbol	Material	Tolerance
C	Carbon and graphite	±2 %
D	Alumina trihydrate	±2 %
E	Clay	±2 %
F	Cellulose	±2 %
G	Glass	±2 %
H	Aramid	±2 %
J	Boron	±2 %
K	Calcium carbonate	±2 %
L	Lubricants (for example: PTFE, graphite)	Depends upon material and process—to be specified.
M	Mineral	±2 %
N	Natural organic (for example: cotton, sisal, hemp, flax)	±2 %
P	Mica	±2 %
Q	Silica	±2 %
R	Combinations of reinforcements and/or fillers	±2 %
S	Synthetic organic	±2 %
T	Talcum	±2 %
V	Metal	±2 %
W	Wood	±2 %
X	Not specified	To be specified

[A] Ash content of filled and/or reinforced materials is to be determined using either Test Method D5630 or ISO 3451-1 where applicable.
[B] Additional symbols will be added to this table as required.

NOTE 4—This part of the classification system uses the percent of reinforcements or additives, or both, in the callout of the modified basic material. The types and percentages of reinforcements and additives are sometimes shown on the supplier's technical data sheet. If necessary, additional callout of these reinforcements and additives can be accomplished by use of the suffix part of the system (see Section 5).

NOTE 5—Materials containing reinforcements or fillers, or both, at nominal levels not in multiples of five are included in the nearest grade designation. For example, a material with a nominal glass fiber level of 33 % is included with Grade G35 as shown in 4.1.1.

4.1.2 To facilitate incorporation of future or special materials the "other" category for group (00), class (0), and grade (0) is shown in Table __.

4.2 Reinforced, filled, and lubricated versions of ___ materials that are not in Table __ are classified in accordance with Tables __ and A or B. Table __ is used to specify the Group or the group and class of ___ and Table A or B is used to specify the property requirements.

4.2.1 Reinforced, filled, and lubricated variations of the basic materials are identified by a single letter from Table 1 that indicates the filler and/or reinforcement used and two digits that indicate the nominal quantity in percent by weight. A second letter, from Table 1a, when desired, is used to indicate the form or structure of the reinforcement and/or filler, but is not used for functional mixtures. Thus, a letter designation G for glass, E for beads or spheres or balls, and 33 for percent by weight, GE33, specifies a reinforced or filled material with 33 percent by weight in the form of glass beads, spheres, or balls. The reinforcement letter designations and associated tolerance levels are shown in the previous table. Form and structure letter designations are shown in the following table:

TABLE 1a Symbols for the Form or Structure of Fillers and Reinforcing Materials

Symbol	Form or Structure
C	Chips, cuttings
D	Fines, powders
E	Beads, spheres, balls
F	Fiber
G	Ground
H	Whisker
K	Knitted fabric
L	Layer
M	Mat (fabric, thick)
N	Non-woven (fabric, thin)
P	Paper
R	Roving
S	Flake
T	Cord
V	Veneer
W	Woven fabric
Y	Yarn
X	Not specified

4.2.2 Specific requirements for reinforced, filled, or lubricated ___ materials shall be shown by a six-character designation. The designation will consist of the letter "A" or "B" and

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

the five digits comprising the cell numbers for the property requirements in the order as they appear in Tables A or B.

4.2.2.1 Although the values listed are necessary to include the range of properties available in existing materials, not every possible combination of the properties exists or can be obtained.

4.2.3 When the grade of the basic material is not known, or is not important, the use of the "0" grade classification shall be used for the reinforced materials in this system.

NOTE 6—An example of this classification for a reinforced ___ material is given as follows. The specification ___ would indicate the following material requirements.

_____ = _____ from Table ___,
_ = _____,
_ = _____,
_ = _____,
_ = _____,
_ = _____, and
_ = _____.

If no properties are specified, the specification would be ___.

5. Suffixes

5.1 When additional requirements are needed that are not covered by the basic requirements or cell-table requirements, they shall be indicated through the use of suffixes.

5.2 A list of suffixes can be found in Classification System D4000 (Table 3) and are to be used for additional requirements as appropriate. Additional suffixes will be added to that standard as test methods and requirements are developed and requested.

6. General Requirements

6.1 Basic requirements from the property tables or cell tables are always in effect unless superseded by specific suffix requirements, which always take precedence.

6.2 The plastics composition shall be uniform and shall conform to the requirements specified herein.

7. Detail Requirements

7.1 The materials shall conform to the requirements in Tables __, __, __, and suffix requirements as they apply.

7.2 For purposes of determining conformance, all specified limits for a specification (line callout) based on this classification system are absolute limits, as defined in Practice E29.

7.2.1 With the absolute method, an observed value or a calculated value is not rounded, but is to be compared directly with the limiting value. Conformance or nonconformance is based on this comparison.

8. Sampling

8.1 Sampling shall be statistically adequate to satisfy the requirements of 12.4.

8.2 A batch or lot is construed as a unit of manufacture as prepared for shipment and can consist of a blend of two or more "production runs."

9. Specimen Preparation

9.1 Indicate the source of the test specimens for the relevant test methods.

9.2 Prepare the specimens by a ___ process in accordance with ___. An example is found in Classification System D6779.

10. Conditioning

10.1 Test specimens shall be conditioned in the standard laboratory atmosphere in accordance with Procedure A of Practice D618 before performing the required tests.

NOTE 7—If another conditioning procedure is used, replace the previous one.

10.2 Conduct those tests influenced by ambient conditions in the standard laboratory atmosphere of 23°C and 50 % relative humidity.

11. Test Methods

11.1 Determine the properties enumerated in this classification system by means of the test methods referenced in Section 2.

11.1.1 The number of tests shall be consistent with the requirements of Section 8 and 12.4.

12. Inspection and Certification

12.1 Inspection and certification of the material supplied with reference to a specification based on this classification system shall be for conformance to the requirements specified herein.

12.2 Lot-acceptance inspection shall be the basis on which acceptance or rejection of the lot is made. The lot-acceptance inspection shall consist of:

12.2.1 ___.
12.2.2 ___.

12.3 Periodic check inspection with reference to a specification based upon this classification system shall consist of the tests for all requirements of the material under the specification. Inspection frequency shall be adequate to ensure the material is certifiable in accordance with 12.4.

12.4 Certification shall be that the material was manufactured by a process in statistical control, sampled, tested, and inspected in accordance with this classification system, and that the average values for the lot meet the requirements of the specification (line callout).

NOTE 8—The ASTM publication *Manual on Presentation of Data and Control Chart Analysis, 7th Edition*, stock number MNL7A, provides detailed information about statistical process control.

12.5 A report of test results shall be furnished when requested. The report shall consist of results of the lot-acceptance inspection for the shipment and the results of the most recent periodic-check inspection.

NOTE 9—If recycled plastics are allowed in the standard, insert the following phrase after the word "shipment" in the last sentence of 12.5: "; the percent by weight of recycled plastic, as defined in 3.1.47 of Guide D7209, if requested,"

13. Packaging, Packing, and Marking

13.1 The provisions of Practice D3892 apply to packaging, packing, and marking of containers for plastic materials.

14. Keywords

14.1 classification; classification system; line callout; plastic materials

APPENDIXES

(Nonmandatory Information)

X1. LIST BY SECTIONS/EXPLANATORY INFORMATION

X1.1 *Scope*—Modify 1.1 for material and processing.

X1.2 *Referenced Documents*—Add documents as required and, if necessary, use footnotes in addition to those included and renumber footnotes as required.

X1.3 *Terminology*—Include new terms, definitions, and abbreviated terms as developed cooperatively between the writer of the standard and Subcommittee D20.92.

X1.4 *Classification*—Modify for material, 4.1. Consult current Classification D4000 for listing.

X1.5 *Suffixes*—If suffixes are needed that are specific to the materials being classified, use the single-letter and two-digit system as found, for example, in Section 5 of Classification System D5205.

X1.6 *General Requirements*—Includes basic requirements as found in Classification D4000.

X1.7 *Detail Requirements.*

X1.8 *Sampling.*

X1.9 *Specimen Preparation*—Expand as required.

X1.10 *Conditioning*—Modify for material.

X1.11 *Test Methods.*

X1.12 *Inspection and Certification.*

X1.13 *Packaging, Packing, and Marking.*

X1.14 *Keywords.*

X2. GENERAL INFORMATION

X2.1 Fill in the material and examples for which the standard applies.

X2.2 The basic property table is to use the abbreviations (symbols) from Classification D4000. Table PA in Classification System D6779 can be used as an example of a basic property table.

X2.3 Develop Cell Tables A and B for the materials that are used. Cell tables found in Classification System D6779 can be used as examples.

X2.4 Certain thermoplastic and thermosetting materials will require a modification of the different sections, depending on the standard being drafted.

SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue (D5740 - 11) that may impact the use of this standard. (September 1, 2016)

(1) Updated the standard laboratory atmosphere in 10.2 to clarify the requirement and eliminate possible confusion.

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