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Standard Guide for Classifying and Specifying Adhesives[1]

This standard is issued under the fixed designation D 4800; 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.

1. Scope

1.1 This guide provides a classification system for tabulating the properties of adhesives suitable for holding parts or assemblies together. The use of this guide also provides information necessary for the development of standard specifications for adhesives.

NOTE 1—This classification system may serve many of the needs of industries using adhesives. This guide is subject to revision as the need requires; therefore, the latest revision should always be used.

1.2 *Limitations*—This classification system is intended to be a means of identifying adhesives. It is not intended for the selection of materials. Material selection should be made by those having expertise in the adhesives field after careful consideration of the design and the performance required of the part, the environment to which it will be exposed, the attachment process to be employed, the inherent properties of the material not covered in this document, and the economic factors.

1.3 This classification system is based on the premise that adhesives can be arranged into broad generic families using basic properties to arrange the materials into groups, classes, and grades.

1.4 In all cases where the provisions of this classification system would conflict with the referenced ASTM specification for a particular material, the latter shall take precedence.

1.5 The values stated in SI units, as detailed in Practice E 380, are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards:*

D 907 Terminology of Adhesives[2]

D 1084 Test Methods for Viscosity of Adhesives[2]

D 1298 Practice for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method[3]

D 1310 Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus[4]

D 2240 Test Method for Rubber Property—Durometer Hardness[5]

D 2583 Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor[6]

D 2834 Test Method for Nonvolatile Matter (Total Solids) in Water-Emulsion Floor Polishes, Solvent-Based Floor Polishes, and Polymer-Emulsion Floor Polishes[7]

D 3278 Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus[4]

D 4562 Test Method for Shear Strength of Adhesives Using Pin-and-Collar Specimen[2]

D 5363 Specification for Anaerobic Single-Component Adhesives (AN)[2]

E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)[8]

2.2 *Military Standards:*

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes[9]

MIL-A-46146 Adhesive, Silicone, RTV, Noncorrosive (for Use with Sensitive Metals and Equipment)[9]

3. Terminology

3.1 The terms used in this guide are in accordance with Terminology D 907.

4. Significance and Use

4.1 The purpose of this classification system is to provide a method of identifying adhesives in order to give industry a system that can be used universally for materials. It further provides a means for specifying these materials by the use of the standards that are developed using this guide.

4.2 This classification system was developed to permit the addition of future adhesives.

5. Classification

5.1 Fig. 1 summarizes the classification system as detailed in this guide.

5.2 Adhesives shall be classified on the basis of their broad generic family. The generic family is identified by letter designations as found in Table 1.

[1] This guide is under the jurisdiction of ASTM Committee D-14 on Adhesives and is the direct responsibility of Subcommittee D14.60 on Materials Classification.

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[2] *Annual Book of ASTM Standards*, Vol 15.06.

[3] *Annual Book of ASTM Standards*, Vol 05.01.

[4] *Annual Book of ASTM Standards*, Vol 06.01.

[5] *Annual Book of ASTM Standards*, Vol 09.01.

[6] *Annual Book of ASTM Standards*, Vol 08.02.

[7] *Annual Book of ASTM Standards*, Vol 15.04.

[8] *Annual Book of ASTM Standards*, Vol 14.02.

[9] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

1	2			3	4	5
|	SPECIFIC			|	CELL REQUIREMENTS	|
|	|			Table	|	Suffix
Broad	Group	Class	Grade			ZZXXX
Generic	XX	X	X		X X X	
Type					Properties	

NOTE 1—

1 = Two or more letters identify the generic family based on abbreviations from Table 1.
2 = Four digits identify the specific type. The first two digits identify the group. The next digit identifies the class and the last digit identifies the grade. A basic property table will provide property values for the specific material (see 5.2).
3 = One letter refers to a cell table listing of physical specifications and test methods.
4 = Four digits refer to the specific physical parameters listed in the cell table.
5 = Suffix codes indicate special requirements based on the application and identify special tests (two letters with three digits).

FIG. 1 Classification System

TABLE 1 Standard Symbols for Generic Families

Standard Symbol[A]	Family Name	ASTM Standard[B]
AN	Anaerobic (dimethacrylate)[B]	D 5363
CA	Cyanoacrylate	
CS	Casein	[C]
EP	Epoxy	
HM	Hot melt	
MF	Melamine-Formaldehyde	
PF	Phenol-Formaldehyde (phenolic)	
PMMA	Acrylic (other than AN or CA)	
PUR	Polyurethane	
SI	Silicone	[C]

[A]Additional symbols will be added to this classification system as they are requested or developed.
[B]The standards listed are those in accordance with this classification system.
[C]A standard is being developed.

NOTE 2—For example: CA = Cyanoacrylate.

5.2.1 The generic family is based on the broad chemical makeup of the base materials. By its designation, certain inherent properties are specified.

5.3 The generic family is classified into groups according, in general, to the chemical composition. These groups are further subdivided into classes and grades, as shown in the basic property table that applies. The letter designation applicable is followed by a four-digit number indicating group, class, and grade.

5.3.1 The basic property tables have been developed to identify the commercially available adhesives into groups, classes, and grades. These tables are found in the standards listed in Table 1.

5.3.1.1 Where a standard does not exist for this classification system the letter designation for the generic family will be followed by four 0's and the use of the suffixes as needed (see 7.1).

NOTE 3—Example: SI0000 indicates a Silicone (SI) from Table 1, with 0000 indicating no basic property table.

5.4 To facilitate the identification of new or special materials where basic property tables are not provided in a material specification, cell tables will be used. These tables shall appear in the material specifications. (See example of cell table in Fig. 2.)

5.4.1 Although the values listed in the cell tables include the range of properties available in existing materials, users should not infer that every possible combination of properties exists or can be obtained.

5.4.2 The requirements for special adhesives will use the classification system, as described, by the addition of a single letter that indicates the proper cell table in which the properties are listed. A specific value is designated by the cell number for each property in the order in which they are listed in the table. When a property is not to be specified, a zero is entered as the cell number. Likewise, when an acceptable value is not available in the cell table, the number 9 should be used and a suffix used indicating the specific value (see 7.1). Thus, the letter designation "A" for cell table and 3400 for property values shall always be written A3400.

NOTE 4—An example of an anaerobic adhesive identified by this classification system is as follows. The designation AN0120A3400 indicates the following with the material requirements from Cell Table A of material specification.

Designation Order Number	Property	Cell Limits									
		0	1	2	3	4	5	6	7	8	9
1	Shear strength, ASTM D 4562 MPa, min[A]	Unspecified	2	4	6	8	12	14	20	35	Specify value
2	Viscosity, ASTM D1084, No. 4 spindle, 20 r/min MPa·s, min[B]	Unspecified	10	26	200	900	6500	10×10^3	25×10^3	1×10^6	Specify value
3	To be determined	Unspecified	...	...	...	...	...	...	...	...	
4	To be determined	Unspecified	...	...	...	...	...	...	...	...	

[A]Megapascals × 145 = pounds-force per square inch.
[B]Viscosity must not exceed the value in the next highest cell.

FIG. 2 Example of Cell Table A Detail Requirements

AN0120	=	Anaerobic–Newtonian flow, thread locking
A	=	Table A for property requirements
3	=	Strength ASTM Test Method D 4562, 6 MPa min
4	=	Viscosity ASTM Test Method D 1084, Method B, 900 MPa·s min
0	=	Unspecified
0	=	Unspecified

6. Basic Requirements

6.1 The cell tables included as part of the listed reference standard shall be used to develop a line call-out for the materials listed in Table 1 covered by a material standard.

6.2 When the existing cell table does not adequately describe the material, then suffixes may be used in place of a cell table designation.

6.3 A line call-out assembled using the standard becomes a specification. The line call-out shall contain the broad and specific type of adhesive together with the appropriate identifiers, followed by special suffix requirements, as they apply.

7. Suffix Requirements

7.1 When requirements are needed that supersede or supplement the property table or cell table requirements, they shall be specified through the use of suffixes. In general, the first suffix letter indicates the special requirement needed and the second letter indicates the condition or test method, or both, with a three-digit number indicating the specific requirement. The suffixes that may be used are listed in Table 2.

7.2 Basic requirements from property or cell tables, as they apply, are always in effect unless these requirements are superseded by special suffix requirements in the line call-out.

NOTE 5—When using the suffixes for additional requirements of the material, the user must keep in mind that not all tests are routinely conducted by the supplier. When these requirements are necessary to identify particular characteristics important to specific applications they shall be agreed upon between user and supplier.

7.3 When a standard for a material is listed in Table 1, the requirements of the referenced standard apply. If desired, the referenced standards may be used since a similar system is used in each document. When a standard for a material specification is written using this guide, the use of the following sections are recommended (in addition to other required sections):

General Requirements
Detail Requirements
Sampling
Specimen Preparation
Conditioning
Test Methods

TABLE 2 Suffix Symbols and Requirements[A]

Symbol	Characteristic
A	Color (Unless otherwise shown by suffix, color is understood to be the commercially available color for the material.) Second letter A = does not have to match a standard B = must match standard Three-digit number 001 = color and standard number on drawing 002 = color on drawing
F	Flammability, Flash Point, or Fungus Resistance Second letter A = ASTM D 1310 (open cup) Three-digit number = minimum value, degrees Celsius B = ASTM D 3278 (closed cup) Three-digit number = minimum value, degrees Celcius
G	Specific Gravity Second letter A = ASTM D 1298 (tolerance ±0.02) B = ASTM D 1298 (tolerance ±0.05) Three-digit number X factor of 0.01 = requirement value
J	Hardness Second letter A = ASTM D 2240 (shore A) tolerance± 5 B = ASTM D 2583 (barcol), minimum D = ASTM D 2240 (shore D) tolerance ±5
R	Volatile Loss or Solids Second letter A = ASTM D 2834 (3 h at 102 ± 3°C)–solids Three-digit number X factor of 0.1 = percent, minimum
V	Viscosity, Flow Rate, or Extrusion Rate Second letter A = MIL-A-46146 (extrusion rate) Three-digit number = value grams per minute, minimum
Z	Other Special Requirements Second letter from existing list of symbols where test or requirement is not available. These characteristics will be spelled out in detail and identified in sequence, that is 01, 02, 03, etc. Example ZV01 Viscosity–ASTM D1084–RVF, No 4 spindle, and 20 r/min, 6000 to 8000 MPa·s

[A] Additional suffixes and requirements will be added to this classification system as test methods or requirements are developed or requested or both.

Number of Tests
Certification and Inspection
Retest and Rejection
Packaging, Packing, and Marking
Quality Assurance Provisions for Government or Military Procurement (MIL STD 105)

For additional guidance in writing standards, refer to the manual *Form and Style for ASTM Standards.*[10]

8. Keywords

8.1 adhesives; classification

[10] Available from ASTM Headquarters.