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Standard Classification System for Specifying Plastic Materials[1]

This standard is issued under the fixed designation D 4000; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This standard provides a classification system for tabulating the properties of unfilled, filled, and reinforced plastic materials suitable for processing into parts.

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

1.2 The classification system and subsequent line callout (specification) is intended to be a means of identifying plastic materials used in the fabrication of end items or parts. It is not intended for the selection of materials. Material selection should be made by those having expertise in the plastics field 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 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 plastic materials can be arranged into broad generic families using basic properties to arrange the materials into groups, classes, and grades. A system is thus established which, together with values describing additional requirements, permits as complete a description as desired of the selected material.

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.

NOTE 2—When using this classification system the two-letter, three-digit suffix system applies.

NOTE 3—When a material is used to fabricate a part where the requirements are too specific for a broad material callout, it is advisable for the user to consult the supplier to secure callout of the properties to suit the actual conditions to which the part is to be subjected.

1.5 *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]

D 149 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
D 150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation
D 256 Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics
D 257 Test Methods for DC Resistance or Conductance of Insulating Materials
D 395 Test Methods for Rubber PropertyCompression Set
D 412 Test Methods for Vulcanized Rubber and Thermoplastic ElastomersTension
D 471 Test Method for Rubber PropertyEffect of Liquids
D 495 Test Method for High-Voltage, Low-Current, Dry Arc Resistance of Solid Electrical Insulation
D 569 Method for Measuring the Flow Properties of Thermoplastic Molding Materials[3]
D 570 Test Method for Water Absorption of Plastics
D 573 Test Method for RubberDeterioration in an Air Oven

[1] This classification system is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.94 on Government/Industry Standardization (Section D20.94.01).

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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] Withdrawn.

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

D 575 Test Methods for Rubber Properties in Compression
D 618 Practice for Conditioning Plastics for Testing
D 624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
D 635 Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position
D 638 Test Method for Tensile Properties of Plastics
D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
D 695 Test Method for Compressive Properties of Rigid Plastics
D 706 Specification for Cellulose Acetate Molding and Extrusion Compounds
D 707 Specification for Cellulose Acetate Butyrate Molding and Extrusion Compounds
D 747 Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
D 785 Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials
D 787 Specification for Ethyl Cellulose Molding and Extrusion Compounds
D 788 Classification System for Poly(Methyl Methacrylate) (PMMA) Molding and Extrusion Compounds
D 789 Test Methods for Determination of Solution Viscosities of Polyamide (PA)
D 790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
D 792 Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
D 883 Terminology Relating to Plastics
D 955 Test Method of Measuring Shrinkage from Mold Dimensions of Thermoplastics
D 1003 Test Method for Haze and Luminous Transmittance of Transparent Plastics
D 1149 Test Methods for Rubber DeteriorationCracking in an Ozone Controlled Environment
D 1203 Test Methods for Volatile Loss From Plastics Using Activated Carbon Methods
D 1238 Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
D 1248 Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
D 1430 Classification System for Polychlorotrifluoroethylene (PCTFE) Plastics
D 1434 Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting
D 1435 Practice for Outdoor Weathering of Plastics
D 1499 Practice for Filtered Open-Flame Carbon-Arc Exposures of Plastics
D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
D 1525 Test Method for Vicat Softening Temperature of Plastics
D 1562 Specification for Cellulose Acetate Propionate Molding and Extrusion Compounds
D 1600 Terminology for Abbreviated Terms Relating to Plastics
D 1693 Test Method for Environmental Stress-Cracking of Ethylene Plastics
D 1784 Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
D 1822 Test Method for Tensile-Impact Energy to Break Plastics and Electrical Insulating Materials
D 1929 Test Method for Determining Ignition Temperature of Plastics
D 2116 Specification for FEP-Fluorocarbon Molding and Extrusion Materials
D 2137 Test Methods for Rubber PropertyBrittleness Point of Flexible Polymers and Coated Fabrics
D 2240 Test Method for Rubber PropertyDurometer Hardness
D 2287 Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
D 2288 Test Method for Weight Loss of Plasticizers on Heating
D 2565 Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications
D 2583 Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
D 2584 Test Method for Ignition Loss of Cured Reinforced Resins
D 2632 Test Method for Rubber PropertyResilience by Vertical Rebound
D 2843 Test Method for Density of Smoke from the Burning or Decomposition of Plastics
D 2863 Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
D 2951 Test Method for Resistance of Types III and IV Polyethylene Plastics to Thermal Stress-Cracking
D 3012 Test Method for Thermal-Oxidative Stability of Polypropylene Using a Specimen Rotator Within an Oven
D 3159 Specification for Modified ETFE-Fluoropolymer Molding and Extrusion Materials
D 3222 Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials
D 3275 Classification System for E-CTFE-Fluoroplastic Molding, Extrusion, and Coating Materials
D 3294 Specification for Polytetrafluoroethylene (PTFE) Resin Molded Sheet and Molded Basic Shapes
D 3295 Specification for PTFE Tubing, Miniature Beading and Spiral Cut Tubing
D 3296 Specification for FEP-Fluorocarbon Tube
D 3307 Specification for Perfluoroalkoxy (PFA)-Fluorocarbon Resin Molding and Extrusion Materials
D 3350 Specification for Polyethylene Plastics Pipe and Fittings Materials

D 3418 Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry
D 3595 Specification for Polychlorotrifluoroethylene (PCTFE) Extruded Plastic Sheet and Film
D 3638 Test Method for Comparative Tracking Index of Electrical Insulating Materials
D 3713 Test Method for Measuring Response of Solid Plastics to Ignition by a Small Flame
D 3801 Test Method for Measuring the Comparative Burning Characteristics of Solid Plastics in a Vertical Position
D 3892 Practice for Packaging/Packing of Plastics
D 3895 Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry
D 3915 Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Pressure Applications
D 3935 Specification for Polycarbonate (PC) Unfilled and Reinforced Material
D 3965 Specification for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Materials for Pipe and Fittings
D 3985 Test Method for Oxygen Gas Transmission Rate Through Plastic Film and Sheeting Using a Coulometric Sensor
D 4020 Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
D 4066 Classification System for Nylon Injection and Extrusion Materials (PA)
D 4067 Classification System for Reinforced and Filled Poly(Phenylene Sulfide) (PPS) Injection Molding and Extrusion Materials Using ASTM Methods
D 4101 Specification for Polypropylene Injection and Extrusion Materials
D 4181 Classification for Acetal (POM) Molding and Extrusion Materials
D 4203 Specification for Styrene-Acrylonitrile (SAN) Injection and Extrusion Materials
D 4216 Specification for Rigid Poly(Vinyl Chloride) (PVC) and Related PVC and Chlorinated Poly(Vinyl Chloride) (CPVC) Building Products Compounds
D 4329 Practice for Fluorescent UV Exposure of Plastics
D 4349 Classification System for Polyphenylene Ether (PPE) Materials
D 4364 Practice for Performing Outdoor Accelerated Weathering Tests of Plastics Using Concentrated Sunlight
D 4396 Specification for Rigid Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds for Plastic Pipe and Fittings Used in Nonpressure Applications
D 4441 Specification for Aqueous Dispersions of Polytetrafluoroethylene
D 4474 Classification System for Styrenic Thermoplastic Elastomer Injection Molding and Extrusion Materials (TES)
D 4507 Specification for Thermoplastic Polyester (TPES) Materials[0]
D 4549 Specification for Polystyrene and Rubber-Modified Polystyrene Molding and Extrusion Materials (PS)
D 4617 Classification System for Phenolic Compounds (PF)
D 4634 Specification for Styrene-Maleic Anhydride Materials (S/MA)
D 4673 Classification System for AcrylonitrileButadieneStyrene (ABS) Plastics and Alloys Molding and Extrusion Materials
D 4745 Specification for Filled Compounds of Polytetrafluoroethylene (PTFE) Molding and Extrusion Materials
D 4804 Test Method for Determining the Flammability Characteristics of Nonrigid Solid Plastics
D 4812 Test Method for Unnotched Cantilever Beam Impact Resistance of Plastics
D 4894 Specification for Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials
D 4895 Specification for Polytetrafluoroethylene (PTFE) Resin Produced From Dispersion
D 4976 Specification for Polyethylene Plastics Molding and Extrusion Materials
D 4986 Test Method for Horizontal Burning Characteristics of Cellular Polymeric Materials
D 5021 Specification for Thermoplastic ElastomerChlorinated Ethylene Alloy (TECEA)
D 5033 Guide for Development of ASTM Standards Relating to Recycling and Use of Recycled Plastics
D 5046 Classification for Fully Crosslinked Elastomeric Alloys (FCEAs)
D 5048 Test Method for Measuring the Comparative Burning Characteristics and Resistance to Burn-Through of Solid Plastics Using a 125-mm Flame
D 5132 Test Method for Horizontal Burning Rate of Polymeric Materials Used in Occupant Compartments of Motor Vehicles
D 5138 Classification System for Liquid Crystal Polymers (LCP)
D 5203 Specification for Polyethylene Plastics Molding and Extrusion Materials from Recycled Post-Consumer (HDPE) Sources
D 5204 Classification System for Polyamide-Imide (PAI) Molding and Extrusion Materials
D 5205 Classification System for Polyetherimide (PEI) Materials
D 5260 Classification for Chemical Resistance of Poly(Vinyl Chloride) (PVC) Homopolymer and Copolymer Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
D 5279 Test Method for Plastics: Dynamic Mechanical Properties: In Torsion
D 5336 Specification for Polyphthalamide (PPA) Injection Molding Materials
D 5420 Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)

D 5436 Specification for Cast Poly(Methyl Methacrylate) Plastic Rods, Tubes, and Shapes
D 5476 Classification System for Thermoplastic Polyurethane Materials (TPU)
D 5575 Classification System for Copolymers of Vinylidene Fluoride (VDF) with Other Fluorinated Monomers
D 5593 Classification for Thermoplastic ElastomersOlefinic (TEO)
D 5628 Test Method for Impact Resistance of Flat, Rigid Plastic Specimens by Means of a Falling Dart (Tup or Falling Mass)
D 5630 Test Method for Ash Content in Plastics
D 5676 Specification for Recycled Polystyrene Molding and Extrusion Materials
D 5857 Specification for Polypropylene Injection and Extrusion Materials Using ISO Protocol and Methodology
D 5927 Specification for Thermoplastic Polyester (TPES) Injection and Extrusion Materials Based on ISO Test Methods
D 5990 Classification System for Polyketone Injection Molding and Extrusion Materials (PK)
D 6314 Specification for Fluorocarbon Perfluoromethoxy (MFA) Resin Molding and Extrusion Materials
D 6338 Classification System for Highly Crosslinked Thermoplastic Vulcanizates (HCTPVs)
D 6339 Specification for Syndiotactic Polystyrene Molding and Extrusion (SPS)
D 6358 Classification System for Poly (Phenylene Sulfide) Injection Molding and Extrusion Materials Using ISO Methods
D 6360 Practice for Enclosed Carbon-Arc Exposures of Plastics
D 6394 Specification for Sulfone Plastics (SP)
D 6457 Specification for Extruded and Compression Molded Rod and Heavy-Walled Tubing Made from Polytetrafluoroethylene (PTFE)
D 6585 Specification for Unsintered Polytetrafluoroethylene (PTFE) Extruded Film or Tape
D 6778 Classification for Polyoxymethylene (POM, Acetal) Molding and Extrusion Materials
D 6779 Classification System for Polyamide Molding and Extrusion Materials (PA)
D 6835 Classification System for Thermoplastic Elastomer-Ether-Ester Molding and Extrusion Materials (TEEE)
D 6869 Test Method for Coulometric and Volumetric Determination of Moisture in Plastics Using the Karl Fischer Reaction (the Reaction of Iodine with Water)
E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
E 84 Test Method for Surface Burning Characteristics of Building Materials
E 96/E 96M Test Methods for Water Vapor Transmission of Materials
E 104 Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions
E 119 Test Methods for Fire Tests of Building Construction and Materials
E 162 Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
E 662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials
E 1354 Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
F 372 Test Method for Water Vapor Transmission Rate of Flexible Barrier Materials Using an Infrared Detection Technique

2.2 *Federal Standard:*[4]
Department of Transportation Federal Motor Vehicle Safety Standard No. 302

2.3 *Underwriters Laboratories:*[5]
UL94 Standards for Tests for Flammability for Parts in Devices and Appliances

2.4 *IEC and ISO Standards:*[6]
IEC 600093 Recommended Methods of Tests for Volume and Surface Resistivities of Electrical Insulation Materials
IEC 600112 Recommended Method for Determining the Comparative Tracking Index of Solid Insulation Materials Under Moist Conditions
IEC 600243 Recommended Methods of Test for Electrical Strength of Solid Insulating Materials at Power Frequencies
IEC 600250 Recommended Methods for the Determination of the Permittivity and Dielectric Dissipation Factor of Electrical Insulation Materials at Power, Audio, and Radio Frequencies Including Metre Wavelengths
IEC 60695-2-12 Fire Hazard Testing—Part 2–12: Glowing/Hot-Wire Based Test Methods—Glow-Wire Flammability Test Method for Materials
IEC 60695-11-10 Fire Hazard Testing—Part 11-10: Test Flames—50 W Horizontal and Vertical Flame Tests
IEC 60695-11-20 Fire Hazard Testing—Part 11-20: Test Flames—500 W Flame Test Methods
ISO 62 Plastics—Determination of Water Absorption
ISO 75-1 Plastics—Determination of Temperature of Deflection Under Load—Part 1: General Principles
ISO 75-2 Plastics—Determination of Temperature of Deflection Under Load—Part 2: Plastics and Ebonite
ISO 178 Plastics—Determination of Flexural Properties of Rigid Plastics

[4] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.
[5] Available from Underwriters Laboratories (UL), 333 Pfingsten Rd., Northbrook, IL 60062-2096, http://www.ul.com.
[6] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

ISO 179 Plastics—Determination of Charpy Impact Strength of Rigid Materials
ISO 180 Plastics—Determination of Izod Impact Strength of Rigid Materials
ISO 294-4 Plastics—Injection Moulding of Test Specimens of Thermoplastic Materials—Part 4: Determination of Moulding Shrinkage
ISO 527–1 Plastics—Determination of Tensile Properties—Part 1: General Principles
ISO 527-2 Plastics—Determination of Tensile Properties—Part 2: Test Conditions for Moulding and Extrusion Plastics
ISO 604 Plastics—Determination of Compressive Properties
ISO 868 Plastics—Determination of Indention Hardness by Means of a Durometer (Shore Hardness)
ISO 877 Plastics—Determination of Resistance to Change Upon Exposure Under Glass to Daylight
ISO 974 Plastics—Determination of the Brittleness Temperature by Impact
ISO 1133 Plastics—Determination of the Melt Mass-Flow Rate (MFR) and the Melt Volume-Flow Rate (MVR) of Thermoplastics
ISO 1183 Plastics—Methods for Determining the Density and Relative Density of Non-Cellular Plastics
ISO 2039-2 Plastics—Determination of Hardness—Part 2: Rockwell Hardness
ISO 3795 Road Vehicles, Tractors, and Machinery for Agriculture and Forestry—Determination of Burning Behavior of Interior Materials
ISO 4577 Plastics—Polypropylene and Propylene—Copolymers—Determination of Thermal Oxidative Stability in Air-Oven Method
ISO 4589 Plastics—Determination of Flammability by Oxygen Index
ISO 4607 Plastics—Method of Exposure to Natural Weathering
ISO 4892 Plastics—Methods of Exposure to Laboratory Light Sources
ISO 4892–4 Plastics—Methods of Exposure to Laboratory Light Sources—Part 4: Open-flame Carbon-arc
ISO 5659 Plastics—Smoke Regeneration—Part 2: Determination of Optical Density by a Single-Chamber Test
ISO 6603-1 Plastics—Determination of Multiaxial Impact Behavior of Rigid Plastics—Part 1: Falling Dart Method
ISO 6721-1 Plastics—Determination of Dynamic Mechanical Properties—Part 1: General Principles
ISO 6721-2 Plastics—Determination of Dynamic Mechanical Properties—Part 2: Torsion-Pendulum Method
ISO 9772 Cellular Plastics—Determination of Horizontal Burning Characteristics of Small Specimens Subjected to a Small Flame
ISO 9773 Plastics—Determination of Burning Behaviour of Thin Flexible Vertical Specimens in Contact with a Small-Flame Ignition Source
ISO 11357-1 Plastics—Differential Scanning Calorimetry—Part 1: General principles
ISO 11357-3 Plastics—Differential Scanning Calorimetry—Part 3: Determination of Temperature and Enthalpy of Melting and Crystallization

TABLE 1 Standard Symbols for Generic Families With Referenced Standards and Cell Tables

Standard Symbol	Plastic Family Name	ASTM[A] Standard	Suggested Reference Cell Tables for Materials Without an ASTM Standard[B]	
			Unfilled	Filled
ABA	acrylonitrile-butadiene-acrylate		E	
ABS	acrylonitrile-butadiene-styrene	D 3965, D 4673		
AMMA	acrylonitrile-methyl methacrylate		E	
ARP	aromatic polyester	(see LCP)		
ASA	acrylonitrile-styrene-acrylate		E	
CA	cellulose acetate	D 706		
CAB	cellulose acetate butyrate	D 707		
CAP	cellulose acetate proprionate		E	D
CE	cellulose plastics, general		E	D
CF	cresol formaldehyde		H	H
CMC	carboxymethyl cellulose		E	
CN	cellulose nitrate		E	D
CP	cellulose propionate	D 1562		
CPE	chlorinated polyethylene		F	
CPVC	chlorinated poly(vinyl chloride)	D 4396, D 1784, D 5260, D 3915, D 4216		
CS	casein		H	H
CTA	cellulose triacetate		E	D
EC	ethyl cellulose	D 787	E	D
E-CTFE	ethylene-chlorotrifluoroethylene copolymer	D 3275		
EEA	ethylene-ethyl acrylate		F	
EMA	ethylene-methacrylic acid		F	
EP	epoxy, epoxide		H	H
EPD	ethylene-propylene-diene			
EPM	ethylene-propylene polymer		F	D
ETFE	ethylene-tetrafluoroethylene copolymer	D 3159		
EVA	ethylene-vinyl acetate		F	

TABLE 1 *Continued*

Standard Symbol	Plastic Family Name	ASTM[A] Standard	Suggested Reference Cell Tables for Materials Without an ASTM Standard[B]	
			Unfilled	Filled
FCEA	fully crosslinked elastomeric alloy	D 5046		
FEP	perfluoro (ethylene-propylene) copolymer	D 2116		
FF	furan formaldehyde	D 3296	H	H
HCTPV	highly crosslinked thermoplastic vulanizates	D 6338		
IPS	impact polystyrene	(see PS)		
LCP	liquid crystal polymer	D 5138		
MF	melamine-formaldehyde		H	H
PA	polyamide (nylon)	D 4066, D 6779		
PAEK	polyacryletherketone			
PAI	polyamide-imide	D 5204	G	G
PARA	polyacryl amide			
PB	polybutene-1		F	
PBT	poly(butylene terephthalate)	(see TPES)		
PC	polycarbonate	D 3935		
PCTFE	polymonochlorotrifluoroethylene	D 1430, D 3595		
PDAP	poly(diallyl phthalate)		H	H
PE	polyethylene	D 1248, D 4976, D 3350, D 4020, D 5203		
PEBA	polyether block amide			
PEEK	polyetheretherketone			
PEI	polyether-imide	D 5205		
PEO	poly(ethylene oxide)			
PESU	polyether sulfone	D 6394		
PET	poly(ethylene terephthalate), general	(see TPES)		
PETG	glycol modified polyethylene terephthalate comonomer	(see TPES)		
PF	phenol-formaldehyde	D 4617		
PFA	perfluoro alkoxy alkane	D 3307		
PI	polyimide		G	G
PIB	polyisobutylene		F	
PK	polyketone	D 5990		
PMMA	Poly(methyl methacrylate)	D 788, D 5436		D
PMP	poly(4-methylpentene-1)		F	
POM	polyoxymethylene (acetal)	D 4181, D 6778		
POP	polyphenylene oxide	(see PPE)		
PP	polypropylene	D 4101, D 5857		
PPA	polyphthalamide	D 5336, D 6779		
PPE	polyphenylene ether	D 4349		
PPH	polyphenylene		G	H
PPOX	poly(propylene oxide)			
PPS	poly(phenylene sulfide)	D 4067, D 6358		
PPSU	poly(phenyl sulfone)	D 6394	G	G
PS	polystyrene	D 4549, D 5676		
PSU	polysulfone	D 6394		
PTFE	polytetrafluoroethylene	D 1430, D 3159, D 3222, D 3294, D 3295, D 3307, D 4441, D 4745, D 4894, D 4895, D 5575, D 6314, D 6457, D 6585		
PUR	polyurethane		F	D
PVAC	poly(vinyl acetate)		F	D
PVAL	poly(vinyl alcohol)		F	D
PVB	poly(vinyl butyral)		F	D
PVC	poly(vinyl chloride)	D 2287	F	D
PVDC	poly(vinyl idene chloride)		F	D
PVDF	poly(vinyl idene fluoride)	D 3222		
PVF	poly(vinyl fluoride)		F	D
PVFM	poly(vinyl formal)		F	D
PVK	poly(vinylcarbazole)		F	D
PVP	poly(vinyl pyrrolidone)		F	D
SAN	styrene-acrylonitrile	D 4203		
SB	styrene-butadiene		E	D
SI	silicone plastics		G	G
S/MA	styrene-maleic anhydride	D 4634		
SMS	styrene-methylstyrene		E	D
SPS	syndiotactic polystyrene	D 6339		
TECEA	thermoplastic elastomer-chlorinated ethylene alloy	D 5021		
TEEE	thermoplastic elastomer, ether-ester	D 6835		
TEO	thermoplastic elastomer-olefinic	D 5593		
TES	thermoplastic elastomer-stryenic	D 4474		
TPE	thermoplastic elastomer	(see individual material)		
TPES	thermoplastic polyester (general)	D 4507, D 5927		
TPU	thermoplastic polyurethane	D 5476		
UF	urea-formaldehyde		H	H
UP	unsaturated polyester			
VDF	vinylidene fluoride	D 5575		

[A]The standards listed are those in accordance with this classification. D __ indicates that a standard is being developed by the subcommittee responsible.

[B]Cell Tables A and B have been reserved for the referenced standards and will apply to unfilled and filled materials covered in those standards.

TABLE 2 Reinforcement-Filler[A] Symbols[B] and Tolerance

Symbol	Material	Tolerance
C	Carbon and graphite	±2 percentage points
D	Alumina trihydrate	±2 percentage points
E	Clay	±2 percentage points
F	Cellulose	±2 percentage points
G	Glass	±2 percentage points
H	Aramid	±2 percentage points
J	Boron	±2 percentage points
K	Calcium carbonate	±2 percentage points
L	Lubricants (for example, PTFE, graphite, and so forth)	Depends upon material and process, to be specified
M	Mineral	±2 percentage points
N	Natural organic (cotton, sisal, hemp, flax, and so forth)	±2 percentage points
P	Mica	±2 percentage points
Q	Silica	±2 percentage points
R	Combinations of reinforcements or fillers, or both	±3 percentage points
S	Synthetic organic	±2 percentage points
T	Talcum	±2 percentage points
V	Metal	±2 percentage points
W	Wood	±2 percentage points
X	Not specified	To be specified

[A]Ash content of filled or reinforced materials, or both may be determined using either Test Method D 5630 or ISO 3451–1 where applicable.

[B]Additional symbols may be added to this table as required.

3. Terminology

3.1 *Definitions*—The definitions used in this classification system are in accordance with Terminology D 883.

4. Significance and Use

4.1 The purpose of this classification system is to provide a method of adequately identifying plastic materials in order to give industry a system that can be used universally for plastic materials. It further provides a means for specifying these materials by the use of a simple line call-out designation.

TABLE 2A Symbols for the Form or Structure of Fillers and Reinforcing Materials

Symbol	Form or Structure
C	Chips, cuttings
D	Fines, powder
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
X	Not specified
Y	Yarn

4.2 This classification system was developed to permit the addition of property values for future plastics.

5. Classification

5.1 Plastic materials shall be classified on the basis of their broad generic family. The generic family is identified by letter designations as found in Table 1. These letters represent the standard abbreviations for plastics in accordance with Terminology D 1600.

NOTE 4—For example: PA = polyamide (nylon).

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

TABLE 3 Suffix Symbols and Requirements[A]

Symbol	Characteristic
A	Color (unless otherwise shown by suffix, color is understood to be natural) 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
B	Fluid resistance Second letter A = reference fuel A, ASTM D 471, aged 70 h at 23 ± 2°C B = reference fuel C, ASTM D 471, aged 70 h at 23 ± 2°C C = ASTM #1 oil, ASTM D 471, aged 70 h at 100 ± 2 °C D = IRM 902 oil, ASTM D 471, aged 96 h at 100 ± 2°C E = IRM 903 oil, ASTM D 471, aged 70 h at 100 ± 2°C F = Distilled water, ASTM D 471, aged 70 h at 100 ± 2°C Three digit number is obtained from Suffix Table 1. It indicates change in hardness, tensile strength, elongation, and volume. Example: BC 132 specifies that material, after aging in ASTM #1 oil for 70 h at 100°C, can have changed no more than 2 Shore D points, 5 % tensile strength, 15 % elongation, and 5 % in volume.
C	Melting point—softening point Second letter B = ASTM D 1525, load 10 N, Rate A (Vicat) C = ASTM D 1525, load 10 N, Rate B (Vicat) D = ASTM D 3418 (Transition temperature DSC/DTA) (ISO 11357-1 and ISO 11357-3) G = ISO 306, load 10 N, heating rate 50°C/h (Vicat) H = ISO 306, load 10 N, heating rate 120°C/h (Vicat) I = ISO 306, load 50 N, heating rate 50°C/h (Vicat) J = ISO 306, load 50 N, heating rate 120°C/h (Vicat) K = ASTM D 1525, load 50 N, Rate A (Vicat) L = ASTM D 1525, load 50 N, Rate B (Vicat) Three-digit number = minimum value °C
E	Electrical Second letter A = dielectric strength (short-time), ASTM D 149 (IEC 600243) Three-digit number × factor of 0.1 = kV/mm, min B = dielectric strength (step by step), ASTM D 149 (IEC 600243) Three-digit number × factor of 0.1 = kV/mm, min C = insulation resistance, ASTM D 257 (IEC 600093) Three-digit number × factor of 10^{14} = Ω, min D = dielectric constant at 1 MHz, ASTM D 150, max (IEC 600250) Three-digit number × factor of 0.1 = value E = dissipation factor at 1 MHz, ASTM D 150, max (IEC 600250) Three-digit number × factor of 0.0001 = value F = arc resistance, ASTM D 495, min Three-digit number = value G = volume resistivity, ASTM D 257 (IEC 600093) Three-digit number × factor of 10^{14} = Ω-cm, min H = comparative tracking index, ASTM D 3638, ac frequency, 50 Hz, 0.1 % ammonium chloride (IEC 600112) Three-digit number = V, min J = volume resistivity, ASTM D 257 (IEC 600093), Ω-cm K = surface resistivity, ASTM D 257 (IEC 600093), Ω (per square) First digit indicates: 1 = minimum requirement 2 = maximum requirement Final two digits indicate the exponential value of the base 10 Example: EJ206 specifies a maximum volume resistivity of 10^6Ω-cm
F	Flammability Second Letter A = Horizontal Burning Rate — ASTM D 635, UL94 HB, IEC 60695-11-10, Method A Report as: (First three digits equal burn rate in mm/min), next three significant digits are thickness of sample tested in mm × factor of 0.1. If sample burns beyond the 100 mm mark, the samples are considered to have no rating. B = Oxygen Index — ASTM D 2863, ISO 4589 Report as: Value % O_2 to three significant figures C = Flash Ignition — ASTM D 1929, Procedure A Report as: Value, °C min to three significant digits rounded to nearest whole number. D = Self Ignition — ASTM D 1929, Procedure B Report as: Value, °C min to three significant digits rounded to nearest whole number. E = Ignition by a Small Flame — ASTM D 3713 Letter retired, standard withdrawn without replacement in 2000. F = Vertical Burn Rating — ASTM D 3801, UL94 V, IEC 60695-11-10, Method B Report as: (First digit = rating), next three significant digits are thickness of sample tested in mm × factor of 0.1. Rating designations: 0 = V-0 1 = V-1 2 = V-2 if no rating, do not use “F” 000 = to be specified by user G = Radiant Panel Test — ASTM E 162 Report as: Flame Spread First two digits indicate minimum specimen thickness

TABLE 3 *Continued*

Symbol		Characteristic	
		00 to be specified	05 3.00 mm
		01 0.25 mm	06 6.00 mm
		02 0.40 mm	07 9.00 mm
		03 0.80 mm	08 12.70 mm
		04 1.60 mm	09 >12.70 mm
		Third digit indicates the flame spread	
		1 15 max	5 100 max
		2 25 max	6 150 max
		3 50 max	7 200 max
		4 75 max	8 >200
		H = Flame Spread Index	ASTM E 84
		Report as:	Flame Spread Index
		NOTE 1:	Smoke Developed Index may also be reported.
		NOTE 2:	Classifications may be used as per the International Building Code
		Class I:	Flame Spread 0–25
		Class II:	Flame Spread 26–77
		Class III:	Flame Spread 76–200
		J = Automotive Horizontal Burn Rate	ASTM D 5132, FMVSS 302, ISO 3795
		Report as:	(First three digits = burn rate in mm/min), next three significant digits are thickness of sample tested in mm × factor of 0.1.
		K =	ASTM D 2843
		Letter retired, method no longer in broad commercial use, replaced by ASTM E 662.	
		L =	UL (IEC 60695-11-10)
		Letter retired, see Appendix X1 for replacement procedures and references to the old requirements.	
		M = Vertical Burn Rating; Film	ASTM D 4804, UL94 VTM, ISO 9773
		Report as:	(First digit = rating), next three significant digits are thickness of sample tested in mm × factor of 0.01.
		Rating designations:	0 = VTM0
			1 = VTM1
			2 = VTM2
			if no rating, do not use “M”
		N = Horizontal Burn Rate; Foam	ASTM D 4986, UL94, ISO 9772
		Report as:	(First digit = rating), next three significant digits are thickness of sample tested in mm × factor of 0.1.
		Rating designations:	0 = HBF
			1 = HF-1
			2 = HF-2
			if no rating, do not use “N”
		P = Glow Wire Flammability Index	IEC 60695-2-12
		Report as:	(First three digits are glow wire flammability index reported in °C). Following three significant digits are thickness of sample tested in mm × factor of 0.1.
		R = Heat Release Rate	ASTM E 1354
		Report as:	Peak Heat Release Rate
		Rating Designations:	(First three digits are peak heat release rate in kW/m^2), next three digits are incident heat flux in kW times ten (×10).
		S = NBS Smoke (Flame or Smolder Mode)	ASTM E 662, ISO 5659–2
		Report as:	(First digit = 1 for Flame mode or 2 for Smolder mode), final three digits = Specific Optical Density.
		T = Fire Rating	ASTM E 119
		Report as:	(Fire resistance rating in hours, first two digits). Third digit = “1” for hose stream applied, “0” for no hose stream applied. Fourth digit is application from table below:
		Rating designations:	0: No application designated
			1: Bearing Walls and Partitions
			2: Nonbearing Walls and Partitions
			3: Columns
			4: Floors and Roofs
			6: Loaded Restrained Beams
			7: Protective Membranes in Wall, Partition, Floor, or Roof Assemblies
		U = Large Flame Vertical Burn Rating; Plaque	ASTM D 5048, UL94 5VA, IEC 60695-11-20
		Report as:	(First three digits = burn time plus afterglow time in seconds after fifth flame application), the fourth digit “1” or “0” for flaming drips (1 = yes, 0 = no), next three significant digits are thickness of sample tested in mm × factor of 0.1. Last digit: “1” or “0” for holes burned through plaques (1 = yes, 0 = no).
		V = Large Flame Vertical Burn Rating; Bar	ASTM D 5048, UL94 5VA, IEC 60695-11-20
		Report as:	(First three digits = burn time plus afterglow time in seconds after fifth flame application), fourth digit “1” or “0” for flaming drips, last three significant digits are thickness of sample tested in mm × factor of 0.1.
G	Specific gravity		
	Second letter	A = ASTM D 792 (tolerance ± 0.02) (ISO 1183 Method A)	

TABLE 3 *Continued*

Symbol	Characteristic
	B = ASTM D 792 (tolerance ± 0.05) (ISO 1183 Method A)
	C = ASTM D 792 (tolerance ± 0.005) (ISO 1183 Method A)
	D = ASTM D 1505 (tolerance ± 0.02)
	E = ASTM D 1505 (tolerance ± 0.05)
	F = ASTM D 1505 (tolerance ± 0.005)
	H = ASTM D 792/D 1505 (max)
	L = ASTM D 792/D 1505 (min)
	Three-digit number × factor of 0.010 = requirement value
H	Heat resistance, properties at temperature
	Second letter A = heat aged for 70 h at 100 ± 2°C, ASTM D 573
	B = heat aged for 70 h at 150 ± 2°C, ASTM D 573
	C = heat aged for 70 h at 200 ± 2°C, ASTM D 573
	Three-digit number is obtained from Suffix Table 1. It indicates change in hardness, tensile strength, elongation and volume.
	Second letter D = tested at 100 ± 2°C
	E = tested at 125 ± 2°C
	F = tested at 150 ± 2°C
	Three-digit numbers obtained from Suffix Table 2. It indicates tensile strength, elongation, and tear strength.
	Example: HE565 specifies that the material has a minimum of 15 MPA tensile strength, 400 % elongation, and a tear strength of 40 kN/m when tested at 125°C.
	Second letter L = low-temperature brittleness, ASTM D 2137
	Three-digit number indicates the temperature (°C) above which the material is non-brittle. Example: HL055 material is non-brittle according to ASTM D 2137a, above – 55°C.
I	Not to be used at this time
J	Hardness
	Second letter A = ASTM D 2240 (Type A) tolerance ±5 (ISO 868)
	B = ASTM D 2583 (Barcol), min
	D = ASTM D 2240 (Type D) tolerance ±3 (ISO 868)
	E = ASTM D 785 (Rockwell E), min
	K = ASTM D 785 (Rockwell K), min
	L = ASTM D 785 (Rockwell L), min (ISO 2039-2)
	M = ASTM D 785 (Rockwell M), min (ISO 2039-2)
	R = ASTM D 785 (Rockwell R), min (ISO 2039-2)
	Three-digit number = value
K	Tensile strength
	Second letter B = at break, ASTM D 638
	C = at rupture, ASTM D 412
	D = tensile stress at break, ISO 527-1 and ISO 527-2
	E = tensile stress at 50 % strain, ISO 527-1 and ISO 527-2
	Three-digit number = value, MPa, min
	Example: KC040 specifies a tensile strength at rupture of 40 MPa
	M = tensile stress, ASTM D 412
	First digit indicates the elongation at which the tensile stress is measured.
	1 = 25 %
	2 = 100 %
	3 = 300 %
	Final two digits = value, MPa, min
	N = tensile modulus, ISO 527-1 and ISO 527-2
	Three-digit number × factor of 100 = value, MPa, min
	S = tensile set, ASTM D 412
	First digit indicates the elongation at which the set is measured.
	1 = 50 %
	2 = 100 %
	3 = at break
	4 = 200 %
	Final two digits indicate the maximum percent set.
	Example: KS208 specifies a maximum tensile set of 8 % when tested at 100 % extension.
	Y = yield, ASTM D 638
	X = tensile stress at yield, ISO 527-1 and ISO 527-2
	Three-digit number = value, MPa, min
L	Elongation
	Second letter B = break, ASTM D 638
	C = break, ASTM D 412
	D = break, ISO 527
	Three-digit number = value, %, min
	R = resilience, ASTM D 2632
	First digit:
	1 = minimum
	2 = maximum
	Final two digits indicate percent rebound
	Example: LR 150 specifies a minimum rebound of 50 %
	T = tear strength, ASTM D 624 Die C
	Three-digit number = value, kN/m, min
	Y = yield, ASTM D 638
	X = yield, ISO 527