Designation: D6358 – 11

# Standard Classification System and Basis for Specification for Poly (Phenylene Sulfide) (PPS) Injection Molding and Extrusion Materials Using ISO Methods[1]

This standard is issued under the fixed designation D6358; 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 classification system covers unfilled, reinforced and filled materials suitable for injection molding and extrusion using ISO methods. The system allows for the use of poly (phenylene sulfide) (PPS) plastic materials that are recycled, reconstituted recycled-regrind, recovered or reprocessed, or both, provided that the requirements as stated in this specification are met. It is the responsibility of the supplier and the buyer of recycled, reconstituted, recycled-regrind, recovered or reprocessed, or both, poly (phenylene sulfide) plastic materials to ensure compliance (see Guide D7209).

1.2 The properties included in this classification are those required to identify the compositions covered. It is possible that other requirements are necessary to identify particular characteristics important to specialized applications. The use of suffixes as shown in Section 5 is one way of specifying these requirements.

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 needs to be made by those having expertise in the plastic 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 costs involved, and the inherent properties of the material other than those covered by this classification.

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.*

NOTE 1—This standard and ISO 28078 address the same subject matter, but differ in technical content.

NOTE 2—ASTM D4067 for PPS uses ASTM test methods.

## 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

D3641 Practice for Injection Molding Test Specimens of Thermoplastic Molding and Extrusion Materials

D3892 Practice for Packaging/Packing of Plastics

D4000 Classification System for Specifying Plastic Materials

D4067 Classification System for and Basis for Specification for Reinforced and Filled Poly(Phenylene Sulfide) (PPS) Injection Molding and Extrusion Materials Using ASTM Methods

D7209 Guide for Waste Reduction, Resource Recovery, and Use of Recycled Polymeric Materials and Products

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

2.2 *IEC and ISO Standards:*[3]

IEC 60112 Recommended Methods for Determining the Comparative Tracking Index of Solid Insulation Materials

IEC 60243 Recommended Methods for Electric Strength of Solid Insulating Materials at Power Frequencies

ISO 62 Plastics-Determination of Water Absorption

ISO 178 Plastics—Determination of Flexural Properties of Rigid Plastics

ISO 180/1A Plastics—Determination of Izod Impact Strength of Rigid Materials

ISO 294-1 Plastics—Injection Moulding Test Specimens of Thermoplastic Materials

ISO 527 Plastics—Determination of Tensile Properties

ISO 604 Plastics—Determination of Compressive Properties

[1] This classification system is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials (Section D20.15.17).

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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] *ISO and IEC Selected Standards for the Plastics Industry, 2nd Edition*, ASTM, Stock#: ISOPLAS2.

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

ISO 1133 Plastics—Determination of Mass Flow Rate and Melt Volume Flow Rate
ISO 1183 Plastics—Methods for Determining the Density and Relative Density of Noncellular Plastics
ISO 3167 Plastics—Multipurpose Test Specimens
ISO 3451 Plastics—Determination of Ash
ISO 11443 Plastics—Determination of the Fluidity of Plastics Using Capillary and Split Die Rheometers
ISO 28078 Plastics—Poly(phenylene sulfide) (PPS) Moulding and Extrusion Materials—Part 1: Designation System and Basis for Specifications

2.3 *UL Standards:*[4]

UL 94 Test for Flammability of Plastic Materials for Parts in Devices and Appliances

2.4 *NTIS Standards:*[5]

AD297457 Procedures and Analytical Method for Determining Toxic Gases Produced by Synthetic Compounds

2.5 *Military Standards:*[6]

MIL-M-24519
MIL-P-46174

## 3. Terminology

3.1 *Definitions*—The terminology used in this classification system is in accordance with Terminology D883 and Terminology D1600.

## 4. Classification

4.1 Poly(phenylene sulfide) materials are classified according to their composition. These classes are subdivided into grades as shown in the Basic Property Table (Table PPS).

NOTE 3—An example of the use of this classification system for specifying fiberglass reinforced poly(phenylene sulfide) is given as follows: The line callout PPS011G40 (specification) indicates the following:

| | | |
|---|---|---|
| PPS | = | poly(phenylene sulfide) as found in Terminology D1600. |
| 01 | = | general purpose (group), |
| 1 | = | glass reinforced (class), and |
| G40 | = | nominal 40 % glass with the requirements given in Table PPS (grade). |

4.1.1 To facilitate incorporation of future or special materials the "other" category for group (00), class (0), and grade (0) is shown in Table PPS. The basic properties of these materials are obtained from Table A as they apply.

4.2 Reinforced, filled, and unfilled versions of poly(phenylene sulfide) materials that are not in Table PPS are specified in accordance with Tables PPS, A, and B. Table PPS is first used to identify the group and class of poly(phenylene sulfide). Table A is then used to specify the property requirements after the addition or reinforcements, pigments, fillers, or lubricants at the nominal level indicated (see 4.2.1) or Table B is used to specify the property requirements of unfilled/unreinforced versions of poly(phenylene sulfide).

4.2.1 Reinforced versions of the basic materials are identified by a single letter that indicates the reinforcement used and two digits that indicate the nominal quantity in percent by weight. Thus, a letter designation G for glass-reinforced and 30 for percent of reinforcement, G30, specifies a filled material with a nominal glass level of 30 %. The reinforcement letter designations and associated tolerance levels are shown as follows:

| Symbol | Material | Tolerance (Based on Total Mass) |
|---|---|---|
| C | carbon and graphite fiber reinforced | ±2 percentage points |
| G | glass-reinforced | ±3 percentage points |
| L | lubricants (such as PTFE, graphite, silicone) | depends upon material and process. to be specified by supplier/user agreement. |
| M | mineral-reinforced | ±3 percentage points |
| R | combinations of reinforcements or fillers, or both | ±3 percentage points |

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

4.2.2 Specific requirements for reinforced, filled, or lubricated poly(phenylene sulfide) materials shall be identified by using a six-character line callout. The specification shall consist of the letter "A" and the five digits comprising the cell number for the property requirements in the order as they appear in Table A.

4.2.2.1 Although the values listed are necessary to include the range of properties available in existing materials, this does not infer that 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 5—An example of a specification for a reinforced PPS material is given as follows. The specification PPS0110G20A31042 indicates the following material requirements:

| | | |
|---|---|---|
| PPS0110 | = | Glass reinforced poly(phenylene sulfide), from Table PPS, |
| G20 | = | Glass reinforced at 20 % nominal, |
| A | = | Table A property requirements, |
| 3 | = | 110 MPa tensile strength, min, |
| 1 | = | 6000 MPa flexural modulus, min, |
| 0 | = | Unspecified Izod strength, |
| 4 | = | 160 MPa flexural strength, min, and |
| 2 | = | $1.5 \times 10^3$ kg/m$^3$ density, min. |

If no properties are specified, the designation would be PPS010G20A00000.

NOTE 6—An example of a specification for an unfilled/unreinforced PPS material is given as follows. The designation PPS0000B32030 indicates the following material requirements:

| | | |
|---|---|---|
| PPS0000 | = | unfilled/unreinforced poly(phenylene sulfide), from Table PPS, |
| B | = | Table B property requirements, |
| 3 | = | 60 MPa tensile strength, min, |
| 2 | = | 2000 MPa flexural modulus, min, |
| 0 | = | unspecified Izod strength, |
| 3 | = | 80 MPa flexural strength min, and |
| 0 | = | unspecified. |

If no properties are specified, the designation would be PPS0000B00000.

[4] Available from Underwriters Laboratories (UL), 2600 N.W. Lake Rd., Camas, WA 98607-8542, http://www.ul.com.

[5] Available from National Technical Information Service (NTIS), 5301 Shawnee Rd., Alexandria, VA 22312, http://www.ntis.gov.

[6] Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, http://dodssp.daps.dla.mil.

## 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 is found in Classification System D4000 (Table 3) and shall 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 Table PPS, A, and B, 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. 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 adequate statistically to satisfy the requirements of 12.4.

8.2 A batch or lot shall be constituted as a unit of manufacture as prepared for shipment and may consist of a blend of two or more "production runs."

## 9. Specimen Preparation

9.1 Test specimens for relevant test methods shall be based on the injection molded ISO 3167 Type 1A multipurpose test specimen. The following specimens are to be used for the listed relevant test methods (tolerances are found in ISO 3167). All test specimens are to be tested as molded and conditioned. Annealing is not allowed.

| Test Piece | Relevant Test Method |
|---|---|
| ISO 3167 Type 1A bar | Tensile strength |
| 80 by 10 by 4-mm bar cut from the center portion of ISO 3167 Type 1A | Flexural modulus, Izod impact, Flexural strength |
| Specimen approximately 10 by 10 by 4-mm cut from the center portion of ISO 3167 Type 1A | Density |

9.2 The test specimens shall be prepared by an injection molding process as specified in ISO 294-1 and Practice D3641. Accurate, reproducible settings of the processing parameters are essential to obtain specimens with comparable properties. Processing conditions are:

| | |
|---|---|
| Drying | 2 h at 135°C |
| Plastic melt temperature | 320°C |
| Mold temperature | 140°C |
| Average injection velocity | 275 ± 75 mm/s |

## 10. Conditioning

10.1 Test specimens shall be conditioned for a minimum of 4 h at 23 ± 2°C and 50 ± 10 % relative humidity before performing the required tests.

10.2 Conduct those tests influenced by ambient conditions in the standard laboratory atmosphere of 23 ± 2°C and 50 ± 10 % relative humidity in accordance with Practice D618 (4/23/50).

## 11. Test Methods

11.1 Determine the properties enumerated in this classification system in accordance with the test methods in 2.1.

11.1.1 The number of tests shall be consistent with the requirements of Sections 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 apparent shear viscosity (Test Method ISO 11443) or flow rate (Test Method ISO 1133); reinforcement or filler content (reinforced and filled products only) (Test Method ISO 3451); and, tensile strength (reinforced and filled products only) (Test Method ISO 527).

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).

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, if requested, shall include the results of the most recent periodic-check inspection. If requested, the report shall also include that recycled, reconstituted, recycled-regrind, recovered or reprocessed, or both, poly(phenylene sulfide) plastic was used and the nominal weight percent.

## 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 line callout; plastic materials; poly(phenylene sulfide); recycled

**TABLE PPS Requirements for Poly(Phenylene Sulfide) Materials[A]**

| Group | Description | Class | Description | Grade | Description | Tensile Strength, ISO 527,[B] MPa, min | Flexural Modulus, ISO 178,[C] MPa, min | Notched Izod, ISO 180/1A,[D] kJ/m$^2$, min | Flexural Strength, ISO 178,[C] MPa, min | Density, ISO 1183, g/cm$^3$ |
|---|---|---|---|---|---|---|---|---|---|---|
| 01 | General purpose | 1 | glass reinforced | G40 | 40 % | 105 | 11 500 | 5.0 | 180 | 1.6 to 1.7 |
| | | | | 0 | other | | | | | |
| | | 2 | combinations of fillers and reinforcements | R53 | 53 % | 120 | 13 500 | 3.0 | 210 | 1.5 to 1.8 |
| | | | | R60 | 60 % | 100 | 13 000 | 3.5 | 170 | 1.5 to 2.2 |
| | | | | R66 | 66 % | 85 | 14 500 | 3.0 | 165 | 1.5 to 2.2 |
| | | | | 0 | other | | | | | |
| 0 | Other | 0 | other | 0 | other | | | | | |

[A]It is recognized that detailed test values, particularly Izod impact, do not predict nor even correlate with performance of parts molded under different conditions.
[B]Tensile strength shall be determined using an ISO 3167 Type IA tensile specimen, as described in ISO 527. Crosshead speed shall be 50 mm/min ± 10 % for unreinforced and 5 mm/min ± 25 % for filled and reinforced.
[C]Izod impact shall be determined on Test Method ISO 180 test specimens 80 ± 2 mm by 10 ± 0.2 by 4 ± 0.2 mm cut from the center of an ISO 3167 Type 1A bar.
[D]Flexural modulus and strength shall be determined on Test Method test specimen 80 ± 2 mm by 10 ± 0.2 mm by 4 ± 0.2 mm cut from the center of an ISO 3167 Type 1A bar.

**TABLE A Detail Requirements for Reinforced Poly(Phenylene Sulfide)[A]**

| Designation Order Number | Property | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Tensile Strength, min, MPa ISO 527[C] | unspecified | 60 | 90 | 110 | 130 | 150 | 170 | 190 | 220 | specify value[B] |
| 2 | Flexural Modulus, min, MPa ISO 178[D] | unspecified | 6 000 | 9 000 | 12 000 | 15 000 | 18 000 | 21 000 | 24 000 | 27 000 | specify value[B] |
| 3 | Izod Impact, min, kJ/m$^2$ ISO 180/1A[E] | unspecified | 2.0 | 3.5 | 5.0 | 6.5 | 8.0 | 9.5 | 11.0 | 12.5 | specify value[B] |
| 4 | Flexural Strength, min, MPa ISO 178[D] | unspecified | 80 | 100 | 130 | 160 | 190 | 220 | 250 | 280 | specify value[B] |
| 5 | Density, min, kg/m$^3$ × 10$^{-3}$ ISO 1183 | unspecified | 1.3 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.1 | 2.3 | specify value[B] |

[A]It is recognized that detailed test values, particularly Izod Impact, do not predict nor even correlate with performance of parts molded under different conditions.
[B]If specific value is required, it must appear on the drawing or contract, or both.
[C]Tensile strength shall be determined using an ISO 3167 Type 1A tensile specimen, as described in . Crosshead speed shall be 5 mm/min ± 25 %.
[D]Flexural modulus and strength shall be determined on test specimen 80 ± 2 mm by 10 ± 0.2 mm cut from the center of an ISO 3167 Type 1A bar.
[E]Izod shall be determined on test specimen 80 ± 2 mm by 10 ± 0.2 by 4 ± 0.2 mm cut from the center of an ISO 3167 Type 1A bar.

TABLE B Detail Requirements for Unfilled/Unreinforced Poly(Phenylene Sulfide)[A]

| Order Number | Property | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Tensile Strength, min, MPa ISO 527[C] | unspecified | 20 | 40 | 60 | 80 | 100 | . . . | . . . | . . . | specify value[B] |
| 2 | Flexural Modulus, min, MPa ISO 178[D] | unspecified | 1000 | 2000 | 3000 | 4000 | 5000 | . . . | . . . | . . . | specify value[B] |
| 3 | Izod Impact, min, kJ/m$^2$ ISO 180/1A[E] | unspecified | 1 | 3 | 5 | 7 | 9 | . . . | . . . | . . . | specify value[B] |
| 4 | Flexural Strength, min, MPa ISO 178[D] | unspecified | 40 | 60 | 80 | 100 | 120 | . . . | . . . | . . . | specify value[B] |
| 5 | Unspecified | | | | | | | | | | |

[A] It is recognized that detailed test values, particularly Izod impact, do not predict nor even correlate with performance of parts molded under different conditions.
[B] If specific value is required, it must appear on the drawing or contract, or both.
[C] Tensile strength shall be determined using an ISO 3167 Type 1A tensile specimen, as described in ISO 527. Crosshead speed shall be 50 mm/min ± 10 %.
[D] Flexural modulus and strength shall be determined on test specimen 80 ± 2 mm by 10 ± 0.2 mm by 4 ± 0.2 mm cut from the center of an ISO 3167 Type 1A bar.
[E] Izod impact shall be determined on test specimen 80 ± 2 mm by 10 ± 0.2 by 4 ± 0.2 mm cut from the center of an ISO 3167 Type 1A bar.

## SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall apply only when specified by the inquiry, contract or order, or agencies of the United States Government.

### S1. Special End Uses

S1.1 Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all testing and inspections. Except as otherwise noted, the supplier shall utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the testing or inspections set forth in the specification requirements. This testing assures qualifications on a one time basis unless the manufacture makes a significant change in formulation, raw material or process.

### S2. Physical Requirements

S2.1 The physical and electrical property requirements for initial material qualification are given in Table S2.1 and the test methods in Table S2.2. Unless otherwise stated, the values are minimum requirements.

### S3. Quality Assurance

S3.1 *Acceptable Criteria*—Failure to confirm to requirements in Table S2.1 shall result in rejection of the material.

**TABLE S2.1 Property Values for Initial Physical and Electrical Qualification Testing**

| Property | Units | Type GST-40F |
|---|---|---|
| Flammability | . . . | V-0 |
| Water Absorption | %, max | 0.08 |
| Compressive strength | MPa | 138 |
| Dielectric strength | | |
| Short time test 1 | kV/mm | 12.6 |
| Short time test 2 | kV/mm | 11.8 |
| Tracking index | V | 150 |

S3.2 *Sample Size*—The minimum number of test specimens to be tested shall be as specified in Table S2.2.

S3.3 *Test Method*—Testing shall be in accordance with the methods specified in Table S2.2.

S3.4 *Conditioning*—Standard test specimens shall be conditioned before testing as specified in Table S2.2 and described in Section S4.

### S4. Conditioning

S4.1 *Nomenclature:*

S4.1.1 *Condition A*—As-received.

S4.1.2 *Condition C*—Humidity conditioning.

S4.1.3 *Condition D*—Immersion conditioning in distilled water.

S4.1.4 *Condition E*—Temperature conditioning.

S4.1.5 *Condition des*—Desiccation condition, cooling over silica gel or calcium chloride in a desiccator at 23°C for 16 to 20 h after temperature conditioning.

S4.2 *Designation*—Conditioning procedures shall be designated as follows:

S4.2.1 A capital letter indicating the general conditioning,

S4.2.2 A number indicating the duration of conditioning, h,

S4.2.3 A number indicating the conditioning temperature, °C, and

S4.2.4 A number indicating the relative humidity when it is controlled.

S4.3 *Tolerances:*

S4.3.1 *Relative Humidity*—Standard tolerance shall be ±10 %.

S4.3.2 *Temperature*—Standard tolerance shall be ±2°C. For water immersion the standard tolerance shall be ±1°C.

**TABLE S2.2 Sampling and Conditioning for Initial Qualification Testing**

| Property to be Tested | Test Method | Test Method Modified Per | Specimens | Number Tested | Conditioning | Units |
|---|---|---|---|---|---|---|
| Flammability | UL 94 | . . . | 125 by 13 mm by thickness | 10 | per UL 94 | per UL 94 |
| Compressive strength | ISO 604 | . . . | 25 by 10 by 4 mm | 5 | E-48/50+C-96/23/50 | Percent (max. average) |
| Water absorption | ISO 62 | . . . | 50 mm disk, 3 mm thick | 3 | E-24/100+des+D-48/50 | Percent (max. average) |
| Dielectric strength: | IEC 60243 | S5.1 | 60 by 60 by 2 mm | 3 | | kV/mm |
| Short-time test | | | plaque | 3 | E-48/50+C-96/23/50 | (min average) |
| Short-time test | | | | | E-48/50+D-48/50 | |
| Tracking index | IEC 60112 | . . . | 80 by 10 by 4 mm | 4 | A | V |

NOTE S4.1—The numbers shall be separated from each other by slant (/) marks, and from the capital letter by a dash (-). A sequence of conditions shall be denoted by use of a plus (+) sign between successive conditions.

Examples: C-96/23/50 Humidity condition; 96 h at 23°C and 50 % RH.
D-48/50 Immersion condition; 48 h at 50°C.
E-48/50 Temperature condition; 48 h at 50°C.

## S5. Test Method Modification

S5.1 *Dielectric Strength:*

S5.1.1 The test shall be performed under oil at a frequency not exceeding 100 Hz at the temperature of the final conditioning.

S5.1.2 *Short-Time Test*—The voltage shall be increased uniformly at the rate of 500 V/s.

## S6. Toxicity Requirements

S6.1 Thermoplastic molding compounds shall be tested for toxicity in accordance with NTIS AD297457. Specimens shall meet the requirements in Table S6.1, expressed as the maximum level permissible.

**TABLE S6.1 Toxicity When Heated**

| Compounds | Units | Type GST-40F |
|---|---|---|
| Carbon Dioxide | ppm | 1500 |
| Carbon Monoxide | ppm | 200 |
| Ammonia | ppm | 100 |
| Aldehydes as HCNO | ppm | 20 |
| Cyanide as HCN | ppm | 0 |
| Oxides of Nitrogen as $NO_2$ | ppm | 25 |
| Hydrogen Chloride | ppm | 0 |

# APPENDIX

**(Nonmandatory Information)**

## X1. CROSS REFERENCE FROM MIL-P-46174(MR) AND MIL-M-24519 TO CLASSIFICATION D4000 AND D6358

X1.1 This specification contains pertinent specification items from MIL-P-46174(MR) and MIL-M-24519, for plastic molding material, poly(phenylene sulfide), glass reinforced.

NOTE X1.1—MIL-P-46174 (MR) has been cancelled and information included here is for historical reference only.

X1.2 These military specifications are based on prior Specification D4067 test protocols and not on the test protocols in this classification system. The following cross-reference designations are believed to accurately provide comparable callout information relative to the intent of the designated military specifications. It is recommended that someone knowledgeable in the requirements of the military specifications review this information before use.

X1.3 Should additional property requirements need to be specified, appropriate suffixes are to be used as needed.

| ASTM D6358 | MIL-M-24519 |
|---|---|
| PPS011G40A33443 | GST-40F |

| ASTM D6358 | MIL-P-46174(MR) |
|---|---|
| PPS0110G15A21221 | CLASS 15 GRADE A |
| PPS0110G15A21221 EA117ED041EE020 | CLASS 15 GRADE E |
| PPS0110G30A32332 | CLASS 30 GRADE A |
| PPS0110G30A32332 EA117ED041EE020 | CLASS 30 GRADE E |
| PPS0110G40A33443 | CLASS 40 GRADE A |
| PPS0110G40A33443 EA117ED041EE020 | CLASS 40 GRADE E |
| PPS0110G50A44454 | CLASS 50 GRADE A |
| PPS0110G50A44454 EA117ED041EE020 | CLASS 50 GRADE E |

## SUMMARY OF CHANGES

Committee D20 has identified the location of selected changes to this standard since the last issue (D6358 - 06) that may impact the use of this standard. (December 1, 2011)

*(1)* The title was changed to conform to D5740, Standard Guide for Writing Material Standards in the Classification D4000 Format.
*(2)* Permissive language was removed throughout the standard.
*(3)* Editorial changes were made to clarify sections of this standard.
*(4)* "Designation" and "classification" were changed to "specification", where applicable, to be in agreement with D5740 and 1.3 of this standard.
*(5)* Note 1 was changed to recognize the new ISO standard for PPS.
*(6)* Section 2: ASTM methods that are not applicable because this standard is based on ISO methods were removed and applicable ISO standards were added.
*(7)* Section 9: "Test pieces" was changed to "test specimens."
*(8)* Section10: The relative humidity range was changed from ±5 % to ±10 % to agree with D618.
*(9)* Note 6: "Flexural modulus" was corrected to "tensile strength" in accordance with Table B.
*(10)* Table PPS was corrected from Group "0" to Group "00."