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Standard Guide for Reporting Properties for Plastics and Thermoplastic Elastomers[1]

This standard is issued under the fixed designation D6436; 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 recommendations for reporting the property values of plastics and thermoplastic elastomers in published literature, data sheets, presentations, comparative analysis, and so forth. It is intended to minimize confusion when comparing the data from several sources.

1.2 This standard is not intended to replace recommendations within the test methods for reporting data. Refer to the test method or use other guidance to determine the number of significant figures for reporting laboratory test results.

NOTE 1—There is no known ISO equivalent to this standard.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 Because of the large number of ASTM test methods referenced in this guide, they will not be identified individually in this section.

2.2 *ASTM Standards:*[2]

D883 Terminology Relating to Plastics

D1600 Terminology for Abbreviated Terms Relating to Plastics

IEEE/ ASTM SI-10 Standard for Use of the International System of Units (SI): The Modern Metric System

2.3 *NFPA Standard:*

NFPA 99 Standard for Health Care Facilities[3]

3. Terminology

3.1 *Definitions*—The terminology used in this guide is in accordance with Terminologies D883, D1600, and IEEE/ ASTM SI-10.

4. Significance and Use

4.1 This guide is intended to provide ready access to the recommended property name, test method reference, maximum number of significant digits,[4] and appropriate units for commonly used plastics and thermoplastic elastomer tests.

4.2 It is particularly useful for those involved in the writing and proofreading of documents containing data for a large number of tests since the need to go to each individual test method should be greatly minimized.

4.3 SI units are to be regarded as standard. U.S. Customary units and conversion factors are provided to accommodate those situations where it is necessary to report both. U.S. Customary refers to units commonly used in the United States and is not always the same as inch-pound units.

5. Procedure

5.1 Refer to Table 1 for the recommended nomenclature and units for physical properties and the recommended number of significant digits for test data associated with each property.

5.2 Abbreviations not shown in Table 1 that may be necessary to further clarify the conditions of testing, such as MHz and kHz for electrical tests, can be found in IEEE/ ASTM SI-10.

6. Keywords

6.1 conversion factors; decimal places; properties reporting; reporting guide; significant figures

[1] This guide is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.15 on Thermoplastic Materials.

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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] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, http://www.nfpa.org.

[4] The recommended maximum number of significant digits is based on experience of experts in the plastics industry.

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

TABLE 1 Reference Guide for Properties Reported

Property Reported	Units, SI (U.S. Customary)	ASTM Test Method	Maximum Number of Significant Digits	Conversion Factor (CV) (SI × CV = U.S. Customary)
Arc Resistance	s (s)	D495	2	1
Bulk Density	kg/m^3 (lb/ft^3)	D1895	3	0.06242
Charpy Impact Resistance of Notched Specimens	J/m (ft × lbf/in.)	D6110	3	0.01873
Coefficient of Friction	—	D1894	2	—
Coefficient of Linear Thermal Expansion	mm/mm × °C (in./in. × °F)	D696	2 (expressed in scientific notation)	0.5556
Color, CIE, L*, a*, b*	—	E308	3	—
Crystalline Peak Melting Point (T_m) 2nd Heating Cycle	°C (°F)	D3418	3	(°C × 1.8) + 32
Dart Impact	g (g)	D1709	2 (1 if value is <100)	1
Deflection Temperature @ 1.82 MPa (264 psi) @ 0.455 MPa (66 psi)	°C (°F)	D648	3	(°C × 1.8) + 32
Density	kg/m^3 (g/cm^3) g/cm^3 (g/cm^3) g/cm^3 (g/cm^3)	D792 D1505 D4883	3 3 3	0.001 1 1
Dielectric Strength (Specify Method Used)	V/mm (V/mil)	D149	3	0.0254
Dissipation Factor (Specify Test Frequency)	—	D150	2	—
Durometer Hardness Shore A Shore D	—	D2240	2	—
Elmendorf Tear Resistance	N (gf)	D1922	3	102
Elongation @ Break	% (%)	D638 D882 D412	2 2 2	1 1 1
Elongation @ Yield	% (%)	D638 D882 D412	2 2 2	1 1 1
Flammability	cm/min (in./min)	D635	2	0.394
Flexural Modulus	MPa (10^5 psi)	D790	3	0.001450
Flexural Modulus, ___% Secant	MPa (10^5 psi)	D790	3	0.001450
Flexural Strength	MPa (psi)	D790	3	145.0
Flexural Yield Strength	MPa (psi)	D790	3	145.0
Flow Rate, Condition ___°C/___kg	g/10 min (g/10 min)	D1238	2	1
Gardner Impact Strength @ F_{50}	J (in. × lbf)	D5420	2	8.851
Gas Permeability, CO_2	cm^3 × mm/m^2 × 24 h × atm (cm^3 × mil/100 in.^{2} × 24 h × atm)	D1434	2	2.54
Gas Permeability, O_2	cm^3 × mm/m^2 × 24 h × atm (cm^3 × mil/100 in.^{2} × 24 h × atm)	D3985	2	2.54
Gas Transmission Rate, CO_2	cm^3/m^2 × 24 h × atm (cm^3/100 in.^{2} × 24 h × atm)	D1434	2	0.06452
Gas Transmission Rate, O_2	cm^3/m^2 × 24 h × atm (cm^3/100 in.^{2} × 24 h × atm)	D3985	2	0.06452
Glass Transition Temperature (T_g)	°C (°F)	D3418	3	(°C × 1.8) + 32

TABLE 1 *Continued*

Property Reported	Units, SI (U.S. Customary)	ASTM Test Method	Maximum Number of Significant Digits	Conversion Factor (CV) (SI × CV = U.S. Customary)
Gloss @ ___°	—	D2457	3	—
Haze	% (%)	D1003	2	1
Heat of Fusion	kJ/kg (cal/g)			
1st Heating Cycle		E793	2	0.2388
2nd Heating Cycle		D3417	2	0.2388
Impact Resistance (Puncture), Energy @ Maximum Load	J (ft × lbf)	D3763	2	0.7376
Impact Resistance of Plastic Film, Energy to Rupture	J (ft × lbf)	D4272	2	0.7376
Izod Pendulum Impact Resistance	J/m (ft × lbf/in.)	D256	3	0.01873
Light Transmission	% (%)	E308	2	1
Melt Density @ ___°C	kg/m^3 (g/cm^3)	D3835 D1238 (Note A, Table 2)	3	0.001
Mold Shrinkage	mm/mm (in./in.)	D955	3	1
Oxygen Index	% (%)	D2863	2	1
Permittivity (Dielectric Constant) (Specify Test Frequency)	—	D150	2	—
PPT Tear Resistance	N (lbf)	D2582	2	0.2248
Refractive Index, n_D	—	D542	4	—
Rockwell Hardness (Specify Scale)	—	D785	3	—
Soluble Matter Loss	% (%)	D570	2	1
Specific Gravity	—	D792	3	—
Specific Heat @ ___°C (°F)	kJ/kg × K (cal/g × °C or Btu/lb × °F)	E1269	3	(cal/g × °C) 0.2388 (Btu/lb × °F) 0.2388
Static Decay Rate	s (s)	D4470 NFPA 99	3	1
Surface Resistivity	ohms/square (ohms/square)	D257	2 (expressed in scientific notation)	1
Tear Propagation Resistance, Split-Tear Method	N (lbf) N/mm (lbf/in.)	D1938	2 2	0.2248 5.710
Tear Propagation Resistance (Specify Specimen Type)	N/mm (lbf/in.)	D624	3	5.710
Tensile Modulus	MPa (10^5 psi) MPa (10^5 psi) MPa (10^5 psi)	D638 D882 D412	3 3 3	0.001450 0.001450 0.001450
Tensile Modulus, __% Secant	MPa (10^5 psi) MPa (10^5 psi) MPa (10^5 psi)	D638 D882 D412	3 3 3	0.001450 0.001450 0.001450
Tensile Stress @ Break	MPa (psi) MPa (psi) MPa (psi)	D638 D882 D412	3 3 3	145.0 145.0 145.0
Tensile Stress @ Yield	MPa (psi) MPa (psi) MPa (psi)	D638 D882 D412	3 3 3	145.0 145.0 145.0