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Standard Guide for Identification of Metals and Alloys in Computerized Material Property Databases[1]

This standard is issued under the fixed designation E1338; 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 covers the identification of metals and alloys in computerized material property databases. It establishes essential and desirable data elements that serve to uniquely identify and describe a particular metal or alloy sample as well as properties that identify a given metal or alloy in general.

1.1.1 This guide does not necessarily provide sufficient data elements to describe weld metal, metal matrix composites, or joined metals.

1.1.2 The data element identified herein are not all germane to every metal or alloy group.

1.1.3 Different sets of data elements may also be applied within a given metal or alloy group depending on conditions or applications specific to that metal or alloy group. Further, within a particular metal or alloy group, different sets of data elements may be used to identify specific material conditions.

1.1.4 Table 1 on Recommended Data Elements and Tables 2-17 on values for specific data elements appear at the end of this guide.

1.2 Some of the data elements in this guide may be useful for other purposes. However, this guide does not attempt to document the essential and desirable data element for any purpose except for the identification of metals and alloys in computerized material property databases. Other purposes, such as material production, material procurement, and material processing, each may have different material data reporting requirements distinct from those covered in this guide. A specific example is the contractually required report for a material property testing series. Such a report may not contain all the data elements considered essential for a specific computerized database; conversely, this guide may not contain all the data elements considered essential for a contracted test report.

1.3 Results from material tests conducted as part of the procurement process are often used to determine adherence to a specification. While this guide includes a number of test result data elements, such data elements are included in this guide only for the purposes of material identification.

1.4 Reporting of contracted test results, such as certification test results, shall follow the requirements described in the material specification, or as agreed upon between the purchaser and the manufacturer.

1.5 This guide contains a limited number of data elements related to material test results. These data elements are for material identification purposes and are not intended to replace the more detailed sets of data elements listed in guides such as Guide E1313 covering data recording formats for mechanical testing of metals. For material identification purposes, the data elements in this guide include typical, nominal, or summary properties normally derived from a population of individual specimen tests. If warranted by the scope of a particular database system, the system might provide links between the material identification data elements given in this guide, and the individual specimen test results recorded in accordance with other guides corresponding to particular test methods.

1.6 *Material Classes*—See ANSI/AWS A9.1-92 for arc welds, Guide E527 for Metal and Alloys in the Unified Numbering System (UNS), Guide E1308 for polymers, Guide E1309 for composite material, and Guide E1471 for fibers, fillers, and core materials.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E8 Test Methods for Tension Testing of Metallic Materials

E8M Test Methods for Tension Testing of Metallic Materials [Metric] (Withdrawn 2008)[3]

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E616 Terminology Relating to Fracture Testing (Discontinued 1996) (Withdrawn 1996)[3]

[1] This guide is under the jurisdiction of ASTM Committee B08 on Metallic and Inorganic Coatings and is the direct responsibility of Subcommittee B08.01 on Ancillary Activities. This guide was developed in cooperation with Committee B07 on Light Metals and Alloys.

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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.

TABLE 1 Recommended Data Elements for the Identification of Metals and Alloys

Number[A]	Data Element Descriptive Name	Data Type	Category Set, Value Set, or Units
	Primary Identifiers		
1	Material class	String	metal
2	Family name	String	Category set in Table 2
3	Family subclass	String	Value set in Table 3
4[B]	Common name[C]	String	
5	Application group[C]	String	
6	Product group[C]	String	
	Material Specification[C]		
7[B]	UNS Number	String	Category set defined in Practice E527
8[B]	Specification organization	String	
9[B]	Specification number	String	
10[B]	Specification version	String	
11[B]	Designation keyword[C]	String	Category set in Table 4
12[B]	Designation value[C]	String	
	Composition Requirements[C]		
13	Element symbol	String	IUPAC symbol(s)
14	Fraction type	String	mass, volume, or mole
15	Composition units	String	% or ppm
16	Minimum specified composition	Real	
17	Maximum specified composition	Real	
	Mechanical Properties Requirements		
	Tensile Test Requirements[C]		
18	Orientation of tensile specimen for certification	String	Value set in Table 5
19	Location of tensile specimen for certification	String	Values set in Table 6
20	Tensile test temperature for certification	Real	°C (°F)
21	Minimum ultimate tensile strength	Real	MPa (ksi)
22	Maximum ultimate tensile strength	Real	MPa (ksi)
23	Minimum yield strength	Real	MPa (ksi)
24	Maximum yield strength	Real	MPa (ksi)
25	Yield strength determination method	String	Category set in Table 7
26	Yield strength offset or extension	Real	%
27	Minimum elongation	Real	%
28	Maximum elongation	Real	%
29	Original gage length	Real	mm (in.)
30	Minimum reduction of area	Real	%
31	Maximum reduction of area	Real	%
	Hardness Requirements[C]		
32	Location of hardness measurement for certification	String	Value set in Table 6
33	Minimum hardness	Real	
34	Maximum hardness	Real	
35	Hardness scale	String	Category set in Table 8
	Charpy Impact Energy to Fracture Requirements[C]		
36	Location of Charpy specimen for certification	String	Value set in Table 6
37	Temperature of Charpy test for certification	Real	°C (°F)
38	Minimum Charpy impact energy	Real	J (ft-lbf)
39	Maximum Charpy impact energy	Real	J (ft-lbf)
	Primary Material Producer		
40	Original producer	String	
41	Country of origin	String	
42	Producer's facility	String	
43	Production date	Date	
44	Primary process type	String	
45	Melt practice	String	Value set in Table 9
46	Cast practice	String	Value set in Table 10
47[B]	Heat number	String	
	Material Processing[C]		
48	Processor's name	String	
49	Processor's country	String	see ISO 3166
50	Processor's facility name	String	
51	Processor's assigned production date	Date	
52[B]	Process type	String	
53	Process lot number	String	
	Heat Treatment[C]		
54	Thermal step type	String	
55	Time of thermal step	Real	h
56	Thermal step temperature	Real	°C (°F)
57	Heating environment	String	Values set in Table 11
58	Heating rate	Real	°C/h (°F/h)
59	Cooling environment	String	Value set in Table 12
60	Cooling rate	Real	°C/h (°F/h)
	Product Detail		
61	Product forming method	String	Value set in Table 13
62	Product identifier	String	
63	Product shape	String	Value set in Table 14