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Standard data element types with associated classification scheme for electric components –

Part 1: Definitions – Principles and methods

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Standard data element types with associated classification scheme for electric components –

Part 1: Definitions – Principles and methods

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

STANDARD DATA ELEMENT TYPES WITH ASSOCIATED CLASSIFICATION SCHEME FOR ELECTRIC COMPONENTS –

Part 1: Definitions – Principles and methods

FOREWORD

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International Standard IEC 61360-1 has been prepared by subcommittee 3D: Data sets for libraries, of IEC technical committee 3: Information structures, documentation and graphical symbols.

This consolidated version of IEC 61360-1 consists of the second edition (2002) [documents 3D/93/FDIS and 3D/96/RVD] and its amendment 1 (2003) [documents 3D/120/FDIS and 3D/127/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 2.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

Annexes A, B and C form an integral part of this standard.

Annex D is for information only.

IEC 61360 consists of the following parts, under the general title *Standard data element types with associated classification scheme for electric components*

– Part 1: Definitions – Principles and methods
– Part 2: EXPRESS dictionary schema
– Part 3: Maintenance and validation procedures
– Part 4: IEC reference collection of standard data element types, component classes and terms
– Part 5: Extensions to the EXPRESS dictionary schema [1)]

The committee has decided that the contents of the base publication and its amendment 1 will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

1) To be published.

STANDARD DATA ELEMENT TYPES WITH ASSOCIATED CLASSIFICATION SCHEME FOR ELECTRIC COMPONENTS –

Part 1: Definitions – Principles and methods

1 General

1.1 Scope and object

This part of IEC 61360 provides a firm basis for the clear and unambiguous definition of characteristic properties (data element types) of all elements of electrotechnical systems from basic components to subassemblies and full systems. Although originally conceived in the context of providing a basis for the exchange of information on electric/electronic components, the principles and methods of this standard may be used in areas outside the original conception such as assemblies of components and electrotechnical systems and subsystems.

In addition, the standard provides for establishing a classification hierarchy and the allocation of applicable and relevant properties to each of the classes so established in order to describe fully the characteristics of objects belonging to that class.

Use of this standard facilitates the exchange of data describing electrotechnical systems through a defined structure for the information to be exchanged in a computer-sensible form. Each property to be exchanged will have an unambiguously defined meaning and consistent naming, where relevant a defined value list, a prescribed format and defined units of measure for all quantitative values. There is also provision for

– control of changes to definitions of the properties through version and revision numbers;
– inclusion of notes and remarks to clarify and help in the application of the definitions;
– indication of the sources of definitions and value lists;
– associated figures and formulae.

1.2 ISO/IEC EXPRESS information model

Closely associated with this part of IEC 61360 is IEC 61360-2. This part contains the information model, using the EXPRESS modelling language. In this model, the definition and structure of IEC 61360-1 is formalized and presented in a computer-sensible form. Use of this information model allows dictionary information to be exchanged between different systems using the STEP Physical File Format as defined in ISO 10303-21.

This information model has also been accepted as the common information model and is reproduced as ISO 13584-42. Use may be made of other standards in the ISO 13584 series of standards for extension of the concepts defined in this standard. In particular ISO 13584-24 contains provisions which allow

– extensions of the class structure to include feature and functional model classes;
– tabulation of properties;
– functional relationships among properties;
– references to graphical information;
– structuring of parts libraries.

1.3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60191-4:1999, *Mechanical standardization of semiconductor devices – Part 4: Coding system and classification into forms of package outlines for semiconductor device packages*

IEC 60747 (all parts), *Semiconductor devices – Discrete devices*

IEC 60748 (all parts), *Semiconductor devices – Integrated circuits*

IEC 61360-2: 2002, *Standard data element types with associated classification scheme for electric components – Part 2: EXPRESS dictionary schema*

IEC 61360-4:1997, *Standard data element types with associated classification scheme for electric components – Part 4: IEC reference collection of standard data element types, component classes and terms*

ISO/IEC 646:1991, *Information technology – ISO 7-bit coded character set for information interchange*

ISO/IEC 6429:1992, *Information technology – Control functions for coded character sets*

ISO/IEC 10646-1:2000, *Information technology – Universal Multiple-Octet Coded Character Set (UCS) – Part 1: Architecture and Basic Multilingual Plane*

ISO/IEC 11179-3:1994, *Information technology – Specification and standardization of data elements – Part 3: Basic attributes of data elements*

ISO 31 (all parts), *Quantities and units*

ISO 843:1997, *Information and documentation – Conversion of Greek characters into Latin characters*

ISO 2382 (all parts), *Information technology – Vocabulary*

ISO 6093:1985, *Information processing – Representation of numerical values in character strings for information interchange*

ISO 9735:1988, *Electronic data interchange for administration, commerce and transport (EDIFACT) – Application level syntax rules*

ISO 10303-21:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 21: Implementation methods: Clear text encoding of the exchange structure*

ISO 13584-24, *Industrial automation systems and integration – Parts library – Part 24: Logical resources: Logical model of supplier library*[2)]

ISO 13584-42:1998, *Industrial automation systems and integration – Parts library – Part 42: Description methodology: Methodology for structuring part families*

2) To be published.

2 Definitions

For the purpose of this part of IEC 61360, the following definitions apply.

2.1
entity
any concrete or abstract object of interest, including relations among things

2.2
relation
observed connection between entities

2.3
data element type
unit of data for which the identification, description and value representation have been specified

2.4
data element type class
class of data element types with the same type of representation, or description or value representation

2.5
quantitative data element type
data element type with a numerical value representing a measurable physical quantity, a quantity of information or a count of objects

2.6
non-quantitative data element type
data element type which identifies or describes an object by means of codes, abbreviations, names, references or descriptions

2.7
condition data element type
kind of data element type whose value affects the value of another data element type

NOTE 1 A condition data element type has only a meaning when it is used in combination with another data element type.

NOTE 2 A condition data element type does not form part of the classification tree and can be used on every level of the classification.

2.8
classifying data element type
data element type applicable for a particular component class, addressing a single elementary attribute of that component and having a homogeneous complementary value list, whose values define the component subclasses

2.9
classification
systematic division of a set of items into subsets according to their difference in some predetermined characteristics

2.10
attribute
any one of the properties to describe an entity, possibly involving one or more other entities

2.11
product
result of labour or of a natural or industrial process

2.12
component
industrial product which serves a specific function or functions, which is not decomposable or physically divisible and which is intended for use in a higher order assembled product

2.13
electric component
component with conductive terminals through which voltages or currents may be applied or delivered

NOTE Electric components and electric transducers are included in this definition.

2.14
component class
set of components of which each component can be described by the same group of data element types

2.15
material
basic matter (such as metal, wood, plastic, fibre) from which the greater part of something physical is made

2.16
feature
generalized property described by a group of related properties

2.17
geometry
a surface shape (as of a mechanical part or a crystal)

2.18
computer-sensible information
information which can be exchanged and manipulated with the interactive use of computer systems, programs and procedures

2.19
applicable data element type
data element type that is defined for a component class and which applies to all components belonging to that class

2.20
visible data element type
data element type that is defined for a component class but which may or may not apply to any component belonging to that class

NOTE 1 The code of the class where a data element type is defined as visible is part of the identification of this data element type.

NOTE 2 Within the IEC, all data element types are defined as visible at the level of the root class, that is the superclass of the component class, material class and geometry class.

2.21
shape
external form of a component package as given by the set of data element types

2.22
outline style
physical information enclosing the apparently plane figure presented by any object to sight, contour and/or external boundary of a component

2.23
package
term applied to an electric or electromechanical component which covers the physical outline of the component, including terminals and any protective material or casing

2.24
drawing
a drawing illustrates the meaning of a group of data element types describing the geometrical characteristics of a component

3 Data element type specification attributes

In this clause the various attributes of data element types as encountered in the specifications are explained. For a list of these attributes, see table 1. These attributes are related to identification, description, value of data element types and relationships between data element types.

Table 1 – List of attributes of data element types

Attributes	Subclause
Code	3.2.1
Version number	3.2.2
Revision number	3.2.3
Preferred name	3.2.4
Synonymous name	3.2.5
Short name	3.2.6
Preferred letter symbol	3.2.7
Synonymous letter symbol	3.2.8
Definition	3.3.1
Note	3.3.2
Remark	3.3.3
Formula	3.3.4
Figure	3.3.5
Source document of data element type definition	3.3.6
Data type	3.4.1
Value format	3.4.2
Unit of measure	3.4.3
Value list	3.4.4
Value	3.4.4.1
Value code	3.4.4.2
Value meaning	3.4.4.3
Source document(s) of value list(s)	3.4.4.4
Referenced class identifier	3.4.5
Condition data element type	3.5.1
Data element type class	3.5.2

For the representation of the attributes of the data element types, in general upper-case letters and lower-case letters are used according to the existing international standards from which the attributes are taken. When no standard exists, the commonly used IEC methodology is followed (IEC 60027 and IEC 60748). Characters are compliant with the character set as defined in annex A.

3.1 Information model of a data element type

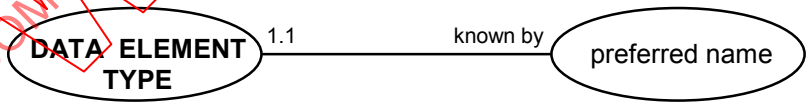
Based on the principles as described in ISO/IEC 11179-3, the attributes of a data element type are divided into four main groups:

– identifying related attributes;
– semantic related attributes;
– value related attributes;
– relationship attributes of a data element type related to relations among entities.

In the following subclauses, the attributes are specified and clarified by the information models.

The information models (entity-relation diagrams), given in figures 2, 3, 4, 5 and 6, of a data element type shall be read as follows:

– from inside outwards starting with the entity in bold capital letters;
– (related) entities are indicated by ellipses;
– relation between an entity and an (related) entity is indicated by the line between those ellipses;
– text accompanying the line between an entity and an (related) entity describes the relation;
– the combination of a relation and an entity constitutes the attribute of a data element type;
– two figures separated by a dot indicate the occurrence of the attribute: the first digit indicates the minimum number of occurrences, the second one, the maximum number of occurrences;
– relations and the corresponding occurrence indications are on the same side of the relation-line positioned;
– in the information models the name of the entities shall be given in capitals and the name of the related entities shall be given in lower case.



Entity:	DATA ELEMENT TYPE
Relation:	known by
Related entity:	preferred name
Attribute:	known by preferred name
	NOTE The attribute is composed of the relation and the relevant entity.
Cardinality:	1.1 (one and not more than one)

Figure 1 – Information model principle

3.2 Identifying attributes

To identify a data element type uniquely within the IEC reference collection, IEC 61360-4 and, for electronic information exchange, a language independent combination of characters shall be used.

The identifier of a data element type shall consist of the combination of the six-character data element type code, followed by a hyphen followed by the three-digit version number of the data element type. The identifier shall be used for the identification of different occurrences of the same data element type code.

Figure 2 shows the possible attributes of a data element used to identify a data element type.

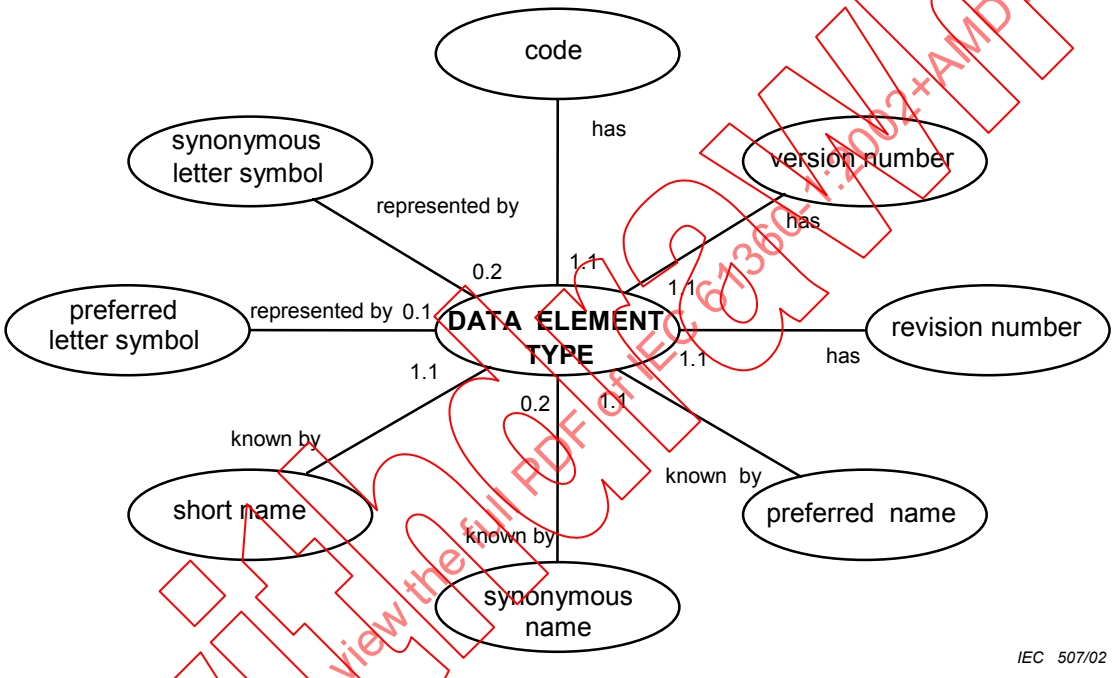


Figure 2 – Identifying attributes for data element type

3.2.1 Code

Attribute name:	code
Attribute definition:	unique six-character code of a data element type
Comments:	the first three characters shall be alphabetic, the last three numeric (format AAANNN). The character "X" [3] shall not be used as first character. The codes are issued sequential and should not have any relationship with the meaning of the data element types. In case of at least one attribute of the data element type, which affects the meaning and or communication of the data element type is changed, a new (other) data element type, having a new code, shall be defined. Such attributes are: – definition; – unit of measure; – condition data element type; – value format; – value code [4] – data type
Obligation:	mandatory
Character type of values:	upper-case latin letters A through Z (to avoid misunderstanding, the upper-case Latin letters O and I shall not be used) digits 0 through 9

3.2.2 Version number

Attribute name:	version number
Attribute definition:	number used to control the versions of a data element type
Comments:	the version number of a data element type shall consist of three digits [5]. Consecutive version numbers shall be issued in ascending order. A new version of the data element type shall be generated if at least one attribute of the data element type is changed which affects the use (communication, data base definition, etc.) but which does not affect the meaning of that data element type. Those attributes which, when changed, will result in a version change are: – preferred name – preferred letter symbol – component class (see super/subclass as described in figure 10) – value meaning – short name – preferred name of condition – data element type – value code – reference class identifier – note
Obligation:	mandatory
Character type of values:	digits 0 through 9

[3] For local or private use within users' environment, codes starting with XAA up to and including codes starting with XZZ, may be used and are therefore excluded from the IEC reference collection of standard data element types (IEC 61360-4).

[4] Whether the code should be changed, so that a new data element type is generated, or whether the version number of a data element type should be changed, is to be determined for each case separately.

[5] Although the common ISO/IEC EXPRESS information model allows more digits, within the IEC system only three digits are to be used.

3.2.3 Revision number

Attribute name:	revision number
Attribute definition:	number used for administrative control of a data element type
Comments:	the revision number of a data element type occurrence shall consist of two digits. Consecutive revision numbers shall be issued in ascending order. Per data element type, unique by its identifier, only one revision number is current at any moment. A new revision number of a data element type shall be generated if an attribute of the data element type is changed which neither affects the use (communication, data base definitions etc.) nor the meaning of the data element type, or when editorial changes of typing and spelling errors have been implemented. Those attributes which, when changed, will result in a revision change are: – synonymous name – synonymous letter symbol – remark – data element type class – formula – source document of DET definition – source document of value list – spelling error in the text of the definition – figure The revision number shall be reset to the starting number 01 when the version number is changed.
Obligation:	mandatory
Character type of values:	digits 0 through 9

3.2.4 Preferred name

Attribute name:	preferred name
Attribute definition:	single-word or multi-word designation assigned to a data element type
Comments:	the preferred name of a data element type shall be identical to the name as used in international standards, if available. The length of the preferred name shall be limited to 70 characters
Obligation:	mandatory
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.2.5 Synonymous name

Attribute name:	synonymous name
Attribute definition:	single-word or multi-word designation that differs from the given preferred name but represents the same data element type concept
Comments:	the number of synonymous names shall be limited to two. For pragmatic reasons, the length of the synonymous name shall be limited to 70 characters
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.2.6 Short name

Attribute name:	short name
Attribute definition:	shortened representation of the preferred name of the data element type
Comments:	the first character of the short name shall be a letter: – preceded by a "@" character for a condition data element type – preceded by a "$" character when defining a specific Greek letter (if applicable the "@" character precedes the "$" character). – For quantitative data element types, the short name shall be derived from the preferred letter symbol in compliance with the following rules: – Greek letters that are graphically identical to Latin letters are not converted; – specific Greek letters shall be represented by a single Latin letter according table 2 (ISO 843, table 1). For retranslation the translated Greek letters shall be preceded by a dollar "$" character; – superscripts shall be indicated by Latin letter(s) preceded by an asterisk "*" character; – Example: letter symbol: α^b ----->> short name: $a*b – subscripts shall be indicated by Latin letter(s) preceded by an underline "_" character; – Example: λ_{peak} ------>> short name: $l_peak – thru scripts shall be placed next to the main character; – Example: letter symbol: â ---->> short name: a^ – For non-quantitative data element types, the short name shall be a short representation of the preferred name. The length of the short name of a data element type shall be limited to 17 characters. This short name shall be unique within each component class
Obligation:	mandatory
Character type of values:	conforming with the character set of ISO/IEC 10646-1

Table 2 – Transliteration

	Greek character		Latin character	
	Upper case	Lower case	Upper case	Lower case
1	Α	α	A	a
2	Β	β	B	b
3	Γ	γ	G	g
4	Δ	δ	D	d
5	Ε	ε	E	e
6	Ζ	ζ	Z	z
7	Η	η	I	I
8	Θ	θ	TH	th
9	Ι	ι	*f* or I6	*f* or i6
10	Κ	κ	K	k
11	Λ	λ	L	l
12	Μ	μ	M	m
13	Ν	ν	N	n
14	Ξ	ξ	X	x
15	Ο	ο	O	o
16	Π	π	P	p
17	Ρ	ρ	R	r
18	Σ	σ, ς	S	s, s
19	Τ	τ	T	t
20	Υ	υ	Y	y
21	Φ	φ	F	f
22	Χ	χ	CH	ch
23	Ψ	ψ	PS	ps
24	Ω	ω	σ or O6	O or o6
NOTE In case the character set does not support the overline character, the apostrophe character is to be used instead of the overline character.				

3.2.7 Preferred letter symbol

Attribute name: preferred letter symbol

Attribute definition: mark or characters used as a sign for expressing an object, for example the characters standing for chemical elements in the periodic system (Ag = silver) or the characters standing for electrical concepts (f = frequency, T_{amb} = ambient temperature)

Comments: the preferred letter symbol of a data element type shall be identical to the letter symbol of IEC 60027, IEC 60747 or IEC 60748. The first character of the preferred letter symbol of a condition data element type shall be a "@"

Obligation: optional

Character type of values: those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.2.8 Synonymous letter symbol

Attribute name:	synonymous letter symbol
Attribute definition:	mark or characters used as a sign for expressing some object that differs from the preferred letter symbol but represents the same data element type concept
Comments:	synonymous letter symbols are sometimes inevitable for historical reasons. The number of synonymous letter symbols shall be limited to two. The first character of the synonymous letter symbol of a condition data element type shall be a "@" The length of the synonymous letter symbol shall be limited to 17 characters
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.3 Semantic attributes

Figure 3 shows the possible attributes of a data element type used to clarify the semantics of a data element type.

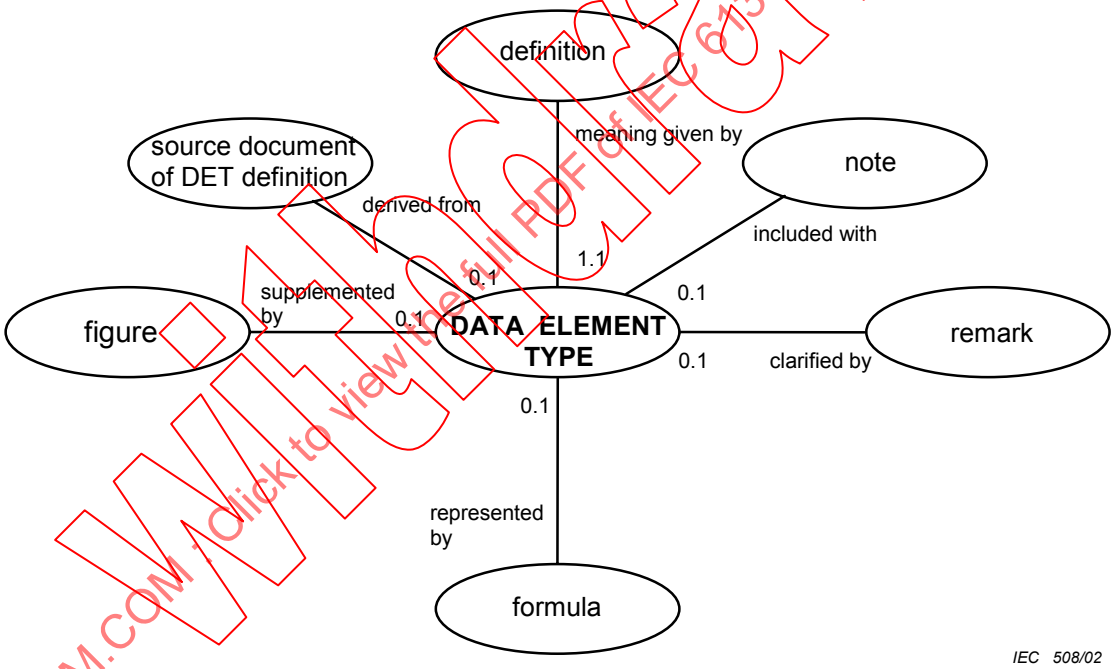


Figure 3 – Semantic attributes for data element type

3.3.1 Definition

Attribute name:	definition
Attribute definition:	statement that describes the meaning of a data element type in an unambiguous and unique manner to permit its differentiation from all other data element types
Comments:	the definition of a data element type shall be derived from the original IEC or ISO definition, if available. IEC or ISO standards may differ because condition data element types may be added to the definition and references to relevant component classes are made. The unit of measure (if present) in which the value of the data element type is expressed shall always be included in the definition
Obligation:	mandatory
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.3.2 Note

Attribute name:	note
Attribute definition:	statement which provides further information on the definition, which is essential to the understanding of that definition
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.3.3 Remark

Attribute name:	remark
Attribute definition:	explanatory text to further clarify the meaning of the definition
Comments:	remarks shall not influence the meaning of the definition
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.3.4 Formula

Attribute name:	formula
Attribute definition:	rule or statement in mathematical form expressing semantics of a quantitative data element type
Comments:	a formula shall not change any essential information of the meaning of that definition. The graphical representation of a formula shall be stored in a file in a general available format. Methods of referencing to such a file are in detailed described in ISO 13584-24
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A. The required control functions should be taken from ISO/IEC 6429

3.3.5 Figure

Attribute name: figure

Attribute definition: illustration to clarify the meaning of the definition of a data element type

Comments: a figure shall not change any essential information of the meaning of that definition. A graphical representation of a figure shall be stored in a file in a general available file format. Methods of referencing to such a file are described in detail in ISO 13584-24

Obligation: optional

3.3.6 Source document of data element type definition

Attribute name: source document of data element type definition

Attribute definition: reference to the source document from which the data element type definition was derived

Comments: the document shall be recognized by the ISO and/or IEC committee concerned as having wide acceptance and authoritative status as well as being publicly available

The value of this attribute shall have a maximum length of 80 characters

Obligation: optional

Character type of values: those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.4 Value attributes

Figure 4 shows the attributes related to the value of the data element types.

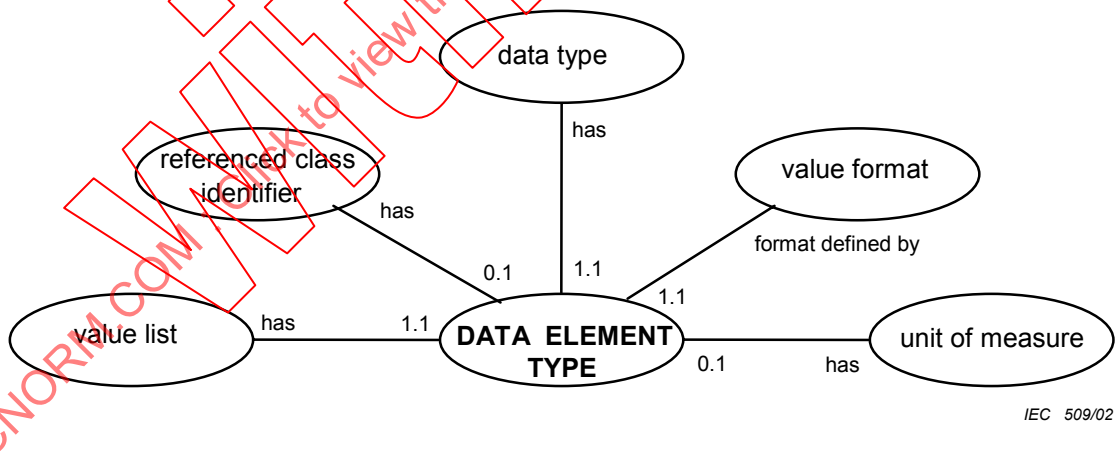


Figure 4 – Value attributes for data element type

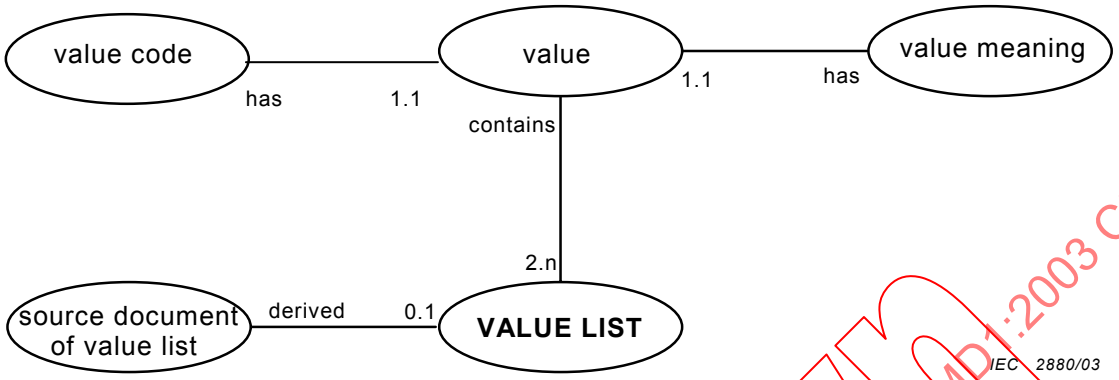


Figure 5 – Attributes of the value list for data element type

Every data element type has a value domain which defines a range of permissible values being implicit by the value format or explicit by listing the possible values.

For quantitative data element types such a domain can be expressed either as a value range with limits within all values must lie or a set or list of discrete possible values.

For non-quantitative data element types the value domain can be expressed as mentioning permissible values in the form of text strings.

In this International Standard, no mechanism is given for defining value ranges for quantitative data element types.

For non-quantitative data element types a mechanism using values, represented by value codes and associated value meanings, is defined as described in 3.4.4.1.

It is noted that in many cases a value domain may be undefined, unknown or infinite. In such cases a value list is not specified in a data element type definition.

For classifying data element types a value list shall be specified.

3.4.1 Data type

Attribute name	Data type
Attribute definition:	identifies a specific property of the value of a data element type
Comments:	Data types are divided into two groups: a) simple type; All simple data types contain single values. b) complex type; All complex data types may contain multiple values. The complex data types are: – level type; – class instance type; – list type; – set type; – bag type; – array type.
Obligation:	mandatory
Character type of value	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.4.1.1 Simple type

A data type that specifies that the value of the data element type is a single value. The value format shall be defined according to 3.4.2.

For a simple type the allowed data values are:

– string type;
– non-quantitative code type;
– real measure type;
– integer measure type;
– Boolean type.

3.4.1.2 Complex type

A data type that specifies that the value of the data element type may be a construct of two or more associated values.

3.4.1.2.1 Level type

Complex type indicating that the value of the data element type consists of one up to four real measure or integer measure values which define a characteristic of a component in the fixed sequence: minimum, nominal, typical, maximum. The value format shall be defined according to 3.4.2.

For a simple type, the allowed data values are:

– real measure type;
– integer measure type.

3.4.1.2.2 Class instance type

Complex type that provides a link to a class containing a collection of data element types in any part of the classification hierarchy. Its value consists of the class identifier of the class to which the link is made. All properties in the class to which the link is made become properties of the class in which the class instance type is used and are inherited by all subclasses of that class. Since all the properties in the class to which the link is made have their own definitions which include respective value formats, a class instance type shall not have an associated value format.

For a class instance type only the data value "class reference identifier" is allowed.

NOTE Use of the class instance type effectively allows an extension of the data element types available through use of the feature class. An example is given in annex D.

3.4.1.2.3 List type

Complex type indicating that the value of the data element type is in the form of an ordered collection of data types, in which duplicate values may or may not be allowed. The value format applicable to each element of the list shall be defined according to 3.4.2.

For a simple type the allowed data values are:

– string type;
– non-quantitative code type;
– real measure type;
– integer measure type;
– Boolean type.

3.4.1.2.4 Set type

Complex type indicating that the value of the data element type is in the form of an unordered collection of data types, in which no duplicate elements shall exist. The value format applicable to each element of the list shall be defined according to 3.4.2.

For a simple type the allowed data values are:

– string type;
– non-quantitative code type;
– real measure type;
– integer measure type;
– Boolean type.

3.4.1.2.5 Bag type

Complex type indicating that the value of the data element type is in the form of an unordered collection of data types, in which duplicate elements are allowed. The value format applicable to each element of the bag shall be defined according to 3.4.2.

For a simple type the allowed data values are:

– string type;
– non-quantitative code type;
– real measure type;
– integer measure type;
– Boolean type.

3.4.1.2.6 Array type

Complex type indicating that the value of the data element type is a collection of data types in the form of a one-dimensional array so that an individual element within the array can be identified by a numeric index. The value format applicable to each element of the array shall be defined according to 3.4.2.

For a simple type the allowed data values are:

– string type;
– non-quantitative code type;
– real measure type;
– integer measure type;
– Boolean type;
– array.

3.4.2 Value format

Attribute name:	value format
Attribute definition:	specification of the type and length of the representation of the value of a data element type
Obligation:	mandatory
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A
Comments:	for data element types of which the data-type is the complex type class_instance_type, the value formats are defined by data element types in the referenced class and could be different (3.4.5). The value of this attribute shall have a maximum length of 80 characters. The value format shall be defined according to the definition below:

a) Non-quantitative data value format types:
A = alphabetic, letters only
M =mixed, all characters allowed
N = numeric, digits only
X = alphanumeric
B = binary, 0 or 1

b) Quantitative data value format types in accordance with ISO6093
NR1 = integers
NR2 = rational numbers with decimal-mark (reals)
NR3 = rational numbers with decimal-mark and exponent-mark (floating point)
S [6] = signed (positive or negative)
. = decimal-mark
E = exponent-mark, base 10: (A)E(B) represents the value $A \times 10^B$

c) Field length

The field length of a non-quantitative data value shall be indicated by a number (for example, 17). A variable field length shall start with two dots. The following preferred standard formats derived from ISO 9735 and ISO 6093 have been defined:

A..3	N..3	X..3	M..3	B 1
A..8	N..8	X..8	M..8	
A..17	N..17	X..17	M..17	
A..35	N..35	X..35	M..35	
A..(n × 35)	N..(n × 35)	X..(n × 35)	M..(n × 35)	

A fixed-field length shall start with one space (for example, A 3 – N 8 – X 17 – M 35, etc.). In these formats, no special characters shall be allowed.

---

[6] In addition to ISO 6093, the sign "S" is used as a marker for "signed" (should read "Sign").

The field length of a quantitative data value shall be indicated by a combination of digits and characters (for example, 3.3ES2). A variable field length shall start with two dots. The following preferred standard formats

derived from ISO 9735 and ISO 6093 have been defined:

NR1..4	positive integers
NR1 S..4	positive or negative integers
NR2..3.3	positive reals
NR2 S..3.3	positive or negative reals
NR3..3.3ES2	floating point, positive
NR3 S..3.3ES2	floating point, positive or negative

A fixed-field length shall start with one space (for example, NR1 4, NR1 S 4, etc.). In these formats, no special characters shall be allowed.

3.4.3 Unit of measure

Attribute name:	unit of measure
Attribute definition:	prescription of the unit in which the value of a quantitative data element type shall be expressed
Comments:	only SI units without decimal multiplier prefixes shall be used. Preference shall be given to SI units as defined in ISO 31 and to units as listed in annex A of this standard. The meaning of the letter symbols used for the quantities shall be according to ISO 31. For quantitative data element types of which the data-type is the complex type class_instance_type, the units of measure are defined by data element types in the referenced class and could be different (3.4.5).
Obligation:	conditional
Condition:	unit of measure shall be specified for quantitative data element types
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.4.4 Value list

Attribute name:	value list
Attribute definition:	set of representations of permissible values of a data element type
Obligation:	conditional
Condition:	value list shall be specified for classifying data element types. For non-classifying data element types a value list may be specified

3.4.4.1 Value

Attribute name:	value
Attribute definition:	representation of a permissible instance of a data element type as an element of a value list
Comments:	the value of non-quantitative data element types shall be composed of the attributes: value code and value meaning.
Obligation:	conditional
Condition:	for classifying data element types the values are mandatory

3.4.4.2 Value code

Attribute name:	value code
Attribute definition:	coded representation of a permissible value of a non-quantitative data element type
Comments:	the value code of a classifying data element type shall be the same as the coded name of the component class which is created by that classifying data element type. The value code of a classifying (non-quantitative) data element type shall have a maximum length of 18 alphanumeric characters. The value code of the other non-quantitative data element types shall be abbreviated for communication efficiency
Obligation:	conditional
Condition:	if there is a value, the value code shall be specified
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.4.4.3 Value meaning

Attribute name:	value meaning
Attribute definition:	descriptive part of a permissible value of a non-quantitative data element type
Comments:	for classifying data element types the value meaning shall be defined in the note attribute of the class that has been defined by this classifying data element type. The value of this attribute shall have a maximum length of 70 characters
Obligation:	conditional
Condition:	if there is a value, the value meaning shall be specified
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.4.4.4 Source document of value list

Attribute name:	source document of the value list
Attribute definition:	reference to the source document, generally an international standard, from which the value list was derived
Comments:	the value of this attribute shall have a maximum length of 80 characters
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.4.5 Referenced class identifier

Attribute name:	referenced class identifier
Attribute definition:	class identifier as defined in 5.5.
Comments:	the class referenced will contain a set of related data element types. The data element type from which the reference is made shall not have either a value format or unit of measure. These attributes will be defined by the data element types in the referenced class.
Obligation:	conditional
Condition:	a referenced class identifier shall be supplied when the data type of a data element type is a class instance type.
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

3.5 Relationship attributes

Data element types in general shall be regarded as characteristic properties of objects. Both the objects (components) and their data element types shall be classified according to their type.

Data element types may be related because these

– are of the same data element type class;

– apply to the same component class (or material class, or feature class);

– refer to a condition data element type. If a data element type is conditioned by more than one condition data element type, then all conditions shall be satisfied simultaneously;

– apply to the same feature class.

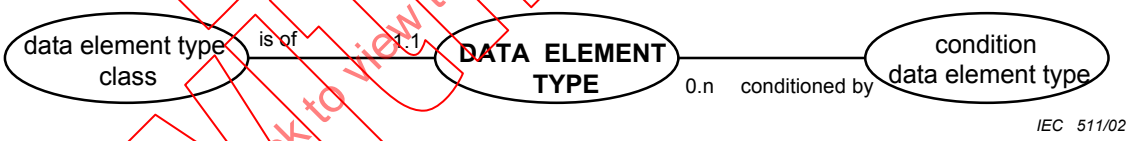


Figure 6 – Relationship attributes for data element type

3.5.1 Condition data element type

Attribute name:	condition data element type
Attribute definition:	data element type that affects the value of another data element type
Comments:	Many data element types have values which depend on the value(s) of one or more independent data element types (called "condition data element types"). This data element type has only a meaning when it is used in combination with a another data element type The definition of a condition data element type shall always contain the phrase "as a variable". When the value of a condition data element type is given as a range, it shall be specified by two condition data element types, representing the upper and lower bound of this range
Obligation:	optional
Character type of values:	identical to the identifier of a data element type

3.5.2 Data element type class

Attribute name:	data element type class
Attribute definition:	class of similar data element types
Comments:	the data element type classification is described in detail in clause 4
Obligation:	mandatory
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

4 Data element type classification

4.1 Objective

Data element types shall be classified in order to make large collections of data element types more manageable. This has been implemented by dividing the subject field from the generic to the specific, bringing related concepts together (for example, referring to the same physical quantity like temperature, voltage, capacitance, etc.) and making orientation easier. The field of interest is primarily divided into a number of classes; they are complementary, i.e. they cover in their totality the whole field without any overlap.

The data element type classification is provided to help with a number of tasks:

– to analyze data element type collections;

– to define unambiguously data element types;

– to control the use of data element types;

– to fix the list of validity of the attributes of data element types.

4.2 General principles

The data element type classification system shall consist of main classes, classes and in some cases subclasses, identified by an upper-case letter and two digits respectively, according to the kind of data they represent.

There shall be two general categories of data element types:

– quantitative data element types, also called measures, to represent the values of a measurable property or phenomenon of a thing. These data element types shall belong to the main classes C, E, etc. Within this general category, physical and non-physical measures shall be distinguished according to table;

– non-quantitative data element types, also called identifications and indicators, to represent identifications of subjects or indications of the properties of a data element type. These shall be implemented by means of codes, names, descriptions, etc. These data element types belong to main class A.

4.3 Quantitative data element types

The quantitative data element types shall be classified into main classes according to their measure concepts or quantities. There shall be main classes for physical measures and for non-physical measures. Within the category non-physical measures, one shall distinguish between the subcategory financial measures and other measures in accordance with table 3.

Table 3 – Survey of main classes and categories of data element types

Non-quantitative data element types	Main class	Description/subjects
	A	Identifications and indicators
Quantitative data element types	**Main class**	**Description/subjects**
Physical measures	C	Physical chemistry and molecular physics
	E	Electricity and magnetism
	F	Periodic and related phenomena
	G	Acoustics
	H	Heat
	J	Information
	K	Mechanics
	L	Light and related electromagnetic radiations
	T	Space and time
	U	Atomic and nuclear physics
	V	Nuclear reactions and ionizing radiations
	W	Solid-state physics
Non-physical measures		
Financial measures	M	Financial amounts
	P	Financial rates: prices, tariffs
Other measures	Q	Denumerable quantities, counts
	R	Business ratios, percentages

The classification of physical quantitative data element types shall closely follow the structure of ISO 31 using the following general rules:

a) the classification shall have two levels:
   - main classes;
   - classes identified by a single capital and two numerical digits respectively;

b) the main classes, except main class J, shall correspond to the chapters of ISO 31 reflecting main areas of physics, for example space and time, mechanics, heat, etc.;

c) the main classes shall be subdivided into classes of physical quantities exactly as in ISO 31, for example, T10: velocity, K01: mass, H12: thermal resistance;

d) the main class J shall be subdivided into classes based on definitions from ISO 2382.

In addition, the following specific rules apply:

e) for quantities occurring in various parts of ISO 31, their complete physical context shall be decisive for the classification, for example wavelengths of light and sound are classified in class L03 or G05 respectively;

f) ISO classes containing a physical constant shall not be used, for example E32/L06: speed of light, L18: Stefan-Boltzmann constant;

g) dimensionless ratios of identical quantities, expressed as fractions or percentages, shall be classified in the same class as the quantity from which they originate, for example: current gain of a transistor in class E01, resistance tolerance of a resistor in class E33;

h) derived quantities not occurring in ISO 31 shall be classified in the class of the numerator, for example steepness of a voltage pulse (in V/s) in class E06.

A complete list of data element type classification codes of quantitative data element types, in alphabetical order of the main class character is given in annex B.

4.4 Non-quantitative data element types

The values of the non-quantitative data element types shall represent identifications of subjects like places, organizations, persons, messages, documents, etc., or indications of the properties of the data element type. These data element types shall belong to main class A and shall further be classified in classes according to their subject, identified by two additional numerical digits. A survey of this classification is given in annex C.

5 Component class specification

For the classification of components, the principle of dividing the whole set of components into parts, as defined in 2.9, shall be applied repeatedly, thereby creating a hierarchical tree of several classes. The tree will start with the so-called root class and consists further of superclasses and subclasses.

Classification principles:

– a superclass shall have two or more subclasses;

– a superclass shall have one classifying data element type to define these subclasses;

– a subclass shall have one superclass;

– a subclass itself becomes a superclass when it has subclasses.

The IEC reference collection is the preferred name of the superclass at the highest level in the IEC classification tree as defined in IEC 61360-4. This class (IEC root class) has no superclass, it is itself a superclass and has only subclasses.

The goal of the classification is to arrange the data element types in an unambiguous and structured way.

Each data element type is defined as visible at the level of the root class. This implies that the data element type may be defined as applicable at any class in the classification tree.

Each data element type shall be applicable to a range of components, determined by class, subclass, etc. A data element type which is applicable to any class shall be also applicable to all subclasses of that class. Data element types which are only applicable for a limited number of subclasses should be repeated in each relevant subclass.

In this way a family-tree structure is created with nodes, branches and leaves as shown in figure 7. In this figure, each leaf shows, as dots, the collection of data element types which are applicable for the class which it represents and among which is the classifying data element type (if any) which defines the subclasses on the level below. However, the data element types applicable in a class include also those inherited from higher classes, so where a leaf is shown as empty the corresponding class nevertheless contains all the inherited data element types. Classifying data element types are indicated by black dots, corresponding to the nodes of the tree, and the branches correspond to their values, the value meanings of which are defined in the note attribute of the class that has been defined by the classifying data element type.

The classification of components described here is set up along the following lines.

a) From the collection of data element types applicable at a particular leaf, one data element type is assigned to be a classifying one. This data element type is chosen because the value list of this classifying data element type has the property that it can be used to divide the set of components at that level into subsets of which each component can be described by the same group of data element types.

b) The hierarchical order of the data element types is determined by "inheritance" so that data element types applicable at a specific level also apply to all lower levels, unless the data element type cannot be applied owing to its definition, to lower levels; for instance data element type "overall diameter" can apply only to components with a cylindrical shape. The classification ends at that level where no further significant division of components can be made.

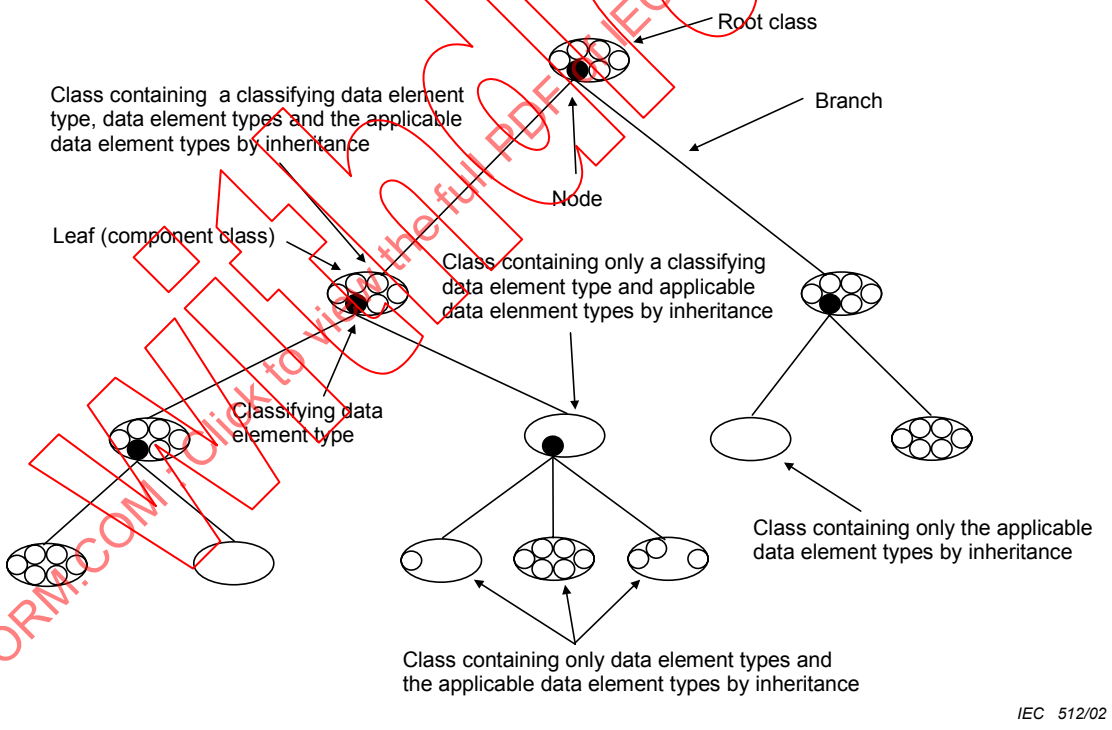


Figure 7 – Classification tree

c) The classifying data element types, applicable at particular nodes in the tree, shall have the following properties:

- each one addresses a single elementary attribute and not a combination of different attributes, i.e. they have homogeneous value lists;
- the subclasses defined by the values of a classifying data element type are complementary, they cover in their totality the whole field completely and without overlap. So-called multiple value fields, where two or more values apply at the same time, are not allowed. Classifying data element types have always the data type value: non-quantitative code type;
- the value codes of classifying data element types shall be unique within the whole classification scheme;
- no garbage subclasses, called "miscellaneous", "remaining", "various" are allowed;
- any relevant attribute may be used in the classification; their choice and order are determined by whether or not they lead to specific data element types which are relevant to the users;
- the attribute used in this classification is mostly related to functionality, but other attributes such as technology, application, material, geometry also occur; the choice varies between components of different type;
- a classifying data element type is generally of the non-quantitative type.

d) For all data element types the visibility and the applicability are defined:

- all data element types are defined as being visible at the level of the IEC reference collection. This implies that a data element type may be used throughout the whole IEC reference collection;
- a data element type is defined as being applicable at the level of a class where it is defined as describing data element type and/or by inheritance;
- a condition data element type only becomes applicable when it is referenced by another data element type that depends on it.

e) The terms which define the branches of the tree, being a value of the appropriate classifying data element, have the following properties:

- they are significant: no vague or ambiguous terms such as "general purpose", "economical", "high speed", etc. are allowed;
- they have a clearly defined objective meaning;
- they conform to international standards where available;
- they are free from synonymy: where synonyms do occur, one term is selected as the preferred name and the others refer to it;
- the specific meaning of homonyms is explained by context indications.

5.1 Shape of package outlines for components

The classification scheme for the shapes of package outlines is based on the following three characteristics of the package according to the codes defined in IEC 60191-4:

– outline style ;
– terminal position;
– terminal form.

Based on these characteristics, five levels of classification are defined as follows:

– level 1: outline style;
– level 2: terminal position;
– level 3: terminal form;
– level 4: terminal variant;
– level 5: body variant (optional).

The specification of each class at the lowest level of the classification tree of the component package shapes contains an attribute which makes a reference to a unique drawing. This associated drawing contains the graphical representation of the data element types describing the characteristic dimension parameters of that specific component package geometry.

Each drawing is unambiguously identified by an identifier. Also associated with each drawing is a descriptive designator which is derived from the coded name of the relevant class in the component package classification tree (see 6.1.5).

5.2 Component class specification attributes

In this clause the various attributes of classes as encountered in the specifications are explained. For a list of these attributes, see table 4. These attributes are related to identification, description and to relationships between classes and data element types.

Table 4 – List of attributes of class

Attributes	Subclause
Code	5.4.1
Version number	5.4.2
Revision number	5.4.3
Preferred name	5.4.4
Coded name	5.4.5
Synonymous name	5.4.6
Definition	5.5.1
Note	5.5.2
Remark	5.5.3
Drawing reference	5.5.4
Source document of class definition	5.5.5

5.3 Information model of a component class

A component class is a set of components of which each component can be described by the same group of data element types obtained by inheritance.

The attributes of a component class are divided into two main groups:

– identifying attributes;
– semantic attributes.

The information models (entity-relation diagrams) of a component class, given in figures 8 and 9, should be read following the same rules as described in 3.1 for a data element type.

5.4 Identifying attributes

To identify a class uniquely within a class dictionary a language-independent combination of characters shall be used.

The identifier of a class shall consist of the combination of the six-character component class code, followed by a hyphen followed by the three-digit version number of the class

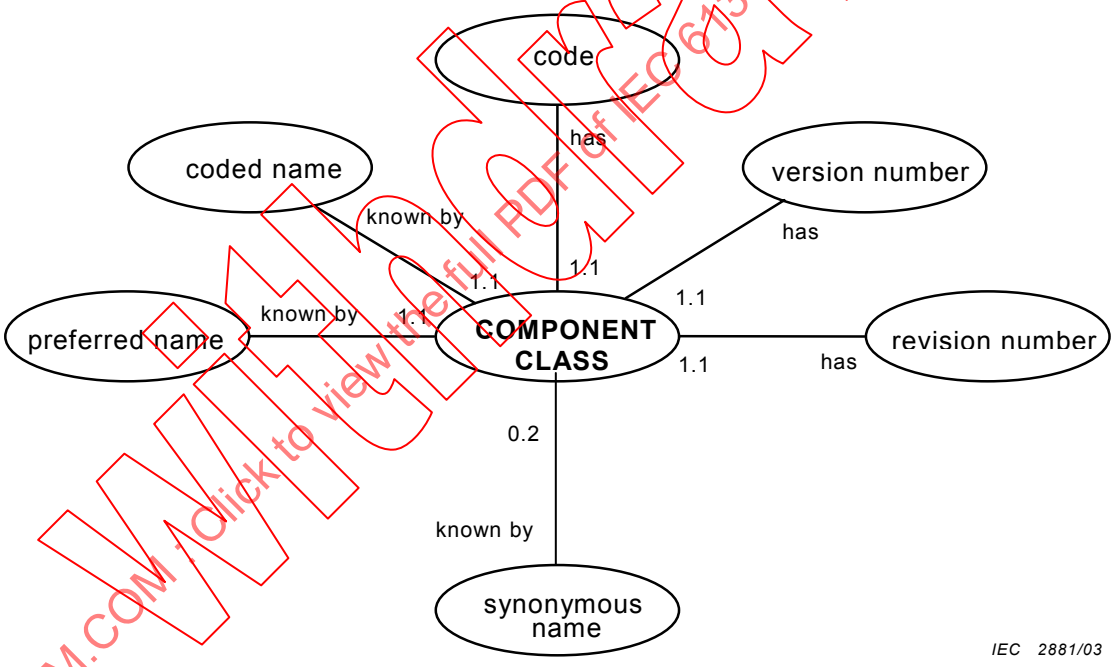


Figure 8 – Identifying attributes for class

5.4.1 Code

Attribute name:	code
Attribute definition:	unique six-character code of a component class
Comments:	the first three characters shall be alphabetic, the last three numeric (format AAANNN). The character "X"[7] shall not be used as first character. The codes are issued chronologically and should not have any relationship with the meaning of the component class In case of at least one attribute of the components class, which affects the meaning and or communication of the components class, changed, a new (other) component class, having a new code, shall be defined. Such an attribute is: – definition
Obligation:	mandatory
Character type of values:	upper-case Latin letters A through Z (to avoid misunderstanding, the upper-case Latin letters O and I shall not be used); digits 0 through 9

5.4.2 Version number

Attribute name:	version number
Attribute definition:	number used to indicate the versions of a component class during its life cycle
Comments:	the version number of a component class shall consist of three digits [8]. Consecutive version numbers shall be issued in ascending order. A new version of the class shall be generated if at least one attribute of the class is changed which affects the use (communication, data base definition, etc.) but which does not affect the meaning of that class. Those attributes which, when changed, will result in a version change are: – preferred name; – coded name; – drawing reference. In addition, the version number of a class shall be changed when a new describing data element type is added to that class. If the added data element type is a classifying data element type, this implies that subclasses are defined to that class
Obligation:	mandatory
Character type of values:	digits 0 through 9

[7] For local or private use within users' environment, codes starting with XAA up to and including codes starting with XZZ, may be used and are therefore excluded from the IEC reference collection of standard data element types (IEC 61360-4).

[8] Although the common ISO/IEC EXPRESS information model allows more digits, within the IEC system only three digits are to be used.

5.4.3 Revision number

Attribute name:	revision number
Attribute definition:	number used for administrative control of a component class
Comments:	the revision number of a component class shall consist of two numerical characters. Consecutive revision numbers shall be issued in ascending order. For each component class with a unique identifier, only one revision number is current at any one time A new revision number of a component class shall be generated if an attribute of the component class is changed which neither affects the use (communication, database definitions etc.) nor the meaning of the components class, or when editorial changes of typing and spelling errors have been implemented. Those attributes which, when changed, will result in a revision change are: – note – remark – source document of class definition
Obligation:	mandatory
Character type of values:	digits 0 through 9

5.4.4 Preferred name

Attribute name:	preferred name
Attribute definition:	single-word or multi-word designation assigned to a class
Comments:	The length of the preferred name of a class shall be limited to 70 characters. The preferred name of a class is related to the value meaning of the classifying data element type that defines the relevant class.
Obligation:	mandatory
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

5.4.5 Coded name

Attribute name:	coded name
Attribute definition:	coded representation of the name of the class which shall be equal to the value code of the value of the classifying data element type except for the IEC reference collection which coded name is not defined by a classifying data element type
Comments:	the first character of the coded name shall be a letter. The coded name of a class shall have a maximum length of 18 alphanumeric characters.
Obligation:	mandatory
Character type of values:	conforming with the character set of ISO/IEC 10646

5.4.6 Synonymous name

Attribute name:	synonymous name
Attribute definition:	single-word or multi-word designation to a class that differs from the given preferred name but represents the same class concept
Comments:	the number of synonymous names shall be limited to two. For pragmatic reasons, the length of the synonymous name shall be limited to 70 characters
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A.

NOTE A synonymous name for a class shall only be used for identification purposes where there are acceptable alternatives to the preferred name. In all references to the class, only the preferred name shall be used.

5.5 Semantic attributes

The following possible attributes are related to the definition of the semantics of classes.

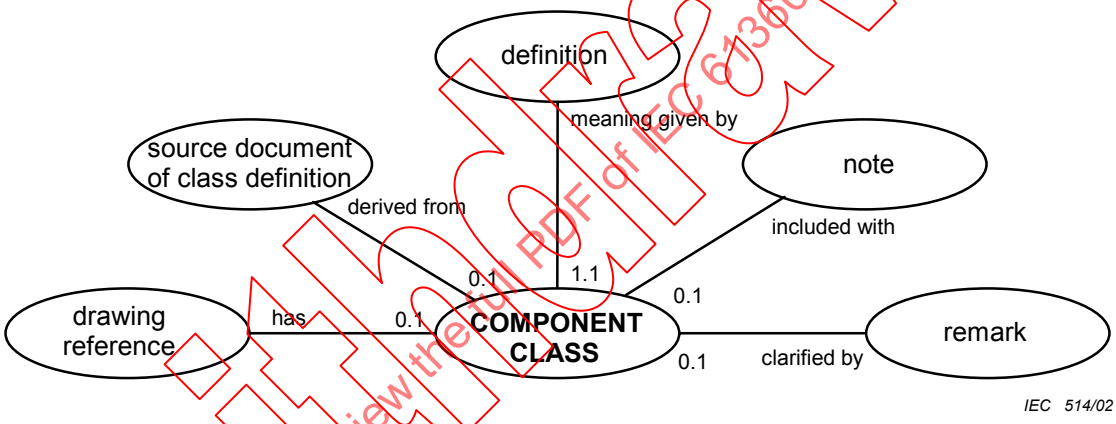


Figure 9 – Semantic attributes for class

5.5.1 Definition

Attribute name:	definition
Attribute definition:	statement that describes the meaning of a class and permits its differentiation from all other classes
Obligation:	mandatory
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

5.5.2 Note

Attribute name:	note
Attribute definition:	statement which provides further information on the definition, which is essential to the understanding of that definition The note attribute should be used to define the meaning of the class.
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

5.5.3 Remark

Attribute name:	remark
Attribute definition:	explanatory text to further clarify the meaning of the definition
Comments:	remarks shall not influence the meaning of that definition
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

5.5.4 Drawing reference

Attribute name:	drawing reference
Attribute definition:	a reference to the identifier of a drawing which illustrates the meaning of a group of data element types describing the characteristics of a component
Comments	the identifier of a drawing shall consists of the combination of the six-character drawing code, followed by a hyphen followed by the three digit version number of the drawing references
Obligation:	conditional
Condition:	this drawing reference shall only be given for geometrical classes

5.5.5 Source document of component class definition

Attribute name:	source document of class definition
Attribute definition:	reference to the source document, generally an international standard, from which the class definition was derived
Comments:	the value of this attribute shall have a maximum length of 80 characters
Obligation:	optional
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

5.6 Class relationships

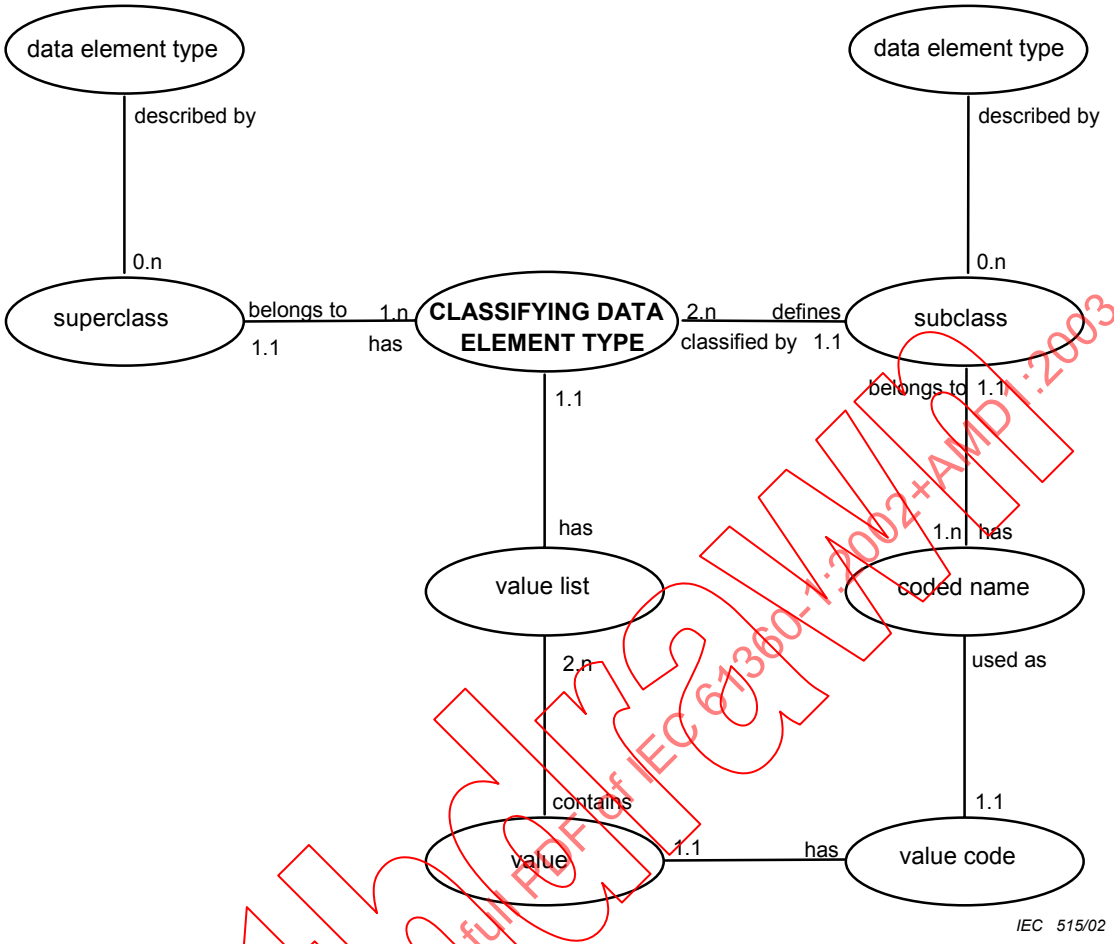


Figure 10 – Class relationships

Figure 10 illustrates the relationship between a superclass and a subclass and the use of the classifying data element in that relationship.

The value codes of the values of a classifying data element type shall be the same as the coded names of the subclasses and vice versa; the coded name of a subclass shall be the same as the value code in the value list of the classifying data element type of its superclass.

6 Drawing specification attributes

In this clause the various attributes of a drawing are explained. For a list of these attributes, see table 5. These attributes are related to the identification of drawings.

Table 5 – List of attributes of drawing

Attributes	Subclause
Code	6.1.1
Version number	6.1.2
Revision number	6.1.3
Drawing title	6.1.4
Descriptive designator	6.1.5
File name	6.1.6
File format	6.1.7

6.1 Information model of a drawing

The sub-information model (entity-association diagram) of a drawing, given in figure 11 should be read following the same rules as described in 3.1 for a data element type.

NOTE When reading this clause, substitute the entity 'data element type' by 'drawing'.

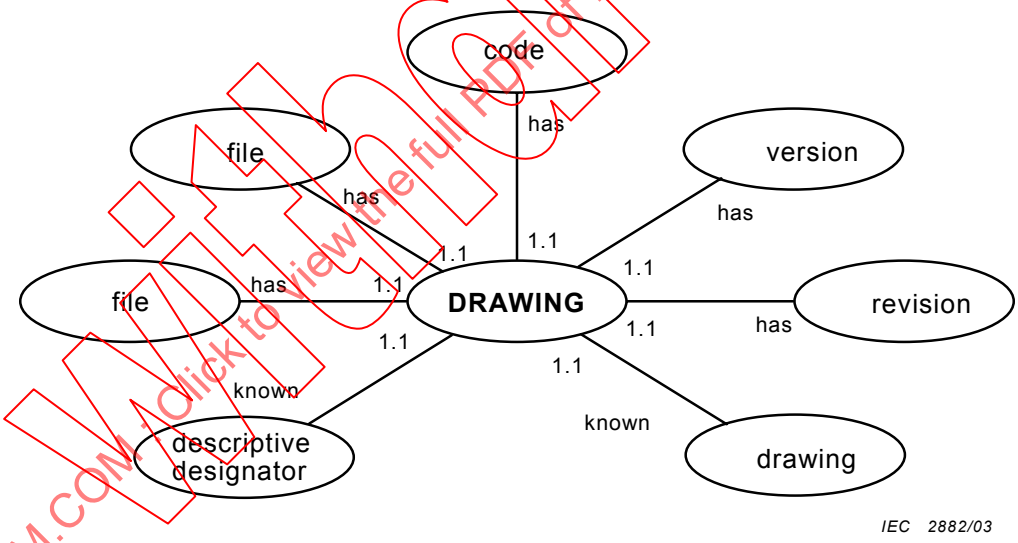


Figure 11 – Identifying attributes for drawing

6.1.1 Code

Attribute name:	code
Attribute definition:	unique six-character code for a drawing
Comments:	the first three characters shall be alphabetic, the last three numeric (format AAANNN). The character 'X'[9] shall not be used as the first character. The codes are issued sequentially and should not have any relationship with the meaning of the drawing
Obligation:	mandatory
Character type of values:	upper-case Latin letters A through Z (to avoid misunderstanding, the upper-case Latin letters O and I shall not be used); digits 0 through 9

6.1.2 Version number

Attribute name:	version number
Attribute definition:	number used to indicate the versions of a drawing during its life cycle
Comments:	the version number of a drawing shall consist of three numerical characters. Consecutive version numbers shall be issued in ascending order. The version number of a drawing shall be changed when there is a major change to the drawing such as the addition of a new dimension parameter. A change to a drawing version shall result in a change to the version of the class that references the drawing
Obligation:	mandatory
Character type of values:	digits 0 through 9

6.1.3 Revision number

Attribute name:	revision number
Attribute definition:	number used for administrative control of a drawing
Comments:	the revision number of a drawing shall consist of two numerical characters. Consecutive version numbers shall be issued in ascending order. For each drawing with a unique identifier, only one revision number is current at any one time. The revision number of a drawing shall change when there is a minor change to the drawing such as the correction of a typographical error or a minor change to the position of an element of the drawing. There will be no change to the version or revision of the class that references the drawing. Whenever there is a change in the version number of a drawing, the revision number shall be reset to 01
Obligation:	mandatory
Character type of values:	digits 0 through 9

[9] For local use, all codes starting with XAA up to and including codes starting with XZZ may be used and are therefore excluded from the set of standard drawings.

6.1.4 Drawing title

Attribute name:	drawing title
Attribute definition:	single-word or multi-word descriptive caption applied to a drawing
Comments:	the drawing title shall have a maximum of 70 characters
Obligation:	mandatory
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

6.1.5 Descriptive designator

Attribute name:	descriptive designator
Attribute definition:	coded representation of the drawing title. It is constructed by concatenation of the coded names of the relevant classes of the component package classification tree separated by hyphens
Comments:	the descriptive designator is used to identify the particular outline drawing and has the form XYY-Z-Tnnn-Bmmm, where the characters have the following meanings: • X indicates the disposition of the terminals, defined by the relevant classifying data element type; • YY indicates the package style of the component, defined by the relevant classifying data element type; • Z indicates the shape of the terminals, defined by the relevant classifying data element type; • Tnnn is the terminal variant code, defined by the relevant classifying data element type; • Bmmm is the optional body variant code, defined by the relevant classifying data element type. The descriptive designator of a drawing shall have a maximum length of 17 alphanumeric characters
Obligation:	mandatory
Character type of values:	those characters from the character set of ISO/IEC 10646-1, as defined in annex A

6.1.6 File name

Attribute name:	file name
Attribute definition:	the name of the file on a carrier which contains the drawing data
Comments:	the name shall be complete, including the file extension. If the file is stored on a remote server the complete path of the URL (including the file name) shall be provided
Obligation:	mandatory

6.1.7 File format

Attribute name:	file format
Attribute definition:	the file format in which the drawing is represented
Comments:	more than one data format for a drawing is allowed[10)]
Obligation:	mandatory

10) It is the responsibility of the sender of a drawing to clarify the data format used. Possible drawing formats include bit-map formats such as BMP, TIFF, GIF and JPEG, vector formats such as CGM, DXF and HP-GL and document formats such as PDF.

Annex A
(normative)

Characters from ISO/IEC 10646-1

The following characters shall be used for the purpose of this standard:

– all characters from row 00 of the Basic Multilingual Plane (BMP) (Plane 00 of Group 00) of ISO/IEC 10646-1;

– characters from other rows of the Basic Multilingual Plane of ISO/IEC 10646-1 as listed below.

NOTE Due to problems of electronic exchange of information among different systems, it is recommended that, where possible, the characters used should be restricted to the G0 set of ISO/IEC 646 and/or row 00 columns 002 to 007 of ISO/IEC 10646-1.

Table A.1 – Group 00 – Plane 00

Character	Name	Row	Cell
ˇ	CARON	02	C7
≡	IDENTICAL TO	22	61
∧	LOGICAL AND	22	27
∨	LOGICAL OR	22	28
∩	INTERSECTION	22	29
∪	UNION	22	2A
⊂	SUBSET OF (IS CONTAINED)	22	82
⊃	SUPERSET OF (CONTAINS)	22	83
⇐	LEFTWARDS DOUBLE ARROW (IS IMPLIED BY)	21	D0
⇒	RIGHTWARDS DOUBLE ARROW (IMPLIES)	21	D2
∴	THEREFORE	22	34
∵	BECAUSE	22	35
∈	ELEMENT OF	22	08
∋	CONTAINS AS MEMBER (HAS AS AN ELEMENT)	22	0B
⊆	SUBSET OF OR EQUAL TO (CONTAINED AS SUB-CLASS)	22	86
⊇	SUPERSET OF OR EQUAL TO (CONTAINS AS SUB-CLASS)	22	87
∫	INTEGRAL	22	2B
∮	CONTOUR INTEGRAL	22	2E
∞	INFINITY	22	1E
∇	NABLA	22	07
∂	PARTIAL DIFFERENTIAL	22	02
~	TILDE OPERATOR (DIFFERENCE BETWEEN)	22	3C
≈	ALMOST EQUAL TO	22	48
≃	ASYMPTOTICALLY EQUAL TO	22	43
≅	APPROXIMATELY EQUAL TO (SIMILAR TO)	22	45

≤	LESS THAN OR EQUAL TO	22	64
≠	NOT EQUAL TO	22	60
≥	GREATER THAN OR EQUAL TO	22	65
⇔	LEFT RIGHT DOUBLE ARROW (IF AND ONLY IF)	21	D4
¬	NOT SIGN	00	AC
∀	FOR ALL	22	00
∃	THERE EXISTS	22	03
א	HEBREW LETTER ALEF	05	D0
□	WHITE SQUARE (D'ALEMBERTIAN OPERATOR)	25	A1
∥	PARALLEL TO	22	25
Γ	GREEK CAPITAL LETTER GAMMA	03	93
Δ	GREEK CAPITAL LETTER DELTA	03	94
⊥	UPTACK (ORTHOGONAL TO)	22	A5
∠	ANGLE	22	20
⊾	RIGHT ANGLE WITH ARC	22	BE
Θ	GREEK CAPITAL LETTER THETA	03	98
〈	LEFT POINTING ANGLE BRACKET (BRA)	23	29
〉	RIGHT POINTING ANGLE BRACKET (KET)	23	2A
Λ	GREEK CAPITAL LETTER LAMBDA	03	9B
′	PRIME	20	32
″	DOUBLE PRIME	20	33
Ξ	GREEK CAPITAL LETTER XI	03	9E
∓	MINUS -OR- PLUS SIGN	22	13
Π	GREEK CAPITAL LETTER PI	03	A0
²	SUPERSCRIPT TWO	00	B2
Σ	GREEK CAPITAL LETTER SIGMA	03	A3
×	MULTIPLICATION SIGN	00	D7
³	SUPERSCRIPT THREE	00	B3
ϒ	GREEK CAPITAL LETTER UPSILON	03	A5
Φ	GREEK CAPITAL LETTER PHI	03	A6
•	MIDDLE DOT	00	B7
Ψ	GREEK CAPITAL LETTER PSI	03	A8
Ω	GREEK CAPITAL LETTER OMEGA	03	A9
∅	EMPTY SET	22	05
⇀	RIGHTWARDS HARPOON WITH BARB UPWARDS (VECTOR OVERBAR)	21	C0
√	SQUARE ROOT (RADICAL)	22	1A

ƒ	LATIN SMALL LETTER F WITH HOOK (FUNCTION OF)	01	92
∝	PROPORTIONAL TO	22	1D
±	PLUS - MINUS SIGN	00	B1
°	DEGREE SIGN	00	B0
α	GREEK SMALL LETTER ALPHA	03	B1
β	GREEK SMALL LETTER BETA	03	B2
γ	GREEK SMALL LETTER GAMMA	03	B3
δ	GREEK SMALL LETTER DELTA	03	B4
ϵ	GREEK SMALL LETTER EPSILON	03	B5
ζ	GREEK SMALL LETTER ZETA	03	B6
η	GREEK SMALL LETTER ETA	03	B7
θ	GREEK SMALL LETTER THETA	03	B8
ι	GREEK SMALL LETTER IOTA	03	B9
κ	GREEK SMALL LETTER KAPPA	03	BA
λ	GREEK SMALL LETTER LAMBDA	03	BB
μ	GREEK SMALL LETTER MU	03	BC
ν	GREEK SMALL LETTER NU	03	BD
ξ	GREEK SMALL LETTER XI	03	BE
‰	PER MILLE SIGN	20	30
π	GREEK SMALL LETTER PI	03	C0
ρ	GREEK SMALL LETTER RHO	03	C1
σ	GREEK SMALL LETTER SIGMA	03	C3
÷	DIVISION SIGN	00	F7
τ	GREEK SMALL LETTER TAU	03	C4
υ	GREEK SMALL LETTER UPSILON	03	C5
φ	GREEK SMALL LETTER PHI	03	C6
χ	GREEK SMALL LETTER CHI	03	C7
ψ	GREEK SMALL LETTER PSI	03	C8
ω	GREEK SMALL LETTER OMEGA	03	C9
†	DAGGER	20	20
←	LEFTWARDS ARROW	21	90
↑	UPWARDS ARROW	21	91
→	RIGHTWARDS ARROW	21	92
↓	DOWNWARDS ARROW	21	93
‾	OVERLINE	20	3E