
**Cutting tool data representation and
exchange —**

Part 100:

**Definitions, principles and methods for
reference dictionaries**

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*Représentation et échange des données relatives aux outils
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*Partie 100: Définitions, principes et méthodes pour les dictionnaires
de référence*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TS 13399-100 was prepared by Technical Committee ISO/TC 29, *Small tools*.

ISO/TS 13399 consists of the following parts, under the general title *Cutting tool data representation and exchange*:

- *Part 1: Overview, fundamental principles and general information model*
- *Part 2: Reference dictionary for the cutting items*
- *Part 3: Reference dictionary of terms for tools*
- *Part 4: Reference dictionary of terms for attachments*
- *Part 5: Reference dictionary of terms for accessories*
- *Part 100: Definitions, principles and methods for reference dictionaries*

Introduction

The purpose of this part of ISO 13399 is to provide a specification for the creation of reference dictionaries that support the use of the general information model defined in ISO 13399-1. This Technical Specification is based on the example of IEC 61360-1.

A cutting tool is used in a machine to remove material from a work piece by a shearing action at the cutting edges of the tool. Cutting tool data that can be described by ISO 13399 include, but are not limited to, everything from the workpiece to the machine tool. Information about inserts¹⁾, solid tools²⁾, assembled tools³⁾, adaptors⁴⁾, components⁵⁾ and their relationships can be represented by the various parts of ISO 13399.

The objective of ISO 13399 is to provide the means of representing the information that describes cutting tools in a computer-sensible form that is independent from any particular computer system. The representation will facilitate the processing and exchange of cutting tool data within and between different software systems and computer platforms and also support the application of these data in manufacturing planning, cutting operations and the supply of tools. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and for archiving. The methods that are used for these representations are those developed by ISO TC 184/SC 4 for the representation of product data by using standardized information models and reference dictionaries.

An information model is a formal specification of types of ideas, facts and processes which together describe a portion of interest of the real world and which provides an explicit set of interpretation rules. Information is knowledge of ideas, facts and/or processes. Data are symbols or functions that represent information for processing purposes. Data are interpreted to extract information by using rules for how that should be done and a dictionary to define the terms that identify the data. Everyone in a communication process must use the same information model, the same set of explicit rules and the same dictionary in order to avoid misunderstanding. If an information model and its dictionary are written in a computer-sensible language then there is the additional benefit that they can be computer processable [1].

An engineering information model is therefore a specification for data, which establishes the meaning of that data in a particular engineering context. A model has to be developed by formal methods to ensure that it meets the needs of the situation that it represents. An engineering information model defines: the information objects that represent the concepts in an engineering application; the attributes of the objects and their relationships; the constraints that add further meaning. An information model is an abstract concept that can be used repeatedly for any example of the real-world situation that it represents. An instance of the model is produced when it is populated with the data items and their values that are applicable to a particular example of that situation.

ISO 13399 uses the following standards developed by ISO TC 184/SC 4:

- the EXPRESS language defined in ISO 10303-11 for defining the information model;
- the file format for data exchange derived from the model and defined in ISO 10303-21;
- the data dictionary defined in ISO 13584.

-
- 1) e.g. regular and irregular shaped replaceable cutting items.
 - 2) e.g. solid drill and solid endmill.
 - 3) e.g. boring bars, indexable drill and indexable milling cutters.
 - 4) e.g. milling arbor and drilling chuck.
 - 5) e.g. shims, screws and clamps.

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ISO 13399 is intended for use by, among others, tool producers and vendors, manufacturers, developers of manufacturing software. It provides a common structure for exchanging data about cutting tools and is intended to provide for, or improve, several manufacturing activities, including:

- the integration and sharing of data for cutting tools and assemblies between different stages of the manufacturing cycle and between different software applications;
- the direct import of data from cutting tool suppliers into customers' databases;
- the management of cutting tool information from multiple sources and for multiple applications.

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Cutting tool data representation and exchange —

Part 100:

Definitions, principles and methods for reference dictionaries

1 Scope

This part of ISO 13399 defines the principles and methods for creating unambiguous definitions of the items and their properties that relate to cutting tools in computer-sensible dictionaries that are to be used for reference by the information model defined in ISO 13399-1.

The following are within the scope of this Technical Specification:

- the specification of data element types, their identifying, semantic and value attributes;
- the specification of item classes, their identifying and semantic attributes;

The following are not within the scope of this Technical Specification:

- information model for cutting tools;
- classifications and definitions of items and data element types relating to cutting tools;
- association between properties and items in a classification.

NOTE 1 The information model for cutting tools is defined in ISO 13399-1.

NOTE 2 The classification of items relating to cutting tools, the definitions of items and data element types and the association of properties to items are defined in ISO 13399-2 to 5.

2 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.

ISO 31 (parts 0 to 13):1992, *Quantities and units*

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/IEC 8824-1:2002, *Information technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation — Part 1*

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

ISO 13399-1, *Cutting tool data representation and exchange — Part 1: Overview, fundamental principles and general information model*

ISO 13584-1:2001, *Industrial automation systems and integration — Parts library — Part 1: Overview and fundamental principles*

ISO 13584-24:2003, *Industrial automation systems and integration — Parts library — Part 24: Logical resource: Logical model of supplier library*

ISO 13584-26:2000, *Industrial automation systems and integration — Parts library — Part 26: Logical resource: Information supplier identification*

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

IEC 61360-1:2004, *Standard data element types with associated classification scheme for electric components — Part 1: Definitions — Principles and methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61360-1 apply, especially the following:

- Entity
- Association
- Data element type
- Quantitative data element type
- Non-quantitative data element type
- Condition data element type
- Classification
- Attribute
- Term
- Feature
- Geometry
- Computer-sensible information
- Applicable data element type
- Visible data element type

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4 Data element type specification attributes

4.1 General

This clause explains and defines the attributes of the data element types that are used in a reference dictionary that conforms to ISO 13399. The list of attributes is shown in Table 1. These attributes are for the identification, description and value of data element types and for the relationships between data element types.

Table 1 — List of attributes of data element types

Attributes	Subclause number
Code	4.3.2
Version number	4.3.3
Date of current version	4.3.4
Revision number	4.3.5
Date of current revision	4.3.6
Preferred name	4.3.7
Synonymous name	4.3.8
Short name	4.3.9
Preferred symbol	4.3.10
Synonymous symbol	4.3.11
Definition	4.4.2
Date of original definition	4.4.3
Note	4.4.4
Remark	4.4.5
Formula	4.4.6
Figure	4.4.7
Source document of data element type definition	4.4.8
Data type	4.5.2
Value format	4.5.3
Unit of measure	4.5.4
Value list	4.5.5

4.2 Information model of a data element type

The attributes of a data element type are divided into four main groups:

- identifying attributes;
- semantic attributes;
- value attributes;
- relationship attributes.

In the following subclauses the attributes are specified and clarified by using information models. The information models (or entity-association diagrams) of a data element type shall be read as follows:

- from inside outwards starting with the 'Entity' in bold capital letters;
- the associated entities indicated by ellipses;
- the association between an entity and an associated entity shown by the line between the two ellipses;
- text beside the line between an entity and an associated entity describing the association;
- the combination of an association and an entity constituting the attribute of a data element type;
- two numerals separated by a dot indicating the occurrence of the attribute: the first digit indicates the minimum number of occurrences, the second one the maximum number of occurrences;
- associations and the corresponding occurrence indications positioned on the same side of the association line;
- in the information models the name of the entities in upper case letters and the name of the associated entities in lower case letters.



Entity:	DATA ELEMENT TYPE
Association:	known by
Associated entity:	preferred name
Attribute:	known by preferred name
Cardinality:	1.1 (one and only one)

NOTE The attribute is composed of the association and the relevant entity.

Figure 1 — Principle of information models

4.3 Data element types — Identifying attributes

4.3.1 General

In order to identify a data element type uniquely within the ISO 13399 reference dictionaries and for electronic information exchange, a language-independent combination of characters shall be used. Figure 2 shows the possible attributes of a data element used to identify a data element type.

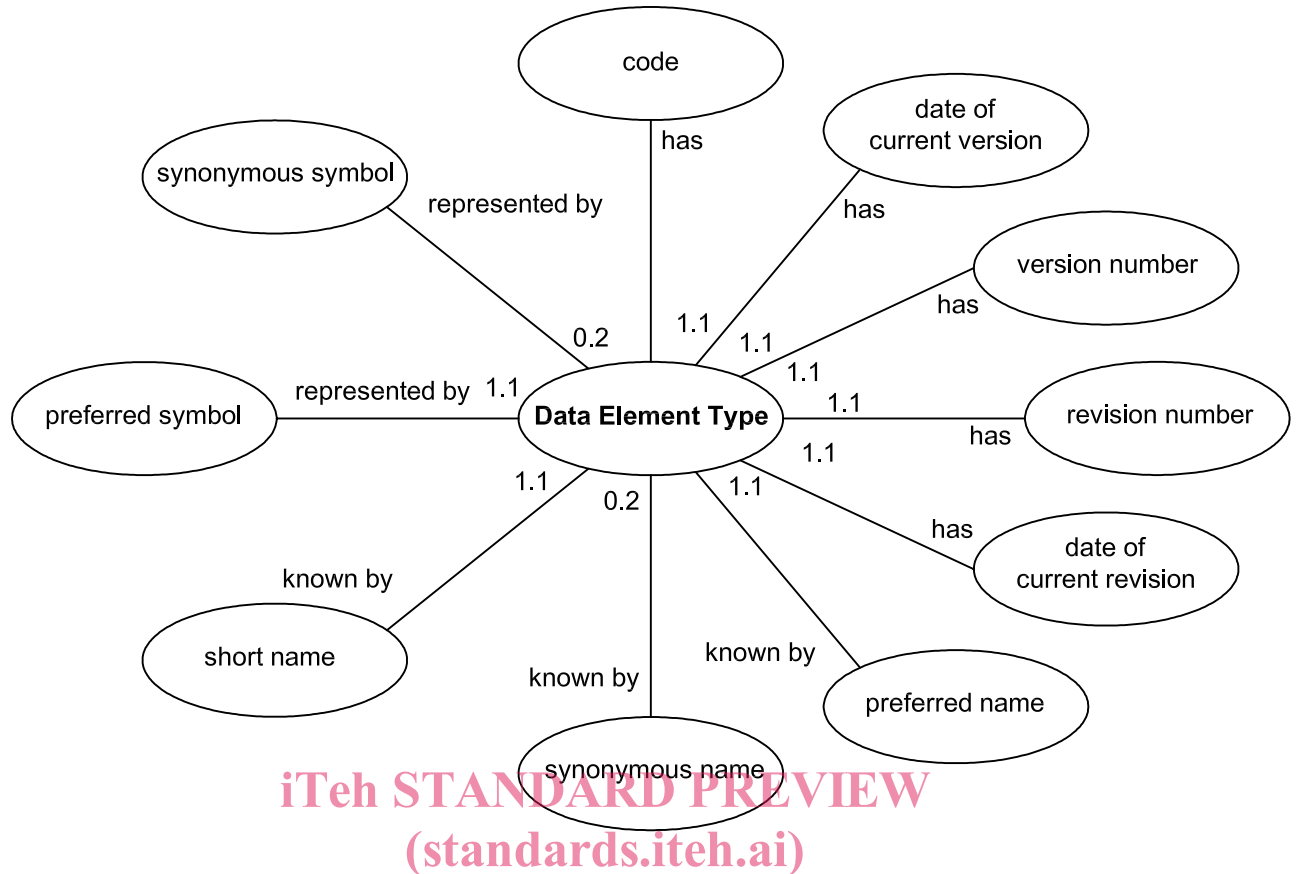


Figure 2 — Identifying attributes for a data element type

4.3.2 Code

Attribute name: code

Attribute definition: unique string of alphabetic and numeric characters

Comments: the characters in the string shall be generated at random and should not bear any relationship to the meaning of the data element types or the structure of the dictionary. In case of a change in at least one attribute of a data element type which affects the meaning and or communication of the data element type, then a new (other) data type having a new code, shall be defined. Such attributes that affect the meaning are:

- definition;
- unit of measure;
- condition data element type;
- value format;
- data type.

Obligation: mandatory

Character type of values: upper case Latin letters A to Z (except O and I), digits 0 to 9.

4.3.3 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. Consecutive version numbers shall be used 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 but which does not affect the meaning of that data element type. These attributes are:

- preferred name;
- short name;
- preferred symbol;
- preferred name of condition data element type;
- value meaning;
- item class.

Obligation: mandatory

Character type of values: digits 0 to 9

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4.3.4 Date of current version

Attribute name: date of current version

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Attribute definition: calendar day on which the current version of the data element type was established

Comments: for the first version, the date is the same as the original definition. The format of the representation shall be dd-mm-ccyy, where dd is the identification number of the day in the month, mm is the identification number of the month in the year and ccyy is the identification number of the year.

Obligation: mandatory

Character type of values: digits 0 to 9

4.3.5 Revision number

Attribute name: revision number

Attribute definition: number used for the administrative control of a data element type