PD ISO/TS 13399-3:2014

BSI Standards Publication

Cutting tool data representation and exchange

Part 3: Reference dictionary for tool items

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National foreword

This Published Document is the UK implementation of ISO/TS 13399-3:2014. It supersedes DD ISO/TS 13399-3:2007 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MTE/18, Tools tips and inserts for cutting applications.

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TECHNICAL SPECIFICATION

ISO/TS 13399-3

Second edition
2014-02-15

Cutting tool data representation and exchange —

Part 3: Reference dictionary for tool items

Représentation et échange des données relatives aux outils coupants —

Partie 3: Dictionnaire de référence pour les éléments relatifs aux outils

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 29, *Small tools*.

This second edition cancels and replaces the first edition (ISO/TS 13399-3:2007), which has been technically revised.

ISO 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 cutting items* [Technical Specification]

— *Part 3: Reference dictionary for tool items* [Technical Specification]

— *Part 4: Reference dictionary for adaptive items* [Technical Specification]

— *Part 5: Reference dictionary for assembly items* [Technical Specification]

— *Part 50 Reference dictionary for reference systems and common concepts* [Technical Specification]

— *Part 60: Reference dictionary for connection systems* [Technical Specification]

— *Part 100: Definitions, principles and methods for reference dictionaries* [Technical Specification]

— *Part 150: Usage guidelines* [Technical Specification]

— *Part 301: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3: *Modelling of thread-cutting taps, thread-forming taps and thread-cutting dies* [Technical Specification]

— *Part 302: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3: *Modelling of solid drills and countersinking tools* [Technical Specification]

The following parts are under preparation:

— *Part 51: Designation system for customer solution cutting tools*

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— *Part 80: Concept for the design of 3D models based on properties according to* ISO 13399*: Overview and principles* [Technical Specification]

— *Part 201: Concept for the design of 3D models based on properties according to* ISO/TS 13399-2*: Modelling of regular inserts* [Technical Specification]

— *Part 202: Concept for the design of 3D models based on properties according to* ISO/TS 13399-2*: Modelling of irregular inserts* [Technical Specification]

— *Part 203: Concept for the design of 3D models based on properties according to* ISO/TS 13399-2*: Modelling of exchangeable inserts for drilling* [Technical Specification]

— *Part 204: Concept for the design of 3D models based on properties according to* ISO/TS 13399-2*: Modelling of inserts for reaming* [Technical Specification]

— *Part 303: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3*: Modelling of end mills with non-indexable cutting edges* [Technical Specification]

— *Part 304: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3*: Modelling of milling cutters with arbor hole and non-indexable cutting edges* [Technical Specification]

— *Part 307: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3*: Modelling of end mills for indexable inserts* [Technical Specification]

— *Part 308: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3*: Modelling of milling cutter with arbor hole for indexable inserts* [Technical Specification]

— *Part 309: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3*: Tool holders for indexable inserts* [Technical Specification]

— *Part 311: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3*: Modelling of solid reamers* [Technical Specification]

— *Part 312: Concept for the design of 3D models based on properties according to* ISO/TS 13399-3*: Modelling of reamers for indexable inserts* [Technical Specification]

— *Part 401: Concept for the design of 3D models based on properties according to* ISO/TS 13399-4*: Modelling of converting, extending and reducing adaptive items* [Technical Specification]

— *Part 405: Concept for the design of 3D models based on properties according to* ISO/TS 13399-4*: Modelling of collets* [Technical Specification]

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Introduction

This part of ISO 13399 defines the terms, properties, and definitions for those portions of a cutting tool that support one or more cutting items with defined cutting edges. Tool items include, but are not limited to, turning tools, milling tools, drilling tools, threading tools, etc. The purpose of this part of ISO 13399 is to provide a reference dictionary to support the use of the general information model defined in ISO 13399-1.

A cutting tool with defined cutting edges is used on a machine to remove material from a workpiece by a shearing action at the cutting edges of the tool. Cutting tool data that can be described by ISO 13399 (all parts) include, but are not limited to, everything between the workpiece and the machine tool. Information about inserts (e.g. regular and irregular shaped replaceable cutting items), solid tools (e.g. solid drill and endmill), assembled tools (e.g. boring bars, indexable drills, and indexable milling cutters), adaptors (e.g. milling arbor and drilling chuck), components (e.g. shims, screws, and clamps), and their relationships can be represented by ISO 13399 (all parts). Possible assemblies of the components of a cutting tool are illustrated in Figure 1.

The objective of ISO 13399 (all parts) is to provide the means to represent 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 support the application of this 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 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, ideas, facts, and processes which together describe a portion of interests 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 items. Everyone in a communication process is expected to 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.

An engineering information model is therefore a specification for data that 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, their relationships, and 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 created when it is populated with the data items and their values that are applicable to a particular example of that situation.

This part of ISO 13399 uses the following International Standards developed by ISO/TC 184/SC 4:

— the EXPRESS language defined in ISO 10303-11 for defining the information model in ISO 13399-1;

— the file format for data exchange derived from the model and defined in ISO 10303-21;

— the data dictionary defined in the ISO 13584 series.

The ISO 13399 series is intended for use by, among others, tool producers and vendors, manufacturers, and developers of manufacturing software. ISO 13399 provides a common structure for exchanging

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data about cutting tools with defined cutting edges. ISO 13399 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 a customer's database, and

— the management of cutting tool information from multiple sources and for multiple applications.

Different companies use different business models to determine their need for the communication of information about their products. For example, one cutting tool manufacturer can regrind its customers' tools while another could allow its customers to do the regrinding and provide the information to enable them to do so. Therefore, the two cutting tool manufacturers can have a different set of cutting tool properties to communicate using the information model and dictionaries provided in ISO 13399.

ISO 13399 defines only the information that could be communicated, but does not specify what information shall be communicated.

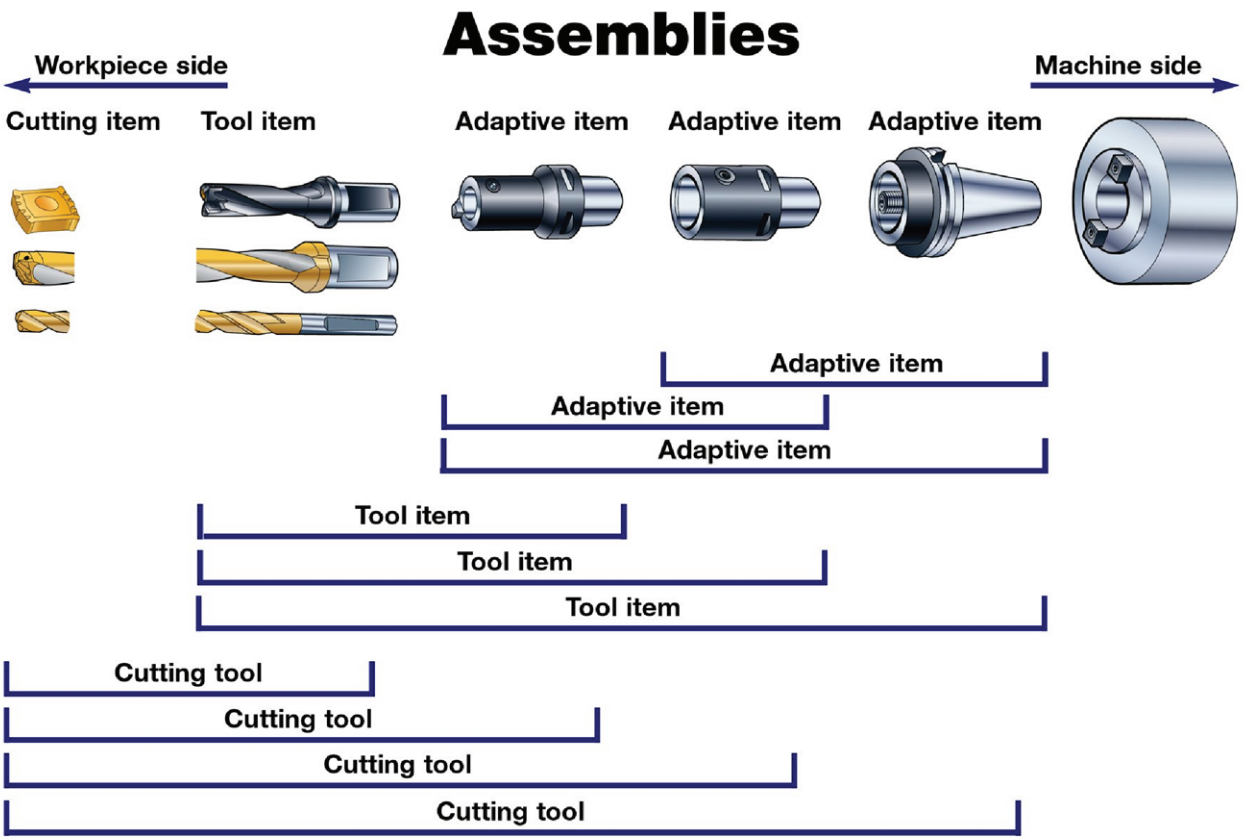

Figure 1 — Possible assemblies of the components of a cutting tool

Since the content of those dictionaries evolves according to industrial innovations and constant improvement of technology in cutting tools, a Maintenance Agency has been established for the purposes of

— correcting errors in the entries of existing classes and properties,

— adding new properties to existing classes,

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— adding new classes and their properties,

— managing the status of those properties and classes, and

— migrating the dictionary to subsequent editions of ISO 13399 (all parts).

The secretariat of this Maintenance Agency has been assigned to

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France

by the ISO Technical Management Board.

The website of the Maintenance Agency is available at: http://www.unm.fr/main/core.php?pag_id=135

The reference dictionaries are available in the form of EXPRESS files on the website of the Maintenance Agency. These files are considered complementary to this part of ISO 13399; they can be freely downloaded and used for cutting tool data representation and exchange.

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Cutting tool data representation and exchange —

Part 3: Reference dictionary for tool items

1 Scope

This part of ISO 13399 specifies a reference dictionary for tool items, together with their descriptive properties and domains of values.

This part of ISO 13399 specifies a reference dictionary containing:

— definitions and identifications of the classes of tool items and their features, with an associated classification scheme;

— definitions and identifications of the data element types that represents the properties of tool items and their features;

— definitions and identifications of domains of values for describing the above-mentioned data element types.

Each class, property, or domain of values of this application domain constitutes an entry of the reference dictionary defined in this part of ISO 13399. It is associated with a computer-sensible and human-readable definition, and with a computer-sensible identification. Identification of a dictionary entry allows unambiguous reference to it from any application that implements the information model defined in ISO 13399-1.

Definitions and identifications of dictionary entries are defined by means of standard data that consist of instances of the EXPRESS entity data types defined in the common dictionary schema, resulting from a joint effort between ISO/TC 184/SC 4 and IEC SC3D, and in its extensions defined in ISO 13584-24 and ISO 13584-25.

The following are within the scope of this part of ISO 13399:

— standard data that represent the various classes of tool items and tool item features;

— standard data that represent the various properties of tool items and tool item features;

— standard data that represent domains of values used for properties of tool items and tool item features;

— definition of cutting operations;

— definitions of reference systems for tool items and their properties;

— one implementation method by which the standard data defined in this part of ISO 13399 can be exchanged.

NOTE 1 The implementation method by which the standard data defined in this part of ISO 13399 can be exchanged is specified in ISO 10303-21.

The following are outside the scope of this part of ISO 13399:

— specialized or expert knowledge in the design and use of cutting tools;

— rules to determine what information should be communicated;

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— applications where these standard data can be stored or referenced;

— implementation methods other than the one defined in this part of ISO 13399 by which the standard data can be exchanged and referenced;

— information model for cutting tools;

— definitions of classes and properties for cutting items;

— definitions of classes and properties for adaptive items;

— definitions of classes and properties for assembly items;

— definitions of classes and properties for connection systems;

— definitions of classes and properties for reference systems.

NOTE 2 The information model for cutting tools is defined in ISO 13399-1.

NOTE 3 The definitions of classes and properties for cutting items, adaptive items, and assembly items are provided in ISO/TS 13399-2, ISO/TS 13399-4, and ISO/TS 13399-5, respectively.

NOTE 4 The definitions of classes and properties for connection systems and reference systems are provided in ISO/TS 13399-50.

2 Normative references

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

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

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

ISO/TS 13399-100:2008, *Cutting tool data representation and exchange — Part 100: Definitions, principles and methods for reference dictionaries*

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO/TS 13399-100 (structure and contents of the dictionary) and the following apply.

NOTE The main collection of the terms and their definitions that relate to adaptive items and their properties is provided in Annexes B to D.

3.1
applicable property
property that is defined for some family of items and that shall apply to any member of this family

[SOURCE: ISO 13584-24:2003]

3.2
basic semantic unit
entity that provides an absolute and universally unique identification of a certain object of the application domain that is represented as a dictionary element

[SOURCE: ISO 13584-42:2010, 3.4]

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3.3
chip
material removed from a workpiece by a cutting process

[SOURCE: ISO/TS 13399-2:2014, 3.3]

3.4
cutting tool
device or assembly of items for removing material from a workpiece through a shearing action at the defined cutting edge or edges of the device

[SOURCE: ISO 13399-1:2006, 3.1]

Note 1 to entry: A cutting tool could be an assembly of one or more adaptive items, a tool item, and several cutting items on a tool item. See Figure 1.

3.5
data
representation of information in a formal manner suitable for communication, interpretation, or processing by human beings or computers

[SOURCE: ISO 10303-1:1994, 3.2.14]

3.6
data element type
unit of data for which the identification, description, and value representation have been specified

[SOURCE: ISO 13584-42:2010, 3.13]

3.7
data exchange
storing, accessing, transferring, and archiving of data

[SOURCE: ISO 10303-1:1994, 3.2.15]

3.8
data type
domain of values

[SOURCE: ISO 10303-11:2004, 3.3.5]

3.9
dictionary
table consisting of a series of entries with one meaning corresponding to each entry in the dictionary and one dictionary entry identifying a single meaning

[SOURCE: ISO 13584-511:2006, 3.1.9]

Note 1 to entry: In the ISO 13399 series, a dictionary is a formal and computer-sensible representation of ontology.

3.10
entity
class of information defined by its attributes that establishes a domain of values defined by common attributes and constraints

[SOURCE: ISO/TS 13399-2:2014, 3.10]

3.11
entity data type
representation of an entity

[SOURCE: ISO/TS 13399-2:2014, 3.11]

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3.12
entity instance
named unit of data that represents a unit of information within the class defined by an entity

Note 1 to entry: An entity instance is a member of the domain established by an entity data type.

[SOURCE: ISO/TS 13399-2:2014, 3.12]

3.13
family of products
set of products represented by the same characterization class

[SOURCE: ISO 13584-42:2010, 3.16]

3.14
implementation method
means for computers to exchange data

[SOURCE: ISO/TS 13399-2:2014, 3.14]

3.15
information
facts, concepts, or instructions

[SOURCE: ISO 10303-1:1994, 3.2.20]

3.16
information model
formal model of a bounded set of facts, concepts, or instructions to meet a specific requirement

[SOURCE: ISO 10303-1:1994, 3.2.21]

3.17
machine side
identification of a direction pointing towards the machine

3.18
machined surface
desired surface produced by the action of the cutting tool

[SOURCE: ISO 3002-1:1982, 3.1.2]

3.19
mirror plane
xz-plane in the coordinate axis system

[SOURCE: ISO/TS 13399-50:2013, 5.3.7]

3.20
ontology
explicit and consensual specification of concepts of an application domain independent of any use of these concepts

[SOURCE: ISO 13584-511:2006, 3.1.20]

Note 1 to entry: In the ISO 13399 series, a dictionary is the formal and computer-sensible representation of ontology.

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3.21
primary coordinate system
right-handed rectangular Cartesian coordinate system in three-dimensional space with three principal axes labelled X, Y, X

[SOURCE: ISO/TS 13399-50:2013, 5.3.1]

3.22
property
defined parameter suitable for the description and differentiation of products

[SOURCE: ISO 13584-42:2010, 3.37]

3.23
transient surface
part of the surface which is formed on the workpiece by the cutting edge and removed during the following cutting stroke, during the following revolution of the tool or workpiece, or by the following cutting edge

[SOURCE: ISO 3002-1:1982, 3.1.3]

3.24
visible property
property that has a definition meaningful in the scope of a given characterization class, but that does not necessarily apply to the various products belonging to this class

[SOURCE: ISO 13584-42:2010, 3.46]

3.25
workpiece
object on which a cutting action is performed

[SOURCE: ISO/TS 13399-2:2014, 3.24]

3.26
workpiece side
identification of a direction pointing towards the workpiece

3.27
xy-plane
plane in the coordinate axis system that contains the X and Y axes with the normal of the plane in the positive Z direction

[SOURCE: ISO/TS 13399-50:2013, 5.3.18]

3.28
xyw-plane
plane in the coordinate axis system related to the xy-plane by the rotation angle PHI about the X axis in an anticlockwise (counter clockwise) direction and by a distance located at a distance XYWD from the origin of the coordinate axis system

[SOURCE: ISO/TS 13399-50:2013, 5.3.19]

3.29
xz-plane
plane in the coordinate axis system that contains the X and Z axes with the normal of the plane in the positive Y direction

[SOURCE: ISO/TS 13399-50:2013, 5.3.20]

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3.30
xzw-plane
plane in the coordinate system related to the xz-plane by the rotation angle KAPPA about the *Z* axis in a counter clockwise direction and located at a distance XZWD from the origin of the primary coordinate system

[SOURCE: ISO/TS 13399-50:2013, 5.3.21]

3.31
yz-plane
plane in the coordinate system that contains the Y and Z axes with the normal of the plane in the positive X direction

[SOURCE: ISO/TS 13399-50:2013, 5.3.22]

3.32
yzw-plane
plane in the coordinate system related to the yz-plane by the rotation angle RHO about the Y axis in a counter clockwise direction and located at a distance YZWD from the origin of the primary coordinate system

[SOURCE: ISO/TS 13399-50:2013, 5.3.23]

Note 1 to entry: The xzw-plane, the xyw-plane, and the yzw-plane are mutually perpendicular.

4 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

BSU basic semantic unit

DET data element type

5 Representation of the ontology concepts as dictionary entries

5.1 General

In the following subclauses, a concept in the ontology is identified by a name in lower-case characters. The name of a class that represents the concept in the dictionary is identified by bold, lowercase characters with multiple words joined by an underscore character.

EXAMPLE "tool item type" is the name of a concept in the ontology. **tool_item_type** is the identifier of the class in the dictionary that represents the concept.

Data for tool items are grouped into two main classes: **tool_item_feature** and **tool_item_type**. The items in the classification of **tool_item_type** are identified by a label that is derived from the main application of a tool. However, it should be recognized that a tool can be used for more than one type of cutting operation. A **tool_item_feature** is an aspect of a **tool_item_type** that could not exist in isolation from the **tool_item_type**. A classification of cutting operations is also provided for completeness and to aid definitions.

Some of the definitions of properties that are applicable to tool items are defined in terms of a primary coordinate system. The coordinate system is the same for adaptive items, cutting items, and tool items and is defined in ISO/TS 13399-50. The applications of this coordinate system to tool items are described in this part of ISO 13399. All functional dimensions of a tool item that uses replaceable cutting items are defined on the assembly of the tool item and the master insert. The convention followed is "the tool in hand".

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Each entry in the dictionary, either a class or a property, is identified with a numerical code (BSU) that is generated at random when the dictionary is compiled. A BSU can be made unique by the addition of a code that is a reference to the supplier of the dictionary. Each classified item in 5.2, 5.3, and 5.4 is associated with its definition from the dictionary.

The structure of the classification is summarized in Annex B. The complete definitions of the tool item classes are provided in Annex C. The properties applicable to tool item classes are defined in Annex D.

5.2 Reference systems for tool items

The primary coordinate system used for tool items in this part of ISO 13399 is the same coordinate system as is defined in ISO/TS 13399-50. The additional reference entities relevant for tool items are as follows:

— **cutting_reference_point**;

— **feed_direction_primary**;

— **master_insert**;

— **prismatic_tool_item_position**;

— **round_tool_item_position**;

— **tool_cutting_edge_plane**;

— **tool_feed_plane**;

— **tool_rake_plane**.

5.2.1 cutting_reference_point is the theoretical sharp point of the cutting tool from which the major functional dimensions are taken.

NOTE 1 For the calculation of this point the following cases apply:

Case 1: For a tool cutting edge angle less than or equal to 90°, the point is the intersection of the **tool_cutting_edge_plane**, the **tool_feed_plane**, and the **tool_rake_plane**.

Case 2: For a tool cutting edge angle greater than 90°, the point is the intersection of the **tool feed_plane**, a plane perpendicular to the **tool_feed_plane** and tangential to the cutting corner, and the **tool_rake_plane**.

Case 3: For ISO tool styles D and V with only axial rake, the point is the intersection of a plane perpendicular to the primary feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the **tool_rake_plane**.

Case 4a: For round inserts with one feed direction parallel to the tool axis, the point is the intersection of a plane perpendicular to the primary feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the **tool_rake_plane**.

Case 4b: For round inserts with two feed directions, one parallel to the tool axis and one perpendicular to the tool axis with two **cutting_reference_point**, each point is the intersection of a plane perpendicular to its feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the **tool_rake_plane**.

NOTE 2 In Case 3, the theoretical sharp corner of the insert and the **cutting_reference_point** are on the plane that is perpendicular to the **tool_feed_plane**.

5.2.2 feed_direction_primary is the direction of movement of a cutting tool to achieve the main cutting function of the tool.

5.2.3 master_insert is a nominal, replaceable cutting item that is used for defining the dimensions of a cutting tool.

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NOTE 1 A master insert can substitute for either a regular or an irregular insert and uses the position of the item that it replaces.

NOTE 2 Definitions making use of a master insert also apply to solid or brazed tools.

5.2.4 prismatic_tool_item_position identifies the location of a prismatic tool item where

— the base of the tool item shall be coplanar with the XZ-plane,

— the normal for the base of the item shall be in the –Y direction,

— the rear backing surface shall be coplanar with the YZ-plane,

— the normal for the rear backing surface shall be in the –X direction,

— the end of the item shall be coplanar with the XY-plane,

— the normal for the end of the item shall be in the –Z direction, and

— the rake face of the primary cutting item shall be completely visible in the XZ quadrant.

NOTE 1 This definition applies to right-handed tool items. Left-handed tool items are as defined for right-handed items but mirrored through the YZ-plane.

NOTE 2 For cartridges, the top of the axial adjustment screw shall be coincident with the XY-plane.

5.2.5 round_tool_item_position identifies the location of a round tool item where

— the axis of the tool item shall be colinear with the Z-axis,

— the vector of the shank that points in the Z direction shall also point towards the workpiece side,

— the drive slots or clamping flats, if present, shall be parallel with the XZ-plane,

— the contact surface of the coupling, the gauge plane, or the end of the cylindrical shank shall be coplanar with the XY-plane, and

— the rake face of the primary cutting item shall be visible in the XZ quadrant.

NOTE 1 This definition applies to right-handed tool items. Left-handed tool items are as defined for right-handed tool items but mirrored through the YZ-plane.

NOTE 2 If a bore is present, the vector of the bore of the item that points in the Z direction shall also point towards the workpiece side.

5.2.6 tool_cutting_edge_plane is the plane perpendicular to the *xy*-plane through the major cutting edge of a master insert or of a solid tool.

5.2.7 tool_feed_plane is the plane perpendicular to the *xy*-plane that is parallel to the primary feed direction of the tool item and that is tangential to the cutting corner of the master insert or of a solid tool.

5.2.8 tool_rake_plane is the plane that contains the cutting edges of a master insert or of a solid tool.

5.3 tool_item_feature is a generic family of characteristics of a tool item that cannot exist independently of the tool item. **tool_item_feature** has the following subclasses:

— **chip_management**;

— **drill_point**;

— **guide_pilot_feature**;

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— **pilot_drill_feature**;

— **tool_hub**.

5.3.1 **chip_management** is a generic class of features of the tool body or assembly to control the direction of motion of the chip channel exit.

End of the chip channel on the machine side.

5.3.2 **drill_point** is a part of a drill that first makes contact with the workpiece.

5.3.3 **guide_pilot_feature** is a portion of a cylindrical tool in front of the cutting portion that acts to limit the sideways movement of the tool in operation.

5.3.4 **pilot_drill_feature** is a part of a larger drill for guiding the main cutting operation.

5.3.5 **tool_hub** is a central part of a disk-shaped tool item with increased thickness.

5.4 **tool_item_type** is a generic family of items that support or hold one or more cutting items in a cutting operation. **tool_item_type** has the following subclasses:

— **broach**;

— **burr_tool**;

— **cartridge**;

— **drill**;

— **mill**;

— **ream**;

— **rotating_borer**;

— **threading_die**;

— **threading_tap**;

— **turn**.

5.4.1 **broach** is a family of items designed for use mainly in broaching operations. Broach has the following subclasses:

— **cylindrical_broach**;

— **disk_broach**;

— **prismatic_broach**;

— **tapered_broach**.

5.4.1.1 **cylindrical_broach** is a tool item used for changing the dimensions of an existing profile that has a constant circular cross section and cutting edges around the whole circumference.

5.4.1.2 **disk_broach** is a disk-shaped tool item used for changing the dimensions of an existing profile and that has the cutting edges on the periphery of the disk.

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5.4.1.3 **prismatic_broach** is a tool item with a constant rectangular cross section used for changing the dimensions of an existing profile and that has cutting items on one side of the cross section.

5.4.1.4 **tapered_broach** is a tool item for changing the dimensions of an existing profile and that has continuously varying cross section with cutting edges surrounding the cross section.

NOTE The cross section can be rectangular, circular, or elliptical.

5.4.2 **burr_tool** is a small rotating tool for removing areas of roughness from a machined edge.

5.4.3 **cartridge** is a tool item that carries a solid cutting edge or locks a replaceable insert and is designed to be mounted onto either an adaptive item or a tool item.

5.4.4 **drill** is a family of items designed for use mainly in drilling operations. **drill** has the following subclasses:

— **centre_drill**;

— **chamfer_drill**;

— **conical_drill**;

— **core_drill**;

— **counterbore_drill**;

— **countersink_drill**;

— **deep_hole_drill**;

— **pilot_drill**;

— **step_drill**;

— **trepanning_drill**;

— **twist_drill**.

5.4.4.1 **centre_drill** is a tool item for creating a hole for the location of a subsequent operation.

NOTE This drill is usually a solid drill.

5.4.4.2 **chamfer_drill** is a tool item for creating a chamfer in or on a hole.

5.4.4.3 **conical_drill** is a tool item for forming a cone-shaped hole.

NOTE This drill is usually a solid drill.

5.4.4.4 **core_drill** is a tool item without a central cutting point or means of starting a hole.

NOTE The tool is used to enlarge an existing hole, for example, in a casting and has the characteristics of a reamer.

5.4.4.5 **counterbore_drill** is a tool item for creating a counterbore section of a hole.

5.4.4.6 **countersink_drill** is a tool item for creating a countersink section of a hole.

5.4.4.7 **deep_hole_drill** is a tool item for creating a hole usually deeper than 10 times the diameter of the tool item.

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5.4.4.8 **pilot_drill** is a tool item that is added to a larger drill for guiding the main cutting operation.

5.4.4.9 **step_drill** is a tool item for creating a stepped hole.

5.4.4.10 **trepanning_drill** is a tool item used to cut a deep face groove leaving a plug of material equal to the inner diameter.

NOTE The tool can be small to leave a boss on a component or large to create a large hole but not produce all the material to swarf.

5.4.4.11 **twist_drill** is a solid drill with helical chip flutes.

5.4.5 **mill** is a family of rotating tool items intended mainly for use in milling operations. **mill** has the following subclasses:

— **double_half_side_mill**;

— **end_mill**;

— **face_mill**;

— **half_side_mill**;

— **ring_mill**;

— **slab_mill**;

— **slotting_cutter**;

— **threading_grooving_mill**.

5.4.5.1 **double_half_side_mill** is a milling cutter that cuts on both sides and part of the periphery and is used for enlarging an existing slot.

NOTE The Z-axis is perpendicular to the slot being enlarged; the cutting width is less than half the cutting diameter (CW < CD/2) and the mounting is normally a bore mount.

5.4.5.2 **end_mill** is a milling cutter with an integral shank.

NOTE The Z-axis is either perpendicular or parallel to the surface being machined and the tool has a cutting diameter of less than 150 mm (CD < 150 mm).

5.4.5.3 **face_mill** is a milling cutter that produces a flat surface on the workpiece although the cutting edges on the periphery remove most of the workpiece material.

NOTE The Z-axis is perpendicular to the surface being machined; there is one row of inserts; the mounting is usually a bore with transverse keyways and the depth of cut is less than the cutting diameter (DOC < CD).

5.4.5.4 **half_side_mill** is a milling cutter that cuts on the periphery and one side.

NOTE The Z-axis is perpendicular to the main workpiece surface being produced; the depth of cut is less than half the cutting diameter (DOC < CD/2) and the mounting is normally a bore mount.

5.4.5.5 **ring_mill** is a milling cutter that cuts on the internal annular surface and both sides.

NOTE The Z-axis is perpendicular to the slot being produced and the cutting width is less than half the cutting diameter (CW < CD/2).

5.4.5.6 **slab_mill** is a milling cutter with cutting edges on the periphery for machining large surfaces.

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NOTE The tool axis is parallel to the workpiece surface; the mounting surface is a bore and the useable length is greater than cutting diameter (LU > CD).

5.4.5.7 **slotting_cutter** is a milling cutter that cuts on the periphery and both sides.

NOTE The Z-axis is perpendicular to the slot being produced; the cutting width is less than half the cutting diameter (CW < CD/2) and the mounting is normally a bore mount.

5.4.5.8 **threading_grooving_mill** is a milling cutter that cuts on its periphery to produce a groove or a thread.

NOTE The Z-axis is parallel to the groove width or to the axis of thread being cut and the mill can either be designed with an integral shank or with a bore mount.

5.4.6 **ream** is a family of items designed for use mainly in reaming operations. **ream** has the following subclasses:

— **cylindrical_reamer**;

— **profile_reamer**;

— **stepped_reamer**;

— **tapered_reamer**.

5.4.6.1 **cylindrical_reamer** is a tool item used for reaming a cylindrical surface.

5.4.6.2 **profile_reamer** is a tool item for reaming a non-regular surface.

5.4.6.3 **stepped_reamer** is a tool item for reaming a hole with more than one diameter.

5.4.6.4 **tapered_reamer** is a tool item for reaming a conical hole.

5.4.7 **rotating_borer** is an assembly of cutting item or items, tool item or items, and adaptive item or items to enlarge an existing hole.

5.4.8 **threading_die** is a family of items used for external threading operations. **threading_die** has the following subclasses:

— **cylindrical_die**;

— **hexagonal_die**.

5.4.8.1 **cylindrical_die** is a threading die whose outside shape is cylindrical.

5.4.8.2 **hexagonal_die** is a threading die whose outside shape is hexagonal.

5.4.9 **threading_tap** is a family of items designed to form an internal thread in an existing hole in a workpiece. **threading_tap** has the following subclasses:

— **conical_tap**;

— **cylindrical_tap**.

5.4.9.1 **conical_tap** is a tool item that creates tapered internal threads.

5.4.9.2 **cylindrical_tap** is a tool item that creates internal cylindrical threads.

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5.4.10 turn is a family of items designed for use mainly in turning and boring operations. **turn** has the following subclasses:

— **boring_bar**;

— **prismatic_tool_holder**;

— **system_tool**.

5.4.10.1 boring_bar is a tool item with cylindrical cross section shank mainly used for internal turning operations.

5.4.10.2 prismatic_tool_holder is a tool item with prismatic cross section shank mainly used for external turning operations.

NOTE The class includes, but is not limited to, square and rectangular shanks.

5.4.10.3 system_tool is a tool item with manufacturer-specific connection used for external and/or internal turning operations.

6 Properties for tool item features and tool item types

The properties that are applicable to items defined in Clause 5 are defined in Annex D, where the association of a property with a class is also specified. In the compilation of the dictionary, all properties are visible properties at the root class of the dictionary and are made applicable properties at the class level where they apply. The names of properties that can be applicable to tool item features and tool item types, with their identification codes (BSU), are shown in Table 1. The order of the names in the table should be read in rows from left to right.

NOTE 1 The value domains for properties are specified in ISO/TS 13399-100.

NOTE 2 The BSU can be made unique by the addition of the code for the supplier of the dictionary as a prefix to the identification code.

EXAMPLE The unique BSU for **a dimension on lf** would be: 0112/1///13399__2–71D0793ECE F9A for version two of the dictionary.

Table 1 — Names of properties for tool items

Property name	Identification code (BSU)
a dimension on lf	71D0793ECEF9A
a dimension on wf	71CF299431CAC
adjustability	71EBBA9E78025
axial groove outside diameter maximum	71D07543FD182
axial groove outside diameter minimum	71CF299354332
balance quality code	71DF151EA5CF1
balanced by design	71EAC0CAB861F
blade reinforcement radius	71CF2992DBC44
body clearance depth	71EAC81F88336
body diameter	71ED6A9AF7D1D
body diameter maximum	71D08462F8185
body half taper angle	71EAC472BD116
body height	71EBB332C60EB

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Table 1 *(continued)*

Property name	Identification code (BSU)
body length	71ED6AA478A3D
body length maximum	71DCD3B16750B
body material code	71DF1523224D8
body width	71EBB33230236
burr type code	71DF1523869EE
cartridge size code	71DF1523EE184
clamping length	71EBAF896BE9A
clamping length maximum	71ED6E54B15C4
clamping length minimum	71EBB339ED2BD
clamping type code	71CF298EEB4F5
clamping width	71EBAF85006BD
clearance angle axial	71EAC83CD450B
clearance angle normal	71ED6E5CD0DAE
clearance angle orthogonal	71D08418C3B4D
clearance angle radial	71EAC83B73825
coating property	71DD703B84298
connection bore depth	71EAC48CAD407
connection bore diameter	71E01D92C41E8
connection code machine side	71D102AE3B252
connection code workpiece side	71D102AE8A5A9
connection count workpiece side	71EDD2C17746F
connection diameter	71EBDBF5060E6
connection retention knob thread size	71CF298A76B66
connection size code	71FC193318002
connection unit basis	71ED6E16D5978
contact surface diameter machine side	71D087D97FCE3
coolant supply property	71EBB342CC751
cutting depth maximum	71CEAEBD5A66A
cutting diameter	71D084653E57F
cutting diameter internal	71D0846545C4E
cutting diameter internal maximum	71D0846570977
cutting diameter internal minimum	71D084655A2F7
cutting diameter maximum	71D084656CE32
cutting diameter minimum	71D0846556288
cutting diameter size code	71DF1527D828C
cutting edge centre count	71DCD0033973E
cutting end count	71DCD00CBBC2A
cutting item count	71DF8C52B8926
cutting length at minimum bore diameter	71CF299287FD3
cutting pitch density	71DF15283219C
cutting pitch differential	71DF152D8CF7D

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Table 1 *(continued)*

Property name	Identification code (BSU)
cutting width	71CEAEBE2B825
cutting width maximum	71D07569F8BC3
cutting width minimum	71D0756A28B42
damping property	71CED03D70452
data chip provision	71CF29869CA0F
depth of cut maximum	71D07576C0558
design configuration style code	71CF2993DC583
drill back taper	71EAC81AD9AE1
drive angle	71D08096F930C
drive count	71E0306423B2A
drop head design	71EAC49F75413
face effective cutting edge count	71DCD00239812
face mounted insert count	71DCD0029BBE7
flute count	71DCCFEBB883E
flute design code	71DCCFEC645BD
flute helix angle	71DCCFEC20115
flute helix hand	71DCCFF654756
flute helix pitch	71DCCFF6A1A13
fluted land width	71EAC8210DF36
functional height	71CF29994E737
functional length	71DCD39338974
functional length minimum	71EBC1EB8456A
functional length secondary	71D078F5BEDBE
functional width	71CF29984CDA7
functional width 2	71D193F495583
functional width secondary	71CF299874B1E
groove depth minimum bore diameter	71CF298FB10E4
guide element property	71EE070696F08
guide pilot diameter	71ED6A7A6E6A2
hand	71CF29872F0AB
head back offset length	71D075730A82B
head back offset width	71D075731F172
head bottom offset height	71CF298F073D3
head bottom offset length	71CF298F4E487
head diameter	71E03062EC034
head length	71D07574A61E8
hub diameter	71D087D3B17B0
hub property	71DF5C078FF46
hub thickness	71D087D3F5E07
inclination angle	71D075754F8A3
insert adjustable count	71DF1538E7378

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Table 1 *(continued)*

Property name	Identification code (BSU)
insert interface code	71CE7A9936610
insert seat size code	71CEAEBF2A69F
overlapping capability	71DF1526AC952
keyway property	71DF5C0761888
length chip flute	71DCCC27DEF53
master insert identification	71CF298FDE0EF
minimum bore diameter	71D07543367C5
mounting hole angle	71EAC0F064E2D
mounting hole distance	71EAC0E9FA4CD
mounting hole distance 2	71EAC0EF68BB7
mounting hole height	71EAC0EFA1BF3
neck diameter	71EAC48EC5DE0
neck length	71EBC1E026769
overall height	71D078EB73E87
overall length	71D078EB7C086
overall length minimum	71EBC1E8857BE
overall width	71CF299257986
peripheral effective cutting edge count	71DCCFF75E485
peripheral mounted insert count	71DCD00054F65
pilot drill protrusion	71EAC49030828
pilot protruding length	71DCCFD24119E
tap chamfer point diameter	71EBC1EA293DC
tap chamfer style	71E02C679DC6D
plunge depth maximum	71D08099F1DDC
point angle	71DCCC4FEF366
point length	71DCCFD064042
premachined hole diameter	71DCCC5A4FD18
profile specification	71DF8C5D91804
protruding length	71DCD394BB20E
qualified tool code	71D078ED2C21E
rake angle axial	71CF29990C41F
rake angle normal	71CF2998EBD46
rake angle orthogonal	71D0808F8F719
rake angle radial	71CF2998A1609
ramping angle maximum	71DF1538632D9
rotational speed maximum	71DF153A691F2
row identifier	71CED04867743
shank cross section shape code	71CF2988A5874
shank diameter	71CF29862B277
shank height	71CF29883E014
shank length	71CF298870946

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Table 1 *(continued)*

Property name	Identification code (BSU)
shank width	71CF298751FCF
shim inclination angle	71FAE074D2EBD
step count	71DCCC3BD1B96
step diameter length	71DCCC3DFA23A
step distance	71DCCC47221E0
step included angle	71DF151D6E547
stock removal maximum	71EBC1EC0BB22
stock removal minimum	71EBC1EBC839F
stock removal recommended	71EBC1EC3E8B6
tangentially mounted insert	71EAC496E7425
tap type identifier	71DF153B4ABCD
taper angle	71EAC4A2B6544
taper gradient	71CEAEC02FEBD
tapered	71EC659C9B3CE
thread diameter	71E02C5C2EED3
thread diameter size	71EBBAA3BCA70
thread tolerance class	71DF153FA5F85
tool changer interference diameter maximum	71CF298A3A99A
tool changer interference length minimum	71CF2989AF0E0
tool cutting edge angle	71D078F683C9B
tool cutting edge angle type code	71D078F6E9893
tool holder shape code	71D078FD4E7BE
tool lead angle	71D078F77616B
tool style code	71D078FBF6C68
unit system	71EBBA9ED6C0A
usable length	71EBB33490FDA
usable length diameter ratio	71DCCC62CD9EE
usable length maximum	71CF2992BDBCC
web taper	71EAC823D95A7
web thickness	71EAC82313165
weight of item	71CED03C97AAB
work piece parting diameter maximum	71D0757C787B8

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Annex A
(normative)

Information object registration

A.1 Document identification

In order to provide for unambiguous identification of an information object in an open system, the object identifier:

{iso technical specification 13399 part (3) version (2)}

is assigned to this part of ISO 13399.

The meaning of this value is defined in ISO/IEC 8824-1 and is described in ISO 13584-1.

A.2 Dictionary identification

The dictionary defined in this part of ISO 13399 is assigned the object identifier:

{iso technical specification 13399 part (3) version (2) object (2) tool items (2)}

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Annex B
(informative)

Classification tables

Table B.1 shows the classification structure of the generic families in the dictionary with an expanded structure for the classes of connection interface feature, cutting operation, reference system, tool item feature, and tool item type. The purpose of the table is to show the relationships between the classes of cutting items and the other classes in the ISO 13399 series.

NOTE Annex C contains the definition of all the classes that are relevant to tool items and definitions of those classes of reference systems that are used in the definition of the properties of tool item types.

Table B.1

Classification structure	Parent	BSU
cutting tool library	Root	71CE7A72B6DA7
adaptive item type	71CE7A72B6DA7	71EAD37F18F34
adjustment	71CE7A72B6DA7	71ED884159C90
assembly item type	71CE7A72B6DA7	71CE7A795C05C
bolt hole circle	71CE7A72B6DA7	71E02520881F1
connection interface feature	71CE7A72B6DA7	71DF8C37D9115
coolant supply	71CE7A72B6DA7	71DF8C3C065EB
cutting item feature	71CE7A72B6DA7	71DD6C82F72DA
cutting item type	71CE7A72B6DA7	71D1AA6C8FC75
cutting operation	71CE7A72B6DA7	71DFF83D21D50
cutting tool	71CE7A72B6DA7	71CE7A7A5038B
flange	71CE7A72B6DA7	71EC5A767182E
keyway	71CE7A72B6DA7	71DF5C026BCE7
locking mechanism	71CE7A72B6DA7	71EBAB85BB5FA
reference system	71CE7A72B6DA7	71CF2968F7A9E
runout axial	71CE7A72B6DA7	71EDD2B84143C
runout radial	71CE7A72B6DA7	71EDD2B858274
tool item feature	71CE7A72B6DA7	71DD70376771D
chip management	71DD70376771D	71DF8C3FD03AF
drill point	71DD70376771D	71DF8C5B8F7B5
guide pilot feature	71DD70376771D	71E019C497CDF
pilot drill feature	71DD70376771D	71EE070754DE2
tool hub	71DD70376771D	71DF5C02D0271
tool item type	71CE7A72B6DA7	71E01A004C775
broach	71E01A004C775	71E01A04C377D
cylindrical broach	71E01A04C377D	71E0250E32A07
disk broach	71E01A04C377D	71E01A082DE72
prismatic broach	71E01A04C377D	71E01A0838E9B

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Table B.1

Classification structure	Parent	BSU
tapered broach	71E01A04C377D	71E01A081855D
burr tool	71E01A004C775	71E02C544BABE
cartridge	71E01A004C775	71D1066F279AD
drill	71E01A004C775	71E01A00BD93C
centre drill	71E01A00BD93C	71E01A073CA28
chamfer drill	71E01A00BD93C	71E01A069566C
conical drill	71E01A00BD93C	71E01A0751456
core drill	71E01A00BD93C	71FAE7AAE8247
counterbore drill	71E01A00BD93C	71E01A06BF88D
countersink drill	71E01A00BD93C	71E01A06A8A08
deep hole drill	71E01A00BD93C	71E01A065F635
pilot drill	71E01A00BD93C	71E01D8A88F65
step drill	71E01A00BD93C	71E01A067F73C
trepanning drill	71E01A00BD93C	71E01A0769982
twist dri ll	71E01A00BD93C	71E01A0608FE4
mill	71E01A004C775	71E01A008D13F
double half side mill	71E01A008D13F	71EF07DFC283C
end mill	71E01A008D13F	71E01A05D27A8
face mill	71E01A008D13F	71E01A05B627B
half side mill	71E01A008D13F	71E01A05EA320
ring mill	71E01A008D13F	71E01A0600702
slab mill	71E01A008D13F	71E01A0540BE7
slotting cutter	71E01A008D13F	71EF07E037025
threading grooving mill	71E01A008D13F	71EF07E083383
ream	71E01A004C775	71E01A04A8AEC
cylindrical reamer	71E01A04A8AEC	71E01A07BC535
profile reamer	71E01A04A8AEC	71E01A07ECCCF
stepped reamer	71E01A04A8AEC	71E01A07FF350
tapered reamer	71E01A04A8AEC	71E01A07D2A1B
rotating borer	71E01A004C775	71E0251F304E1
threading die	71E01A004C775	71E01A04F70F7
cylindrical die	71E01A04F70F7	71E01A0E4EE75
hexagonal die	71E01A04F70F7	71E01A0E79239
threading tap	71E01A004C775	71E01A04E0236
conical tap	71E01A04E0236	71E01A0E34C7F
cylindrical tap	71E01A04E0236	71E01A0A5355D
turn	71E01A004C775	71E01A05104CF
boring bar	71E01A05104CF	71E01A0E9CBA9
prismatic tool holder	71E01A05104CF	71E01A0E85121
system tool	71E01A05104CF	71E01A0EAF067

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Table B.1

Classification structure	Parent	BSU
tool thread external	71CE7A72B6DA7	71FC1D22BF4CD
tool thread internal	71CE7A72B6DA7	71FC1D25097D7

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Annex C
(informative)

Class definitions

The content of this annex is limited to the classes of connection interface feature, cutting operation, reference system, tool item feature, and tool item type.

The layout of the information for each class in this annex is

BSU Code – version number **Revision number**

Preferred name **Short name**

Definition

NOTE

REMARKS

Subclasses:

Properties:

71DD70376771D-001 **001**

tool item feature **tif**

characteristic of a tool item that cannot exist independently of the tool item

Subclasses:

71DF8C3FD03AF-001	chip management
71DF8C5B8F7B5-002	drill point
71E019C497CDF-001	guide pilot feature
71EE070754DE2-001	pilot drill feature
71DF5C02D0271-001	tool hub

71DF8C3FD03AF-001 **001**

chip management **chpmg**

feature of the tool body or assembly to control the direction of motion of the chip

Properties:

71DCCFEC645BD-001	flute design code
71DCCFEC20115-002	flute helix angle
71DCCFF654756-001	flute helix hand
71DCCFF6A1A13-001	flute helix pitch

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71DCCC27DEF53-001 length chip flute

71DF8C5B8F7B5-002 001

drill point dpt

part of a drill that first makes contact with the workpiece

Properties:

71DCCC4FEF366-001 point angle

71DCCFD064042-001 point length

71E019C497CDF-001 001

guide pilot feature gpy

portion of a cylindrical tool in front of the cutting portion that acts to limit the sideways movement of the tool in operation

Properties:

71ED6A7A6E6A2-001 guide pilot diameter

71DCCFD24119E-001 pilot protruding length

71EE070754DE2-001 001

pilot drill feature pdrl

part of a larger drill for guiding the main cutting operation

Properties:

71EAC49030828-001 pilot drill protrusion

71DF5C02D0271-001 001

tool hub tihub

central part of a disk-shaped tool item with increased thickness

Properties:

71D087D3B17B0-001 hub diameter

71D087D3F5E07-001 hub thickness

71E01A004C775-002 001

tool item type titp

family of items that support or hold one or more cutting items in a cutting operation

NOTE Dimensions and properties of tool items assume the presence of at least one master insert.

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Subclasses:

71E01A04C377D-002	broach
71E02C544BABE-002	burr tool
71D1066F279AD-002	cartridge
71E01A00BD93C-002	drill
71E01A008D13F-002	mill
71E01A04A8AEC-002	ream
71E0251F304E1-002	rotating borer
71E01A04F70F7-002	threading die
71E01A04E0236-003	threading tap
71E01A05104CF-002	turn

Properties:

71DF1523224D8-001	body material code
71DD703B84298-001	coating property
71D102AE3B252-001	connection code machine side
71FC193318002-001	connection size code
71ED6E16D5978-001	connection unit basis
71EBB342CC751-001	coolant supply property
71DF8C52B8926-001	cutting item count
71CF29869CA0F-001	data chip provision
71CF29872F0AB-001	hand
71CE7A9936610-001	insert interface code
71CF298FDE0EF-001	master insert identification
71D078EB7C086-002	overall length
71D078FBF6C68-001	tool style code
71EBBA9ED6C0A-001	unit system
71CED03C97AAB-001	weight of item

71E01A04C377D-002 **001**

broach **broach**

family of items designed for use mainly in broaching operations

Subclasses:

71E0250E32A07-002	cylindrical broach

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71E01A082DE72-001	disk broach
71E01A0838E9B-001	prismatic broach
71E01A081855D-002	tapered broach

Properties:

71EBBA9E78025-002	adjustability
71DF1523EE184-001	cartridge size code
71CF298EEB4F5-001	clamping type code
71EAC83CD450B-002	clearance angle axial
71EAC83B73825-002	clearance angle radial
71D102AE8A5A9-001	connection code workpiece side
71EBDBF5060E6-001	connection diameter
71DF15283219C-001	cutting pitch density
71DF152D8CF7D-001	cutting pitch differential
71D08096F930C-001	drive angle
71DCCFEBB883E-001	flute count
71DCD39338974-001	functional length
71DF1538E7378-001	insert adjustable count
71CEAEBF2A69F-001	insert seat size code
71DF5C0761888-001	keyway property
71DCD394BB20E-002	protruding length
71CF29990C41F-002	rake angle axial
71CF2998A1609-002	rake angle radial
71EBC1EC0BB22-001	stock removal maximum
71EBC1EBC839F-001	stock removal minimum
71EBC1EC3E8B6-001	stock removal recommended
71EAC496E7425-001	tangentially mounted insert

71E0250E32A07-002 **001**

cylindrical broach **cylbch**

tool item used for changing the dimensions of an existing profile that has a constant circular cross section and cutting edges around the whole circumference

Properties:

71DF151EA5CF1-001	balance quality code
71EAC0CAB861F-001	balanced by design

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71D08462F8185-001	body diameter maximum
71DCD3B16750B-002	body length maximum
71EAC48CAD407-001	connection bore depth
71E01D92C41E8-001	connection bore diameter
71CF298A76B66-001	connection retention knob thread size
71D087D97FCE3-001	contact surface diameter machine side
71D084653E57F-001	cutting diameter
71CED03D70452-001	damping property
71D07576C0558-001	depth of cut maximum
71DCD00239812-001	face effective cutting edge count
71DCD0029BBE7-001	face mounted insert count
71DCCFF75E485-001	peripheral effective cutting edge count
71DCD00054F65-001	peripheral mounted insert count
71DCCC5A4FD18-001	premachined hole diameter
71CED04867743-001	row identifier
71CF29862B277-001	shank diameter
71CF298870946-001	shank length
71CF298A3A99A-001	tool changer interference diameter maximum
71CF2989AF0E0-001	tool changer interference length minimum
71CF2992BDBCC-001	usable length maximum

71E01A082DE72-001	**001**
disk broach	**dskbroach**

disk-shaped tool item used for changing the dimensions of an existing profile and that has the cutting edges on the periphery of the disk

Properties:

71ED6A9AF7D1D-001	body diameter
71D08462F8185-001	body diameter maximum
71EBB332C60EB-002	body height
71EAC48CAD407-001	connection bore depth
71E01D92C41E8-001	connection bore diameter
71D084653E57F-001	cutting diameter
71D084656CE32-001	cutting diameter maximum
71D0846556288-001	cutting diameter minimum

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71CEAEBE2B825-001	cutting width
71D07569F8BC3-001	cutting width maximum
71D0756A28B42-001	cutting width minimum

71E01A0838E9B-001 **001**

prismatic broach **psmbroach**

tool item with a constant rectangular cross section used for changing the dimensions of an existing profile and that has cutting items on one side of the cross section

Properties:

71EBB332C60EB-002	body height
71ED6AA478A3D-002	body length
71DCD3B16750B-002	body length maximum
71EBB33230236-002	body width
71EBAF85006BD-001	clamping width
71ED6E5CD0DAE-001	clearance angle normal
71D08418C3B4D-001	clearance angle orthogonal
71CEAEBE2B825-001	cutting width
71CF29994E737-002	functional height
71D078EB73E87-002	overall height
71CF299257986-002	overall width
71CF29883E014-001	shank height
71CF298870946-001	shank length
71CF298751FCF-001	shank width
71EBB33490FDA-001	usable length
71CF2992BDBCC-001	usable length maximum

71E01A081855D-002 **001**

tapered broach **tpbroach**

tool item for changing the dimensions of an existing profile and that has continuously varying cross section with cutting edges surrounding the cross section

NOTE The cross section can be rectangular, circular, or elliptical.

Properties:

71ED6A9AF7D1D-001	body diameter
71D08462F8185-001	body diameter maximum

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71ED6AA478A3D-002	body length
71DCD3B16750B-002	body length maximum
71CF298A76B66-001	connection retention knob thread size
71D084653E57F-001	cutting diameter
71D084656CE32-001	cutting diameter maximum
71D0846556288-001	cutting diameter minimum
71DCCC5A4FD18-001	premachined hole diameter
71CED04867743-001	row identifier
71CF29862B277-001	shank diameter
71CF298870946-001	shank length
71EAC4A2B6544-001	taper angle
71CEAEC02FEBD-001	taper gradient
71EC659C9B3CE-001	tapered
71EBB33490FDA-001	usable length
71CF2992BDBCC-001	usable length maximum

71E02C544BABE-002 **001**

burr tool **burr**

small rotating tool item for removing areas of roughness from a machined edge

Properties:

71ED6A9AF7D1D-001	body diameter
71DF1523869EE-001	burr type code
71D084653E57F-001	cutting diameter
71DCD39338974-001	functional length
71CF29862B277-001	shank diameter
71CF298870946-001	shank length
71EBB33490FDA-001	usable length
71CF2992BDBCC-001	usable length maximum

71D1066F279AD-002 **001**

cartridge **cartridge**

tool item that carries a solid cutting edge or locks a replaceable insert and is designed to be mounted onto either an adaptive item or a tool item

Properties:

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71D0793ECEF9A-001	a dimension on lf
71CF299431CAC-001	a dimension on wf
71EBBA9E78025-002	adjustability
71D07543FD182-001	axial groove outside diameter maximum
71CF299354332-001	axial groove outside diameter minimum
71CF2992DBC44-001	blade reinforcement radius
71EBB332C60EB-002	body height
71ED6AA478A3D-002	body length
71EBB33230236-002	body width
71DF1523EE184-001	cartridge size code
71CF298EEB4F5-001	clamping type code
71EAC83CD450B-002	clearance angle axial
71ED6E5CD0DAE-001	clearance angle normal
71D08418C3B4D-001	clearance angle orthogonal
71EAC83B73825-002	clearance angle radial
71CEAEBE2B825-001	cutting width
71D07569F8BC3-001	cutting width maximum
71D0756A28B42-001	cutting width minimum
71CF29994E737-002	functional height
71DCD39338974-001	functional length
71D078F5BEDBE-002	functional length secondary
71CF29984CDA7-001	functional width
71D193F495583-001	functional width 2
71CF299874B1E-002	functional width secondary
71D075730A82B-001	head back offset length
71D075731F172-001	head back offset width
71CF298F073D3-002	head bottom offset height
71CF298F4E487-001	head bottom offset length
71D07574A61E8-001	head length
71D075754F8A3-002	inclination angle
71CEAEBF2A69F-001	insert seat size code
71D07543367C5-001	minimum bore diameter
71EAC0F064E2D-002	mounting hole angle

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71EAC0E9FA4CD-001	mounting hole distance
71EAC0EF68BB7-001	mounting hole distance 2
71EAC0EFA1BF3-001	mounting hole height
71D078EB73E87-002	overall height
71CF299257986-002	overall width
71CF29990C41F-002	rake angle axial
71CF2998EBD46-002	rake angle normal
71D0808F8F719-002	rake angle orthogonal
71CF2998A1609-002	rake angle radial
71CF2988A5874-002	shank cross section shape code
71CF29883E014-001	shank height
71CF298870946-001	shank length
71CF298751FCF-001	shank width
71EAC496E7425-001	tangentially mounted insert
71D078F683C9B-002	tool cutting edge angle
71D078F6E9893-002	tool cutting edge angle type code
71D078FD4E7BE-001	tool holder shape code
71D078F77616B-002	tool lead angle
71D0757C787B8-001	work piece parting diameter maximum

71E01A00BD93C-002	**001**
drill	**drill**

family of items designed for use mainly in drilling operations

Subclasses:

71E01A073CA28-002	centre drill
71E01A069566C-002	chamfer drill
71E01A0751456-002	conical drill
71FAE7AAE8247-001	core drill
71E01A06BF88D-002	counterbore drill
71E01A06A8A08-002	countersink drill
71E01A065F635-002	deep hole drill
71E01D8A88F65-002	pilot drill
71E01A067F73C-002	step drill

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71E01A0769982-002	trepanning drill
71E01A0608FE4-002	twist drill

Properties:

71DF151EA5CF1-001	balance quality code
71EAC0CAB861F-001	balanced by design
71ED6A9AF7D1D-001	body diameter
71D08462F8185-001	body diameter maximum
71DCD3B16750B-002	body length maximum
71CF298EEB4F5-001	clamping type code
71EAC83CD450B-002	clearance angle axial
71EAC83B73825-002	clearance angle radial
71D102AE8A5A9-001	connection code workpiece side
71EBDBF5060E6-001	connection diameter
71CF298A76B66-001	connection retention knob thread size
71D087D97FCE3-001	contact surface diameter machine side
71D084653E57F-001	cutting diameter
71D084656CE32-001	cutting diameter maximum
71D0846556288-001	cutting diameter minimum
71D08096F930C-001	drive angle
71DCD00239812-001	face effective cutting edge count
71DCD0029BBE7-001	face mounted insert count
71DCCFEBB883E-001	flute count
71DCD39338974-001	functional length
71CEAEBF2A69F-001	insert seat size code
71DCD394BB20E-002	protruding length
71CF29990C41F-002	rake angle axial
71CF2998A1609-002	rake angle radial
71DF153A691F2-002	rotational speed maximum
71CF29862B277-001	shank diameter
71CF298870946-001	shank length
71EAC496E7425-001	tangentially mounted insert
71CF298A3A99A-001	tool changer interference diameter maximum
71CF2989AF0E0-001	tool changer interference length minimum

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71EBB33490FDA-001	usable length
71CF2992BDBCC-001	usable length maximum

71E01A073CA28-002 **001**

centre drill **cntdrill**

tool item for creating a hole for the location of a subsequent operation

REMARKS This drill is usually a solid drill.

Properties:

71DCD00CBBC2A-001	cutting end count
71DCCC3BD1B96-0012	step count
71DCCC3DFA23A-001	step diameter length
71DCCC47221E0-002	step distance
71DF151D6E547-002	step included angle

71E01A069566C-002 **001**

chamfer drill **cfdrill**

tool item for creating a chamfer in or on a hole

Properties:

71EAC81F88336-001	body clearance depth
71ED6AA478A3D-002	body length
71DF1538E7378-001	insert adjustable count
71EAC48EC5DE0-001	neck diameter
71EBC1E026769-001	neck length
71DCCC5A4FD18-001	premachined hole diameter

71E01A0751456-002 **001**

conical drill **cnldrill**

tool item for forming a cone-shaped hole

REMARKS This drill is usually a solid drill.

Properties:

71EAC81F88336-001	body clearance depth
71EAC8210DF36-001	fluted land width
71DF1538E7378-001	insert adjustable count

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71EAC4A2B6544-001	taper angle
71CEAEC02FEBD-001	taper gradient
71EC659C9B3CE-001	tapered
71DCCC62CD9EE-001	usable length diameter ratio
71EAC823D95A7-001	web taper
71EAC82313165-001	web thickness

71FAE7AAE8247-001 **001**

core drill **crdrl**

tool item without a central cutting point or means of starting a hole

NOTE The tool is used to enlarge an existing hole, for example, in a casting and has the characteristics of a reamer.

Properties:

71EAC81F88336-001	body clearance depth
71EAC8210DF36-001	fluted land width
71DF1538E7378-001	insert adjustable count
71DCCC62CD9EE-001	usable length diameter ratio

71E01A06BF88D-002 **001**

counterbore drill **cbdrill**

tool item for creating a counterbore section of a hole

Properties:

71EAC81F88336-001	body clearance depth
71ED6AA478A3D-002	body length
71EAC48CAD407-001	connection bore depth
71E01D92C41E8-001	connection bore diameter
71EE070696F08-001	guide element property
71E03062EC034-001	head diameter
71D07574A61E8-001	head length
71DF1538E7378-001	insert adjustable count
71DF5C0761888-001	keyway property
71EAC48EC5DE0-001	neck diameter
71EBC1E026769-001	neck length
71DCCC5A4FD18-001	premachined hole diameter

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71DCCC62CD9EE-001	usable length diameter ratio

71E01A06A8A08-002 **001**

countersink drill **cskdrill**

tool item for creating a countersink section of a hole

Properties:

71EAC81F88336-001	body clearance depth
71ED6AA478A3D-002	body length
71EAC48CAD407-001	connection bore depth
71E01D92C41E8-001	connection bore diameter
71EE070696F08-001	guide element property
71E03062EC034-001	head diameter
71D07574A61E8-001	head length
71DF1538E7378-001	insert adjustable count
71DF5C0761888-001	keyway property
71EAC48EC5DE0-001	neck diameter
71EBC1E026769-001	neck length
71DCCC5A4FD18-001	premachined hole diameter
71EAC4A2B6544-001	taper angle
71CEAEC02FEBD-001	taper gradient
71EC659C9B3CE-001	tapered
71DCCC62CD9EE-001	usable length diameter ratio

71E01A065F635-002 **001**

deep hole drill **dhdrill**

tool item for creating a hole usually deeper than 10 times the diameter of the tool item

Properties:

71EE070696F08-001	guide element property
71E03062EC034-001	head diameter
71D07574A61E8-001	head length
71DF1538E7378-001	insert adjustable count
71DCCC62CD9EE-001	usable length diameter ratio

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71E01D8A88F65-002 **001**

pilot drill **pilot**

tool item that is added to a larger drill for guiding the main cutting operation

Properties:

71DF1538E7378-001	insert adjustable count

71E01A067F73C-002 **001**

step drill **stpdrill**

tool item for creating a stepped hole

Properties:

71EAC81F88336-001	body clearance depth
71ED6AA478A3D-002	body length
71EAC8210DF36-001	fluted land width
71EE070696F08-001	guide element property
71DF1538E7378-001	insert adjustable count
71DCCC3BD1B96-002	step count
71DCCC3DFA23A-001	step diameter length
71DCCC47221E0-002	step distance
71DF151D6E547-002	step included angle
71DCCC62CD9EE-001	usable length diameter ratio
71EAC823D95A7-001	web taper
71EAC82313165-001	web thickness

71E01A0769982-002 **001**

trepanning drill **trpdrill**

tool item used to cut a deep face groove leaving a plug of material equal to the inner diameter

REMARKS The tool can be small to leave a boss on a component or large to create a large hole but not produce all the material to swarf.

Properties:

71ED6AA478A3D-002	body length
71D0846545C4E-001	cutting diameter internal
71D0846570977-001	cutting diameter internal maximum
71D084655A2F7-001	cutting diameter internal minimum
71DF1538E7378-001	insert adjustable count

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71DF5C0761888-001	keyway property

71E01A0608FE4-002	**001**
twist drill	**twdrill**

solid tool item with helical chip flutes

Properties:

71EAC81F88336-001	body clearance depth
71DF1527D828C-001	cutting diameter size code
71EAC81AD9AE1-001	drill back taper
71EAC8210DF36-001	fluted land width
71DF1538E7378-001	insert adjustable count
71DCCC62CD9EE-001	usable length diameter ratio
71EAC823D95A7-001	web taper
71EAC82313165-001	web thickness

71E01A008D13F-002	**001**
mill	**mill**

family of rotating tool items intended mainly for use in milling operations

Subclasses:

71EF07DFC283C-002	double half side mill
71E01A05D27A8-002	end mill
71E01A05B627B-002	face mill
71E01A05EA320-002	half side mill
71E01A0600702-002	ring mill
71E01A0540BE7-002	slab mill
71EF07E037025-002	slotting cutter
71EF07E083383-002	threading grooving mill

Properties:

71DF151EA5CF1-001	balance quality code
71EAC0CAB861F-001	balanced by design
71ED6A9AF7D1D-001	body diameter
71D08462F8185-001	body diameter maximum
71DCD3B16750B-002	body length maximum

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