PD ISO/TS 13399-50:2013

BSI Standards Publication

Cutting tool data representation and exchange

Part 50: Reference dictionary for reference systems and common concepts

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National foreword

This Published Document is the UK implementation of ISO/TS 13399-50:2013. It supersedes DD ISO/TS 13399-50:2007 which is withdrawn.

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

A list of organizations represented on this committee can be obtained on request to its secretary.

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© The British Standards Institution 2013.
Published by BSI Standards Limited 2013

ISBN 978 0 580 82714 3
ICS 25.100.01; 35.240.50

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 December 2013.

Amendments/corrigenda issued since publication

Date	Text affected

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TECHNICAL SPECIFICATION

ISO/TS 13399-50

Second edition
2013-12-01

Cutting tool data representation and exchange —

Part 50: Reference dictionary for reference systems and common concepts

Représentation et échange des données relatives aux outils coupants —

Partie 50: Dictionnaire de référence pour les systèmes de coordonnées et les concepts communs

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Reference number
ISO/TS 13399-50:2013(E)

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Published in Switzerland

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Foreword

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

This second edition cancels and replaces the first edition (ISO/TS 13399-50:2007), 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 the 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/TS 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 connection systems, coordinate reference systems and other features and characteristics that are shared with several components of a cutting tool with defined cutting edges. 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,[1] solid tools,[2] assembled tools,[3] adaptors,[4] components[5] and their relationships can be represented by this part of ISO 13399. 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. This representation will facilitate the processing and exchange of cutting tool data within and among different software systems and computer platforms and 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 used for these representations are those developed by ISO/TC 184, *Automation systems and integration*, SC 4, *Industrial data*, 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 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. 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 produced 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:

a) the EXPRESS language defined in ISO 10303-11 for defining the information model;

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

c) the data dictionary defined in the ISO 13584 series.

---

1) For example regular and irregular shaped replaceable cutting items.

2) For example solid drill and endmill.

3) For example boring bars, indexable drills and indexable milling cutters.

4) For example milling arbor and drilling chuck.

5) For example shims, screws and clamps.

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The ISO 13399 series is intended for use by tool producers and vendors, manufacturers, and developers of manufacturing software, among others. ISO 13399 provides a common structure for exchanging data about cutting tools with defined cutting edges. The ISO 13399 series 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 for 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 could 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 could have a different set of cutting tool properties to communicate using the information model and dictionaries provided in ISO 13399.

ISO 13399 defines only that information which could be communicated; it does not specify what information shall be communicated.

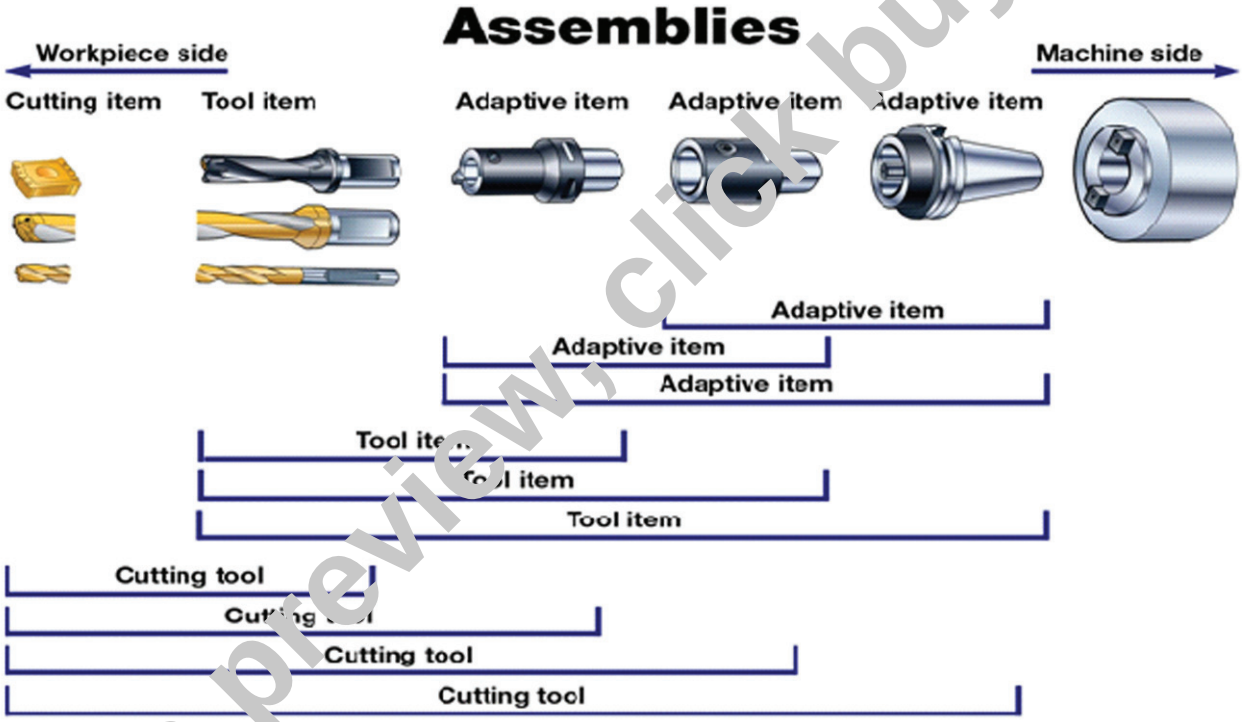

Figure 1 — Possible assemblies of components of a cutting tool

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;

— adding new classes and their properties;

— managing the status of those properties and classes;

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

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The secretariat of this Maintenance Agency has been assigned to

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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 50: Reference dictionary for reference systems and common concepts

1 Scope

This part of ISO 13399 specifies a reference dictionary for reference systems for cutting tools, 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 reference systems for cutting tools, with an associated classification scheme;

— definitions and identifications of the data element types that represent the properties of reference systems for cutting tools;

— 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 connection systems for cutting tools;

— standard data that represent the various properties of connection systems for cutting tools;

— standard data that represent domains of values used for properties of connection systems for cutting tools;

— standard data that represent the various classes of reference systems for cutting tools;

— standard data that represent the various properties of reference systems for cutting tools;

— standard data that represent domains of values used for properties of reference systems for cutting tools;

— 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.

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