PD ISO/TS 13399-71:2016

BSI Standards Publication

Cutting tool data representation and exchange

Part 71: Graphical data layout — Creation of documents for standardized data exchange: Graphical product information

bsi.

National foreword

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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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ISBN 978 0 580 91035 7

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 July 2016.

Amendments issued since publication

Date	Text affected

PD ISO/TS 13399-71:2016

TECHNICAL SPECIFICATION

ISO/TS 13399-71

First edition
2016-07-15

Cutting tool data representation and exchange —

Part 71: Graphical data layout — Creation of documents for standardized data exchange: Graphical product information

Représentation et échange des données relatives aux outils coupants —

Partie 71: Format des données graphiques — Création de documents pour l'échange de données normalisées: Informations graphiques des produits

Reference number
ISO/TS 13399-71:2016(E)

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Contents

Page

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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

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 70: Graphical data layout — Layer settings for tool layout* [Technical Specification]

— *Part 71: Graphical data layout — Creation of documents for the standardized data exchange — Graphical product information* [Technical Specification]

— *Part 72: Creation of documents for the standardized data exchange — Definition of properties for drawing header and their XML-data exchange* [Technical Specification]

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

— *Part 201: Creation and exchange of 3D models — Regular inserts* [Technical Specification]

— *Part 202: Creation and exchange of 3D models — Irregular inserts* [Technical Specification]

— *Part 203: Creation and exchange of 3D models — Replaceable inserts for drilling* [Technical Specification]

— *Part 204: Creation and exchange of 3D models — Inserts for reaming* [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]

— *Part 303: Creation and exchange of 3D models — Solid end mills* [Technical Specification]

— *Part 304: Creation and exchange of 3D models — Solid milling cutters with arbor hole* [Technical Specification]

— *Part 307: Creation and exchange of 3D models — End mills for indexable inserts* [Technical Specification]

— *Part 308: Creation and exchange of 3D models — Milling cutters with arbor hole for indexable inserts* [Technical Specification]

— *Part 309: Creation and exchange of 3D models — Tool holders for indexable inserts* [Technical Specification]

— *Part 311: Creation and exchange of 3D models — Solid reamers* [Technical Specification]

— *Part 312: Creation and exchange of 3D models — Reamers for indexable inserts* [Technical Specification]

— *Part 401: Creation and exchange of 3D models — Converting, extending and reducing adaptive items* [Technical Specification]

— *Part 403: Creation and exchange of 3D models — Modelling of driven tool units* [Technical Specification]

— *Part 405: Creation and exchange of 3D models — Collets* [Technical Specification]

— *Part 406: Creation and exchange of 3D models — Modelling of connection interface* [Technical Specification]

The following parts are under preparation:

— *Part 80: Creation and exchange of 3D models — Overview and principles* [Technical Specification]

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

— *Part 305: Creation and exchange of 3D models — Modular tooling systems with adjustable cartridges for boring* [Technical Specification]

— *Part 310: Creation and exchange of 3D models — Turning tools with carbide tips* [Technical Specification]

— *Part 313: Creation and exchange of 3D models — Creation and exchange of 3D models — Burrs* [Technical Specification]

— *Part 314: Creation and exchange of 3D models — Creation and exchange of 3D models — Cartridges for indexable inserts* [Technical Specification]

— *Part 315: Creation and exchange of 3D models — Modelling of machine operated feed out tools* [Technical Specification]

Introduction

This part of ISO/TS 13399 defines the terms, properties and definitions of the drawing frame and drawing content of a computer-aided design. The purpose of this part of ISO/TS 13399 is to provide a common way of an electronic data exchange of graphical product information. However, the aim is the simplified communication during the phase of documentation — namely on the basis of 2D drawings.

Within the 2D drawing, the aim is to separate the proper product description (2D graphic) from the users specific presentation (drawing header). Most of the design orders are forced to use the individual drawing frames of the users. Therefore, a big portion of the design expenditure is used for the creation of the documentation and not for the proper problem solution.

Drawings are the most important communicative devices of a producing company. Besides the description of complex workpiece geometries, most cases are requests for correspondent documentation, e.g. to support NC-programming or production facilities.

This part of ISO/TS 13399 defines a standardized data exchange format for documentation. Therefore, the effort for maintenance of the documentation is reduced because the product drawing of the supplier or manufacturer is merged automatically into the individual drawing frames of the end users. This concept provides advantage for both supplier/manufacturer and end user, since the particular template is centrally maintained once only.

To support a standardized electronic product data exchange, the content of drawing headers have been examined by means of their common basic elements and the applicability. The identified data fields have been consolidated and may be used for a universal application because of a unified definition of their attributes. Thus, in a defined use case, the graphical product description (2D graphic) and the descriptive data of the product (content of the drawing header) can be merged and filed as a complete drawing documentation.

Cutting tool data representation and exchange —

Part 71: Graphical data layout — Creation of documents for standardized data exchange: Graphical product information

1 Scope

This part of ISO/TS 13399 determines the elements to be used for the creation of 2D documentation. The individual parts of documentation are drawing content, geometrical data, drawing frame and drawing header data as shown in Figure 1.

The standardization of drawing formats, e.g. drawing frame, structure of the bill of material, are out of the scope of this part of ISO/TS 13399. Furthermore, it is intended to standardize the data exchange of the product documentation.

This part of ISO/TS 13399 specifies a common way for the basic principles for the creation of product documentation that contain the following:

— definitions and identifications of the elements of a product documentation;

— definitions and identifications of the internal structure of the product documentation;

— definitions and identifications of those elements and features that are necessary to show the protection notices and the copyrights of the originator of the document.

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

— layer settings as defined in ISO/TS 13399-70;

— structure of the data exchange file using extensible mark-up language (XML);

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

— concept of the classification of cutting tool data and their properties;

— concept of the design of 2D drawings for cutting tools;

— concept of the design of 3D models for cutting tools;

— application data for the use of those cutting tools;

— information about the reconditioning of cutting tools;

— information about additional application and usage data (e.g. coolant supply).

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/TS 13399-70, *Cutting tool data representation and — Part 70: Graphical data layout — Layer setting for tool layout*

ISO/TS 13399-72, *Cutting tool data representation and exchange — Part 72: Creation of documents for the standardized data exchange — Definition of properties for drawing header and their XML-data exchange*

3 Fundamental system description

The way of creating 2D cutting tool documentation and the necessary elements are given in Figure 1. In this part of ISO/TS 13399, the defined procedure for the creation of documentation is applicable for standard and custom solution tools.

In principle, cutting tool documentation consists of four main elements. These elements are shown in Figure 1.

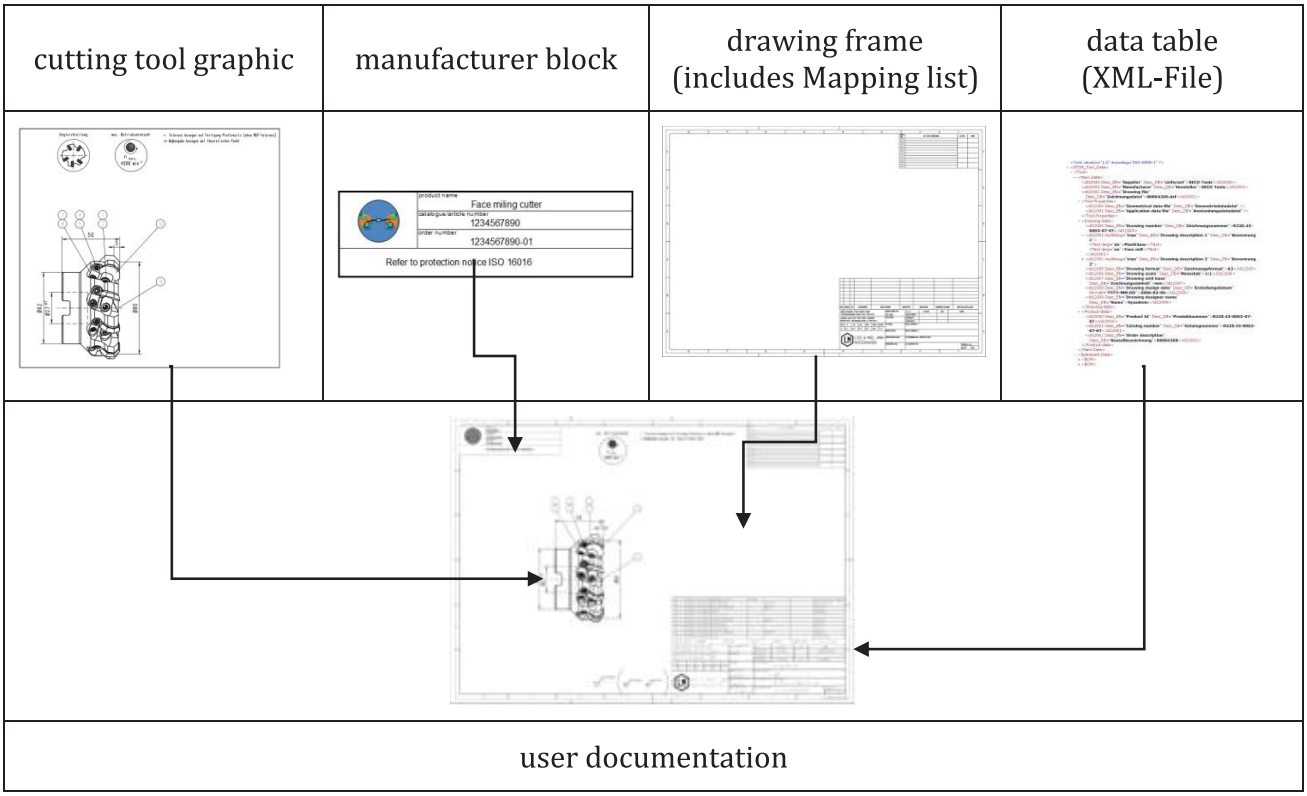

Figure 1 — System for the creation of a 2D documentation

4 Definition of the drawing elements

4.1 Drawing frame

The design of the drawing frame shall follow the definitions given in ISO/TS 13399-70. The drawing frame shall consists of the following:

— the definition of the content;

— the position of the custom-specific drawing header date, including the organizational data;

— the layout of the bill of material;

— the definition of the available drawing area.

4.2 Graphic of the cutting tool

The manufacturer shall create the cutting tool layout. The structure and design shall follow the rules according to ISO/TS 13399-70. The content of the drawing shall be positioned automatically into the drawing frame during the creation of the documentation.

4.3 Manufacturer/supplier block

The layout and content of the header data of the manufacturer/supplier are defined in this part of ISO/TS 13399. This block shall set the copyright and shall be part of any cutting tool documentation, if custom-specific drawing headers are used. Position and direction may vary according to customer's demand of the 2D documentation.

4.4 Data table

The data table shall contain all parametric information in XML format that are relevant for the creation of the 2D cutting tool documentation. The prime data are

— bill of material, and

— information with reference to the user.

4.5 Mapping list

The mapping list shall contain the logic assignment of the neutral master classification to the data fields and their valid values, which are defined in the drawing frame and the manufacturer block. The positions of the place holders of the data fields that allow an individual and automatic positioning of the entries of the data table are primarily defined in the mapping list.

The mapping list shall be created for every drawing frame.

5 Structure and layout of the drawing elements

5.1 Drawing frame

The drawing frame shall be designed in accordance with ISO/TS 13399-70 and filed as DXF. This format supports an automated configuration of the 2D cutting tool documentation. The drawing frame contains the following header elements which are also defined with its position:

— drawing header with user block;

— revision block;

— bill of material;

— blank space for the 2D graphic.

The user shall determine the layout and the content of the drawing frame. The design shall follow the definitions published in ISO/TS 13399-70. Based on these rules, the drawing frame shall be uploaded on a data medium.

5.2 Tool graphic

The tool manufacturer shall provide the tool graphic with the format DXF code AC1015. The layer settings shall follow the specification according to ISO/TS 13399-70.

5.3 Manufacturer/supplier block

5.3.1 General

The user shall determine the position and direction of the manufacturer block, which shall be placed on this position with all the data entries. This block shall also follow the determinations with its layer settings according to ISO/TS 13399-70.

5.3.2 Data content and size of the fields

The size of the manufacturer/supplier block shall be unique across all drawing formats. Table 1 lists the fields of the block.

Table 1 — Definition of the manufacturer/supplier fields

Field number	Field name	Description	Field ID[a]	Size of the field (width × height) [b] mm
Field 1	Logo	Manufacturer/supplier logo and name	No ID number	43 × 30
Field 2	Drawing description	Drawing description 1	ID12001	117 × 10
Field 3	ID	Item ID	ID13000	117 × 10
Field 4	Name	Item name	ID13001	117 × 10
Field 5	Protection	Protection notices	No ID number	160 × 15

[a] According to ISO/TS 13399-72.

[b] See Figure 2.

The field “protection notices” shall contain at least the wording “Refer to protection notice ISO 16016.”

The font “Monospace 821 BT” shall be used for the textual content of the block and the font size shall be by default 3,5 mm.

5.3.3 Design of the manufacturer block

The manufacturer block shall be designed as shown in the example given in Figure 2.

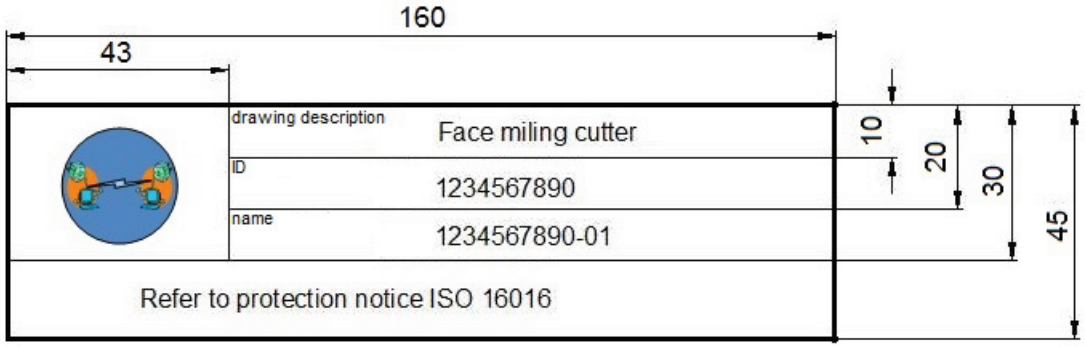

Figure 2 — Manufacturer/supplier block

5.4 Data table for drawing header and bill of material

The data table contains all texts of the 2D tool documentation that are shown in the drawing header and in the bill of material. The data fields are defined as a master classification in ISO/TS 13399-72.

NOTE ISO/TC 29 takes care of the central assignment of data fields under use in available standards and definitions.

The manufacturer/supplier shall provide, as much as possible and completely, the data entries of the data table to each of the cutting tool graphic. Only then, an automated file generation of the 2D tool documentation can be guaranteed.

Requested additional data shall be included in the data table of the master classification during the creation of the user-drawing frames. The user himself is asked to complete empty data fields during the creation of the 2D documentation caused by the requested entry.

The data table is defined as XML file and is used for the data transfer. The provided structure shall be used to put the data field entries to the defined place holders in the 2D documentation. The structure of the XML data file is defined in ISO/TS 13399-72. This XML file shall not be used for the data exchange of cutting tool property data according to ISO/TS 13399-2, ISO/TS 13399-3, ISO/TS 13399-4 and ISO/TS 13399-5.

5.5 Internal mapping list

Together with the data table (see 5.4), the mapping list (see 4.5) allows an automated fill in of the drawing header and the bill of material. The process takes one entry of the data table and places this entry to the defined position in the drawing header or bill of material.

6 Functional description

6.1 General

If it is possible to access a public user platform, the specified process described in the following clauses shall only represent a recommendation. In these cases, the use and determination of the described technologies are subject to the specifications of that platform.

6.2 Workflow for standard tools

All necessary information and elements are available on a public user platform to be able to create a 2D tool documentation of a standard tool. The user selects his desired drawing frame, which is placed on the user platform, as well as the tool graphic provided by the tool manufacturer. In an internal process, both these files are mated and the data fields of the drawing frame are filed with the available information. If the user has defined individual fields, the user is requested to input the information.

The workflow is shown in Figure 3.

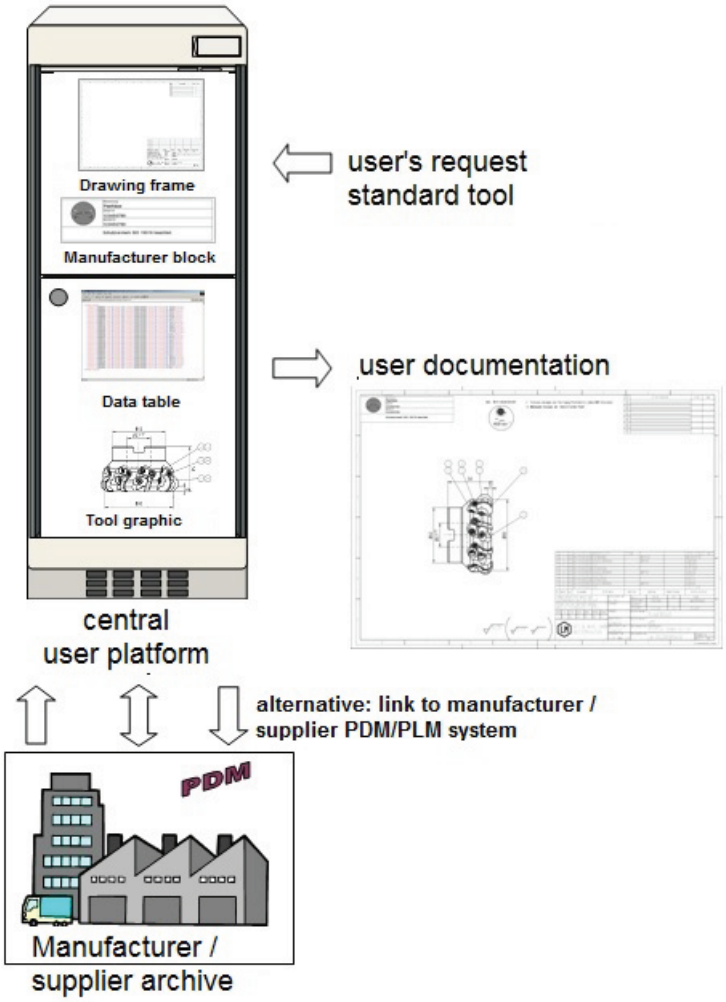

Figure 3 — Workflow of 2D tool documentation for standard tools

6.3 Workflow for custom solution tools

The procedures shall be the same than for custom solution tools, as described in Clause 3. The difference is the location of the information of such custom solution tools.

In contrast to the workflow for standard tools, the tools graphics and the data tables are filled individually by the manufacturer/supplier. If a user requests custom solution tool documentation, the manufacturer shall create the documentation by means of choosing the desired drawing frame from the public platform and mates the graphic from its own server together. Additional user information shall be sent to the manufacturer prior to the creation of the documentation to be added to the data fields.

The workflow is shown in Figure 4.

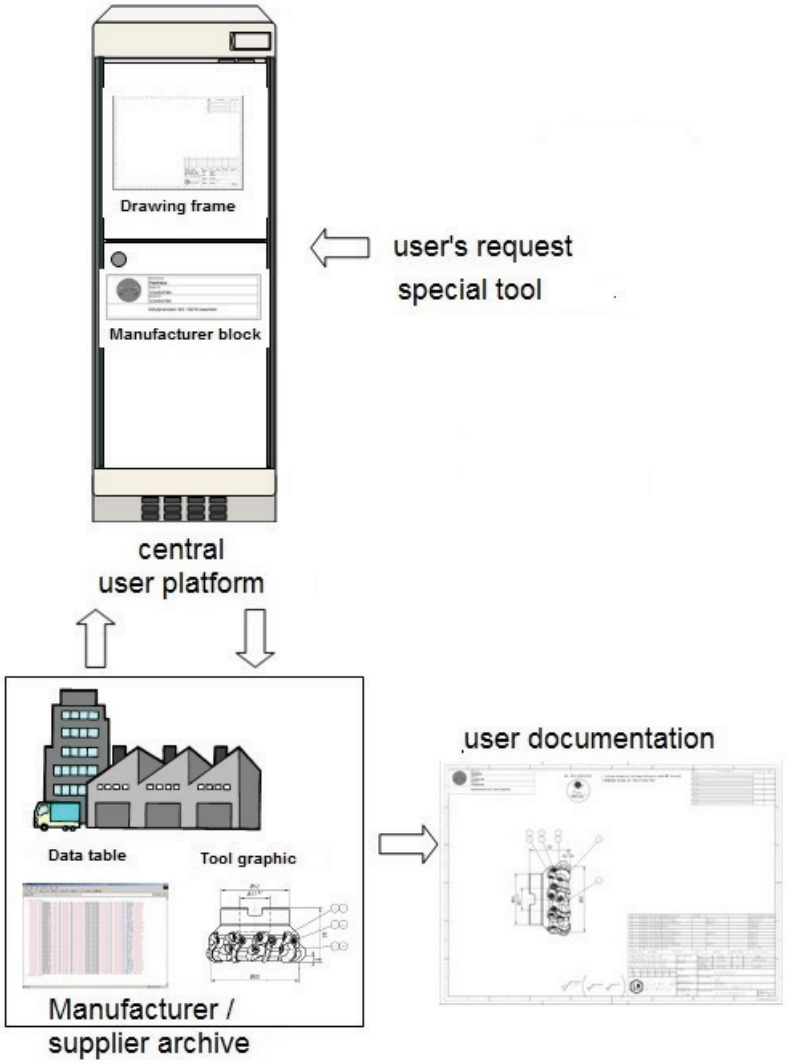

Figure 4 — Workflow of 2D tool documentation for custom solution tools

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[1] ISO 128-20, *Technical drawings — General principles of presentation — Part 20: Basic conventions for lines*

[2] ISO 6428, *Technical drawings — Requirements for microcopying*

[3] ISO 10303-28, *Industrial automation systems and integration — Product data representation and exchange — Part 28: Implementation methods: XML representations of EXPRESS schemas and data, using XML schemas*

[4] ISO 16016, *Technical product documentation — Protection notices for restricting the use of documents and products*

[5] ISO/TS 13399-2, *Cutting tool data representation and exchange — Part 2: Reference dictionary for the cutting items*

[6] ISO/TS 13399-3, *Cutting tool data representation and exchange — Part 3: Reference dictionary for tool items*

[7] ISO/TS 13399-4, *Cutting tool data representation and exchange — Part 4: Reference dictionary for adaptive items*

[8] ISO/TS 13399-5, *Cutting tool data representation and exchange — Part 5: Reference dictionary for assembly items*

ICS 25.100.01; 35.240.50
Price based on 8 pages

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