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Technical product documentation — Digital product definition data practices

Documentation technique de produits — Pratiques pour les données numériques de la définition d'un produit

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Foreword

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

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 10, *Technical product documentation*.

This third edition cancels and replaces the second edition (ISO 16792:2015), which has been technically revised.

The main changes to the previous edition are as follows:

— information on assembly part identification added;

— information on movable parts in assemblies added;

— figures updated to reflect current International Standards,

— content which is authored in other documents removed;

— former practices moved to Annex A;

— Annex C with additional examples of applying this document added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Every effort was made during the preparation of this document, adapted from ASME Y14.41:2012, to apply existing requirements developed for two-dimensional (2D) presentation equally to the output from three-dimensional (3D) models. Where new geometrical product specification (GPS) rules have proved essential, these have been drafted with a view to their being equally applicable to both 2D and 3D. Therefore, in order to maintain the integrity of a single system, these new rules are being incorporated in the relevant existing International Standards for cross-reference. Application examples have been included where, due to the specific requirements of 3D modelling in support of model-based definition (MBD), additional guidance was deemed beneficial.

It is recognized that there is a need to support drawings in conjunction with 3D models now and for the foreseeable future. This need has been addressed in this document through the definition of the two methods for documenting digital models and specification of requirements to ensure that the information in a data set is consistent between the model and the drawing.

The figures in this document are intended only as illustrations to aid the user in understanding the practices elaborated in the text. In some cases, figures show a level of detail as needed for emphasis; in others, they are only complete enough to illustrate a concept or facet thereof, including the associativity of annotations in the design model. The absence of figures has no bearing on the applicability of the specified requirement or practice.

Most figures are illustrations of models in a 3D environment. Figures illustrating drawings in digital format include a drawing sheet border.

This document describes general requirements and practices for digital product definition applied for 3D mechanical engineering (MCAD) but which can be also applied to other disciplines and trades (e.g. ECAD).

For former practices, see Annex A.

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Technical product documentation — Digital product definition data practices

1 Scope

This document specifies requirements for the preparation, revision and presentation of digital product definition data, hereafter referred to as data sets, complementing existing standards. It supports two methods of application: 3D model-only and 3D model with 2D drawing in digital format. The structure of this document presents requirements common to both methods followed by clauses providing for any essential, differing requirements for each method. Additionally, its use in conjunction with computer-aided design (CAD) systems can assist in the progression towards improved modelling and annotation practices for CAD and engineering disciplines, as well as serving as a guideline for CAx software developers.

The actual definitions for the interpretation, in particular the ISO TPD and ISO GPS rules, are taken from the original definition standards, e.g. ISO 129-1 and ISO 1101.

When the term model is used in this document it applies to both design models and annotated models.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 128-2, *Technical product documentation (TPD) — General principles of representation — Part 2: Basic conventions for lines*

ISO 128-3:2020, *Technical product documentation (TPD) — General principles of representation — Part 3: Views, sections and cuts*

ISO 129-1, *Technical product documentation (TPD) — Presentation of dimensions and tolerances — Part 1: General principles*

ISO 1101, *Geometrical product specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

ISO 2553, *Welding and allied processes — Symbolic representation on drawings — Welded joints*

ISO 3098-1, *Technical product documentation — Lettering — Part 1: General requirements*

ISO 3098-5, *Technical product documentation — Lettering — Part 5: CAD lettering of the Latin alphabet, numerals and marks*

ISO 5457, *Technical product documentation — Sizes and layout of drawing sheets*

ISO 5459, *Geometrical product specifications (GPS) — Geometrical tolerancing — Datums and datum systems*

ISO 7200, *Technical product documentation — Data fields in title blocks and document headers*

ISO 8015, *Geometrical product specifications (GPS) — Fundamentals — Concepts, principles and rules*

ISO 10209:2012, *Technical product documentation — Vocabulary — Terms relating to technical drawings, product definition and related documentation*

ISO 11442, *Technical product documentation — Document management*

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ISO 21920-1[1)], *Geometrical product specifications (GPS) — Surface texture: Profile —Part 1:Indication of surface texture*

ISO 25178-1, *Geometrical product specifications (GPS) — Surface texture: Areal — Part 1: Indication of surface texture*

ISO 80000-1, *Quantities and units — Part 1: General*

IEC 82045-2, *Document management — Part 2: Metadata elements and information reference model*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10209 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 General terms and definitions

3.1.1
absolute coordinate system
initial model coordinate system in the active CAD model used to define the location of digital elements in that CAD model

Note 1 to entry: The active CAD model may be a part, subassembly or assembly.

Note 2 to entry: This absolute coordinate system has absolute origin of 0,0,0.

3.1.2
offset section
stepped cutting plane to include features not located in a straight cutting plane

Note 1 to entry: 2D offset section views are drawn as if the offsets were in one plane, and the offsets are not indicated in any manner in the section views. 3D offset section views are shown by cutting through the part in an offset manner.

3.1.3
product definition data set
data set
collection of one or more computer files that discloses (directly or by reference), by means of graphic or textual presentations, or combinations of both, the physical and functional requirements of a product

3.1.4
user-defined coordinate system
model coordinate system which is created in the CAD model by the user in addition to the absolute coordinate system

3.2 Classification codes for drawings and data sets (see Annex B)

3.2.1
classification code
designation assigned to product definition data that defines what data are included within the drawing, data set or both

Note 1 to entry: A drawing can be in either physical or electronic format.

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3.2.2
classification code 1
drawing with optional data set

Note 1 to entry: Classification code 1 identifies that the data elements are located on the drawing and the drawing is the original.

3.2.3
classification code 2
data set with design model and drawing containing specifications

Note 1 to entry: Classification code 2 identifies that data elements are located on a drawing and the drawing is the original. A computer is used as a tool to prepare the drawing graphics sheet and the model. Data elements are located in the digital data and the drawing. The model when provided is supplementary to the drawing.

3.2.4
classification code 3
data set with design model or annotated model and simplified drawing

Note 1 to entry: Classification code 3 identifies a model with a simplified drawing used to expedite communication of common part features and to define non-geometric part definitions. The data set is the original. For example, the model and the drawing must be used together to satisfy this requirement.

Note 2 to entry: When used, annotated models under classification code 3 are partially annotated.

3.2.5
classification code 4
data set with annotated model and drawing

Note 1 to entry: Classification code 4 identifies that all data elements are located in both the digital data and the drawing. The data set is the original. For example, the model or the drawing can be used individually to satisfy this requirement.

3.2.6
classification code 5
data set with annotated model

Note 1 to entry: Classification code 5 identifies that all data elements are located in the data set with model. No drawing exists.

4 Data set identification and control

4.1 General

Actual data sets shall meet the requirements of this document.

Data sets for which conformity with this document is claimed shall include a reference to this document either in the data set itself or in a document referenced by the data set (see 5.4.3).

The current revision of the data and the computer application(s) and version(s) used to develop the data set shall be specified with other management data (see 5.4).

The data set identifier shall be unique and shall consist of numeric, alphabetic or special characters in any combination. Spaces are not permitted between any of the characters of the data set identifier.

The length of the data set identifier may be a direct function of the computer system and the operating system. When the part or identifying number is used as the data set identifier, the length shall be compatible with recognized limitations on number length in accordance with ISO 7200 and IEC 82045-2.

Special characters, such as hyphen (-), slash (/) or asterisk (*), shall be selected in a manner that does not hinder data set identification or have an adverse effect on the computer system operation.

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