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Technical product documentation — Digital product definition data practices

Documentation technique de produits — Données de définition d'un produit

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Full standard:
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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 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 10, *Technical product documentation*. This third edition cancels and replaces the second edition (ISO 16792:2015), which has been technically revised.

Introduction

Every effort was made during the preparation of this International Standard, 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 ISO 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) and product and manufacturing information (PMI) initiatives, 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 International Standard 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 International Standard 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.

In order to comply with the requirements of this International Standard, actual data sets shall meet the content requirements set forth in its text.

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

Technical product documentation — Digital product definition data practices

1 Scope

This International Standard specifies requirements for the preparation, revision, and presentation of digital product definition data, hereafter referred to as data sets. It supports two methods of application: model-only and model and drawing in digital format. Its structure 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 could assist in the progression towards improved modelling and annotation practices for CAD and engineering disciplines, as well as serving as a guideline for IT engineers.

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

2 Normative references

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

ISO 128 (all parts), *Technical drawings — General principles of presentation*

ISO 129-1, *Technical drawings — Presentation of dimensions and tolerances — Part 1: General principles*

ISO 286 (all parts), *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes*

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

ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

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

ISO 2692, *Geometrical product specifications (GPS) - Geometrical tolerancing - Maximum material requirement (MMR), least material requirement (LMR) and reciprocity requirement (RPR)*

ISO 3098-0, *Technical product documentation — Lettering — Part 0: General requirements*

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

ISO 5456 (all parts), *Technical drawings — Projection methods*

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

ISO 11442, *Technical product documentation — Document management*

ISO 14405-1, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 1: Linear sizes*

ISO 14405-2, *Geometrical product specifications (GPS) — Dimensional tolerancing — Part 2: Dimensions other than linear sizes*

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

ISO 17450-1, *Geometrical product specifications (GPS) — General concepts — Part 1: Model for geometrical specification and verification*

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

primary 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.

3.1.2**annotated model**

a combination of design model, annotation, and attributes that describe a product.

Note 1 to entry: This definition had a prior title of Model

3.1.3**datum system**

set of two or more situation features established in a specific order from two or more datum features

Note 1 to entry: To define a datum system, it is necessary to consider the collection surface created by the considered datum features. The invariance class of a collection surface can be complex, prismatic, helical, cylindrical, revolute, planar, or spherical (see ISO 5459:2011, Table B.1).

[SOURCE: ISO 5459:2011, 3.10]

3.1.4**design model**

portion of the data set that contains model and supplemental geometry

3.1.5**user defined coordinate system**

model coordinate system which is created in the CAD model in addition to the absolute coordinate system

3.1.6**digital element**

geometric element, model feature, group of model features, annotation, associated group or attribute that exists in a data set

[SOURCE: ISO 10209:2012, 9.9]

3.1.7**model based definition (MBD)**

an annotated model and its associated data elements that define the product in a manner that can be used effectively without a drawing graphic sheet.

3.1.8

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.

3.1.9

product and manufacturing information (PMI) (semantic)

annotations and attributes that are associated with a 3D solid model and its geometry features, is software interpretable, and can be displayed for human interpretation

3.1.10

revolved section

When features have an angular change in direction from the cutting plane which is not more than than 90 degrees, a section of the feature can be rotated in the relevant view as if the bent cutting plane and features were rotated into a plane perpendicular to the line of sight of the section view.

Note 1 to entry: The rotational direction of the section in the view is unknown.

3.1.11

simplified 3D weld model

Weld shapes such as fillet welding, flare welding, plug welding, etc. modelled in a simplified form

Note 1 to entry: The molten area is not modelled on simplified 3D weld models.

3.1.12

simplified drawing

a drawing with minimal views and dimensional characteristics that relies on the model to provide complete part definition.

3.1.13

spot locating symbol

A symbol utilized when indicating the position of welding points for spot welding on the integral feature (on the surface).

Note 1 to entry: Spot locating symbols are handled as supplemental geometry

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

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 either be in physical or electronic format.

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

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. E.g. The model and the drawing must be used together to satisfy this requirement.

Note 2 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. E.g. 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

Data sets for which compliance with this International Standard is claimed shall include a reference to this International Standard, ISO 16792, either in the data set itself or in a document referenced by the data set. Refer to clause 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.

A recognizable prefix or suffix may be included as part of the identifier to associate files and sets of related data.

The classification codes given in the informative Annex A can be used to identify the content of the data sets and define the hierarchal relationships when applicable.

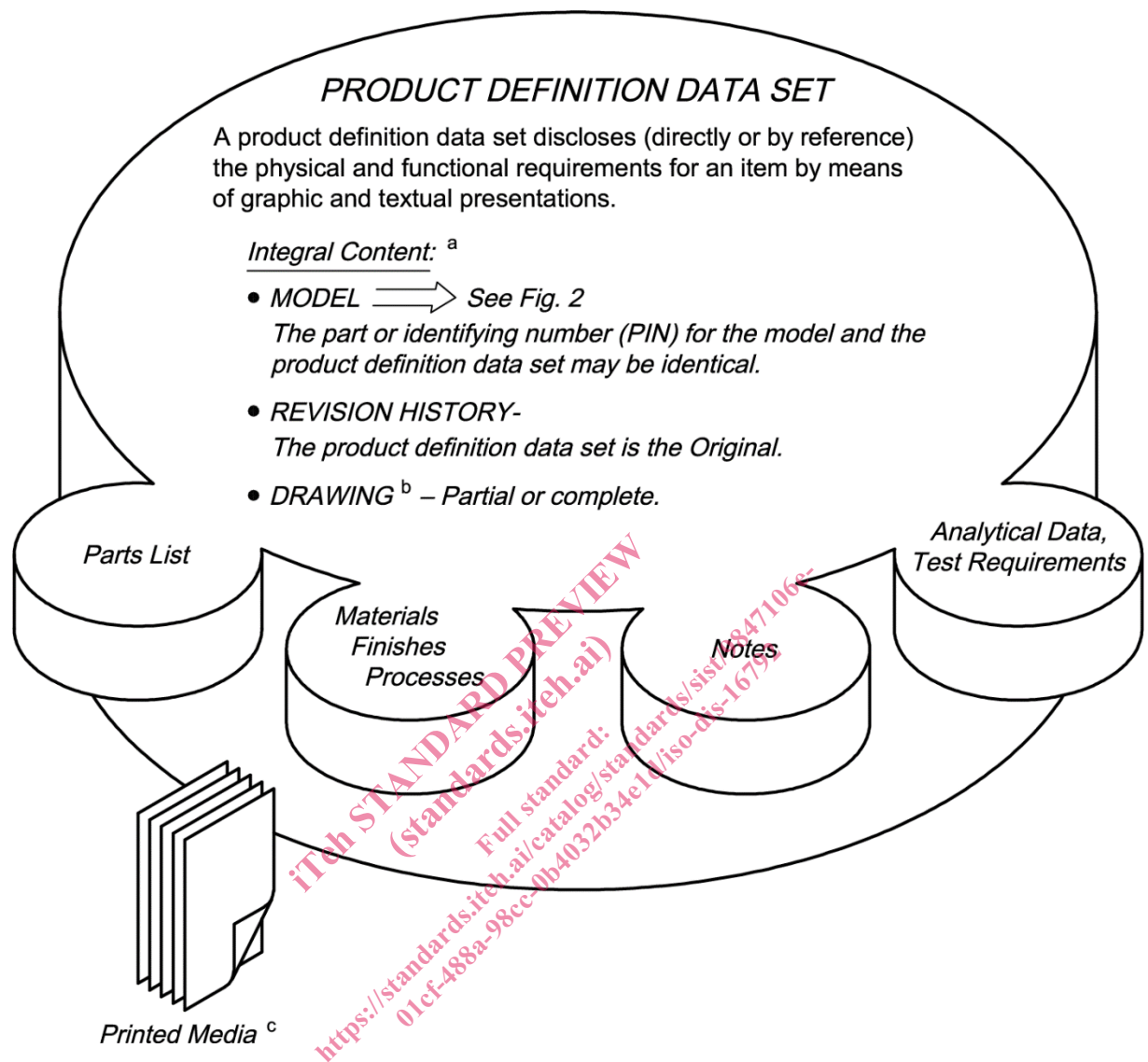
4.2 Related data

Related data shall be integral to, or referenced in, the data set. Related data consists of, but is not limited to, analytical data, parts lists, test requirements, material specifications, process, and finish requirements in accordance with Figure 1 .

4.3 Data management

The following specifies the structure and control requirements for data management:

- a) The data management system shall meet the requirements of ISO 11442, providing information to enable the control and tracking of data sets, throughout the life cycle of the product to which each relates. The system may include work in process, data review status, model checked status, release status, design tool and version, libraries, etc.
- b) Revision history information per ISO 11442 shall be contained in the data set.

**Key**

- a Related data (as applicable) required for complete definition may be integral to or referenced in the product definition data set. Data not integral to the product definition data set may be revised independently.
- b A drawing is not required for Model Only data sets.
- c Related data may be manually or computer generated.

Figure 1 — Content of a product definition data set

A model in a product definition data set contains annotations, attributes and the cad design model (which typical is made of model geometry, geometric elements and supplemental geometry. See Figure 2