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Industrial automation systems and integration — Product data representation and exchange —

iTeh STANDARD PREVIEW

Part 101:

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Integrated application resources: Draughting

Systèmes d'automatisation industrielle et intégration — Représentation et échange de données de produits —

Partie 101: Ressources d'application intégrées: Dessins techniques

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Foreword

The International Organization for Standardization (ISO) 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.

Draft International Standards adopted by technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

International Standard ISO 10303-101 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC4, *Industrial data and global manufacturing languages*.

ISO 10303 consists of the following parts under the general title *Industrial automation systems and integration – Product data representation and exchange*:

- Part 1, Overview and fundamental principles;

- Part 11, Description methods: The EXPRESS language reference manual;

- Part 21, Implementation methods: Clear text encoding of the exchange structure;

- Part 22, Implementation methods: Standard data access interface;

- Part 31, Conformance testing methodology and framework: General concepts;

- Part 32, Conformance testing methodology and framework: Requirements on testing laboratories and clients;

- Part 41, Integrated generic resources: Fundamentals of product description and support;

- Part 42, Integrated generic resources: Geometric and topological representation;

- Part 43, Integrated generic resources: Representation structures;

- Part 44, Integrated generic resources: Product structure configuration;

- Part 45, Integrated generic resources: Materials;

– Part 46, Integrated generic resources: Visual presentation;

– Part 47, Integrated generic resources: Shape variation tolerances;

– Part 49, Integrated generic resources: Process structure and properties;

– Part 101, Integrated application resources: Draughting;

– Part 104, Integrated application resources: Finite element analysis;

– Part 105, Integrated application resources: Kinematics;

– Part 201, Application protocol: Explicit draughting;

– Part 202, Application protocol: Associative draughting;

– Part 203, Application protocol: Configuration controlled design;

– Part 207, Application protocol: Sheet metal die planning and design;

– Part 210, Application protocol: Printed circuit assembly product design data;

– Part 213, Application protocol: Numerical control process plans for machined parts.

The structure of this International Standard is described in ISO 10303-1. The numbering of the parts of this International Standard reflects its structure:

– Part 11 specifies the description method;

– Parts 21 and 22 specify the implementation methods;

– Parts 31 and 32 specify the conformance testing methodology and framework;

– Parts 41 to 49 specify the integrated generic resources;

– Parts 101 to 105 specify the integrated application resources;

– Parts 201 to 213 specify the application protocols.

Should further parts be published, they will follow the same numbering pattern.

Annexes A and B form an integral part of this part of ISO 10303. Annexes C, D, and E are for information only.

Diskette

Users should note that this part of ISO 10303 comprises a diskette:
— the short names of entities given in annex A are also included on the diskette;
— the EXPRESS listings (annex C) are provided on the diskette only;
— a method to enable users to report errors in the documentation is given. Full details are provided in the file.

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Introduction

ISO 10303 is an International Standard for the computer-interpretable representation and exchange of product data. The objective is to provide a neutral mechanism capable of describing product data throughout the life cycle of a product independent from any particular system. 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 archiving.

This International Standard is organized as a series of parts, each published separately. The parts of ISO 10303 fall into one of the following series: description methods, integrated resources, application protocols, abstract test suites, implementation methods, and conformance testing. The series are described in ISO 10303-1. This part of ISO 10303 is a member of the integrated resources series. Major subdivisions of this part of the International Standard are:

- drawing definition which specifies the resources necessary for the identification, description, organization, and administration of drawing and drawing sheet versions;

- draughting element which specifies the resources representing basic draughting elements such as dimension lines, projection lines, leader lines and the use of these resources in combination with other annotation curves, symbols, and text to depict information found on the drawing sheet;

- draughting dimension which specifies the resources necessary for the use of basic draughting elements, in combination with other annotation curves, symbols, and text, to depict dimensions, tolerances, and dimension-related information on a drawing sheet.

The objective of this part is the system-independent representation of digital CAD data resulting from the application of draughting practices in the drawing depiction of product definition data. This part provides for the representation of draughting information not provided for in other integrated resource parts of ISO 10303. Where necessary, it provides the draughting semantic extension to information represented in those parts.

Requirements and practices regarding the draughting-specific use, appearance, and specific aggregation of curves, symbols, and text are specified in draughting-practices standards regarding technical drawings, such as those compiled in ISO Standards Handbook 12.

Industrial automation systems and integration - Product data representation and exchange - Part 101: Integrated application resources: Draughting

1 Scope

This part of ISO 10303 specifies the resource constructs for the representation of draughting information. The following are within the scope of this part of ISO 10303:

- information regarding the definition, description, and administration of a drawing and the sheets of a drawing;

- elementary draughting annotations and their aggregation with more general annotations for the depiction of facts and requirements concerning the product or interpretation of a drawing;

- draughting annotations used in the depiction of dimensions, tolerances, and related dimension-measurement information.

The following are outside the scope of this part of ISO 10303:

- management information such as changes that create drawing versions, approvals, contracts under which draughting work is done, security classification, persons responsible, and the roles of responsibility of these persons, provided in ISO 10303-41;

- views and the viewing mechanism for depiction of the shape, provided in ISO 10303-46;

- styled generic annotations (i.e., curves, symbols, text and sectioning (crosshatching)), provided in ISO 10303-46;

- coordinate systems for the location of annotations, and their relationships, provided in ISO 10303-42 and ISO 10303-43.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 10303. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 10303 are encouraged to

investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10209-1:1992, *Technical product documentation - Vocabulary - Part 1: Terms relating to technical drawings: general and types of drawing.*

ISO 10303-1:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 1: Overview and fundamental principles.*

ISO 10303-11:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 11: Description methods: The EXPRESS language reference manual.*

ISO 10303-41:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 41: Integrated generic resources: Fundamentals of product description and support.*

ISO 10303-46:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 46: Integrated generic resources: Visual presentation.*

ISO/IEC 8824-1:–[1], *Information Technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1) - Part 1: Specification of Basic Notation.*

3 Definitions

3.1 Terms defined in ISO 10303-1

This part makes use of the following terms defined in ISO 10303-1.

  - application;

  - application protocol;

  - application resource;

  - data;

  - formal;

  - generic resource;

  - information;

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[1] To be published.

– integrated resource;

– product;

– product data;

– resource construct.

3.2 Terms defined in ISO 10303-42

This part makes use of the following term defined in ISO 10303-42.

– curve.

3.3 Terms defined in ISO 10303-46

This part makes use of the following terms defined in ISO 10303-46.

– annotation;

– presentation.

3.4 Terms defined in ISO 10209-1

This part makes use of the following term defined in ISO 10209-1:

– drawing;

– technical drawing.

3.5 Other definitions

For the purposes of this part of ISO 10303, the following definitions apply:

3.5.1 callout: A depiction of requirements and information about a product.

3.5.2 draughting; drafting: An activity of selecting and configuring appropriate representations of product data for the human-interpretable presentation in the form of a drawing.

3.5.3 drawing sheet: A subdivision of a drawing having the same identifier as the drawing and its own sheet number. A drawing sheet may contain part or all of the text or pictorial presentations of the drawing.

3

4 Drawing definition

The following EXPRESS declaration begins the **drawing_definition_schema** and identifies the necessary external references.

<u>EXPRESS specification</u>:

```
*)
SCHEMA drawing_definition_schema;

REFERENCE FROM support_resource_schema
    (label,
     text,
     identifier,
     bag_to_set);

REFERENCE FROM representation_schema
    (mapped_item,
     representation_relationship,
     representation);

REFERENCE FROM presentation_organization_schema
    (area_in_set,
     presentation_area,
     presentation_set,
     presentation_representation_relationship);
(*
```

NOTE - The schemas referenced above can be found in the following parts of ISO 10303:

support_resource_schema	ISO 10303-41
representation_schema	ISO 10303-43
presentation_organization_schema	ISO 10303-46

4.1 Introduction

The subject of the **drawing_definition_schema** is the identification, description, organization, and administration of drawing revisions. It identifies drawing revisions and drawing sheet revisions that comprise a drawing. It describes the relationship between revisions of drawings and sheets. In short, this schema provides resources for the definition and management of the drawing.

NOTE - An EXPRESS-G diagram for this schema appears in annex D.

4.2 Fundamental concepts and assumptions

A drawing is a draughting-specific presentation of information about a product including information used to interpret the presentation. A drawing can be partitioned or divided into a number of drawing sheets. Drawings are configured and administered by versions. Each drawing, including its drawing sheets, may have many versions. Versions of drawings and drawing sheets are known as revisions. A drawing is a revision whether it be initial or the result of change. If any drawing sheet is added, changed, or deleted, a new revision of the drawing may be established. The ability to identify and describe a drawing revision is provided, independently of organizational practices.

A revised drawing or drawing sheet is considered a successor of the original drawing or drawing sheet. The revisions of a drawing or drawing sheet may be sequentially ordered.

Drawing and drawing sheet revisions may have a draughting-specific title or description. A draughting title may change for subsequent revisions of the drawing or drawing sheet.

4.3 drawing_definition_schema type definition: draughting_titled_item

A selection of items which may be given a draughting-specific title.

EXPRESS specification:
```
*)
TYPE draughting_titled_item = SELECT
  (drawing_revision,
   drawing_sheet_revision);
END_TYPE;
(*
```

4.4 drawing_definition_schema entity definitions

4.4.1 drawing_definition

A drawing definition identifies and categorizes, by type, a set of drawing versions.

> NOTE - When the need for a drawing is identified, a drawing definition begins its existence when the organization assigns a drawing number.

EXPRESS specification:
```
*)
ENTITY drawing_definition;
  drawing_number : identifier;
  drawing_type   : OPTIONAL label;
END_ENTITY;
(*
```

Attribute definitions:

drawing_number: An identifier for the versions of a drawing.

> NOTE 1 - Drawing numbers themselves are often composed of parts such as: a type prefix, a part number (or stem), and a suffix. Its composition is provided by the originating organization.

> EXAMPLE 1 - "CK123456-789", "DL-S12345", "1B5102-04", and "1D55500" are examples of drawing number strings.

drawing_type: A label used to describe the functional categorization of the drawing.

> NOTE 2 - A type of drawing is used to communicate a specific portion of the information about a product. For a printed wiring assembly, the functional aspects are communicated by means of a schematic diagram whereas the physical aspects are communicated by means of another drawing type.

> EXAMPLE 2 - "SCHEMATIC DIAGRAM", "SITE PLAN", "DETAIL", and "ASSEMBLY" are examples of drawing-type labels. Additional examples for drawing-type labels may be found in clause 3 of ISO 10209-1.

4.4.2 drawing_revision

A drawing revision is a version of a drawing, resulting from creation or change.

EXPRESS specification:

```
*)
ENTITY drawing_revision
   SUBTYPE OF (presentation_set);
   revision_identifier : identifier;
   drawing_identifier  : drawing_definition;
   intended_scale      : OPTIONAL text;
UNIQUE
   UR1: revision_identifier, drawing_identifier;
END_ENTITY;
(*
```

Attribute definitions:

revision_identifier: An identifier for the revision of the drawing.

> NOTE - The values for this representation may be comprised of any allowable characters. Any limit or restrictions must be specified in an Application Protocol. Typically the revision identifier is an alphanumeric string.

EXAMPLE 3 - The revision identifier may be "A", "AA", "2.4", or could be "31".

drawing_identifier: An identifier for the drawing.

intended_scale: A text description of the intended drawing scale where the description is for information only.

EXAMPLE 4 - "1/4", "100:1", "NONE" are drawing scale examples.

Formal propositions:

UR1: The identifier for a version of a drawing shall be unique for that drawing.

EXAMPLE 5 - A drawing revision identified by the letter "A" is the only drawing revision identified by that letter in the set of revisions of a particular drawing.

4.4.3 drawing_revision_sequence

A drawing revision sequence is the successive relationship of one version to another for the same drawing.

EXAMPLE 6 - If two drawing revisions were identified by revision identifiers equal to A and B successively, the drawing revision identified by A would play the role of predecessor and the drawing revision identified by B would play the role of successor in the sequence of drawing revisions.

EXPRESS specification:

```
*)
ENTITY drawing_revision_sequence;
   predecessor : drawing_revision;
   successor   : drawing_revision;
WHERE
   WR1: predecessor :<>: successor;
END_ENTITY;
(*
```

Attribute definitions:

predecessor: A version of a drawing which precedes another version of a drawing.

successor: A version of a drawing which succeeds another version of a drawing.

NOTE - A drawing version (i.e., drawing_revision) may precede or succeed another version of the same drawing or a version of a different drawing (i.e., not identified by the same drawing_definition) in a logical sequence of drawings .