

INTERNATIONAL
STANDARD

ISO
10303-43

First edition
1994-12-15

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

iTeh STANDARD PREVIEW

Part 43:

(standards.iteh.ai)
**Integrated generic resources: Representation
structures**

[ISO 10303-43:1994](https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994)

<https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994>

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

Partie 43: Ressources génériques intégrées: Structures de représentation



Reference number
ISO 10303-43:1994(E)

Contents	Page
1 Scope	1
2 Normative references	2
3 Definitions	3
3.1 Terms defined in ISO 10303-1	3
4.1 Introduction	4
4.2 Fundamental concepts and assumptions	4
4.2.1 Fundamental concepts and assumptions related to representation	4
4.2.2 Fundamental concepts and assumptions related to the context of representation	5
4.2.3 Fundamental concepts and assumptions related to elements of representation	5
4.2.4 Fundamental concepts and assumptions related to the association of representations	6
4.2.5 Fundamental concepts and assumptions related to transformation	6
4.3 Representation_schema type definition: transformation	8
4.4 Representation_schema entity definitions	8
4.4.1 uncertainty_measure_with_unit	8
4.4.2 representation_context	9
4.4.3 global_uncertainty_assigned_context	9
4.4.4 representation_item	10
4.4.5 representation	10
4.4.6 representation_relationship	12
4.4.7 item_defined_transformation	13
4.4.8 functionally_defined_transformation	14
4.4.9 representation_relationship_with_transformation	14
4.4.10 representation_map	15
4.4.11 mapped_item	16
4.4.12 definitional_representation	17
4.4.13 parametric_representation_context	17
4.5 Representation_schema function definitions	18
4.5.1 acyclic_mapped_representation	18
4.5.2 item_in_context	19
4.5.3 using_representations	21

© ISO 1994

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Annexes

A Short names of entities 23

B Information object registration 24

 B.1 Document identification 24

 B.2 Schema identification 24

C Computer-interpretable listings 25

D EXPRESS-G figures 26

Index 27

Figures

Figure D.1 - Representation schema subject planning model 26

Tables

Table A.1 - Short names of entities 23

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 10303-43:1994](https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994)
<https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994>

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 10303-43 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 and D 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.

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.

This part of ISO 10303 specifies the overall structure for representation. Collections of elements may be formed to act as the representation of some aspect of product data, such as a property of a product. Each element in such a collection is a representation item. An example of a property that can be represented is the shape of a product. The aspect or property that is being represented is not specified in this part of ISO 10303. Instead the subject of the representation is defined where the capabilities for representation are used in other parts of ISO 10303.

When representation items are collected to participate in a representation, they share a common context which is associated with the representation. This context is referred to as a representation context.

Not all elements of product data participate in representations. Those items which may participate in representations are defined to be representation items. Representation items are those elements that have complete meaning only when associated with a context. As an example, a point is a representation item which is only meaningful within a context (a coordinate space). In contrast, the name of a person is not a representation item because it has meaning separate from any context.

In addition to being an element of representation, a representation item may also support the definition of other representation items. This part of ISO 10303 allows for this distinction.

A collection of product data may contain numerous representation items, each participating in one or more representations. These representations may be related to form a structure which also relates the representation contexts. This structure can then be used to determine which representation items may be related to each other in a meaningful way. As an example, distance between points is only meaningful if the coordinate systems in which the points are defined can be related.

Representations that are unrelated in one context may be related in another. Consider the representation of the shape of a part and its components. The shape of each component may be represented as an independent concept, unrelated to the shape of the other components. In the context of the assembled part, however, the shapes of the components are related.

An aspect of product data may have zero, one, or multiple representations, none of which are the concept itself. For example, the shape of a part may be represented by a collection both of two-dimensional geometry and of constructive solid geometry. Either representation is an idealization of the shape.

Each representation is not necessarily a complete model of some aspect of product data, but it may represent a model of the aspect that is suitable for specific applications. Neither shape representation in the previous paragraph is necessarily a complete representation of the shape concept. Another shape representation might include tolerance information. Rather, each representation is suitable to some specific application's view or approach.

This part of ISO 10303 specifies the structure for transformation of one representation into another.

This part of ISO 10303 includes constructs for the specification of transformations. These transformations may be asserted as defining the relationship between existing representations. The ability to define a new representation by applying the transformation to another representation is provided. The new representation in this case is called a mapped item.

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

[ISO 10303-43:1994](https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994)

<https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994>

iTeh STANDARD PREVIEW

This page intentionally left blank
(standards.iteh.ai)

ISO 10303-43:1994

<https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994>

Industrial automation systems and integration — Product data representation and exchange — Part 43: Integrated generic resources: Representation structures

1 Scope

This part of ISO 10303 specifies the integrated generic resources for associating elements of representation into distinct collections. It provides a basis for distinguishing, within a set of such elements, which elements are related and which elements are not. This part also includes structure for specifying the relationships among these collections, including transformation of one representation as it participates in such a relationship.

The following are within scope of this part of ISO 10303:

- the specification of distinct unrelated contexts for representation;
- the specification of elements of representation;
- the association of elements of representation with one or more contexts in which they are combined to represent a concept;
- the association of elements of representation such that one defines another;
- a structure for relating two representations such that one participates in the definition of the other;
- a structure for relating two representations in which one does not participate in the definition of the other;
- constraints to prevent the recursive definition of instances of an element of representation;
- the specification of the process to transform one element of representation into another by specifying an element of the process before the application of the process and that element of the process after application of the process;
- the specification of the process to transform one element of representation into another by specifying the transforming function.

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

- the complete specification of the types of representation, types of elements of representation, and types of representation context;
- the specification of the uses of representation;
- the association of representation with any of its possible uses;
- constraints requiring a directed relationship between representations;

NOTE - A directed relationship exists between items A and B when the meaning of the relationship of A to B is different from the meaning of B to A. A and B are peers in a non-directed relationship. A directed relationship is a constrained version of the relationships specified in this part of ISO 10303. Such constraints are left to those integrated resources or application protocols specializing the structures presented in this part of ISO 10303.

- constraints forbidding cyclic structures of related representations;
- constraints requiring a directed relationship between the contexts in which related representations exist;
- constraints forbidding cyclic structures of relationships between representation contexts.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

2 Normative references

[ISO 10303-43:1994](https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994)

<https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994>

The following standards contain provisions which, through references 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/IEC 8824-1:–¹⁾, *Information technology - Open Systems Interconnection - Abstract Syntax Notation One (ASN.1) - Part 1: Specification of Basic Notation.*

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.*

¹⁾ To be published.

3 Definitions

3.1 Terms defined in ISO 10303-1

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

- application;
- application protocol;
- assembly;
- component;
- data;
- information;
- integrated resource;
- product;
- product data;
- structure.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 10303-43:1994](https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994)

<https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-5a720db1a4a7/iso-10303-43-1994>

4 Representation_schema

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

EXPRESS Specification:

```
*)
SCHEMA representation_schema;

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

REFERENCE FROM measure_schema
  (measure_with_unit);
(*)
```

NOTES

- 1 - See annex D for a graphical presentation of this schema using the EXPRESS-G notation.
- 2 - The schema referenced above can be found in the following part of ISO 10303:

support_resource_schema	ISO 10303-41
measures_schema	ISO 10303-41

4.1 Introduction

The subject of the **representation_schema** is the structures for the representation that relates a collection of elements of product data to a context. The use of the representation(s) is not defined in this part of ISO 10303. Other parts of ISO 10303 make use of the structures defined in this part.

Structures are specified that are common to all uses of representation in ISO 10303. Each representation has a context and a collection of elements specified in that context. A context may be related to different or broader contexts.

NOTE - For the representation of geometric elements, the context is a coordinate space.

This part of ISO 10303 also enables the transformation between representations to be specified. The ability to specify the transformation of one representation such that the result forms part of another representation is provided.

(standards.iteh.ai)

4.2 Fundamental concepts and assumptions

ISO 10303-43:1994

<https://standards.iteh.ai/catalog/standards/sist/9abbde3d-48f3-42d2-bc0a-725972597259>

4.2.1 Fundamental concepts and assumptions related to representation

The following assumptions apply to the portions of this schema that deal with representation:

- Elements of representation are organized into identifiable collections associated in a context for specific uses. These organizations are called representations. By organizing the elements in this way, the elements are distinguishable as either related or unrelated in the context of the specified use.

NOTES

- 1 - In this and following notes, most of the examples will be geometric in nature. However, the concepts being illustrated are not restricted to geometry.
 - 2 - Consider two points with coordinate values of (0,0,0) and (1,0,0). It is not possible to assert that these points are one unit apart in space until it is established that they are in the same coordinate space. The specification of a point by itself does not contain enough data to state which coordinate space it is in and what other elements also share that coordinate space.
- In this International Standard, these representations correspond to instances of the entity **representation**.
 - A representation may be invoked in more than one use. A representation is independent of its use.