

BRITISH STANDARD

**BS ISO
10303-43 : 1994**

**Implementation of
ISO 10303-43 : 1994**

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

**Part 43. Integrated generic resources:
Representation structures**



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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee AMT/4, Product data exchange, upon which the following bodies were represented:

British Aerospace
CIMIO Ltd.
Construction Industry Computing Association
Department of Trade and Industry (Services Management Division (IMS))
GKN Technology Ltd.
Institute of Materials
Institution of Chemical Engineers
Institution of Electrical Engineers
Lloyd's Register of Shipping
Ministry of Defence
NAFEMS
Nine Tiles K-Net
Rutherford Appleton Laboratory
South Bank University
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University of Loughborough

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Committee reference AMT/4

National foreword

This British Standard reproduces verbatim ISO 10303-43 : 1994 and implements it as the UK national standard.

This British Standard is published under the direction of the Advanced Manufacturing Technology Assembly whose Technical Committee AMT/4 has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international committee any enquiries on interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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INTERNATIONAL STANDARD

ISO
10303-43

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

Part 43:

**Integrated generic resources: Representation
structures**

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

Partie 43: Ressources génériques intégrées: Structures de représentation



AVA Documents
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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 10303-43 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.

