

INTERNATIONAL
STANDARD

ISO
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**Industrial automation systems and
integration — Product data representation
and exchange —
Part 1:
Overview and fundamental principles**

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

Partie 1: Aperçu et principes fondamentaux

INTERNATIONAL

ISO



Reference number
ISO 10303-1:1994(E)

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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 10303-1 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC4, *Industrial data and global manufacturing programming 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 specification;
- 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 methods;
- 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.

Annex A forms an integral part of this part of ISO 10303. Annex B is for information only.

Introduction

The information generated about a product during its design, manufacture, use, maintenance, and disposal is used for many purposes during that life cycle. The use may involve many computer systems, including some that may be located in different organizations. In order to support such uses, organizations need to be able to represent their product information in a common computer-interpretable form that is required to remain complete and consistent when exchanged among different computer systems.

ISO 10303 is an International Standard for the computer-interpretable representation and exchange of product data. The objective is to provide a mechanism that is 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.

ISO 10303 is organized as a series of parts, each published separately. The parts of this International Standard fall into one of the following series: description methods, integrated resources, application protocols, abstract test suites, implementation methods, and conformance testing.

This part of ISO 10303 provides an overview. It specifies the functions of the various series of parts of ISO 10303 and the relationships among them.

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Industrial automation systems and integration — Product data representation and exchange — Part 1 : Overview and fundamental principles

1 Scope

This part of ISO 10303 provides an overview of this International Standard.

This International Standard provides a representation of product information along with the necessary mechanisms and definitions to enable product data to be exchanged. The exchange is among different computer systems and environments associated with the complete product lifecycle, including product design, manufacture, use, maintenance, and final disposition of the product.

The following are within the scope of ISO 10303:

- the representation of product information, including components and assemblies;
- the exchange of product data, including storing, transferring, accessing, and archiving.

This part of ISO 10303 defines the basic principles of product information representation and exchange used in ISO 10303. It specifies the characteristics of the various series of parts of ISO 10303 and the relationships among them.

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

- an overview of this International Standard;
- the structure of this International Standard;
- definitions of terms used throughout this International Standard;
- an overview of data specification methods used in this International Standard including the *EXPRESS* data specification language and graphical presentation of product information models;
- an introduction to the integrated resources;
- an introduction to application protocols that are used to define the scope, context, and information requirements of an application, and the representation of the application information;
- an introduction to the methodology and framework for conformance testing that provides an assessment of whether an implementation conforms to this International Standard;

- an introduction to the abstract test suites to be used as a basis for conformance testing;
- an introduction to the implementation methods which may be used with this International Standard.

The scopes of the other parts of ISO 10303 are defined within those parts.

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 10303-31:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 31: Conformance testing methodology and framework: General concepts.*

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

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3 Definitions and abbreviations

3.1 Terms defined in ISO 10303-31

This part of ISO 10303 makes use of the following terms defined in ISO 10303-31:

- abstract test case
- abstract test method
- conformance testing
- test purpose
- verdict
- verdict criteria

¹⁾To be published.

3.2 Other definitions

For the purposes of ISO 10303, the following definitions apply.

3.2.1 abstract test suite: a part of this International Standard that contains the set of abstract test cases necessary for conformance testing of an implementation of an application protocol.

3.2.2 application: a group of one or more processes creating or using product data.

3.2.3 application activity model (AAM): a model that describes an application in terms of its processes and information flows.

3.2.4 application context: the environment in which the integrated resources are interpreted to support the use of product data in a specific application.

3.2.5 application interpreted model (AIM): an information model that uses the integrated resources necessary to satisfy the information requirements and constraints of an application reference model, within an application protocol.

3.2.6 application object: an atomic element of an application reference model that defines a unique concept of the application and contains attributes specifying the data elements of the object.

3.2.7 application protocol (AP): a part of this International Standard that specifies an application interpreted model satisfying the scope and information requirements for a specific application.

NOTE – This definition differs from the definition used in open system interconnection (OSI) standards. However, since this International Standard is not intended to be used directly with OSI communications, no confusion should arise.

3.2.8 application reference model (ARM): an information model that describes the information requirements and constraints of a specific application context.

3.2.9 application resource: an integrated resource whose contents are related to a group of application contexts.

3.2.10 assembly: a product that is decomposable into a set of components or other assemblies from the perspective of a specific application.

3.2.11 component: a product that is not subject to decomposition from the perspective of a specific application.

3.2.12 conformance class: a subset of an application protocol for which conformance may be claimed.