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

**Part 1:
Overview and fundamental principles**

iTeh STANDARD PREVIEW
*Systemes d'automatisation industrielle et intégration —
Représentation et échange de données de produits —
Partie 1: Aperçu et principes fondamentaux*
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ISO 10303-1:2021

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Contents

	Page
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	2
3 Terms, definitions and abbreviated terms	2
3.1 Terms and definitions.....	2
3.2 Abbreviated terms.....	8
4 Overview of ISO 10303	9
4.1 Purpose.....	9
4.2 Scope of ISO 10303.....	9
4.3 Fundamental principles.....	9
4.3.1 General.....	9
4.3.2 Integrated resources.....	9
4.3.3 Support for applications.....	10
4.3.4 Implementation methods.....	10
4.3.5 Implementations.....	10
4.3.6 Conformance testing.....	10
5 Architecture of ISO 10303	11
5.1 Concepts behind the architecture.....	11
5.2 Elaborations of the architecture.....	11
5.2.1 General.....	11
5.2.2 Sharing interpretations in the initial architecture.....	12
5.2.3 Sharing interpretations in the Modular architecture.....	12
6 Structure of ISO 10303	13
6.1 Series of parts.....	13
6.2 Description methods.....	13
6.2.1 Purpose.....	13
6.2.2 The EXPRESS and EXPRESS-G modeling languages (ISO 10303-11).....	14
6.2.3 The EXPRESS-X language.....	14
6.3 Implementation methods.....	14
6.3.1 Purpose.....	14
6.3.2 Use of formal language.....	14
6.3.3 Mapping from EXPRESS to implementation method.....	14
6.3.4 Exchange structures for product data (implementation).....	14
6.3.5 Standard data access interface specification.....	15
6.3.6 EXPRESS to OMG XMI binding.....	15
6.3.7 BO Model implementation.....	16
6.4 Application interpreted construct.....	16
6.4.1 Purpose.....	16
6.4.2 Characteristics.....	16
6.5 Application modules.....	16
6.5.1 Purpose.....	16
6.5.2 Characteristics.....	16
6.5.3 Business benefits.....	17
6.6 Business object models.....	17
6.6.1 Purpose.....	17
6.6.2 EXPRESS Model of the Business Object.....	17
6.6.3 An API Signature for a Business Object.....	17
6.6.4 A UML Model of the Business Object.....	18
6.7 Application protocols.....	18
6.7.1 Purpose.....	18
6.7.2 Definition of information requirements.....	18

6.7.3	Information representation	18
6.7.4	Implementation methods.....	18
6.7.5	Conformance requirements	18
6.8	Usage guides.....	18
6.8.1	Purpose.....	18
6.8.2	Characteristics	19
6.8.3	Document structure	19
6.8.4	Content.....	19
6.9	Conformance testing methodology and framework.....	19
6.9.1	Purpose.....	19
6.9.2	Procedures for conformance testing	19
6.9.3	Abstract test methods	20
6.10	Abstract test suites	20
7	Information object registration scheme.....	20
Annex A	(normative) Information object registration	22
Bibliography	23

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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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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This second edition cancels and replaces the first edition (ISO 10303-1:1994), which has been technically revised.

The main changes compared to the previous edition are as follows:

- inclusion of application interpreted constructs;
- inclusion of application modules;
- inclusion of business object models;
- inclusion of additional implementation methods;
- inclusion of modular architecture as a preferred alternative to the initial architecture of ISO 10303-1:1994;
- permission for integrated resources to reference constructs written using EXPRESS from other International Standards;
- corrections to part numbering scheme;
- extension of information object registration to be usable on other standards;
- inclusion of usage guides;
- additional definitions.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

A list of all parts in the ISO 10303 series can be found on the ISO website.

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation of product information and for the exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their life cycle. This mechanism is suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases, and as a basis for archiving. The information generated about a product during its design, manufacture, use, maintenance, and disposal is used for many purposes. The use can involve many computer systems, including some that can 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.

This document is an overview of ISO 10303. It specifies the overall scope of ISO 10303 and describes the ISO 10303 architectures and structure. It describes the various series of parts of ISO 10303 and the relationships among them.

ISO 10303 is organized as a series of parts, each published separately. The structure of ISO 10303 is described in this document.

Each part of ISO 10303 is a member of one of the following series: description methods, implementation methods, conformance testing methodology and framework, integrated generic resources, integrated application resources, application protocols, abstract test suites, application interpreted constructs, application modules and business object models.

A list of all parts in the ISO 10303 series is available from the following URL:

http://standards.iso.org/iso/10303/tech/step_titles.htm

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

Part 1: Overview and fundamental principles

1 Scope

This document provides an overview of ISO 10303.

ISO 10303 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.

This document 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 document:

- scope statement for ISO 10303 as a whole;
- overview of ISO 10303;
- architectures of ISO 10303; [ISO 10303-1:2021](https://standards.iteh.ai/catalog/standards/sist/476456b9-6d89-4a75-aeb2-54af3cab9cfe/iso-10303-1-2021)
- structure of ISO 10303;
- terms and definitions used throughout ISO 10303;
- overview of data specification methods used in ISO 10303;

NOTE This includes the EXPRESS data specification language and graphical presentation of product information models.

- introduction to the series of parts of ISO 10303:
 - integrated resources;
 - application interpreted constructs;
 - application modules;
 - business object models;
 - application protocols;
 - implementation methods;
 - usage guides;
 - conformance testing methodology and framework;

- abstract test suites;
- scheme for identification of schemas and other information objects defined within parts of ISO 10303.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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/IEC 8824-1, *Information technology — Abstract Syntax Notation One (ASN.1) — Part 1: Specification of basic notation*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

abstract test case

ATC

specification, encapsulating at least one test purpose, that provides the formal basis from which executable test cases are derived and that is independent of both the implementation and the values

3.1.2

abstract test method

ATM

description of how an implementation is tested, given at the appropriate level of abstraction to make the description independent of any specific implementation of testing tools or procedures, but with sufficient detail to enable these tools and procedures to be produced

3.1.3

abstract test suite

ATS

part of ISO 10303 that contains the set of abstract test cases necessary for conformance testing of an implementation of an application protocol

3.1.4

agreement of common understanding

result of discussions between the partners of product data exchange or sharing, that ensures that all of them have the same understanding of the transferred or shared information

3.1.5

application

one or more processes creating or using product data

3.1.6

application activity model

AAM

model that describes an application in terms of its processes and information flows

3.1.7

application construct

collection of EXPRESS language entities, types, functions, rules and references that are based on resource constructs and that specialize those resource constructs as necessary to define a valid description of an aspect of product data for specific application areas

3.1.8**application context**

subset of an application activity model

3.1.9**application interpreted construct**

AIC

logical grouping of interpreted constructs that supports a specific function for the usage of product data across multiple application contexts

Note 1 to entry: See also *interpretation* ([3.1.41](#)).

3.1.10**application interpreted model**

AIM

information model that includes the application constructs necessary to satisfy the requirements of an application reference model

3.1.11**application module**

AM

reusable collection of a scope statement, information requirements, mappings and module interpreted model that supports a specific usage of product data across multiple application contexts

3.1.12**application object**

AO

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

3.1.13**application programming interface**

API

set of standard software interrupts, calls, functions, and data formats that can be used by an application program to access network services, devices, or operating systems

3.1.14**application programming interface implementation**

API implementation

implementation of ISO 10303 that supplies the services of the application programming interface, in contrast to an implementation of this standard that uses the API implementation

3.1.15**application programming interface instance**

API instance

individual execution context and state of an application programming interface implementation

Note 1 to entry: The notion of “execution context” in ISO 10303 is the same as in ECMAScript.

3.1.16**application programming interface signature**

APIS

description of the set of functions, protocols, and tools that programmers can use to enhance applications to access network services, devices, or operating systems

ISO 10303-1:2021(E)

3.1.17

application protocol

AP
part of ISO 10303 that specifies an application interpreted model satisfying the scope and information requirements for a specific application

Note 1 to entry: This definition differs from the definition used in ISO 7498-2:1989 because the protocols address different contexts of use.

3.1.18

application reference model

ARM
information model that describes the information requirements and constraints of an application within an application protocol or module

3.1.19

application resource

integrated resource whose contents are related to a group of application contexts

3.1.20

assembly

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

3.1.21

business object model

BO Model
single integrated information model for the scope of an AP

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3.1.22

common resources

collection of information models, specified in the EXPRESS language, that can be reused to specify application-specific information models within the domain of industrial data

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Note 1 to entry: The resource constructs defined by an application module are those defined in its module interpreted model schema.

Note 2 to entry: The term does not specify a specific series of ISO 10303 parts.

3.1.23

component

product that is not subject to decomposition from the perspective of a specific application

3.1.24

conformance assessment

analysis of conformance testing results to determine conformance to a particular application protocol's conformance class or option

3.1.25

conformance class

subset of an application protocol for which conformance can be claimed

3.1.26

conformance option requirement

incremental subset of an application protocol for which conformance can be claimed in addition to the conformance claimed for one or more conformance classes

3.1.27

conformance

precise, text definition of a characteristic required to be present in a conforming implementation

3.1.28**conformance testing**

testing of a conforming implementation by evaluating its data for the specific characteristics required by ISO 10303

3.1.29**data**

representation of information in a formal manner suitable for communication, interpretation, or processing by human beings or computers

3.1.30**data mapping language**

computer interpretable language that specifies how one information set relates to another

3.1.31**data exchange**

storing, accessing, transferring, and archiving of data

3.1.32**data specification language**

set of rules for defining data and their relationships suitable for communication, interpretation, or processing by computers

3.1.33**description method**

systematic procedure for specifying elements of a domain

EXAMPLE ISO 10303-11 is a description method that specifies the elements of the EXPRESS language.

3.1.34**digital signature**

result of a cryptographic transformation of data that, when properly implemented, provides a mechanism for verifying origin authentication, data integrity and signatory non-repudiation

3.1.35**domain**

area of knowledge, influence, or activity

3.1.36**exchange structure**

computer-interpretable format used for storing, accessing, transferring, and archiving data

3.1.37**externally defined**

explicit identification of the definition given within another source

Note 1 to entry: That source provides all the information necessary to unambiguously recreate the element; the information can be referenced rather than recreated.

3.1.38**generic resource**

integrated resource whose contents are independent of a specific application

EXAMPLE ISO 10303-42.

3.1.39**implementation method**

part of ISO 10303 that specifies a technique used by computer systems to exchange product data that is described using the EXPRESS data specification language

ISO 10303-1:2021(E)

3.1.40

implementation under test

IUT

part of an application that is studied under testing

Note 1 to entry: This is normally an implementation of one or more characteristics of the standard(s) based on a given implementation method.

3.1.41

information

facts, concepts, or instructions

3.1.42

information model

formal model of information

Note 1 to entry: In ISO 10303, an information model is based on the Object-relationship modeling technique that organizes the product data as represented in different system aspects.

Note 2 to entry: In ISO 10303, information models are developed using EXPRESS modeling language.

EXAMPLE ISO 10303-242.

3.1.43

integrated resource

IR

part of ISO 10303 that defines a group of resource constructs used as the basis for product data. It includes the two types of resource parts: generic resources and application resources

Note 1 to entry: The 4x to 6x numbering is reserved for integrated generic resources and the 1xx numbering is reserved for integrated application resources.

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EXAMPLE 1 ISO 10303-42. <https://standards.iteh.ai/catalog/standards/sist/476456b9-6d89-4a75-aeb2-54af3cab9cfe/iso-10303-1-2021>

EXAMPLE 2 ISO 10303-104.

3.1.44

interpretation

process of adapting a resource construct to satisfy an application-specific requirement of an application protocol

Note 1 to entry: The interpretation process can involve the addition of restrictions on attributes, the addition of constraints, and the addition of assignments.

3.1.45

module interpreted model

MIM

information model that uses the common resources necessary to satisfy the information requirements and constraints of an application reference model, within an application module

Note 1 to entry: The term common resources is not meant to imply that all such information models are required to be used in a module interpreted model regardless of domain or application.

EXAMPLE Three-dimensional geometry information models are common resources used in many MIMs. However, an application module describing colour will not use three-dimensional geometry information models as a resource.

3.1.46

neutral

independent of a specific computer system