INTERNATIONAL STANDARD

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

Part 1:
Overview and fundamental principles

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

Partie 1: Aperçu et principes fondamentaux

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Contents

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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.

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 4, *Industrial data*.

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.

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;

— 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

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

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

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