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

Part 27: Implementation methods: Java™ programming language binding to the standard data access interface with Internet/Intranet extensions

bsi.

# National foreword

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

## Part 27: Java TM programming language binding to the standard data access interface with Internet/ Intranet extensions

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

*Partie 27: Méthodes de mise en application: Liaison de langage de programmation Java TM à l'interface d'accès aux données normales avec extensions Internet/Intranet*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the 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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

— an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed every three years with a view to deciding whether it can be transformed into an International Standard.

Attention is drawn to the possibility that some of the elements of this part of ISO 10303 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TS 10303-27 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

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 12, Description methods: The EXPRESS-I language reference manual;

— Part 14, Description methods: The EXPRESS-X language reference manual;

— Part 21, Implementation methods: Clear text encoding of the exchange structure;

— Part 22, Implementation method: Standard data access interface specification;

— Part 23, Implementation method: C++ language binding to the standard data access interface;

— Part 24, Implementation method: C language binding to the standard data access interface;

— Part 26, Implementation method: Interface definition language binding to the standard data access interface;

— Part 27, Implementation method: Java™ programming language binding to the standard data access interface with Internet/Intranet extensions;


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— Part 28, Implementation method: XML representation for EXPRESS-driven data;

— Part 29, Implementation method: Lightweight Java programming language binding to the standard data access interface with Internet/Intranet extensions;

— Part 31, Conformance testing methodology and framework: General concepts;

— Part 32, Conformance testing methodology and framework: Requirements on testing laboratories and clients;

— Part 34, Conformance testing methodology and framework: Abstract test methods;

— Part 35, Conformance testing methodology and framework: Abstract test methods for standard data access interface implementations;

— 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 resource: Materials;

— Part 46, Integrated generic resources: Visual presentation;

— Part 47, Integrated generic resource: Shape variation tolerances;

— Part 49, Integrated generic resource: Process structure and properties;

— Part 50, Integrated generic resource: Mathematical construct;

— Part 101, Integrated application resource: Draughting;

— Part 104, Integrated application resource: Finite element analysis;

— Part 105, Integrated application resource: Kinematics;

— Part 106, Integrated application resource: Building construction core model;

— Part 107, Integrated application resource: Engineering analysis core application reference model (EA C-ARM);

— Part 108, Integrated application resource: Parameterization and constraints for explicit geometric product models;

— Part 201, Application protocol: Explicit draughting;

— Part 202, Application protocol: Associative draughting;

— Part 203, Application protocol: Configuration controlled 3D designs of mechanical parts and assemblies;

— Part 204, Application protocol: Mechanical design using boundary representation;

— Part 205, Application protocol: Mechanical design using surface representation;

— Part 207, Application protocol: Sheet metal die planning and design;

— Part 208, Application protocol: Life cycle management - Change process;

— Part 209, Application protocol: Composite and metallic structural analysis and related design;

— Part 210, Application protocol: Electronic assembly, interconnect, and packaging design;

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— Part 212, Application protocol: Electrotechnical design and installation;

— Part 213, Application protocol: Numerical control process plans for machined parts;

— Part 214, Application protocol: Core data for automotive mechanical design processes;

— Part 215, Application protocol: Ship arrangement;

— Part 216, Application protocol: Ship moulded forms;

— Part 217, Application protocol: Ship piping;

— Part 218, Application protocol: Ship structures;

— Part 221, Application protocol: Functional data and their schematic representation for process plant;

— Part 223, Application protocol: Exchange of design and manufacturing product information for casting parts;

— Part 224, Application protocol: Mechanical product definition for process plans using machining features;

— Part 225, Application protocol: Building elements using explicit shape representation;

— Part 226, Application protocol: Ship mechanical systems;

— Part 227, Application protocol: Plant spatial configuration;

— Part 230, Application protocol: Building structural frame: Steelwork;

— Part 231, Application protocol: Process engineering data: Process design and process specification of major equipment;

— Part 232, Application protocol: Technical data packaging core information and exchange;

— Part 233, Application Protocol: Systems engineering data representation;

— Part 234, Application protocol: Ship Operational logs, records, and messages;

— Part 235, Application Protocol: Materials information for the design and verification of products;

— Part 236, Application Protocol: Furniture product data and project data;

— Part 301, Abstract test suite: Explicit draughting;

— Part 302, Abstract test suite: Associative draughting;

— Part 303, Abstract test suite: Configuration controlled design;

— Part 304, Abstract test suite: Mechanical design using boundary representation;

— Part 305, Abstract test suite: Mechanical design using surface representation;

— Part 307, Abstract test suite: Sheet metal die planning and design;

— Part 308, Abstract test suite: Life cycle management --- Change process;

— Part 309, Abstract test suite: Composite and metallic structural analysis and related design;

— Part 310, Abstract test suite: Electronic assembly, interconnect, and packaging design;

— Part 312, Abstract test suite: Electrotechnical design and installation;

— Part 313, Abstract test suite: Numerical control process plans for machined parts;


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— Part 314, Abstract test suite: Core data for automotive mechanical design processes;

— Part 315, Abstract test suite: Ship arrangement;

— Part 316, Abstract test suite: Ship moulded forms;

— Part 317, Abstract test suite: Ship piping;

— Part 318, Abstract test suite: Ship structures;

— Part 321, Abstract test suite: Functional data and schematic representation for process plant;

— Part 322, Abstract test suite: Exchange of product data for composite structures;

— Part 323, Abstract test suite: Exchange of design and manufacturing product information for cast parts;

— Part 324, Abstract test suite: Mechanical product definition for process plans using machining features;

— Part 325, Abstract test suite: Building elements using explicit shape representation;

— Part 326, Abstract test suite: Ship mechanical systems;

— Part 327, Abstract test suite: Plant spatial configuration;

— Part 329, Abstract test suite: Exchange of design and manufacturing product information for forged parts;

— Part 330, Abstract test suite: Building structural frame: Steelwork;

— Part 331, Abstract test suite: Process engineering data: Process design and process specification of major equipment;

— Part 332, Abstract test suite: Technical data packaging core information and exchange;

— Part 333, Abstract test suite: Systems engineering data representation;

— Part 334, Abstract test suite: Ship Operational logs, records, and messages;

— Part 335, Abstract test suite: Materials information for the design and verification of products;

— Part 336, Abstract test suite: Furniture product data and project data;

— Part 501, Application interpreted construct: Edge-based wireframe;

— Part 502, Application interpreted construct: Shell-based wireframe;

— Part 503, Application interpreted construct: Geometrically bounded 2D wireframe;

— Part 504, Application interpreted construct: Draughting annotation;

— Part 505, Application interpreted construct: Drawing structure and administration;

— Part 506, Application interpreted construct: Draughting elements;

— Part 507, Application interpreted construct: Geometrically bounded surface;

— Part 508, Application interpreted construct: Non-manifold surface;

— Part 509, Application interpreted construct: Manifold surface;

— Part 510, Application interpreted construct: Geometrically bounded wireframe;

— Part 511, Application interpreted construct: Topologically bounded surface;

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— Part 512, Application interpreted construct: Faceted boundary representation;

— Part 513, Application interpreted construct: Elementary boundary representation;

— Part 514, Application interpreted construct: Advanced boundary representation;

— Part 515, Application interpreted construct: Constructive solid geometry;

— Part 517, Application interpreted construct: Mechanical design geometric presentation;

— Part 518, Application interpreted construct: Mechanical design shaded presentation;

— Part 519, Application interpreted construct: Geometric tolerances;

— Part 520, Application interpreted construct: Associative draughting elements;

— Part 1001, Application module: Appearance assignment;

— Part 1002, Application Module: Colour;

— Part 1003, Application module: Curve appearance;

— Part 1004, Application module: Elemental shape;

— Part 1005, Application module: Elemental topological shape;

— Part 1006, Application module: Foundation representation;

— Part 1007, Application module: General surface appearance;

— Part 1008, Application Module: Layer assignment;

— Part 1009, Application Module: Shape appearance and layers;

The structure of this International Standard is described in ISO 10303-1. The numbering of the parts of the International Standard reflects its structure:

— Parts 11 to 14 specify the description methods,

— Parts 21 to 29 specify the implementation methods,

— Parts 31 to 35 specify the conformance testing methodology and framework,

— Parts 41 to 50 specify the integrated generic resources,

— Parts 101 to 108 specify the integrated application resources,

— Parts 201 to 236 specify the application protocols,

— Parts 301 to 336 specify the abstract test suites,

— Parts 501 to 520 specify the application interpreted constructs,

— Parts 1001 to 1009 specify the application module

Should further parts of ISO 10303 be published, they will follow the same numbering pattern.

Annexes A and B form a normative part of this part of ISO 10303. Annexes C to E are for information only.


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# 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 organised 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 integrated constructs, application protocols, abstract test suites, implementation methods, and conformance testing. The series is described in ISO 10303-1. This part of ISO 10303 is a member of the implementation methods series.

This part of ISO 10303 specifies the complete Java™ programming language binding to the standard data access interface (SDAI). SDAI is the access interface specification to data that has been defined using ISO 10303-11. SDAI is specified in ISO 10303-22.

Major subdivisions in this part of ISO 10303 are:

— Fundamental concepts in clauses 4 and 5;

— SDAI session classes to manage the environment in clause 6;

— Late binding: Generic Java interfaces and classes for arbitrary EXPRESS schemas in clause 7;

— Early binding: Specific Java interfaces and classes for particular EXPRESS schemas in clause 8;

— Error handling through the Java exception mechanism in clause 9.

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

## Part 27:
## Implementation methods: Java™ programming language binding to the standard data access interface with Internet/Intranet extensions

### 1 Scope

This part of ISO 10303 specifies a binding of the Java[1)] programming language to application data modelled in EXPRESS, ISO 10303-11 and to the standard data access interface, ISO 10303-22. It also specifies an import and export mechanism for data according to the clear text encoding of the exchange structure, ISO 10303-21. A further extension is that SDAI repositories can be created, deleted and linked while the SDAI session is open. Dynamically linking SDAI repositories through a network like Internet or Intranet allows accessing and changing of remote data.

In addition to the scope of ISO 10303-22 the scope of this part of ISO 10303 contains:

— creating, deletion and linking of the data repositories during an SDAI session;

— specific support for linking a remote data repository through a network like Internet or Intranet;

— convenience interfaces, classes, fields and methods suitable to this Java programming language binding;

— implementation mechanisms for the handling of errors as specified in ISO 10303-22;

— import from and export to the clear text encoding of the exchange structure as specified in ISO 10303-21.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10303. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10303 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 8824-1:1998, *Information technology — Abstract Syntax Notation One (ASN.l): 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.*

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1) Java is the trade mark of a product supplied by Sun Microsystems, Inc. This information is given for the convenience of users of this part of ISO 10303 and does not constitute an endorsement by ISO of the product name. Equivalent products may be used if they can be shown to lead to the same result.

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