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

Part 34:

**Conformance testing methodology and  
framework: Abstract test methods for  
application protocol implementations**

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*Partie 34: Méthodologie et cadre général pour l'évaluation de la conformité:  
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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.

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.

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.

International Standard ISO 10303-34 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

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 interpreted constructs, application protocols, abstract test suites, implementation methods, and conformance testing. The series are described in ISO 10303-1.

A complete list of parts of ISO 10303 is available from the Internet:

<<http://www.nist.gov/sc4/editing/step/titles/>>

Annex A forms a normative part of this part of ISO 10303.

## 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 part of ISO 10303 is a member of the conformance testing series.

This part of ISO 10303 specifies the test methods used in the conformance testing of implementations which read and write 10303 exchange structures or share information with SDAI implementations based on a given ISO 10303 application protocol.

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# Industrial automation systems and integration – Product data representation and exchange – Part 34: Conformance testing methodology and framework: Abstract test methods for application protocol implementations

## 1 Scope

This part of ISO 10303 specifies the abstract test methods for conformance testing of an implementation of an ISO 10303 Application Protocol (AP). The scope is limited to the following implementation methods:

- preprocessors that claim to generate 10303 schema instances represented as exchange structures as defined by ISO 10303-21;
- postprocessors that claim to accept and process 10303 schema instances represented as exchange structures as defined by ISO 10303-21;
- preprocessors that claim to generate 10303 schema instances and use the SDAI interface as defined in ISO 10303-22 to populate an SDAI implementation with these schema instances;
- postprocessors that claim to accept (standards.itec.ai) and use the SDAI interface as defined in ISO 10303-22 to extract schema instances from an SDAI implementation.

The following are within the scope of this part of ISO 10303:  
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- the conformance assessment process undertaken to evaluate the conformity of an implementation of an ISO 10303 application protocol. The abstract test methods are independently applicable to implementation methods based on ISO 10303-21 and ISO 10303-22;

- the methods to be followed by the testing laboratory using executable test cases (ETC). The methods presented are abstract, that is, they are independent of the implementation under test (IUT). The method descriptions cover the different steps from abstract test case (ATC) selection to test case report production.

The following is outside the scope of this part of ISO 10303:

- the generation of executable test cases from abstract test cases. This part of ISO 10303 does not include abstract test methods for conformance testing of application protocol independent implementations of the Standard Data Access Interface (SDAI) -- ISO 10303-22.

## 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 revision 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

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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 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: The EXPRESS language reference manual.*

ISO 10303-21:1994, *Industrial automation systems and integration - Product data representation and exchange - Part 21: Implementation methods: Clear text encoding of the exchange structure.*

ISO 10303-22:1998, *Industrial automation systems and integration - Product data representation and exchange - Part 22: Implementation methods: Standard data access interface.*

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

ISO 10303-32:1998, *Industrial automation systems and integration - Product data representation and exchange - Part 32: Conformance testing methodology and framework: Requirements on testing laboratories and clients.*

## 3 Terms, definitions and abbreviations

### 3.1 Terms defined in ISO 10303-1

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-1 apply.

- abstract test suite (ATS);
- application interpreted model;
- application protocol (AP);
- application reference model;
- conformance class;
- exchange structure;
- implementation method;
- Protocol Implementation Conformance Statement (PICS);
- PICS proforma.

### 3.2 Terms defined in ISO 10303-11

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-11 apply.



- entity;
- entity instance.

### 3.3 Terms defined in ISO 10303-22

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-22 apply.

- schema instance;
- SDAI model.

### 3.4 Terms defined in ISO 10303-31

For the purposes of this part of ISO 10303, the following terms defined in ISO 10303-31 apply.

- abstract test case (ATC);
- abstract test method;
- conformance;
- conformance log; **ITeh STANDARD PREVIEW**
- conformance test report; **(standards.iteh.ai)**
- conformance testing; [ISO 10303-34:2001](https://standards.iteh.ai/catalog/standards/sist/a7bc6e5f-20fe-46ba-bd65-59e2e81c7683/iso-10303-34-2001)
- executable test case; <https://standards.iteh.ai/catalog/standards/sist/a7bc6e5f-20fe-46ba-bd65-59e2e81c7683/iso-10303-34-2001>
- fail (verdict);
- implementation under test (IUT);
- inconclusive (verdict);
- pass (verdict);
- PIXIT (Protocol Implementation eXtra Information for Testing);
- PIXIT proforma;
- preprocessor;
- postprocessor;
- system under test (SUT);
- test campaign;
- test case error;

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- testing laboratory;
- test report;
- test verdict;
- verdict criteria.

### 3.5 Other terms and definitions

For the purposes of this part of ISO 10303, the following terms and definitions apply.

#### 3.5.1

##### **application element**

an application object, attribute, or assertion defining the information requirements in clause 4 of an application protocol.

#### 3.5.2

##### **semantic analysis**

the evaluation as to whether or not the information content of a schema instance was maintained during either preprocessing or postprocessing.

#### 3.5.3

##### **structure analysis**

the evaluation as to whether or not an IUT schema instance conforms to the AIM and conformance requirements of the ISO 10303 application protocol of interest.

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#### 3.5.4

##### **SUT operator**

a human or an automated component of the system under test that enables communication of instructions and query data between the test engine and the implementation under test.

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#### 3.5.5

##### **syntax analysis**

the evaluation as to whether or not an IUT schema instance is properly encoded in an exchange representation conforming to an implementation method of ISO 10303.

#### 3.5.6

##### **test case report**

a report covering the identifiers, data, results, and verdicts associated with the execution of a test case.

#### 3.5.7

##### **test case verdict**

a summarized verdict assigned to a test case derived from the individual verdicts assigned to the verdict criteria of a test case.

#### 3.5.8

##### **test engine**

the component of a test system that, by observing test case instructions, prepares, controls, observes, and analyses an IUT.

**3.5.9****test system**

the hardware, software, and data used by a testing laboratory to execute a test method.

**3.6 Abbreviations**

For the purposes of this part of ISO 10303, the following abbreviations apply.

AE	Application Element
AP	Application Protocol
ATC	Abstract Test Case
ATS	Abstract Test Suite
ETC	Executable Test Case
IUT	Implementation Under Test
PICS	Protocol Implementation Conformance Statement
PIXIT	Protocol Implementation eXtra Information for Testing
SDAI	Standard Data Access Interface
SUT	System Under Test

**4 Overview and assumptions**

Two abstract test methods are defined in this part of ISO 10303. The first provides for testing of implementations that generate exchange structures, i.e., preprocessors. The second provides for testing of implementations that interpret exchange structures, i.e., postprocessors. These methods are defined in clauses 5 and 6 respectively. Both abstract test methods apply also to applications that interface with SDAI implementations in a data sharing environment.

General principles and an overall framework for conformance testing are provided in ISO 10303-31. Requirements on test laboratories are defined in ISO 10303-32. The methods for preparing, controlling, observing, and analyzing implementations during testing are defined in this part of ISO 10303. Specific abstract test cases associated with ISO 10303 application protocols are defined in corresponding ISO 10303 abstract test suite standards. A description of abstract test suites concepts and the requirements on their use are defined in each 10303 abstract test suite.

**4.1 Components of exchange structure test methods**

Exchange structure test methods are based on three principal components: the implementation to be tested, a test system, and a human or automated component between them. These are the Implementation Under Test (IUT), the Test Engine, and the System Under Test Operator (SUT Operator), respectively.

— The Test Engine represents the control and communication functions of a test system, directing the execution and analysis of tests. The Test Engine communicates directly with