TECHNICAL SPECIFICATION

ISO/TS 10303-332

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

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

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

Partie 332: Suite d'essai abstrait: Paquet de données techniques

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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 any or all such patent rights.

ISO/TS 10303-323 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

This International Standard is organised as a series of parts, each published separately. The structure of this International Standard is described in ISO 10303-1.

Each part of this International Standard 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, and application modules. This part is a member of the abstract test suite series.

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

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

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

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.

This part of ISO 10303 specifies the abstract test suite for ISO 10303-232, Application protocol: Technical data packaging core information and exchange. The abstract test cases presented here are the basis for conformance testing of implementations of ISO 10303-232.

The purpose of an abstract test suite is to provide a basis for evaluating whether a particular implementation of an application protocol actually conforms to the requirements of that application protocol. A standard abstract test suite helps ensure that evaluations of conformance are conducted in a consistent manner by different test laboratories.

This abstract test suite is made up of two major parts:

— the test purposes, the specific items to be covered by conformance testing;

— the set of abstract test cases that meet those test purposes.

The test purposes are statements of the application protocol requirements that are to be addressed by the abstract test cases. Test purposes are derived primarily from the application protocol's information requirements and AIM, as well as from other sources such as standards referenced by the application protocol and requirements stated in the application protocol conformance requirements clause.

The abstract test cases address the test purposes by:

— specifying the requirements for input data to be used when testing an implementation of the application protocol;

— specifying the verdict criteria to be used when evaluating whether the implementation successfully converted the input data to a different form.

The abstract test cases set the requirements for the executable test cases that are required to actually conduct a conformance test. Executable test cases contain the scripts, detailed values, and other explicit information required to conduct a conformance test on a specific implementation of the application protocol.

At the time of publication of this document, conformance testing requirements had been established for implementations of application protocols in combination with ISO 10303-21 and ISO 10303-22. This part of ISO 10303 only specifies test purposes and abstract test cases for a subset of such implementations.

NOTE ISO TC184/SC4 has prepared Standing Documents [1] and [2] for documenting abstract test suites that are prepared as International Standards. Subsequent ISO TC184/SC4 resolutions allow abstract test suites to be prepared as Technical Specifications. This part of ISO 10303 was documented as a Technical Specification using the ISO TC184/SC4 Standing Documents [1] and [2] as a guide. Primary reliance was placed on [2].

Portions of this part of ISO 10303 that relied on [1] are identified in NOTEs in the appropriate clause or subclause. Technical differences in documentation of abstract test suites from the Standing Documents [1] and [2] are identified in NOTEs throughout this part of ISO 10303. Editorial differences in documentation are not identified in this part of ISO 10303.

For ISO 10303-21, two kinds of implementations, preprocessors and postprocessors, must be tested. Both these are addressed in this abstract test suite.

For ISO 10303-22, a class of applications will possess the capability to upload and download AP-compliant SDAI-models or schema instances to and from applications that implement the SDAI. By providing test case data that correspond with SDAI-models, this abstract test suite addresses such applications in a single-schema scenario.

Industrial automation systems and integration — Product data representation and exchange — Part 332: Abstract test suite: Technical data packaging core information and exchange

1 Scope

This part of ISO 10303 specifies the abstract test suite to be used in the conformance testing of implementations of ISO 10303-232. The following are within the scope of this part of ISO 10303:

— the specification of the test purposes associated with ISO 10303-232;

— the verdict criteria to be applied during conformance testing of an implementation of ISO 10303-232 using ISO 10303-21 or ISO 10303-22;

NOTE The verdict criteria are used to ascertain whether a test purpose has been satisfactorily met by an implementation under test (IUT) within the context of a given test case.

— the abstract test cases to be used as the basis for the executable test cases for conformance testing.

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

— the creation of executable test cases;

— test specifications for tests other than conformance testing such as interoperability or acceptance testing;

— other implementation methods.

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 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*

ISO 10303-21:2002, *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*

ISO 10303-34:2001, *Industrial automation systems and integration — Product data representation and exchange — Part 34: Conformance testing methodology and framework: Abstract test methods for application protocol implementations*

ISO 10303-232:2002, *Industrial automation systems and integration — Product data representation and exchange — Part 232: Application protocol: Technical data packaging core information and exchange*

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

3 Terms, definitions, and abbreviations

3.1 Terms defined in ISO 10303-1

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

— abstract test suite (ATS);

— application protocol (AP);

— implementation method.

3.2 Terms defined in ISO 10303-31

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

— abstract test case (ATC);

— conformance testing;

— executable test case;

— implementation under test (IUT);

— postprocessor;

— preprocessor;

— test purpose;

— verdict criterion.

3.3 Terms defined in ISO 10303-232

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303-232 apply.

— associated list;

— data definition exchange (DDE);

— data list;

— indentured data list;

— index list;

— parts list;

— TDP element;

— technical data package (TDP).

3.4 Other terms and definitions

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

3.4.1
application element
an application object, attribute, or assertion defining the information requirements in clause 4 of an application protocol.

3.4.2
application element test purpose
a test purpose derived from the application elements in the ARM of an application protocol.

3.4.3
application interpreted model test purpose
a test purpose derived from the AIM EXPRESS schema of an application protocol.

3.4.4
domain test purpose
a test purpose that arises from the requirements that are implicit in an application protocol and derived from usage scenarios and the process and information flows in the application domain of an application protocol.

3.4.5
external reference test purpose
test purpose derived from requirements that arise from standards referenced by an application protocol.

3.4.6
input specification
the instance model of an abstract test case presented in an unambiguous form, the table format for preprocessors and physical files (ISO 10303-21).

3.5 Abbreviations

AE application element

AIM application interpreted model

AP application protocol

ARM application reference model

ATS abstract test suite

CC conformance class

IUT implementation under test

TDP technical data package

UoF unit of functionality

4 Test purposes

NOTE 1 Portions of this clause have been written in accordance with the Guidelines for the development of abstract test suites [1].

This clause specifies the test purposes for this part of ISO 10303. Clauses 4.1 and 4.2 describe the source and meaning of test purposes that are derived from the information requirement defined in ISO 10303-232, clause 4, and the AIM EXPRESS schema defined in ISO 10303-232, annex A. Each test purpose statement identifies some specific element from the application elements or the AIM. Every test purpose statement implicitly requires that the identified element, as specified in the test purpose statement, will be correctly instantiated by the implementation under test in at least one test case within the test suite.

Implementation method test purposes in 4.3 are derived from ISO 10303-21. Domain test purposes in 4.4 are derived from implicit domain requirements in the AP that are not clearly specified at the application element level. The primary source of these implicit domain requirements is optional mappings specified in ISO 10303-232, clause 5.1. Implementation method and domain test purposes are individually identified by the prefix “other” in the test purpose number. These test purposes are statements of requirements that shall be met by a conforming implementation.

NOTE 2 Not all test purposes are covered by an abstract test case in clause 6 of this edition of this part of ISO 10303. Additional test cases will be added to a future edition to provide more complete coverage of the test purposes.

4.1 Application element test purposes

NOTE 1 This clause has been written in accordance with the Guidelines for the development of abstract test suites [1].

AE test purposes are individually identified by the prefix “ae” in the test purpose number. Each test purpose derived from the information requirements shall be interpreted as given in the following statement: the IUT shall preserve the semantics associated with the unique application element from which the test purpose was derived. This implies that the semantics of the application element are preserved by the IUT between the input and output of a test, according to the reference path specified in the mapping table of the AP. AE test purposes apply to the input specifications of both preprocessor and postprocessor test cases. AE test purposes are derived from the AP information requirements as follows:

— application objects (see 4.2 of ISO 10303-232). A test purpose derived from an application object is a simple statement of the object's name. Each application object test purpose is documented in a separate subclause.

NOTE 2 The following application objects function as simple type attributes and do not have separate, derived test purposes: A_number, A_real, An_integer, Identifier, Label, Measure, and Text. See notes 2 and 3 below.

— application objects with categorisations (subtypes) (see 4.2 of ISO 10303-232). Test purposes derived from application objects with categorisations are statements of the application object name as a specific subtype.

— application object attributes (see 4.2 of ISO 10303-232). Test purposes derived from application object attributes are statements of the application object name with a specific attribute name.

NOTE 3 Only the application object attributes whose type is one of the application objects identified in note 1 have test purposes of this kind.

— application assertions (see 4.3 of ISO 10303-232). Test purposes derived from application assertions are statements describing the relationship between two application objects. Application assertion test purposes address the directions of relationships as well as the number (cardinality) of relationships.

NOTE 4 Application assertions that involve one of the application objects identified in note 1 do not have test purposes.

Each application object test purpose is listed as a separate subclause, with its related application object attribute test purposes and assertion test purposes.

4.1.1 Accessed_file

ae1 Accessed_file
ae2 Accessed_file with path_information not present
ae3 Accessed_file with path_information
ae4 Accessed_file with storage_node_identification not present
ae5 Accessed_file with storage_node_identification
ae6 Accessed_file is entry_files for one Data_definition_entry_item
ae7 Accessed_file is entry_files for many Data_definition_entry_item objects

