



IEEE

IEC 61636-1

Edition 1.0 2016-11

INTERNATIONAL IEEE Std 1636.1™ STANDARD

**Software interface for maintenance information collection and analysis (SIMICA):
Exchanging test results and session information via the extensible markup
language (XML)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 25.040.01; 35.060

ISBN 978-2-8322-3684-0

Warning! Make sure that you obtained this publication from an authorized distributor.

Contents

1. Overview	1
1.1 Scope	2
1.2 Purpose	2
1.3 Application	2
1.4 Precedence	3
1.5 Conventions used in this document	3
2. Normative references.....	4
3. Definitions, acronyms, and abbreviations	4
3.1 Definitions	4
3.2 Acronyms and abbreviations	5
4. Test results and session information.....	6
4.1 Background.....	6
4.2 Introduction	6
4.3 Applicability	6
4.4 Usage	7
4.5 Relationships to other automatic test system (ATS) architectural elements.....	7
5. EXPRESS model, EXPRESS-G diagram, and XML schema names and locations	9
6. Conformance	10
7. Extensibility.....	11
Annex A (normative) XML schemas	12
A.1 TestResults.xsd	12
A.2 TestResultsCollection.xsd.....	59
Annex B (normative) EXPRESS models	60
B.1 TEST_RESULTS_MODEL.....	60
B.2 TestResults model EXPRESS-G diagrams	76
Annex C (informative) Bibliography.....	83
Annex D (informative) IEEE list of participants.....	85

**SOFTWARE INTERFACE
FOR MAINTENANCE INFORMATION COLLECTION
AND ANALYSIS (SIMICA):
EXCHANGING TEST RESULTS AND SESSION
INFORMATION VIA THE EXTENSIBLE MARKUP
LANGUAGE (XML)**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation.

IEEE Standards documents are developed within IEEE Societies and Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board. IEEE develops its standards through a consensus development process, which brings together volunteers representing varied viewpoints and interests to achieve the final product. Volunteers are not necessarily members of IEEE and serve without compensation. While IEEE administers the process and establishes rules to promote fairness in the consensus development process, IEEE does not independently evaluate, test, or verify the accuracy of any of the information contained in its standards. Use of IEEE Standards documents is wholly voluntary. IEEE documents are made available for use subject to important notices and legal disclaimers (see <http://standards.ieee.org/IPR/disclaimers.html> for more information).

IEC collaborates closely with IEEE in accordance with conditions determined by agreement between the two organizations.

- 2) The formal decisions of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees. The formal decisions of IEEE on technical matters, once consensus within IEEE Societies and Standards Coordinating Committees has been reached, is determined by a balanced ballot of materially interested parties who indicate interest in reviewing the proposed standard. Final approval of the IEEE standards document is given by the IEEE Standards Association (IEEE-SA) Standards Board.
- 3) IEC/IEEE Publications have the form of recommendations for international use and are accepted by IEC National Committees/IEEE Societies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC/IEEE Publications is accurate, IEC or IEEE cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications (including IEC/IEEE Publications) transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC/IEEE Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC and IEEE do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC and IEEE are not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or IEEE or their directors, employees, servants or agents including individual experts and members of technical committees and IEC National Committees, or volunteers of IEEE Societies and the Standards Coordinating Committees of the IEEE Standards Association (IEEE-SA) Standards Board, for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC/IEEE Publication or any other IEC or IEEE Publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that implementation of this IEC/IEEE Publication may require use of material covered by patent rights. By publication of this standard, no position is taken with respect to the existence or validity of any patent rights in connection therewith. IEC or IEEE shall not be held responsible for identifying Essential Patent Claims for which a license may be required, for conducting inquiries into the legal validity or scope of Patent Claims or determining whether any licensing terms or conditions provided in connection with submission of a Letter of Assurance, if any, or in any licensing agreements are reasonable or non-discriminatory. Users of this standard are expressly advised that determination of the validity of any patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

International Standard IEC 61636-1/IEEE Std 1636.1 has been processed through IEC technical committee 91: Electronics assembly technology, under the IEC/IEEE Dual Logo Agreement.

The text of this standard is based on the following documents:

IEEE Std	FDIS	Report on voting
1636.1 (2013)	91/1360/FDIS	91/1371/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The IEC Technical Committee and IEEE Technical Committee have decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Exchanging Test Results and Session Information via the eXtensible Markup Language (XML)

Sponsor

**IEEE Standards Coordinating Committees on
Test and Diagnosis for Electronic Systems (SCC20)**

Approved 23 August 2013

IEEE-SA Standards Board

Abstract: This standard is intended to promote and facilitate interoperability between components of automatic test systems where test results need to be shared. The standard thus facilitates the capture of test results data in storage devices and databases, facilitating online and offline analysis. The test results schema becomes a class of information that can be used within the SIMICA family of standards. The exchange format utilizes the XML formats.

Keywords: automated test system (ATS), eXtensible markup language (XML), IEEE 1636.1™, session information, Software Interface for Maintenance Information Collection and Analysis (SIMICA), test results, XML schema

IEEE Introduction

This introduction is not part of IEEE Std 1636.1™-2013, IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Exchanging Test Results and Session Information via the eXtensible Markup Language (XML).

Maintainers of complex systems require the ability to capture and share test result information in a way that supports such activities as performance analysis, post-production product improvement, maintenance process improvement, and diagnostic maturation. Principal stakeholders of this project include but are not limited to maintenance organizations within various Departments/Ministries of Defense, the commercial airlines, the automotive industry, and the telecommunications industry. This standard is being developed as a component of the IEEE 1636™ Software Interface for Maintenance Information Collection and Analysis (SIMICA) project. SIMICA's purpose is to specify a software interface for access, exchange, and analysis of product diagnostic and maintenance information. Clause 4, Test results and session information, provides a subset of the data needed to satisfy SIMICA requirements.

The use of formal information models will facilitate exchanging historical test results between information systems and analysis tools. The models will facilitate creating open system software architectures for maturing system diagnostics.

The XML schema described in this standard where appropriate utilizes and references components of the IEEE Std 1671™ schema set.

It is anticipated that these schemas will be used throughout industries that utilize diagnostic and maintenance data as an exchange format that can be understood by humans or machines. In order to ensure wide acceptance throughout the user community, the schemas have been designed to encompass a broad range of use cases. To accommodate use cases beyond the released design, the schemas provide means for user extensibility.

It is anticipated that the IEEE Std 1636.1 schema will be used throughout the automatic test equipment (ATE) industry as an exchange format that can be understood by humans or machines. In order to ensure wide acceptance throughout the user community, the schemas have been designed to encompass a broad range of use cases.

Software Interface for Maintenance Information Collection and Analysis (SIMICA): Exchanging Test Results and Session Information via the eXtensible Markup Language (XML)

IMPORTANT NOTICE: IEEE Standards documents are not intended to ensure safety, security, health, or environmental protection, or ensure against interference with or from other devices or networks. Implementers of IEEE Standards documents are responsible for determining and complying with all appropriate safety, security, environmental, health, and interference protection practices and all applicable laws and regulations.

This IEEE document is made available for use subject to important notices and legal disclaimers. These notices and disclaimers appear in all publications containing this document and may be found under the heading “Important Notice” or “Important Notices and Disclaimers Concerning IEEE Documents.” They can also be obtained on request from IEEE or viewed at <http://standards.ieee.org/IPR/disclaimers.html>.

1. Overview

The XML schema and EXPRESS model described in this document are intended for the recording of the history of the execution and observations from a test or test session. This information includes results data directly generated by test equipment or by the test equipment operating software. The combination of this information will aid in the improvement of the test process.

The XML schema associated with this standard is based on World Wide Web Consortium (W3C)¹ XML eXtensible Markup Language (XML) 1.0 Proposed Edited Recommendation [B1].²

The EXPRESS model associated with this standard is based on ISO 10303-11:1994 [B9].

¹ W3C is a registered trademark of the World Wide Web Consortium.

² Information on references can be found in Annex C.

1.1 Scope

The scope of this standard is the definition of an exchange format, utilizing XML, for exchanging data resulting from executing tests of a unit under test (UUT) via a test program in an automatic test environment. The standard uses the information models of IEEE Std 1636TM-2009³ as a foundation.

1.2 Purpose

The purpose of this standard is to specify a software interface for access, exchange, and analysis of test result information. The standard enables the capture of test results data, facilitating data analysis to assess the effectiveness of test and diagnostic processes applied to complex systems. The test results information model and XML schema define the semantics and exchange format for information to be used among applications implementing the SIMICA family of standards.

1.3 Application

1.3.1 Of this document

This document provides formal specifications of the information required for the development of shared maintenance data and the results of testing. These are applicable to both the SIMICA family of standards and the ATML family of standards.

Anticipated users of this standard include the following:

- a) System developers
- b) System maintainers
- c) Test program set (TPS) developers
- d) TPS maintainers
- e) Automatic test equipment (ATE) system developers
- f) ATE system maintainers
- g) Test instrument developers

1.3.2 Of this document's annexes

This document includes three annexes. Of these three, two are normative (Annex A and Annex B).

Annex A contains the description of each of the XML schema elements and types.

Annex B contains the description of the EXPRESS and EXPRESS-G model elements.

Annex C is informative, and thus are provided strictly as information, for both users and maintainers of this document.

³ Information on references can be found in Clause 2.

1.4 Precedence

In the event of conflict between this document and an SIMICA family component standard, this document shall take precedence.

In the event of conflict between this document and a normatively referenced standard (See Clause 2), the normatively referenced standard, as it applies to the information being produced, shall take precedence.

In the event of conflict between this document's EXPRESS model definition and/or annotations and this document's XML schema definition and/or annotations, this document's EXPRESS model definition and/or annotations, as it applies to the information being produced, shall take precedence.

In the event of conflict between this document's EXPRESS model definition and/or annotations and an SIMICA family component standard and/or EXPRESS model, this document's EXPRESS model definition and/or annotations, as it applies to the information being produced, shall take precedence.

In the event of conflict between this document's XML schema definition and/or annotations and an SIMICA family component standard and/or XML schemas, this document's XML schema definition and/or annotations, as it applies to the information being produced, shall take precedence.

In the event of conflict between this document's XML schema definition and/or annotations and the ATML Common XML schema, this document's XML schema definition and/or annotations, as it applies to the information being produced, shall take precedence.

1.5 Conventions used in this document

1.5.1 General

All simple, complex types attribute groups and elements will be listed; explanatory information will be provided, along with examples if additional clarification is needed. The explanatory information shall include information on the intended use of the elements and/or attributes where the name of the entity does not clearly indicate its intended use. For elements derived from another source type (e.g., an abstract type), only attributes which extend the source type shall be listed; details regarding the base type shall be listed along with the base type.

The namespace prefix "c:" identifies that the type or attribute group is contained in Annex B of IEEE Std 1671TM (Schema-Common.xsd).

When referring to an attribute of an XML element, the convention of *[element]@[attribute]* shall be used. In cases where an attribute name is referred to with no associated element, the attribute name shall be enclosed in single quotes.

In tables that describe XML elements, the column "Use" indicates the occurrence constraints for each element.

- a) "Required" indicates that the element shall appear exactly once.
- b) "Optional" indicates that the element may appear once or not at all.
- c) "1..∞" indicates that the element shall appear at least once and may appear multiple times.
- d) "0..∞" indicates that the element may appear multiple times, once, or not at all.

All specifications for the EXPRESS language are given in the Courier type font which includes references to entity and attribute names in the supporting text.

1.5.2 Word usage

In this document, the word *shall* is used to indicate a mandatory requirement. The word *should* is used to indicate a recommendation. The word *may* is used to indicate a permissible action. The word *can* is used for statements of possibility and capability.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 1636TM-2009, IEEE Trial-Use Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA).^{4, 5}

IEEE 1636.99TM-2013, IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA): Common Information Elements.

IEEE Std.1671TM-2010, IEEE Standard for Automatic Test Markup Language (ATML) for Exchanging Automatic Test Equipment and Test Information via XML.

⁴ IEEE publications are available from The Institute of Electrical and Electronics Engineers (<http://standards.ieee.org/>).

⁵ The IEEE standards or products referred to in this clause are trademarks of The Institute of Electrical and Electronics Engineers, Inc.