BS IEC 61636-1:2016

BSI Standards Publication

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

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

National foreword

This British Standard is the UK implementation of IEC 61636-1:2016.

The UK participation in its preparation was entrusted to Technical Committee EPL/501, Electronic Assembly Technology.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2016.
Published by BSI Standards Limited 2016

ISBN 978 0 580 94225 9
ICS 25.040.01; 35.060

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 November 2016.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

IEC 61636-1

Edition 1.0 2016-11

INTERNATIONAL STANDARD IEEE Std 1636.1™

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.

® Registered trademark of the International Electrotechnical Commission

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

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

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

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.

AVA Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

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.

Documents
Document Sharing Hub
Full document details: BS IEC 61636-1:2016

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

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

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

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

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.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub
Full document details: BS IEC 61636-1:2016

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.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

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 1636™-2009[3] 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.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

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 1671™ (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.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

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 1636™-2009, IEEE Trial-Use Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA).[4, 5]

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

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

3. Definitions, acronyms, and abbreviations

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* [B2] should be consulted for terms not defined in this clause.[6]

3.1 Definitions

branch: In an eXtensible Markup Language (XML) document or schema, a specified element and all elements subordinate to that specified element.

component (in eXtensible Markup Language (XML) schema): The generic term for the building blocks that compose the abstract data model of the schema.

eXtensible Markup Language (XML) attribute: Name-value pair associated with an XML element.

eXtensible Markup Language (XML) document: A (text) data object that conforms to the XML requirements for being well-formed (as defined by W3C).

[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.
[6] *IEEE Standards Dictionary Online* subscription is available at:
http://www.ieee.org/portal/innovate/products/standard/standards_dictionary.html

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

eXtensible Markup Language (XML) namespace: A method for distinguishing XML elements and attributes that may have the same name but different meanings. A URL is used as a prefix to a "local name." This combination ensures the uniqueness of the element or attribute name. The URL is used only as a way to create a unique prefix and does not have to resolve to a real page on the Internet.

NOTE—See Namespaces in XML 1.0 [B10] and Schenk and Wilson [B11][7].

eXtensible Markup Language (XML) schema: The structure or framework used to define a data record. This includes each field's name, type, shape, dimension, and mapping.

framework: A framework is a real or conceptual structure expressed as a set of abstract classes. The framework provides a context for the components to be used.

instance document: A textual information set grouped for some purpose that is governed by a single XML schema.

maintenance: Activity intended to keep equipment (hardware) or programs (software) in satisfactory working condition, including replacements, adjustments, repairs, software/firmware updates, and program improvements. Maintenance can be preventative or corrective. (Adapted from MIL-STD-1309D [B12].)

particle (in eXtensible Markup Language (XML) schema): A kind of component.

qualified name (in XML schema): The complete name of an XML element, attribute, or data type, including the local name and a prefix that identifies the namespace in which the local name is defined/declared.

sequence (in XML schema): A compositor for model group schema components which specifies that subordinate elements in an instance document must correspond, in order, to the specified particles.

3.2 Acronyms and abbreviations

AI-ESTATE	Artificial Intelligence Exchange and Service Tie to All Test Environments
ATE	automatic test equipment
ATML	Automatic Test Markup Language
ATS	automatic test system
DMC	Diagnostic and Maintenance Control
ISO	International Organization for Standardization
MAI	maintenance action information
SCC20	Standards Coordinating Committee 20
SIMICA	Software Interface for Maintenance Information Collection and Analysis
TPS	test program set
UUT	unit under test

[7] Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

URL	universal resource locator
W3C	World Wide Web Consortium
XML	eXtensible Markup Language

4. Test results and session information

4.1 Background

Current automatic test system architectures are implemented with tight coupling between components. This tight coupling inhibits interoperability by requiring components of the automatic test system to be developed specific to that particular architecture. In many cases, this coupling can be reduced by developing the components that operate relative to standard interfaces.

This document will facilitate accomplishing several objectives. First, the document will serve as a single source for specifying essential test data with data elements related to the unit under test (UUT), the test station, and the test program. Second, the document will assist the automatic test equipment (ATE) industry to design and create compatible, interoperable tool sets such as data parsers and writers. Third, the standard will assist ATE users of such data (e.g., automotive, semiconductor, aerospace, and military) to process and display test results across a variety of systems.

This document has been developed as a “component standard” under IEEE Std 1636. SIMICA’s purpose is to specify software interfaces for access, exchange, and analysis of product diagnostic and maintenance information. Test results provide a subset of the data needed to satisfy SIMICA’s requirements.

This document also represents the test results component of IEEE Std 1671 (ATML). In defining its overall architecture, ATML references include both IEEE Std 1636 (SIMICA) and IEEE Std 1636.1 (this standard).

4.2 Introduction

This document’s XML schema and EXPRESS model provides a standard format for the transport of both quantitative (measured values) and qualitative (pass/fail determination) test results. The design is such that it is possible to store ancillary information such as environmental conditions and system/operator messages. This information, although not specifically “results,” is intended to permit use of an instance document for a variety of purposes, including statistical analysis and diagnostics. Some examples of this ancillary information include identifying information for the UUT, the test station, and the test program; ambient environmental conditions at the time of the test; test equipment calibration data; as well as test program input data and ancillary textual comments. This document establishes a hierarchical structure for results data to permit the grouping of a series of related test results in a single instance document.

4.3 Applicability

This document will permit test results data to be shared for a variety of purposes, including statistical analysis, diagnostics, and improvement of the unit under test (UUT) repair process.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

4.4 Usage

This document presumes some knowledge of XML and the use of XML schemas. A variety of XML software tools are available in a number of computer programming languages. This document makes no presumption regarding the tool(s) being used or the specific test system(s) generating the test result information being captured in an XML instance document.

This document describes the TestResults.xsd schema and specifies the EXPRESS information model that conformant instance documents must follow. In general, this document serves as an enhancement to the annotations provided within the XML schema and EXPRESS model files.

4.4.1 XML schema representations

Within the body of this document, unless otherwise indicated, all syntax references relate to XML. Refer to XML eXtensible Markup Language (XML) 1.0 [B1] for detailed descriptions of XML data formats.

4.4.2 EXPRESS/EXPRESS-G representations

This document also uses the EXPRESS information modeling language to represent the information contained in the XML schema in a way that supports alternative exchange mechanisms and better defines the semantics of the elements of the XML schema. The information models are presented in a lexical form (EXPRESS) as well as in graphical form (EXPRESS-G) to facilitate understanding. The EXPRESS language is defined by ISO 10303-11:1994 [B9].

4.5 Relationships to other automatic test system (ATS) architectural elements

4.5.1 General

In the ATS context, a test is a procedure for evaluating or quantifying the operation of some device or system. The TestResults schema provides a standard format for the transport or storage of both quantitative (measured values) and qualitative (pass/fail determination) test results. The XML schema design is such that ancillary information such as environmental conditions and system/operator messages may also be stored in an XML instance document. This information, while not specifically “results,” is intended to permit use of an XML instance document for a variety of purposes, including statistical analysis and diagnostics. Some examples of this ancillary information includes identifying information for the UUT, the test station, and the test program; ambient environmental conditions at the time of the test; test equipment calibration data; test program input data and ancillary textual comments. The structure of the schema establishes a hierarchical structure for results data to permit the grouping of a series of related test results in a single instance document.

4.5.2 ATML test description instance documents

Within the context of an ATS, a test is any procedure for evaluating or quantifying the operation of a UUT. This test may be an implementation of an ATML test description XML instance document. In those cases where the test is an implementation of an ATML test description XML instance document, the relationships described in this clause apply.

The SIMICA test result can be qualitative (yes/no) or quantitative (a measured or calculated value). It can be a personal observation or the output of an ATS.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

The SIMICA Test Results XML schema provides a standard format for exchanging and storing the measured values, pass/fail results, and accompanying data (including test operator, station information, and environmental conditions) associated with the test method implemented for the ATML Test Description XML instance documents defined test(s).

ATS architecture shall maintain a direct correlation between the ATML test description and the SIMICA test result. An example of this direct correlation is depicted by Figure 1.

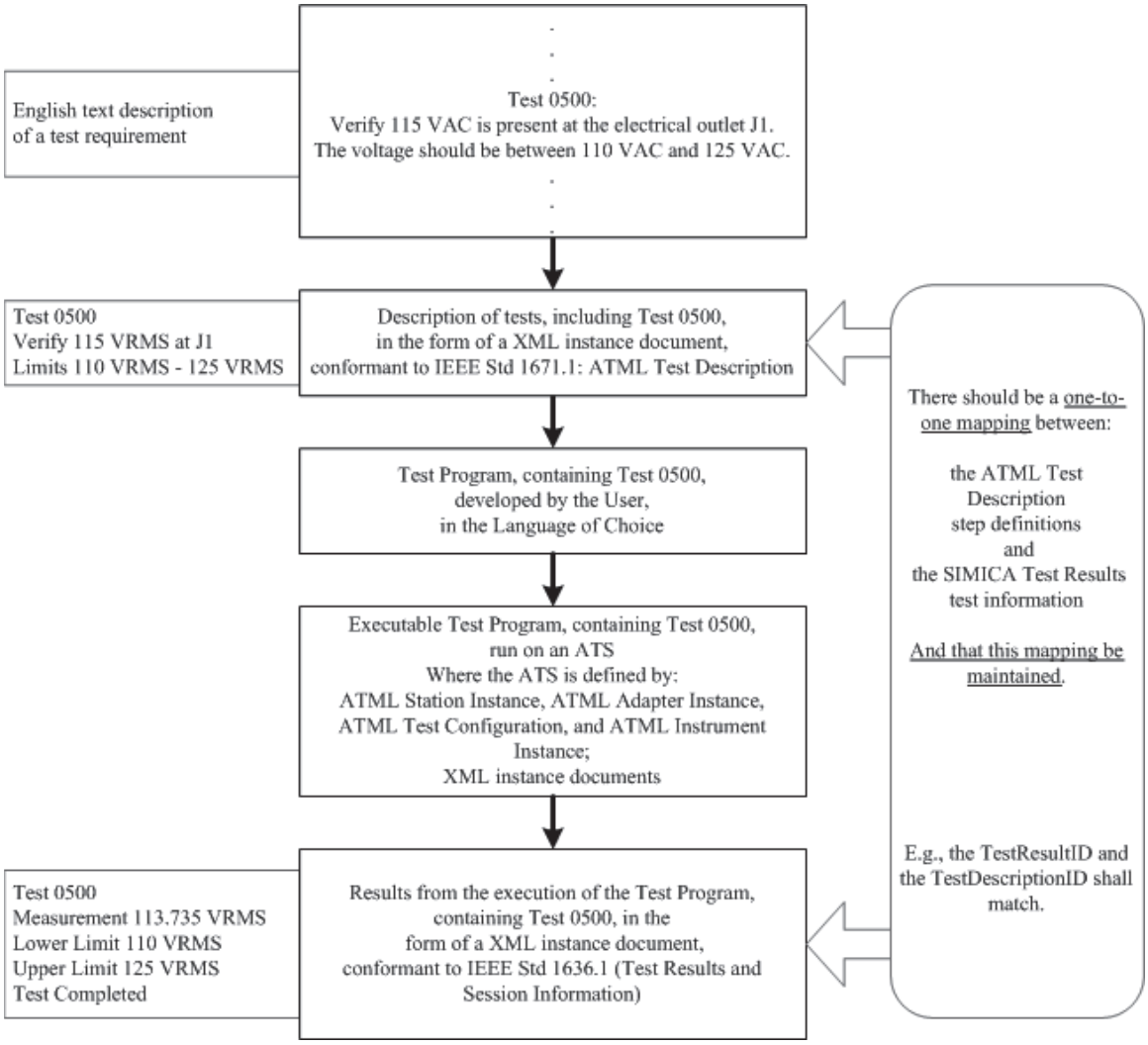

Figure 1—Direct relationship to a IEEE 1671.1 test description

Maintaining this direct correlation between the ATML test, the test method, and the SIMICA test results is vital to all interested parties (engineering, contracts, etc.) to both understand and agree upon:

— The methods of making measurements and,

— The method of obtaining the data.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub
Full document details: BS IEC 61636-1:2016

5. EXPRESS model, EXPRESS-G diagram, and XML schema names and locations

The IEEE provides a download site for material published in association with IEEE Standards, presented in machine friendly format. This material is digital rights management restricted use material. The SIMICA family of standards utilizes this download site to allow easy accessibility to all of the SIMICA family EXPRESS models and XML schemas (and in some cases, example XML instance documents). As depicted by Figure 2, the IEEE download site (http://standards.ieee.org/downloads/) contains several folders, each folder labeled by an associated IEEE standards number (e.g., IEEE 1636 standards are in the 1636 folder). Each folder under the "base" IEEE standards number contains the material (XML schemas, etc) for that family member. Family members are identified by their "dot" standard number (if it is a "dot" standard) and the year in which that standard was published by the IEEE.

NOTE 1—Standards that are revised will contain a folder for the year in which the standard is reissued. Both folders (for each year the standard was published) will be present on the IEEE download Web site.

NOTE 2—Providing a particular standard has associated material that is to be made available via the download Web site, folders for that standard are not available until the standard is published by the IEEE.

Figure 2 depicts a portion of the IEEE download site, as it pertains to the SIMICA family of standards.

http://standards.ieee.org/downloads

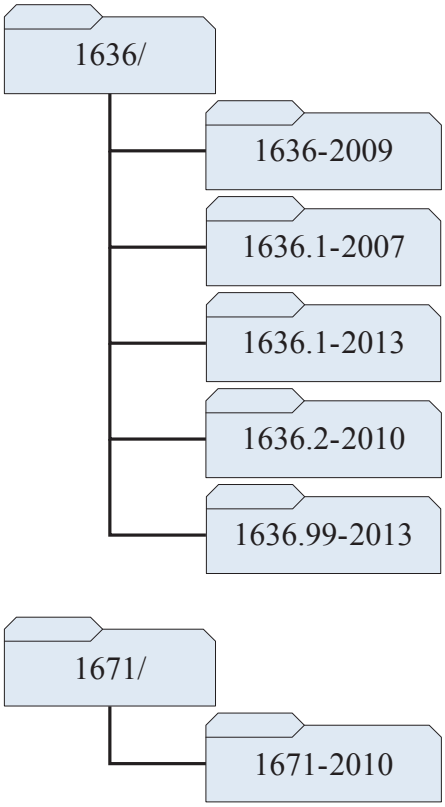

Figure 2—SIMICA-related IEEE download site structure

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub
Full document details: BS IEC 61636-1:2016

The IEEE Std 1636.1–associated XML schemas names, and the IEEE download site folder locations; where each of the XML schemas shall be located, is as defined in Table 1. Where the IEEE Std 1636.1–associated EXPRESS model shall be located, is as defined in Table 2.

Table 1—IEEE Std 1636.1 XML schema names and folder locations

Component	Defined in	XML schema name	IEEE download site folder (See Figure 2)
Test results and session information	Annex A.1	TestResults.xsd	1636/1636.1-2013
Test results collection	Annex A.2	TestResultsCollection.xsd	1636/1636.1-2013

Table 2—IEEE Std 1636.1 EXPRESS model and diagram names and folder locations

Component	Defined in	EXPRESS model name	IEEE download site folder (See Figure 2)
Test results and session information model	Annex B.1	1636.1.exp	1636/1636.1-2013

The XML schemas identified in Table 1 includes the ATML common XML schema and the SIMICA common XML schema. The XML schema name and the IEEE download site folder locations and where the XML schemas shall be located is as defined in Table 3.

Table 3—ATML and SIMICA common element XML schema names and locations

Component	Defined in	XML schema name	IEEE download site folder
ATML common	IEEE Std 1671-2010 Annex B.1	Common.xsd	1671/1671-2010
SIMICA common	IEEE Std 1636.99-2013 Annex A.1	SIMICACommon.xsd	1636/1636.99-2013

6. Conformance

The minimal expectation for XML instance documents conformant with this document shall be that a populated XML instance is considered valid if it complies with:

a) The Test Results XML schema (Defined in Annex A of this document, and available as described in Clause 5)

b) The Test Results EXPRESS model (Defined in Annex B of this document, and available as described in Clause 5)

c) The SIMICA Common XML schema (Defined in Annex A of IEEE Std 1636.99, and available as described in Clause 5)

d) The ATML Common XML schema (Defined in Annex B.1 of IEEE Std 1671, and available as described in Clause 5)

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

7. Extensibility

A provision in the XML schema of an extension mechanism is necessary to ensure the viability of the specification and allow producers and consumers of SIMICA XML instance documents to interoperate in those cases where there is a requirement to exchange relevant data that is not included in the TestResults.xsd schema. The use of the extensions shall be done in a way that ensures that a conformant consumer can utilize the extended file without error, discard, or otherwise sidestep the extended data and use the non-extended portions of the data as it is intended—without error or loss of functionality.

Extensions shall be additional information added to the content model of the element being extended.

Extensions shall not repackage existing information entities that are already supported by this standard.

An extended instance document shall be accompanied by the extension XML schema and documentation sufficient to explain the need for the extension as well as the underlying semantics and relationship(s) to the base schema.

TestResults.xsd supports two forms of extension:

a) Wildcard-based extensions allow for the extension of SIMICA schemas with additional elements.

b) Type derivation allows for extending the set of data types by deriving a new type from an existing type.

XML schemas control the location and type of extension allowed.

An element has an extensible content model if in instance documents that element can contain elements and data beyond that specified by the schema. SIMICA schemas should explicitly identify where they can be extended. Only elements from a namespace different from the document namespace should be allowed in an extension. The schema shall use the TestResults `<Extension>` type to identify where extension is allowed.

Allowing the extension of a schema using type substitution should be avoided. Schemas should mark elements defined via a simple or complex type with the block attribute set to #all if type substitution is to be avoided. Elements which use type substitution as their means of definition should set the abstract attribute to true.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

Annex A

(normative)

XML schemas

Should the reader not have a general understanding of XML schemas, there are several XML schema tutorials available for reference. The *XML Schema Part 0: Primer* [B13], the *XML Schema Tutorial* [B14], and the *XML Schema Tutorial, Part 1* [B15] are three available on the World Wide Web. These tutorials will help with the understanding of the contents of the TestResults.xsd schema that this Annex is defining the elements of.

Prefixes utilized in this Annex are as follows:

a) The prefix “c:” represents that the element is defined by/is inherited from the IEEE Std 1671-2010 associated Common.xsd XML schema.

b) The prefix “sc:” represents that the element is defined by/is inherited from the IEEE Std 1636.99-2013 associated SIMICACommon.xsd XML schema.

c) The prefix “tr:” represents that the element is defined within the TestResults.xsd schema.

A.1 TestResults.xsd

attributeFormDefault	unqualified
elementFormDefault	qualified
targetNamespace	urn:IEEE-1636.1:2013:TestResults

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

A.1.1 element TestResults

type	tr:TestResults
properties	**content** complex
children	tr:Personnel tr:PreTestRepairs tr:References tr:ResultSet tr:Site tr:TestDescription tr:TestProgram tr:TestStation tr:UUT tr:WorkOrder tr:Extension
attributes	**Name** / **Type** / **Use** / **Default** / **Fixed** / **Annotation** uuid / c:Uuid / required / / / **documentation** A universal unique identifier for the element containing this attribute. classified / xs:boolean / optional / / / **documentation** An indication that the element is or is not classified. securityClassification / c:NonBlankString / optional / / / **documentation** A use-case determined string declaring the security classification level of the element containing this attribute and the subordinate branch of the XML document. name / c:NonBlankString / optional / / / **documentation** The name of the instance document. Example: Acme Widget Test Results.
annotation	**documentation** The TestResults element shall be a container for all information entities utilized in the collection of the results of testing a UUT on (or within) a particular test station, executing a particular set of tests. This root element serves as the parent element for all other elements within the Test Results XML schema.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

A.1.2 complexType Action

properties	**abstract** true					
children	tr:Description tr:Events tr:Parameters tr:Data tr:EnvironmentalData tr:Extension					
used by	**complexTypes** SessionAction Test					
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**Annotation**
	ID	c:NonBlankString	required			**documentation** A descriptive or common name for the Action. The value of "ID" shall be unique within the context of the containing XML instance document.
	name	c:NonBlankString	optional			**documentation** A user-friendly textual name for the Action.
	userDefinedType	c:NonBlankString	optional			**documentation** A user defined textual "type" that will describe the non-test action.
	cost	xs:double	optional			**documentation** The monetary cost value associated with performing the action.
	simulated	xs:boolean	optional			**documentation** A True/False indication as to whether or not the Action occurred during a simulated test.
	startDateTime	xs:dateTime	required			**documentation** The beginning date and time of the action.
	endDateTime	xs:dateTime	optional			**documentation** The ending date and time of the action.
	testReferenceID	c:NonBlankString	optional			**documentation** A reference to the test program entity that generated this Action or the ID of a Test Description Test, Test Group, or Session Action.
	documentRequirementID	c:NonBlankString	optional			**documentation** When an ATML Test Description instance document does not exist, this attribute can be used to track that a given result in the report maps to a given requirement from a requirements document.
annotation	**documentation** The Action complex type shall be used to identify specific data related to any action(s) performed; either in/during the execution of a test. If an ATML Test Description instance document is identified by the /TestResults/TestDescription element, then the value of the 'referenceID' attribute shall be identical to the value of the 'ID' attribute of the Test Description Test Group, Test or SessionAction that was executed to generate the current Action. Otherwise, this referenceID attribute shall reference the test program entity that generated this Action, for example: line number, test number, step name, etc.					

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

A.1.3 element Action/Data

type	c:Value
properties	**minOcc** 0 **maxOcc** 1 **content** complex
children	c:Datum c:Collection c:IndexedArray
annotation	**documentation** This element shall be used to identify data associated with non-test actions.

A.1.4 element Action/Description

type	c:NonBlankString
properties	**minOcc** 0 **maxOcc** 1 **content** simple
facets	**Kind** **Value** **Annotation** minLength 1 whiteSpace replace
annotation	**documentation** This element shall be used to identify descriptive information for the parent element.

A.1.5 element Action/EnvironmentalData

properties	**minOcc** 0 **maxOcc** 1 **content** complex
children	tr:Environmental tr:Extension
annotation	**documentation** This element shall be used to identify environmental conditions which are related to a test.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

A.1.6 element Action/EnvironmentalData/Environmental

type	extension of c:NamedValue
properties	**minOcc** 1 **maxOcc** unbounded **content** complex
children	c:Datum c:Collection c:IndexedArray
attributes	**Name** / **Type** / **Use** / **Default** / **Fixed** / **annotation** name / c:NonBlankString / required / / / **documentation** A descriptive or common name for the subject data value. timeStamp / xs:dateTime / / / / **documentation** Date and time associated with the environmental data. This attribute should be used where the time the data was recorded is significant within the overall context of a particular action.
annotation	**documentation** This element shall be used as a collector for multiple sets of environmental data pertinent to a particular action. Identifies the environmental data that is pertinent to a particular action.

A.1.7 element Action/EnvironmentalData/Extension

type	Extension
properties	**content** complex
annotation	**documentation** This element shall provide a specific extension point for use cases that require elements not provided in the basic structure.

A.1.8 element Action/Events

properties	**minOcc** 0 **maxOcc** 1 **content** complex
children	tr:Event
annotation	**documentation** This element shall be used as a collector for session occurrences such as system or operator messages.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

A.1.9 element Action/Events/Event

type	tr:Event
properties	**minOcc** 1 **maxOcc** unbounded **content** complex
children	tr:Message tr:Data tr:Reference tr:Extension
attributes	**Name** / **Type** / **Use** / **Default** / **Fixed** / **Annotation** ID / c:NonBlankString / required / / / **documentation** A descriptive or common name for the Event. The value of "ID" shall be unique within the context of the containing XML instance document. name / c:NonBlankString / optional / / / **documentation** A user-friendly textual name for the Event. severity / derived by: xs:int / optional / / / **documentation** An enumeration of 0 to 4 inclusive that shall indicate a severity level for the Event. It shall be presumed that a value of 0 indicates least severe. Successive values shall indicate increasing levels of severity with 4 indicating most severe. source / c:NonBlankString / required / / / **documentation** An identification of the source of the Event (e.g., operator or test system). timeStamp / xs:dateTime / optional / / / **documentation** The date and time of the Event occurrence.
annotation	**documentation** This element shall be used to identify non-result data or system/operator messages generated during a test.

A.1.10 element Action/Extension

type	Extension
properties	**minOcc** 0 **maxOcc** 1 **content** complex
annotation	**documentation** This element shall provide a specific extension point for use cases that require elements not provided in the basic structure.

A.1.11 element Action/Parameters

properties	**minOcc** 0 **maxOcc** 1 **content** complex
children	tr:Parameter
annotation	**documentation** This element shall be used to identify test parameter data.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016

A.1.12 element Action/Parameters/Parameter

type	tr:Parameter
properties	**minOcc** 1 **maxOcc** unbounded **content** complex
children	tr:Description tr:Data tr:Reference tr:Extension
attributes	**Name** / **Type** / **Use** / **Default** / **Fixed** / **Annotation** ID / c:NonBlankString / required / / / **documentation** A descriptive or common name for the Parameter. The value of "ID" shall be unique within the context of the containing XML instance document. name / c:NonBlankString / optional / / / **documentation** A user-friendly textual name for the Parameter. timeStamp / xs:dateTime / optional / / / **documentation** The date and time associated with the Parameter. This shall be used where the time of application of a parameter is significant within the overall context of a test.
annotation	**documentation** This element shall be used to identify a particular test parameter.

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub
Full document details: BS IEC 61636-1:2016

A.1.13 complexType Event

children	tr:Message tr:Data tr:Reference tr:Extension					
used by	**Element** Action/Events/Event					
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**Annotation**
	ID	c:NonBlankString	required			**documentation** A descriptive or common name for the Event. The value of "ID" shall be unique within the context of the containing XML instance document.
	name	c:NonBlankString	optional			**documentation** A user-friendly textual name for the Event.
	severity	derived by: xs:int	optional			**documentation** An enumeration of 0 to 4 inclusive that shall indicate a severity level for the Event. It shall be presumed that a value of 0 indicates least severe. Successive values shall indicate increasing levels of severity with 4 indicating most severe.
	source	c:NonBlankString	required			**documentation** An identification of the source of the Event (e.g., operator or test system).
	timeStamp	xs:dateTime	optional			**documentation** The date and time of the Event occurrence.
annotation	**documentation** This complex type shall identify non-result data or system/operator messages generated during a test.					

A.1.14 element Event/Data

type	c:NamedValue					
properties	**minOcc** 0 **maxOcc** unbounded **content** complex					
children	c:Datum c:Collection c:IndexedArray					
attributes	**Name**	**Type**	**Use**	**Default**	**Fixed**	**Annotation**
	name	c:NonBlankString	required			**documentation** A descriptive or common name for the subject data value.
annotation	**documentation** This element permits the recording of structured event data.					

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

AVA Documents
Document Sharing Hub
Full document details: BS IEC 61636-1:2016

A.1.15 element Event/Extension

type	Extension
properties	**minOcc** 0 **maxOcc** 1 **content** complex
annotation	**documentation** This element shall provide a specific extension point for use cases that require elements not provided in the basic structure.

A.1.16 element Event/Message

type	c:NonBlankString
properties	**minOcc** 0 **maxOcc** unbounded **content** simple
facets	**Kind** **Value** **Annotation** minLength 1 whiteSpace replace
annotation	**documentation** This element permits the recording of textual data relevant to the subject event.

A.1.17 element Event/Reference

type	c:Document
properties	**minOcc** 0 **maxOcc** unbounded **content** complex
children	c:URL c:Text c:Extension
attributes	**Name** **Type** **Use** **Default** **Fixed** **Annotation** uuid c:Uuid required **documentation** The universal unique identifier for the document. name c:NonBlankString required **documentation** A descriptive or common name for the document. controlNumber c:NonBlankString optional **documentation** A unique identifier for the document. version c:NonBlankString optional **documentation** The version identification of the document.
annotation	**documentation** This element shall be used to identify reference(s) to external items (e.g., documents).

Published by IEC under license from IEEE. © 2013 IEEE. All rights reserved.

Documents
Document Sharing Hub

Full document details: BS IEC 61636-1:2016