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# **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)**

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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

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IEEE Std	FDIS	Report on voting
1636.1 (2018)	91/1717/FDIS	91/1729/RVD

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# **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 Committee 20 on  
Test and Diagnosis for Electronic Systems**

Approved 27 September 2018

**IEEE-SA Standards Board**

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**Abstract:** Promoting and facilitating interoperability between components of automatic test systems where test results need to be shared is addressed in this standard. 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 is expressed in both the OWL and XML formats.

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

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## Introduction

This introduction is not part of IEEE Std 1636.1-2018, 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, commercial airlines, the automotive industry, and the telecommunications industry. This standard is being developed as a component of the IEEE Std 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. Test Result information provides a subset of the data needed to satisfy SIMICIA requirements.

This document provides the description of the test results and session information elements.

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

## 1. Overview

### 1.1 General

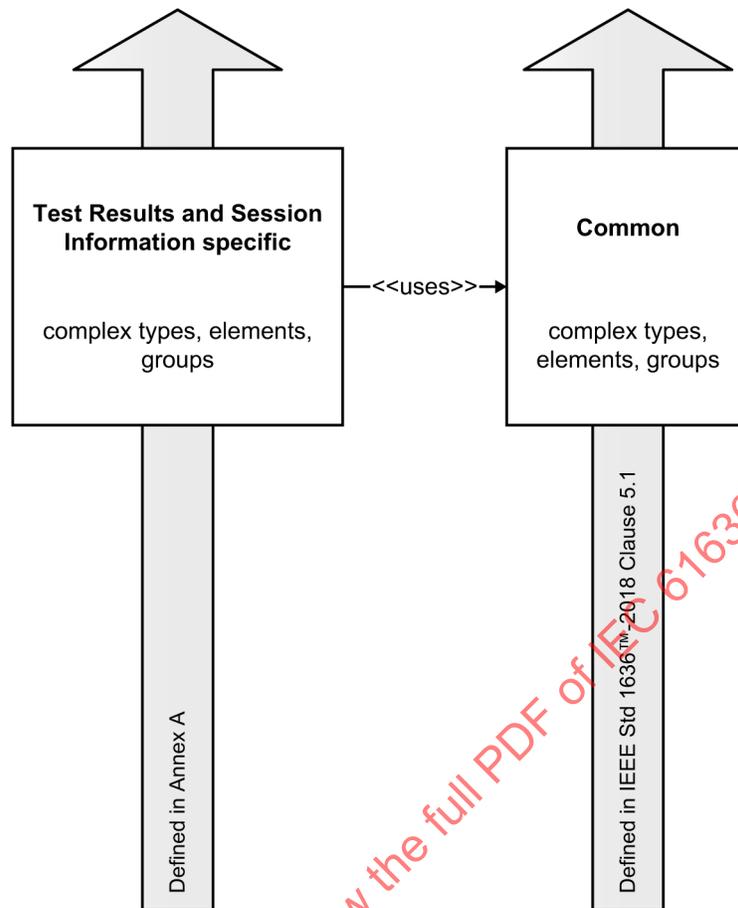
Software Interface for Maintenance Information Collection and Analysis (SIMICA) is a family of IEEE standards, associated web ontologies (OWL), and extensible markup language (XML) schemas which allow automatic test system (ATS), test result and session information, and maintenance action information to be exchanged in a common format adhering to the OWL and XML standards.

The SIMICA family of standards has been developed and is being maintained under the guidance of IEEE Standards Coordinating Committee 20 (SCC20) to serve as a comprehensive environment for integrating test results, test session information, and maintenance action information, while allowing this unit under test (UUT) related data to be interchanged between heterogeneous systems.

The SIMICA family of standards is organized as a base Standard (IEEE Std 1636™) and two (2) 'dot' standards:

- Test Results and Session Information (IEEE Std 1636.1™)
- Maintenance Action Information (IEEE Std 1636.2™)

The SIMICA base document and its relationship to this document is depicted in [Figure 1](#).



**Figure 1—Relationship between this document and the SIMICA base document**

This document specifically defines the Test Results and Session Information (IEEE Std 1636.1) OWL ontologies and XML schemas.

## 1.2 Scope

The scope of this standard is the definition of an exchange format, utilizing Web Ontology Language (OWL) and extensible markup language (XML), for exchanging data resulting from executing tests of a unit under test (UUT) via a test program in an automatic test environment.

## 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.

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 systems maintainers
- g) Test instrument developers
- h) Reliability, maintainability, and diagnostic analytical applications

### 1.3.2 Of this document's annexes

This document includes two annexes. Of these two, one is normative ([Annex A](#)).

[Annex A](#) contains descriptive information about each of the XML schema and OWL ontology elements and types.

[Annex B](#) contains the bibliography. This is informative, and thus is provided strictly as information, for both users and maintainers of this document.

## 1.4 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 and the SIMICA family base document (IEEE Std 1636-2018), the SIMICA family base document shall take precedence.

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

## 1.5 Conventions used in this document

### 1.5.1 General

All groups, complex types, simple types, and attribute groups are listed in [Annex A](#); descriptive information for each is provided.

Where there are references to a groups, complex types, simple types, and attribute groups within the associated XML schema or OWL ontology (TestResults.xsd and Test\_Results.owl), the convention of [name] at [element] is used to indicate where the user can locate the data within either the TestResults.xsd or Test\_Results.owl files.

Example: 1636.1-2018 download at: <https://standards.ieee.org/downloads> indicates the user is to open the Simica.xsd schema at the location provided and find *Example* for the schema definition.

The namespace prefix “tr:” identifies that the type or attribute group associated with this document.

All specifications for OWL and XML within this document are given in the *Courier* type font and italicized.

### 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™-2018, IEEE Standard for Software Interface for Maintenance Information Collection and Analysis (SIMICA).<sup>1,2</sup>

World Wide Web Consortium, (W3C) extensible Markup Language (XML), 1.0 (Fifth Edition) Proposed Edited Recommendation.<sup>3</sup>

World Wide Web Consortium, (W3C) OWL Web Ontology Language (OWL 2), W3C Recommendation.

## 3. Definitions, acronyms, and abbreviations

### 3.1 Definitions

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.<sup>4</sup>

**component (in an extensible Markup Language (XML) schema)**: The generic term for the building blocks that comprise 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).

**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 [B7].<sup>5</sup>

**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 [B11].)

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<sup>3</sup>Information on references can be found in Annex B.

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<sup>5</sup>The numbers in brackets correspond to those of the bibliography in Annex B.

**ontologies:** A formal way to define the structure of knowledge.

**web ontology language:** A knowledge representation language for authoring ontologies.

### 3.2 Acronyms and abbreviations

ATE	automatic test equipment
ATS	automatic test system
OWL	Web Ontology Language
PCB	printed circuit board
SCC20	Standards Coordinating Committee 20
SIMICA	Software Interface for Maintenance Information Collection and Analysis
TPS	test program set
UUT	unit under test
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” or “dot standard” under the SIMICA family base document (IEEE Std 1636). The SIMICA family of standards 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.

### 4.2 Introduction

This document’s XML schema and OWL ontology 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 result data to be shared for a variety of purposes, including statistical analysis, diagnostics, and improvement of the unit under test (UUT) repair process.

### 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 schemas as well as specifies the OWL ontology model that conformant instance documents must follow. In general, this document serves as an enhancement to the annotations provided within the XML schema and OWL ontology files.

#### 4.4.1 XML schemas associated with this document

There are two (2) XML schemas associated with this document, both titled TestResults.xsd.

For new applications of Test Results and Session Information that do not require adherence to IEEE Std 1671, the TestResults.xsd schema that includes Simica.xsd shall be utilized. (This schema is contained in the download site folder 1636.1-2018, see [Clause 7](#).)

For new or legacy applications of Test Results and Session Information that require adherence to IEEE Std 1671, the TestResults.xsd schema that includes Common.xsd shall be utilized. (This schema is contained in the download site folder 1636.1-2018/1671-Compatible, see [Clause 7](#).)

#### 4.4.2 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 (Fifth Edition). W3C Proposed Edited Recommendation [B1] for detailed descriptions of XML data formats.

#### 4.4.3 OWL ontology representations

This document also provides an OWL ontology that further defines the semantics of the elements contained in the XML schema. Refer to the OWL Web Ontology Language (OWL 2), W3C Recommendation [B9] for detailed descriptions of OWL data formats.

#### 4.4.4 XML instance document example associated with this document

This document also provides an example Test Results XML instance document. This instance document is provided as an illustration of the use of the TestResults.xsd and Simica.xsd schemas. The Test Results XML instance document is available as described in [Clause 7](#).

## 5. Conformance

The minimal expectation for XML instance documents conformant with this standard shall be that the XML instance document is considered valid if the instance document complies with the constraints expressed in:

- a) The TestResults.xsd schema (Defined in [Annex A](#) of this document, and available as described in [Clause 7](#)).
- b) The Simica.xsd or Common.xsd schema (defined in 5.1 of IEEE Std 1636-2018 and available as described in [Clause 7](#)).
- c) The TestResults.owl ontology (defined in [Annex A](#) of this document, and available as described in [Clause 7](#)).
- d) The Simica.owl ontology (defined in IEEE Std 1636-2018 and available as described in [Clause 7](#)).

Validity shall only occur when the XML instance document is populated.

## 6. XML schema 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 that use type substitution as their means of definition should set the abstract attribute to true.

## 7. OWL ontology 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, OWL ontologies and XML schemas (and in some cases, example XML instance documents and EXPRESS Information Models).

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 Std 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.

A description of the use of the OWL ontologies, XML schemas, and EXPRESS models associated with the SIMICA family of standards and their publication revisions is provided in the SIMICA base document, IEEE Std 1636-2018 Clause 9.

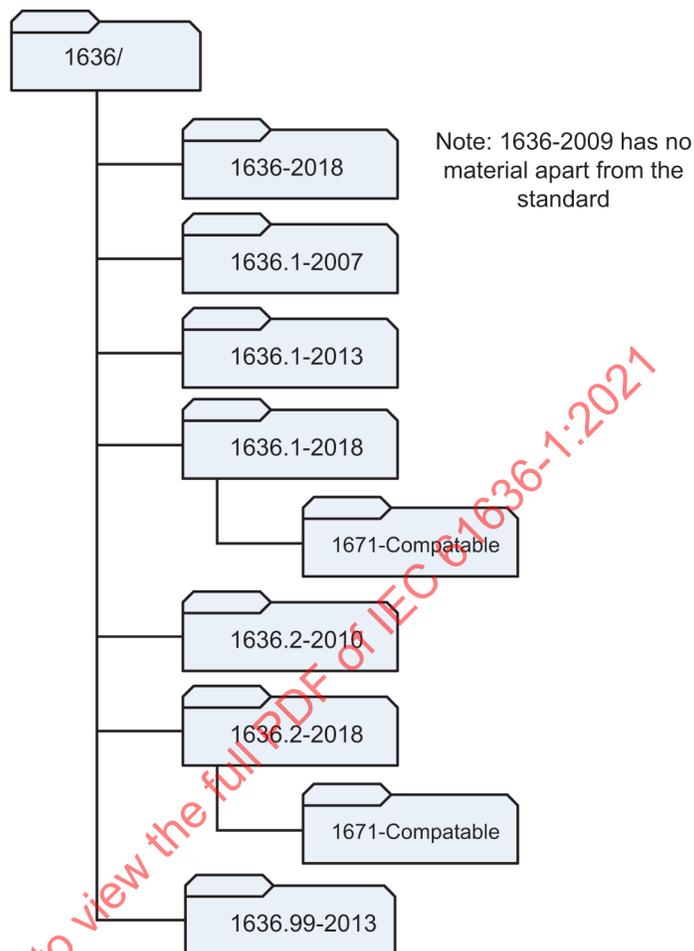
NOTE 1—Standards that are revised will contain a folder for the year in which the standard is reissued. Both folders (for each year the standard was published) will be present on the IEEE download Web site.

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.

IECNORM.COM : Click to view the full PDF of IEC 61636-1:2021

http://standards.ieee.org/downloads/



**Figure 2—SIMICA related download site structure**

The material available on the IEEE download Web site in association with this document is described in [Table 1](#).

**Table 1—IEEE Std 1636.1-2018 folder contents**

Component	Defined In:	Name	IEEE Download Site Folder (See <a href="#">Figure 2</a> )
XML schema	<a href="#">Annex A</a>	TestResults.xsd (NOTE 1)	1636/1636.1-2018
XML schema	<a href="#">Annex A</a>	TestResults.xsd (NOTE 2)	1636/1636.1-2018/1671-Compatible
XML schema	—	TestResultsCollection.xsd (NOTE 1)	1636/1636.1-2018
XML schema	—	TestResultsCollection.xsd (NOTE 2)	1636/1636.1-2018/1671-Compatible
OWL ontology	<a href="#">Annex A</a>	Test_Results.owl	1636/1636.1-2018
XML Instance Document Example	<a href="#">4.4.4</a>	IEEE 1636.1-2018 Example 1.xml	1636/1636.1-2018
NOTE 1—Requires the inclusion of the Simica.xsd schema; see IEEE Std 1636-2018.			
NOTE 2—Requires the inclusion of the Common.xsd schema; see IEEE Std 1671-2010.			

## Annex A

(informative)

### XML schema and OWL ontology

#### A.1 General

Should the reader not have a general understanding of XML schemas, there are several XML schema tutorials available for reference (see the XML Schema Part 0: Primer [B12], the XML Schema Tutorial [B13] and the XML Schema Tutorial, Part 1 [B14]). These tutorials will help with the understanding of the contents of the TestResults.xsd schema which this Annex is defining the elements.

Should the reader not have a general understanding of OWL ontologies, there are several OWL tutorials available for reference (see the Tutorial on OWL [B10] and OWL Web Ontology Language Guide—W3C [B8]). These tutorials will help with the understanding of the contents of the Test\_Results.owl ontology which this Annex is defining the elements.

A.1 defines Test Results with Simica.xsd included; A.2 defines Test Results with Common.xsd included.

#### A.2 TestResults

**Name:** *tr:TestResults*

**Type:** Element

**Description:** 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.

**XML Definition:**

See TestResults.xsd at: *TestResults* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *TestResults* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

##### A.2.1 Action

**Name:** *tr:Action*

**Type:** Complex

**Description:** Shall be used to identify specific data related to any action(s) performed; either in/during the execution of a test.

NOTE—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 ATML Test Description [B6]

*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.

**XML Definition:**

See TestResults.xsd at: *Action* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *Action* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

## A.2.2 Event

**Name:** *tr:Event*

**Type:** Complex

**Description:** Shall be used to identify non-result data or system/operator messages generated during a test.

**XML Definition:**

See TestResults.xsd at: *Event* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *Event* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

## A.2.3 Indictments

**Name:** *tr:Indictments*

**Type:** Complex

**Description:** Shall be used to indicate (1) that something is wrong with one or more subcomponents of the tested UUT or (2) which subcomponents of the tested UUT are the possible causes of a test failure.

**XML Definition:**

See TestResults.xsd at: *Indictments* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *Indictments* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

## A.2.4 Outcome

**Name:** *tr:Outcome*

**Type:** Complex

**Description:** Shall be used to identify test outcomes (i.e., Passed, Failed, or Aborted).

NOTE—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 *Outcome*. Otherwise, this *referenceID* attribute shall reference the test program entity that generated this outcome, for example: line number, test number, step name, etc.

**XML Definition:**

See TestResults.xsd at: *Outcome* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *Outcome* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**A.2.5 Parameter**

**Name:** *tr:Parameter*

**Type:** Complex

**Description:** Shall provide a structure in which test parameters may be reported. Parameters are generally described as configuration or input values for a test.

**XML Definition:**

See TestResults.xsd at: *Parameter* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *Parameter* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**A.2.6 ReferenceDesignator**

**Name:** *tr:ReferenceDesignator*

**Type:** Complex

**Description:** Shall be used as the base type for any element representing a reference designator, with optional descriptions of the designator and failure modes of the item the designator represents.

Reference designators are used for the purpose of unambiguously identifying a component in an electrical schematic (circuit diagram) or on a printed circuit board (PCB). The reference designator usually consists of one or two letters followed by a number, e.g. R13, C1002.

Subclause 22.4 of IEEE Std 315™ [B2] contains a list of Class Designation Letters to use for electrical and electronic assemblies. For example, the letter R is the designation letter for the resistors of an assembly, C for capacitors, K for relays.

**XML Definition:**

See TestResults.xsd at: *ReferenceDesignator* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *ReferenceDesignator* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.2.7 Repair

**Name:** *tr:Repair*

**Type:** Complex

**Description:** Shall be used to capture the type of repair(s) conducted.

**XML Definition:**

See TestResults.xsd at: *Repair* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *Repair* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.2.8 RepairAction

**Name:** *tr:RepairAction*

**Type:** Complex

**Description:** Shall be used as the base type of any element providing information on the work performed to restore a part to an operational state.

**XML Definition:**

See TestResults.xsd at: *RepairAction* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *RepairAction* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.2.9 SessionAction

**Name:** *tr:SessionAction*

**Type:** Complex

**Description:** Shall be used to record any action other than a test occurring within the context of a TestResults session, having a specified *ActionOutcome*.

**XML Definition:**

See TestResults.xsd at: *SessionAction* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *SessionAction* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**A.2.10 SessionActionOutcome**

**Name:** *tr:SessionActionOutcome*

**Type:** Complex

**Description:** Shall be used to record the outcome of all actions that took place during the session. These include actions that are not directly part of the test executed, such as human activity.

NOTE—If an ATML Test Description [B6] 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 *Outcome*. Otherwise, this *referenceID* attribute shall reference the test program entity that generated this outcome, for example: line number, test number, step name, etc.

**XML Definition:**

See TestResults.xsd at: *SessionActionOutcome* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *SessionActionOutcome* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**A.2.11 Test**

**Name:** *tr:Test*

**Type:** Complex

**Description:** Shall be used to identify all relevant information related to a single test. This includes input parameters, system or operator events, calibration values and an outcome.

**XML Definition:**

See TestResults.xsd at: *Test* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *Test* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

## A.2.12 TestGroup

**Name:** *tr:TestGroup*

**Type:** Complex

**Description:** Shall be used to identify a grouping of related tests, test groups, or session actions.

*TestGroup* provides a hierarchical structure for the aggregation of test results data within a Test Results XML instance document.

*TestGroup* is recursive; that is, a *TestGroup* optionally contains subordinate *TestGroup* elements.

The *TestGroup* structure shall be used to contain a collection of multiple iterations of a single test, or a related set of tests that the user desires to be reported or captured as a unit. When multiple *Test*, *TestGroup*, or *SessionAction* elements appear, the order of appearance of these elements should correspond to the time sequence order in which the test(s) or action(s) occurred.

When the optional *Outcome* element appears, it shall represent a summary outcome of all subordinate *TestGroup* elements.

Each subordinate *TestGroup* element may have a separate and distinct *Outcome*.

### XML Definition:

See TestResults.xsd at: *TestGroup* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### OWL Definition:

See Test\_Results.owl at: *TestGroup* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

## A.2.13 TestResult

**Name:** *tr:TestResult*

**Type:** Complex

**Description:** Shall be used as an identifying name for the *TestResult*. The value of “ID” shall be unique within the context of the containing XML instance document.

### XML Definition:

See TestResults.xsd at: *TestResult* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### OWL Definition:

See Test\_Results.owl at: *TestResult* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

## A.2.14 TestResults

**Name:** *tr:TestResults*

**Type:** Complex

**Description:** Shall be used shall be used to capture 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.

**XML Definition:**

See TestResults.xsd at: *TestResults* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *TestResults* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

## A.2.15 OutcomeValue

**Name:** *tr:OutcomeValue*

**Type:** Simple

**Description:** Shall be used as the base type for any attribute or element that represents a test outcome.

The following enumerations shall be used:

“*Passed*” shall indicate the results of a test were within specified limits.

“*Failed*” shall indicate that the results of a test were not within specified limits.

“*Aborted*” shall indicate that a test did not complete.

“*NotStarted*” shall indicate that the test did not start.

“*Unknown*” shall indicate that the result of the test is not known.

“*UserDefined*” shall indicate that the test outcome has been defined to be something other than one of the five enumerations available.

**XML Definition:**

See TestResults.xsd at: *OutcomeValue* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *OutcomeValue* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.2.16 RepairCode

**Name:** *tr:RepairCode*

**Type:** Simple

**Description:** Shall be used as the base type for any attribute or element to specify permitted UUT repair codes.

The following enumerations shall be used:

“*Repair*” shall indicate the UUT was repaired.

“*Replace*” shall indicate the UUT, or a subassembly of the UUT was replaced.

“*Reseat*” shall indicate that a subassembly of the UUT was resealed.

“*Alignment*” shall indicate the UUT was aligned.

“*SoftwareUpgrade*” shall indicate the UUT software was upgraded.

“*UserDefinedCode*” shall indicate that the repair code has been defined to be something other than one of the five enumerations available.

**XML Definition:**

See TestResults.xsd at: *RepairCode* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *RepairCode* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.2.17 SessionActionOutcomeValues

**Name:** *tr:SessionActionOutcomeValues*

**Type:** Simple

**Description:** Shall be used as the base type for any attribute or element to specify permitted UUT repair codes.

The following enumerations shall be used:

“*Done*” shall indicate the session is completed.

“*Aborted*” shall indicate the session was aborted.

“*NotStarted*” shall indicate the session has not started.

“*Unknown*” shall indicate the state of the session is not known.

“*UserDefined*” shall indicate that the state of the session has been defined to be something other than one of the four enumerations available.

**XML Definition:**

See TestResults.xsd at: *SessionActionOutcomeValues* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

**OWL Definition:**

See Test\_Results.owl at: *SessionActionOutcomeValues* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.3 TestResults

**Name:** *tr:TestResults*

**Type:** Element

**Description:** 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.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *TestResults* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

#### A.3.1 Action

**Name:** *tr:Action*

**Type:** Complex

**Description:** Shall be used to identify specific data related to any action(s) performed; either in/during the execution of a test.

NOTE—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 ATML Test Description [B6] *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.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *Action* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

#### A.3.2 Event

**Name:** *tr:Event*

**Type:** Complex

**Description:** Shall be used to identify non-result data or system/operator messages generated during a test.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *Event* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.3.3 Indictments

**Name:** *tr:Indictments*

**Type:** Complex

**Description:** Shall be used to indicate (1) that something is wrong with one or more subcomponents of the tested UUT or (2) which subcomponents of the tested UUT are the possible causes of a test failure.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *Indictments* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.3.4 Outcome

**Name:** *tr:Outcome*

**Type:** Complex

**Description:** Shall be used to identify test outcomes (i.e., Passed, Failed, or Aborted).

NOTE—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 *Outcome*. Otherwise, this *referenceID* attribute shall reference the test program entity that generated this outcome, for example: line number, test number, step name, etc.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *Outcome* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.3.5 Parameter

**Name:** *tr:Parameter*

**Type:** Complex

**Description:** Shall provide a structure in which test parameters may be reported. Parameters are generally described as configuration or input values for a test.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *Parameter* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.3.6 ReferenceDesignator

**Name:** *tr:ReferenceDesignator*

**Type:** Complex

**Description:** Shall be used as the base type for any element representing a reference designator, with optional descriptions of the designator and failure modes of the item the designator represents.

Reference designators are used for the purpose of unambiguously identifying a component in an electrical schematic (circuit diagram) or on a printed circuit board (PCB). The reference designator usually consists of one or two letters followed by a number, e.g. R13, C1002.

Subclause 22.4 of IEEE Std 315 [B2] contains a list of Class Designation Letters to use for electrical and electronic assemblies. For example, the letter R is the designation letter for the resistors of an assembly, C for capacitors, K for relays.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *ReferenceDesignatorI* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.3.7 Repair

**Name:** *tr:Repair*

**Type:** Complex

**Description:** Shall be used to capture the type of repair(s) conducted.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *Repair* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.3.8 RepairAction

**Name:** *tr:RepairAction*

**Type:** Complex

**Description:** Shall be used as the base type of any element providing information on the work performed to restore a part to an operational state.

**XML Definition:**

See 1671-Compatible/TestResults.xsd at: *RepairAction* located in the 1636.1-2018 download at: <https://standards.ieee.org/downloads>.

### A.3.9 SessionAction

**Name:** *tr:SessionAction*