

# INTERNATIONAL IEEE Std 1671.6™ STANDARD

Standard for automatic test markup language (ATML) test station description

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Standard for automatic test markup language (ATML) test station description

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## Standard for Automatic Test Markup Language (ATML) Test Station Description

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# IEEE Standard for Automatic Test Markup Language (ATML) Test Station Description

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**IEEE Standards Coordinating Committee 20 on  
Test and Diagnosis for Electronic Systems**

Approved 26 March 2015

**IEEE-SA Standards Board.**

**Abstract:** An exchange format, using extensible markup language (XML), for identifying all of the hardware, software, and documentation associated with a test station is specified in this document. This test station may be used with a test program set to test and diagnose a unit under test.

**Keywords:** ATML instance document, automatic test equipment (ATE), Automatic Test Markup Language (ATML), automatic test system (ATS), IEEE 1671.6™, test station, XML schema

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## IEEE Introduction

This introduction is not part of IEEE Std 1671.6™-2015, IEEE Standard for Automatic Test Markup Language (ATML) Test Station Description.

This child, or dot, standard, also known as an ATML component standard, provides for the definition of the Test Station XML schemas, and contains references to examples; both of which accompany this standard.

These XML schemas provide for the identification and definition of a test station.

ATML's XML schemas define the basic information required within any test application and provide a vehicle for formally defining the test environment by defining a class hierarchy corresponding to these basic information entities and provide several methods within each to enable basic operations to be performed on these entities. ATML component standards within the ATML framework define the particular requirements within the test environment.

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# Standard for Automatic Test Markup Language (ATML) Test Station Description

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## 1. Overview

### 1.1 General

Automatic test markup language (ATML) is a collection of IEEE standards and associated extensible markup language (XML) schemas that allows automatic test system (ATS) and test information to be exchanged in a common format adhering to the XML standard.<sup>1</sup>

The ATML framework and the ATML family of standards have been developed and are maintained under the guidance of the Test Information Integration (TII) Subcommittee of IEEE Standards Coordinating Committee 20 (SCC20) to serve as a comprehensive environment for integrating design data, test strategies, test requirements, test procedures, test results management, and test system implementations, while allowing test program (TP), test asset interoperability, and unit under test (UUT) data to be interchanged between heterogeneous systems.

This standard (as well as the XML schemas and XML instance document examples<sup>2</sup> that accompany this standard) is intended to be used in identifying and documenting a test station which may be utilized during the testing of unit under tests (UUTs). This information includes the mechanical, electrical and software interfaces of the test station.

<sup>1</sup> This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of this consortium standard. Equivalent standards or products may be used if they can be shown to lead to the same results.

<sup>2</sup> The XML schemas and examples that accompany this standard are available at the locations defined in Clause 6.

This standard makes use of XML schemas and XML terminology. For readers new to XML, the XML Schema Tutorial [B1] provides a general introduction.

## 1.2 Application of this document's annexes

This document includes four annexes.

Annex A through Annex D are informative, and thus are provided strictly as information, for both users, implementers, and maintainers of this document.

## 1.3 Scope

This standard defines an exchange format, utilizing eXtensible Markup Language (XML), for both the static description of a test station, and the specific description of test station instance information.

## 1.4 Application

This standard provides a clear definition of test station information that may be exchanged between conformant cooperating software components and applications. This standard provides a definition that accomplishes the following objectives:

- a) Provide a means of describing the aspects of a complete automatic test equipment (ATE) or a partial system thereof. (e.g., automatic test information)
- b) Provide a means to represent the current information represented within the specification for a test station.

The information contained in XML documents conforming to this standard will be useful to:

- a) TPS developers.
- b) Test program set (TPS) developers
- c) TPS maintainers
- d) Automatic test equipment (ATE) system developers
- e) ATE system maintainers
- f) Developers of ATML-based tools and systems
- g) UUT developers and maintainers

## 1.5 Conventions used within this document

### 1.5.1 General

In accordance with the *IEEE Standards Style Manual* [B3]<sup>3</sup>, any schema examples will be shown in Courier font. In cases where instance document examples are necessary to depict the use of a schema type

<sup>3</sup> The numbers in brackets correspond to those of the bibliography in Annex D.

or element, such examples will also be shown in Courier font. When the characters “...” appear in an example, it indicates that the example component is incomplete.

All simple types, 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 will 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 that extend the source type will be listed; details regarding the base type will be listed along with the base type.

When referring to an attribute of an XML element, the convention of [element]@[attribute] will be used. In cases where an attribute name is referred to with no associated element, the attribute name will be enclosed in single quotes. Element and type names will always be set in italics when appearing in text.

This standard uses the vocabulary and definitions of relevant IEEE standards. In case of conflict of definitions, except for those portions quoted from standards, the following precedence shall be observed: 1) Clause 3, and 2) The *IEEE Standards Dictionary Online* [B2].

### 1.5.2 Precedence

The TestStationDescription schema (TestStationDescription.xsd) element, child element, and annotation information shall take precedence over the descriptive information contained in Clause 4.

The TestStationDescription schema and the material contained in Clause 4 shall take precedence over the example information represented in Annex B.

The TestStationInstance schema (TestStationInstance.xsd) element, child element, and annotation information shall take precedence over the descriptive information contained in Clause 5.

The TestStationInstance schema and the material contained in Clause 5 shall take precedence over the example information represented in Annex B.

### 1.5.3 Word usage

In accordance with the *IEEE Standards Style Manual* [B3], the word *shall* is used to indicate mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*). The use of the word *must* is used only to describe unavoidable situations. The use of the word *will* is only used in statements of fact.

The word *should* is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

The word *can* is used for statements of possibility and capability (*can* equals *is able to*).

## 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 1671<sup>TM</sup>, IEEE Standard for Automatic Test Markup Language (ATML) for Exchanging Automatic Test Equipment and Test Information via XML.<sup>4,5</sup>

### 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>6</sup> In the event a term is explicitly redefined, or further defined in an ATML component standard, the component standards definition shall take precedence for that ATML component standard.

**abstract type:** A declared type that can be used to define other types through derivation. Only non-abstract types derived from the declared type can be used in instance documents. When such a type is used, it shall be identified by the `xsi:type` attribute.

**automatic test information:** The complete set of information needed to describe a partial automatic test system (e.g., only rack 1 of the complete ATE).

**Automatic Test Markup Language (ATML) instance document:** *See:* instance document.

**element:** A bounded component of the logical structure of an eXtensible Markup Language (XML) document that has a type and that may have XML attributes and content {adapted from eXtensible Markup Language (XML) 1.0 (Fifth Edition)}

**entity:** Something that has a distinct separate existence.

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

**eXtensible Markup Language (XML) document:** A data object that conforms to the XML requirements for being well formed. In addition, the data object is valid if it additionally conforms to semantic rules of the XML schema.

**eXtensible Markup Language (XML) schema:** The definition of a class of XML document, typically expressed in terms of constraints on the structure and the content of documents of that class, above and beyond the basic syntax constraints imposed by XML itself.

**instance document:** An XML document that conforms to a particular XML schema.

**object:** An object consists of state and behavior. An object stores its states in fields (variables in some programming languages) and exposes its behavior through methods (functions in some programming languages).

**well-formed:** Conforming to all of XML's syntax rules.

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### 3.2 Acronyms and abbreviations

|                  |                                     |
|------------------|-------------------------------------|
| ATE              | automatic test equipment            |
| ATML             | Automatic Test Markup Language      |
| ATS              | automatic test system               |
| CHA              | channel A                           |
| COM              | common relay contact                |
| DC               | direct current                      |
| DCLVA            | dc power supply low voltage type A  |
| DMM              | digital multimeter                  |
| DMMHI            | digital multimeter high connection  |
| DMMLO            | digital multimeter low connection   |
| FREQ             | frequency                           |
| NC               | normally closed relay contact       |
| NO               | normally open relay contact         |
| OUT              | output                              |
| PS               | power supply                        |
| RF               | radio frequency                     |
| TII              | test information integration        |
| TP               | test program                        |
| TPS              | test program set                    |
| UTF-8            | 8-bit Unicode transformation format |
| UUT              | unit under test                     |
| W3C <sup>®</sup> | World Wide Web consortium           |
| XML              | eXtensible Markup Language          |

## 4. Schema—TestStationDescription.xsd

### 4.1 General

In addition to the conventions specified in 1.5.1, the prefix “c:” indicates that the element is defined by/is inherited from the IEEE Std 1671-2010 associated Common.xsd XML schema. The prefix “hc:” indicates that the element is defined by/is inherited from the IEEE Std 1671-2010 associated HardwareCommon.xsd XML schema. The prefix “te:” indicates that the element is defined by/is inherited from the IEEE Std 1671-2010 associated TestEquipment.xsd XML schema.

### 4.2 Elements

#### 4.2.1 TestStationDescription root (or document)

Exactly one element exists, called the root, or document element, of which no part appears in the content of any other element. This root element serves as the parent for all other elements of the TestStationDescription schema.

The TestStationDescription schemas root element is defined as follows:<sup>7</sup>

| Name                                                                    | Set to                                                                                             |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Attribute form default                                                  | Unqualified (see NOTE)                                                                             |
| Element form default                                                    | Qualified (see NOTE)                                                                               |
| Encoding                                                                | UTF-8                                                                                              |
| Included schema                                                         | None                                                                                               |
| Imported schema                                                         | urn:IEEE-1671:2010:Common<br>urn:IEEE-1671:2010:HardwareCommon<br>urn:IEEE-1671:2010:TestEquipment |
| Target namespace                                                        | urn:IEEE-1671.6:2015:TestStationDescription                                                        |
| Version                                                                 | 2.3                                                                                                |
| XML schema namespace reference                                          | <sup>a</sup>                                                                                       |
| NOTE—Qualified and unqualified are described in A.3.7 of IEEE Std 1671. |                                                                                                    |

<sup>a</sup> The namespace reference URL is: <http://www.w3.org/2001/XMLSchema>.

#### 4.2.2 TestStationDescription

Base type: *ts:TestStationDescription*

Properties: content complex

The *TestStationDescription* element shall be used to document the aspects of a family of test stations.

##### 4.2.2.1 Attributes

*TestStationDescription* element inherits the attributes from *TestStationDescription* complex type (see 4.2.3).

<sup>7</sup> Notes in text, tables and figures are given for information only, and do not contain requirements needed to implement the standard.

#### 4.2.2.2 Child elements

*TestStationDescription* element inherits the child elements from *TestStationDescription* complex type (see 4.2.3).

#### 4.2.3 TestStationDescription complex type

Base type: Extension of *te:TestEquipment*

Properties: content complex

The test station description type will encompass all information necessary to identify all of the hardware, software, and documentation in a test station.

Figure 1 illustrates the XML types inherited and the XML types (both simple and complex) that comprise the *TestStationDescription*.

The subclauses referenced in Figure 1 identify where the definition of the element is located within this standard.

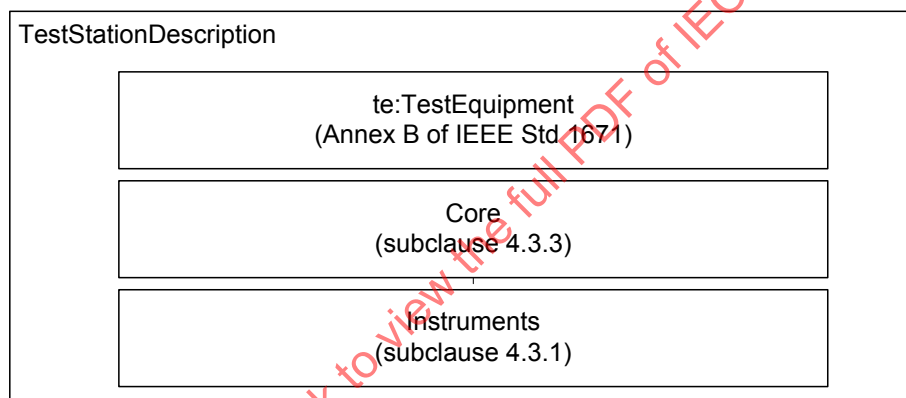


Figure 1—Test station description complex type content

##### 4.2.3.1 Attributes

*TestStationDescription* contains the *securityClassification*, *classified*, *name*, *version* and *uuid* attributes inherited from the *te:TestEquipment* complex type and the *DocumentRootAttributes* attribute group defined in Annex B of IEEE Std 1671.

##### 4.2.3.2 Child elements

*TestStationDescription* contains the following child element in addition to those inherited from the *te:TestEquipment* complex type contained in Annex B of IEEE Std 1671.

| Name        | Type                       | Description | Use      |
|-------------|----------------------------|-------------|----------|
| Core        | c:ItemDescriptionReference | See 4.3.3   | Optional |
| Instruments |                            | See 4.3.1   | Optional |

## 4.3 Child elements

### 4.3.1 TestStationDescription/Instruments

Properties: isRef 0, content complex

The *TestStationDescription/Instruments* child element shall identify each instrument within the test station.

#### 4.3.1.1 Attributes

*TestStationDescription/Instruments* contains no attributes.

#### 4.3.1.2 Child elements

*TestStationDescription/Instruments* contains the following child element:

| Name       | Type                                  | Description                                       | Use      |
|------------|---------------------------------------|---------------------------------------------------|----------|
| Instrument | <i>InstrumentDescriptionReference</i> | A description of an instrument in a test station. | Optional |

### 4.3.2 TestStationDescription/Instruments/Instrument

Base type: *InstrumentDescriptionReference*

Properties: isRef 0, content complex

The *TestStationDescription/Instruments/Instrument* child element shall identify a specific instrument. The presence of an instrument in a test station shall only be referenced in this section of a *TestDescriptionDocument*. There is no need for instruments to also be referenced in the Components section.

#### 4.3.2.1 Attributes

*TestStationDescription/Instruments/Instrument* inherits the attributes from *InstrumentDescriptionReference* (see 4.4.1).

#### 4.3.2.2 Child elements

*TestStationDescription/Instruments/Instrument* inherits the child elements of *InstrumentDescriptionReference* (see 4.4.1).

### 4.3.3 TestStationDescription/Core

Base type: *c:ItemDescriptionReference*

Properties: isRef 0, content complex

The *TestStationDescription/Core* child element shall reference the Test Stations base description where the test station is derived from core test station as part of a family of testers. Note specific items in the *TestStationDescription* override equivalent descriptions defined in the *Core* reference.

#### 4.3.3.1 Attributes

*TestStationDescription/Core* contains no attributes.

#### 4.3.3.2 Child elements

*TestStationDescription/Core* inherits the child elements of *c:ItemDescriptionReference*, complex type contained in Annex B of IEEE Std 1671.

### 4.4 Complex types

#### 4.4.1 InstrumentDescriptionReference

Base type: Extension of *c:ItemDescriptionReference*

Properties: isRef 0, content complex

The *InstrumentDescriptionReference* complex type shall identify details of a specific instrument and its location within a test station.

##### 4.4.1.1 Attributes

*InstrumentDescriptionReference* contains the following attributes:

| Name | Type                    | Description                                                              | Use      |
|------|-------------------------|--------------------------------------------------------------------------|----------|
| ID   | <i>c:NonBlankString</i> | A descriptive or common name for the Instrument. Example: "DMM Number 1" | Required |

##### 4.4.1.2 Child elements

*InstrumentDescriptionReference* contains the following child elements in addition to those inherited from the *c:ItemDescriptionReference* complex type contained in Annex B of IEEE Std 1671.

| Name             | Type                    | Description | Use      |
|------------------|-------------------------|-------------|----------|
| PhysicalLocation | <i>c:NonBlankString</i> | See 4.4.2   | Optional |
| Address          | <i>c:NonBlankString</i> | See 4.4.3   | Optional |

#### 4.4.2 InstrumentDescriptionReference/PhysicalLocation

Base type: *c:NonBlankString*

Properties: isRef 0, content simple

Facets: minLength 1, whiteSpace replace

When present, the *InstrumentDescriptionReference/PhysicalLocation* child element shall identify where the instrument is physically located.

#### 4.4.2.1 Attributes

*InstrumentDescriptionReference/PhysicalLocation* contains no attributes.

#### 4.4.2.2 Child elements

*InstrumentDescriptionReference/PhysicalLocation* contains no child elements.

#### 4.4.3 InstrumentDescriptionReference/Address

Base type: *c:NonBlankString*

Properties: isRef 0, content simple

Facets: minLength 1, whiteSpace replace

When present, the *InstrumentDescriptionReference/Address* child element shall identify the address used to communicate with the instrument.

##### 4.4.3.1 Attributes

*InstrumentDescriptionReference/Address* contains no attributes.

##### 4.4.3.2 Child elements

*InstrumentDescriptionReference/Address* contains no child elements.

### 5. Schema—TestStationInstance.xsd

#### 5.1 General

In addition to the conventions specified in 1.5.1, the prefix “*c:*” indicates that the element is defined by/is inherited from the IEEE Std 1671-2010 associated Common.xsd XML schema. The prefix “*hc:*” indicates that the element is defined by/is inherited from the IEEE Std 1671-2010 associated HardwareCommon.xsd XML schema. The prefix “*te:*” indicates that the element is defined by/is inherited from the IEEE Std 1671-2010 associated TestEquipment.xsd XML schema.

#### 5.2 Elements

##### 5.2.1 TestStationInstance root (or document)

Exactly one element exists, called the root, or document element, of which no part appears in the content of any other element. This root element serves as the parent for all other elements of the TestStationInstance schema.

The TestStationInstance schema’s root element is defined as follows:

| Name                                                                    | Set to                                                                                             |
|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| Attribute form default                                                  | Unqualified (see NOTE)                                                                             |
| Element form default                                                    | Qualified (see NOTE)                                                                               |
| Encoding                                                                | UTF-8                                                                                              |
| Included schema                                                         | <i>None</i>                                                                                        |
| Imported schema                                                         | urn:IEEE-1671:2010:Common<br>urn:IEEE-1671:2010:HardwareCommon<br>urn:IEEE-1671:2010:TestEquipment |
| Target namespace                                                        | urn:IEEE-1671.6:2015:TestStationInstance                                                           |
| Version                                                                 | 2.3                                                                                                |
| XML schema namespace reference                                          | <sup>a</sup>                                                                                       |
| NOTE—Qualified and unqualified are described in A.3.7 of IEEE Std 1671. |                                                                                                    |

<sup>a</sup> The namespace reference URL is: <http://www.w3.org/2001/XMLSchema>.

## 5.2.2 TestStationInstance

Base type: Extension of *tsi:TestStationInstance*

Properties: content complex

The *TestStationInstance* element shall be used to document the aspects of a particular instance of a test station.

### 5.2.2.1 Attributes

*TestStationInstance* element inherits the attributes from *TestStationInstance complex type* (see 5.2.3).

### 5.2.2.2 Child elements

*TestStationInstance* element inherits the child elements from *TestStationInstance complex type* (see 5.2.3).

## 5.2.3 TestStationInstance complex type

Base type: Extension of *te:TestEquipmentInstance*

Properties: content complex

The test station instance type will encompass all information necessary to identify all of the hardware, software, and documentation of that particular test station serial number.

### 5.2.3.1 Attributes

*TestStationInstance* inherits the *securityClassification*, *classified*, and *uuid* attributes from the *DocumentRootAttributes* attribute group defined in Annex B of IEEE Std 1671.

### 5.2.3.2 Child elements

*TestStationInstance* contains the following child element in addition to those inherited from the *te:TestEquipmentInstance* complex type contained in Annex B of IEEE Std 1671.

| Name        | Type | Description | Use      |
|-------------|------|-------------|----------|
| Instruments |      | See 5.3.1   | Optional |

## 5.3 Child elements

### 5.3.1 TestStationInstance/Instruments

Properties: isRef 0, content complex

When present, the *TestStationInstance/Instruments* child element shall identify all of the instruments within the test station.

#### 5.3.1.1 Attributes

*TestStationInstance/Instruments* contains no attributes.

#### 5.3.1.2 Child elements

*TestStationInstance/Instruments* contains the following child element:

| Name       | Type                           | Description | Use      |
|------------|--------------------------------|-------------|----------|
| Instrument | <i>c:ItemInstanceReference</i> | See 5.3.2   | Optional |

### 5.3.2 TestStationInstance/Instruments/Instrument

Base type: *c:ItemInstanceReference*

Properties: isRef 0, content complex

When present, the *TestStationInstance/Instruments/Instrument* child element shall identify a specific instrument.

#### 5.3.2.1 Attributes

*TestStationInstance/Instruments/Instrument* contains no attributes.

#### 5.3.2.2 Child elements

*TestStationInstance/Instruments/Instrument* inherits the child elements of *c:ItemInstanceReference* contained in Annex B of IEEE Std 1671.

## 5.4 Complex types

### 5.4.1 InstrumentInstanceReference

Base type: Extension of *c:ItemInstanceReference*

Properties: isRef 0, content complex

The *InstrumentInstanceReference* complex type shall identify details of a specific instrument instance. The mandatory *InstrumentDocumentReference/ID* attribute shall match the *Instrument/ID* from the *TestStationDescription* description.

#### 5.4.1.1 Attributes

*InstrumentInstanceReference* *Instrument* contains no attributes.

#### 5.4.1.2 Child elements

*InstrumentInstanceReference* contains the following child elements in addition to those inherited from the *c:ItemInstanceReference* complex type contained in Annex B of IEEE Std 1671.

| Name             | Type                    | Description | Use      |
|------------------|-------------------------|-------------|----------|
| PhysicalLocation | <i>c:NonBlankString</i> | See 5.4.2   | Optional |
| Address          | <i>c:NonBlankString</i> | See 5.4.3   | Optional |

#### 5.4.2 InstrumentInstanceReference/PhysicalLocation

Base type: *c:NonBlankString*

Properties: isRef 0, content simple

Facets: minLength 1, whiteSpace replace

When present, the *InstrumentInstanceReference/PhysicalLocation* child element shall identify where the instrument is physically located.

##### 5.4.2.1 Attributes

*InstrumentInstanceReference/PhysicalLocation* contains no attributes.

##### 5.4.2.2 Child elements

*InstrumentInstanceReference/PhysicalLocation* contains no child elements.

#### 5.4.3 InstrumentInstanceReference/Address

Base type: *c:NonBlankString*

Properties: isRef 0, content simple

Facets: minLength 1, whiteSpace replace

When present, the *InstrumentInstanceReference/Address* child element shall identify the address used to communicate with the instrument.

##### 5.4.3.1 Attributes

*InstrumentInstanceReference/Address* contains no attributes.

### 5.4.3.2 Child elements

*InstrumentInstanceReference/Address* contains no child elements.

## 6. ATML TestStationDescription XML schema names and locations

IEEE provides a download website for material published in association with published IEEE standards, presented in machine-friendly format. This material is digital rights management restricted use material. The ATML family of standards utilizes this download website to allow easy accessibility to all of the ATML family XML schemas (and in some cases, example XML instance documents). As depicted by Figure 2, the IEEE download website (<http://standards.ieee.org/downloads/>) contains several folders, each folder labeled by an associated IEEE standards number (e.g., IEEE 1671 series standards are in the 1671 folder). Each folder under this base IEEE standard number contains the material (XML schemas, etc.) for that ATML family component standard. ATML family component standards are identified by their IEEE 1671 series dot standard number and the year in which that standard was published by 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 website.

NOTE 2—Folders for a particular standard are not available until the standard is published by IEEE, provided the standard has associated material that is to be made available via the download website.

Figure 2 depicts a portion of the entire IEEE download website as it pertains to the Test Station Description ATML family standard.

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

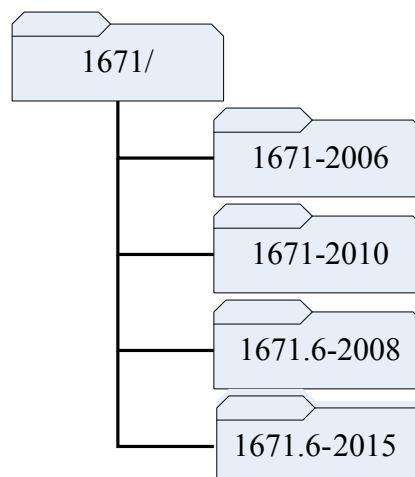


**Figure 2—ATML test station related IEEE download website structure**

The Test Station ATML family component standard, where the component is defined, their associated XML schemas' names, and the IEEE download website folder name (where the XML schemas are located), are as defined in Table 1.

**Table 1—ATML family XML schema name and folder location**

| Component                | Defined in clause | XML schema name            | IEEE download website folder (see Figure 2) |
|--------------------------|-------------------|----------------------------|---------------------------------------------|
| Test Station Description | 4                 | TestStationDescription.xsd | 1671.6-2015                                 |
| Test Station Instance    | 5                 | TestStationInstance.xsd    | 1671.6-2015                                 |

The XML schema identified in Table 2 includes ATML common elements. The ATML common element (e.g., component), where the component is defined, the associated XML schema's name, and the IEEE download website folder name (where the XML schema are located).

**Table 2—ATML common element XML schema name and location**

| Component       | Defined in IEEE Std 1671-2010 | XML schema name     | IEEE download website folder (see Figure 2) |
|-----------------|-------------------------------|---------------------|---------------------------------------------|
| Common          | Annex B.1                     | Common.xsd          | 1671-2010                                   |
| Hardware Common | Annex B.2                     | Hardware Common.xsd | 1671-2010                                   |
| Test Equipment  | Annex B.3                     | TestEquipment.xsd   | 1671-2010                                   |

## 7. ATML XML schema extensibility

The provision of an extension mechanism is necessary to help ensure the viability of the specification and allow producers and consumers of Test Station instance documents to interoperate in those cases where there is a requirement to exchange relevant data that is not included in the *Test Station* associated XML schema. The use of the extensions shall be done in a way 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 the *Test Station* XML schema.

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 *Test Station* XML schema.

The ATML family of standards associated XML schemas allow for three forms of extension:

- Wildcard-based extensions allow for the extension of the XML schemas with additional elements.
- Type derivation allows for extending the set of data types by deriving a new type from an existing common element type.
- Lists derived from *c:NamedValues* allowing user-defined properties with attached values.

## 8. Conformance

This clause specifies the requirements that must be satisfied to claim conformance to this standard. Conformance is defined for the following items:

- a) A TestStationDescription instance document.
- b) A TestStationInstance instance document.

Extensions are permitted to both the TestStationDescription and TestStationInstance documents, but shall only occur through the facility of the extensibility mechanism described in Clause 7. As defined in the W3C XML schema standard, any extended schema shall conform to the W3C XML schema specification and shall not describe any entities defined in the base schema.

### 8.1 Conformance of a TestStationDescription instance document

A document shall conform as a TestStationDescription instance document if it satisfies all of the following conditions:

- a) The document satisfies the requirements for a well-formed XML document
- b) The root element of the XML document is a TestStationDescription element
- c) The contents of the XML document are valid with respect to the TestStationDescription XML schema, including imported XML schemas
- d) The contents of the XML document satisfy the requirements stated in Clause 4
- e) The contents of the XML document satisfy the requirements stated in the annotations of the TestStationDescription XML schema, including requirements stated in the annotations of imported XML schemas
- f) Extensions, if any, satisfy the requirements stated in Clause 7

### 8.2 Conformance of a TestStationInstance instance document

A document shall conform as a TestStationInstance instance document if it satisfies all of the following conditions:

- a) The document satisfies the requirements for a well-formed XML document
- b) The root element of the XML document is a TestStationInstance element
- c) The contents of the XML document are valid with respect to the TestStationInstance XML schema, including imported XML schemas
- d) The contents of the XML document satisfy the requirements stated in Clause 5
- e) The contents of the XML document satisfy the requirements stated in the annotations of the TestStationInstance XML schema, including requirements stated in the annotations of imported XML schemas
- f) Extensions, if any, satisfy the requirements stated in Clause 7

## Annex A

(informative)

### IEEE download website material associated with this document

This document includes supporting material required to maintain and/or develop the ATML framework as well as maintain the ATML family of standards. This material is published by the IEEE in association with this document, presented in a machine-friendly format. This is digital rights management restricted use material. The ATML family of standards utilizes this download website to allow easy accessibility to these documents' XML schemas, and associated material referenced within this document (e.g., examples or committee drafts). For an explanation of, and the location of, the IEEE download website and its structure (as it pertains to the ATML family of standards), see Clause 6. The material available on the IEEE download website in association with this document is described in Table A.1.

**Table A.1—IEEE download website contents**

| File                                  | Description                                                                                         |
|---------------------------------------|-----------------------------------------------------------------------------------------------------|
| TestStationDescription.xsd            | The ATML Test Station Description schema defined in Clause 4.                                       |
| TestStationInstance.xsd               | The ATML Test Station Instance schema defined in Clause 5.                                          |
| 1671_6_TestStationExample.xml         | Example                                                                                             |
| 1671_6_TestStationExampleInstance.xml | Example                                                                                             |
| Readme.txt                            | This file contains user information pertaining to the files posted, related files, and their usage. |

## Annex B

(informative)

### User's information and examples

#### B.1 Partial automatic test station

##### B.1.1 General

This fictitious example, while not a complete detailed specification of Rack 10 of the Automatic Test Station hardware depicted by Figure B.1, provides example test station elements that may be included in either an automatic test station or a specific instance of an automatic test station identified by its serial number.

##### B.1.2 Test Station Description XML instance document

The Test Station Description XML instance document *P1671\_6\_TestStationExample.xml* contains the following:

- a) Station identification definition (manufacturer, part number, contact information)
- b) Interface port definitions (connector and pin)
- c) Interface connector types
- d) Station documentation (assembly drawings, schematics, test procedures, development specifications)
- e) Station environmental requirements (operational, storage)
- f) Station physical characteristics (weight, dimensions)
- g) Station internal connection (as depicted in Figure B.1)
- h) Station controller hardware definitions (processor, physical memory, storage)
- i) Installed software on the station controller (operating system, runtime system, compiler, self-test programs)
- j) S-Parameter path definition for the 'HiFreqCh1' connection between the instrument with ID="677 RF Signal Generator" and the port with name="RF\_OUT\_UUT01"
- k) Station level specifications of the 7778 Timer Counter
- l) Definition of the switching in the rack
- m) Identification of the instrumentation in the rack
- n) References to external Instrument Description Instance documents for each of the instruments in the rack

The XML instance document *1671\_6\_TestStationExample.xml* shall be available at:  
<http://standards.ieee.org/downloads/1671/1671.6-2015/>.