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Industrial automation systems and integration — Open systems application integration framework —

Part 1: Generic reference description

AMENDMENT 1

Systèmes d'automatisation industrielle et intégration — Cadres d'intégration d'application pour les systèmes ouverts —

Partie 1: Description générale de référence

AMENDEMENT 1

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Foreword

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Amendment 1 to ISO 15745-1:2003 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 5, *Architecture, communication and integration frameworks*.

Industrial automation systems and integration — Open systems application integration framework —

Part 1:
Generic reference description

AMENDMENT 1

Page 1, Clause 2

Add the following normative reference:

"REC-xmldsig-core-20020212, XML-Signature – W3C Recommendation 12 February 2002"

Page 5, Clause 3

Add the following term and definition:

"**3.37**
integrity
property that data has not been changed, destroyed, or lost in an unauthorized or accidental manner [W3C]"

Page 12, Subclause 7.2.1 and Figure 5

Replace the entire subclause and figure with the following:

"The master profile template consists of a header section, a body section, and an optional integrity signature (see Figure 5)."

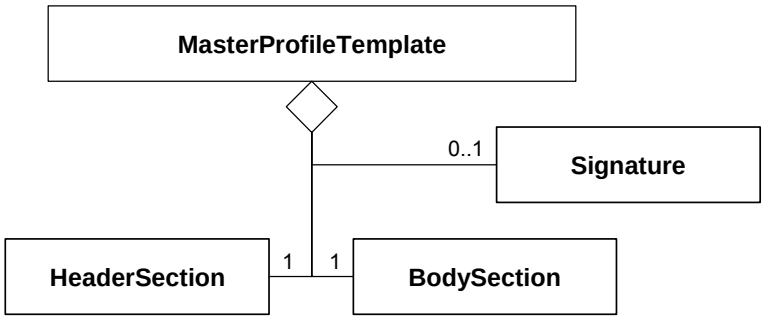

Figure 5 – Master profile template class diagram"

Pages 13 and 14, Table 1

Replace "ProfileClassID", "ISO15745Reference", "ISO15745Edition", and "IASInterfaceType" entries with the following:

Attribute	Description
ProfileClassID	Identification of the profile class. XML data type : ProfileClassID_DataType (based on "string") – see Figure 6. Valid profiles classes are: AIP Process InformationExchange Resource Device CommunicationNetwork Equipment Human Material EXAMPLE : AIP
ISO15745Reference	Identifies the part of ISO 15745 (see ISO15745Part), together with its edition (see ISO15745Edition) and the profile technology (see ProfileTechnology). XML data type : ISO15745Reference_DataType – see Figure 6. Multiple references are allowed e.g. for a device with more than one communication interface.
ISO15745Edition	Edition of the referenced part of ISO 15745. XML data type : positiveInteger The first digit shall reference the edition, and the second digit shall reference the amendment (if any). EXAMPLE 1 : 1 (indicating 1st edition, no amendment) EXAMPLE 2 : 11 (indicating 1st edition, 1st amendment) EXAMPLE 3 : 42 (indicating 4th edition, 2nd amendment)
IASInterfaceType	The IAS interface type. XML data type : IASInterfaceType_DataType (based on "string") – see Figure 6. This field is optional. Valid IAS interface types are listed below and described in Annex B. Any combination of the following is permitted: a) IAS interface types defined in ISO/IEC TR 14252 (see B.1): CSI Communication Services Interface HCI Human/Computer Interface ISI Information Services Interface API Application Program Interface b) IAS interface types defined in ISO 15745 (see B.2): CMI Configuration Management Interface ESI Engineering Support Interface FSI Facility Services Interface MTI Material Transport Interface SEI Safety And Environmental Interface USI Utility Services Interface c) User defined IAS interface types (see B.3). EXAMPLE 1 : ISI ESI EXAMPLE 2 : CMI 37X6

Page 14, Subclause 7.2.4

Replace the entire subclause with the following:

7.2.4 Integrity signature (Signature element)

A profile may include an optional dedicated element (Signature) that enables checking of the integrity of all the other elements (e.g. header and body) in the corresponding XML file.

NOTE 1 Profiles are editable text files using XML notation. Integration tools may use profiles from different sources and the integrity signature (Signature element) enables the user to determine if unauthorized or accidental changes have occurred. This is the only purpose of the integrity check.

NOTE 2 The integrity check applies only to the XML profile documents, not to the schemas that were used to generate these XML profile documents.

The Signature element (see Figure 6):

— shall follow the requirements given in the XML Digital Signature Recommendation of the World Wide Web Consortium (see REC-xmldsig-core-20020212);

— shall be of the same data type as the Signature Type of W3C;

— shall be the last XML child element of the root element (ISO15745Profile);

— shall reside in a schema which imports the “xmldsig-core-schema.xsd” schema using the namespace “http://www.w3.org/2000/09/xmldsig#”.

NOTE 3 The use of the integrity signature (Signature element) with a profile container is described in 7.4.2.

Pages 15 and 16, Figure 6

Replace the entire figure with the following:

```
<?xml version="1.0" encoding="UTF-8" ?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:ds="http://www.w3.org/2000/09/xmldsig#">
    <xsd:import namespace="http://www.w3.org/2000/09/xmldsig#"
        schemaLocation="xmldsig-core-schema.xsd" />

<!-- Target namespaces are not specified in this master template -->

<xsd:element name="ISO15745Profile">
    <xsd:complexType>
        <xsd:sequence>
            <xsd:element name="ProfileHeader" type="ProfileHeader_DataType"/>
            <xsd:choice>
                <xsd:element name="ProfileBody" type="ProfileBody_DataType" />
                <!-- This "abstract type" definition format is mandatory if a profile container is used (see 7.4).
    If desired, this definition format can also be used without a profile container. -->
                <xsd:element ref="ProfileBody" />
                <!-- This "legacy" definition format shall not be used if a profile container is used (see 7.4) -->
            </xsd:choice>
            <xsd:element name="Signature" type="ds:SignatureType" minOccurs="0" maxOccurs="1" />
        </xsd:sequence>
```

```
    </xsd:complexType>
</xsd:element>

<xsd:annotation>
    <xsd:documentation>* HEADER SECTION *</xsd:documentation>
</xsd:annotation>

<xsd:complexType name="ProfileHeader_DataType">
    <xsd:sequence>
        <xsd:element name="ProfileIdentification" type="xsd:string" />
        <xsd:element name="ProfileRevision" type="xsd:string" />
        <xsd:element name="ProfileName" type="xsd:string" />
        <xsd:element name="ProfileSource" type="xsd:string" />
        <xsd:element name="ProfileClassID" type="ProfileClassID_DataType" />
        <xsd:element name="ProfileDate" type="xsd:date" minOccurs="0" maxOccurs="1" />
        <xsd:element name="AdditionalInformation" type="xsd:anyURI" minOccurs="0" maxOccurs="1" />
        <xsd:element name="ISO15745Reference" type="ISO15745Reference_DataType"  />
        <xsd:element name="IASInterfaceType" type="IASInterface_DataType" minOccurs="0"
    maxOccurs="unbounded" />
    </xsd:sequence>
</xsd:complexType>

<xsd:annotation>
    <xsd:documentation>* BODY SECTION *</xsd:documentation>
</xsd:annotation>

<xsd:complexType name="ProfileBody_DataType" abstract="true" />
<!-- If the "abstract type" definition format is used, the profile body details shall be specified in the actual
    profile body data types that will be mapped to this abstract type. -->

<xsd:element name="ProfileBody">
<!-- Profile body details are not specified in this master profile template.  They only need to be specified here
    if the "legacy" definition format is used. -->
</xsd:element>

<xsd:annotation>
    <xsd:documentation>* HEADER AUXILIARY DATA TYPES *</xsd:documentation>
</xsd:annotation>

<xsd:simpleType name="ProfileClassID_DataType">
    <xsd:restriction base="xsd:string">
        <xsd:enumeration value="AIP" />
        <xsd:enumeration value="Process" />
        <xsd:enumeration value="InformationExchange" />
        <xsd:enumeration value="Resource" />
        <xsd:enumeration value="Device" />
        <xsd:enumeration value="CommunicationNetwork" />
        <xsd:enumeration value="Equipment" />
        <xsd:enumeration value="Human" />
        <xsd:enumeration value="Material" />
    </xsd:restriction>
</xsd:simpleType>

<xsd:complexType name="ISO15745Reference_DataType">
    <xsd:sequence>
        <xsd:element name="ISO15745Part" type="xsd:positiveInteger" />
        <xsd:element name="ISO15745Edition" type="xsd:positiveInteger" />
        <xsd:element name="ProfileTechnology" type="xsd:string" />
    </xsd:sequence>
</xsd:complexType>
```

```
<xsd:simpleType name="IASInterface_DataType">
    <xsd:union>
        <xsd:simpleType>
            <xsd:restriction base="xsd:string">
                <xsd:enumeration value="CSI" />
                <xsd:enumeration value="HCI" />
                <xsd:enumeration value="ISI" />
                <xsd:enumeration value="API" />
                <xsd:enumeration value="CMI" />
                <xsd:enumeration value="ESI" />
                <xsd:enumeration value="FSI" />
                <xsd:enumeration value="MTI" />
                <xsd:enumeration value="SEI" />
                <xsd:enumeration value="USI" />
            </xsd:restriction>
        </xsd:simpleType>
        <xsd:simpleType>
            <xsd:restriction base="xsd:string">
                <xsd:length value="4" />
            </xsd:restriction>
        </xsd:simpleType>
    </xsd:union>
</xsd:simpleType>

<xsd:annotation>
    <xsd:documentation>* ISO 15745 DEFINED DATA TYPES *</xsd:documentation>
</xsd:annotation>

<xsd:complexType name="ProfileHandle_DataType">
    <xsd:sequence>
        <xsd:element name="ProfileIdentification" type="xsd:string" />
        <xsd:element name="ProfileRevision" type="xsd:string" />
        <xsd:element name="ProfileLocation" type="xsd:anyURI" minOccurs="0" maxOccurs="1" />
    </xsd:sequence>
</xsd:complexType>

</xsd:schema>
```

NOTE 1 The definition of the profile body using an abstract type has been added for reasons of flexibility – in particular, to allow the use of a profile container (see 7.4). An example of how to use this option is given in Figure 18.

NOTE 2 Use of the "abstract type" definition format of ProfileBody (ProfileBody_DataType) will be indicated in the XML file by using the expression <ProfileBody xsi:Type="xxx">. Use of the "legacy" definition format of ProfileBody (ProfileBody element) will be indicated in the XML file by using the expression <ProfileBody>.

Figure 6 – Master profile template XML schema

Page 16, Subclause 7.2.6

Add the following NOTE after Figure 6:

NOTE XML files compliant with ISO 15745-1:2003 are also compliant with the schema given in Figure 6.

Page 25

Insert the following new subclause 7.4 after subclause 7.3.4.6 and before Clause 8:

7.4 Profile container

7.4.1 Structure

To facilitate the handling of profiles by software tools, it may sometimes be useful to combine several profiles within a single XML file. If such an XML file is used, it shall be constructed as shown in Figure 16:

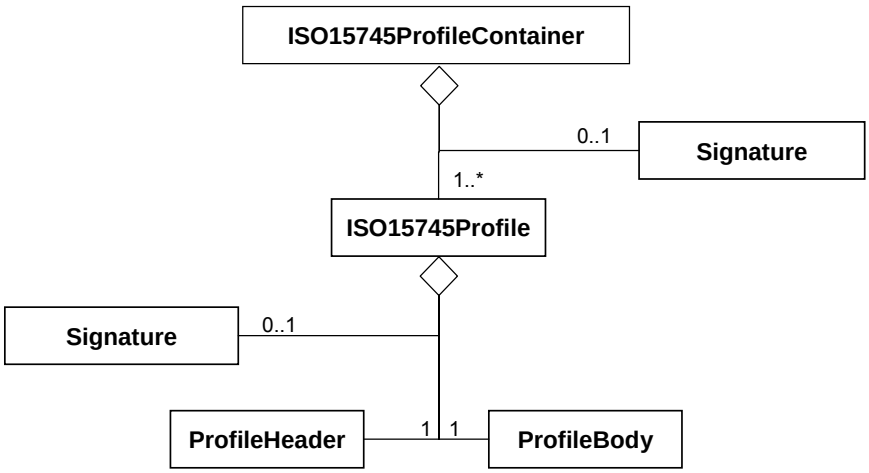

Figure 16 – ISO15745ProfileContainer class diagram

NOTE Combining several profiles within a single XML file has no impact on the related profile schemas, which are defined as separate entities.

7.4.2 Integrity signature (Signature element)

The Signature element described in 7.2.4 can also be used with a profile container.

The relevant Signature element shall be the last XML child element of the root element (ISO15745ProfileContainer) - see Figure 17.

If the ISO15745ProfileContainer is built from individual ISO15745Profile based profiles that already include Signature elements, then the contents of these individual Signature elements shall be treated as any other elements by the overall integrity checking process.

7.4.3 XML representation

The element ISO15745ProfileContainer shall be used as a container for the ISO15745Profile profile elements. The skeleton XML schema for the profile container template (see Figure 17) is derived from the master profile template XML schema shown in Figure 6.

```
<?xml version="1.0" encoding="UTF-8" ?>

<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns:ds="http://www.w3.org/2000/09/xmldsig#">
    <xsd:import namespace="http://www.w3.org/2000/09/xmldsig#"
        schemaLocation="xmldsig-core-schema.xsd" />
```

```
<!-- Target namespaces are not specified in this master template -->

    <xsd:element name="ISO15745ProfileContainer">
        <xsd:complexType>
            <xsd:sequence>
                <xsd:element ref="ISO15745Profile" minOccurs="1" maxOccurs="unbounded"/>
                <xsd:element name="Signature" type="ds:SignatureType" minOccurs="0" maxOccurs="1" />
            </xsd:sequence>
        </xsd:complexType>
    </xsd:element>

</xsd:schema>
```

Figure 17 – Profile container template XML schema

Profile templates based on the profile container template XML schema (see Figure 17) shall define a complex type derived from the abstract type ProfileBody_DataType, to be used as a template for the profile body. An example of such a definition and its use in an XML file are shown in Figure 18.

Example schema definition for a device profile body element:

```
    <xsd:complexType name="ProfileBody_Device_MyFieldbus">
        <xsd:complexContent>
            <xsd:extension base="ProfileBody_DataType">
                <xsd:sequence>
                    <xsd:element ref="DeviceIdentity" minOccurs="0" maxOccurs="1" />
                    <xsd:element ref="DeviceManager" minOccurs="0" maxOccurs="1" />
                    <xsd:element ref="DeviceFunction" minOccurs="1" maxOccurs="unbounded" />
                    <xsd:element ref="ApplicationProcess" minOccurs="0" maxOccurs="unbounded" />
                    <xsd:element name="ExternalProfileHandle" type="ProfileHandle_DataType"
                        minOccurs="0" maxOccurs="unbounded" />
                </xsd:sequence>
            </xsd:extension>
        </xsd:complexContent>
    </xsd:complexType>
```

Corresponding example XML profile contents:

```
<ProfileBody xsi:type=”ProfileBody_Device_MyFieldbus”>
    <DeviceIdentity/>
    <DeviceManager/>
    <DeviceFunction/>
    <ApplicationProcess/>
    <ApplicationProcess/>
</ProfileBody>
```

Figure 18 – Example of a profile body type definition

7.4.4 Naming scheme for profile body types

Names for profile body types shall be of the form (name items are separated by “_“ underscores):

ProfileBody_ProfileClassID_[ProfileTechnology][_FurtherDescription]

where:

— ProfileBody is the string “ProfileBody”;

— ProfileClassID is a string as defined in Table 1;

— ProfileTechnology (optional) is the name associated with the referenced technology as specified in the relevant part of ISO 15745 (if no ISO 15745 technology is applicable, then the field shall be empty);

— FurtherDescription (optional) is any further descriptive information that helps identify the profile body type.

The profile body type name shall include at least one of the two optional items (ProfileTechnology or FurtherDescription).

EXAMPLE 1 Profile body type name with all fields:
ProfileBody_Device_MyFieldbus_DeviceProfileForMyFieldbus

EXAMPLE 2 Profile body type name without FurtherDescription:
ProfileBody_Device_MyFieldbus

EXAMPLE 3 Profile body type name without ProfileTechnology (FurtherDescription is then preceded by a double underscore):
ProfileBody_Equipment__BottleConveyor

Page 27, Table A.1

Insert the following new row between rows for the entries “Dependency” and “Note”:

Symbol	Description
{xor}	Exclusive or. An exclusive-or (not inclusive-or) constraint between one or more associations.

Page 31, Bibliography

Replace all the items in the Bibliography with the following:

[1] ISO 8879, *Information processing – Text and office systems – Standard Generalized Markup Language (SGML)*

[2] ISO/IEC TR 10000 (all parts), *Information technology – Framework and taxonomy of International Standardized Profiles*

[3] ISO/IEC 10646, *Information technology – Universal Multiple-Octet Coded Character Set (UCS)*

[4] ISO/IEC 10746 (all parts), *Information technology – Open Distributed Processing – Reference Model*

[5] ISO/IEC TR 14252, *Information technology – Guide to the POSIX Open System Environment (OSE)*

[6] ISO 15704, *Industrial automation systems – Requirements for enterprise-reference architectures and methodology*

[7] IEC 61131-3, *Programmable controllers – Part 3: Programming languages*

[8] IEC 61158 (all parts), *Digital data communications for measurement and control – Fieldbus for use in industrial control systems*

[9] IEC 61499 (all parts), *Function blocks*

[10] IEC 61804 (all parts), *Function blocks (FB) for process control*

[11] IEC TS 61915, *Low-voltage switchgear and controlgear — Principles for the development of device profiles for networked industrial devices*

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