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

Part 4:

**Reference description for Ethernet-based  
control systems**

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**AMENDMENT 1: PROFINET profiles**

[ISO 15745-4:2003/Amd.1:2006](https://standards.iteh.ai/standards/ISO/15745-4:2003/Amd.1:2006)

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d'integration d'application pour les systemes ouverts —**

*Partie 4: Description de référence pour les systèmes de contrôle fondés  
sur Ethernet*

*AMENDEMENT 1: Profils pour PROFINET*



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## Foreword

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Amendment to ISO 15745-4: was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 5, *Architecture, communications and integration frameworks*.

This amendment to ISO 15745-4:2003 specifies profiles for PROFINET<sup>1)</sup> and, as such, adds to the number of technology-specific elements and rules in ISO 15745-4 for describing both communication network profiles and communication-related aspects of device profiles, thus further extending the Application Integration Framework described in ISO 15745-1.

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

## Part 4: Reference description for Ethernet-based control systems

### AMENDMENT 1: PROFINET profiles

Page 1, clause 2

Add the following normative references:

"ISO 639-1:2002, *Codes for the representation of names of languages – Part 1: Alpha-2 code*

"ISO 15745-3:2003, *Industrial automation systems and integration – Open systems application integration framework – Part 3: Reference description for IEC 61158-based control systems*

"ISO/IEC 11578:1996, *Information technology -- Open Systems Interconnection -- Remote Procedure Call (RPC)*

"REC-svg-20030114, *Scalable Vector Graphics (SVG) 1.1 Specification – W3C Recommendation 14 January 2003, available at <<http://www.w3.org/TR/SVG/>>*

"REC-xpath-19991116, *XML Path Language (XPath) Version 1.0 – W3C Recommendation 16 November 1999*

"RFC 1101:1989, *DNS encoding of network names and other types – Internet Engineering Task Force (IETF), Request for Comments (RFC)*

"RFC 2131:1997, *Dynamic Host Configuration Protocol – Internet Engineering Task Force (IETF), Request for Comments (RFC)*"

Page 2, clause 4

Add the following abbreviated terms:

"DAP	Device Access Point
"DNS	Domain Name System (see RFC 1101)
"GSD	Generic Station Description
"GSDML	Generic Station Description Markup Language
"ID	Identification
"IO	Input/Output
"PDU	Protocol Data Unit
"SVG	Scalable Vector Graphics (see REC-svg-20030114)
"URL	Uniform Resource Locator

"UUID Universally Unique Identifier (see ISO/IEC 11578)

"W3C World Wide Web Consortium"

Page 3, subclause 5.2.2

In the second sentence of the second paragraph, replace "(Annex A to Annex C)" with "(see annexes)."

Page 4, Table 1

Add a row with the entries "GSDML" under the "ProfileTechnology name" column and "PROFINET" under the "Technology" column.

Page 4, subclause 5.3

Add a fourth list item in the first paragraph to read "— PROFINET (see 6.4)."

In the second paragraph, replace "Annex A to Annex C." with "the annexes."

Page 18

Insert the following new subclause 6.4 before Annex A.

## 6.4 PROFINET

### 6.4.1 General

NOTE In addition to the UML terminology and notation in ISO 15745-1:2003, Annex A, the following diagrams make use of the multiplicity notation (UML V1.4). The multiplicity of an attribute is displayed in squared brackets.

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### 6.4.2 Device profile

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#### 6.4.2.1 General

Figure 11 shows the class structure of a GSDML device profile.

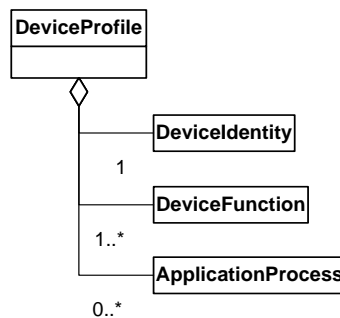


Figure 11 — GSDML device profile class diagram

The XML schema representing the GSDML device profile template is defined in D.5.2. The profile header of the GSDML device profile shall have the following content:

```
<ProfileHeader>
  <ProfileIdentification>PROFINET Device Profile</ProfileIdentification>
  <ProfileRevision>1.00</ProfileRevision>
  <ProfileName>Device Profile for PROFINET Devices</ProfileName>
  <ProfileSource>PROFIBUS Nutzerorganisation e. V. (PNO)</ProfileSource>
```

```

<ProfileClassID>Device</ProfileClassID>
<ISO15745Reference>
  <ISO15745Part>4</ISO15745Part>
  <ISO15745Edition>1</ISO15745Edition>
  <ProfileTechnology>GSDML</ProfileTechnology>
</ISO15745Reference>
</ProfileHeader>

```

**6.4.2.2 Device identity**

Figure 12 shows the structure of the DeviceIdentity class.

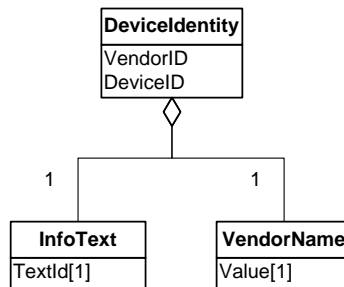


Figure 12 — DeviceIdentity class diagram

Attributes and semantics of the classes are defined in D.4.2.

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**6.4.2.3 Device function**

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Figure 13 shows the structure of the DeviceFunction class.

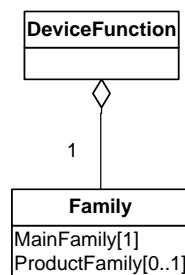


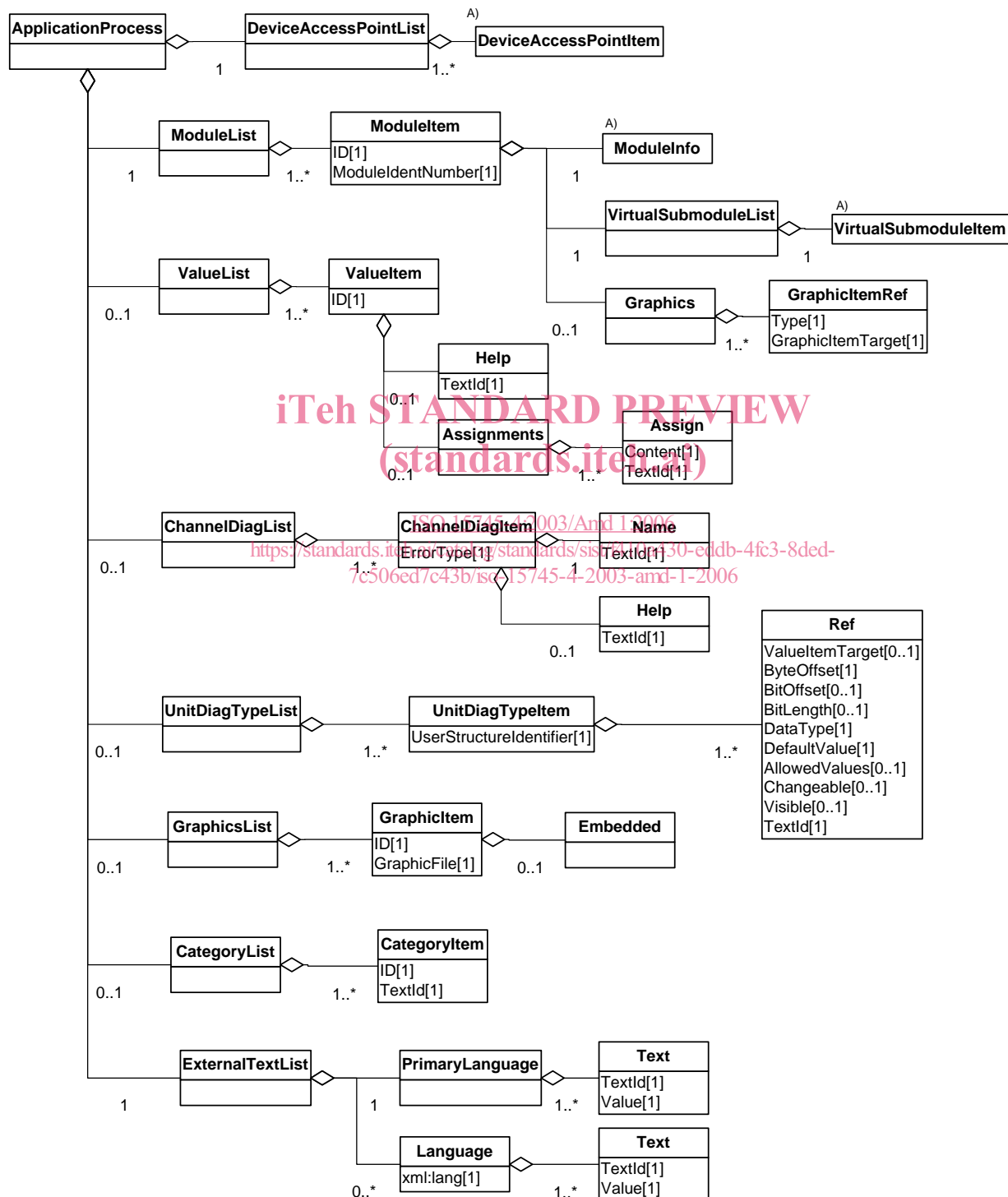
Figure 13 — DeviceFunction class diagram

Attributes and semantics of the classes are defined in D.4.3.

6.4.2.4 Application process

6.4.2.4.1 General

Figure 14 describes the structure of the ApplicationProcess element. UML classes without an attribute field are detailed in a separate diagram. Attributes and semantics of the classes are defined in D.4.4.



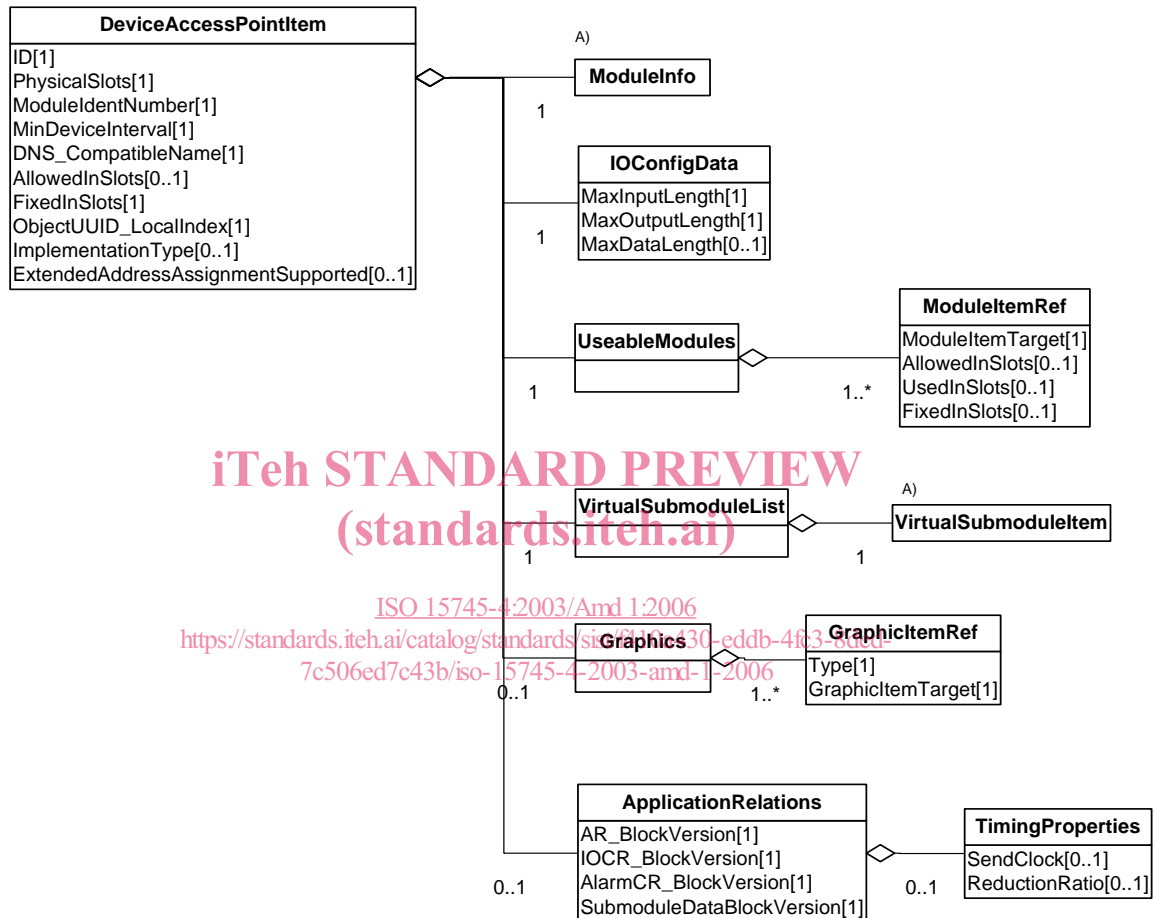


A) see subdiagram for details

Figure 14 — PROFINET ApplicationProcess class diagram

6.4.2.4.2 DeviceAccessPointItem

Figure 15 describes the structure of the DeviceAccessPointItem element. UML classes without an attribute field are explained in a separate diagram in detail. Attributes and semantics of the classes are defined in D.4.5.

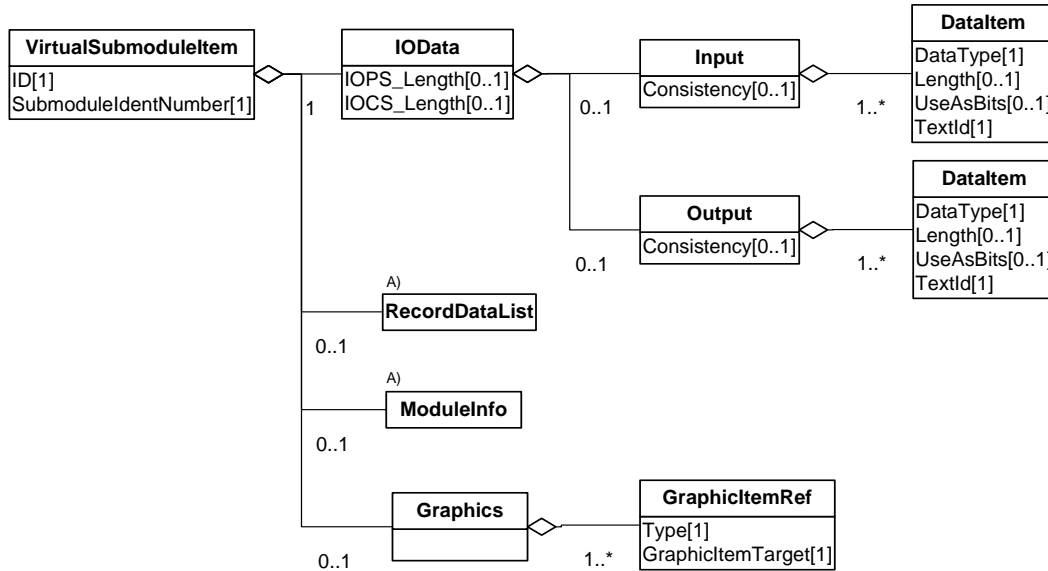


A) see subdiagram for details

Figure 15 — PROFINET DeviceAccessPointItem class diagram

6.4.2.4.3 VirtualSubmoduleItem

Figure 16 describes the structure of the VirtualSubmoduleItem element. UML classes without an attribute field are explained in a separate diagram in detail. Attributes and semantics of the classes are defined in D.4.6.



A) see subdiagram for details

Figure 16 — PROFINET VirtualSubmoduleItem class diagram

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### 6.4.2.4.4 RecordDataList

Figure 17 describes the structure of the RecordDataList element. Attributes and semantics of the classes are defined in D.4.7.

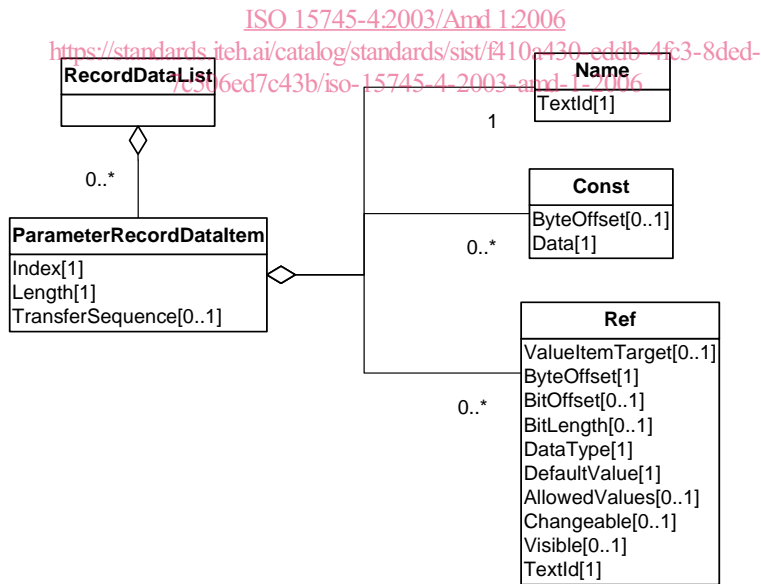


Figure 17 — PROFINET RecordDataList class diagram

6.4.2.4.5 ModuleInfo

Figure 18 describes the structure of the ModuleInfo element. Attributes and semantics of the classes are defined in D.4.8.

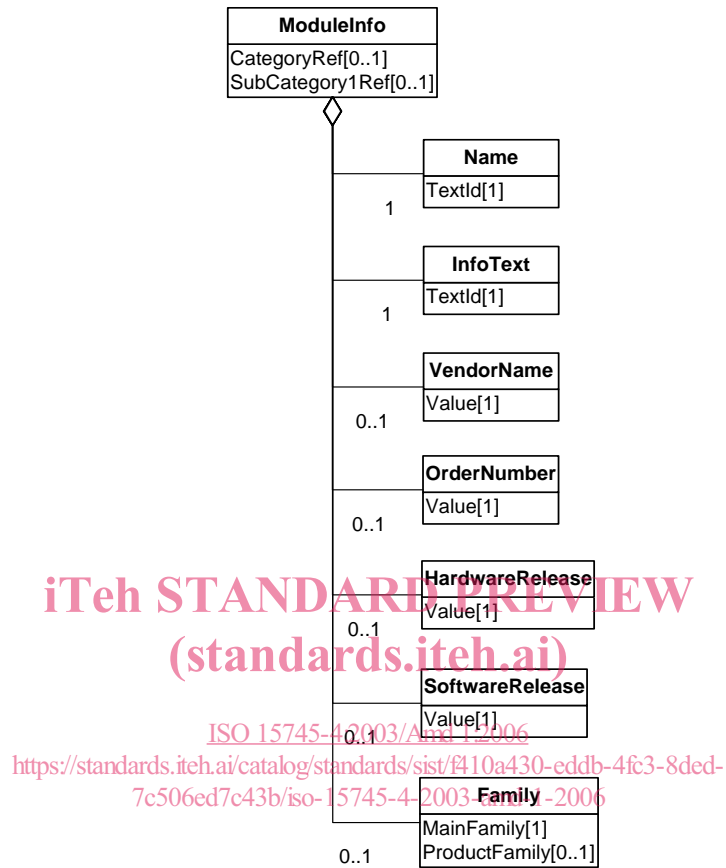
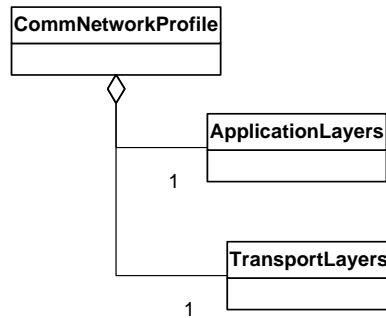


Figure 18 — PROFINET ModuleInfo class diagram

### 6.4.3 Communication network profile

Figure 19 shows the class structure of a GSDML communication network profile.



**Figure 19 — PROFINET communication network profile class diagram**

NOTE In GSDML the classes of the communication network profile are empty. The reason is that no options of the communication properties of a PROFINET device are provided.

The XML schema representing the GSDML communication network profile template is defined in D.5.3.

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Insert the following new Annex D before the Bibliography.  
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## Annex D (normative)

### PROFINET profile templates

#### D.1 Overview

PROFINET is an Ethernet based network compliant to IEC 61784-1 (Ed.1) CP 3/3.

PROFINET uses the profile description based on ISO 15745-1. The profile technology name is GSDML (Generic Station Description Markup Language).

It is not the purpose of the GSDML format to describe technological functions or the graphical user interface of a device. For this purpose already established concepts (for example Electronic Device Description Language (EDDL) according IEC 61804-2) are recommended.

By using the GSDML a GSD (Generic Station Description) file is created. In order to distinguish from the PROFIBUS<sup>2)</sup> GSD format described in ISO 15745-3:2003, Annex B, the term "GSDML based file" is used in this document.

A GSDML based file can contain more than one Device Access Points (DAP). A DAP is a special module which connects the device to the network. This allows building one file for a family of devices sharing the same modules (see D.4.4.1 and D.4.5).

#### D.2 Data types

Table D.1 describes the data types used in the GSDML.

Regular expressions are used as defined in REC-xml-20001006.

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Table D.1 — Data types

Name	Definition Schema	Description
Boolean	http://www.w3.org/2001/XMLSchema	See (REC-xmlschema-2-20010502)
Enumeration	GSDML-DeviceProfile-v1.0.xsd	String with defined content
IdT	GSDML-Primitives-v1.0.xsd	Used for object identification. The value list shall comply with the following regular expression: (\S.*)*\S
NormalizedString	http://www.w3.org/2001/XMLSchema	See (REC-xmlschema-2-20010502)
Token	http://www.w3.org/2001/XMLSchema	See (REC-xmlschema-2-20010502)
RefIdT	GSDML-Primitives-v1.0.xsd	Used for object reference
Unsigned8	GSDML-Primitives-v1.0.xsd	Unsigned integer in range 0..255
Unsigned16	GSDML-Primitives-v1.0.xsd	Unsigned integer in range 0..65535
Unsigned32	GSDML-Primitives-v1.0.xsd	Unsigned integer in range 0.. 4294967295
ValueList	GSDML-Primitives-v1.0.xsd	Base type for a list including ranges of unsigned values. The value list shall comply with the following regular expression:  ((\d+\.\.\d+) (\d+))((\d+\.\.\d+) (\d+))*  If a range is defined, the value left from “.” shall be less than the value right from “.” (see Example 1).
SignedValueList	GSDML-Primitives-v1.0.xsd	Base type for a list including ranges of signed values. The value list shall comply with the following regular expression:  ((-?\d+\.\.\d+) (-?\d+))((-?\d+\.\.\d+) (-?\d+))*  If a range is defined, the value left from “.” shall be less than the value right from “.” (see Example 2).
EXAMPLE 1	Valid ValueList contents:	<p>1 2 3 4</p> <p>5 12211</p> <p>0..6</p> <p>5..12</p> <p>0..34 36 38</p>
EXAMPLE 2	Valid SignedValueList contents:	<p>1 2 3 4</p> <p>-12 5 12211</p> <p>0..6</p> <p>-5..12</p> <p>0..34 36 38</p>

### D.3 General rules

#### D.3.1 Version control

If a GSDML based file is already released, it is important that the identification of objects remains unchanged. Therefore the content of the attributes corresponding to the following XPath expressions (see REC-xpath-19991116) shall not be changed in a new version of a GSDML based file:

//DeviceAccessPointItem/@ID

//ModuleList/ModuleItem/@ID

//VirtualSubmoduleItem/@ID

//ValueItem/@ID

//GraphicItem/@ID

//CategoryItem/@ID

### D.3.2 Rules for the name of a GSDML based file

The name of a GSDML based file shall be composed of the six fields below in the following order:

- "GSDML"
- The version ID in format Vx.y whereby "x" and "y" are unsigned numbers. The version ID refers to the ID of the GSDML Schema used.
- Vendor name
- Device family name
- Release date of the GSDML based file in format yyymmdd
- ".xml" (file extension)

As a delimiter between the fields the dash character "-" (ASCII 45 decimal) shall be used.

EXAMPLE "GSDML-V1.0-Lieferant-ET200X-20030818.xml"

Already released files shall not be changed without changing the filename. When building a new version of a GSDML based file, the release date shall be changed.

If more than one version of a GSDML based file is installed, the engineering system can use the release date to determine the newest version.

### D.3.3 Schema location in a GSDML based file

An XML schema validator needs information about the location of the assigned schema file. Therefore the attribute xsi:schemaLocation of the ISO15745Profile root element is specified.

To use the same location for all GSDML based files, the relative path "..\xsd" shall be used for the schema files.

### D.3.4 Identification of objects

Some elements in the GSDML schema can be addressed by an identifier. This identifier is an attribute with the name "ID". See D.3.2 for the valid range of this attribute.

The Identification of objects shall be kept unique over all elements of the same category as described in the following table. (For example, all Identification of objects of Object of type "ModuleItem" shall be kept unique)

Document wide unique IDs are not necessary.

Table D.2 shows the addressable elements. The right column shows all those objects where the items of the left column are being referenced in. These references use the IDs in question as a means of addressing.