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Standard data element types with associated classification scheme for electric components –

Part 2: EXPRESS dictionary schema

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

STANDARD DATA ELEMENT TYPES WITH ASSOCIATED CLASSIFICATION SCHEME FOR ELECTRIC COMPONENTS –

Part 2: EXPRESS dictionary schema

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61360-2 has been prepared by subcommittee 3D: Data sets for libraries, of IEC technical committee 3: Information structures, documentation and graphical symbols.

This consolidated version of IEC 61360-2 consists of the second edition (2002) [documents 3D/92/FDIS and 3D/95/RVD] and its amendment 1 (2003) [documents 3D/117/FDIS and 3D/126/RVD].

The technical content is therefore identical to the base edition and its amendment and has been prepared for user convenience.

It bears the edition number 2.1.

A vertical line in the margin shows where the base publication has been modified by amendment 1.

Annexes A and B are for information only.

IEC 61360 consists of the following parts, under the general title *Standard data element types with associated classification scheme for electric components:*

– Part 1 : Definitions – Principles and methods
– Part 2 : EXPRESS dictionary schema
– Part 3 : Maintenance and validation procedures
– Part 4 : IEC reference collection of standard data element types, component classes and terms.
– Part 5 : Extensions to the EXPRESS dictionary schema[1].

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

[1] To be published

INTRODUCTION

The common ISO/IEC dictionary schema presented here is based on the intersection of the scopes of the following standards:

– IEC 61360-1

– ISO 13584-42

Relevant parts of the scope clauses of these standards include the following:

IEC 61360-1:
"This part of IEC 61360 provides a firm basis for the clear and unambiguous definition of characteristic properties (data element types) of all elements of electrotechnical systems from basic components to subassemblies and full systems. Although originally conceived in the context of providing a basis for the exchange of information on electric/electronic components, the principles and methods of this standard may be used in areas outside the original conception such as assemblies of components and electrotechnical systems and subsystems."

ISO 13584-42:
"This part of ISO 13584 provides rules and guidelines for library data suppliers to create hierarchies of families of parts according to a common methodology intended to enable multi-supplier consistency. These rules pertain to the following: the method for grouping parts into families of parts to form a hierarchy; the dictionary elements that describe the families and properties of parts."

IEC SC 3D and ISO TC 184/SC4 agreed NOT to change and/or modify the presented EXPRESS model independent of each other in order to guarantee the harmonization and the reusability of the work of both committees.

Requests for amendments should therefore be sent to both committees. These requests should be adopted by both committees before modifying the EXPRESS information model.

STANDARD DATA ELEMENT TYPES WITH ASSOCIATED CLASSIFICATION SCHEME FOR ELECTRIC COMPONENTS –

Part 2: EXPRESS dictionary schema

1 General

1.1 Scope

This part of IEC 61360 presents a common ISO/IEC dictionary schema based on the intersection of the scopes of two base standards IEC 61360-1 and ISO 13584-42.

The presented EXPRESS model represents a common formal model for the two standards and facilitates a harmonization of both.

The IEC 61360-2 standard forms the master document. ISO 13584-42 contains a copy of the IEC 61360-2 EXPRESS model in an informative annex

This standard provides a formal model for data according to the scope as given in the publications cited above, and thus provides a means for the computer-sensible representation and exchange of such data.

The intention is to provide a common information model for the work of IEC TC 3D and ISO TC 184/SC4, thus allowing for the implementation of dictionary systems dealing with data delivered according to either of the standards elaborated by both committees.

Two schemas are provided in this part of IEC 61360 defining the two options that may be selected for an implementation. Each of these options is referred to as a conformance class.

- The **ISO13584_IEC61360_dictionary_schema**[2] provides for modelling and exchanging technical data element types with associated classification scheme used in the data element type definitions. It constitutes conformance class 1 of this part of IEC 61360.
- The **ISO13584_IEC61360_language_resource_schema** provides resources for permitting strings in various languages. It has been extracted from the dictionary schema, since it could be used in other schemata. It is largely based on the **support_resource_schema** from ISO 10303-41: STEP part 41: "Fundamentals of Product Description and Support", and can be seen as an extension to that. It allows for the usage of one specific language throughout an exchange context (Physical File) without the overhead introduced when multiple languages are used.

When used together with ISO 10303-21, each schema defines one single exchange format.

The exchange format defined by conformance class 1 is fully compatible with the ISO 13584 series.

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2 All the names that stand for items, formally defined within the EXPRESS model, are presented in **bold face.**

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61360-1:1995, *Standard data element types with associated classification scheme for electric components – Part 1: Definitions – Principles and methods*

IEC 61360-4:1997, *Standard data element types with associated classification scheme for electric components – Part 4: IEC reference collection of standard data element types, component classes and terms*

ISO 31 (all parts), *Quantities and units*

ISO 639:1988, *Code for the representation of names of languages*

ISO 843:1997, *Information and documentation – Conversion of Greek characters into Latin characters*

ISO 4217:1995, *Codes for the representation of currencies and funds*

ISO 6093:1985, *Information processing – Representation of numerical values in character strings for information interchange*

ISO 8601:2000, *Data elements and interchange formats – Information interchange – Representation of dates and times*

ISO 8859-1:1998, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

ISO 8879:1986, *Information processing – Text and office systems – Standard Generalized Markup Language (SGML)*

ISO 9735:1988, *Electronic data interchange for administration, commerce and transport (EDIFACT) – Application level syntax rules*

ISO 10303-11:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 11: Description methods: The EXPRESS language reference manual*

ISO 10303-21:1994, *Industrial automation systems and integration – Product data representation and exchange – Part 21: Implementation methods: Clear text encoding of the exchange structure*

ISO 10303-41:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 41: Integrated generic resources: Fundamentals of product description and support*

ISO 10303-42:2000, *Industrial automation systems and integration – Product data representation and exchange – Part 42: Integrated generic resources: Geometric and topological representation*

ISO 12083:1994, *Information and documentation – Electronic manuscript preparation and markup*

ISO 13584-26, *Industrial automation systems and integration – Parts library – Part 26: Logical resource: Information supplier identification*

ISO 13584-42, *Industrial automation systems and integration – Parts library – Part 42: Description methodology: Methodology for structuring part families*

2 Definitions

For the purpose of this part of IEC 61360 the following definitions apply:

2.1
basic semantic unit (BSU)
entity that provides an absolute and universal identification of certain objects of the application domain (for example classes, data element types)

2.2
dictionary element
set of attributes that constitutes the dictionary description of certain objects of the application domain (for example classes, data element types)

2.3
common dictionary schema
information model for a dictionary, using the information modelling language EXPRESS

2.4
data type
set of allowed values of a data element type

NOTE Within IEC the **data_type** that is either a unit of measure or a value domain is defined separately for each data element type.

2.5
IEC root class
class that is the superclass of all the classes defined in IEC 61360-4; its class code is 'AAA000' and its version is '001'

2.6
applicable data element type
data element type that is defined for some component class and that applies to any component that belongs to this component class

2.7
visible data element type
data element type that is defined for some component class and that may or may not apply to the different components of this component class

NOTE 1 The code of the class where a data element type is defined as visible is part of the identification of this data element type.

NOTE 2 Within IEC all data element types are defined as visible at the level of the root class, that is the superclass of both the component class and the material class.

2.8
item
a thing whose description can be captured by a class structure and a set of properties

3 Abbreviations

In this part of IEC 61360 the following abbreviations are used:

- BSU: Basic Semantic Unit;
- DET: Data Element Type;
- ICS: International Classification of Standards;
- SI: International System of Units.

4 Overview of the common dictionary schema and compatibility with ISO 13584

In the following subclauses, the architecture of the common dictionary schema will be presented and it will be explained how the same information model has to be used in the International Standards to ensure their compatibility.

The common dictionary schema combines the requirements of IEC 61360 and ISO 13584. Therefore, it contains resources to accommodate the specific requirements of both International Standards. These resources are provided either as optional capabilities or as subtypes of the types defined to fulfil the common requirements.

4.1 Use of the common dictionary schema to exchange IEC 61360-1 compliant data

a) The ISO 13584 specific extensions to support multilingual capability are not reguired for the exchange of dictionary elements defined according to IEC 61360-1. However, these extensions, that is **present_translations**, **translated_label** and **translated_text,** shall be used in the exchange structure for compatibility reasons.

b) If a component class has a superclass, the **coded_name** shall be defined as a **value_code** in the **domain** of the classifying data element type of the superclass.

c) If a classifying data element type exists within a specific component class, for each **value** in its **domain** a subclass and a **term** shall be defined.

d) A classifying data element type, optional in conformance class 2 in the common dictionary schema, shall always be provided for the component classes defined according to IEC 61360-1.

e) Only SI units shall be used although the common dictionary schema enables the use of many kind of system units. When using this schema however for the exchange of IEC 61360 compliant data, only SI shall be used for quantitative data element types.

4.2 Compatibility with ISO 13584-42

An implementation compliant with this part of IEC 61360 shall support all the entities, types and associated constraints that belong to the conformance class it claims to support.

Therefore, conformance to conformance class 1 of this part of IEC 61360 requires that all the entities, types and associated constraints defined in the common dictionary schema be supported. ISO 13584 data conforming to the common dictionary schema may thus be processed by an IEC 61360 implementation that conforms to conformance class 1 that includes all the features of conformance class 1.

In ISO 13584, a specific conformance class[3] is intended to contain all the entities, types and associated constraints defined in the common dictionary schema. An ISO 13584 compliant implementation conforming to this conformance class shall therefore be able to support IEC data that belongs to conformance class 1 of this part of IEC 61360.

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[3] This conformance class is defined as conformance class 0 in ISO 13584-24.

4.3 Naming correspondence between IEC 61360-1 and IEC 61360-2

Due to specific application restrictions, for example the EXPRESS language allows no spaces in entity names, a number of similar 'EXPRESS names' are created by replacing the blank in a name by an underscore (e.g. preferred name is presented as **preferred_name**).

At other places, names are used in the EXPRESS model that deviate from those used in IEC 61360-1. This is a consequence of the effort to reach one common EXPRESS information model together with parts libraries.

The table below presents a help for matching the names used in the two parts of IEC 61360.

Table 1 – X-REFERENCE table

Naming in IEC 61360-2	Naming in IEC 61360-1
component_class	Component class
condition_DET	Condition data element type
dependent_P_DET	Data element type
det_classification	Data element type class
(DER)dic_identifier	Identifier
dic_value	Value
material_class	Material class
meaning	Value meaning
non_dependent_P_DET	Data element type
preferred_symbol	Preferred letter symbol
revision	Revision number
source_doc_of_definition	Source document of data element type definition
source_doc_of_definition	Source document of component class definition
synonymous_symbols	Synonymous letter symbol
unit	Unit of measure
value_code	Value code
version	Version number

4.4 Main structure of the common dictionary schema

This subclause explains the main resource constructs provided by the common dictionary schema:

- **dictionary_element** is any element defined in the dictionary;
- **supplier_element** captures the data of suppliers of dictionary elements (classes, properties, data types);
- **class** models the dictionary element of classes (families) which are described by properties;
- **property_DET** is the dictionary element of a property;
- **data_type** specifies the type of a property.

These parts of the dictionary schema are presented in more detail in clause 5: **ISO13584_IEC61360_dictionary_schema**.

In the presentation of the common dictionary schema, some overview diagrams are provided as planning models (see figure 1 to figure 11). These planning models use the EXPRESS-G graphical notation for the EXPRESS language.

For clarification of the diagrams, some of the relationships that are defined in the EXPRESS model are omitted. Figure 1 below outlines as a planning model the main structure of the common dictionary schema.

Most of these figures contain overview models (or planning models) but show only that level of detail which is appropriate at a certain place.

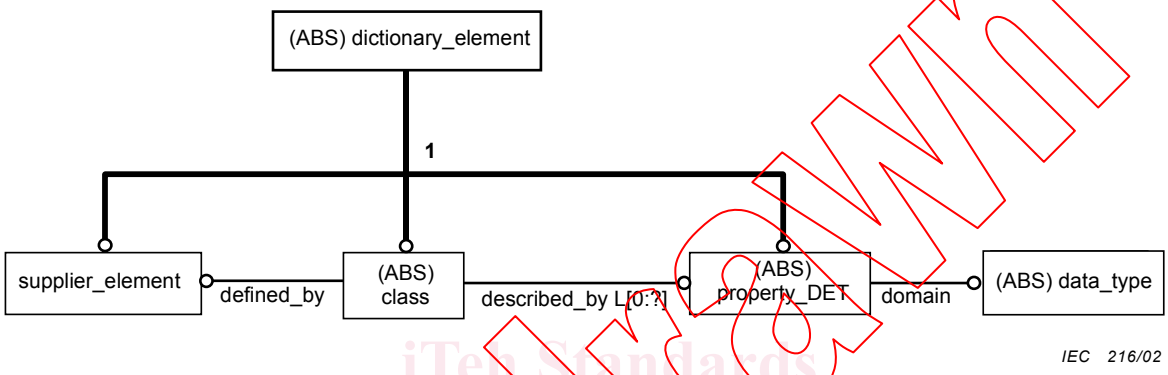

Figure 1 – Overview of the dictionary schema

5 ISO13584_IEC61360_dictionary_schema

This clause, which constitutes the main part of the common information model of ISO 13584-42 and IEC 61360, contains the full EXPRESS listing of the dictionary schema, annotated with comments and explanatory text. The order of text in this clause is determined primarily by the order imposed by the EXPRESS language, secondarily by importance.

```
*)
SCHEMA ISO13584_IEC61360_dictionary_schema;
(*
```

5.1 References to other schemata

This subclause contains references to other EXPRESS schemata which are used in the Dictionary Schema. Their source is indicated in the respective comment.

```
*)
REFERENCE FROM support_resource_schema (identifier, label, text);
        (*      from ISO 10303-41: STEP Part 41: "Fundamentals of Product
        Description and Support" *)
REFERENCE FROM person_organization_schema (organization, address);
        (*      from ISO 10303-41: STEP Part 41: "Fundamentals of Product
        Description and Support" *)
REFERENCE FROM measure_schema;
        (*      from ISO 10303-41: STEP Part 41: "Fundamentals of Product
        Description and Support" *)
REFERENCE FROM ISO13584_IEC61360_language_resource_schema;
        (*      see clause 6 "ISO13584_IEC61360_language_resource_schema"
```