

# TECHNICAL SPECIFICATION



**Information model covering the contents of IEC 81346-1 and IEC 81346-2,  
IEC 61175, IEC 61666 and IEC 81714-3**



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# TECHNICAL SPECIFICATION



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**Information model covering the contents of IEC 81346-1 and IEC 81346-2,  
IEC 61175, IEC 61666 and IEC 81714-3**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INFORMATION MODEL COVERING THE CONTENTS  
OF IEC 81346-1 AND IEC 81346-2, IEC 61175, IEC 61666 AND IEC 81714-3**

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IEC 62771, which is a technical specification, has been prepared by IEC technical committee 3: Information structures, documentation and graphical symbols.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
3/1080/DTS	3/1102/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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## INFORMATION MODEL COVERING THE CONTENTS OF IEC 81346-1 AND IEC 81346-2, IEC 61175, IEC 61666 AND IEC 81714-3

### 1 Scope

This Technical Specification contains a formal reference information model of the concepts and methods established in IEC 81346-1, IEC 81346-2, IEC 61175, IEC 61666 and IEC 81714-3, which are its normative basis.

The information model is normative with respect to data exchange.

### 2 Normative references

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

IEC 61175:2005, *Industrial systems, installations and equipment and industrial products – Designation of signals*

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

IEC 61360-DB, *IEC Common Data Dictionary*<sup>1</sup>

IEC 61666, *Industrial systems, installations and equipment and industrial products – Identification of terminals within a system*

IEC 81346-1, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules*

IEC 81346-2, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 2: Classification of objects and codes for classes*

IEC 81714-3, *Design of graphical symbols for use in the technical documentation of products – Part 3: Classification of connect nodes, networks and their encoding*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 81346-1, IEC 81346-2, IEC 61175, IEC 61666, and IEC 8174-3 apply.

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<sup>1</sup> At the next revision the title of the IEC 61360 series will be modified to: *Standard data element types with associated classification scheme for products and services*, with Part 1: *Definitions, principles and methods*, Part 2: *EXPRESS Dictionary schema*, Part 4: *IEC reference collection for products and services used in electrotechnology*, and Part 5: *Extensions to the EXPRESS dictionary schema*. Likewise the title of the database will be: IEC 61360-DB: *IEC Common Data Dictionary*.

## 4 General

The standards IEC 81346-1, IEC 81346-2, IEC 61175, IEC 61666 and IEC 81714-3 are interrelated, but the concepts used in these standards have so far only been dealt with separately in the different publications. The purpose of the present technical specification is to illustrate their relations by means of a common reference information model.

When data is transferred or exchanged, the exchange shall conform to this reference model. The model is conceptual and independent from any implementation method.

For the preparation of the information model, the EXPRESS modelling language, described in ISO 10303-11, has been used. The graphical form is presented using EXPRESS-G.

The information model is contained in Annex A.

0 provides an overview by means of a graphical representation of the structure and constraints of the application objects. The computer interpretable textual form is represented in A.3.

A.1 lists the entities and attributes of the information model and A.2 contains the detailed verbal descriptions of the entities and attributes.

The reference information model depicts the requirements set up, using where possible available subsets of application reference models of the ISO 10303 series.

The model is not intended to be complete within the framework of neither integrated resource models nor application reference models developed within the ISO 10303 series. It is complete with respect to the requirements established within this publication.

NOTE 1 For an introduction to EXPRESS-G, see <http://tc3.iec.ch/txt/xpress.pdf>.

NOTE 2 Annex A is available in the English language only.

Annex B contains a set of source definitions for Data Element Types (DETs) derived from the common reference information model.

## Annex A (normative)

### Reference information model

#### A.1 List of entities and attributes

This clause provides an alphabetically ordered list of the entities and attributes of the reference information model described in this Annex.

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## A.2 Entity descriptions

### A.2.1 Domain

The Domain is a collection of attributes providing information about the context of the identification of an object, in which the identification is unambiguously defined.

The data associated with a Domain are the following:

- classified\_as S[0:?];
- related\_to;
- id.

#### A.2.1.1 classified\_as S[0:?]

This attribute specifies the relation to a classification code associated to a specific Domain based on a specified classification system.

#### A.2.1.2 related\_to

This attribute establishes the relation to an Object within a given Domain.

#### A.2.1.3 id

This attribute provides the identification number assigned to a Domain.

### A.2.2 Object

The Object entity is a collection of attributes establishing relationships among Object, Domain, Object\_aspect, Class, Signal, Signal\_variant and Terminal.

The data associated with an Object are the following:

- classified\_as S[0:?];

- has\_views S[1:?].

#### **A.2.2.1 classified\_as S[0:?]**

This attribute specifies the relation to a classification code associated to a specific Object based on a specified classification system.

#### **A.2.2.2 has\_views S[1:?]**

This attribute lists the different views existing on the Object. At least one view shall be defined.

### **A.2.3 Object\_aspect**

The Object\_aspect entity represents an aspect of an Object and provides a mechanism for representing the relationship between an Object and its constituent objects within an aspect.

The data associated with an Object\_aspect are the following:

- is\_a\_view\_of;
- is\_aspect;
- consist\_of S[0:?].

Constraint: The aspect of the Object\_aspect instances being used as constituents of the current instance shall be the same as the aspect of the current instance.

#### **A.2.3.1 is\_a\_view\_of**

This attribute specifies the Object of which the current instance represents a view, i.e. an aspect.

#### **A.2.3.2 is\_aspect**

This attribute specifies the aspect the current instance is representing.

#### **A.2.3.3 consists\_of S[0:?]**

This attribute lists the instances of Object\_aspect\_in\_object\_aspect being constituents of the current instance.

### **A.2.4 Object\_aspect\_in\_object\_aspect**

The Object\_aspect\_in\_object\_aspect represents the usage of an Object\_aspect within an Object\_aspect.

The data associated with Object\_aspect\_in\_object\_aspect are the following:

- uses;
- single\_level\_reference\_designation.

#### **A.2.4.1 uses**

This attribute specifies the Object\_aspect being used at the current instance.

#### **A.2.4.2 single\_level\_reference\_designation**

This attribute provides the reference designation assigned to the current instance with respect to the Object of which the specific Object is a direct constituent in one aspect.

### **A.2.5 Aspect**

The Aspect entity is a collection of attributes describing one view of Objects.

The data associated with an Aspect are the following:

- aspect;
- description;
- prefix.

#### **A.2.5.1 aspect**

This attribute specifies the type of aspect, i.e. the kind of view to be applied on an object.

The predefined values of aspect are one of the following:

- function\_view;
- product\_view;
- location\_view;
- other\_view.

NOTE If the value "other\_view" is selected, then its semantical meaning is previously agreed among the involved partners.

#### **A.2.5.2 description**

This attribute provides a clear language-bound text description of the aspect associated with the current instance.

The description need not be specified.

#### **A.2.5.3 prefix**

This attribute provides the possibility to supply the prefix sign of the associated aspect with the current instance.

The prefix need not be specified.

NOTE Predefined prefixes with their semantical meaning are defined in IEC 81346-1.

Constraint: If in addition to the mandatory Aspect value the optional prefix value will also be provided to the same instance, this may lead to inconsistency. In such cases the Aspect value shall have preference.

### **A.2.6 Class**

The Class entity is a collection of attributes allowing assigning multiple classifications to an item. The data associated with a Class are the following:

- id;
- description;
- used\_classification\_system.

#### **A.2.6.1 id**

This attribute specifies the classification code associated to a specific item based on a specified Classification\_system.

NOTE It is generally understood that any classification code as provided in a internationally standardized classification system, e.g. IEC 81346-2, is not translatable and hence language independent.

### **A.2.6.2 description**

This attribute provides a clear language-bound text description of the classification code associated with the current instance based on a given Classification\_system.

The description need not be specified.

### **A.2.6.3 used\_classification\_system**

This attribute specifies the information about the Classification\_system applied.

## **A.2.7 Classification\_system**

The Classification\_system identifies the used\_classification\_system providing the Classes.

The data associated with a Classification\_system are the following:

- id;
- description.

### **A.2.7.1 id**

This attribute identifies unambiguously the applied Classification\_system. The values are either user-defined or predefined.

The predefined values are:

- IEC 81346-2;
- IEC 81714-3;
- IEC 61175:2005, Table 1;
- ...

NOTE The list is an open list and may be expanded. Non-defined values are previously agreed among the involved partners.

#### **A.2.7.1.1 IEC 81346-2**

This attribute indicates that the Classification\_system is according to IEC 81346-2.

#### **A.2.7.1.2 IEC 81714-3**

This attribute indicates that the Classification\_system is according to IEC 81714-3.

### **A.2.7.2 description**

This attribute provides a clear text description of the used\_classification\_system.

The description need not be specified.

## **A.2.8 Terminal**

The Terminal is a collection of attributes providing information about the Terminal and its associated Object.

The data associated with a Terminal are the following:

- classified\_as S[0:?];
- belongs\_to;

- (INV) has\_views S[1:?].

#### **A.2.8.1 classified\_as S[0:?]**

This attribute specifies the relation to a classification code associated to a specific Terminal based on a specified Classification\_system.

NOTE IEC 81714-3 provides classification codes for terminals.

#### **A.2.8.2 belongs\_to**

This attribute provides the relation of a specific Terminal to a given Object.

#### **A.2.8.3 (INV) has\_views S[1:?]**

This attribute lists the different views existing on the Terminal. At least one view shall be defined.

### **A.2.9 Terminal\_aspect**

The Terminal\_aspect entity is a collection of attributes providing information about the different views on a Terminal associated with a Terminal.

The data associated with a Terminal\_aspect are the following:

- is\_aspect;
- is\_a view\_of;
- terminal\_designation.

#### **A.2.9.1 is\_aspect**

This attribute specifies the aspect the current instance is representing.

#### **A.2.9.2 is\_a\_view\_of**

This attribute specifies the Terminal of which the current instance represents a view, i.e. an aspect.

#### **A.2.9.3 terminal\_designation**

This attribute identifies a Terminal with respect to the Object to which it belongs, related to one defined Aspect.

### **A.2.10 Terminal\_relationship**

The Terminal\_relationship is a collection of attributes providing information about the relations among different terminals.

The data associated with a Terminal\_relationship are the following:

- description;
- related\_terminal\_aspect;
- relating\_terminal\_aspect.

#### **A.2.10.1 description**

This attribute provides human-readable information about the specific Terminal\_relationship occurrence.

### **A.2.10.2 related\_terminal\_aspect**

This attribute specifies the second of the two Terminal\_aspects related by the Terminal\_relationship.

### **A.2.10.3 relating\_terminal\_aspect**

This attribute specifies the first of the two Terminal\_aspects related by the Terminal\_relationship.

## **A.2.11 Signal**

The Signal is a collection of attributes providing information about the units of information conveyed from one object to another.

The data associated with a Signal are the following:

- variants S[1:?];
- short\_name;
- basic\_signal\_name;
- classified\_as S[0:?];
- signal\_domain.

### **A.2.11.1 variants S[1:?]**

This attribute provides the different variants of Signals occurring in the different sections of a Signal connection chain on its way from the source to its destination.

NOTE There is always at least one variant in a signal connection chain.

### **A.2.11.2 short\_name**

This attribute provides a short textual description of the reporting Object respectively of the controlled Object.

The short\_name need not be specified.

### **A.2.11.3 basic\_signal\_name**

This attribute provides a short description of the Signal defining its special function.

NOTE IEC 61175 provides abbreviations recommended to be used as basic signal name.

### **A.2.11.4 classified\_as S[0:?]**

This attribute provides the relation to a classification code associated to a specific Signal based on a specified Classification\_system.

NOTE IEC 61175:2005, Table 1, provides a classification code for signals.

### **A.2.11.5 signal\_domain**

This attribute provides the relation to a specific Object within which the basic Signal name is unambiguously defined.

## **A.2.12 Signal\_relationship**

The Signal\_relationship is a collection of attributes providing information about the relations among different Signal occurrences.

The data associated with a Signal\_relationship are the following:

- related\_signal;
- relating\_signal;
- description.

#### **A.2.12.1 related\_signal**

This attribute specifies the second of the two related\_signal provided by the Signal\_relationship.

#### **A.2.12.2 relating\_signal**

This attribute specifies the first of the two related\_signal provided by the Signal\_relationship.

#### **A.2.12.3 description**

This attribute provides human-readable information about the specific Signal\_relationship occurrence.

### **A.2.13 Signal\_variant**

The Signal\_variant is a collection of attributes providing information about a section of the Signal connection chain describing the way of a Signal from source to its destination.

The data associated with a Signal\_variant are the following:

- internal\_signal;
- variant\_domain;
- terminals\_involved\_in\_transfer\_of\_signal\_variant S[1:?];
- id;
- additional\_information.

#### **A.2.13.1 internal\_signal**

This attribute provides the information on whether the relevant Signal\_variant is an internal one not being relevant for transmission via other objects.

The internal\_signal need not be specified.

#### **A.2.13.2 variant\_domain**

This attribute provides the identification of an object in which the Signal\_variant applies and is unambiguously defined.

#### **A.2.13.3 terminals\_involved\_in\_signal\_transfer S[1:?]**

This attribute identifies the terminals involved in the transmission of a Signal\_variant.

#### **A.2.13.4 id**

This attribute identifies a variant in a section of a Signal connection chain.

#### **A.2.13.5 additional\_information**

This attribute provides additional information about the characteristics of a Signal\_variant.

The additional\_information need not be specified.

### A.3 Express source code

Clause A.3 provides the full valid EXPRESS source code. This file is electronically available at [http://tc3.iec.ch/stp/IEC62771\\_SCHEMA.txt](http://tc3.iec.ch/stp/IEC62771_SCHEMA.txt) for testing purposes.

```
SCHEMA MODEL_FOR_DESIGNATION_OF_OBJECTS_AND_TERMINALS;
```

```
TYPE aspect_type = ENUMERATION OF
```

```
(FUNCTION_VIEW,  
PRODUCT_VIEW,  
LOCATION_VIEW,  
OTHER_VIEW);
```

```
END_TYPE;
```

```
ENTITY Object;
```

```
  classified_as : SET OF Class;
```

```
  INVERSE
```

```
  has_views : SET [1:?] OF Object_aspect FOR is_a_view_of;
```

```
END_ENTITY;
```

```
ENTITY Class;
```

```
  id : STRING;
```

```
  used_classification_system : Classification_system;
```

```
  description : OPTIONAL STRING;
```

```
END_ENTITY;
```

```
ENTITY Classification_system;
```

```
  id : STRING;
```

```
  description : OPTIONAL STRING;
```

```
END_ENTITY;
```

```
ENTITY Object_aspect;
```

```
  is_a_view_of : Object;
```

```
  consist_of : SET OF Object_aspect_in_object_aspect;
```

```
  is_aspect : Aspect;
```

```
END_ENTITY;
```

```
ENTITY Object_aspect_in_object_aspect;
```

```
  uses : Object_aspect;
```

```
  single_level_reference_designation : STRING;
```

```
END_ENTITY;
```

```
ENTITY Aspect;
```

```
  aspect : aspect_type;
```

```
  description : OPTIONAL STRING;
```

```
  prefix : OPTIONAL STRING;
```

```
END_ENTITY;
```

```
ENTITY Terminal;
```

```
  belongs_to : Object;
```

```
  classified_as : SET OF Class;
```

```
  INVERSE
```

```
  has_views : SET [1:?] OF Terminal_aspect FOR is_a_view_of;
```

```
END_ENTITY;
```

```
ENTITY Terminal_aspect;
  is_a_view_of      : Terminal;
  is_aspect         : Aspect;
  terminal_designation : STRING;
END_ENTITY;
```

```
ENTITY Terminal_relationship;
  relating_terminal_aspect : Terminal_aspect;
  related_terminal_aspect : Terminal_aspect;
  description              : STRING;
END_ENTITY;
```

```
ENTITY Domain;
  related_to      : Object;
  classified_as  : SET OF Class;
  id              : STRING;
END_ENTITY;
```

```
ENTITY Signal;
  signal_domain      : Object;
  variants           : SET [1:?] OF Signal_variant;
  short_name         : OPTIONAL STRING;
  basic_signal_name  : STRING;
  classified_as      : SET OF Class;
END_ENTITY;
```

```
ENTITY Signal_variant;
  variant_domain      : Object;
  terminals_involved_in_transfer_of_signal_variant : SET [1:?] OF Terminal;
  id                  : STRING;
  internal_signal     : OPTIONAL Signal;
  additional_information : OPTIONAL STRING;
END_ENTITY;
```

```
ENTITY Signal_relationship;
  relating_signal     : Signal;
  related_signal      : Signal;
  description         : STRING;
END_ENTITY;
```

```
END_SCHEMA;
```

#### A.4 EXPRESS-G graphical representation

EXPRESS-G is a graphical data modelling language specified in ISO 10303-11. For presentation purposes, the complete model is presented in Figure 1.



## Annex B (normative)

### Data Element Type definitions

#### B.1 General

Data Element Types (DETs) (sometimes also called “properties”) are used to unambiguously express characteristic properties for objects, especially when information is communicated between computers.

Once a DET is hosted in a dictionary, this can serve as an unambiguous common reference for the communication. This is vital for the support of electronic business.

The standardized full descriptions of DETs, providing all attributes in accordance with IEC 61360-1, are contained in the IEC Common Data Dictionary (IEC CDD), IEC 61360-4DB, available at <http://std.iec.ch/iec61360>.

The publication in hand is the source for the data element types and classes defined in B.2. For the purpose of this publication only a subset of the full descriptions are provided, containing: *identification number*, *preferred name* and *definition*.

NOTE 1 The identification number is listed in the IEC CDD as *code* under which it is stored in the dictionary.

NOTE 2 The attributes *preferred name* and *definition* are provided in the English language only, as the English language is the reference language of the IEC CDD. The IEC CDD allows adding national language variants to the dictionary under the control of the relevant National Committee.

NOTE 3 The DETs defined in this publication have been forwarded for standardization and inclusion in the IEC CDD following the procedure defined in Annex SL of ISO/IEC Directives, IEC Supplement: 2012: *Procedures specific to IEC*. The intent of this procedure is to make the DETs available in the IEC CDD at the time of publication of the present publication.

Other DETs referenced in this publication are listed in Clause B.3. For these DETs the identification number with link is provided. These DETs are listed under their preferred name, with synonyms or short names indicated, if used in this publication.

## B.2 Source definitions of DETs and classes of DETs in this publication

### B.2.1 Definitions of DETs

Identification number (DET ID)	Preferred name	Definition
AAF527	basic signal name	short description of the active signal defining the special function of the signal, normally using standardized abbreviations or codes
AAF528	short name	short textual description of the reporting object respectively the controlled object
AAF571	signal variant ID	identifier of a section of a path of a group of coherent signal connections belonging to the same signal NOTE There is always at least one variant in a signal connection chain.
AAF572	additional information	optional description of the technical characteristics of the signal variant e.g. version, time stamp, system info, limits (level), value and unit
AAF709	class ID	identifier of a class in accordance with the applied classification system
AAF710	classification system	identifier of the documented system in accordance with which classification is made
AAF751	aspect	specified way of viewing an object
AAF754	terminal designation	identifier of a terminal with respect to the object to which it belongs, related to one defined aspect
AAF784	single-level reference designation	reference designation assigned with respect to the object of which the specific object is a direct constituent in one aspect NOTE A single-level reference designation does not include any reference designations of upper level or lower level objects.

### B.2.2 Definitions of classes of DETs

Identification number (Class ID)	Preferred name	Definition
AAA759	object reference designation	concept for the identification of a specific object formed with respect to the system of which the object is a constituent, based on one or more aspects of that system NOTE An object may have more than one object reference designation in accordance with the used aspects.
AAA760	terminal reference designation	concept for the identification of a terminal with respect to the object to which it belongs, related to one defined aspect NOTE A terminal may have more than one terminal reference designation in accordance with the used aspects.
AAA761	classification	concept for the association of an object to a class within a documented classification system NOTE An object may be multiply classified if different classification systems are applied.
AAF525	signal	concept for the identification of a connection chain within a given domain conveying information from one object to another NOTE Messages (units of signals) may be sent in a communication network in the form of telegrams. Such messages may represent one or several signals.
AAF526	signal variant	concept for the identification of a section of a group of coherent signal connections belonging to the same signal on the way from its source to its destination

### **B.3 Other DETs in this publication with source definitions elsewhere**

#### **B.3.1 General**

The source references for the following DETs can be found via the links to the IEC CDD, in which the source is indicated by means of the administrative attribute *published in* for each DET.

#### **B.3.2 ADA002**

Domain number (synonym: domain ID): [ADA002](#)

#### **B.3.3 ADA003**

Object number (synonym: object ID): [ADA003](#)

## Bibliography

ISO 10303 (all parts), *Industrial automation systems and integration – Product data representation and exchange*

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

ISO/IEC Directives Supplement:2012, *Procedures specific to IEC*

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