

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



HORIZONTAL STANDARD  
NORME HORIZONTALE

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

**Systemes industriels, installations et appareils, et produits industriels –  
Principes de structuration et designations de référence –  
Partie 1: Règles de base**



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Structuring principles and reference designations –  
Part 1: Basic rules**

**Systèmes industriels, installations et appareils, et produits industriels –  
Principes de structuration et désignations de référence –  
Partie 1: Règles de base**

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**INDUSTRIAL SYSTEMS, INSTALLATIONS  
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STRUCTURING PRINCIPLES AND REFERENCE DESIGNATIONS –****Part 1: Basic rules****FOREWORD**

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International Standard IEC 81346-1 has been prepared by IEC technical committee 3: Information structures, documentation and graphical symbols, in close co-operation with ISO technical committee 10: Technical product documentation.

It is published as a double logo standard.

It has the status of a horizontal standard in accordance with IEC Guide 108.

This edition cancels and replaces the first edition of IEC 61346-1, published in 1996. This edition constitutes a technical revision.

This edition includes the following substantial changes with respect to the first edition of IEC 61346-1:

- a new introductory clause providing a description and explanation to the concepts used elsewhere in the publication;
- a more comprehensive description of the structuring principles and rules for structuring are provided;



- “other aspects” are introduced, and the prefix sign # is assigned to these aspects;
- the concept of reference designation group has been deleted;
- the specific term “transition” has been avoided and been replaced by an improved textual description of this phenomenon in annex D;
- a new clause about labelling is introduced;
- the old annexes have been removed with the exception of the annex showing an example of the application of reference designations within a system;
- a new annex explaining the manipulation of objects is introduced;
- 4 new annexes are introduced as rearrangement of detailed examples or explanatory information.

The text of this standard is based on the following documents:

FDIS	Report on voting
3/947/FDIS	3/958/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table. In ISO, the standard has been approved by 12 members out of 13 having cast a vote.

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

A list of all parts of the International Standard 81346 series, formerly IEC 61346 series, under the general title *Industrial systems, installations and equipment and industrial products – structuring principles and reference designations*, can be found on the IEC website.

Future standards in this series will carry the new general number 81346. Numbers of existing standards in this series will be updated at the time of the next edition.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

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## INTRODUCTION

### 0.1 General

This standard establishes a further development of earlier and withdrawn standards (IEC 60113-2, IEC 60750) on item designation, see Annex A. It provides basics for establishing models of plants, machines, buildings etc.

The standard specifies:

- principles for structuring of objects including associated information;
- rules on forming of reference designations based on the resulting structure.

By applying the structuring principles, even very large sets of information in a complex installation can be handled efficiently.

The structuring principles and the rules for reference designations are applicable to objects of both physical and non-physical character.

The structuring principles and the rules for reference designations provide a system that is easy to navigate within and easy to maintain. This system provides an excellent overview on a technical system since composite structures are simple to establish and understand.

The structuring principles and the rules for reference designations support alternative design and engineering processes in the life cycle of an object since they are based on the successively established results of this process and not on how the engineering process itself is carried out.

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The structuring principles and the rules for reference designations allow, by accepting more than one aspect, that more than one coding principle can be applied. This technique also allows 'old structures' to be handled together with 'new structures' by using multiple unambiguous identifiers.

The structuring principles and the rules for reference designations support individual management for the establishment of reference designations, and enable subsequent integration of modules into larger constructs. They also support the establishment of reusable modules, either as functional specifications or as physical deliverables.

NOTE The concept of reusable modules encompasses for example, for manufacturers: the establishment of contract independent modules, and, for operators of complex assemblies: the description of requirements in terms of supplier independent modules.

The structuring principles and the rules for reference designations support concurrent work and allow different partners within a project to add and / or remove data to the structured project result as it proceeds.

The structuring principles and the rules for reference designations recognize time factor within the life-cycle as important for the application of different structures based on different views on the considered technical system.

### 0.2 Basic requirements for this standard

The basic requirements were developed during the preparation of IEC 61346-1 Ed. 1, and accepted by vote by the national committees.

NOTE These basic requirements concern the development of the structuring principles in this standard and not its application. They are therefore not normative vis-à-vis the application of this standard.

- This standard should be applicable to all technical areas and enable a common application.
- This standard shall be applicable to all kind of objects and their constituents, such as plants, systems, assemblies, software programs, spaces, etc.
- This standard should be capable of being consistently applied in all phases (i.e. conceptual development, planning, specification, design, engineering, construction, erection, commissioning, operation, maintenance, decommissioning, disposal, etc.) of the life time of an object of interest, i.e. an object to be identified.
- This standard shall provide the ability to identify unambiguously any single object being a constituent of another object.
- This standard shall support the incorporation of sub-object structures from multiple organizations into objects from other organizations without change to the original object structures and neither to the sub-object structures nor any of their documentation.
- This standard shall support a representation of an object independently of the complexity of the object
- This standard should be easy to apply and the designations should be easy for the user to understand.
- This standard should support the use of, and should be able to be implemented by, computer-aided tools for conceptual development, planning, specification, design, engineering, construction, erection, commissioning, operation, maintenance, decommissioning, disposal, etc.

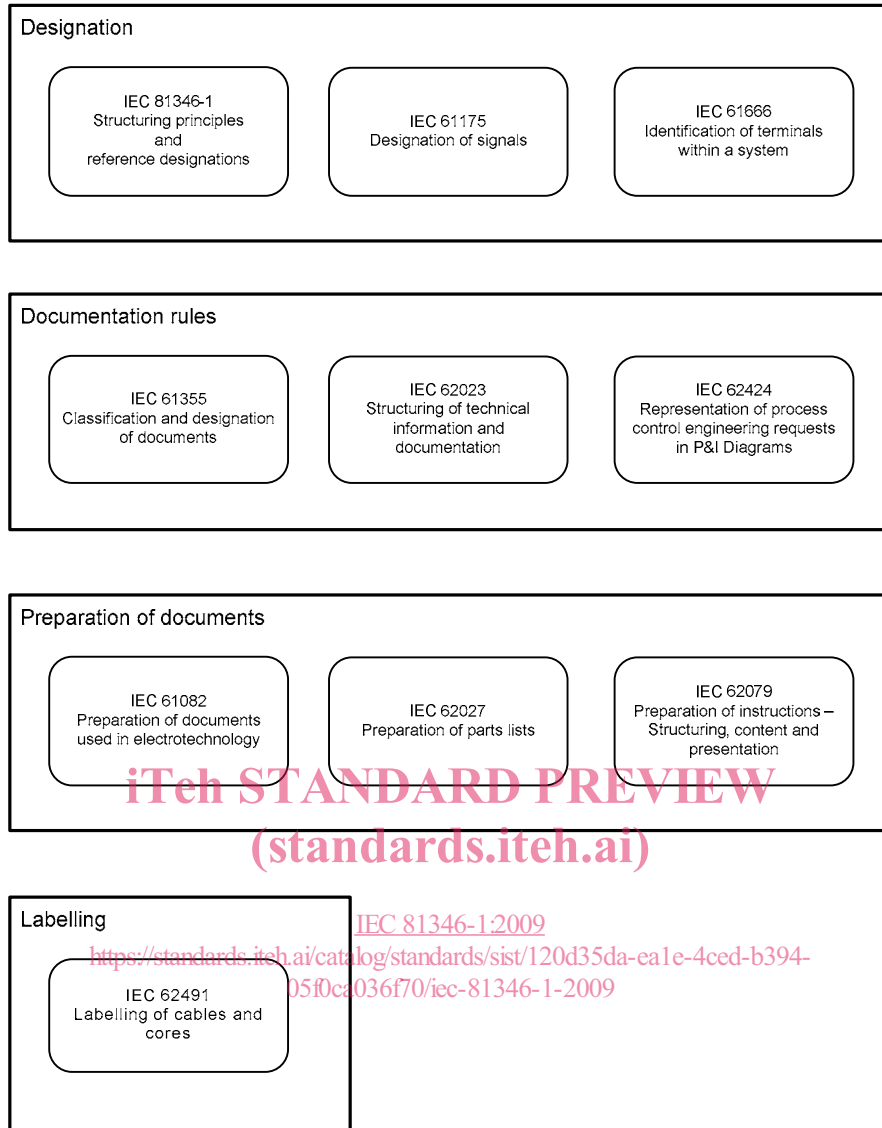
### 0.3 Required properties of the standard

The required properties were developed during the preparation of IEC 61346-1 Ed. 1, and accepted by vote by the national committees.

NOTE 1 These required properties concern the development of the letter code classification system in this standard and not its application. They are therefore not normative vis-a-vis the application of this standard.

- This standard shall not contain rules and restrictions that prohibit its use within a technical area.
- This standard shall cover all its foreseeable applications within all technical areas.
- This standard shall support addressing of information to objects at all phases in their life time.
- This standard shall allow construction of designations at any time from the currently available information.
- This standard shall support the identification of objects based on a constituency principle.
- This standard shall contain rules that enable the formulation of unambiguous designations.
- This standard shall be open and allow a designation to be extended.
- This standard shall support modularity and reusability of objects.
- This standard shall support the description of different users' views on the object
- This standard shall provide rules for the interpretation of designations where needed.

Figure 1 provides an overview on international standards providing a consistent system for designation, documentation and presentation of information.



IEC 1386/09

**Figure 1 – International standards providing a consistent system for designation, documentation and presentation of information**

NOTE 2 The titles of the publications shown in Figure 1 are not complete.

# INDUSTRIAL SYSTEMS, INSTALLATIONS AND EQUIPMENT AND INDUSTRIAL PRODUCTS – STRUCTURING PRINCIPLES AND REFERENCE DESIGNATIONS –

## Part 1: Basic rules

### 1 Scope

This part of IEC 81346, published jointly by IEC and ISO, establishes general principles for the structuring of systems including structuring of the information about systems.

Based on these principles, rules and guidance are given for the formulation of unambiguous reference designations for objects in any system.

The reference designation identifies objects for the purpose of creation and retrieval of information about an object, and where realized about its corresponding component.

A reference designation labelled at a component is the key to find information about that object among different kinds of documents.

The principles are general and are applicable to all technical areas (for example mechanical engineering, electrical engineering, construction engineering, process engineering). They can be used for systems based on different technologies or for systems combining several technologies.

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### 2 Normative references

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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.

ISO/IEC 646, *Information technology – ISO 7-bit coded character set for information interchange*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Terms given in italics are defined elsewhere in this clause.

#### 3.1

##### **object**

entity treated in a *process* of development, implementation, usage and disposal

NOTE 1 The object may refer to a physical or non-physical “thing”, i.e. anything that might exist, exists or did exist.

NOTE 2 The object has information associated to it.

#### 3.2

##### **system**

set of interrelated *objects* considered in a defined context as a whole and separated from their environment

NOTE 1 A system is generally defined with the view of achieving a given objective, e.g. by performing a definite function.

NOTE 2 Elements of a system may be natural or man-made material objects, as well as modes of thinking and the results thereof (e.g. forms of organisation, mathematical methods, programming languages).

NOTE 3 The system is considered to be separated from the environment and from the other external systems by an imaginary surface, which cuts the links between them and the system.

NOTE 4 The term "system" should be qualified when it is not clear from the context to what it refers, e.g. control system, colorimetric system, system of units, transmission system.

NOTE 5 When a system is part of another system, it may be considered as an object as defined in this standard.

[IEV 151-11-27, modified]

### 3.3

#### **aspect**

specified way of viewing an *object*

### 3.4

#### **process**

set of interacting operations by which material, energy or information is transformed, transported or stored

NOTE In the context of this standard the term "process" refers to the industrial process (assembly, construction, installation, etc.) through which an object is realized.

[IEV 351-21-43, modified]

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### 3.5

#### **function**

intended or accomplished purpose or task

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### 3.6

#### **product**

intended or accomplished result of labour, or of a natural or artificial *process*

### 3.7

#### **component**

*product* used as a constituent in an assembled *product*, *system* or plant

### 3.8

#### **location**

intended or accomplished space

### 3.9

#### **structure**

organization of relations among *objects* of a *system* describing constituency relations (consists-of / is-a-part-of)

### 3.10

#### **identifier**

attribute associated with an *object* to unambiguously distinguish it from other *objects* within a specified domain

### 3.11

#### **reference designation**

*identifier* 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*

### 3.12

#### **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.

### 3.13

#### **multi-level reference designation**

*reference designation* consisting of concatenated *single-level reference designations*

### 3.14

#### **reference designation set**

collection of two or more *reference designations* assigned to an *object* of which at least one unambiguously identifies this *object*

## 4 Concepts

### 4.1 Object

The definition of the term "object" is very general (see 3.1) and covers all items that are subject to activities in the whole life cycle of a system.

Most objects have a physical existence as they are tangible (e.g. a transformer, a lamp, a valve, a building). However, there are objects that do not have a physical existence but exist for different purposes, for example:

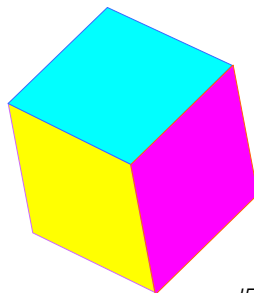
- an object exists only by means of the existence of its sub-objects, thus the considered object is defined for structuring purposes (i.e. a system);
- for identification of a set of information.

This international standard does not distinguish between those objects that have a physical existence and those that have not. Both kinds of objects can be relevant for being identified and handled in the life-cycle of a system.

There are no genuine rules on how an object is established. In fact, it is the designer/engineer who decides that an object exists and establishes the need to identify this object.

When an object is established, information may be associated with it. This information may change throughout the life cycle of that object

Figure 2 illustrates an object where the surface of each side of the cube represents one aspect of the object. This representation of an object is used in further figures for the explanation of the concepts.



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**Figure 2 – Illustration of an object**