TECHNICAL SPECIFICATION

ISO/TS 16952-1

Technical product documentation — Reference designation system —

Part 1:
General application rules

Documentation technique de produits — Système de désignation de référence —

Partie 1: Règles générales d'application

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

— an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;

— an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

It is intended, at the next revision of ISO/TS 16952-1 and of IEC 61346-1, to combine both documents into one ISO/IEC standard with a 80000 number.

ISO/TS 16952-1 was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 10, *Process plant documentation and tpd-symbols*.

ISO/TS 16952 consists of the following parts, under the general title *Technical product documentation — Reference designation system*:

— *Part 1: General application rules*

The following part is under preparation:

— *Part 10: Power plants*

Further parts on sector-specific rules are under consideration.

Introduction

IEC 61346 is the basic standard for structuring principles and reference designation. IEC 61346-1 provides a number of possibilities for the construction of reference designations. For most applications, however, only a subset of the possibilities given in IEC 61346-1 need to be used. IEC 61346-1 does not restrict the use of the reference designation system to a specific area. It is sometimes necessary to incorporate further basic requirements, and it is recommended that these be specified and explained in supporting documentation.

To enhance an efficient implementation of those basic rules and to ensure a consistent interpretation of those rules, an easily understandable system is necessary. Consequently, ISO/TS 16952:

— offers broadly based, general solutions with rules for a practice-oriented and consistent application;

— fulfils the requirements for ergonomics and occupational safety;

— takes into account memorability, labelling, and processing in common office- and CAx-tools;

— summarizes in a single document all technical designation tasks (reference designations according to function, product and location aspect as well as designation of connections, signals, documents);

— recommends decoupling of reference designation activities of plant designers and of equipment suppliers, by use and allocation of different aspects;

— introduces the "conjoint designation" for higher level objects without specific aspect;

— supports the handling of computer programs and parts of such programs as technical products;

— forms the basis for sector-specific solutions and specifications in further parts of ISO/TS 16952, in order to achieve a consistent designation across different technical fields.

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Technical product documentation — Reference designation system —

Part 1:
General application rules

1 Scope

This part of ISO/TS 16952 establishes comprehensive and practice-oriented principles and rules for the designation of technical objects within a system, as well as for the designation of connections, signals and documents in accordance with the corresponding basic standards.

The principles of this part of ISO/TS 16952 apply to all technical fields for all industries and can be applied in all phases of the life cycle of a technical object.

This part of ISO/TS 16952 serves as the basis for sector-specific parts of ISO/TS 16952 and thus forms the connecting element between them and the basic IEC 61346 series.

The designation of types, individuals, cost-centres, projects, etc. is not covered by this part of ISO/TS 16952.

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.

ISO 9355-1, *Ergonomic requirements for the design of displays and control actuators — Part 1: Human interactions with displays and control actuators*

ISO 9355-2, *Ergonomic requirements for the design of displays and control actuators — Part 2: Displays*

ISO 12100-1, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

ISO 12100-2, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

IEC 61175, *Industrial systems, installations and equipment and industrial products — Designation of signals*

IEC 61346-1:1996, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 1: Basic rules*

IEC 61346-2:2000, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 2: Classification of objects and codes for classes*

IEC 61355, *Classification and designation of documents for plants, systems and equipment*

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

3 Terms and definitions

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

3.1
aspect
specific way of selecting information on, or describing a system or an object of a system

[IEC 61346-1]

3.2
building
construction works that has the provision of shelter for its occupants or contents as one of its main purposes, and which is usually partially or totally enclosed and designed to stand permanently in one place

[ISO 6707-1]

3.3
designation
generation of task-specific reference designations for technical objects in accordance with fixed rules

3.4
document
information on a data medium

NOTE 1   Normally a document is designated in accordance with the type of information and the form of presentation, for example overview diagram, connection table, function chart.

NOTE 2   Information can appear in static manner on paper and microform, or dynamically on (video) display devices.

[IEC 61082-1]

3.5
document kind
type of document defined with respect to its specified content of information and form of presentation

[IEC 61355]

3.6
document kind class
group of document kinds having similar characteristics concerning the content of information independent of the form of presentation

[IEC 61355]

3.7
documentation
collection of documents assigned to a specific object

NOTE   This can include technical, commercial and/or other documents.

[IEC 61082-1]

3.8
function
purpose related to an object

[IEC 61346-1]

3.9
infrastructure
system of facilities, equipment and services required for the operation of an organization

[ISO 9000]

3.10
multi-level reference designation
reference designation derived from a structural path through an overall system

[IEC 61346-1]

3.11
object
entity treated in the process of design, engineering, realization, operation, maintenance and demolition

NOTE 1   The entity can refer to a physical or non-physical "thing", or to a set of information associated with it.

NOTE 2   Depending on its purpose, an object can be viewed in different ways, called "aspects".

[IEC 61346-1]

3.12
plant
complete set of technical equipment and facilities for solving a defined technical task

NOTE   A plant includes apparatus, machines, instruments, devices, means of transportation, control equipment and other operating equipment.

[IEC 60050-351]

3.13
process
sequence of chemical, physical or biological operations for the conversion, transport or storage of material or energy

NOTE 1   Different processes or process steps can be carried out in the same process plant or plant section at different times.

[ISO 10628]

NOTE 2   A process can also be regarded as an entirety of interacting events in a system through which material, energy or information are transformed, transported or stored.

3.14
product
intended or accomplished result of labour, or of a natural or artificial process

NOTE 1   A product usually has a part number, order number, type designation, and/or a name.

NOTE 2   A technical system or plant can be considered as a product.

[IEC 61346-1]

3.15
reference designation
identifier of a specific object with respect to the system of which the object is a constituent, based on one or more aspects of that system

[IEC 61346-1]

3.16
signal
identification of information and transferring of the information from an object to another

[IEC 61175]

3.17
single-level reference designation
reference designation assigned with respect to the object of which the specific object is a direct constituent

[IEC 61346-1]

3.18
structure
relations among the elements of a system

[IEC 60050-351]

3.19
system
set of interrelated objects

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[IEC 61346-1]

3.20
terminal
point of access to an object intended for connection to an external network

NOTE 1   The connection can refer to:

⎯ a physical interface between conductors and/or contacts, or piping and/or duct systems to provide a signal, energy or material flow path;

⎯ an association of functional nature established between logical elements, software modules, etc. for conveying information.

NOTE 2   The external networks can be of different nature and accordingly they can be classified. IEC 81714-3 provides such classifications.

[IEC 61666]

4 Designation systematics

4.1 General

4.1.1   Designation systematics is a well-ordered and methodical process of forming designations on the basis of simple rules, ensuring compliance with the following requirements:

a) consistency in all phases (e.g. engineering, operation and decommissioning) and engineering disciplines (e.g. process, civil, mechanical and electrical engineering) of a project;

b) fulfilment of ergonomic principles in accordance with ISO 12100-1, ISO 12100-2, ISO 9355-1 and ISO 9355-2, with regard to occupational health and safety (hazard analysis, fault tracing, job orders, equipment release procedures, etc.), e. g.

— simple structure of designation,

— easy-to-remember representation,

— clear legibility and easy memorability,

— error-free interpretation;

c) improvement of information management and information quality control, e.g. by establishing:

— identifiers for data and document management systems,

— identifiers for configuration and quality management systems,

— clear cross-references between physical application and documentation.

The designation shall clearly and unambiguously identify all objects and associated information according to their function, implementation and location.

The designation shall describe the real structure of an object and its relations to other objects.

The designation of the parts of a system shall be generic to such an extent that the system can be incorporated in any other system, without the need for changing the reference designations in any of the systems involved.

4.1.2   IEC 61346-1 provides a number of possibilities for the construction of reference designation. For most applications, however, only a subset of the possibilities given in IEC 61346-1 need to be used. For a consistent application in practice, this part of ISO/TS 16952 establishes clear and easily understandable rules and guidelines as well as well-defined specifications for the following:

— tasks of designation (see Clause 5),

— general and sector neutral construction of designation (see Clause 6).

4.1.3   This part of ISO/TS 16952 stipulates only basic rules. Detailed and specific requirements are given in the sector-specific parts of ISO/TS 16952, in order to cover the specific needs of different application fields. These specific requirements comprise:

— a relevant subset of designation possibilities,

— letter codes for infrastructure objects,

— a reference designation that identifies the object unambiguously (main aspect),

— transitions between different aspects,

— a sector-specific designation structure,

— the allocation of structural levels to letter code tables,

— additional aspects.

4.1.4 Furthermore, the following specifications need to be established and documented for each project:

— conjoint allocation,

— notation, e.g. in documents, on labels, on displays.

4.1.5 The chosen structure, with corresponding reference designations, shall be documented not only in relevant object describing documents, but also in a separate document describing the structure.

For a specific project, the general rules shall be listed at the start of the designation process and documented complete with specific requirements in separate instructions.

4.1.6 An example of a designation process within a project is given in Annex A. Application examples are given in Annex B. Other terms and definitions that are used in the context of a "designation system" and will be helpful for the elaboration of sector-specific parts of ISO/TS 16952 are given in Annex C.

4.2 Designation process

The designation process comprises the following sub-processes.

Starting from process flow diagrams, overview diagrams, site plans, etc. used to describe the structure of the overall project in accordance with IEC 61346-1, the overall object shall be broken down according to different viewpoints. For instance, a location with industrial facilities can be divided into specific areas (e.g. manufacture, power plant). These objects shall be defined as top-level nodes of the overall structure and shall serve as starting point for subdivisions into lower-level aspect-oriented structures (see 5.3.1).

At an early stage in the planning, the task-oriented representations of the object of interest shall be translated into a hierarchical tree-like structure under a functional aspect. In subsequent phases, the products that fulfil the tasks of the partial objects viewed under functional aspects shall be defined and structured. To designate the location of the products, the overall object shall be structured under the location aspect. Structuring shall be performed in compliance with the principle of constituency, i.e. an object is a constituent of a single higher object, but can comprise several sub-objects (hierarchical structural model). The subdividing process is completed with the smallest object of interest for the defined purpose.

Partial objects shall be defined and classified during the structuring process. To classify partial objects, it is possible to use IEC 61346-2:2000, Table 1, for non aspect-specific purposes and/or sector- or project-specific letter code tables structured in accordance with IEC 61346-2:2000, Table 2. In cases where both methods are used, the allocations of the structural level to the corresponding letter code level shall be defined. The parts of an object shall be classified in accordance with their location in the structure (structural level), as specified by the agreed tables.

The prefix for the aspect, the letter code of the object class and an additional number form the single-level reference designation. The number is used to distinguish between objects belonging to the same class and to the same overall object. The multi-level reference designation is created by concatenating the single-level reference designations represented in the path beginning with the top-most one.

To establish a unique designation, it is necessary to create task-specific designation combinations (in relation to technical objects, signals, connections, documents), as described in Clause 6.

The designation shall be used for labelling technical objects in the plant, for designating documents and for identifying the representation of objects in documents.

Reference designations with different aspects can be used in databases to network object information in different records ("pragmatic relations"). This yields a large number of task-related evaluation options, e.g. information about the location of products performing a function and which are reported as defective.

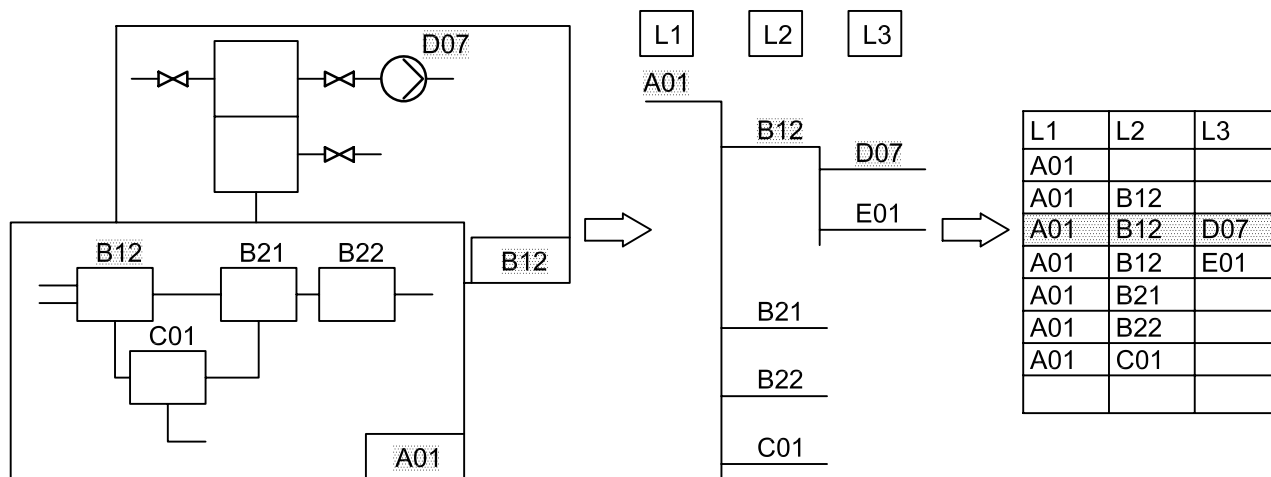Figure 1 shows the schematic representation of the designation process.

Figure 1 — Schematic representation of the designation process

5 Tasks of designation

5.1 General

A reference designation shall:

— identify an object,

— provide information regarding the class to which the object belongs, and

— provide information on where the object is located within a structure.

5.2 Conjoint designation

It is recognized that on a site different plants may exist. In order to address these plants with respect to the site, it may be necessary to apply a conjoint designation. A conjoint designation is a reference designation of a plant/system with respect to the site, which is not related to one of the defined aspects.

The use of the conjoint designation is optional. The application, structure and number of data characters shall be defined project-specifically.

If this designation is used as part of the identifier (see 6.1), the systems, objects and products which fulfil the same task in different plants can have the same reference designation. Unambiguous designations are obtained by means of the different conjoint designations. There is a significant ergonomic advantage in adopting this approach. Even if the equipment is moved from plant to plant, the necessary changes of its designation are limited. The same principle applies to designations of locations.
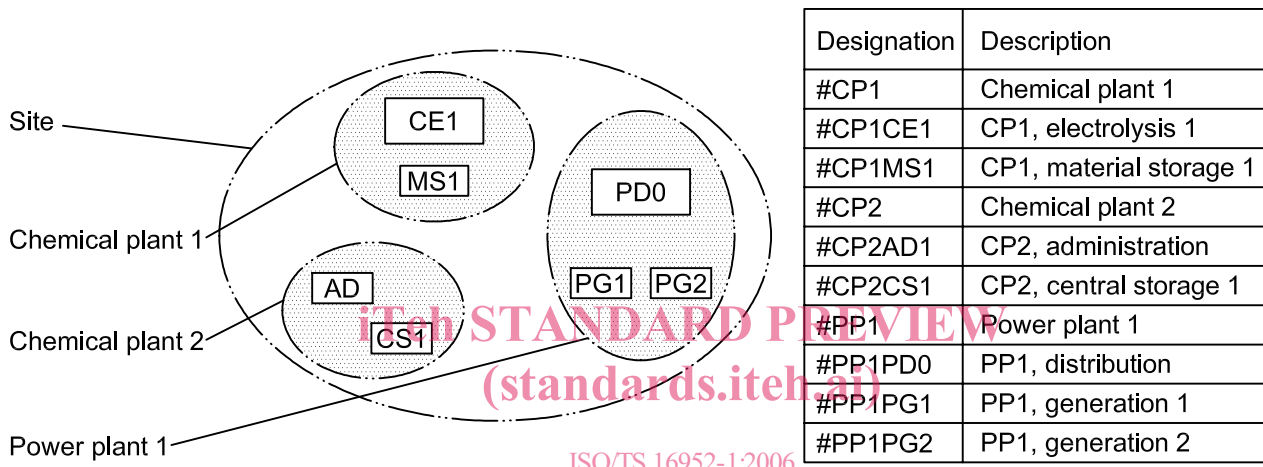

Designation	Description
#CP1	Chemical plant 1
#CP1CE1	CP1, electrolysis 1
#CP1MS1	CP1, material storage 1
#CP2	Chemical plant 2
#CP2AD1	CP2, administration
#CP2CS1	CP2, central storage 1
#PP1	Power plant 1
#PP1PD0	PP1, distribution
#PP1PG1	PP1, generation 1
#PP1PG2	PP1, generation 2

Figure 2 — Conjoint designation, designation principle

5.3 Designation of technical objects

### 5.3.1 Reference designation

5.3.1.1 Aspects

IEC 61346-1:1996 specifies that "the reference designation identifies objects for the purpose of correlating information about an object among different kinds of documents and the products implementing the system".

A system, and each constituent object, can be viewed in many ways, called "aspects" (see Figure 3).

Questions:

— What does the object do? (function aspect)

— How is the object constructed? (product aspect)

— Where is the object located? (location aspect)
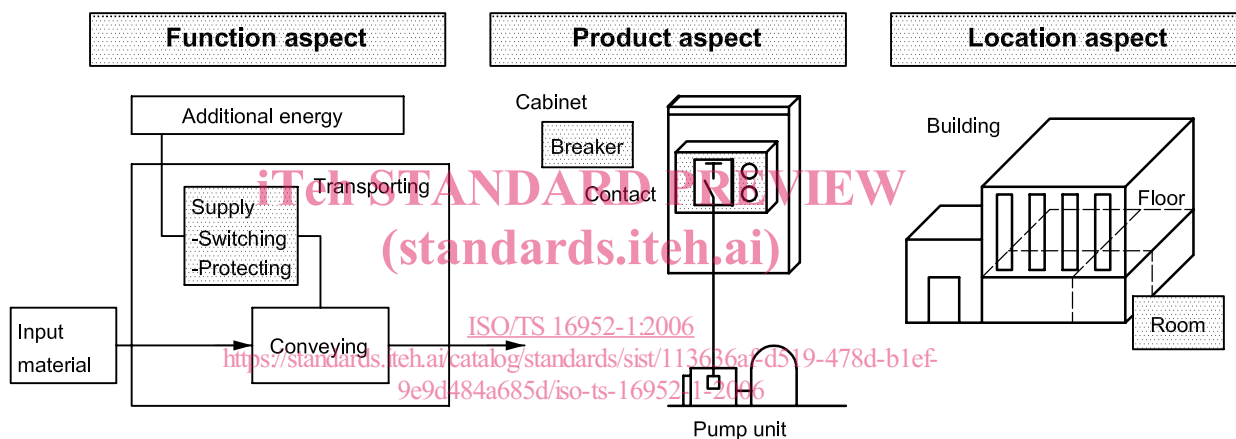
Explanations:

— Materials are to be conveyed in a transport process. This task requires electrical energy, which shall be switched by a control. The equipment shall be protected from the effects of short circuit and overload (function aspect).

— A breaker with contacts is part of a cabinet (product aspect).

— A building with floors and a number of rooms (location aspect).

Figure 3 — Aspects