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**Industrial systems, installations and  
equipment and industrial products —  
Structuring principles and reference  
designation —**

Part 10:  
**Power plants**

*Systèmes industriels, installations et appareils et produits  
industriels — Principes de structuration et désignation de  
référence —*

*Partie 10: Centrales électriques*



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# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>2</b>
<b>4 Designation systematic</b> .....	<b>5</b>
4.1 General.....	5
4.2 Process of forming designations.....	5
4.3 General rules for designation structure.....	6
4.4 Rules for forming designations.....	7
<b>5 Designation tasks</b> .....	<b>8</b>
5.1 General.....	8
5.2 Conjoint designation.....	8
5.3 Designation of technical objects — Reference designation.....	9
5.3.1 General.....	9
5.3.2 Function aspect.....	9
5.3.3 Product aspect.....	10
5.3.4 Transition from function aspect to product aspect.....	10
5.3.5 Location aspect.....	11
5.4 Specific designations.....	11
5.4.1 Signal designation.....	11
5.4.2 Terminal designation.....	11
5.4.3 Document designation.....	12
<b>6 Structure and contents of designation blocks</b> .....	<b>12</b>
6.1 General.....	12
6.2 Designation block “Conjoint designation”.....	12
6.3 Function aspect.....	12
6.3.1 Designation block “Function”.....	12
6.3.2 Designation block “Function allocation”.....	13
6.4 Product aspect — Designation block “Product”.....	14
6.5 Transition from function aspect to product aspect.....	15
6.6 Location aspect.....	19
6.6.1 Designation block “Point of installation”.....	19
6.6.2 Designation block “Location”.....	21
6.7 Specific designations.....	22
6.7.1 Signal designation.....	22
6.7.2 Terminal designation.....	25
6.7.3 Document designation.....	26
<b>7 Application of designation</b> .....	<b>26</b>
7.1 Combination of designation blocks.....	26
7.2 Designation notation.....	27
7.2.1 General.....	27
7.2.2 Notation in technical documents.....	27
7.2.3 Notation in the plant.....	28
<b>Annex A (normative) Representation of designations</b> .....	<b>29</b>
<b>Annex B (normative) Special stipulations</b> .....	<b>31</b>
<b>Annex C (informative) Stipulations between parties to the project</b> .....	<b>35</b>
<b>Annex D (informative) Application examples</b> .....	<b>36</b>
<b>Bibliography</b> .....	<b>44</b>

## 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.

ISO/TS 81346-10 was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 10, *Process plant documentation and tpd-symbols*.

Documents in the 80000 to 89999 range of reference numbers are developed by collaboration between ISO and IEC.

ISO 81346 consists of the following parts, under the general title *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designation*:

- *Part 3: Application rules for a reference designation system* [Technical Specification]
- *Part 10: Power plants* [Technical Specification]

IEC 81346 consists of the following parts, under the general title *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designation*:

- *Part 1: Basic rules*
- *Part 2: Classification of objects and codes for classes*

Further parts on sector-specific rules are under consideration.

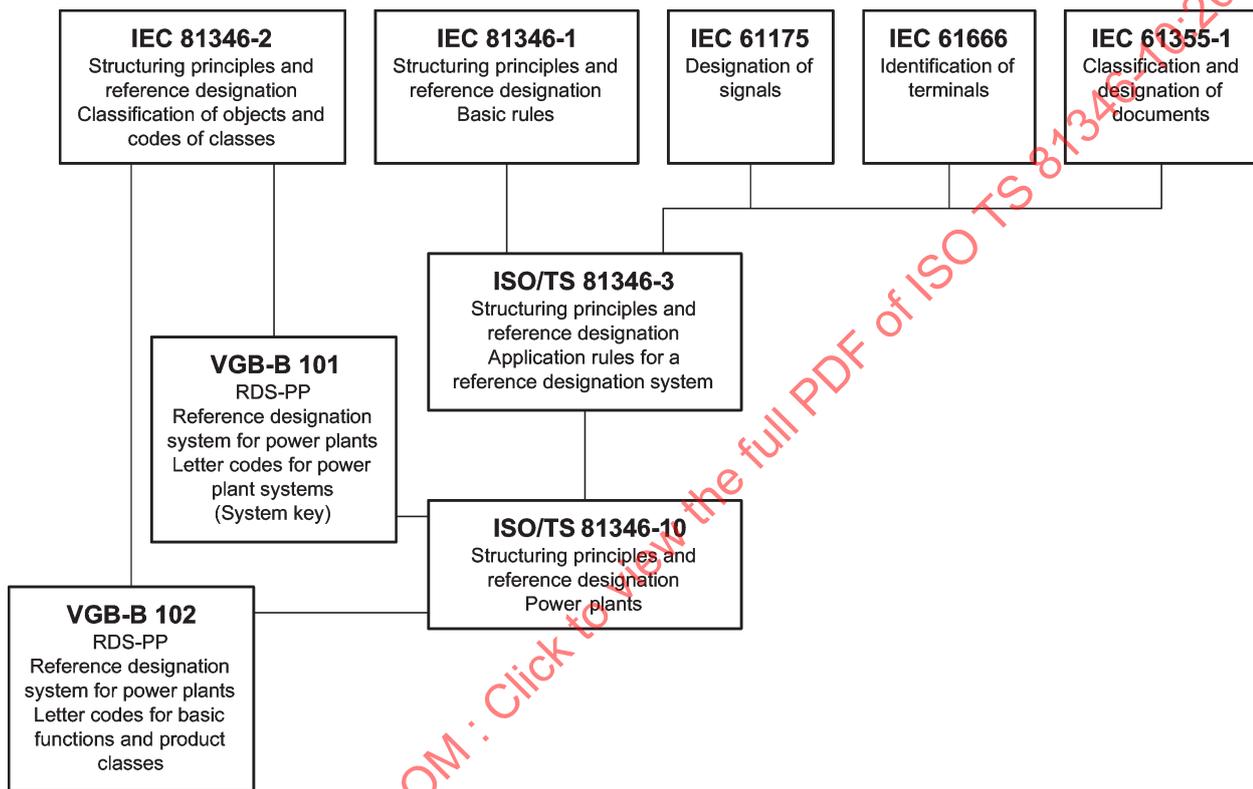
NOTE ISO/TC 10/SC 10 and IEC/TC 3 have agreed to integrate their publications on structuring principles and reference designation in the ISO/IEC 81346 series to ensure a consistent set of publications based on IEC 81346-1 and -2. Against this background, ISO/TS 16952-10 has been converted to ISO/TS 81346-10 following its systematic review. At this time, apart from necessary updates, no further changes have been made. Among the issues to be considered at the next review/revision is how to make the referenced VGB publications, although recognized as having wide acceptance and authoritative status as well as being publicly available, better accessible to ISO/IEC users, e.g. by integrating them in the ISO/IEC 81346 series.

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## Introduction

Based on ISO/TS 81346-3, this part of ISO 81346 serves to designate plants, sections of plants and items of equipment in any type of installation for industrial production of electrical and thermal energy according to task, type and location. This sector-specific Reference Designation System (RDS) is intended for application by all engineering disciplines for the entire life cycle of a plant, from planning, licensing, construction, operation and maintenance, re-powering, extension and recreation, to dismantling and demolition. Based on the structuring principles and reference designation rules of IEC 81346 and other documents, ISO 81346 breaks down these rules into interdisciplinary guidelines for practical application.

The relationships of input documents with this part of ISO 81346 are shown in [Figure 1](#).



**Figure 1 — Structuring and designation standards**

This part of ISO 81346 establishes the prerequisites for

- uniform designation of all power plant processes (see [Figure 2](#) for a summary of the energy conversion cycle),
- uniform designation of all power plant types,
- language-independent codes to ensure international applicability,
- adequate capacity and possible detail for designation of all systems, equipment and structures,
- adequate extension possibilities for new technologies,
- consistent designation for planning, licensing, construction, operation, maintenance and decommissioning,
- common applicability in mechanical, electrical, instrumentation and control (I&C) and civil engineering, with the simultaneous possibility to designate according to function, product and location aspects,

- fulfilment of quality management requirements,
- fulfilment of the technical documents management system requirements,
- fulfilment of the requirements for occupational safety and ergonomics.

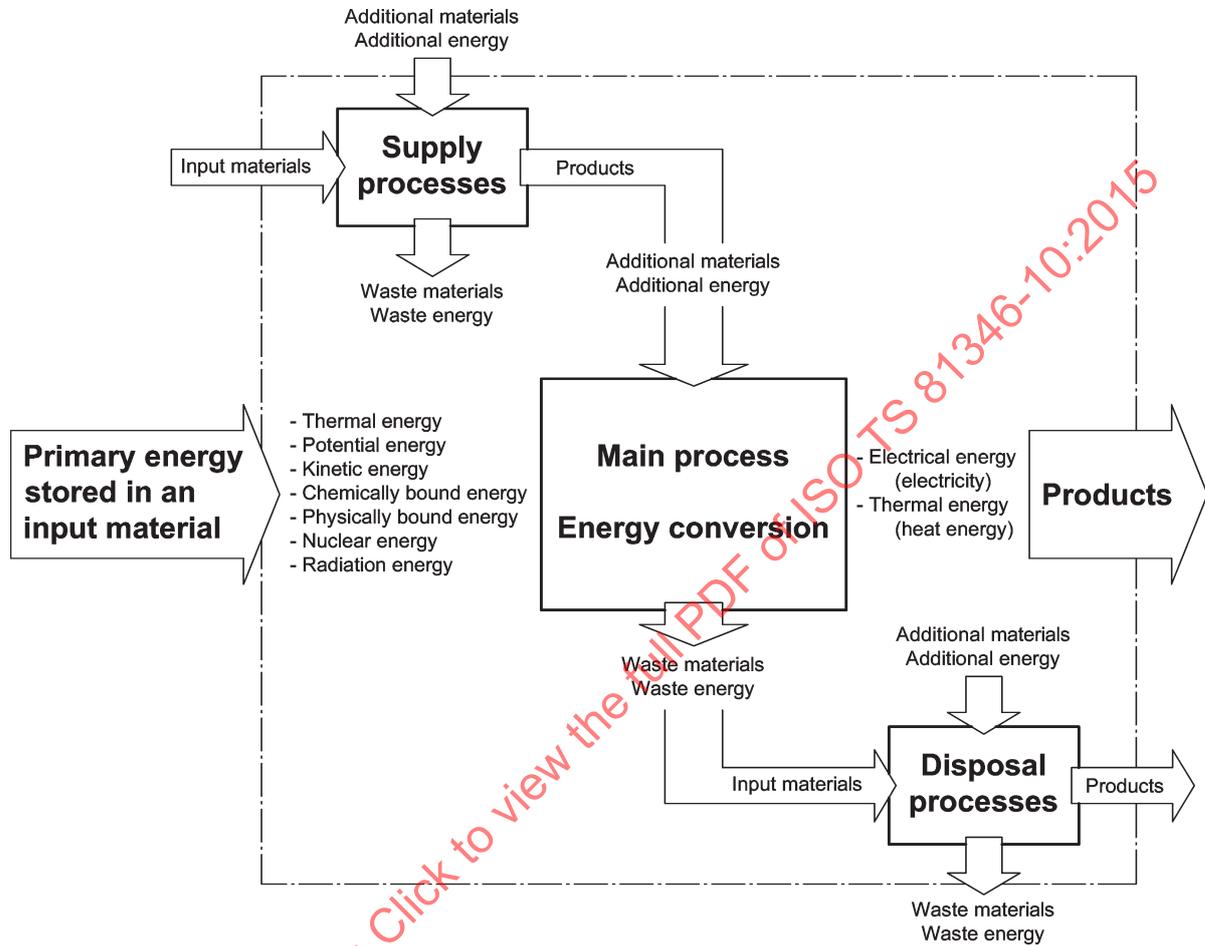


Figure 2 — Principle of energy conversion including supply and disposal processes

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# Industrial systems, installations and equipment and industrial products — Structuring principles and reference designation —

## Part 10: Power plants

### 1 Scope

This part of ISO 81346 contains sector-specific stipulations for structuring principles and reference designation rules on technical products and technical product documentation of power plants.

It applies in combination with IEC 81346-2, ISO/TS 81346-3, VGB-B 101 and VGB-B 102 for the classification of systems and objects, and for function-, product- and location-specific designation of technical products and their documentation for power plants.

It specifies the designation blocks for the clear identification and localization of the technical products, which are used for their labelling in the plant, for their designation in technical documents and for the designation of the technical documents as well.

This part of ISO 81346 encompasses the process of energy conversion. The specifications in this document apply for the power plant process, for the primary energy supply and final products distribution, as well as for auxiliary media and auxiliary energy supply, waste materials and waste energy disposal.

This part of ISO 81346 is not applicable to recovery of the primary energy and the media for supplying the process, nor to the processing of residues from process disposal (e.g. gypsum, slag products, waste water, etc.).

### 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 60445, *Basic and safety principles for man-machine interface, marking and identification — Identification of equipment terminals and of terminations of certain designated conductors, including general rules of an alphanumeric system*

IEC 61082-1, *Preparation of documents used in electrotechnology — Part 1: Rules*

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

IEC 61355-1, *Classification and designation of documents for plants, systems and equipment — Part 1: Rules and application tables*

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*

ISO/TS 81346-3:2012, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 3: Application rules for a reference designation system*

EN 50005, *Low Voltage Switchgear and Controlgear for Industrial Use — Terminal Marking and Distinctive Number — General Rules*

VGB-B 101, *Reference designation system for power plants (RDS-PP) — Letter codes for power plant systems (system key)*<sup>1)</sup>

VGB-B 102, *Reference designation system for power plants (RDS-PP) — Letter codes for basic functions and product classes* <sup>1)</sup>

### 3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO/TS 81346-3 and the following apply.

#### 3.1 ancillary system

system which is not directly required for the power plant process

Note 1 to entry: This includes heating, ventilation, air-conditioning systems, space-heating systems, stationary compressed air supplies, fire protection systems, cranes, elevators, workshops, staff amenities, etc.

#### 3.2 aspect

specific way of viewing an object

Note 1 to entry: Such ways may be:

- what the system or object is doing (function viewpoint);
- how the system or object is constructed (product viewpoint);
- where the system or object is located (location viewpoint).

[SOURCE: IEC 81346-1:2009, definition 3.3]

#### 3.3 auxiliary system

system which is required for the support of a power plant process

Note 1 to entry: This includes auxiliary steam system, compressed air, carrier air, control air, central chemicals supply, sampling systems, etc.

#### 3.4 control

purposeful action on or in a process to meet specified objectives

[SOURCE: IEC 60050-351:2013, definition 351-42-19]

Note 1 to entry: This includes measure, count, monitor, indicate, alert, record, log, manipulate, evaluate, optimize, intervene, manipulate by hand, safeguard, structure, configure, parameter, automate.

#### 3.5 designation block

structured compilation of related information units, consisting of a prefix, letters and numbers, and optionally a breakdown mark

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1) Source: [www.vgb.org](http://www.vgb.org).

**3.6****document kind class**

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

[SOURCE: IEC 61355-1:2008, definition 3.7]

**3.7****documentation**

collection of documents assigned to a specific object

Note 1 to entry: This may include technical, commercial and/or other documents.

[SOURCE: IEC 61082-1:2006, definition 3.1.4]

**3.8****functional area**

combination of groups and/or elements in a unit that can be used independently

**3.9****functional group**

combination of elements in a unit that can be used independently

**3.10****functional unit**

item under consideration defined according to function or effect

Note 1 to entry: A functional unit produces the interactive effect between input variables and output variables.

Note 2 to entry: A functional unit may be implemented by one or several physical units or program modules.

Note 3 to entry: If compound terms are used to designate functional units, the following should be used as the last word (in ascending order of rank):

- element,
- system.

Note 4 to entry: This entry was numbered 351-32-02 in IEC 60050-351:2006.

[SOURCE: IEC 60050-351:2013, definition 351-56-02]

**3.11****multi-level reference designation**

reference designation consisting of concatenated single-level reference designations

[SOURCE: IEC 81346-1:2009, definition 3.13]

**3.12****object**

entity treated in the process of development, implementation, usage and disposal

Note 1 to entry: The entity may refer to a physical or non-physical “thing”, i.e. anything that might exist, exists or did exist.

Note 2 to entry: The object has information associated to it.

[SOURCE: IEC 81346-1:2009, definition 3.1]

**3.13****operating equipment**

all products, which serve to implement technical tasks as a whole or in individual parts

### 3.14

#### **physical unit**

item under consideration, defined according to construction or configuration

Note 1 to entry: One or several functional units may be implemented in a single physical unit. The corresponding functional unit(s) is/are in some cases not explicitly designated.

Note 2 to entry: The various parts of a physical unit need not be functionally interrelated. For example, a physical unit may be in the form of an integrated circuit with four independent AND modules.

Note 3 to entry: If compound terms are used to designate physical units, the following should be used as the last word (in ascending order of rank):

- component,
- assembly,
- device,
- plant.

Note 4 to entry: The entry was numbered 351-32-03 in IEC 60050-351:2006.

[SOURCE: IEC 60050-351:2013, definition 351-56-03]

### 3.15

#### **plant**

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

Note 1 to entry: A plant includes apparatus, machines, instruments, devices, means of transportation, control equipment and other operating equipment.

Note 2 to entry: This entry was numbered 351-21-45 in IEC 60050-351:2006.

[SOURCE: IEC 60050-351:2013, definition 351-42-35]

### 3.16

#### **plant section**

part of a process plant that can, at least occasionally, be operated independently

[SOURCE: ISO 10628:1997, definition 3.7]

### 3.17

#### **power plant process**

process for the generation of electrical energy and/or heat energy products, including the conversion, supply, and disposal processes

### 3.18

#### **power plant unit**

technical plant including all equipment needed for fulfilment of a power plant process

### 3.19

#### **system**

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

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

Note 2 to entry: Elements of a system may be natural or man-made material objects, as well as modes of thinking and the results thereof (e.g. form of organization, mathematical methods, programming languages).

Note 3 to entry: 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 to entry: The term “system” should be qualified when it is not clear from the context to what it refers, e.g. control system, colourimetric system, system of units, transmission system.

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

[SOURCE: IEC 81346-1:2009, definition 3.2]

### 3.20

#### **technical equipment**

physical or functional unit used to fulfil a technical task

### 3.21

#### **terminal**

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

Note 1 to entry: The connection may refer to

- a) a physical interface between conductors and/or contacts, or piping and/or duct systems to provide a signal, energy or material flow path,
- b) an association of functional nature established between logical elements, software modules, etc. for conveying information.

Note 2 to entry: The external networks may be of different nature and accordingly they may be classified. IEC 81714-3 provides such classifications.

[SOURCE: IEC 61666:2010, definition 3.9]

### 3.22

#### **works**

system of industrial complexes and the associated infrastructure in one location

[SOURCE: ISO 10628:1997, definition 3.4]

## 4 Designation systematic

### 4.1 General

The designation systematic has to be understood as a well-organized, methodical process of forming permanent designations with ergonomic notation according to simple, easily learned rules that are based on predefined standards.

### 4.2 Process of forming designations

Starting from site plans, process flow diagrams, overview diagrams, etc., the entire power plant shall be broken down into plant sections, units and, if necessary, sub-units.

These shall then be further broken down, based on functional aspects, into systems, subsystems and technical equipment. Consistent compliance with the rule of constituency (an object can contain more than one sub-objects but is a constituent of one higher object only) shall be ensured. The objects identified in this way shall be classified based on specified letter codes in accordance with VGB-B 101 for systems and subsystems and VGB-B 102 for technical objects, and then provided with reference designations. All information about the object is governed under this designation.

Structuring of location-specific systems (structures, sites, etc.) shall be performed in the same way.

In further processing, the products required for fulfilment of the tasks shall be specified and designated. The combination of the function and product aspects generates a unique designation.

The results shall be documented.

### 4.3 General rules for designation structure

The general designation structure corresponds to ISO/TS 81346-3:2012, 6.1. It shall consist of a maximum of three main parts, see [Figure 3](#).

Identifier		
<b>Conjoint designation</b> – Site – Factory complex – Power plant unit – Subsystems based on project-specific requirements	<b>Reference designation</b> Technical objects based on – Function aspect – Product aspect – Location aspect	<b>Specific designation</b> – Signals – Terminals – Documents

Figure 3 — Parts of the identifier

The permitted combinations and their sequence are given in [Figure 4](#).

Conjoint designation		
Conjoint designation	Reference designation	
Conjoint designation	Reference designation	Specific designation
Conjoint designation		Specific designation
	Reference designation	
	Reference designation	Specific designation

Figure 4 — Permitted combinations of identifier parts

Each of the three identifier parts consists of one or more designation blocks (see [Figure 5](#) and [Clause 6](#)). Each designation block always contains

- a prefix in accordance with [Table 1](#) and
- letters and numbers in accordance with [Figure 6](#).

Prefix	Letters and numbers
--------	---------------------

Figure 5 — Designation block

The designation blocks are distinguished by prefixes and thus uniquely identified. The prefixes are always the first data characters in the designation blocks.

Table 1 — Prefixes for designation tasks

Prefix		Designation	Designation tasks/aspect	Prefix origin, basic principles specified in
1	2			
	#	Number	Conjoint designation	ISO/TS 81346-3
	=	Equals	Function-oriented designation	IEC 81346-1
=	=	Equals-Equals	Functional allocation	ISO/TS 81346-3
	+	Plus	Point of installation	IEC 81346-1
+	+	Plus-Plus	Location	ISO/TS 81346-3
	–	Minus	Product-oriented designation	IEC 81346-1
	:	Colon	Terminal designation	IEC 61666
	;	Semicolon	Signal designation	IEC 61175
	&	Ampersand	Document designation	IEC 61355-1

The letter codes and numbers in the designation blocks are subdivided into breakdown levels, sections and data characters as the smallest information unit.

The letters classify an object and are specified as letter codes in the corresponding tables (see VGB-B 101 and VGB-B 102).

The numbers are used to distinguish between objects with the same letter code, if they are constituents of the same object.

The basic structure is shown in [Figure 6](#). Details of the individual designation blocks are specified in [Clause 6](#).

Breakdown level	1				2					
	1		2		3		4			
Section										
Number / type of data position	A	A	A	N	N	A	A	N	N	N

#### Key

- A Letter  
N Number

Figure 6 — Basic structure of the designation part of a designation block

#### 4.4 Rules for forming designations

- **Rule 1:** Each object can be viewed in one or more ways called aspects (see [5.3.1](#)). The considered aspect is indicated by a prefix (see [Table 1](#)). The prefix shall be written always when a misinterpretation of the aspect is possible.
- **Rule 2:** Sections at the beginning and/or at the end of a designation block may be omitted.
- **Rule 3:** Only the transition from the function aspect to the product aspect is allowed.
- **Rule 4:** Designation of operating equipment shall be achieved exclusively by the transition from the functional aspect to the product aspect. The location-oriented designation carries the allocation information only.
- **Rule 5:** When designation blocks are combined, the prefix of the block that is the furthest to the right (smallest object of consideration) shall determine the aspect of the entire designation.

- **Rule 6:** The structure within an aspect shall comply with the principle of constituency in accordance with IEC 81346-1. Each object has only one predecessor, but can have one or more successors.
- **Rule 7:** Information regarding the installation and location of an object as well as the interaction of the object in the power plant process shall be represented by attaching the designations "+ point of installation", "++ location" and "==" functional allocation" respectively as a separate additional designation.
- **Rule 8:** The multi-level reference designations shall be presented in designation blocks with a fixed structure. The designation blocks shall be identified with regard to their aspect by prefixes, which have their own data character positions.
- **Rule 9:** Each designation section shall consist of a maximum of three data characters, but not all of these need to be written, depending on the application. The sections shall be structured with alternating alphabetic (A) and numeric (N) characters.
- **Rule 10:** The letter codes from VGB-B 101 and VGB-B 102 shall be used for the classification of objects. Only Roman capitals from A to Z, with the exception of "I" and "O", are permitted; country-specific letters and mnemonic assignments shall be avoided.
- **Rule 11:** Arabic numerals "1" to "9" and "0" (zero) shall be used for numerical data characters; numbers shall be written with leading zeros.
- **Rule 12:** For certain designation blocks between breakdown levels, the breakdown mark "." (full stop) with its own data position shall be applied. In this case Rule 2 shall apply for each part of the designation block on the left and on the right side of the breakdown mark.

## 5 Designation tasks

### 5.1 General

The designation system for power plants shall fulfil the following main tasks:

- a) unambiguous identification of the technical objects and documents;
- b) classification of objects according to their purpose, task or composition;
- c) coded representation of technical structures;
- d) coded representation of networked relationships.

This enables the designation of the following:

- conjoint allocations (factories, plant complexes, power plant units, etc.);
- technical objects (systems, plants, technical equipment, components, etc.);
- electrical and mechanical connections;
- signals and potentials;
- documents.

The structure and contents of designation for these different tasks are specified in [Clause 6](#).

### 5.2 Conjoint designation

It may be required to identify different sites. Moreover, different power plant units, non-unit-aligned or common plants and systems, different extension stages as well as power plant extrinsic works can exist or be planned on the same site (e.g. at cogeneration power plants). Conjoint designation facilitates a unified identification of such different plant complexes (for an example see [Figure D.1](#)).

Conjoint designation is a reference designation of a plant/system with respect to the site not being related to one of the defined aspects.

If it is used as part of the identifier, then systems, objects and products which fulfil the same task in different plants can have the same reference designation. The unambiguous nature of the equipment designation is achieved by using different conjoint designations. This provides significant ergonomic and economic advantages.

The use of the conjoint designation is optional.

### 5.3 Designation of technical objects — Reference designation

#### 5.3.1 General

Reference designation identifies objects for the purpose of correlating information about an object among different kinds of documents with the products implementing the system. A reference designation shall unambiguously identify an object of interest within the considered system.

An object within a system can be viewed in different ways, called aspects:

- What does the object do? (function aspect)
- How is the object constructed? (product aspect)
- Where is the object located? (location aspect)

#### 5.3.2 Function aspect

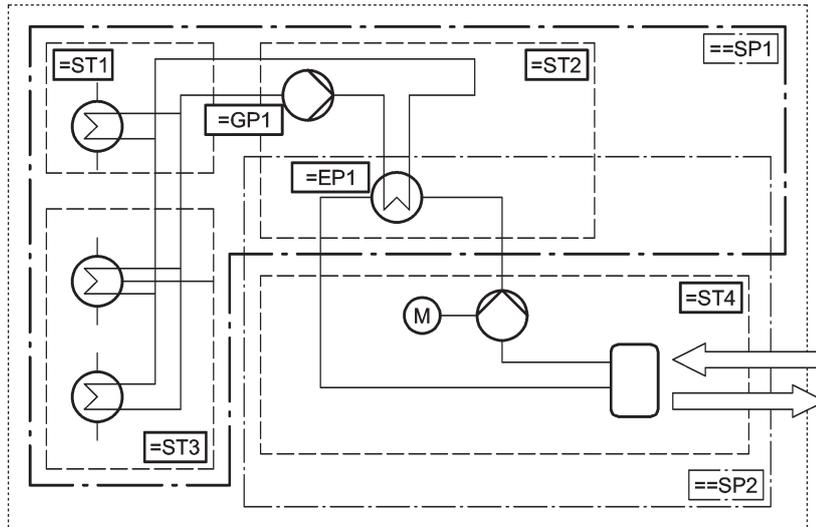
A function-oriented structure is based on the purpose of a system, without necessarily taking into account the products with which this purpose is fulfilled or their location.

Designation by function aspect is applied in an early planning phase of a project, and remains unchanged over the entire service life of an overall plant.

In power plant engineering, a distinction is made between functional units with static tasks (see [6.3.1](#)) and those with dynamic effect (see [6.3.2](#)).

[Figure 7](#) shows a diagram of a system consisting of several functions.

NOTE The notations in this diagram are not based on standardized letter codes.

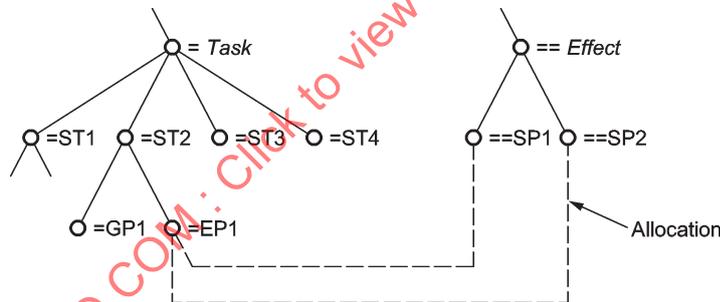


Subtask =ST2 consists of heat exchanger =EP1 and pump =GP1

**Figure 7 — Diagram of functional units by task (subtasks ST) and effect (subprocesses SP)**

As a subfunction of subtask =ST2, heat exchanger =EP1 has effects both in subprocess ==SP1 as well as in ==SP2.

Figure 8 shows the relationships in two structure trees with the constituent relations in each of the tree-like structures (solid lines) and the allocation (associative relations) between these two structures (dashed lines).



**Figure 8 — Function structures by task (subtasks ST) and effect (subprocesses SP)**

### 5.3.3 Product aspect

A product-oriented structure is based on the way in which a system is implemented, constructed or delivered, including the use of intermediate or end products, without necessarily taking into account their functions and/or locations.

Designation by product aspect is used in the manufacture of equipment parts without taking into account their application or places of use.

In power plant engineering, the designation according to product aspect is specifically restricted (see 6.4).

### 5.3.4 Transition from function aspect to product aspect

It is possible and often expedient to identify an object in a system using two aspects. Different aspects may be used for successive objects by making a transition from one aspect to another. Prerequisite for this is that the object is exclusively associated with the preceding functional unit.

Figure 9 shows the transition from the function aspect to the product aspect and allocation to the location structure for the example of the multi-level reference designation =LAB12 QM001 QA01 (feed water piping system, train 12, isolation 1; power breaker 1).

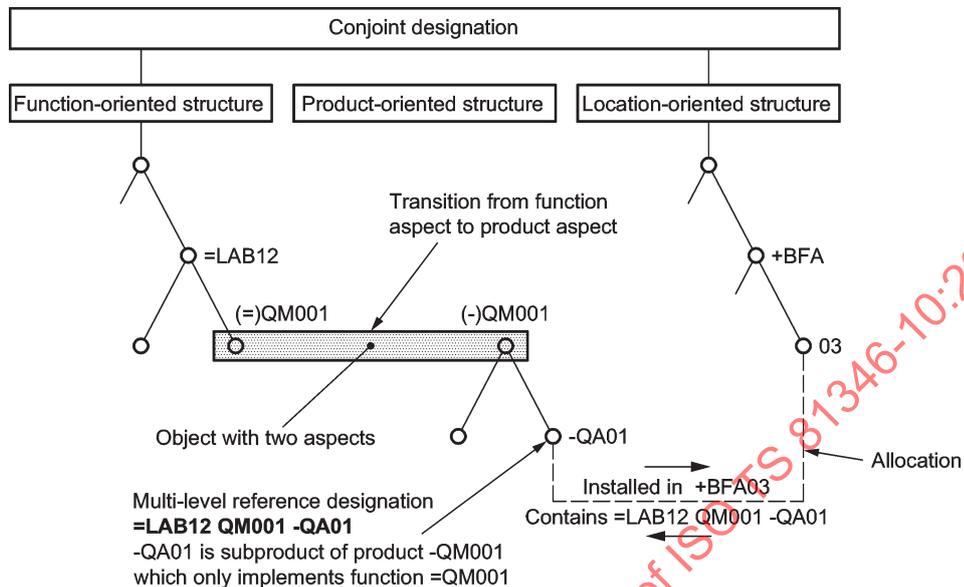


Figure 9 — Transition from function aspect to product aspect and allocation (associative relation)

### 5.3.5 Location aspect

A location-oriented structure is based on the topographical layout of a system and/or the surroundings in which the system is located, without necessarily taking into account products and/or functions.

This additional aspect enables distinction between the following:

- designation of points of installation within design units or modules of electrical and I&C systems, as well as designation of locations in mechanical engineering equipment (installation aspect);
- designation of object locations (erection aspect).

Designation by location aspect is applied in the designation of objects which perform the task of providing points of installation for other technical objects.

This type of designation is used for allocation of the equipment parts to their locations (point of installation, location).

## 5.4 Specific designations

### 5.4.1 Signal designation

Signals are the carriers of information and shall be designated unambiguously. The principles are specified in IEC 61175.

### 5.4.2 Terminal designation

Electrical and mechanical terminals shall be designated unambiguously. The principles are specified in IEC 61666.

5.4.3 Document designation

Documents shall be designated unambiguously. A non-manufacturer-specific, uniform and object-related designation in accordance with IEC 61355-1 is required for power plant technology.

6 Structure and contents of designation blocks

6.1 General

The designations are structured in the form of designation blocks, which are subdivided into sections (alphabetical and numerical). The number and type of data characters for the individual designation tasks are specified and described in the following subclauses.

The alphabetical sections classify systems, plants and technical equipment, components, points of installation and locations as well as signals, connections and documents according to their purpose or task. The numerical sections serve for distinction and numbering.

The rules specified in 4.4 apply.

6.2 Designation block “Conjoint designation”

Each of the two breakdown levels has a maximum of 12 data characters. The structure of the designation block, the contents, the meaning as well as the type and number of data characters shall be defined separately for every project.

Figure 10 shows the structure and contents of the designation block “Conjoint designation”.

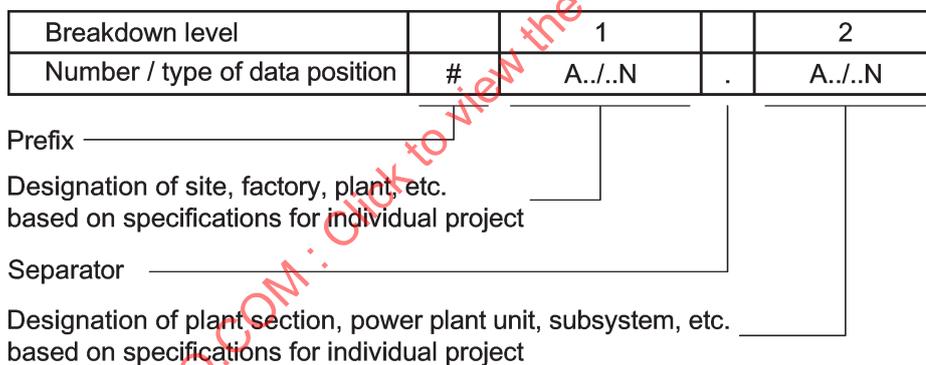
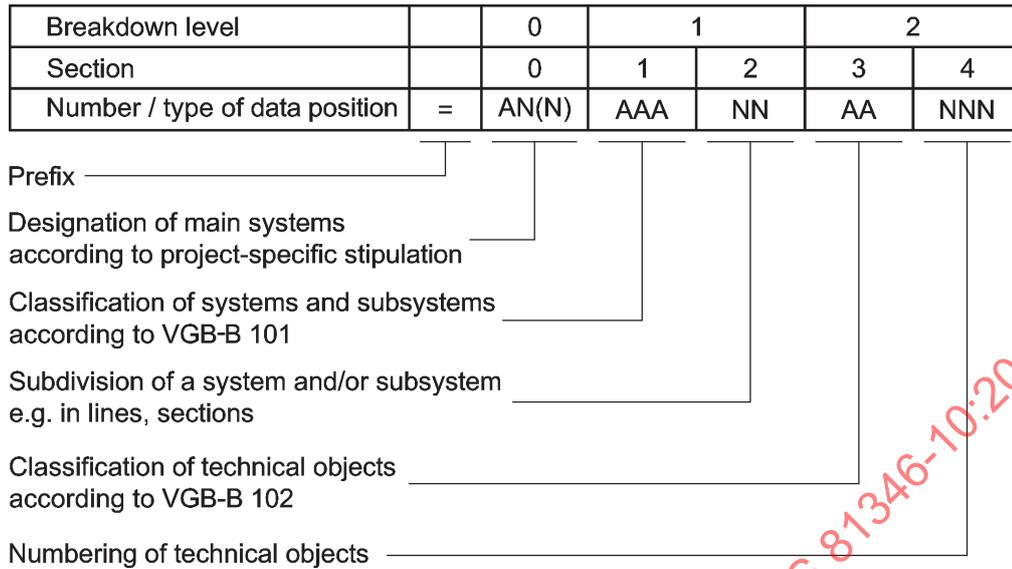


Figure 10 — Structure and contents of designation block “Conjoint designation”

6.3 Function aspect

6.3.1 Designation block “Function”

This designation block is used for function-oriented structuring with regard to the task and purpose (static tasks) of the technical objects. It is used to designate systems, plants, subsystems and technical equipment, see Figure 11.



**Figure 11 — Structure and contents of designation block “Function”**

Figure D.2 shows an example of breakdown level 0. Figure D.3 shows an example of a civil engineering object.

### 6.3.2 Designation block “Function allocation”

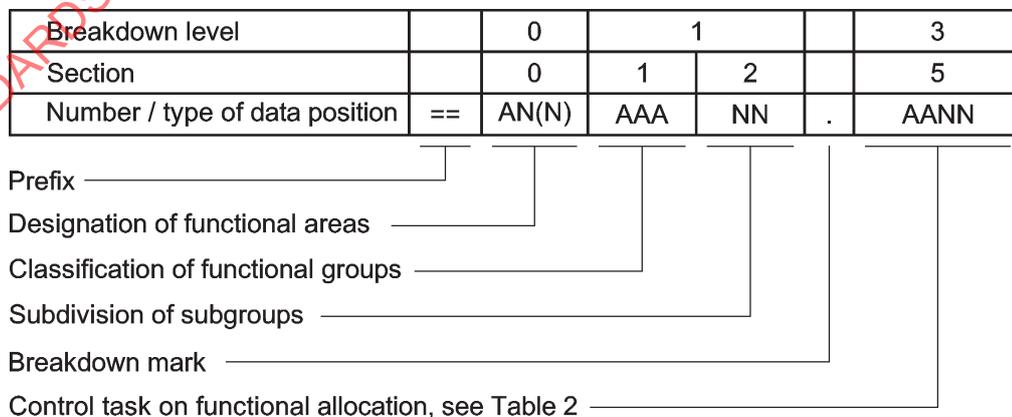
#### 6.3.2.1 General

This designation block is used for function-oriented structuring with regard to interaction (dynamic effect) of technical objects. It is used to designate relationships between functions, technical equipment and components.

#### 6.3.2.2 Designation of functional areas and groups as “Function allocation (group level)”

This designation block is used to designate functional areas and/or functional groups of technical objects, which are represented under a functional aspect different to that in the designation block “Function”, see Figure 12.

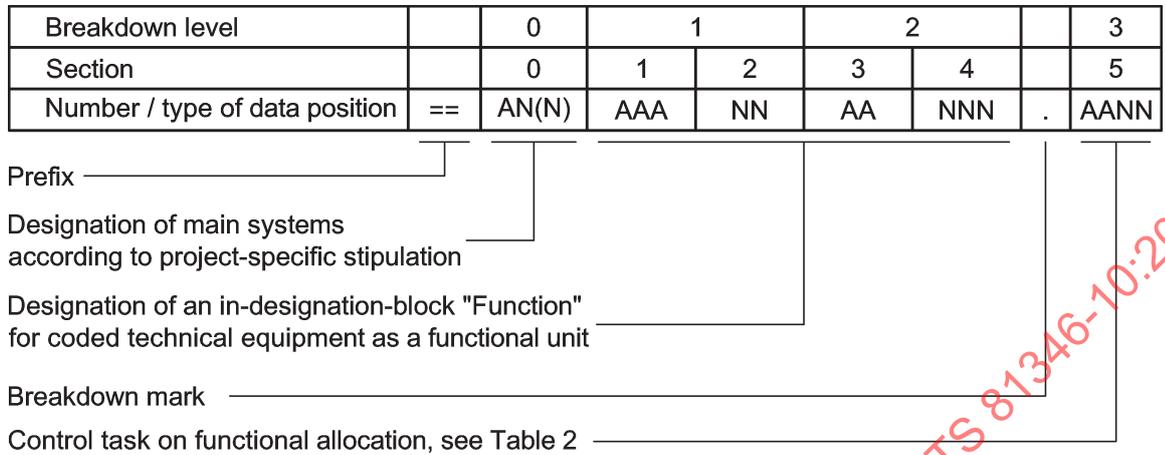
Universally valid contents cannot be specified (for examples see Figures D.4 and D.5).



**Figure 12 — Structure and contents of designation block “Function allocation” for functional areas**

**6.3.2.3 Designation of technical equipment as “Function allocation (individual level)”**

This designation block is used to designate technical equipment which is viewed in the sense of the function allocation. See [Figure 13](#) and [Table 2](#).



**Figure 13 — Structure and contents of designation block “Function allocation for technical equipment”**

**Table 2 — Control tasks for “Function allocation”, [section 5](#), data characters 1 and 2**

Code	Denomination
AA	Alarms, monitoring
CA	Closed-loop feedback control
CB	Reference loop control
HA	Operation and monitoring
MA	Direct measurement
MB	Measurand calculation
SA	Individual control
SB	Group control
ZA	Equipment protection
ZB	Plant protection

Further stipulations, if necessary, should be project-specific.

**6.4 Product aspect — Designation block “Product”**

This designation block is used for product-oriented designation of electrical and mechanical objects, see [Figure 14](#).

If an object is to be further broken down into its parts, the “nested product-oriented designation” shall be applied, where several blocks are concatenated in the sense of the multi-level reference designation. The prefix shall be placed in front of the first designation block only (example see [Figure D.6](#)).

Breakdown level		1		2	
Section		1	2	3	4
Number / type of data position	-	AA	(N)NN	AA	(N)NN

Prefix \_\_\_\_\_

Classification of technical objects according to VGB-B 102 \_\_\_\_\_

Numbering of objects \_\_\_\_\_

Figure 14 — Structure and contents of designation block “Product”

### 6.5 Transition from function aspect to product aspect

For unambiguous identification of technical objects in power plant engineering, the possibility is used to simultaneously follow objects according to both function and product aspects. The structure of such a designation block is shown in Figure 15, with Examples 1 and 2.

Function aspect				Product aspect		
Breakdown level	0	1	2	Breakdown level	1	2
=	AN(N)	AAANN	AANNN	-	AA(N)NN	AA(N)NN
Prefix	Main system	System/ subsystem	Technical equipment	Prefix	Device/ assembly	Component
=	C01	MDK51	GP001	-	MA01	XD02
=	C01	MDY10	QA001	-	QA07	

Designation block “Function”  
see 6.3.1
Designation block “Product”  
see 6.4.1

**Equipment designation**

Figure 15 — Structure of the designation block “Equipment”

EXAMPLE 1     **=C01 MDK51 GP001 -MA01XD02**  
 wind turbine generator system C01, wind turbine system MD, power transmission (drive train) K, transmission lubricant subsystem 51, conveying GP001; electric motor MA01, junction box XD02

EXAMPLE 2     **=C01 MDY10 QA001 -QA07**  
 wind turbine generator system C01, wind turbine system MD, control system Y10, power unit QA001; circuit breaker QA07

The first letter codes in breakdown level 1 of the function aspect are given in Table 3. Selected first letter codes are illustrated in Figure 16.

The first letter codes in breakdown level 2 of the function aspect and of breakdown levels 1 and 2 of the product aspect are given in Table 4.

**Table 3 — Letter code for designation block “Function”,  
breakdown level 1, [section 1](#), data character 1 (according to VGB-B 101)**

	Class code	Denomination
Objects for conjoint tasks	A	Systems for common tasks
Objects for the power plant process	B	Electrical auxiliary power supply systems
	C	Control and management systems
	D	Function allocation (group level)
	E	Treatment and supply of fossil and renewable energy sources including residue disposal
	F	Handling of nuclear equipment
	G	Water supply, disposal and treatment
	H	Heat generation by combustion of fossil and renewable energy sources and heat recovery from natural energy sources
	J	Nuclear heat generation
	K	Nuclear auxiliary systems
	L	Steam, water, condensate systems
	M	Systems for conversion of energy (without heat generation) and for transmission of electrical energy
	N	Medium supply systems for external consumers, energy storage systems
	P	Cooling water systems
	Q	Auxiliary systems
	R	Flue gas exhaust and treatment
	S	- reserved for later standardization -
	T	- reserved for later standardization -
U	Structures and areas for systems inside of the power plant process	
Objects which are not allocated to the power plant process	V	Systems for storage of material or goods
	W	Systems for administrative or social purposes or tasks
	X	Ancillary systems
	Y	Communication and information systems
	Z	Structures and areas for systems outside of the power plant process

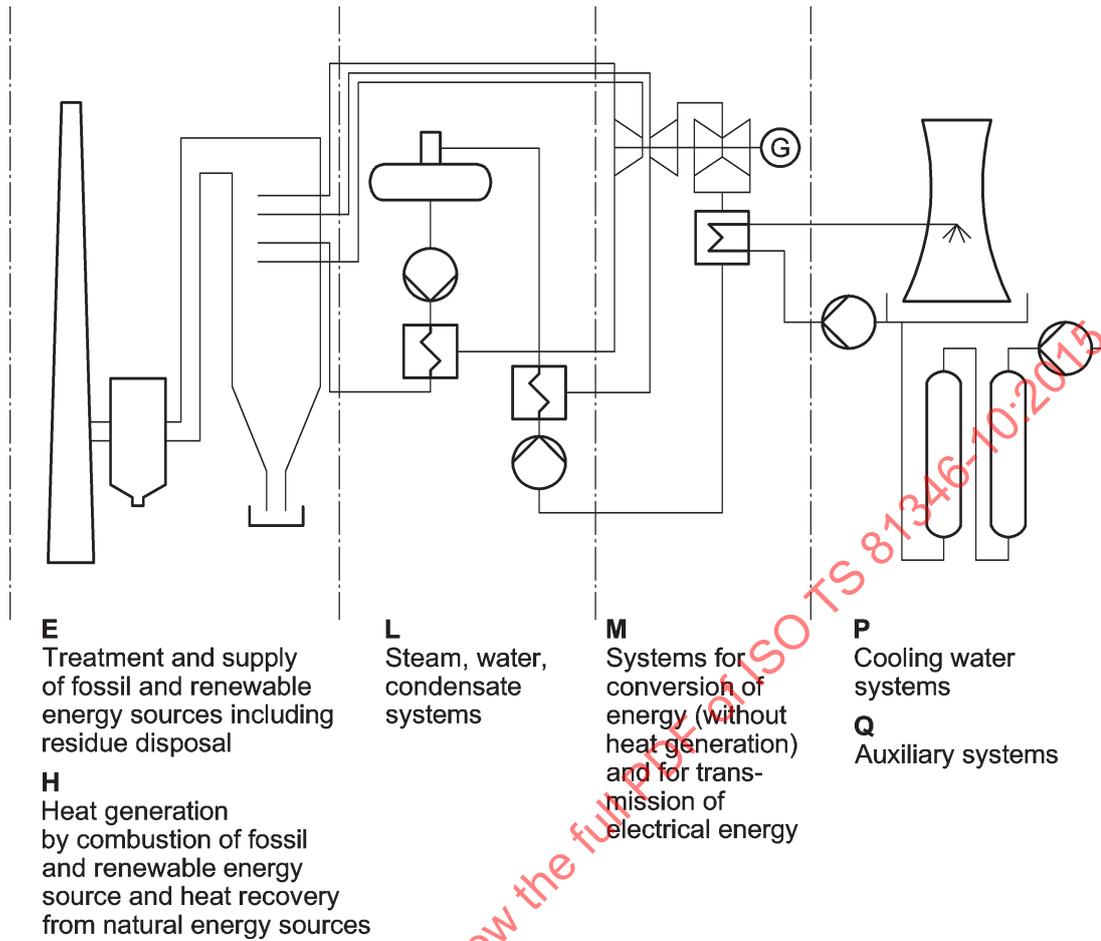


Figure 16 — Overview with letter codes and denominations, e.g. steam power plant

**Table 4 — Letter code for designation block “Function”, breakdown level 2, [section 3](#), data character 1 and for designation block “Product”, breakdown level 1, [section 1](#), data character 1 and breakdown level 2, [section 3](#), data character 1 (according to IEC 81346-2 and VGB-B 102)**

Code	Denomination
A	Two or more purposes or tasks
B	Conversion of an input variable (physical property, condition or event) to a specific signal for further processing
C	Storage of energy, information or material
D	- reserved for future standardization -
E	Providing radiant or thermal energy
F	Direct (self-acting) protection of an energy or signal flow, of personnel or facilities from dangerous or unwanted conditions including systems and equipment for protective purposes
G	Initiation of an energy or material flow; generation of signals which are used as an information carrier or reference source
H	Production of a new type of material or product
J	- reserved for future standardization -
K	Processing (receipt, processing and providing) of signals or information (with the exception of objects for protection purposes, see class F)
L	Reserved for future standardization
M	Providing mechanical energy (rotational or linear mechanical notion) for driving purposes
N	- reserved for future standardization -
P	Presentation of information
Q	Controlled switching or variation of a flow of energy, signal or material (see classes K and S for signals in closed/open feedback control loops)
R	Restriction or stabilization of movement or flow of energy, information or material
S	Conversion of a manual operation to a specific signal for further processing
T	Conversion of energy while maintaining the kind of energy, conversion of an established signal while maintaining the content of information, conversion of the form or shape of a material
U	Keeping objects in a defined position
V	Processing (handling) of material or products (including pre-treatment and post-treatment)
W	Conducting or routing energy, signals, materials or products from one location to another
X	Connecting objects
Y	- reserved for future standardization -
Z	- reserved for future standardization -

## 6.6 Location aspect

### 6.6.1 Designation block “Point of installation”

#### 6.6.1.1 General

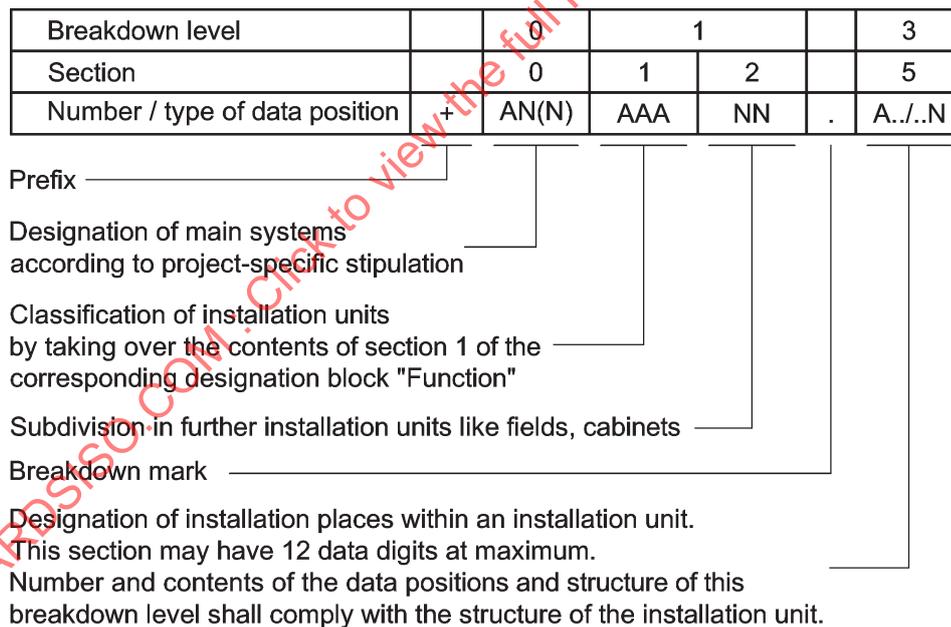
This designation block is used for designating the points of installation of technical products. Different designation blocks are specified according to the tasks in the various disciplines:

- points of installation in electrical/I&C<sup>2)</sup> installation units (consoles, panels, cabinets);
- points of installation in electrical/I&C installation units oriented to mechanical systems;
- points of installation in electrical/I&C installation units oriented to locations;
- points of installation in technical equipment for mechanical and civil engineering.

NOTE For the designation of points of installation, the contents of the designation block “= Function” (or parts of it) can be used as the “+ point of installation”. The aspect of the designation is determined solely by the prefix (+).

#### 6.6.1.2 Points of installation in electrical/I&C installation units

The structure and contents of the designation block “point of installation” for electrical and I&C installation units are shown in [Figure 17](#).

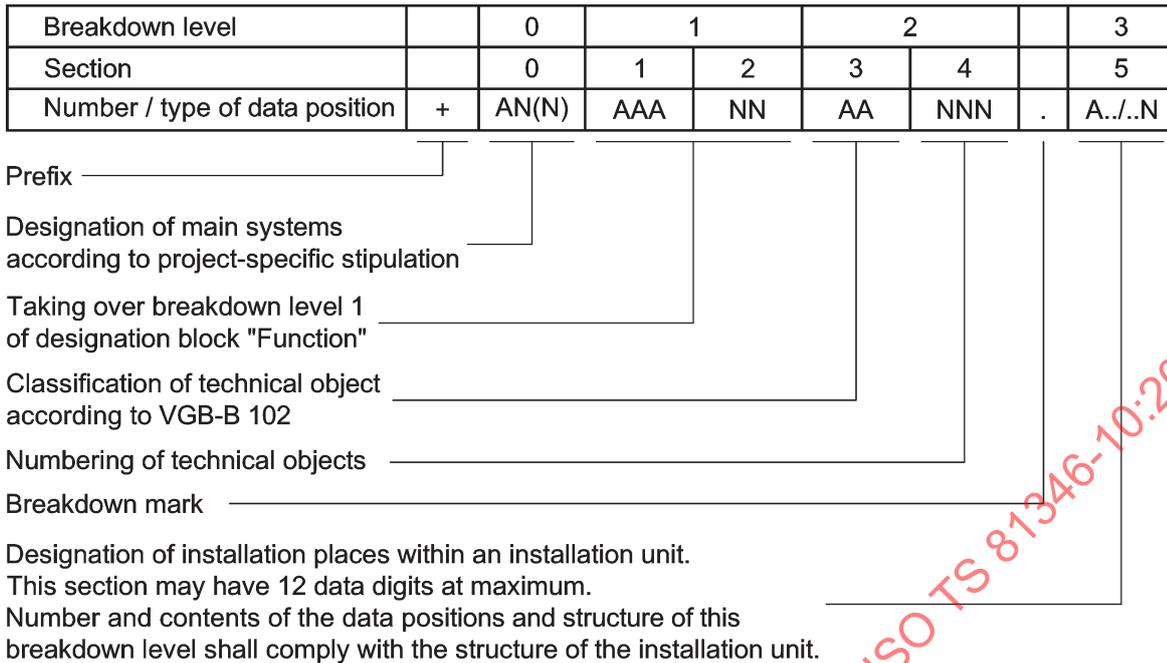


**Figure 17 — Structure and contents of designation block “Point of installation” in electrical/I&C installation units**

#### 6.6.1.3 Points of installation in electrical/I&C installation units oriented to mechanical systems

The structure and contents of the designation block “point of installation” for system-oriented electrical and I&C installation units are shown in [Figure 18](#).

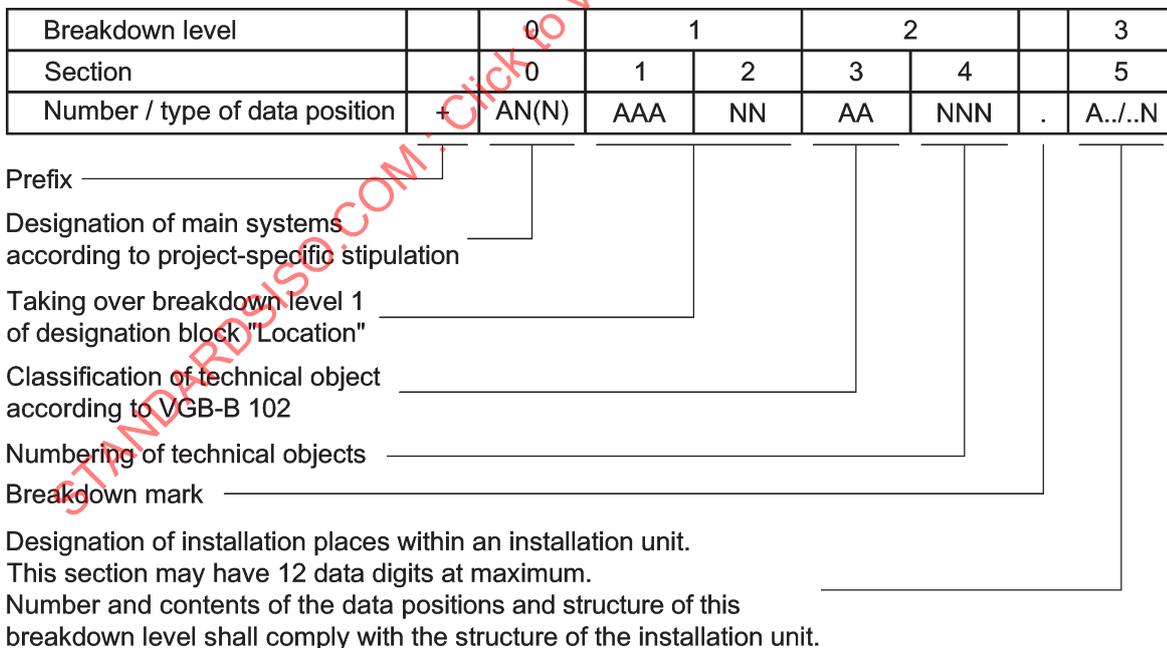
2) I&C = Instrumentation and Control.



**Figure 18 — Structure and contents of the designation block “Point of installation” in electrical/I&C installation units oriented to mechanical systems**

**6.6.1.4 Points of installation in electrical/I&C installation units oriented to locations**

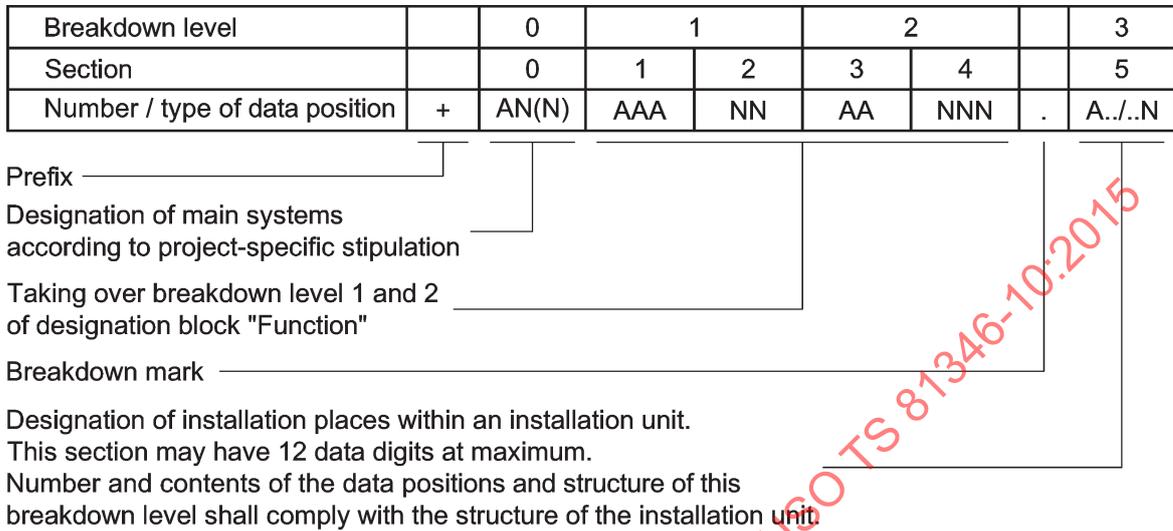
The structure and contents of the designation block “Point of installation” for location-oriented electrical and I&C installation units are shown in [Figure 19](#).



**Figure 19 — Structure and contents of designation block “point of installation” in electrical/I&C installation units oriented to locations**

**6.6.1.5 Points of installation in technical equipment for mechanical and civil engineering**

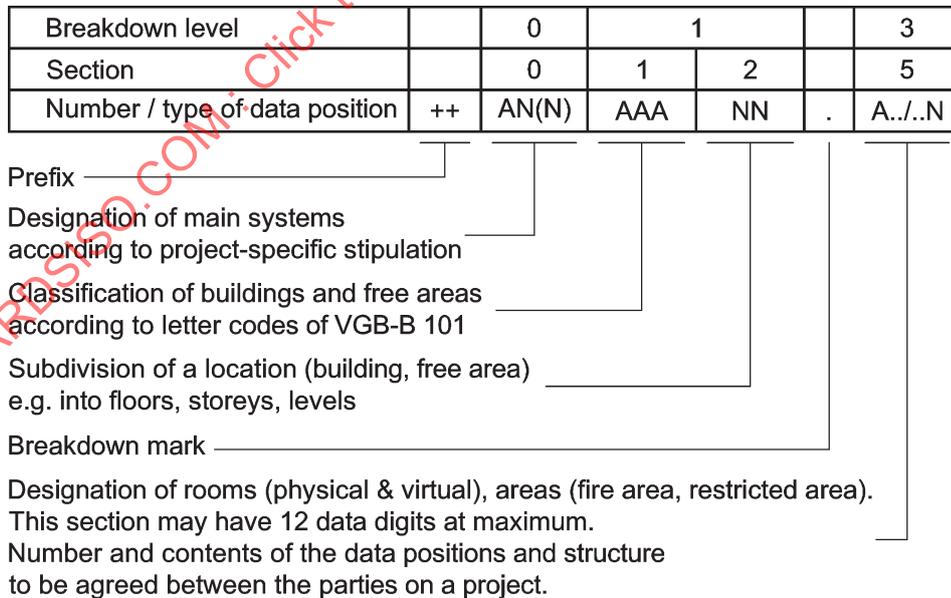
The structure and contents of the designation block “Point of installation” in technical equipment for mechanical and civil engineering is shown in [Figure 20](#).



**Figure 20 — Structure and contents of designation block “Point of installation” in technical equipment for mechanical and civil engineering**

**6.6.2 Designation block “Location”**

This designation block is used for designation of locations; see [Figure 21](#). The contents of breakdown level 1 can be used in the designation block “function” if technical equipment is to be designated on a building-specific basis.



**Figure 21 — Structure and contents of designation block “Location”**

## 6.7 Specific designations

### 6.7.1 Signal designation

#### 6.7.1.1 General

The unambiguous designation of signals is achieved by combining the reference designations and the signal name based on IEC 61175, see [Figure 22](#).



**Figure 22 — Signal designation**

Signal designation distinguishes between:

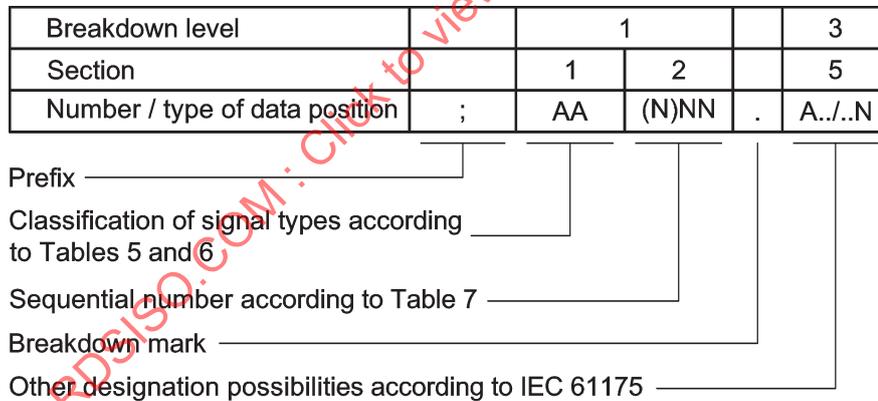
- signal origin (information source), and
- signal application (information sink).

A signal may serve several applications; an application may be served by several signals.

The signal origin is assigned the reference designation of the function in which the signal is generated (output); the signal application is assigned the reference designation of the function in which the signal is processed (input).

#### 6.7.1.2 Designation block “Signal”

This designation block is used for the designation of signals, see [Figure 23](#) and [Tables 5 to 7](#).



**Figure 23 — Structure and contents of the designation block “Signal”**

**Table 5 — Letter code for main classes of signal name, [section 1](#), data character 1**

Code in accordance with IEC 61175	Main classes of signal name
X	Signal origin
Y	Signal application

Table 6 — Letter code for subclasses of signal name, [section 1](#), data character 2

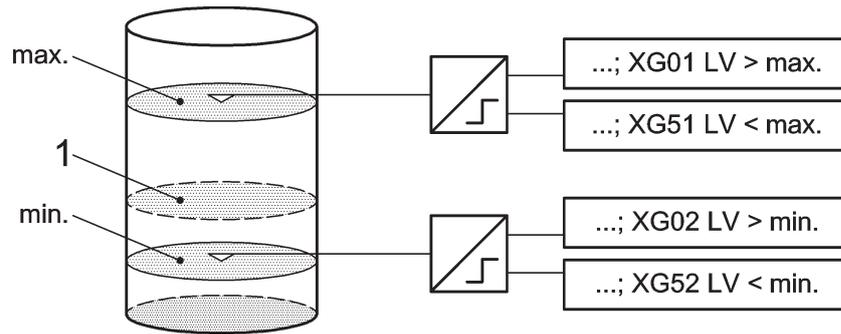
Code	Subclasses of signal name
A	Group control (open-loop)
B	Individual control (open-loop)
C	Individual control (closed-loop)
G	Binary process signals
H	Limit signals, generated from analogue process signals
J	Unspecified areas
K	Component protection
L	Control rooms and control stations
M	Individual alarms
P	Process computer
Q	Analogue process signals
R	Pilot controls
S	Step control
U	Group fault alarms
V	Signal interlock
W	Alarm system
NOTE Unused letters may be defined for project-specific applications.	

**Table 7 — Specification of sequential numbers for the signal classes B, G and H**

Sequential number	Signal class		
	B	G	H
01	Check back on/open	LV > max. 1, check back on/open	LV > max. 1
02	Check back off/closed	LV > min. 1, check back off/closed	LV > min. 1
03		LV > max. 2	LV > max. 2
04		LV > min. 2	LV > min. 2
05		LV > max. 3	LV > max. 3
06		LV > min. 3	LV > min. 3
07			
08			
09			
10			
11	Push button command on/open		
12	Push button command off/closed		
13	Control command		
14			
.....			
21	Automatic command on/open		
22	Automatic command off/closed		
23	Control command		
24			
.....			
31	Protection command on/open		
32	Protection command off/closed		
33	Control command		
34			
.....			
.....			
51	Check back not on/not open	LV < max. 1, check back not on/not open	LV < max. 1
52	Check back not off/not closed	LV < min. 1, check back not off/not closed	LV < min. 1
53		LV < max. 2	LV < max. 2
54		LV < min. 2	LV < min. 2
55		LV < max. 3	LV < max. 3
56		LV < min. 3	LV < min. 3

NOTE LV = limit value.

Specifications for operation level are represented in [Figure 24](#).



**Key**

1 operation level

**Figure 24 — Specifications for operation level**

**6.7.2 Terminal designation**

**6.7.2.1 General**

The unambiguous designation of terminals is achieved by combining the reference designation and the terminal designation based on IEC 61666, see [Figure 25](#).

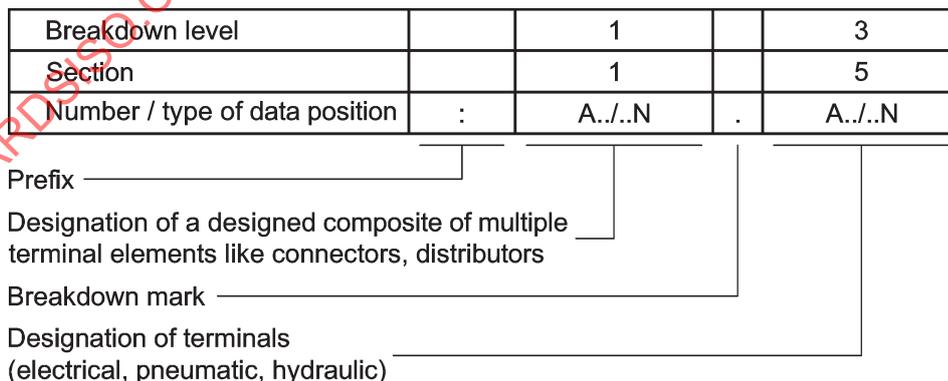


**Figure 25 — Terminal designation**

**6.7.2.2 Designation block “Terminal”**

This designation block is used for the designation of the terminals to technical products, see [Figure 26](#).

The component’s existing terminal designations are used here. If no terminal designations exist, they shall be generated in accordance with existing standards, such as EN 50005 and IEC 60445 for electrical engineering.



**Figure 26 — Structure and contents of designation block “Terminal”**

The breakdown mark “.” shall only be used if identical data characters occur successively in breakdown levels 1 and 3. If breakdown level 3 is used alone, the breakdown mark “.” shall be omitted.

The sections of the designation block shall not contain more than 12 data characters. Deviating from Rule 10 in [4.4](#), lowercase letters and special characters are permitted.

6.7.3 Document designation

6.7.3.1 General

The non-manufacturer-specific, appropriate designation of documents is achieved by combining the object designation and the document kind classification code according to IEC 61355-1 together with a counting number (optional), see [Figure 27](#).



Figure 27 — Document designation

6.7.3.2 Designation block “Document kind class”

This designation block is used for document designation distinguishing between information contents, independent of the information carriers of the documents, see [Figure 28](#).

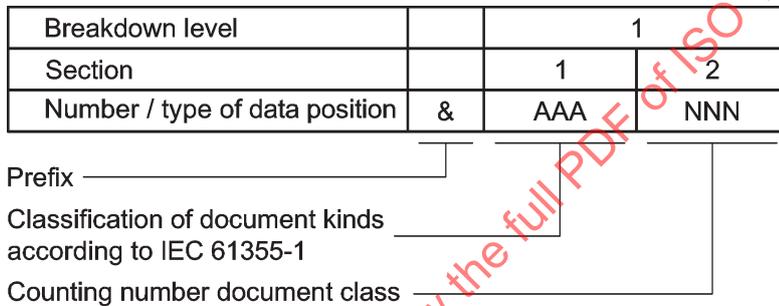


Figure 28 — Structure and contents of designation block “Document kind class”

7 Application of designation

7.1 Combination of designation blocks

Depending on the task and designation complexity, designation blocks may be used alone or in combination for identification and localization of the technical objects.

When combining designation blocks, a distinction shall be made between the following:

- a) **Linking** of two or more designation blocks in a new unambiguous designation (identifier), see [Figure 29](#).

EXAMPLE 1 Factory 1, power plant 2; turbine building, floor 3

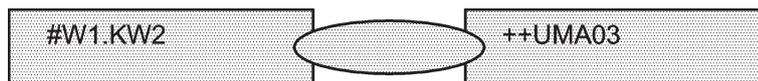


Figure 29 — Linking two designation blocks

The permitted links between various designation blocks are specified in [Table 8](#).

**Table 8 — Permitted designation block link-ups**

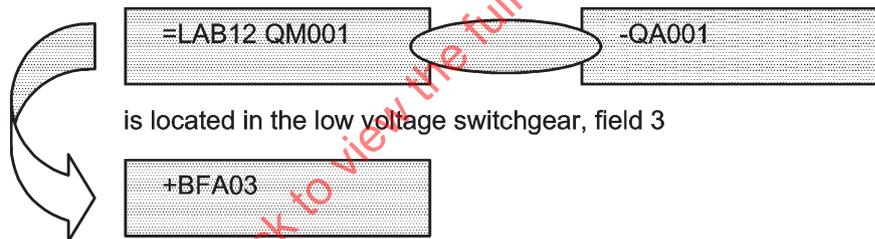
Designation blocks			
= Function	–	Product	
= Function	–	Product	: Connection
= Function	–	Product	& Document kind class
= Function	;	Signal name	
= Function	&	Document kind class	
== Functional allocation	;	Signal name	
== Functional allocation	&	Document kind class	
+ Point of installation	&	Document kind class	
++ Location	&	Document kind class	

The designation block conjoint designation (#) may be linked with function, function allocation, point of installation, location and document kind class.

and

- b) **Allocation** of a designation block or of a linked designation to one or more designation blocks or linked designations (associative relation), see [Figure 30](#).

EXAMPLE 2 Feed water piping system, train 12, isolation 1, power breaker 1



**Figure 30 — Allocation between a linked designation and a designation block**

## 7.2 Designation notation

### 7.2.1 General

Depending on the requirements, the designation blocks may be written individually, in combination, together or separately, but always with their prefixes.

Basically, objects shall be identified by their full identifier. However, where a first part of the designation is common to all objects of an assembly or to all objects represented in a document, then this common part may be shown only once. This is called a divided notation.

Divided notation is permitted only if the allocation of the reference designation remains clear.

The breakdown mark “.” (full stop) between individual breakdown levels shall be written if specified for an application in accordance with [Clause 6](#).

### 7.2.2 Notation in technical documents

Designations may be written:

- in the title block;

- at the top left edge of the document page and/or at the boundary frames;
- at the separating lines and break points;
- in tables;
- at (next to) graphical symbols.

In divided notation, the complete designation comprises

- a) the common designation part for the larger object of consideration, which is written at the top left edge of the document page and
- b) the designation parts for smaller objects of consideration (sub-objects) placed at other locations in the document, e.g. at the boundary frame, adjacent to graphical symbols, to the signal break point, or in the text.

It shall be possible to compile complete designations easily. If there is any risk of misinterpretation, the full, undivided designation shall be used.

Rules for the notation at break points, for reference generation and for abbreviations or divided notation are specified in IEC 61082-1.

### 7.2.3 Notation in the plant

Rooms, technical equipment, components and installation locations shall be designated in such a way that simple identification and unambiguous reference to the documentation for reliable operation is ensured at all times. Divided notation is also permitted in the plant, provided this condition is fulfilled.

[Subclause 7.2.2](#) applies analogously.

## Annex A (normative)

### Representation of designations

The designation may be represented with or without spacing (blanks), but it shall be written in such a way that it cannot be misinterpreted. Spaced notation promotes the comprehensibility and mnemonic quality of designations. Designations may be spaced by the insertion of blanks at specified points in a single-line notation, or by multiple-line notation.

The permitted spaced notations are defined. Their application for each intended use shall be agreed between the parties to the project.

There are two methods, see [Figure A.1](#):

a) “Small spacing”:

Blanks between the breakdown levels for designations, which do not have to be recognized within a limited period of time.

b) “Large spacing”:

Blanks between the alphabetical and numerical parts within the breakdown levels where the breakdown levels are more than four data characters long. This kind of spacing shall be used for example on designations in the control room, which have to be recognized in a short period of time.

Line type	Small spacing	Large spacing
Single line	ANN AAANN AANNN AANNN	A NN AAA NN AA NNN AA NNN
Multiple line	ANN	A NN
	AAANN	AAA NN
	AANNN	AA NNN
	AANNN	AA NNN

**Figure A.1 — Basic representation of designations with small and large spacing**

The proper position of prefixes in spaced writing is shown in [Table A.1](#).

Table A.1 — Examples of spaced notations

#S5.B3 =LNA10 BL001 -BP002:U+	<b>Site 5, works 3;</b> <b>Upper-water, level 1, pressure-measuring transducer 2;</b> <b>Terminal U+</b>
#S5.B3 +BFA17.G4	Site 5, works 3; Installation place BFA, section 17; Mounting point tier G, row 4
#S5.V1 ++UAA01.CH2	Site 5, distribution 1; Building UAA, storey 1; Section CH2
=M 1 MBV 10 GP 001 -MA 001	<b>Machine group 1:</b> <b>Gas turbine system, lubricant supply system;</b> <b>Conveyance 1, electrical motor 1</b>

NOTE Designation with spacing (blanks) may not be accepted by CAD/CAE systems.

## Annex B (normative)

### Special stipulations

#### B.1 Rules for letter codes

The letter codes to be used in power plant engineering and their designations are defined in VGB-B 101 and VGB-B 102. These documents provide information on their application (description of system boundaries, etc.).

#### B.2 System designations for driving systems

The designation of certain “components”, such as steam turbines used as drives for feed-water pumps, can be extremely complex so that, as “driving systems”, they need separate system designations in order to permit designation of all associated mechanical equipment as well as electrical and I&C equipment. The subgroups of the respective main group shall be used as system designations for these driving systems (see also the example in [Figure D.7](#)).

#### B.3 Allocation of technical equipment to system designations

Mechanical installations, equipment and apparatus shall be designated based on the system within whose limits they are installed.

#### B.4 Hangers and supports, racks, junction boxes

These auxiliary equipment items may be designated using function- or location-oriented designations.

Function-oriented designation shall be used when the auxiliary equipment can be clearly allocated to a particular system.

The location-oriented designation shall be used when different systems share the same auxiliary equipment.

#### B.5 Special rules for mechanical engineering

##### B.5.1 Valves

Valves are classified as FL (safety valves), QM (shut-off valves), QN (control valves) or RM (check/non-return valves) in the designation for technical equipment, independent of design, type or method of actuation.

Exceptions are pilot valves where the method of actuation is part of the code — KH (fluid-operated pilot valves) and KL (electric pilot valves).

Safety equipment (FL) comprising safety valves and associated piping shall be allocated to the system to which it is connected.

Emptyings, drains and vents, up to the last shut-off (including double) valve or up to the free outlet, shall be allocated to the system to be emptied, drained or vented (originator principle).

At supply systems and closed cooling-water systems, all the piping, including valves and other in-line equipment up to the inlet into, and outlet from, the consumer (system), shall be allocated to the supply system.

System shut-off valves for instrumentation loops shall be designated with the classification QM in the breakdown level 2 of the designation block "Function".

Downstream shut-off and equalizing valves in the instrumentation loop are components of the instrumentation loop with classification QM.

### B.5.2 Supply systems

Supply systems which supply several main groups of breakdown level 1 in "= function" shall be designated as separate main groups with the following letter codes:

- G Water supply, disposal and treatment;
- K Nuclear auxiliary systems;
- Q Auxiliary systems;
- X Ancillary systems.

If several mechanical consumers are connected to a mechanical supply system, the following letter codes shall be used for the supply systems at the second or third data character in breakdown level 1 in "= function":

- V Lubricant supply;
- W Sealing fluid supply;
- X Fluid supply system for control and protection equipment.

This designation application is illustrated with an example for sealing fluid supply, W, in [Table B.1](#).

**Table B.1 — Designation application for sealing fluid supply, W**

Consumers		Supply system	
Class code	Denomination	Class code	Denomination
LAB	Feed-water piping system	LAW	Feed-water sealing-water system (common for LAB, LAC, LAD and other LA. systems)
LAC	Feed-water pump system		
LAD	HP feed-water heating system		
LA.	Feed-water system	LW.	Sealing-fluid supply system for water, steam, gas cycles (common for LA., LB., LC. and other L systems)
LB.	Steam system		
LC.	Condensate system		
L..	Steam, water, condensate system	Q..	Auxiliary systems (common for L.. and M..)
M..	System for conversion of energy (without heat generation) and for transmission of electrical energy		

### B.5.3 Auxiliary equipment with supply tasks

Technical equipment with supply tasks without a separate classifying designation in breakdown level 1 of the function designation are designated in breakdown level 2 on the same level as the other technical objects within the affected subsystem.

## B.6 Special rules for civil engineering

If a building structure contains several process-engineering systems, the designation of this structure shall be specified based on the most important, dominant system.

The designation of duct and bridge structures shall be discussed among the parties to the project, considering priority aspects and depending on the structures to be connected.

## B.7 Special rules for electrical and I&C systems

### B.7.1 Cable penetrations through the reactor containment

Cable penetrations through the reactor containment shall be designated with JML = “cable penetration” in breakdown level 1 of “= function” and with X = “connection of objects” in the first data character of designation [section 3](#).

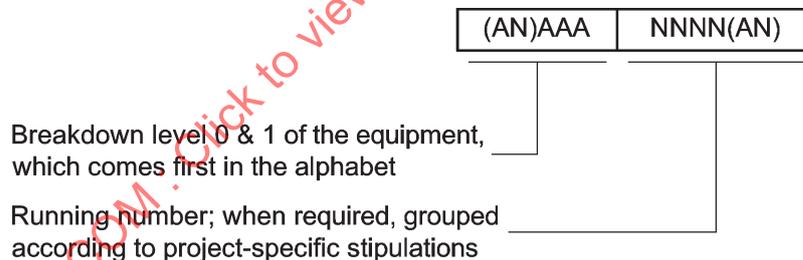
### B.7.2 Cable penetrations on and in building structures

Where cable penetrations on and in building structures are to be designated, they shall be given the designation for the respective structure and floor in breakdown level 1.

### B.7.3 Identification of cable connections

#### B.7.3.1 Cable numbering

For an unambiguous identification of cable connections between electric equipment in different systems, a cable numbering should preferably be applied. The numbering scheme is given in [Figure B.1](#). This is a well established and practice-proven procedure in power plant engineering.



**Figure B.1 — Structure of the cable number**

In this method, cable connections between electric equipment in different systems are not considered as equipment with a reference designation. The cables are delivered as bulk material to the site, where the specific cable connections are made based on connection-describing documents. See [Figure D.8](#) and [Table D.1](#) for an example.

#### B.7.3.2 Cable designation

Electric connections with prefabricated cables (cable with plug connectors) within systems or physical units shall be considered as equipment (with order number, constituent of a part list) and therefore designated according to [6.5](#). See [Figure D.9](#) and [Table D.2](#) for an example.

This designation method may also be used in other cases provided the unambiguous nature of the cable designations is ensured.

#### **B.7.4 Measurements**

Direct measurements are not designated by the measurement principle, but by the physical unit to be measured.

#### **B.7.5 Closed-loop control**

Closed loop controls are identified according to the controlled variable (not by the final control element on which the control acts).

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## Annex C (informative)

### Stipulations between parties to the project

This part of ISO 81346 does not contain all the rules necessary for designating a project. There are areas for which clear definitions need to be stipulated between the purchaser (operator) and the vendor (supplier) in the form of project-specific requirements prior to the start of designation.

In this part of ISO 81346, such aspects are indicated by the remark "Details of application to be agreed between the parties to the project".

A checklist is provided below as a basis (contents) for these agreements.

#### C.1 General stipulations

General stipulations can include the following:

- a) changes to denominations for functions, systems, plants (VGB-B 101), technical equipment and components (VGB-B 102), which are only possible as long as contents remain the same;
- b) rules on numbering systems and direction of numbering for all designation sections entailing numbering;
- c) rules on "conjoint designation" regarding content, scope, type and number of data positions;
- d) rules on breakdown level 0 regarding content, scope, type and number of data positions;
- e) rules on spacing for designation notation;
- f) allocation of "free for use" available classifying code elements.

#### C.2 Stipulations on function-oriented designation

These stipulations can include the following:

- a) rules on numerical designation sections;
- b) rules on designation for system-interfacing signal processing;
- c) rules on designation for "signals and signal application" as well as allocation of subgroups in the main groups.

#### C.3 Stipulations on location designation

These stipulations can include the following:

- a) rules on numbering in designation of structures;
- b) rules on room designation;
- c) rules on structure designation for structures which contain several different systems;
- d) rules on structure designation for duct and bridge structures as connecting structures.