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

**Part 10:
Power supply systems**

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

Partie 10: Centrales électriques

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 10, *Process plant documentation*, in cooperation with the Technical Committee IEC/TC 3, *Information structures and elements, identification and marking principles, documentation and graphical symbols*.

This document cancels and replaces ISO/TS 81346-10:2015, which has been technically revised.

The main changes are as follows:

- converted to an International Standard;
- structure adapted to that of IEC 81346-1;
- only requirements constituting a modification or addition to those of IEC 81346-1 have been included;
- reference is made to ISO 81346-12, with which this document is intended to be used, if needed;
- the abbreviation RDS-PS is introduced for reference designation system for power supply systems, providing an identifier to reference designation systems according to this document.

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

A list of all parts in the ISO 81346 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document considers and supports planning, erection, utilization and operation of power supply systems. The application of a reference designation system for power supply systems (RDS-PS) can lead to restructuring and reorientation of these activities and thereby offers chances and potential of increasing efficiency and economization.

This document has shifted from the focus of the previous technical specification (ISO/TS 81346-10:2015), where fixed syntax and focus on coding mechanism were dominant, towards full flexibility in dividing systems into system elements in a non-fixed manner (i.e. no fixed syntax), using one or more aspects at the same time to designate objects of interest. Locations can also be designated accordingly in order to reference the location of objects. [Annex E](#) provides a mapping of letter codes between ISO/TS 81346-10:2015 and this document.

Furthermore, this document is aligned with ISO 81346-12 for construction works (referred to as RDS-CW), in order to support harmonization of methods and principles for forming reference designations across the industry-specific applications of the ISO 81346 series.

The following advantages of designation systems in accordance with this document and the IEC/ISO 81346 series in general will become increasingly important in the future. The following should be noted:

- The reference designation system can be applied in several technical fields in the same way and is not designed for one field only. Therefore, process, mechanical, electrical and structural design, for example, can be treated in the same way, which is a basis for company-wide synergy effects.
- The reference designation system allows for integrating any kind of systems and components without changing the once-defined designations.
- The reference designation is not bound to a fixed structural pattern. Thus, the designation system is vertically and horizontally expandable, which can make the interpretability in some cases quite complex. Therefore, an exact documentation and description of the designation system is important when it is applied.
- The application of different aspects allows for the designation of system elements by function, realizing products or location independently of each other.
- The different aspects used for structuring and the possibility of creating relations between objects represented in these structures offer search and filter criteria and information correlations in a much greater variety than before.

The users of this document will be able to manage objects and related properties in a more efficient and consistent way. When implemented, information across various data processing systems can be handled in an unambiguous way. Other information structures besides those described in this document are:

- organization structures;
- utilization structures;
- cost structures;
- performance structures;
- real estate structures.

This document is applicable for all types of assets used for energy conversion and provision to transmission, distribution or local energy networks, for example:

- large central conventional or renewable power generation systems
 - thermal power plants;

- hydropower plants;
- nuclear power plants;
- onshore and offshore wind farms;
- photovoltaic and solar power plants;
- geothermal plants;
- distributed and/or renewable energy resources
 - wind turbine generators;
 - diesel and gas generators;
 - photovoltaic, solar thermal and combined heat and power (CHP) units;
 - generation from combustible renewables;
- storage or a combination of storage technologies
 - thermal storage;
 - electrochemical storage;
 - electrical storage;
 - mechanical storage;
- power to X technologies
 - power to gas;
 - power to liquid;
 - power to heat;
- transmission and distribution systems, including technical equipment provided by such systems.

New technologies with the purpose of reducing CO₂ emissions, such as coal gasification, air separation and amine scrubbing, are also covered by this document. It applies, furthermore, to digital process control systems, operational management systems (e.g. asset management systems and virtual power plants used for demand response or aggregation) and the designation of related application software.

Due to the natural diversification of international energy infrastructures, this document will enable and support the establishment of regional or branch-specific application profiles in order to provide the required level of interoperability of designations among different stakeholder groups.

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

Part 10: Power supply systems

1 Scope

This document provides rules for structuring of systems in the domain of power supply systems, being supplementary to the general principles for the structuring of systems including structuring of information about systems specified in IEC 81346-1.

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 finding information about that object among different kinds of documents.

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

This document also defines classes for systems and spaces in the field of power supply systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 81346-1:2022, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 1: Basic rules*

IEC 81346-2:2019, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 2: Classification of objects and codes for classes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 81346-1 and IEC 81346-2 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

**3.1
building**

construction entity (3.3) that has the provision of shelter for its occupants or contents as one of its main purposes, usually partially or totally enclosed and designed to stand permanently in one place

[SOURCE: ISO 6707-1:2020, 3.1.1.3, modified — *works* replaced by *entity* and Note 1 to entry deleted.]

**3.2
construction complex**

aggregate of one or more *construction entities* (3.3) intended to serve at least one function or user activity

[SOURCE: ISO 12006-2:2015, 3.4.1, modified — Note 1 to entry deleted]

**3.3
construction entity**

independent unit of the built environment with a characteristic form and spatial structure, intended to serve at least one function or user activity

[SOURCE: ISO 12006-2:2015, 3.4.2, modified — Note 1 to entry deleted]

**3.4
component system**

system of one or more components providing a fundamental self-contained function

**3.5
control**

purposeful action on or in a process to meet specified objectives

Note 1 to entry: Actions include measuring, counting, monitoring, indicating, alerting, recording, logging, manipulating, evaluating, optimizing, intervening and configuring.

[SOURCE: IEC 60050-351:2013, 351-42-19, modified — Note 1 to entry replaced, Note 2 to entry and Figure 29 deleted.]

**3.6
equipment**

aggregation of functional elements or assembly of components and modules that belong together in one physical unit of a *plant* (3.10) or in a functional unit of a system

[SOURCE: ISO 16484-2:2004, 3.73, modified — Notes 1 and 2 to entry deleted.]

**3.7
host installation aspect**

location aspect relating objects to locations inside or on a product or product assembly

Note 1 to entry: Product or product assembly is not to be confused with reference designations based on the product aspect.

**3.8
inherent function**

function of an object, independent of any application of the object

**3.9
power supply system**

system representing a process for conversion, transmission and/or distribution of energy

**3.10
plant**

assembly of different systems on a specific site

[SOURCE: IEC 61355-1:2008, 3.10]

3.11**site of installation aspect**

location aspect relating objects to locations inside a *space* (3.12)

3.12**space**

limited three-dimensional extent defined physically or notionally

[SOURCE: ISO 12006-2:2015, 3.1.8]

3.13**technical system**

object with characteristics which predominantly represents a coherent technical solution with an *inherent function* (3.8)

[SOURCE: ISO 81346-12:2018, 3.21]

3.14**works**

system of industrial complexes and the associated infrastructure in one location

4 Concepts**4.1 General**

The requirements of IEC 81346-1:2022, Clause 4, apply.

4.2 Object

The requirements of IEC 81346-1:2022, 4.1, apply. <https://standards.iteh.ai/catalog/standards/sist/25ad3428-f5d7-478f-ba9c-6908c5f595e3/iso-81346-10-2022>

4.3 Aspect

The requirements of IEC 81346-1:2022, 4.2, apply.

4.4 Systems**4.4.1 General**

The requirements of IEC 81346-1:2022, 4.3, apply with the following additions:

In the context of this document, all objects are seen as systems and/or system elements.

The system concept allows a designer to handle wholes (as distinct from parts). By identifying related systems, the relationships among these can be determined and monitored, for example to ensure that all systems operate correctly.

Systems and system elements bring together a set of objects for a task that none of the objects can accomplish on their own.

4.4.2 Power supply systems

Power supply systems are those systems used to convert, transmit, distribute or store energy and to manage such systems.

Power supply systems shall be classified in accordance with the scheme defined in [Annex B, Table B.1](#).

A power supply system may incorporate another power supply system recursively as one of its elements.

4.4.3 Technical systems

Technical systems are those systems that are not by themselves considered to be power supply systems but represent technical solutions useful for the realization of a power supply system.

Technical systems shall be classified in accordance with the scheme defined in [Annex B, Table B.2](#).

A technical system may incorporate another technical system recursively as one of its elements.

4.4.4 Component systems

Component systems are systems that are well defined with respect to both their inherent function and implementation. Component systems are used as part of technical systems and may also be referred to power supply systems.

Component systems shall be classified in accordance with IEC 81346-2:2019, Table 3.

A component system may incorporate another component system recursively as one of its elements.

4.5 Structuring

The requirements of IEC 81346-1:2022, 4.4, apply.

4.6 Function

The requirements of IEC 81346-1:2022, 4.5, apply.

4.7 Products and components

The requirements of IEC 81346-1:2022, 4.6, apply.

4.8 Location

4.8.1 General

The requirements of IEC 81346-1:2022, 4.7, apply.

Two different location aspects shall be applied:

- Host installation aspect: this location aspect shall be applied to relate the location of an object to locations inside or on a product or product assembly.

EXAMPLES Locations within or on a cubicle, a console or a panel.

- Site of installation aspect: this location aspect shall be applied to relate the location of an object to a location defined inside a larger location, irrespective of the existence of physical objects making up that larger location.

EXAMPLES A site, a construction complex, a construction entity (a building), a part of a building, a storey, a room, an outside area, a green area, a park area.

4.8.2 Construction complexes

Construction complexes are spaces which are an aggregation of construction entities in the context of this document. Construction complexes are used to represent spaces, i.e. locations, within the site installation aspect.

Classes of construction complexes are shown in [Annex C, Table C.1](#).

A construction complex may recursively incorporate another construction complex as one of its elements.

4.8.3 Construction entities

A construction entity is an independent unit of a built environment forming a construction complex. In the context of this document, construction entities are used to represent spaces, i.e. locations, within the site installation aspect.

Classes of construction entities are shown in [Annex C, Table C.2](#).

A construction entity may recursively incorporate another construction entity as one of its elements.

4.8.4 Construction spaces

Construction spaces are spaces, i.e. locations, within the site installation aspect that are well defined with respect to their intended use. Construction spaces are used as part of construction entities and may also be referred to as construction complexes.

Construction spaces shall be classified in accordance with IEC 81346-2:2019, Table 4.

A construction space may recursively incorporate another construction space as one of its elements.

4.9 Types

The requirements of IEC 81346-1:2022, 4.8, apply.

4.10 Object occurrences and product individuals

The requirements of IEC 81346-1:2022, 4.9, apply.

4.11 Relations between concepts

The requirements of IEC 81346-1:2022, 4.10, apply.

4.12 Management aspect

For the purpose of this document, the management aspect signifies an aspect of the considered system that is not covered by the other aspects defined. The management aspect is used to relate objects within the considered system to the system independent of any other aspects.

The application of the management aspect shall be explained in supporting documentation. See also IEC 81346-1:2022, 5.7.

NOTE This aspect was formerly known as the “conjoint aspect”.

5 Structuring principles

5.1 General

The requirements of IEC 81346-1:2022, 5.1, apply.

5.2 Forming structures

The requirements of IEC 81346-1:2022, 5.2, apply.

5.3 Function-oriented structure

The requirements of IEC 81346-1:2022, 5.3, apply.

A function-oriented structure is important for the full life cycle of a system, for example system design, design of process and control functions, commissioning and locating failures of functionality, service operations and optimization works during system operation.

A reference designation based on a function-oriented structure may be shown in any kind of document, for example an overview diagram, a process diagram, a function diagram or a circuit diagram.

5.4 Product-oriented structure

The requirements of IEC 81346-1:2022, 5.4, apply.

A product can realize one or more functions, for example a heat exchanger can heat or cool, an ornament can be used for covering and for providing a presentation of some artwork. Several control functions can be implemented in one control system unit.

A product can, alone or together with others, be located at one or more locations, for example a measuring system with location of measuring unit and displaying unit or a duct system extended to several different locations.

For the structuring and assessment of objects in planning and implementation as preparation of the operation phase, the product-oriented aspect is important, for example for assembling and maintenance.

A reference designation based on a product-oriented structure may be shown in any kind of document, for example product description, construction drawing, assembly drawing, exploded view drawing, network part drawing or maintenance instruction. Such a reference designation will only designate the product occurrence within a system and not the real-world product individual being used.

5.5 Location-oriented structure

The requirements of IEC 81346-1:2022, 5.5, apply.

A location-oriented structure is used for locating objects.

A reference designation based on a location-oriented structure may be shown in any kind of document, for example a site plan, a floor plan, a sectional drawing, an elevation drawing, a ground plan, an arrangement drawing or an installation drawing.

The following separate location-oriented structures shall be made, if applicable:

- host installation-oriented structure utilizing the host-installation aspect;
- site installation-oriented structure utilizing the site installation aspect.

A host installation-oriented structure may be based on a coordinate system, a defined grid zone, area or similar. It may also be based on a physical product, e.g. a cabinet.

5.6 Type-oriented structure

The requirements of IEC 81346-1:2022, 5.6, apply.

A type-oriented structure may be used to relate object occurrences to a company's object-type library or a company's product catalogue (the compilation of information about their products) or to a project-type library.

A reference designation based on a type-oriented structure may be shown in any kind of document and is especially applicable to object libraries and bills of quantities.

5.7 Structures based on “other aspects”

The requirements of IEC 81346-1:2022, 5.7, apply.

A management-oriented structure is based on the subdivision of the system into constituent objects with respect to the management aspect without taking into account other possible aspects of these objects.

On a power supply site, it is recognized that different systems, such as generators, switchgears or buildings, can exist. The management aspect is used to relate these units with respect to the site, without considering the other aspects defined. The management information aspect is often used as site reference in asset management systems, where all aspect-related designation structures are related to.

A reference designation based on a management-oriented structure may be shown in any kind of document.

5.8 Structures based on more than one aspect

The requirements of IEC 81346-1:2022, 5.8, apply.

6 Construction of reference designations

6.1 General

The requirements of IEC 81346-1:2022, 6.1, apply.

6.2 Format of reference designations

6.2.1 Single level

The requirements of IEC 81346-1:2022, 6.2.1, apply.

Except for designation of spaces, a single-level reference designation shall be formed by applying the method of a prefix followed by a letter code followed by a number.

IEC 81346-1:2022, 6.2.1, Rule 7 does not apply. Instead, the following applies:

The prefix signs used to indicate the type of aspect in a reference designation shall be:

- a) “=” (EQUALS SIGN) when relating to the function aspect of the object;
- b) “-” (MINUS SIGN) when relating to the product aspect of the object;
- c) “+” (PLUS SIGN) when relating to the host installation aspect of the object;
- d) “++” (PLUS SIGN, PLUS SIGN) when relating to the site installation aspect of the object;
- e) “%” (PERCENT SIGN) when relating to the type aspect of the object;
- f) “#” (NUMBER SIGN) when relating to the management aspect of the object.

6.2.2 Multi-level

The requirements of IEC 81346-1:2022, 6.2.2, apply.

6.2.3 Use of letter codes

The requirements of IEC 81346-1:2022, 6.2.3, apply.