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Identification systems enabling unambiguous information interchange – Requirements – Part 1: Principles and methods

Systèmes d'identification permettant l'échange non ambigu de l'information – Exigences – Partie 1: Principes et méthodes

IEC 62507-1:2010

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Systèmes d'identification permettant l'échange non ambigu de l'information – Exigences – Partie 1: Principes et méthodes

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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IDENTIFICATION SYSTEMS ENABLING UNAMBIGUOUS INFORMATION INTERCHANGE – REQUIREMENTS –

Part 1: Principles and methods

FOREWORD

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

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

FDIS	Report on voting
3/1007/FDIS	3/1024/RVD

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

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

A list of all parts of the IEC 62507 series, published under the general title, *Identification systems enabling unambiguous information interchange – Requirements*, can be found on the IEC website.

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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IDENTIFICATION SYSTEMS ENABLING UNAMBIGUOUS INFORMATION INTERCHANGE – REQUIREMENTS –

Part 1: Principles and methods

1 Scope

This part of IEC 62507 specifies basic requirements for systems for the identification of objects (such as products, “items”, documents, etc., excluding human individuals). It focuses on assigning identifiers to an object for referencing purposes.

The classification of objects for any and whatever reason and the verification that an object is really the object it claims to be, are excluded.

This standard includes recommendations for the human readable presentation of identifiers and its machine readable representation, to be considered when constructing the identifiers and identification numbers.

The standard includes also requirements for the application of identifiers in a computer sensible form in accordance with such systems, and requirements for their interchange.

The specification of the physical file or transfer format (syntax) for a machine to machine information interchange is not included, nor is the specification and transfer formats for the implementation by a physical medium, e.g. file, bar code, Radio Frequency Identification (RFID), used for information interchange and the identification labelling on an object included.

2 Normative references

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

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

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

IEC 82045-1, *Document management – Part 1: Principles and methods*

IEC 82045-2, *Document management – Part 2: Metadata elements and information reference model*

ISO/IEC 646:1991, *Information technology – IS0 7-bit coded character set for information interchange*

ISO/IEC 6523-1, *Information technology – Structure for the identification of organizations and organization parts –Part 1: Identification of organization identification schemes*

ISO/IEC 15418, *Information technology – Automatic identification and data capture techniques – GS1 Application identifiers and ASC MH 10 data identifiers and maintenance*

ISO/IEC 15434, *Information technology – Automatic identification and data capture techniques – Syntax for high-capacity ADC media*

ISO/IEC 15459-1, *Information technology – Unique identifiers – Part 1: Unique identifiers for transport units*

ISO/IEC 15459-2, *Information technology – Unique identifiers – Part 2: Registration procedures*

ISO/IEC 15459-4, *Information technology – Unique identifiers – Part 4: Individual items*

ISO 3166-1, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*

ISO 7064, *Information technology – Security techniques – Check character systems*

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

3 Terms and definitions

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

3.1
batch number
lot number
identification number assigned to a group of specimens considered as one *object* to identify the specimens that are manufactured together under assumed identical conditions and in a limited time interval

NOTE The *batch number* / *lot number* is normally assigned at the manufacturing of the *object*.

3.2
domain
distinguished part of an abstract or physical space where something exists

NOTE A *domain* can be e.g. an *organization* or a country or a part of it.

3.3
domain number
domain ID
identification number assigned to a *domain*

NOTE The assigned *domain number* can coincide with the *organization number*.

[IEC 82045-2 derived]

3.4
identification [activity]
act of associating *identification numbers* to an *object*

3.5
identification number
ID
string of characters representing the value of the *identifier*

NOTE 1 It is practice that although the term says “number” the string can contain other types of characters as well.

NOTE 2 Note that the term “*identifier*” as being an attribute and the term ”*identification number*” as being the value of that attribute are here considered different things, but they are often mixed in existing definitions.

NOTE 3 *Identification numbers* are often required to be unique (an *object* shall have one number only). This is an unnecessary strong requirement, it is sufficient if they are unambiguous within a specified *domain*. An *object* may have more than one *identification number*.

Furthermore, it is assumed in the definition that an *organization* may be responsible for more than one *identification number domain*. This is a commonly occurring situation when *organizations* are merged, etc.

[IEC 82045-2 derived]

3.6
identification scheme
definition and description of the structure of *identifiers*

3.7
identification system
system of defined and documented rules and procedures within an *organization* aiming at the unambiguous *identification* and retrieval of any *object* of interest by applying an *identification scheme*

3.8
identifier
attribute associated with an *object* to unambiguously identify it in a specified *domain*

NOTE In an identification system several types of identifiers may be required.

3.9
identity
established relation between an *object* and an *identification number*

3.10
issuing organization
organization being entrusted by a *registration authority* or of the management of an *organization* to assign *identification numbers* in a given *domain*

[ISO 6523 derived]

3.11
metadata
meta information
information (irrespective of its form) used to describe a real or abstract *object*

[IEC 82045-1 derived]

3.12
object
entity treated in a *process* of development, implementation, usage and disposal

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

NOTE 2 The object has information associated to it.

[IEC 81346-1, 3.1]

3.13
object number
object ID
identification number assigned to an *object*

NOTE 1 The terms product number, item number, part number, article number, product identifying number, traceability number (serial or batch) are sometimes used as synonyms to *object number*.

NOTE 2 For products the identification number is normally assigned at the engineering of the object. Objects with the same identification number are supposed to have the same "form, fit and function" and hence being interchangeable.

3.14
object individual
specimen of an *object t*ype irrespective of where it is being used

3.15
object occurrence
use of an *object type* within a specified context (another *object* or system) irrespective of which *object individual* that is being used

3.16
object type
class of *objects* having the same set of characteristic properties

3.17
organization
company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration

3.18
organization number
organization ID
identification number assigned to an *organization*

NOTE The assigned organization number can coincide with the *domain number*.

[ISO 6523-1 derived]

3.19
registration authority
organization responsible to receive and acknowledge applications from *organizations* wishing to become an *issuing organization* in a given *domain*

[ISO 6523 derived]

3.20
serial number
identification number assigned to an individual specimen of *objects* or an *object type*

NOTE In most industrial applications a *serial number* is used for tracing the different individual specimen of a product type during their life times, e.g. the individual cars manufactured of a specific car type.

In other cases the serial number is used as a running number in order to differentiate among different objects or among different objects within a given domain.

3.21
traceability
ability to trace (identify and retrieve) the information on the stages that lead to a particular point in a process

[ISO 9000 3.5.4 modified]

3.22
variant
object type derived from a basic (general) object type

NOTE *Variants* are intended to exist at the same time and require simultaneous management, while *versions* follow each other sequentially in time. Versions can, however, also exist at the same time, depending on how older versions are phased out.

3.23
version
identified state of an *object* to indicate changes in its life cycle, related to a given *object number* for the type of *object*

NOTE 1 A *document version* is an identified state in the development of a document during its life cycle, identified and recorded for retrieval purposes. The term *document revision* is normally used to indicate that the document version is formally approved, see e.g. IEC 82045-1 and IEC 82045-2. This term is not used in this standard.

NOTE 2 A *product version* is an identified state in the development of a product type identified with regard to the life cycle of a series of products.

[IEC 82045-2 derived]

3.24
version number
version ID
identification number assigned to a *version*

NOTE The *object number* of the related object serves as *domain number* for the *version numbers*.

[IEC 82045-2 derived]

4 General

4.1 Purpose of identification

The purpose of identification is to ensure unambiguous and precise *referencing*.

Referencing is a basic requirement for traceability.

An identifier is an attribute to an object serving for its identification.

An identification number is the value of the identifier; a string of characters supplying absolute and unambiguous reference to the particular object (product, document, information object, etc.), hence making it unique *within a specified domain* (or context).

The most important requirement for an identification number is that it shall be unambiguous within a given domain based on the stipulated rules established in that domain.

NOTE 1 As for example identification numbers for products are presented on the products themselves, as well as in the associated product documentation used for the maintenance of those products for their whole life-time, product numbers are used as references for the life time of a product (ranging up to more than 100 years).

NOTE 2 In the case that changes to an object are identified through version management, object number serves as domain number for the version numbers. If version management is not applied, entirely new object numbers need to be assigned to changed objects in the relevant domain.

The specification of the domain, the kind of objects to be identified in it and the rules for the construction of identification numbers in this domain is usually called an *identification system.*

The most important requirement for an identification system is that it shall be permanent.

NOTE 3 Examples of possible methods to handle necessary changes at the acquirement of companies are dealt with in Clause 9.

These requirements for unambiguity and permanence have become even more emphasized, because of the existing and increasing use of electronic information exchange in internal as well as external trade.

In connection with the design, engineering, realization, operation, maintenance and disposal, i.e. the life-cycle of a product or system, it is necessary to employ a number of identification systems for different purposes and for various kinds of objects, for example:

- product/part identification system used for the identification of types of products;
- (product/part) serial identification system used for the identification of product specimens;
- (product/part) lot/batch identification system used for the identification of sets of products of the same type manufactured under identical conditions and in which therefore all products are assumed to be equal;
- document identification systems for the identification of documents;
- quotation identification system for the identification of quotations/offers;
- order identification system used for identification of orders/contracts;
- asset identification systems used for the identification of assets plant management or leasing business;
- etc.

Such identification systems are used to identify the objects within the domain(s) used within an organization being responsible for them and thus associating the identified object to this organization.

Another group of identification systems, often focusing on the facilitation of trade and logistics, and for which usually international organizations are responsible, has the purpose to identify objects from different sources, in order to allow global tracing, search and retrieval, for example:

- trade item (article) identification systems;
- asset identification systems;
- book identification systems;
- banking account identification systems;
- serial publications identification systems;
- package identification systems containing one or more trade items;
- package identification systems of e.g. air carriers;
- identification systems for certificates;
- identification systems for public key infrastructures;
- identification systems for equipment connected to a network, etc.

A third group of identification systems has the purpose to associate the identified object occurrences to the *product / system / plant of which they are a part*:

- reference designation system used for the identification of objects; and
- document designation system used for the identification of documents.

Annex A describes different types of identification systems and their requirements.

NOTE Examples of identification systems will be given in Part 2 of this standard *(in preparation)*.

4.2 Referencing and traceability

An identification number makes it possible to refer to one specific object (or a group of objects).

In order to fulfil the requirements for traceability an identification number shall refer to a document or documentation or generally: A source of *metadata* for the object. The metadata provides the relevant description. See Figure 1.

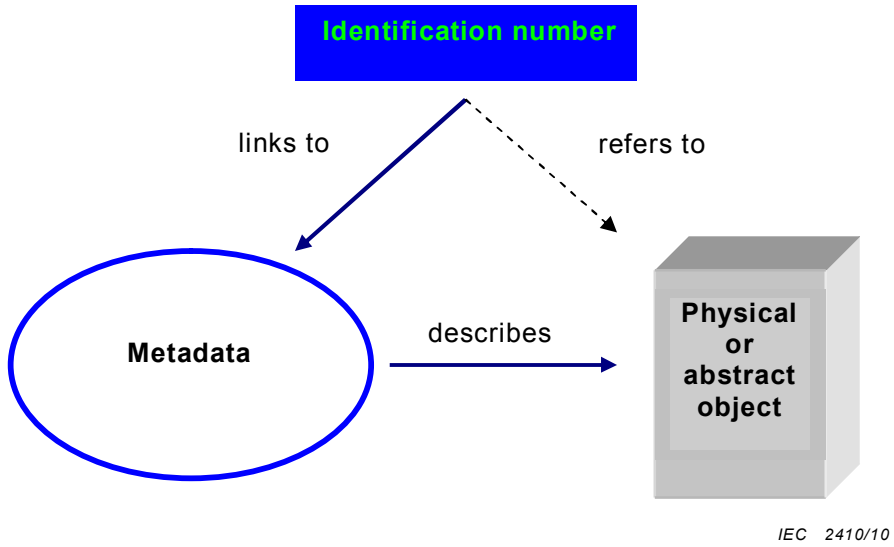


Figure 1 – Illustration of the referencing mechanism

An identification number may also refer to information *per se*, without any associated object.

4.3 Permanence

The requirement for permanence of an identification system is primarily fulfilled by:

- the selection of a domain with permanence, secondly by
- stable rules for the generation of identification numbers within this domain; and finally
- a register permitting retrieval of the metadata of the identification number itself (when and by whom was the number generated).

Internal and external structures of organizations being in charge of identification systems are likely to change over time in order to meet external and internal business requirements. IT system environments in which the identifiers are used may also change over time.

Nevertheless, an applied identification system shall ensure that one identification number can never depict two different objects, and one object does not need to have more than one identification number in the same domain.

Principally, information describing an established and used identification system shall not be deleted.

Identification numbers shall not be reused, unless otherwise specified in the description of the identification system, until nobody can be expected to refer to it; i.e. beyond the lifetime of the item it was previously identifying.

NOTE International, regional or national laws, if existing, should have precedence.

An identification system shall therefore be independent from - seen in this time perspective – the volatile internal organization of a company or other organization and from the used computer system environment.

4.4 Kinds of objects

A *type* is a class of objects having a set of characteristics in common. Depending on the number of common characteristics a type can be from very generic to quite specific.

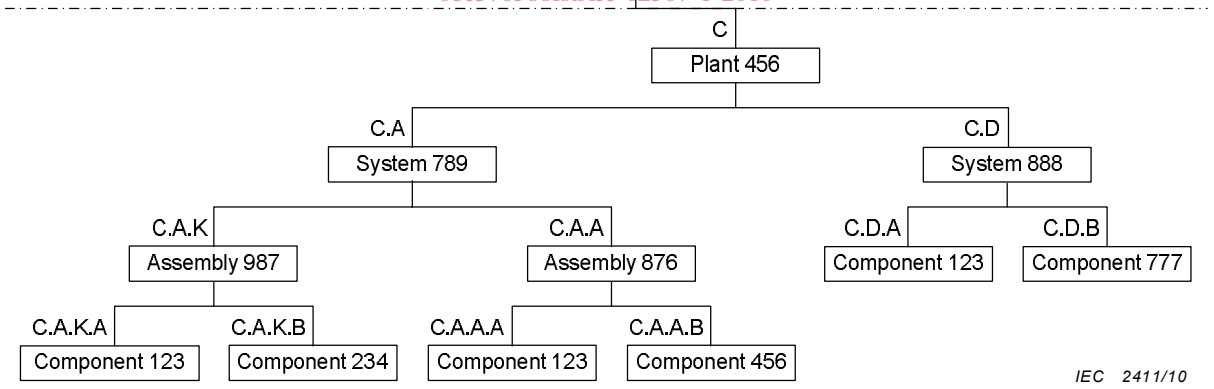
- Generic object types, for example as described in IEC 81346-2 and ISO/IEC 15418 where the type is identified by a string of characters.
- Many kinds of products, for example motors, transformers or contactors, are designed as a range of sizes with common characteristics. In such cases the identifier for the range as a whole might be a type designation (type designator); for each size possibly a more specific one (a variant of that type) could be required.
- Each product variant of a product series has its own identification number.
- The commercial packaging of products can introduce further types; packages containing for example 1, 5 or 10 products need to be differentiated by different identification numbers.

An *individual* (object) is one specimen of a product type irrespective of where it is being used. Each of the produced specimens of the product type mentioned might need to be individually identified. If it is not required, nor practically possible, to differentiate among the individuals, identification of a lot or batch may be used instead.

NOTE The term individual (object) is in this standard not intended to include human individuals.

An *occurrence of a type* refers to the application of a type in a plant or system irrespective of which individual it is.

Figure 2 illustrates the relations between types and occurrences of types. Table 1 provides examples of identifiers of types, occurrences of types and of individuals in different contexts.



NOTE The objects below the dash-dotted line are all objects identified as occurrences within “Network 999”. The latter represents in this example a “top node” that can not be identified as an occurrence.

Figure 2 – Relations among occurrences (identified by concatenated letter codes) of types (identified by numbers) in a tree-like structure

Table 1 – Use of identifiers in a product context

Origin/main use	Types	Occurrences of types	Individuals
Development	Type designation Product number	(Reference designation)	Not applicable
Engineering	Type designation Product number	Reference designation	Plant number