ISO/IEC JTC 1 N9363

2008-10-17

Replaces:

ISO/IEC JTC 1
Information Technology

Document Type:	committee draft
Document Title:	IEC CD 62507 Ed. 1, Requirements for identification systems enabling unambiguous information interchange – Part 1: Principles and methods
Document Source:	IEC
Document Status:	In accordance with JTC 1 Australia resolution 44, this document is circulated to JTC 1 National Bodies and SCs for review and consideration.
Action ID:	COM
Due Date:	2009-01-17
No. of Pages:	24

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3/908/CD
COMMITTEE DRAFT (CD)

IEC/TC or SC: 3	Project number IEC 62507 Ed. 1	
Title of TC/SC: Information structures, documentation and graphical symbols	Date of circulation **2008-06-27**	Closing date for comments **2008-09-26**
Also of interest to the following committees IEC: TC44, TC65, TC57, TC91, TC100, ISO: TC10, TC37, TC46, TC46/SC9, TC68, TC154, TC184/SC4, TC215, JTC1: SC27, SC31, SC32	Supersedes document 3/810/NP + 3/836/RVN	
Functions concerned: ☐ Safety ☐ EMC ☐ Environment ☐ Quality assurance		
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Title:
Requirements for identification systems enabling unambiguous information interchange – Part 1: Principles and methods

(Titre) :
Conditions pour des systèmes d'identification permettant l'échange non ambigu de l'information - Partie 1 : Principes et méthodes

Introductory note

This Committee Draft has been prepared by the Project Team IEC TC3/PT39, set up following the circulation of IEC 3/810/NP with the result shown in 3/836/RVN. The CD is based on the draft attached to 3/810/NP.

As a result of the comments to the NP, the PT39 has split the original proposal in two parts, of which this is the first one, focusing on principles and methods. It is intended to be followed by a second one providing application guidelines and giving examples. Only a few existing identification systems are therefore explicitly mentioned in this first part.

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

FOREWORD

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International Standard IEC 62507-1 has been prepared by IEC technical committee 3: Information structures, documentation and graphical symbols.

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

FDIS	Report on voting
XX/XX/FDIS	XX/XX/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.

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

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

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

1 Scope

This standard specifies basic requirements for systems for the identification of objects (such as products, “items”, documents, database entries, etc., excluding human individuals.) It focuses on assigning identification strings to an object for referencing purposes. The classification of objects and the verification of that an object is really the object it claims to be, are excluded.

The standard includes the human readable presentation of the identifiers.

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 for an 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 (presently under revision, please refer to document 3/904/CDV)*

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

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

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

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

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

ISO 7372 *Trade data interchange – Trade data elements dictionary*

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

ISO/IEC 15459 *Information technology - Unique identifiers for item management*

ISO/IEC 9834-8 *Information technology -- Open Systems Interconnection -- Procedures for the operation of OSI Registration Authorities: Generation and registration of Universally Unique Identifiers (UUIDs) and their use as ASN.1 Object Identifier components*

3 Terms and definitions

3.1
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.

3.2

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 The terms product number, item number; part number; article number; product identifying number, traceability number (serial or batch) are sometimes used as synonyms to identification number.

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**. An object may have more than one identification number, even if this is an undesirable situation.

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.

NOTE 4 For products, 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.

3.3
identification [activity]
act of associating *identification numbers* to an *object*

3.4
identification scheme
definition and description of the structure of *identifiers*

3.5
identity
established relation between an *object* (or individual) and an *identification number*

3.6
domain
distinguished part of an abstract or physical space where something exists, is performed or is valid

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

3.7
domain identification number; domain ID;
identification number assigned to a *domain*

NOTE – The assigned identification number can coincide with the *organization ID*.

3.8
identification system
set of formal rules for *objects* to be identified in a given *domain*

3.9
serial number
identification number for an individual specimen of a type of an *object*

NOTE – The serial number is normally assigned at the manufacturing of the object

3.10
lot number; batch number
identification number for a set of specimens of *objects* manufactured together under assumed identical conditions and in a limited time interval

NOTE – The *lot number* is normally assigned at the manufacturing of the object. A *lot number* is a "less precise *serial number*" used in addition to an *identification number*.

3.11
traceability
ability to trace (identify and measure) the stages that lead to a particular point in a process

3.12
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

3.13
organization identification number; organization ID
identification number assigned to an *organization*

NOTE – The assigned *identification number* can coincide with the *domain number*.

3.14
issuing organization; issuing agency
organization being entrusted by a registration authority to assign *identification numbers* in a given *domain*

3.15
registration authority

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

3.16

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

3.17
version
identified state of an object to indicate changes in its life cycle, related to a given *identification number* for the 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 -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.

3.18
version number; version ID
identification number assigned to a *version*

NOTE – The *identification number* of the related object serves as *domain ID* for the *version IDs*.

3.19
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.

4 Introduction

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 a string of characters supplying absolute and unambiguous reference to a 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 its stipulated rules.

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 identification numbers are used as references for the life time of a product (ranging from 3 up to more than 100 years).

Reuse of a once registered identification number shall not be allowed within a domain.

NOTE 2 In the case that changes to an object are identified through version management, the identification number for the object serves as domain ID for the version numbers. If version management is not applied, entirely new identification 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 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.

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 numbering of types of products;
- (product/part) serial identification system used for the numbering of product specimens;
- (product/part) lot/batch identification system used for the numbering 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 numbering of documents;
- quotation identification system for the numbering of quotations/offers;
- order identification system used for numbering of orders/contracts;

- asset identification systems used for plant management or leasing business;
- etc.

Such identification systems have the purpose to associate the identified objects to the ***organization being responsible*** for them.

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 and public key infrastructures);
- identification systems for equipment connected to a network, etc.

A third group of identification systems have 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.

NOTE – Examples of identification systems are given in Part 2 of this standard.

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 ***meta information*** for the object. The metadata provides the relevant description. See Figure 1.

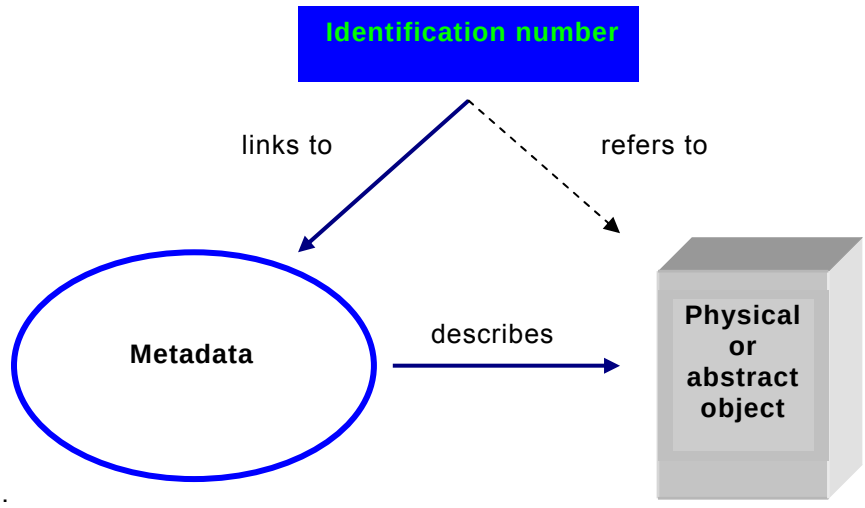

Figure 1 – Illustration of the referencing mechanism

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 needs not to have more than one identification number in the same domain.

Principally, information on an established and used identification system must not be deleted, and an identification number not be reused until nobody can be expected to refer to it; i.e. beyond the lifetime of the item it was previously identifying. 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 where the type is identified by a letter code.

- 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).
- Each product variant in such a product series has its own product identification number.
- The commercial packaging of these products can introduce further types; packages containing for example: 1, 5 or 10 products need to be differentiated by different identification numbers.

An **individual** 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 between the individuals, identification of a lot or batch may be used instead.

NOTE – The term individual is in this standard not intended to include human individual.

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.

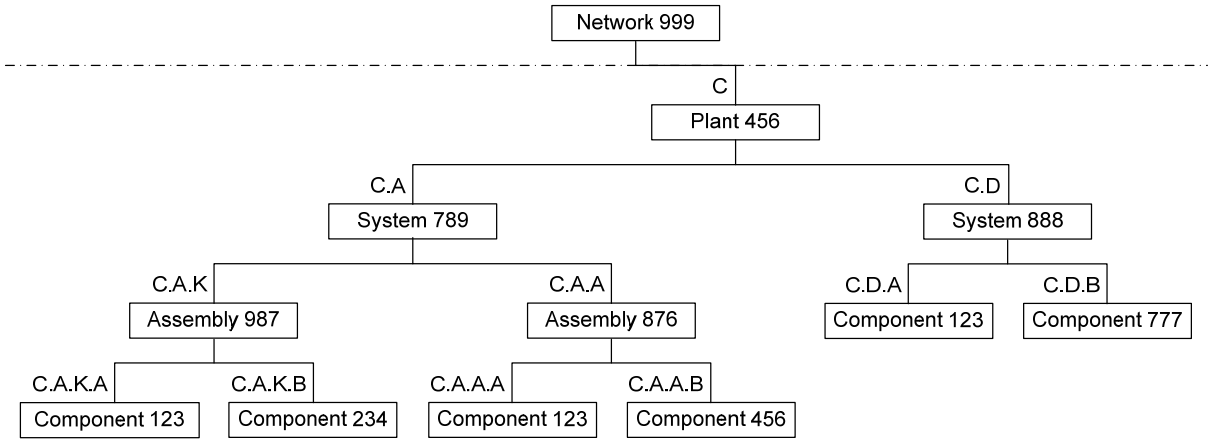

Figure 2 Relations among occurrences (identified by concatenated letter codes) of types (identified by numbers) in a tree-like structure

Table 1 Use of identifiers in a product context

Origin/main use	Types	Occurrences of types	Individuals
Development	Type designation Product identification number	(Reference designation)	Not applicable
Engineering	Type designation Product identification number	Reference designation	Plant identification number
Manufacturing	Product identification number	Reference designation	Serial number, Batch number, Lot number, Package number
Marketing, sales and shipment	Product identification number	(Reference designation)	Serial number, Batch number, Lot number, Package number , Transport number, Order number
Use and maintenance	Product identification number	Reference designation	Serial number, Asset number

4.5 Changes to an identified object

Objects subject to change shall be identified with the same identification number as long as their relevance is the same from a usage perspective. This is necessary in order to avoid unnecessary changes in the context where it is referenced, thus avoiding the potential “avalanches” of changes of identification numbers that would otherwise be a consequence.

In order to manage such changes within the context of a fixed identification number from other perspectives than usage, a complete identification of the object shall, in addition to the identification number include, at least one of the following:

- version number;
- serial number and/or lot/batch number; and/or
- production date, packaging date or expiration date.

4.6 Identification schemes

In the following clauses the attributes are specified and clarified by information models.

The information models (entity-relation diagrams), given in Figure 4, Figure 6, Figure 8 and Figure 9 shall be read as follows, see also Figure 3:

- from inside outwards starting with the 'ENTITY’ in bold capital letters;
- (related) entities are indicated by ellipses;
- relation between an entity and an (related) entity is indicated by the line between those ellipses;

- text accompanying the line between an entity and an (related) entity describes the relation;
- combination of an relation and an entity constitutes the attribute of a data element type;
- two figures separated by a dot indicate the occurrence of the attribute: the first digit indicates the minimum number of occurrences, the second one, the maximum number of occurrences;
- relations and the corresponding occurrence indications are on the same side of the relation-line positioned;
- in the information models the name of the entities are given in capitals and the name of the related entities in lower case letters.

Entity: OBJECT

Relation: has

Related entity: identifier

Attribute: has an identifier

NOTE – The attribute is composed of the Relation and the relevant entity

Cardinality: 1.1 (one and not more than one)

Figure 3 Information model principle

4.7 Identifying attributes of an object

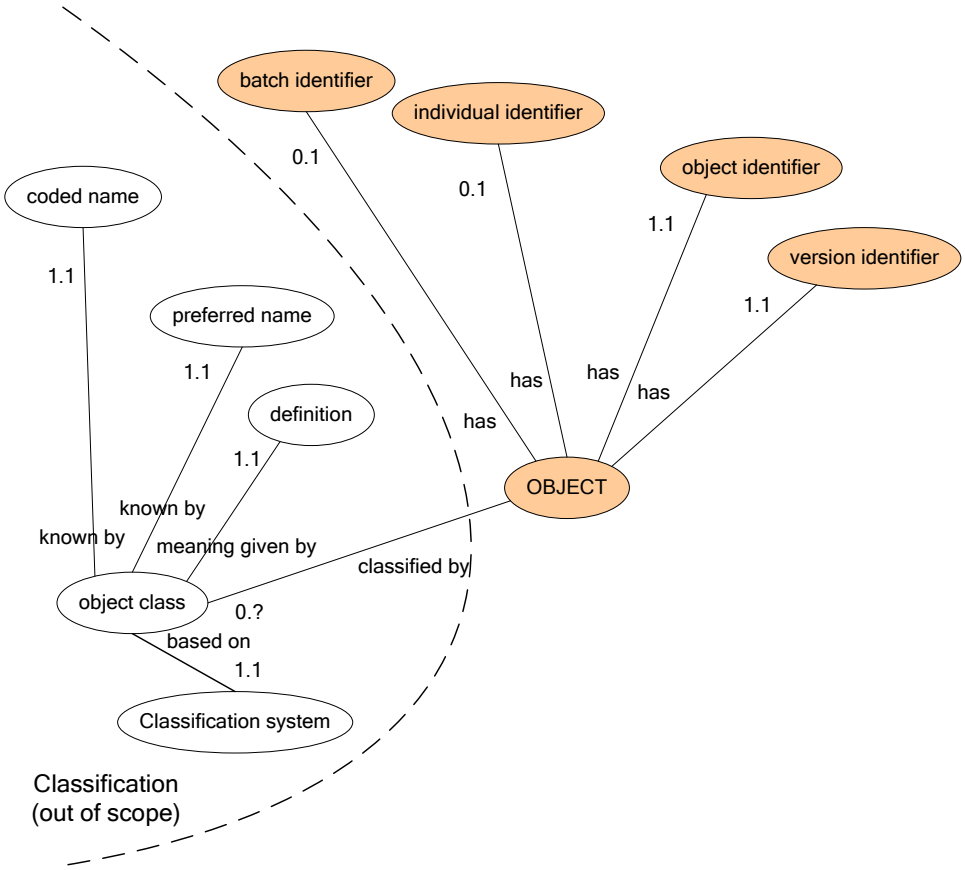

Figure 4 – Examples of identifying attributes for an object

An object has a number of identifying attributes, see Figure 4. Each of these attributes has a value – the corresponding identification number. The identification number belongs to a defined and identified domain.

4.8 Identification of an issuing domain

A domain may be part of another domain and identified as part of that. The identification number assigned in the more comprehensive domain shall be unambiguous within that and serves as a domain ID for the partial domain, see Figure 5. The principles described in clause 6 apply.

NOTE – Clause 6.1.1 can be applied if a registration authority for the larger domain exists. If no registration authority is available clause 6.1.2 is applicable.

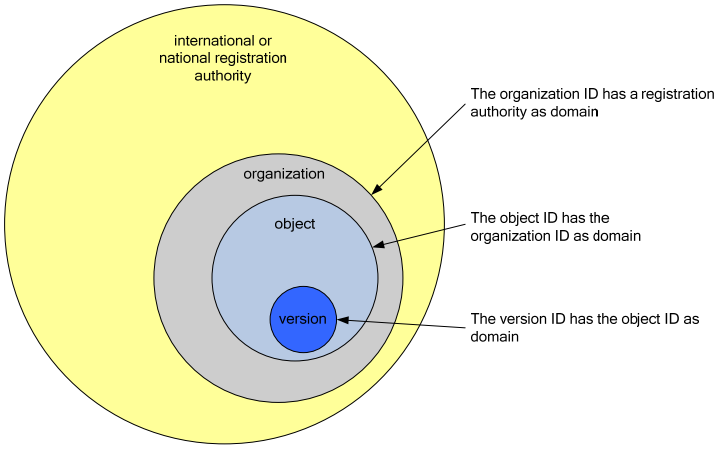

Figure 5 Illustration of domains

This principle is used to achieve globally unambiguous identification. The issuing (local) domain is identified within a larger domain, in turn identified within a larger, etc. This series of successively larger domains ends with the identification of a domain (national or international (regional or global)) that is globally recognized. The registration can be carried out by either an international registration authority (in accordance with ISO 6523-1 or ISO/IEC 15459-2) or a national one further identified by the country code (identified in accordance with ISO 3166-1).

For complete identification of an object the domain IDs of all relevant domains need to be provided.

The information related to a domain is illustrated in Figure 6. If a domain is not assigne a domain ID as described above, then a number of the other information elements need to be combined in order to achieve unambiguity in the relevant context.

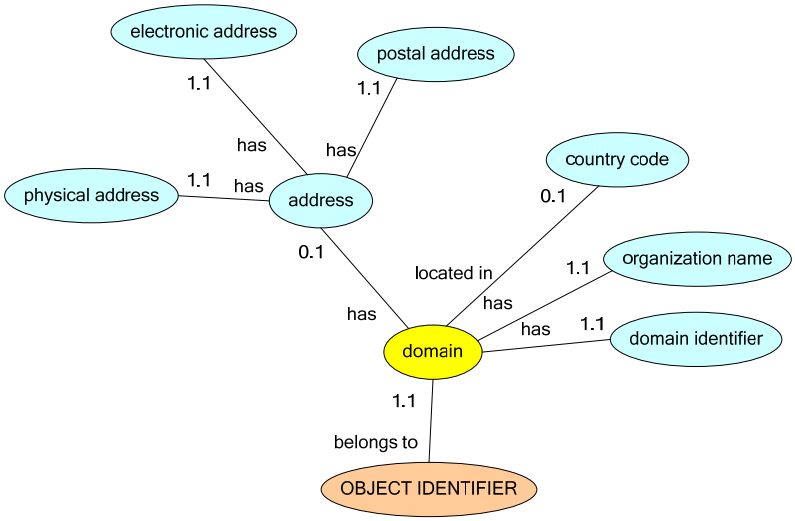

Figure 6 – Organization-defined domain identification

The relations among domains, identifiers and identification numbers are illustrated in Table 2.

Table 2 Relations among domains, identifiers and identification numbers

The issuing domain is identified by	Identified object	Object identifier	Value of the attribute"
Registration authority number	Organization	Organization identifier	Organization number
Organization number	***Object***	Object identifier	Identification number
Organization number	Batch/Lot	Batch/Lot identifier	Batch/lot number
Organization number or Identification number	Individual	Individual identifier	Serial number
Identification number <for top node>	Occurrence	Reference identifier	Reference designation
Identification number	Version	Version identifier	Version number

4.9 Multiple identification of the same object

In a given domain there shall be one identification number of the object within it. In most cases this will be the identification of the object within the domain of the organization being in charge of it, e.g. its manufacturing. It is up to the organization which of the identification methods is applied, see clauses 6.1.1 and 6.1.2.

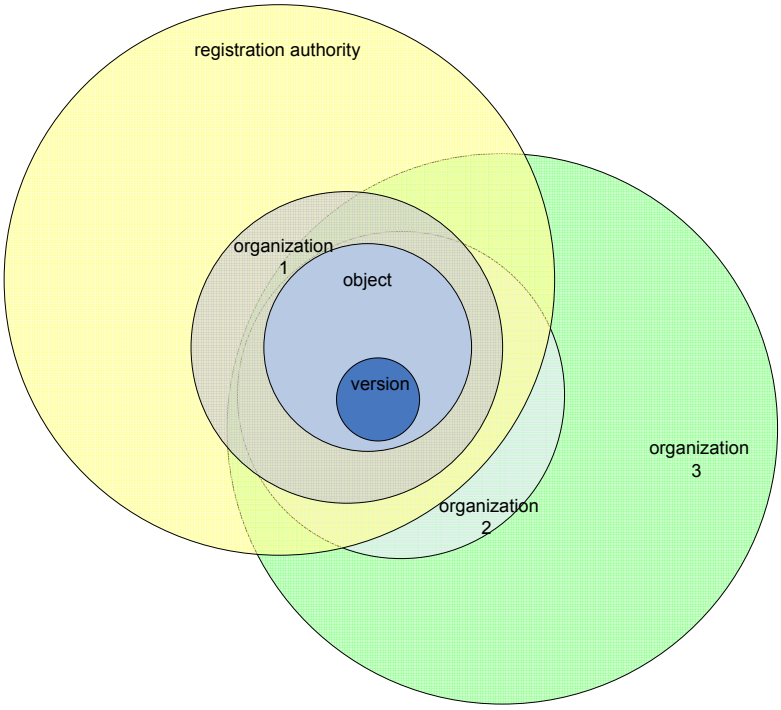

Figure 7 Illustration of identification in multiple domains

For different reasons, e.g. for marketing or exportation purposes, it may be desirable to assign additional identifiers belonging to different domains to the same object; e.g. by assigning an identification number based on a recognized international identification system.

The organization in charge of the multiple identification of the object is strongly encouraged to run a register including all identifications assigned to the object in order to allow cross-referencing. In the case of e.g. version changes of the referred object, it is then immediately known which identifiers that needs to be updated.

NOTE - The management of such systems on regional or global level require administration services. (Therefore such services need to be financed.)

4.10 Storage and use of identification numbers

A system storing and managing different types of identification numbers from different identification systems shall not limit the string length to be of a specific length that is less than the globally defined maximum length for information exchange, see clause 6.2.1.

NOTE – Data elements listed in ISO 7372 are intended to facilitate an open interchange of data in international trade with any method for data processing and communication.

4.11 Presentation of identification numbers

4.11.1 Presentation for human readers

The identification number shall be presented in a single string.

If ambiguity can arise with regard to the type of identification number, the corresponding identifier for the used identification number shall be presented visually either as human readable text or as a coded identifier identity. It shall be followed by a separating character SPACE SIGN ( ) in front of the relevant identification number.

If the complete identification of an object requires presentation of the associated domain IDs, these shall be presented either explicitly with identifiers or be concatenated into a single string, according to the following rules.

- If the complete identification is concatenated into a single string then the notation shall start from left to right, beginning with the identifier of the most comprehensive domain.
- The different identifiers may be visually separated by a separating character, as defined by the issuer. The separating characters shall have no semantic meaning.

  NOTE – Such a separating character is intended to be used just as a control character by a processing system.

Example :

Structure of the IBAN composed in this sequence by ISO 13616 / European Committee for Banking Standards (ECBS):

- Coded identifier IBAN, followed by the character SPACE SIGN ( );
- two-letter country code according to ISO 3166-1; immediately followed by the
- two check digits for the complete identification number;
- maximum 30 digits for basic account number, including bank identification and account identification within the identified bank with intermediate separating characters SPACE SIGN ( ) as defined by the issuer

Example for the presentation of the IBAN e.g. for Germany:

IBAN DE21 7005 1995 0000 0072 29

4.11.2 Presentation of multiple identifiers for human readers

If multiple identification numbers of the same object are presented, each of the identification numbers shall be preceded by the (coded) identifier of the type of identification number in order to avoid ambiguity.

Example of multiple presentation:

: EAN-8 4080 4330

EAN-13 4 00267 801721

4.11.3 Presentation for use in computer systems

For information used for interchange media, e.g. computer systems, barcode, RFID, etc, each of the different identifiers together with associated value shall be transmitted.

This allows an IT system to derive the information received for presentation purposes to human readers following clause 4.11.1.and 4.11.2.

NOTE 1 There are some IT-systems concatenating the different identifiers of an objects identification to a single string and communicating this string as a single unit. In order to identify each semantic part of that string for computer processing, each semantic part of the complete identification is identified by a prefix. The character PLUS SIGN (+) is defined as segment delimiter if concatenation is to be done in conjunction with ISO/IEC 15418.

NOTE 2 For prefixes in reference designations of objects see IEC 81346-1.

5 Documentation of an identification system

An identification system shall be ***documented*** by a description of:

- the *domain* to which it applies, possibly including its relation to other identification systems applied in the same environment;
- the *kind of objects* subject to identification;
- the *rules* for how the identification numbers shall be constructed in order to be unambiguous within this domain, see 6.2;
- the rules for how the domain should be *managed over time*; and
- a description of relevant *tools* for the management of the system: at least a register, see 6.2.2, possibly supplemented with identification number generator(s), see 6.2.3.

To maintain the integrity of an identification system is it important that it is not used for other purposes than the originally intended.

Table 1 gives generic examples of identification systems by means of indicating the names of the identifiers, and relating the domain to the contexts within which they originate and are being used.

The domain is in these tables expressed by means of the name of an activity for which the custodian for the domain is responsible.

6 Definition of identification numbers

6.1 Principle methods

To create the identification numbers two principally different methods can be applied.

1. The identification numbers are entirely *free from semantic meaning with regard to the identified object*, issued from a managed number bank in order to avoid duplication and ambiguity. This number is referring to the information that provides the required description of the identified object; or

2. The required description is *coded into the identifying number* in accordance with a defined coding scheme. Such an identification number is either the complete description or referring to the meta information that provides additional information.

6.1.1 Method 1

Method 1 requires centralized management of the identification number register. It does not require long identification numbers and is flexible in the sense that the meta information referred to can be arbitrarily voluminous and structured, and have any desired information granularity. The identification number can easily be kept stable over time; at the same time the content of the metadata can be adapted to current needs (e.g. restructured, increase of granularity).

This method is therefore recommended for, but not limited, to the use for identifiers of objects which need to be associated to an organization as a whole for reasons of traceability, product liability, etc and therefore have to be under strict control.

6.1.2 Method 2

Method 2 requires centralized management of the coding schemes, but then the generation of identification numbers can be decentralized. The application of the method results normally in long identification numbers, as the length depends on the number of properties necessary to code. It is sensitive to changes in information requirement; focus on additional coded properties or making changes from existing to other properties will impose changes in the coding system also when the described objects *per se* are unchanged.

This method is primarily recommended for, but not limited, to the identification of occurrences of (information or other) objects within a limited context, for example delivery or a library.

NOTE – An extreme example of the possibility for decentralization is the UUID (GUID) system in accordance with RFC4122 (ISO/IEC 9834-8:2004). An UUID is a 128 bit long identification number based on time stamps and node IDs and guaranteed to be unique across space and time without need for registration. Example of such a UUID: b5ef6610-b746-11da-a94d-0800200c9a66. The UUID system is commonly applied for global identification in computer systems, but can because of the length of the identification numbers be used for machine-reading only.

6.2 Construction of identification numbers

6.2.1 General

The identification numbers shall consist of a string of characters and be in accordance with 6.1.1 or 6.1.2.

The characters that shall be used for human readable notation are: digits 0, …, 9 and upper case Latin letters A, …, Z, i.e. 36 characters.

For identification numbers intended to be human readable it is good practice to avoid using letters with similar glyphs: upper-case letter O to avoid confusion with digit 0, and not to use upper-case letter I due to confusion with lower-case letter l and digit 1, since not all fonts that might be used for the presentation of the number distinguish clearly between those characters.

NOTE 1 If no semantic meaning is put into specific character positions, the identification numbers do not need to be very long, as illustrated in the following table, based on 34 characters (excluding letters I and O).

No of characters (*n*)	No of possible identification numbers (34^n)
3	39304
4	1 336 336
5	45 435 424
8	$1{,}78 * 10^{12}$
10	$2{,}06 * 10^{15}$
20	$4{,}26 * 10^{30}$

For both identification methods, the characters PLUS SIGN (+), HYPHEN SIGN (-), UNDERLINE SIGN (_), COLON SIGN (:), “SLASH” SIGN (/), VERTICAL LINE (|), and SPACE SIGN ( ) may be used as separator signs between groups of characters in order to enhance readability for human readers. If such a character is used, it shall be clearly defined by the issuer if it is to be interpreted as part of the identification or not.

The number of characters in the string is not limited or specified in this standard, since it depends on the application area. The following should, however, be considered:

- Identification numbers intended to be human readable and manageable should be kept as short as practicable;
- For identification numbers intended to be primarily machine readable (by bar code symbol, RFID, etc) ISO/IEC 15459-1 and -4 recommends a limitation to 20 characters, EDIFACT allows 35 characters for transport units. Information about the length of data element types is given in ISO 7372 and IEC 61360-1.

It is strongly advised that for data interchange a receiving system needs to be capable of receiving the full character length of the sending system. It is recommended to apply a variable length of up to 256 characters.

6.2.2 Issue (Registration)

Each assigned identification number shall be registered by the issuer within the relevant domain in order to ensure that no duplicates are issued.

It might for practical reasons be required to delegate this responsibility within an organization to different organizational units.

NOTE 1 – This delegation can be implemented either through the formal creation of sub-domains, identified by the characters in the initial position of the identification numbers, or by assigning limited sub-series of identification numbers to an organizational unit, This use of character positions is not to be interpreted as an assignment of a “semantic meaning” with regard to the identified object, since the responsibility for a given series might be transferred over time.

NOTE 2 - The management of the information on the actually identified objects is out of scope of this publication. For further information please refer, e.g. to the series IEC-ISO 82045 on document management.

Reuse of a once registered identification number shall not be allowed within a domain.

6.2.3 Identification number generators

An identification number generator is a software program that creates identification numbers in accordance with defined rules, ensures that no duplicates are issued, and logs the result. When called upon, the program responds with the next free number.

Identification number generators are commonly integrated into computer systems for the purpose of creating unambiguous identification numbers for use within the system itself.

If such identification numbers are to be communicated outside of the system, for example for as product identification numbers, the rules for the creation of the identification numbers shall be in agreement with the long-term rules for identification numbers within the domain to which the identification number belongs, since the life-time of the computer system is likely to be short in comparison with the life-time of e.g. investment products.

If several such identification number generators are used within an organization, it is possible to distribute the responsibility for the number generation as described in 6.2.3, but in this case not to organizational units but to identification number generators.

NOTE – When setting up an identity number generator it is good practice to reserve (part of) a series for training, education, software testing, fault finding and similar purposes. People are otherwise very creative and use old numbers or redefine old things because there is no way for them to be allowed to create new numbers for those purposes without triggering other mechanisms in an integrated environment. This could be harmful.

6.2.4 Validation

For identification numbers likely to be transferred several times from one medium to another, for example by human key-in or scanning, it can be useful to check the integrity of the number before further processing. This can in simpler cases be done by a format check or, more secure, by using check digits.

The validation by means of format check or a check digit could be applied for a single identification number or for a concatenation of several identification numbers.

ISO 7064 provides information about the application of check digits. If used, checking systems used in identification systems shall be publicly accessible. It is recommended to provide facilities to allow decentralized checks.

6.3 Application of the domain identifier

In most cases the identification numbers alone are sufficient as identifiers for the objects, as the identification number domain is known and presupposed in that specific context.

- An identification number shown on a rating plate of a product is interpreted as belonging to a domain corresponding to the organization with its name or logotype presented on the plate.
- An identification number used as a document number is interpreted as belonging to a domain corresponding to the issuing organization with its name or logotype presented in the title block of the document, or in e.g. a letter head.
- An identification number presented in the content of a document (listing of parts or documents, references to related documents, etc) are also interpreted as belonging to a domain corresponding to the issuing organization with its name or logotype presented in the header or footer of the document.

Wherever an identification number is presented or used, and the domain is not clear from the context, information about the domain identifier shall be explicitly stated.

The appearance of the identification number domain can be different in different contexts.

- In presentation as field names on screens, headlines in tables, in clear text, etc., the domain might be shown integrated in a field name, column headline, etc.
- In applications where identification numbers from several different domains are handled regularly, the domain ID (or name) and the identification number are specified as separate fields that always are communicated as a pair.
- As a concatenated part of an identification string comprising the domain ID and the identification number can be visualized by a separating character, see clause 6.2.

In communication between different parties the domain identifier and the identification number should be transferred as two separate identifiers, however, as a pair, unless the domain is not the same (in which case it can be presupposed).

7 Identification within a global context

7.1 General

Globally unambiguous identification can be achieved in two different ways:

- an issuing (local) domain with validity within an organization is supplemented with an identification of that domain, possibly further supplemented with an identification (number) for the country, etc., see clause 6.2 and Figure 8, or
- the domain for the identification system is defined as global right from the start, see Figure 9.

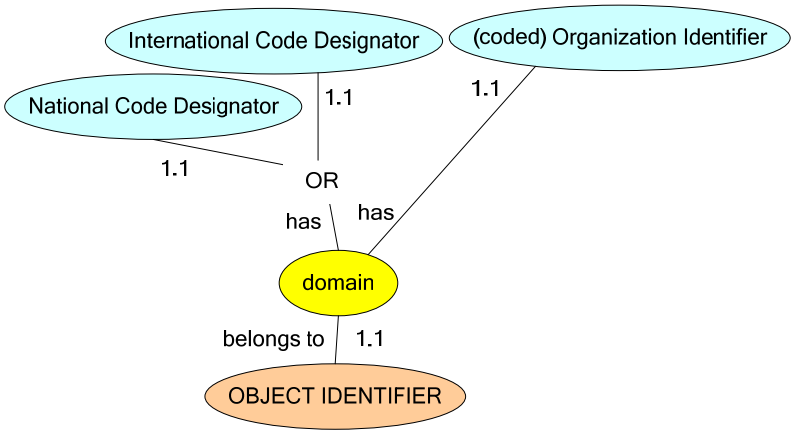

Figure 8 – Illustration of domain identification

7.2 Global domains

A number of global domains are defined today to allow unambiguous identification, see Part 2.

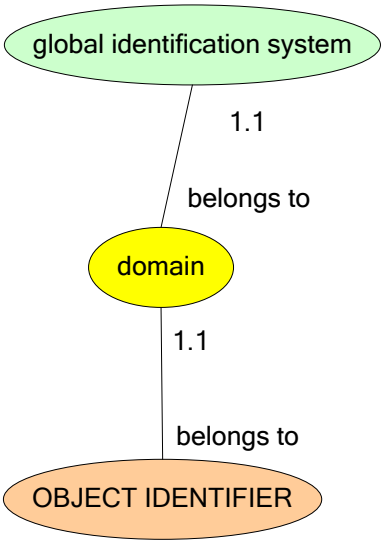

Figure 9 – Globally-based domain identification

8 Recommendations with regard to organization changes

8.1 General

The requirement for permanence is reasonably easy to meet, provided that the issuing organization in charge of a domain is also stable over time. Organizations are, however, sometimes split or merged with other organizations. At a merger the new organization will face a situation with two or more domains. In unfortunate cases these might be impossible to merge since some identification numbers would then no longer be unambiguous. Identification numbers from the earlier organizations are most likely necessary to be handled in one common IT system environment where collisions would be likely to appear.

Re-identification of objects is under such circumstances neither a practically nor a principally possible solution. It would in most cases be extremely costly (because of all changes in existing documentation) and for example product identification numbers are in any case printed on the marking plates of since long sold and distributed products.

The method to create a globally unambiguous identification by means of domain identifiers can be applied also for this purpose. The domain identifier (Domain ID) depicts in this case the former issuing organization, i.e. the owner and manager of the numbering scheme from which the identification number was once generated. This domain becomes a sub-domain within the new owners' domain.

Note that the former organization will in many cases no longer exist, and therefore no international or national organization codes etc will be available. Therefore, the domain ID may need to be handled as a separate entity entirely within the new organization.

There are cases where the numbering scheme for some of the identification numbers in actual use is not possible to trace back to its origin. In such cases a Domain ID can be created based on the organizational unit in which these numbers was first created and controlled.

9 Conformance

9.1 General

Conformance to this standard can be claimed for identification systems defined and documented in accordance with clause 5 to 8 (which includes part of clause 4 by references).

For computer systems claimed to be in compliance with this standard should special attention be given the requirement to manage domains.