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BSI Standards Publication

Identification systems enabling unambiguous information interchange — Requirements

Part 1: Principles and methods

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National foreword

This British Standard is the UK implementation of EN 62507-1:2011. It is identical to IEC 62507-1:2010.

The UK participation in its preparation was entrusted to Technical Committee GEL/3, Documentation and graphical symbols.

A list of organizations represented on this committee can be obtained on request to its secretary.

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

(IEC 62507-1:2010)

Systèmes d'identification permettant l'échange non ambigu de l'information - Exigences - Partie 1: Principes et méthodes (CEI 62507-1:2010)

Anforderungen an Identifikationssysteme zur Unterstützung eines eindeutigen Informationsaustauschs - Teil 1: Grundsätze und Methodik (IEC 62507-1:2010)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 3/1007/FDIS, future edition 1 of IEC 62507-1, prepared by IEC TC 3, Information structures, documentation and graphical symbols, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62507-1 on 2011-01-02.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-10-02
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2014-01-02

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62507-1:2010 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 81346-1	NOTE	Harmonized as EN 81346-1.
ISO 9000:2005	NOTE	Harmonized as EN ISO 9000:2005 (not modified).

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 61360-1	-	Standard data elements types with associated classification scheme for electric items - Part 1: Definitions - Principles and methods	EN 61360-1	-
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	EN 81346-2	-
IEC 82045-1	-	Document management - Part 1: Principles and methods	EN 82045-1	-
IEC 82045-2	-	Document management - Part 2: Metadata elements and information reference model	EN 82045-2	-
ISO/IEC 646	1991	Information technology - ISO 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 MH10 Data Identifiers and maintenance	-	-
ISO/IEC 15434	-	Information technology - Syntax for high-capacity automatic data capture (ADC) media	-	-
ISO/IEC 15459-1	-	Information technology - Unique identification of transport units - Part 1: General	-	-
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/IEC 7064	-	Information technology - Security techniques - Check character systems	-	-
ISO 3166-1	-	Codes for the representation of names of countries and their subdivisions - Part 1: Country codes	EN ISO 3166-1	-

Publication	Year	Title	EN/HD	Year
ISO 10303-11	-	Industrial automation systems and integration - Product data representation and exchange - Part 11: Description methods: The EXPRESS language reference manual	-	-

CONTENTS

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.

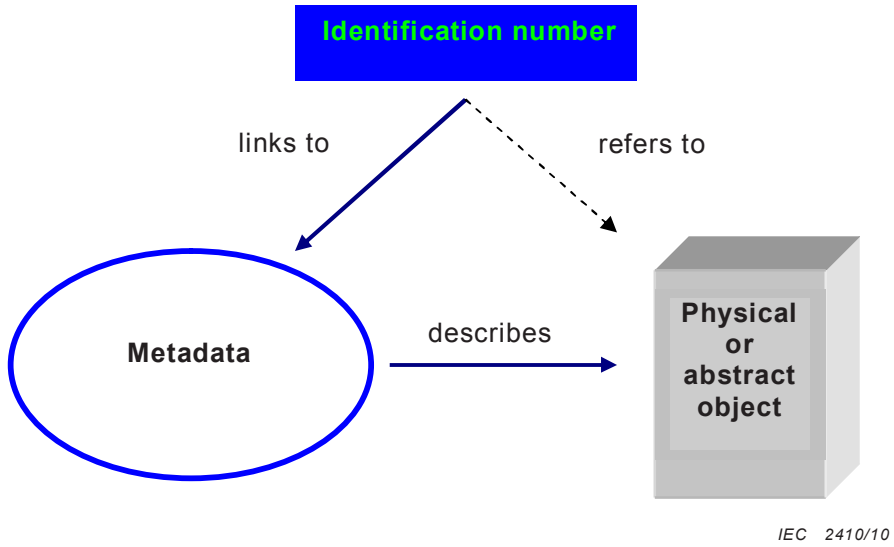


Figure 1 – Illustration of the referencing mechanism

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.

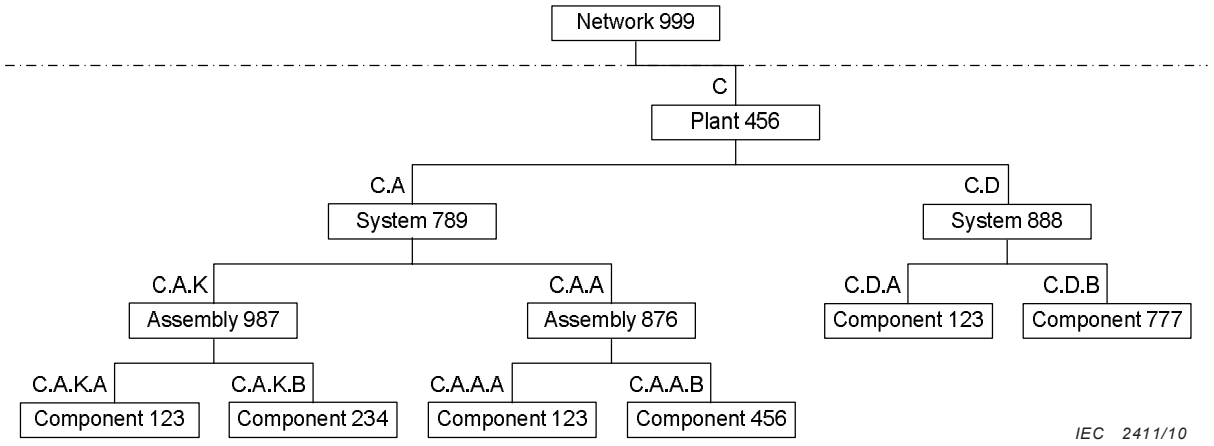
- Generic object types, for example as described in IEC 81346-2 and ISO/IEC 15418 where the type is identified by a string of characters.
- Many kinds of products, for example motors, transformers or contactors, are designed as a range of sizes with common characteristics. In such cases the identifier 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

Origin/main use	Types	Occurrences of types	Individuals
Manufacturing	Type designation Product number	Reference designation Part reference	Serial number, batch number, lot number
Marketing, sales and shipment	Type designation Product number	(Reference designation)	Serial number, batch number, lot number, package number, transport number, order number
Use and maintenance	Type designation Product number	Reference designation	Plant number, serial number, asset number

4.5 Changes to an identified object

Objects subject to change shall be identified with the same object 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 they are 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

A detailed information model for reference purposes is provided in Annex B.

In the following clauses, the attributes are additionally described by simplified information models.

The information models (entity-relation diagrams), given in Figure 4, Figure 6 and Figure 8 and 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 a 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

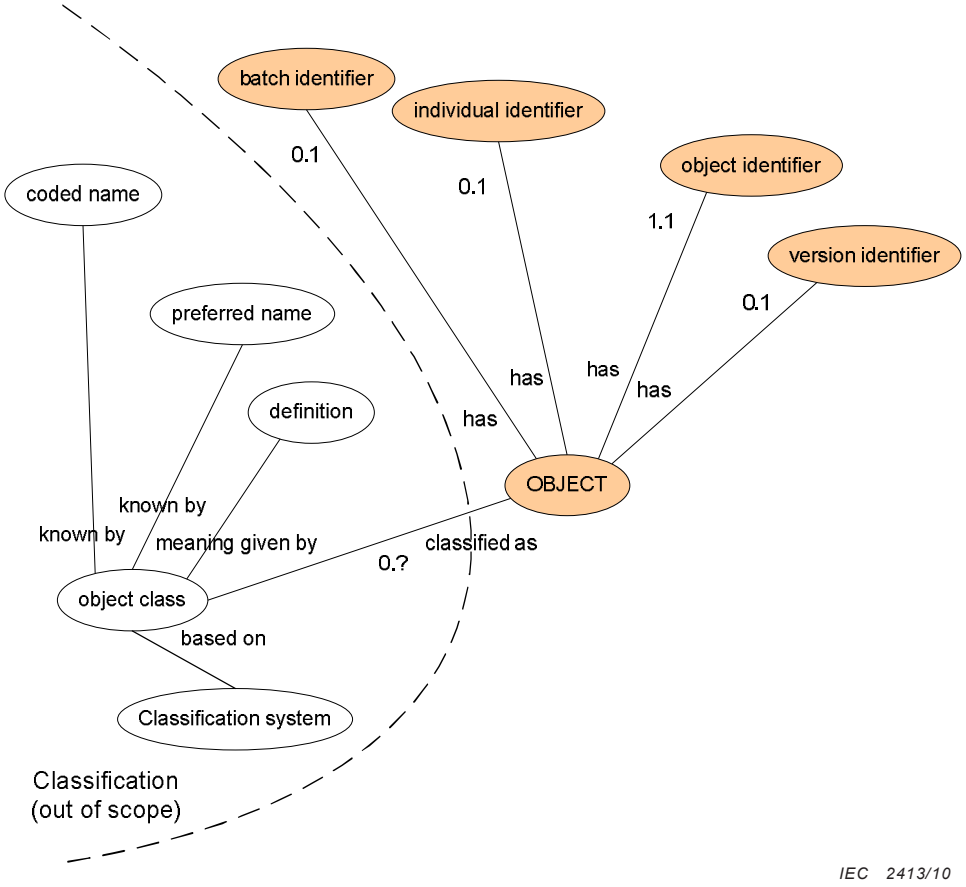


Figure 4 – Examples of identifying attributes for an object within a given domain

An object has 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 domain number (domain ID) for the partial domain, see Figure 5. The principles described in Clause 6 apply.

NOTE Subclause 6.1.2 can be applied if a registration authority for the larger domain exists. If no registration authority is available 6.1.3 is applicable.

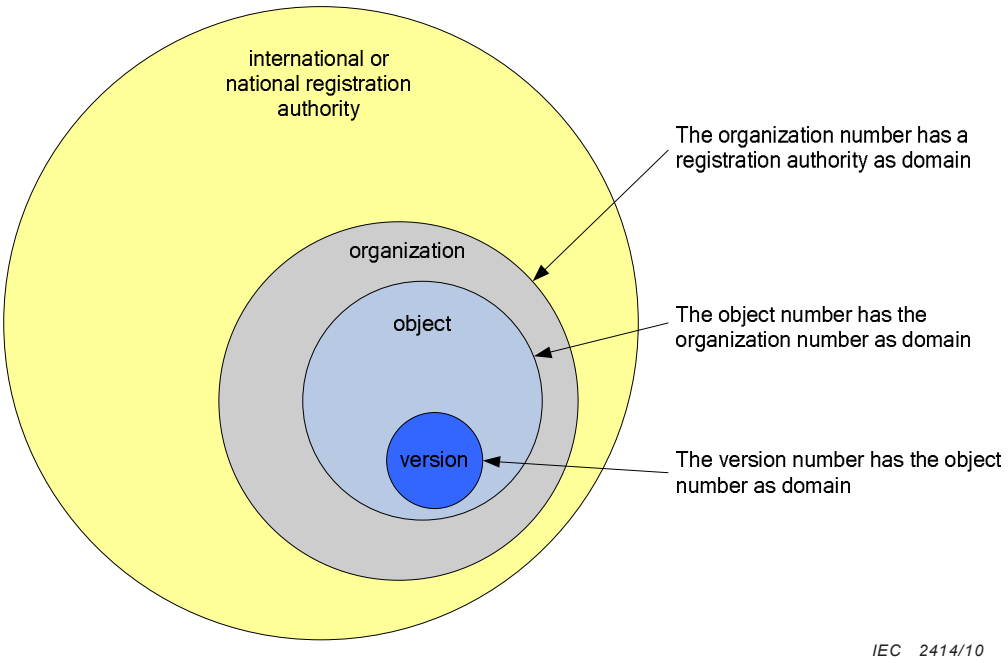


Figure 5 – Illustration of domains

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 numbers of all relevant domains need to be provided.

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

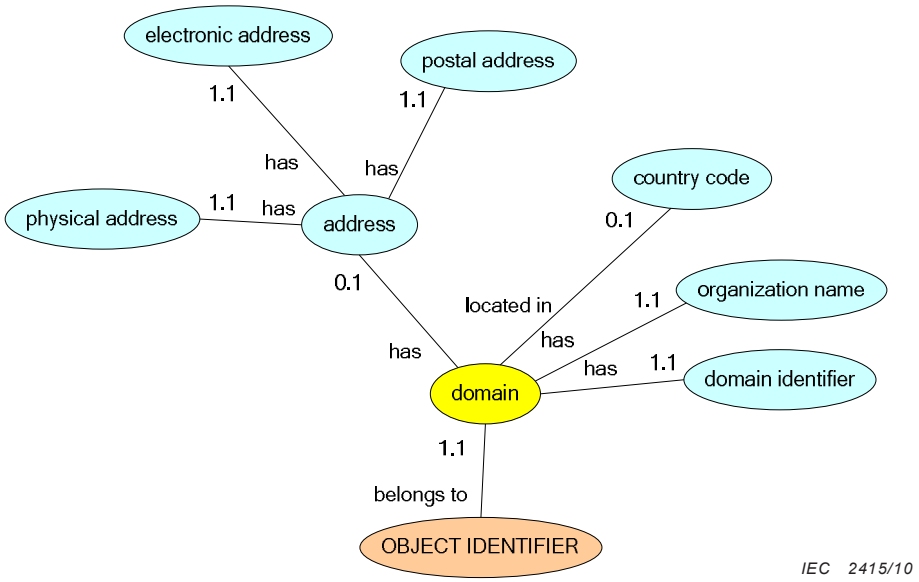


Figure 6 – Organization-defined domain identification

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 type	Object identifier	Object number
Organization number or Object number	Batch/Lot	Batch/Lot identifier	Batch/lot number
Organization number or Object number	Individual	Individual identifier	Serial number
Organization number or Object number	Occurrence	Reference identifier	Reference designation
Object 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 6.1.2 and 6.1.3.

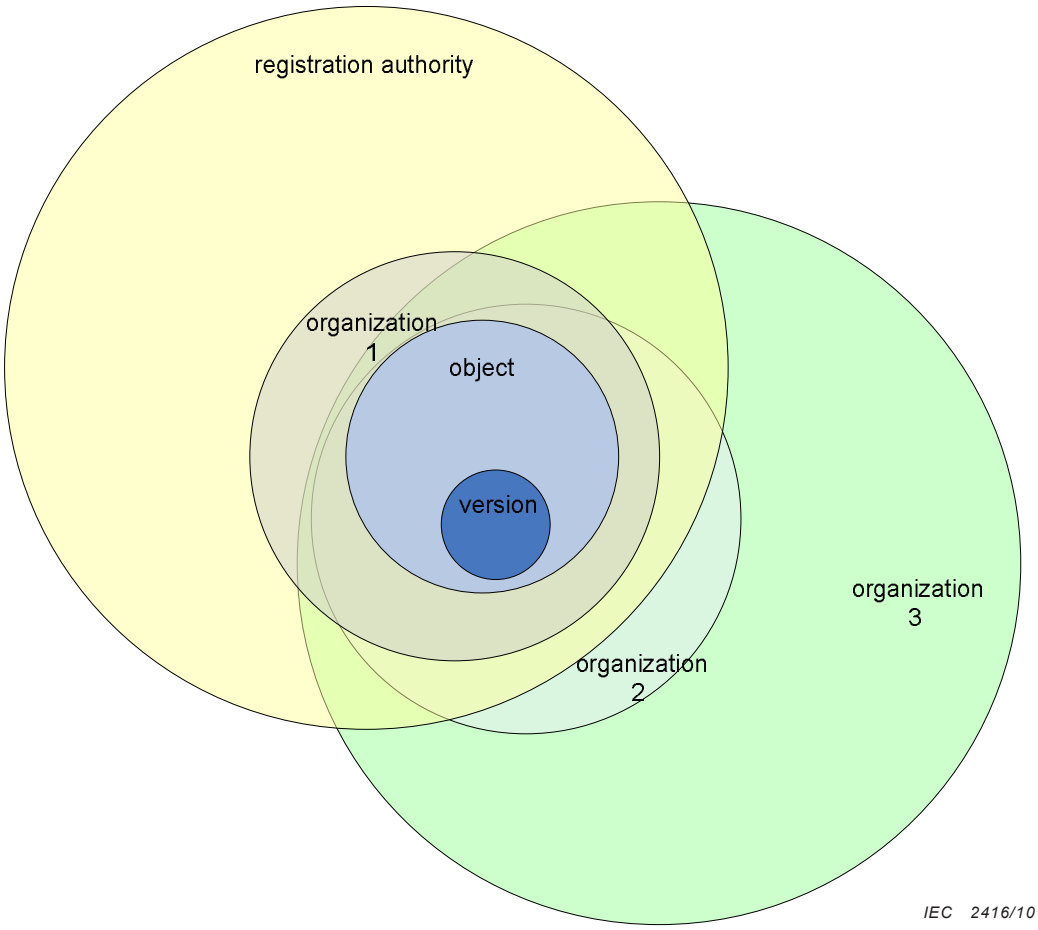


Figure 7 – Illustration of identification in multiple domains

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 (the responsible object owner) is strongly encouraged to run a register including all object numbers 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 need 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 for storage and management of different types of identification numbers from different identification systems shall not limit the number of characters in the string. The globally defined maximum length for information exchange is defined in 6.2.1.

NOTE If concatenation of the different components of an identification string is applied, then the limitation applies to the concatenated string.

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.

Annex C gives an example of documentation of an identification system.

The integrity of an identification system shall be maintained. In order to support this, the use of an identification system for other purposes than originally intended should be avoided.

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 this table expressed by means of the name of an activity for which the custodian for the domain is responsible.

6 Generation of identification numbers

6.1 Principle methods

6.1.1 General

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

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

b) 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.

6.1.2 Method 1

Method 1 requires centralized management of the identification number register within the domain. 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.

6.1.3 Method 2

Method 2 does not require centralized management of the identification number registers in a domain, but the used coding schemes have to be centrally defined and managed.

The generation of identification numbers can then be decentralized, but for unambiguity it may be necessary to create sub-domains.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.

Method 2 has also a disadvantage in the risk of running out of numbers, since during set up of the coding rules it is not possible to foresee the needs that may come in the future.

NOTE An extreme example of the possibility for decentralization is the UUID 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

An identification number shall consist of a string of characters and be in accordance with 6.1.2 or 6.1.3.

The characters used to compose an identification number shall be chosen from the G0-set of the International Reference Version (IRV) of ISO/IEC 646, excluding those for national or application-oriented use.

NOTE The bit combinations used for national or application-oriented use are 4/10, 5/11 to 5/14, 6/0 and 7/11 to 7/14, please refer to 6.4.3 and Table 4 and 5 of ISO/IEC 646.

Recommended characters for human readable notation are: digits 0, …, 9 and upper case Latin letters A, …, Z, i.e. 36 characters.

For notations primarily intended for machine reading, lower case letters may also be used.

For specific applications the following signs may additionally be used: NUMBER SIGN (‘#’), AMPERSAND (‘&’), PLUS SIGN (‘+’), HYPHEN-MINUS (‘-‘), FULL STOP (‘.’), SOLIDUS (‘/’), COLON (‘:’), SEMI-COLON (‘;’), EQUALS SIGN (‘=’), LESS-THAN SIGN (‘<’), GREATER-THAN SIGN (‘>’).

Annex D shows the characters supported by this standard.

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 3, based on 34 characters (having excluded letters I and O).

Table 3 – Number of possible identification numbers

No of characters (n)	No of possible identification numbers (34^n)
3	39 304
4	1 336 336
5	45 435 424
8	$1{,}78 * 10^{12}$
10	$2{,}06 * 10^{15}$
20	$4{,}26 * 10^{30}$

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 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.
- For identification numbers intended to be primarily machine readable by bar code, RFID, etc ISO/IEC 15459-1 and ISO/IEC 15459-4 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 for this purpose 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 International Standard IEC 82045, developed jointly by IEC and ISO 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 typically, but not limited to, 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 use 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 6.2.2, 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 add a sub-domain or 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 (manual or automated), 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.

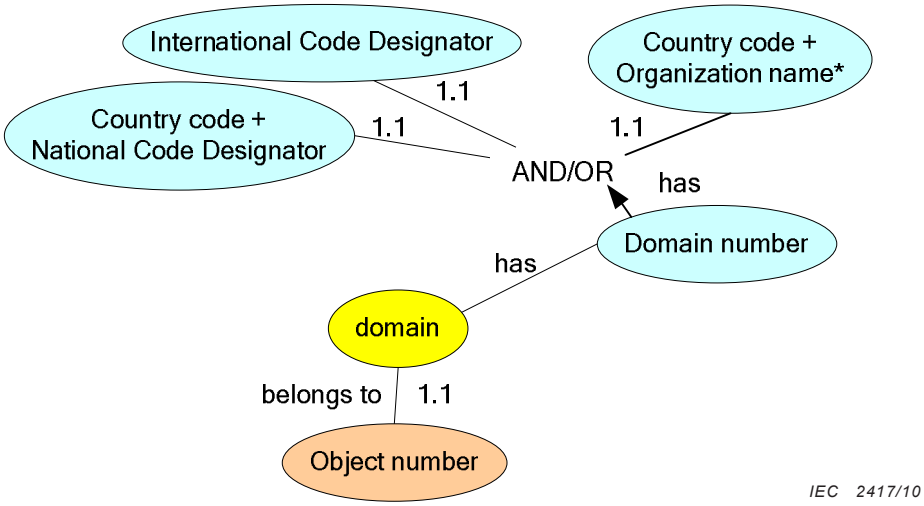
The validation by means of format check or a check digit could be applied for a single identification number or for a concatenation of several identification numbers.

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.

7 Identification within a global context

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 6.2 and Figure 8, or
- the domain for the identification system is defined and identified as global by being registered by an international recognized registration authority.



*) Further information required if companies with the same name appear in a country.

Figure 8 – Illustration of domain identification

8 Representation and presentation of identification numbers

8.1 Representation 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 identification number shall be transmitted.

It is up to the physical electronic transfer format to define:

- which kind of separator character among the different identification numbers, and
- which kind of segmentation character among the different identification elements of an identification number

are used in the exchange file.

As alternative solution for the segmentation character, the character GROUP SEPARATOR SIGN <GS> (ASCI Character 029) in accordance with ISO/IEC 15434 may be used.

This allows an IT system to derive the information received for presentation purposes to human readers according to 8.2.and 8.2.3.

NOTE IT- systems should keep the structure of the different identifiers of an object identification in order to ease electronic transaction processes and simplify later processing steps, instead of flattening the structure to a single string for presentation purposes. In the case of a printed object identification e.g. by a bar code, the data structure is flattened to a single string. The bar code scanning software has to read the string and convert the string into the previous structure again.

8.2 Presentation for human readers

8.2.1 General

An 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 code. It should be followed by a separating character SPACE (‘ ‘) in front of the relevant identification number.

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

- If the complete identifier 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.

8.2.2 Presentation of concatenated identifiers for human readers

As several identifiers may be concatenated for presentation purposes, the associated identification numbers may be visually separated by a separating character as defined by the issuer. Such separating characters shall have no meaning. The presentation shall follow from the top level (largest domain) to the smaller element (smallest domain) consecutively.

In order to enhance readability for human readers, the following characters may be used as separators: SPACE SIGN (‘ ‘) or LOW LINE (‘_‘). Other separating characters need to be commonly agreed.

EXAMPLE

Structure of the IBAN composed in this sequence by ISO 13616:

- 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 for Germany:

IBAN DE21 7005 1995 0000 0072 29

8.2.3 Presentation of multiple identifiers for human readers

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

EXAMPLE

ABC 12345678
DEF 9012345678

8.3 Indication of sub domains

If within the same identification system different notations are used indicating a sub-domain within that system, e.g. by using different numbers of characters to present that sub-domain, then the coded identifier of the identification system should be expanded by adding the character HYPHEN SIGN (‘-‘) being immediately followed by a string of characters, e.g. by the number of characters, to indicate the applicable sub-domain.

The coded domain identifier shall be followed with the separating character SPACE SIGN (‘ ‘) being followed with the identification number.

EXAMPLE (with the value ABC of the domain identifier):

ABC-8 40804330
ABC-13 400267801721

8.4 Application of the domain identifier

In most cases the identification numbers alone are sufficient as identifiers, as the 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.) is 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 domain number can be indicated in different ways 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 number (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 number, and the identification number can be visualized by a separating character, see 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).

9 Recommendations with regard to organization changes

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 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 number 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 number may need to be handled as a separate entity entirely within the new organization.

10 Conformance

Conformance to this standard can be claimed for identification systems defined and documented in accordance with Clauses 5 to 9 (which includes part of Clause 4 by references).

Annex A contains examples of how such systems can be defined and delimited and Annex C how they can be documented.

Conformity with this part of IEC 62507 for global or regional use can be declared if the set of data elements specified in at least one of the following subclauses; A.2.2, A.2.3 or A.3.2, is provided.

Conformity with this part of IEC 62507 for local use can be declared if the set of data elements specified in at least one of the following subclauses; A.2.4 or A.3.3, is provided.

Conformity with this part of IEC 62507 for identification within an object-bound domain can be declared if the set of data elements specified in one of the following subclauses; A.4.2 or A.4.3, is provided.

Annex A
(informative)

Types of identification systems

A.1 General

The following clauses provide a non-exhaustive list of identification systems.

Clauses A.2 and A.3 describe identification systems used to relate objects to an organization.

Clause A.4 describes identification systems used to relate objects to other objects (systems).

The expressions as used in the EXPRESS-model are shown in brackets.

A.2 Identification systems with custodian recognized by code

A.2.1 General

Recognition of a custodian by code requires the use of a registration authority (or an issuing organization working on behalf of such an authority) by which this *organization number* [coded_organization_id] is assigned and registered. Such registration authorities can be international as well as national.

A.2.2 Internationally registered identification system

The use of an internationally registered identification system requires a registration on international level of the organization being the custodian of the domain. During this registration process the custodian gets the appropriate *domain number* [domain_id] used as an attribute for the identification of objects within its domain.

Global identification of an object requires the following associated attributes:

- **Organization number**;
- **Domain number**;
- **Object number** (being assigned by the custodian of the identification system);

Identification of versions is not common in internationally registered identification systems, but if used the following attribute shall be added:

- **Version number** (being assigned by the organization responsible for the object).

If concatenated, the concatenated string shall have the following structure:

Organization number + Domain number + Object number + Version number

With reference to the EXPRESS model in Annex B: [coded_organization_id + domain_id + object_id + version_id]

EXAMPLE: Corporate identification systems where the organization is registered internationally. This includes systems for serial numbers and batch/lot numbers in the case that these numbers are directly related to an organizational domain. (Compare Example 2 of A.4.2 for another method.)

A.2.3 Nationally registered identification system

The use of a nationally registered identification system requires registration on national level of the organization being the custodian of the domain. During this registration process the custodian gets the *organization number* [coded_organization_id] as well as the appropriate *domain number* [domain_id] used as an attribute for the identification of the objects within its domain. In order to make the domain id globally unambiguous also the country code [country_code] shall be added.

Global identification of an object requires the following associated attributes:

- **Country code** (in accordance with ISO/IEC 3166-1);
- **Organization number**;
- **Domain number** (assigned by the registration authority);
- **Object number** (assigned by the custodian of the identification system);
- **Version number** (assigned by the organization responsible for the object).

If concatenated, the concatenated string shall have the following structure:

Country code + Organization number + Domain number + Object number + Version number

With reference to the EXPRESS model in Annex B: [country_code + coded_organization_id + domain_id + object_id + version_id]

EXAMPLE: Corporate identification systems where the organization is registered nationally. This includes systems for product numbers, serial numbers and batch/lot numbers in the case that these numbers are directly related to an organizational domain. (Compare Example 2 of A.4.2 for another method.)

A.2.4 Registered identification system for sub-domains

Identification systems can be defined for a domain that is a *sub-domain* to an internationally or nationally registered identification system (the “higher-level domain”) for which a domain number is available or to a sub-domain of such a domain.

The use of sub-domains requires registration at the custodian of the higher-level domain, or at the custodian of a sub-domain to such a domain. During this registration process, the custodian of the sub-domain gets an *organization number* [coded_organization_id] and the appropriate *domain number* [domain_id] used as an attribute for the identification of objects within the sub-domain.

Global identification of an object in a sub-domain requires, **in addition** to the identifiers of the domain in which the local one is registered:

- **… + Domain number** (assigned by the custodian of the higher-level domain)
- **Object number** (assigned by the custodian of the identification system)
- **Version number** (assigned by the organization responsible for the object)

If concatenated, the concatenated string shall start with the identifiers of the internationally or nationally registered domain followed by this structure:

… + Domain number (for the higher-level domain) + Domain number (for the sub-domain) + Object number + Version number

With reference to the EXPRESS model in Annex B: [… + domain_id (for the higher level domain) + domain_id (for the sub-domain) + object_id + version_id]

Example of sub-domains: ABC-8, ABC-13, DEF-A, DEF-B, DEF-C.

A.3 Identification systems with custodian recognized by name

A.3.1 General

Recognition of a custodian by name for an identification system requires that sufficient information is provided to make the organization unambiguous.

A.3.2 Identification system recognized on global level

For recognition on global level the custodian of the identification system needs to be specified by

- **Country name or country code**;
- **Organization name**

With reference to the EXPRESS model in Annex B: [country_name | country_code + organization_name]

In some countries it is not required that organization names are unambiguous within the country. In such cases the information above shall be supplemented by at least physical address information as shown in Annex B.

Global identification of an object in the domain requires **in addition** to this:

- **… + Object number** (assigned by the custodian of the identification system)
- **Version number** (assigned by the organization responsible for the object)

If concatenated: **Object number + Version number**

With reference to the EXPRESS model in Annex B: [… + object_id + version_id]

EXAMPLE: Corporate identification systems where the organization is not registered. This includes systems for product numbers, serial numbers and batch/lot numbers in the case that these numbers are directly related to an organizational domain. (Compare Example 2 of A.4.2 for another method.)

A.3.3 Identification system for sub-domain

Identification systems can be defined for a domain that is a *sub-domain* to an identification system for which the custodian is recognized by name (the “higher-level domain”).

In order to recognize the relation to the higher-level domain the use of sub-domains requires registration at the custodian of the higher-level domain, or at the custodian of a sub-domain to such a domain.

This case coincides with A.2.4 above, with the difference that the higher-level domain is dealt with in accordance with A.3.2.

EXAMPLE: Corporate identification systems where the organization is not registered and where sub-domains are created and registered on corporate level.

A.4 Identification systems for sub-objects

A.4.1 General

Identification systems for sub-objects are used to relate sub-objects from a given aspect to a higher-level object, identified in one of the ways described in Clauses A.2 and A.3

A.4.2 Single-level identification

The high-level object in the actual context serves as a domain for the identification system for its sub-objects.

Identification of an object within the context of another requires:

- **Object number (for the "highest-level object in the actual context, used as a domain for the lower level)**
- **Object number (for the sub-object, within this domain)**

With reference to the EXPRESS model in Annex B: [object_id (for the domain = domain_id) + object_id]

EXAMPLE 1: Single-level reference designation (IEC 81346-1 with top-node identification), local telephone number.

EXAMPLE 2: Serial numbers for the individual specimen of a type of object where the identification number of the object type serves as a domain identifier for the serial numbers.

A.4.3 Multi-level identification

The *object number* [object_id] defined in A.4.2 can in its turn be used as *domain number* for its sub-objects. By this method the sub-division can be recursively repeated.

Identification of an object within the context of another requires:

- **Object number (for the "highest-level object" in the actual context, used as a domain for the next-lower level)**
- **Object number (for the sub-object, unambiguous with the domain defined above and used as a domain for the next-lower level)**
- **Etc.**

With reference to the EXPRESS model in Annex B: [object_id (for the domain = domain_id) + object_id (= domain_id) + Etc.]

EXAMPLE: Multi-level reference designation (IEC 81346-1, with top-node identification), international telephone number, IP-address.

Annex B
(normative)

Reference information model

B.1 General

The reference information model shown in this annex delivers a formal model of the concepts and methods established in this part of the IEC 62507 series. It is normative with respect to data exchange; i.e when data is transferred or exchanged, the exchange shall conform to this reference model.

B.2 Reference model

The reference model provided in Clause B.5 is a graphical representation of the structure and constraints of the application objects specified in Clause B.6. The graphical form of the reference model is presented using EXPRESS-G. The reference model is independent from any implementation method.

The reference model depicts the requirements set up, using where possible available subsets of application reference models of the ISO 10303 series.

The model is not intended to be complete within the framework of neither integrated resource models nor application reference models developed within the ISO 10303 series. It is complete with respect to the requirements established within this standard.

NOTE 1 For an introduction to EXPRESS-G, see http://tc3.iec.ch/txt/xpress.pdf .

NOTE 2 This Annex is available in the English language only.

B.3 List of entities and attributes

This clause provides an alphabetically ordered list of the entities and attributes of the reference information model described in Clause B.4.

B.4 Entity descriptions

B.4.1 Domain

The Domain is a collection of attributes establishing the relationship between the Domain_identifier, and the Party serving as custodian of the domain and, in the case that an object serves as domain, to the Object_identifier of this object.

The data associated with a Domain are the following:

- (INV) identified_by S[1:?];
- maintained_by;
- associated_with.

B.4.1.1 (INV) identified_by S[1:?]

Provides the relation between Domain and the Domain_identifier. A Domain has at least one identifier, and may have more than one.

B.4.1.2 maintained_by

Provides the relation between Domain and the Party serving as custodian.

B.4.1.3 associated_with

Domains belonging to an organization may belong to other organization related domains.

A domain may optionally be associated to an **object** identified within such a domain. The object identification number of such an object serves as domain_id for sub-objects of this object.

NOTE This association describes the creation of reference designations according i.a to IEC 81346, based on tree-like structures (consists-of/is-part-of). Hierarchical reference designations are concatenated identification numbers for domains of this type.

B.4.2 Domain_identifier

The Domain_identifier provides the identification of a Domain.

The attributes associated with an Doamin_identifier are:

- identifies;
- domain_id.

B.4.2.1 identifies

Provides the relation to the identified Domain.

B.4.2.2 domain_id

A string providing the domain identification number.

B.4.3 Domain_relationship

This enity contains the description of the relations between domains.

The associated attributes are:

- relating_domain;
- related_domain;
- domain_relationship_type.

B.4.3.1 relating_domain

Specifies the first of the two Domains related by the Domain_relationship.

B.4.3.2 related_domain

Specifies the second of the two Domains related by the Domain_relationship.

B.4.3.3 domain_relationship_type

The domain relationship_type specifies the meaning of the relation.

The prefined domain_relationship_types are:

- decomposition;
- substitution.

B.4.4 Object

The Object entity is a collection of attributes establishing relationships among and Object_identifier, Object_version and Object_class.

The data associated with an Object are the following:

- (INV) identified_by S[1:?];
- (INV) has_version S[0:?],
- classified_as S[0:?];

B.4.4.1 (INV) identified_by S[1:?]

Provides the relation between Object and the Object_identifier. An Object has at least one identifier, and may have many.

B.4.4.2 (INV) has_version S[0:?]

Provides the relation between Object and Object_version. An object does not need to have any versions, but may have many.

B.4.4.3 classified_as S[0:?]

Provides the relation from the entity Object to the entity Object_class. An object may belong to many classes.

B.4.5 Object_class

The Object_class is a collection of attributes allowing assigning multiple classifications to an object.

The data associated with an Object_class are the following:

- id;
- description S[0:?];

- uses_classification_system.

B.4.5.1 id

Specifies the classification code associated to a specific object class based on a specified classification system.

B.4.5.2 uses_classification_system

Specifies the information about the classification system applied.

B.4.5.3 description S[0:?]

Provides a clear language-bound text description of the classification code associated within the specific object based on a given classification system.

B.4.6 Object_identifier

The Object_identifier provides identification of an Object within an Domain identified by a domain_id.

The attributes associated with an Object_identifier are:

- identifies;
- related_to;
- object_id

B.4.6.1 identifies

Provides the relation to the identified Object.

B.4.6.2 related_to

Provides the relation to the Domain_identifer.

B.4.6.3 object_id

A string providing the object number.

B.4.7 Object_relationship

This enity contains the description of the relations between objects.

The associated attributes are:

- relating_object;
- related_object;
- object_relationship_type.

B.4.7.1 relating_object

Specifies the first of the two Objects related by the Object_relationship.

B.4.7.2 related_object

Specifies the second of the two Objects related by the Object_relationship.

B.4.7.3 object_relationship_type

The object_relationship_type specifies the meaning of the relation.

The prefined object_relationship_types are:

- addition;
- affecting;
- copy;
- decomposition;
- derivation
- peer;
- referencing;
- sequence;
- substitution;
- superseding;
- translation;
- variant;
- withdrawal.

B.4.7.3.1 addition

Defines a relationship where the related item provides supplementary or collateral information with regard to the information provided by the relating item.

B.4.7.3.2 affecting

Defines a relationship where the related item affects the relating item.

B.4.7.3.3 copy

Defines a relationship where the related item is a copy of the relating item.

B.4.7.3.4 decomposition

Defines a relationship where the related item is a decomposition of the relating item.

B.4.7.3.5 derivation

Defines a relationship where the related item is derived from the relating item.

NOTE As synonym for derivation “based on” is often used.

B.4.7.3.6 peer

Defines a relationship where the related item provides required information with regard to that provided by the relating item. The peer item is essential for contributing completeness of understanding.

B.4.7.3.7 referencing

Defines a relationship where the related item is referencing the relating item.

B.4.7.3.8 sequence

Defines a relationship where the related item follows the relating item sequentially.

B.4.7.3.9 substitution

Defines a relationship where the related item replaces the relating item.

B.4.7.3.10 superseding

Defines a relationship where the related item supersedes the relating item.

B.4.7.3.11 translation

Defines a relationship where the related item is generated through a translation process from the relating item.

B.4.7.3.12 variant

Defines a relationship where the related item is a variant of the relating item.

B.4.7.3.13 withdrawal

Defines a relationship where the related item is withdrawn without replacement.

B.4.8 Object_version

The Object_version is a collection of attributes establishing relationships between Object and Object_version_identifier,

The data associated with an Object_version are the following:

- version of;
- (INV) identified_by S[1:?].

B.4.8.1 version_of

Provides the relation to the Object of which the Object_version is a version.

B.4.8.2 (INV) identified_by S[1:?]

Provides the relation between Object_version and the Object_version_identifier. An Object_version (if existing) has at least one identifier.

B.4.9 Object_version_identifier

The Object_version_identifier provides identification of an Object_version within a Domain identified by the object_id for the related Object.

The attributes associated with an Object_version_identifier are:

- identifies;
- related_to;

B.4.9.1 identifies

Provides the relation to the identified Object_version.

B.4.9.2 related_to

Provides the relation to the Object_identifer. The attribute object_id to the Object_identifier serves as domain_id for the version_id.

B.4.9.3 version_id

A string providing the version number.

B.4.10 Object_version_relationship

This enity contains the description of the relations between Object_versions.

The associated attributes are:

- relating_object_version;
- related_object_version;
- object_version_relationship_type.

B.4.10.1 relating_object_version

Specifies the first of the two Object_versions related by the Object_version_relationship.

B.4.10.2 related_object_version

Specifies the second of the two Object_versions related by the Object_version_relationship.

B.4.10.3 Object_version_relationship_type

The object_version_relationship_type specifies the meaning of the relation.

The prefined object_version_relationship_types are:

- addition;
- affecting;
- copy;
- decomposition;
- derivation
- peer;
- referencing;
- sequence;
- substitution;
- superseding;
- translation;
- variant;
- withdrawal.

B.4.10.3.1 addition

Defines a relationship where the related item provides supplementary or collateral information with regard to the information provided by the relating item.

B.4.10.3.2 affecting

Defines a relationship where the related item affects the relating item.

B.4.10.3.3 copy

Defines a relationship where the related item is a copy of the relating item.

B.4.10.3.4 decomposition

Defines a relationship where the related item is a decomposition of the relating item.

B.4.10.3.5 derivation

Defines a relationship where the related item is derived from the relating item.

NOTE As synonym for derivation “based on” is often used.

B.4.10.3.6 peer

Defines a relationship where the related item provides required information with regard to that provided by the relating item. The peer item is essential for contributing completeness of understanding.

B.4.10.3.7 referencing

Defines a relationship where the related item is referencing the relating item.

B.4.10.3.8 sequence

Defines a relationship where the related item follows the relating item sequentially.

B.4.10.3.9 substitution

Defines a relationship where the related item replaces the relating item.

B.4.10.3.10 superseding

Defines a relationship where the related item supersedes the relating item.

B.4.10.3.11 translation

Defines a relationship where the related item is generated through a translation process from the relating item.

B.4.10.3.12 variant

Defines a relationship where the related item is a variant of the relating item.

B.4.10.3.13 withdrawal

Defines a relationship where the related item is withdrawn without replacement.

B.4.11 Party

The Party is an abstract supertype of Person and Organization.

B.4.12 Party_role

The Party_role specifies the role of the Party.

In the context of this specific model the Party_role is that of a Party being custodian of a Domain

The attributes are:

- is_role_of;
- custodian.

B.4.12.1 is_role_of

Specifies the Party in charge of the role.

B.4.12.2 custodian

Specified type of role, with reference to a defined list of Role_type.

B.4.12.3 Role_type

Specifies the responsibility of the assigned individual or organization with respect to the item to which it is applied. The value is either user defined or predefined.

The predefined values of Role_type are:

- custodian;
- customer;
- license_holder;
- local_representative;
- manufacturer;
- operator;
- owner;
- responsible_party;
- supplier;
- vendor.

B.4.12.3.1 custodian

The assigned individual or organization is responsible for the existence and integrity of the referenced item.

B.4.12.3.2 customer

The assigned individual or organization acts as a purchaser or consumer of the referenced item.

NOTE The customer may be part of the same organization as the supplier.

B.4.12.3.3 license_holder

The assigned individual or organization produces the referenced item under license.

B.4.12.3.4 local_representative

The assigned individual or organization acts as a local contact point for the referenced item.

EXAMPLE The jobsite management of a construction site may act as local_representative of its company.

B.4.12.3.5 manufacturer

The assigned individual or organization produces the referenced item.

B.4.12.3.6 operator

The assigned individual or organization is running the referenced item.

B.4.12.3.7 owner

The assigned individual or organization owns the referenced item.

B.4.12.3.8 responsible_party

The assigned individual or organization is in charge of managing the referenced item.

B.4.12.3.9 supplier

The assigned individual or organization provides the referenced item.

B.4.12.3.10 vendor

The assigned individual or organization is the seller of the referenced item.

B.4.13 Party_to_address_relationship

This entity relates party to applicable Address.

The attributes are:

- related_address;
- related_party.

B.4.13.1 related_address

This attribute specifies the relation to a related address.

B.4.13.2 related_party

This attribute specifies the Party.

B.4.14 Party_relationship

This entity contains the description of the relations between Parties.

The associated attributes are:

- relating_party;
- related_party;
- party_relation_type.

B.4.14.1 relating_party

Specifies the first of the two parties related by the Party_relationship.

B.4.14.2 related_party

Specifies the second of the two parties related by the Party_relationship.

B.4.14.3 party_relationship_type

The party relationship_type specifies the meaning of the relation.

The prefined domain_relationship_types are:

- employer;
- employee

B.4.14.3.1 employer

The assigned party is employed by the other.

B.4.14.3.2 employee

The assigned party employes the other.

B.4.15 Person

Person is a subtype of Party.

The attributes are:

- id;
- last_name;
- first_name;
- middle_name;
- prefix_title;
- suffix_title;
- digital_signature.

B.4.16 Organization

Organization is a subtype of Party.

The attributes are:

- identifier.

B.4.16.1 identifier

Describes the relation between Organization and (ABS) Organization_identifier. An Organization has at least one and can have many Organization_identifiers.

B.4.17 Organization_identifier

Organization_identifier is an abstract supertype of Named_organization_idenifier and Coded_organization_identifier.

B.4.18 Coded_organization_identifier

The Coded_organization_identifier is a subtype of Organization_identifier. The identifier may be either international or national.

The attributes are:

- coded_organization_id;

- valid_domain; and optionally
- country_code.

B.4.18.1 coded_organization_id

The coded_organization_id provides the organization number.

B.4.18.2 valid_domain

The valid domain specifies the relation to a domain for which the organization is custodian.

B.4.18.3 country_code

The two-letter country_code as specified in ISO 3166-1.

B.4.19 Named_organization_identifier

The Named_organization_identifier is a subtype of Organization_identifier.

The attributes are:

- country_name;
- organization_name; and optionally
- country_code.

B.4.19.1 country_name

The country_name as specified in ISO 3166-1.

B.4.19.2 organization_name

The official name of the organization.

B.4.19.3 country_code

The two-letter country_code as specified in ISO 3166-1.

B.4.20 Address

Abstract supertype of Postal_address, Electronic_address and Physical address.

B.4.21 Electronic_address

The Electronic_address is a subtype of Address. It is the set of attributes needed to address a Party electronically.

The attributes are:

- electronic_mail_address;
- telephone_number;
- mobile_number;
- facsimile_numkber
- telex_number
- url.

B.4.22 Physical_adress

The Physical_address is a sub_type of Address. It is the set of attributes needed to address a Party physically:

The attributes are:

- postal_code;
- country;
- region;
- town;
- street
- street_number;
- internal location;
- property_name.

NOTE If other attributes than those listed are required they should be subject to agreement between the involved parties.

B.4.23 Postal_address

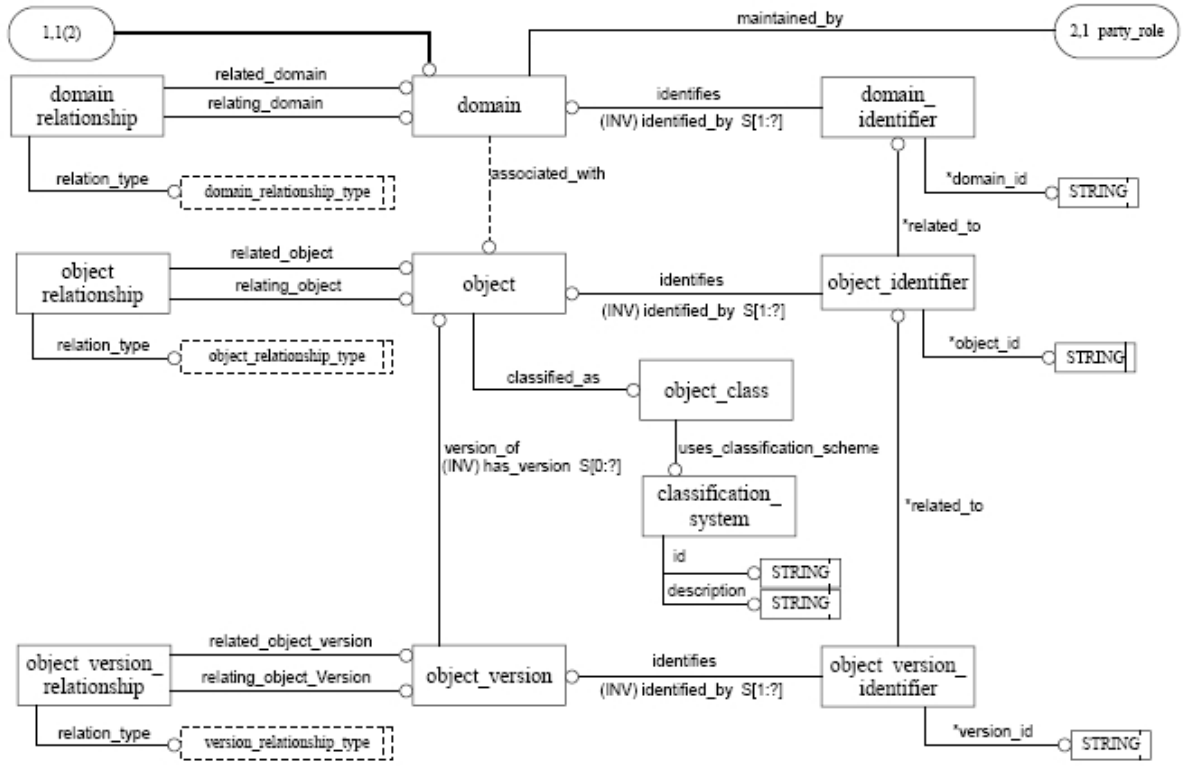
The Postal_address is a sub_type of Address. It is the set of attributes intended specifically for postal purposes. Note that in many cases the Physical address is also used for postal purposes.

The attributes are:

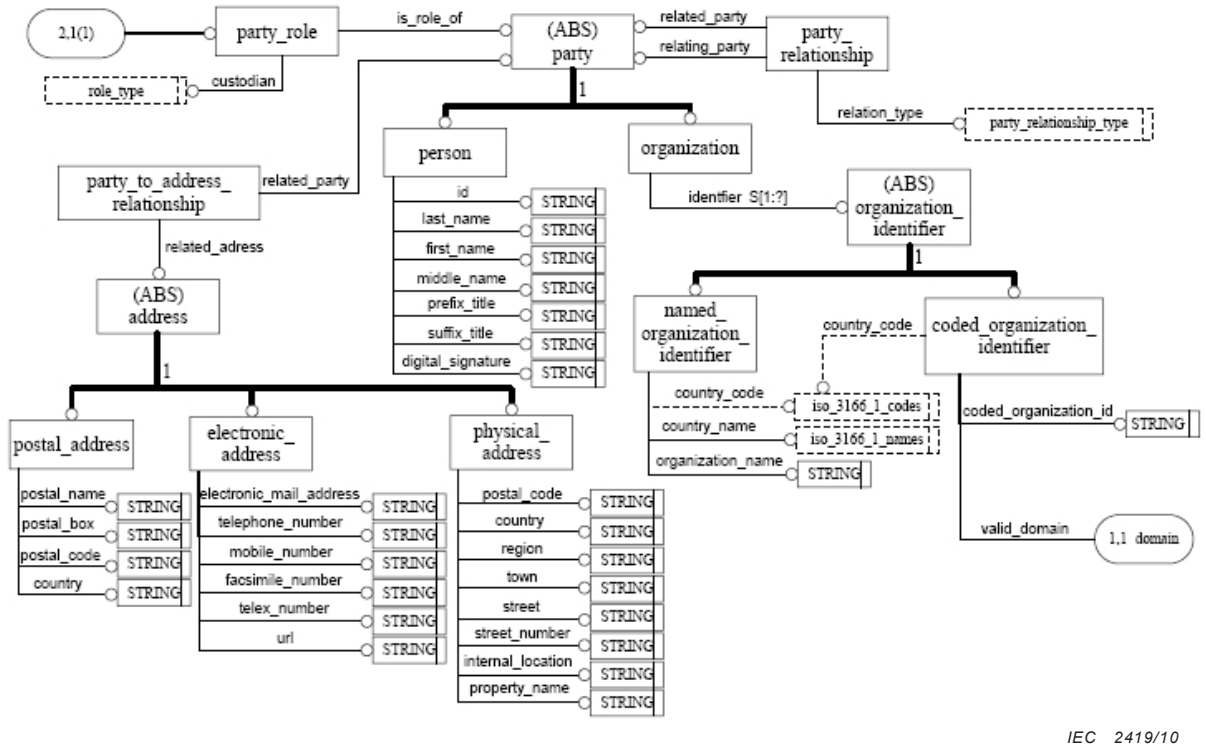
- postal_name;
- postal_box;
- postal_code;
- country.

B.5 EXPRESS-G graphical model

EXPRESS-G is a graphical modeling language specified in ISO 10303-11. For presentation purposes, the complete model is presented on two pages internally numbered 1 and 2, on this and the following page.


1,1(2)
maintained_by
2,1 party_role
domain relationship
related_domain
relating_domain
domain
identifies
(INV) identified_by S[1:?]
domain_ identifier
relation_type
domain_relationship_type
associated_with
*domain_id
STRING
*related_to
object relationship
related_object
relating_object
object
identifies
(INV) identified_by S[1:?]
object_identifier
relation_type
object_relationship_type
*object_id
STRING
classified_as
object_class
version_of
(INV) has_version S[0:?]
uses_classification_scheme
classification_ system
*related_to
id
STRING
description
STRING
object_version_ relationship
related_object_version
relating_object_Version
object_version
identifies
(INV) identified_by S[1:?]
object_version_ identifier
relation_type
version_relationship_type
*version_id
STRING

IEC 2418/10


2,1(1)
party_role
is_role_of
(ABS) party
related_party
relating_party
party_ relationship
role_type
custodian
1
relation_type
party_relationship_type
person
organization
party_to_address_ relationship
related_party
identifier S[1:?]
(ABS) organization_ identifier
related_adress
id
last_name
first_name
middle_name
prefix_title
suffix_title
digital_signature
STRING
(ABS) address
named_ organization_ identifier
country_code
coded_organization_ identifier
country_code
iso_3166_1_codes
country_name
iso_3166_1_names
organization_name
coded_organization_id
valid_domain
1,1 domain
postal_address
electronic_ address
physical_ address
postal_name
postal_box
postal_code
country
electronic_mail_address
telephone_number
mobile_number
facsimile_number
telex_number
url
postal_code
country
region
town
street
street_number
internal_location
property_name
IEC 2419/10

B.6 EXPRESS source code

This clause provides the EXPRESS source code. It is electronically available at http://tc3.iec.ch/stp/ IEC62507-1_EXPRESS_V10_SCHEMA.txt for testing purposes. This file will be made electronically available along with the publication of this document.

NOTE The shown enumerations of ISO 3166-1 codes includes only a subset. For the complete set, please refer to ISO 3166-1.

```
SCHEMA IEC_62507-1_V00;

 TYPE iso_3166_1_codes = ENUMERATION OF
  (BE,
   DE,
   DK,
   ES,
   FI,
   FR,
   IT,
   NL,
   NO,
   PT,
   SE,
   UK,
   US);
 END_TYPE;

 TYPE iso_3166_1_names = ENUMERATION OF
  (BELGIUM,
   DENMARK,
   FINLAND,
   FRANCE,
   GERMANY,
   GREAT_BRITAIN,
   ITALY,
   NORWAY,
   PORTUGAL,
   SPAIN,
   SWEDEN,
   THE_NETHERLANDS,
   USA);
 END_TYPE;

 TYPE role_type = ENUMERATION OF
  (CUSTODIAN,
   CUSTOMER,
   LICENSE_HOLDER,
   LOCAL_REPRESENTATIVE,
```

```
    MANUFACTURER,
    OPERATOR,
    OWNER,
    RESPONSIBLE_PARTY,
    SUPPLIER,
    VENDOR);
  END_TYPE;

  TYPE domain_relationship_type = ENUMERATION OF
   (DECOMPOSITION,
    SUBSTITUTION);
  END_TYPE;

  TYPE object_relationship_type = ENUMERATION OF
   (ADDITION,
    AFFECTING,
    COPY,
    DECOMPOSITION,
    DERIVATION,
    PEER,
    REFERENCING,
    SEQUENCE,
    SUBSTITUTION,
    SUPERSEDING,
    SUPPLIED,
    TRANSLATION,
    VARIANT,
    WITHDRAWAL);
  END_TYPE;

  TYPE version_relationship_type = ENUMERATION OF
   (ADDITION,
    AFFECTING,
    COPY,
    DECOMPOSITION,
    DERIVATION,
    PEER,
    REFERENCING,
    SEQUENCE,
    SUBSTITUTION,
    SUPERSEDING,
    SUPPLIED,
    TRANSLATION,
    VARIANT,
    WITHDRAWAL);
  END_TYPE;
```

```
TYPE party_relationship_type = ENUMERATION OF
 (EMPLOYER,
 EMPLOYEE);
END_TYPE;

ENTITY classification_system;
   id        : STRING;
   description: STRING;
END_ENTITY;

ENTITY object_class;
   uses_classification_scheme: classification_system;
END_ENTITY;

ENTITY domain_relationship;
   relating_domain: domain;
   related_domain : domain;
   relation_type  : domain_relationship_type;
END_ENTITY;

ENTITY domain;
   associated_with: OPTIONAL object;
   maintained_by  : party_role;
 INVERSE
   identified_by  : SET [1:?] OF domain_identifier FOR identifies;
END_ENTITY;

ENTITY object;
   classified_as: object_class;
 INVERSE
   has_version  : SET OF object_version FOR version_of;
   identified_by: SET [1:?] OF object_identifier FOR identifies;
END_ENTITY;

ENTITY object_version;
   version_of   : object;
 INVERSE
   identified_by: SET [1:?] OF object_version_identifier FOR identifies;
END_ENTITY;

ENTITY object_version_identifier;
   identifies: object_version;
   related_to: object_identifier;
   version_id: STRING;
 UNIQUE
```

```
    identifier: version_id, related_to;
END_ENTITY;

ENTITY object_identifier;
    identifies: object;
    related_to: domain_identifier;
    object_id : STRING;
  UNIQUE
    identifier: object_id, related_to;
END_ENTITY;

ENTITY domain_identifier;
    identifies: domain;
    domain_id : STRING;
  UNIQUE
    identifier: domain_id;
END_ENTITY;

ENTITY party_role;
    is_role_of: party;
    custodian : role_type;
END_ENTITY;

ENTITY party
  ABSTRACT SUPERTYPE OF (ONEOF(person, organization));
END_ENTITY;

ENTITY person
  SUBTYPE OF(party);
    id              : STRING;
    last_name       : STRING;
    first_name      : STRING;
    middle_name     : STRING;
    prefix_title    : STRING;
    suffix_title    : STRING;
    digital_signature: STRING;
END_ENTITY;

ENTITY organization
  SUBTYPE OF(party);
    identfier: SET [1:?] OF organization_identifier;
END_ENTITY;

ENTITY organization_identifier
  ABSTRACT SUPERTYPE OF (ONEOF(named_organization_identifier, coded_organization_identifier));
END_ENTITY;
```

```
ENTITY named_organization_identifier
  SUBTYPE OF(organization_identifier);
    country_code     : OPTIONAL iso_3166_1_codes;
    organization_name: STRING;
    country_name     : iso_3166_1_names;
END_ENTITY;

ENTITY coded_organization_identifier
  SUBTYPE OF(organization_identifier);
    coded_organization_id: STRING;
    country_code         : OPTIONAL iso_3166_1_codes;
    valid_domain         : domain;
END_ENTITY;

ENTITY object_relationship;
    relation_type  : object_relationship_type;
    relating_object: object;
    related_object : object;
END_ENTITY;

ENTITY object_version_relationship;
    relation_type         : version_relationship_type;
    relating_object_Version: object_version;
    related_object_version : object_version;
END_ENTITY;

ENTITY party_to_address_relationship;
    related_adress: address;
    related_party : party;
END_ENTITY;

ENTITY address
  ABSTRACT SUPERTYPE OF (ONEOF(postal_address, electronic_address, physical_address));
END_ENTITY;

ENTITY postal_address
  SUBTYPE OF(address);
    postal_name: STRING;
    postal_box : STRING;
    postal_code: STRING;
    country    : STRING;
END_ENTITY;

ENTITY electronic_address
  SUBTYPE OF(address);
```

```
    electronic_mail_address: STRING;
    telephone_number       : STRING;
    mobile_number          : STRING;
    facsimile_number       : STRING;
    telex_number           : STRING;
    url                    : STRING;
  END_ENTITY;

  ENTITY physical_address
   SUBTYPE OF(address);
    postal_code      : STRING;
    country          : STRING;
    region           : STRING;
    town             : STRING;
    street           : STRING;
    street_number    : STRING;
    internal_location: STRING;
    property_name    : STRING;
  END_ENTITY;

  ENTITY party_relationship;
    relation_type : party_relationship_type;
    relating_party: party;
    related_party : party;
  END_ENTITY;

END_SCHEMA;
```

Annex C
(informative)

Example of documentation of an identification system

Domain id			
Issuing organization	Organization	Name Organization id Postal address Electronic address Physical address	
Maintaining organization	Organization	Name Organization id (if any) Postal address Electronic address Physical address	
	Resp. person	Name Person id Postal address Electronic address Physical address	
Issued sub-domains (if applicable)	Domain id	Responsible organization	Reference to document
	Domain id	Responsible organization	Reference to document
	Domain id	Responsible organization	Reference to document
Description of identification system	Kind of objects ☐ Multiple identification of a same object is permitted. ☐ Multiple identification of a same object is NOT permitted.		
	Rules for construction of identification numbers		Reference to document:
	Method of creation NOTE: Refer to 6.1.		☐ Method 1 ☐ Method 2
	Registration of identification numbers	☐ Manual register Id and location:	☐ On-line register URL:
	Registered metadata	☐ Date of registration of identification number ☐ Name of person generating the identification numbers	
		Kind of number: ☐ Identification number ☐ Serial number	

	☐ Lot number/Batch number	
	☐ Packaging date	
	☐ Production date	
	☐ Expiration date	
Reuse of identification numbers	☐ Not permitted	☐ Permitted after .... years
Version identification numbers	☐ Not used	☐ Used Identified by:
Used separating characters (if any)		

Annex D
(informative)

Invariant characters of ISO/IEC 646

	0	1	2	3	4	5	6	7
0			SP	0		P		p
1			!	1	A	Q	a	q
2			“	2	B	R	b	r
3			#	3	C	S	c	s
4			$	4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			‘	7	G	W	g	w
8			(	8	H	X	h	x
9			)	9	I	Y	i	y
10			*	:	J	Z	j	z
11			+	;	K		k	
12			,	<	L		l	
13			-	=	M		m	
14			.	>	N		n	
15			/	?	O	_	o	

NOTE Values shown unshaded are specifically supported by this standard for use in identification numbers.

For light shaded values, please refer to 6.2.1

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

ISO 9000:2005, *Quality management systems – Fundamentals and vocabulary*

ISO 13616, *Banking and related financial services – International bank account number (IBAN)*

ISO 10303 (all parts), *Industrial automation systems and integration – Product data representation and exchange*

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