

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Identification link –
Part 1 : General requirements

Lien d'identification –
Partie 1 : Exigences générales [IEC 61406-1:2022](https://standards.iteh.ai/catalog/standards/sist/46fb4519-73ad-47c4-9ebe-ad2da74240b5/iec-61406-1-2022)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

IDENTIFICATION LINK

Part 1: General requirements

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The text of this International Standard is based on the following documents:

Draft	Report on voting
65E/845/CDV	65E/905/RVC

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available

at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 61406 series, published under the general title *Identification link*, can be found on the IEC website.

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INTRODUCTION

Every year, industry purchases hundreds of millions of items of technical equipment – referred to here as physical objects – for setting up new production facilities and maintaining existing ones. When applying this standard, these physical objects can be simply and unambiguously identified by using a standardized Identification Link (IL), attached for example on the nameplate. This means that all information relating to the physical object can be identified in various IT systems and then called up, edited and stored as necessary across all processes from storage and retrieval to assembly, maintenance, inspection, repair and disassembly. This is an invaluable advantage in all these processes. The manufacturer in turn can link all information such as drawings, operating instructions and spare part lists to this IL in its systems. Users, e.g. owners or operators, can do the same with their information in their systems. In communication between the manufacturer and user, this IL alone then suffices for both parties to find and exchange all the information they need about a physical object throughout its lifecycle. This IL is therefore a prerequisite for easy accessing and maintaining information in the physical object's digital twin.

Previous standards for machine-readable identification of physical objects essentially describe how the traditional identification features (manufacturer, product number, serial number) can be stored in a machine-readable way using standardized syntax (e.g. as per ISO/IEC 15434 [6]) and semantics (e.g. as per ISO/IEC 15418 [7]) so that the strings used for identification according to these standards can be analyzed (parsed) and processed across all manufacturers using suitable software. These regulations allow a great variety of identifiers and technologies to be used, some of which can be highly complex, depending on the chosen solution. This means that in the relationship between the manufacturer and the user, which parts of these regulations and which of the identification methods specified in them are to be used needs to be determined. A universally usable identification by the manufacturer is not possible without consulting the respective user. The identification options listed in these regulations also always require analysis of the character string and the information encoded in it using suitable software, which involves much greater requirements for further processing. Furthermore, for industrial applications such as in the process manufacturing industry, there are special requirements for the long-term legibility and reliability of markings in the harsh conditions of industrial environments.

Production systems, e.g. in the process manufacturing industry, usually consist of several thousand individual physical objects. Each of these physical objects must be uniquely identified during all steps and processes in its lifecycle by both the manufacturer and the user. On the part of the manufacturer, this identification starts during the production of the physical object, and continues during its packaging and shipping. On the part of user, this process continues with the receipt, storage and retrieval of the physical object, carries on through installation, commissioning, operation, inspection, maintenance, repair and disassembly, and finally ends when it is scrapped.

The manufacturer usually provides each physical object with an identifier that allows it to be uniquely identified. This identification of the physical object usually takes place using a nameplate.

The product type of the physical object can generally be clearly identified using the information on the nameplate. If it is a serialized physical object, which means a serial number is present on the nameplate, then it can also be identified as a single, distinguishable instance of a model.

However, in practice this identification of physical objects on a nameplate often cannot be read and used automatically. This is a serious drawback to optimizing and in particular automating identification in all work processes. The reason for this is that the characteristics of a nameplate such as the content, designation, layout and fonts vary greatly according to the physical object and the manufacturer. The same applies to the physical properties of the nameplate, such as the material and the process for producing the graphic content (e.g. printing, etching, engraving, laser marking etc.).

This document does not try to standardize nameplates or physical properties of nameplates, due to the widely differing requirements of manufacturers and users and the vast variety of objects.

Optimizing and automating the identification of a physical object merely requires a unique machine-readable ID attached to the object.

Linking to information on the internet with a URL in a 2D symbol or NFC tag on the physical object is more and more used.

This Identification Link covers in a simple, monomorphic and single solution both major use cases for machine readable product marking, the unique identification and the link to data on the internet.

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IDENTIFICATION LINK

1 Scope

This part of IEC 61406 specifies minimum requirements for a globally unique identification of physical objects which also constitutes a link to its related digital information. This identification is designated hereinafter as "Identification Link" (IL), with the encoded data designated as IL string. The IL string has the data-format of a link (URL). The IL is machine-readable and is attached to the physical object in a 2D symbol or NFC tag.

The requirements in this document apply to physical objects

- that are provided by the manufacturer as an individual unit,
- and that have already been given a unique identity by the manufacturer.

This document does not specify any requirements on the content and the layout of nameplates/typeplates (e.g. spatial arrangement, content of the plain texts, approval symbols etc.).

2 Normative references

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

IEC 60050-351, *International Electrotechnical Vocabulary (IEV) – Part 351: Control technology*

ISO/IEC 8859-1, *Information technology – 8-bit single-byte coded graphic character sets – Part 1: Latin alphabet No. 1*

ISO/IEC 14443-1, *Cards and security devices for personal identification – Contactless proximity objects – Part 1: Physical characteristics*

ISO/IEC 14443-2, *Cards and security devices for personal identification – Contactless proximity objects – Part 2: Radio frequency power and signal interface*

ISO/IEC 14443-3, *Cards and security devices for personal identification – Contactless proximity objects – Part 3: Initialization and anticollision*

ISO/IEC 14443-4, *Cards and security devices for personal identification – Contactless proximity objects – Part 4: Transmission protocol*

ISO/IEC 15415, *Information technology – Automatic identification and data capture techniques – Bar code symbol print quality test specification – Two-dimensional symbols*

ISO/IEC 15693-1, *Cards and security devices for personal identification – Contactless vicinity objects – Part 1: Physical characteristics*

ISO/IEC 15693-2, *Cards and security devices for personal identification – Contactless vicinity objects – Part 2: Air interface and initialization*

ISO/IEC 15693-3, *Cards and security devices for personal identification – Contactless vicinity objects – Part 3: Anticollision and transmission protocol*

ISO/IEC 16022, *Information technology – Automatic identification and data capture techniques – Data Matrix bar code symbology specification*

ISO/IEC 19762, *Information technology – Automatic identification and data capture (AIDC) techniques – Harmonized vocabulary*

ISO/IEC 18004, *Information technology – Automatic identification and data capture techniques – QR Code bar code symbology specification*

ISO/IEC 29158, *Information technology – Automatic identification and data capture techniques – Direct Part Mark (DPM) Quality Guideline*

ISO/IEC 29160, *Information technology – Radio frequency identification for item management – RFID Emblem*

ISO 13849-1, *Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design*

IETF RFC 3986:2005, *Uniform Resource Identifier (URI): Generic Syntax*

3 Terms, abbreviated terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-351, ISO/IEC 19762 and the following apply.

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

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

3.1

data carrier

device or medium used to store data as a relay mechanism in an AIDC system

Note 1 to entry: Bar code, OCR character string and RF tag are examples of data carriers.

[SOURCE: ISO/IEC 19762:2016, 01-01-59]

3.2

Identification Link

IL

combination of 2D symbol or NFC tag and contained IL string

3.3

Identification Link string

IL string

data string in URL syntax which is the globally unique identification of a physical object and points to related information on the internet

Example: <https://www.domain-abc.com/sd09fqw4?1P=productcode&S=serialnumber>

3.4 manufacturer

company or organization with ultimate responsibility for the compliance of the physical object with the appropriate standard or standards and to provide the product information

3.5 user

organization or person that is the owner or operator of the physical object

3.6 physical object

technical equipment such as vessels, units, machines, electronic devices and components, assemblies, batteries, components, spare parts etc.

3.7 RFID Emblem

graphical symbol specified in ISO/IEC 29160 to inform users of the presence of RFID

3.8 symbology

standard means of representing data in optically machine readable form

Note 1 to entry: Each symbology specification sets out its particular rules of composition or symbol architecture.

[SOURCE: ISO/IEC 19762:2016, 02-01-02]

4 Identification Link string

4.1 ILS-1: Global uniqueness IEC 61406-1:2022

4.1.1 Requirement

The IL string shall be a globally unique string that is assigned to only one physical object.

4.1.2 Rationale and supplemental guidance

The manufacturer and the user have an interest in unambiguously linking a physical object to data accrued during its lifecycle using machine reading processes. The reasons for this might include the following:

- If measures are carried out on a physical object, it must be unambiguously identified in order to rule out any confusion with other physical objects which would endanger the physical object itself, the system it is installed in, human beings or the environment.
- Any consistent and clear inventory management depends on unambiguous identification.

Figure 1 shows an example of the role of the globally unique IL for linking a physical object to various data and information.

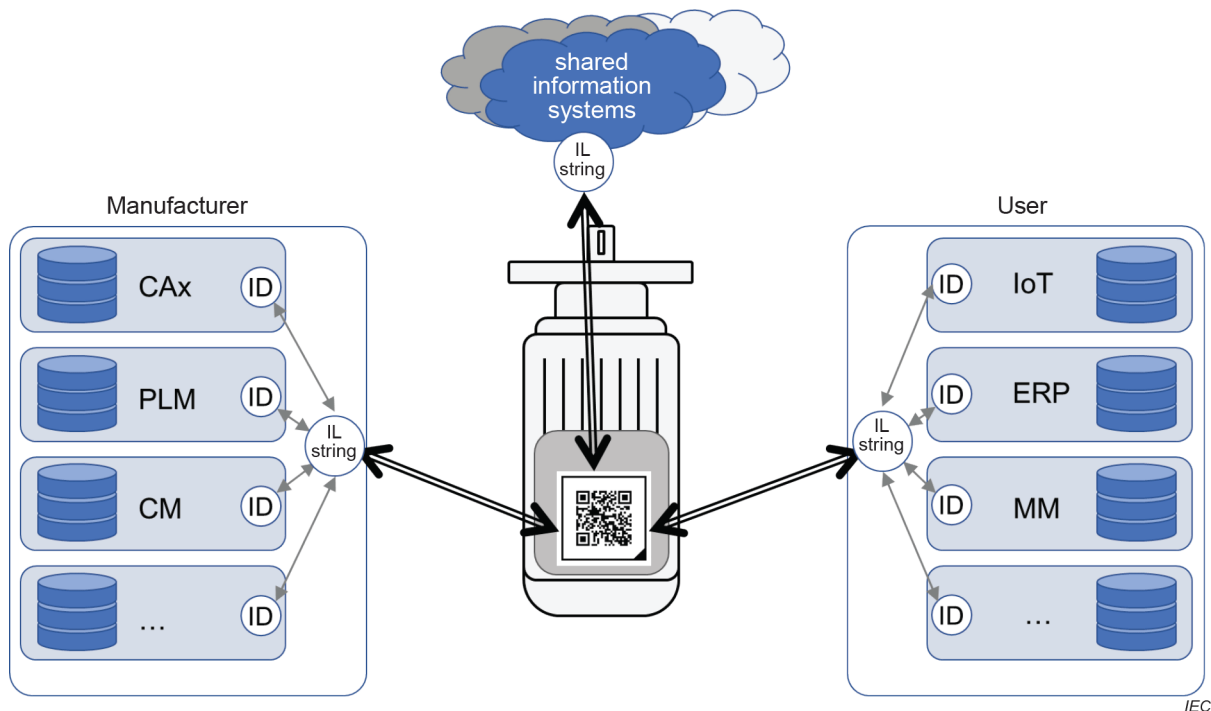


Figure 1 – Example of an IL linking a physical object to information associated with it

Examples of information possibly associated to the physical object are:

- information from the manufacturer such as operating instructions, drawings, spare parts lists and calibration records;
- operating data such as speeds, power consumption and pressures;
- models such as function and simulation models;
- maintenance and inventory management data.

This information is required in many processes during the lifecycle of the physical object. Simplifying access to this information using an IL is thus of significant benefit.

4.2 ILS-2: Link to additional information

4.2.1 Requirement

The IL string shall lead to additional information in digital form related to the physical object.

4.2.2 Rationale and supplemental guidance

In addition to identifying the physical object, the IL is also able to link to information pertaining to the object in the manufacturer and the user systems, as well as in other systems such as cloud-based third-party systems and to further information provided via the Internet.

NOTE This document does not specify requirements on format and content of the information provided.

4.3 ILS-3: No reuse

4.3.1 Requirement

Once an IL string has been assigned to a physical object, it shall not be reused for any another physical object, even after the maximum lifetime of the physical object has expired.