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Responsible committee: GEL/65/5 Devices and integration in enterprise systems

Interested committees:

Title: BS EN IEC 61406-1 Identification Link

Part 1: General requirements

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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UK Vote

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



65E/1196/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

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SECRETARIAT:

United States of America

SECRETARY:

Mr David Richmond

OF INTEREST TO THE FOLLOWING COMMITTEES:

SC 3D,TC 57,TC 62,TC 121

HORIZONTAL FUNCTION(S):

ASPECTS CONCERNED:

☒ SUBMITTED FOR CENELEC PARALLEL VOTING

☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

Attention IEC-CENELEC parallel voting

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The CENELEC members are invited to vote through the CENELEC online voting system.

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TITLE:

Identification Link - Part 1: General requirements

PROPOSED STABILITY DATE: 2030

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

IDENTIFICATION LINK

PART 1 GENERAL REQUIREMENTS

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IEC 61406 has been prepared by subcommittee 65E: Devices and integration in enterprise systems, of IEC technical committee 65: Industrial-process measurement, control and automation. It is an International Standard.

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

Draft	Report on voting
65E/XX/FDIS	65E/XX/RVD

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.

221 The committee has decided that the contents of this document will remain unchanged until the
222 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
223 specific document. At this date, the document will be

- 224 • reconfirmed,
- 225 • withdrawn,
- 226 • replaced by a revised edition, or
- 227 • amended.

228

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INTRODUCTION

232 Every year, hundreds of millions of items, both tangible (e.g. hardware) and intangible (e.g.
233 software, resources), are bought and sold across the world. For various reasons, it is in the
234 interest of those concerned that these items, for simplicity, referred to here as physical objects
235 – can be identified for what they are.

236 When applying this standard, physical objects can be simply and unambiguously identified by
237 using a standardized Identification Link (IL), attached for example on a nameplate. This means
238 that all information relating to the physical object can be identified in various IT systems and
239 then called up, edited and stored as necessary. For industrial equipment this would cover all
240 processes from storage and retrieval to assembly, maintenance, inspection, repair and
241 disassembly. This is an invaluable advantage to all concerned. The manufacturer in turn can
242 link all information such as drawings, operating instructions and spare part lists to this IL in its
243 systems. Users, e.g. owners or operators, can do the same with their information in their
244 systems. In communication between the manufacturer and user, this IL alone suffices for both
245 parties to find and exchange all the information they need about a physical object throughout
246 its lifecycle. This IL is therefore a prerequisite for easy accessing and maintaining information
247 in the object's digital twin.

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

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

272 The manufacturer usually provides each physical object with a code that allows it to be uniquely
273 identified. This identification is normally to be found on the nameplate.

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

277 However, in practice this identification of physical objects on a nameplate often cannot be read
278 and used automatically. This is a serious drawback to optimizing and in particular automating
279 identification in all work processes. The reason for this is that the characteristics of a nameplate
280 such as the content, designation, layout and fonts vary greatly according to the physical object
281 and the manufacturer. The same applies to the physical properties of the nameplate, such as

282 the material and the process for producing the graphic content (e.g. printing, etching, engraving,
283 laser marking etc.).

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

287 Optimizing and automating the identification of a physical object merely requires a unique
288 machine-readable ID attached to the object. In this context, the use of a URL in a 2D symbol or
289 an NFC tag on the physical object to link to information on the Internet is becoming more
290 common. The Identification Link that is the subject of this standard covers, in a simple,
291 monomorphic and single solution, both major use cases for machine readable product marking:
292 the unique identification and the link to data on the Internet.

293 IEC 61406 comprises two parts.

294 IEC 61406-1 *General requirements* sets out the basic physical and syntactic requirements of the
295 Identification Link, whereby:

- 296 • the Identification Link designates and links to exactly one individual physical object
- 297 • the Identification Link does not require any additional syntactical or semantical
298 intelligence

299 In practice, these two assumptions do not always apply. For instance, many objects produced in lots
300 are not identified individually but by their lot number. These cases are covered by IEC 61406-2
301 *Types/models, lots/batches, items and characteristics* that specifies a Structured Identification Link
302 whereby:

- 303 • that gives further information about the kind of identified object, for example product,
304 person, location or document. It can contain additional data elements or classifications.
- 305 • that for products can designate and link to the unique information of lots/batches or
306 product codes and is not limited to the uniqueness of individual items.

307 Structured Identification Link strings according to IEC 61406-2 differ from Identification Link strings
308 according to IEC 61406-1 by having a URL parameter with a name starting with a dot “.”.

309 Identification Link strings according to IEC 61406-1 are always used in combination with the
310 Identification link frame IEC 60417-6452 with full corner, indicating the association with a unique physical
311 object.

312 Structured Identification Link strings according to IEC 61406 part 2 can be combined either with an
313 Identification link frame to IEC 60417-6452 with full corner to indicate the association with a unique
314 physical object or alternatively can be combined with an Identification link frame IEC 60417-6452-1 with
315 bevelled corner to indicate an association with a group of items such as a lot/batch or product code
316 level.

IDENTIFICATION LINK PART 1 GENERAL REQUIREMENTS

1 Scope

This International Standard specifies minimum requirements for a globally unique identification of physical objects that 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 as a 2D symbol or NFC tag.

The requirements in this standard apply to physical objects that are individual units and have been given a unique identity.

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

Note: Electronic labelling together with the displaying of the Identification Link on screens is not in scope of this standard.

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 7000 / IEC 60417, *Graphical symbols for use on equipment*

Note: This is now available as a database standard

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 15426-2, *Information technology — Automatic identification and data capture techniques — Bar code verifier conformance specification – Part 2: 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 18004, *Information technology – Automatic identification and data capture techniques – QR Code bar code symbology specification*

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

ISO/IEC 21471:2025, *Information technology — Automatic identification and data capture techniques — Data Matrix Rectangular Extension (DMRE) bar code symbology specification*

ISO/IEC 23941:2022, *Information technology — Automatic identification and data capture techniques — Rectangular Micro QR Code (rMQR) 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.example.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**symbolology**

standard means of representing data in optically machine readable form

Note 1 to entry: Each symbolology 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****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.

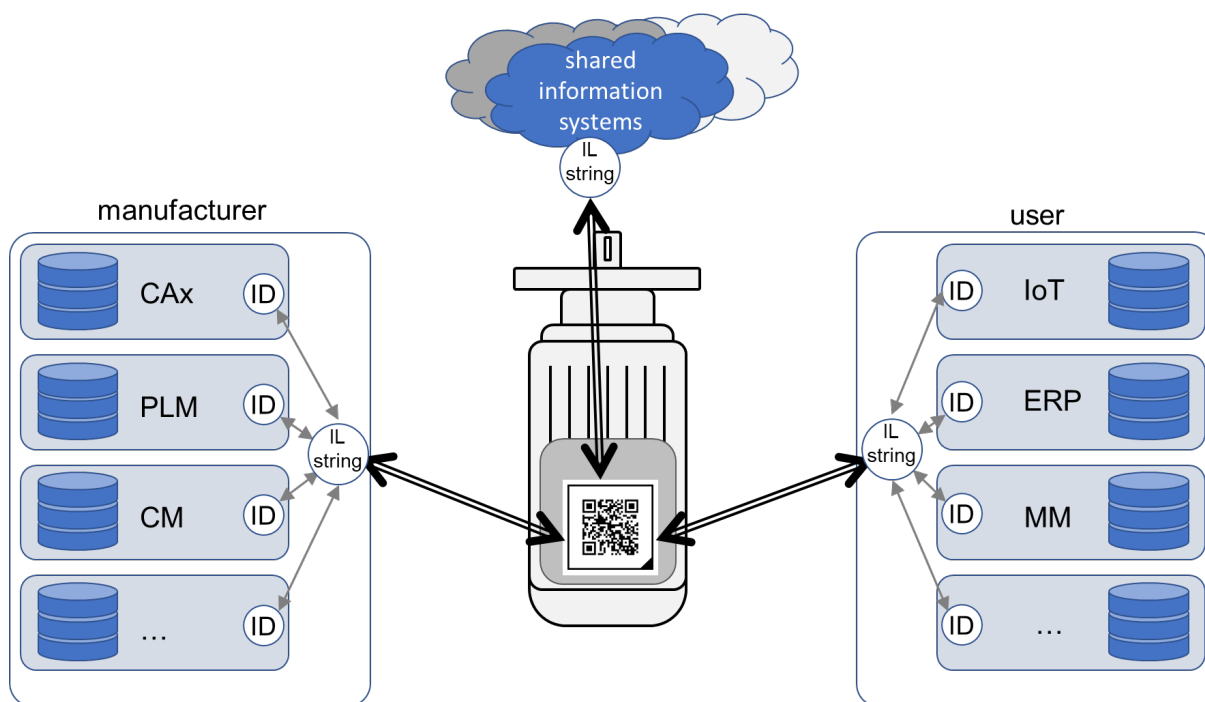


Figure 1 – Example of an IL linking a physical object to information associated with it

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.

Examples for additional information are a Digital Product Passport (DPP) or a Digital Twin (DT).

NOTE This document does not specify requirements regarding 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.

4.3.2 Rationale and supplemental guidance

An IL string is always associated with the one physical object to which it was originally assigned, even after the end of life of that object.

4.4 ILS-4: No altering

4.4.1 Requirement

Once an IL string has been assigned to a physical object, it shall not be altered.

4.4.2 Rationale and supplemental guidance

An IL string is always associated with the one physical object to which it was originally assigned, even after the end of life of that object.

4.5 ILS-5: String length

4.5.1 Requirement

The length of the IL string shall not exceed 255 characters.

4.5.2 Rationale and supplemental guidance

The limit of 255 characters results from 8-bit data types in databases, as $2^8 = 256$, which are still relevant in some legacy applications.

In practice, it may be necessary to encode numerous or lengthy pieces of information in the IL string. However, to make the IL string easy to place, to scan and to display and to use in brown field legacy systems of the users, it must be as short as possible. Space for large 2D symbols is typically very limited, especially on front panels or nameplates, and manufacturers typically make strong efforts to reduce the content of the 2D symbol as much as possible.

It is recommended that external constraints are checked before creating strings longer than 72 characters.

NOTE 1 The largest rectangular Data Matrix code according to ISO/IEC 16022, with 16 x 48 cells, has the data capacity of 72 alphanumeric characters.

NOTE 2 The shorter the length of the IL-string, the less risk there is of length conflicts with field limitations of the IT-systems of business partners.

NOTE 3 Including a digital signature according to ISO/IEC 20248 [10] or a visual digital seal according to ISO 22376 [16] in the IL string increases the string-length by around 120 additional characters.

4.6 ILS-6: URL syntax

4.6.1 Requirement

The IL string shall use the URL syntax according to IETF RFC 3986, with the exception that scheme ("https") and "://www." may be omitted.

4.6.2 Rationale and supplemental guidance

The URL syntax is in common use and well defined. The domain name is unique by definition. Apart from linking to information on the Internet, this syntax is also suitable for representing information from the manufacturer such as the model name, serial number, date of manufacture. This can be done without excessive data overheads, as for example when using XML.

Not all valid URL strings according to IETF RFC 3986 are allowed for the IL string. See ILS-5, ILS-7, ILS-8 and ILS-9 for restrictions.