



BSI Standards Publication

**Information technology - Automatic
identification and data capture techniques
- Electronic identification plate**

National foreword

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Typenschild

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COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 17071:2019) has been prepared by Technical Committee CEN/TC 225 “AIDC technologies”, the secretariat of which is held by TSE.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2019, and conflicting national standards shall be withdrawn at the latest by August 2019.

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Introduction

Many items are equipped with a type plate, which contains the most relevant data for the identification of the item and to fulfil legal requirements. These type plates are widely manufacturer and user specific. This causes problems as the data construction for machine readable processing is done in different ways.

The data on type plates is among others required for the installation, maintenance and inventory management of items. Machine readable data carriers are used more and more to support reading the data in higher efficiency and with fewer errors.

In order to rationalize the related activities, the data constructs used in type plates needs to be in a consistent way to allow use of both human readable and machine readable information on the type plate.

RFID can give access to the data without that the type plate should be directly visible to the reader and may offer the possibility for rewriting part of the content or add content. Depending on the memory size of the transponder more data can be stored.

1 Scope

This document defines a concept for building data structures (including data elements, syntax and semantics) for type plates with a RFID transponder (including HF, UHF, NFC), 2D symbol (including DataMatrix, QR-Code) and human readable text in a consistent way.

This document also defines a minimum set of consistent data that are needed on the data carriers when multiple data carrier techniques are used on the same item.

This document also gives guidance for creating specific applications standards, to support interoperability and backward compatibility.

The processes related to the usage of type plates are not in scope of this document.

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.

EN 16571:2014, *Information technology — RFID privacy impact assessment process*

EN 16656, *Information technology — Radio frequency identification for item management — RFID Emblem (ISO/IEC 29160:2012, modified)*

ISO/IEC 15418, *Information technology — Automatic identification and data capture techniques — GS1 Application Identifiers and ASC MH10 Data Identifiers and maintenance*

ISO/IEC 15424, *Information technology — Automatic identification and data capture techniques — Data Carrier Identifiers (including Symbology Identifiers)*

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

ISO/IEC 15459-2, *Information technology — Automatic identification and data capture techniques — Unique identification — Part 2: Registration procedures*

ISO/IEC 15459-4, *Information technology — Automatic identification and data capture techniques — Unique identification — Part 4: Individual products and product packages*

ISO/IEC 15962:2013, *Information technology — Radio frequency identification (RFID) for item management — Data protocol: data encoding rules and logical memory functions*

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

ISO/IEC 18000-3, *Information technology — Radio frequency identification for item management — Part 3: Parameters for air interface communications at 13,56 MHz*

ISO/IEC 18000-63, *Information technology — Radio frequency identification for item management — Part 63: Parameters for air interface communications at 860 MHz to 960 MHz Type C*

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*

EPC Tag Data Standard

3 Terms and definitions

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

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

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

4 Concepts

4.1 Principles

Type plates are typically attached physically to the item to provide basic information about the item.

Shape and content of type plates vary depending on sector and type of equipment.

For some sectors / equipment types, regulations mandate specific format and content.

This standard defines general rules for machine readable type plates, and how to implement sectors / equipment specific additional requirements in machine readable form.

4.2 Type plate format

This standard specifies the machine readable representation of data in barcodes and/or RFID, including the barcode symbology standards and the RFID radio protocols standards to be used for type labels.

This standard also specifies some aspects for human readable data to ease consistent processing with machine readable data. Item specific type plate format aspects such as a minimum or maximum size or shapes are not restricted by this standard.

4.3 Interoperability on Data Level

The physical, syntactical and semantical representations in the different media depend on the media / data carrier. Capturing and pre-processing the data from the type labels requires different equipment and tools, depending on used media. However once captured and pre-processed the encoded data map –as far as possible– to a technology independent set of data elements. Figure 1 shows how interoperable data encoded and transmitted with different technologies can be provided for applications and services for technology-independent further processing.

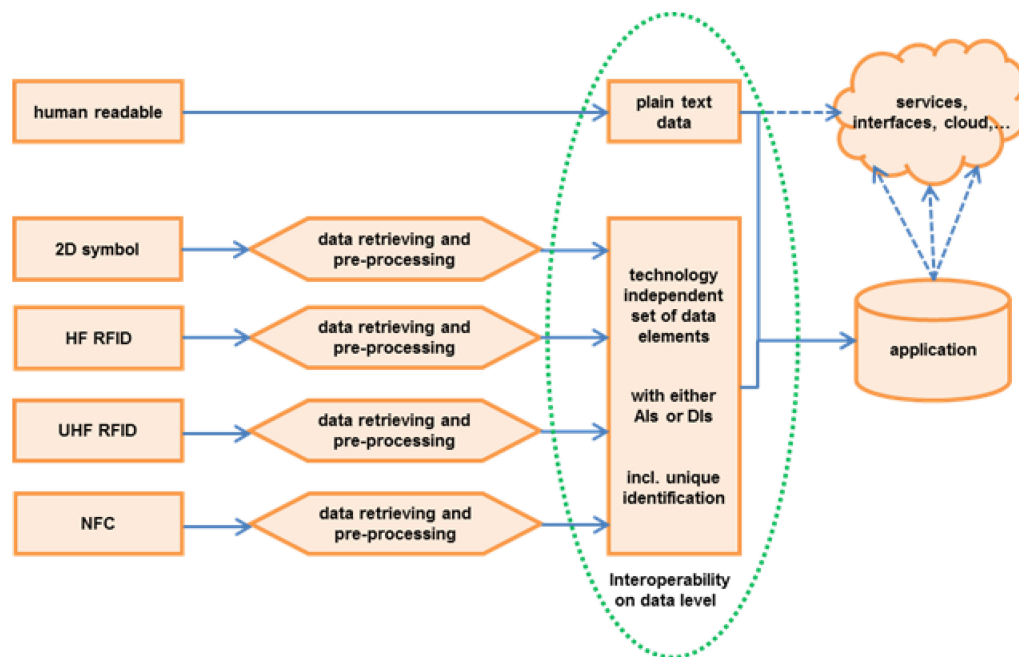


Figure 1 — Interoperability on data level

Once the data are made available in a target application the further processing, e.g. access additional data via the internet- should not depend on the data carrier used for the type label. 2D symbols and human readable text should be easy to use as backup for RFID media, and vice versa, when possible.

4.4 Unique Identification

The identifier/identification relate to the object to which the type plate is attached, not to the type plate itself.

Each individual instance of serialized objects marked with a type plate is uniquely identified.

The unique identification can be within one “monomorphic” data element, or can be splitted in several data elements.

4.5 Data Attributes

Unique identification of items is the minimum mandatory information in this standard.

Data attributes vary greatly depending on the type of items and the sector of use. Many regulations are mandating the use -especially of human readable- data attributes.

Typical data attributes related to identification and approvals are: product code, product version or revision, serial number, lot number, country of origin, production date, company name, company ID

Examples of technical data attributes are: operating voltage, power, weight, pressure, length, width, maximum temperature, etc.

Data Attributes can be marked on the type label, or can be referred via the type label.

4.6 Data Carriers

Data carriers in scope are human readable text, 2D symbols and RFID tags.

For human readable text this standard has some requirements, but does not define specific headers or fonts.

For 2D symbols this standard allows DataMatrix and QR-Code.

For RFID type plates this standard allows HF (13,56 MHz, ISO/IEC 18000-3 Mode 1 and Mode 3), NFC (13,56 MHz, NFC Forum Types 1,2,3,4 and 5) and UHF (860...960 MHz, ISO/IEC 18000-63).

Table 1 gives an overview of data carrier technology specific aspects of the interoperable data.

Table 1 —data carrier specific aspects with interoperable data content

	Human Readable	2D Symbol	RFID HF and UHF	RFID NFC
Type of information	Heading	DI/AI	EPC, AFI, DI/AI, Relative OID	NDEF
Value of information	Data	Data	Data	Data
Format of information	Font	Syntax	Syntax	Syntax
Communication information	Visual	Symbology	Air interface protocol	Air interface protocol

4.7 Data Structures

Human readable text is structured in headers and data.

2D symbols and RFID content is structured with ISO/IEC 15434 Data Transfer Syntax –if more than one element-, and semantics according to ISO/IEC 15418. ISO/IEC 15418 is referring to ANS MH 10.8.2 and GS1 General Specifications. The semantics of data elements is indicated either with ANS MH 10.8.2 Data Identifiers or GS1 Application Identifiers.

When RFID (including NFC) is used, then the ISO/IEC 15962 applies in addition.

NOTE When NFC is used, the data (according to ISO/IEC 15962, ISO/IEC 15434 and ISO/IEC 15418) is encoded in the “payload” of an NDEF record.

4.8 Detailed Application Standards

When more specific application standards do apply in addition to this standard, they can be referred to with the dedicated data element identified with “10N”, when Data Identifiers are used.

5 Data

5.1 General aspects

For any machine readable media –RFID or 2D symbol- the content shall contain an ISO/IEC 15459 conform unique identification of the marked item.

The tag identification (TID) is not sufficient for the purpose of unique identification of the marked item, as the TID does not directly refer to the object to be identified, but provides “only” the unique identification of the transponder. The TID is used by some anti-collision-protocols for simultaneous reading of several transponders (bulk reading).

5.2 Data Quality Dimensions

The data quality is based to the requirements of the users and their situation where the data are used. Data quality is always made dependent on the requirements of the product information. The data and the quality of this data shall always comply with the requirements. The basis for the information are data, thus the data quality affects the quality of the information obtained from the data. The statements regarding to the quality of information refer to how accurately this describes the reality or how reliable it is. However, to measure the quality of data, all possible applications and requests for data shall be understood. The generic data quality issues in conjunction with the specific requirements of the

business processes and the actual product information determines the specific data quality requirements.

The following data quality dimensions are to consider:

- accuracy
- objectivity
- believability
- reputation
- accessibility
- access security
- value-added
- timeliness
- completeness
- amount of information
- interpretability
- ease of understanding
- ease of manipulation
- concise representation
- consistent representation

5.3 Data Protection

The data protection is not described in this standard, because the memory structures and their protection mechanisms (write protection, read protection) depend on the transponder chips and are not uniform. The memories are segmented in blocks of e.g. 2, 4, 8, or 16 byte length. Each block can be protected individually. Hereby it depends on the chips, which protection mechanisms are available. It can be a write protection only or a protection mechanism that prevents reading of the data too. It is up to the user, how the respective mechanisms are implemented.

5.4 Data Security

Data security aspects are not described in this standard. Requirements from other relevant standards and from regulations and legislations for the specific items and applications are to fulfil.

5.5 Privacy

Privacy aspects are not described in this standard. Requirements from other relevant standards and from regulations and legislations for the specific items and applications are to fulfil.

Attention is drawn to the RFID Privacy Impact Analysis techniques contained in EN 16571:2014 as amended.

5.6 Digital Signature

Digital Signatures, respective references to digital signatures, are not required by this standard, but can be used optionally. If digital signatures are used, then this shall not complicate the access of the basic data, and shall be done compliant to relevant ISO standards.

NOTE Attention is drawn to ISO/IEC 20248.

5.7 Reference based Data Access

5.7.1 Data Access Concepts

For machine readable identification two concepts are established, both supported by this standard:

- a) “reference-only data access” concept: only a unique reference to a repository is marked machine readable, and the product data can be accessed via this reference
- b) “data on item” concept: The most relevant attributes of the item -including unique identification- are marked on the item in machine readable format

5.7.2 Requirements for Reference-Only Data Access

The reference shall be conforming to ISO/IEC 15459-4.

The reference shall lead to the data required.

The reference shall be valid longer than:

- the maximum lifetime of the item.
- the maximum time some party may have obligations to provide data related to this item. E.g. as part of fiscal audits covering some years of the past.
- the maximum time the reference may be needed for some user process, e.g. for checks in customer databases.

The data shall be easily accessible for parties with justified interest.

5.8 Unique Identification

5.8.1 Monomorphic and Combined Unique Identification

The unique identification of the item shall conform to ISO/IEC 15459-4 that specifies two methods:

- 1) Unique identification by class of items / combined unique identification: The unique ID comprises a company identification number (CIN) followed by an identifier of the item class and a serial number. In this case the unique identification results from a combination of several data elements. The first data element shall be globally unique, and the other data element(s) shall be unique within the domain of the first data element.
- 2) Unique identification by company / monomorphic unique ID. The unique ID comprises a company identification number (CIN) followed by a serial number of the individual item. In this case the unique identification is provided by one data element alone, sometimes described as a “monomorphic” data element for unique identification.

Furthermore, ISO/IEC 15459-4 specifies 3 methods to encode data in AIDC carriers: GS1 Application Identifiers, ASC MH 10 Data Identifiers and object identifiers according ISO/IEC 15962.

Table 2 shows the unique identification methods for GS1 Application Identifiers, ASC MH 10 Data Identifiers and object identifiers, and the mapping from object identifiers to application identifiers and data identifiers.

Table 2 — Item unique identification methods, with representative AIs, DIs and object identifiers

	GS1 Application Identifiers	Object identifiers mapping to Application Identifiers	ASC MH 10 Data Identifiers	Object identifiers mapping to Data Identifiers
Unique ID by item class / combined unique ID	"01" plus "21"	1 0 15459 4 3	"25P" plus "S"	1 0 15459 4 6
Unique ID by item class / combined unique ID with company code unique	n.a. (company code is always part of product code)	n.a. (company code is always part of product code)	"18V" plus "1P" plus "S"	1 0 15459 4 (DIs may be used in the data string, but there is no implied mapping from OI)
Unique ID by company / monomorphic unique ID	"8004"	1 0 15459 4 2	"25S"	1 0 15459 4 4

Depending on the data carrier, instead of AIs or DIs object identifiers according ISO/IEC 15962 can be used. In that case this standard recommends to use only such object identifiers that can be mapped to GS1 Application Identifiers or ASC MH 10 data identifiers to ease interoperability on data level.

ISO/IEC 15459-4 does not limit the possible suite of data qualifiers for the purpose of unique identification to the data qualifiers above. In the example above, the Data Identifier "25S" is used as example of data elements of monomorphic globally unique identifiers. ANS MH 10.8.2 lists some other ISO/IEC 15459-2 compliant globally unique monomorphic data elements, such as "I" (upper case "i") for a vehicle identification number, or "4I" for the vehicle identification number plus vehicle license plate, which may be used for the unique identification of items.

See also informative Annex E for a possible logic to parse out the unique identification when Data Identifiers are used.

5.8.2 Unique ID with Application Identifiers

5.8.2.1 Methods to use GS1 Application Identifiers for the Unique ID

All assets start their lifecycle as a trade item (merchandise) identified by a Global Trade Item Number (GTIN). The Global Trade Item Number (GTIN) can be used by a company to uniquely identify all of its trade items. GS1 defines trade items as products or services that are priced, ordered or invoiced at any point in the supply chain.

Once a company acquires such a trade item, the company may classify that item as an asset. Each asset requires an appropriate identifier to ensure efficient asset management. Asset identification and management is dependent on the type of application and owner.

So we have two ways to create a unique identifier:

- 1) A trade Item with serial number (SGTIN)