



# SLOVENSKI STANDARD

## SIST ISO 28560-3:2014

01-december-2014

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### Informatika in dokumentacija - RFID v knjižnicah - 3. del: Kodiranje z nespremenljivo dolžino

Information and documentation -- RFID in libraries -- Part 3: Fixed length encoding

Information et documentation -- RFID dans les bibliothèques -- Partie 3: Encodage de longueur fixe

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#### **ICS:**

35.040	Nabori znakov in kodiranje informacij	Character sets and information coding
35.240.30	Uporabniške rešitve IT v informatiki, dokumentiranju in založništvu	IT applications in information, documentation and publishing

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Information and documentation —  
RFID in libraries —

Part 3:  
Fixed length encoding

*Information et documentation — RFID dans les bibliothèques —*

*Partie 3: Encodage de longueur fixe*  
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**ISO 28560-3:2014(E)****Foreword**

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 46, *Information and documentation*, Subcommittee SC 4, *Technical interoperability*.

This second edition cancels and replaces the first edition (ISO 28560-3:2011), of which it constitutes a minor revision.

ISO 28560 consists of the following parts, under the general title *Information and documentation — RFID in libraries*:

- *Part 1: Data elements and general guidelines for implementation*
- *Part 2: Encoding of RFID data elements based on rules from ISO/IEC 15962*
- *Part 3: Fixed length encoding*

The following parts are under preparation:

- *Part 4: Encoding of data elements based on rules from ISO/IEC 15962 in an RFID tag with partitioned memory* [Technical Specification]

## Introduction

Libraries are implementing radio frequency identification (RFID) as item identification to replace bar codes. RFID streamlines applications like user self-service, security, and materials handling. A standard data model for encoding information on RFID tags could increase the cost-effectiveness of the technology within libraries, particularly through greater interoperability of RFID tags and equipment, and enhance support for resource sharing between libraries.

Several countries have undertaken preliminary work on standardization. The Netherlands developed a data model for public libraries and in Denmark “RFID Data Model for Libraries” has been published (DS/INF 163-1). Finland has adopted the Danish model, but with a few changes. There is a French data model that differs from the Danish and Dutch models. Other libraries in different parts of the world have installations based on various proprietary systems offered by technology and library system suppliers. All of these constitute the installed base of RFID systems, but only account for a small minority of the total of libraries globally.

There is an opportunity to develop a standard data model, taking into account the lessons learned from the national schemes and vendor solutions, and provide migration options for those libraries that have already invested in the technology. Because new items are continually being purchased, a number of migration options can be adopted based on factors relevant to each library.

This part of ISO 28560 deals with the encoding of a basic set of data elements in a fixed length format and the rest of the data elements in optional extension blocks. ISO 28560-1 defines the set of mandatory and optional data elements.

ISO 28560-2 and this part of ISO 28560 are mutually exclusive with respect to an RFID tag being applied to a loan item. In other words, the RFID tag is encoded according to the rules of this part of ISO 28560, or to the rules of ISO 28560-2, or to some proprietary rules. Depending on the technologies being used, and other features of tags that are claiming compliance with ISO 28560-2, the reading system might achieve a degree of interoperability.

This International Standard provides essential standards-based information about RFID in libraries. Ongoing advice needs to be provided because of the evolving nature of RFID technology, and the opportunities to migrate between different types of legacy system and encoding rules of this International Standard.

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# Information and documentation — RFID in libraries —

## Part 3: Fixed length encoding

### 1 Scope

This part of ISO 28560 provides a data model and encoding rules for the use of radio frequency identification (RFID) tags for items appropriate for the needs of all types of libraries (including national, academic, public, corporate, special, and school libraries).

This part of ISO 28560 specifies the rules for encoding

- a subset of data elements taken from the total set of data elements listed in ISO 28560-1 into a basic block, and
- other data elements into extension blocks onto the RFID tag.

A source of additional information about implementation issues is provided in [Annex A](#).

### 2 Normative references

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The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 28560-1, *Information and documentation — RFID in libraries — Data elements and general guidelines for implementation*

ISO/IEC 10646, *Information technology — Universal Coded Character Set (UCS)*

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 18046-3, *Information technology — Radio frequency identification device performance test methods — Part 3: Test methods for tag performance*

ISO/IEC TR 18047-3, *Information technology — Radio frequency identification device conformance test methods — Part 3: Test methods for air interface communications at 13,56 MHz*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 28560-1 and the following apply.

#### 3.1

##### **basic block**

data block occupying the first 272 bits of the RFID tag

Note 1 to entry: If the RFID tag is limited to 256 bits (i.e. 32 bytes), the basic block is truncated.

**ISO 28560-3:2014(E)****3.2****byte****8-bit byte**

group of eight consecutive bits

Note 1 to entry: A byte can represent one *character* (3.3) or be part of a representation of a character.

**3.3****character**

one or more *bytes* (3.2)

**3.4****CRC****cyclic redundancy check**

value calculated from the data on the tag

**3.5****data block**

container for encoding data elements, *CRC* (3.4), filler, and end mark

**3.6****end block**

*data block* (3.5) containing the end mark terminating the information on the RFID tag

**3.7****extension block**

optional *data block* (3.5) following the *basic block* (3.1)

**3.8****field**

entry in a *data block* (3.5)

**3.9****filler data block**

optional *data block* (3.5) that can be inserted to align other data blocks on *page* (3.11) boundaries

**3.10****fixed length field**

*field* (3.8) of prescribed size in a *data block* (3.5)

**3.11****page**

minimum data unit that can be read from or written to a tag

Note 1 to entry: This is measured in *bytes* (3.2).

**3.12****string**

sequence of *characters* (3.3)

**3.13****unsigned integer**

binary value of a number of consecutive bits

**3.14****variable length field**

*field* (3.8) of variable size in a *data block* (3.5)

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## 4 Requirements

### 4.1 Data elements

The data elements shall be as defined and compliant with those listed in ISO 28560-1.

NOTE There is a degree of flexibility in using locally defined codes that enable enhancements and variations to be implemented while still complying with the basic set of data elements.

### 4.2 RFID air interface

#### 4.2.1 Air interface conformance

The air interface for compliant tags shall be in accordance with the specification for Mode 1.

For migration purposes, additional non-compliant air interfaces used in legacy systems can be supported during a transition period, which is permitted to remain in place for years, as necessary.

The air interface conformance shall be tested in accordance with ISO/IEC TR 18047-3.

#### 4.2.2 Tag performance

Where there are requirements for test tag performance, these shall be performed in accordance with ISO/IEC 18046-3.

### 4.3 Data protocol

The fixed length encoding described in this part of ISO 28560 does not require a separate data protocol.

## 5 General encoding rules

### 5.1 Distinguishing from other applications and encodings

The value of the application family identifier (AFI) is used to distinguish tags for library applications from other applications. The values of AFI for library applications are defined in ISO 28560-1.

ISO 28560-1 describes how the data storage format identifier (DSFID), if present in the system memory as a programmable register, is used to distinguish tags in the library application area, i.e. with the same AFI.

Tags encoded according to this part of ISO 28560 shall be programmed with the value  $3E_{\text{HEX}}$  in the DSFID register if the tag contains a programmable DSFID register.

This part of ISO 28560 is not able to encode the DSFID if the tag does not contain a programmable DSFID register. In this case, ISO 28560-2 encodes the DSFID in the first byte of the working area of the tag. To take this situation into account, the content parameter (see [Table 1](#)) shall not take the value 6 on RFID tags encoded according to this part of ISO 28560.

If and only if the tag does not contain a programmable DSFID register, it is permissible to distinguish tags encoded according to this part of ISO 28560 from other encodings by verifying the cyclic redundancy check (CRC) encoded in the basic block (see [7.2](#)).

### 5.2 Writing/reading direction

Data shall be written to and read from the tag as specified in ISO/IEC 18000-3, Mode 1, such that the first bit transmitted to or from the tag is the least significant bit of the first field of the basic block. This field contains the content parameter (see [Table 1](#)). From that starting point, bytes are transmitted to or from

## ISO 28560-3:2014(E)

the tag in order from left to right, with byte 0 to the left of bytes 1, 2, and 3, as shown in the memory map in [Annex B](#).

### 5.3 Memory area layout

#### 5.3.1 Specifications

The memory area shall be encoded starting with a basic block with fixed length encoding of a basic set of data elements for use in the library.

If the size of the RFID tag is limited to 256 bits (32 bytes), the RFID tag can only contain a truncated basic block.

If the size of the RFID tag is greater than 256 bits, extension blocks (structured or unstructured) can be inserted after the basic block up to the capacity of the chip. If extension blocks are inserted, the order of these is optional. The length of an extension block is determined by the first byte of the block. The type of extension block is defined in the following two bytes.

Filler data blocks may be inserted between blocks to align to page boundaries.

An end block shall terminate the encoding, unless the basic block and possible extension blocks take up the whole space on the RFID tag, in which case an end block is not needed.

#### 5.3.2 Layout for tags greater than 32 bytes

The layout for tags greater than 32 bytes (256 bits) shall be as follows:

<basic block>[(<filler data block>)\*<extension block>]\*(<filler data block>)\*(<end block>)

The end block is mandatory if the tag is not full (see [5.3.1](#)). Basic block, filler data block, structured extension blocks, unstructured extension blocks, and end block are specified in [Clause 7](#).

An example is given in [Annex B](#).

#### 5.3.3 Layout for 32-byte tags

The layout for 32-byte tags shall be as follows:

<truncated basic block>

The truncated basic block is specified in [Clause 7](#).

An example is given in [Annex B](#).

### 5.4 Strings and integers

#### 5.4.1 String encoding

All strings shall be encoded in UTF-8 in accordance with ISO/IEC 10646, with the first character of the string stored in the lowest memory location. Note that UTF-8 encoding implies that a character can occupy more than one byte.

The end of a string can be defined in the following different ways:

- with one byte 00<sub>HEX</sub>;
- with the length of a fixed length field;
- with the end of a structured extension block.

For fixed length fields, all unused bytes shall be 00<sub>HEX</sub>.